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NATO NAVAL ARMAMENTS GROUP

JOINT CAPABILITY GROUP ON UNMANNED AERIAL VEHICLES

RATIFICATION OF STANAG 4586 (EDITION 3) ON STANDARD INTERFACES OF UAV CONTROL SYSTEMS (UCS) FOR NATO UAV INTEROPERABILITY

Note by the Deputy Assistant Secretary General for Armaments

(RATIFICATION REQUEST))

Reference: NSA/1022(2007)NAVY/4586 dated 7 November 2007 (promulgation of STANAG 4586 (Edition 2))

1. STANAG 4586 (Edition 2) on "Standard Interfaces of UAV Control System (UCS) for NATO UAV Interoperability" was promulgated on 8 November 2007 (ref.). It is being utilised by nations in the development and acquisition of selected UAV Systems which conform with its requirements.

2. Based on feedback from national programmes and industries supporting development of UAV Systems, and further analysis by the Joint Capability Group UAV (JCGUAV) Specialist Team (ST), changes to Edition 2 have been identified which fall into the following areas:

- The definition of Level of Interoperability 2 (LOI 2) has been revised/clarified to be applicable to the case where the sensor data is received in digital format with embedded metadata in accordance with the appropriate STANAG, e.g., STANAG 4609. Data Link Interface (DLI) related sensor data may optionally be supported.
- The definition of Level of Interoperability 3 (LOI 3) has been revised/clarified to include receipt of payload product, monitor or monitor/control of the UAV sensor in addition to direct receipt of sensor related data via DLI messages. Sensor metadata may optionally be supported.
- In order to reduce the required data link bandwidth requirements for communication between the UCS and the air vehicle, the messages have been modified to:
  - Add a "presence vector" (applicable to each field in the message).

  - The message data elements type and units have been changed to a more efficient form, e.g., from floating point to a "scaled" value
- Messages have been added to support a greater level of autonomy then was possible in Edition 2.
- Addition of a recommended minimum set of Key Length Value (KLV) Metadata implementation requirements.
- Addition of updated messages for STANAG 7085 compliant data link set-up, control and monitoring .
- Interoperable mission planning via extensions to the Common Route Definition (CRD).
- Technical and administrative errors have been corrected and editorial changes made to clarify requirements.

3. These changes were incorporated, and at the April 2008 meeting the final draft Edition 3 was distributed by the Custodian Support Team (CST) to the nations of the JCGUAV with the request to staff the document in the capitals and to provide final comments before the STANAG is formally sent out to nations for ratification.

4. At their September 2008 meeting the JCGUAV noted the statements by nations that they are content with the draft and agreed that the document is now mature enough to be sent out for ratification.

5. Delegations are requested to obtain the national ratification by 1 July 2009 and to inform the Defence Investment Division, Joint Armaments & Industry Section, Naval Unit of their national ratification references, together with a statement of the actual or forecast date by which national implementation is intended to be effective. Furthermore, the service or services within which the standard applies should be indicated or corrected (use form on page ii of the STANAG).

6. Most national Ministries of Defence have a Standardisation Office or Standardisation Liaison Officer who can give advice on the procedure to be adopted to obtain the formal ratification reference. It is recommended that contact be made with that office.

7. As soon as sufficient ratifications have been received, this STANAG will be forwarded to the Director, NATO Standardisation Agency, for promulgation.

Richard Froh

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NORTH ATLANTIC TREATY ORGANIZATION
(NATO)

NATO Standardization Agency (NSA)

STANDARDIZATION AGREEMENT
(STANAG)

SUBJECT: Standard Interfaces of UAV Control System (UCS) for NATO UAV Interoperability

Promulgated on

Juan A. MORENO
Vice Admiral, ESP(N)
Director, NATO Standardization Agency

RECORD OF AMENDMENTS

No	Reference/date of amendment	Date entered	Signature

EXPLANATORY NOTES

AGREEMENT

1. This NATO Standardization Agreement (STANAG) is promulgated by the Director NATO Standardization Agency under the authority vested in him by the NATO Standardization Organisation Charter.

2. No departure may be made from the agreement without informing the tasking authority in the form of a reservation. Nations may propose changes at any time to the tasking authority where they will be processed in the same manner as the original agreement.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this STANAG will include a reference to the STANAG number for purposes of identification.

RATIFICATION, IMPLEMENTATION AND RESERVATIONS

4. Ratification, implementation and reservation details are available on request or through the NSA websites (internet http://nsa.nato.int; NATO Secure WAN http://nsa.hq.nato.int).

FEEDBACK

5. Any comments concerning this publication should be directed to NATO/NSA – Bvd Leopold III - 1110 Brussels - BEL.

NATO STANDARDIZATION AGREEMENT (STANAG)

STANDARD INTERFACES OF UAV CONTROL SYSTEM (UCS) FOR NATO UAV INTEROPERABILITY

Annexes:
A. TERMS AND DEFINITIONS
B. STANDARD INTERFACES OF UAV CONTROL SYSTEM (UCS) FOR NATO UAV INTEROPERABILITY

AIM

1. The aim of this agreement is to promote interoperability of present and future UAV systems in a NATO Combined/Joint Service Environment. Interoperability is required because it will significantly enhance the war fighting capability of the forces. Interoperability will increase flexibility and efficiency to meet mission objectives through sharing of assets and common utilization of information generated from UAV systems. The objective is to enable interoperability between the ground segments (e.g. UCSs), the air segments (e.g. UAVs), and the Command, Control, Communication, Computer and Intelligence (C4I) segments of UAV systems operating in a NATO Combined/Joint environment. Compliance with this agreement alone enables, but does not achieve full interoperability between various UAV systems. Specifically, this agreement does not address platform and/or sensor operators' proficiency levels, nor does it define the CONOPs necessary to enact full interoperability. Interoperability Levels 3-5 assume a CONOPS supporting the operation of a UAV and/or its payload(s) by other than the organic unit responsible for the UAV. The implementation of the specified standard UCS interfaces will also facilitate the integration of different types of UAV systems into a NATO Combined/Joint Service battlefield environment. The herein specified Standardization will support interoperability of legacy as well as future UAV systems.

AGREEMENT

2. Participating nations agree to implement the standards presented herein in whole or in part within their respective UAV systems to achieve the desired level of interoperability (LOI).

REFERENCE DOCUMENTS:

3. The following Standardization Agreements (STANAGs), Military Standards (MIL-STDs), International Telecommunication Union (ITU) Recommendations and International Standards (ISs) contain provisions which, through references in this text, constitute provisions of this STANAG. At the time of publication, the editions indicated were valid. All recommendations and standards are subject to revision, and parties to agreements based on this STANAG are encouraged to investigate the possibility of applying the most recent editions of the STANAGs, MIL-STDs, ICAO Documents, ITU Recommendations and ISs listed below. The NATO Standardization Agency (NSA) maintains registers of currently valid STANAGs.

AAP-6 (2008) – NATO Glossary of Terms and Definitions
AEDP-2 - NATO ISR Interoperability Architecture
AEDP-4 - STANAG 4545, NATO Secondary Imagery Format (NSIF) Implementation Guide
Comité Consultatif International Téléphonique et Télégraphique (CCITT) v.42bis – Modem standard for error correction and compression at speeds of 28.8 kbps
Common Route Definitions (CRD ICD 2.0.2.0)
Digital Feature Analysis Data (DFAD)
ECMA Script scripting language (ECMA Script 262)
EG0601.1, Motion Imagery Standards Board Engineering Guidance, “UAS Data Link Local Metadata Set”
Electronic Industry Association (EIA) RS-170
File Transfer Protocol (FTP), IETF, RFC 959
Hypertext Transfer Protocol (HTTP) Version 1.1, IETF RFC 2616
ICAO document - Rules of the Air and Air Traffic Services, Doc 4444-RAC/501
Institute of Electrical and Electronics Engineers, Inc.(IEEE) Network Standards - 802
Internet Protocol (IP) (IPv4 (RFC 791, 792, 919,922, 1112))
IPv6 (RFC 2460-4, 2375, 2236)
ISO/DIS 9241-3 - Visual Display Requirements
ISO/DIS 9241-8 - Requirements for Displayed Colours
ISO/Work Doc 9241-9 - Non-Keyboard Input Devices
ISO/DIS 9241-10 - Dialogue Principles
ISO/Work Doc 9241-12 - Presentation of Information
ISO/CD 9241-13 - User Guidance
ISO/DIS 9241-14 - Menu Dialogues
ISO/CD 9241-16 - Direct Manipulation Dialogues
ISO/CD 13406-2 - Flat Panel Displays
International Organisation for Standardization/International Electro technical Commission ECMAScript Language Specification - ISO/IEC 16262
MIL-STD-2525B – Common Warfighting Symbology
MIL-STD-2401 - World Geodetic System – 84 (WGS – 84)
NATO C3 Technical Architecture (NC3TA) / Version 5.2 – June 8 - 2004 (All 5 volumes)
NATO Data Policy 2000 – 12.20-00
Network Time Protocol (V3), April 9, 1992, NTP (RFC-1305)
Society of Motion Picture and Television Engineers (SMPTE) 170 M
STANAG 1059 Letter Codes for Geographical Entities Edition 8
STANAG 3150 Uniform System of Supply Classification
STANAG 3151 Uniform System of Item Identification

STANAG 3377 AR (Edition 6) – Air Reconnaissance Intelligence Report Forms
STANAG 3809 Digital Terrain Elevation Data (DTED) Geographic Information Exchange Standard
STANAG 4250 NATO Reference Module for Open Systems Interconnection - Part 1 General Description
STANAG 4545 NATO Secondary Imagery Format (NSIF)
STANAG 4559 NATO Standard Image Library Interface (NSILI)
STANAG 4575 NATO Advanced Data Storage Interface (NADSI)
STANAG 4607 NATO Ground Moving Target Indicator (GMTI) Format
STANAG 4609 NATO Motion Imagery Standard
STANAG 5500 NATO Message Text Formatting System (FORMETS) ADatP-3 Build 11
STANAG 7023 Air Reconnaissance Primary Imagery Data Standard
STANAG 7024 Imagery Air Reconnaissance Tape Recorder Standards
STANAG 7074 Digital Geographic Information Exchange Standard (DIGEST)
STANAG 7085 Interoperable Data Links for Imaging Systems
STANAG 7149 NATO Message Catalogue (NMC) – APP 11(B)
STDI-0002, National Imagery and Mapping Agency, “The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF)”, CMETAA Support Data Extension.
Transmission Control Protocol (TCP) (IETF STD 7) RFC 793 (TCP)
United States Message Text Format (USMTF)
User Datagram Protocol (UDP) (IEN 88, RFC 768, 1122)
Variable Message Format (VMF)

DEFINITIONS

4. The terms and definitions used in this document are listed in Annex A.

GENERAL

5. The outline of this STANAG follows the following format:

- **Annex A** contains the Terms and Definitions used in the STANAG.
- **Annex B** provides a top level description of the objectives and the approach taken to achieve UAV Systems Interoperability through standardising the interfaces between the Core UCS (CUCS) and the air vehicle, and the CUCS and the external C4I Systems. It also specifies the Human Computer Interface (HCI) requirements that the CUCS shall provide to the UAV system operator. It describes the requirement for a standard functional UCS architecture to accommodate those interfaces and refers to the Appendices B1 – B3 that contain the details of the Standards required by STANAG 4586. It

also lists other STANAGs, standards and protocols that are required for achieving UAV Systems interoperability and offers some considerations for their implementation.

DETAILS OF AGREEMENT

6. STANAG 4586 defines the architectures, interfaces, communication protocols, data elements, message formats and identifies related STANAGs that compliance with is required to operate and manage multiple legacy and future UAVs in a complex NATO Combined/Joint Services Operational Environment. The UCS Architecture encompasses the Core UCS to handle UAV Common/Core processes, the Data Link Interface (DLI) to enable operations with legacy as well as future UAV systems, the Command Control Interface for UAV and UAV payload data dissemination to support legacy and evolving NATO C4I Systems and Architectures, and the HCI requirements to support the interface to the UAV system operators. Five levels of interoperability are defined to accommodate operational requirements. This version of the STANAG contains the messages which support the Electro-Optical/Infra-Red (EO/IR), Synthetic Aperture Radar (SAR), Communications Relay, and Stores (e.g., weapons, payloads, etc.) across the DLI. As additional payloads are defined the STANAG will be updated accordingly to incorporate those payloads. The Command and Control Interface (CCI) utilizes applicable messages from the NATO FORMETS, ADatP-3 Build 11. As this system is replaced with bit oriented message formats, this STANAG will be updated accordingly. In addition, this STANAG supports the NATO Air Force Armaments Group (NAFAG) NATO ISR Interoperability Architecture (NIIA) in that it invokes compliance with the NIIA specified standards.

PROTECTION OF PROPRIETARY RIGHTS (SEE ARTICLE 307)

7. If required.

IMPLEMENTATION OF THE AGREEMENT

8. This STANAG is implemented by a nation when it has issued instructions that all such equipment procured for its forces will be manufactured in accordance with the characteristics detailed in this agreement.

STANAG MAINTENANCE AND UPDATE

10. STANAG 4586 will be maintained and updated to correct any latent errors, add improvements from lessons learned, and incorporate new requirements by the STANAG Custodian, supported by a multinational Custodian Support Team (CST). The STANAG has a high degree of continuing attention from the CST. As new editions are published, feedback is being collected on a continuing basis for follow-on editions. That experience gained in implementation is highly valued by the CST and should be forwarded to the STANAG 4586 Custodian, Mr. Keith Wheeler, PEO (U&W), e-mail: keith.wheeler@navy.mil.

TERMS AND DEFINITIONS

1. **Acronyms and Abbreviations.** The following acronyms are used for the purpose of this agreement.

A

ACCS	Army Command and Control System (US)/Air Command and Control System (NATO)
Accel	Acceleration
ACK	Acknowledge
ACM	Airspace Control Means
ACO	Airspace Control Order
ADatP-3	Allied Data Publication – 3
AGL	Above Ground Level
AMPS	Aviation Mission Planning System
ANSI	American National Standards Institute
AOA	Angle Of Attack
AOI	Area Of Interest
AP	Allied Publication/Alliance Publication
API	Application Program(ming) Interface
ASCII	American Standard Code for Information Interchange
ASM	Air Space Management
ASW	Anti-Submarine Warfare
ATC	Air Traffic Control
ATP	Allied Tactical Publication
ATR	Automatic Target Recognition
ATS	Air Traffic Services
AV	Air Vehicle
AVC	Air Vehicle Control

B

BDA	Battle Damage Assessment
BER	Bit Error Rate
BIT	Built-in-Test
BITE	Built-in-Test Equipment
BLOS	Beyond Line of Sight
BOM	Bit-Oriented Message

C

C2	Command and Control
C4I	Command, Control, Communications, Computers and Intelligence
CBIT	Continuous Built-in-Test

CCI	Command & Control Interface
CCISM	Command and Control Interface Specific Module
CDL	Common Data Link
CDT	Control Data Terminal
CEN	European Standardization Organisation
CEP	Circular Error Probability
CFOV	Centre Field of View
CG	Centre of Gravity
CGS	Common Ground Segment/Common Ground Station/Common Ground System
CIRC	Circular
CJTF	Combined Joint Task Force
CL	Connectionless
Cm	Centimetres
CO	Connection Oriented
COE	Common Operating Environment
CONOPS	Concept of Operations
COP	Common Operational Picture
CORBA	Common Object Request Broker Architecture
COTS	Commercial-Off-The-Shelf
CR	Communications Relay
CRD	Common Route Definition
CRT	Cathode Ray Tube
CUCS	Core UAV Control System
D	
DC	Direct Current
DCE	Distributed Computing Environment
DCM	Data Link Control Module
DIGEST	Digital Geographic Information Exchange Standard
DII	Defence Information Infrastructure
DII/COE	Defence Information Infrastructure/Common Operating Environment
DIN	Deutsche Institut fur Normung
DL	Data Link
DLI	Data Link Interface
DoD	Department of Defence
DTED	Digital Terrain Elevation Data
E	
ECM	Electronic Counter Measures

EIA	Electronic Industries Association
EIA/IS	EIA Interim Standard
ELINT	Electronic Intelligence
EMCON	Emission Control
EO	Electro-Optical
EO/IR	Electro Optical/Infrared
EP	External pilot
ERF	Ego-Referenced Frame
ERS	Emergency Recovery System
ESM	Electronic Support Measures
ETA	Estimated Time of Arrival
ETSI	European Telecommunications Standards Institute
EW	Electronic Warfare
F	
FLIR	Forward Looking Infrared
FOB	Forward Operations Base
FOV	Field of View
FT	Flight Termination
FTP	File Transfer Protocol
G	
GMT	Greenwich Mean Time
GMTI	Ground Moving Target Indicator
GOTS	Government Off-The-Shelf
GPS	Global Positioning System
GUI	Graphical User Interface
H	
HALE	High Altitude, Long Endurance
HCI	Human Computer Interface
HF	High Frequency
HSI	Hyperspectral Imagery
HL	Hand Launched
HTML	Hyper Text Mark-up Language
HTTP	Hypertext Transfer Protocol
Hz	Hertz, cycles per second
I	
I/O	Input/Output
IA	International Agreement
ICAO	International Civil Aviation Organisation

ID	Identification
IDD	Interface Design Description/Interface Definition Document
IEA	Information Exchange Agreements
IEC	International Enterprise Committee/International Electro technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IER	Information Exchange Requirements
IES	Imagery Exploitation System
IETF	Internet Engineering Task Force
IFF	Identification Friend or Foe
IL	Image Library
INS	Inertial Navigation System
IP	Internet Protocol/Internal Pilot
IPS	Image Print Services
IPX	NetWare Transport Protocol
IR	Infrared
IRS	Interface Requirements Specifications
ISAR	Inverse Synthetic Aperture Radar
ISDN	Integrated Services Digital Network
ISG	Industry Support Group
ISO	International Organisation for Standardization
ISO/CD	Committee Draft of ISO
ISO/DIS	Draft International Standard of ISO
ISR	Intelligence, Surveillance, Reconnaissance
ISTAR	Intelligence, Surveillance, Target Acquisition and Reconnaissance
ITDP	International Technology Demonstration Program
ITU	International Telecommunication Union
ITU-T(SB)	International Telecommunications Union – Telecommunications (Standardization Bureau)
J	
JFACC	Joint Force Air Component Commander
JFC	Joint Force Commander
JPEG	Joint Photographic Experts Group
JSH	JASA Standards Handbook
JSWG	JASA Standards Working Group
JTA	Joint Technical Architecture
JTF	Joint Task Force
JTFC	Joint Task Force Commander
K	

Kilo	1,000
KLV	Key Length Value
Km	Kilometres
L	
L&R	Launch and Recovery
L-16	Link-16 (TADIL-J message standard)
LIDAR	Light Detection And Ranging
LAN	Local Area Network
LAS	Local Access Subsystem
LB	Land-Based
LCD	Liquid Crystal Display
LOI	Level of Interoperability
LOS	Line of Sight
LRF	Laser Range Finder
LSB	Least Significant Bit
M	
MAV	Micro Air Vehicle
Mb	Megabit
MB	Megabyte
Mb/s	Megabits per second
MB/s	Megabytes per second
Met	Meteorological
MGRS	Military Grid Reference System
MIJI	Meaconing, Intrusion, Jamming, and Interference
MIL	Military
MIL-STD	Military Standard
MIME	Multipurpose Internet Mail Extension
MIN	Minimum
MMP	Modular Mission Payload
MMS	Manufacturing Messaging Specification
MOA	Memorandum of Agreement
MOTS	Military Off-The-Shelf
MOU	Memorandum of Understanding
MP	Mission Planning/Mission Planner
MPEG	Motion Pictures Experts Group
MPO	Mission Planning Operator/Mission /Payload Operator
MPS	Metres per second
MSE	Mobile Subscriber Equipment

Msg	Message
MSI	Multi-Spectral Imagery
MSK	Minimum Shift Keying
MSL	Mean Sea Level
MTF	Message Text Formats
MTI	Moving Target Indicator
N	
N/A	Not Applicable
NATO	North Atlantic Treaty Organisation
NBC	Nuclear, Biological and Chemical
NC3TA	NATO C3 Technical Architecture
NCIS	NATO Common Interoperability Standards
NCOE	NATO Common Operating Environment
NCSP	NC3 Common Standards Profile
Near RT	Near Real Time
NED	NATO Effective Date
NIIA	NATO ISR Interoperability Architecture
NIMP	NATO Interoperability Management Plan
NIIRS	National Imagery Interpretation Rating Scale
NIPD	NATO Interoperability Planning Document
NITF	National Imagery Transmission Format
NITFS	National Imagery Transmission Format Standard
Nm	Nanometre
NNAG	NATO Naval Armaments Group
NOSIP	NATO Open System Interconnection Profile
NOTS	NATO Off-The-Shelf
NRBC	Nuclear, Radiological, Biological and Chemical
NRT	Non-Real Time
NSA	NATO Standardization Agency
NSE	Non Standard Equipment
NSIF	NATO Secondary Imagery Format
NSIL	NATO Standard Image Library
NSILI	NATO Standard Image Library Interface
NSR	NATO Staff Requirements
NTF	Network File Server
NTIS	NATO Technical Interoperability Standards
NTSC	National Transmission Standards Committee
O	

OPFOR	Opposing Force
OPS	Operations
OSE	Open System Environment
OSI	Open System Interconnection (model)
OTH	Over The Horizon
OTH-T	Over The Horizon – Targeting
P	
PDF	Portable Document Format
PDU	Power Distribution Unit
PG/35	Project Group 35
PO	Payload Operator
Pyld	Payload
Q	
QoS	Quality of Service
R	
Rad	Radians
RAID	Redundant Array of Inexpensive/Independent Disks
RECCEXRE	Reconnaissance Exploitation Report
RF	Radio Frequency
RFC	Request for Comment
ROS	Relief on Station/Rules of Safety
RP	Route Plan
Rpt	Report
RT	Real Time
RTP	Real Time Protocol/ Real Time Processor
Rx	Receive
S	
SA	Situational Awareness
SALUTE	Size, Activity, Location, Unit, Time, Equipment
SAR	Synthetic Aperture Radar/Search And Rescue
SATCOM	Satellite Communications
SB	Sea-based
SEC	Seconds
SED	Signal External Descriptor
SIGINT	Signals Intelligence
SINCGARS	Single Channel Ground and Airborne Radio System
SMPTE	Society of Motion Picture and Television Engineers
SMTP	Simple Mail Transfer Protocol

SNR	Signal to Noise Ratio
ST	Specialist Team
STANAG	(NATO) Standardization Agreement
T	
TBD	To Be Defined
TCDL	Tactical Common Data Link
TCP/IP	Transfer Control Protocol/Internet Protocol
Tgt	Target
TV	Television
TX	Transmit
U	
UAV	Unmanned Aerial Vehicle/Uninhabited Aerial Vehicle
UB	Unified Build
UCAV	Unmanned/ Uninhabited Combat Aerial Vehicle
UCT	Universal Coordinated Time
UDP	User Datagram Protocol
UES	UAV Exploitation System
UHF	Ultra High Frequency
UI	User Interface
UJTL	Universal Joint Task List
UPS	Uninterruptible Power Supply
URL	Uniform Resource Locator
USIS	United States Imagery Standards
USMTF	United States Message Text Formatting
UTC	Universal Time Coordinated
UTM	Universal Transverse Mercator
V	
VCR	Video Cassette Recorder
VDL	VHF Data Link
VDU	Visual Display Unit
VDT	Vehicle Data Terminal
VHF	Very High Frequency
VISP	Video Imagery Standards Profile
VMAP	Vector Map
VMF	Variable Message Format
VSM	Vehicle Specific Module
W	
WAN	Wide Area Network

WAS	Wide Area Subsystem
WGS-84	World Geodetic System – 84
WIMP	Windows, Icons, Mouse and Pull-down/pop-up (menus)
WP	Waypoint
WRF	World-Referenced Frame
X	
XML	Extended Mark-up Language
Y	
Z	

2. Terms and Definitions. The following terms and definitions are used for the purpose of this agreement.

Advisories	An alert that requires crew awareness but not immediate awareness nor immediate attention.
Air Reconnaissance	The collection of information of intelligence interest either by visual observation from the air or through the use of airborne sensors.
Air Traffic Control (ATC)	A service provided for the purposes of: a) preventing collisions between aircraft and in the manoeuvring area between aircraft and obstructions; and b) expediting and maintaining an orderly flow of air traffic.
Air Vehicle (AV)	The core platform consisting of all flight relevant subsystems but without payload and data link.
Aircraft Handover	The process of transferring control of aircraft from one controlling authority to another.
Alert	A signal or combination of signals that informs the aircrew of the existence of a warning, caution, or advisory condition, and may inform the aircrew of the nature of the warning, caution, or advisory condition.
Allied Data Publication – 3 (ADatP-3)	The NATO Message Text Formatting System (FORMETS) provides the rules, constructions and vocabulary for standardised CHARACTER-oriented MESSAGE TEXT FORMATS (MTF) that can be used in both manual and computer assisted operational environments. FORMETS is specified in Allied Data Publication Number 3 (ADatP-3).
Altitude	The vertical distance of a level, a point or an object considered as a point, measured from mean sea level. The terms most relevant to UAV operations are: Absolute Altitude: The height of an aircraft directly above the surface or terrain over which it is flying. Critical Altitude: The altitude beyond which an aircraft or air-breathing guided missile ceases to perform satisfactory. ` True Altitude: The height of an aircraft as measured from mean sea level.
Analysis	The study of a whole by examining its parts and their interactions. Note: In the context of military forces, the hierarchical relationship in logical sequence is: assessment, analysis, evaluation, validation and certification.

Automated Take-off and Landing	The ability of the AV to be launched with a single command once planning and pre-flight has been conducted and permission to launch has been granted. Includes releasing the AV from a securing device and flight of the AV to the first waypoint and the ability to land and secure the AV with a single command once the air vehicle has been stationed at a gate position no closer than 100 meters to the landing spot.
Battle Damage Assessment (BDA)	The assessment of effects resulting from the application of military action, either lethal or non-lethal, against a military objective.
Byte	Eight bits.
Cassette	In photography, a reloadable container for either unexposed or exposed sensitised materials which may be removed from the camera or darkroom equipment under lighted conditions.
Cautions	An alert indicating a potentially dangerous condition requiring immediate crew awareness but not immediate action.
Certification	The process of officially recognizing that organizations, individuals, materiel or systems meet defined standards or criteria. Note: In the context of military forces, the hierarchical relationship in logical sequence is: assessment, analysis, evaluation, validation and certification.
Chemical Monitoring	The continued or periodic process of determining whether or not a chemical agent is present.
Classification	The ability to determine unique characteristics about a contact, which allow the differentiation of military and commercial contacts and determination of contact class and type.
Command and Control	The exercise of authority and direction by a properly designated commander over assigned forces in the accomplishment of a mission.
Command Control Interface (CCI)	The interface between the UCS Core and the external C4I systems. It specifies the data requirements that should be adopted for communication between the UCS Core and all C4I end users through a common, standard interface.
Command and Control Interface Specific Module (CCISM)	Conversion software and/or hardware between the CCI and incompatible C4I systems. May form part of a particular UCS implementation to establish a connection between the UCS and specific “customers” of the UAV system (i.e. one or more C4I systems). Can range in complexity from a simple format or protocol translator to a user-specific application to adapt the type of information to C4I requirements.
Command and Control Information System	An integrated system comprised of doctrine, procedures, organisational structure, personnel, equipment, facilities and communications which provides authorities at all levels with timely and adequate data to plan, direct and control their activities.

Commonality	The state achieved when the same doctrine, procedures or equipment are used.
Communications Plan	The overarching plan which covers all communication aspects. Includes the Data Link Plan.
Compatibility	The suitability of products, processes or services for use together under specific conditions to fulfil relevant requirements without causing unacceptable interactions.
Component	In logistics, a part or combination of parts having a specific function, which can be installed or replaced only as an entity.
Compression	The ability to transmit the same amount of data in fewer bits. There are a variety of data compression techniques, but only a few have been standardized. The CCITT has defined a standard data compression technique for transmitting faxes (Group 3 standard) and a compression standard for data communications through modems (CCITT V.42*bis*). In addition, there are file compression formats, such as ARC and ZIP. Data compression is also widely used in backup utilities, spreadsheet applications, and database management systems. Certain types of data, such as Bitmapped graphics, can be compressed to a small fraction of their normal size.
Concept of Operations	A clear and concise statement of the line of action chosen by a commander in order to accomplish his mission.
Continuous Strip Imagery	Imagery of a strip of terrain in which the image remains unbroken throughout its length, along the line of flight.
Controlled Airspace	An airspace of defined dimensions within which air traffic control service is provided to controlled flights (e.g., flights within controlled airspace require approval by/coordination with the controlling authority, and certain manoeuvres may be prohibited or restricted, or require supervision).
Control Data Terminal	The data link element consists of the Vehicle Data Terminal (VDT) in the air vehicle and the Control Data Terminal (CDT) that can be located either on the ground or in the air (e.g., Command and Control aircraft). Connectivity between the CDT and VDT is prerequisite for Level 2, 3, 4, and 5 interoperability.
Core UCS (CUCS)	Provides the UAV operator with the functionality to conduct all phases of a UAV mission. It shall support the requirements of the DLI, CCI, and HCI. Also provides a high resolution, computer generated, graphical user capability that enables a qualified UAV operator the ability to control different types of UAVs and payloads.
Countermeasures	That form of military science that, by the employment of devices and/or techniques, has as its objective the impairment of the operational effectiveness of enemy activity.
Damage Assessment	The determination of the effect of attacks on targets.

Data Communication	The transfer of information between functional units by means of data transmission according to a protocol.
Data Link	The means of connecting one location to another for the purpose of transmitting and receiving data.
Data Link Interface (DLI)	The interface between the Vehicle Specific Module (VSM) and the UCS core element. It provides for standard messages and formats to enable communication between a variety of air vehicles and NATO standardised control stations.
Data Link Plan	The details of the available link including the band and frequencies to be used. It is associated with waypoints within the route and the details of required actions made available for cueing the operator.
Dispensing Payloads	Objects that are released from the UAV as part of the UAV mission objectives. This can include the release of weapons or deployment of remote sensors, etc.
Electromagnetic Spectrum	The range of frequencies of electromagnetic radiation from zero to infinity.
Electronic Warfare (EW)	Military action to exploit the electromagnetic spectrum encompassing: the search for, interception and identification of electromagnetic emissions, the employment of electromagnetic energy, including directed energy, to reduce or prevent hostile use of the electromagnetic spectrum, and actions to ensure its effective use by friendly forces.
Emergency Recovery Plan	In case of failures such as data link loss, UAVs need to automatically carry out recovery actions referred to as Rules of Safety (ROS). The ROS are selected at the mission planning stage. The ROS differ according to the priority given to emergency action relative to that given to mission execution. Using the mission planning application the UCS operator selects the appropriate safety scenario (e.g., to define a pre-programmed recovery route).
Encoding	Converting information or data from a system, format or signal to another.
Exercise	A military manoeuvre or simulated wartime operation involving planning, preparation, and execution. It is carried out for the purpose of training and evaluation. It may be a combined, joint, or single Service exercise, depending on participating organisations.
Field of View	In photography, the angle between two rays passing through the perspective Centre (rear nodal point)) of a camera lens to the two opposite sides of the format. Not to be confused with angle of view.

Formatted Message Text	Words composed of several sets ordered in a specified sequence, each set characterized by an identifier and containing information of a specified type, coded and arranged in an ordered sequence of character fields in accordance with the NATO message text formatting rules. It is designed to permit both manual and automated handling and processing.
Frame	In photography, any single exposure contained within a continuous sequence of photographs.
Free Form Message Text	Words without prescribed format arrangements. It is intended for fast drafting as well as manual handling and processing.
Functional Architecture	Establishes the following functional elements and interfaces: • Core UCS (CUCS) • Data Link Interface (DLI) • Command and Control Interface (CCI) • Vehicle Specific Module (VSM) • Command and Control Interface Specific Module (CCISM)
Fusion	The blending of intelligence and/or information from multiple sources or agencies into a coherent picture. The origin of the initial individual items should then no longer be apparent.
Handover	The act of passing control of a UAV and/or a payload from one UCS to another UCS and/or transferring of data link control.
Human Computer Interface (HCI)	Definitions of the requirements of the functions and interactions that the UCS should allow the operator to perform. Will support any HCI requirements that are imposed on the CUCS by the Command and Control Interface (CCI) and Data Link Interface (DLI). Will also support any specific or unique CCI Specific Module (CCISM) or Vehicle Specific Module (VSM) display requirements.
Hyperspectral Imagery (HSI)	The image of an object obtained simultaneously using hundreds or thousands of discrete spectral bands.
Image	A two-dimensional rectangular array of pixels indexed by row and column.
Imagery	Collectively, the representations of objects reproduced electronically or by optical means on film, electronic display devices, or other media.
Imagery Exploitation	The cycle of processing and printing imagery to the positive or negative state, assembly into imagery packs, identification, interpretation, mensuration, information extraction, the preparation of reports and the dissemination of information.

Integration	In intelligence usage, a step in processing phase of the Intelligence cycle whereby analyzed information and/or intelligence is selected and combined into a pattern in the course of the production of further intelligence. Related term: intelligence cycle.
Intelligence	The product resulting from the processing of information concerning foreign nations, hostile or potentially hostile forces or elements, or areas of actual or potential operations. The term is also applied to the activity which results in the product and to the organisations engaged in such activity.
Interaction	A one or two-way exchange of data among two or more systems/sub-systems.
Interface	(1) A concept involving the definition of the interconnection between two equipment items or systems. The definition includes the type, quantity, and function of the interconnecting circuits and the type, form, and content of signals to be interchanged via those circuits. Mechanical details of plugs, sockets, and pin numbers, etc., may be included within the context of the definition. (2) A shared boundary, (e.g., the boundary between two subsystems or two devices). (3) A boundary or point common to two or more similar or dissimilar command and control systems, subsystems, or other entities against which or at which necessary information flow takes place. (4) A boundary or point common to two or more systems or other entities across which useful information flow takes place. (It is implied that useful information flow requires the definition of the interconnection of the systems which enables them to interoperate.) (5) The process of interrelating two or more dissimilar circuits or systems. (6) The point of interconnection between user terminal equipment and commercial communication-service facilities.
Interoperability	The ability to operate in synergy in the execution of assigned tasks.
Joint	Adjective used to describe activities, operations and organisations in which elements of at least two services participate.
Laser Designator	A device that emits a beam of laser energy which is used to mark a specific place or object.
Laser Range-Finder	A device that uses a laser to determine the distance from the device to a place or object.
Level of Interoperability (LOI)	A method for describing the ability of UASs to be interoperable for basic types of UAS functions. This measure is applied for the DLI and CCI capabilities.

LIDAR	An acronym of Light Detection And Ranging, describing systems that use a light beam in place of conventional microwave beams for atmospheric monitoring, tracking and detection functions.
Mission Plan	The route planning, payload planning, data link planning (including frequency planning), and UAV emergency recovery planning (rules of safety) for a A/V.
Meaconing	A system of receiving radio beacon signals and rebroadcasting them on the same frequency to confuse navigation. The meaconing stations cause inaccurate bearings to be obtained by aircraft or ground stations.
Metadata	Data about data. The term is normally understood to mean structured data about resources that can be used to help support resource description and discovery, the management of information resources (e.g., to record information about their location and acquisition), long-term preservation management of digital resources, and for help to preserve the context and authenticity of resources. Might be technical in nature, documenting how resources relate to particular software and hardware environments or for recording digitisation parameters. In short, any kind of standardised descriptive information about resources, including non-digital ones.
Mission Plan	The route planning, payload planning, data link planning (including frequency planning), and UAV emergency recovery planning (rules of safety) for a UAV flight.
Modularity	Use of sub-systems or components from one system to function properly as part of another system. The interface at the sub-system level is sufficiently defined.
Motion Imagery	A sequence of images, with metadata, which are managed as a discrete object in standard motion imagery format and displayed as a time sequence of images.
Moving Map Display	A display in which a symbol, representing the vehicle, remains stationary while the map or chart image moves beneath the symbol so that the display simulates the horizontal movement of the vehicle in which it is installed. Occasionally the design of the display is such that the map or chart image remains stationary while the symbol moves across a screen.
Moving Target Indicator (MTI)	A radar presentation which shows only targets which are in motion. Signals from stationary targets are subtracted out of the return signal by the output of a suitable memory circuit.
Multispectral Imagery (MSI)	The image of an object obtained simultaneously in a number of discrete spectral bands.

National Transmission Standards Committee (NTSC)	The first colour TV broadcast system was implemented in the United States in 1953. This was based on the NTSC standard. NTSC is used by many countries on the North American continent and in Asia including Japan. This U.S. video standard uses EIA RS-170 and SMPTE 170 M – 1994 formats. The standard applies to imagery with metadata in either closed caption overlays or encoded via closed caption. NTSC runs on 525 lines/frame and 30 frames/second with 2:1 interlace.
Native System	All components which compose a unique UAV system.
NATO ISR Interoperability Architecture (NIIA)	The architecture that defines the STANAGs used for ISR sensor system interoperability. This architecture is defined in AEDP-2.
NATO OSI Profile Strategy (NOSIP)	Interoperability strategy now merged into the NC3TA.
NATO Standardization Agreement (NATO STANAG)	A normative document recording an agreement among several or all NATO member nations, that has been ratified at the authorized national level, to implement a standard, in whole or in part, with or without reservation.
NC3 Common Standards Profile (NCSP)	The minimum set of communication and information technology standards to be mandated for the acquisition of all NATO C3 systems.
NC3 Technical Architecture (NC3TA)	The technical, standards-related view of an overarching NC3 Architectural Framework.
Near Real Time	Pertaining to the timeliness of data or information which has been delayed by the time required for electronic communication and automatic data processing. This implies that there are no significant delays.
Network	(1) An interconnection of three or more communicating entities and (usually) one or more nodes. (2) A combination of passive or active electronic components that serves a given purpose.
Open Systems Interconnect Model	This model is defined in ISO/IEC 7498-1.
Order of Battle	The identification, strength, command structure, and disposition of the personnel, units, and equipment of any military force.
Passive	In surveillance, an adjective applied to actions or equipment which emits no energy capable of being detected.
Payload	UAV sensor(s), weapons, chaff, pamphlets, onboard systems, etc. carried onboard which are used to accomplish a specified mission.

Payload Plan	Details of the sensor to be used, or which sensors are to be loaded if multiple payloads are within the UAV capability. At specific points along a route there may be pre-planned sensor operations and the details of these have to be incorporated into the payload plan and associated with waypoints in the route. Available as hard copy for UAV payload loading and for display with or along side the route plan, action cueing has to be incorporated either for the operator or the UAV depending on system sophistication. Includes payload configuration (e.g., payload type and lens size), payload imagery extraction (e.g., desired resolution), and operator commands for controlling both EO/IR and SAR payloads (e.g., zoom settings, depression angle, and focus).
Primary Data	Data directly received from the sensor.
Primary Imagery	Unexploited, original imagery data that has been derived directly from a sensor. Elementary processing may have been applied at the sensor, and the data stream may include auxiliary data.
Processed Imagery	Imagery that has been formatted into image pixel format, enhanced to remove detected anomalies and converted to a format appropriate for subsequent disposition.
Protocol	(1) [In general], A set of semantic and syntactic rules that determine the behaviour of functional units in achieving communication. For example, a data link protocol is the specification of methods whereby data communication over a data link is performed in terms of the particular transmission mode, control procedures, and recovery procedures. (2) In layered communication system architecture, a formal set of procedures that are adopted to facilitate functional interoperation within the layered hierarchy. Note: Protocols may govern portions of a network, types of service, or administrative procedures.
Real Time	Pertaining to the timeliness of data or information that has been delayed only by the time required for electronic communication. This implies that there are no noticeable delays.
Reconnaissance	A mission undertaken to obtain, by visual observation or other detection methods, information about the activities and resources of an enemy or potential enemy, or to secure data concerning the meteorological, hydrographic, or geographic characteristics of a particular area.
Recovery	In air operations, that phase of a mission which involves the return of an aircraft to a base.
Resolution	A measurement of the smallest detail which can be distinguished by a sensor system under specific conditions.

Route Plan	A set of waypoints for the UAV to follow, as well as general air vehicle commands for auxiliary systems (e.g., lights, IFF, de-icing, etc.) and emergency operation commands. Taxi or flight patterns may be incorporated into the route either as a series of sequenced waypoints or as 'seed' waypoints with range and bearing information, which, will depend on the sophistication of the UCS and UAV systems.
Scalability	The characteristic that enables system size and capability to be tailored dependent on the user needs.
Search and Rescue	The use of aircraft, surface craft, submarines, specialized rescue teams and equipment to search for and rescue personnel in distress on land or at sea.
Secondary Imagery	Imagery and/or imagery products derived from primary imagery or from the further processing of secondary imagery.
Sensor	An equipment which detects, and may indicate, and/or record objects and activities by means of energy or particles emitted, reflected, or modified by objects.
Shall	Mandatory compliance.
Should	Recommended compliance.
Signals Intelligence	The generic term used to describe communications intelligence and electronic intelligence when there is no requirement to differentiate between these two types of intelligence, or to represent fusion of the two.
Software	A set of computer programs, procedures and associated documentation concerned with the operation of a data processing system, (e.g., compilers, library routines, manuals, and circuit diagrams).
STANAG	Preferred term: NATO standardization agreement. The NATO term derived from standardization agreement.
Standardization	The development and implementation of concepts, doctrines, procedures and designs in order to achieve and maintain the compatibility, interchangeability or commonality which are necessary to attain the required level of interoperability, or to optimise the use of resources, in the fields of operations, materiel and administration.
Storage	a) The retention of data in any form, usually for the purpose of orderly retrieval and documentation. b) A device consisting of electronic, electrostatic or electrical hardware or other elements into which data may be entered, and from which data may be obtained.
Surveillance	The systematic observation of aerospace, surface or subsurface areas, places, persons, or things, by visual, aural, electronic, photographic, or other means.

Synthetic Aperture Radar (SAR)	A system that uses the frequency shifts associated with the motion of the sensor (Doppler shift) to produce an image with higher resolution then would be available with only the radar system's beam width and pulse length. It requires complex data processing after collection of the radar data. Complements photographic and other optical imaging capabilities because of the minimum constraints on time-of-day and atmospheric conditions and because of the unique responses of terrain and cultural targets to radar frequencies.
System Architecture	Defines the physical connection, location and identification of the key nodes, circuits, networks, war fighting platforms, etc., associated with information exchange and specifies systems performance parameters. Constructed to satisfy operational architecture requirements per the standards defined in the technical architecture.
Target	The object of a particular action, for example a geographic area, a complex, an installation, a force, equipment, an individual, a group or a system, planned for capture, exploitation, neutralization or destruction by military forces.
Target Acquisition	The detection, identification, and location of a target in sufficient detail to permit the effective employment of weapons.
Targeting	The ability to report the position (may include speed and direction) of a target detected with an AV payload. Target position is reported in terms of latitude and longitude (may include altitude) or in terms relative to a point. Target position information is sufficiently accurate to support weapon system fire control requirements.
Technical Architecture	A minimal set of rules governing the arrangement, interaction, and interdependence of the parts or elements whose purpose is to ensure that a conformant system satisfies a specific set of requirements. It identifies system services, interfaces, standards, and their relationships. It provides the framework, upon which engineering specifications can be derived, guiding the implementation of systems. Simply put, it is the "building codes and zoning laws" defining interface and interoperability standards, information technology, security, etc.
Tracking	Precise and continuous position finding of targets by radar, optical, or other means.
Uninhabited Aerial Vehicle /Unmanned Aerial Vehicle (UAV)	A powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or non-lethal payload. Ballistic or semi-ballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles.

UAV system	Includes the air vehicles, modular mission payloads, data links, launch and recovery equipment, mission planning and control stations, data exploitation stations and logistic support.
UAV Control System (UCS)	The functional set charged with control of the AV and interfacing with C4I, the UAV payload and UAV System operator(s). Includes all the UAV control systems and encompasses launch and recovery system.
United States Message Text Format (USMTF)	Fixed format, character-oriented messages which are man-readable and machine processable.
Variable Message Format (VMF)	Used between systems requiring variable bit-oriented messages.
Vehicle Data Terminal (VDT)	The data link element consists of the Vehicle Data Terminal (VDT) in the air vehicle and the Control Data Terminal (CDT) on the ground. Connectivity between the CDT and VDT is prerequisite for Level 2, 3, 4, and 5 interoperability.
Vehicle Specific Information	Information sent to or from the air vehicle that is not contained in the core, generic DLI message set.
Vehicle Specific Module (VSM)	A function that resides between the DLI and the air vehicle subsystem. Facilitates compliance with this STANAG by acting as a bridge between standard DLI data formats, and protocols, and a specific air vehicle.
Video Imagery	A sequence of images, with metadata, which is collected as a timed sequence of images in standard motion imagery format, managed as a discrete object in standard motion imagery format, and displayed as a sequence of images. Video imagery is a subset of the class of motion imagery.
Warnings	An alert indicating a hazardous condition requiring immediate action to prevent loss of life, equipment damage, or failure of the mission.
Waypoint	A point on a UAV route which is defined by latitude/longitude. Altitude is usually defined.
Waypoint Control	Semi-autonomous or man-in-the-loop method of air vehicle control involving the use of defined points (latitude/longitude/altitude) to cause the UAV (air vehicle, sensor(s), weapons, dispensable payloads, onboard systems, etc.) to accomplish certain actions.

ANNEX B to
STANAG 4586
Edition 3

STANDARD INTERFACES OF UAV CONTROL SYSTEM (UCS) FOR NATO UAV INTEROPERABILITY

TABLE OF CONTENTS

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1 Introduction

1.1 STANAG 4586 Objective

Unmanned Aerial Vehicle Systems (UASs) have become valuable assets in helping Joint Force Commanders (JFCs) to meet a variety of theatre, operational and tactical objectives. The optimum synergy among the various national UASs deployed requires close co-ordination and the ability to quickly task available UAS assets, the ability to mutually control the unmanned air vehicles (UAVs) and their payloads, as well as rapid dissemination of the resultant information at different command echelons. This requires the employed UASs to be interoperable.

Currently, many UASs are not fully interoperable. The interfaces defined in the NATO ISR Interoperable Architecture (NIIA) provide interoperability for ISR systems at Level of Interoperability (LOI) 1 and 2 for digital sensors compliant with the applicable referenced STANAGS, 7085 compliant data link and NATO Command, Control, Communication Technical Architecture (NC3TA) specified communications protocols.

Current or “legacy” UASs have been designed and procured nationally and contain system elements that are generally unique and system specific. They do not have standard interfaces between the system elements. This results in a variety of non-interoperable “stovepipe” systems. Although commonality of hardware and software would be a solution to achieve interoperability and may be desirable from an economic standpoint, commonality is not mandatory.

In order to enable interoperability of UASs the implementation of standards for key system interfaces and functions is required. These standards are laid down in a number of existing or emerging NATO STANAGs and generally applied commercial standards documents. They are referred to and listed in this STANAG where they are applicable. The respective operational requirements and approved Concept of Operations (CONOPS) will determine or drive the required LOI (see Section 2.3 for definition) that the specific UAV system will achieve.

The objective of STANAG 4586 is to specify the interfaces that shall be implemented in order to achieve the operationally required and feasible LOI according to the respective UAV system’s CONOPS as applicable to the specific system and theatre of operations. This will be accomplished through implementing standard interfaces in the UAV Control System (UCS) to communicate with different UAVs and their payloads, as well as with different C4I systems. The implementation of standard interfaces will also facilitate the integration of components from different sources as well as the interoperability of legacy systems.

The standards in STANAG 4586, which are identified as mandatory, shall be implemented as a whole in order to achieve the required LOI. It is assumed that air safety regulations will require the certification of systems, which result from combining the operation of assets from different UASs. Compliance with STANAG 4586 will ease this process and likely UAV system combinations can be certified in advance.

On this basis, UASs that are compliant with STANAG 4586 will increase NATO Combined/Joint Service flexibility and efficiency to meet mission objectives through the sharing of assets and common utilisation of information generated from UASs.

1.2 Assumptions and Constraints

This STANAG was developed using the following assumptions and constraints:

- Elements of the system (e.g., Core UAV Control System (CUCS), Data Link Interface (DLI) Vehicle Specific Module (VSM), Command and Control Interface (CCI), Command and Control Interface Specific Module (CCISM),) are not required to be co-located.
- The STANAG requirements have been developed independent of national CONOPS. Thus it is not the intent to define or imply specific CONOPS in this STANAG.
- This STANAG addresses the interface with Airspace Management Authority required to coordinate the operation of UAVs in a controlled air space. It does not address or imply the overall requirements and required certifications that may be necessary to operate UAVs in controlled air space.
- Critical real/near real time requirements of UAV and payload control shall be allocated to the VSM function.
- The contents of the STANAG are independent of the UAS hardware characteristics.

1.3 Annex B Structure

Annex B provides a top level description of interoperability objectives and the approach taken to achieve UAS interoperability through standardising the interfaces between the CUCS and the UAV and the CUCS and external C4I systems. It describes the requirement for a standard functional UCS architecture to accommodate those interfaces and refers to the Appendices B1 – B3 that contain the details of the standards required by STANAG 4586. It also lists other STANAGs, standards and protocols that are required for achieving UAS interoperability and offers some considerations for their implementation. The following Appendices are elements of Annex B:

- **Appendix 1** explains the approach to standardising the DLI and the functionality of the VSM. It contains the standard messages and protocols required at the DLI that enable the CUCS to communicate with and control different UAVs and payloads and to support the required UAS operator(s) interface as specified in the Human Computer Interface (HCI), Appendix 3.
- **Appendix 2** shows the approach selected to standardise the CCI and the application of the Command and Control Interface Specific Module (CCISM). The appendix contains the Information Exchange Requirements (IER), Attachment 2 - 1 and lists the UCS ADatP-3 Message Implementation Requirements, Attachment 2 - 2, to satisfy the

IER requirements and to support the required UAV System operator(s) interface as specified in the Human Computer Interface (HCI), Appendix 3.

- **Appendix 3** describes the Human Computer Interface (HCI) requirements and services that the CUCS will provide to the UAS operator(s).

2 Interoperability Concepts

2.1 Overview

A UAS can be divided into five distinct elements as shown in Figure B - 1. The air vehicle element consists of the airframe, propulsion and the avionics required for air vehicle and flight management. The payload element is comprised of payload packages. These can be sensor systems and associated recording devices that are installed on the UAV, or they can consist of stores, e.g., weapon systems, and associated control/feedback mechanisms, or both. As illustrated, the data link element consists of the Vehicle Data Terminal (VDT) in the air vehicle and the Control Data Terminal (CDT) which may be located on the surface, sub-surface or air platforms. Control of the UAS is achieved through the UCS and data link elements. Although shown as part of the UAS surface component, the UCS and the associated data link terminal can be located in any platform, (e.g., another air platform). The UCS element incorporates the functionality to generate, load and execute the UAV mission and to disseminate useable information data products to various C4I systems. It should be noted that Figure B -1 shows a common path for UAV command and control, payload command and control, and products. These functions may be accomplished on separate, independent data links. The launch and recovery element incorporates the functionality required to launch and recover the air vehicle(s).

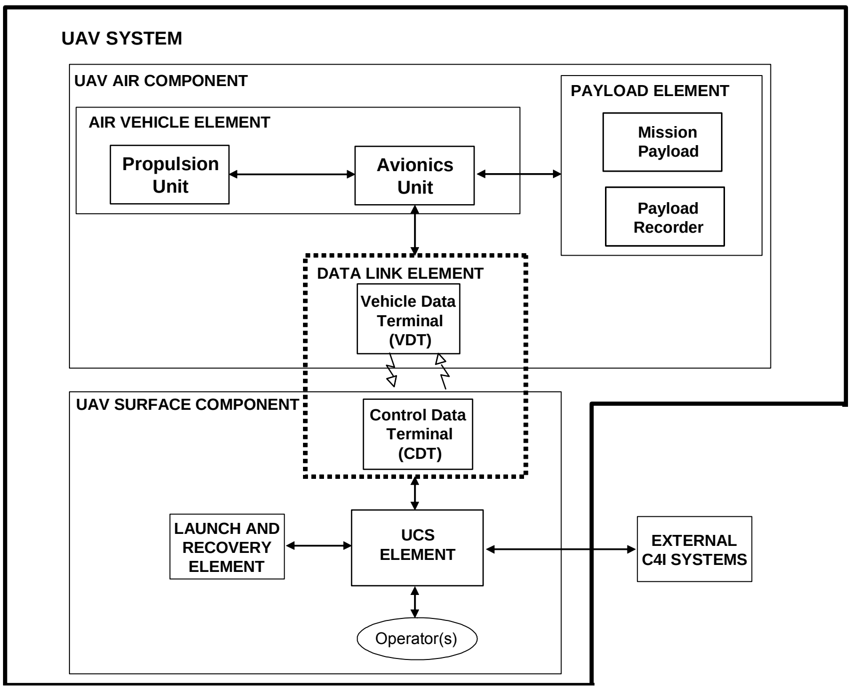

Figure B - 1. UAV System Elements

The Launch and Recovery element is unique to its air vehicle. The UCS accommodates this vehicle specific uniqueness via its VSM as defined in Section 3, UCS Functional Architecture.

2.2 Current Status of UAV Systems Interoperability

Current UASs are mostly “stove pipe” systems. They utilize unique data links, communication protocols and message formats for communication between UCS and the UAV and the UCS and external C4I systems. As a result, the dissemination of sensor data is mostly via indirect means, (e.g., from UCS to an exploitation system to the user). Current UAS operations in Joint NATO operations are illustrated in Figure B - 2.

The illustrated UASs all utilize unique data links and UCS as well as unique data/message formats for communication between the UAV and the UCS and also the UCS and the C4I nodes. Dynamic joint cooperative operations require near real time tasking/re-tasking and dissemination of reconnaissance data to support the Tactical Commander, which the “stove-pipe” UAS may not support.

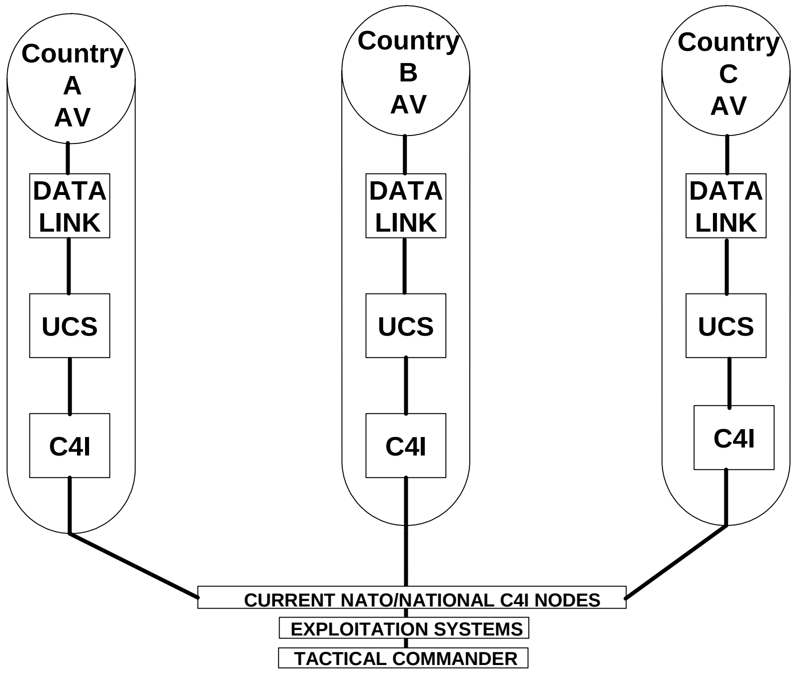

Figure B - 2. Current UAS Operations Example

2.3 Levels of Interoperability

2.3.1 General

A UAS as defined above may be composed of various components which include; a UAV, a CUCS, a VSM, a CCISM, and data links, that provide for interoperable operations between diverse UASs. The STANAG 4586 used the LOI as defined in Edition 2 for the current UASs as a starting point, and modified these definitions to enable UASs to support a broader scope of interoperable CONOPS. LOIs have been defined for discrete levels of functionality and are Independent of one another. In other words, the control of a sensor (within LOI 3) is independent and separate from the control of the air vehicle (within LOI 4). LOI definitions are applied to both the DLI and CCI. The DLI and CCI LOIs can be different for a specific UAS design.

2.3.2 Definition

The following LOIs have been defined in this Edition of STANAG 4586 for UASs in order to improve operational flexibility:

Level 1: Indirect receipt and/or transmission of sensor product and associated metadata, for example KLV Metadata Elements as per Attachment 2-5, from the UAV.

Level 2: Direct receipt of sensor product data and associated metadata from the UAV.

Level 3: Control and monitoring of the UAV payload unless specified as control (C) only or monitor (M) only.

Level 4: Control and monitoring of the UAV, unless specified as control (C) only or monitor (M) only, less launch and recovery.

Level 5: Control and monitoring of UAV launch and recovery unless specified as control (C) only or monitor (M) only.

Unless otherwise stated, LOI 3, 4 & 5 assume control and monitor.

2.3.3 Application

The interoperability levels defined above can be enabled through the standardization of interfaces between the UAS elements and between the UCS and external C4I systems. This can be accomplished if the overall System Architecture is also standardised to the extent that it accommodates the implementation of these standard interfaces. In order to achieve interoperability, the UCS Architecture and interfaces shall support the appropriate communication protocols and message formats for legacy as well as new UASs.

To achieve LOI 2 and above (LOI 3, 4, and 5) interoperability across an RF communications interface requires the use of a CDT that is interoperable with the VDT. Connectivity between the CDT and VDT is prerequisite for LOI 2 and above.

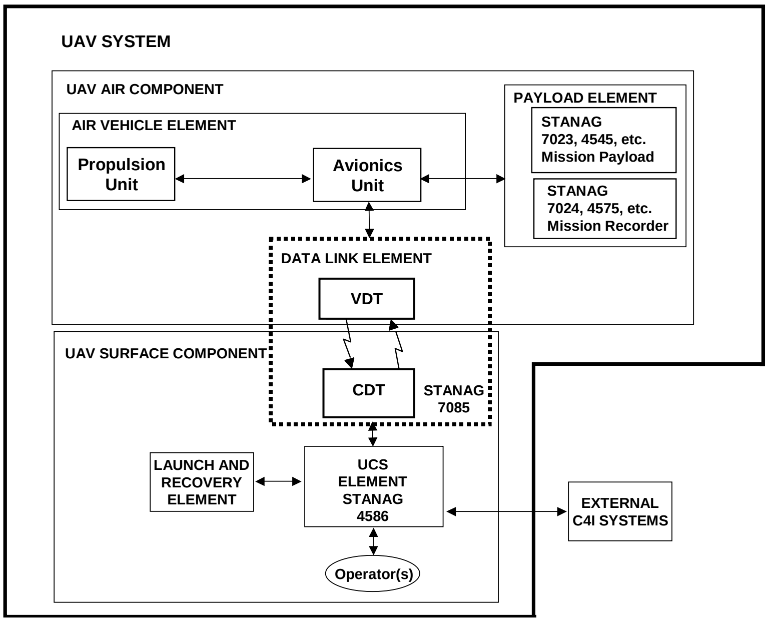

Figure B - 3. UAS Interoperability Architecture

As illustrated in Figure B – 3, there are already a number of existing or emerging Standardization Agreements (STANAGs) that are applicable to UASs. They provide standards for interoperable data link (STANAG 7085), digital sensor data between the payload and the UAV element of the data link (STANAG 7023, 4545, 4607, and 4609), and for on-board recording device(s) (STANAG 7024 and 4575).

Currently, there is no standard that defines the interfaces between the UCS and the UAV (including launch and recovery functions) via the CDT. Although STANAG 5500, ADatP-3, defines a catalogue of standard messages for tasking and status reporting, there is no standard/agreement as to which specific messages and fields should be used by UASs. In addition, there are no standards/agreements as to the type of information that should be presented to a UAS operator, nor for defining a system operator's required level of proficiency.

STANAG 4586 provides the standardization of these interfaces. UASs, which are compliant with STANAG 4586, including the referenced STANAGs and standards, will enable interoperability at LOI 2 or above. For LOI 1 or 2 systems that use digital imaging payloads and STANAG 7085 compliant data links, only the NIIA standards are required, regardless of whether the surface component is a UCS or other ISR exploitation facility. The interface requirements (messages or display parameters) to achieve a given LOI are identified in the Appendices of this Annex.

The use of the NIIA standards to enable LOI 1 or 2 implies that some of the LOIs are conditional on the type of payload data format used by the UAS. For example, system A produces payload data in format A (e.g., STANAG 7023) and system B produces data in format B (e.g., STANAG 4545), both systems can be LOI 2 but they use different payload data formats.

Where a UAS does not use the NIIA standards (e.g., analogue payload data), there is a need to be able to associate the appropriate metadata with the analogue payload data. To enable this to be achieved the appropriate metadata needs to be captured in a standard way. The mechanism for achieving this is to use 4586 messages that will support this at the appropriate LOI, e.g. LOI (3).

Thus the approach to enabling the desired LOI is based on compliance with existing standards or establishing new standards for:

- A data link system(s) that provides connectivity and interoperability between the UCS and the UAV(s). The data link system(s) shall accommodate legacy as well as future systems. STANAG 7085, Interoperable Data Links for Imaging Systems, specifies a data link system that would provide the required connectivity and interoperability. Users that require encryption should reference work being done by the Joint Capability Group on ISR (JCGISR) and NATO International Military Staff (IMS) for interoperable encryption standards. A standard for a separate, “back up”, command and control (C2) data link for UASs requiring one, or for use in tactical UASs not requiring the capability of a STANAG 7085 Data Link, is not currently available. A draft standard, STANAG 4660, has been drafted to define the waveform and upper layers (ISO layers) of an interoperable C2 data link. The draft STANAG is in review process and when and if ratified, it will become a standard for an Interoperable C2 Data Link (IC2DL).
- Format for payload/sensor data for transmission to the UCS via the data link and/or for recording on the on-board recording device. STANAG 7023, Air Reconnaissance Primary Imagery Data Standard, with addition for non-imagery sensors, e.g., Electronic Support Measures (ESM),, STANAG 4545, NATO Secondary Imagery Format, STANAG 4607, NATO GMTI Format, and STANAG 4609, NATO Digital Motion Imagery Format, provide standard formats for transmitting payload data to the UCS or for storage on the on-board recording device.
- Recording device for on-board recording of sensor data, if required. STANAG 7024, Imagery Air Reconnaissance Tape Recorder Standard, and STANAG 4575, NATO Advanced Data Storage Interface (NADSI), specify standard recording devices and formats for wideband tape and other advanced media, e.g., solid state, RAID recorders, respectively.
- UCS interfaces with the data link system, e.g., DLI; UCS interface with command and control systems, e.g., CCI; and HCI top level requirements

for a UCS to support the UAS operators. STANAG 4586 defines the UCS architecture and interface requirements.

- Although beyond the scope of this STANAG, operational guidelines or standards that define the minimum level of operator proficiency needed to operate a given UAV at the desired LOI are also required.

It is also recognised that UAVs will have the capability to carry a range of payload types, e.g., EO, EO/IR, SAR, ESM, etc., and that each UAS will only implement some of these payload types. It has been accepted that each UAS will only support the payload type implemented on that system and this in turn will affect the LOI. For example, UAV A carries an EO/IR payload and UAV B carries a SAR payload; system A is LOI 2 for an EO/IR payload; system B is LOI 2 for a SAR payload, both systems are LOI 2 but only for the appropriate payload. This means that the defined LOIs are conditional on the type of payload implemented in the UAV.

2.3.4 Summary

Keys concepts to remember are:

- LOI 2 monitor is conditional on the type of payload (station) and the number of payloads (stations) implemented onboard the UAV. It is also conditional on the type of payload data format used by the UAS.

- LOI 3 monitor or monitor/control is conditional on the type of payload (station) and the number of payloads (stations) and the payload data format used by the UAV.

- LOI 4 monitor or monitor/control is not affected by the payloads onboard the UAV.

- The detailed impact on the LOIs and their relation to the requirements and messages defined in STANAG 4586 is discussed further in the Annex B Appendices.

3 UCS Functional Architecture

The UCS Functional Architecture required to support interoperability among future and legacy UAS is illustrated in Figure B - 4, UCS Functional Architecture.

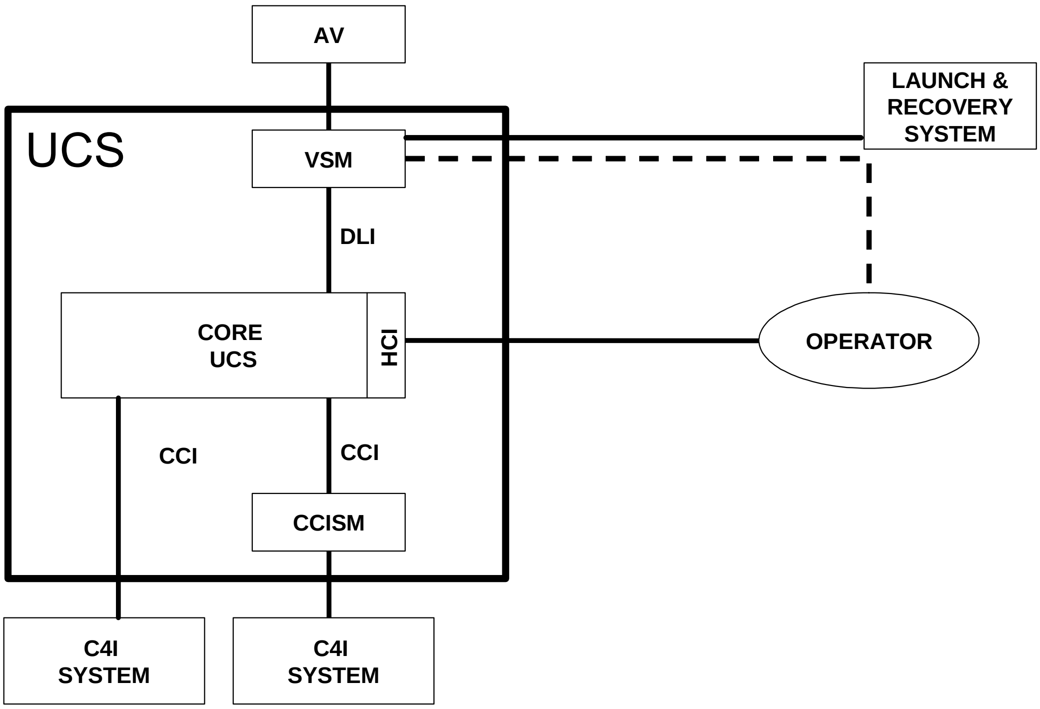

Figure B - 3. UCS Functional Architecture

This architecture establishes the following functional elements and interfaces:

- CUCS
- DLI
- CCI
- VSM
- CCISM

This STANAG is not an attempt to define a detailed design or implementation for the CUCS other than specifying that the functional architecture accommodate the integration of the DLI and CCI and recommending that it follow applicable NATO STANAGS and guidelines for software. Lastly, because of changing technology, this STANAG does not define a specific Common Operating Environment (COE) but only specifies that the Operating Environment supports/integrates the specified network/transport protocols and supports the specified user applications.

Future, as well as legacy UASs, will be enabled for interoperability through compliance with this architecture and the relevant STANAGs. The DLI shall support legacy as well as future UAVs and all air vehicle technologies (e.g., fixed wing, rotary wing, etc.), and all UAV operational missions (surveillance, reconnaissance, and combat). Future UASs should utilize a STANAG 7085 compliant data link system. For those that do not (future as well as legacy systems), a VDT compatible CDT shall be provided in order to achieve LOI 2 and above.

In similar fashion, the CCI shall support legacy as well as future C4I systems (e.g., Allied Command and Control System (ACCS)). Thus, the interface between the CUCS and the external C4I nodes shall be compatible with the communication system infrastructure utilized to support the external tasking and sensor data dissemination. This will be accomplished by using the communication standards identified by the NC3TA's Common Standards Profile (NCSP) as specified in Section 4. The NC3TA is intended to provide an overall framework for NATO communications. All future communications and information systems used in NATO are to conform to these standards.

The concept of a VSM functionality is introduced which provides the unique/proprietary communication protocols, interface timing, and data formats that the respective air vehicles require. The functionality of the VSM is defined in Section 1.4 of Appendix 1. For example, one of the VSM functions is to provide any necessary “translation” of the DLI protocols and message formats to the unique air vehicle requirements. Since the VSM may be unique to each air vehicle, the air vehicle manufacturer would generally provide it. If the data links utilized in the UAS are not STANAG 7085 compliant (such as a low band link providing beyond line-of-sight connectivity, e.g., SATCOM data link), then the CDT associated with the non-compliant data link must be provided and interfaced with the UCS via the VSM DLI function, i.e. managing interfaces required to control and monitor data link(s) operation, or the capability to receive and process the DLI specified Data Link Command and Status Messages should be incorporated in the CDT. Selected VSM functions, e.g. translating data from the representation used by the CUCS (DLI defined messages) to vehicle specific representations and vice versa, can be hosted on the UAV and/or on the ground. A ground based VSM function can reside on the same, different, or even remote hardware with respect to the CUCS, as long as sufficient bandwidth is provided for the message interface. If required, the critical real/near real time functions and interfaces shall be implemented via the VSM function to assure meeting the system latency requirements as illustrated by the dashed line in Figure B - 4 above.

When a new UAV is introduced into a pool of interoperable UASs, it may be necessary to integrate and validate a new corresponding VSM function into each existing UCS. This would be necessary only if the newly introduced vehicle requires VSM functionality in the ground portion of the system. If, however, the existing UCS includes a 7085 compliant CDT and incorporates the data link management functions defined by STANAG 4586, and if the newly introduced UAV implements DLI messages directly and includes a 7085 compliant VDT, then the corresponding VSM functions are not required.

The CCISM provides a function similar to the VSM, that is, the encapsulation of the CCI data and any translation required to be compatible/interoperable with the physical communication links between the UCS and the C4I systems. The CCISM can be hosted on and collocated with the UCS or by and with the connecting C4I node. The UCS architecture shall make provision for the integration of a CCISM.

The UAV system operator should be provided a standard set of parameters that the operator can use to operate/monitor the UAVs that have been assigned to him. This includes his interface with the Controlling Air Management Authority. Although it is not necessary for different STANAG 4586 compliant UCSs to have identical displays, it is mandatory that the CUCS meets the HCI requirements specified in Appendix 3. To facilitate this. it is recommended that the HCI Guidelines in the STANAG 4586 Implementation Guideline Document be followed in the development of the CUCS.

The DLI and CCI shall be implemented using messages. In addition to supporting the generic message sets defined in the appendices to the STANAG 4586, the CUCS shall be capable of supporting a “remote display” capability. The remote display capability supports the control and monitoring of “vehicle specific” information on the CUCS for which there is no available generic capability. Services, which are installed on the CUCS in an unaltered state, that are compatible with identified operating systems to support this “remote display” capability, are identified in Appendix 1. The framework for the information exchange will allow for information to be able to move from one process to another on the same platform, between processes on different platforms, and even between different software products and operating systems.

3.1 Core UCS Requirements

The CUCS shall provide a user interface that enables the qualified UAV operator to conduct all phases of a UAV mission. It shall support the requirements of the DLI, CCI, and HCI. The CUCS should provide a high resolution, computer generated, graphical user interface that enables a qualified UAV operator the ability to control different types of UAVs and payloads.

Depending on the appropriate LOI and the payloads supported in the respective UAS, the CUCS should provide:

- The functionality and capability to receive, process, and disseminate data from the UAV and payload; perform mission planning; monitor and control the payload; monitor and control the UAV; and monitor and control the data links
- An open software architecture to support additional future UAVs and payload capabilities
- The UAS operator with the necessary tools for computer related communications, mission tasking, mission planning, mission execution and monitoring, data receipt, data processing, and data dissemination

- The capability to host the required VSM and CCISM functions

3.2 Data Link interface (DLI)

The DLI interface between the CUCS and the VSM element of the UAS is defined in Appendix 1. It will enable the CUCS to generate and understand specific messages, detailed in Appendix 1, for control and status of UAVs and payloads. This standard message set and accompanying protocols have been developed to be UAV and payload class, e.g., EO/IR, independent. In addition, the DLI specifies the mechanism for the processing and display of vehicle specific messages.

3.3 Command and Control Interface (CCI)

The CCI between the C4I systems/nodes and the CUCS is defined in Appendix 2.

The standard message set and accompanying protocols have been selected to be C4I system/node independent and to avoid placing additional requirements on the C4I system. The UCS provider and respective C4I user of the UAS should jointly identify the CCISM functionality required, if any, to provide UCS compatibility with the specific C4I system. Appendix 2 specifies the protocols down to the message content and format level. The networks and communications used to support the CCI shall be NC3TA compliant. The NC3TA is intended to provide an overall framework for NATO communications that provides for interoperability among military command, control and communications systems. The NC3TA strategy has been developed to achieve interoperability, maximize the exploitation of commercial of-the shelf (COTS), and reduce the proliferation of non-standard systems. All future communication and information systems used in NATO will conform to these standards.

3.4 Human Computer Interface (HCI) Requirements

The HCI Appendix 3 establishes the operator display and input requirements that the CUCS shall support. Appendix 3 specifies the requirements levied upon the CUCS, and does not impose any design requirements on human factors (HF) and ergonomics, (e.g., number of displays, manual controls, switches etc.). Appendix 3, while not specifically defining the format of the data to be displayed, identifies the capabilities that the CUCS shall provide in order for the qualified UAS operator(s) to effectively operate the UAS. The HCI requirements also address the display and operator interactions that are imposed on the CUCS by the CCI and DLI.

4 UCS Communication and Information Technology Protocols and Standards

UAS and C4I systems should be capable of interoperating across a routed network of multiple sub-networks, in which the UAS is seen as a terminal element (or terminal sub-network) of the whole network. This will allow the physical components of the UAS and C4I systems to be anywhere on that network. The electronic exchange of information between UCS and the C4I systems shall be in accordance with the NC3TA, Volume 4-V7, NC3 Common Standards Profile (NCSP),.

The NCSP is a single profile containing the emerging and mandatory standards and profiles of standards for these systems, their communications and computers, and their interfaces with other (NATO, national or other relevant civilian) systems to support critical combined/joint interoperability in NATO missions, including the Combined Joint Task Force (CJTF) concept. The NCSP applies to all NATO Command and Control Information Systems (CCISs) and Management Information Systems (MISs), including their internal and external interfaces, which produce, use, or exchange information electronically.

The NCSP specifies the minimum set of communication and information technology standards to be mandated for the acquisition of all NATO Command, Control and Communication (C3) systems. In order to assist planners and developers of future C3 systems and major upgrades to existing C3 systems, it also contains a set of emerging standards. Future NATO C3 systems are expected to support both combined and joint operations, and thus national commitments to the appropriate mandatory standards specified in this document will also significantly contribute to the achievement of the LOI required between NATO and national C3 systems for such objectives. The LOI needed to achieve the desired goal will be determined by operational requirements and stipulated in the applicable CONOPs.

In this scenario, it is important to note that different LOIs may be required to achieve internal interoperability between NATO systems than those required for external interoperability between NATO systems and national systems. The standards selection focuses on mandating only those standards critical to external interoperability, and is based primarily on commercial open system technology, which has strong support in the commercial marketplace. Where a system is to be implemented utilizing certain services, it is essential that it adopts the relevant standards mandated in the NCSP (e.g., if a service/interface is required, it should be implemented in accordance with the associated mandated standard(s)). Specification and usage of other standards, if required beyond those identified in the NCSP, shall be additive, complementary, and non-conflicting with NCSP mandated standards. Legacy standards, when necessary, can be implemented as necessary on a case-by-case basis, in addition to the mandated NCSP standards. Emerging standards are standards required to capitalize on new technologies. It is expected that emerging standards will be elevated to mandatory status when implementations of the standards mature and national consensus is reached.

The NCSP Volume 2 document organizes these standards into the twelve service areas which are to be considered part of NC3TA, NATO Technical Reference Model (NTRM),:

- User Interface
- Data Management
- Data Interchange
- Graphics
- Communications
- Operating Systems
- Internationalisation
- System Management
- Security
- Distributed Computing
- Software Engineering
- Common C2 Applications

4.1 Data Interchange/Communications Protocols and Standards

4.1.1 Data Interchange Services

For data interchange services, at a minimum, the following NCSP mandated standards shall be implemented in the UCS to achieve interoperability:

4.1.1.1 Geographical

- Digital Geographic Information Exchange Standard (DIGEST), STANAG 7074
- Digital Terrain Elevation Data (DTED) Geographic Information Exchange Standard, STANAG 3809
- Digital Feature Analysis Data (DFAD)
- World Geodetic System - 84 (WGS-84), Mil-STD-2401

4.1.1.2 Communication Services

For communications service area, at a minimum, the following NCSP mandated standards shall be implemented in the UCS to achieve interoperability:

4.1.1.2.1 Internet Protocol (IP) IPv4 (STD 5) RFC 791, 792, 919, 922, 950:1985 updated by RFC 1112:1989, 2474:1998, 2507:1999, 2508:1999, 3168:2001, 3260:2002, 3376:2002) 1112)) / IPv6, RFC 1981 through 4007

The UCS architecture will adhere to the IP version selected by the wider defence community within which they are integrated. In the near-term, systems will need to support the current version of IP (STD 5)]. In the longer term, the emerging standard IPv6 will be adopted by the military to overcome perceived weaknesses in IPv4. IPv6 increases the available address space, reorganizes the protocol headers and improves support for security, throughput, latency, error rate and cost.

4.1.1.2.2 Transmission Control Protocol (TCP) (IETF STD 7) RFC 0793:1981 updated by RFC 3168:2001))

The Transmission Control Protocol (TCP) [RFC 793] provides a connection oriented reliable byte stream service. TCP is a bi-directional protocol, which has no concept of messages. Any framing has to be added at the application level. TCP contains an acknowledgement scheme which makes it reliable (bytes are delivered correctly and in order) and which implements flow control.

The TCP/IP protocols were selected since they can provide consistent end-to-end network and transport communications compliant with NATO-wide digitisation initiatives.

4.1.1.2.3 User Datagram Protocol (UDP) (IETF STD 6:1980), RFC 768, 1122

The User Datagram Protocol (UDP) offers only a minimal transport service non-guaranteed datagram delivery and gives applications direct access to the datagram service of the IP layer. UDP is used by applications that do not require the level of service of TCP or that wish to use communications services (e.g., multicast or broadcast delivery) not available from TCP.

4.1.1.2.4 Hypertext Transfer Protocol (HTTP) Version 1.1, IETF RFC 2616:1999 updated by RFC 2817:2000

Hypertext Transfer Protocol (HTTP) should be the main protocol used for web browsing. Web browsing provides a common and powerful mechanism for sharing information. HTTP and applications associated with the use of HTTP are used to index, access and transfer processed information. The ability to search the web server can be provided using COTS applications. A C4I user needs a Web browser (e.g., Netscape or Internet Explorer), the Uniform Resource Locator (URL) of the page and communications connectivity to access the information.

4.1.1.2.5 File Transfer Protocol (FTP), IETF, RFC 0959:1985 updated by RFC 2228:1997, 2640:1999, 2773:2000

File Transfer Protocol (FTP) should be used to transfer processed information. It can be used in support of HTTP to transfer files, but needs additional support for providing an index to the information stored on the file server. Once the file has been transferred to the C4I system it is then the responsibility of the C4I to provide applications to process the file.

4.1.1.2.6 Network Time Protocol (NTP), RFC 1305:1992

The Network Time Protocol (NTP) is a client/server relationship that exists between the CUCS and the VSM (in the air or ground). This paragraph does not attempt to provide an in-depth response to the NTP explanation. For the definition, see RFC 1305 as well as Sun Microsystems NTP related information. This paragraph provides an overview of the planned NTP client/server capability that the CUCS will use to control and maintain the VSM clock.

It will be required that the CUCS be provided a UTC reference source for the NTP server daemon.

There are two solutions to synchronizing the time using NTP. The solution recommended here is the xntp option (vs. the ntpdate). An ntp.conf file will be required to provide configuration information required by the NTP server daemon.

Within the NTP protocol, the designation of the NTP client and server is embedded as part of the NTP protocol initialization process. This process is defined at the lower layers of the operating system and is transparent to the application layer.

The end result of the NTP initialization process is that the client and server can be designated to the CUCS or VSM.

For a detailed explanation of this process, please see RFC 1305.

The NTP time server will use UDP to communicate with the clients. There is no overhead associated with the protocol because it is connectionless. It will not interfere with TCP/IP communications. This level of communication will not be required to be documented in the STANAG DLI.

This protocol provides 10 millisecond accuracy with a 1 millisecond resolution.

4.2 Standards For Optional Functionality

If it is desired to implement additional service areas (e.g., data interchange), and classes within these service areas (e.g., video and audio interchange) into the UCS, the NCSP mandated standards should be used in implementing these services.

4.3 Compliance With Other STANAGS

While STANAG 4586 is mandatory to enable UAV command and control interoperability, the following ISR interface standards are required to address interfaces among the various horizontal and vertical architectures of ISR, and include interfaces that use both physical (e.g., wired, tape, etc.) and electromagnetic links:

- STANAG 3809 - Digital Terrain Elevation Data (DTED) Geographic Information Exchange Standard
- STANAG 4545 - NATO Secondary Imagery Format
- STANAG 4559 - NATO Standard Image Library Interface (NSILI) (If interface with Image library is desired)
- STANAG 4575 - NATO Advanced Data Storage Interface (NADSI) (If advanced storage is required)
- STANAG 4607 - NATO GMTI Data Format
- STANAG 4609 - NATO Digital Motion Imagery Standard
- STANAG 4633 - ELINT Common Message Format (ECMF) (Study)
- STANAG 5500 - NATO Message Text Formatting System (FORMETS) ADatP-3 Build 11
- STANAG 7023 - Air Reconnaissance Primary Imagery Data Standard
- STANAG 7024 - Imagery Air Reconnaissance (Digital Tape Storage) (If tape storage is required)
- STANAG 7074 - Digital Geographic Information Exchange Standard (DIGEST)
- STANAG 7194 – NATO Imagery Interpretability Rating Scale (NIIRS)

- APP-11 - NATO Message Catalogue (NMC)

To enhance UAV interoperability and flexibility, it is recommended that the UCS should also be compliant with the following STANAGs:

- STANAG 3377 - Air Reconnaissance Intelligence Report Forms
- STANAG 4250 - NATO Reference Module for Open Systems Interconnection
- STANAG 7085 - Interoperable Data Links For Imaging Systems
    - Digital Point to Point Annex of STANAG 7085 (compatible with Common Data Link (CDL)/Tactical Common Data Link (TCDL) specification)

APPENDIX B1 – DATA LINK INTERFACE

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1 Introduction

1.1 Scope

NATO Standardization Agreement (STANAG 4586) Annex B Appendix 1 specifies the detailed requirements for interfacing the Core UCS (CUCS) to a Vehicle Specific Module (VSM). This interface is designated as the Data Link Interface (DLI) throughout this document.

STANAG 4586 Annex B Appendix 1 is intended to allow NATO nations to enable UAV interoperability between any compliant CUCS and any compliant air vehicle system (through its VSM) by specifying a standard set of messages and data formats for the interface while at the same time providing support for handling vehicle-specific data needs.

1.2 Appendix 1 Overview.

This Appendix defines the DLI element of the UCS. The DLI provides a common set of messages and mechanisms for handling vehicle and payload specific messages. Appendix 1 is divided into the following sections:

- Section 1 Introduction
- Section 2 System Functional Requirements By Mission Phase
- Section 3 Message Distribution Standard
- Section 4 Message Formats
- Section 5 Miscellaneous Interfaces

1.3 DLI General Overview.

A wide range of air vehicles and control system requirements have been considered in establishing the DLI message set. The DLI shall be the interface between the UAV/data link and the CUCS element. The DLI provides standard messages and formats to enable communication between a variety of air vehicles and STANAG 4586 compliant CUCSs

Defining the DLI generic message structure for the AV/CDT/CUCS communication is the purpose of this Appendix. The message set defined in this Appendix includes control and status messages for the following:

- Air Vehicle
- Payloads
- Data Links
- Cautions and Warnings

The message set contains UAV data that is vehicle and payload independent, such that the interface standard is not required to change to accommodate a particular air vehicle or payload. In addition the message set includes a capability to have the DLI generate system specific displays through the UCS HCI.

The DLI has two major components. The first component is a generic set of messages designed to be vehicle and payload independent that support CUCS functionality, and common air vehicle data needs. The second component is a mechanism to support communication of vehicle specific information, from the AV/CDT to the CUCS, to remotely display vehicle-specific information. The “services” methodology allows new vehicle specific elements, and even new vehicles, to be added to a UCS system without having to modify the CUCS software components.

The CUCS shall generate and understand common air vehicle and payload messages using the DLI. The development of a standard message set and protocol for communication between the AV/data link and the CUCS function is key to establishing an interoperable CUCS architecture. These messages as defined in this document are air vehicle and payload independent.

The CUCS and AV/CDT communicate with each other via “messages” as the primary method of transferring information between these two components. This messaging structure has the objective of passing UAV control and status information between the CUCS and AV/CDT without creating dependencies between the two components. Messages are used to pass a generic set of data between the CUCS and the AV/CDT, and this generic data may be acted upon by both the CUCS and AV/CDT (local host machine). This methodology allows the CUCS to act upon data originating at the AV/CDT, and then transmits the data to an independent location.

The secondary method of communication between the CUCS and the AV/CDT is the use of “services” to pass information between the two components. The services allow the AV/CDT to affect the HCI on the CUCS, much like a web browser accesses web pages for locally displaying data residing on a remote host. The AV/CDT-driven displays include the display of data that is not part of any standard "data" message sets, and allow the operator to interact with an air vehicle through the AV/CDT to select options, modes of operation, and other vehicle-specific actions. The CUCS has no capability to alter or use the content of the “remote displays” on the local machine.

There are several ways to implement the DLI in a UAS. The following sections describe the role of the VSM for implementing the DLI for the air vehicle and data link.

1.4 Vehicle Specific Module Functions

In the UCS system functional architecture, the VSM shall be responsible for the following functions where they are not part of the AV or CDT:

- Translating data from the representation used by the CUCS (DLI defined messages) to vehicle specific representations and vice versa.
- Acting as a repository and server for vehicle-specific data (such as vehicle configuration and performance limitations) and methods (such as routines for updating vehicle-specific operator displays).
- Packing and unpacking data link data to optimise transmission bandwidth when necessary.

- Managing UAV real-time data and interfaces required to control and monitor data link(s) operation.
- Managing interfaces required to control and monitor launch and recovery (L/R) systems associated with the respective vehicles.
- Analogue to digital conversion of sensor data, if required.

These VSM functions service/support the DLI interface between the CUCS elements and the air vehicle system. The VSM functions insulate the CUCS from air vehicle, data link, launch and recovery (L/R) and real-time air vehicle specific interface peculiarities, by maintaining closed-loop control and communication with the air vehicle and its payload(s) following the air vehicle's specific protocols, timing and encoding methods.

To accomplish these functions, the VSM functions can be allocated to various UAS system components, i.e. CUCS, CDT, VDT, Air Vehicle or a "stand alone" VSM system element. It is envisaged that a VSM function will be an embedded processing element that performs the processing associated with the above VSM functions. The VSM is envisioned as the element of the UAV system architecture that provides a migration path for legacy UAV systems to achieve STANAG 4586 compliance with minimal impact to the air vehicle design.

1.4.1 Example Implementations for the Air Vehicle

The location of the VSM function may be located in the air vehicle and/or with the UAV control system. The CUCS shall not contain real-time processes that are required to support the air vehicle and CDT operation. There are several ways to implement DLI and this relationship, or architecture, is presented in Figure B1 - 1.

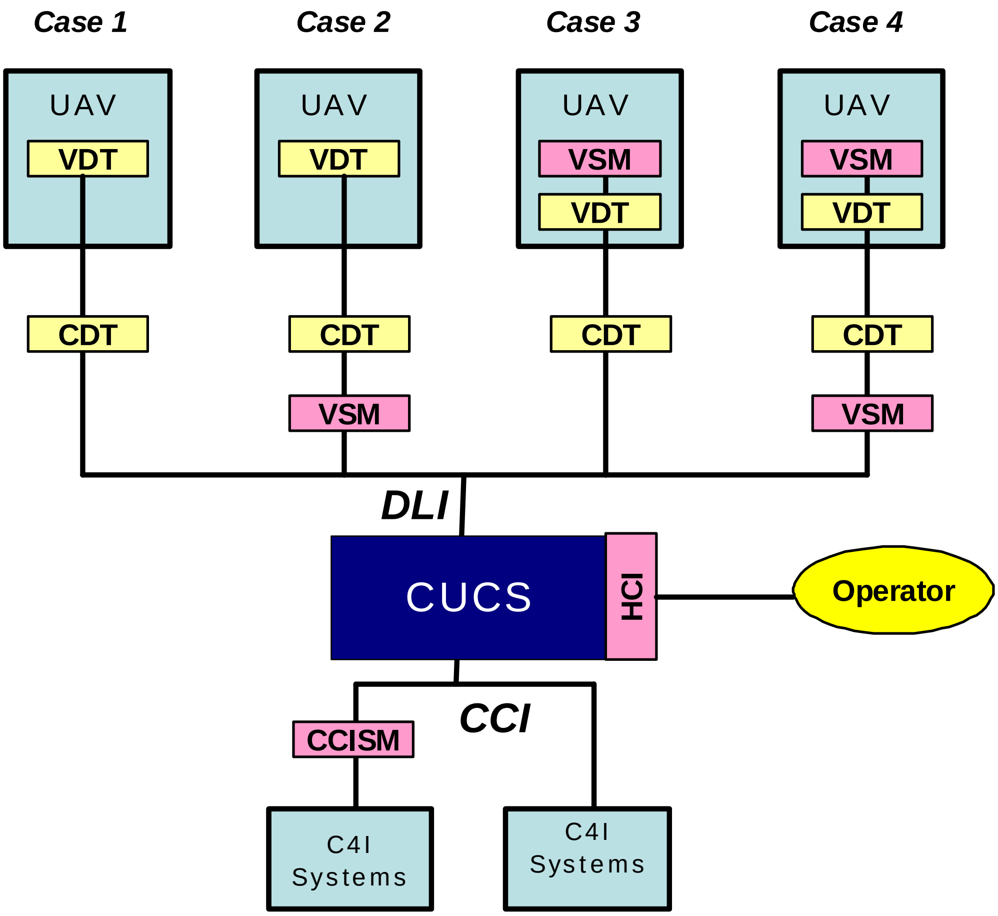

Figure B1 - 1: DLI Role in the AV/UCS Concept

Figure B1 -1 illustrates four air vehicles which support different levels of DLI as its native language. In Case 1, the air vehicle and CDT support all of the VSM functionality as identified in section 1.4.2 below. Vehicle Specific (remote display) and real-time processing functionality, if required, would be provided by the CUCS. In Case 2, the air vehicle and CDT don't support any of the VSM functions and require a VSM to provide this functionality. In Case 3, the VSM functionality, with possible exception of remote display and real-time processing is allocated to the air vehicle. In Case 4, the VSM functionality is split between the air vehicle and the ground elements of the UAS.

1.4.2 Example Implementations for the Data Link

In the case of systems using a data link that is not compliant with STANAG 7085 (e.g. BLOS/SATCOM), the VSM CDT function shall serve as an isolating interface that allows the UAV system CDT interface to become STANAG 4586 compliant without requiring modifications to the air vehicle or the data link.

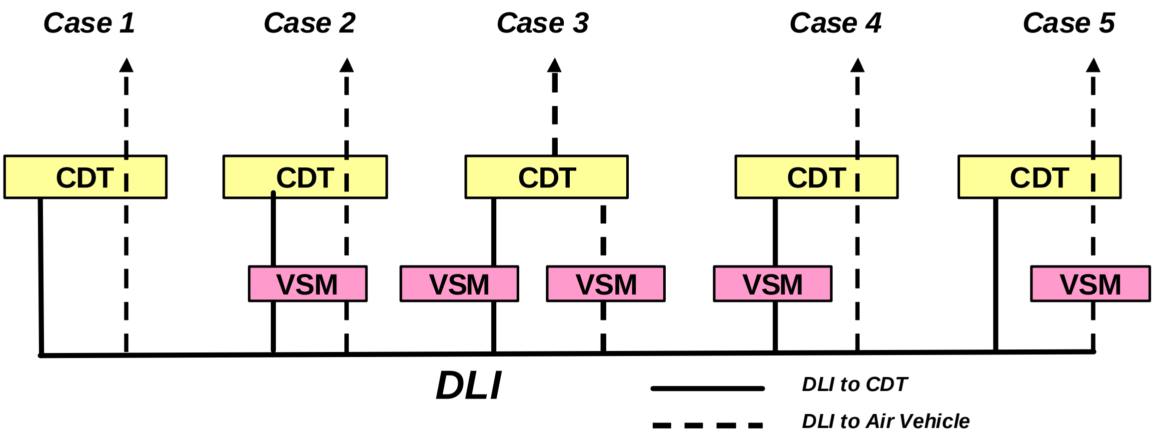

Figure B1 - 2: DLI Role in the CDT/UCS Concept

Figure B1 - 2 addresses the Control Data Terminal (CDT) DLI interface. To show the functional flow, the AV DLI messages are shown as a separate, dotted line from the CDT DLI messages. As with the AV, the CDT may understand the DLI messages and not require a separate VSM. This could be true even if the AV required a VSM of its own. The CDT could require a VSM and the AV may not require one. Both the AV and the CDT could both require a VSM and this could be supported by either a single physical VSM or two separate VSMs.

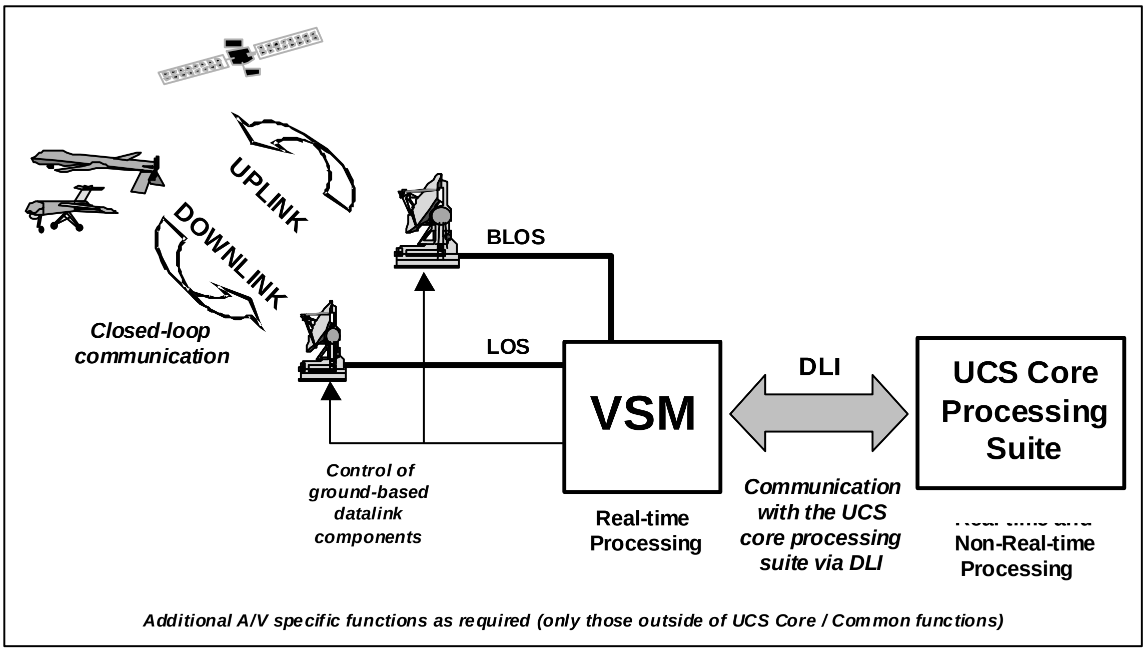

Figure B1 - 3: Role of the VSM

Figure B1 - 3 provides another view of the relationship among the CUCS, the VSM, and the DLI. In this figure, note that real time processing has been allocated to the VSM which maintains closed loop control with the air vehicle. In addition, it provides a command and status interface with the data link subsystem. The CUCS, in contrast, performs its function in “non-real time”. This is to say that the system is not bound to a particular latency specification but to a maximum latency for the various functions and messages as specified in this Appendix. This is a critical distinction that presumes a reasonable level of automation in the system. For those functions requiring real time interaction with a human operator, the interfaces to the system will be directly through the VSM.

The VSM function can reside on the same, different, or even remote hardware with respect to the CUCS, as long as sufficient bandwidth for the message interface (including sensor data) can be provided. The intent of this appendix is not to specify hardware, but to specify in detail the DLI such that interoperability can be achieved.

1.5 Interfaces.

1.5.1 Physical Interfaces.

The DLI (notionally depicted in Figure B1-4) can actually consist of multiple physical interfaces. At least one full duplex bi-directional digital data interface shall provide a communication pathway for the following:

- Commands to the UAV, payload, data link and VSM
- Environmental data to the UAV system elements
- Status from the UAV, payload, data link and VSM
- Digital payload data from the UAV - depending on data rate requirements and available bandwidth, digital payload data may require a separate physical interface to be included in a specific DLI implementation

Voice communication with ATC, if required, is outside the scope of this STANAG.

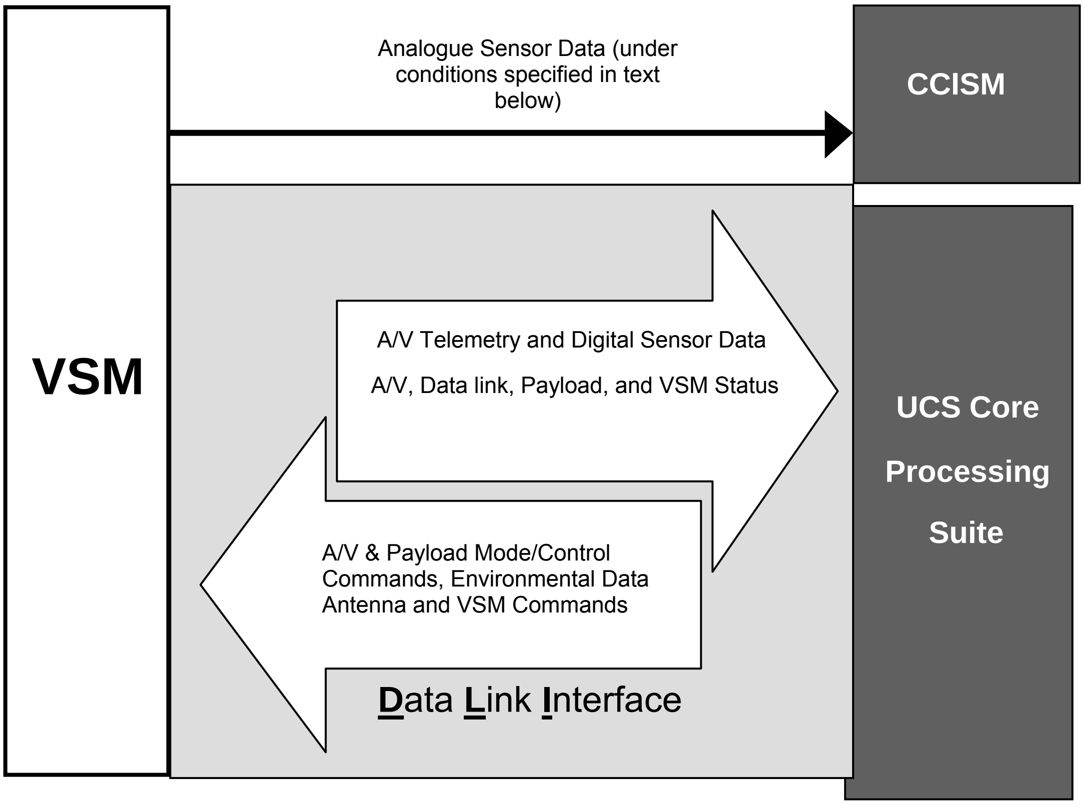

Figure B1 - 4: High-Level Depiction of DLI Interface Content

This STANAG envisions an all-digital medium for data; analogue data interfaces are not within the scope of the DLI. The VSM shall provide analogue to digital conversion (“frame grabbing”) services when imagery or other sensor data is transmitted from the air vehicle in analogue format. Under this circumstance, to avoid unnecessary translation from analogue to digital and back to analogue when a C4I system requires analogue video, the VSM shall provide a dedicated physical interface for displays or for external feeds (through a CCISM).

The physical interface between the CUCS and the VSM functions can differ depending upon where the VSM functionality is physically located. The VSM functionality can reside on the ground as part of the UCS and/or as a subsystem in the air vehicle. When the VSM function is allocated to a component outside the CUCS, its interface with the CUCS, the physical interface, shall support the TCP/IP and UDP/IP protocols (e.g., Ethernet (IEEE 802) – 10Base2, 10BaseT, 100BaseT, 1000BaseT, fibre, etc.). When the VSM functionality resides in the air vehicle, the interface to the VDT portion of the data link is defined in STANAG 7085.

1.5.2 System Latency and Real-time Interface Considerations

In vehicle control systems, designers typically should consider all sources of latency to ensure satisfactory handling qualities and system stability. This is particularly true in a UAV system employing manual control of the aircraft. In such systems, a critical area of concern is the total latency between the air vehicle and the operator controls and displays, as this attribute will strongly influence system performance under manual control.

In the UCS architecture, real-time UAV and data link control functions (when required) are managed by the VSM. The CUCS performs non-real-time processing, and the DLI specifies neither fixed nor maximum latency in exchanges between the VSM and the CUCS. Though message delivery may be guaranteed, latency is not, and consequently real time performance is not guaranteed for signals passing through the DLI. In general, the DLI physical medium will have sufficiently high data rates to support control and display data needs at reasonable rates for human interaction. However, because the DLI medium may potentially be shared among a number of VSMs simultaneously, messaging rates and overall bandwidth may tend to be variable and should not be relied upon.

Several approaches are possible in constituting a UCS-compliant system:

- The VSM performs all real-time functionality autonomously, and data interchange needed to support controls and displays are designed to be of a non-real-time nature. In this approach, controls and displays presented to the user are not dependent upon any particular latency. Changes in latency are managed such that they do not affect readability of displays or performance of controls. For instance, integrators in a control stick filter may use dynamic integration time to avoid changes in the timing of data delivery across the DLI.
- The system is designed to take advantage of measured throughput available through the DLI and in the CUCS using near real time techniques resulting in no significant delays, but special provisions are incorporated to sense and accommodate excessive latency. This approach is somewhat risky in that the CUCS hardware configuration is variable and some configurations may not support a given function or approach.
- Certain manual controls and displays are critical and will be serviced with no noticeable delays (isochronous) process. In this case, processing is performed in the VSM and device interfaces are managed directly by the VSM without passing through the DLI logically or physically. This approach might be used by legacy systems and UAVs that do not have the sophistication to perform autonomous operations.

In the case where the VSM is housed in the aircraft, the CDT shall have a DLI-compliant interface and autonomously perform real time control of the data link.

1.6 Tailoring by Interoperability Level

The applicability of the messages within the complete DLI message sets vary with the selected interoperability level and the selected UAV System functionality. For example, vehicle steering commands are inappropriate at Levels of Interoperability (LOI) 1-3 (as defined in Annex B). The CUCS shall filter messages and respond to, as well as issue, only those messages that are applicable at the currently authorized LOI. The definition of the authorized LOI is contained later in Table B1 - 6, which define applicability of each message.

Level 2/3 monitoring and Level 3 monitor/control are divisible on a per payload station basis for an air vehicle where there is more than one payload (station) located onboard the air vehicle.

Level 4 interoperability is for the air vehicle alone, and does not include payload monitoring or control, as that capability is specified as Level 2/3 (monitor and/or monitor/control) respectively. A CUCS controlling both the air vehicle and its payload is exercising Level 3 and Level 4 control.

1.7 Philosophy of Interface Data Representation

The approach adopted for creating the Interface Data Representation for a message is outlined in the following sub-sections. The general requirements for the generation of a message are identified and each message is defined in detail in Section 4. It is recommended that these requirements be complied with whenever possible in the specification of new messages.

1.7.1 Byte Ordering

The byte ordering shall be most significant byte first.

Floating point numbers shall be as defined in IEEE Standard for Binary Floating-Point Arithmetic, ANSI/IEEE Standard 754-1985, Institute of Electrical and Electronics Engineers, August 1985.

1.7.2 Units

Due to the variety of possible UAV systems envisioned in the future, and the international nature of the interoperability planned for the UCS, the philosophy for developing the message types in the DLI shall be to use metric (SI, ISO 1000:1992) units wherever possible. The DLI is a system-internal representation only between the CUCS and the VSM, and therefore any conversions required for human readability or familiarity (e.g., metres/second to knots) can be performed at the appropriate user interface.

All earth-fixed position references shall be expressed in the latitude-longitude system with respect to the WGS-84 ellipsoid in units of radians using Binary Angle Measurement (BAM). Representations in other systems, such as Universal Transverse Mercator (UTM), shall be converted at the point of use. All times shall be represented in Universal Time Coordinated (UTC) in seconds since Jan 1, 2000 using a 5 byte unsigned integer where the least significant bit represents 0.001 seconds. In 2034 and in subsequent years, when the maximum value of the five byte field is exceeded, the timestamp shall “roll over” and numbering shall restart at zero.

All angular parameters shall be expressed in radians. Bearings shall be measured clockwise from true north. Elevation shall be referenced from local horizontal, positive toward the zenith.

Data quantities, where specified in megabits (or megabytes), shall be specified as 1,000,000 bytes (or bits) instead of 2^{20}. (Reference: Amendment 2 to International Standard IEC 60027-2: Letter symbols to be used in electrical technology - Part 2: Telecommunications and electronics (Jan 1999).)

1.7.3 Approach to Packaging Command Data

The general intent for packaging data was to strike a balance between minimizing the overhead associated with message headers while maximizing the modularity of the message set. In addition, the further intent was to categorize data into logical messages combinations, such as inertial data vs. body-relative data vs. wind-relative data when referring to vehicle state. Command and status data are kept in separate message groups to separate uplink messages from downlink messages. Data for which some sort of acknowledgement receipt is generally required are separated from status information requiring no acknowledgement. Finally, an attempt is made to keep data from appearing in multiple messages to avoid the possibility of inconsistencies.

When fixed point scaling is used to represent real values in this standard, (e.g., 0.0001 radians), the unit column defines the unit of measure (LSB = 0.0001 radians) for the field. Unless specifically stated, a zero fixed point value is equal to a zero real value. In the cases where the range limit values can not be perfectly represented by the fixed point representation, the fix point value closest to, but not exceeding the real limit shall be used. For angular measurement values, Binary Angle Measure (BAM) is used. The real range of $-\pi$ inclusive to π exclusive is mapped to the entire binary range of the field, (e.g., for Integer, 1 - 128 would represent $-\pi$, 0 would represent 0, and 127 would represent $\sim\pi$.

1.7.4 Concept for Autonomy

Autonomous behaviour to be provided by the VSM and/or air vehicle is described using activity identifiers in messages that specify vehicle, payload or data link activities. As depicted in Figure B1-5, each activity that the CUCS requests of the AV/VSM may be immediate or may be part of a set of goals, behaviours and constraints that the CUCS may communicate to the AV/VSM. An activity with an Activity ID value of zero is an activity that the vehicle, payload or data link is to perform immediately. An activity with a non-zero Activity ID is part of a set of goals behaviours and constraints. Message numbers 36000 through 36003 are used to specify the constraints to be applied to the activities with non-zero Activity IDs. Messages 36100 and 36200 are used to describe activity status from the VSM to the CUCS during mission execution. The 36000 series of messages are also used by the AV/VSM to communicate its ability to comply with the requested constraints.

During initialization and discovery, the AV/VSM shall indicate whether or not it supports the Activity ID field for each activity message. If a AV/VSM indicates that it doesn't support an Activity ID field for a particular activity, then the only AV/VSM supported operation for that activity is immediate (Activity ID = 0).

To implement autonomous operations for a AV/VSM that supports non-zero Activity IDs, the CUCS shall send a set of activities with non-zero Activity IDs to the AV/VSM. For each non-zero Activity ID the CUCS shall also send one or more activity constraint messages to the AV/VSM indicating the constraints describing the conditions under which the activity is to be performed. After sending all of the activities with non-zero Activity IDs and all of the constraints messages for those activities, the CUCS shall send a constraints complete message. After receipt of a constraints complete message, the AV/VSM shall send a constraint response message for each constraint message received from the CUCS. The AV/VSM shall send an Activity Status Message for each activity whose constraints are marked as "satisfied" in the associated constraint response message. After all of the constraint responses have been sent, the AV/VSM shall send an activity status message for each activity whose constraints have been "satisfied". Finally the AV/VSM shall send a constraint responses complete message.

Note that Activity IDs can be referenced in more than one constraint message, but constraint IDs cannot be reused. Activity IDs will be reused if multiple constraints are to be applied to the same activity. For example, if an activity is to occur before waypoint 9 that could be specified in a constraint message and if the same activity is to occur after waypoint 3 that would be specified in a second constraint message, but both constraint messages would refer to the same Activity ID. If the activity would not be executed because one of the constraints could not be satisfied, it is necessary for that Constraint ID to be uniquely identified so that the user knows why the activity will not occur.

During the execution of the mission, if the AV/VSM determines that constraint satisfaction conditions have changed, the AV/VSM shall send a constraint response for each constraint whose satisfaction condition has changed, followed by an activity status message for each activity whose status has changed and then the AV/VSM shall send a constraint responses complete message. This means that if conditions have changed so that either:

1. an activity that was to have been performed will not be performed

   or

2. an activity that was not to have been performed will be performed

the AV/VSM shall send a constraint response message for each activity where condition 1 or 2, above, has occurred and shall send an activity status message for each activity where condition 2 has occurred and shall then send a constraint responses complete message.

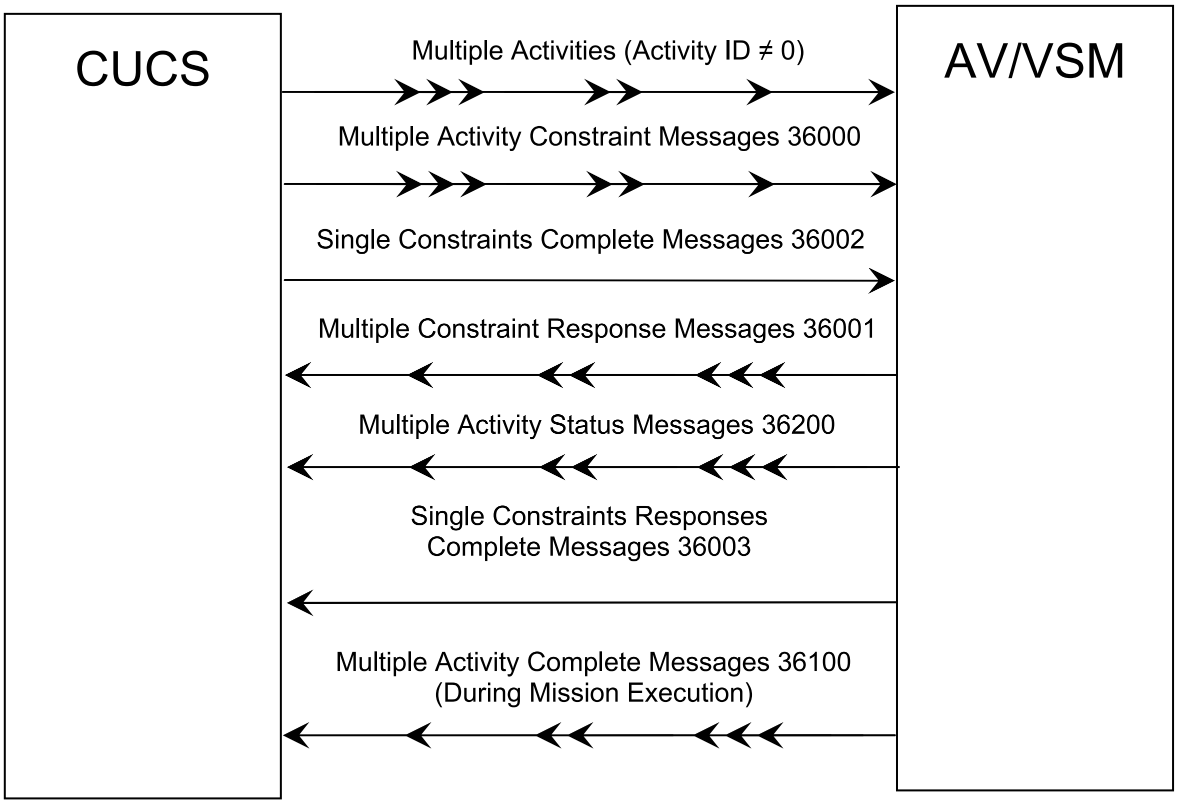

Figure B1 - 5: Autonomy Message Flow

1.7.5 Concept for Display of Vehicle Specific Data

There is a requirement to control and monitor an air vehicle through the generic DLI message set, identified in Section 4 of this document. The generic message set provides the capability for a qualified operator to control and monitor a significant percentage of air vehicle functions through the use of generic control panels and dialogs. The VSM is required to support all the formatted DLI messages that are applicable to the air vehicle for which it has been developed. All data elements contained in the generic message set that are applicable to the air vehicle are therefore available to the CUCS, and are able to be displayed as required in the generic displays, and allow for control of the generic air vehicle functionality by a qualified operator.

There are control and monitoring requirements that an air vehicle may require that are not provided for through the generic DLI message set, as they are not considered to be generic to all air vehicles. There shall, therefore, be a capability to provide additional operator displays and controls for these vehicle specific functionalities. This capability is identified as the “remote display” capability or “vehicle specific” mechanism.

The DLI enables the VSM to display information on the CUCS, for example:

- Vehicle specific displays show status
- Vehicle specific displays allow the selection of options and modes of control
- Vehicle specific displays are independent of the CUCS capabilities, except for specified generic services (e.g., a change in VSM capability should not be limited by the CUCS capability)
- Vehicle specific displays are controlled by the CUCS
- Vehicle specific display information is passed through the DLI interface
- Vehicle specific data intent should be maintained

It is important to note that the CUCS does not know the intended usage of the vehicle specific parameters, and is not able to manipulate the vehicle specific parameters. The vehicle specific data is “remotely displayed” on the CUCS displays. The content and arrangement of these displays is controlled by the VSM, and the displays are therefore tailored to a specific air vehicle. The VSM process is controlling specific air vehicle functionality and providing status information for these specific processes through these remote displays.

1.7.5.1 Vehicle Specific Display Services

For generating the remote displays according to the requirements identified in this section of the document, the following services shall be supported. The display formats are determined by the VSM. The following services are the minimum requirement of the CUCS platform to support interoperability with all VSMs and the maximum allowable for the VSM platform that shall be supported for interoperability:

- Web Browser Services shall be compatible with:
    - http://www.w3.org/TR/REC-CSS1
      Cascading Style Sheets, level 1
      W3C Recommendation 17 Dec 1996, revised 11 Jan 1999

    - http://www.w3.org/TR/REC-DOM-Level-1
      Document Object Model (DOM) Level 1 Specification
      Version 1.0
      W3C Recommendation *1 October 1998*

    - http://www.w3.org/TR/html4
      HTML 4.01 Specification
      W3C Recommendation 24 December 1999

- http://www.ecma-international.org/publications/files/ecma-st/Ecma- 262.pdf
  Referred as to Jscript or JavaScript
  ECMA Script 262 or ISO/IEC 16262 3rd Edition December 1999

- Java applet mechanism shall be compatible with:
  - Sun Microsystems Compliant JRE V1.1 or superior version
  The Java applet mechanism shall be integrated with the Web Browser Service.

- The X-Server Services shall be compatible with:
  - X11R6 X Window System Release 6
  http://www.x.org/Downloads/

1.7.5.2 Vehicle Specific Display Requests and Presentation

Vehicle Specific (remote) displays are initiated by the CUCS making a request to the VSM, through the mechanisms provided by the generic formatted DLI message set.

The Remote Display philosophy is that the generic control panels shall be displayed to the operator prior to requesting the remote displays, and the CUCS shall have been authorized control of the specified AV. To initiate the transmission of the remote displays from the VSM, the CUCS shall transmit Message #42001, CUCS Resource Report, to the VSM. The VSM shall transmit the required Vehicle Specific control panels after the reception of the CUCS Resource Report message. The CUCS Resource Report provides the VSM with the details of where to transmit and locate the remote displays.

As identified previously, the CUCS is required to contain a browser, an x-windows display capability, and a Java run-time environment in accordance with Section 1.7.5.1 Vehicle Specific Display Services. The positive control over the remote services shall be a CUCS responsibility, to include the security settings for these services. It is a CUCS responsibility to ensure adequate services are selected for the remote displays. As an example, for the web browser service this means that the selected browser must have adequate security settings to disallow un-requested windows from popping up on the system; potentially have the capability to hide the close button; and disallow the resizing of the remote display windows, etc.

Vehicle specific displays can be used to request additional vehicle specific displays. When these additional vehicle specific displays are required, they shall be initially displayed within the resources allocated by Message #42001 or within the window from which it was requested. A second method of an operator initiating remote displays from the VSM is through the use of the STANAG 4586 “Subsystem State Report Reference” field of Message #15001, Subsystem Status Detail Request. These processes ensure that the operator must request all remote panels for display thus maintaining positive control over the displays.

Remote Displays shall not be initiated by the VSM via Message #16000 or #16001 until the CUCS Resource Report has been transmitted to the VSM.

VSM shall use remote services that transmit remote displays to the CUCS in accordance with Message #42001, CUCS Resource Report. This provides a second level of security to ensure remote displays are displayed where expected on the CUCS displays, and not covering critical data.

Refer to Section 4.25.2 Message #42001: CUCS Resource Report for additional requirements.

Figure B1-6 below provides a representation of how the remote displays are generated using the subsystem reference report. The generic displays will identify a warning condition and any requirement to place a vehicle-specific display on the CUCS display screens. The additional information will usually be information specific to the air vehicle and not provided through the generic message set.

In Figure B1-6, a generic warning indication is provided to the operator in the generic displays identifying a problem with Engine #2. An enunciator flashes to indicate to the operator that an engine warning state exists, and identifies a more detailed display is available to the operator. The operator may request the additional information by clicking on the enunciator, which then generates a request to the VSM through the generic message mechanism, requesting the detailed Engine #2 status information. The VSM then transmits the required information to the CUCS through the vehicle-specific mechanism implemented for the air vehicle. The CUCS then displays this information to the operator in a controlled manner.

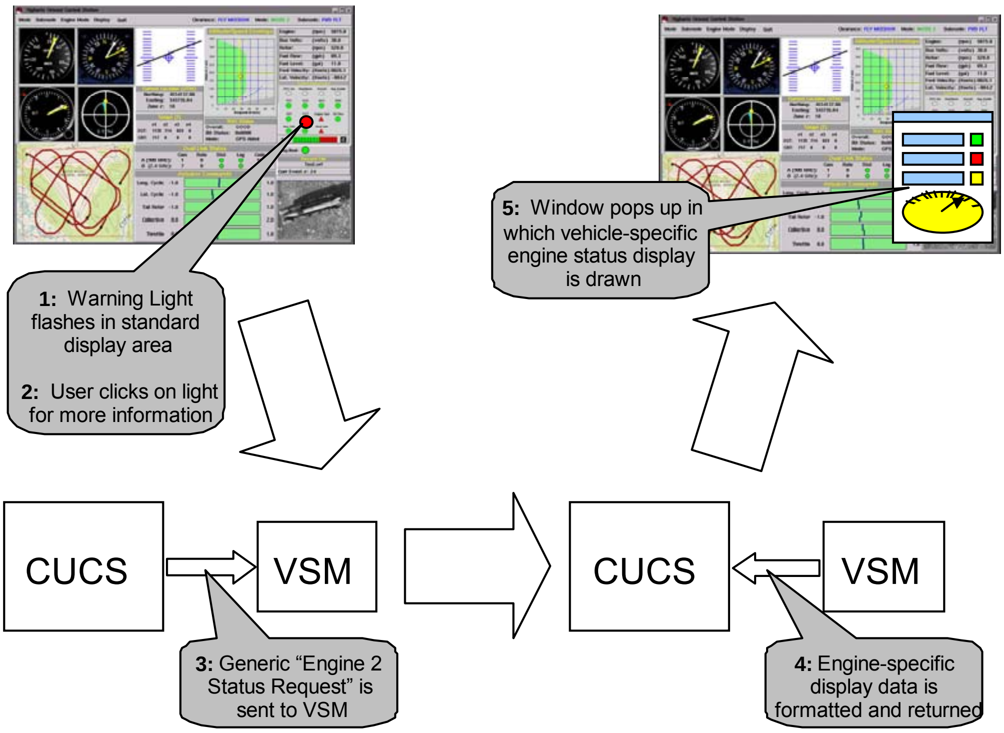

Figure B1 - 6: Typical Scenario for Generating Vehicle-Specific Displays

The vehicle specific mechanism provides the capability to create CUCS displays for a specific air vehicle, without having to present data that is specific to a particular vehicle in a set of generic displays, thus eliminating unnecessary clutter from the displays. This capability also eliminates the need for the CUCS to carry around large libraries of display functions for many different types of air vehicles that would be difficult to keep current. In this concept, the VSM is responsible for providing the information necessary for detailed system management functions, and that information remains hidden from the operator until needed.

1.7.6 Vehicle, Data Link, and CUCS Identification (ID) Numbers

Each message shall contain fields that specify the identification (ID) numbers for the air vehicle and CUCS that are communicating with one another. Some messages also contain the Data Link ID and the VSM ID. The VSM ID is provided in those messages which may be required to be transmitted between a CUCS and a VSM in advance of a connection to an air vehicle, payload or a data link. The purpose of these numbers is to uniquely identify any entity in an arbitrarily formed system combining multiple CUCS, air vehicles, and data links all potentially interacting with VSMs which may control zero or more vehicles at a time. A VSM that controls zero air vehicles might require connection to a CUCS in advance of receiving an air vehicle handoff from another STANAG 4586 ground station.

ID numbers shall be formed as 4-byte numbers. The first (most significant) byte shall be the standard NATO country code, as defined in Table B1-1, NSIF Country Codes. NATO may assign additional country codes at its discretion. Country code 255 (hexadecimal FF) shall be reserved. The next three bits shall identify the type of component requiring identification. The remaining 21 bits shall be assigned and maintained by the individual countries in accordance with their specific procedures and protocols. It is the responsibility of the specific country to ensure uniqueness in these 21 bits to eliminate potential component conflicts. This numbering scheme and valid component codes are illustrated in Figure B1-7.

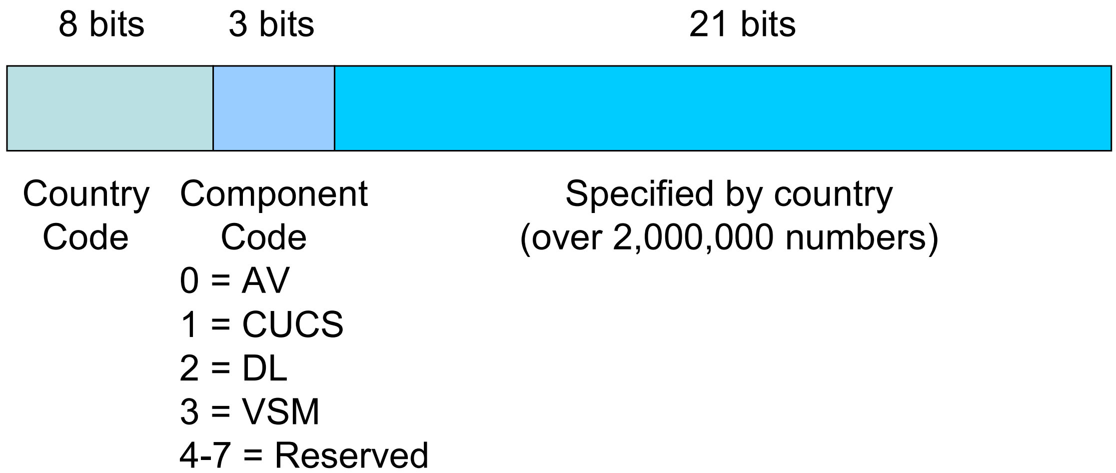

Figure B1 - 7: ID Numbering Scheme

The purpose of these numbers is to uniquely identify any entity in an arbitrarily formed system combining multiple CUCS and multiple vehicles with multiple interacting VSMs, each of which may control one or more vehicles at a time. STANAG 1059 Edition 8 provides the latest 3 letter country codes. The country codes are 3-letter character sets, e.g. USA, which would require 3 bytes to represent. Since we only allocate 1 byte, we need a specific numerical code to represent the NATO countries. Using STANAG 1059 defined 3 letter country codes, Table B1-1 assigns an integer to a NATO and Partner for Peace (PfP) nation. NATO member nations (including NATO owned assets) are in the range from 1 to 99. For PfP nations the range is from 100 to 200.These codes would be used for the first byte of the ID number designating the asset country code.

Each STANAG 4586 compliant Air Vehicle, data link, and CUCS shall be assigned a unique system ID within its respective type. Among the three types (A/V, data link, or CUCS), devices of different types may have an identical ID number, but this should be avoided where possible. If sharing of numbers across types are used, it shall be according to the member nations' procedures.

In this document and in the accompanying Implementation Guide, ID numbers will be represented as individual hexadecimal bytes separated by colons (e.g., 10:4E:F3:06). ID number FF:FF:FF:FF shall be reserved as a broadcast ID referring to all vehicles, and FF:00:00:00 shall be reserved as a null ID. 0.xx.xx.xx shall be reserved for logical IDs that describe a logical air vehicle that does not have a specific instantiation. These logical IDs are defined by the VSM manufacturer.

Each STANAG 4586 compliant device shall be responsible for maintaining a permanent record of its ID number and being able to provide its ID number upon request. For air vehicles and data link systems not possessing assigned IDs, the VSM employed to interface with that system shall maintain a correspondence between devices and assigned ID numbers.

A VSM receiving a CUCS Authorisation Request Message (Message #1, see Section 4.2.1) with a broadcast request ID, will respond with at least one VSM Authorisation Response Message (Message #2, see Section 4.2.2), and more than one if more than one AV/ payload entity type/subtype combination is controllable through the VSM. When a VSM is not connected to an air vehicle/ payload the vehicle ID field shall be filled with a distinct logical vehicle ID. A distinct logical ID shall be reported up to the number of vehicle entities that the VSM can control/ monitor.

Country	**NATO number code used in STANAG 4586**	**NATO (ISO) three letter code**
NATO Security Asset	001	*[none defined]*
BELGIUM	002	BEL
BULGARIA	003	BGR
CANADA	004	CAN
CZECH REPUBLIC	005	CZE
DENMARK	006	DNK
ESTONIA	007	EST
FRANCE	008	FRA
GERMANY	009	DEU
GREECE	010	GRC
HUNGARY	011	HUN
ICELAND	012	ISL
ITALY	013	ITA
LATVIA	014	LVA
LITHUANIA	015	LTU
LUXEMBOURG	016	LUX
NETHERLANDS	017	NLD
NORWAY	018	NOR
POLAND	019	POL
PORTUGAL	020	PRT
ROMANIA	021	ROU
SLOVAKIA	022	SVK
SLOVENIA	023	SVN
SPAIN	024	ESP
TURKEY	025	TUR
UNITED KINGDOM	026	GBR
UNITED STATES	027	USA
PfP		
ALBANIA	100	ALB
ARMENIA	101	ARM
AUSTRIA	102	AUT
AZERBAIJAN	103	AZE
BELARUS	104	BLR
CROATIA	105	HRV
FINLAND	106	FIN
GEORGIA	107	GEO
IRELAND	108	IRL
KAZAKHSTAN	109	KAZ
KYRGYZSTAN	110	KGZ

Country	**NATO number code used in STANAG 4586**	**NATO (ISO) three letter code**
REPUBLIC of MOLDOVA	111	MDA
RUSSIAN FEDERATION	112	RUS
SWEDEN	113	SWE
SWITZERLAND	114	CHE
TAJIKISTAN	115	TJK
TURKMENISTAN	116	TKM
UKRAINE	117	UKR
UZBEKISTAN	118	UZB
THE FORMER REPUBLIC OF MACEDONIA*	119	FYR**

Table B1 - 1: NSIF Country Codes

* Turkey recognises the Republic of Macedonia by its constitutional name
** It is NATO three letter code only (ISO letter code is MKD and it is not to be used)

2 System Functional Requirements By Mission Phase

The DLI data content is determined by the functional requirements of the CUCS and VSM needs to communicate with one another. The set of common functions and vehicle/payload specific functions from which data elements of the DLI are described can be found in detail in Section 4. Functionality is categorised by the phase of a UAV mission. Within each mission phase, functionality is identified as either common (meaning consistent across all vehicle and payload types) or vehicle-specific. In most cases, vehicle specific functions are those that vary either in procedure or in data content and will require interaction between the CUCS and the VSM to how those functions are to be performed. The functions within each of the phases of the UAV mission are described in the table below.

Mission Phase	Common Functions	Vehicle-Specific Functions
Pre-flight	Interoperable Mission Planning Mission Plan / Verify Upload Process. Common Built-In-Testing (BIT). Mission Go / No-go	Vehicle Availability. Flight Plan Validation. Lost Link Strategy. Vehicle Specific BIT. Payload Configuration Validation & BIT checks. Pre-flight Checkout and Initialisation. Downloaded Mission Plan Validation. UCS/Vehicle Communications. Clocks Synchronization (Air Vehicle & UCS).
Takeoff	Local ATC Communications. Checklists Complete Validation. UCS/UAV Communications Validation. Takeoff Clearance Acquisition.	Ground Traffic Pattern/Plan Execution. Ground Operations Safety Constraints Monitoring. Launch. Abort Sequence Management.
Ingress / Egress	Mission Execution Monitoring. Active Emitters (e.g., radar) Activation.	UAV Vehicle-Specific Handoff Data Management.
Prime Mission Area (Target Area)	Generic Payload Control. Payload Data Handling. Mission Execution Monitoring. System Status Summary Information.	Detailed System Status Monitoring. Payload Specific Control & Monitoring. Payload Specific Data Handling
Approach / Landing	ATC Coordination. Recovery Procedures Execution.	Approach Flight path Acquisition and Maintenance. Landing Sequences Execution. Taxi Sequence Execution. Shutdown / Safing Checklists & Procedure Execution.
Post-Mission Reporting	Mission Execution Summary Report.	Vehicle Maintenance Status Report.
Phase-independent In-flight	UAV handoff among UCSs Management. Mission Execution Monitoring. Mission Phase Monitoring. General Health & Status Monitoring (H&SM) and Warning. Dynamic Flight Path Replanning. Multiple (Possibly Different) Aircraft Control. Data Recording / Buffering. CDT Control, Status, & Initialisation.	Detailed Health & Status Monitoring. Lost Link Strategy Execution and Monitoring. Operator Control Modes Management. CBIT (Continuous Built-In-Tests) Across Subsystems. Differential GPS Corrections.

Table B1 - 2: Common vs. Vehicle Specific Functions by Mission Phase

3 Message Distribution Standard

3.1 Introduction

A primary goal of the Core UAV Control System (CUCS) is to provide a set of functions that are common among many different vehicle platforms and different C4I systems. Some of the functions of the CUCS include providing connectivity with various national C4I systems, providing standard controls and displays for qualified users with an appropriate training background to operate differing air vehicle platforms, providing standard operations and maintenance displays, and providing a common basis for battle space awareness and mission management. However, to perform the full range of its functions in a manner that is truly interoperable among different vehicle platforms and varying external ground-based systems, the CUCS should have a consistent, common way of obtaining input from and providing output to external systems. A common “language” for expressing key information has to be established that is both robust enough to support a full range of functions as well as flexible enough to adapt to a rapidly changing technology environment. The DLI in particular should address this problem, as it shall serve as the point of contact between vehicle specific systems and the CUCS.

A common approach to providing inter-process (and inter-processor) communications is a technique known as “message passing.” In a message passing system, data serving a common purpose is aggregated into structured packages that are commonly understood by both sender and receiver. A system for transporting messages, assuring proper delivery, and managing allocation of resources, as well as a standard definition for how data is packaged and formatted, is all that is required. If a commonly available library of functions is provided for these services, robust integration can be achieved at relatively little extra cost and with very little interaction among disparate development teams. Properly defined, this technique of formatting, packing, transmitting, parsing, and interpreting information can be as flexible, detailed, and robust in application as needed. If defined as an open standard, it can assure interoperability among independently developed systems.

This section provides a definition for message content and handling methods within the CUCS. In general, inter-process communications shall be implemented as message transactions in which data is sent in half-duplex mode from one process to another.

Data communications within a given process may be managed by whatever means the developer chooses, consistent with sound software engineering practices. Interoperability between tasks within a process is entirely within control of the developer because performance constraints may not always permit messaging system overhead.

3.2 Requirements

A message handling structure shall, as a minimum, consist of the following elements:

- Definition of structured data format and content for standard information.
    - For information supporting common functions within the CUCS that is supportable across multiple system types, a set of messages are defined that specify the variables, values, data formats, and locations within the message to permit efficient handling of the information according to a

consistent scheme. This structure should not be burdened by vehicle or system specific “baggage”, and shall encompass only that which serves a common purpose. This structured data definition should not unduly burden message passing with unnecessary data.

- A means for transmitting unstructured data.
    - o Some information will have to be exchanged between air vehicle and ground processing elements that support platform-specific functionality. A generalized messaging scheme shall be capable of passing data for which the format and content of the message are unknown to the CUCS but through which the data should pass.
- A means of managing transport of messages of any type.
    - o A variety of message types will have to be supported, and a means for distinguishing among types for proper processing shall be defined. Furthermore, UAV systems will have multiple channels for transporting information among system components, and the messaging system has to be capable of managing messages passing among multiple source-destination pairs across multiple communications channels.
- A means for managing multiple (possibly redundant) channels of communications among multiple processes.
    - o This requirement has several different “flavours.” Data may need to be replicated across multiple channels for the sake of redundancy. Data may need to be passed from one process to a sole recipient (private communication) or from one process to many (broadcast communication). To assure interoperability and portability among environments, the means of transporting and routing messages shall be independent of the physical transport mechanism used (e.g., Ethernet, dedicated serial port, Unix sockets) and transport protocol (either TCP/IP or UDP, depending on the port used).
    - o In the case where data integrity must be formally checked, a transport independent means of checking it should exist.
- A means of cataloguing an expanding set of message types and tracking changes needed to support evolving technology.
    - o UAV technology is rapidly evolving, and a static system definition will soon become obsolete. Therefore, provision shall be made for supporting a continually evolving set of message types. This catalogue should not only support the definition of the message types, but to be maximally useful it shall also support an open source library of methods for handling new and evolving message types.

3.3 Message Handling Approach

3.3.1 Message Wrapper Information

Each message shall use the message wrapper structure defined in Table B1-3. The header contains information that enables the message handling software to manage transmission and distribution of the messages to the appropriate entities. The footer contains the checksum information that assists identifying transmission errors. The following sections provide a description of each of the data items in the wrapper and its role in the message handling system.

Source Port*	**Destination Port***
Packet Length*	**UDP Checksum***
Sequence #	**Message Length**
Source ID	
Destination ID	
Message Type	**Message Properties**
Data (Message Payload)	
Optional Checksum	

Table B1 - 3: Message Wrapper Structure

Special Note: Unless otherwise noted, all header entries described below shall be 16-bit unsigned integers generated sequentially by an application call to a core library function. The intent is that the message packet sequence number shall not be reused within a given mission. However, because ID utilization rates and mission duration's can vary without bound, the burden is left on the application developer to ensure that any reuse of ID numbers shall not result in ambiguity of meaning for the receiving process. (This may be managed, for example, by tagging messages for which reuse may occur with date-time groups). "*" indicates a UDP header field and is shown in Table B1-3 to illustrate the complete message header including the UDP header. The application layer message wrapper starts with "Sequence #" and ends with "Optional Checksum".

3.3.1.1 Source Port

Field of standard UDP header.

3.3.1.2 Destination Port

Field of standard UDP header.

3.3.1.3 Packet Length

Field of standard UDP header.

3.3.1.4 UDP Checksum

Field of standard UDP header.

3.3.1.5 Sequence #

The purpose of Sequence Number was to provide a means for segmenting data from a single message into sequences of blocks of a maximum length. This field is not used and shall contain "- 1".

3.3.1.6 Message Length

The length shall be a 16-bit unsigned integer of the number of bytes in the "Message Data". The length shall be any number between 1 and 528.
Note. The UDP protocol under IPv4 has a guaranteed minimum datagram size of 576 bytes that must be supported by all implementations. Subtracting the IPv4 header size of 20 bytes and the UDP header size of 8 bytes, leaves 548 bytes as the maximum amount data that can be sent in a datagram that will guarantee interoperability. Therefore, no message or multi-message datagram shall exceed this data limit. Subtracting the message wrapper size of 20 bytes, gives 528 bytes as the maximum message length of a single message with no room for another message in the datagram. Extra care should be taken when packing multiple messages in the same datagram.

3.3.1.7 Source ID

Source ID shall be the ID number of UAS element which is originating/transmitting the message, e.g., air vehicle for downlink messages. ID formation shall be consistent with Section 1.7.6.

3.3.1.8 Destination ID

The Destination ID shall be the ID number for the UAS element for which is the intended recipient of the message, e.g., CUCS for air vehicle downlink messages. ID formation shall be consistent with Section 1.7.6.

3.3.1.9 Message Type

The message type is a 16-bit unsigned integer value associated with the defined messages types below. Message types shall be numbered as shown in Section 4.1.1. It is anticipated that the number of standard message types may grow and that NATO will establish a commission to maintain configuration control on changes to the standard message list. For vehicle specific messages (private), the number range is specified in Section 4.1.1.27.

3.3.1.10 Message Properties

Message Properties is a Bitmapped field with four subfields. The most significant bit shall be used to indicate whether or not receipt of the message shall be acknowledged. When the bit is "1," an acknowledgement shall be sent: if "0," an acknowledgement shall not be sent. The next seven bits (bits 14:8) shall indicate the IDD version number.

<table>
<tr><td>No ACK = 0, ACK = 1</td><td colspan="7">Version
Range 0……127
Draft STANAG 4586
Edition 3 for Ratification = 10
Future Drafts/Editions…11 -127</td><td colspan="2">Checksum Length
No Checksum = 0
2 bytes = 01
4 bytes = 10</td><td colspan="6">Reserved for Future Use</td></tr>
<tr><td>15</td><td>14</td><td>13</td><td>12</td><td>11</td><td>10</td><td>9</td><td>8</td><td>7</td><td>6</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td><td>0</td></tr>
</table>

Figure B1 - 8: Message Properties Field Definition

Each message shall contain the version identification of the Interface Definition Document (IDD) from which its structure was defined. This version identification shall be placed in a fixed 7 bit field. Version identification management shall be used by error checking functions to validate format consistency. Table B1-4 shows the current version of the IDD that has been assigned.

STANAG 4586 Document Version	IDD Version Identification
STANAG 4586 Edition 3	30

Table B1 - 4: IDD Version Identification

Checksum Length	Checksum
00 bin = "0"	No Checksum is used
01 bin = "1"	2 bytes
10 bin = "2"	4 bytes

Table B1 - 5: Checksum Length

3.3.1.11 <u>Optional Checksum</u>

In addition to the UDP checksum (part of the UDP header), Optional Checksum may be employed to determine the presence of errors during transmission or handling of messages. The use of optional checksum and its length, i.e. 2-byte or 4-byte, is specified by the checksum length field of Message Properties as illustrated in Table B1 - 5. The checksum is an unsigned integer and calculated by simple, byte-wise unsigned binary addition of all data contained in the message excluding the checksum, and truncated to 2 or 4 bytes.

4 Generic (Common) DLI Message Overview

4.1 Common Message Properties

The Message Summary and Properties Tables (Tables B1 - 7 – B1 - 34) in this section define the required messages that shall be implemented in order to enable the desired UAV NATO LOI via the DLI. Control systems will have a set of common commands and requests for the air vehicle, such as air vehicle or payload operating commands. The primary purpose of this section is to define the set of generic (common) messages for communicating across the DLI interface between the VSM/AV/Data Link and the CUCS. The information contained in the messages will be used for the display and control of functions common to a STANAG 4586 compliant UCS implementation. The intent of this Appendix is to provide an expandable structure and preliminary set of message definitions that can grow with UAS technology.

The goal of the common message set is to provide standard information and the functional groupings required by a CUCS for use in displays that can be made common to all UAVs monitored or controlled by that CUCS. Provisions are also made for the development and use of vehicle-specific (private) message types and remote displays. Manufacturers may provide any amount of information, whether or not redundant with the common message types, as required by their particular design, but must still support the generic messages that contain that data. The generic (common) message types for a functional grouping shall be supported by the VSM (vehicle, payload, data link) regardless of where that functionality is allocated, e.g. Vehicle, CUCS, etc., for a STANAG 4586 system to guarantee interoperability and be considered a compliant implementation. As not every data element in the applicable generic messages are required by the VSM (vehicle, payload, data link) in every application, the general configuration messages allow the identification of unsupported data elements within a message or of non-support for a complete message within a functional grouping.

Receiving processes shall perform range checking and properly handle out-of-range values for their system. The generic messages provide the capability to modify the ranges and contents of the generic message data elements to specifically tailor a message to the UAV system as applicable. Out of range values, invalid data and non-supported messages shall not cause the CUCS/VSM to be adversely affected if received by the system.

All the messages detailed in Section 4.1.1 below start with a presence vector. The presence vector is a “Bitmapped” field indicating which fields in the remainder of the message are present in that message. Each bit represents a specific field. A “1” in a given bit location indicates that the field is present, and a “0” indicates that the field is absent. For example, a message containing ten fields would have a two-byte Presence Vector. The least significant bit indicates the presence of the time stamp (field 1), the next more significant bit indicates the presence of the second field, etc.

The first field after the presence vector is the time stamp indicating the time the data contained in the message was captured (or confirmed as valid). It is recommended, but not required, that the time stamp be present in every message to enable data recording and message handling. In the event that the time stamp is omitted via a zero in the first presence vector bit, then message order shall be presumed to be in order of receipt, rather than by time. The message sender shall be responsible for assuring that omission of certain fields shall not result in an inconsistent or undefined meaning of the message as a whole.

The message tables contained in this section of the document define functional groupings that shall be supported by the CUCS. These tables also shall be supported by a VSM if the NATO UAV LOI and functional group is supported by the UCS system.

4.1.1 Common Message Functional Groups

In the development of the STANAG 4586, the generic (common) messages have been grouped and numbered according to their functionality. These groups of messages are defined as Functional Groups. The currently defined Functional Groups are as follows:

a. System ID
b. Flight Vehicle Command
c. Flight Vehicle Status
d. Flight Vehicle Payload Relevant
e. IFF Command
f. IFF Status
g. ATC Interface Command
h. ATC Interface Status
i. Vehicle Auxiliary Command
j. Vehicle Auxiliary Status
k. Mission Command and Status
l. Subsystem Status
m. Miscellaneous Messages
n. Payload Command
o. Payload Status
p. Weapons Command
q. Weapons Status
r. Data Link Discovery
s. Data Link Command
t. Data Link Status
u. Data Link Transition
v. General Pre-connection Configuration
w. General Post-connection Configuration
x. Autonomy
y. VSM Forced Commands
z. Draw Interface
aa. Private Messages

The applicability of the messages within the complete DLI message set varies with the selected interoperability level (LOI) and the selected UAV System functionality. The following table is a summary of the requirements to implement each of the functional message groups to achieve a specific LOI.

The LOI columns in the table associate the functional message groups with the level of control the CUCS has over the air vehicle and/or its payloads to include the VDT Data Link.

The LOI fields shall define the requirement to implement the specified functional message group for a specified LOI. LOI 2 has been reserved for a ground station that is capable of receiving other STANAG compliant digital payload data (e.g., STANAG 4545, 7023, 4609) for a specific payload type and the associated auxiliary data (pointing, position), and such a ground station shall be considered STANAG 4586 LOI 2 compliant for that payload type without having to receive the formatted LOI 3 DLI payload messages for that payload type, e.g., for these ground systems these messages are optional for LOI 2. LOI 3 messages are for the control / monitoring and/or monitoring of Payloads types that are installed onboard an air vehicle. LOI 4 messages are for the control/monitoring and/or monitoring of an air vehicle, without the capability to launch or recover the air vehicle. Since Launch and Recovery is vehicle specific, complex LOI 5 functionality for Launch and recovery functions is not implemented via generic STANAG 4586 DLI messages. Launch and Recovery functions in excess of the flight modes provided in Message #2001, Vehicle Operating Mode Command, shall be implemented through the VSM using the vehicle specific mechanism or through the definition of private messages. As a result, there are no defined LOI 5 formatted DLI messages.

The Functional Message Groups in Table B1 - 6 specify at which LOI(s) each of the messages must be supported by the CUCS / VSM to achieve a compliant STANAG 4586 implementation for that LOI. In general, the messages are not to be transmitted between the CUCS and VSM until an authorized connection between the two components has been established (accomplished via Message #1 and Message #2 for all functionality with the exception of Data Links); however certain messages such as the System ID Messages are required to be exchanged in advance of a connection to actually create the connection. Messages that are allowed to be transmitted "outside" a valid connection will be noted.

O = Optional, Y = Yes

Message Group	LOI 2	LOI 3 (Monitor)	LOI 3 (Control)	LOI 4 (Monitor)	LOI 4 (Control)	LOI 5	Comment
System ID	O	Y	Y	Y	Y	Y	
Flight Vehicle Command	-	-	-	-	Y	Y	
Flight Vehicle Status	-	-	-	Y	Y	Y	
Flight Vehicle	O	Y	Y	Y	Y	Y	-

Message Group	LOI 2	LOI 3 (Monitor)	LOI 3 (Control)	LOI 4 (Monitor)	LOI 4 (Control)	LOI 5	Comment
Payload-relevant							
IFF Command				-	Y	Y	
IFF Status				Y	Y	-	
ATC Interface Command				Y	Y	Y	LOI applicability is ATC equipment dependent
ATC Interface Status				Y	Y	Y	LOI applicability is ATC equipment dependent
Vehicle Auxiliary Command				Y	Y	Y	
Vehicle Auxiliary Status				Y	Y	Y	
Mission Command and Status:							
Vehicle Mission Messages		O	O	Y	Y	Y	Note: In LOI 4M only require messages from VSM to CUCS.
Payload Mission Messages		O	O	Y	Y	Y	Note: In LOI 4M only require messages from VSM to CUCS.
Subsystem Status		Y	Y	Y	Y	Y	LOI 3/ 3M – required payload systems only. LOI 4M – status messages only.
Miscellaneous Messages	O	Y	Y	Y	Y	Y	
Payload Command		-	Y	-	-	-	
Payload Status	-	Y	Y	-	-	-	

Message Group	LOI 2	LOI 3 (Monitor)	LOI 3 (Control)	LOI 4 (Monitor)	LOI 4 (Control)	LOI 5	Comment
Weapons Command			Y				
Weapons Status		Y	Y				
Data Link Discovery	O	Y	Y	Y	Y	Y	
Data Link Command:							
Control Data Link (CDT)	LOI is not applicable to the Control Data Link Terminal (e.g.; GDT), however the STANAG DLI messages are mandatory for controlling a STANAG 7085 CDT. The messages are optional for all other Data Link types.						
Vehicle Data link (VDT)	O	O	O	O	Y	Y	In LOI 3/3M, these messages are optional as a LOI 3 operator may not be allowed to control/ monitor a VDT Data Link. The VDT is considered a vehicle subsystem, therefore separation of this system from the vehicle is an implementation decision.
Data Link Status:							
Control Data Link (CDT)	LOI is not applicable to the Control Data Link Terminal (e.g.; GDT), however the STANAG DLI messages are mandatory for monitoring a STANAG 7085 CDT. The messages are optional for all other Data Link types.						
Vehicle Data link (VDT)	O	O	O	Y	Y	Y	In LOI 3/3M, these messages are optional as a LOI 3 operator may not be allowed to control/ monitor a VDT Data Link. The VDT is considered a vehicle subsystem,

Message Group	LOI 2	LOI 3 (Monitor)	LOI 3 (Control)	LOI 4 (Monitor)	LOI 4 (Control)	LOI 5	Comment
							therefore separation of this system from the vehicle is an implementation decision.
Data Link Transition			O		Y	Y	
Autonomy:							
Vehicle Autonomy		O	O	Y	Y	Y	
Payload Autonomy		O	O	Y	Y	Y	
General Pre-Connection Configuration	O	Y	Y	Y	Y	Y	
General Post-Connection Configuration	O	Y	Y	Y	Y	Y	
VSM Forced Commands							
Private Messages	O	O	O	O	O	O	VSM-specific
Draw Interface		O	O	O	O	O	
Payload data (product):							
Primary data	Y	Y	Y				
Embedded Metadata	Y	Y					

Table B1 - 6: Functional Message Group Table

In the following tables, i.e. Tables B1 – 7 through B1 - 34, each Message type entry is identified with several properties, one of these properties is labelled the “Push/Pull” property. Push messages are communicated either periodically or based on some event, but do not require a request to result in sending a message. Pull messages are messages that are communicated in response to a request. This mechanism is used to assure that data link bandwidth is not unnecessarily consumed by unneeded data.

The Source property in the tables shall identify the component from which the message is issued (CUCS or VSM). Where VSM is identified as the source of the message in the table, it can be considered to mean either the VSM, AV, or Data Link as appropriate dependent on the functionally grouping and selected implementation of the UCS System.

The Allowable Max Latency (msec) property defines the maximum transport delay between the HCI input and the output at the DLI interfaces on a CUCS.

DLI common messages shall all be transmitted through a port configured for communications using UDP multicast. UDP multicast enables multiple processes (VSMs and CUCSs) to communicate with each other on a single IP address and port number. Since UDP does not provide guaranteed delivery, messages requiring acknowledgement of receipt shall be acknowledged using the Message Acknowledgement (Message #17000). Messages designated as “Push” type messages may be communicated without the requirement for acknowledgement. This allows transmission of streaming and ephemeral data (such as periodic vehicle state data) for which retransmit is neither required nor desired. Messages designated as “Pull” type messages are responses to queries and the message is itself an acknowledgement. UDP multicast of these “Pull” type messages makes it possible for multiple CUCSs to remain synchronized with each other and with multiple VSMs by monitoring query/response transactions for vehicles and payloads that are controlled by other CUCSs. However, acknowledgement of receipt of a request to generate a pull-type message may be required if delayed response is an issue. In such cases, the Message Acknowledgement bit in the header shall be used to fulfil a requirement for such acknowledgement cases.

4.1.1.1 System ID Functional Group

The messages defined in the System ID Messages table shall compose the System ID Functional Group of messages. The messages identified here as pulled from the VSM will be in response to the command. The System ID messages shall be able to be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
SYSTEM ID MESSAGES (Section 4.2)					
1	1	CUCS Authorisation Request	Push	CUCS	2,000
2	21	VSM Authorisation Response	Push/Pull	VSM	2,000
3	20	Vehicle ID	Push/Pull	VSM	1,000
	22-39	Unassigned message types in the range of 0 - 1999 are reserved			

Table B1 - 7: System ID Messages

4.1.1.2 Flight Vehicle Command Functional Group

The messages defined in the Flight Vehicle Command Messages table shall compose the Flight Vehicle Command Functional Group of messages. The Flight Vehicle Command messages shall not be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
FLIGHT VEHICLE COMMAND MESSAGES (Section 4.3)					
2000	40	Vehicle Configuration Command	Push	CUCS	2,000
2001	42	Vehicle Operating Mode Command	Push	CUCS	1,000
2002	43	Vehicle Steering Command	Push	CUCS	1,000
2003	48	Mode Preference Command	Push	CUCS	2000
2004	41	Loiter Configuration	Push	CUCS	2,000
2005	46	Flight Termination Command	Push	CUCS	500
2006	47	Relative Route/Waypoint Absolute Reference Message	Push	CUCS	1,000
2007	44	Air Vehicle Lights	Push	CUCS	500
2008	45	Engine Command	Push	CUCS	500
2009	49	Zeroize Encryption Keys Command	Push	CUCS	500
	50 – 99	Unassigned message types in the range of 2000 –2999 are reserved			

Table B1 - 8: Flight Vehicle Command Messages

4.1.1.3 Flight Vehicle Status Functional Group

The messages defined in the Flight Vehicle Status Messages table shall compose the Flight Vehicle Status Functional Group of messages. The Flight Vehicle Status messages shall not be able to be sent between a CUCS and VSM without an authorized connection, with the exception of Message #3000, Vehicle Configuration Message in response to a specific configuration request via Message #17002, Generic Information Request Message.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
FLIGHT VEHICLE STATUS MESSAGES (Section 4.4)					
3000	100	Vehicle Configuration	Pull	VSM	10,000
3001	106	Vehicle Operating Mode Report	Push/Pull	VSM	2,000
3002	104	Vehicle Operating States	Push/Pull	VSM	1,000
3003	109	Mode Preference Report	Push/Pull	VSM	2000
3004	112	Loiter Configuration Report	Push/Pull	VSM	1000
3005	108	Flight Termination Mode Report	Push/Pull	VSM	2,000
3006	107	Vehicle Lights State	Push/Pull	VSM	500
3007	105	Engine Operating States	Push/Pull	VSM	500
3008	111	Zeroize Encryption Keys State	Push/Pull	VSM	500
3009	102	Air and Ground Relative States	Push	VSM	1,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
3010	103	Body-Relative Sensed States	Push	VSM	200
	113 - 199	Unassigned message types in the range of 3000 – 3999 are reserved			

Table B1 - 9: Flight Vehicle Status Messages

4.1.1.4 Flight Vehicle Payload Relevant Status Functional Group

The messages defined in the Flight Vehicle Payload Relevant Status Messages table shall compose the Flight Vehicle Payload Relevant Status Functional Group of messages. The Flight Vehicle Payload Relevant Status Messages have been distinguished from the other Flight Vehicle status messages to limit implementation of messages on a system, CUCS and VSM that require the flight vehicle orientation, or location knowledge, to correctly implement LOI 3 monitor capabilities for a payload. The Flight Vehicle Payload Relevant Status Messages shall not be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
FLIGHT VEHICLE PAYLOAD RELEVANT MESSAGES (Section 4.5)					
4000	101	Inertial States	Push	VSM	1,000
4001	110	From-To-Next Waypoint States	Push	VSM	2000
		Unassigned message types in the range of 4000 – 4999 are reserved			

Table B1 - 10: Flight Vehicle Payload Relevant Status Message

4.1.1.5 IFF Command Functional Group

The messages defined in the IFF Command Messages table shall compose the IFF Command Functional Group of messages. The IFF Command Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
IFF COMMAND MESSAGE TYPES (Section 4.6)					
5000	1500	IFF Code Command	Push	CUCS	1,000
5001	1501	IFF Ident (Squawk) Command	Push	CUCS	1,000
	1502-1599	Unassigned message types in the range of 5000 – 5999 are reserved		CUCS	

Table B1 - 11: IFF Command Messages

4.1.1.6 IFF Status Functional Group

The messages defined in the IFF Status Messages table shall compose the IFF Status Functional Group of messages. The IFF Status Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
IFF STATUS MESSAGE TYPES (Section 4.7)					
6000	1600	IFF Status Report	Push/Pull	VSM	1,000
	1601-1699	Unassigned message types in the range of 6000 – 6999 are reserved			

Table B1 - 12: IFF Status Messages

4.1.1.7 ATC Interface Command Functional Group

The messages defined in the ATC Interface Command Messages table shall compose the ATC Interface Command Functional Group of messages. The ATC Interface Command Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
ATC INTERFACE COMMAND MESSAGE TYPES (Section 4.8)					
7000		Civilian Air Traffic Control (ATC) Radio Command	Push	CUCS	1,000
7001		NAVAID Radio Command	Push	CUCS	1,000
		Unassigned message types in the range of 7000 – 8999 are reserved			

Table B1 - 13: ATC Interface Command Messages

4.1.1.8 ATC Interface Status Functional Group

The messages defined in the ATC Interface Status Messages table shall compose the ATC Interface Status Functional Group of messages. The ATC Interface Status Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
ATC INTERFACE STATUS MESSAGE TYPES (Section 4.9)					
9000		Civilian Air Traffic Control (ATC) Radio Status	Push/Pull	VSM	1,000
9001		NAVAID Radio Status	Push/Pull	VSM	1,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
		Unassigned message types in the range of 9000 – 10999 are reserved			

Table B1 - 14: ATC Interface Status Messages

4.1.1.9 Vehicle Auxiliary Command Functional Group

The messages defined in the Vehicle Auxiliary Command Messages table shall compose the Vehicle Auxiliary Command Functional Group of messages. The Vehicle Auxiliary Command Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
VEHICLE AUXILIARY COMMAND MESSAGE TYPES (Section 4.10)					
11000		Vehicle Auxiliary Command	Push	CUCS	1,000
		Unassigned message types in the range of 11000 – 11999 are reserved			

Table B1 - 15: Vehicle Auxiliary Command Messages

4.1.1.10 Vehicle Auxiliary Status Functional Group

The messages defined in the Vehicle Auxiliary Status Messages table shall compose the Vehicle Auxiliary Status Functional Group of messages. The Vehicle Auxiliary Status Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
VEHICLE AUXILIARY STATUS MESSAGE TYPES (Section 4.11)					
12000		Vehicle Auxiliary Status	Push/Pull	VSM	1,000
		Unassigned message types in the range of 12000 – 12999 are reserved			

Table B1 - 16: Vehicle Auxiliary Status Messages

4.1.1.11 Mission Command and Status Functional Group

The messages defined in the Mission Command and Status Messages table shall compose the Mission Command and Status Functional Group of messages. The Mission Command

and Status messages shall not be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
MISSION MESSAGES (Section 4.12)					
13000	800	Mission Upload Command	Push	CUCS	1,000
13001	801	AV Route	Push/Pull	CUCS/VSM	2,000
13002	802	AV Position Waypoint	Push/Pull	CUCS/VSM	2,000
13003	803	AV Loiter Waypoint	Push/Pull	CUCS/VSM	2,000
13004	804	Payload Action Waypoint	Push/Pull	CUCS/VSM	2,000
13005	805	Airframe Action Waypoint	Push/Pull	CUCS/VSM	2,000
13006	806	Vehicle Specific Waypoint	Push/Pull	CUCS/VSM	2,000
14000	900	Mission Upload/Download Status	Push	VSM	2,000
	901-999	Unassigned message types in the range of 13000 – 14999 are reserved			

Table B1 - 17: Mission Command and Status Messages

4.1.1.12 <u>Subsystem Status Functional Group</u>

The messages defined in the Subsystem Status Messages table shall compose the Subsystem Status Functional Group of messages. The Subsystem Status Messages shall not be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
SUBSYSTEM STATUS MESSAGES (Section 4.13)					
15000	1000	Subsystem Status Request	Push	CUCS	1,000
15001	1001	Subsystem Status Detail Request	Push	CUCS	1,000
16000	1100	Subsystem Status Alert	Push	VSM	1,000
16001	1101	Subsystem Status Report	Pull/Push	VSM	1,000
16002	1405	Heartbeat Message	Pull	CUCS/VSM	1000
	1102-1199	Unassigned message types in the range of 16000 – 16999 are reserved		VSM	

Table B1 - 18: Subsystem Status Messages

4.1.1.13 <u>Miscellaneous Message Functional Group</u>

The messages defined in the Miscellaneous Messages table shall compose the Miscellaneous Message Functional Group of messages. The Miscellaneous Messages shall not be transmitted between a CUCS and VSM without an authorized LOI connection with the exception of Message #17000, Message Acknowledgement, in response to a request for acknowledgement to a message that may be transmitted without a valid connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
MISCELLANEOUS MESSAGE TYPES (Section 4.14)					
17000	1400	Message Acknowledgement	Pull	CUCS/VSM	1,000
17001	1402	Schedule Message Update Command	Push	CUCS/VSM	2,000
17002	1403	Generic Information Request	Push	CUCS/VSM	1,000
17003	1404	File Transfer Notification	Push	CUCS/VSM	1,000
18000	1800	Link Audio Command	Push	CUCS	500
18100	1825	Link Audio Status	Pull	VSM	500
	1405-1499	Unassigned message types in the range of 17000 – 18999 are reserved			

Table B1 - 19: Miscellaneous Messages

4.1.1.14 Payload Command Functional Group

The messages defined in the Payload Command Messages table shall compose the Payload Command Functional Group messages, divisible by payload type. The Payload Command messages shall not be sent between a CUCS and VSM without an authorized connection for the specified Payload Type.

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
PAYLOAD COMMAND MESSAGES (Section 4.15)						
19000	206	Payload Bay Command	Push	CUCS	As applicable	2,000
19001	200	Payload Steering Command	Push	CUCS	EO/IR, SAR, others as applicable	200
19100	201	EO/IR/Laser Payload Command	Push	CUCS	EO/IR	1,000
19101	208	EO/IR/Laser Payload Quality Control	Push	CUCS	EO/IR	1,000
19200	202	SAR Payload Command	Push	CUCS	SAR	1,000
19400	204	Communications Relay Command	Push	CUCS	Comm Relay	1,000
19500	205	Payload Data Recorder Control Command	Push	CUCS	Recorder	1,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
19600	207	Terrain Data Update	Push	CUCS	EO/IR, SAR, others as applicable	2,000
19700	209	Payload Operating Mode Command	Push	CUCS		1,000
	210-299	Unassigned message types in the range of 19000 – 20999 are reserved				

Table B1 - 20: Payload Command Messages

4.1.1.15 Payload Status Functional Group

The messages defined in the Payload Status Messages table shall compose the Payload Status Functional Group messages, divisible by payload type. The Payload Status Messages shall not be able to be sent between a CUCS and VSM without an authorized connection for the specified Payload Type, with the exception of Message #21001, Payload Configuration and Message #12100, EO/IR – Configuration State in response to a specific configuration request via Message #17002, Generic Information Request.

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
PAYLOAD STATUS MESSAGES (Section 4.16)						
21000	308	Payload Bay Status	Pull	VSM	As applicable	2,000
21001	300	Payload Configuration	Push/Pull	VSM	All	1,000
21100	301	EO/IR - Configuration State	Pull	VSM	EO/IR	200
21101	302	EO/IR/Laser Operating State	Push/Pull	VSM	EO/IR	2,000
21200	303	SAR Operating State	Pull	VSM	SAR	2,000
21400	305	Communications Relay Status	Pull	VSM	Comm Relay	1,000
21500	306	Payload Data Recorder Status	Pull	VSM	Recorder	1,000
21501	307	Vehicle Payload/Recorder Configuration	Pull	VSM	Recorder	2,000
21600	309	Terrain Data Request	Push	VSM	EO/IR, SAR, others as applicable	2,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
21700	310	Payload Operating Mode Report	Pull	VSM		1,000
	311-399	Unassigned message types in the range of 21000 – 23999 are reserved				

Table B1 - 21: Payload Status Messages

The Payload Types have been defined to provide a set of generic (common) messages per payload type for common air vehicle payloads. A CUCS and/or VSM do not have to support the generic payload messages that do not apply to the Payload type(s) in their systems configuration. However, if a generically identified payload type(s) is applicable for the air vehicle system, the identified formatted DLI message(s) for that payload type shall be supported.

A generic set of Payload Types has been identified in Message #21001, Payload Configuration Message. The generic DLI messages associated with each of the payload types is identified in Table B1 - 22.

Payload Type	Required Message	Msg Type
All LOI 2 & 3	Message #21001: Payload Configuration	Configuration
EO/IR & Fixed	Message #21100: EO/IR Configuration State Message #21101: EO/IR/Laser Operating State Message #21700: Payload Operating Mode Report Message #19001: Payload Steering Command Message #19100: EO/IR/Laser Payload Command Message #19101: EO/IR/Laser Payload Quality Control Message #19700: Payload Operating Mode Command	Configuration Status Command Command (Modes)
SAR	N/A : Configuration Message Message #21200: SAR Operating State Message #19001: Payload Steering Command Message #19200: SAR Payload Commands	Configuration Status Command Command (modes)
Dispensable (Stores)	N/A : Configuration Message Message #26000: Stores Management System Status Message #24000: Stores Management System Command	Configuration Status Command
Comm. Relay	N/A : Configuration Message #21400: Communication Relay Status Message #19400: Communications Relay Command	Configuration Status Command

Recorder	Message #21501: Vehicle Payload/Recorder Configuration Message #21500: Payload Data Recorder Status Message #19500: Payload Data Recorder Control Command	Configuration Status Command
Payload Bay	Message #19000: Payload Bay Command	Command

Table B1 - 22: Conditional Payload Message Groups

Common message formats covering command and status of other payloads (e.g., electronic countermeasures, weapons delivery, electronic warfare, self-defence payloads) are not currently defined. UAVs carrying such payloads shall use vehicle specific message mechanisms described above. Future revisions of this STANAG will incorporate standard control and status messages for such payloads as they become commonly employed across a variety of UAV platforms.

4.1.1.16 Weapons Command Functional Group

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
WEAPONS COMMAND MESSAGES (Section 4.17)						
24000	203	Stores Management System Command	Push	CUCS	Disp. Stores	1,000
		Unassigned message types in the range of 24000 – 25999 are reserved				

Table B1 - 23: Weapons Command Message Groups

4.1.1.17 Weapons Status Functional Group

New Msg #	Old Msg #	Description	Push/Pull	Source	Payload Type	Allowable Max Latency (msec)
WEAPONS STATUS MESSAGES (Section 4.18)						
26000	304	Stores Management System Status	Pull	VSM	Disp. Stores	1,000
		Unassigned message types in the range of 26000 – 27999 are reserved				

Table B1 - 24: Weapons Status Message Groups

4.1.1.18 Data Link Discovery Functional Group

The messages defined in the Data Link Discovery Messages table shall compose the Data Link Discovery Functional Group of messages. The messages identified here as pulled from the VSM will be in response to the command. The Data Link Discovery messages shall be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
DATA LINK DISCOVERY MESSAGES (Section 4.19)					
28000	404	Data Link Control Authorization Request	Push	CUCS	2,000
28001	500	Data Link Configuration/Assignment Message	Pull	VSM	1,000
		Unassigned message types in the range of 28000 – 29999 are reserved			

Table B1 - 25: Data Link Discovery Messages

4.1.1.19 Data Link Command Functional Group

The messages defined in the Data Link Command Messages table shall compose the Data Link Command Functional Group of messages.

Note that LOI is not applicable to controlling or monitoring a CDT data link terminal (command terminal, GDT), as the CUCS is either controlling or monitoring that terminal, or it is not. The VDT data Link terminal (vehicle terminal), for all intents and purposes, is considered to be a subsystem of the flight vehicle, therefore it is an air vehicle implementation decision whether to allow control of the VDT data link at LOI 3 or 4. It is recommended that at a minimum the LOI 4/5 operator is in control of at least one VDT to maintain positive control over the flight vehicle.

The Data Link Command Messages shall not be able to be sent from a CUCS to a VSM for a VDT without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
DATA LINK COMMAND MESSAGES (Section 4.20)					
30000	405	Data Link to Vehicle ID Assignment	Push	CUCS	2,000
30001	400	7085 Data Link Active Configuration Set Up Message	Push	CUCS	1,000
30002	401	7085 Data Link Fallback Configuration Set Up Message	Push	CUCS	1,000
30003	403	Data Link Control Command	Push	CUCS	2,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
30004	402	RF Command Processing Set Up Message	Push	CUCS	1,000
30100	406	Antenna Pedestal Location Command	Push	CUCS	1,000
30101	407	Antenna Control Command	Push	CUCS	2,000
30102	408	Antenna Position Command	Push	CUCS	1,000
30200	409	Link Health Command	Push	CUCS	2,000
30300	410	Set Data Link UDP Monitor Period	Push	CUCS	2,000
	411-499	Unassigned message types in the range of 30000 – 31999 are reserved			

Table B1 - 26: Data Link Command Messages

4.1.1.20 Data Link Status Functional Group

The messages defined in the Data Link Status Messages table shall compose the Data Link Status Functional Group of messages.

The Data Link Status messages shall not be able to be sent from a VSM to a CUCS for a VDT without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
DATA LINK STATUS MESSAGES (Section 4.21)					
32000	501	Data Link to Vehicle ID Report	Push	VSM	2,000
32001	502	7085 Data Link Active Configuration Status Report	Pull	VSM	1,000
32002	503	7085 Data Link Fallback Configuration Status Report	Pull	VSM	1,000
32003	505	Data Link Control Status Report	Push	VSM	2,000
32004	504	RF Command Processing Status Report	Pull	VSM	2,000
32100	506	Antenna Pedestal Location Status Report	Push	VSM	2,000
32101	507	Antenna Control Status Report	Push	VSM	2,000
32102	509	Antenna Position Report	Push	VSM	1,000
32200	508	Link Health Status	Push	VSM	2,000
32201	511	Data Link Fallback Status	Push	VSM	2,000
32300	510	Data Link UDP Count	Push	VSM	1,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
	512-599	Unassigned message types in the range of 32000 – 33999 are reserved		VSM	

Table B1 - 27: Data Link Status Messages

4.1.1.21 Data Link Transition Functional Group

The messages in this grouping are provided to allow the transition in control of a vehicle from one UCS system to another where there vehicle only has a single, directional VDT, therefore these messages need to be implemented to support interoperability with such systems.

The messages defined in the Data Link Transition Messages table shall compose the Data Link Transition Functional Group of messages.

The Data Link Transition messages shall not be able to be sent between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
DATA LINK TRANSITION MESSAGES (Section 4.22)					
34000	600	Vehicle Data Link Transition Coordination	Push	CUCS	1,000
35000	700	Handover Status Report	Pull	VSM	1,000
	701-799	Unassigned message types in the range of 34000 – 35999 are reserved			

Table B1 - 28: Data Link Transition Messages

4.1.1.22 Autonomy Functional Group

The messages defined in the Autonomy Messages table shall compose the Autonomy Message Functional Group of messages. The Autonomy Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
AUTONOMY MESSAGES (Section 4.23)					
36000	1700	Activity Constraint	Push	CUCS	1,000
36001	1701	Constraint Response	Push	VSM	1,000
36002	1702	Constraint Requests Complete	Push	CUCS	1,000
36003	1703	Constraint Responses Complete	Push	VSM	1,000

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
36100	1704	Activity Complete	Push	VSM	1,000
36200	1705	Activity Status	Push/Pull	VSM	1,000
36300	1706	Area Definition	Push	CUCS	2,000
	1707 – 1799	Unassigned message types in the range of 36000 – 39999 are reserved			

Table B1 - 29: Autonomy Messages

4.1.1.23 General Pre-connection Configuration Functional Group

The messages defined in the General Pre-connection Configuration Messages table shall compose the General Pre-connection Configuration Functional Group of messages, which do not require an authorized connection to be transmitted between the CUCS and the VSM.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
GENERAL PRECONNECTION CONFIGURATION MESSAGES (Section 4.24)					
40000	1200	Field Configuration Request	Push	CUCS	2,000
41000*	1300	Field Configuration Integer Response	Pull	VSM	2,000
41001*	1301	Field Configuration Float Response	Pull	VSM	2,000
41002*	1302	Field Configuration Enumerated Response	Pull	VSM	2,000
41003*	1308	Field Configuration Unsigned Response	Pull	VSM	2,000
41004*	1309	Field Configuration Character Response	Pull	VSM	2,000
41005	1203	Configuration Complete	Push	VSM	2,000
	1303, 1310-1399	Unassigned message types in the range of 40000 – 41999 are reserved			

Note (*): These messages are used for both Pre-connection and Post connection

Table B1 - 30: General Preconnection Configuration Messages

4.1.1.24 General Post-connection Configuration Functional Group

The messages defined in the General Post-connection Configuration Messages table shall compose the General Post-connection Configuration Functional Group of messages. The General Post-connection Configuration Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
GENERAL POSTCONNECTION CONFIGURATION MESSAGES (Section 4.25)					
42000	1201	Display Unit Request	Push	CUCS	2,000
42001	1202	CUCS Resource Report	Push	CUCS	2,000
42002	1204	Manage VSM Windows	Push	CUCS	2,000
43000	1304	VSM Services Report Message	Pull	VSM	2,000
43001	1310	AV Route Configuration	Pull	VSM	2,000
43002	1311	Remote Windows GUI Definition	Pull	VSM	2,000
41000*	1300	Field Configuration Integer Response	Pull	VSM	2,000
41001*	1301	Field Configuration Float Response	Pull	VSM	2,000
41002*	1302	Field Configuration Enumerated Response	Pull	VSM	2,000
41003*	1308	Field Configuration Unsigned Response	Pull	VSM	2,000
41004*	1309	Field Configuration Character Response	Pull	VSM	2,000
	1310-1399	Unassigned message types in the range of 42000 – 43999 are reserved			

Note (*): These messages are used for both Pre-connection and Post connection

Table B1 - 31: General Configuration Messages

4.1.1.25 VSM Forced Commands Functional Group

The messages defined in the VSM Forced Commands Messages table shall compose the VSM Forced Commands Functional Group of messages. The VSM Forced Commands Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
VSM FORCED COMMAND MESSAGES (Section 4.26)					
44000	1900	Field Change Integer Command	Push	VSM	2,000
44001	1901	Field Change Float Command	Push	VSM	2,000
44002	1902	Field Change Enumerated Command	Push	VSM	2,000
44003	1903	Message Parameter Availability	Push	VSM	2,000
		Unassigned message types in the range of 44000 – 45999 are reserved			

Table B1 - 32: VSM Forced Command Messages

4.1.1.26 Draw Interface Functional Group

The messages defined in the Draw Interface Messages table shall compose the Draw Interface Functional Group of messages. The Draw Interface Messages shall not be transmitted between a CUCS and VSM without an authorized connection.

New Msg #	Old Msg #	Description	Push/Pull	Source	Allowable Max Latency (msec)
Draw Interface Messages (Section 4.27)					
46000	2000	Draw Layer Configuration			
46001	2001	Draw Layer Update Request / Status			
46002	2002	Draw Layer Control			
46003	2003	Draw Line			
46004	2004	Draw Simple Polygon			
46005	2005	Draw Complex Polygon			
46006	2006	Draw Arc / Circle			
46007	2007	Draw Text			
46008	2008	Draw Arrow			
46009	2009	Set Cursor Interest			
46010	2010	Remove Cursor Interest			
46011	2011	Cursor Interest Return			
		Unassigned message types in the range of 46000 – 49999 are reserved			

Table B1 - 33: Draw Interface Messages

4.1.1.27 Private Messages

The Private Messages are defined as vehicle specific messages and are used within the above defined functional groups at the specified LOI(s) as per their definition when created. The Private Messages shall not be transmitted between a CUCS and VSM without an authorized connection for the LOI specified in the private message definition.

New Msg #	Old Msg #	Description	Push/Pull	Source	LOI			Allowable Max Latency (msec)
					2/4M	3	4 or 5	
PRIVATE MESSAGES (Section 4.28)								
50000 - 65000	3000 - 3999	VSM-Specific Private Message	Push/Pull	VSM-Specific	(1)	(1)	(1)	1,000

NOTE: (1) VSM-Specific

Table B1 - 34: Private Messages

4.1.2 Generic (Common) DLI Messages

The following section contains the generic (common) DLI messages identified in the tables above. In the tables that follow, data types shall conform to the following meanings:

- Character (n) - ASCII character data of "n" bytes in length, which includes the null terminator character
- Integer (n) - signed integers, where n is 1, 2, or 4 bytes
- Float - IEEE format floating point numbers (4 bytes in length)
- Unsigned (n) - unsigned integers; where n is 1, 2, or 4 bytes

In addition, data ranges that have "reserved" values shall not be used by a CUCS or VSM. Data ranges that have "VSM specific" values may be used by the VSM/ AV/ Data link to add vehicle unique functionality that is not supported by the STANAG defined values to the specified data field. The addition of vehicle specific values to the generic message data fields is accomplished through the use of the Generic Pre-connection Configuration messages.

Bit maps are used in certain command messages to allow multiple data definition of data fields in a message, such as in the request for subsystem status. Each addressed component shall accept such a request and may respond with a separate status message for the overloaded request, or as specified in the specific message. Bit maps are indicated in the STANAG 4586 where the Units = Bitmapped.

4.2 System ID Messages

4.2.1 Message #1: CUCS Authorisation Request

This message shall be sent by a CUCS to a VSM/ air vehicle to request a specific monitor/ control connection to the VSM/ air vehicle, or to discover available connection(s) to the VSM/ air vehicle. If the Destination ID (e.g., Vehicle/VSM) for the connection is known by the CUCS then the Destination ID field in this message shall be filled in with the specified IDs.

Where the CUCS is discovering a connection, the Destination ID field shall be filled with the broadcast VSM ID/ Vehicle ID. If more than one authorisation (connection) is needed for a specific vehicle (including payload onboard), this message may be sent multiple times, once for the vehicle and each payload station.

This message is designed to allow more than one CUCS to control AV/Payload functions of a single VSM/ air vehicle for a given vehicle ID. For example, one controlling the vehicle and another controlling a payload, etc, not two stations simultaneously controlling the same payload.

A CUCS controlling a connection (e.g.: an AV at LOI 4 or 5) shall maintain control of that functionality until either it breaks the connection, specifically relinquishes control, or is displaced by another CUCS that is asserting override over the same functionality while the current CUCS is not.

A CUCS controlling a payload (e.g.: LOI 3) shall maintain payload control until it either breaks the connection, specifically relinquished control, or when the CUCS that has control over the platform (i.e.: LOI 4 or 5) specifically requests control of that payload.

The Asset Mode field shall be filled with “3 = Broadcast Request” for a broadcast request.

As specified above, the CUCS Authorization Request message may be transmitted from a CUCS to a VSM without an authorized LOI connection as it is used to discover possible connections, and it is used to request an authorized LOI connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0001.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0001.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0001.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
0001.05	**3**	**Data Link ID** Identifies the specific data link to process this message.	Integer 4	None	See Section 1.7.6
0001.06	**4**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	None	See Table B1-37
0001.07	**5**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	$0 \leq x \leq 32767$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0001.08	**6**	**Requested/Handover LOI**	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
0001.16	**7**	**Requested/Handover Access** Allows request or handover.	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= Monitor 0x02 = Control
0001.09	**8**	**Controlled Station**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002= Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 0x0010 = Stn #5 0x0020 = Stn #6 0x0040 = Stn #7 0x0080 = Stn #8 etc.
0001.14	**9**	**Payload Type**	Unsigned 2	Enumerated	0 = Not Specified/ N/A 1 = EO 2 = IR 3 = EO/IR 4 = SAR 5 = Fixed Camera 6 = Comms Relay 7 = Dispensable Payload 8 = Recorder 9 = Payload Bay Door 10 – 999 = Reserved 1000 – (2^{16}-1) = VSM Specific
0001.15	**10**	**Asset Mode**	Unsigned 1	Enumerated	0 = Relinquish/ Handoff 1 = Request 2 = Override 3 = Broadcast Request

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0001.11	**11**	**Wait for Vehicle Data Link Transition Coordination Message** Wait for Message #34000.	Unsigned 1	Enumerated	0 = Don't wait 1 = Wait for Message
0001.12	**12**	**CUCS Type** Identifies the type name of CUCS; Numbers to be assigned by STANAG Custodian.	Unsigned 1	None	See Table B1-36
0001.13	**13**	**CUCS Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 1	None	$0 \le x \le 255$

Table B1 - 35: Message #1: CUCS Authorisation Request

Table B1-36 lists the CUCS Types of many current CUCSs. (Contact the STANAG 4586 Custodian for the most current CUCS Type Table.)

CUCS Type	CUCS Name
0	Not Identified
1	Army One System
2	Navy TCS
3	
4	
5	

Table B1 - 36: CUCS Type Table

Table B1 - 37 lists the Vehicle Type IDs of many current UAVs. (Contact the STANAG 4586 Custodian for the most current Vehicle Type ID Table.)

Vehicle Type ID	Vehicle Name
0	Not Identified
1	BAMS UAV
2	Crecerelle
3	Crecerelle GE
4	Eagle-1
5	MQ-8B Fire Scout (Navy)
6	RQ-4A Global Hawk A

Vehicle Type ID	Vehicle Name
7	Grasshopper
8	Moyen Duc
9	Petit Duc
10	Phoenix
11	MQ-1 Predator A
12	MQ-9 Predator B
13	Ranger
14	RQ-7 Shadow 200
15	Sperwer
16	Sperwer LE
17	RQ-2B Pioneer
18	Eagle Eye
19	RQ-5 Hunter
20	GHMD (Navy)
21	Mucke
22	Luna
23	KZO
24	Taifun
25	Fledermaus
26	Falco
27	Nibbo
28	Hermes 180
29	Hermes 450
30	RQ-4B Global Hawk B
31	Sky Warrior ER/MP (Extended Range/Multi-Purpose) (Army)
32	ScanEagle A15

Vehicle Type ID	Vehicle Name
33	Vigilante 496
34	Vigilante 502
35	CamCopter S100
36	Little Bird
37	Neuron
38	Tier II (USMC)
39	RQ-14A - Dragon Eye
40	Silver Fox
41	SkyLark
42	Kestrel
43	Voyeur
44	Coyote
45	FCS Class I (YRQ-16A)
46	Reserved
47	Reserved
48	RQ-11A - Raven-B
49	Spyhawk
50	Wasp
51	Puma
52	Aerosonde
53	ScanEagle A20
54	Sky-X
55	Lince
56	Cobra
57	N-UCAS
58	Killer Bee
59	FCS Class IV (MQ-8B - Army)

Vehicle Type ID	Vehicle Name
60	GoldenEye 50
61	GoldenEye 80
62	Excalibur
63	Orion
64	STRIX-A
65	A -160
66	A-UAV SR
67	A-UAV FR
68	ORKA
69	Watchkeeper Air Vehicle WK450
$70 \leq x < 2^{16}$	Reserved

Table B1 - 37: Vehicle Type IDs

4.2.2 Message #2: VSM Authorisation Response

This message shall be sent by the VSM/ vehicle in response to a CUCS Authorisation Request Message (Message #1) received from a CUCS.

If the request from the CUCS was a "Broadcast Request" or for unspecified connection access, and the Source ID received in the wrapper message is for an authorised CUCS, the VSM/ vehicle shall respond once for each vehicle or payload that it can potentially control. For each vehicle/payload that the VSM/ vehicle has granted control or monitoring to a CUCS, the VSM/ vehicle shall respond with its VSM ID (as applicable) and/or specific/logical vehicle ID(s), the Access Authorized, LOI Authorized, and Access Granted fields set as granted to that CUCS for the Controlled Station and the Vehicle type and Vehicle sub-type fields set correctly to the controlling CUCS. For each vehicle/payload that the VSM/ vehicle has not granted control to any CUCS, the VSM/ vehicle shall respond with its VSM ID (as applicable) and/or specific/logical vehicle ID(s), Access Authorized, Access Granted set as N/A, Controlled station, Payload type, Vehicle type, and vehicle subtype to the requesting CUCS. Where a VSM is able to monitor and/ or control/monitor more than one vehicle/ payload entity, this capability shall be relayed to the CUCS by the use of multiple instances of this message, one per available vehicle/payload combination.

If the CUCS requested a specified connection, control/monitor and/or monitor, for a specific VSM ID/ vehicle ID and functionality in the Authorisation Request message, then the VSM/ vehicle shall respond with the Access Granted and Controlled Station Asset fields set as appropriate, with the Access Request field filled to echo the original request. If another

CUCS is in control of the requested vehicle/payload, the VSM/vehicle shall deny control to a second CUCS unless that CUCS is commanding an override for the requested functionality. If the granting of control of a vehicle/payload to a CUCS eliminates the potential control of another reported vehicle/payload entity, the VSM shall send this message to that CUCS ID indicating that the connection to the eliminated vehicle/payload is no longer available, (i.e., connection not authorized). For example, a VSM may be able to potentially control two types of vehicles but only control one vehicle at a time. Once the VSM grants control of one of the vehicle types to a CUCS, the other type is no longer available for control.

A CUCS may monitor all VSM Authorisation Response Messages on the network, not only the messages directed to that CUCS. By monitoring all messages, a CUCS will know what vehicles/payloads are available for control/ monitoring and will know what vehicles/payloads are currently being controlled by other CUCS. This may be necessary to provide the override capability.

As specified above, the VSM Authorization Response Message may be transmitted from a VSM to a CUCS without an authorized connection as it is used to report possible connections, and it is used to authorize connections.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0021.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0021.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0021.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
0021.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6
0021.13	**4**	**Access Authorized**	Unsigned 1	Bitmapped	0x00 = Connection Not Authorised 0x01= Monitor 0x02 = Control
0021.06	**5**	**LOI Authorized**	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
0021.14	**6**	**Access Granted**	Unsigned 1	Bitmapped	0x00 = N/A 0x01= Monitor 0x02 = Control

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0021.08	**7**	**Controlled Station**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002= Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 0x0010 = Stn #5 0x0020 = Stn #6 0x0040 = Stn #7 0x0080 = Stn #8 etc.
0021.12	**8**	**Payload Type**	Unsigned 2	Enumerated	0 = Not Specified/ N/A 1 = EO 2 = IR 3 = EO/IR 4 = SAR 5 = Fixed Camera 6 = Comms Relay 7 = Dispensable Payload 8 = Recorder 9 = Payload Bay Door 10 – 999 = Reserved 1000 – (2^{16}-1) = VSM Specific
0021.15	**9**	**Access Requested** This field echoes the access request that this response addresses	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= Monitor 0x02 = Control 0x04 = Broadcast Response
0021.10	**10**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	None	See Table B1-37

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0021.11	**11**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	0 ≤ x ≤ 65535

Table B1 - 38: Message #2: VSM Authorisation Response

4.2.3 Message #3: Vehicle ID

This message shall be sent by a VSM/ vehicle to the CUCS to identify the air vehicle. The VSM ID shall be filled with the null ID when this message is transmitted directly from a vehicle for which a ground based VSM does not exist. This message shall indicate a Tail Number of zero, and a logical vehicle ID (Source ID) if transmitted from a VSM, along with the VSM ID when there is no vehicle connected to the VSM. This message shall be sent by the VSM/vehicle whenever the contents of this message (vehicle ID, tail number, mission ID or ATC Call sign) change. The Vehicle ID Update field allows a VSM to change a logical vehicle ID to a real vehicle ID and vice versa. When the Vehicle ID Update field in this message is filled differently than the Source ID field in this message, this shall signify that the currently used vehicle ID value is to be replaced with the vehicle ID update value.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0020.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0020.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0020.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
0020.06	**3**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	None	See Table B1-37
0020.07	**4**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	0 ≤ x ≤ 32767
0020.08	**5**	**Owning Country Code** Identifies the owning country, using NATO-assigned numerical identifiers.	Unsigned 1	None	See Section 1.7.6
0020.09	**6**	**Tail Number** Null terminated string with the tail number designated by the owning country's certifying agency.	Character, 16 bytes	None	Null-terminated Printable ASCII

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0020.10	**7**	**Mission ID** Identifies mission and (by reference) flight plan currently executing on this platform.	Character 20	None	Null-terminated Printable ASCII
0020.11	**8**	**ATC Call Sign**	Character, 32 bytes	None	Printable ASCII, null terminated

Table B1 - 39: Message #3: Vehicle ID

4.3 Flight Vehicle Command Messages

4.3.1 Message #2000: Vehicle Configuration Command

This message shall be used to initialize the AV to its current state as required, usually in preparation for launch. This message shall be sent from the CUCS to the VSM whenever the AV configuration is changed.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0040.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0040.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0040.04	**2**	**Initial Propulsion Energy** Amount of usable propulsion energy with respect to the maximum usable propulsion energy for this configuration.	Unsigned 2	0.002 Percent	Configuration Dependent

Table B1 - 40: Message #2000: Vehicle Configuration Command

4.3.2 Message #2001: Vehicle Operating Mode Command

This message shall be used to control the vehicle operating mode. The vehicle operating mode defines the system behaviour and establishes how commands shall be interpreted. The behaviours established include vehicle flight path response. The intent of these behaviours is to provide a standard way of expressing common operating modes and tactics. The specific implementation is left up to the vehicle manufacturer.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0042.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0042.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0042.04	2	**Select Flight Path Control Mode** Specifies the method for controlling the vehicle's flight path. Manual control modes lie in the range 1-10, automatic control modes lie in the range 11-31	Unsigned 1	Enumerated	0 = No Mode 1 = Reserved 2 = Flight Director (Manual near real-time control of AV using Message #2002, where AV autopilot is disengaged) 3-10 = Reserved 11 = Waypoint (Fly to predefined waypoint(s), during first leg altitude is controlled using Message #2002) 12 = Loiter (Defined in Message #2004) 13 - 14= Reserved 15 = Autopilot (Autopilot engaged, but manual override in near real-time of AV using Message #2002) 16 = Terrain Avoidance (Uses Message #2002, field 5 to define clearance distance) 17 = NavAid Slaved Navigation relative to a navigation beacon. 18 = Reserved 19 = Autoland Engage 20 = Autoland Wave-off 21 = Launch 22 = Slave to Sensor 23-31 = Reserved 32-255 = Vehicle Specific
0042.05	3	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 41: Message #2001: Vehicle Operating Mode Command

4.3.3 Message #2002: Vehicle Steering Command

This message shall be used to provide the ability to command a new flight vector to the air vehicle. Such commands are generated by manual input. Upon receipt of this message, the vehicle's response shall be to immediately enter into a manoeuvre to achieve the new desired flight state. The vehicle's responsibility shall be to avoid unsafe flight states during the manoeuvre to answer the new command.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #2002, dependent on the current Flight mode (Message #2001, Vehicle Operating Mode Command) and the current Altitude mode, Speed mode and Course/ Heading mode states (Message #2003, Mode Preference Command). Refer to Sections 4.24 and 4.25 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0043.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0043.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0043.04	**2**	**Altitude Command Type**	Unsigned 1	Enumerated	0 = No valid altitude command 1 = Altitude 2 = Vertical Speed 3 = Rate-limited altitude
0043.05	**3**	**Commanded Altitude** Altitude hold value to be achieved (ignored in Altitude Command Type = 2).	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0043.06	**4**	**Commanded Vertical Speed** Vertical Speed value to be achieved (Used in Altitude Command Type = 2, ignored in Altitude Command Type = 1, used as rate limit in Altitude Command Type = 3).	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0043.07	**5**	**Heading Command Type**	Unsigned 1	Enumerated	0 = No Valid Heading Command 1 = Heading 2 = Course 3 = Heading and Course 4 = Roll 5 = Heading Rate
0043.21	**6**	**Heading Reference**	Unsigned 1	Enumerated	0 = True North 1 = Magnetic North

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0043.08	**7**	**Commanded Heading** Heading hold value to be achieved (Used in Heading Command Type = 1 and 3, ignored in Heading Command Type = 2, 4, and 5). Provided in True North if Heading Reference is 0, and in Magnetic North if Heading Reference is 1.	Integer 2	BAM	$-\pi \leq x < \pi$
0043.09	**8**	**Commanded Course** Course value to be achieved (Used in Heading Command Type = 2 and 3, ignored in Heading Command Type = 1, 4 and 5)	Integer 2	BAM	$-\pi \leq x < \pi$
0043.10	**9**	**Commanded Turn Rate** Heading or Course turn rate value to be achieved (Used in Heading Command Type = 1 thru 3, and 5)	Integer 2	0.0001 Radians/ Second	Configuration dependent A zero commanded rate indicates that the AV should use its default rates for the Applicable Heading Command type mode. i.e.; Does not apply to Heading Command Type = 5.
0043.11	**10**	**Commanded Roll Rate** Roll rate value to be achieved (used in Heading Command Type = 4)	Integer 2	0.0001 Radians/ Second	Configuration dependent A zero commanded rate indicates that the AV should use its default rates.
0043.12	**11**	**Commanded Roll** (Used in Heading Command Type = 4)	Integer 2	BAM	$-\pi \leq x < \pi$
0043.13	**12**	**Commanded Speed**	Unsigned 2	0.5 Metres/ Second	$0 \leq x \leq 10000$
0043.14	**13**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Ground Speed
0043.15	**14**	**Commanded Waypoint Number** As defined in Section 4.12, Mission Messages.	Unsigned 2	-	$1 \leq x < 65535$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0043.16	**15**	**Altimeter Setting** Local Barometric pressure at sea level. Used to correct pressure altitude to barometric altitude.	Integer 2	10 Pascals	$0 \le x \le 107500$
0043.17	**16**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0043.18	**17**	**Loiter Position Latitude** Manual Loiter position latitude command.	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0043.19	**18**	**Loiter Position Longitude** Manual Loiter position longitude command.	Integer 4	BAM	$-\pi \le x < \pi$
0043.20	**19**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 42: Message #2002: Vehicle Steering Command

4.3.4 Message #2003: Mode Preference Command

The Message #2003, Altitude mode, the Message #2003, Speed mode, and the Message #2003, Course Heading mode fields are used to determine the source of the altitude, (air)speed, and course/heading demands respectively for the selected (VSM reported) Flight mode (Message #2001, Select Flight Path Control mode).

The Altitude, Speed, and Course/ Heading commanded values shall come from a specific configuration message (see below) if the mode setting (report) is "Configuration", and the Altitude, Speed, and Course/ Heading commanded values shall come from Message #2002, Vehicle Steering Command, when the mode setting (report) is "Manual/ Override."

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0048.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0048.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0048.04	**2**	**Altitude Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0048.05	**3**	**Speed Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0048.06	**4**	**Course/ Heading Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0048.07	**5**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 43: Message #2003: Mode Preference Command

“Configuration” enumeration: When in the selected Flight mode (Message #2001, Select Flight path Control Mode), the Altitude, Speed, and Course/Heading from the Configuration message specified (see below) for that flight mode shall be used. While in this (altitude, Speed, Course) mode, the altitude/speed/course commanded values shall not be altered using Message #2002, Vehicle Steering Command.

“Manual/ Override until reaching the Waypoint or Loiter Point” enumeration: Manual/ Override commands (Enumeration 2) shall be used until the air vehicle reaches the Waypoint or Loiter Point, at which time the commanded values shall be taken from the Configuration commands (Enumeration 0): When in the selected flight mode (Message #2001, Select Flight Path Control Mode), use the “Manual/ Override” settings for Altitude, Speed, and Course/ Heading for that flight mode until next waypoint or loiter position has been reached, and then use the Configuration message (see below) settings. Once the air vehicle reaches the transition point, it shall revert to the “Configuration” mode. In order to re-enter the “Manual/ Override until reaching the Waypoint or Loiter Point” mode, another mode shall first be commanded.

“Manual/ Override” enumeration: When in the selected flight mode (Message #2001, Select Flight Path Control Mode), the Altitude, Speed, and Course/ Heading commanded values shall always be from Message #2002, Vehicle Steering Command.

Table B1 - 44 shows the source message for the altitude/airspeed for each combination of Flight Mode (Msg. #2001, Select Flight Path Control Mode) and Altitude or Airspeed Mode (Msg. #2003, Altitude Mode, or Msg. #2003, Speed Mode).

Flight Mode	Altitude or Airspeed Mode	Source Message for Altitude or Airspeed
2 – Flight Director	0 – Configuration	Not defined
	1 – Manual until reaching the WP, Loiter	2002
	2 – Manual/Override	2002
11 – Waypoint	0 – Configuration	13002
	1 – Manual until reaching the WP, Loiter	2002
	2 – Manual/Override	2002
12 – Loiter	0 – Configuration	2004
	1 – Manual until reaching the WP, Loiter	2002
	2 – Manual/Override	2002
All other Flight Modes	0 – Configuration	Not defined
	1 – Manual until reaching the WP, Loiter	2002
	2 – Manual/Override	2002

Table B1 - 44: Source Message for Altitude/Airspeed

Table B1 - 45 shows the source message for the course/heading or the lat/long, dependent on which is valid, for each combination of Flight Mode (Message. #2001, Select Flight Path Control Mode) and Course/Heading Mode (Message #2003, Course/Heading Mode).

Flight Mode	Course/Heading Mode	Source Message for Course / Heading	Source Message for Lat/Long
2 – Flight Director	0 – Configuration	Not defined	Not valid
	1 – Manual until reaching the WP, Loiter	2002	Not valid
	2 – Manual/Override	2002	Not valid
11 – Waypoint	0 – Configuration	Not valid	13002
	1 – Manual until reaching the WP, Loiter	2002	2002
	2 – Manual/Override	2002	2002

Flight Mode	Course/Heading Mode	Source Message for Course / Heading	Source Message for Lat/Long
12 – Loiter	0 – Configuration	Not defined	Not defined
	1 – Manual until reaching the WP, Loiter	Not valid	2002
	2 – Manual/Override	Not valid	2002
All other Flight Modes	0 – Configuration	Not defined	Not defined
	1 – Manual until reaching the WP, Loiter	2002	2002
	2 – Manual/Override	2002	2002

Table B1 - 45: Source Message for Course/Heading

Msg # Specified – Mode valid and the specified message shall be used by the VSM if the functionality is supported by the VSM.
Not valid – Mode shall never be allowed by STANAG 4586 CUCS or VSM.
Not defined – STANAG 4586 does not define the functionality; the VSM shall define the required functionality and make the required controls available at the CUCS. The VSM may use a formatted DLI message for the functionality if desired.

4.3.5 Message #2004: Loiter Configuration

This message shall be used to command the loiter pattern that the AV must use when in the Loiter flight mode. (Refer to Message #2001, Vehicle Operating Mode Command). The Loiter position shall be defined in Message #2002. The Loiter altitude and Loiter airspeed shall be used as the commanded values for the air vehicle dependent on the current Altitude mode and current Speed mode settings. Refer to Message #2003, Mode Preference Command, for additional details.

Time-based loiters are provided to allow configuration of FAA time-based loiter requests. If the loiter length is specified in time, the time will be the length of the inbound loiter pattern. The VSM/AV will adjust the outbound leg distance to be able to achieve the specified inbound leg while maintaining speed.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #2004. Refer to Sections 4.24 and 4.25 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0041.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0041.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0041.04	**2**	**Loiter type**	Unsigned 1	Enumerated	1 = Circular 2 = Racetrack 3 = Figure 8 4 = Hover 5 – 9 = Reserved 10 – 255 = Vehicle Specific
0041.05	**3**	**Loiter Radius** Used as radius for circular Loiter, and used as the radius of the half circle at each end of the loiter pattern.	Unsigned 2	1.5 Metres	$1 \leq x \leq 98302.5$
0041.06	**4**	**Loiter Length** Used for racetrack and figure 8 to define length of pattern, centred around the Loiter Point (defined in Message #2002) in the direction of the Loiter Bearing.	Unsigned 2	1.5 Metres	$1 \leq x \leq 98302.5$
0041.13	**5**	**Loiter Length Units** Used for specifying the units of measurement for the Loiter Length. Time-based loiter lengths only apply to racetrack patterns.	Unsigned 1	Enumerated	0 = Distance (Metres) 1 = Time (Seconds)
0041.07	**6**	**Loiter Bearing** The bearing of the loiter pattern, referenced to the Loiter Point (defined in Message #2002), from True North.	Integer 2	BAM	$-\pi \leq x < \pi$
0041.08	**7**	**Loiter Direction** Defines direction of turn when rounding the loiter point defined by "Vehicle Steering Command" Message (Message #2002).	Unsigned 1	Enumerated	0 = Vehicle Dependent 1 = Clockwise 2 = Counter-Clockwise 3 = Into the wind
0041.09	**8**	**Loiter altitude**	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0041.10	**9**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0041.11	**10**	**Loiter Speed**	Unsigned 2	0.5 Metres/ Second	$0 \le x \le 10000$
0041.12	**11**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Ground Speed
0041.14	**12**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 46: Message #2004: Loiter Configuration

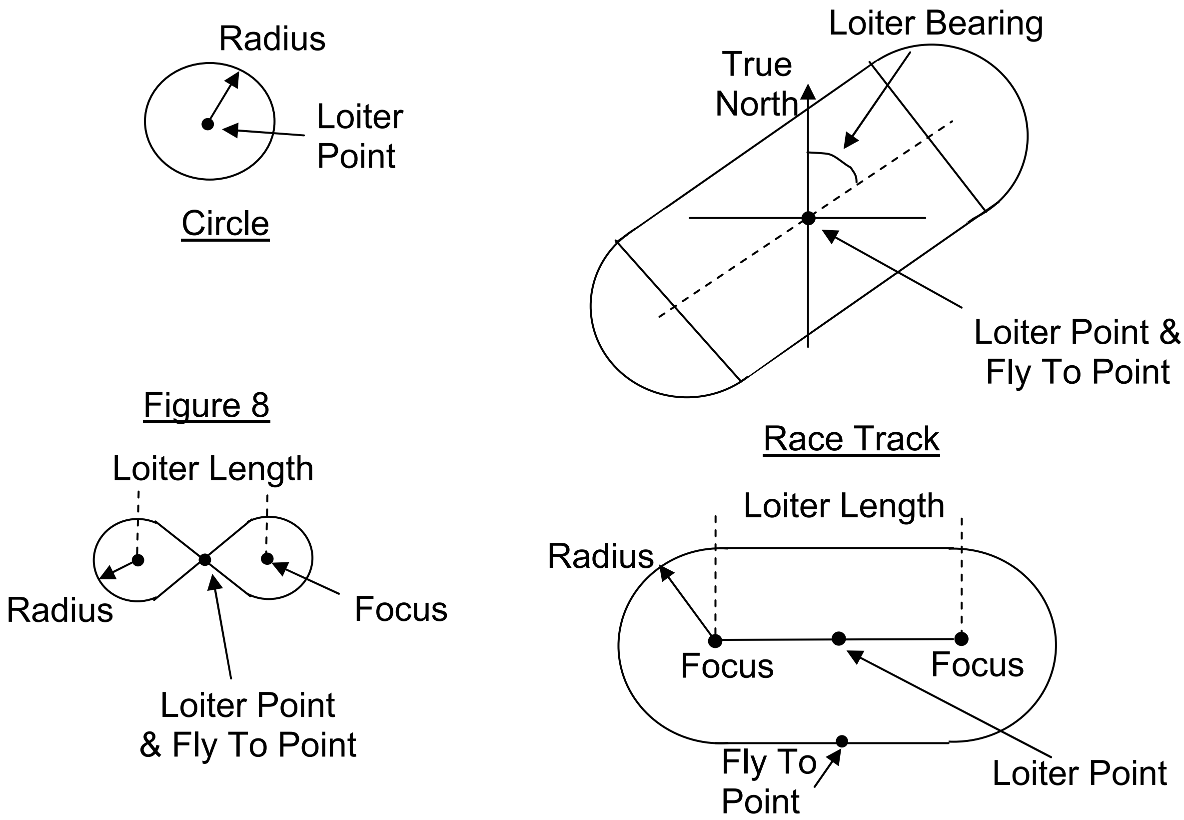

Figure B1 - 9: Loiter Pattern

4.3.6 Message #2005: Flight Termination Command

This message shall be used to provide means for the CUCS to issue a flight termination command to the VSM. To accomplish flight termination, this message shall be sent twice with two different values in field 4 (once to arm, and a second time to execute).

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0046.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0046.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0046.04	**2**	**Commanded Flight Termination State**	Unsigned 1	Enumerated	0 = Reset FT System 1 = Arm FT System 2 = Execute FT Seq.
0046.05	**3**	**Flight Termination Mode**	Unsigned 1	Enumerated	0 = Not Specified 1-255 = VSM specific
0046.06	**4**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 47: Message #2005: Flight Termination Command

4.3.7 Message #2006: Relative Route/Waypoint Absolute Reference Message

This message shall be used by the CUCS to identify the absolute reference system for relative routes and their associated waypoints. The intent of this message is to support moving platforms for launch and recovery, and to support usage of reusable "route templates" (e.g. for search patterns). This message shall be provided prior to commanding programmed flight along any relative route, and updated as necessary otherwise.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0047.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0047.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0047.04	**2**	**Latitude (Y-axis zero)**	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0047.05	**3**	**Longitude (X-axis zero)**	Integer 4	BAM	$-\pi \leq x < \pi$
0047.06	**4**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0047.07	**5**	**Altitude**	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0047.08	**6**	**Orientation** Defines heading of Y-axis.	Integer 2	BAM	$-\pi \leq x < \pi$
0047.09	**7**	**Route ID**	Character 20	None	Text identifier of route, or null to update all routes.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0047.10	**8**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 48: Message #2006: Relative Route / Waypoint Absolute Reference Message

4.3.8 Message #2007: Air Vehicle Lights

This message shall be used by the CUCS to control the air vehicle lights.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0044.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0044.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0044.04	**2**	**Set Lights** When a bit is set the lights are commanded on, when the bit is cleared the lights are commanded off.	Unsigned 2	Bitmapped	0x0001=Nav 0x0002=NavIR 0x0004=Strobe 0x0008=StrobeIR 0x0010=NVD 0x0020=Reserved 0x0040= Landing 0x0080= LandingIR
0044.05	**3**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 49: Message #2007: Air Vehicle Lights

4.3.9 <u>Message #2008: Engine Command</u>

This message shall be used by the CUCS to control the air vehicle engines.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #2008. Refer to Sections 4.24 and 4.25 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0045.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0045.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0045.04	**2**	**Engine Number** ID of engine currently being commanded	Integer 4	None	Configuration Dependent

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0045.05	**3**	**Engine Command**	Unsigned 1	Enumerated	0 = Stop 1 = Start 2 = Enable/Run 3-9 = Reserved 10-255 = Vehicle Specific
0045.06	**4**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 50: Message #2008: Engine Command

4.3.10 Message #2009: Zeroize Encryption Keys Command

This message shall be used by the CUCS to request that the encryption keys zeroize. The VSM will perform the appropriate zeroize operations for the ground and/or the VDTs for that vehicle's data links.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0049.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0049.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0049.04	**2**	**Zeroize Air Vehicle** Zeroizes all keys in vehicle	Integer 1	Enumerated	0 = Ignore 1 = Command Zeroize
0049.05	**3**	**Zeroize GCS** Zeroizes all keys in ground control system associated with the specified Vehicle ID. If Vehicle ID = 0, applies to all GCS encryption equipment controlled by the VSM.	Integer 1	Enumerated	0 = Ignore 1 = Command Zeroize
0049.06	**4**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 51: Message #2009: Zeroize Encryption Keys Command

4.4 Flight Vehicle Status Messages

4.4.1 Message #3000: Vehicle Configuration

This message shall be used to specify the characteristics of the vehicle, primarily for flight planning purposes. It indicates the current characteristics of the vehicle either as specified by type by the manufacturer, or based on current loading. For instance, "Optimum Cruise Speed" is likely only to be available as the manufacturer-specified performance index, even though presence of extra load or external stores may cause the number to vary in an unknown manner.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0100.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0100.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0100.05	**2**	**Configuration ID** Identifies particular configuration of the air vehicle as specified by the manufacturer. (This manufacturer-specified identifier is used by the VSM to provide vehicle specific data, such as current weight and c.g. given current stores status.)	Unsigned 4	None	$0 \le x \le (2^{32} - 1)$
0100.06	**3**	**Propulsion Fuel Capacity** Amount of weight in fuel that can be carried for this configuration.	Float	Kilograms	Configuration Dependent (<0: Not Applicable)
0100.07	**4**	**Propulsion Battery Capacity**	Float	Joules	Configuration Dependent (<0: Not Applicable)
0100.08	**5**	**Maximum Indicated Airspeed** Not to exceed dash speed	Unsigned 2	0.05 Metres/ Second	$0 \le x \le 3276.75$
0100.09	**6**	**Optimum Cruise Indicated Airspeed**	Unsigned 2	0.05 Metres/ Second	$0 \le x \le 3276.75$
0100.10	**7**	**Optimum Endurance Indicated Airspeed**	Unsigned 2	0.05 Metres/ Second	$0 \le x \le 3276.75$
0100.11	**8**	**Maximum Load Factor** Not-to-exceed G-load tolerance	Unsigned 1	Metres/ Sec2	$0 \le x \le 255$

0100.12	**9**	**Gross Weight** Calculated gross weight of current configuration, including effects of fuel load changes.	Float	Kilograms	Determined by Vehicle Configuration
0100.13	**10**	**X_CG** Calculated centre of gravity of current configuration rearward from the nose.	Float	Metres	Determined by Vehicle Configuration
0100.14	**11**	**Number of Engines**	Unsigned 1	None	$0 \le x \le 255$

Table B1 - 52: Message #3000: Vehicle Configuration

4.4.2 Message #3001: Vehicle Operating Mode Report

This message shall be used to report the vehicle-operating mode, as commanded from the Vehicle Operating Mode Command (Message #2001).

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0106.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0106.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0106.04	**3**	**Select Flight Path Control Mode** Specifies the method for controlling the vehicle's flight path. Manual control modes lie in the range 1-10, automatic control modes lie in the range 11-31	Unsigned 1	Enumerated	0 = No Mode 1 = Reserved 2 = Flight Director (Manual near real-time control of AV using Message #2002, where AV autopilot is disengaged) 3-10 = Reserved 11 = Waypoint (Fly to predefined waypoint(s), during first leg altitude is controlled using Message #2002) 12 = Loiter (Defined in Message #2004) 13 - 14= Reserved 15 = Autopilot (Autopilot engaged, but manual override in near real-time of AV using Message #2002) 16 = Terrain Avoidance (Uses Message #2002, field 5 to define clearance distance) 17 = NavAid Slaved Navigation relative to a navigation beacon. 18 = Reserved 19 = Autoland Engage 20 = Autoland Wave-off 21 = Launch 22 = Slave to Sensor 23-31 = Reserved 32-255 = Vehicle Specific

Table B1 - 53: Message #3001: Vehicle Operating Mode Report

4.4.3 Message #3002: Vehicle Operating State

This message shall be used to report the current air vehicle operating state.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0104.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0104.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0104.04	**2**	**Commanded Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0104.05	**3**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0104.06	**4**	**Commanded Heading**	Integer 2	BAM	$-\pi \le x < \pi$
0104.07	**5**	**Commanded Course**	Integer 2	BAM	$-\pi \le x < \pi$
0104.08	**6**	**Commanded Turn Rate**	Integer 2	0.0001 Radians/ Second	Configuration Dependent
0104.09	**7**	**Commanded Roll Rate**	Integer 2	0.005 Radians/ Second	Configuration Dependent
0104.10	**8**	**Commanded Speed**	Unsigned 2	0.5 Metres/Second	$0 \le x \le 10000$
0104.11	**9**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumerated	0 = Indicated / Calibrated Airspeed 1 = True Airspeed 2 = Ground Speed
0104.12	**10**	**Power Level** Average throttle setting of all engines	Integer 1	Percent	Configuration Dependent (Nominally 0-110 Percent)
0104.21	**11**	**Bingo Energy** Minimum energy required to return to base with reserve energy.	Unsigned 2	0.0016 Percent	0-100 Percent
0104.16	**12**	**Current Propulsion Energy Level** Reported as a percentage of maximum usable energy for interoperable gauge displays.	Unsigned 2	0.0016 Percent	0-100 Percent

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0104.17	**13**	**Current Propulsion Energy Usage Rate** Total consumption as a percentage of maximum usable energy of this configuration.	Unsigned 2	0.0002 Percent per Second	0 – 13.1
0104.18	**14**	**Commanded Roll**	Integer 2	BAM	$-\pi \leq x < \pi$
0104.19	**15**	**Altitude Command Type**	Unsigned 1	Enumerated	0 = No Valid Altitude Command 1 = Altitude 2 = Vertical Speed 3 = Rate-Limited Altitude
0104.20	**16**	**Heading Command Type**	Unsigned 1	Enumerated	0 = No Valid Heading Command 1 = Heading 2 = Course 3 = Heading and Course 4 = Roll 5 = Heading Rate
0104.22	**17**	**AV State** The reported flight phase of the air vehicle.	Unsigned 1	Enumerated	0 = Unknown 1 = Power Up 2 = Pre-start 3 = Pre-launch 4 = Launch Abort 5-9 = Reserved 10-255= VSM Specific

Table B1 - 54: Message #3002: Vehicle Operating States

4.4.4 Message #3003: Mode Preference Report

The VSM shall use the Mode Preference Report message to report the Altitude mode, Speed mode, and Course/ Heading mode states at the VSM to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0109.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0109.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0109.04	**2**	**Altitude Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0109.05	**3**	**Speed Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0109.06	**4**	**Course/ Heading Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override

Table B1 - 55: Message #3003: Mode Preference Report

4.4.5 Message #3004: Loiter Configuration Report

This message shall be used by the VSM/ AV to report the loiter pattern/ configuration that the AV is using in the Loiter flight mode, or other flight mode(s) as applicable.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0112.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0112.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	Section 1.7.2
0112.04	**2**	**Loiter type**	Unsigned 1	Enumerated	1 = Circular 2 = Racetrack 3 = Figure 8 4 = Hover

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0112.05	**3**	**Loiter Radius** Used as radius for circular Loiter, and used as the radius of the half circle at each end of the loiter pattern.	Integer 2	1.5 Metres	1 ≤ x ≤ 100000
0112.06	**4**	**Loiter Length** Used for racetrack and figure 8 to define length of pattern, centred around the Loiter Point (defined in Message #2002) in the direction of the Loiter Bearing.	Integer 2	1.5 Metres	1 ≤ x ≤ 98000
0112.07	**5**	**Loiter Bearing** The bearing of the loiter pattern, referenced to the Loiter Point (defined in Message #2002), from True North.	Integer 2	BAM	$-\pi \leq x \leq \pi$
0112.08	**6**	**Loiter Direction** Defines direction of turn when rounding the loiter point defined by "Vehicle Steering Command" Message (Message #2002).	Unsigned 1	Enumerated	0 = Vehicle Dependent 1 = Clockwise 2 = Counter-Clockwise 3 = Into the wind
0112.09	**7**	**Loiter altitude**	Integer 3	0.02 Metres	-1000 ≤ x ≤ 100000
0112.10	**8**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0112.11	**9**	**Loiter Speed**	Unsigned 2	0.5 Metres/Second	0 ≤ x ≤ 10000
0112.12	**10**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Ground Speed

Table B1 - 56: Message #3004: Loiter Configuration Report

4.4.6 Message #3005: Flight Termination Mode Report

This message shall be used to report the flight termination command set at the VSM and its current status. This message shall be sent in response to the Flight Termination Message (Message #2005) and whenever the current status of flight termination changes.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0108.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0108.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0108.04	**2**	**Reported Flight Termination State**	Unsigned 1	Enumerated	0 = Reset FT System 1 = Arm FT System 2 = Execute FT Seq.
0108.05	**3**	**Reported Flight Termination Mode**	Unsigned 1	Enumerated	0 = Not Specified 1-255 = VSM specific

Table B1 - 57: Message #3005: Flight Termination Mode Report

4.4.7 Message #3006: Vehicle Lights State

This message shall be used by the VSM to report the state of the air vehicle lights.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0107.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0107.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0107.04	**3**	**Navigation Lights State** When a bit is set the lights are commanded on, when the bit is cleared the lights are commanded off	Unsigned 2	Bitmapped	0x0001=Nav 0x0002=NavIR 0x0004=Strobe 0x0008=StrobeIR 0x0010=NVD 0x0020=Reserved 0x0040=Landing 0x0080=LandingIR

Table B1 - 58: Message #3006: Vehicle Lights State

4.4.8 Message #3007: Engine Operating States

This message shall be used to report the operating state of a given engine. For vehicles with multiple engines, full operating state shall require one such message for each engine. The intent of this message is to provide data for a generic set of indicators for the operator. (Detailed information about engine operating state and health is left as a vehicle-specific function.)

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.00	**0**	**Presence Vector**	Unsigned 4	None	Bitmapped
0105.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0105.04	**2**	**Engine Number** ID of engine currently being reported	Integer 4	None	Configuration Dependent

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.05	**3**	**Engine Status**	Unsigned 1	Enumerated	0 = Stopped 1 = Started 2 = Enabled/Running 3-9 = Reserved 10-255 = Vehicle Specific
0105.06	**4**	**Reported Engine Command**	Unsigned 1	Enumerated	0 = Stop 1 = Start 2 = Enable/Run 3-9 = Reserved 10-255 = Vehicle Specific
0105.07	**5**	**Engine Power Setting**	Unsigned 2	0.0017 Percent	0 <= x <= 110
0105.17	**6**	**Engine Speed 1 Type**	Unsigned 1	Enumerated	0 = Output Shaft 1 = Gas Turbine 2 = Power Turbine 3 = Rotor
0105.08	**7**	**Engine Speed 1**	Unsigned 2	0.5 Radians/ Second	0 <= x <= 21000
0105.18	**8**	**Engine Speed 2 Type**	Unsigned 1	Enumerated	0 = Output Shaft 1 = Gas Turbine 2 = Power Turbine 3 = Rotor
0105.19	**9**	**Engine Speed 2**	Unsigned 2	0.5 Radians/Sec	0 <= x <= 21000
0105.20	**10**	**Engine Speed 3 Type**	Unsigned 1	Enumerated	0 = Output Shaft 1 = Gas Turbine 2 = Power Turbine 3 = Rotor
0105.21	**11**	**Engine Speed 3**	Unsigned 2	0.5 Radians/Sec	0 <= x <= 21000

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.09	**12**	**Engine Speed 1 Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green 5 = High – Green 6 = High – Yellow 7 = High – Red
0105.22	**13**	**Engine Speed 2 Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green 5 = High – Green 6 = High – Yellow 7 = High – Red
0105.23	**14**	**Engine Speed 3 Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green 5 = High – Green 6 = High – Yellow 7 = High – Red
0105.10	**15**	**Output Power (Shaft Torque) Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green 5 = High – Green 6 = High – Yellow 7 = High – Red

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.24	**16**	**Engine Temperature 1**	Unsigned 1	Enumerated	0 = N/A 1 = Engine Body 2 = Inlet Gas 3 = Exhaust Gas 4 = Rotor Air Outlet 5 = Lubricant - Engine 6 = Lubricant - Transmission 7 = Coolant 8 = Fuel
0105.11	**17**	**Engine Temperature 1 Status**	Unsigned 1	Enumerated	0 = Detection or suppression circuit trouble 1 = Detection and suppression circuits normal 2 = Detection circuit alarm one 3 = Detection circuit alarm two 4 = Suppression material discharged
0105.25	**18**	**Engine Temperature 2**	Unsigned 1	Enumerated	0 = N/A 1 = Engine Body 2 = Inlet Gas 3 = Exhaust Gas 4 = Rotor Air Outlet 5 = Lubricant - Engine 6 = Lubricant - Transmission 7 = Coolant 8 = Fuel

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.26	**19**	**Engine Temperature 2 Status**	Unsigned 1	Enumerated	0 = Detection or suppression circuit trouble 1 = Detection and suppression circuits normal 2 = Detection circuit alarm one 3 = Detection circuit alarm two 4 = Suppression material discharged
0105.27	**20**	**Engine Temperature 3**	Unsigned 1	Enumerated	0 = N/A 1 = Engine Body 2 = Inlet Gas 3 = Exhaust Gas 4 = Rotor Air Outlet 5 = Lubricant - Engine 6 = Lubricant - Transmission 7 = Coolant 8 = Fuel
0105.28	**21**	**Engine Temperature 3 Status**	Unsigned 1	Enumerated	0 = Detection or suppression circuit trouble 1 = Detection and suppression circuits normal 2 = Detection circuit alarm one 3 = Detection circuit alarm two 4 = Suppression material discharged

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.29	22	**Engine Temperature 4**	Unsigned 1	Enumerated	0 = N/A 1 = Engine Body 2 = Inlet Gas 3 = Exhaust Gas 4 = Rotor Air Outlet 5 = Lubricant - Engine 6 = Lubricant - Transmission 7 = Coolant 8 = Fuel
0105.30	23	**Engine Temperature 4 Status**	Unsigned 1	Enumerated	0 = Detection or suppression circuit trouble 1 = Detection and suppression circuits normal 2 = Detection circuit alarm one 3 = Detection circuit alarm two 4 = Suppression material discharged
0105.14	24	**Lubricant Pressure Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green 5 = High – Green 6 = High – Yellow 7 = High – Red
0105.31	25	**Lubricant Level Status**	Unsigned 1	Enumerated	0 = No Status 1 = Low – Red 2 = Low – Yellow 3 = Low – Green 4 = Normal – Green

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.16	26	**Fire Detection Sensor Status**	Unsigned 1	Enumerated	0 = Detection or suppression circuit trouble 1 = Detection and suppression circuits normal 2 = Detection circuit alarm one 3 = Detection circuit alarm two 4 = Suppression material discharged

Table B1 - 59: Message #3007: Engine Operating States

4.4.9 Message #3008: Zeroize Encryption Keys State

This message shall be used by the VSM to report the state of the zeroized command. The VSM will report the Zeroize Air Vehicle completion status as completed as the vehicle cannot respond further once it has been zeroized.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0111.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0111.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0111.04	2	**Zeroize Air Vehicle State**	Integer 1	Enumerated	0 = Zeroize not Completed 1 = Zeroize Completed
0111.05	3	**Zeroize GCS State**	Integer 1	Enumerated	0 = Zeroize not Completed 1 = Zeroize Completed

Table B1 - 60: Message #3008: Zeroize Encryption Keys State

4.4.10 Message #3009: Air and Ground Relative States.

This message shall be used to send the current state of the parameters defined in this message from the air vehicle to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0102.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0102.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0102.04	**2**	**Angle of Attack**	Integer 2	BAM	$-\pi \le x < \pi$
0102.05	**3**	**Angle of Sideslip**	Integer 2	BAM	$-\pi \le x < \pi$
0102.06	**4**	**True Airspeed**	Unsigned 2	0.05 Metres/ Second	$0 \le x \le 10000$
0102.07	**5**	**Indicated Airspeed**	Unsigned 2	0.05 Metres/ Second	$0 \le x \le 10000$
0102.08	**6**	**Outside Air Temp**	Unsigned 1	0.05 º Kelvin	$172.15 \le x \le 327.67$
0102.09	**7**	**U_Wind** Estimated wind component along true north vector	Integer 2	0.05 Metres/Second	$-1000 \le x \le 1000$
0102.10	**8**	**V_Wind** Estimated wind component along true east vector	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0102.11	**9**	**Altimeter Setting** Local Barometric pressure at sea level. Used to correct pressure altitude to barometric altitude.	Unsigned 2	10 Pascals	$0 \le x \le 107500$
0102.12	**10**	**Barometric Altitude** Altitude based on Altimeter Setting	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0102.13	**11**	**Barometric Altitude Rate** Estimated vertical velocity (+ up) based on pressure rate from air data system	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0102.14	**12**	**Pressure Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0102.15	**13**	**AGL Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0102.16	**14**	**WGS-84 Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0102.17	**15**	**U_Ground** Ground Speed component along true north vector	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0102.18	16	**V_Ground** Ground Speed component along true east vector	Integer 2	0.05 Metres/ Second	-1000 ≤ x ≤ 1000

Table B1 - 61: Message #3009: Air and Ground Relative States

4.4.11 Message #3010: Body-Relative Sensed States.

This message shall be used to send the air vehicle body-relative sensed states to the CUCS. Directly sensed body-relative states are packaged as a separate message type from other vehicle states because these terms may need to be known at substantially higher rates for various control-related functions.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0103.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0103.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0103.04	2	**X_Body_Accel** Longitudinal acceleration, + forward	Integer 2	0.005 Metres/Sec2	-100 ≤ x ≤ 100
0103.05	3	**Y_Body_Accel** Lateral acceleration, + right	Integer 2	0.005 Metres/Sec2	-100 ≤ x ≤ 100
0103.06	4	**Z_Body_Accel** Vertical acceleration, + down	Integer 2	0.005 Metres/Sec2	-100 ≤ x ≤ 100
0103.07	5	**Roll_Rate**	Integer 2	0.0001 Radians/ Second	$-\pi \le x < \pi$
0103.08	6	**Pitch_Rate**	Integer 2	0.0001 Radians/ Second	$-\pi \le x < \pi$
0103.09	7	**Yaw_Rate**	Integer 2	0.0001 Radians/ Second	$-\pi \le x < \pi$

Table B1 - 62: Message #3010: Body-Relative Sensed States

4.5 Flight Vehicle Payload Relevant Messages.

4.5.1 Message #4000: Inertial States.

This message shall be used to send the current air vehicle inertial state to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0101.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0101.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0101.04	**2**	**Latitude**	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0101.05	**3**	**Longitude**	Integer 4	BAM	$-\pi \leq x < \pi$
0101.06	**4**	**Altitude** Distance above (+) or below (-)	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0101.07	**5**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84 (geoid)
0101.08	**6**	**U_Speed** Speed component along true north vector	Integer 2	0.05 Metres/ Second	$-1000 \leq x \leq 1000$
0101.09	**7**	**V_Speed** Speed component along true east vector	Integer 2	0.05 Metres/ Second	$-1000 \leq x \leq 1000$
0101.10	**8**	**W_Speed** Inertial vertical speed component pointing down	Integer 2	0.05 Metres/ Second	$-1000 \leq x \leq 1000$
0101.11	**9**	**U_Accel** Acceleration component along true north vector	Integer 2	0.005 Metres/Sec^2	$-100 \leq x \leq 100$
0101.12	**10**	**V_Accel** Acceleration component along the true east vector	Integer 2	0.005 Metres/Sec^2	$-100 \leq x \leq 100$
0101.13	**11**	**W_Accel** Inertial vertical acceleration component pointing down	Integer 2	0.005 Metres/Sec^2	$-100 \leq x \leq 100$
0101.14	**12**	**Phi** Roll angle (Euler convention)	Integer 2	BAM	$-\pi \leq x < \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0101.15	**13**	**Theta** Pitch angle (Euler convention)	Integer 2	BAM	$-\pi/2 \le x \le \pi/2$
0101.16	**14**	**Psi** Yaw angle (Euler convention)	Integer 2	BAM	$-\pi \le x < \pi$
0101.17	**15**	**Phi_dot** Roll rate (Euler convention)	Integer 2	0.0005 Radians/Second	$-\pi \le x < \pi$
0101.18	**16**	**Theta_dot** Pitch rate (Euler convention)	Integer 2	0.0005 Radians/Second	$-\pi \le x < \pi$
0101.19	**17**	**Psi_dot** Yaw rate (Euler convention)	Integer 2	0.0005 Radians/Second	$-\pi \le x < \pi$
0101.20	**18**	**Magnetic Variation** True = Magnetic + Variation	Integer 2	BAM	$-\pi \le x \le \pi$

Table B1 - 63: Message #4000: Inertial States

4.5.2 Message #4001: From-To-Next Waypoint States.

This message shall be used to report the vehicle From-To-Next Waypoints for the Flight modes supported by the air vehicle that requires this function. The From, To, or Next Waypoint may not be valid dependent on the current Flight mode (Message #2001, Vehicle Operating Mode Command), therefore, zero values shall be transmitted in the waypoint number field to define invalid waypoints. Fields 11 through 16 (To waypoint) shall be used to define the non-loiter/loiter destination (the position toward which the vehicle is flying) when in the "Loiter" and "Waypoint" flight modes. It is highly encouraged that the "To waypoint" be reported for all other Flight modes where the air vehicle is attempting to achieve a non-loiter/loiter position.

Fields 6 through 10 (From waypoint) shall be used to define the point the air vehicle is departing from when in the "Waypoint" Flight mode (Message #2001, Vehicle Operating Mode Command). Fields 17 through 22 (Next waypoint) shall be used to define the non-loiter/loiter point to which the vehicle will proceed after achieving the "To Waypoint" when in the "Waypoint" Flight mode (Message #2001, Vehicle Operating Mode Command). The From-To-Next Waypoints provide a monitoring station with the capability to view a portion of the AV route. It is highly encouraged that the "From waypoint" and Next waypoint" be reported for all other Flight modes where applicable. The "Waypoint Numbers" used by the VSM in this message shall not correspond to any Mission Waypoint numbers (Message #13002) loaded to the VSM/AV by a CUCS, except to report those Mission Waypoints.

The Loiter Configuration Report Validity field shall be set to valid in this message to indicate that the Message #3004, Loiter Configuration Report, is reporting the Loiter to be performed at the “To Waypoint” location. The VSM/ AV shall push Message #3004, Loiter Configuration Report, to the CUCS as required by the Flight mode to correctly report the loiter configuration. Such an instance would be while the AV is reporting the Fly-By-Sensor mode of operation and is updating its own loiter position and pattern based on internal AV algorithms.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0110.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0110.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0110.04	**2**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0110.05	**3**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Ground Speed
0110.06	**4**	**From Waypoint – Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0110.07	**5**	**From Waypoint – Longitude**	Integer 4	BAM	$-\pi \le x < \pi$
0110.08	**6**	**From Waypoint Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0110.09	**7**	**From Waypoint Time** The Time at which the AV reached the waypoint.	Unsigned 5	0.001 Seconds	See Section 1.7.2
0110.10	**8**	**From Waypoint Number** 0 indicates that the From Waypoint is not valid.	Unsigned 2	None	$0 \le x < 65535$
0110.11	**9**	**To Waypoint – Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0110.12	**10**	**To Waypoint – Longitude**	Integer 4	BAM	$-\pi \le x < \pi$
0110.13	**11**	**To Waypoint Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0110.14	**12**	**To Waypoint Speed**	Unsigned 2	0.5 Metres/Second	$0 \le x \le 10000$
0110.15	**13**	**To Waypoint Time** The Time at which the AV will reach the waypoint. Not a countdown.	Unsigned 5	0.001 Seconds	See Sect. 1.7.2
0110.16	**14**	**To Waypoint Number** 0 indicates that the remaining To Waypoint data is not valid. 65535 indicates that the remaining To Waypoint data is valid, but there is no valid waypoint number.	Unsigned 2	None	$0 \le x \le 65535$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0110.17	15	**Next Waypoint – Latitude**	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0110.18	16	**Next Waypoint – Longitude**	Integer 4	BAM	$-\pi \leq x < \pi$
0110.19	17	**Next Waypoint Altitude**	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0110.20	18	**Next Waypoint Speed**	Unsigned 2	0.5 Metres/Second	$0 \leq x \leq 10000$
0110.21	19	**Next Waypoint Time** The Time at which the AV will reach the waypoint. Not a countdown.	Unsigned 5	0.001 Seconds	See Section 1.7.2
0110.22	20	**Next Waypoint Number** 0 indicates that the Next Waypoint is not valid	Unsigned 2	None	$0 \leq x < 65535$
0110.23	21	**Loiter Configuration Report Validity for "To Waypoint"** Message #3004, Loiter Configuration Report, is valid for the "To Waypoint"	Unsigned 1	Enumerated	0 = Not Valid 1 = Valid

Table B1 - 64: Message #4001: From-To-Next Waypoint States

4.6 IFF Command Messages.

4.6.1 Message #5000: IFF Code Command.

This message shall be used to set the IFF codes and is sent by the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1500.00	0	**Presence Vector**	Unsigned 2	None	Bitmapped
1500.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1500.04	2	**Mode 1 Code**	Integer 1	Units	First digit 0..7 2^{nd} digit 0..3, transmitted as decimal
1500.05	3	**Mode 1 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.06	4	**Mode 2 Code**	Integer 2	Units	Octal 0000 to 7777, transmitted as decimal
1500.07	5	**Mode 2 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.08	6	**Mode 3/A Code**	Integer 2	None	Octal 0000 to 7777, transmitted as decimal

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1500.09	**7**	**Mode 3/A Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.10	**8**	**Mode C Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.11	**9**	**Mode 4 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.12	**10**	**Mode 4 A/B**	Unsigned 1	Enumerated	A = 0 B = 1
1500.13	**11**	**Mode 4 Hold**	Unsigned 1	Enumerated	1 = Hold 0 = Normal
1500.14	**12**	**Mode 4 Zeroize**	Unsigned 1	Enumerated	1 = Zeroize 0 = Normal
1500.17	**13**	**Mode S Address**	Integer 3	None	Octal 00000000 to 77777777, transmitted as decimal
1500.18	**14**	**Mode S Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.19	**15**	**Mode S Aircraft ID** While the Mode S does support 8 characters, many countries only allow seven characters.	Character 9	None	8 character sequence. Each character is coded using the International Alphabet Number (IA-5 code) but limited to Upper case letters, space and digits 0-9
1500.20	**16**	**Mode S Maximum True Airspeed (Knots)**	Unsigned 1	Enumerated	0 = No Airspeed Available 1 = 0 to 75 2 = >75 to 150 3 = >150 to 300 4 = >300 to 600 5 = >600 to 1200 6 =>1200 7 = Not Assigned
1500.15	**17**	**Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = Normal 3 = Emergency

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1500.16	18	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 65: Message #5000: IFF Code Command

4.6.2 Message #5001: IFF Ident (Squawk) Command.

This message shall be used to manually transmit the vehicle's Ident.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1501.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1501.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1501.04	2	**Mode 3/A Ident**	Unsigned 1	Enumerated	0 = Normal 1 = Ident
1501.06	3	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 66: Message #5001: IFF Ident (Squawk) Command

4.7 IFF Status Messages.

4.7.1 Message #6000: IFF Status Report.

This message shall be used to report the IFF status to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1600.00	0	**Presence Vector**	Unsigned 2	None	Bitmapped
1600.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1600.04	2	**Mode 1 Code**	Integer 1	Units	First Digit 0..7 2nd Digit 0..3, Transmitted As Decimal
1600.05	3	**Mode 1 Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.14	4	**Mode 2 Code**	Integer 2	None	Octal 0000 to 7777, Transmitted As Decimal
1600.06	5	**Mode 2 Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1600.07	**6**	**Mode 3/A Code**	Integer 2	None	Octal 0000 to 7777, Transmitted As Decimal
1600.08	**7**	**Mode 3/A Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.09	**8**	**Mode C Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.10	**9**	**Mode 4 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.11	**10**	**Mode 4 A/B**	Unsigned 1	Enumerated	A = 0 B = 1
1600.12	**11**	**Mode 4 Hold**	Unsigned 1	Enumerated	1 = Hold 0 = Normal
1600.14	**12**	**Mode S Address**	Integer 3	None	Octal 00000000 to 77777777, transmitted as decimal
1600.15	**13**	**Mode S Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.16	**14**	**Mode S Aircraft ID**	Character 8	None	8 character sequence. Each character is coded using the International Alphabet Number (IA-5 code) but limited to Upper case letters, space and digits 0-9
1600.17	**15**	**Mode S Maximum True Airspeed (Knots)**	Unsigned 1	Enumerated	0 = No Airspeed Available 1 = 0 to 75 2 = >75 to 150 3 = >150 to 300 4 = >300 to 600 5 = >600 to 1200 6 =>1200 7 = Not Assigned
1600.13	**16**	**Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = Normal 3 = Emergency

Table B1 - 67: Message #6000: IFF Status Report

4.8 ATC Interface Command Messages.

4.8.1 Messages #7000: Civilian Air Traffic Control (ATC) Radio Command.

This message shall be used to command the AV radios for data that should be sent or received from civil aviation authorities if the UAV has to pass through civil airspace. It is sent from the CUCS to the AV.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
7000.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
7000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
7000.02	**2**	**Set Communication Radio State**	Unsigned 1	Enumerated	0 = Off 1 = On
7000.03	**3**	**Set Communication Frequency**	Unsigned 2	8333.3… Hz	118MHz to 136.975 MHz
7000.04	**4**	**Voice Transmit Enable** Enables voice transmission to ATC	Unsigned 1	Enumerated	0 = Disabled 1 = Enabled
7000.05	**5**	**Radio Unit** Selects which radio unit is addressed by this message.	Unsigned 1	None	$0 \le x \le 255$

Table B1 - 68: Message #7000: Civilian Air Traffic Control (ATC) Radio Command

4.8.2 Message #7001: NAVAID Radio Command.

This message shall be used to command the NAVAID radios and is sent from the CUCS to the AV.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
7001.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
7001.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
7001.02	**2**	**Set NAVAID Radio State**	Unsigned 1	Enumerated	0 = Off 1 = On
7001.03	**3**	**Set NAVAID Frequency**	Unsigned 2	50000 Hz	108MHz to 117.95 MHz
7001.04	**4**	**VOR Radial** Requested Radial that AV should fly	Signed 2	BAM	$-\pi \le x < \pi$
7001.05	**5**	**Radial To/From** Defines if AV is flying in to the VOR or away from the VOR	Unsigned 1	Enumerated	0 = In 1 = Out
7001.06	**6**	**Voice Transmit Enable** Enables voice transmission from ATC over NAVAID Radio	Unsigned 1	Enumerated	0 = Disabled 1 = Enabled

Unique ID	Field	Data Element Name & Description	Type	Units	Range
7001.07	**7**	**Radio Unit** Selects which radio unit is addressed by this message.	Unsigned 1	None	$0 \leq x \leq 255$

Table B1 - 69: Message #7001: NAVAID Radio Command

4.9 ATC Interface Status Messages.

4.9.1 Messages #9000: Civilian Air Traffic Control (ATC) Radio Status.

This message shall be used to report the ATC radios status to the CUCS from the AV.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
9000.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
9000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
9000.02	**2**	**Communication Radio State**	Unsigned 1	Enumerated	0 = Off 1 = On
9000.03	**3**	**Communication Frequency**	Unsigned 2	8333.3… Hz	118MHz to 136.975 MHz
9000.04	**4**	**Voice Transmit Enabled** Enables voice transmission to ATC	Unsigned 1	Enumerated	0 = Disabled 1 = Enabled
9000.05	**5**	**Radio Unit** Selects which radio unit is addressed by this message.	Unsigned 1	None	$0 \leq x \leq 255$

Table B1 - 70: Message #9000: Civilian Air Traffic Control (ATC) Radio Status

4.9.2 Message #9001: NAVAID Radio Status.

This message shall be used to report the NAVAID radios status to the CUCS from the AV.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
9001.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
9001.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
9001.02	**2**	**VOR NAVAID State**	Unsigned 1	Enumerated	0 = Off 1 = On
9001.03	**3**	**NAVAID Frequency**	Unsigned 2	50000 Hz	108MHz to 117.95 MHz
9001.04	**4**	**VOR Azimuth**	Signed 2	BAM	$-\pi \leq x < \pi$
9001.05	**5**	**DME**	Signed 3	Metres	$0 \leq x \leq 364000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
9001.06	**6**	**LOC/Glide Slope Valid**	Unsigned 1	Bitmapped	0x01 = LOC Valid 0x02 = Glideslope Valid
9001.07	**7**	**LOC** Left (-128), Right (127)	Signed 1	N/A	$-128 \le x \le 127$
9001.08	**8**	**Glide Slope** Down (-128), Up (127)	Signed 1	N/A	$-128 \le x \le 127$
9001.09	**9**	**Marker**	Unsigned 1	Bitmapped	0x01 = Outer 0x02 = Middle 0x04 = Inner
9001.10	**10**	**Voice Transmit Enabled** Enables voice transmission from ATC over NAVAID Radio	Unsigned 1	Enumerated	0 = Disabled 1 = Enabled
9001.11	**11**	**Radio Unit** Selects which radio unit is addressed by this message.	Unsigned 1	None	$0 \le x \le 255$

Table B1 - 71: Message #9001: NAVAID Radio Status

4.10 Vehicle Auxiliary Command Messages.

4.10.1 Message #11000: Vehicle Auxiliary Command.

This message shall be used by the CUCS to control the air vehicle's landing gear, flaps, and speed brakes.

The VSM shall use the General Configuration Messages to define the air vehicle's capability to support the fields commanded in Message #11000. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
11000.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
11000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
11000.02	**2**	**Landing Gear Command**	Unsigned 1	Enumerated	0 = Up 1 = Down 2-9= Reserved 10-255 = Vehicle Specific
11000.03	**3**	**Flap Deployment Command** Command to set flap position	Integer 1	0.02 Radians	$-\pi/2 \le x \le \pi/2$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
11000.04	**4**	**Speed Brake Deployment Command** Command to set speed break position	Integer 1	0.02 Radians	$-\pi/2 \le x \le \pi/2$
11000.05	**5**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 72: Message #11000: Vehicle Auxiliary Command

4.11 Vehicle Auxiliary Status Messages.

4.11.1 Message #12000: Vehicle Auxiliary Status.

This message shall be used by the VSM to report the commanded state of the air vehicle's landing gear, flaps, and speed brakes.

The VSM shall use the General Configuration Messages to define the air vehicle's capability to support the fields commanded in Message #12000. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
12000.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
12000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
12000.02	**2**	**Landing Gear State**	Unsigned 1	Enumerated	0 = Up1 = Down & Locked 2 = Down & not locked 3-9= Reserved 10-255 = Vehicle Specific
12000.03	**3**	**Specific Gear Location**	Unsigned 1	Bitmapped	0x00 = All 0x01 = Nose 0x02 = Port 0x03 = Starboard 0x04 = Aft 0x08 – 0x80 = Vehicle Specific
12000.04	**4**	**Flap Deployment Angle**	Integer 1	0.02 Radians	$-\pi/2 \le x \le \pi/2$
12000.05	**5**	**Speed Brake Deployment Angle**	Integer 1	0.02 Radians	$-\pi/2 \le x \le \pi/2$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
12000.06	**6**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 73: Message #12000: Vehicle Auxiliary Status

4.12 Mission Command and Status Messages.

The messages in this section support loading of a mission plan to the air vehicle and downloading the mission plan to a CUCS. Mission messages can be sent to/from the air vehicle before and during flight.

4.12.1 Message #13000: Mission Upload Command.

The Mission Upload command shall be used to control the overall mission upload, download and storage of a mission and to request autonomous activity status. The mission shall be uploaded from a CUCS to a VSM as a series of individual waypoints based on Message #13002, AV Position Waypoint message, for which there may be a number of optional associated messages. The optional associated messages include Message #13003, AV Loiter Waypoint, Message #13004, Payload Action Waypoint, Message #13005, Airframe Action Waypoint, and Message #13006, Vehicle Specific Waypoint. A Message #13000, Mission Plan Mode “Load Mission” command shall identify that all mission waypoints have all been transmitted from the CUCS to the VSM, and the VSM shall transform the mission as required and load it to the air vehicle.

Field 5 value 6, "Download all activity status" shall be used to command the VSM or vehicle to send an Activity Status Message, Message #36200 for each activity that the VSM or vehicle will execute, describing the scheduling status of that activity.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #13000. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0800.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0800.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0800.04	**2**	**Mission ID**	Character 20	None	Text Identifier of Mission

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0800.05	**3**	**Mission Plan Mode**	Unsigned 1	Enumerated	0 = Clear Route 1 = Clear Mission 2 = Load Mission 3 = Download Mission 4 = Download Single Waypoint 5 = Cancel Upload/ Download 6 = Download All Activity Status
0800.06	**4**	**Waypoint Number**	Unsigned 2	None	1 ≤ x < 65535
0800.07	**5**	**Route ID**	Character 20	None	Text Identifier of Route
0800.08	**6**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 74: Message #13000: Mission Upload Command

4.12.2 Message #13001: AV Route.

This message shall be used by the CUCS to define a Route Type for an AV route defined by a series of Message #13002, AV Position Waypoint, messages. If the "Initial waypoint number" field in this message is set to 0, the route definition, but not the waypoints, shall be deleted. Where routes have been uploaded to an air vehicle without a defined Route Type, the default Route Type shall be "2= Flight."

This message shall be transmitted from the VSM/ AV in response to a Message #13000, "Download Mission" request to report the AV route types loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0801.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0801.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0801.04	**2**	**Initial Waypoint Number** First Waypoint in defined route.	Unsigned 2	None	0 ≤ x < 65535
0801.05	**3**	**Route ID**	Character 33	None	Text identifier of route

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0801.06	**4**	**Route Type**	Unsigned 1	Enumerated	0 = Launch 1 = Approach 2 = Flight 3 = Contingency A 4 = Contingency B

Table B1 - 75: Message #13001: AV Route

4.12.3 Message #13002: AV Position Waypoint.

This message shall be used by the CUCS to define a single Route, or series of Routes, to be uploaded to the VSM/ AV. Waypoint numbers forming a route do not need to be contiguous, but the use of contiguous integers is recommended within a route. This message shall be used to define the location the AV will fly to. When the Location Type is relative, the Relative Y and Relative X shall maintain the units of radians.

This message shall be transmitted from the VSM/ AV in response to a Message #13000, “Download Mission” request to report the AV Position Waypoints loaded onboard.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #13002. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0802.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0802.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0802.04	**2**	**Waypoint Number**	Unsigned 2	None	$1 \le x < 65535$
0802.05	**3**	**Waypoint to Latitude or Relative Y**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0802.06	**4**	**Waypoint to Longitude or Relative X**	Integer 4	BAM	$-\pi \le x < \pi$
0802.07	**5**	**Location Type**	Unsigned 1	Enumerated	0 = Absolute 1 = Relative (See Message #2006)
0802.08	**6**	**Waypoint to Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0802.09	**7**	**Waypoint Altitude Type** Defines altitude type for all altitude related fields in the messages for this waypoint.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0802.10	**8**	**Waypoint to Speed**	Unsigned 2	0.5 Metres/ Second	0 ≤ x ≤ 10000
0802.11	**9**	**Waypoint Speed Type**	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Groundspeed 3 = Arrival Time
0802.12	**10**	**Next Waypoint** Next waypoint to fly to when this waypoint is reached. If value = 0 and Activity = 0, this is the last waypoint in the series. If value = 0 and Activity ID ≠ 0, then the VSM is to fill in the next waypoint value to determine the order to fly the waypoints.	Unsigned 2	None	0 ≤ x < 65535
0802.13	**11**	**Contingency Waypoint A** Waypoint to fly to if a contingency (Type A) requires abandonment of the current mission. If value = 0, the AV will continue with the planned mission.	Unsigned 2	None	0 ≤ x < 65535
0802.14	**12**	**Contingency Waypoint B** Waypoint to fly to if a Contingency (Type B) requires abandonment of the current mission. If value = 0, the AV will continue with the planned mission.	Unsigned 2	None	0 ≤ x < 65535
0802.16	**14**	**Turn Type**	Unsigned 1	Enumerated	0 = Short Turn 1 = Flyover

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0802.17	**15**	**Optional Messages for Waypoint**	Unsigned 1	Bitmapped	0x00 = None 0x01= Msg #803 0x02 = Msg #804 0x04 = Msg #805 0x08 = Msg #806
0802.18	**16**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 76: Message #13002: AV Position Waypoint

4.12.4 <u>Message #13003: AV Loiter Waypoint.</u>

This message shall be used to define the loiter characteristics the AV will perform once it has arrived at the “Waypoint Number”.

This message shall be transmitted from the VSM / AV in response to a Message #13000, “Download Mission” request to report the loiter characteristics waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0803.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0803.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0803.04	**2**	**Waypoint Number**	Unsigned 2	None	1 ≤ x < 65535
0803.05	**3**	**Waypoint Loiter Time**	Unsigned 3	Seconds	0 ≤ x ≤ MAX_INT, Where 0 = Indefinite.
0803.06	**4**	**Waypoint Loiter Type**	Unsigned 1	Enumerated	1= Circular 2 = Racetrack 3 = Figure 8 4 = Hover
0803.07	**5**	**Loiter Radius** Used as radius for circular Loiter, else used as the width perpendicular to line between loiter points.	Unsigned 2	1.5 Metres	1 ≤ x ≤ 98000

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0803.08	**6**	**Loiter Length** Used for racetrack and figure 8 to define length of pattern, centred around the Loiter Point (defined in Message #13002) in the direction of the Loiter Bearing.	Unsigned 2	1.5 Metres	$1 \le x \le 98000$
0803.09	**7**	**Loiter Bearing** The bearing of the loiter pattern, referenced to the Loiter Point (defined in Message #13002), from True North.	Integer 2	BAM	$-\pi \le x < \pi$
0803.10	**8**	**Loiter Direction** Defines direction of turn when rounding the loiter point defined by the AV Position Waypoint Message (Message # 13002).	Unsigned 1	Enumerated	0 = Vehicle Dependent 1 = Clockwise 2 = Counter - Clockwise 3 = Into the Wind
0803.11	**9**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 77: Message #13003: AV Loiter Waypoint

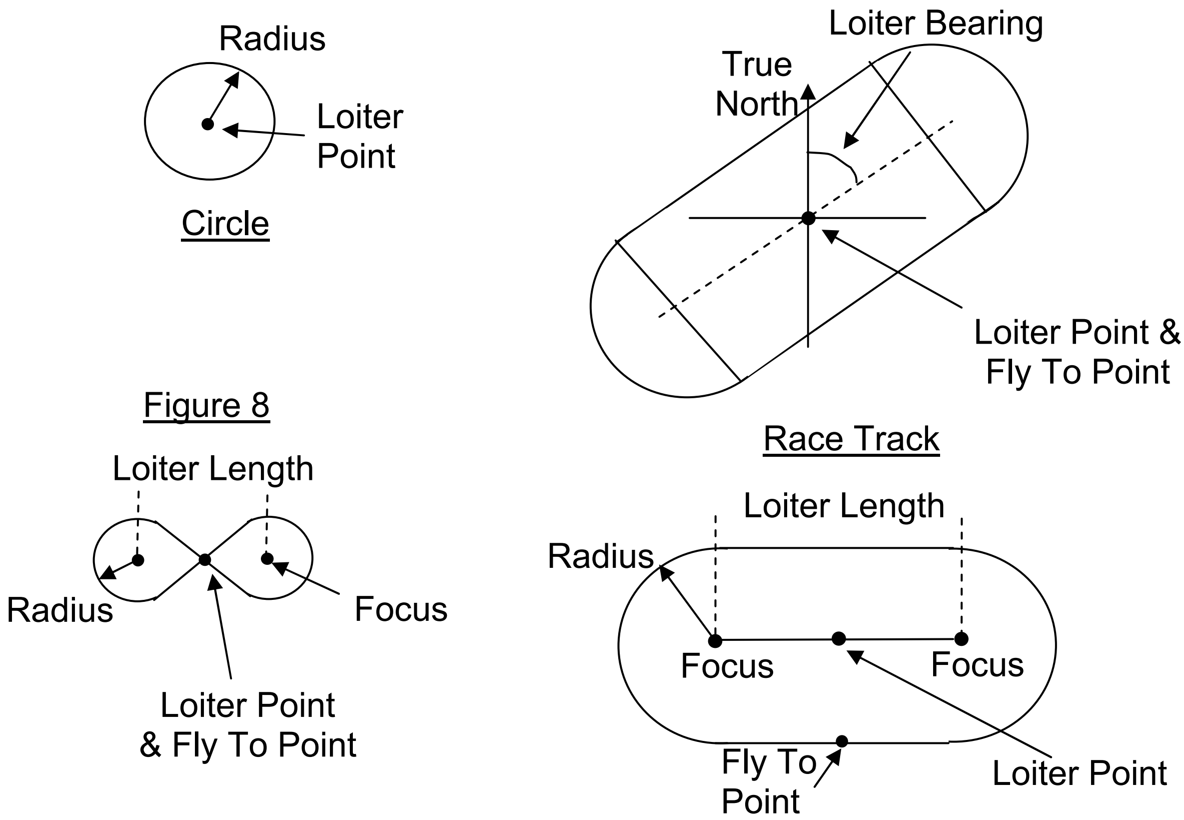

Figure B1 - 10: Loiter Pattern

4.12.5 Message #13004: Payload Action Waypoint.

This message shall be used by the CUCS to define the Payload action that will be performed when the AV begins to fly to the waypoint defined by the "Waypoint Number".

This message shall be transmitted from the VSM/ AV in response to a Message #13000, "Download Mission" request to report the Payload Action Waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0804.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0804.04	**2**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.05	**3**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0804.06	**4**	**Set Sensor 1 Mode**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby 3 = No Change 4-10 = Reserved 11-255 = Vehicle/Payload Specific
0804.07	**5**	**Set Sensor 2 Mode**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby 3 = No Change 4-10 = Reserved 11-255 = Vehicle/Payload Specific
0804.08	**6**	**Sensor Output**	Unsigned 1	Enumerated	0 = None 1 = Sensor 1 2 = Sensor 2 3 = Both Sensors 4 = No Change 5-10 = Reserved 11-255 = Vehicle/Payload Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.09	**7**	**Set Sensor Pointing Mode**	Unsigned 1	Enumerated	0 = Nil 1 = Angle Relative to AV 2 = Slewing Rate Relative to AV 3 = Slewing Rate Relative to Inertial 4 = Lat-Long Slaved 5 = Target Slaved 6 = Stow 7 = Line Search Start Location 8 = Line Search End Location
0804.10	**8**	**Starepoint Latitude**	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0804.11	**9**	**Starepoint Longitude**	Integer 4	BAM	$-\pi \leq x < \pi$
0804.12	**10**	**Starepoint Altitude**	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0804.13	**11**	**Starepoint Altitude Type** Defines altitude type for previous field	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0804.14	**12**	**Payload Az (wrt AV)**	Integer 2	BAM	$-\pi \leq x < \pi$
0804.15	**13**	**Payload El (wrt AV)**	Integer 2	BAM	$-\pi/2 \leq x \leq \pi/2$
0804.16	**14**	**Payload Sensor Rotation Angle**	Integer 2	BAM	$-\pi/2 \leq x \leq \pi/2$
0804.17	**15**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 78: Message #13004: Payload Action Waypoint

4.12.6 Message #13005: Airframe Action Waypoint.

This message shall be used by the CUCS to define the Airframe action that will be performed when the AV begins to fly to the waypoint defined by the “Waypoint Number”.

This message shall be transmitted from the VSM/ AV in response to a Message #13000, “Download Mission” request to report the Airframe Action Waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0805.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0805.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0805.04	**2**	**Waypoint Number**	Unsigned 2	None	1 ≤ x < 65535
0805.05	**3**	**Function**	Unsigned 1	Enumerated	1 = Navigation Lights 2 = Strobe Lights 3 = Primary Data Link 4 = Secondary Data Link 5 = Navigation IR Lights 6 = Strobe IR Lights 7 = NVD Compatible 8 = Landing 9 = Landing IR 10 = Reserved 11 – 255 = Vehicle Specific
0805.06	**4**	**Enumerated State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby 3 = Receive Only 4 = Transmit Only
0805.07	**5**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 79: Message #13005: Airframe Action Waypoint

4.12.7 Message #13006: Vehicle Specific Waypoint.

This message shall be used to define the vehicle specific action that will be performed when the AV begins to fly to the waypoint. This message shall be used to pass Common Route Definition (CRD) messages that cannot be mapped to the generic waypoints defined in this section. A waypoint value of zero indicates mission generic data that is not associated with any specific waypoint.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0806.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0806.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0806.04	**2**	**Waypoint Number**	Unsigned 2	None	0 ≤ x < 65535
0806.05	**3**	**Tag Type**	Unsigned 1	Enumerated	0 = None 1 = Start Tag 2 = Stop Tag
0806.06	**4**	**Tag/Data**	Character 20	None	Null Terminated ASCII String
0806.07	**5**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 80: Message #13006: Vehicle Specific Waypoint

4.12.8 Message #14000: Mission Upload / Download Status.

This message shall be used to provide status on a mission upload / download from a VSM to a CUCS, and to request a missing Waypoint from a CUCS mission upload.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0900.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0900.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0900.06	**2**	**Mission ID** Identifies mission and (by reference) flight plan uploading or downloading on this platform.	Character 20	None	Text Identifier of Mission.
0900.04	**3**	**Status**	Unsigned 1	Enumerated	0 = In progress 1 = Complete 2 = Aborted / Rejected
0900.05	**4**	**Percent Complete**	Unsigned 1	Percent	0 ≤ x ≤ 100
0900.07	**5**	**Waypoint Request**	Unsigned 2	None	0 = N/A 1 ≤ x < 65535

Table B1 - 81: Message #14000: Mission Upload / Download Status

4.13 Subsystems Status Messages.

The common message set includes summary health and status information for use by CUCS status displays. This information need not convey detailed, configuration-specific health and status information, but should provide the CUCS with overall health summary data suitable for annunciation on the console using conventional colour codes (Green=Nominal, Yellow=Caution, Red= Warning, Black=Failed or Out-of-service). In the event of a system caution or warning, vehicle, payload or data link specific status messages can provide detailed diagnostic information peculiar to the configuration.

These messages shall provide health and status overview information only in an interoperable context. Detailed status information about particular subsystems shall be a vehicle-specific message type.

4.13.1 Message #15000: Subsystem Status Request.

This message shall be used by the CUCS to request Subsystem information from the AV, VSM or Data Link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1000.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1000.04	**2**	**Subsystem ID** Identifier associated with the subsystem for which status information is being requested as applicable.	Unsigned 4	Bitmapped	0x0001 = Engine 0x0002 = Mechanical 0x0004 = Electrical 0x0008 = Reserved 0x0010 = Propulsion Energy 0x0020 = Navigation 0x0040 = Payload 0x0080 = Recovery System 0x0100 = Environmental Control System 0x0200 = VSM Status 0x0400 = VDT 0x0800 = CDT 0x1000 through 0x80000 = Reserved 0x100000 through 0x80000000 = VSM Specific
1000.06	**3**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 82: Message #15000: Subsystem Status Request

4.13.2 Message #15001: Subsystem Status Detail Request.

This message shall be used by the CUCS to request more information from the AV, VSM or Data Link about a specific subsystem. The AV, VSM or Data Link shall respond using a vehicle specific service specified in Section 1.7.5.1.

Unique ID	Field	Data Element Name & Description	Type	Units	Range

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1001.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1001.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1001.04	**2**	**Subsystem State Report Reference** The Report Reference is the Vehicle or Data Link Specific information reference previously provided by the AV, VSM or Data Link.	Integer 4	None	$0 \leq x \leq (2^{31} - 1)$

Table B1 - 83: Message #15001: Subsystem Status Detail Request

4.13.3 Message #16000: Subsystem Status Alert Message.

This message shall be used by the AV, VSM, or Data Link to create a Subsystem Status Alert. Examples are:

- "Engine #3 Failure"
- "Engine #3 Cylinder Head Temp > 280C, currently 295 C"

The Subsystem State Report Reference shall be assigned by the AV, VSM or Data Link. The purpose of this field is to provide a reference number for subsequent requests for more information on a posted alert by the CUCS.. If the CUCS requires additional information for a specific alert posted by the AV, VSM or the Data Link, the CUCS shall request this information using Message #15001. Alert messages of Type 1 (Not Clearable or Acknowledgeable by operator) can be cleared by the AV, VSM or Data Link sending the alert with a priority of "0 = Clear" or Type of "0 = Clear".

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1100.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1100.04	**2**	**Priority**	Unsigned 1	Enumerated	0 = Cleared 1 = Nominal 2 = Caution 3 = Warning 4 = Emergency 5 = Failed

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.05	**3**	**Subsystem State Report Reference** Identifier associated with a particular report associated with the specified subsystem. Used to request particular status information from the VSM.	Integer 4	None	$-1 \le x \le (2^{31} - 1)$, where -1 = No More Info Available
1100.06	**4**	**Subsystem ID** Identifier associated with the subsystem for which status information is being reported.	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Reserved 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environmental Control System 9 = VSM Status 10 = VDT 11 = CDT 12-19 = Reserved 20 – 31= VSM Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.07	**5**	**Type**	Unsigned 1	Enumerated	0 = Clear 1 = Not Clearable or Acknow-ledgeable By Operator 2 = Clearable By Operator 3 = Display For Fixed Time Then Automatically Clear 4 = Acknowledgeable By Operator 5 = Acknowledgeable and clearable
1100.08	**6**	**Warning ID** The Warning ID is used to update warning messages that have been previously sent to the CUCS from the VSM.	Integer 4	None	<Warning ID> Note: Warning ID is a unique value generated by the VSM for use when additional message #16000s are sent about the same alert
1100.09	**7**	**Text**	Character 80	None	Null Terminated ASCII String
1100.10	**8**	**Persistence** This field determines the minimum time an alert will be displayed. This time is referenced to when this message is received by the CUCS.	Integer 1	Seconds	<0 = Not Defined 0 = Clear Immediately >0 = Display for at least this many seconds

Table B1 - 84: Message #16000: Subsystem Status Alert

4.13.4 Message #16001: Subsystem Status Report.

This message shall be used by the AV, VSM or Data Link to produce a Subsystem Status Report.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1101.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1101.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1101.04	**2**	**Subsystem ID** Identifier associated with the subsystem for which status information is being reported as applicable. IDs above 20 are used for vehicle and payload specific subsystems.	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Reserved 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environment-al Control System 9 = VSM Status 10 = VDT 11 = CDT 12-19 = Reserved 20 – 31= VSM Specific
1101.05	**3**	**Subsystem State**	Unsigned 1	Enumerated	0 = No Status 1 = Nominal 2 = Caution 3 = Warning 4 = Emergency 5 = Failed
1101.06	**4**	**Subsystem State Report Reference** The Report Reference is the Vehicle Specific information reference, provided by the AV, VSM or Data Link, which the CUCS can use to request additional information from the AV, VSM or Data Link on the reported alert.	Integer 4	None	$-1 \le x \le (2^{31} - 1)$, where -1 = No More Info Available

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1101.07	6	**Report Text Type**	Unsigned 1	Enumerated	0=Use Report Reference 1=http URL Address 2=PDF URL Address
1101.08	7	**Report Text Reference** Contains the URL associated with the Subsystem detailed status.	Character 256	None	Null if Unused.

Table B1 - 85: Message #16001: Subsystem Status Report

4.13.5 Message #16002: Heartbeat Message.

This message shall be used to allow either the CUCS or the VSM to monitor whether the other component is operational.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1405.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1405.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Table B1 - 86: Message #16002: Heartbeat Message

4.14 Miscellaneous Message Types.

4.14.1 Message #17000: Message Acknowledgement.

This message shall be used to acknowledge standard message types that require acknowledgement per the Message Acknowledge bit. Vehicle specific (private) message types may also elect to use this message if desired.

The null ID shall be used for an ID that is not applicable during an instance of transmission of this message. The Message Acknowledgement Message shall only be used to acknowledge configuration messages, as requested by the Message Acknowledge Configuration Message, in advance of an authorized connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1400.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1400.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1400.06	2	**Original Message Time Stamp**	Unsigned 5	0.001 Seconds	See section 1.7.2
1400.08	3	**Original Message Type**	Unsigned 2	NA	0 to 2^{32}-1

Table B1 - 87: Message #17000: Message Acknowledgement

4.14.2 Message #17001: Schedule Message Update Command.

This message shall be used to request that the specified message be sent at a given frequency. The effect of this message is to make the requested message a "push" type message, but without requesting each pull individually.

The null ID shall be used for an ID that is not applicable during an instance of transmission of this message.

The Schedule Message Update Command message shall not be transmitted from a CUCS to a VSM, and vice versa, without an authorized connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1402.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1402.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1402.04	**2**	**Requested Message Type**	Unsigned 2	None	See Section 4.1.1
1402.05	**3**	**Frequency**	Unsigned 2	0.01 Hertz	0 <= x < =100 0 = Cancel Automatic Send of Requested Message
1402.06	**4**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 88: Message #17001: Schedule Message Update Command

4.14.3 Message #17002: Generic Information Request Message.

This message shall be used to request the VSM, air vehicle, Data Link or CUCS to send the specified message. The Presence Vector field allows the requesting unit to determine the minimum number of fields that shall be returned. This message shall not be used to request Message #41000, Message #41001, Message #41002, and Message #44003, as this is specifically achieved with Message #40000.

The Generic Information Request Message shall not be transmitted from a CUCS to a VSM, and vice versa, without an authorized connection, with the exception of requesting specific (non-generic) configuration messages such as Message #3, Message #3000, Message #21001 and Message #21100.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1403.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1403.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1403.06	2	**Station Number**	Unsigned 4	None	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1403.07	3	**Message Type** Type number of the message being requested	Unsigned 2	None	See Section 4.1.1
1403.08	4	**Requested Field Presence Vector** Fields within the message that are requested.	Unsigned 4	None	Bitmapped
1403.09	5	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 89: Message #17002: Generic Information Request Message

4.14.4 Message #17003: File Transfer Notification.

This message shall be used to report an FTP file transfer between the CUCS and the VSM/AV. The message can be sent in either direction. The file will be available in the FTP directory previously identified by the CUCS/VSM by Message #42001, CUCS Resource Report or Message #43000 VSM Services Report Message.

The File Transfer Notification message shall not be transmitted from a CUCS to a VSM, and vice versa, without an authorized connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range in STANAG 4586, Appendix 1
1404.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1404.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1404.05	2	**File Type**	Unsigned 1	Enumerated	0 = Payload Data 1-10 = Reserved 11-255 = VSM Specific
1404.06	3	**File Name** Name of binary file being transferred.	Character, 32 bytes	None	Null-terminated Printable ASCII

Table B1 - 90: Message #17003: File Transfer Notification

4.14.5 Message #18000: Link Audio Command.

This message shall be used by the CUCS to assert the Push To Talk (PTT) function within the UAS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1800.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1800.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1800.02	**2**	**PTT** This field will cause a change of the state of the PTT discrete output. Suggest that at least one discrete, controlled by Bit 0, be used, and reserved for the primary Push To Talk signal.	Unsigned 1	Bit Mask	For each bit: 0 = Not Active 1 = Active

Table B1 - 91: Message #18000: Link Audio Command

4.14.6 Message #18100: Link Audio Status.

This message is sent from the VSM to the CUCS, and shall report the status of the Push To Talk (PTT).

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1825.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1825.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1825.02	**2**	**PTT**	Unsigned 1	Bit Mask	For each bit: 0 = Not Active 1 = Active

Table B1 - 92: Message #18100: Link Audio Status

4.15 Payload Command Messages.

Since UAVs are commonly used as carriers for payload systems, the messages in this group are specified to provide a means for the UCS to command the operating state in an interoperable fashion. Vehicles not carrying such payloads need not support the messages in the group.

4.15.1 Message #19000: Payload Bay Command.

This message shall be used to control each payload bay.

Note: Message #21001 defines the Station to Payload Bay door configuration.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0206.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0206.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0206.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0206.05	**3**	**Payload Bay Doors**	Unsigned 1	Enumerated	0 = Close 1 = Open
0206.06	**4**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 93: Message #19000: Payload Bay Command

4.15.2 Message #19001: Payload Steering Command.

This message shall be used to steer any steerable payload located at the Station Number specified in the message. Table B1-22, Conditional Payload Message Groups, identifies the common payload types that are required to use the Payload Steering Command.

The VSM shall use the General Configuration Messages to define the payloads capability (specified by Station Number) to support the fields commanded in this message dependent on the current payload steering mode (Message #19100, Set EO/IR Pointing Mode and Message #19200, SAR Mode) for the Payload type. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0200.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0200.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0200.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0200.05	**3**	**Set Centreline Azimuth Angle** (+ right of aircraft x axis)	Integer 2	BAM	$-\pi \leq x < \pi$
0200.06	**4**	**Set Centreline Elevation Angle** (+ above aircraft waterline)	Integer 2	BAM	$-\pi \leq x < \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0200.17	5	**Set Zoom** Allows control of the payload zoom by either requesting a specific angle or by requested the payload to zoom in or out until commanded to stop.	Unsigned 1	Enumerated	0 = Use Set Horizontal & Vertical Field Of View 1 = No change 2 = Zoom In 3 = Zoom Out
0200.07	6	**Set Horizontal Field Of View** Applies to the Addressed Sensor specified in Message #19100.	Integer 2	BAM	$-\pi \leq x < \pi$
0200.08	7	**Set Vertical Field Of View** Applies to the Addressed Sensor specified in Message #19100.	Integer 2	BAM	$-\pi \leq x < \pi$
0200.09	8	**Horizontal Slew Rate** (+ Slew FOV right)	Integer 2	BAM	-2π to 2π
0200.10	9	**Vertical Slew Rate** (+ Slew FOV up)	Integer 2	BAM	-2π to 2π
0200.11	10	**Latitude** Commanded Stare point latitude: latitude of centre of FOV	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0200.12	11	**Longitude** Commanded Stare point longitude: longitude of centre of FOV	Integer 4	BAM	$-\pi \leq x < \pi$
0200.13	12	**Altitude** Altitude of centre of FOV	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0200.14	13	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0200.18	14	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 94: Message #19001: Payload Steering Command

4.15.3 <u>Message #19100: EO/IR/Laser Payload Command.</u>

This message shall be used to command EO/IR/Laser payloads with the exception of payload pointing commands, manual focus commands and FOV (Zoom) commands which are commanded from the Payload Steering Command Message (Message #19001).

Notes:

- Slaved modes are assumed to lock on the centre of FOV at the time the command is received by the payload (VSM).
- Target slaving implies that the FOV will track the target.
- Lat-Long slaving implies that the FOV will track a specific location on the ground.

The VSM shall use the General Configuration Messages to define the payloads capability (specified by Station Number) to support the fields commanded in this message. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0201.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0201.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0201.05	**3**	**Addressed Sensor** Identifies which sensor (s) to control where applicable.	Unsigned 1	Bitmapped	0x01 = EO 0x02 = IR 0x04 = Payload - Specific
0201.07	**4**	**Set EO Sensor Mode**	Unsigned 1	Enumerated	0 = BW Mode 1 = Colour Mode
0201.17	**5**	**Focus Type**	Unsigned 1	Enumerated	0 = Automatic 1 = Manual
0201.18	**6**	**Set EO Iris Adjustment mode**	Unsigned 1	Enumerated	0 = Automatic 1 = Manual
0201.19	**7**	**Set IR Gain Adjustment mode**	Unsigned 1	Enumerated	0 = Automatic 1 = Manual
0201.08	**8**	**Set IR Polarity**	Unsigned 1	Enumerated	0 = Black Hot 1 = White Hot
0201.20	**9**	**Select IR Temperature**	Unsigned 1	Enumerated	1-255 VSM Specific
0201.16	**10**	**Set NUC Table**	Unsigned 1	Enumerated	0 <= X <= 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.09	**11**	**Image Output**	Unsigned 1	Enumerated	0 = None 1 = EO 2 = IR 3 = Both Simultaneously 4 = Payload-Specific
0201.10	**12**	**Set EO/IR Pointing Mode**	Unsigned 1	Enumerated	0 = No Value 1 = Angle Relative to AV 2 = Slewing Rate Relative to AV 3 = Slewing Rate Relative to Inertial 4 = Lat-Long Slaved 5 = Target Slaved (track) 6 = Stow 7 = Cage 8-31 = Reserved 32-255 = Payload - Specific
0201.21	**13**	**Enable Image Stabilization**	Unsigned 1	Enumerated	0 = Off 1 = On
0201.11	**14**	**Fire Laser Pointer/Rangefinder**	Unsigned 1	Enumerated	0000 0000 = Turn Off 0011 0011 = Turn On, Do Not Fire 0101 0101 = Fire One Laser Pulse 1110 1110 = Fire Laser
0201.12	**15**	**Select Laser Rangefinder First/Last Pulse**	Unsigned 1	Enumerated	1 = First 2 = Last
0201.13	**16**	**Set Laser Designator Code**	Unsigned 2	None	Laser Illuminator Code per STANAG 5516 (Ed 2) (Link 16) Page E-3-527 DFI #1676 DUI 001

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.14	**17**	**Initiate Laser Designator**	Unsigned 1	Enumerated	0000 0000 = Turn Off (Safe) 0011 0011 = Turn On (Arm) 0100 0100 = Deactivate Laser (Disable) 0101 0101 = Activate Laser (Fire) 0110 0110 = Payload Specific 1000 1000 = Payload Specific 1001 1001 = Payload Specific 1100 1100 = Payload Specific
0201.24	**18**	**Laser Mode**	Unsigned 1	Enumerated	0 = Operational Check 1 = Mission 2 = Boresight 3-7 = Reserved 8 – 255 = Payload Specific
0201.22	**19**	**Sensor Power** Applies to the Addressed Sensor	Unsigned 1	Enumerated	0 = Off 1 = On
0201.23	**20**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 95: Message #19100: EO/IR/Laser Payload Command

4.15.4 Message #19101: EO/IR/Laser Payload Quality Control.

This message shall be used to manually adjust the payload quality.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0208.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0208.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0208.04	**2**	**Station Number**	Unsigned 4	None	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0208.05	**3**	**Set Focus**	Unsigned 1	None	0 = No Change 1 = Focus Closer 2 = Focus Farther
0208.06	**4**	**Adjust EO Iris**	Unsigned 1	Enumerated	0 = No Change 1 = Decrease Iris Size 2 = Increase Iris Size
0208.07	**5**	**Adjust IR Gain**	Unsigned 1	Enumerated	0 = No Change 1 = Decrease Gain 2 = Increase Gain
0208.08	**6**	**Adjust IR Level**	Unsigned 1	Enumerated	0 = No Change 1 = Decrease Gain 2 = Increase Gain

Table B1 - 96: Message #19101: EO/IR/Laser Payload Quality Control

4.15.5 Message #19200: SAR Payload Commands.

This message shall be used to instruct the VSM to generate all commands for SAR Payloads, except for pointing and FOV commands that are covered in the Payload Steering Command Message (Message #19001).

The VSM shall use the General Configuration Messages to define the SAR payloads capability (specified by Station Number) to support the fields commanded in this message. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0202.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0202.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0202.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 0x0010 = Stn #5 0x0020 = Stn #6 0x0040 = Stn #7 0x0080 = Stn #8 etc.
0202.06	**3**	**Set MTI Radar Mode**	Unsigned 1	Enumerated	1 = Clutter Map 2 = Moving Target 3-9 = Reserved 10-255 = Payload-Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
202.07	**4**	**Set SAR Modes**	Unsigned 1	Enumerated	0 = 0FR - Mode 0, Slant Plane 1 = 0FG - Mode 0, Ground Plane 2 = 1FR - Mode 1, Slant Plane 3 = 1FG - Mode 1, Ground Plane 4 = 2FR - Mode 2, Slant Plane 5 = 2FG - Mode 2, Ground Plane 6 = 22FR - Mode 5, Slant Plane 7 = 22FG - Mode 5, Ground Plane 8 = 07A - Mode 3 Area, Slant Plan 9 = 07L - Mode 3 LOC, Slant Plan 10 = 14A - Mode 4 area, Slant Plane 11 = 14L - Mode 4 LOC, Slant Plane 12 = 1SP - ETP, Spotlight 1, Slant 13 = 3SP - ETP, Spotlight 3, Slant 14 = 10S - ETP, Scan, Slant 15 = GSP - Tier 2+ Spot Mode 16 = GSH - Tier 2+ Search Mode 17 = AIP13 - Monopulse Calibration 18 = AIP14 - Wide Area MTI (WAMTI) 19 = AIP15 - Coarse Resolution Search 20 = AIP16 -Medium Resolution Search 21 = AIP17 - High Resolution Search 22 = AIP18 - Point Imaging 23 = AIP19 - Swath MTI (SMTI) 24 = AIP20 - Repetitive Point Imaging 25 = AS201 – Search 26 = AS202 - Spot 3 27 = AS204 - Spot 1 28 = AS207 - Continuous Spot 3 29 = AS208 - Continuous Spot 1 30 = AS209 - EMTI Wide Frame Search 31 = AS210 - EMTI Narrow Frame Search 32 = AS211 - EMTI Augmented Spot 33 = AS212 - EMTI Wide Area MTI (WAMTI) 34 = AS213 – Monopulse Calibration 35-100 = Reserved 101-255 = VSM Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0202.08	5	**Set Radar Resolution**	Unsigned 2	0.01 Metres	0 = Unknown .01 ≤ x ≤ 100
0202.09	6	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 97: Message #19200: SAR Payload Command

4.15.6 Message #19400: Communications Relay Command.

This message shall be used by the CUCS to command the Communications Relay located at the Station Number specified in the message.

The VSM shall use the General Configuration Messages to define the Communication Relay (specified by Station Number) capability to support the fields commanded in this message. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0204.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0204.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0204.04	2	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0204.03	3	**Operating Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = On
0204.02	4	**RF Power Level – Radio A** Defines the transmission power level of radio A. 0 is the lowest power level. If the radio has less than 256 power levels the upper range should be configured to only support the number of available power settings.	Unsigned 1	None	0 ≤ x ≤ 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0204.08	**5**	**RF Power Level – Radio B** Defines the transmission power level of radio B. 0 is the lowest power level. If the radio has less than 256 power levels the upper range should be configured to only support the number of available power settings.	Unsigned 1	None	$0 \le x \le 255$
0204.06	**6**	**Select Stored Configuration Number – Radio A** Selects a predefined repeater configuration.	Unsigned 1	None	$0 \le x \le 255$
0204.07	**7**	**Select Stored Configuration Number – Radio B** Selects a predefined repeater configuration.	Unsigned 1	None	$0 \le x \le 255$
0204.05	**8**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 98: Message #19400: Communications Relay Command

4.15.7 Message #19500: Payload Data Recorder Control Command.

This message shall be used to command the platform payload data storage device indicated in the "Recording Device Number" field to the state as specified in the message.

The VSM shall use the General Configuration Messages to define the Payload Data Recorders (specified by Recording Device Number) capability to support the fields commanded in this message. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Note: Message #21501 defines the Payload to recording device configuration.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0205.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0205.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0205.04	**2**	**Recording Device Number**	Unsigned 1	None	0 – 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0205.05	**3**	**Set Recording Index Type**	Unsigned 1	Enumerated	0 = Time 1 = Block Number 2 = Event Mark 3 = Session Number
0205.06	**4**	**Set Recording Mode**	Unsigned 1	Enumerated	0 = Stop 1 = Ready 2 = Recording 3 = Play 4 = Seek 5-9 = Reserved 10-255 = Payload -Specific
0205.07	**5**	**Set Recording Rate**	Float	Megabits/Second	$.001 \le x \le 40000$
0205.08	**6**	**Initial Recording Index**	Integer 4	None	$0 \le x \le (2^{31} - 1)$, where 0 = No Active Index
0205.09	**7**	**Set Replay Mode**	Unsigned 1	Enumerated	0 = Stop 1 = Ready 2 = Reading 3-9 = Reserved 10-255 = Payload -Specific
0205.10	**8**	**Replay Clock Rate**	Float	Megabits/Second	$.001 \le x \le 40000$
0205.11	**9**	**Seek Replay Index**	Integer 4	None	$0 \le x \le (2^{31} - 1)$, where 0 = No Active Index
0205.12	**10**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 99: Message #19500: Payload Data Recorder Control Command

4.15.8 Message #19600: Terrain Data Update.

This message shall be used by the CUCS to convey terrain data at a specific location.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0207.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0207.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0207.04	**2**	**Latitude** of terrain data point	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0207.05	**3**	**Longitude** of terrain data point	Integer 4	BAM	$-\pi \le x < \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0207.06	**4**	**Elevation** of terrain data point Distance above (+) or below (-) the WGS-84 reference geoid	Integer 3	0.02 Metres	-1000 ≤ x ≤ 100000

Table B1 - 100: Message #19600: Terrain Data Update

4.15.9 Message #19700: Payload Operating Mode Command

This message is used to command the payload to a specific mode and whether it should be commanded via a preplanned mission or real time.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0209.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0209.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0209.04	**2**	**Station Number**	Unsigned 4	None	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0209.05	**3**	**Device Number**	Unsigned 1	None	0 ≤ x ≤ 255
0209.06	**4**	**Platform Power**	Unsigned 1	Enumerated	0 = Off 1 = Standby Power 2 = On
0209.07	**5**	**System Operating Mode**	Unsigned 1	Enumerated	0 = Deploy 1 = Activate 2 = Deactivate 3 -9 = Reserved 10-255 = Payload-Specific
0209.08	**6**	**Mission Plan Control Mode**	Unsigned 1	Enumerated	0 = Preplanned Mode 1 = Manual Mode
0209.09	**7**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 101: Message #19700: Payload Operating Mode Command

4.16 Payload Status Messages.

Since UAVs are commonly used as carriers for payload systems, the messages in this group are specified to provide a means for the UCS to report the operating state in an interoperable fashion. Vehicles not carrying such payloads need not support the messages in the group.

4.16.1 Message #21000: Payload Bay Status.

This message shall be used to return the status of a payload bay.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0308.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0308.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0308.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0308.05	**3**	**Payload Bay Door Status**	Unsigned 1	Enumerated	0 = Closed 1 = Open

Table B1 - 102: Message #21000: Payload Bay Status

4.16.2 Message #21001: Payload Configuration.

This message shall be used to identify payload configuration by vehicle station and device number. Configuration data is used by mission planning, dynamic re-planning, and mission execution monitoring applications to determine flight performance characteristics, manoeuvring limits, and to ascertain flight safety issues, particularly during takeoff and landing. In-flight configuration changes may also need to be tracked by the UCS in terms of their effect on vehicle performance as the mission progresses.

This message shall be used to provide the CUCS with payload configuration on initial start up and on a change basis. The CUCS shall request this message from the AV/ VSM using Message #17002, Generic Information Request Message, during the configuration process as required for determination of the vehicle payload configuration. One instance of this message shall be sent by the AV/ VSM for each employed device on each payload station when requested by the CUCS. An instance of the message shall be sent by the AV/ VSM each time the configuration changes.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0300.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0300.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0300.05	**2**	**Payload Stations Available**	Unsigned 1	None	0 <= X <= 255
0300.06	**3**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0300.10	**4**	**Device Number**	Unsigned 1	None	**0 <= X <= 255**
0300.07	**5**	**Payload Type**	Unsigned 2	Enumerated	0 = Not Specified / N/A 1 = EO 2 = IR 3 = EO/IR 4 = SAR 5 = Fixed Camera 6 = Comms Relay 7 = Dispensable Payload 8 = Recorder 9 = Payload Bay Door 10 – 999 = Reserved 1000 – (2^{16}-1) = VSM Specific
0300.08	**6**	**Station Door**	Unsigned 1	Enumerated	0 = No 1 = Yes
0300.09	**7**	**Number of Devices on this Station**	Unsigned 2	None	0 <= X <= (2^{16}-1)

Table B1 - 103: Message #21001: Payload Configuration

4.16.3 Message #21100: EO/IR Configuration State.

This message shall be used to define the EO/IR configuration to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0301.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0301.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0301.05	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0301.06	**3**	**EO/IR Type** Type is identified using NATO stock numbers, which are 13-digit numerical values conforming with the NATO Codification System as defined in STANAGs 3150 and 3151 define the structure for these values.	Character 14	None	Null Terminated ASCII String
0301.07	**4**	**EO/IR Type Revision Level** Number identifying modification level of the type specified in EO/IR Type Field.	Unsigned 1	None	0 <= x <= 255
0301.08	**5**	**EO Vertical Image Dimension** Number of pixel rows	Integer 2	None	$0 \le x \le 32767$, where 0 = Off
0301.09	**6**	**EO Horizontal Image Dimension** Number of pixel columns	Integer 2	None	$0 \le x \le 32767$, where 0 = Off
0301.10	**7**	**IR Vertical Image Dimension** Number of pixel rows	Integer 2	None	$0 \le x \le 32767$, where 0 = Off
0301.11	**8**	**IR Horizontal Image Dimension** Number of pixel columns	Integer 2	None	$0 \le x \le 32767$, where 0 = Off
0301.12	**9**	**Field of Regard – Elevation Min**	Integer 2	BAM	$-\pi \le x < \pi$
0301.13	**10**	**Field of Regard – Elevation Max**	Integer 2	BAM	$-\pi \le x < \pi$
0301.14	**11**	**Field of Regard – Azimuth Min**	Integer 2	BAM	$-\pi \le x < \pi$
0301.15	**12**	**Field of Regard – Azimuth Max**	Integer 2	BAM	$-\pi \le x < \pi$

Table B1 - 104: Message #21100: EO/IR Configuration State

4.16.4 Message #21101: EO/IR/Laser Operating State.

This message shall be used to report the operating state of the EO/IR payload by station to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0302.00	0	**Presence Vector**	Unsigned 4	None	Bitmapped
0302.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0302.04	2	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0302.05	3	**Addressed Sensor** Identifies which sensor(s) is under control where applicable.	Unsigned 1	Bitmapped	0x01 = EO 0x02 = IR 0x04 = PAYLOAD-Specific
0302.07	4	**EO Camera Status**	Unsigned 1	Enumerated	0 = B/W mode 1 = Colour Mode
0302.26	5	**EO Iris Adjustment Status**	Unsigned 1	Enumerated	0 = Automatic 1 = Manual
0302.08	6	**IR Polarity Status**	Unsigned 1	Enumerated	0 = Black Hot 1 = White Hot
0302.27	7	**NUC Table Selection**	Unsigned 1	Enumerated	1 – 255 VSM Specific
0302.28	8	**IR Integration Time Status**	Integer 2	0.001 Seconds	0 <= x <= 1000
0302.29	9	**IR Gain Adjustment Mode Status**	Unsigned 1	Enumerated	0 = Automatic 1 = Manual
0302.09	10	**Image Output State**	Unsigned 1	Enumerated	0 = None 1 = EO 2 = IR 3 = Both Simultaneously 4 = Payload - Specific
0302.10	11	**Actual Centreline Elevation Angle** (+ above aircraft waterline)	Integer 2	BAM	$-\pi \leq x < \pi$
0302.11	12	**Actual Vertical Field of View**	Integer 2	BAM	$-\pi \leq x < \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0302.12	**13**	**Actual Centreline Azimuth Angle** (+ right of aircraft x axis)	Integer 2	BAM	$-\pi \leq x < \pi$
0302.13	**14**	**Actual Horizontal Field of View**	Integer 2	BAM	$-\pi \leq x < \pi$
0302.14	**15**	**Actual Sensor Rotation Angle** (+ Clockwise rotation from aircraft normal (Up))	Integer 2	BAM	$-\pi \leq x < \pi$
0302.15	**16**	**Image Position** Indicates when the latitude, longitude and altitude fields are filled with valid data	Unsigned 1	Enumerated	0 = Fields 16, 17 and 18 Not Valid 1 = Fields 16, 17, 18 Valid
0302.16	**17**	**Latitude** of image centre	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0302.17	**18**	**Longitude** of image centre	Integer 4	BAM	$-\pi \leq x < \pi$
0302.18	**19**	**Altitude** Distance above (+) or below (-) the WGS-84 reference geoid of image centre.	Integer 3	0.02 Metres	$-1000 \leq x \leq 100000$
0302.19	**20**	**Pointing Mode State**	Unsigned 1	Enumerated	0 = No Value 1 = Angle Relative to AV 2 = Slewing Rate Relative to AV 3 = Slewing Rate Relative to Inertial 4 = Lat-Long Slaved 5 = Target Slaved (track) 6 = Stowed 7 = Caged 8-31 = Reserved 32-255 = Payload - Specific
0302.21	**21**	**Reported Range** If > 0, then reported range is valid for the current reported location in this message	Unsigned 2	Metres	0 = Range is invalid 0 - 65,535
0302.30	**22**	**Focus Type Status**	Unsigned 1	Enumerated	0 = Auto 1 = Manual
0302.31	**23**	**Image Stabilization Status**	Unsigned 1	Enumerated	0 = Off 1 = On

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0302.22	**24**	**Fire Laser Pointer/Rangefinder Status**	Unsigned 1	Enumerated	0 = Off (Safe) 1 = On – Not Firing (Arm) 2 = On – Recharging (Arm - Charging) 3 = Lasing (Fire) 4 = Laser Masked (Disable) 5 – 15 = Reserved 16 – 255 = Payload Specific
0302.35	**25**	**Laser Mode Status**	Unsigned 1	Enumerated	0 = Operational Check 1 = Mission 2 = Boresight 3-7 = Reserved 8 – 255 = Payload Specific
0302.23	**26**	**Selected Laser Rangefinder First/Last Pulse**	Unsigned 1	Enumerated	1 = First 2 = Last
0302.24	**27**	**Laser Designator Code**	Unsigned 2	None	Laser Illuminator Code per STANAG 5516 (Ed 2) (Link 16) Page E-3-527 DFI #1676 DUI 001
0302.25	**28**	**Laser Designator Status**	Unsigned 1	Enumerated	0 = Off 1 = On - Deactivated 2 = On – Activated
0302.32	**29**	**EO Sensor Power State**	Unsigned 1	Enumerated	0 = Off 1 = On
0302.33	**30**	**IR Sensor Power State**	Unsigned 1	Enumerated	0 = Off 1 = On
0302.34	**31**	**Other Sensor Power State**	Unsigned 1	Enumerated	0 = Off 1 = On

Table B1 - 105: Message #21101: EO/IR/Laser Operating State

4.16.5 Message #21200: SAR Operating State.

This message shall be used to report the SAR operating state by station to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0303.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0303.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0303.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0303.05	**3**	**SAR Type** Type is identified using NATO stock numbers, which are 13-digit numerical values as of date of publication.	Character 14	None	Null Terminated ASCII String
0303.06	**4**	**SAR Type Revision Level** Number identifying modification level of the type specified in the SAR Type Field.	Unsigned 1	Enumerated	0 <= x <= 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0303.07	**5**	**Radar Operating Mode** (Reference: NSIF Registry, AEDP-4, Annex D.)	Unsigned 1	Enumerated	0 = 0FR - Mode 0, Slant Plane 1 = 0FG - Mode 0, Ground Plane 2 = 1FR - Mode 1, Slant Plane 3 = 1FG - Mode 1, Ground Plane 4 = 2FR - Mode 2, Slant Plane 5 = 2FG - Mode 2, Ground Plane 6 = 22FR - Mode 5, Slant Plane 7 = 22FG - Mode 5, Ground Plane 8 = 07A - Mode 3 Area, Slant Plan 9 = 07L - Mode 3 LOC, Slant Plan 10 = 14A - Mode 4 Area, Slant Plane 11 = 14L - Mode 4 LOC, Slant Plane 12 = 1SP - ETP, Spotlight 1, Slant 13 = 3SP - ETP, Spotlight 3, Slant 14 = 10S - ETP, Scan, Slant 15 = GSP - Tier 2+ Spot Mode 16 = GSH - Tier 2+ Search Mode 17 = AIP13 - Monopulse Calibration 18 = AIP14 - Wide Area MTI (WAMTI) 19 = AIP15 - Coarse Resolution Search 20 = AIP16 -Medium Resolution Search 21 = AIP17 - High Resolution Search 22 = AIP18 - Point Imaging 23 = AIP19 - Swath MTI (SMTI) 24 = AIP20 - Repetitive Point Imaging 25 = AS201 – Search 26 = AS202 - Spot 3 27 = AS204 - Spot 1 28 = AS207 - Continuous Spot 3 29 = AS208 - Continuous Spot 1 30 = AS209 - EMTI Wide Frame Search 31 = AS210 - EMTI Narrow Frame Search 32 = AS211 - EMTI Augmented Spot 33 = AS212 - EMTI Wide Area MTI (WAMTI) 34 = AS213 – Monopulse Calibration 35-100 = Reserved 101-255 = VSM Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0303.09	6	**Radar MTI Mode Status**	Unsigned 1	Enumerated	1 = Clutter Map 2 = Moving target 3-9 = Reserved 10-255 = Payload -Specific
0303.10	7	**Resolution -** Current pixel resolution of SAR product	Integer 2	0.01 Metres	0 = Unknown 0.1<= x <= 20.00
0303.11	8	**Current Field of View –** Elevation Min (above body x axis)	Integer 2	BAM	$-\pi \le x < \pi$
0303.12	9	**Current Field of View – Elevation Max** (above body x axis)	Integer 2	BAM	$-\pi \le x < \pi$
0303.13	10	**Current Field of View – Azimuth Min** (right of body x axis)	Integer 2	BAM	$-\pi \le x < \pi$
0303.14	11	**Current Field of View – Azimuth Max** (right of body x axis)	Integer 2	BAM	$-\pi \le x < \pi$

Table B1 - 106: Message #21200: SAR Operating State

4.16.6 Message #21400: Communications Relay Status.

This message shall be used to report the Communications Relay status to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0305.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0305.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0305.04	2	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0305.03	3	**Operating Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = On
0305.02	4	**RF Power Level – Radio A** Reports the transmission power level of radio A. 0 is the lowest power level. If the radio has less than 256 power levels the upper range should be configured to only support the number of available power settings.	Unsigned 1	None	$0 \le x \le 255$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0305.05	5	**RF Power Level – Radio B** Reports the transmission power level of radio B. 0 is the lowest power level. If the radio has less than 256 power levels the upper range should be configured to only support the number of available power settings.	Unsigned 1	None	$0 \le x \le 255$
0305.06	6	**Configuration Number – Radio A** Reports the predefined repeater configuration.	Unsigned 1	None	$0 \le x \le 255$
0305.07	7	**Configuration Number – Radio B** Reports the predefined repeater configuration.	Unsigned 1	None	$0 \le x \le 255$
0305.08	8	**Configuration Name – Radio A** Reports the configuration name.	Character 80	None	
0305.09	9	**Configuration Name – Radio B** Reports the configuration name.	Character 80	None	

Table B1 - 107: Message #21400: Communications Relay Status

4.16.7 Message #21500: Payload Data Recorder Status.

This message shall be used to report the status of the platform payload data storage device(s). It assumes that there is a potential for multiple recorders on-board the platform and that each recorder has independent play/record states (e.g., is capable of simultaneous record and playback activity.) Recorder status messages shall be sent by request only.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0306.00	0	**Presence Vector**	Unsigned 2	None	Bitmapped
0306.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0306.04	2	**Recording Device Number**	Unsigned 1	None	0 – 255
0306.05	3	**Active Index Type** Indicates the type of indexing currently in use on the given recorder.	Unsigned 1	Enumerated	0 = Time 1 = Block Number 2 = Event Mark 3 = Session Number 4-9 = Reserved 10-255 = Payload - Specific
0306.06	4	**Recording Status**	Unsigned 1	Enumerated	0 = Stop 1 = Active, Not Ready 2 = Ready/Pause

Unique ID	Field	Data Element Name & Description	Type	Units	Range
					3 = Recording
0306.07	**5**	**Record Rate**	Float	Megabits/Second	$.001 \le x \le 40000$
0306.08	**6**	**Current Recording Index**	Integer 4	None	$0 \le x \le (2^{31} - 1)$, where 0 = No Active Index
0306.09	**7**	**Record Index Time Stamp** For events, time of the event, for blocks or sessions, the time of block or session start.	Unsigned 5	0.001 Seconds	See Section 1.7.2
0306.10	**8**	**Replay Status**	Unsigned 1	Enumerated	0 = Stop 1 = Active, Not Ready 2 = Ready/Pause 3 = Reading
0306.11	**9**	**Replay Rate**	Float	Megabits/Second	$.001 \le x \le 40000$
0306.12	**10**	**Current Replay Index**	Integer 4	None	$0 \le x \le (2^{31} - 1)$, Where 0 = No Active Index
0306.13	**11**	**Health Status Code**	Integer 2	None	Recorder Specific

Table B1 - 108: Message #21500: Payload Data Recorder Status

4.16.8 Message #21501: Vehicle Payload/Recorder Configuration.

This message shall be used by the VSM to identify the payload/recorder configuration of the AV and is sent to the CUCS. This message will be sent once for each connection between a Payload and Recorder.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0307.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0307.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0307.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0307.05	**3**	**Payload Recorder**	Unsigned 1	None	0 – 255

Table B1 - 109: Message #21501: Vehicle Payload/Recorder Configuration

4.16.9 Message #21600: Terrain Data Request.

This message shall be used to request terrain data at a specific location.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0309.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0309.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0309.04	2	**Latitude** of terrain data value	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0309.05	3	**Longitude**	Integer 4	BAM	$-\pi \leq x \leq \pi$

Table B1 - 110: Message #21600: Terrain Data Request

4.16.10 Message #21700: Payload Operating Mode Report.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0310.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0310.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0310.04	2	**Station Number**	Unsigned 4	None	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0310.05	3	**Device Number**	Unsigned 1	None	$0 \leq x \leq 255$
0310.06	4	**Platform Power State**	Unsigned 1	Enumerated	0 = 0ff 1 = Power Standby 2 = On
0310.07	5	**System Operating Mode State**	Unsigned 1	Enumerated	0 = Deployed 1 = Activated 2 = Deactivated 3-9 = Reserved 10-255 = Payload-Specific
0310.08	6	**Mission Plan Control Mode**	Unsigned 1	Enumerated	0 = Preplanned Mode 1 = Manual Mode

Table B1 - 111: Message #21700: Payload Operating Mode Report

4.17 Weapons Command Messages.

4.17.1 Message #24000: Stores Management System Command.

This message shall be used by the CUCS to command the stores management system located at the Station Number specified in the message.

The VSM shall use the General Configuration Messages to define the Stores Management Systems (specified by Station Number) capability to support the fields commanded in this message. Refer to Sections 4.24 and 4.25, General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0203.00	0	**Presence Vector**	Unsigned 3	None	Bitmapped
0203.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0203.04	2	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0203.18	3	**Device Number**	Unsigned 1	None	$0 \le x \le 255$
0203.19	4	**Number of Stores to Release Each Time**	Unsigned 2	None	$0 \le x \le (2^{16}-1)$
0203.06	5	**Active Weapon Mode Command**	Unsigned 1	Enumerated	0000 0000 = N/A 0000 0001 = Disarm 0010 0010 = Initialise 0011 0011 = Arm 0100 0100 = Jettison 0101 0101 = Launch
0203.07	6	**Active Target Acquisition Mode Select**	Unsigned 1	Enumerated	0 = N/A 1 = Coordinates 2 = Sensor-Based Tracking 3-9 = Reserved 10-255 = Payload - Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0203.08	**7**	**Active Attack Mode**	Unsigned 1	Enumerated	0 = N/A 1 = Time 2 = Heading 3 = Window 4 = Altitude 5-9 = Reserved 10-255 = Payload - Specific
0203.09	**8**	**Rack/Rail Ejector Enable (Hung Ordnance)**	Unsigned 1	Enumerated	0 = N/A 1 = Lock 2 = Unlock
0203.10	**9**	**Safety Enable Discrete Command**	Unsigned 1	Enumerated	0 = N/A 1 = Enable 2 = Inhibit
0203.11	**10**	**Set Target Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0203.12	**11**	**Set Target Longitude**	Integer 4	BAM	$-\pi \le x < \pi$
0203.13	**12**	**Set Target Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0203.14	**13**	**Target Altitude Type** Defines altitude type for pervious field	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0203.15	**14**	**Set Target Inertial Speed (Vx)**	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0203.16	**15**	**Set Target Inertial Speed (Vy)**	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0203.17	**16**	**Set Target Inertial Speed (Vz)**	Integer 2	0.05 Metres/ Second	$-1000 \le x \le 1000$
0203.20	**17**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 112: Message #24000: Stores Management System Command

4.18 Weapons Status Messages.

4.18.1 Message #26000: Stores Management System Status.

This message shall be used to report the stores management system status to the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0304.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
0304.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0304.04	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0304.20	**3**	**Device Number**	Unsigned 1	None	0 <= X <= 255
0304.05	**4**	**Active Weapon Type**	Unsigned 1	Enumerated	0 = No Mode 1= Air-To-Air Weapon 2 = Air-To-Ground Weapon 3 = Anti-Submarine Weapon 4 - 10 = Reserved 11-255 = Payload Specific
0304.06	**5**	**Active Weapon Sensors**	Unsigned 1	Enumerated	0 = No Mode 1 = EO 2 = Laser 3 = EM 4 = IR
0304.07	**6**	**Active Weapon Number per Station**	Unsigned 1	None	0 = None Selected 1 = One Weapon 2 = Two Weapons … 255 = 255 Weapons
0304.08	**7**	**Active Target Acquisition Mode**	Unsigned 1	Enumerated	0 = No Mode 1 = Coordinates 2 = Sensor-Based Tracking 3-9 = Reserved 10-255 = Payload - Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0304.09	**8**	**Active Attack Mode**	Unsigned 1	Enumerated	0 = No Mode 1 = Time 2 = Heading 3 = Window 4 = Altitude 5-9 = Reserved 10-255 = Payload - Specific
0304.10	**9**	**Weapon Initialising**	Unsigned 1	Enumerated	0 = No Mode 1 = Sensors Initial Alignment 2 = Seeker Steering Mode 3 = Navigation Data Loading 4 = Target Data Loading 5 = BIT in Progress
0304.11	**10**	**Weapon Release Clearance**	Unsigned 1	Enumerated	0 = Not Clear 1 = Clear
0304.12	**11**	**Clearance Validity**	Unsigned 1	Enumerated	0 = Not clear 1 = Clear
0304.14	**12**	**Weapon Status**	Unsigned 1	Enumerated	0 = N/A 1 = Ready 2 = Armed 3 = Failed
0304.21	**13**	**Current Target Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
0304.22	**14**	**Current Target Longitude**	Integer 4	BAM	$-\pi \le x \le \pi$
0304.23	**15**	**Current Target Altitude**	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
0304.24	**16**	**Current Target Altitude Type**	Unsigned 1	Enumerated	0 = Pressure Alt 1 = Baro Alt 2 = AGL 3 = WGS-84
0304.15	**17**	**Rack/Rail/Ejector Unlock**	Unsigned 1	Enumerated	0 = Unlocked 1 = Locked
0304.16	**18**	**Safety Enable Discrete State**	Unsigned 1	Enumerated	0 = N/A 1 = Enable 2 = Inhibit

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0304.17	**19**	**Launch Acceptable Region (LAR) Status**	Unsigned 1	Enumerated	0 = N/A 1 = Green (Acceptable) 2 = Yellow (Marginal) 3 = Red (Not Acceptable)
0304.18	**20**	**Safe Separation Status (Weapon)**	Unsigned 1	Enumerated	0 = N/A 1 = Green (Released) 2 = Red (Hung Store)
0304.19	**21**	**Number of Stores Available**	Unsigned 2	None	0 = Empty or N/A 1 to (2^{16}-2) = Count (2^{16}-1) = (2^{16}-1) or Greater Count

Table B1 - 113: Message #26000: Stores Management System Status

4.19 Data Link Discovery Messages.

The messages have been developed with the intention of separating the communication (radio) equipment functionality from the pedestal functionality. The Data Link Command and Status messages have also been developed with the intention to fully control a STANAG 7085 compliant data link.

Message #28000 and Message #28001 are considered to be the Data Link Discovery and Connection messages. The Data Link Discovery functionality is intended to allow a CUCS on the network to discover any data link connected to the network, whether it be a standalone network data link or a data link connection to the network through a VSM, without the CUCS having previous knowledge of the system data links. Once a data link has been configured for control, using the General Configuration Messages, Message #28000 and Message #28001 are used for the requesting and granting of data link control within the system.

Each of the data link messages contain a Data Link ID field which is used to specifically identify the data link terminal for which the message applies. In Message #28001 there is an additional VDT/CDT flag to specifically identify a Data Link as an VDT or as a CDT. The CDT and VDT are not considered permanently paired; therefore the Data Link ID for a CDT/VDT combination shall not be a single Data Link ID for a specific hardware pair. This is to provide the capacity to maintain a Data Link ID reference for each terminal, such as in the event of a transition in control of an AV from one CDT to another, where the CDT/VDT combination is altered.

A CUCS may be directly configured for control of a CDT from the CDT Data Link terminal itself if the Data Link terminal “speaks” DLI, or via a VSM, using the General Configuration messages. A VDT Data link terminal onboard an AV that “speaks” DLI cannot report its presence until it has a communication channel to the CUCS. Therefore it is expected that a CUCS that requires control over a VDT will first be communicating with the AV.

It is suggested that the configuration, control and statusing of a VDT(s) onboard an AV be coordinated by the AV avionics (control system) and not by the VDT independent of the vehicle control system. This will ensure that the CUCS controlling the AV maintains control over a VDT terminal for communicating AV control and status messages between that CUCS and the AV. To support this philosophy, the Data Link Command Messages (#30004 & 32004) support the capability to command the data link to pass all data link messages received from the RF side of the link to the local CUCS/ VSM/ AV without interpreting those commands at the Data Link, and only interpret commands for itself from the “hardware/ wired” interface. In this sense any Data Link control messages transmitted for an VDT located onboard an AV are considered AV control messages, and any Data Link status messages transmitted from the AV for an VDT are considered AV status messages, and treated as such.

Currently a multicast schema has been defined for transmitting the DLI messages across the network, therefore the Data link messages have been developed to provide a basic functional message routing capability. The messages allow for the use of CDT and VDT Data Links that do not have a built in switching or routing capability for multicast messages.

4.19.1 Message #28000: Data Link Control Authorization Request.

When a CUCS is required to communicate with a data link (CDT) in order to transmit and receive messages to and from an AV, the determination of the type and number of data links attached to the system may be required in order for that CUCS to select the data link(s) to communicate with the specified vehicle. Where the CUCS does not know the Data Link ID(s) on the network, the CUCS may conduct a broadcast request for Data Link information.

When a CDT Data Link is being “discovered”, the Vehicle Type and Subtype fields shall be filled appropriate to the request. The “Request/ Handover Access” field shall be transmitted as “Unspecified” for a Broadcast Discovery (Request) and the Asset Mode field shall be set to “Broadcast Request”.

To conduct a broadcast for the VDT Data Links located on an AV, the Vehicle ID of the AV is used in the wrapper “destination” field to filter (limit) the request to that AV.

Where the CUCS knows the CDT/ VDT Data Link ID, the Data Link Assignment Request Message shall be used to request and release control over the Data Link ID for the configuration specified in the message (e.g.; by vehicle ID, vehicle type, and vehicle subtype).

The transmission of the Data Link Assignment Request message with both a Vehicle ID and a Data Link ID (Destination ID in wrapper) shall be to request or release control of the specified Data Link ID located on the specific Vehicle ID in accordance with the “Requested/

Handover Access" and "Assets Mode" fields. Most likely the CDT will not be located on a vehicle (AV), therefore in this instance the vehicle ID value shall be set to the null ID to indicate that it does not apply.

Where a VSM is between the Data Link ID and the CUCS, the VSM shall be responsible for transferring the Data Link Command and Status messages (Section 4.20 and 4.21) between the specified Data Link ID and the CUCS. Refer to the following figure.

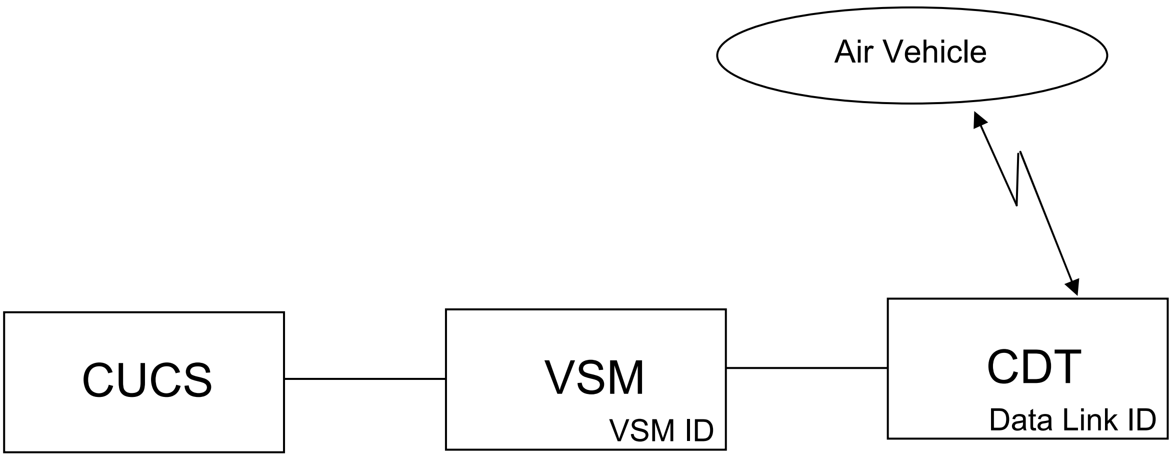

Figure B1 - 11: CUCS VSM CDT Connection

The response to this message is Message #28001, Data Link Configuration/ Assignment Message.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0404.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0404.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0404.10	**2**	**Requested/Handover Access** Allows request or handover	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= Monitor 0x02 = Control
0404.12	**3**	**VSM / Vehicle ID**	Integer 4	None	See Section 1.7.6

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0404.11	**4**	**Asset Mode**	Unsigned 1	Enumerated	0 = Relinquish/ Handoff 1 = Request 2 = Override 3 = Broadcast Request
0404.07	**5**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	None	See Table B1-37
0404.08	**6**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	$0 \leq x \leq 65535$
0404.09	**7**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 114: Message #28000: Data Link Control Assignment Request

4.19.2 Message #28001: Data Link Configuration / Assignment Message.

The intent of this message is to provide the CUCS with the data link configuration of the VSM, or network, on request from a CUCS, with one instance of this message sent for each employed Data Link ID/ Vehicle type/ Vehicle Subtype combination.

This message shall be transmitted in response to Message #28000, Data Link Control Authorization Request, by appropriately filling this message with the reported Data Link IDs capabilities and setting the “Access Authorized” field as appropriate. The “Access Granted” field shall be set appropriately in response to a Data Link Broadcast Request from a CUCS that is already in control of the Data Link being reported in the broadcast response.

The appropriate supported Vehicle type and Vehicle subtype identified in this message, shall be transmitted once once for each vehicle type/ subtype combination possible. The Data Link (ID) shall be responsible for identifying (reporting) the availability of the data link based on the number of vehicle / CUCS connections that are possible versus connected.

This message shall be used by a VDT (Data Link ID) to identify its capabilities to the CUCS, where the message wrapper specifically identifies the vehicle ID on which the VDT is located.

This message shall be used by a VSM to identify to a CUCS the data link capabilities associated with a VSM, where the Data Links are attached behind the air vehicle’s ground based VSM. Refer to Figure B1 - 12. Where a CDT is connected through the VSM, the VSM shall assign a “logical” vehicle ID to be transmitted with the supported Vehicle type and

Vehicle subtype identified in this message along with the VSM ID to identify the connection. This message therefore provides the association between the VSM and Data Link through their respective IDs as reported in this message. Where a VSM supports more than one Vehicle Type and Vehicle subtype for a single CDT (resource sharing), each instance of support shall be reported to the CUCS with the same Data Link ID, but with a different logical vehicle ID, vehicle type and subtype.

Where a data link is shared between two or more VSMs, physical or logical, the CDT (Data Link) Status shall be the responsibility of the VSMs. Refer to the following figure.

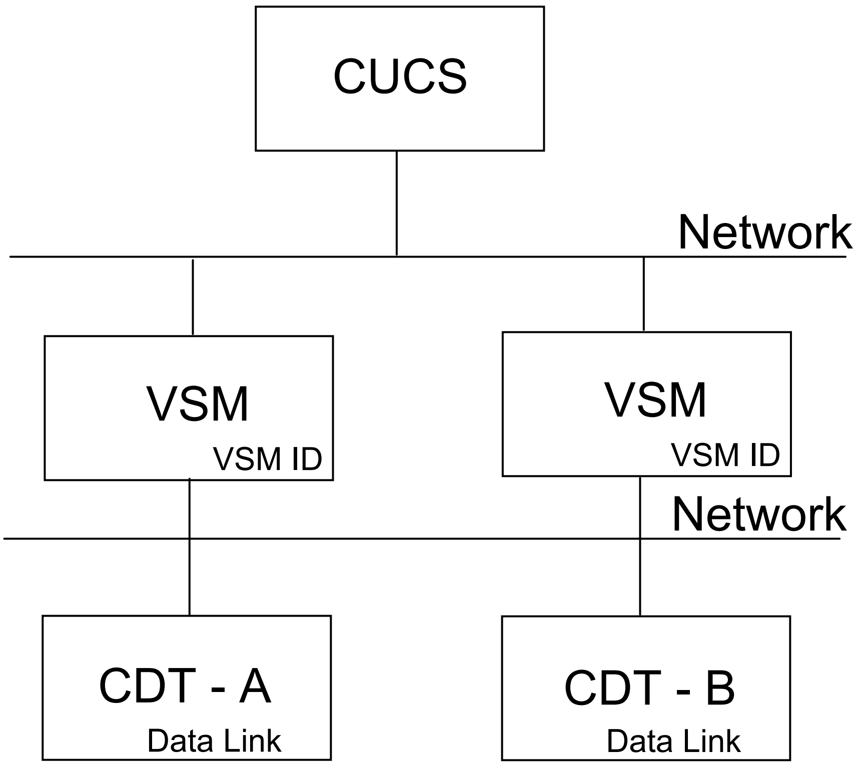

Figure B1 - 12: Shared Data Links

This message shall be used by the VSM/ Data Link to grant a CUCS control over a specific Data Link ID, report the Data Link ID connection as not authorized, or to report the successful release/ availability of a Data Link ID. For each reported Data Link ID / vehicle type / vehicle subtype combination, the VSM/ Data Link shall report the controllability of the data link in the “Access Authorized” field. Where the CDT is in control and being used to transmit messages to a vehicle for one of these Data Link ID / vehicle type / vehicle subtype combinations, the Vehicle ID field located in the message wrapper structure shall be filled with the controlled Vehicle ID.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0500.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0500.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0500.17	**2**	**VSM / Vehicle ID**	Integer 4	None	See Section 1.7.6
0500.13	**3**	**Access Authorized**	Unsigned 1	Bitmapped	0x00 = Connection Not Authorised 0x01= Monitor 0x02 = Control
0500.14	**4**	**Access Granted**	Unsigned 1	Bitmapped	0x00 = N/A 0x01= Monitor 0x02 = Control
0500.15	**5**	**Access Requested** This field echoes the access request that this response addresses	Unsigned 1	Enumerated	0x00 = Unspecified 0x01= Monitor 0x02 = Control 0x04 = Broadcast Response
0500.07	**6**	**Terminal Type**	Unsigned 1	Enumerated	0 = CDT 1 = VDT
0500.08	**7**	**Data Link Type**	Unsigned 1	Enumerated	0 = STANAG 7085 1 - 7 = Reserved 8 – 255 = VSM Specific
0500.17	**8**	**Data Link Subtype**	Unsigned 1	None	$0 \leq x \leq 255$
0500.13	**9**	**Data Link Name** Text identifier for Data Link	Character 20	None	Null terminated Printable ASCII
0500.10	**10**	**Antenna Type**	Unsigned 1	Bit Mapped	0x01 = Omni 0x02 = Directional
0500.16	**11**	**Pedestal Index**	Unsigned 1	None	0 - 255
0500.11	**12**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian	Unsigned 2	None	See Table B1-37
0500.12	**13**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	$0 \leq x \leq 65535$

Table B1 - 115: Message #28001: Data Link Configuration/Assignment Message

4.20 Data Link Command Messages.

4.20.1 Message #30000: Data Link To Vehicle ID Assignment.

This message allows for the use of CDT and VDT Data Links that do not have a built in switching or routing capability for multicast messages.

The CUCS shall transmit this message to the Vehicle ID, VSM ID, and Data Link ID to identify which vehicles are communicating via the Data Link ID. The data link with the Data Link ID specified in this message shall intercept all the other DLI messages with the vehicle ID specified in the Communicating Vehicle ID field and forward those messages to the specified vehicle ID over the RF link. The data link with the Data Link ID specified in this message shall receive messages from the Vehicle ID (Communicating Vehicle ID) and forward the messages to the required CUCS ID/ VSM ID per the received message.

This message shall be sent once for each vehicle ID required to communicate through the specified Data Link ID.

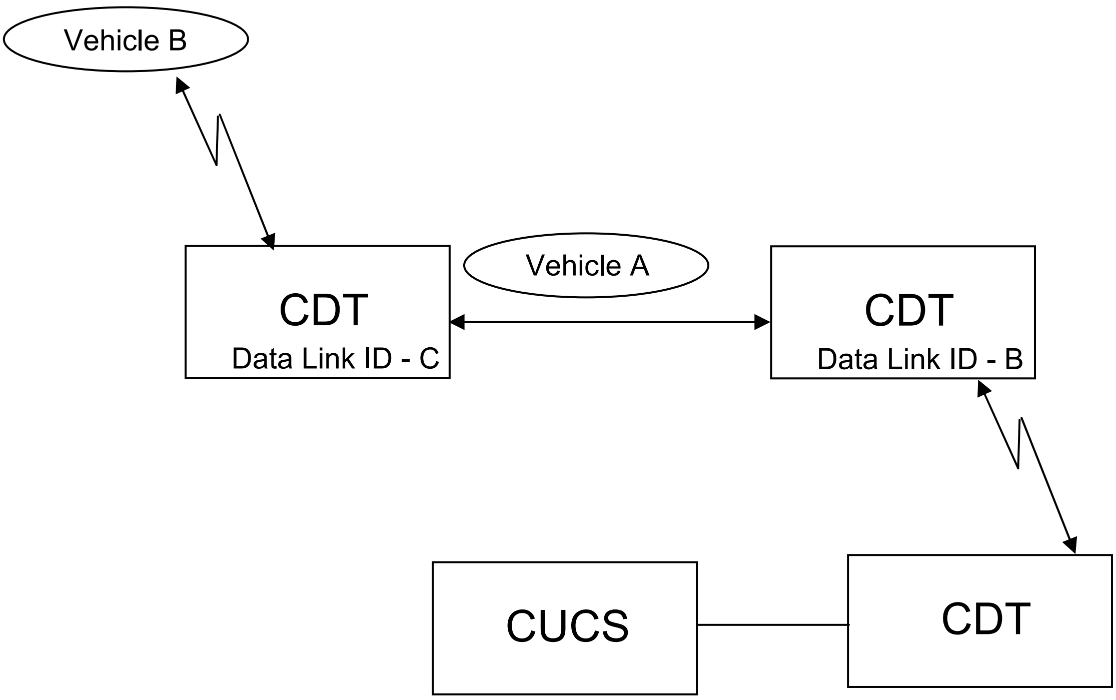

Figure B1 - 13: Relay System

In the above example, the CUCS transmits one message to the null Vehicle ID/ Data Link ID – A to indicate that Vehicle ID – A is communicating through Data Link ID –

A, and one message to the null vehicle ID/ Data Link ID – A to indicate that vehicle ID – B is communicating through Data Link ID – A. The CUCS transmits one message to the Vehicle ID - A/ Data Link ID – C to indicate that Vehicle ID – B is communicating through Data Link ID – A.

If multiple Data Links on the AV are not capable of routing messages between themselves through a multicast routing, it is the AV's responsibility to ensure the correct messages pass between the two data links in the system.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0405.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0405.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0405.06	**2**	**Communicating Vehicle ID** Vehicle ID to be controlled through Data Link ID.	Integer 4	None	See Section 1.7.6
0405.07	**3**	**Communication State** For Communicating Vehicle ID	Unsigned 1	Enumerated	0 = Specified communicating Vehicle ID to be unassigned from DL 1 = Specified communicating Vehicle ID to be assigned to DL
0405.08	**4**	**Message Assignment**	Unsigned 1	Enumeration	0 = Pass All Messages 1= Pass Specific Message 2 = Do Not Pass Specific Message 3= Pass Specific LOI 4 = Do Not Pass Specific LOI 5 = Clear All Message Passing Assignments
0405.09	**5**	**Message Type**	Integer 4	None	See Section 3.3.1.9
0405.10	**6**	**Specific LOI**	Unsigned 1	Bitmapped	0x01 = LOI 1 0x02 = LOI 2 0x04 = LOI 3 0x08 = LOI 4 0x10 = LOI 5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0405.12	**7**	**Specific Control/Monitor**	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= Monitor 0x02 = Control
0405.11	**8**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 116: Message #30000: Data Link To Vehicle ID Assignment

4.20.2 Message #30001: 7085 Data Link Active Configuration Set Up Message.

This message shall be used to set up the components of the VDT and/or CDT data link communication equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0400.12	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0400.13	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0400.15	**2**	**STANAG 7085 Profile ID – Part 1** Defines the first three digits of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Bit field	Bits 7..6 = 7085 Annex 00 = Annex B 01 = Annex C 10 = Not Used 11 = Not Used Bits 5..4 = 7085 Appendix 00 = Appendix 1 01 = Not Used 10 = Not Used 11 = Not Used Bits 3..0 = 7085 Implementation 0000 = Implementation 1 0001 = Implementation 2 0010 - 1111 = Not Used See STANAG 7085, Annex P
0400.21	**3**	**STANAG 7085 Profile ID – Part 2** Defines the last digit of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Enumerated	1 to 255 See STANAG 7085, Annex P
0400.16	**4**	**Set Configuration Index** Defines default values for the data link configuration fields.	Unsigned 1	Enumerated	1 to 255 = See STANAG AR 7085, Annex B, Appendix 1, Implementation 1

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0400.17	**5**	**Set Forward Link (FL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0400.18	**6**	**Set Return Link (RL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0400.19	**7**	**Set Forward PN Code Index**	Unsigned 1	None	Implementation Specific
0400.20	**8**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 117: Message #30001: 7085 Data Link Active Configuration Set Up Message

4.20.3 Message #30002: 7085 Data Link Fallback Configuration Set Up Message.

This message shall be used to set up the fallback configuration of the VDT and/or CDT data link communication equipment. The data link equipment will assume this configuration if a loss of link exceeds the Fallback time defined in this message.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0401.11	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0401.12	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0401.14	**2**	**STANAG 7085 Profile ID – Part 1** Defines the first three digits of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Bit field	Bits 7..6 = 7085 Annex 00 = Annex B 01 = Annex C 10 = Not Used 11 = Not Used Bits 5..4 = 7085 Appendix 00 = Appendix 1 01 = Not Used 10 = Not Used 11 = Not Used Bits 3..0 = 7085 Implementation 0000 = Implementation 1 0001 = Implementation 2 0010 - 1111 = Not Used See STANAG 7085, Annex P

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0401.21	**3**	**STANAG 7085 Profile ID – Part 2** Defines the last digit of the Profile Identifier as specified in STANAG7085.	Unsigned 1	Enumerated	1 to 255 See STANAG 7085, Annex P
0401.18	**4**	**Configuration Index** Defines default values for the data link configuration fields.	Unsigned 1	Enumerated	1 to 255 = See STANAG AR 7085, Annex B, Appendix 1, Implementation 1
0401.15	**5**	**Set Forward Link (FL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0401.16	**6**	**Set Return Link (RL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0401.17	**7**	**Set Forward PN Code Index**	Unsigned 1	None	0 to TBD
0401.19	**8**	**Set Fallback Time** Loss of link greater than this time will cause the data link to change to this configuration.	Unsigned 1	10 Seconds	0 = Fallback Function Disabled
0401.20	**9**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 118: Message #30002: 7085 Data Link Fallback Configuration Set Up Message

4.20.4 Message #30003: Data Link Control Command.

This message shall be used to send instructions to the VSM/Data Link to command the components of the CDT and/or VDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0403.14	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0403.15	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0403.17	**2**	**Set Transmitter State**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = On
0403.18	**3**	**Set Transmit Attenuation**	Unsigned 1	Enumerated	0-255 = Data Link Specific
0403.19	**4**	**Set Receiver State**	Unsigned 1	Enumerated	0 = Off 1 = On

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0403.20	**5**	**Select Active Antenna Pedestal Index** Selects which antenna is being addressed	Unsigned 1	Enumerated	0 – 255 = Data Link Specific
0403.21	**6**	**Communication Security Mode**	Unsigned 1	Enumerated	0000 0000 = Normal 0001 0001 = Zeroize 0010 0010 = Hold 0011 0011 = Reset 0100 0100 = Bypass (Future) All others = Reserved
0403.22	**7**	**Communication Security Key Index**	Unsigned 1	Enumerated	0 = Primary 1-255 = Data Link Specific
0403.23	**8**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 119: Message #30003: Data Link Control Command

4.20.5 Message #30004: RF Command Processing Set Up Message.

This message shall be used to specify how the data link will use the data link commands directly received via the RF transmission. The Commands from RF field specifies if the commands are to be acted on when received via the RF path and if the command should be passed on to the local host.

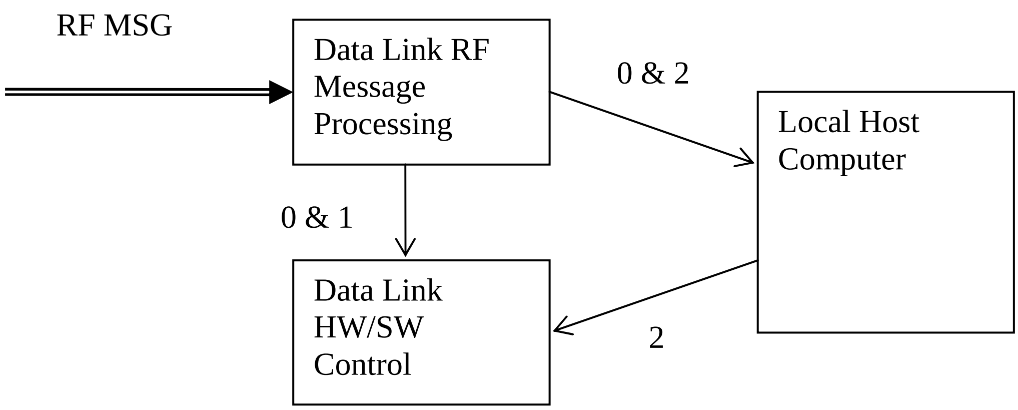

Figure B1 - 14: Commands from RF Data Flow

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0402.09	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0402.10	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0402.12	**2**	**Commands From RF** Commands the data link if it should directly interpret messages sent as received on the RF side of the data link. Also commands the data link if it should pass all data link messages received from the RF side on to the local CUCS/VSM/AV.	Unsigned 1	Enumerated	0 = use RF commands and Pass them through 1 = Use RF commands and do not pass them through 2 = Do not use RF commands but pass them through
0402.13	**3**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 120: Message #30004: RF Command Processing Set Up Message

4.20.6 Message #30100: Antenna Pedestal Location Command.

This message shall be used by the CUCS/VSM to send the location of the data link antenna pedestal to the data link to allowing the data link to point the antenna. If the antenna is not located on a pedestal, the parameters are filled with the antenna location. This message is normally used only for the local antenna pedestal.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0406.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0406.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0406.03	**2**	**Antenna Pedestal Latitude**	Integer 4	BAM	-π/2 <= x <= π/2 WGS-84
0406.04	**3**	**Antenna Pedestal Longitude**	Integer 4	BAM	- π <= x < π WGS-84
0406.05	**4**	**Antenna Pedestal Altitude**	Integer 3	0.02 Meter	Baro
0406.06	**5**	**Antenna Pedestal Ground Speed**	Integer 2	0.05 M/s	Platform Dependent
0406.07	**6**	**Antenna Pedestal Vertical Speed**	Integer 2	0.05 M/s	Platform Dependent
0406.08	**7**	**Antenna Pedestal Course**	Integer 2	BAM	- π <= x < π Clockwise from true north
0406.09	**8**	**Antenna Pedestal Heading**	Integer 2	BAM	- π <= x < π Clockwise from true north
0406.10	**9**	**Antenna Pedestal Pitch (THETA)**	Integer 2	BAM	-π/2 <= x <= π/2
0406.11	**10**	**Antenna Pedestal Roll (PHI)**	Integer 2	BAM	-π/2 <= x <= π/2
0406.12	**11**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 121: Message #30100: Antenna Pedestal Location Command

4.20.7 Message #30101: Antenna Control Command.

This message shall be used to send instructions to the VSM/Pedestal to command the components of the pedestal.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0407.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0407.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0407.03	**2**	**Pedestal Index** The antenna pedestal to which the information in this message is addressed.	Unsigned 1	Enumerated	0 – 255 = Data Link Specific
0407.04	**3**	**Set Pedestal State**	Unsigned 1	Enumerated	0 = Stowed - Off 1 = Deployed - Off 2 = Deployed - Standby 3 = Deployed – On
0407.05	**4**	**Set Antenna Pointing Mode**	Unsigned 1	Enumerated	0 = Manual – Position 1 = Manual - Rate 2 = Auto – RF Tracking 3 = Reserved 4 = Auto - Location 5 = Search – Pattern 1 6 = Search – Pattern 2 7 = Search – Pattern 3 8 = Search – Pattern 4 9-255 Data Link Specific
0407.06	**5**	**Set Antenna Type**	Unsigned 1	Enumerated	0 = Omni 1 = Directional 2 = Auto
0407.07	**6**	**Set Pedestal Location Source** Determine the pedestal source of its own location, e.g. internal = pedestal IMU.	Unsigned 1	Enumerated	0 = External 1 = Internal
0407.08	**7**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 122: Message #30101: Antenna Control Command

Set Antenna pointing modes are defined below:

Manual, Position
Antenna is steered manually by providing azimuth and elevation angle

(This corresponds roughly to Air Auto mode in the CDL spec. The only difference is that in the CDL spec, the elevation is expected to come from a stored value and in this case, the elevation must be provided. For backward compatibility, the elevation could be ignored which would be reflected in the status)

Manual, Rate
Antenna is steered manually by providing rate and direction for Azimuth and Elevation

(This corresponds roughly to Ground Manual in the CDL spec. The difference is that Ground Manual only specifies a direction with the rate being fixed and this command specifies a magnitude and sign indicating direction and speed. For backward compatibility, a not could be added indicating that fixed rate systems need only look at the sign of the parameter and not the magnitude.)

Auto, RF Tracking
Antenna follows the remote antenna by adjusting the antenna position to maintain maximum RF signal strength received from the remote antenna.

(This is not documented in the current CDL specification but was back in Rev E where it was referred to as Closed Loop Tracking. This is primarily a ground antenna mode but there is not reason any random terminal, air or ground, couldn't use it.)
Auto, Location Tracking
Antenna points to the geographic Location (latitude, longitude, altitude) of the remote antenna. Remote antenna location may be static or dynamic.

(This corresponds directly to the Air Auto mode defined in the CDL specification. Generically, this mode applies to both air and ground antennas. In the Rev E specification, this was referred to as Open Loop tracking with respect to ground antennas.)

Search, Pattern 1
Data Link specific.

Search, Pattern 2
Data Link specific.

Search, Pattern 3
Data Link specific.

Search, Pattern 4
Data Link specific.

4.20.8 <u>Message #30102: Antenna Position Command.</u>

This message shall be used to control the position of the local antenna relative to the data link/pedestal. It also provides information about the remote antenna position and motion.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0408.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0408.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0408.03	**2**	**Pedestal Index** The antenna pedestal to which the information in this message is addressed.	Unsigned 1	Enumerated	0 – 255 = Data Link Specific
0408.04	**3**	**Set Antenna Azimuth**	Integer 2	BAM	$-\pi \le x < \pi$
0408.05	**4**	**Set Antenna Elevation**	Integer 2	BAM	$-\pi/2 \le x \le \pi/2$
0408.06	**5**	**Set Azimuth Slew Rate.** Valid for Manual Rate control mode.	Integer 2	0.0001 Radians/ Second	$-\pi \le x \le \pi$
0408.07	**6**	**Set Elevation Slew Rate.** Valid for Manual Rate control mode.	Integer 2	0.0001 Radians/ Second	$-\pi \le x \le \pi$
0408.08	**7**	**Remote Antenna Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$ WGS-84
0408.09	**8**	**Remote Antenna Longitude**	Integer 4	BAM	$-\pi \le x < \pi$ WGS-84
0408.10	**9**	**Remote Antenna Altitude**	Integer 3	0.02 Meter	Baro
0408.11	**10**	**Remote Antenna Ground Speed**	Integer 2	0.05 M/s	Platform Dependent
0408.12	**11**	**Remote Antenna Course**	Integer 2	BAM	$-\pi \le x < \pi$
0408.13	**12**	**Remote Antenna Vertical Speed**	Integer 2	0.05 M/s	Platform Dependent
0408.14	**13**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 123: Message #30102: Antenna Position Command

4.20.9 Message #30200: Link Health Command.

This message shall be used to set the data link health reporting mode.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0409.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0409.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0409.03	**2**	**Bit Mode**	Unsigned 1	Enumerated	0 = Off (Abort) 1= Run Initiated Bit 2 = Run Continuous Bit 3-255 = Data Link Specific
0409.04	**3**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 124: Message #30200: Link Heath Command

4.20.10 Message #30300: Set Data Link UDP Monitor Period.

This message shall be used to set the period to accumulate UDP messages received by the data link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0410.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0410.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0410.03	**2**	**UDP Monitor Period** Defines the period to count UDP messages received and processed by this data link. 0 = do not count number of UDP messages	Unsigned 1	Second	$0 \leq x < 255$
0410.04	**3**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 125: Message #30300: Set Data Link UDP Monitor Period

4.21 Data Link Status Messages.

4.21.1 Message #32000: Data Link To Vehicle ID Report.

The Data Link ID/ vehicle ID/ VSM ID shall transmit this message to the CUCS ID to report the vehicle ID(s) communicating through the Data Link ID. This message shall be sent for each vehicle ID communicating, uplink or downlink, through the specified Data Link ID.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0501.15	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0501.16	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0501.19	**2**	**Communicating Vehicle ID - Uplink** - Vehicle ID to which the Data Link ID is transmitting messages over the RF link. Use null ID to specify as not applicable.	Integer 4	None	See Section 1.7.6
0501.20	**3**	**Uplink Communication State** - For Communicating Vehicle ID - Uplink	Unsigned 1	Enumerated	0 = N/A 1 = Specified communicating vehicle ID unassigned from DL 2 = Specified communicating vehicle ID assigned to DL
0501.21	**4**	**Communicating Vehicle ID - Downlink** - Vehicle ID for which the Data Link ID is receiving messages on the RF link. Use null ID to specify as not applicable.	Integer 4	None	See Section 1.7.6
0501.22	**5**	**Downlink Communication State** - for Communicating Vehicle ID - Downlink	Unsigned 1	Enumerated	0 = N/A 1 = Specified communicating vehicle ID no longer communicating with DL 2 = Specified communicating vehicle ID down linking to DL

Table B1 - 126: Message #32000: Data Link To Vehicle ID Report

4.21.2 Message #32001: 7085 Data Link Active Configuration Status Report.

This message shall be used by the VSM to send the CUCS information on the status of the VDT and/or CDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0502.09	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0502.10	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0502.12	**2**	**STANAG 7085 Profile ID – Part 1** Defines the first three digits of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Bit field	Bits 7..6 = 7085 Annex 00 = Annex B 01 = Annex C 10 = Not Used 11 = Not Used Bits 5..4 = 7085 Appendix 00 = Appendix 1 01 = Not Used 10 = Not Used 11 = Not Used Bits 3..0 = 7085 Implementation 0000 = Implementation 1 0001 = Implementation 2 0010 - 1111 = Not Used See STANAG 7085, Annex P
0502.17	**3**	**STANAG 7085 Profile ID – Part 2** Defines the last digit of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Enumerated	1 to 255 See STANAG 7085, Annex P
0502.13	**4**	**Configuration Index**	Unsigned 1	None	0 to TBD
0502.14	**5**	**Reported Forward Link (FL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0502.15	**6**	**Reported Return Link (RL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0502.16	**7**	**Forward PN Code Index**	Unsigned 1	None	Link Dependent

Table B1 - 127: Message #32001: 7085 Data Link Active Configuration Status Report

4.21.3 Message #32002: 7085 Data Link Fallback Configuration Status Report.

This message shall be used by the VSM to send the CUCS information on the fallback status of the VDT and/or CDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0503.14	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0503.15	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0503.17	**2**	**STANAG 7085 Profile ID – Part 1** Defines the first three digits of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Bit field	Bits 7..6 = 7085 Annex 00 = Annex B 01 = Annex C 10 = Not Used 11 = Not Used Bits 5..4 = 7085 Appendix 00 = Appendix 1 01 = Not Used 10 = Not Used 11 = Not Used Bits 3..0 = 7085 Implementation 0000 = Implementation 1 0001 = Implementation 2 0010 - 1111 = Not Used See STANAG 7085, Annex P
0503.23	**3**	**STANAG 7085 Profile ID – Part 2** Defines the last digit of the Profile Identifier as specified in STANAG 7085.	Unsigned 1	Enumerated	1 to 255 See STANAG 7085, Annex P
0503.18	**4**	**Configuration Index**	Unsigned 1	None	0 to TBD
0503.19	**5**	**Reported Forward Link (FL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0503.20	**6**	**Reported Return Link (RL) Carrier Frequency**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9.0005 GHz, etc.
0503.21	**7**	**Forward PN Code Index**	Unsigned 1	None	Link Dependent
0503.22	**8**	**Fallback Timeout**	Unsigned 1	10 seconds	0= Fallback Function Disabled

Table B1 - 128: Message #32002: 7085 Data Link Fallback Configuration Status Report

4.21.4 Message #32003: Data Link Control Status Report.

This message shall be used by the VSM to send the CUCS information on the status of the VDT and/or CDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0505.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0505.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0505.03	**2**	**Transmitter State**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = On
0505.04	**3**	**Transmit Attenuation State**	Unsigned 1	Enumerated	0-255 = Data Link Specific
0505.05	**4**	**Receiver State**	Unsigned 1	Enumerated	0 = Off 1 = On
0505.06	**5**	**Active Antenna Pedestal Index**	Unsigned 1	Enumerated	0 – 255 = Data link Specific
0505.07	**6**	**Communication Security State**	Unsigned 1	Enumerated	0000 0000 = Normal 0001 0001 = Zeroized 0010 0010 = Holding 0011 0011 = Reset 0100 0100 = Bypass (Future) All others = Reserved
0505.08	**7**	**Communication Security Key Index**	Unsigned 1	Enumerated	0 = Primary 1-255 = Alternate Keys

Table B1 - 129: Message #32003: Data Link Control Status Report

4.21.5 Message #32004: RF Command Processing Status Report.

This message reports the current command processing status of the data link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0504.10	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0504.11	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0504.13	**2**	**Commands From RF**	Unsigned 1	Enumerated	0 = Used RF commands and passed them through 1 = Used RF commands and did not pass them through 3 – Did not use RF commands, but passed them through.

Table B1 - 130: Message #32004: RF Command Processing Status Report

4.21.6 Message #32100: Antenna Pedestal Location Status Report.

This message shall be used by the VSM to send the CUCS information on the antenna pedestal location.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0506.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
0506.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0506.11	**2**	**Pedestal Index**	Unsigned 1	None	0 - 255
0506.03	**3**	**Antenna Pedestal Latitude**	Integer 4	BAM	$-\pi/2 <= x <= \pi/2$ WGS-84
0506.04	**4**	**Antenna Pedestal Longitude**	Integer 4	BAM	$-\pi <= x < \pi$ WGS-84
0506.05	**5**	**Antenna Pedestal Altitude**	Integer 3	0.02 Meter	Baro
0506.06	**6**	**Antenna Pedestal Ground Speed**	Integer 2	0.05 M/s	Platform Dependent
0506.07	**7**	**Antenna Pedestal Vertical Speed**	Integer 2	0.05 M/s	Platform Dependent
0506.08	**8**	**Antenna Pedestal Course**	Integer 2	BAM	$-\pi <= x < \pi$ Clockwise from true north
0506.09	**9**	**Antenna Pedestal Pitch (THETA)**	Integer 2	BAM	$-\pi/2 <= x <= \pi/2$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0506.10	**10**	**Antenna Pedestal Roll (PHI)**	Integer 2	BAM	-π/2 <= x <= π/2

Table B1 - 131: Message #32100: Antenna Pedestal Location Status Report

4.21.7 Message #32101: Antenna Control Status Report.

This message shall be used by the VSM to send the CUCS information on the status of the VDT and/or CDT pedestal.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0507.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0507.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0507.03	**2**	**Pedestal Index**	Unsigned 1	None	0 - 255
0507.04	**3**	**Pedestal State**	Unsigned 1	Enumerated	0 = Stowed - Off 1 = Deployed - Off 2 = Deployed - Standby 3 = Deploy - On
0507.05	**4**	**Antenna Pointing Mode**	Unsigned 1	Enumerated	0 = Manual - Position 1 = Manual - Rate 2 = Auto - RF Tracking 3 = Auto – Azimuth 4 = Auto – Location 5 = Search – Pattern 1 6 = Search – Pattern 2 7 = Search – Pattern 3 8 = Search – Pattern 4 9-255 = Data Link Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0507.06	**5**	**Antenna Type**	Unsigned 1	Enumerated	0 = Manual Omni 1 = Manual Directional 2 = Auto Omni 3 = Auto Directional
0507.07	**6**	**Pedestal Location Source**	Unsigned 1	Enumerated	0 = External 1 = Internal

Table B1 - 132: Message #32101: Antenna Control Status Report

4.21.8 Message #32102: Antenna Position Report.

This message shall be used to report the local antenna position and control command and the remote antenna location and movement.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0509.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0509.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0509.03	**2**	**Pedestal Index** The antenna pedestal to which the information in this message is addressed.	Unsigned 1	Enumerated	0 – 255 = Data Link Specific
0509.04	**3**	**Reported Antenna Azimuth**	Integer 2	BAM	$-\pi \le x < \pi$
0509.05	**4**	**Reported Antenna Elevation**	Integer 2	BAM	$-\pi/2 \le x \le \pi/2$
0509.06	**5**	**Reported Azimuth Slew Rate.** Valid for Manual Rate control mode.	Integer 2	0.0001 Radians/ Second	$-\pi \le x \le \pi$
0509.07	**6**	**Reported Elevation Slew Rate.** Valid for Manual Rate control mode.	Integer 2	0.0001 Radians/ Second	$-\pi \le x \le \pi$
0509.08	**7**	**Reported Remote Antenna Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$ WGS-84
0509.09	**8**	**Reported Remote Antenna Longitude**	Integer 4	BAM	$-\pi \le x < \pi$ WGS-84
0509.10	**9**	**Reported Remote Antenna Altitude**	Integer 3	0.02 Meter	Baro
0509.11	**10**	**Reported Remote Antenna Ground Speed**	Integer 2	0.05 M/s	Platform Dependent
0509.12	**11**	**Reported Remote Antenna Course**	Integer 2	BAM	$-\pi \le x < \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0509.13	**12**	**Reported Remote Antenna Vertical Speed**	Integer 2	0.05 M/s	Platform Dependent

Table B1 - 133: Message #32102: Antenna Position Report

4.21.9 Message #32200: Link Health Status.

This message shall be used by the VSM to report to the CUCS the link health.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0508.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0508.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0508.03	**2**	**Bit Mode Status**	Unsigned 1	Enumerated	0 = Off (Abort) 1= Running BIT 2 = BIT Passed 3= BIT Failed 4-255 = Link Specific

Table B1 - 134: Message #32200: Link Health Status

4.21.10 Message #32201: Data Link Fallback Status.

This message shall be used to report the fallback status of the data link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0511.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0511.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0511.03	**2**	**Fallback Status**	Unsigned 1	Enumerated	0 = Normal 1 = Fall Back in Progress 2 = Fallback Failed 3 = Fallback Successful

Table B1 - 135: Message #32201: Data Link Fallback Status

4.21.11 Message #32300: Data Link UDP Count.

This message shall be used to report the number of UDP messages received by the data link. The period that the messages are counted is defined by Message #30300, Set Data Link UDP Monitor Period. The message reports the number of messages for the last complete period measured and not the current period being measured.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0510.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
0510.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0510.03	2	**UDP Message Count** Defines the number of UDP messages received and processed by this data link. 65535 = at least 63535 messages received during the monitor period.	Unsigned 2	None	$0 \leq x < 65535$

Table B1 - 136: Message #32300: Data Link UDP Count

4.22 Data Link Transition Messages.

The messages in this section allow the CUCS to control the data links and receive the status of the data links. These messages also support air vehicle handover.

4.22.1 Message #34000: Vehicle Data Link Transition Coordination Message.

This message shall be used to establish a new data link configuration when transferring from one UCS data link to another UCS data link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0600.00	0	**Presence Vector**	Unsigned 2	None	Bitmapped
0600.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0600.04	2	**Data Link ID** (VDT data link ID for air vehicle transition)	Integer 4	None	See Section 1.7.6
0600.05	3	**Acquiring CUCS ID**	Integer 4	None	See Section 1.7.6

0600.14	**4**	**STANAG 7085 Profile ID – Part 1 Defines the first three digits of the Profile Identifier as specified in STANAG 7085.**	Unsigned 1	Bit field	Bits 7..6 = 7085 Annex 00 = Annex B 01 = Annex C 10 = Not Used 11 = Not Used Bits 5..4 = 7085 Appendix 00 = Appendix 1 01 = Not Used 10 = Not Used 11 = Not Used Bits 3..0 = 7085 Implementation 0000 = Implementation 1 0001 = Implementation 2 0010 - 1111 = Not Used See STANAG 7085, Annex P
0600.15	**5**	**STANAG 7085 Profile ID – Part 2 Defines the last digit of the Profile Identifier as specified in STANAG 7085.**	Unsigned 1	Enumerated	1 to 255 See STANAG 7085, Annex P
0600.06	**6**	**Set Forward Link (FL) Carrier Frequency (VDT)**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9,0005 GHz, etc.
0600.07	**7**	**Set Return Link (RL) Carrier Frequency (VDT)**	Unsigned 2	0.5 MHz	Link Dependent 0 = 9 GHz, 1 = 9,0005 GHz, etc.
0600.08	**8**	**Set PN Code (VDT)**	Unsigned 1	None	0 to TBD
0600.09	**9**	**Acquiring CDT Latitude**	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
0600.10	**10**	**Acquiring CDT Longitude**	Integer 4	BAM	$-\pi \leq x < \pi$
0600.11	**11**	**Acquiring CDT Altitude**	Integer 3	0.02 Metres	$-1000 \leq x \leq$ 100000
0600.12	**12**	**Data Link Time-out Limit** 0 = Abort data link transition.	Unsigned 2	0.1 Seconds	See Section 1.7.2

0600.13	**13**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 137: Message #34000: Vehicle Data Link Transition Coordination

4.22.2 Message #35000: Handover Status Report.

This message shall be used to report the status of the handover procedure.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0700.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
0700.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
0700.04	**2**	**Acquiring CUCS ID**	Integer 4	None	See Section 1.7.6
0700.05	**3**	**Status**	Unsigned 1	Enumerated	0 – Handover not requested 1 – Handover in Progress 2 – Handover Successful 3 – Handover Failed
0700.06	**4**	**Air Data Link ID** (Data link ID for air vehicle transition)	Integer 4	None	See Section 1.7.6

Table B1 - 138: Message #35000: Handover Status Report

4.23 Autonomy Messages.

4.23.1 Message #36000: Activity Constraint Message.

The Activity Constraint Message, Message #36000, shall be used to communicate requested autonomous goals and behaviour constraints from the CUCS to the VSM. Each constraint shall be provided with a unique identifier by the CUCS so that it may be referenced by the VSM to indicate which constraints are able to be met and which constraints are not able to be met. In combination with the constraint response message below, the unique constraint identifier enables the system to provide feedback describing why a particular constraint or set of constraints for an activity cannot be met. The system shall execute an activity if and only if all constraints associated with the activity are satisfied.

The following time window constraints may be specified using Message # 36000:

- Waypoint constraints, before, after or concurrent (field 6, values 6 – 8)
    - o Example: Between ten and twenty seconds before waypoint six

  - Example: Between ten and twenty seconds after waypoint six
  - Example: Between ten seconds before and five seconds after reaching waypoint six
- Absolute time constraints, before, after or concurrent (field 6, values 3 – 5)
  - Example: Between ten and twenty seconds before a specific time
  - Example: Between ten and twenty seconds after a specific time
  - Example: Between ten seconds before and five seconds after a specific time
- Relative to other constraints, before, after or concurrent (field 6, values 0 – 2)
  - Example: Between ten and twenty seconds before satisfying constraint 37
  - Example: Between ten and twenty seconds after satisfying constraint 37
  - Example: Between ten seconds before and ten seconds after satisfying constraint 37
- Conditioned on a contingency level occurring (field 6, values 9, 10)
  - Example: If contingency type "A" occurs squawk a different IFF code
  - Example: If contingency type "B" occurs turn on the landing lights

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1700.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1700.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1700.05	**2**	**Constraint ID** A unique identifier for this constraint	Unsigned 3	None	$1 \le x < 2^{24}$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1700.06	**3**	**Constraint Timing or Condition** Used to identify goals, behaviours and constraints	Unsigned 1	Enumerated	0 = Before constraint 1 = After constraint 2 = Concurrent constraint 3 = Before time 4 = After time 5 = Concurrent time 6 = Before waypoint 7 = After waypoint 8 = Concurrent with arrival at waypoint, or start of loiter at AV loiter point 9 = If contingency type "A" occurs 10 = If contingency type "B" occurs
1700.07	**4**	**Timing Start** Used to identify the start time of a constraint time window, relative to a waypoint, start of loiter at an AV loiter waypoint, an absolute time, or another constraint	Unsigned 3	Seconds	$0 \leq x < 2^{24}$
1700.08	**5**	**Timing End** Used to identify the end time of a constraint time window, relative to a waypoint, start of loiter at an AV loiter waypoint, an absolute time, or another constraint	Unsigned 3	Seconds	$0 \leq x < 2^{24}$
1700.09	**6**	**Referenced Constraint or Waypoint ID** Used to identify the waypoint or other constraint that this constraint is relative to; used if field 6 has a value of 0, 1, 2, 6, 7, or 8	Unsigned 3	None	$1 \leq x < 2^{24}$
1700.10	**7**	**Constraint Time** Used to identify the absolute time that this constraint is relative to; used if field 6 has a value of 3, 4, or 5	Unsigned 5	0.001 Seconds	See Section 1.7.2
1700.11	**8**	**Relative Priority** Used to identify which constraints are more important than others; higher priority is more important	Unsigned 1	None	$0 \leq x \leq 100$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1700.04	**9**	**Activity ID** **Identifies the activity with (non-zero activity ID) to which this constraint is to be applied**	Unsigned 3	None	$1 \le x < 2^{24}$

Table B1 - 139: Message #36000: Activity Constraint

4.23.2 Message #36001: Constraint Response Message.

The Constraint Response Message, Message #36001, shall be sent from the VSM to the CUCS. It shall be used to communicate the ability of the VSM/air vehicle to meet the requested autonomous goals and behaviour constraints received by the VSM in Message #36000. For each constraint (Message #36000) received by the VSM, the VSM shall produce a constraint response (Message #36001) indicating whether or not the constraint will be satisfied.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1701.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1701.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1701.04	**2**	**Constraint ID or Area ID** Identifies the constraint that will be satisfied or that has failed, or the area that has been violated if field 3 value = 10 or 11.	Unsigned 3	None	$1 \le x < 2^{24}$
1701.05	**3**	**Constraint Response** Used indicate whether or not the constraint will be satisfied	Unsigned 1	Enumerated	0 = Satisfied 1 = Unsupported 2 = Priority failure 3 = Resource unavailable 4 = Time constraint failure 5 = Computing complexity failure 6 = Consistency failure 7 = Auto-router failure 8 = Unknown failure 9 = Vehicle specific failure 10 = Area violation 11 = Illegal Area specification 12 – 255 = Reserved

Table B1 - 140: Message #36001: Constraint Response

4.23.3 Message #36002: Constraint Requests Complete Message.

The Constraint Requests Complete Message, Message #36002, shall be sent from the CUCS to the VSM after the CUCS has sent all activity constraints. It shall be used to indicate to the VSM that it should begin processing all constrained activity and should produce constraint responses using one message (Message #36001) for each Message #36000 received. After all constraint responses have been sent by the VSM, the VSM shall send Message #36003, Constraint Responses Complete (see below) to indicate to the CUCS that all constraints have been processed.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1702.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1702.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Table B1 - 141: Message #36002: Constraint Requests Complete

4.23.4 Message #36003: Constraint Responses Complete Message.

The Constraint Responses Complete Message, Message #36003, shall be sent from the VSM to the CUCS after the VSM has sent all constraint responses to the CUCS. It shall be used to indicate to the CUCS that all constraints have been processed.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1703.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1703.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2

Table B1 - 142: Message #36003: Constraint Responses Complete

4.23.5 Message #36100: Activity Complete Message.

The Activity Complete Message, Message #36100, shall be sent from the VSM to the CUCS after the vehicle, payload or data link has completed an activity.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1704.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1704.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1704.02	**2**	**Activity ID**	Integer 3	None	$1 < x \leq 2^{32}$

Table B1 - 143: Message #36100: Activity Complete

4.23.6 Message #36200: Activity Status Message.

The Activity Status Message, Message #36200, shall be sent from the VSM to the CUCS at least once for each activity whose constraints are satisfied as described in Message #36001. The VSM shall send Message #36200 when the activity status changes to notify the CUCS that the activity will occur at a different estimated time or enroute to a different waypoint.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1705.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1705.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1705.05	**2**	**Timing Start** Used to identify the estimated absolute start time of the activity in field 4	Unsigned 5	0.001 Seconds	See Section 1.7.2
1705.06	**3**	**Timing End** Used to identify the estimated absolute end time of the activity in field 4	Unsigned 5	0.001 Seconds	See Section 1.7.2
1705.07	**4**	**Enroute Waypoint ID** Used to identify the waypoint that the vehicle will be flying toward, or the AV Loiter waypoint the vehicle will be loitering at when the activity in field 4 is started	Unsigned 2	None	$1 \leq x \leq 2^{32}$
1705.04	**5**	**Activity ID**	Integer 3	None	$1 < x \leq 2^{32}$

Table B1 - 144: Message #36200: Activity Status

4.23.7 <u>Message #36300: Area Definition Message.</u>

The Area Definition Message, Message #36300, shall be used to communicate areas and zones from the CUCS to the VSM. Each area or zone shall describe a polygon volume with a single altitude range and between three and sixteen corner points. The polygon volume shall be constructed as a closed volume by sequentially joining together the points of the polygon in the order provided. The last point shall be joined to the first point. Every valid polygon shall have lines that do not cross each other. Each zone shall include a start time when the zone definition begins and a stop time when the zone definition ends. Each zone shall be provided with a unique identifier by the CUCS so that it may be modified or deleted. The VSM shall use the unique area or zone identifier to indicate autonomous activities that cannot be achieved because of area restrictions.

The following areas or zones may be defined using Message #36300:

- Keep-out area, (no fly zone) field 2 value = 0
- Flight corridor, (stay in zone) field 2 value = 1
- Surveillance zone, field 2 value = 2
- No collection zone, field 2 value = 3
- No emission area, field 2 value = 4

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Unique ID	Field	Data Element Name & Description	Type	Units	Range
1706.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1706.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1706.02	**2**	**Area Type** Identifies the activity with (non-zero activity ID) to which this constraint is to be applied	Unsigned 1	Enumerated	0 = Keep out 1 = Stay in 2 = Surveillance 3 = No collection 4 = No emission 5 – 255 = Vehicle specific
1706.03	**3**	**Area ID** A unique identifier for this area	Unsigned 3	None	$1 \le x \le 2^{24}$
1706.04	**4**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumerated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
1706.05	**5**	**Altitude Max** Maximum altitude for this area	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
1706.06	**6**	**Altitude Min** Minimum altitude for this area	Integer 3	0.02 Metres	$-1000 \le x \le 100000$
1706.07	**7**	**Area Start Time** Used to identify the absolute time that this area definition begins	Unsigned 5	0.001 Seconds	See Section 1.7.2
1706.08	**8**	**Area End Time** Used to identify the absolute time that this area definition ends	Unsigned 5	0.001 Seconds	See Section 1.7.2
1706.09	**9**	**Total Number of Polygon Points.**	Integer 1	None	3 to 16
1706.10	**10**	**Latitude – Point 1**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
1706.11	**11**	**Longitude – Point 1**	Integer 4	BAM	$-\pi \le x \le \pi$
1706.12	**8 + 2N**	**Latitude – Point N** N = The Index for this polygon point where 1< N ≤ (total number of polygon points from field 9)	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
1706.13	**9 + 2N**	**Longitude – Point N** N = The Index for this polygon point where 1< N ≤ (total number of polygon points from field 9)	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 145: Message #36300: Area Definition

4.24 General Preconnection Configuration Messages.

4.24.1 Message #40000: Field Configuration Request.

This message shall be used by the CUCS to initiate and, if required, abort the transmission of the DLI field related configuration parameter information from the VSM, vehicle or data link, for a specified LOI, for a specified data link ID, vehicle ID (specific or logical) or specific payload station, or to request the configuration of a single parameter. The CUCS uses this message to update DLI parameter configuration data at the CUCS, and to potentially control the display of information. The VSM, vehicle or data link shall respond with one or more Field Configuration Integer Response (Message #41000) message(s), Field Configuration Float Response (Message #41001) message(s), Field Configuration Enumerated Response (Message #41002) message(s) or Field Configuration Unsigned Response (Message #41003) message(s) with the static configuration for each of the configuration items specified in this document that are supported by the VSM.

The null ID shall be used for an ID that is not applicable during an instance of transmission of this message.

The Field Configuration Request message shall be able to be transmitted from a CUCS to a VSM without an authorized connection as it is used to request configuration in advance of requesting a connection in order to prepare the CUCS for the connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1200.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1200.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1200.14	**2**	**Request LOI**	Unsigned 1	Bitmapped	0x00 = N/A 0x01 = LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
1200.06	**3**	**Request Type**	Unsigned 1	Enumerated	0 = Single Parameter 1 = Monitor 2 = Control 3 = Abort Configuration
1200.07	**4**	**Requested Message**	Unsigned 2	None	See Section 4.1.1 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1200.08	**5**	**Requested Field**	Unsigned 1	None	0 ≤ x ≤ 255 0 = N/A
1200.09	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1200.10	**7**	**Sensor Select**	Unsigned 1	Enumerated	0 = N/A 1 = Sensor 1 2 = Sensor 2 3 = Sensor 3
1200.11	**8**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian	Unsigned 2	None	See Table B1-37
1200.12	**9**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	0 ≤ x ≤ 65535
1200.13	**10**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 146: Message #40000: Field Configuration Request

4.24.2 Message #41000: Field Configuration Integer Response.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS after the reception of Message #40000 as required for each of the parameters within the list (below) that are required per a single parameter, monitor, or control configuration request, and supported by the VSM for the ‘Station Number.” i.e.; based on the Request type and Station Number fields in the Message #40000 configuration request.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS in direct response to a Message #40000 for a single parameter request from the CUCS if configuration information is available for the requested parameter. Where the VSM/ vehicle/ data link does not support a requested parameter, this message shall be sent with the “Field Supported” parameter filled as “Field Not Supported.”

Where the Message #40000, Request Type, field is set to an LOI for "monitoring", only parameters from status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link. e.g.; Message #3002, is an AV status message therefore parameter Message #3002, Power Level is Station Number equal to AV platform, Request Type equal to monitor parameter required in response to such a configuration request.

Where the Message #40000, Request Type, field is set to an LOI for "controlling", parameters from both control and status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link.

For CUCS commanded values, this message shall define the level of support provided to the CUCS for control over a specified commanded DLI message parameter of size Integer, by the VSM/ vehicle/ Data Link filling in the message for the requested parameter and transmitting it to the CUCS.

For VSM/ vehicle/ Data Link reported values, this message shall define the level of support provided for the reporting of a DLI message parameter, of size Integer, by the VSM/ vehicle/ Data Link filling in the message for the requested parameter and transmitting it to the CUCS.

This message may be sent from the VSM to the CUCS after the Configuration Complete Message, Message #41005 has been sent to change the following attributes of a field:

- Min Value
- Max Value
- Min Display Value
- Max Display Value
- Minimum Display Resolution
- All warning and caution limits
- Help Text

The CUCS will use this information to configure the display and control of VSM data elements. The Default Value field shall be used by the CUCS to define the initial state of the displayed field. If no configuration message is received by the CUCS during the VSM response(s) to Message #40000, the CUCS will display the field with its full range enabled.

Where the VSM/ vehicle/ data link uses this message to report a DLI message parameter, the CUCS shall present the Cautions and Warnings to the operator in accordance with the message for the specified parameter. The High Caution Limit and Low Caution limit shall be equivalent to Message #16000, Priority enumeration of "Caution." The High Warning Limit and Low Warning limit shall be equivalent to Message #16000, Priority enumeration of "Warning." The VSM shall not present these same warnings.

The CUCS, as a minimum, shall support the reception of the following DLI message parameters from a VSM/ vehicle/ data link:

- Message #2002, Altimeter Setting
- Message #3002, Power Level
- Message #3002, Flap Deployment Angle
- Message #3002, Speed Brake Deployment Angle

- Message #3009, Altimeter Setting
- Message #9001, DME
- Message #9001, LOC
- Message #9001, Glide Slope
- Message #11000; Flap Deployment Command
- Message #11000; Speed Brake Deployment Command
- Message #13002, Waypoint Number
- Message #30001, Select Channel
- Message #30001, Select Primary Hop Pattern
- Message #30001, Set PN Code
- Message #30001, Set Forward Link (FL) Carrier Frequency
- Message #30001, Set Return Link (RL) Carrier Frequency
- Message #30002, Set Forward Link (FL) Carrier Frequency
- Message #30002, Set Return Link (RL) Carrier Frequency
- Message #30102, Set Antenna Elevation
- Message #30102, Set Azimuth Slew Rate
- Message #30102, Set Elevation Slew Rate
- Message #32001, Reported Forward Link (FL) Carrier Frequency
- Message #32001, Reported Return Link (RL) Carrier Frequency
- Message #32002, Reported Forward Link (FL) Carrier Frequency
- Message #32002, Reported Return Link (RL) Carrier Frequency
- Message #32300, Reported Antenna Elevation
- Message #32300, Reported Azimuth Slew Rate
- Message #32300, Reported Elevation Slew Rate

For bit fields, e.g. 0x0001, 0x0002, 0x0004, 0x0008, the right most bit (0x0001) shall be considered Enumeration Index 0.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
1300.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1300.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
1300.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.06	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1300.07	**5**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1300.08	**6**	**Requested Field** If Requested Field = 0, then the entire message is not supported.	Unsigned 1	None	0 = Message Not Supported $0 \leq x \leq 255$
1300.09	**7**	**Field Supported**	Unsigned 1	Enumerated	0 = Field Not Supported 1 = Field Supported
1300.21	**8**	**Default Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.10	**9**	**Max Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.11	**10**	**Min Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.12	**11**	**Max Display Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.13	**12**	**Min Display Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.14	**13**	**Minimum Display Resolution**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.15	**14**	**High Caution Limit** Minimum value that will cause a Caution	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.16	**15**	**High Warning Limit** Minimum value that will cause a Warning	Integer 4	See Field In Requested Message	See Field In Requested Message

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.17	**16**	**Low Caution Limit** Maximum value that will cause a Caution	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.18	**17**	**Low Warning Limit** Maximum value that will cause a Warning	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.19	**18**	**Help Text**	Character 80	None	Null Terminated ASCII String
1300.20	**19**	**Subsystem ID** Identifier subsystem for which this field is associated	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Comms 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environmental Control System 9 = VSM Status 10 = VDT 11 = CDT 12-18 = Reserved 19 = Not Assigned 20 – 31= VSM Specific

Table B1 - 147: Message #41000: Field Configuration Integer Response

4.24.3 Message #41001: Field Configuration Float Response.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS after the reception of Message #40000 as required for each of the parameters within the list (below) that are required per a single parameter, monitor, or control configuration request, and supported by the VSM for the “Station Number.” i.e.; based on the Request type and Station Number fields in the Message #40000 configuration request.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS in direct response to a Message #40000 for a single parameter request from the CUCS, if configuration information is available for the requested parameter. Where the VSM does not support a DLI message parameter, this message shall be sent with the "Field Supported" parameter filled as "Field Not Supported."

Where the Message #40000, Request Type, field is set to an LOI for "monitoring", only parameters from status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link.

Where the Message #40000, Request Type, field is set to an LOI for "controlling", parameters from both the control and status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link. e.g.; Message #2002 is a control message for the Station Number of AV platform, therefore parameter Message #2002, Commanded Altitude is a control parameter required in response to a configuration request, Request Type of control, for the Station Number of AV platform.

For CUCS commanded values, this message shall define the level of support provided to the CUCS for control over a specified commanded DLI message parameter, of size float, by the VSM/ vehicle/ Data Link filling in the message for the requested DLI message parameter(s) and transmitting it to the CUCS.

For VSM/ vehicle/ Data Link reported values, this message shall define the level of support provided for the reporting of a DLI message parameter, of size float, by the VSM/ vehicle/ Data Link filling in the message for the requested parameter and transmitting it to the CUCS.

This message may be sent from the VSM to the CUCS after the Configuration Complete Message #41005 has been sent to change the following attributes of a field:

- Min Value
- Max Value
- Min Display Value
- Max Display Value
- Minimum Display Resolution
- All warning and caution limits
- Help Text

The CUCS will use this information to configure the display and control of VSM data elements. The Default Value field shall be used by the CUCS to define the initial state of the displayed field. If no configuration message is received by the CUCS during the VSM response(s) to Message #40000, the CUCS will display the field with its full range enabled.

In the list (below), the configuration or support of some parameters is dependent on the configuration of others parameters within this list or within the lists contained in the other configuration messages. This is to ensure consistency between parameters for similar functionality (such as the Message #2002, Commanded Altitude and Message #2004, Loiter Altitude), there are parameters not required to be reported by the VSM to the CUCS as part of the configuration process, as these parameters are to have the same configuration (some of these parameters are identified in the list below). Note, where parameters are not contained on the list, such as reported values or reported commanded values, these reports should use the same configuration of their associated command data element contained in the list. This means for example, that a reported altitude parameter uses the same configuration as the commanded altitude parameter.

Where the VSM/ vehicle/ data link uses this message to report a DLI message parameter, the CUCS shall present the Cautions and Warnings to the operator in accordance with the message for the specified parameter. The High Caution Limit and Low Caution limit shall be equivalent to Message #16000, Priority enumeration of “Caution.” The High Warning Limit and Low Warning limit shall be equivalent to Message #16000, Priority enumeration of “Warning.” The VSM shall not present these same warnings on to the operator.

The CUCS, as a minimum, shall support the reception of the following DLI message parameters from a VSM/ vehicle/ data link:

- Message #2004, Loiter Radius
- Message #2004, Loiter Length
- Message #2004, Loiter Altitude – uses the Message #2002, Commanded Altitude configuration
- Message #2004, Loiter Speed – uses the Message #2002, Commanded Speed configuration
- Message #2002, Heading Reference
- Message #2002, Commanded Altitude – the configuration for this parameter is from this message, but the support for this parameter is dependent on the Message #2002, Altitude Command Type of “Altitude” and "Rate-limited attitude" being supported
    - o i.e.; if Message #2002, Altitude Command Type “Altitude” and "Rate-limited attitude" is not supported (see Message #44003), this parameter is not supported
- Message #2002, Commanded Vertical Speed – the configuration for this parameter is from this message, but the support for this parameter is dependent on the Message #2002, Altitude Command Type of “Altitude Rate” being supported.
    - o i.e.; if Message #2002, Altitude Command Type “Altitude rate” is not supported (see Message #44003), this parameter is not supported.
- Message #2002, Commanded Turn Rate
- Message #2002, Commanded Roll Rate
- Message #2002, Commanded Speed
- Message #2002, Commanded Roll
- Message #3002, Current Propulsion Energy Level
- Message #3002, Current Propulsion Energy Usage Rate
- Message #3007, Engine Speed
- Message #3009, Angle of Attack

- Message #3009, Angle of Sideslip
- Message #3009, Indicated Airspeed
- Message #3009, True Airspeed
- Message #3009, Outside Air Temperature
- Message #3009, Barometric Altitude
- Message #3009, Barometric Altitude Rate
- Message #3009, U_Ground
- Message #3009, V_Ground
- Message #3010, X_Body_Accel
- Message #3010, Y_Body_Accel
- Message #3010, Z_Body_Accel
- Message #3010, Roll_Rate
- Message #3010, Pitch_Rate
- Message #3010, Yaw_Rate
- Message #4000, Altitude
- Message #4000, Phi (Roll)
- Message #4000, Theta (Pitch)
- Message #4000, Phi_dot (Roll Rate)
- Message #4000, Theta_dot (Pitch Rate)
- Message #4000, Psi_dot (Yaw Rate)
- Message #4000, U_Speed
- Message #4000, V_Speed
- Message #4000, W_Speed
- Message #4000, U_Accel
- Message #4000, V_Accel
- Message #4000, W_Accel
- Message #7000, Voice Transmit Enable
- Message #7001, Voice Transmit Enable
- Message #9000, Voice Transmit Enabled
- Message #9001, Voice Transmit Enabled
- Message #13002, Waypoint to Speed
- Message #13002, Waypoint to Altitude
- Message #13003 Loiter Radius
- Message #19001, Set Horizontal Field of View – uses the Message #301 configuration

- Message #19001, Set Vertical Field of View – uses the Message #301 configuration
- Message #19001, Horizontal Slew Rate
- Message #19001, Vertical Slew Rate
- Message #19001, Altitude
- Message #21101, Reported Range
- Message #30001, Set Forward Link Carrier Frequency
- Message #30001, Set Return Link Carrier Frequency
- Message #30003, Set Antenna Azimuth – this parameter is not configured using this message, this message is only used to identify if this parameter is supported by the VSM.
- Message #30003, Set Azimuth Offset – this parameter is not configured using this message, this message is only used to identify if this parameter is supported by the VSM.
- Message #30003, Set Elevation Offset – this parameter is not configured using this message, this message is only used to identify if this parameter is supported by the VSM.
- Message #30003, Set Antenna Elevation
- Message #30003, Set Azimuth Slew Rate
- Message #30003, Set Elevation Slew Rate
- Message #30004, Set CDT Altitude

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
1301.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1301.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
1301.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6 0 = N/A
1301.06	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1301.07	**5**	**Requested Message**	Unsigned 4	None	See Section 4.1.1

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.08	**6**	**Requested Field** If Requested Field = 0, then the entire message is not supported.	Unsigned 1	None	0 = Message Not Supported 0 ≤ x ≤ 255
1301.09	**7**	**Field Supported**	Unsigned 1	Enumerated	0 = Field Not Supported 1 = Field Supported
1301.21	**8**	**Default Value**	Float	See Field In Requested Message	See Field In Requested Message
1301.10	**9**	**Max Value**	Float	See Field In Requested Message	See Field In Requested Message
1301.11	**10**	**Min Value**	Float	See Field In Requested Message	See Field In Requested Message
1301.12	**11**	**Max Display Value**	Float	See Field In Requested Message	See Field In Requested Message
1301.13	**12**	**Min Display Value**	Float	See Field In Requested Message	See Field In Requested Message
1301.14	**13**	**Minimum Resolution**	Float	See Field In Requested Message	See Field In Requested Message
1301.15	**14**	**High Caution Limit** Minimum value that will cause a Caution	Float	See Field In Requested Message	See Field In Requested Message
1301.16	**15**	**High Warning Limit** Minimum value that will cause a Warning	Float	See Field In Requested Message	See Field In Requested Message
1301.17	**16**	**Low Caution Limit** Maximum value that will cause a Caution	Float	See Field In Requested Message	See Field In Requested Message
1301.18	**17**	**Low Warning Limit** Maximum value that will cause a Warning	Float	See Field In Requested Message	See Field In Requested Message
1301.19	**18**	**Help Text**	Character 80	None	Null Terminated ASCII String

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.20	**19**	**Subsystem ID** Identifier subsystem for which this field is associated	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Comms 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environmental Control System 9 = VSM Status 10 = VDT 11 = CDT 12-18 = Reserved 19 = Not Assigned 20 – 31= VSM Specific

Table B1 - 148: Message #41001: Field Configuration Float Response

4.24.4 Message #41002: Field Configuration Enumerated Response.

This message shall be transmitted from the VSM/vehicle/Data Link to the CUCS after the reception of Message #40000 as required for the parameters within the list (below) that are required per a single parameter, monitor, or control configuration request, and supported by the VSM for the “Station Number.” i.e.; based on the Request type and Station Number fields in the Message #40000 configuration request.

This message shall report when an enumerated parameter is supported in part by removing unsupported generic enumerations from an enumerated or bitmapped message field. i.e.; if not all the enumerations/ bit fields in an enumerated/ bit mapped field are supported by the AV/VSM, they are identified by instances of this message in response to the Message #40000 configuration request.

This message provides the capability to configure enumerated fields where there is no generic enumerated listing for the parameter, or to extend the set of enumerated values where vehicle specific values are available. Where an enumerated field contains a vehicle (payload) specific or VSM specific listing and a VSM/ vehicle/ Data link requires to use this capability, this message shall be used by the VSM/ vehicle/ Data Link to extend that listing. This message shall not be used to alter a generic enumerated listing.

Note, one such message is required to remove each unsupported generic enumeration within an enumerated field, and one such message is required to add a single vehicle (payload) specific enumeration to an enumerated field.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS in direct response to a Message #40000 for a single parameter request from the CUCS, if configuration information is available for the requested parameter. Where the VSM does not support the DLI message parameter, this message shall be sent with the “Field Supported” parameter filled as “Field Not Supported.”

Where the Message #40000, Request Type, field is set to an LOI for “monitoring”, only parameters from status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link.

Where the Message #40000, Request Type, field is set to an LOI for “controlling”, parameters from both the control and status messages that are applicable to the Message #40000, Station Number, field shall be required to be sent from the VSM/ AV/ Data Link. e.g.; Message #2001 is a control message for the Station Number of AV platform, therefore parameter Message #2001, Select Flight Path Control Mode, is a control parameter required in response to a configuration request of Request Type control, for the Station Number of AV platform. Using this example, the AV/ VSM would send Message #41002 for any Message #2001, Select Flight Path Control Mode, generic enumerations that it does not support and to potentially add vehicle specific flight modes.

For CUCS commanded values, this message shall define the level of support provided to the CUCS for control over a specified commanded DLI message parameter, of size float, by the VSM/ vehicle/ Data Link filling in the message for the requested DLI message parameter(s) and transmitting it to the CUCS.

For VSM/ vehicle/ Data Link reported values, this message shall define the level of support provided for the reporting of a DLI message parameter, of size float, by the VSM/ vehicle/ Data Link filling in the message for the requested parameter and transmitting it to the CUCS.

The CUCS shall use this message to configure the User Interface for the display or control of VSM/ vehicle/ Data Link information. The Default Value field shall be used by the CUCS to define the initial state of the displayed field. If no configuration message is received by the CUCS during the VSM response(s) to Message #40000, the CUCS will display the field with its full range enabled.

The CUCS, as a minimum, shall support the reception of the following DLI message parameters from a VSM/vehicle/data link:

- Message #2001, Select Flight Path Control Mode
- Message #2002, Altitude Command Type
- Message #2002, Heading Command Type
- Message #2002, Speed Type
- Message #2002, Altitude Type
- Message #2003, Altitude Mode
- Message #2003, Speed Mode
- Message #2003, Course/Heading Mode
- Message #2004, Speed Type
- Message #2004, Loiter Type
- Message #2004, Loiter Direction

- Message #2004, Altitude Type
- Message #2005, Flight Termination Mode
- Message #2006, Altitude Type
- Message #2007, Set Lights
- Message #2008, Engine Command
- Message #6000, Mode 2 Code
- Message #7000, Voice Transmit Enable
- Message #7001, Voice Transmit Enable
- Message #9000, Voice Transmit Enabled
- Message #9001, Voice Transmit Enabled
- Message #9001, LOC/Glide Slope Valid
- Message #9001, Marker
- Message #11000; Landing Gear Command
- Message #13000, Mission Plan Mode
- Message #13002, Waypoint Altitude Type
- Message #13002, Waypoint Speed Type
- Message #13002, Turn Type
- Message #13003, Waypoint Loiter type
- Message #13003, Loiter Direction
- Message #13004, Set Sensor Pointing Mode
- Message #13004 Set Sensor 1 Mode
- Message #13004, Set Sensor 2 Mode
- Message #13004, Set Sensor Output
- Message #13004, Starepoint Altitude Type
- Message #13005, Function
- Message #13005, Enumerated State
- Message #15000, Subsystem ID
- Message #16000, Subsystem ID – Note: Not implemented with Message #41002, use Message #15000, Subsystem ID configuration
- Message #16001, Subsystem ID – Note: Not implemented with Message #41002, use Message #15000, Subsystem ID configuration
- Message #18000, PTT
- Message #19001, Set Zoom
- Message #19001, Altitude Type
- Message #19100, Set EO Sensor Mode

- Message #19100, Select IR Temperature
- Message #19100, Set EO/IR Pointing Mode
- Message #19100, Focus Type
- Message #19100, Set IR Polarity
- Message #19100, Set EO/IR Pointing Mode
- Message #19100, Initiate Laser Designator
- Message #19100, Laser Mode
- Message #19200, Set MTI Radar Mode
- Message #19200, Set SAR Mode
- Message #19300, Active Weapon Mode Command
- Message #19300, Active Target Acquisition Mode Select
- Message #19300, Active Attack Mode
- Message #19300, Target Altitude Type
- Message #19500, Set Recording Index Type
- Message #19500, Set Recording Mode
- Message #21101, IR Temperature Status
- Message #28001, Data Link Type
- Message #28001, Antenna Type
- Message #30001, Set Configuration Index
- Message #30002, Set Configuration Index
- Message #30002, Set Data Link State
- Message #30002, Set Antenna Mode
- Message #30002, Communication Security Mode
- Message #30003, Set Pedestal Mode
- Message #30003, Set Transmitter Attenuation
- Message #30003, Select Active Antenna Pedestal Index
- Message #30003, Communication Security Key Index
- Message #30101, Pedestal Index
- Message #30101, Set antenna Pointing Mode
- Message #30102, Pedestal Index
- Message #30200, Bit Mode

For bit fields, e.g. 0x0001, 0x0002, 0x0004, 0x0008, the right most bit (0x0001) shall be considered Enumeration Index 0.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1302.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1302.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1302.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
1302.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6 0 = N/A
1302.06	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1302.07	**5**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1302.08	**6**	**Requested Field** If Requested Field = 0, then the entire message is not supported.	Unsigned 1	None	0 = Message Not Supported 0 ≤ x ≤ 255
1302.09	**7**	**Field Supported** Set to zero to unsupport all enumerations in the reported field.	Unsigned 1	Enumerated	0 = Field Not Supported 1 = Field Supported
1302.14	**8**	**Default Value**	Unsigned 1	None	See Field In Requested Message
1302.10	**9**	**Vehicle (Payload) Specific Enumeration Count** Set to zero when vehicle specific enumerations are not being added. When zero, fields 1302.11, 1302.12 and 1302.13 are also N/A.	Unsigned 1	None	0 = N/A Number Of Vehicle Specific Enumeration States For This Field
1302.11	**10**	**Vehicle (Payload) Specific Enumeration Index**	Unsigned 1	None	0 = N/A Actual Enumeration Index

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1302.12	11	**Vehicle (Payload) Specific Enumeration Text**	Character 16	None	Null Terminated ASCII String. Text To Display For Selected Enumeration
1302.13	12	**Vehicle (Payload) Specific Help Text**	Character 80	None	Null Terminated ASCII String
1302.15	13	**Remove Enumerated Index** Enumerated index value not supported by Addressed Asset	Unsigned 1	None	0 = N/A Controlled By "Field Available"

Table B1 - 149: Message #41002: Field Configuration Enumerated Response

4.24.5 Message #41003: Field Configuration Unsigned Response.

This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS after the reception of Message #40000 as required for each of the parameters within the list (below) that are required per an LOI configuration request, and supported by the VSM (i.e.; based on the Request type for LOI). The LOI for each of the referenced parameters in the list shall be in accordance with Table B1 – 6, Functional Message Group Table for the referenced messages. This message shall be transmitted from the VSM/ vehicle/ Data Link to the CUCS after the reception of Message #40000 in response to a single parameter request from the CUCS if configuration information is available for the requested parameter.

This message shall define the level of support provided to the CUCS for control over a specified commanded DLI message parameter, or for the reporting of a DLI message parameter, of type Unsigned, by the VSM/ vehicle/ Data Link filling in the message for the requested parameter and transmitting it to the CUCS. Where the VSM/ vehicle/ data link does not support a requested parameter, this message shall be sent with the "Field Supported" parameter filled as "Field Not Supported."

The CUCS will use this information to configure the display and control of VSM data elements.

Where the VSM/ vehicle/ data link uses this message to report a DLI message parameter, the CUCS shall present the Cautions and Warnings to the operator in accordance with the message for the specified parameter. The High Caution Limit and Low Caution limit shall be equivalent to Message #16000, Priority enumeration of "Caution." The High Warning Limit and Low Warning limit shall be equivalent to Message #16000, Priority enumeration of "Warning." The VSM shall not present these same warnings.

The CUCS, as a minimum, shall support the reception of following DLI message parameters from a VSM/ vehicle/ data link:

- None specified at this time

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1308.00	**0**	**Presence Vector**	Unsigned 3	None	Bitmapped
1308.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1308.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
1308.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6 0 = N/A
1308.06	**4**	**Station Number**	Unsigned 4	None	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1308.07	**5**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1308.08	**6**	**Requested Field**	Unsigned 1	None	$1 \leq x \leq 255$
1308.09	**7**	**Field Supported**	Unsigned 1	Enumerated	0 = Field Not Supported 1 = Field Supported
1308.10	**8**	**Max Value**	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.11	**9**	**Min Value**	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.12	**10**	**Max Display Value**	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.13	**11**	**Min Display Value**	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.14	**12**	**Minimum Display Resolution**	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.15	**13**	**High Caution Limit** Minimum value that will cause a Caution	Unsigned 4	See Field In Requested Message	See Field In Requested Message

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1308.16	**14**	**High Warning Limit** Minimum value that will cause a Warning	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.17	**15**	**Low Caution Limit** Maximum value that will cause a Caution	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.18	**16**	**Low Warning Limit** Maximum value that will cause a Warning	Unsigned 4	See Field In Requested Message	See Field In Requested Message
1308.19	**17**	**Help Text**	Character 80	None	Null Terminated ASCII String

Table B1 - 150: Message #41003: Field Configuration Unsigned Response

4.24.6 Message #41004: Field Configuration Character Response.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #40000 in response to a single parameter request from the CUCS if configuration information is available for the requested parameter.

This message shall define the level of support provided to the CUCS for control over a specified commanded DLI message parameter, or for the reporting of a DLI message parameter, of size Integer, by the VSM/vehicle/data link filling in the message for the requested parameter and transmitting it to the CUCS. Where the VSM/vehicle/data link does not support a requested parameter, this message shall be sent with the “Field Supported” parameter filled as “Field Not Supported.”

The CUCS will use this information to configure the display and control of VSM data elements.

The CUCS is not required to support the request/reception of any DLI message parameters from a VSM/vehicle/data link with regard to character type field configuration.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1309.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1309.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1309.04	**2**	**VSM ID**	Integer 4	None	See Section 1.7.6
1309.05	**3**	**Data Link ID**	Integer 4	None	See Section 1.7.6 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1309.06	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 0x0010 = Stn #5 0x0020 = Stn #6 0x0040 = Stn #7 0x0080 = Stn #8 0x0100 = Stn #9 0x0200 = Stn #10 0x0400 = Stn #11 0x0800 = Stn #12 0x1000 = Stn #13 0x2000 = Stn #14 0x4000 = Stn #15 0x8000 = Stn #16
1309.07	**5**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1309.08	**6**	**Requested Field**	Unsigned 1	None	$0 \le x \le 255$
1309.09	**7**	**Field Supported**	Unsigned 1	Enumerated	0 = Field Not Supported 1 = Field Supported
1309.10	**8**	**Help Text**	Character 80	None	Null Terminated ASCII String
1309.11	**9**	**Subsystem ID** Identifier subsystem for which this field is associated	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Comms 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environmental Control System 9 = VSM Status 10 = VDT 11 = CDT 12-18 = Reserved 19 = Not Assigned 20-31 = VSM Specific

Table B1 - 151: Message #41004: Field Configuration Character Response

4.24.7 Message #41005: Configuration Complete.

The VSM/vehicle/data link shall use the Configuration Complete message to identify that all configuration messages have been sent from the VSM/vehicle/data link to the CUCS as requested with Message #40000, Field Configuration Request, for the identified VSM, air vehicle, data link, or payload station.

The null ID shall be used for an ID that is not applicable during an instance of transmission of this message.

The VSM/ vehicle/ data link shall be able to transmit this message to the CUCS without an authorized connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1203.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1203.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1203.04	2	**VSM ID**	Integer 4	None	See Section 1.7.6
1203.05	3	**Data Link ID**	Integer 4	None	See Section 1.7.6 **0 = N/A**
1203.06	4	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1203.07	5	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	None	See Table B1-37
1203.08	6	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	None	$0 \le x \le 65535$

Table B1 - 152: Message #41005: Configuration Complete

4.25 General Postconnection Configuration Messages.

After connection Messages #41000, #41001, #41002, #41003, and #41004 are reused in order to update any of the initial parameters that were set during the pre-connection phase.

4.25.1 Message #42000: Display Unit Request.

The CUCS shall use the Display Unit Request message to identify the display units that the VSM/ vehicle is required to use in Remote Displays for that CUCS. The VSM/ vehicle shall accept this message from the CUCS anytime the CUCS has a valid connection with the VSM/ vehicle to control functionality.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1201.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1201.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1201.05	**2**	**Distance**	Unsigned 1	Enumerated	0 = Meters 1 = Feet 2 = Kilometres 3 = Nautical Miles
1201.06	**3**	**Altitude**	Unsigned 1	Enumerated	0 = Meters 1 = Feet
1201.07	**4**	**Speed**	Unsigned 1	Enumerated	0 = Meters/Second 1 = Knots 2 = MPH 3 = Km/Hour
1201.08	**5**	**Position (Latitude, Longitude)**	Unsigned 1	Enumerated	0 = Degrees 1 = UTM 2 = MGRS
1201.09	**6**	**Temperature**	Unsigned 1	Enumerated	0 = Centigrade 1 = Fahrenheit
1201.10	**7**	**Mass/Weight**	Unsigned 1	Enumerated	0 = Kilograms 1 = Pounds
1201.11	**8**	**Angles**	Unsigned 1	Enumerated	0 = Radians 1 = Degrees
1201.12	**9**	**Pressure – Barometric**	Unsigned 1	Enumerated	0 = mb 1 = inHg 2 = Pascals
1201.13	**10**	**Fuel Quantity**	Unsigned 1	Enumerated	0 = Litres 1 = Pounds 2 = Kilograms
1201.14	**11**	**Activity ID** Used to identify goals, behaviours and constraints.	Unsigned 3	None	0 = Immediate Activity

Table B1 - 153: Message #42000: Display Unit Request

4.25.2 Message #42001: CUCS Resource Report.

This message shall be used to communicate to the VSM/vehicle/data link the resources available within the CUCS for managing remote displays to be presented at the CUCS. The VSM/vehicle/data link shall transmit Remote Displays to the CUCS in accordance with the contents of this message only after the reception of this message from a CUCS. The use of Field 12 shall be limited to transfer of STANAG 4545 data from the VSM to CUCS.

The null ID in the wrapper shall be used for an ID that is not applicable during an instance of transmission of this message.

The CUCS shall only transmit this message to the VSM/vehicle/ data link when it has an authorized connection.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1202.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1202.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1202.10	**2**	**(X Window) Display Number**	Integer 1	None	N/A
1202.11	**3**	**(X Window) Screen Number**	Integer 1	None	N/A
1202.12	**4**	**Vertical Offset from Top Left Corner** Location of top corner of remote display.	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.13	**5**	**Horizontal Offset from Top Left Corner** Location of left corner of remote display.	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.14	**6**	**Display Window Horizontal Width (Pixels)**	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.15	**7**	**Display Window Vertical Height (Pixels)**	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.16	**8**	**CUCS IP Address**	Unsigned 4	None	$0 \leq x \leq (2^{32} - 1)$
1202.17	**9**	**STANAG 4545 Directory**	Character, 256 bytes	None	N/A

Table B1 - 154: Message #42001: CUCS Resource Report

4.25.3 Message #42002: Manage VSM Windows Message

This message shall be used by the CUCS to identify to the VSM/ vehicle/ data link if the selected vehicle ID (Destination ID) (separated by station)/ Data Link ID has focus at the CUCS, thus authorizing the display of remote windows for the referenced functionality. Where the vehicle ID (separated by station)/ Data Link ID does not have focus at the CUCS, the VSM/ vehicle/ data link shall remove its Remote Displays as required from the CUCS user interface. i.e.: when the Data Link ID is set to a specific value, that Data Link must remove all its remote displays from the CUCS when the vehicle focus field is set to false.

As another example, a message transmitted to the AV/ VSM with a non null Vehicle ID with the Station number set to zero (AV platform only) and with the Vehicle focus set to false, means the vehicle payload windows are still allowed to remain displayed, if they were already in focus, but the vehicle platform windows must be removed from the CUCS displays.

During the configuration process remote display items that can be selected via this message were defined using Message #43002: Remote Windows GUI Definition and this message shall be used by the CUCS to request the AV/ VSM/ Data Link to display one of those particular GUIs. When the GUI Reference ID field is set to “255” the VSM shall restore the remote window configuration on the CUCS for the specified functionality, vehicle, payload, or data link, as per previous i.e.; the remote display configuration as for the specified station just before it was taken out of focus.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1204.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1204.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1204.06	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1204.07	**3**	**Vehicle Focus** Remove all Remote Displays for station (1204.06), vehicle station or for Data Link, as applicable when set to False	Unsigned 1	Enumerated	0 = False 1 = True

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1204.08	4	**GUI Reference ID** From Message #43002, Remote Windows GUI Definition, GUI Reference ID field (Unique ID 1205.05).. Not valid when Vehicle Focus (1204.07) is false. Enumeration zero sets the focus back to the vehicle/ data link, but does not call a remote display in particular.	Unsigned 1	None	0 = none 1 to 254 = per configuration 255 = Restore remote window configuration

Table B1 - 155: Message #42002: Manage VSM Windows

4.25.4 Message #43000: VSM Services Report Message.

This message shall be used to communicate to the CUCS the remote display services provided by the VSM to the CUCS. It defines the VSM's home page and FTP location, if these services are used by the VSM. This message will be sent after the VSM receives the CUCS Resource Report (Message #42001) and has done any needed setup or initialization of its services. Once this message has been received by the CUCS, the CUCS can browse to the VSM's home page.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1304.00	0	**Presence Vector**	Unsigned 1	None	Bitmapped
1304.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1304.04	2	**VSM Home Web Page URL**	Character, 249 bytes	None	N/A Blank if service not provided by VSM
1304.05	3	**FTP URL**	Character, 249 bytes	None	N/A Blank if service not provided by VSM

Table B1 - 156: Message #43000: VSM Services Report Message

4.25.5 Message #43001: AV Route Configuration.

This message shall be used by the VSM to define its capability to support multiple instances of each Route Type, and the maximum allowable number of waypoints and the supported Location Types per Route Type.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1310.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1310.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1310.04	**2**	**Route Type**	Unsigned 1	Enumerated	0 = Launch 1 = Approach 2 = Flight 3 = Contingency A 4 = Contingency B
1310.05	**3**	**Instances**	Unsigned 1	None	1-255
1310.06	**4**	**Maximum Number Waypoints**	Unsigned 2	None	1 <= x < 65535
1310.07	**5**	**Location Type Support**	Unsigned 1	Bitmapped	0x01= Absolute 0x02 = Relative

Table B1 - 157: Message #43001: AV Route Configuration

4.25.6 Message #43002: Remote Windows GUI Definition.

This message shall be used by the AV/ VSM/ Data Link to define remote windows (vehicle specific displays) that the CUCS operator can select from the generic CUCS user interface. As an example, the selection of these remote displays may be from a CUCS menu item.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1205.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1205.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1205.05	**2**	**GUI Reference ID** Reference ID that identifies a standalone GUI element, such as a dialog.	Unsigned 1	None	1 to 255
1205.06	**3**	**Parent GUI Reference ID** Reference ID that identifies a GUI Grouping. A zero indicates that the GUI is not related to a higher level GUI Group.	Unsigned 1	None	0 to 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1205.07	4	**Subsystem ID** Identifier associated with the subsystem for which status information is being reported.	Unsigned 1	Enumerated	0 = Engine 1 = Mechanical 2 = Electrical 3 = Comms 4 = Propulsion Energy 5 = Navigation 6 = Payload 7 = Recovery System 8 = Environmental Control System 9 = VSM Status 10 = VDT 11 = CDT 12-19 = Reserved 20 – 31= VSM Specific
1205.08	5	**Text** Text to display on CUCS for the GUI	Character, 16 bytes	None	
1311.07	6	**Enable** Indicates whether the VSM GUI can be requested by the CUCS	Unsigned 1	Enumerated	0 = Enabled 1 = Disabled

Table B1 - 158: Message #43002: Remote Windows GUI Definition

4.26 VSM Forced Command Messages.

4.26.1 Message #44000: Field Change Integer Command.

This message shall be transmitted from the VSM to change the current commanded state of a CUCS field. The CUCS will use this information to update the state of the command field. If the field is available for selection, then the CUCS shall send the appropriate message as if the field had been changed by the operator. If the field is currently unavailable for selection, the CUCS shall not send the message associated with that field.

The CUCS shall at a minimum support the following fields when receiving this message:

Message #2002, Altimeter Setting

Message #2008, Engine Command, Engine Number

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1305.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1305.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1305.05	**2**	**Requested Message**	Unsigned 2	None	See Section 4.1.1
1305.06	**3**	**Requested Field**	Unsigned 1	None	$0 \leq x \leq 255$
1305.07	**4**	**Commanded Value**	Integer 4	See Field In Requested Message	See Field In Requested Message

Table B1 - 159: Message #44000: Field Change Integer Command

4.26.2 Message #44001: Field Change Float Command.

This message shall be transmitted from the VSM to change the current commanded state of a CUCS field. The CUCS will use this information to update the state of the command field. If the field is available for selection, then the CUCS shall send the appropriate message as if the field had been changed by the operator. If the field is currently unavailable for selection, the CUCS shall not send the message associated with that field.

The CUCS shall at a minimum support the following fields when receiving this message:

Message #2002, Vehicle Steering Command, Commanded Altitude

Message #2002, Vehicle Steering Command, Commanded Heading

Message #2002, Vehicle Steering Command, Commanded Roll

Message #2002, Vehicle Steering Command, Commanded Speed

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1306.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1306.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1306.05	**2**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1306.06	**3**	**Requested Field**	Unsigned 1	None	$0 \leq x \leq 255$
1306.07	**4**	**Commanded Value**	Float	See Field In Requested Message	See Field In Requested Message

Table B1 - 160: Message #44001: Field Change Float Command

4.26.3 Message #44002: Field Change Enumerated Command.

This message shall be transmitted from the VSM to change the current commanded state of a CUCS field. The CUCS will use this information to update the state of the command field. If the field is available for selection, then the CUCS shall send the appropriate message as if the field had been changed by the operator. If the field is currently unavailable for selection, the CUCS shall not send the message associated with that field.

The CUCS shall at a minimum support the following fields when receiving this message:

Message #2001, Vehicle Operating Mode Command, Select Flight Path Control Mode

Message #2002, Vehicle Steering Command, Altitude Command Type

Message #2002, Vehicle Steering Command, Heading Command Type

Message #2002, Vehicle Steering Command, Speed Type

Message #2002, Vehicle Steering Command, Altitude Type

Message #2003, Mode Preference Command, Altitude Mode

Message #2003, Mode Preference Command, Speed Mode

Message #2003, Mode Preference Command, Course/Heading Mode

Message #2005, Flight Termination Command, Command Flight Termination State

Message #2005, Flight Termination Command, Flight Termination Mode

Message #2007, Air Vehicle Lights, Set Lights

Message #2008, Engine Command, Engine Command

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1307.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
1307.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1307.05	**2**	**Requested Message**	Unsigned 4	None	See Section 4.1.1
1307.06	**3**	**Requested Field**	Unsigned 1	None	$0 \leq x \leq 255$
1307.07	**4**	**Commanded Enumeration Index Value**	Integer 1	None	Index Into Enumerated States Where 0 = First, 1 = Second, etc.

Table B1 - 161: Message #44002: Field Change Enumerated Command

4.26.4 Message #44003: Message Parameter Availability.

This message shall be used by the CUCS to make available (default) or unavailable any components on the CUCS interface associated with the control of supported DLI message parameters, as referenced in the list below.

This message shall be sent from the AV/ VSM/ Data Link to the CUCS for a listed DLI parameter anytime the controllable state of that parameter, or an enumeration/ bit mapped value within an enumerated/ bit mapped parameter, changes thus altering the allowable state of control over the specified parameter at the AV/ VSM/ Data Link, i.e., the VSM reports if a DLI message field is currently available to control or if it is unavailable (Field Available), or if specific enumerations within an enumerated data element field are available or unavailable for control.

If no configuration message is received by the CUCS during the VSM response(s) to Message #40000, the CUCS will display the field with its full range enabled.

For parameters in the list below, the availability of some DLI message fields may depend on the availability of other message fields/ enumerations, and are therefore noted as such. This is to ensure consistency between fields of the exact same type. The AV/ VSM/ Data Link and CUCS shall use the primary parameter, the parameter that the other's parameters availability follows, to report the availability of that parameter. E.g.: The Message #2002, Heading Command Type, is used to report the availability to control the heading (Message #2002, Commanded Heading) by stating the availability of the Heading enumeration in the Heading Command Type field.

The CUCS, as a minimum, shall support the reception of the following mandatory DLI message parameters from the VSM/vehicle/data link:

- Message #2001, Select Flight Path Control Mode
- Message #2002, Altitude Command Type
- Message #2002, Heading Reference
- Message #2002, Heading Command Type
- Message #2002, Speed Type
- Message #2002, Altitude Type
- Message #2002, Commanded Altitude (Use Message #2002, Altitude Command Type)
- Message #2002, Commanded Vertical Speed (Use Message #2002, Altitude Command Type)
- Message #2002, Commanded Heading (Use Message #2002, Heading Command Type)
- Message #2002, Commanded Course (Use Message #2002, Heading Command Type)
- Message #2002, Commanded Turn Rate (Use Message #2002, Heading Command Type)
- Message #2002, Commanded Roll Rate (Use Message #2002, Heading Command Type)
- Message #2002, Commanded Roll (Use Message #2002, Heading Command Type)
- Message #2002, Commanded Airspeed
- Message #2003, Altitude Mode

- Message #2003, Speed Mode
- Message #2003, Course/Heading Mode
- Message #2004, Speed Type
- Message #2004, Loiter Type
- Message #2004, Loiter Direction
- Message #2004, Altitude Type
- Message #2006, Altitude Type
- Message #2007, Set Lights
- Message #2008, Engine Command
- Message #13000, Mission Plan Mode
- Message #13002, Waypoint Altitude Type
- Message #13002, Waypoint Speed Type
- Message #13002, Arrival time – This parameter is not configured from this message, this message is only to identify if this parameter is supported by the VSM / AV.
- Message #13002, Turn Type
- Message #13003, Waypoint Loiter Type
- Message #13003, Loiter Direction
- Message #13004, Set Sensor Pointing Mode
- Message #13004, Set Sensor 1 Mode
- Message #13004, Set Sensor 2 Mode
- Message #13004, Starepoint Altitude Type
- Message #13005, Function
- Message #13005, Enumerated State
- Message #15000, Subsystem ID
- Message #18000, PTT
- Message #19001, Set Zoom
- Message #19001, Altitude Type
- Message #19100, Set EO Sensor Mode
- Message #19100, Focus Type
- Message #19100, Set IR Polarity
- Message #19100, Set EO/IR Pointing Mode
- Message #19200, Set MTI Radar Mode
- Message #19300, Active Weapon Mode Command
- Message #19300, Target Altitude Type
- Message #19700, System Operating Mode

- Message #28001, Data Link Type
- Message #28001, Antenna Type
- Message #30002, Set Data Link State
- Message #30002, Set Antenna Mode
- Message #30002, Communication Security Mode
- Message #30003, Set Pedestal Mode
- Message #43002, GUI Reference ID

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1303.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
1303.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
1303.05	**2**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = AV Platform 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1303.06	**3**	**Reported Message**	Unsigned 4	None	See Section 4.1.1
1303.07	**4**	**Reported Field**	Unsigned 1	None	$1 \leq x \leq 255$ = Field Identifier
1303.08	**5**	**Field Available**	Unsigned 1	Enumerated	0 = Complete Field Not Available For Selection 1 = Complete Field Available For Selection

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1303.09	**6**	**Reported Enumerated Index** Reported enumerated index for enumerated fields to disable/ enable a "single" enumeration in an enumerated/ bit mapped field. Overrides 1303.08 enumeration "1" for the specified enumeration.	Unsigned 1	None	Controlled By "Field Available"
1303.10	**9**	**Enumerated Index Enable** State of the enumeration specified 1303.09.	Integer 1	None	-1 = State Unavailable For Selection 0 = State Available For Selection

Table B1 - 162: Message #44003: Message Parameter Availability

4.27 Draw Interface Messages.

4.27.1 Message #46000: Draw Layer Configuration.

This message shall be sent by the AV, VSM or Data Link to a CUCS to assign and name draw layers for a situation awareness display for operator reference. This provides a priority to the draw layers, and provides the capability to hide or erase an entire layer.

The Draw Layer specifies which draw list to use, 1- N, according to the order in which this layer is drawn (higher numbered layers are drawn later, and hence appear over top of lower numbered layers).

The Draw Layer (N) Name string is provided to allow the operator to turn off this layer (to de-clutter the situation display). It is recommended that this feature be used only for complex draw layers.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2000.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2000.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2000.05	**2**	**Draw Layer Number**	Unsigned 1	None	1 to 255
2000.06	**3**	**Draw Layer Name**	Character 16	None	Null = No Label

Table B1 - 163: Message #46000: Draw Layer Configuration

4.27.2 Message #46001: Draw Layer Update Request / Status.

This message shall be sent by the CUCS to the AV, VSM or Data Link to request an update to a Draw Layer or to return status of the draw request from the AV, VSM or Data Link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2001.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2001.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2001.05	**2**	**Draw Layer** Layer to update.	Unsigned 1	None	0 = All 1 to 255
2001.06	**3**	**Object ID**	Integer 2	None	0 = N/A 1 to 65535
2001.07	**4**	**Layer / Object Status**	Unsigned 1	Enumerated	0 = Layer Cleared 1 = Layer Displayed 2 = Layer Hidden 4 = Layer Released 5 = Object Deleted 6 = Request Update

Table B1 - 164: Message #46001: Draw Layer Update Request / Status

4.27.3 Message #46002: Draw Layer Control.

This message shall be sent by the AV, VSM or Data Link to the CUCS to clear/ erase/ show/ release the contents of a Draw Layer or to delete an object within a Layer.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2002.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2002.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2002.05	**2**	**Draw Layer**	Unsigned 1	None	0 = All 1 to 255
2002.06	**3**	**Object ID**	Integer 2	None	0 = N/A 1 to 65535
2002.07	**4**	**Layer / Object Control**	Unsigned 1	Enumerated	0 = Clear Layer 1 = Show Layer 2 = Hide Layer 4 = Release Layer 5 = Delete Object

Table B1 - 165: Message #46002: Draw Layer Control

4.27.4 Message #46003: Draw Line.

This message shall be sent by the AV, VSM or Data Link to a CUCS to draw a geo-referenced 3-D line object on a situation awareness display for operator reference.

The line Colour property represents the colour of the line. It is a string representation for an RGB triple value as in: “#2a443c”. The ‘2a’ is the intensity of the red component represented as hexadecimal. Likewise, the ‘44’ is the green component, and the ‘3c’ is the blue component.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2003.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
2003.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2003.05	**3**	**Object ID**	Integer 2	None	1 to 65535
2003.06	**4**	**Draw Layer**	Unsigned 1	None	1 to 255
2003.07	**5**	**Draw Colour**	Unsigned 4	RGBA	0 to 255
2003.08	**6**	**Line Width**	Unsigned 1	pixels	1 to 255
2003.09	**7**	**Line Style**	Unsigned 1	Enumerated	0 = Solid 1 = Dashed 2 = Dotted 3 = Stipple1 4 = Stipple2 5 = Stipple3 6 = Stipple4
2003.10	**8**	**Start Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2003.11	**9**	**Start Longitude**	Integer 4	BAM	$-\pi \le x \le \pi$
2003.12	**10**	**End Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2003.13	**11**	**End Longitude**	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 166: Message #46003: Draw Line

4.27.5 Message #46004: Draw Simple Polygon.

This message shall be sent by the AV, VSM or Data Link to a CUCS to draw a simple geo-referenced polygon object on a situation awareness display for operator reference.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2004.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
2004.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2004.05	**2**	**Object ID**	Integer 2	None	1 to 65535
2004.06	**3**	**Draw Layer**	Unsigned 1	None	1 to 255
2004.07	**4**	**Draw Colour**	Unsigned 4	RGBA	0 to 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2004.08	**5**	**Fill Style**	Unsigned 1	Enumerated	0 = Outline 1 = FillSolid 2 = FillStipple1 3 = FillStipple2 4 = FillStipple3 5 = FillStipple4
2004.09	**6**	**Line Width**	Unsigned 1	Pixels	1 to 255
2004.10	**7**	**Line Style**	Unsigned 1	Enumerated	0 = Solid 1 = Dashed 2 = Dotted 3 = Stipple1 4 = Stipple2 5 = Stipple3 6 = Stipple4
2004.11	**8**	**Latitude Top** Top left corner.	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
2004.12	**9**	**Longitude Top** Top left corner.	Integer 4	BAM	$-\pi \leq x \leq \pi$
2004.13	**10**	**Latitude Bottom** Bottom right corner.	Integer 4	BAM	$-\pi/2 \leq x \leq \pi/2$
2004.14	**11**	**Longitude Bottom** Bottom right corner.	Integer 4	BAM	$-\pi \leq x \leq \pi$

Table B1 - 167: Message #46004: Draw Simple Polygon

4.27.6 Message #46005: Draw Complex Polygon.

This message shall be sent by the AV, VSM or Data Link to a CUCS to draw a complex geo-referenced polygon object on a situation awareness display for operator reference. The last vertex shall be automatically connected to the first and at least 3 vertices shall be specified for this polygon to be drawn.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2005.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
2005.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2005.05	**2**	**Object ID**	Integer 2	None	1 to 65535
2005.06	**3**	**Draw Layer**	Unsigned 1	None	1 to 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2005.07	**4**	**Draw Colour**	Unsigned 4	RGBA	0 to 255
2005.08	**5**	**Fill Style**	Unsigned 1	Enumerated	0 = Outline 1 = FillSolid 2 = FillStipple1 3 = FillStipple2 4 = FillStipple3 5 = FillStipple4
2005.09	**6**	**Line Width**	Unsigned 1	Pixels	1 to 255
2005.10	**7**	**Line Style**	Unsigned 1	Enumerated	0 = Solid 1 = Dashed 2 = Dotted 3 = Stipple1 4 = Stipple2 5 = Stipple3 6 = Stipple4
2005.11	**8**	**Total Polygon Indices.**	Integer 2	None	1 to 65535
2005.12	**9**	**Latitude – Point 1**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2005.13	**10**	**Longitude – Point 1**	Integer 4	BAM	$-\pi \le x \le \pi$
2005.14	**11 + 2N-1**	**Latitude – Point N** **N = Total Polygon Indices from Total Polygon Indices field.**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2005.15	**12+ 2N**	**Longitude – Point N** **N = Total Polygon Indices from Total Polygon Indices field**	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 168: Message #46005: Draw Complex Polygon

4.27.7 <u>Message #46006: Draw Arc/Circle.</u>

This message shall be sent by the AV, VSM or Data Link to a CUCS to draw a geo-referenced 3-D Arc/Circle object on a situation awareness display for operator reference.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2006.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
2006.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2006.05	**2**	**Object ID**	Integer 2	None	1 to 65535
2006.06	**3**	**Draw Layer**	Integer 1	None	1 to 255
2006.07	**4**	**Draw Colour**	Unsigned 4	RGBA	0 to 255

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2006.08	**5**	**Fill Style**	Unsigned 1	Enumerated	0 = Outline 1 = FillSolid 2 = FillStipple1 3 = FillStipple2 4 = FillStipple3 5 = FillStipple4
2006.09	**6**	**Line Width**	Unsigned 1	Pixels	1 to 255
2006.10	**7**	**Line Style**	Unsigned 1	Enumerated	0 = Solid 1 = Dashed 2 = Dotted 3 = Stipple1 4 = Stipple2 5 = Stipple3 6 = Stipple4
2006.11	**8**	**Radius**	Integer 2	Metres	0 to 65535
2006.12	**9**	**Start Angle**	Integer 2	BAM	$-\pi \le x \le \pi$
2006.13	**10**	**End Angle**	Integer 2	BAM	$-\pi \le x \le \pi$
2006.14	**11**	**Latitude Centre**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2006.15	**12**	**Longitude Centre**	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 169: Message #46006: Draw Arc/Circle

4.27.8 Message #46007: Draw Text.

This message shall be sent by the AV, VSM or Data Link to a CUCS to draw a geo-referenced Text object on a situation awareness display for operator reference.

Offset Right, Offset Down – centre the text this many pixels right (if positive) and down (if positive) from the specified coordinates. The Pixel-reference allows for the Text object to be displaced by a fixed amount from a coordinate that is independent of scaling.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2007.00	**0**	**Presence Vector**	Unsigned 2	None	Bitmapped
2007.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2007.05	**2**	**Object ID**	Integer 2	None	1 to 65535
2007.06	**3**	**Draw Layer**	Unsigned 1	None	1 to 255
2007.07	**4**	**Draw Colour**	Unsigned 4	RGBA	0 to 255
2007.08	**5**	**Draw Font**	Unsigned 1	Enumerated	0 = Small, 1 = Medium 2 = Large

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2007.09	6	**Text String**	Character 20		
2007.10	7	**Latitude** Top Left corner.	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2007.11	8	**Longitude** Top Left corner.	Integer 4	BAM	$-\pi \le x \le \pi$
2007.12	9	**Offset Right**	Integer 2	Pixels	0 to 65535
2007.13	10	**Offset Down**	Integer 2	Pixels	0 to 65535

Table B1 - 170: Message #46007: Draw Text

4.27.9 Message #46008: Draw Arrow.

This message shall be sent by the AV, VSM or data link to a CUCS to draw a geo-referenced 3-D Arrow object on a situation awareness display for operator reference.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2008.00	0	**Presence Vector**	Unsigned 3	None	Bitmapped
2008.01	1	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2008.05	2	**Object ID**	Integer 2	None	1 to 65535
2008.06	3	**Draw Layer**	Unsigned 1	None	1 to 255
2008.07	4	**Draw Colour**	Unsigned 4	RGBA	0 to 255
2008.08	5	**Line Width**	Unsigned 1	Pixels	1 to 255
2008.09	6	**Line Style**	Unsigned 1	Enumerated	0 = Solid 1 = Dashed 2 = Dotted 3 = Stipple1 4 = Stipple2 5 = Stipple3 6 = Stipple4
2008.10	7	**Arrowhead Style**	Unsigned 1	Enumerated	0 = SolidArrow 1 = OutlineArrow 2 = Arrow/Stem
2008.11	8	**Arrowhead Length**	Integer 2	Pixels	0 to 65535
2008.12	9	**Arrow Stem Length**	Integer 2	Pixels	0 = Use Stem Location 1 to 65535
2008.13	10	**Orientation** Angle from north in CW direction from tip to stem.	Integer 2	BAM	$0 \le x \le 2\pi$ N/A if Arrow Stem Length = 0

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2008.14	**11**	**Latitude** Tip location.	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2008.15	**12**	**Longitude** Tip location.	Integer 4	BAM	$-\pi \le x \le \pi$
2008.16	**13**	**Latitude** Stem location.	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2008.17	**14**	**Longitude** Stem location.	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 171: Message #46008: Draw Arrow

4.27.10 Message #46009: Set Cursor Interest.

This message shall be sent by the AV, VSM or data link to a CUCS to register for a basic mouse click event notification where the AV, VSM or data link desires that a coordinate be sent as a result of a coordinate selection on the situational awareness display. Message #46011, Cursor Interest Return, shall be transmitted when a Cursor Interest is set and the event occurs.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2009.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2009.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2009.05	**2**	**Interest ID**	Unsigned 1	None	1 to 255
2009.06	**3**	**Cursor interest name** For display purposes.	Character 20		

Table B1 - 172: Message #46009: Set Cursor Interest

4.27.11 Message #46010: Remove Cursor Interest.

This message shall be sent by the AV, VSM or data link to a CUCS to release mouse cursor interest, and shall stop the transmission of Message #46011, Cursor Interest Return, from the CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2010.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2010.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2010.05	**2**	**Interest ID**	Unsigned 1	None	1 to 255

Table B1 - 173: Message #46010: Remove Cursor Interest

4.27.12 Message #46011: Cursor Interest Return.

This message shall be sent by the CUCS to a AV, VSM or data link in response to a Message #46009, Set Cursor Interest Message as a result of a coordinate selection on the situational awareness display.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
2011.00	**0**	**Presence Vector**	Unsigned 1	None	Bitmapped
2011.01	**1**	**Time Stamp**	Unsigned 5	0.001 Seconds	See Section 1.7.2
2011.05	**2**	**Interest ID**	Unsigned 1	None	1 to 255
2011.06	**3**	**Geo-referenced Pointer Latitude**	Integer 4	BAM	$-\pi/2 \le x \le \pi/2$
2011.07	**4**	**Geo-referenced Pointer Longitude**	Integer 4	BAM	$-\pi \le x \le \pi$

Table B1 - 174: Message #46011: Cursor Interest Return

4.28 Vehicle and Payload Specific Message Formats.

Section 4.1 defines the generic message types common to all compliant systems. Vehicle and payload specific messages may be formatted in a manner determined by the designers of the VSM using any of the vehicle specific services defined in Section 1.7.5.1, Vehicle Specific Display Services. The VSM shall support the formatted DLI messages where they are applicable to the air vehicle, which it supports.

The CUCS shall provide the services for displaying vehicle or payload specific data, and for interpreting and displaying the information appropriately (such as in a browser window). In all cases, vehicle or payload specific displays created at the CUCS using such messaging shall be compliant with Appendix 3 (HCI).

Vehicle and payload specific messaging shall use ports configured for either TCP/IP or UDP/IP communications. In general, it is anticipated that TCP communications will be commonly used for generating display information using commonly employed GUI support tools that require TCP support. However, some vehicle or payload-specific applications may require the support for streaming ephemeral data for which UDP is preferable.

General Configuration Messages may be used to configure private messages as well as the DLI defined messages.

5 Miscellaneous Interfaces.

5.1 Analogue Video Interface.

Interfaces for analogue video lie outside the scope of the DLI. In cases where video data is transmitted to the ground in analogue format, the VSM shall provide services to translate video into digital form consistent with STANAG 4609, 4545, or 7023 for transport across the DLI. Where desired, the VSM may provide an analogue output port for exporting analogue video (e.g., RS-170 format) to displays or other nodes. If displays at the operator station require analogue input, a separate channel may be established between the CUCS and VSM to transmit the data directly.

5.2 Digital Image Data Interface.

Digital payload data (still digital imagery, full motion digital imagery, SAR imagery, etc.) shall enter the CUCS via the DLI interface. Digital payload data shall be transferred to the CUCS using established NATO standards (STANAGs 7023, 4609, 4545, 4607, as specified in Annex B) for both communication protocol and physical medium.

If bandwidth constraints permit, a physical interface between the CUCS and the VSM can be shared for digital payload data and command and status data. Where bandwidth requirements exceed capabilities of the Core-to-VSM physical interface, a separate physical interface (e.g., a second Ethernet port) shall be established for transfer of digital payload data.

Where necessary to satisfy system requirements, the CUCS shall provide the functionality to annotate, display, and distribute digital payload data. The CUCS shall also provide any necessary functionality to store, retrieve, and display digital payload data.

Any payload-specific metadata that is associated with the digital payload data shall be published on the same interface as the payload data in accordance with applicable NATO standards. The metadata and payload data should be time tagged, and share a common time reference. The resolution of the time tag shall be sufficient to fully exploit the payload data. The contents of the metadata shall be sufficient to process the payload data in downstream processes.

Digital motion imagery in MPEG-2 format shall be in accordance with STANAG 4609.

APPENDIX 2 - COMMAND AND CONTROL INTERFACE

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1 Introduction.

1.1 Scope.

STANAG 4586, Annex B Appendix 2 specifies the Command and Control Interface (CCI) between the Core Unmanned Aerial Vehicle (UAV) Control System (CUCS) and Command, Control, Communication, Computer, & Intelligence (C4I) systems.

Standardization of the CCI is intended to enable NATO nations to achieve interoperability between UAV Systems and C4I users by the implementation of a common set of generic interface standards. A standard CCI should facilitate seamless integration of NATO UAV systems into joint combined C4I infrastructures across all levels of interaction.

The purpose of Appendix 2 is to specify standards covering command, control, and data transmission and receipt from all external systems that need to communicate with the CUCS. These standards will lead to the enablement of interoperability between all present (legacy systems) and future UAV systems and designated C4I systems. This appendix specifies standards to be implemented in the CUCS, and does not impose any requirements on C4I systems.

1.2 CCI General Overview.

The CCI is an interface between the CUCS and the external C4I systems. It specifies the data requirements that should be adopted for communication between the CUCS and all C4I end users through a common, standard interface. Figure B2 -1 illustrates the CCI within the UCS functional architecture.

All types of data or information that need to be formally exchanged between the CUCS and the external C4I systems shall be defined in accordance with the standards specified in this Appendix.

The CCI is intended to cover all types of messages and data that need to be exchanged in both directions between the CUCS and the C4I systems during all the phases of a UAV mission, including:

- Before the flight: tasking messages, tactical situation, environmental data, general mission constraints and mission plans.
- During the flight: status and service messages, payload data, progress reports
- After the flight: status and service messages, payload data, post-flight exploitation reports, mission reports

The format of all data passing across the CCI is defined in this appendix but a UCS implementation or connected C4I system may use other formats provided format translations take place in accordance with the CCI definitions:

- A UCS implementation may be CCI compliant with the CUCS retaining its own, possibly non-standard internal data representation, for example for processing efficiency. Appendix 2 allows CUCS developers to identify data that has to be generated or accepted by the CUCS software in order to be CCI compliant.

- Many C4I systems, particularly legacy systems, may not directly comply with the CCI standards specified in this appendix. To avoid both proliferation of the number of standards specified in the CCI and modifications to the large number of national or joint C4I systems to be connected to CUCS, conversion software and/or hardware will be necessary between the CCI and incompatible C4I systems. This conversion software/hardware is depicted in Figure B2 -1 and is called the Command and Control Interface Specific Module (CCISM). The CCISM may form part of a particular UCS implementation to establish a connection between the CUCS and specific "customers" of the UAV system (e.g., one or more C4I systems). The CCISM, when needed, can range in complexity from a simple format or protocol translator to a user-specific application to adapt the type of information to particular C4I requirements.

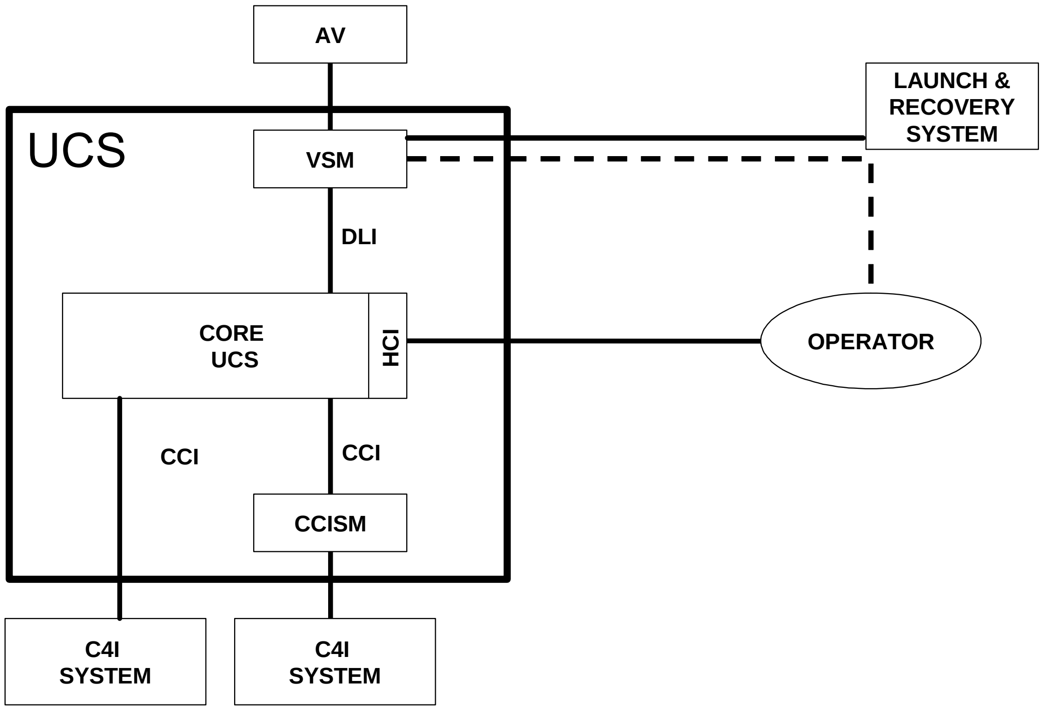

Figure B2 - 1: UCS Interface Functional Architecture

The CCISM is mainly intended for communication with legacy C4I systems that are not directly compatible with STANAG 4586 specified standards, protocols or physical layer.

When future C4I systems are developed it is expected that they will be STANAG 4586 compliant in which case there will be a direct link without the need for an intermediate CCISM.

This appendix does not address either the hardware needed for information exchange between the CUCS and the CCISM or the architecture and design of the CCISM itself. Design, development and fielding of specific CCISM functionality, when needed, will be the responsibility of either the UAV system or the applicable C4I program office.

Also, it is recognised that some communication will take place between the UCS and C4I systems via voice or email. As these methods are inherently unstructured, they fall outside the scope of this STANAG, apart from the need to conform to the requirements of the NC3TA, cited in Annex B, to ensure that such communications can take place.

1.3 Appendix 2 Overview.

Appendix 2 is divided into the following sections:

- Section 1: Introduction: Provides a general introduction of the CCI architecture and gives a brief system overview.
- Section 2: CCI Data Description: Identifies and describes the data exchanged between the CUCS and the C4I systems. This section concentrates on the description of the information to be transferred across the CCI without specification of data formats.
- Section 3: CCI Data Representation: Defines the data formats that should be implemented in an implementation of the CCI. This chapter covers message formats, file formats, data exchange standards, applicable transfer media and protocols.
- Attachment B2-1: Information Exchange Requirements: Lists the information exchange requirements for communications between the CCI and external systems.
- Attachment B2-2: Allied Data Publication-3 (ADatP-3) Message Implementation Requirements: Lists the set of ADatP-3 messages that are to be transferred across the CCI. These messages are a sub set of STANAG 7149, NATO Message Catalogue.
- Attachment B2-3: UAV Level of Interoperability (LOI) ADatP-3 Requirements: Allocates the ADatP-3 messages to achieve each LOI, where suitable at the lowest level.
- Attachment B2-4: UAS Custom Tags. Provides the background, definition, and structure of a standard set of identifies for extending the Common Route Definition (CRD) to enable full UAS mission planning.
- Attachment B2-5: KLV Metadata Elements. Common metadata parameters which should be used within an imagery data stream.

1.4 Information Exchange Requirements.

The Information Exchange Requirements (IERs) define the generic data types, criticality of the data, receiving and transmitting nodes, and format of the data that need to be exchanged between the CUCS and the various types of C4I systems, as well as other CUCSs, to support the operational user mission needs. These IERs, provided in Attachment B2-1 of this appendix, identify the information exchange that needs to take place between the CUCS and the external C4I systems to achieve the operationally required feasible LOI according to the UAV system's Concept of Operations (CONOPS). The identification and definition of messages to satisfy these requirements is provided in Sections 2 and 3 of this appendix.

1.5 Types of CCI Data.

Figure B2 - 2 depicts the top level of the IERs exchanged between the CUCS and the external C4I systems. Further breakdown of these top level IERs is presented in Attachment B2 -1.

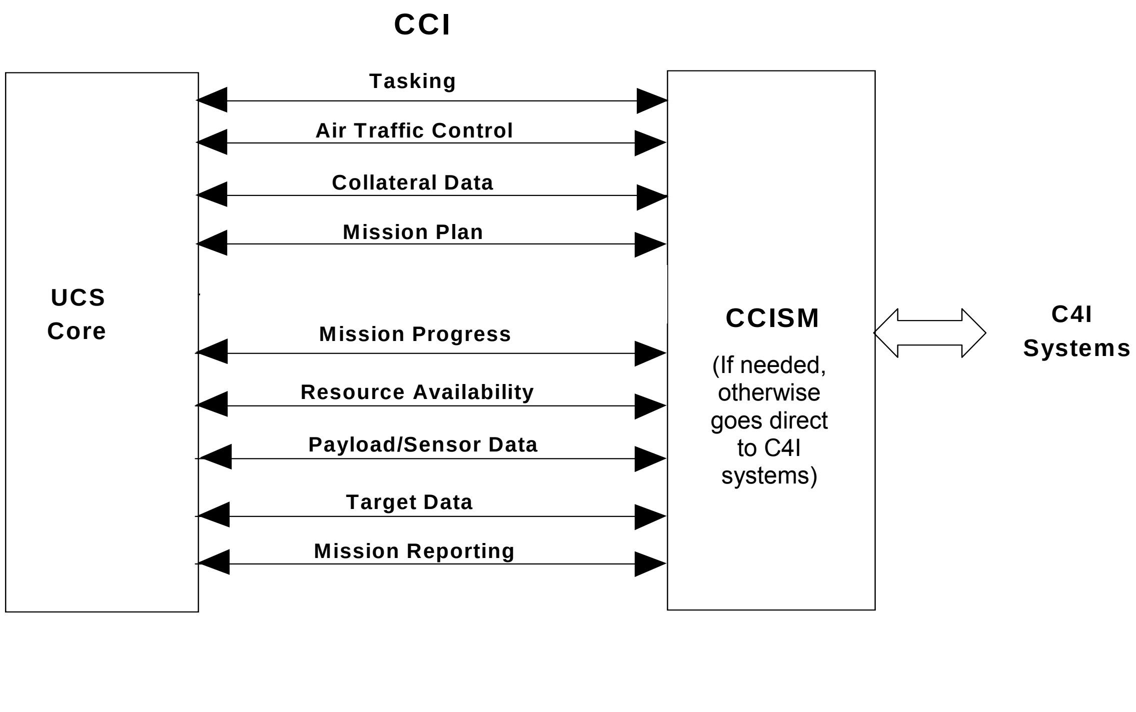

Figure B2 - 2: Types of CCI Data

These data types are described in Section 2 of this appendix, and are summarised below:

- Tasking - UAV tasking messages as received from the appropriate tasking authority.
- Air Traffic Control (ATC) - Data that should be sent or received from civil or military aviation authorities if the UAV has to pass through civil airspace.
- Collateral Data - Supporting information that is required for the planning and execution of UAV missions, and which is not defined in the other data areas. This includes the tactical situation, target database, previously exploited imagery and environmental data.
- Mission Plan - As generated for a tasked mission. Mission Plans are imported and exported from the CUCS using CRD file formats.
- Mission Progress - Status as the UAV mission is in progress.
- Resource Availability - Status of the sub components of the UAV system.
- Payload/Sensor Data - Data received from the UAV payload(s), may be raw, processed or exploited.
- Target Data - Near real time target location data for targeting purposes.
- Mission Reporting – Information on the outcome of a mission.

1.6 Implementation of UAV LOI in the CCI.

For an implementation of the UCS to achieve a required LOI, Levels 1 through 5, it is necessary for the CCI to specify which different data types are mandatory to achieve a given LOI and above. This is specified in Section 3 and Attachments B2 - 1 and B2 - 2 of this appendix.

However, this does not cover the requirements of particular national and/or NATO concepts of operation for different types of UAV systems that may override the necessity to include particular types of data. For example, Section 3.3 states that ATC messages are mandatory to achieve LOI 4 and 5. This may not be appropriate for a UAV that will never use civil airspace, such as a short range tactical UAV, but which is nevertheless required to achieve LOI 4. Operating procedures will vary according to individual national and NATO requirements and are therefore outside the scope of this STANAG. Therefore, use of the term mandatory in connection with LOI in this appendix shall be interpreted to include the phrase “provided that operating procedures require the exchange of this type of data”.

1.7 Strategy for Selection of CCI Standards.

The approach taken in the selection of standards for each type of data given in Section 1.5 has been:

- To identify existing NATO standards as specified in various STANAGs and other NATO publications.
- Where such NATO standards do not exist, identify other military or commercial standards that are applicable to that data type.

- Analyse the candidate standards to ensure they meet the requirements of all types of UAV systems.
- Where choices may be made, for example in the selection of ADatP-3 messages, the selected items are given (e.g., the standard is profiled).

Priority has been given to existing NATO standards wherever possible. In some cases, there is a likely future standard that is applicable to some of the data types. Such future standards cannot be specified at this stage as they may change or never be adopted. In these cases, an existing standard has been used, (e.g. ADatP-3), with a switch to the future standard intended for the future.

2 CCI Data Description.

2.1 Introduction.

This section provides a description of each of the data types exchanged between the CUCS and the C4I system, potentially via a CCISM if the C4I system is not compatible with specified CUCS formats and standards.

2.2 Tasking of the UCS.

The CUCS is expected to receive and respond to tasking orders, pre-planned mission plans and mission plan changes requiring dynamic retasking (change of a pre-planned mission after it has been uploaded to the UAV). The response to the tasking order will be a mission plan which may be passed across the CCI interface to higher levels of the command and control structure for deconfliction and approval. (See Section 2.5 for a description of the mission plan.)

ADatP-3 tasking messages defined in STANAG 5500 Edition 4 and STANAG 7149 are appropriate for tasking UAV missions within the UCS. It is assumed that the UCS mission planner will be designed to support multi-UAV operations (two or more UAVs flying simultaneously), therefore the CUCS should be able to receive multi-mission tasking.

In a given UCS, particularly smaller systems, tasking may be received by voice or e-mail messages. These are outside the scope of this STANAG with the exception that e-mail message applications shall be in compliance with NC3TA's Common Standards Profile (NCSP) as specified in Annex B.

The CCI shall also support the capability for dynamic re-tasking of the UAV (e.g., changes to either the route or the payload plan). These changes may be required during all phases of an operation.

2.2.1 Tasking.

The most prevalent method of tasking a UAV system is by the use of an Air Tasking Order (ATO) which is common to all air missions, manned and unmanned, across multi-national forces and multi-service operations.

The ATO is an ADatP-3 message that may be very large and complex, possibly several hundred pages in size, not all of which will be applicable to UAV systems. There are other ADatP-3 messages that do not form part of an ATO and that may be used to task individual UAV systems or payloads. An example is the Electronic Warfare Requesting/Tasking Message (EWRTM). The complete list of these tasking messages is given in Section 3.2.1.

2.2.2 Airspace Control.

Airspace Management (ASM) is the activity of structuring the airspace and scheduling its use. In the military airspace management system the airspace is structured through the specification of Airspace Control Means (ACM) which defines airspace volumes, surfaces and lines, and specific rules for the use of the resulting airspace partitions. The ACMs approved for a given period of time are promulgated in the ADatP-3 Airspace Control Order (ACO). The ACO is based upon the air operations and airspace usage requirements of other Air Command and Control Systems (ACCS), non-ACCS tri-service entities, civil requirements and airspace requests, together with constraints imposed on the use of that airspace.

The ACO allows the separation of all types of aircraft, manned and unmanned, fixed and rotary wing, by the definition of altitude layers, geographic zones and surveillance systems. The ACO defines how a volume of airspace is to be structured for air missions over a given period. The ACO defines how this division of airspace will be used by different air operations throughout the 24-hour ACO cycle.

Therefore, for mission planning, a UCS requires the ACO to define the constraints on the route to be flown by the UAV.

2.3 Air Traffic Control (ATC).

When a UAV, particularly a long range strategic UAV, has to pass through controlled airspace, it is necessary to file a flight plan with civil aviation authorities.

The International Civil Aviation Organisation (ICAO) publishes a document that specifies the content of all messages that have to be submitted to ATC authorities before, during and after flights. This document is the “Rules of the Air and Air Traffic Services”, DOC 4444-RAC/501, latest edition.

The messages may be sent as appropriate and desired over voice channels, by completed paper forms or electronically. Voice messages and paper forms are outside the scope of the CCI, hence only electronic messages are considered below. There are two types of electronic messages specified by the ICAO, Air Traffic Services (ATS) and Automatic Dependent Surveillance (ADS) messages. ADS messages are sent from the air platform via a data link to an ATS unit covering the airspace in which the platform is flying, hence these are not applicable to the UCS and not considered further. However, in order to be compliant with ICAO regulations, the Air Vehicle (AV) should carry a compatible Identification Friend or Foe (IFF) device (e.g., Mode S IFF).

The content and formats of ATS messages are given in Appendix 3 of the above ICAO document. This STANAG does not mandate the use of these messages because they will not be required for some UAV systems (e.g., small UAVs), but does require that, if generated in a particular system, the ICAO format should be used.

The ATS message types are listed in Table B2 –1:

Category	Message Type	Description
Emergency	Alerting	Contains a description of an emergency
	Radio communication failure	
Filed flight plan and associated update	Filed flight plan	
	Modification	Changes to a flight plan
	Cancellation	Cancellation of a flight plan
	Delay	If departure is delayed
	Departure	Actual departure time
	Arrival	Actual arrival time
Coordination (Note)	Current flight plan	Flight plan plus estimated time at a boundary point
	Estimate	Estimated time at a boundary point
	Coordination	Amendment to coordination data
	Acceptance	Acceptance of the current flight plan, estimate or coordination message
	Logical acknowledgment	Computer to computer acknowledgment
Supplementary	Request flight plan	
	Request supplementary flight plan	
	Supplementary flight plan	Fuel endurance, frequencies available, aircraft markings + others irrelevant to UAVs

Table B2 - 1: Air Traffic Control Messages

Note: Coordination messages are for handing over control from one ATC centre to the next during a flight.

2.4 Collateral Data.

2.4.1 General Battlefield Picture.

Both enemy and own tactical situation can be exchanged between C4I systems and the UCS. This information is carried by messages, which are both incoming and outgoing. Knowledge of the position of own and enemy forces is useful within the UCS to allow the operators to understand the context of the required mission and to optimise the flight plan. Reciprocally, the UCS may use the results of image exploitation to update the local tactical situation (by generating tactical symbols related to observed targets) and to export it through intelligence networks or to upper levels of command.

Information on the tactical situation shall be obtained and reported by use of relevant ADatP-3 messages, particularly the Enemy Situation Report (ENSITREP) and Own Situation Report (OWNSITREP).

2.4.2 Mission Dependent Data.

Some information on the tactical situation may be obtained via additional ADatP-3 messages that are specific to particular missions and/or payloads. An example of this is the Meaconing, Intrusion, Jamming, and Interference (MIJI) Warning Report which provides information on hazardous Electronic Warfare (EW) situations. A full list of this type of message is given in Section 3.4.2.

2.4.3 Nuclear, Radiological, Biological and Chemical (NRBC).

The NRBC situation is handled by a set of specific NBC reports that are received by all units on the battlefield (see Section 3.4.3). These are needed by a CUCS both as a hazard warning and to carry out mission planning for NRBC payloads.

2.4.4 Artillery Targeting.

A UCS can support artillery operations such as target acquisition and firing support. Information has to be exchanged between the UCS and the artillery networks. There are specific ADatP-3 messages to cover this requirement, for example the Artillery Target Intelligence-Target Information Request (ATI.TIR) that is used to request target information either as a one-time query or as a standing request for target information. Another example is the Artillery Target Intelligence-Artillery Target Report (ATI.ATR) message, which provides a report in response to the ATI.TIR.

2.4.5 Meteorological Data.

Meteorological data may be required for UAV mission planning. This includes information related to wind (direction and speed), visibility, significant current and forecasted weather, amount of turbulence, cloud cover, cloud base altitude, cloud top altitude, temperature, and barometric pressure. This is available via the ADatP-3 messages listed in Section 3.4.5 or via international meteorological data.

2.4.6 Image Products.

There will be a requirement for the operator to read imagery and image products, which are relevant to the area of operation, from external C4I systems. Such collateral material could be needed, for example, for detailed mission planning or image exploitation. It is expected that these image products will be accessed from one of a number of image libraries (IL) held by various NATO or coalition nations. STANAG 4559, the NATO Standard Image Library Interface (NSILI), exists to standardise access to such image libraries.

The CUCS may be connected to a network to allow file transfers from the external ILs to the CUCS using the software interface specified in STANAG 4559.

Once the operator is logged on to the external ILs (logging on is beyond the scope of STANAG 4559), NSILI specifies only query and read transactions with ILs. Defining mechanisms for writing image products into an IPL is the responsibility of the IPL owner and is outside the scope of both STANAG 4559 and STANAG 4586. Therefore, if it is desirable to deposit imagery data into the NATO releasable IL, the CUCS should follow the protocols established by the nation's IL and defined by the external C4I system that provides this capability. This protocol is typically provided as an FTP transfer of the imagery file data to a preconfigured directory accessible over the network.

NSILI specifies that image products will be delivered in STANAG 4545 format. Delivery of image products will be via the LAN in the majority of cases, but NSILI also permits delivery via other media. If products are delivered on magnetic tape the media will conform to STANAG 7024 with the data stored in STANAG 4545 format. This will require magnetic tape readers conforming to STANAG 7024 to be provided in an implementation of the UCS.

2.5 Mission Plan.

2.5.1 General Considerations.

Mission planning for UAV systems consists of route planning, payload collection and dissemination planning, communication planning (including frequency planning), and UAV contingency planning (rules of safety). The combined results of these five items comprise the mission plan.

It should be noted that the data required to be able to generate a mission plan is normally far more than contained in these items. A detailed knowledge of current Phase and Boundary lines, Engagement Areas, Hazards, Air Defence Units (ADU) and Control Measures is also required. This information is already covered in the collateral data section of this document.

Pre-planned missions may also be provided across the C4I interface in the form of a mission plan that has been developed by another UAV planning system. Mission Plans are imported into the UCS using the CRD file format.

The mission planner also requires vehicle performance models for UAVs controlled by the UCS to calculate fuel consumption, climb rates etc. These performance models will be included in the Vehicle Specific Module (VSM), described in Appendix 1, Data Link Interface.

Other functions that may be available in a mission planner are the ability to do radar shadowing and line of sight evaluations and to show confliction and inter visibility between points and routes. These calculations require knowledge of ADU/Radar characteristics and the plans of other users.

Planning for designator operations will also require a means of coordination/ implementing of Laser Codes and Keywords.

The capability should exist within the UCS (HCI) to provide the mission plan, or components of the mission plan, as hard or soft copy as required. The outputs from a mission planner may also include printouts of instructions for loading the UAV (e.g., fuel type and amount, sensor/designator settings, and communications frequencies).

2.5.2 Dissemination of the Mission Plan.

The mission plan needs to be sent to different recipients at various times, these include:

- The tasking authority, immediately after generation of the mission plan, for airspace deconfliction and approval
- The air vehicle via the Data Link Interface (DLI) for those UAVs that can autonomously execute a mission plan
- To another UCS for handover of UAV control via the DLI

The CRD data format will be used for each transfer of the mission plan data. It should be noted that there is a difference between mission plans and mission reporting: CRD is used for mission plans and ADatP-3 is used for mission reporting. However it is recognised that not all recipients will require the full mission plan. For those systems it will be possible to extract only the necessary parts. Note that UCS-to-UCS transfer requires the ability for a UCS to receive a mission plan.

ATC is excluded from the list of recipients as there are existing civil flight plan formats (see Section 2.3) that are adequate for UCS mission plan formats.

2.5.3 Route Planning.

Route planning may be done at the UCS or passed from an external agency. This agency may be Headquarters, another UCS, or come from an intermediate level. A route plan from Headquarters may require additional tactical information to be built into it at the squadron of the Forward Operations Base (FOB) to make it compatible with the current state of the battle space. The instructions might be very detailed, where information about a specific target is required or may be instructions for a Reconnaissance, Intelligence, Surveillance and Target Acquisition (RISTA) type operation and specify only an area of operations. When a route plan comes from another UCS this may be a UAV handover operation with detailed route and instructions or may be a plan generated at another UCS for use by other operators.

A route plan will comprise a set of waypoints. These waypoints may have different parameters, which drive the action to be taken when a waypoint is reached. Flight patterns may be incorporated into the route either as a series of sequenced waypoints or as ‘seed’ waypoints with range and bearing information, which will depend on the sophistication of the UCS and UAV systems.

2.5.4 Payload Planning.

Payload planning includes details of how a specific payload is to be used. The details of planned payload operations will be incorporated into the payload collection plan and a payload dissemination plan, and will be associated with waypoints in the route.

2.5.5 Communication Planning.

Communication planning includes the details of the data links, bands, and frequencies to be used (e.g., see Section 3.2.1 Tasking, of this appendix). Data link planning needs initial assignment provided by C4I (e.g., through the OPTASK LINK message) and leads to a set of configuration data that is used by the mission planner. This is sent to the DLI for data link configuration (see Appendix 1, Data Link Control Command).

2.5.6 Contingency Planning.

In case of failures such as data link loss, UAVs need to automatically carry out recovery actions referred to as Rules of Safety (ROS). The ROS are selected at the mission planning stage. The ROS differ according to the priority given to emergency action relative to that given to mission execution. Using the mission planning application, the UCS operator selects the appropriate safety scenario (e.g., to define a pre-programmed recovery route).

2.6 Handover Control.

This section deleted.

2.7 Mission Progress.

This data is required primarily to inform higher levels of command about the progress of the mission. This includes information on the air vehicle position, status of on-board equipment, fuel levels and ongoing achievement of mission goals. The ADatP-3 message Mission Report (MISREP) amplified by accompanying text in an amplification (AMPN) set will be used to report this information.

2.8 Resource Availability.

The CCI will have the capability to provide, as well as receive, the status and operational capability of the sub-components of the UAV system. This will include both the Air Segment and the Ground Segment of the UAV system as specified in the following paragraphs.

2.8.1 Air Segment Status.

The status and operational capability of the air segment of the UAV system will consist of data relevant to the air vehicle(s), the payload(s), and the air data link(s). The following types of data will be incorporated into the resource availability reporting process:

2.8.1.1 Air Vehicles (AV)

<table>
<tr><td colspan="3">Total number of AVs assigned</td></tr>
<tr><td rowspan="4">UAV type
(Repeated for each UAV type)</td><td colspan="2">Number of UAVs of this type</td></tr>
<tr><td rowspan="3">Tail number
(repeated for each UAV of this type)</td><td>AV configuration</td></tr>
<tr><td>AV status (see 2.8.1.4)</td></tr>
<tr><td>AV operational state (see below)</td></tr>
</table>

Table B2 - 2: AV Availability

AV operational state is one of:

- Airborne - Executing a mission
- Ground alert - Ready to fly and execute a mission
- Airborne alert - In flight and awaiting a mission

2.8.1.2 Payloads.

Total number of payloads		
Payload type (Repeated for each payload type)	Number of payloads of this type	
	Payload ID(Repeated for each payload)	Payload Configuration
		Payload Status (see 2.8.1.4)
		UAV Tail number

Table B2 - 3: Payload Availability

2.8.1.3 Vehicle Data Terminals (VDT).

Total number of VDTs		
VDT Type (repeated for each VDT type)	Number of VDTs of this type	
	Status (repeated for each type)	Primary link status (see 2.8.1.4)
		Secondary link status (see 2.8.1.4)

Table B2 - 4: VDT Availability

2.8.1.4 Status Table.

This table shows the status data that will be used for status entries in the tables in Sections 2.8.1 and 2.8.2.

Fully Operational	
Limited Operational	Reasons/Limitations
	Estimated Time of Return to Full Ops
Number Non-Operational	Reasons
	Estimated Time of Return to Full Ops

Table B2 - 5: Operational Status Data

2.8.2 Ground Segment Status.

The status and operational capability of the ground segment of the UAV system will consist of data relevant to the UCS(s), the launch system(s), the recovery system(s) the ground data link(s), and the maintenance and refurbishing system(s). The following types of data will be incorporated into the resource availability reporting process:

2.8.2.1 UCSs.

<table>
<tr><td colspan="3">Number of UCSs available to support UAV operations</td></tr>
<tr><td rowspan="4">UCS ID (Repeated for each UCS)</td><td colspan="2">UCS Configuration (including AV Types supported, and LOI)</td></tr>
<tr><td>UCS Status</td><td>(see 2.8.1.4)</td></tr>
<tr><td rowspan="2">CCI Dissemination Capability</td><td>C4I Products Supported</td></tr>
<tr><td>C4I Systems Supported</td></tr>
</table>

Table B2 - 6: UCS Availability Data

2.8.2.2 Launch Systems.

<table>
<tr><td colspan="3">Number of launch systems available to support UAV operations</td></tr>
<tr><td rowspan="3">Launch System ID (repeated for each launch system)</td><td colspan="2">Launch System Configuration (including AV Types supported)</td></tr>
<tr><td colspan="2">Launch System Configuration (including AV Types supported)</td></tr>
<tr><td>Status</td><td>(see 2.8.1.4)</td></tr>
</table>

Table B2 - 7: Launch System Availability

2.8.2.3 Recovery Systems.

<table>
<tr><td colspan="3">Number of recovery systems available to support UAV operations</td></tr>
<tr><td rowspan="2">Recovery system ID (repeated for each recovery system)</td><td colspan="2">Recovery System Configuration (including AV Types supported)</td></tr>
<tr><td>Status</td><td>(see 2.8.1.4)</td></tr>
</table>

Table B2 - 8: Recovery System Availability

2.8.2.4 Control Data Terminals (CDT).

<table>
<tr><td colspan="3">Number of CDTs available</td></tr>
<tr><td rowspan="3">CDT type (repeated for each CDT type)</td><td colspan="2">Number of CDT type available</td></tr>
<tr><td rowspan="2">Link status (repeated for each CDT type)</td><td>Primary (see 2.8.1.4)</td></tr>
<tr><td>Secondary (see 2.8.1.4)</td></tr>
</table>

Table B2 - 9: CDTs Availability

2.8.2.5 Maintenance and Refurbishing Systems.

Type of replaceable unit (repeated for each type)	Number of each type held
Fuel availability	
Personnel Availability to Perform Maintenance	

Table B2 - 10: Other Unit Resource Availability Data

2.9 Payload/Sensor Data.

2.9.1 Overview.

Sensor data may be received from the air platform in a variety of formats depending on the type of UAV and sensor. Where possible, the formats used to transmit data from the CUCS to the C4I systems across the CCI will use existing international standards (NATO or commercial) so as to minimise the number of formats used in the CCI and by the receiving C4I systems. It is impossible to cover all existing and future types of payloads because of the rate of change in sensor technology. Therefore, only the most common types of sensors have been considered to date; and specific UCS implementations may need to convert from a particular sensor data format to the CCI required data format if the two do not match.

The types of payloads, possible sensor outputs via the CCI, and maturity of current standards addressed in this version of the STANAG are summarised in Table B2 –11 below.

Note: If a specific UAV system does not support a particular payload type (e.g., GMTI, ELINT, etc.), the supporting UCS can still be STANAG 4586 compliant without having to implement those requirements associated with that particular payload.

Payload Type	Sensor Type	CCI Output	Applicable Standards
Imagery	EO/IR/MSI/HSI TV camera	Motion/Still image	STANAG 4545, 7023, 4609
	EO/IR/MSI/HSI Line scanner	Continuous image/Still image	STANAG 4545, 7023
	EO/IR/MS/HS Photo (framing) sensor	Still image	STANAG 4545, 7023
	Synthetic Aperture Radar (SAR)	Spot	STANAG 4545, 7023
		Swath (Area Search)	STANAG 4545, 7023
	Radar Moving Target Indicator (MTI)	Vector data	STANAG 4607

Payload Type	Sensor Type	CCI Output	Applicable Standards
Signals Intelligence (SIGINT)	Electronics Intelligence (ELINT/ESM)	Signal data	STANAG 4633
		Dissemination reports	STANAG 4633
	Communications Intelligence (COMINT)	Signal data	TBD
		Dissemination reports	TBD
Electronic Warfare (EW)	Jammer	None	N/A
Nuclear, Radiological, Biological, and Chemical (NRBC)	Detectors	Dissemination reports	STANAG 4719 (NBC 1)
Laser designator/ range finder	N/A	None	N/A
Communication relay	N/A	None	N/A
Stores/Weapon	N/A	None	N/A

Table B2 - 11: Payload and Sensor Type with CCI Output

It is recognised that there will be requirements to receive unprocessed (raw) sensor data from particular UAV payloads (for example unprocessed SAR) that may need to be transferred to an external system (for example for exploitation). Such data is likely to be in a proprietary non-standard format, therefore it is outside the scope of the CCI standard and not considered further in this appendix.

Those payloads that provide data to be disseminated via the CCI are described below.

2.9.2 Imagery.

2.9.2.1 Electro/Optical Imagery.

Electro/optical imagery consists of visible, infrared as well as multispectral/ hyperspectral imagery. Multispectral and hyperspectral images consist of multiple images from different parts of the electromagnetic spectrum.

2.9.2.1.1 Digital Still Imagery.

2.9.2.1.1.1 Framed.

A framed image is a single rectangular image of a predefined size. The still image can be a standalone image or combined with annotations, symbology and descriptive text. The dimensions of the image are only limited by sensor characteristics. STANAG 7023 and 4545, respectively, are the controlling standards for these types of payloads.

2.9.2.1.1.2 Scanned.

Scanned images are typically produced by line scan sensors and the image forms a continuous strip. In this case, the complete image is of indefinite length and the image may cover an irregular path according to platform route, sensor viewing angle etc. STANAG 7023 and 4545, respectively, are the controlling standards for these types of payloads.

2.9.2.1.2 Motion Imagery.

2.9.2.1.2.1 Analogue Video.

Analogue video is a product that is provided by many legacy UAV systems, and also required as an input by some legacy C4I systems. If analogue video is required by a C4I system, it shall be obtained either directly from the VSM (if analogue video is a direct output from the air vehicle to the VSM), or via the CCISM, if format and/or protocol conversion is required. Note that as a function of CCISM design, analogue video can be output from the CCISM in any of the international standard formats desired, and can also include encoding of telemetry metadata within the analogue video stream in a closed caption format in accordance with Video Imagery Standard Profile (VISP) Standard 9709 and VISP recommended practice 971.

(Note: The CUCS has a requirement to process digital video, but not a requirement to process analogue video. If analogue video is received from the air vehicle, it can be distributed directly to the C4I system from the VSM, and will also be transformed by the VSM into digital video in accordance with STANAG 4609 for processing within the CUCS. If digital video is received from the air vehicle, it can be processed within the CUCS; and if a C4I system requires analogue video, a CCISM will be necessary in order to take the digital video as processed inside the CUCS, and convert it into the analogue video product required).

2.9.2.1.2.2 Digital Motion Imagery.

Digital motion imagery will be output from the CCI as specified in STANAG 4609, with applicable KLV metadata as specified in EG0601.1.

2.9.2.2 Radar.

2.9.2.2.1 Synthetic Aperture Radar (SAR).

SAR data that has been processed on the platform or in the CUCS will be transmitted across the CCI using the same standards as for EO/IR images.

There may be systems (possibly legacy systems) that require SAR processing to be carried out in an external ground station and therefore require the unprocessed data to be transmitted from the CUCS. As stated above, this is considered to be non-standard data and is outside the scope of the CCI standard until such time as a standard for this data has been defined.

2.9.2.2.2 Ground Moving Target Indicator (GMTI).

Processed GMTI data gives the position and velocity of moving targets and hence consists of a set of target vectors.

GMTI data will be transmitted in accordance with STANAG 4607.

2.9.3 Signals Intelligence (SIGINT).

2.9.3.1 ELINT.

The CUCS will handle SIGINT data and reports generated from processed SIGINT data. Cooperating airborne platforms require that data be fused to generate SIGINT information. This fusion may take place inside a CUCS. Therefore, this data should be transmitted to and from the CUCS. SIGINT reports may be generated in the CUCS for transmission to a user via the CCI.

2.9.3.1.1 ESM.

ESM data is derived from analysis of enemy electronic signals and is not included in this issue of the CCI standard as there are no agreed standards to transmit the information. If suitable standards are defined in the future they will be included within the CCI.

2.9.3.2 Communications Intelligence.

Future Capability.

2.9.4 Electronic Warfare.

Future capability

2.9.5 Nuclear, Radiological, Biological, and Chemical (NRBC).

UAVs can carry a large set of NRBC detectors. Results of NRBC detection will be transmitted across the CCI through standard NBC reports (see Section 3.9.5). This assumes that information required within these reports is generated on board the platform or within the CUCS. The CCI will not include unprocessed NRBC measurements as there is no known standard format for this data.

2.9.6 Other Payload Types.

2.9.6.1 Laser Designator/Range Finder.

Future capability

2.9.6.2 Communication Relay.

Future capability

2.9.6.3 Stores/Weapons.

Future capability

2.10 Target Data.

Near real time target data transmission across the CCI has not been included in this issue of the CCI. Target reporting requires a commander to approve the target and issue authority to fire. Concept of Operations is currently under development, and this issue may be addressed in a future update to STANAG 4586.

2.11 Mission Reporting.

The CUCS will provide the various C4I systems with payload dependent products; including, but not limited to, payload reports, mission status, mission progress and mission reports. This information may have to be provided on a routine basis during the flight of the UAV, on completion of the mission, on demand, or when specified threshold criteria are met.

Selected C4I systems may be supplied with one or more of the following types of reports:

- Reports derived from sensor processing and/or exploitation
- Mission status reports. In any kind of emergency or unexpected mission event, the ADatP-3 General Information Message (GENINFOMSG) may be used to provide information, which cannot be provided using existing ADatP-3 message text formats. This is a special message used for unusual circumstances that cannot be anticipated or planned, and should not be used on a routine basis. It is not intended to replace existing messages described in Section 2.8.
- Mission Progress reports. The ADatP-3 message MISREP may be used to report mission results and items of intelligence interest in all tactical roles. It may also be used to retransmit and/or amplify in-flight reports.
- Final Mission Report. On completion of the mission.

A number of ADatP-3 message reports, as listed in Section 3.11, will be used for these types of reports as appropriate.

2.12 General Messages.

There are numerous messages contained in STANAG 5500, NATO FORMETS ADatP-3 and STANAG 7149. Several of these messages are germane to overall UCS C2 functionality and operational mission accomplishment (e.g., operational environments ranging from peacetime to Military Operations Other Than War to Wartime), but do not appropriately fit into the message categories previously discussed. Those messages that are deemed appropriate for UCS operations, but have not been identified in previous sections, are listed in Section 3.12.

3 CCI Data Representation.

3.1 Introduction.

This section defines which standards are to be used for the data types described in Section 2. Where an ADatP-3 message is mandated, a fuller description of that message and the applicable LOI is contained in Attachment B2-2. Some of these ADatP-3 messages are designated optional and may be included as required by a particular CUCS; they are included below for completeness. CUCS shall provide capability to display to the operator all messages received as defined in the following paragraphs. For purposes of this edition of STANAG 4586, the ADatP-3 messages mandated shall be interpreted to mean ADatP-3 Build 11 messages.

3.2 Tasking of the UCS.

3.2.1 Tasking.

The CUCS shall be capable of processing the following ADatP-3 message types in order to accomplish the Tasking function:

Index	Identifier	Format Name
A033	FM.CFF	FIRE MISSION-CALL FOR FIRE
A034	FM.SUB	FIRE MISSION-SUBSEQUENT ADJUSTMENT
A035	FM.MTO	FIRE MISSION-MESSAGE TO OBSERVER
A036	FM.FMC	FIRE MISSION-FIRE MISSION COMMAND
A080	FRAGO	FRAGMENTARY ORDER
F004	AIRTASK	AIR TASK
F015	AIRALLOC	AIR ALLOCATION MESSAGE
F043	RESPONSE	AIR SUPPORT RESPONSE
F058	ATO	AIR TASKING ORDER
J017	IFFPROD	IFF PROCEDURES
J050	ORBATTOA LAN-AIR	ORDER OF BATTLE TRANSFER OF AUTHORITY MESSAGE – LAND AND AIR
J051	ROEIMPL	RULES OF ENGAGEMENT IMPLEMENTATION
J060	ROEAUTH	RULES OF ENGAGEMENT AUTHORIZATION
J065	EWSTOPJAM	ELECTRONIC WARFARE STOP JAMMING MESSAGE
J066	EWRTM	ELECTRONIC WARFARE REQUESTING/TASKING MESSAGE
J070	WCO	WEAPON CONTROL ORDER
J076	ACTWARN	ACTIVATION WARNING MESSAGE
J077	ACTREQ	ACTIVATION REQUEST MESSAGE
J078	ACTORD	ACTIVATION ORDER MESSAGE
J079	LASERWARN	LASER TARGET MARKING WARNING MESSAGE

Index	Identifier	Format Name
N010	OPTASK.ASUW	OPERATIONAL TASKING OF ANTI-SURFACE WARFARE
N017	OPTASKLINK	OPERATIONAL TASKING DATA LINK
N023	GREEN	MARITIME UNIT EXECUTION ORDER
N028	OPTASK AIR	OPERATIONAL TASKING ORGANIC AIRCRAFT
N067	OPTASK COMMS	OPERATIONAL TASKING COMMUNICATIONS
N068	OPTASK EW	OPERATIONAL TASKING ELECTRONIC WARFARE

Table B2 - 12: ADatP-3 Tasking Messages

3.2.2 Airspace Control.

Where appropriate for the required LOI, the CUCS shall be capable of processing the following ADatP-3 message types in order to accomplish the Airspace Control function:

Index	Identifier	Format Name
A069	SPRT.ACA	SUPPORT AIRSPACE COORDINATION ORDER
F011	ACO	AIRSPACE CONTROL ORDER
F012	ACMREQ	AIRSPACE CONTROL MEANS REQUEST

Table B2 - 13: ADatP-3 Airspace Control Messages

3.3 Air Traffic Control.

For UAVs that fly in controlled airspace and for LOI 4 and 5, ATS messages summarised in section 2.3 shall be formatted as described in Appendix 3 of the ICAO document, Rules of the Air and Air Traffic Services, Doc 4444-RAC/501

3.4 Collateral Data.

3.4.1 General Battlefield Picture.

The CUCS shall be capable of processing the following ADatP-3 message types in order to accomplish the General Battlefield Picture:

Index	Identifier	Format Name
A026	ENSITREP	ENEMY LAND FORCES SITUATION REPORT
A031	OWNSITREP	OWN LAND FORCES SITUATION REPORT
A032	ORBATLAND	ORDER OF BATTLE – LAND FORCES
A071	SYS.RFR	SYSTEM-REQUEST FOR REPORT
F001	AIRINTREP	AIR INTELLIGENCE REPORT
F006	FAM	FRIENDLY AIR MOVEMENTS
F032	ORBATAIR	ORDER OF BATTLE – AIR FORCES
J009	FIRSTHOSTILEACT	FIRST HOSTILE ACT REPORT
J015	MARINTSUM	MARITIME INTELLIGENCE SUMMARY
J016	MARINTREP	MARITIME INTELLIGENCE REPORT
J019	AIRATTACKWARN	AIR ATTACK WARNING
J038	GEOSITREP	GEOGRAPHIC SITUATION REPORT
J071	TRACKREP	TARGET TRACK REPORT
J111	INTSUM	INTELLIGENCE SUMMARY

Table B2 - 14: ADatP-3 General Battlefield Picture Messages

3.4.2 Mission Dependent Data.

The CUCS shall be capable of processing the following ADatP-3 message types in order to provide Mission Dependent Data:

Index	Identifier	Format Name
A058	ATI.ATR	ARTILLERY TARGET INTELLIGENCE-ARTILLERY TARGET REPORT
A059	ATI.TIR	ARTILLERY TARGET INTELLIGENCE-TARGET INFORMATION REQUEST
A070	SPRT.GEOM	SUPPORT-BATTLEFIELD GEOMETRY
J005	COMSPOT	COMMUNICATIONS SPOT REPORT
J006	INCSPOTREP	INCIDENT SPOT REPORT
J018	MIJIWARNREP	MIJI WARNING REPORT
J072	COVREP	WEAPON COVERAGE REPORT

Index	Identifier	Format Name
J073	SENSCOVREP	SENSOR COVERAGE REPORT
J110	INTREP	INTELLIGENCE REPORT
N003	JAMWARN	JAMMING WARNING
N025	LOCATOR	MARITIME FORCE LOCATOR

Table B2 - 15: ADatP-3 Mission Dependent Data Messages

3.4.3 NRBC.

The CUCS shall be capable of processing the following ADatP-3 message types in order to provide NRBC Data:

Index	Identifier	Format Name
J022	NBC 6	NBC 6 MESSAGE
J024	NBCSITREP	NBC SITUATION REPORT
J026	NBC3	NBC 3 REPORT
J028	NBC BWR	NBC BASIC WIND REPORT
J033	NBC4	NBC 4 REPORT
J034	NBC5	NBC 5 REPORT
J061	NBC EDR	NBC EFFECTIVE DOWNWIND REPORT

Table B2 - 16: ADatP-3 NBC Data Messages

3.4.4 Artillery Targeting.

The CUCS shall be capable of processing the following ADatP-3 message types in order to support Artillery Target Intelligence reporting:

Index	Identifier	Format Name
A058	ATI.ATR	ARTILLERY TARGET INTELLIGENCE – ARTILLERY TARGET REPORT
A059	ATI.TIR	ARTILLERY TARGET INTELLIGENCE – TARGET INFORMATION REQUEST

Table B2 - 17: ADatP-3 Artillery Target Intelligence Messages

3.4.5 Meteorological Data.

The CUCS shall be capable of processing the following ADatP-3 message types in order to coordinate Meteorological Data:

Index	Identifier	Format Name
A062	MET.TA	METEOROLOGICAL-TARGET ACQUISITION
A060	MET.CM	METEOROLOGICAL-COMPUTER
A061	MET.RFM	METEOROLOGICAL-REQUEST FOR MET

Table B2 - 18: ADatP-3 Meteorological Data Messages

3.4.6 Image Products.

The CUCS shall provide access to external Image Product Libraries via the CCI in accordance with the interface specified in STANAG 4559.

The CUCS shall be capable of transmitting and receiving imagery products in STANAG 4545 format (e.g., to or from an Image Product Library). If magnetic media is used for delivery it shall conform to STANAG 4575.

Inclusion of this capability is largely independent of LOI and therefore optional, but if there is a requirement for a system to access image product libraries for collateral information, then use of STANAG 4559 is mandatory.

3.5 Mission Plan.

A complete mission plan needs to include a route plan, contingency plan, collection plan, dissemination plan, and communication plan. There is currently no international standard agreed upon that fully defines these elements of a mission plan. However, there is a joint US and UK interface specification, called the Common Route Definition (CRD) that is applicable to a route plan and a contingency plan. The core data elements (called Tags) within the CRD interface specification may be augmented by custom Tags, which reflect unique planning requirements that are not addressed with the core Tags. Custom UAS Tags have been developed to create a collection, dissemination, and/or a communication plan. These custom Tags are contained and defined in Attachment B2-4, UAS Custom Tags.

To communicate with C4I systems or other UCSs, the UCS shall use the CRD format (see DLI Mission Upload Command Message as defined in Appendix 1) whenever possible to transmit or receive the mission plan. When not possible, a CCISM shall be provided to translate between the CRD format and the differently-formatted mission plan messages.

The capability to transmit and receive mission plans is recommended for 3 and shall be provided (mandatory) for LOI 4.

The ROS are likely to be included in the VSM (Appendix 1) for two reasons:

- Scenarios are likely to be specific to particular types of air vehicles as they depend on air vehicle capability, etc.
- Not all existing air vehicles implement ROS.

Therefore a standard for ROS is not proposed in this document.

(NOTE: It is assumed that the emergency recovery plan is not exchanged with the C4I systems.)

3.6 Handover Control.

This section deleted.

3.7 Mission Progress.

The CUCS shall be capable of processing the ADatP-3 message F031, Mission Report (MISREP), to report mission progress. When appropriate, the MISREP shall include an AMPN message set to report data not included in the standard MISREP message sets.

Index	Identifier	Format Name
F031	MISREP	MISSION REPORT

Table B2 - 19: ADatP-3 Mission Report Message

3.8 Resource Availability.

3.8.1 Air Segment Status.

The CUCS shall be capable of processing the following ADatP-3 message types in order to provide status and operational capability of the Air Segment:

Index	Identifier	Format Name
J002	ASSESSREP	COMMANDER'S ASSESSMENT REPORT
J029	AIRSTAT	OFFENSIVE WEAPON SYSTEM AND AIR DEFENCE STATUS REPORT
J082	LOGASSESSREP	LOGISTIC ASSESSMENT REPORT
J083	LOGUPDATE	LOGISTIC UPDATE REPORT
J095	SITREP	SITUATION REPORT
J099	CISSITREP	CIS SITUATION REPORT

Table B2 - 20: ADatP-3 Air Segment Status and Operational Capability Messages

3.8.2 Ground Segment Status.

The CUCS shall be capable of processing the following ADatP-3 message types in order to provide status and operational capability of the elements of the Ground Segment.

Index	Identifier	Format Name
A010	LOGSITLAND	LOGISTIC SITUATION REPORT LAND FORCES
J002	ASSESSREP	COMMANDER'S ASSESSMENT REPORT
J029	AIRSTAT	OFFENSIVE WEAPON SYSTEM AND AIR

Index	Identifier	Format Name
		DEFENCE STATUS REPORT
J082	LOGASSESSREP	LOGISTIC ASSESSMENT REPORT
J083	LOGUPDATE	LOGISTIC UPDATE REPORT
J095	SITREP	SITUATION REPORT
J099	CISSITREP	CIS SITUATION REPORT

Table B2 - 21: ADatP-3 Ground Segment Status and Operational Capability Messages

3.9 Payload/Sensor Data.

3.9.1 Overview.

This section specifies the standards to be used for transmission of UAV ISR payload data via the CCI.

Note: If a specific UAV system does not support a particular payload type (e.g., GMTI, ELINT, etc.), the supporting UCS can still be STANAG 4586 compliant without having to implement those requirements associated with that particular payload.

3.9.2 Imagery Intelligence (IMINT).

The standards identified in Table B2-22 shall be used for the exchange of imagery data across the CCI. When the UCS is receiving payload data and a C4I system requires that data, the UCS shall provide the capability to disseminate payload data to the C4I system

Standard	Imagery Type
STANAG 4545	Still EO/IR, MSI/ HSI, and SAR
STDI-0002	Controlled extensions for STANAG 4545 metadata
STANAG 7023	Still EO/IR, MSI/HSI, and SAR
STANAG 4607	Ground moving target indicator
STANAG 4609	Motion EO/IR, MSI/HSI

Table B2 - 22: Imagery Standards

3.9.2.1 Still Imagery.

All digital still imagery will be transmitted over the CCI using either STANAG 4545 or 7023 as appropriate. For all still imagery types, STDI-0002 will be used to record metadata describing the imagery when using STANAG 4545. However when STANAG 7023 is used, metadata describing the imagery will be captured as specified within STANAG 7023.

3.9.2.2 Digital Motion Imagery.

STANAG 4609 specifies a standard compression (MPEG-2) and means to capture metadata describing digital motion imagery. Motion imagery, whether collected as analogue or digital, shall be transmitted over the CCI using STANAG 4609 to those C4I systems requiring digital motion imagery. Applicable KLV metadata shall be implemented in accordance with EG0601.1. The mapping of KLV parameters to STANAG 4586 data elements is provided in Attachment B2-5 of this appendix, along with the requirement for each specific KLV parameter to be present at either the CCI only, or at both the CCI and the DLI.

For those instances where an external CCI node requires analogue imagery, the VSM or the CCISM shall provide the necessary conversion (if any required) of the payload imagery to the format required by the respective CCI node, as discussed in Section 2.9.2.1.2.1.

3.9.2.3 Multi/Hyperspectral.

Multispectral and hyperspectral images consist of multiple images from different parts of the electromagnetic spectrum. Though not currently a UCS requirement, STANAG 7023 and 4545, respectively, are the controlling standards for these types of payloads.

3.9.2.4 Synthetic Aperture Radar (SAR).

SAR images shall be transmitted across the CCI in accordance with STANAG 4545 or STANAG 7023 specified formats.

SAR auxiliary text files shall contain support data as defined in STANAG 4545 and STDI-0002, National Imagery and Mapping Agency, “The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF)”, CMETAA Support Data Extension.

3.9.2.5 Ground Moving Target Indicator (GMTI).

STANAG 4607 specifies a common standard format for GMTI data. GMTI data shall be transmitted over the CCI in accordance with STANAG 4607.

3.9.3 ELINT.

ELINT data and related reports shall conform to the requirements of STANAG 4633, ELINT Common Message Format (ECMF) (draft).

ESM data derived from analysis of enemy electronic signals shall conform to STANAG 4633 (draft).

3.9.4 Nuclear, Radiological, Biological, and Chemical (NRBC).

The CUCS shall be capable of processing the following ADatP-3 messages to report data from an NRBC payload. (The older term, Nuclear, Biological, and Chemical (NBC) is still used where appropriate in the ADatP-3 Messages.) Note that NBC SITREP is not included as it is envisioned that it will be generated outside the UCS following multi-source analysis. (The NBC SITREP is included in Section 3.4.3.)

Index	Identifier	Format Name
J007	NBC1	NBC 1 REPORT
J020	NBC CDR	NBC CHEMICAL DOWNWIND REPORT
J022	NBC6	NBC 6 REPORT
J023	NBC2	NBC 2 REPORT
J026	NBC3	NBC 3 REPORT
J028	NBC BWR	NBC BASIC WIND REPORT
J033	NBC4	NBC 4 REPORT
J034	NBC5	NBC 5 REPORT
J061	NBC EDR	NBC EFFECTIVE DOWNWIND REPORT

Table B2 - 23: ADatP-3 NBC Data Messages

3.9.5 Other Payload Types.

3.9.5.1 Laser Designator/Range Finder.

Future Capability.

3.10 Target Data.

Formats for near real time target data may be included in a future issue of the CCI appendix.

3.11 Mission Reporting.

Where appropriate, the CUCS shall be capable of processing the following ADatP-3 messages to report the results from a mission:

Index	Identifier	Format Name
A046	OBSREP	OBSTACLE REPORT
A088	RBTRECCEREP	ROAD, BRIDGE OR TUNNEL RECONNAISSANCE REPORT
A092	GAPRECCEREP	GAP RECONNAISSANCE REPORT
A100	OBSRECCEREP	OBSTACLE RECONNAISSANCE REPORT
F031	MISREP	MISSION REPORT
J064	EWMSNSUM	ELECTRONIC WARFARE MISSION SUMMARY
J101	COMPASSESSREP	COMPLIANCE ASSESSMENT REPORT

Index	Identifier	Format Name
J103	RECCEXREP	RECONNAISSANCE EXPLOITATION REPORT
N024	PURPLE	MARITIME MISSION SUMMARY REPORT

Table B2 - 24: ADatP-3 Mission Results Messages

3.12 General Messages.

There are a number of messages that do not appropriately belong in any of the message categories discussed in the previous sections, but that are applicable to UCS functionality and may be necessary to support a given LOI. Attachment B2-2 defines whether they are mandated or optional for a given LOI. Where appropriate the CUCS shall be capable of processing the following ADatP-3 messages:

Index	Identifier	Format Name
A009	PRESENCE	PRESENCE REPORT
A027	LOGASREQ	LOGISTIC ASSISTANCE REQUEST
A028	LOGASRESP	LOGISTIC ASSISTANCE RESPONSE
A057	MAPREQ	MAP REQUEST
A072	SYS.RRM	SYSTEM REPLY MESSAGE
F087	MOVEREQ	MOVEMENT REQUEST
F088	MWO	MOVEMENT WARNING ORDER
F089	MEO	MOVEMENT EXECUTION ORDER
F090	MCR	MOVEMENT COMPLETION REPORT
J001	MSGCORRCANX	MESSAGE CORRECTION OR CANCELLATION
J003	GENINFOMSG	GENERAL INFORMATION MESSAGE
J012	SARIR	SEARCH AND RESCUE INCIDENT REPORT
J013	SARREQ	SEARCH AND RESCUE REQUEST
J021	INTREQ	INTELLIGENCE REQUEST
J052	ROEREQ	RULES OF ENGAGEMENT REQUEST
J092	EVENTREP	EVENTS REPORT
J112	CIINTREP	COUNTER-INTELLIGENCE AND SECURITY REPORT
J113	CIINTSUM	COUNTER-INTELLIGENCE AND SECURITY SUMMARY

Index	Identifier	Format Name
J114	SUPINTREP	SUPPLEMENTARY INTELLIGENCE REPORT
J115	CISUPINTREP	COUNTER-INTELLIGENCE AND SECURITY SUPPLEMENTARY REPORT
N033	SATVULREP	SATELLITE VULNERABILITY REPORT

Table B2 - 25: ADatP-3 General Messages

Attachment B2 - 1: Information Exchange Requirements

This section contains the Information Exchange Requirements imposed on the UCS and hence on the CCI which, excluding the DLI, represents the external interface to the UCS.

NOTES:

Note 1 refers to the Product/ Action Column of the IER	"Tx" indicates that this function/product is transmitted from the UCS. "Rx" indicates that this function/product is received by the UCS.
Note 2 refers to the Rationale (UJTL#) Column of the IER	The following provides the descriptions of the various Universal Joint Task List (UJTL) numbers identified in this document.

ST 2.2.1	Collect Information on Theatre Strategic Situation
ST 2.4.2.2	Provide Theatre Current Intelligence
ST 2.4.2.4	Provide Target Intelligence for Theatre Planning and Execution
ST 5.1.4	Monitor Worldwide and Theatre Strategic Situation
OP 1.2.5	Conduct Offensive Operations in the Joint Operations Area
OP 1.3.2	Enhance Movement of Operational Forces
OP 2.1.3	Prepare Operational Collection Plan
OP 2.2	Collect and Share Operational Information
OP 2.2.1	Collect Information on Operational Situation
OP 2.2.3	Collect and Assess METOC Information
OP 2.2.5	Collect Target Information
OP 2.4	Produce Operational Intelligence and Prepare Intelligence Products
OP 2.4.2.1	Provide Indications and Warnings for the Joint Operations Area

NOTES:

OP 2.4.2.2	Provide Current Intelligence for the Joint Operations Area
OP 2.4.2.4	Provide Target Intelligence for the Joint Operations Area
OP 2.5	Disseminate and Integrate Operational Intelligence
OP 2.5.3	Provide Near Real Time Intelligence for the Joint Operations Area Planners and Decision Makers
OP 3.1.3	Develop Operational Targets
OP 3.1.6.1	Assess Battle Damage on Operational Targets
OP 5.1.4	Maintain Operational Information and Force Status
OP 5.1.5	Monitor Strategic Situation
OP 5.2	Assess Operational Situation
OP 5.2.1	Review Current Situation
TA 1.2.2	Conduct Joint Airborne Operations
TA 2.2	Obtain and Access Intelligence Information
TA 3.1	Process Targets
TA 5.1	Acquire and Communicate Information and Maintain Status and Force Reporting
TA 5.2.1	Establish, Operate, and Maintain Baseline Communications

Note 3 refers to the LOI Column of the IER	This indicates the operating LOI of the UCS.

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
TASKING Identified in sections 2.2. and 3.2.										
Airspace Control Order (Rx)	ST 5.1.4, OP 2.2.5	4, 5	STANAG 5500 (ADatP-3) ACO	Tactical Msg		Restricted flight zones: 4-Dimension	JFACC; Any capable ATM node	UCS	Yes; may not always be required	Variable; Minutes to Hours
Tasking Orders (Rx)	ST 2.2.1, ST 2.4.2.2, ST 2.4.2.4, ST 5.1.4	2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg(s)	At min. mandatory fields: (e.g., ATO Msg.)	UAV Mission Tasking; Route, Pyld. Comm. Plan	JFACC or any properly equipped C2 Node	UAV Det or System	Yes	Variable; Minutes to Hours
E-Mail Messages (Rx)	OP 2.2.1 OP 2.2.5	2, 3, 4, 5	SMTP	Text Message		Min. Mission Plan, e.g. route/target area	Any authorized C2 Node	UAV Det or System	Yes	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Sensor Tasking/Re-tasking (Rx)	OP 2.2.5, OP 2.4.2.2, OP 2.5.3	2, 3, 4, 5	STANAG 5500 (ADatP-3) SMTP	Tactical Msg, Text Msg		New Plan for Sensor, e.g. AOI, dwell time, etc.	Any authorized C2 Node	UAV Det or System	No. Dependent on mission	Variable; Minutes to Hours
Voice Tasking (Rx)	OP 2.2.5, OP 2.4.2.2, OP 2.5.3	2, 3, 4, 5	APP-11	Voice		Mission Tasking	Any authorized C2 Node	UAV Det or System	Yes	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product / Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
AIR TRAFFIC CONTROL Identified in sections 2.3 and 3.3.										

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product / Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
ATS Messages (Tx/Rx)	ST 5.1.4, OP 2.2.5	4, 5	DOC 4444-RAC/501	Tactical Msg(s)	For operations in civil airspace.	Corridors, Routes, Plan Changes, etc.	JFACC; Any capable ATM node, UCS	JFACC; Any capable ATM node, UCS	Yes; may not always be required	Variable; Minutes to Hours
E-Mail Messages (Tx./Rx)	ST 5.1.4, OP 2.2.5	4, 5	SMTP	Text Message		Corridors, Routes, etc.	JFACC; Any capable ATM node, UCS	JFACC; Any capable ATM node, UCS	No – unless Tactical Msgs not available	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
COLLATERAL DATA Identified in sections 2.4 and 3.4.										
Tactical Situation (Rx)	OP 2.2.1, OP 5.1.4, OP 5.1.5, TA 5.1	2, 3, 4, 5 (May be LOI 1 for some msgs. See AdatP-3 Impl Table)	STANAG 5500 (AdatP-3)	Tactical Msg, Text Msg	Includes, but not limited to Enemy and Friendly Order of Battle and SitReps	Blue/Red Force Location, charact/OB Map Overlay Data	Any C2 node having data	UCS	Yes	Variable; Minutes to Hours
Hostile Systems (Tx/Rx)	OP 3.1.3	2, 3, 4, 5	STANAG 5500 (AdatP-3)	Tactical Msg		Location & Charact. Of threat(s)	Any C2 node having data	UCS	Yes	Variable; Minutes to Hours
Target Database (Update) (Tx/Rx)	TA 3.1, OP 2.4.2.4	2, 3, 4, 5	STANAG 5500 (AdatP-3)	Tactical Msg, Data		Loc. & type Of all tgts.	UCS; Any C2 node having Tgt data	UCS; Any C2 node having Tgt data	Depends on mission	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Meteoro-logical Data (Tx/Rx)	OP 2.2.3	2, 3, 4, 5	STANAG 5500 (AdatP-3)	Tactical Msg, Text Msg		Met. Data for specified location	UCS; Any C2 node having Met data	UCS; Any C2 node having Met data	Depends on mission	Variable; Minutes to Hours
NRBC Data (Tx/Rx)	ST 2.2.1, OP 2.2	2, 3, 4, 5	STANAG 5500 (AdatP-3)	Tactical Msg, Text Msg		NRBC Data for specified location	UCS; any C2 node having NRBC data	UCS; any C2 node having NRBC data	Depends on mission	Variable; Minutes to Hours
Image Products (Tx/Rx)	OP 2.5	1, 2, 3, 4, 5	STANAG 4559	Digital Imagery		Digital	Any C2 Node having an -IL	UCS	Depends on mission; yes for most RSTA	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action [(1)]	**Rationale (UJTL#) [(2)]**	**LOI [(3)]**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
MISSION PLAN Identified in sections 2.5 and 3.5. (For mission plan that is transmitted to C2 for Response to ATO or externally generated mission plan)										
Flight Route (Tx/Rx)	OP 2.4.2.2, OP 2.5.3	3, 4, 5	CRD (STANAG is TBD)	Tactical Msg, Text Msg	Internat'l Filing Format	Waypoints, recovery plan, etc. Loaded to AV	UCS, JFACC, or any capable C2 node	UCS, JFACC, or any capable C2 node	Yes; may not always be required	Variable; Minutes to Hours
Collection Data Plan (Tx/Rx)	OP 2.1.3	3, 4, 5	CRD (STANAG is TBD)	Tactical Msg, Text Msg	To/from AMPS	Payload plan data; formatted message or e-mail	UCS, JFACC, or any capable C2 node	UCS, JFACC, or any capable C2 node	Yes; may not always be required	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Comm Plan (Tx/Rx)	OP 2.5.3	3, 4, 5	CRD (STANAG is TBD)	Tactical Msg, Text Msg		Data Link plan data	UCS	UCS, JFACC, or any capable C2 node	Yes; may not always be required	Variable; Minutes to Hours
Emergency Recovery Plan		3, 4, 5	CRD (STANAG is TBD)	Tactical Msg(s), Text Msgs		Emergency Recovery Plan	UCS	UCS, JFACC, or any capable C2 node	Yes; may not always be required	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
MISSION PROGRESS Identified in sections 2.7 and 3.7.										
Tactical Messages (Tx/Rx)	OP 2.4.2.1, OP 5.1.4, OP 5.2.1	2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg		AV Position, Sys. Status, Pyld Status, etc.	UCS	UCS; any capable C2 node	Yes	Near real time
RESOURCE AVAILABILITY Identified in sections 2.8 and 3.8. (Includes entire system availability, including both air segment and ground segment.)										
UAV Status (Tx/Rx)	OP 5.2.1, TA 5.1	1, 2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg, Text Msg	Including payload status.	AV Status, Pyld availability	UAV, UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours
Data Link Status (Tx/Rx)	OP 5.2.1, TA 5.1	1, 2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg, Text Msg	Including VDTs and CDTs	D/L type & availability	Data Links, UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
UCS Status (Tx)	OP 5.2.1, TA 5.1	1, 2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg, Text Msg		UCS capability & status	UCS	Any capable C2 node	Yes	Variable; Minutes to Hours
Launch and Recovery Sys (Tx/Rx)	OP 5.2.1, TA 5.1	1, 2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg, Text Msg		Launch and Recovery Sys capability & status	Launch and Recovery Systems, UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours
Maint. and Refurb Sys (Tx/Rx)	OP 5.2.1, TA 5.1	1, 2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg, Text Msg			UCS	UCS; any capable C2 node	No	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
PAYLOAD/SENSOR DATA (Primary and Secondary) Identified in sections 2.9 and 3.9										
Digital Data (Tx/Rx)										
EO/IR Motion Imagery	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4609; MPEG2 ISO/IEC 13818-1 to –3	Encoded or Decoded imagery stream	EO/IR Framing Line Scan Sensor	Continuous video and telemetry as the AV transmits	UCS	UCS; any capable C4 node	Yes	Variable; Seconds to Hours
KLV Metadata	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4609	See EG 0601.1	See Attachment B2-5	Continuous metadata as the video is transmitted	UCS	Any capable C4 node	Yes	Variable; Seconds to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
EO/IR Still Imagery	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 7023 STANAG 4545 STDI-0002	Still Imagery	NITF 2.0/2.1	UCS processed/annotated imagery	UCS	UCS; any capable C4 node	Yes	Variable; Seconds to Hours
SAR Process-ed	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 7023 STANAG 4545 STDI-0002	Encoded Imagery Stream Or Still Imagery	SAR Data formed into an image	Continuous video and telemetry as the AV transmits Or UCS processed/annotated imagery	UCS	UCS; any capable C4 node	No (If other imagery available)	Variable; Seconds to Hours
GMTI Process-ed	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4607	MTI Tracks & Vectors		Continuous data as the AV transmits	UCS	UCS; any capable C4 node	No (If other imagery available)	Variable; Seconds to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
MSI, HSI	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4545 STANAG 7023		Future Implement					
ELINT and ESM	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4633			Continuous data as the AV transmits	UCS	UCS; any capable C4 node	Yes	Variable; Seconds to Hours
NRBC Data	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	TBD			Continuous data as the AV transmits	UCS	UCS; any capable C4 node	No (If other data available)	Variable; Seconds to Hours
COMINT	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	TBD		Future Implement					

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Weapon Payloads – Unmanned Combat Aerial Vehicles (UCAV) Platforms					Future Implement					
TARGET DATA - Deferred until future update and implementation of STANAG 4586. Identified in sections 2.10 and 3.10.										
MISSION REPORTING Identified in sections 2.11 and 3.11.										

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Mission Status (Tx/Rx)	OP 2.2.1, OP 5.2, TA 5.1	1, 2, 3, 4, 5 (May be only 2, 3, 4, 5 for some msgs. See ADatP-3 Impl Table)	STANAG 5500 (ADatP-3) SMTP	Tactical Msg, Text Msg		Tasked Mission Status, (pending, in progress, etc.)	UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours
Target, Collection Coord-inate (Tx/Rx)	OP 2.2.5, TA 3.1	2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg		UAV detected target data	UCS	UCS; any capable C2 node	Yes	Variable; Seconds to Hours
Battlefield Geometry (Tx/Rx)	OP 5.1.5	2, 3, 4, 5	STANAG 5500 (ADatP-3)	Tactical Msg		Order Of Battle	UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
Recon Rpts (Tx)	OP 2.4, OP 2.5	1, 2, 3, 4, 5 (May be only 2, 3, 4, 5 for some msgs. See ADatP-3 Impl Table)	STANAG 5500 (ADatP-3)	Tactical Msg		Summary Reports (mission, communica-tions, EW, etc.)	UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours
Battle Damage Reports (Tx)	OP 3.1.6.1	1, 2, 3, 4, 5 (May be only 2, 3, 4, 5 for some msgs. See ADatP-3 Impl Table)	STANAG 5500 (ADatP-3)	Tactical Msg, Video, Imagery	Can be via tactical msg, or BDA imagery.	Damage assessment report	UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours
MISCELLANEOUS										

UNMANNED AERIAL VEHICLE CONTROL SYSTEM (UCS) COMMAND AND CONTROL INTERFACE (CCI) -INFORMATION EXCHANGE REQUIREMENTS (IER) MATRIX-										
Product/ Action (1)	**Rationale (UJTL#)** (2)	**LOI** (3)	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
LAN Con-nection	TA 5.2.1	1, 2, 3, 4, 5	ISO/IEC 8802-3, ANSI/IEEE Std 802.3 (DOD JTA, protocols)	Imagery, Text, Voice, Video, Data	Includes protocols (e.g., TCP, UDP, IP, SMTP, FTP, NFS, MIME, etc.) (Annex B)	N/A	N/A	N/A	Yes	N/A
IPL (IL) Interface (Rx)	OP 2.2	1, 2, 3, 4, 5	STANAG 4559	Imagery	Inherent use of CORBA	NSIF imagery files from IL	IL	UCS	Yes	Variable; Seconds to Hours
Digital Voice (Tx/Rx)	TA 5.2.1	1, 2, 3, 4, 5	H.323	Voice	Voice over IP		UCS; any capable C4 node	UCS; any capable C4 node	No	Real Time

Attachment B2 - 2: ADatP-3 Build 11 Message Implementation Requirements

The table provided in this attachment contains the list of ADatP-3 Build 11 messages that are applicable to the UCS. Each message is identified, its function or purpose summarised, and its applicable LOI stated.

Index Ref. No – This column contains the Index Reference Number as listed in ADatP-3. This column also indicates the transmission (Tx) or receipt (Rx) requirements of the UCS.

MTF Identifier – This column contains the Message Text Format Identifier as listed in ADatP-3.

MTF Name – This column contains the Message Text Format Name as listed in ADatP-3.

Function or purpose – This column contains the Function or Purpose as listed in ADatP-3.

LOI – This column contains the applicable LOI associated with each message. This number refers to the lowest level at which the message is mandatory. Below this number, implementation is optional (refer to the remarks in Section 1.6, Implementation of UAV LOI in the CCI).

Comments – This column contains general comments and cross-references to paragraphs in Annex B and Appendix 2, where applicable.

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
A009 (Tx)	PRESENCE	Presence Report	The PRESENCE report is used to inform a commander on the deployment of military organisations within his area of responsibility. The report addresses both organisations under his command and those that are not.	Optional	Para 3.12 General Msg
A010 (Tx)	LOGSITLAND	Logistic Situation Report Land Forces	The LOGSITLAND is used to provide a superior headquarters with an evaluation of a units or formation's logistical situation, capability, and deficiencies/surpluses.	Optional	Para 3.8.2 Resource Availability, Gnd Seg Status
A026 (Tx/Rx)	ENSITREP	Enemy Land Forces Situation Report	The ENSITREP is used to report and inform on the enemy forces situation, to include: locations, activities, boundaries, status, order of battle (ORBAT) and subordination of units/formations.	2, 3, 4, 5	Para 3.4.1 Collateral data, Gen Battlefield Pic
A027 (Tx)	LOGASREQ	Logistics Assistance Request	The LOGASREQ is used by land forces to request logistics assistance.	Optional	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
A028 (Rx)	LOGASRESP	Logistics Assistance Response	The LOGASRESP is used by land forces to respond to a request for logistics assistance.	Optional	Para 3.12 General Msg
A031 (Tx/Rx)	OWNSITREP	Own Land Forces Situation Report	The OWNSITREP is used to report factors affecting the situation, deployment, status and/or order of battle of own and subordinate units.	2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
A032 (Rx)	ORBATLAND	Order of Battle - Land Forces	The ORBATLAND is used to inform major NATO commanders (MNCs)/strategic commanders (SCs) and other NATO commanders in peacetime and in periods of crisis and war of changes in the order of battle land forces and thereby to assure that the most current information is available for operational planning.	4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
A033 (Tx)	FM.CFF	Fire Mission-Call For Fire	The FM.CFF is used to transmit initial fire for effect requests and/or orders to fire.	3	Para 3.2.1 Tasking
A034 (Tx)	FM.SUB	Fire Mission-Subsequent Adjustment	The FM.SUB is used to transmit updated grid locations, to repeat fire for effect and/or to terminate missions.	3	Para 3.2.1 Tasking

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
A035 (Tx/Rx)	FM.MTO	Fire Mission-Message to Observer	The FM.MTO is used to transmit a message to observer in response to a call for fire on a target of opportunity.	3	Para 3.2.1 Tasking
A036 (Tx)	FM.FMC	Fire Mission-Fire Mission Command	The FM.FMC is used to transmit a fire mission command to a fire unit or an observer.	3	Para 3.2.1 Tasking
A046 (Tx/Rx)	OBSREP	Obstacle Report	The OBSREP is used to report obstacles up the chain of command	2, 3, 4, 5	Para 3.11 Mission Reporting
A057 (Tx/Rx)	MAPREQ	Map Request	The MAPREQ is used to submit requests for map coverage.	Optional	Para 3.12 General Msg
A058 (Tx/Rx)	ATI.ATR	Artillery Target Intelligence-Artillery Target Report	The ATI.ATR is used to transmit targets by target type based on a standing request for information or a one-time query for target information resulting from an ATI.ATR message. It will also be used to establish or delete target information.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
A059 (Rx)	ATI.TIR	Artillery Target Intelligence-Target Information Request	The ATI.TIR is used to request target information either as a one-time query or as a standing request for target information.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent
A060 (Rx)	MET.CM	Meteorological-Computer	The MET.CM is used to transmit computer meteorological data.	2, 3, 4, 5	Para 3.4.4 Collateral Data, MET
A061 (Tx/Rx)	MET.RFM	Meteorological-Request For Met	The MET.RFM is used to request meteorological support.	2, 3, 4, 5	Para 3.4.4 Collateral Data, MET
A062 (Tx/Rx)	MET.TA	Meteorological-Target Acquisition	The MET.TA is used to transmit meteorological data for target acquisition purposes.	2, 3, 4, 5	Para 3.4.4 Collateral Data, MET
A069 (Tx/Rx)	SPRT.ACA	Support-Airspace Coordination Area	The SPRT.ACA is used to establish or delete airspace coordination areas (ACA).	4, 5	Para 3.2.2 Airspace Control

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
A070 (Tx/Rx)	SPRT.GEOM	Support-Battlefield Geometry	The SPRT.GEOM is used to establish or delete battlefield geometries (e.g., avenue of approach, axis of advance, target areas, zone of fire) in support of land combat operations for current operations or for a fire plan.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent
A071 (Tx/Rx)	SYS.RFR	System-Request For Report	The SYS.RFR is used to establish or delete a request for ammunition status reports, fire unit status reports, firing sites, battlefield geometry, friendly unit locations, fire plan target lists, and other applicable reports.	2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
A072 (Tx/Rx)	SYS.RRM	System Reply Message	The SYS.RRM is used to transmit a reply to a received message.	1, 2, 3, 4, 5	Para 3.12 General Messages

Index Ref No	**MTF Identifier**	**MTF Name**	**Function or purpose**	**LOI**	**Comments**
A080 (Rx)	FRAGO	Fragmentary Order	The FRAGO is used to issue key sections of an operation order before the complete order has been produced; provide specific instructions to commanders who do not require the complete operation order; provide a summary of the complete order to serve as confirmatory notes; issue timely changes to existing operation orders or provide an outline operational directive (mission order) for use in fast moving mobile operations.	1, 2, 3, 4, 5	Para 3.2.1 Tasking
A088 (Tx/Rx)	RBTRECCEREP	Road, Bridge or Tunnel Reconnaissance Report	The RBTRECCEREP is used to report the results of a technical reconnaissance of a road, bridge or tunnel along a section of a route.	2, 3, 4, 5	Para 3.11 Mission Reporting
A092 (Tx/Rx)	GAPRECCEREP	Gap Reconnaissance Report	The GAPRECCEREP is used to report the results of a gap crossing site reconnaissance.	2, 3, 4, 5	Para 3.11 Mission Reporting
A100 (Tx/Rx)	OBSRECCEREP	Obstacle Reconnaissance Report	The OBSRECCEREP is used to report the results of a reconnaissance of enemy or friendly obstacles, existing or planned.	2, 3, 4, 5	Para 3.11 Mission Reporting

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
F001 (Rx)	AIRINTREP	Air Intelligence Report	The AIRINTREP is used to inform SHAPE and ACE commanders of changes in the location, disposition, status and other essential elements of information concerning non-NATO air order of battle.	4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
F004 (Rx)	AIR TASK	Air Task	The AIRTASK is used to task tactical air support including support for land or maritime operations.	2, 3, 4, 5	Para 3.2.1 Tasking
F006 (Rx)	FAM	Friendly Air Movements	The FAM is used to inform units of civil and military air movements in their area of interest which are not part of tactical air support for maritime operations (TASMO) or carrier operations.	Optional	Para 3.4.1 Collateral Data, Gen Battlefield Pic
F011 (Rx)	ACO	Airspace Control Order	The ACO is used to provide specific detailed orders for airspace management and control from a higher command to subordinate units	4, 5	Para 3.2.2 Airspace Control
F012 (Tx/Rx)	ACMREQ	Airspace Control Means Request	The ACMREQ is used to request that a specific airspace control means be specified in a future airspace control order.	4, 5	Para 3.2.2 Airspace Control

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
F015 (Rx)	AIRALLOC	Air Allocation Message	The AIRALLOC is used to inform subordinate units, formations and/or tasking agencies of the air effort allocated.	2, 3, 4, 5	Para 3.2.1 Tasking
F031 (Tx/Rx)	MISREP	Mission Report	The MISREP is used to report mission results and items of intelligence interest in all tactical roles and to retransmit and/or amplify in-flight reports.	2, 3, 4, 5	Para 3.7 & 3.11 Mission Progress & Mission Reporting
F032 (Rx)	ORBATAIR	Order of Battle - Air Forces	The ORBATAIR is used to inform major NATO commanders (MNCs)/strategic commanders (SCs) and other NATO commanders in peacetime and in periods of crisis and war of changes in the order of battle air forces and thereby to assure that the most current information is available for operational planning.	4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
F043 (Tx)	RESPONSE	Air Support Response	The RESPONSE is used to accept, refuse, or veto an air support request. it may also endorse or state priorities for an air support request.	4, 5	Para 3.2.1 Tasking

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
F058 (Rx)	ATO	Air Tasking Order	The ATO is used to task air missions, assign cross-force tasking and may also be used for intraservice tasking.	2, 3, 4, 5	Para 3.2.1 Tasking
F087 (Tx/Rx)	MOVEREQ	Movement Request	The MOVREQ is used by a unit or higher level to request execution of a deployment of land-based unit(s).	Optional	Para 3.12 General Msg
F088 (Rx)	MWO	Movement Warning Order	The MWO is used by tasking agencies to warn of intended or expected deployments of land-based unit(s).	Optional	Para 3.12 General Msg
F089 (Rx)	MEO	Movement Execution Order	The MEO is used by tasking authorities to order the deployment of land-based unit(s).	Optional	Para 3.12 General Msg
F090 (Tx/Rx)	MCR	Movement Completion Report	The MCR is used by land-based units to report the completion of deployment.	Optional	Para 3.12 General Msg
J001 (Tx/Rx)	MSRCORRCANX	Message Correction or Cancellation	He MSGCORRCANX is used to cancel a message(s) and/or to correct the information in a previously transmitted message(s).	1, 2, 3, 4, 5	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J002 (Tx/Rx)	ASSESSREP	Commander's Assessment Report	The ASSESSREP is used to advise superior commanders of the situation/operations in the reporting commander's area of concern, his assessment of the overall situation, and his intended or recommended actions based on that assessment.	Optional	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Stat & Gnd Segment Stat
J003 (Tx/Rx)	GENINFOMSG	General Information Message	The GENINFOMSG may only be used to provide information which cannot be provided using existing MTFs. This is a special message used for unusual circumstances that cannot be anticipated or planned and should not be used on a routine basis nor is it intended to replace existing messages.	Optional	Para 3.12 General Msg
J005 (Tx/Rx)	COMSPOT	Communications Spot Report	The COMSPOT is used to report actual or forecast communications outages including relocation and EMCON.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J006 (Tx/Rx)	INCSPOTREP	Incident Spot Report	The INCSPOTREP is used to provide time critical information on important events that have an immediate impact on operations.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent
J007 (Tx/Rx)	NBC1	NBC 1 Report	The NBC1 is used to provide the observer's initial report giving basic data on a single nuclear, biological, or chemical attack.	2, 3, 4, 5	Para 3.9.5 & 3.9.11 Payload Data, NRBC & Mission Reporting
J009 (Rx)	FIRST HOSTILE ACT	First Hostile Act Report	The FIRST HOSTILE ACT is used to rapidly provide major NATO commands with information on initial enemy/opposition forces (OPFOR) hostile acts in order to enable major NATO commands to react as early as possible.	1, 2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J012 (Tx)	SARIR	Search and Rescue Incident Report	The SARIR is used to report any situation which may require a search and rescue effort.	Optional	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J013 (Rx)	SARREQ	Search and Rescue Request	The SARREQ is used to request forces to participate in a search and rescue mission.	4, 5	Para 3.12 General Msg
J015 (Rx)	MARINTSUM	Maritime Intelligence Summary	The MARINTSUM is used to provide periodic summary information pertaining to the movement of non-NATO forces in NATO maritime areas.	1, 2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J016 (Rx)	MARINTREP	Maritime Intelligence Report	The MARINTREP is used to provide time sensitive advisory information pertaining to the movement of non-NATO forces in NATO maritime areas.	4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J017 (Rx)	IFFPROD	IFF Procedures	The IFFPROD is used to provide friendly forces with effective IFF modes and codes, and effective time periods.	4, 5	Para 3.2.1 Tasking
J018 (Tx/Rx)	MIJIWARNREP	MIJI Warning Report	The MIJIWARNREP is used in times of peace and crisis to warn NATO nations, commands and units of hazardous electronic warfare situations caused by MIJI incidents, which are of hostile, friendly (inadvertent) or unknown origin.	1, 2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J019 (Rx)	AIRATTACKWARN	Air Attack Warning	The AIRATTACKWARN is used to warn of imminent enemy air attacks against friendly forces. It may be used in conjunction with either global early warning (GEW) or local early warning (LEW) messages generated by automated air defence (ad) systems.	1, 2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J020 (Rx)	NBC CDR	NBC Chemical Downwind Report	The NBC CDR is used by appropriate agencies every six hours to disseminate a forecast of the meteorological data needed for the chemical hazard area prediction procedure for 3 consecutive 2 hour periods for either the nearest 6 hours or for a period more than 6 hours ahead.	1, 2, 3, 4, 5	Para 3.9.5 & 3.11 Payload Data, NRBC & Mission Reporting
J021 (Tx/Rx)	INTREQ	Intelligence Request	The INTREQ is used to standardise the method by which military authorities and forces of NATO nations and NATO commands request intelligence information.	2, 3, 4, 5	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J022 (Tx/Rx)	NBC6	NBC 6 Message	The NBC6 is used to pass detailed information on chemical attack.	2, 3, 4, 5	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC
J023 (Rx)	NBC2	NBC 2 Report	NBC2 is used for disseminating evaluated data of a single nuclear, biological or chemical attack.	1, 2, 3, 4, 5	Para 3.9.5 Payload/Sensor Data, NRBC
J024 (Rx)	NBCSITREP	NBC Situation Report	The NBCSITREP is used for passing information on the NRBC situation.	2, 3, 4, 5	Para 3.4.3 Collateral Data, NRBC
J026 (Tx/Rx)	NBC3	NBC 3 Report	The NBC3 is used for passing immediate warning of predicted contamination and hazard areas following NRBC attack.	1, 2, 3, 4, 5	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J028 (Tx/Rx)	NBC BWR	NBC Basic Wind Report	The NBC BWR is used to report wind direction and speed in 2,000m increments from the surface of the earth to 30,000m altitude for either the nearest 6 hours or for a period more than 6 hours ahead.	Optional	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC
J029 (Tx)	AIRSTAT	Offensive Weapon System and Air Defence Status Report	The AIRSTAT is used to keep Shape informed on availability of offensive air forces committed to Shape, maritime helicopter and patrol aircraft committed to Shape, and defensive weapon systems committed to the integrated air defence of ACE.	4, 5	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Stat & Gnd Segment Stat
J033 (Tx/Rx)	NBC4	NBC 4 Report	The NBC4 is used to report NRBC monitoring and survey results.	2, 3, 4, 5	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J034 (Tx/Rx)	NBC5	NBC 5 Report	The NBC5 is used for passing information on areas of actual nuclear, biological, or chemical contamination.	2, 3, 4, 5	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC
J038 (Rx)	GEOSITREP	Geographic Situation Report	The GEOSITREP is used to keep major subordinate commands informed during periods of tension and war on the geographical situation within ace. The first report is required to inform headquarters of serious shortages and most urgent requirements within the geographic services when military vigilance is declared. It also gives an overall picture of the map/chart reproduction potential immediately available. Continuation reports are required to keep the information up-to-date for evaluation, planning, and coordination by the headquarters.	Optional	Para 3.4.1 Collateral Data, Gen Battlefield Pic

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J050 (Rx)	ORBATTOA LAN-AIR	Order of Battle Transfer of Authority Message - Land and Air	The ORBATTOA LAND-AIR is used to report or direct the transfer of operational command (OPCOM) and/or control (OPCON) between nations and NATO or within the NATO chain of command. An ORBATTOA land-air message will normally confirm the delegation of authority requested in ACTWARN and ACTREQ messages.	Optional	Para 3.2.1 Tasking
J051 (Rx)	ROEIMPL	Rules of Engagement Implementation	The ROEIMPL is used to implement and/or cancel specific rules of engagement.	3, 4, 5	Para 3.2.1 Tasking
J052 (Tx/Rx)	ROEREQ	Rules of Engagement Request	The ROEREQ is used to request authorization to implement specific rules of engagement (roe(s)).	Optional	Para 3.12 General Msg
J060 (Rx)	ROEAUTH	Rules of Engagement Authorization	The ROEAUTH is used by the North Atlantic Council (NAC)/Defence Planning Committee (DPC) to authorize implementation or cancellation of specific rules of engagement (roe(s)).	3, 4, 5	Para 3.2.1 Tasking

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J061 (Rx)	NBC EDR	NBC Effective Downwind Report	The NBC EDR is used to provide the effective downwind data needed for prediction of fallout areas following nuclear burst for either the nearest 6 hours or for a period more than 6 hours ahead, including specific downwind speeds and directions for up to seven selected weapon yields.	2, 3, 4, 5	Para 3.4.3 & 3.9.5 Collateral Data, NRBC & Payload/Sensor Data, NRBC
J064 (Tx/Rx)	EWMSNSUM	Electronic Warfare Mission Summary	The EWMSNSUM is used to summarize significant electronic warfare missions and the status of offensive electronic warfare assets.	3, 4, 5	Para 3.11 Mission reporting
J065 (Rx)	EWSTOPJAM	Electronic Warfare Stop Jamming Message	The EWSTOPJAM is used to terminate immediately a jamming mission being conducted by an electronic countermeasures asset.	3	Para 3.2.1 Tasking
J066 (Rx)	EWRTM	Electronic Warfare Requesting/Task-ing Message	The EWRTM is used to task component commanders to perform electronic warfare (EW) operations in support of the overall joint EW plan and to support component EW operations.	3, 4, 5	Para 3.2.1 Tasking
J070 (Rx)	WCO	Weapon Control Order	The WCO is used to order a new weapon control order for SHORAD.	4, 5	Para 3.2.1 Tasking

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J071 (Tx/Rx)	TRACKREP	Target Track Report	The TRACKREP is used to report aircraft movement by track number.	2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J072 (Rx)	COVREP	Weapon Coverage Report	The COVREP is used to inform other formations of SHORAD weapon coverage.	4, 5	Para 3.4.2 Collateral Data, Mission Dependent
J073 (Rx)	SENSCOVREP	Sensor Coverage Report	The SENSCOVREP is used to inform other formations of SHORAD sensor coverage.	4, 5	Para 3.4.2 Collateral Data, Mission Dependent
J076 (Rx)	ACTWARN	Activation Warning Message	The ACTWARN is used to inform nations, military headquarters, MNCS and other commands of a potential requirement to activate contingency plans, on call forces, special surveillance missions or other unique requirement to employ military forces.	1, 2, 3, 4, 5	Para 3.2.1 Tasking

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J077 (Tx/Rx)	ACTREQ	Activation Request Message	The ACTREQ is used to request authority from the NATO military committee (NAMILCOM) to activate contingency plans, on call forces, special surveillance missions or other unique requirement to employ military forces.	Optional	Para 3.2.1 Tasking
J078 (Rx)	ACTORD	Activation Order Message	The ACTORD is used to activate contingency plans, on call forces, special surveillance missions or other unique requirement to employ military forces.	1, 2, 3, 4, 5	Para 3.2.1 Tasking
J079 (Tx/Rx)	LASERWARN	Laser Target Marking Warning Message	The LASERWARN is used to confirm the activation arrangements for laser target markers.	3, 4, 5	Para 3.2.1 Tasking
J082 (Tx/Rx)	LOGASSESSREP	Logistic Assessment Report	The LOGASSESSREP is used to standardise the method for informing superior headquarters of the command's logistics status and to provide an assessment of the overall logistics situation for forces, together with intended or recommended action.	Optional	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Status & Gnd Segment Status

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J083 (Tx/Rx)	LOGUPDATE	Logistic Update Report	The LOGUPDATE is used to provide NATO commanders with a dynamic update of changes to core database information on stockpiles of specific equipment and consumable materiel held by national forces declared to NATO, as well as specified equipment and materiel held by nations in support of such forces.	Optional	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Status & Gnd Segment Status
J092 (Tx/Rx)	EVENTREP	Events Report	The EVENTREP is used to provide NATO HQ and Nations, through the MNC chain of command, information about important events, trends and activities that do not have an element of extreme urgency, but do influence peace support operations force (PSOFOR) (e.g. IFOR, SFOR) operations.	1, 2, 3, 4, 5	Para 3.12 General Msg
J095 (Tx/Rx)	SITREP	Situation Report	The SITREP is used to provide SACEUR with information of the committed forces capabilities with regard to current and release operations and the overall situation of the involved parties.	1, 2, 3, 4, 5	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Status & Gnd Segment Status

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J099 (Tx/Rx)	CISSITREP	CIS Situation Report	The CISSITREP is used to provide a periodic report of own communications and information systems (CIS) status in support of operations and exercises.	1, 2, 3, 4, 5	Para 3.8.1 & 3.8.2 Resource Availability, Air Segment Status & Gnd Segment Status
J101 (Tx/Rx)	COMPASSESSREP	Compliance Assessment Report	The COMPASSESSREP is used to provide MNCS and NATO HQ information of the parties' compliance with accepted agreements concerning the designated 'safe' or other area(s)/exclusion zone(s)/separation zone(s). This report may include assessments.	1, 2, 3, 4, 5	Para 3.11 Mission Reporting
J103 (Tx/Rx)	RECCEXREP	Reconnaissance Exploitation Report	The Reconnaissance Exploitation Report (RECEXREP) is used to report the results of an air reconnaissance mission by the interpretation of sensor data.	1, 2, 3, 4, 5	Para 3.11 Mission Reporting

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J110 (Tx/Rx)	INTREP	Intelligence Report	The INTREP is used for the immediate dissemination of key intelligence that could have a significant impact on current and pending operations and planning.	1, 2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J111 (Rx)	INTSUM	Intelligence Summary	The INTSUM is used to periodically inform addressees of military, associated political/economical or other related intelligence and the assessment of this. It gives an indication of change in potential OPFOR (opposing force) capabilities, preparedness or military posture, activities, intentions, objectives and/or courses of action in peace, operations other than war, and war.	1, 2, 3, 4, 5	Para 3.4.1 Collateral Data, Gen Battlefield Pic
J112 (Tx/Rx)	CIINTREP	Counter-Intelligence and Security Report	The CIINTREP is used for the immediate dissemination of counter-intelligence and security information that could have a significant impact on current or pending operations and planning.	Optional	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
J113 (Tx/Rx)	CIINTSUM	Counter-Intelligence and Security Summary	The CIINTSUM is used to inform addresses periodically on current counter-intelligence and security and to provide estimate of threat posed by hostile intelligence services (his) or subversive groups.	Optional	Para 3.12 General Msg
J114 (Rx)	SUPINTREP	Supplementary Intelligence Report	The SUPINTREP is used for providing all addressees with comprehensive reviews of non-time-sensitive intelligence collected over an extended period of time, or detailed intelligence studies on specific subjects	Optional	Para 3.12 General Msg
J115 (Rx)	CISUPINREP	Counter-Intelligence and Security Supplementary Report	The CISUPINTREP is used to provide all addressees with a comprehensive review of all counter-intelligence (CI) data collected over an extended period of time including an assessment of trends in the development of the CI situation. The CISUPINTREP is also used to provide a comprehensive review of one or several specific CI projects.	Optional	Para 3.12 General Msg

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
N003 (Tx/Rx)	JAMWARN	Jamming Warning	The JAMWARN is used to issue a warning about own jamming operations.	1, 2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent
N010 (Rx)	OPTASK ASUW	Operational Tasking of Anti-Surface Warfare	The OPTASK ASUW is used to promulgate detailed tasking and instructions for the conduct of anti-surface warfare.	3, 4, 5	Para 3.2.1 Tasking
N017 (Rx)	OPTASK LINK	Operational Tasking Data Links	The OPTASK link is used to provide detailed instructions regarding the operations of tactical data links.	2, 3, 4, 5	Para 3.2.1 Tasking
N023 (Rx)	GREEN	Maritime Unit Execution Order	The GREEN is used to task maritime patrol or surveillance and ASW units.	1, 2, 3, 4, 5	Para 3.2.1 Tasking
N024 (Tx/Rx)	PURPLE	Maritime Mission Summary Report	The PURPLE is used to provide a comprehensive summary of the activities of a mission or event.	3, 4, 5	Para 3.11 Mission Reporting
N025 (Tx/Rx)	LOCATOR	Maritime Force Locator	The LOCATOR is used to report surface, subsurface, air, or special interest units operating in the maritime environment.	2, 3, 4, 5	Para 3.4.2 Collateral Data, Mission Dependent

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
N028 (Rx)	OPTASK AIR	Operational Tasking Organic Aircraft	The OPTASK air is used for the OTC or delegated authority to promulgate detailed tasking and instructions for all organic aircraft. This message is normally promulgated by the OTC or the air coordinator.	3, 4, 5	Para 3.2.1 Tasking
N033 (Rx)	SATVULREP	Satellite Vulnerability Report	The SATVULREP is used to promulgate periods of vulnerability to satellite reconnaissance and to prescribe countermeasures to satellite surveillance.	Optional	Para 3.12 General Msg
N067 (Rx)	OPTASK COMMS	Operational Tasking Communications	The OPTASK COMMS is used to promulgate the communications plan in force and provide communications related instructions.	2, 3, 4, 5	Para 3.2.1 Tasking
N068 (Rx)	OPTASK EW	Operational Tasking Electronic Warfare	The OPTASK EW is used to promulgate detailed tasking and instructions for the conduct of electronic warfare.	3, 4, 5	Para 3.2.1 Tasking

Attachment B2 - 3: UAV System LOI ADatP-3 Build 11 Requirements

The following tables list the ADatP-3 messages that are required to support each UAV system LOI (refer to the remarks in Section 1.6, Implementation of UAV LOI in the CCI).

Level of Interoperability 1

Index Ref No	MTF Identifier	MTF Name
A072	SYS.RRM	SYSTEM REPLY MESSAGE
A080	FRAGO	FRAGMENTARY ORDER
J001	MSRCORRCANX	MESSAGE CORRECTION OR CANCELLATION
J009	FIRST HOSTILE ACT	FIRST HOSTILE ACT REPORT
J015	MARINTSUM	MARITIME INTELLIGENCE SUMMARY
J018	MIJIWARNREP	MIJI WARNING REPORT
J019	AIRATTACKWARN	AIR ATTACK WARNING
J020	NBC CDR	NBC CHEMICAL DOWNWIND REPORT
J023	NBC2	NBC 2 REPORT
J026	NBC3	NBC 3 REPORT
J076	ACTWARN	ACTIVATION WARNING MESSAGE
J078	ACTORD	ACTIVATION ORDER MESSAGE
J092	EVENTREP	EVENTS REPORT
J095	SITREP	SITUATION REPORT
J099	CISSITREP	CIS SITUATION REPORT
J101	COMPASSESSREP	COMPLIANCE ASSESSMENT REPORT
J103	RECCEXREP	RECONNAISSANCE EXPLOITATION REPORT
J110	INTREP	INTELLIGENCE REPORT
J111	INTSUM	INTELLIGENCE SUMMARY
N003	JAMWARN	JAMMING WARNING
N023	GREEN	MARITIME UNIT EXECUTION ORDER

Level of Interoperability 2

All lower LOI messages are required plus the following messages (refer to the remarks in Section 1.6, Implementation of UAV LOI in the CCI):

Index Ref No	MTF Identifier	MTF Name
A026	ENSITREP	ENEMY LAND FORCES SITUATION REPORT
A031	OWNSITREP	OWN LAND FORCES SITUATION REPORT
A046	OBSREP	OBSTACLE REPORT
A058	ATI.ATR	ARTILLERY TARGET INTELLIGENCE-ARTILLERY TARGET REPORT
A059	ATI.TIR	ARTILLERY TARGET INTELLIGENCE-TARGET INFORMATION REQUEST
A060	MET.CM	METEOROLOGICAL-COMPUTER
A061	MET.RFM	METEOROLOGICAL-REQUEST FOR MET
A062	MET.TA	METEOROLOGICAL-TARGET ACQUISITION
A070	SPRT.GEOM	SUPPORT-BATTLEFIELD GEOMETRY
A071	SYS.RFR	SYSTEM-REQUEST FOR REPORT
A088	RBTRECCEREP	ROAD, BRIDGE OR TUNNEL RECONNAISSANCE REPORT
A092	GAPRECCEREP	GAP RECONNAISSANCE REPORT
A100	OBSRECCEREP	OBSTACLE RECONNAISSANCE REPORT
F004	AIR TASK	AIR TASK
F015	AIRALLOC	AIR ALLOCATION MESSAGE
F058	ATO	AIR TASKING ORDER
J005	COMSPOT	COMMUNICATIONS SPOT REPORT
J006	INCSPOTREP	INCIDENT SPOT REPORT
J007	NBC1	NBC 1 REPORT
J021	INTREQ	INTELLIGENCE REQUEST
J022	NBC6	NBC 6 MESSAGE
J024	NBCSITREP	NBC SITUATION REPORT
J033	NBC4	NBC 4 REPORT
J034	NBC5	NBC 5 REPORT
J061	NBC EDR	NBC EFFECTIVE DOWNWIND REPORT
J071	TRACKREP	TARGET TRACK REPORT

Index Ref No	MTF Identifier	MTF Name
N017	OPTASK LINK	OPERATIONAL TASKING DATA LINKS
N025	LOCATOR	MARITIME FORCE LOCATOR
N067	OPTASK COMMS	OPERATIONAL TASKING COMMUNICATIONS

Level of Interoperability 3

All lower LOI messages are required plus the following messages (refer to the remarks in Section 1.6, Implementation of UAV LOI in the CCI):

Index Ref No	MTF Identifier	MTF Name
A033	FM.CFF	FIRE MISSION-CALL FOR FIRE
A034	FM.SUB	FIRE MISSION-SUBSEQUENT ADJUSTMENT
A035	FM.MTO	FIRE MISSION-MESSAGE TO OBSERVER
A036	FM.FMC	FIRE MISSION-FIRE MISSION COMMAND
F031	MISREP	MISSION REPORT
J051	ROEIMPL	RULES OF ENGAGEMENT IMPLEMENTATION
J060	ROEAUTH	RULES OF ENGAGEMENT AUTHORIZATION
J064	EWMSNSUM	ELECTRONIC WARFARE MISSION SUMMARY
J065	EWSTOPJAM	ELECTRONIC WARFARE STOP JAMMING MESSAGE
J066	EWRTM	ELECTRONIC WARFARE REQUESTING/TASKING MESSAGE
J079	LASERWARN	LASER TARGET MARKING WARNING MESSAGE
N010	OPTASK ASUW	OPERATIONAL TASKING OF ANTI-SURFACE WARFARE
N024	PURPLE	MARITIME MISSION SUMMARY REPORT
N028	OPTASK AIR	OPERATIONAL TASKING ORGANIC AIRCRAFT
N068	OPTASK EW	OPERATIONAL TASKING ELECTRONIC WARFARE

Level of Interoperability 4 and 5

All messages from LOI 1 & 2 tables contained in this attachment are required plus the following messages (See remarks in Section 1.6):

Index Ref No	MTF Identifier	MTF Name
A032	ORBATLAND	ORDER OF BATTLE - LAND FORCES
A069	SPRT.ACA	SUPPORT-AIRSPACE COORDINATION AREA
F001	AIRINTREP	AIR INTELLIGENCE REPORT
F011	ACO	AIRSPACE CONTROL ORDER
F012	ACMREQ	AIRSPACE CONTROL MEANS REQUEST
F031	MISREP	MISSION REPORT
F032	ORBATAIR	ORDER OF BATTLE - AIR FORCES
F043	RESPONSE	AIR SUPPORT RESPONSE
J013	SARREQ	SEARCH AND RESCUE REQUEST
J016	MARINTREP	MARITIME INTELLIGENCE REPORT
J017	IFFPROD	IFF PROCEDURES
J029	AIRSTAT	OFFENSIVE WEAPON SYSTEM AND AIR DEFENCE STATUS REPORT
J051	ROEIMPL	RULES OF ENGAGEMENT IMPLEMENTATION
J060	ROEAUTH	RULES OF ENGAGEMENT AUTHORIZATION
J064	EWMSNSUM	ELECTRONIC WARFARE MISSION SUMMARY
J066	EWRTM	ELECTRONIC WARFARE REQUESTING/TASKING MESSAGE
J070	WCO	WEAPON CONTROL ORDER
J072	COVREP	WEAPON COVERAGE REPORT
J073	SENSCOVREP	SENSOR COVERAGE REPORT
J079	LASERWARN	LASER TARGET MARKING WARNING MESSAGE
N010	OPTASK ASUW	OPERATIONAL TASKING OF ANTI-SURFACE WARFARE
N024	PURPLE	MARITIME MISSION SUMMARY REPORT

Index Ref No	MTF Identifier	MTF Name
N028	OPTASK AIR	OPERATIONAL TASKING ORGANIC AIRCRAFT
N068	OPTASK EW	OPERATIONAL TASKING ELECTRONIC WARFARE

Attachment B2 - 4: UAS Custom Tags

OVERVIEW

This Attachment describes the background, definition, and structure for the UAS custom tags.

BACKGROUND

The core CRD is defined in the CRD Interface Control Document (ICD) (currently version 2.0.2.0) and uses a Common Route Object Model to describe the entities found in the Common Route Definition. The object model also describes the relationships among the entities. The Universal Modeling Language (UML) is used to specify the Common Route Object Model. The tags describing the model entity attributes and definition are represented in eXtensible Mark-up Language (XML) format.

The UAS custom tags were developed as new entities to the Common Route Object Model and its tags are also represented in XML format.

COMMON ROUTE OBJECT MODEL

The following series of figures show how the core CRD object model has been changed to add the custom UAS objects. Figure B2-4.1 shows the top level Common Route Object Model used for establishing the relationships among the core CRD entities. The MISSION and INTENT entities are modified by adding additional entities.

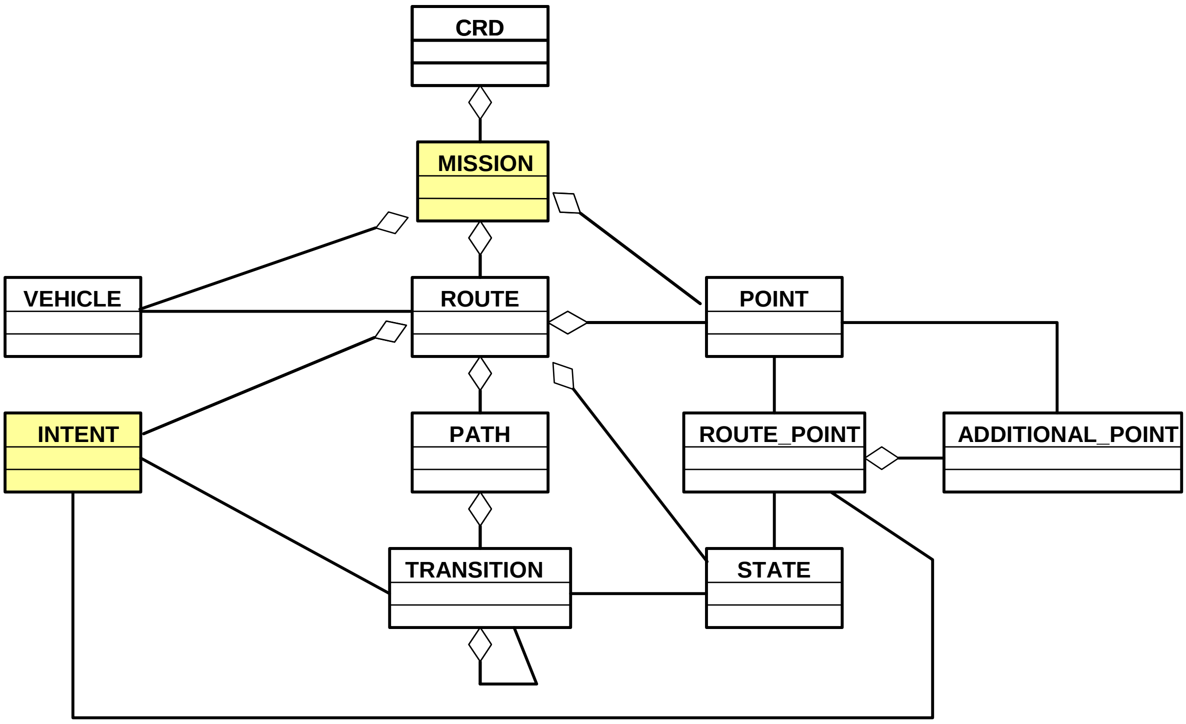

Figure B2-4.1 Core Common Route Object Model

Figure B2-4.2 shows the series of entities that have been associated with the Mission. In this figure, the series of entities incorporate essential higher mission reference data that was tasked through the Aircraft Collection Tasking Message (ACTM). This allows the tracing of collected data from the original tasking requirements.

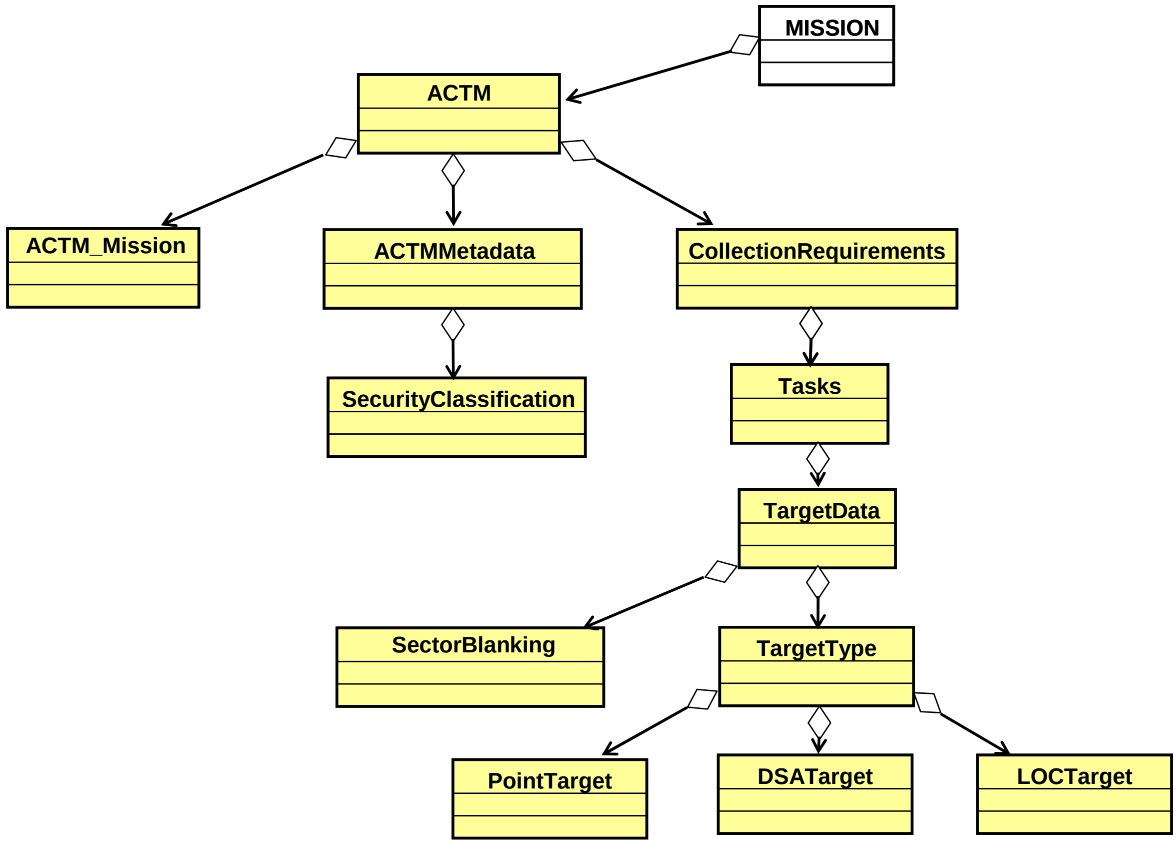

Figure B2-4.2 Custom ACTM Entities

Figure B2-4.3 shows the series of entities that have been created to allow a UAS to add data collection and dissemination planning and communication planning to the existing core CRD to generate a complete Mission Plan.

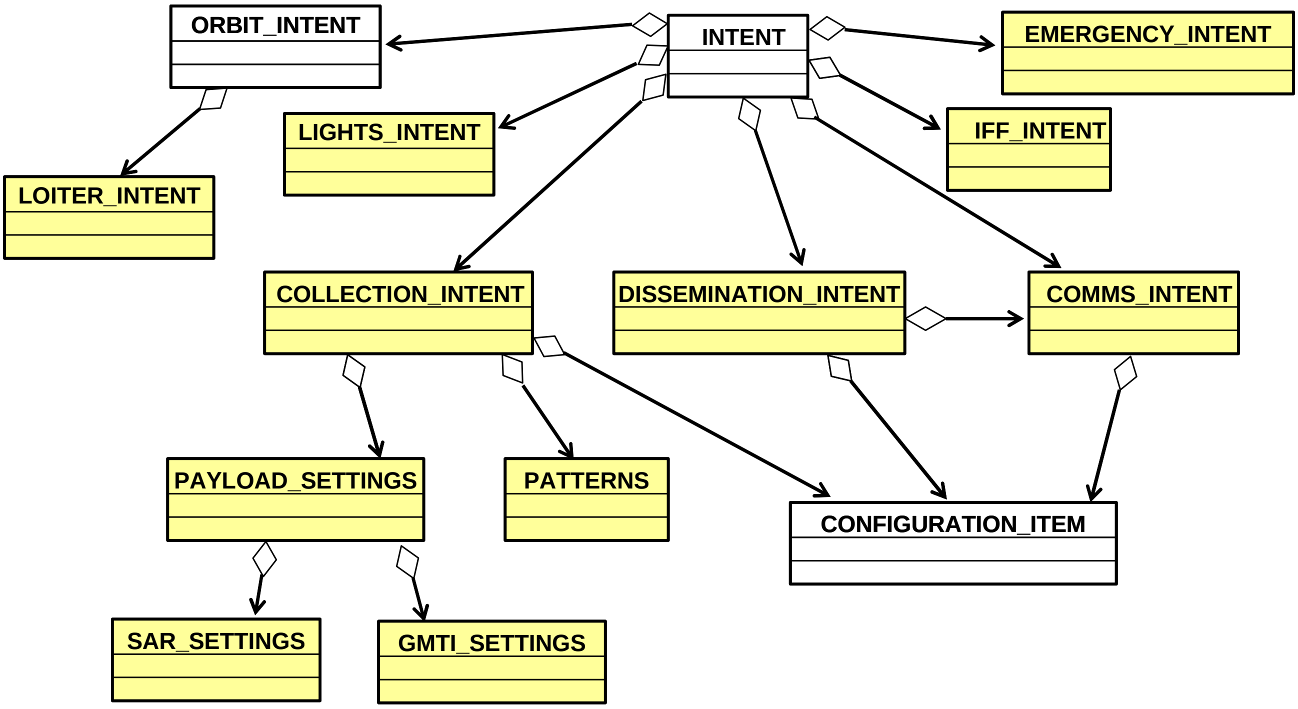

Figure B2-4.3 Custom UAS Entities

DATA DICTIONARY

Table B2-4.1 is the data dictionary for the new UAS custom tags, or the individual data elements for each of the UAS entities. The table parameters are defined as:

Name of entity or tag and description
Type: the name of the type of data under which attributes are defined
TypeInfo: the class category of data
Unit: the name of units of measure associated with the data (if applicable)
MinMax: the minimum or maximum value of the data (if applicable)
Format: the specific format of the data (if required)
Example: an example if available
Reference: name of an enumeration table. These appear after Table B2-4.1.
Card: the cardinality of the data—required or optional

Table B2-4.1 **Custom UAS Data Dictionary**

ACTM

ACTM_Mission — Target collection indexing

Type:	ACTM_Mission	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	

ACTMMetadata — Collection manager classification and control markings/data

Type:	ACTMMetadata	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A<= x <= N/A	card:	required

CollectionRequirements — Target collection details

Type:	CollectionRequirements	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

ACTM_Mission

MissionIdentifier — An alternative identifier to "Mission Number" Either MissionNumber OR MissionIdentifier should be filled-in

Type:	STRING	format:	
TypeInfo:	Primitive	example:	
Unit:		reference:	
MinMax:	0 <= x <= 54	card:	Optional

MissionNumber — The theater specific mission number.

Type:	MissionNumber	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

ProjectCode — The project code which is part of the mission number.

Type:	String	format:	([A-Y][A-Z]|Z[A-Y])
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

ACTMMetadata

DeclassificationInformation — Declassification information for the ACTM. If the ACTM is classified, Declassification Information must be used.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

DisseminationControl — Made up of two elements: "Markings" and "REL TO". If releasable, use the Authorized for Release to (REL TO) that contains country trigraphs and/or International Organization tetragraphs. If dissemination of the ACTM is further controlled, the Dissemination Control's "Markings" field must be used.

Type:	DisseminationControl	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

Originator — Unit which originated the requirement.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

SCIControlSystemsCodewords

SCI control systems and code words. If the ACTM contains Sensitive Compartmented Information (SCI), SCI Control Systems/Codewords must be used.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 35	card:	conditional

SecurityClassification

Security classification of the Aircraft Collection Tasking Message (ACTM).

Type:	SecurityClassification	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

TaskGenerationTimestamp

Date/time the ACTM file was created or modified. Creation Timestamp will change anytime there is a change to the ACTM. So, for every Requirement ID control date change, there will be a Creation Timestamp change. But, there will not be a control date change for every Creation Timestamp change, ie Mission ID change with all the same requirements.

Type:	dateTime	format:	YYYY-MM-DDThh:mm:ssZ
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

COLLECTION_INTENT

ID

Unique identifier for collection intent

Type:	ID	format:	
TypeInfo:	Reference	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 2147483647	card:	Required

OPERATION_MODE

Mode of operation for selected payload during a specific portion of the mission. An onboard sensor data recorder is considered a Payload. A separate communications relay is a Payload, but not the comms systems which is part of the basic air vehicle configuration.

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.42
MinMax:		card:	Required

PATTERN

UAV flight pattern or sensor search pattern associated with data collection for a specific payload

Type:	PATTERN	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

PAYLOAD_LIST

List of payloads used for this mission

Type:	CONFIGURATION_ITEM	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Required

PAYLOAD_SETTINGS — Specific settings to be used by the payload during a specific portion of the mission

Type:	PAYLOAD_SETTINGS	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

CollectionRequirements

CollectionPrecedence_int — Priority indicator

Type:	integer	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 999	card:	conditional

Control_UTCDateTime — Date/Time the Requirement ID was created or modified. The Requirement ID may not change if the exact same tasks were flown over several days. Control Date changes only when there is a change to the Requirement ID. So, for every Requirement ID control date change, there will be a Creation Timestamp change. But, there will not be a control date change for every Creation Timestamp change, ie Mission ID change with all the same requirements.

Type:	dateTime	format:	YYYY-MM-DDThh:mm:ssZ
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

RequestorID — Code for the unit which created the ACTM. Free text

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

RequirementName — User specified text name providing descriptive data about the collection requirement purpose; usually the same as the nomination name.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 50	card:	conditional

RequirementPriority_int — The relative importance of the collection requirement, where the lower assigned number value, the higher the priority.

Type:	integer	format:	000-999
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 999	card:	conditional

RequirementsID User specified identification to facilitate tracking collection requirements.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 12	card:	required

Tasks Individual intel collection segments of the overall collection message.

Type:	Tasks	format:	
TypeInfo:	collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

COMMS_INTENT

ANTENNA_MODE Operating mode for communication antennas

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.52
MinMax:		card:	Required

COMMS_LIST List of communication devices used for this leg of mission

Type:	CONFIGURATION_ITEM	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:		card:	Required

COMMS_MODE Operating modes for communication devices

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.53
MinMax:		card:	Required

COMMS_SECURITY Normal if TRUE; Zeroize if FALSE

Type:	Boolean	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

DATA_RATE Selectable data transmission rate

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

FREQ_RECEIVE Assigned receiver frequency

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	Hz	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Required

FREQ_TRANSMIT Assigned transmitter frequency

Type: Double
TypeInfo: Primitive
Unit: Hz
MinMax: 0 <= x <= 1.0E100
format:
example:
reference:
card: Required

ID Unique identifier for communication intent

Type: ID
TypeInfo: Reference
Unit: N/A
MinMax: 0 <= x <= 2147483647
format:
example:
reference:
card: Required

LINK_LOSS_OK A pre-planned flag indicating that loss of the data link will not cause initiation of contingency actions.

Type: BOOLEAN
TypeInfo: Primative
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

POWER_TRANSMIT Assignable transmission power level

Type: Decimal
TypeInfo: Primitive
Unit: Percent
MinMax: 0.00 <= x <= 1.00
format:
example:
reference:
card: Optional

RECEIVER_ALTITUDE The altitude of the receiver, used for directional antennas. This could be a ground location or a satellite position

Type: ALTITUDE
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

RECEIVER_LOCATION The coordinates of the receiver, used for directional antennas. This could be a ground location or a satellite position

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

RETRANSMIT Number of retransmission attempts after a condition of lost communication is reached

Type: Short
TypeInfo: Primitive
Unit: N/A
MinMax: 0 <= x <= 32767
format:
example:
reference:
card: Optional

SLOT_RECEIVE Assigned receiver slot

Type: Short
TypeInfo: Primitive
Unit: N/A
MinMax: 0 <= x <= 32767
format:
example:
reference:
card: Required

SLOT_TRANSMIT Assigned transmitter slot

Type: Short
TypeInfo: Primitive
Unit: N/A
MinMax: 0 <= x <= 32767
format:
example:
reference:
card: Required

TIME_OUT Time between transmission and expected reply, after which non-reply is judged as lost communication

Type: Double
TypeInfo: Primitive
Unit: seconds
MinMax: 0 <= x <= 1.0E100
format:
example:
reference:
card: Optional

DISSEMINATION_INTENT

COMMS_SET_IN Setting of any communication devices needed to receive external data for dissemination

Type: COMMS_INTENT
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

COMMS_SET_OUT Setting of any communication devices needed to transmit internal data for dissemination

Type: COMMS_INTENT
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

ID Unique identifier for dissemination intent

Type: ID
TypeInfo: Reference
Unit: N/A
MinMax: 0 <= x <= 2147483647
format:
example:
reference:
card: Required

INPUT_SOURCE Originating device providing data for dissemination. This could be a sensor streaming data, a recorder, post-processed data from an onboard sensor processor, or a comm relay.

Type: CONFIGURATION_ITEM
TypeInfo: Collection
Unit: N/A
MinMax:
format:
example:
reference:
card: Optional

OUTPUT_DESTINATION Destination device which will receive the data. This could be an internal recorder, sensor processor, or communication data link.

Type:	CONFIGURATION_ITEM	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:		card:	Optional

TIME_START — The start time of the dissemination process based on time since making the last waypoint

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	seconds	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

TIME_STOP — The stop time of the dissemination process based on time since making the last waypoint

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	seconds	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

DisseminationControl

Markings — Dissemination control other than "Releasable To". May include markings such as "FOUO" or "NF"

Type:	STRING	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 35	card:	Optional

RELTO — Countries and organizations that this message is authorized to be releasable to. Unlimited number of 3-letter country codes (found in International Organization for Standardization (ISO) 3166) and/or 4-letter International Organizational codes.

Type:	STRING	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 4	card:	Optional

DSATarget

TargetName — The target name which generally provides information about the target's location and/or function.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 38	card:	required

EMERGENCY_INTENT

EMERGENCY_RECOVERY_SETTINGS Settings used for emergency landings

Type:	STRING	format:	
TypeInfo:	Enumeration	example:	N/A
Unit:	Container	reference:	A.55
MinMax:	N/A	card:	Optional

EMERGENCY_ROUTE_ENTRY_ID Entry waypoint number. Emergency route starts at entry waypoint

Type:	ID	format:	
TypeInfo:	Reference	example:	
Unit:		reference:	
MinMax:		card:	Optional

EMERGENCY_ROUTE_ID ID of the Route to activate as the emergency route at this waypoint

Type:	ID	format:	
TypeInfo:	Reference	example:	
Unit:		reference:	
MinMax:		card:	Optional

GMTI_SETTINGS

BAR_END Last range bar for GMTI scan

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

BAR_START First range bar for GMTI scan

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

MAX_TARGETS Maximum targets per coherent processing interal

Type:	SHORT	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

MIN_DETECTABLE_VELOCITY Minimum detectable velocity of targets

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	feet/second	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

MIN_SNR Minimum target Signal to Noise Ration (SNR)

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	dB	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

MIN_TARGET_RCS Minimum target Radar Cross Section (RCS)

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	dBsf	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

RANGE_RESOLUTION The range resolution

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	feet	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

SLANT_RANGE Slant range to the center of the scanned area (Arc Mode only)

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	feet	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

IFF_INTENT

MODE 1 CODE

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

MODE 1 ENABLE Off if TRUE; On if FALSE

Type:	Boolean	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

MODE 2 CODE

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

MODE 2 ENABLE Off if TRUE; On if FALSE

Type:	Boolean	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

MODE 3/A CODE

Type: Short — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: 0 <= x <= 32767 — card: Optional

MODE 3/A DURATION — Amount of time Mode 3/A is Squawking

Type: Double — format:
TypeInfo: Primitive — example:
Unit: seconds — reference:
MinMax: 0 <= x <= 1.0E100 — card: Optional

MODE 3/A ENABLE — Off if TRUE; On if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE 3/A IDENT — Off if TRUE; On if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE 4 A/B — “A” if TRUE; “B” if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE 4 ENABLE — Off if TRUE; On if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE 4 HOLD — Normal if TRUE; Hold if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE 4 ZEROIZE — Normal if TRUE; Zeroize if FALSE

Type: Boolean — format:
TypeInfo: Primitive — example:
Unit: N/A — reference:
MinMax: N/A — card: Optional

MODE C ENABLE Off if TRUE; On if FALSE

Type:	Boolean	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

OPERATION_MODE

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.51
MinMax:		card:	Required

INTENT

COLLECTION_INTENT Contains one or more collection objects, which identify the payloads, settings, and collection patterns used in the mission

Type:	COLLECTION_INTENT	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

COMMS_INTENT Contains one or more communications objects, which identify the communication devices for C2, payload information dissemination, and other communications interfaces

Type:	COMMS_INTENT	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Required

DISSEMINATION_INTENT Contains one or more dissemination objects, which identify the output destination device for collected information from the payload

Type:	DISSEMINATION_INTENT	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

EMERGENCY_INTENT Emergency actions allowed for the air vehicle

Type:	EMERGENCY_INTENT	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

IFF_INTENT Provides the IFF settings for discrete portions of the mission

Type:	IFF_INTENT	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Required

LIGHTS_INTENT Controls the air vehicle lights during the mission

Type:	LIGHTS_INTENT	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Required

LOITER_INTENT A planned delay enroute

Type:	LOITER_INTENT	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

LIGHTS_INTENT

LIGHT_MODE Off if TRUE; On if FALSE

Type:	Boolean	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

LIGHTS Selection of types of lights

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.41
MinMax:	N/A	card:	Optional

LOCTarget

TargetName The target name which generally provides information about the target's location and/or function.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 38	card:	required

LOITER_INTENT

LOITER_TYPE A designate pattern for a loiter

Type:	STRING	format:	
TypeInfo:	Enumeration	example:	N/A
Unit:	Container	reference:	A.55
MinMax:	N/A	card:	Optional

LOITER_WIDTH The maximum width of the inbound/outbound legs of a loiter pattern

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	feet	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

REQ_LOOPS The number of full circuits of the loiter pattern that must be completed

Type:	SHORT	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 10000	card:	Optional

MISSION

ACTM A collection of target and tasking identifiers from the intel task manager

Type:	ACTM	format:	
TypeInfo:	Collection	example:	
Unit:	N/A	reference:	
MinMax:	N/A<= x <= N/A	card:	required

PATTERN

ALONG_TRACK Number of swaths per Spot

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

ALTITUDE Altitude for the pattern

Type:	ALTITUDE	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

CROSS_TRACK Number of payload frames per swath

Type:	Short	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 32767	card:	Optional

PATTERN_MODE The class of collection patterns. This is used with PATTERN_TYPE to define the full pattern functions. Defines patterns for UAV or sensor search.

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.49
MinMax:		card:	Optional

PATTERN_START The start time of the pattern based on time since making the last waypoint

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	seconds	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

PATTERN_TIME

The duration of the pattern

Type: Double
TypeInfo: Primitive
Unit: seconds
MinMax: 0 <= x <= 1.0E100
format:
example:
reference:
card: Optional

PATTERN_TYPE

The geometry of the collection pattern. This defines an area or path for sensor data collection. This is used with PATTERN_MODE to define the full pattern functions

Type: String
TypeInfo: Enumeration
Unit: N/A
MinMax:
format:
example:
reference: A.50
card: Optional

REF_1

Geographic coordinate to define an area, point, or payload starting-point. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE. For a circle or spiral, REF_1 would be the center point; for an area search, REF_1 would be the first point to define the area. REF_! could also be the center point for Spot mode on a Point pattern.

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

REF_2

Geographic coordinate to define an area, point, or payload starting-point. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE. For an area search, REF_2 would be the second point to define the area; for a line pattern, it would b e the second point along the path..

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

REF_3

Geographic coordinate to define an area, point, or payload starting. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE.

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

REF_4

Geographic coordinate to define an area, point, or payload starting. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE.

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

REF_5

Geographic coordinate to define an area, point, or payload starting. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE.

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

REF_6

Geographic coordinate to define an area, point, or payload starting. The actual definition of this point is based on the selection of PATTERN_MODE and PATTERN_TYPE.

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

SPEED

Airspeed during the pattern

Type: AIRSPEED
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

TARGET

Geographic coordinate for the target

Type: WGS84_POSITION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

TARGET_ELEV

The elevation of the target

Type: ELEVATION
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

TRACK_SPACING

The spacing between pattern tracks for selected pattern. The actual definition of the spacing is based on the selection of PATTERN_MODE and PATTERN_TYPE. For a Raster mode the spacing is the distance between tracks; for spirals, the incremental added distance between segments; for a circle, the circle radius.

Type: Short
TypeInfo: Primitive
Unit: feet
MinMax: 0 <= x <= 32767
format:
example:
reference:
card: Optional

PAYLOAD_SETTINGS

ANGLE_AZ

Setting for the centerline of the payload azimuth angle

Type: Decimal
TypeInfo: Primitive
Unit: degrees
MinMax: 0.00 <= x <= 360.00
format:
example:
reference:
card: Optional

ANGLE_ELEV

Setting for the centerline of the payload elevation angle

Type: Decimal
TypeInfo: Primitive
Unit: degrees
MinMax: 0.00 <= x <= 90.00
format:
example:
reference:
card: Optional

ANGLE_REL — The pointing angle of the payload, relative to the air vehicle's body OR relative to true North

Type: STRING
TypeInfo: Enumeration
Unit: N/A
MinMax: N/A
format:
example:
reference: A.56
card: Optional

COMPRESSION_RATIO — Selected compression parameter

Type: Short
TypeInfo: Primitive
Unit: N/A
MinMax: 0 <= x <= 32767
format:
example:
reference:
card: Optional

COMPRESSION_TYPE — Compression method to compress payload data

Type: String
TypeInfo: Enumeration
Unit: N/A
MinMax:
format:
example:
reference: A.43
card: Optional

FOV_HOR — Setting for Field Of View in the horizontal plane

Type: Decimal
TypeInfo: Primitive
Unit: degrees
MinMax: 0.00 <= x <= 360.00
format:
example:
reference:
card: Optional

FOV_VER — Setting for Field Of View in the vertical plane

Type: Decimal
TypeInfo: Primitive
Unit: degrees
MinMax: 0.00 <= x <= 360.00
format:
example:
reference:
card: Optional

GMTI_SETTINGS — Functional settings for the GMTI payload

Type: GMTI_SETTINGS
TypeInfo: Container
Unit: N/A
MinMax: N/A
format:
example:
reference:
card: Optional

OUTPUT — Selection for the EO/IR output

Type: String
TypeInfo: Enumeration
Unit: N/A
MinMax:
format:
example:
reference: A.44
card: Optional

PAYLOAD_MODE — Specific payload function selected when in an operating mode

Type: String
TypeInfo: Enumeration
Unit: N/A
MinMax:
format:
example:
reference: A.45
card: Optional

PAYLOAD_OPERATING_MODE — The state of operation of the payload (e..g., Off, Standby, Stowed, etc.)

Type:	STRING	format:	
TypeInfo:	Enumeration	example:	N/A
Unit:	Container	reference:	A.42
MinMax:	N/A	card:	Optional

POINTER_MODE — Selection for a specific method for payload pointing

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.46
MinMax:		card:	Optional

POLARITY — Polarity setting

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.47
MinMax:		card:	Optional

RADAR_MODE — Selection for a particular SAR or GMTI function Mode

Type:	String	format:	
TypeInfo:	Enumeration	example:	
Unit:	N/A	reference:	A.48
MinMax:		card:	Optional

RECORDER_OVERWRITE — Flag to allow recorder to overwrite existing data. No overwrite if TRUE; Overwrite if FALSE

Type:	BOOLEAN	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	N/A <= x <= N/A	card:	Optional

RECORDING_INDEX — Assignment of an identifier for marking the start or stop of a recording session

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

SAR_SETTINGS — Functional settings for the SAR payload

Type:	SAR_SETTINGS	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

SCENE_NUMBER — Assignment of an identifier for information collected by a payload within an assigned portion of a mission

Type:	Double	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0 <= x <= 1.0E100	card:	Optional

WEAPONS_CODE — Assignment of an Laser codes or other types of codes within an assigned portion of a mission

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	N/A	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

PointTarget

BENumber — The Basic Encyclopedia (BE) number of the target.

Type:	String	format:	.{10}(.{5})?
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

Target_CategoryCode_int — The target category code is based on a breakdown of targets into major groups.

Type:	integer	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

TargetName — The target name which generally provides information about the target's location and/or function.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 38	card:	required

SAR_SETTINGS

RANGE — Range from the sensor to the center of a strip, when the SAR is in Strip Mode

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	feet	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

RESOLUTION — Image resolution setting for the SAR

Type:	DOUBLE	format:	
TypeInfo:	Primitive	example:	
Unit:	inches	reference:	
MinMax:	0.0 <= x <= 1.0E4	card:	Optional

SectorBlanking

SectorName

Name of an area where collection is not permitted

Type:	STRING	format:	
TypeInfo:	Primitive	example:	
Unit:		reference:	
MinMax:	N/A <= x <= N/A	card:	Optional

Common Route Data Dictionary

SecurityClassification

Classification_Any

Alternative means of classification from external xml library. The Classification tag uses the xs:any schema element, which means that this tag may contain any string or as-yet-undefined XML element, to accommodate current and future classification markings.

Type:	ANY	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

Classification_String

Free-text classification of ACTM, either this field or "Classification Any" must be used. Per source country/organization classification guide

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 3	card:	Optional

OwnerProducer

Source country/organization of the security classification. 3-letter country code (International Organization for Standardization (ISO) 3166) or 4-letter International Organizational code.

Type:	String	format:	
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 4	card:	Optional

TargetData

SectorBlanking

Area where data collection is not permitted

Type:	SectorBlanking	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	Optional

TargetType

Indicates the collection type for the target to be collected as either a point, Line of Communication (LOC), or Directed Search Area (DSA).

Type:	TargetType	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

TargetType

DSATarget

Specific collection parameters or constraints associated with a DSA target.

Type:	PointTarget	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

LOCTarget

Specific collection parameters or constraints associated with a LOC target.

Type:	PointTarget	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

PointTarget

Specific collection parameters or constraints associated with a point target.

Type:	PointTarget	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

Tasks

EEI_ID

Identification code for an essential element of information set within a task. EEI identification codes are defined by the user in the Exploitation Requirements section of the ACTM.

Type:	ID	format:	"EEI_[0-9]+"
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	conditional

TargetData

Specific collection parameters or constraints associated which a specific target.

Type:	TargetData	format:	
TypeInfo:	Container	example:	
Unit:	N/A	reference:	
MinMax:	N/A	card:	required

TaskPriority_int

The relative importance of the task, where the lower assigned number value, the higher the priority.

Type:	integer	format:	000-999
TypeInfo:	Primative	example:	
Unit:	N/A	reference:	
MinMax:	0<= x <= 999	card:	required

A.41 LIGHTS

Code	Tag Value	Number	Description
	NAV		Navigation lights
	NAV_IR		Infrared navigations lights
	STROBE		Strobe lights
	STROBE_IR		Infrared strobe lights
	NVD		Night Vision Devices
			reserved
	LANDING		Landing lights
	LANDING_IR		Infrared landing lights
	ANTI_COLLISION		Anti-Collision lights

A.42 PAYLOAD OPERATING MODE

Code	Tag Value	Number	Description
	SYS_PWR_OFF		System power OFF
	SYS_PWR_ON		System power ON
	DEVICE_PWR_OFF		Device power OFF
	DEVICE_PWR_ON		Device power ON
	INITIALIZE		Initialize
	STANDBY		Standby
	ACTIVATE		Activate
	CALIBRATE		Calibrate
	CAGE		Cage
	STOW		Stow
	DEPLOY		Deploy the payload

A.43 COMPRESSION TYPE

Code	Tag Value	Number	Description
	VIDEO_HUFF		EO/IR Huffman
	VIDEO_QUANT		EO/IR quantization
	SAR_HUFF		SAR Huffman
	SAR_QUANT		SAR quantization

A.44 OUTPUT

Code	Tag Value	Number	Description
	NONE		No output
	EO		Electro-Optic
	IR		Infrared
	BOTH		Both

A.45 PAYLOAD MODE

Code	Tag Value	Number	Description
	BW		Black & white Mode
	COLOR		Color Mode
	CLUTTER		Clutter Map
	MTI		Moving Target indicator
	REC_GOTO		Go To on recorder
	REC_RECORD		Record on recorder
	REC_SEEK		Seek on recorder
	REC_PLAY		Play on recorder
	REC_REWIND		Rewind on recorder
	REC_PAUSE		Pause the recorder
	REC_STOP		Stop the recorder

A.46 POINTER MODE

Code	Tag Value	Number	Description
	NONE		No Value
	ANGLE_AV		Angle Relative to AV
	SLEW_AV		Slewing Rate Relative to AV
	SLEW_INERTIAL		Slewing Rate Relative to Inertial
	POSITION_SLAVED		Lat-Long Slaved

A.47 POLARITY

Code	Tag Value	Number	Description
	BLACK		Black Hot
	WHITE		White Hot

A.48 RADAR MODE

Code	Tag Value	Number	Description
	LOW_RES		Low resolution
	MED_RES		Medium resolution
	HIGH_RES		High resolution
	SAR_POLAR		SAR polar format
	SAR_POINT		SAR point image
	SAR_STRIP		SAR using strip function
	GMTI_ARC		Ground moving target indication using the Arc function
	GMTI_SPOT		Ground moving target indication using the Spot function

A.49 PATTERN MODE

Code	Tag Value	Number	Description
	RASTER_SENS		Sensor searches in Raster pattern
	RASTER_UAV		UAV flies a Raster pattern
	SPOT_SENS		Sensor collects data from series of designated Spots
	SPOT_UAV		UAV flies to designated Spots for optimal sensor view
	TARGET_SENS		Sensor collects data from same Target in separate scenes
	TARGET_UAV		UAV flies a Target pattern
	WAS_SENS		Sensor performs a Wide Area Search pattern
	WAS_UAV		UAV flies a Wide Area Search pattern

A.50 PATTERN TYPE

Code	Tag Value	Number	Description
	POINT		Point
	LINE		Line
	TRACK_FOLLOW		Follow specific track over the ground
	SPIRAL		Spiral, normal
	SPIRAL_REC		Spiral, rectangular
	CIRCLE		Circle
	RACETRACK		Racetrack
	QUADRILATERAL		Quadrilateral
	POLYGON		Polygon
	FIGURE_8		Figure 8
	OWNTRACK		Pattern following path of air vehicle

A.51 IFF OPERATING MODE

Code	Tag Value	Number	Description
	OFF		Off
	STANDBY		Standby
	NORMAL		Normal
	EMERGENCY		Emergency

A.52 ANTENNA MODE

Code	Tag Value	Number	Description
	STOW		Stow
	DIRECTIONAL		Directional
	OMNI		Omni
	AUTO		Auto
	POINT_TO_RECEIVER		Point to the external transceiver

A.53 COMMS OPERATING MODE

Code	Tag Value	Number	Description
	SYS_PWR_OFF		System power OFF
	SYS_PWR_ON		System power ON
	DEVICE_PWR_OFF		Device power OFF
	DEVICE_PWR_ON		Device power ON
	INITIALIZE		Initialize
	STANDBY		Standby
	RX_TX		Receive and transmit
	RX		Receive only
	TX		Transmit only

A.55 EMERGENCY MODE

Code	Tag Value	Number	Description
	PWR_OFF		Power OFF
	PWR_ON		Power ON
	ARM		Arm the system
	DISARM		Disarm the system
	ACTIVATE		Activate the system

A.55 LOITER TYPES

Code	Tag Value	Number	Description
	CIRCLE		Circle (Hover if radius is zero)
	FAA_HOLD		FAA holding pattern
	FIGURE_8		Figure 8
	RACETRACK		Racetrack

A.56 ANGLE REL

Code	Tag Value	Number	Description
	BODY		Uses the longitudinal centerline of the air vehicle as the reference
	NORTH		Uses true North as the reference

UAS CUSTOM TAG XML SCHEMA

The following schema must be used in conjunction with the core CRD ICD in the Data Exchange Model for Data Validation.


```
<?xml version="1.0" encoding="UTF-8"?>
<!-- edited with XMLSpy v2006 rel. 3 U (http://www.altova.com) by Mike Hanchuck (self) -->
<!--Generated by Turbo XML 2.3.1.100. Conforms to w3c http://www.w3.org/2001/XMLSchema-->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" elementFormDefault="qualified"
attributeFormDefault="unqualified">
	<!-- edited with XMLSpy v2006 rel. 3 U (http://www.altova.com) by Mike Hanchuck (self) -->
	<xs:element name="UAS_Custom">
		<xs:annotation>
			<xs:documentation>Root for UAV custom tags</xs:documentation>
		</xs:annotation>
		<xs:complexType>
			<xs:all>
				<xs:element ref="ACTM"/>
				<xs:element ref="UAV"/>
			</xs:all>
		</xs:complexType>
	</xs:element>
	<xs:element name="ACTM">
		<xs:annotation>
			<xs:documentation>Metadata related to tasking message</xs:documentation>
		</xs:annotation>
		<xs:complexType>
			<xs:sequence>
				<xs:element name="ACTMMetadata">
					<xs:complexType>
						<xs:sequence>
							<xs:element name="SecurityClassification">
								<xs:complexType>
									<xs:sequence>
										<xs:element
name="OwnerProducer">

	<xs:simpleType>

	<xs:restriction base="xs:string">

	<xs:minLength value="3"/>

	<xs:maxLength value="4"/>

	</xs:restriction>

	</xs:simpleType>
```

```
</xs:element>
<xs:choice>
<xs:element
name="Classification_string">
<xs:simpleType>
<xs:restriction base="xs:string">
<xs:maxLength value="128"/>
</xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element
name="Classification_any">
<xs:complexType>
<xs:sequence>
<xs:any>
<xs:annotation>
<xs:documentation>
The Classification tag uses the xs:any schema element, which means that
this tag may contain any string or as-yet-undefined XML element, to accommodate current and future classification markings.
</xs:documentation>
</xs:annotation>
</xs:any>
</xs:sequence>
</xs:complexType>
</xs:element>
</xs:choice>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="SCIControlSystemsCodewords"
type="String35" minOccurs="0"/>
<xs:element name="DisseminationControl"
minOccurs="0">
<xs:complexType>
<xs:sequence>
<xs:element
name="Marking" type="String35" minOccurs="0"/>
<xs:element
name="RelTo" type="CountryCode3OrOrg4" minOccurs="0" maxOccurs="unbounded"/>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="DeclassificationInformation"
type="String35" minOccurs="0"/>
```

```
                        <xs:element name="CreationTimestamp" type="UTCDateTime" minOccurs="0"/>
                        <xs:element name="Originator" type="xs:string" minOccurs="0"/>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
            <xs:element name="ACTM_Mission">
                <xs:complexType>
                    <xs:sequence>
                        <xs:element name="MissionNumber" type="MissionNumberType"/>
                        <xs:element name="MissionIdentifier" type="MissionIdentifierType"/>
                        <xs:element name="ProjectCode">
                            <xs:annotation>
                                <xs:documentation>2 letter code, not ZZ</xs:documentation>
                            </xs:annotation>
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:pattern value="([A-Y][A-Z]|Z[A-Y])"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
            <xs:element name="CollectionRequirements" maxOccurs="unbounded">
                <xs:complexType>
                    <xs:sequence>
                        <xs:element name="RequirementID">
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:maxLength value="12"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="RequirementName" minOccurs="0">
                            <xs:simpleType>
                                <xs:restriction base="xs:string">
                                    <xs:maxLength value="50"/>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="RequestorID" type="xs:string" minOccurs="0"/>
                        <xs:element name="ControlDate_UTCDateTime" type="UTCDateTime"/>
                        <xs:element name="RequirementPriority_int">
                            <xs:simpleType>
                                <xs:restriction base="xs:int">
                                    <xs:maxInclusive value="999"/>
                                    <xs:minInclusive value="0"/>
                                </xs:restriction>
                            </xs:simpleType>
```

```
</xs:element>
<xs:element name="Tasks" maxOccurs="unbounded">
<xs:complexType>
<xs:sequence>
<xs:element
name="TaskPriority_int">
<xs:simpleType>
<xs:restriction base="xs:int">
<xs:maxInclusive value="999"/>
<xs:minInclusive value="0"/>
</xs:restriction>
</xs:simpleType>
</xs:element>
<xs:element
name="EEI_ID" type="EEI_IDREF" minOccurs="0" maxOccurs="unbounded"/>
<xs:element
name="TargetData">
<xs:complexType>
<xs:sequence>
<xs:element name="TargetType">
<xs:complexType>
<xs:choice>
<xs:element name="PointTarget">
<xs:complexType>
<xs:sequence>
<xs:element name="BENumber">
<xs:annotation>
<xs:documentation>Either 10 or 15
letters, numbers, and symbols</xs:documentation>
</xs:annotation>
<xs:simpleType>
<xs:restriction base="xs:string">
<xs:pattern
value=".{10}(.{5})?"/>
</xs:restriction>
</xs:simpleType>
</xs:element>
```

```
<xs:element name="TargetName" type="xs:string"/>
<xs:element name="Target_CategoryCode_int"
minOccurs="0">
<xs:simpleType>
<xs:restriction base="xs:int">
<xs:minInclusive
value="0"/>
</xs:restriction>
</xs:simpleType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="DSATarget">
<xs:complexType>
<xs:sequence>
<xs:element name="TargetName">
<xs:simpleType>
<xs:restriction base="xs:string">
<xs:maxLength
value="38"/>
</xs:restriction>
</xs:simpleType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>
<xs:element name="LOCTarget">
<xs:complexType>
<xs:sequence>
<xs:element name="TargetName">
<xs:simpleType>
```

```
                                        <xs:restriction base="xs:string">
                                            <xs:maxLength value="38"/>
                                        </xs:restriction>
                                    </xs:simpleType>
                                </xs:element>
                            </xs:sequence>
                        </xs:complexType>
                    </xs:element>
                </xs:choice>
            </xs:complexType>
        </xs:element>
        <xs:element name="SectorBlanking" minOccurs="0">
            <xs:complexType>
                <xs:sequence>
                    <xs:element name="SectorName" type="xs:string"/>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
        </xs:sequence>
        </xs:complexType>
                                            </xs:element>
                                        </xs:sequence>
                                    </xs:complexType>
                                </xs:element>
                                <xs:element name="CollectionPrecedence_int" minOccurs="0">
                                    <xs:simpleType>
                                        <xs:restriction base="xs:int">
                                            <xs:maxInclusive value="999"/>
                                            <xs:minInclusive value="1"/>
                                        </xs:restriction>
                                    </xs:simpleType>
                                </xs:element>
                            </xs:sequence>
                        </xs:complexType>
                    </xs:element>
                </xs:sequence>
            </xs:complexType>
        </xs:element>
```

```xml
			<xs:element name="UAV">
				<xs:annotation>
					<xs:documentation>This defines the structure of the CRD custom intent
tags</xs:documentation>
				</xs:annotation>
				<xs:complexType>
					<xs:sequence minOccurs="0" maxOccurs="unbounded">
						<xs:element name="COLLECTION_INTENT" minOccurs="0"
maxOccurs="unbounded">
							<xs:complexType>
								<xs:all>
									<xs:element name="ID" type="ID_TYPE"/>
									<xs:element name="PAYLOAD_LIST"
type="CONFIGURATION_ITEM" minOccurs="0"/>
									<xs:element name="OPERATION_MODE"
type="xs:string" minOccurs="0"/>
									<xs:element name="PATTERN"
type="PATTERN_TYPE" minOccurs="0"/>
									<xs:element name="PAYLOAD_SETTINGS"
type="PAYLOAD_SETTINGS_TYPE" minOccurs="0"/>
								</xs:all>
							</xs:complexType>
						</xs:element>
						<xs:element name="COMMS_INTENT" type="COMMS_INTENT_TYPE"
minOccurs="0" maxOccurs="unbounded"/>
						<xs:element name="DISSEMINATION_INTENT" minOccurs="0"
maxOccurs="unbounded">
							<xs:complexType>
								<xs:all>
									<xs:element name="COMMS_SET_IN"
type="COMMS_INTENT_TYPE" minOccurs="0"/>
									<xs:element name="COMMS_SET_OUT"
type="COMMS_INTENT_TYPE" minOccurs="0"/>
									<xs:element name="ID" type="ID_TYPE"/>
									<xs:element name="INPUT_SOURCE"
type="CONFIGURATION_ITEM" minOccurs="0"/>
									<xs:element name="OUTPUT_DESTINATION"
type="CONFIGURATION_ITEM" minOccurs="0"/>
									<xs:element name="TIME_START" type="TIME_TYPE"
minOccurs="0"/>
									<xs:element name="TIME_STOP" type="TIME_TYPE"
minOccurs="0"/>
								</xs:all>
							</xs:complexType>
						</xs:element>
						<xs:element name="IFF_INTENT" minOccurs="0" maxOccurs="unbounded">
							<xs:complexType>
								<xs:all>
									<xs:element name="MODE1_CODE" type="xs:short"
minOccurs="0"/>
									<xs:element name="MODE1_ENABLE"
type="xs:boolean" minOccurs="0"/>
									<xs:element name="MODE2_CODE" type="xs:short"
minOccurs="0"/>
									<xs:element name="MODE2_ENABLE"
type="xs:boolean" minOccurs="0"/>
									<xs:element name="MODE3_CODE" type="xs:short"
minOccurs="0"/>
									<xs:element name="MODE3A_DURATION"
block="restriction" minOccurs="0">
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											<xs:simpleContent>
```

```
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                            <xs:attribute name="UNITS" type="UNITS_TYPE" fixed="seconds"/>
                        </xs:extension>
                    </xs:simpleContent>
                </xs:complexType>
            </xs:element>
            <xs:element name="MODE3A_ENABLE" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODE3A_IDENT" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODE4AB" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODE4_ENABLE" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODE4_HOLD" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODE4_ZEROIZE" type="xs:boolean" minOccurs="0"/>
            <xs:element name="MODEC_ENABLE" type="xs:boolean" minOccurs="0"/>
            <xs:element name="OPERATION_MODE" minOccurs="0">
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                        <xs:enumeration value="OFF"/>
                        <xs:enumeration value="STANDBY"/>
                        <xs:enumeration value="NORMAL"/>
                        <xs:enumeration value="EMERGENCY"/>
                    </xs:restriction>
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            </xs:element>
        </xs:all>
    </xs:complexType>
</xs:element>
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                <xs:restriction base="xs:string">
                    <xs:enumeration value="ON"/>
                    <xs:enumeration value="OFF"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="type" use="optional">
            <xs:simpleType>
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                    <xs:enumeration value="NAV_IR"/>
                    <xs:enumeration value="STROBE"/>
                    <xs:enumeration value="STROBE_IR"/>
                    <xs:enumeration value="LANDING"/>
                    <xs:enumeration value="NVD"/>
```

```
                                                <xs:enumeration value="LANDING_IR"/>
                                            </xs:restriction>
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                                    </xs:attribute>
                                </xs:complexType>
                            </xs:element>
                            <xs:element name="EMERGENCY_INTENT" minOccurs="0">
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                                            <xs:simpleType>
                                                <xs:restriction base="xs:string">
                                                    <xs:enumeration value="PWR_OFF"/>
                                                    <xs:enumeration value="PWR_ON"/>
                                                    <xs:enumeration value="ARM"/>
                                                    <xs:enumeration value="DISARM"/>
                                                    <xs:enumeration value="ACTIVATE"/>
                                                </xs:restriction>
                                            </xs:simpleType>
                                        </xs:element>
                                        <xs:element name="EMERGENCY_ROUTE_ENTRY_ID" type="xs:ID"/>
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                                    </xs:all>
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                            <xs:element name="LOITER_INTENT" minOccurs="0">
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                                                <xs:restriction base="xs:string">
                                                    <xs:enumeration value="CIRCLE"/>
                                                    <xs:enumeration value="FAA_HOLD"/>
                                                    <xs:enumeration value="FIGURE_8"/>
                                                    <xs:enumeration value="RACETRACK"/>
                                                </xs:restriction>
                                            </xs:simpleType>
                                        </xs:element>
                                        <xs:element name="LOITER_WIDTH" minOccurs="0">
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                                                <xs:simpleContent>
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                                                        <xs:attribute name="UNITS" type="UNITS_TYPE" fixed="FEET"/>
                                                    </xs:extension>
                                                </xs:simpleContent>
                                            </xs:complexType>
                                        </xs:element>
```

```
                        <xs:element name="REQ_LOOPS" type="xs:short"/>
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</xs:element>
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    <xs:annotation>
        <xs:documentation>The type for payload settings</xs:documentation>
    </xs:annotation>
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                    <xs:enumeration value="LOW_RES"/>
                    <xs:enumeration value="MED_RES"/>
                    <xs:enumeration value="HIGH_RES"/>
                    <xs:enumeration value="SAR_POLAR"/>
                    <xs:enumeration value="SAR_POINT"/>
                    <xs:enumeration value="SAR_STRIP"/>
                    <xs:enumeration value="GMTI_ARC"/>
                    <xs:enumeration value="GMTI_SPOT"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="RECORDING_INDEX" type="xs:double" minOccurs="0"/>
        <xs:element name="POLARITY" minOccurs="0">
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                    <xs:enumeration value="WHITE"/>
                    <xs:enumeration value="BLACK"/>
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            </xs:simpleType>
        </xs:element>
        <xs:element name="POINTER_MODE" minOccurs="0">
            <xs:simpleType>
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                    <xs:enumeration value="ANGLE_AV"/>
                    <xs:enumeration value="SLEW_AV"/>
                    <xs:enumeration value="SLEW_INERTIAL"/>
                    <xs:enumeration value="POSITION_SLAVED"/>
                    <xs:enumeration value="TARGET_SLAVED"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
        <xs:element name="PAYLOAD_MODE" minOccurs="0">
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                <xs:restriction base="xs:string">
                    <xs:enumeration value="BW"/>
                    <xs:enumeration value="COLOR"/>
                    <xs:enumeration value="CLUTTER"/>
                    <xs:enumeration value="MTI"/>
                    <xs:enumeration value="REC_GOTO"/>
                    <xs:enumeration value="REC_RECORD"/>
                    <xs:enumeration value="REC_SEEK"/>
                    <xs:enumeration value="REC_PLAY"/>
                    <xs:enumeration value="REC_REWIND"/>
                    <xs:enumeration value="REC_PAUSE"/>
                    <xs:enumeration value="REC_STOP"/>
```

```xml
				</xs:restriction>
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		</xs:element>
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				<xs:restriction base="xs:string">
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					<xs:enumeration value="EO"/>
					<xs:enumeration value="IR"/>
					<xs:enumeration value="BOTH"/>
					<xs:enumeration value=""/>
				</xs:restriction>
			</xs:simpleType>
		</xs:element>
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				<xs:simpleContent>
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						<xs:minInclusive value="0"/>
						<xs:totalDigits value="5"/>
						<xs:fractionDigits value="2"/>
					</xs:restriction>
				</xs:simpleContent>
			</xs:complexType>
		</xs:element>
		<xs:element name="FOV_HOR" minOccurs="0">
			<xs:complexType>
				<xs:simpleContent>
					<xs:restriction base="ANGLE_TYPE">
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						<xs:minInclusive value="0"/>
						<xs:totalDigits value="5"/>
						<xs:fractionDigits value="2"/>
					</xs:restriction>
				</xs:simpleContent>
			</xs:complexType>
		</xs:element>
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					<xs:enumeration value="VIDEO_QUANT"/>
					<xs:enumeration value="SAR_HUFF"/>
					<xs:enumeration value="SAR_QUANT"/>
				</xs:restriction>
			</xs:simpleType>
		</xs:element>
		<xs:element name="COMPRESSION_RATIO" type="xs:short" minOccurs="0"/>
		<xs:element name="ANGLE_ELEV" block="restriction" minOccurs="0">
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				<xs:simpleContent>
					<xs:restriction base="ANGLE_TYPE">
						<xs:maxInclusive value="180"/>
						<xs:minInclusive value="0"/>
						<xs:totalDigits value="5"/>
						<xs:fractionDigits value="2"/>
					</xs:restriction>
				</xs:simpleContent>
			</xs:complexType>
		</xs:element>
		<xs:element name="ANGLE_AZ" block="#all" minOccurs="0">
```

```xml
<xs:complexType>
    <xs:simpleContent>
        <xs:restriction base="ANGLE_TYPE">
            <xs:maxInclusive value="180"/>
            <xs:minInclusive value="0"/>
            <xs:totalDigits value="5"/>
            <xs:fractionDigits value="2"/>
        </xs:restriction>
    </xs:simpleContent>
</xs:complexType>
</xs:element>
<xs:element name="PAYLOAD_OPERATING_MODE" minOccurs="0">
    <xs:simpleType>
        <xs:restriction base="xs:string">
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            <xs:enumeration value="SYS_PWR_ON"/>
            <xs:enumeration value="DEVICE_PWR_ON"/>
            <xs:enumeration value="DEVICE_PWR_OFF"/>
            <xs:enumeration value="INITIALIZE"/>
            <xs:enumeration value="STANDBY"/>
            <xs:enumeration value="ACTIVATE"/>
            <xs:enumeration value="CALIBRATE"/>
            <xs:enumeration value="CAGE"/>
            <xs:enumeration value="STOW"/>
            <xs:enumeration value="DEPLOY"/>
        </xs:restriction>
    </xs:simpleType>
</xs:element>
<xs:element name="GMTI_SETTINGS" minOccurs="0">
    <xs:complexType>
        <xs:all>
            <xs:element name="BAR_END" type="xs:short" minOccurs="0"/>
            <xs:element name="BAR_START" type="xs:short"
minOccurs="0"/>
            <xs:element name="MAX_TARGETS" type="xs:short"
minOccurs="0"/>
            <xs:element name="MIN_DETECTABLE_VELOCITY"
minOccurs="0">
                <xs:complexType>
                    <xs:simpleContent>
                        <xs:extension base="xs:double">
                            <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="feet/second"/>
                        </xs:extension>
                    </xs:simpleContent>
                </xs:complexType>
            </xs:element>
            <xs:element name="MIN_SNR" minOccurs="0">
                <xs:complexType>
                    <xs:simpleContent>
                        <xs:extension base="xs:double">
                            <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="dB"/>
                        </xs:extension>
                    </xs:simpleContent>
                </xs:complexType>
            </xs:element>
            <xs:element name="MIN_TARGET_RCS" minOccurs="0">
                <xs:complexType>
                    <xs:simpleContent>
                        <xs:extension base="xs:double">
```

```
                                        <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="dBsf"/>
                                    &lt;/xs:extension&gt;
                                &lt;/xs:simpleContent&gt;
                            &lt;/xs:complexType&gt;
                        &lt;/xs:element&gt;
                        &lt;xs:element name="RANGE_RESOLUTION" minOccurs="0"&gt;
                            &lt;xs:complexType&gt;
                                &lt;xs:simpleContent&gt;
                                    &lt;xs:extension base="xs:double"&gt;
                                        <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="feet"/>
                                    &lt;/xs:extension&gt;
                                &lt;/xs:simpleContent&gt;
                            &lt;/xs:complexType&gt;
                        &lt;/xs:element&gt;
                        &lt;xs:element name="SLANT_RANGE" minOccurs="0"&gt;
                            &lt;xs:complexType&gt;
                                &lt;xs:simpleContent&gt;
                                    &lt;xs:extension base="xs:double"&gt;
                                        <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="feet"/>
                                    &lt;/xs:extension&gt;
                                &lt;/xs:simpleContent&gt;
                            &lt;/xs:complexType&gt;
                        &lt;/xs:element&gt;
                    &lt;/xs:all&gt;
                &lt;/xs:complexType&gt;
            &lt;/xs:element&gt;
            &lt;xs:element name="SAR_SETTINGS" minOccurs="0"&gt;
                &lt;xs:complexType&gt;
                    &lt;xs:all&gt;
                        &lt;xs:element name="RANGE" minOccurs="0"&gt;
                            &lt;xs:complexType&gt;
                                &lt;xs:simpleContent&gt;
                                    &lt;xs:extension base="xs:double"&gt;
                                        <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="feet"/>
                                    &lt;/xs:extension&gt;
                                &lt;/xs:simpleContent&gt;
                            &lt;/xs:complexType&gt;
                        &lt;/xs:element&gt;
                        &lt;xs:element name="RESOLUTION" minOccurs="0"&gt;
                            &lt;xs:complexType&gt;
                                &lt;xs:simpleContent&gt;
                                    &lt;xs:extension base="xs:double"&gt;
                                        <xs:attribute
name="UNITS" type="UNITS_TYPE" fixed="inches"/>
                                    &lt;/xs:extension&gt;
                                &lt;/xs:simpleContent&gt;
                            &lt;/xs:complexType&gt;
                        &lt;/xs:element&gt;
                    &lt;/xs:all&gt;
                &lt;/xs:complexType&gt;
            &lt;/xs:element&gt;
            &lt;xs:element name="ANGLE_REL"&gt;
                &lt;xs:simpleType&gt;
                    &lt;xs:restriction base="xs:string"&gt;
                        &lt;xs:enumeration value="NORTH"/&gt;
                        &lt;xs:enumeration value="BODY"/&gt;
                    &lt;/xs:restriction&gt;
                &lt;/xs:simpleType&gt;
```

```
				</xs:element>
			</xs:all>
		</xs:complexType>
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				<xs:documentation>The type for pattern tags</xs:documentation>
			</xs:annotation>
			<xs:all>
				<xs:element name="ALONG_TRACK" type="xs:short" minOccurs="0"/>
				<xs:element name="ALTITUDE" type="ALTITUDE_TYPE" minOccurs="0"/>
				<xs:element name="CROSS_TRACK" type="xs:short" minOccurs="0"/>
				<xs:element name="PATTERN_MODE" minOccurs="0">
					<xs:simpleType>
						<xs:restriction base="xs:string">
							<xs:enumeration value="RASTER_SENS"/>
							<xs:enumeration value="RASTER_UAV"/>
							<xs:enumeration value="SPOT_SENS"/>
							<xs:enumeration value="SPOT_UAV"/>
							<xs:enumeration value="TARGET_SENS"/>
							<xs:enumeration value="TARGET_UAV"/>
							<xs:enumeration value="WAS_SENS"/>
							<xs:enumeration value="WAS_UAV"/>
						</xs:restriction>
					</xs:simpleType>
				</xs:element>
				<xs:element name="PATTERN_START" type="xs:double" minOccurs="0"/>
				<xs:element name="PATTERN_TIME" type="xs:double" minOccurs="0"/>
				<xs:element name="PATTERN_TYPE" minOccurs="0">
					<xs:simpleType>
						<xs:restriction base="xs:string">
							<xs:enumeration value="POINT"/>
							<xs:enumeration value="LINE"/>
							<xs:enumeration value="TRACK_FOLLOW"/>
							<xs:enumeration value="SPIRAL"/>
							<xs:enumeration value="SPIRAL_REC"/>
							<xs:enumeration value="CIRCLE"/>
							<xs:enumeration value="RACETRACK"/>
							<xs:enumeration value="QUADRILATERAL"/>
							<xs:enumeration value="POLYGON"/>
							<xs:enumeration value="FIGURE_8"/>
							<xs:enumeration value="OWNTRACK"/>
						</xs:restriction>
					</xs:simpleType>
				</xs:element>
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				<xs:element name="REF_2" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="REF_3" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="REF_4" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="REF_5" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="REF_6" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="SPEED" type="AIRSPEED_TYPE" minOccurs="0"/>
				<xs:element name="TARGET" type="WGS84_POSITION_TYPE" minOccurs="0"/>
				<xs:element name="TRACK_SPACING" minOccurs="0">
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						<xs:simpleContent>
							<xs:extension base="xs:short">
								<xs:attribute name="UNITS" type="UNITS_TYPE"
fixed="feet"/>
							</xs:extension>
						</xs:simpleContent>
					</xs:complexType>
				</xs:element>
```

```
				<xs:element name="TARGET_ELEV" minOccurs="0">
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type="ELEVATION_VALUE_TYPE" minOccurs="0"/>
							<xs:element name="ELEVATION_SOURCE"
type="ELEVATION_SOURCE_TYPE" minOccurs="0"/>
						</xs:all>
					</xs:complexType>
				</xs:element>
			</xs:all>
		</xs:complexType>
		<xs:complexType name="COMMS_INTENT_TYPE">
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				<xs:documentation>The type for communications settings</xs:documentation>
			</xs:annotation>
			<xs:sequence>
				<xs:element name="ANTENNA_MODE" minOccurs="0">
					<xs:simpleType>
						<xs:restriction base="xs:string">
							<xs:enumeration value="STOW"/>
							<xs:enumeration value="DIRECTIONAL"/>
							<xs:enumeration value="OMNI"/>
							<xs:enumeration value="AUTO"/>
							<xs:enumeration value="POINT_TO_RECEIVER"/>
						</xs:restriction>
					</xs:simpleType>
				</xs:element>
				<xs:element name="COMMS_LIST" type="CONFIGURATION_ITEM" minOccurs="0"/>
				<xs:element name="COMMS_MODE" minOccurs="0">
					<xs:simpleType>
						<xs:restriction base="xs:string">
							<xs:enumeration value="SYS_PWR_OFF"/>
							<xs:enumeration value="SYS_PWR_ON"/>
							<xs:enumeration value="DEVICE_PWR_OFF"/>
							<xs:enumeration value="DEVICE_PWR_ON"/>
							<xs:enumeration value="INITIALIZE"/>
							<xs:enumeration value="STANDBY"/>
							<xs:enumeration value="RX_TX"/>
							<xs:enumeration value="RX"/>
							<xs:enumeration value="TX"/>
						</xs:restriction>
					</xs:simpleType>
				</xs:element>
				<xs:element name="COMMS_SECURITY" type="xs:boolean" minOccurs="0"/>
				<xs:element name="DATA_RATE" type="xs:double" minOccurs="0"/>
				<xs:element name="FREQ_RECEIVE" type="xs:double" minOccurs="0"/>
				<xs:element name="FREQ_TRANSMIT" type="xs:double" minOccurs="0"/>
				<xs:element name="ID" type="ID_TYPE"/>
				<xs:element name="POWER_TRANSMIT" type="PERCENT_TYPE" minOccurs="0"/>
				<xs:element name="RECEIVER_ALTITUDE" type="ALTITUDE_TYPE" minOccurs="0"/>
				<xs:element name="RECEIVER_LOCATION" type="WGS84_POSITION_TYPE"
minOccurs="0"/>
				<xs:element name="RETRANSMIT" type="xs:short" minOccurs="0"/>
				<xs:element name="SLOT_RECEIVE" type="xs:short" minOccurs="0"/>
				<xs:element name="SLOT_TRANSMIT" type="xs:short" minOccurs="0"/>
				<xs:element name="TIME_OUT" block="restriction" minOccurs="0">
					<xs:complexType>
						<xs:simpleContent>
							<xs:extension base="xs:double">
								<xs:attribute name="UNITS" type="UNITS_TYPE"
fixed="seconds"/>
```

```
                        </xs:extension>
                    </xs:simpleContent>
                </xs:complexType>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ANGLE_TYPE">
        <xs:annotation>
            <xs:documentation>The type for angle settings</xs:documentation>
        </xs:annotation>
        <xs:simpleContent>
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                <xs:attribute name="UNITS" type="UNITS_TYPE" fixed="degrees"/>
            </xs:extension>
        </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="PERCENT_TYPE">
        <xs:annotation>
            <xs:documentation>The type to set percentages</xs:documentation>
        </xs:annotation>
        <xs:simpleContent>
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            </xs:extension>
        </xs:simpleContent>
    </xs:complexType>
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        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
    </xs:complexType>
    <xs:complexType name="CONFIGURATION_ITEM">
        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
    </xs:complexType>
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        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
    </xs:complexType>
    <xs:complexType name="WGS84_POSITION_TYPE">
        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
    </xs:complexType>
    <xs:complexType name="AIRSPEED_TYPE">
        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
    </xs:complexType>
    <xs:complexType name="TIME_TYPE">
        <xs:annotation>
            <xs:documentation>Defined in core CRD listing</xs:documentation>
        </xs:annotation>
        <xs:attribute name="UNITS" type="UNITS_TYPE" fixed="seconds"/>
    </xs:complexType>
    <xs:simpleType name="UNITS_TYPE">
        <xs:annotation>
            <xs:documentation>Defined in Core CRD listing</xs:documentation>
        </xs:annotation>
        <xs:restriction base="xs:string"/>
```

```xml
	</xs:simpleType>
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		<xs:annotation>
			<xs:documentation>Defined in core ATCM</xs:documentation>
		</xs:annotation>
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			<xs:maxLength value="35"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:simpleType name="CountryCode3OrOrg4">
		<xs:restriction base="xs:string">
			<xs:pattern value="[A-Z]{3,4}"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:simpleType name="EEI_ID">
		<xs:annotation>
			<xs:documentation>Defined in core ATCM</xs:documentation>
		</xs:annotation>
		<xs:restriction base="xs:ID">
			<xs:pattern value="EEI_[0-9]+"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:simpleType name="EEI_IDREF">
		<xs:annotation>
			<xs:documentation>Defined in core ATCM</xs:documentation>
		</xs:annotation>
		<xs:restriction base="xs:IDREF">
			<xs:pattern value="EEI_[0-9]+"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:simpleType name="UTCDateTime">
		<xs:annotation>
			<xs:documentation>Standard XML dateTime, except required to explicitly have "Z" zulu specifier at end.</xs:documentation>
		</xs:annotation>
		<xs:restriction base="xs:dateTime">
			<xs:pattern value=".*Z"/>
		</xs:restriction>
	</xs:simpleType>
	<xs:complexType name="ELEVATION_VALUE_TYPE">
		<xs:annotation>
			<xs:documentation>Defined in core CRD</xs:documentation>
		</xs:annotation>
	</xs:complexType>
	<xs:simpleType name="ELEVATION_SOURCE_TYPE">
		<xs:annotation>
			<xs:documentation>Defined in core CRD</xs:documentation>
		</xs:annotation>
		<xs:restriction base="xs:string"/>
	</xs:simpleType>
	<xs:complexType name="MissionNumberType">
		<xs:annotation>
			<xs:documentation>Defined in core ATCM</xs:documentation>
		</xs:annotation>
		<xs:sequence>
			<xs:element name="ProgramCode">
				<xs:simpleType>
					<xs:restriction base="xs:string">
						<xs:pattern value="([0-8A-Z][A-Z]|9[0-9A-Y])">
							<xs:annotation>
								<xs:documentation>2 alphanumeric, do not use 9Z</xs:documentation>
```

```
                                        </xs:annotation>
                                    </xs:pattern>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="Month_int">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:pattern value="(0?[1-9]|1[0-2])">
                                        <xs:annotation>
                                            <xs:documentation>01-12 or 1-
12</xs:documentation>
                                        </xs:annotation>
                                    </xs:pattern>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="Sortie_int">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:minInclusive value="01"/>
                                    <xs:pattern value="[0-9]{2}">
                                        <xs:annotation>
                                            <xs:documentation>Must be 2 digits, 01-
99</xs:documentation>
                                        </xs:annotation>
                                    </xs:pattern>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                        <xs:element name="Year_int">
                            <xs:simpleType>
                                <xs:restriction base="xs:integer">
                                    <xs:pattern value="[0-9]{4}">
                                        <xs:annotation>
                                            <xs:documentation>4 digits, no explicit
constraint on range</xs:documentation>
                                        </xs:annotation>
                                    </xs:pattern>
                                </xs:restriction>
                            </xs:simpleType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
                <xs:simpleType name="MissionIdentifierType">
                    <xs:restriction base="xs:string">
                        <xs:maxLength value="54"/>
                    </xs:restriction>
                </xs:simpleType>
</xs:schema>
```

Attachment B2-5: KLV Metadata Elements

This section contains information regarding common metadata parameters which should be used by a STANAG 4586 compliant UCS. Table B2-5.1 provides the comprehensive list of metadata elements from Engineering Guide 0601.1, UAS Datalink Local Metadata Set, which has been adopted by many existing UAV systems.

It should be noted that an "X" in the first column indicates that the particular element is suggested for implementation in order to enhance imagery exploitation. If the particular element is implemented, then it shall be applicable to the interface specified in the second column of the table – either the CCI interface only, or both the CCI and DLI interfaces. This table also specifies for each element which unique DLI message/field is to be used.

Suggested Elements [2]	DLI / CCI [3]	UAS LDS Key [1]	Name [1]	DLI Unique identifier
X	Co	1	Checksum	-
X	D&C	2	UNIX Time Stamp	0101.01
X	Co	3	Mission ID	0020.10
	Co	4	Platform Tail Number	0020.09
X	D&C	5	Platform Heading Angle	0101.16
X	D&C	6	Platform Pitch Angle	0101.15
X	D&C	7	Platform Roll Angle	0101.14
	Co	8	Platform True Airspeed	0102.06
	Co	9	Platform Indicated Airspeed	0102.07
	Co	10	Platform Designation	0020.06 & 0020.07
X	D&C	11	Image Source Sensor	-
X	Co	12	Image Coordinate System	-
X	D&C	13	Sensor Latitude	0101.04
X	D&C	14	Sensor Longitude	0101.05
X	D&C	15	Sensor True Altitude	0101.06
X	D&C	16	Sensor Horizontal Field of View	0302.13

Suggested Elements [2]	DLI / CCI [3]	UAS LDS Key [1]	Name [1]	DLI Unique identifier
X	D&C	17	Sensor Vertical Field of View	0302.11
X	D&C	18	Sensor Relative Azimuth Angle	0302.12
X	D&C	19	Sensor Relative Elevation Angle	0302.10
X	D&C	20	Sensor Relative Roll Angle	0302.14
	Co	21	Slant Range	-
X	Co	22	Target Width	-
X	Co	23	Frame Center Latitude	0302.16
X	Co	24	Frame Center Longitude	0302.17
X	Co	25	Frame Center Elevation	0302.18
	Co	26	Offset Corner Latitude Point 1	-
	Co	27	Offset Corner Longitude Point 1	-
	Co	28	Offset Corner Latitude Point 2	-
	Co	29	Offset Corner Longitude Point 2	-
	Co	30	Offset Corner Latitude Point 3	-
	Co	31	Offset Corner Longitude Point 3	-
	Co	32	Offset Corner Latitude Point 4	-
	Co	33	Offset Corner Longitude Point 4	-
	D&C	34	Icing Detected	
	Co	35	Wind Direction	0102.09 & 0102.10
	Co	36	Wind Speed	0102.09 & 0102.10
	D&C	37	Static Pressure	0102.14
	D&C	38	Density Altitude	0102.08 & 0102.14
	D&C	39	Outside Air Temperature	0102.08
	Co	40	Target Location Latitude	-
	Co	41	Target Location Longitude	-
	Co	42	Target Location Elevation	-

Suggested Elements [2]	DLI / CCI [3]	UAS LDS Key [1]	Name [1]	DLI Unique identifier
	Co	43	Target Track Gate Width	-
	Co	44	Target Track Gate Height	-
	Co	45	Target Error Estimate - CE90	-
	Co	46	Target Error Estimate - LE90	-
	Co	47	Generic Flag Data 01	-
X	Co	48	Security Local Metadata Set	-
	D&C	49	Differential Pressure	0102.07
	D&C	50	Platform Angle of Attack	0102.04
	D&C	51	Platform Vertical Speed	0101.10
	D&C	52	Platform Sideslip Angle	0102.05
	Co	53	Airfield Barometric Pressure	-
	Co	54	Airfield Elevation	-
	Co	55	Relative Humidity	-
	D&C	56	Platform Ground Speed	0102.17 & 0102.18
	Co	57	Ground Range	-
	D&C	58	Platform Fuel Remaining	0104.16
	Co	59	Platform Call Sign	0020.08
	Co	60	Weapon Load	-
	Co	61	Weapon Fired	-
	Co	62	Laser PRF Code	0302.24
	Co	63	Sensor Field of View Name	-
	D&C	64	Platform Magnetic Heading	0101.16 & 0101.20
X	D&C	65	UAS LDS Version Number	-
	Co	66	Target Location Covariance Matrix	-
	D&C	67	Alternate Platform Latitude	-

Suggested Elements [2]	DLI / CCI [3]	UAS LDS Key [1]	Name [1]	DLI Unique identifier
	D&C	**68**	Alternate Platform Longitude	-
	D&C	**69**	Alternate Platform Altitude	-
	D&C	**70**	Alternate Platform Name	-
	D&C	**71**	Alternate Platform Heading	-
	Co	**72**	Event Start Time - UTC	-

Table B2-5.1
EG0601.1 KLV Metadata Elements and DLI/CCI Mapping Requirements

Table notes:

1. The element name and key refers to MISB EG0601.1 UAS Datalink Local Metadata Set.
2. Elements marked with a ”X” are suggested to be included as an extended list of elements, oriented for image exploitation.
3. (Co): The element shall be available at the CCI only.
   (D&C): The element shall be available at the DLI and the CCI.

APPENDIX 3 – HUMAN COMPUTER INTERFACE

TABLE OF CONTENTS

LIST OF FIGURES

1 Introduction.

1.1 Scope.

NATO Standardization Agreement (STANAG 4586) Annex B Appendix 3 specifies the Human Computer Interface (HCI) requirements that a CUCS shall support for various levels of interoperability. As illustrated in Figure B3-1, the HCI is an integral element of the CUCS. STANAG 4586 Annex B Appendix 3 specifies requirements which will contribute to UAV interoperability.

The HCI requirements should facilitate seamless integration of NATO UAV systems into joint combined NATO battlefield infrastructures across the five Levels of Interoperability (LOI).

The HCI Appendix 3 establishes the general requirements for information to be displayed by the UCS. The requirements detail the functions and interactions that the UCS shall allow the operator to perform.

Annex B Appendix 3 specifies the requirements levied upon the UCS, and does not impose any requirements on Human Factors (HF) and ergonomics.

The HCI complies with the NATO C3 Technical Architecture's NC3 Common Standards Profile (NCSP).

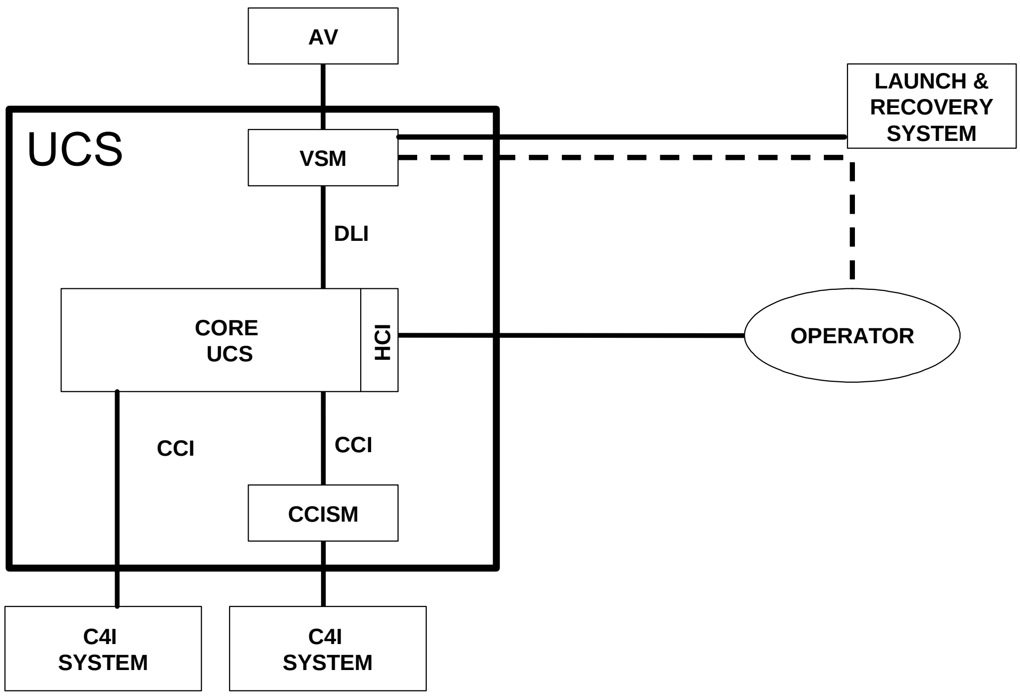

Figure B3 - 1. UCS Functional Architecture

Although portions of the HCI will have a physical implementation within a CUCS, Annex B Appendix 3 does not impose any design requirements. This means that there are no restrictions to size, form or components used in an HCI implementation. The reader is referred to the STANAG 4586 Implementation Document for recommended methods to incorporate HCI functional requirements, but some examples follow. Example 1: a HCI may be a dual workstation in a shelter offering a high degree of functionality required by a High Altitude Long Endurance (HALE) UAV, whereas a small portable unit (hand-held computer) used to operate a Micro Air Vehicle (MAV) would also be considered a HCI implementation. Example 2: for a maritime UCS, there may be a HCI providing LOI 5 functionality, while lower levels of functionality (LOI 1 or 2) could be required on other parts of the vehicle, which may require a different HCI.

Within this appendix, the applicable LOI have been identified for all requirements (both mandatory ‘shall’ and recommended ‘should’ statements). This has the effect of clearly identifying what requirements the CUCS should be compliant with in order to enable the required LOI.

2 Functional Requirements.

This section provides a set of mandatory requirements and recommendations for the HCI to allow user interoperability between NATO Nations' UAV assets. These are categorised under the following headings:

- 2.1 General Requirements
- 2.2 UCS Configuration
- 2.3 Mission Planning
- 2.4 Air Vehicle Control
- 2.5 Operator Control and Monitoring
- 2.6 Payload Control and Monitoring
- 2.7 Warnings, Cautions, and Advisories
- 2.8 Communications Management

Following the functional requirements statements, the applicable LOIs are presented.

In the following sections a 'qualified operator' is a system operator who has been determined by the operational system user, e.g. US Air Force, to be qualified to perform the specified function. Since this is an operational requirement it will not/can not be tested/verified by the acquisition/development organization and does not have to be validated as part of the component and system test.

2.1 General Requirements.

The operator shall have the ability to enter and synchronise a time with the UAV System and applicable C4I systems. This applies to LOIs 1, 2, 3, 4, and 5.

2.2 UCS Configuration.

The HCI shall provide the operator with the ability to generate, receive, display, edit, and send message types that have been defined in the STANAG 4586 as applicable to required LOI. This applies to LOIs 1, 2, 3, 4, and 5.

The operator shall be able to globally change the measurement units (e.g., change from imperial units to metric, or Latitude/Longitude to Universal Transverse Mercator (UTM) or Military Grid Reference System (MGRS)). This applies to LOIs 1, 2, 3, 4, and 5.

2.3 Mission Planning.

Mission Planning includes all planning aspects of all phases of the mission contained in the ATO (e.g., pre-flight and in-flight for AV, payload, data link and communications.) For CUCSs, which have the capability to generate mission plan(s), the HCI shall enable a qualified operator to create, edit, and save a mission plan(s). For mission plans developed external to the CUCS, the HCI shall enable a qualified operator to import, view, and save a mission plan. This applies to LOIs 3, 4, and 5.

The HCI shall enable a qualified operator to update (without uploading) a current mission plan at any time before or during flight. This applies to LOIs, 3, 4, and 5.

The HCI shall provide a qualified operator with the ability to upload mission plans to the AV. This applies to LOIs 3, 4 and 5.

2.4 Air Vehicle Control.

The HCI shall provide controls and displays for controlling/monitoring the air vehicle in all supported flight modes. This applies to LOIs 4 & 5.

The operator shall have the ability to pass AV control (handover) to another UCS with a qualified operator(s) and monitor the status of the handover as per the mechanisms defined in Appendix 1 (DLI). This applies to LOIs 4 and 5.

2.5 Operator Control and Monitoring.

The HCI shall provide an image display to allow the operator to view image files from external C4I sources. This applies to LOI 1, 2 and 3.

2.6 Payload Control and Monitoring.

The Payload Control HCI functions defined within the CUCS will be generic to types of payload, rather than specific payloads, where possible. The payload types are:

- Imaging Sensors (Passive) (including visible and infrared wavebands, hyperspectral, and multispectral sensors)
- Imaging Sensors (Radar/Active Sensors) (including Airborne Radar, Synthetic Aperture Radar (SAR) and Moving Target Indicator (MTI))
- Laser Based Payloads (e.g., Laser Range Finders, Laser Target Designators)
- Communications Relay (CR)
- Stores (Dispensing) payloads (to include weapons, humanitarian aid, unattended ground sensors, buoys)

The HCI shall provide sufficient controls and displays to control payloads and all associated functions for only those payloads that have been validated with the current CUCS. This applies to LOI 3.

The HCI shall provide sufficient controls and displays to monitor payloads and all associated functions for only those payloads that have been validated with the current CUCS. This applies to LOI 2 and 3.

A qualified operator shall have the ability to pass and receive control (handover) of the AV's payload to/from another control system and monitor the payload control via the mechanisms defined in Appendix 1 (DLI). This applies to LOI 3.

For payloads that generate motion imagery, the operator shall have a motion imagery display. This applies to LOIs 2 and 3.

Stores (dispensing) payloads are considered to be those that are released from the UAV as part of the UAV mission objectives. This can include the release of weapons or deployment of remote sensors, etc. The release mechanism for the payload shall be clearly identified and labelled to the operator. This applies to LOI 3.

A safety interlock shall operate such that the operator cannot inadvertently release the payload. This applies to LOI 3.

For multiple-shot dispensing payloads, the number of uses remaining shall be indicated to the operator. This applies to LOIs 2 and 3.

2.7 Warnings, Cautions, and Advisories.

Warnings, cautions, and advisories inform the operator about any unusual or critical condition. The HCI shall provide the capability to display and manage warnings, cautions, and advisories as defined in Annex B of STANAG 4586. This applies to LOIs 2, 3, 4, and 5.

2.8 Communications Management.

Communications Management controls the communications links between the UCS and the UAV. This would include any additional antennas or data links required to support a specific payload (e.g., a CR payload). It provides the operator at the CUCS with the ability to configure the data links and to change a number of parameters of the VDT and the CDT. Whilst the majority of data link parameters will be controlled from the CUCS, some more specific data link functions will need to be controlled through the DLI. Refer to Appendix 1: Data Link Interface for further details.

The HCI shall provide the operator with the ability to open and control the communications links between the CUCS and other outside agencies such as:

- C4I systems via the CCI interface
- Air traffic control via both voice and data links
- VDT/CDT

This applies to LOIs 1, 2, 3, 4, and 5.

The CUCS shall provide an antenna/data link status display. This display does not necessarily have to be separate from the AV control/monitor display. This applies to LOIs 2, 3, 4, and 5.