NATO STANDARDIZATION AGENCY
AGENCE OTAN DE NORMALISATION

8 November 2007 NSA1022(2007)NAVY/4586

STANAG 4586 NAVY (EDITION 2) – STANDARD INTERFACES OF UAV CONTROL SYSTEM (UCS) FOR NATO UAV INTEROPERABILITY

References:
a. AC/141-D/0770 of 18 April 2005 (Edition 2) (Ratification Draft)
b. NSA/0435-NAVY/4586 of 20 April 2007 (Edition 1)

1. The enclosed NATO Standardization Agreement which has been ratified by nations as reflected in the NATO Standardization Document Database (NSDD) is promulgated herewith.

2. The references listed above are to be destroyed in accordance with local document destruction procedures.

ACTION BY NATIONAL STAFFS

3. National staffs are requested to examine their ratification status of the STANAG and, if they have not already done so, advise the Naval Section, Defence Investment Division, through their national delegation as appropriate, of their intention regarding its ratification and implementation.

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

Enclosure:
STANAG 4586 (Edition 2)

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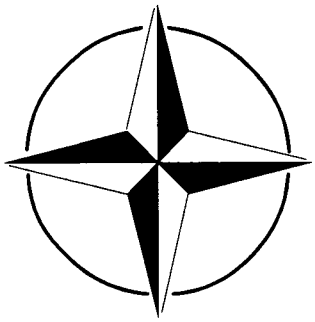
STANAG 4586
(Edition 2)

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 8 November 2007

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

RECORD OF AMENDMENTS

N°	Reference/date of Amendment	Date entered	Signature
1	NSA/0903(2009)NAVY/4586 28-08-2009	28-08-2009	W.Duensing

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 STANDARDISATION 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 Standardisation will support interoperability of legacy as well as future UAV systems.

AGREEMENT

2. This NATO Standardisation Agreement (STANAG) is promulgated by the Chairman NSA under the authority vested in him by the NATO Military Committee. No departure should be made from the agreement without consultation with the tasking authority where they will be processed in the same manner as the original agreement. 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). 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.

REFERENCE DOCUMENTS:

3. The following Standardisation 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. NATO Standards Agency (NSA) maintains registers of currently valid STANAGs.

AAP-6 (V) - Definitions
ADatP-3 - NATO Message Text Formatting System (Formets) - Concept of Formets (Conformets)
AEDP-2 - NATO ISR Interoperability Architecture
AEDP-4 - STANAG 4545, NATO Secondary Imagery Format (NSIF) Implementation Guide
APP 11 - NATO Message Catalogue (NMC)
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)
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 Electrotechnical 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
STANAG 3150 Codification - Uniform System of Supply Classification
STANAG 3151 Codification - Uniform System of Item Identification
STANAG 3377 AR (Edition 6) – Air Reconnaissance Intelligence Report Forms
STANAG 3809 Digital Terrain Elevation Data (DTED) 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 Format (NGMTIF)
STANAG 4609, NATO Digital Motion Imagery Standard
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
STDI-0002, National Imagery and Mapping Agency, “The Compendium of Controlled Extensions (CE) for the National Imagery Transmission Format (NITF)”, CMETAA Support Data Extension.
Transport 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 and Control Interface (CCI) 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 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.

CHANGES TO EDITION 1

9. Based on the results of a Canadian funded STANAG 4586 Edition1 validation effort using simulated environment, further analysis by PG/35 Specialist Team (ST) supported by NATI Industrial Advisory Group (NIAG) Study Group 73 (S/G 73), and feedback from national programs and industries supporting development of UAV Systems, changes to Edition 1 have been identified, analyzed, and agreed to by the ST and are forwarded for national review and ratification. The changes fall into the following areas:

- Definitions of levels of interoperability have been revised to separate payload control (LOI 3) from air vehicle control (LOI 4)
- Human Computer Interface (HCI) has been redefined as Core UAV Control System (CUCS) capability requirements rather then as an interface like the DLI or CCI

- HCI guidance has been moved to the STANAG 4586 Implementation Guide
- Additional messages and fields have been added to the DLI in support of configuration definition of the UCS components (e.g., Core UCS and Vehicle Specific Module (VSM))
- Technical and administrative errors have been corrected and editorial changes to clarify requirements

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, Phone # 1-760-939-4287 (U.S.) or 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
ADT	Air Data Terminal
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
CEN	European Standardisation 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	
GDT	Ground Data Terminal
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 Standardisation
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 (Standardisation 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
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
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 Standardisation 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) Standardisation 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
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 Data Terminal (ADT)	The data link element consists of the air data terminal in the air vehicle and the ground data terminal (GDT) on the ground. Connectivity between the GDT and ADT is prerequisite for Level 2, 3, 4, and 5 interoperability.
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	In intelligence usage, a step in the processing phase of the intelligence cycle in which information is subjected to review in order to identify significant facts for subsequent interpretation.

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 determination of the affect of all air attacks on targets (e.g., bombs, rockets, strafing, etc.).
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.
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 and 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	An item of an interchangeable nature which is in common use by two or more nations or services of a nation.
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 bit-mapped 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).
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.
Ground Data Terminal	The data link element consists of the air data terminal in the air vehicle and the ground data terminal (GDT) that can be located either on the ground or in the air (e.g., Command and Control aircraft). Connectivity between the GDT and ADT is prerequisite for Level 2, 3, 4, and 5 interoperability.
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 displaying, assembly into imagery packs, identification, interpretation, mensuration, information extraction, the preparation of reports (including annotated images) and the dissemination of information.
Integration	Refers to combining segments – not systems – and ensuring that the segments work correctly within the environment; do not adversely impact one another; and conform to standards. Integration does not imply interoperability. It only provides a level of assurance that the system will work as designed.
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 of Alliance forces and, when appropriate, forces of Partner and other nations to train, exercise and operate effectively together in the execution of assigned missions and 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 which uses laser energy for determining the distance from the device to a place or object.

Level of Interoperability (LOI)	Multiple levels of interoperability are feasible between different UAVs and their UAV Ground Stations (UCSs). Maximum operational flexibility can be achieved if the UCS supports the following levels of interoperability with the UAV: Level 1: Indirect receipt of UAV data Level 2: Direct receipt of UAV data where "direct" covers reception of the UAV data by the UCS when it has direct communication with the UAV. Level 3: Control and monitoring of the UAV payload in addition to direct receipt of UAV data Level 4: Control and monitoring of the UAV, less launch and recovery Level 5: Control and monitoring of the UAV (Level 4), plus launch and recovery functions Note: Although these LOI definitions do not address dissemination of the UAV data from the UCS to external C^4I systems, this functionality may be required by specific systems and associated requirements are addressed in Appendix B-2.
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.
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 Standardisation Agreement (NATO STANAG)	The record of an agreement among several or all the member nations to adopt like or similar military equipment, ammunition, supplies, and stores; and operational, logistic, and administrative procedures. National acceptance of a NATO Allied publication issued by the NATO Standardisation Agency (NSA) may be recorded as a Standardisation Agreement.
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 characteristics of a particular area.
Recovery	A mission which involves the return of an aircraft to base and includes the approach to the landing platform, & landing. If the Air Vehicle is to be stowed after flight, securing on deck and handling of the Air Vehicle (AV) is also included.
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 locate and recover 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	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	The NATO term derived from standardization agreement. See NATO Standardization Agreement.
Standardization	The development and implementation of concepts, doctrines, procedures and designs to achieve and maintain the required levels of compatibility, interchangeability or commonality in the operational, procedural, material, technical and administrative fields to attain interoperability.

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	a) A geographical area, complex, or installation planned for capture or destruction by military forces. b) In intelligence usage, a country, area, installation, agency, or person against which intelligence operations are directed.
Target Acquisition	The detection, identification, and location of a target in sufficient detail to permit the effective employment of weapons. Increasingly applied to reconnaissance as the object(s) of search and location activity, whether to provide intelligence data or to cue weapon systems directly.
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	Accurate location and updating of target positions (in terms of geographic co-ordinates) 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 nonlethal payload.
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 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 2

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

Currently, many UAV systems are not fully interoperable. The interfaces defined in the NIIA provide interoperability for ISR systems at Levels 1 and 2 for digital sensors compliant with the applicable referenced STANAGS, 7085 compliant data link and NC3TA specified communications protocols.

Current or “legacy” UAV systems 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 for UAV systems 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 Level of Interoperability (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 new combinations of UAV systems, which result from combining the operation of assets from different UAV systems. Compliance with STANAG 4586 will ease this process and likely UAV System combinations can be certified in advance.

On this basis UAV systems 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 UAV systems.

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 should be allocated to the VSM function.
- The UAV system scalability is independent of the contents of the STANAG.

1.3 Annex B Structure.

Annex B provides a top level description of interoperability objectives and the approach taken to achieve UAV systems interoperability through standardising the interfaces between the CUCS and the air vehicle, the CUCS and external C4I systems, and the CUCS 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. The following Appendices are elements of Annex B.

- **Appendix B1** 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 exploit different UAVs and payloads and to support the required UAV System operator(s) interface as specified in the Human Computer Interface (HCI), Appendix B3.
- **Appendix B2** 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 B2 - 1 and lists the UCS ADatP-3 Message Implementation Requirements, Attachment B2 - 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 B3.

- **Appendix B3** describes the Human Computer Interface (HCI) requirements and services that the CUCS will provide to the UAV System operator(s).

2 Interoperability Concepts.

2.1 Overview.

A UAV System 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 air vehicle (AV), 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 air data terminal in the air vehicle and the ground data terminal (may be located on surface, sub-surface or air platforms). Control of the UAV System is achieved through the UCS and data link elements. Although shown as part of the UAV 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).

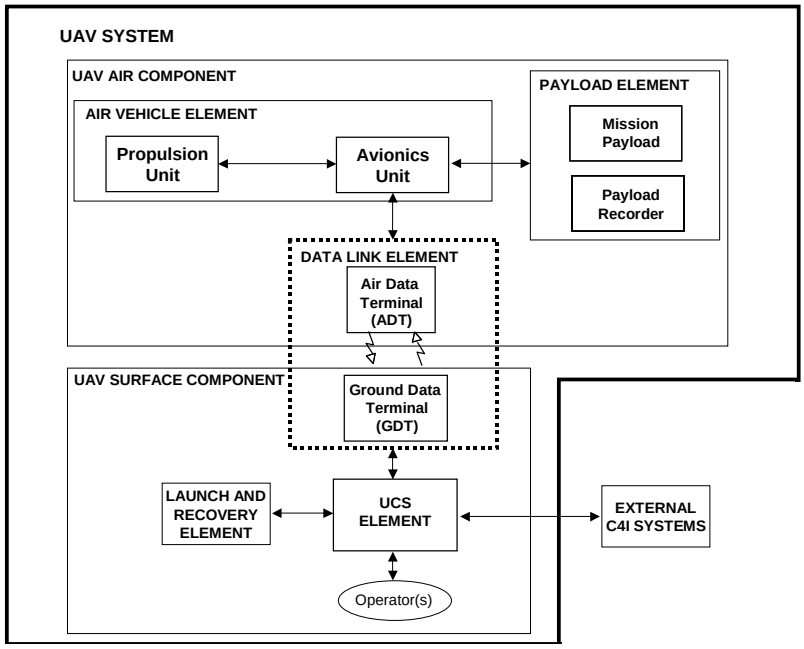

Figure B - 1. UAV System Elements

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

2.2 Current Status of UAV Systems Interoperability.

Current UAV systems are mostly “stove pipe” systems. They utilize unique data links, communication protocols and message formats for communication between UCS and Air Vehicle 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 UAV System Operations in Joint NATO Operations are illustrated in Figure B - 2.

The illustrated UAV systems all utilize unique data links and UCS as well as unique data/message formats for communication between the Air Vehicle 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” UAV systems may not support.

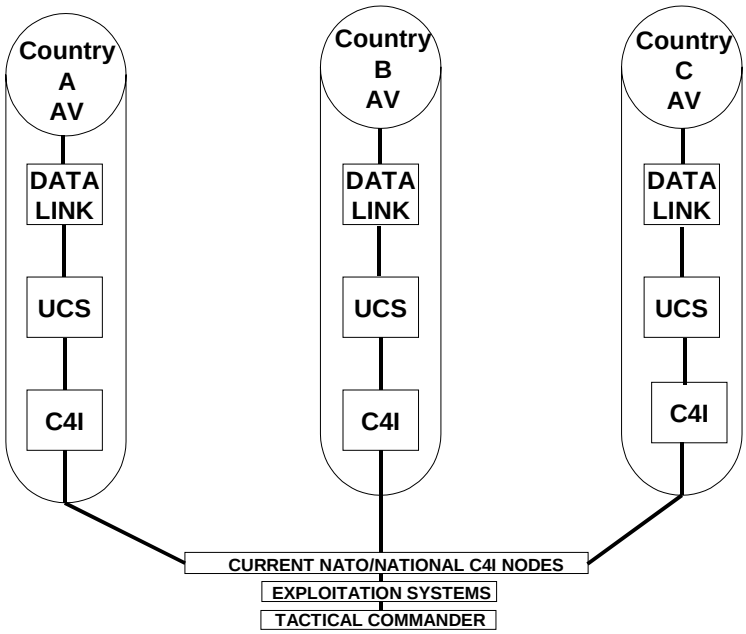

Figure B - 2. Current UAV System Operations Example

2.3 Levels of Interoperability.

The following list defines the Levels of Interoperability for STANAG compliant UAV systems:

Level 1: Indirect receipt of UAV related data

Level 2: Direct receipt of ISR/other data where “direct” covers reception of the UAV data by the UCS when it has direct communication with the UAV.

Level 3: Control and monitoring of the UAV payload in addition to direct receipt of ISR/other data

Level 4: Control and monitoring of the UAV, less launch and recovery

Level 5: Control and monitoring of the UAV (Level 4), plus launch and recovery functions

Level 2 monitoring and Level 3 controls are divisible by payload for an air vehicle where there is more than one payload located onboard the air vehicle. Level 4 interoperability is for the air vehicle alone, and does not include payload control that is specified as Level 3 control. A CUCS controlling both the air vehicle and its payload is exercising Level 3 and Level 4 control.

The interoperability levels defined above can be enabled through the standardization of interfaces between the UAV system 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 UAV systems. In addition, Level 2 and above (Level 2, 3, 4, and 5) interoperability requires the use of a Ground Data Terminal (GDT) that is interoperable with the Air Data Terminal (ADT), (e.g., connectivity between the GDT and ADT is prerequisite for Level 2,3,4 and 5 interoperability).

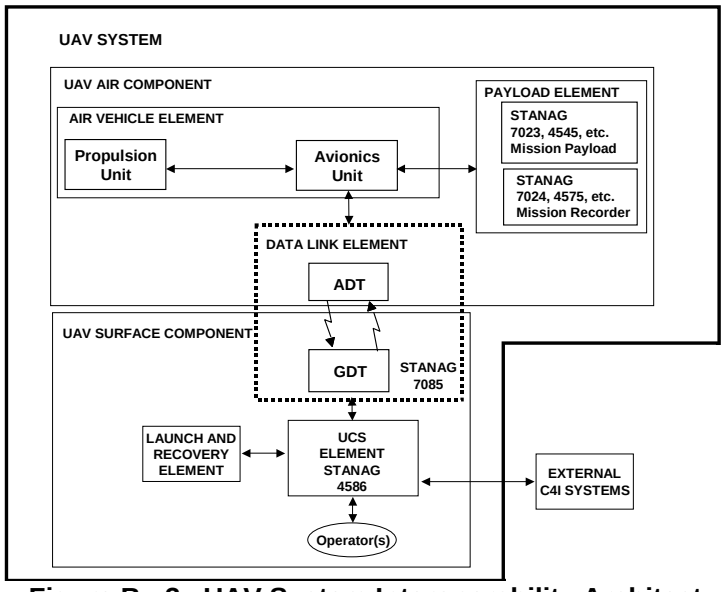

Figure B - 3. UAV System Interoperability Architecture

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

Currently, there is no standard that defines the interfaces between the UCS and the AV (including launch and recovery functions) via the GDT. 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 UAV systems. In addition, there are no standards/agreements as to the type of information that a UAV system operator should be presented nor for defining a system operator's required levels of proficiency.

STANAG 4586 provides the standardization of these interfaces. UAV systems, which are compliant with STANAG 4586, including the referenced STANAGs and standards, will enable interoperability at Level 2 or above. For Level 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 interoperability level are identified in the Annex B.

Thus the approach to enabling the desired level of UAV interoperability 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 AV(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 for data links by NAFAG Air Group IV and NATO International Military Staff (IMS) for interoperable encryption standards. A standard for a secondary or "back up" data link for UAV systems requiring one, or for use in tactical UA systems not requiring the capability of a STANAG 7085 Data Link is not currently available and needs to be developed.
- 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 UAV System 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.

3 UCS Functional Architecture.

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

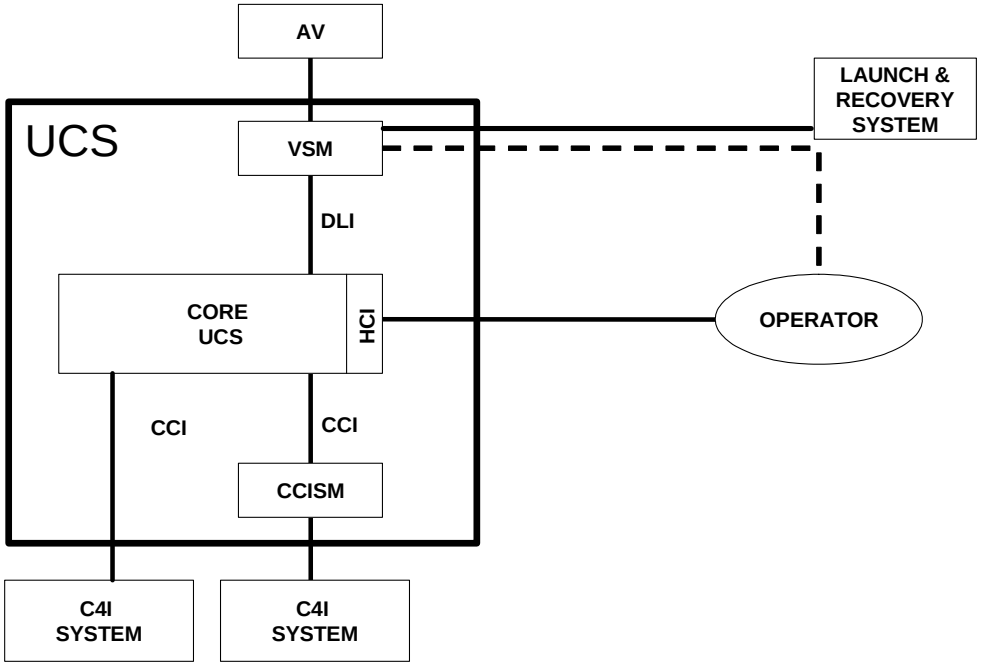

Figure B - 4. UCS Functional Architecture

This 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)

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 UAV systems, 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 purposes (surveillance, reconnaissance, and combat). Future UAV systems should utilize a STANAG 7085 compliant data link system. For those that do not (future as well as legacy systems), an ADT compatible GDT shall be provided in order to achieve Level 2 and above interoperability.

In similar fashion, the CCI interface shall support legacy as well as future C4I systems (e.g., Allied Command and Control System (ACCS)). Thus, the interface between the Core UCS 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 NATO C3 Technical Architecture's (NC3TA's) NC3 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 Vehicle Specific Module (VSM) function is introduced which provides the unique/proprietary communication protocols, interface timing, and data formats that the respective air vehicles require. The VSM will also 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 UAV system are not STANAG 7085 compliant (such as a low band link providing beyond line-of-sight connectivity, e.g. SATCOM data link), then the GDT associated with the non-compliant data link must be provided and interfaced with the UCS via the VSM DLI function or the capability to receive and process the DLI specified Data Link Control and Status messages should be incorporated in the GDT. The VSM function can be hosted on the air vehicle and/or on the ground. A ground based VSM function can reside on the same, different, or even remote hardware with respect to the core UCS, as long as sufficient bandwidth is provided for the message interface. If the VSM is hosted on the air vehicle, the vehicle specific launch and recovery and unique data link functions will, due to latency and band width, still need to be hosted in a ground based component of the UAV System. 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 UAV systems, it may be necessary to introduce 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 GDT and incorporates the data link management functions

defined by STANAG 4586, and if the newly introduced air vehicle implements DLI messages directly and includes a 7085 compliant ADT, then a separate ground based VSM is 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 B-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 from the VSM, on the CUCS, for which there is no available generic interface. 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 B1. 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.

The VSM developers are free to determine the method of implementation to exchange the required information between the CUCS and the VSM using the identified services. This approach focuses on information exchange in a manner that effectively displays air vehicle specific status information and provides for effective control over the air vehicle’s specific functionality.

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 UAV System, the CUCS should provide:

- The functionality and capability to receive, process, and disseminate data from the AV and payload; perform mission planning; monitor and control

the payload; monitor and control the AV; and monitor and control the data links

- An open software architecture to support additional future air vehicles and payload capabilities
- The UAV 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 VSM, and CCISM functions

3.2 Data Link interface (DLI).

The DLI interface between the CUCS and the VSM element of the UAV system is defined in Appendix B1. It will enable the CUCS to generate and understand specific messages, detailed in Appendix B1, for control and status of air vehicles and payloads. This standard message set and accompanying protocols have been developed to be air vehicle 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 interface between C4I Systems/nodes and the CUCS is defined in Appendix B2.

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 UAV system should jointly identify the CCISM functionality required to provide UCS compatibility with the specific C4I system. Appendix B2 specifies the protocols down to the message content and format level. The networks and communications used to support the CCI Interface 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 B3 establishes the operator display and input requirements that the CUCS shall support. Appendix B3 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 B3, while not specifically defining the format of the data to be displayed, identifies the requirements that the CUCS shall provide in order for the qualified UAV System Operator(s) to effectively operate the UAV System. 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.

UAV and C4I Systems should be capable of interoperating across a routed network of multiple sub-networks, in which the UAV vehicle is seen as a terminal element (or terminal sub-network) of the whole network. This will allow the physical components of the UAV 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 NATO Command, Control, Communication (NC3) Technical Architecture (TA), Volume 4, NC3 Common Standards Profile (NCSP), Annex 4 of AC/322(SC/5)WP/31(rev).

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 or 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 system (CCIS) and management information system (MIS) systems, 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 degree of interoperability required between NATO and national C3 systems for such objectives. The degree of interoperability 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 interoperability levels 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 document organizes these standards into the eleven service areas defined by NC3TA, NATO Technical Reference Model, Volume 2:

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

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 Version 1.2a), STANAG 7074:1998.
- 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 (RFC 791, 792, 919,922, 1112)) / IPv6 (RFC 2460-4, 2375, 2236).

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 [IPv4, RFC 791]. In the longer term, as digitisation progresses, it is possible that the new version of IP [IPv6, RFC 1883] 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 Transport Control Protocol (TCP) (IETF STD 7) RFC 793 (TCP).

The Transport Control Protocol (TCP) [RFC 761] 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) IEN 88, 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.

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 959.

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 (V3), April 9, 1992, NTP (RFC-1305).

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:

- 3809 - Digital Terrain Elevation Data (DTED) Geographic Information Exchange Standard
- 4545 - NATO Secondary Imagery Format
- 4559 - NATO Standard Image Library Interface (NSILI) (If interface with Image library is desired)
- 4575 - NATO Advanced Data Storage Interface (NADSI) (If advanced storage is required)
- 4607 – NATO GMTI Data Format (Emerging Standard)
- 4609 – NATO Digital Motion Imagery Standard
- 4633 – ELINT Common Message Format (ECMF) (draft)
- 5500 - NATO Message Text Formatting System (FORMETS) ADatP-3 Build 11
- 7023 - Air Reconnaissance Primary Imagery Data Standard
- 7024 - Imagery Air Reconnaissance (Digital Tape Storage) (If tape storage is required)
- 7074 - Digital Geographic Information Exchange Standard (DIGEST Version 2.1)

- 7194 – NATO Message Catalogue (NMC) – APP-11 (Edition 1)

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

- 3377 AR (Edition 6) – Air Reconnaissance Intelligence Report Forms
- 4250 - NATO Reference Module for Open Systems Interconnection
- 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 1 to
ANNEX B to
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Edition 2

DATA LINK INTERFACE

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1 Introduction.

1.1 Scope.

NATO Standardization Agreement (STANAG 4586) Annex B Appendix B1 specifies the detailed requirements for interfacing the 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 B1 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 B1 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 B1 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. DLI provides standard messages and formats to enable communication between a variety of air vehicles and STANAG 4586 compliant UAV control systems (CUCS). This relationship, or architecture, is presented in Figure B1 - 1.

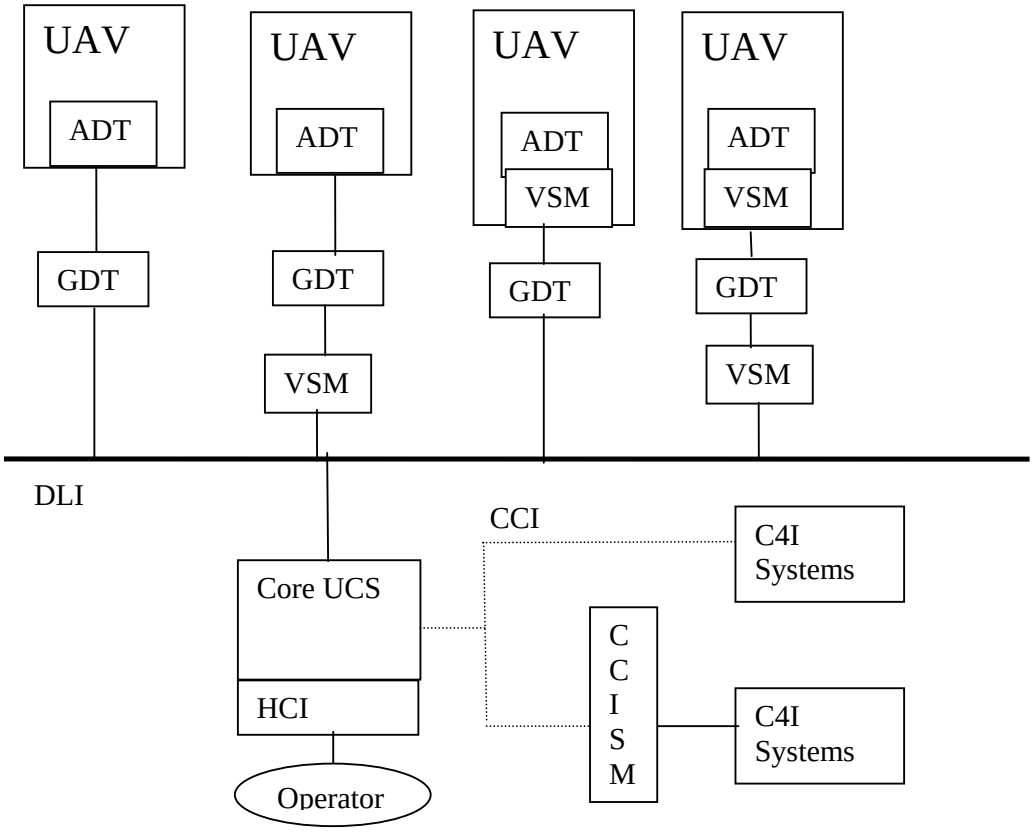

Figure B1 - 1: DLI Role in the AV/UCS Concept

In Figure B1 - 1 there are four air vehicles. The air vehicles support three different levels of DLI as its native language. An air vehicle that totally supports the DLI interface does not require a separate VSM. An Air Vehicle may partially support the DLI messages and require a VSM to provide the remaining DLI interface functionality. In the extreme case the air vehicle may not be capable of supporting any of the DLI messages and the VSM would provide all of the DLI functionality. The majority of this standard refers to a VSM, but in the case where the DLI functions are native to the air vehicle the VSM requirements for interfacing to the DLI and the test requirements shall be assigned to the air vehicle.

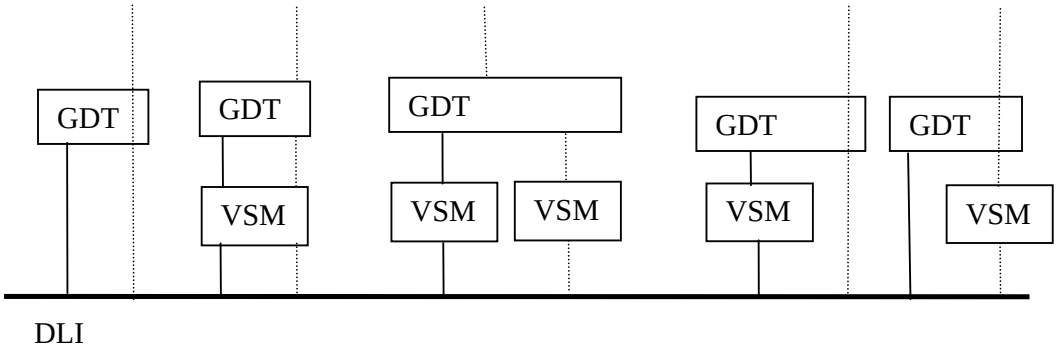

Figure B1 - 2: DLI Role in the GDT/UCS Concept

Figure B1-2 addressed the Ground Data Terminal (GDT) DLI interface. To show the functional flow the AV DLI messages are shown as a separate line from the GDT DLI messages. As with the AV, the GDT 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 GDT could require a VSM and the AV may not require one. Both the AV and the GDT could both require a VSM and this could be supported by either a single Physical VSM or two separate VSMs. The majority of this standard refers to a VSM, but in the case where the DLI functions are native to the ground data link the VSM requirements for interfacing to the DLI and the test requirements shall be assigned to the data link.

Requirements assigned in this standard to a VSM can be performed in the AV or GDT, in which case all the requirements assigned to the VSM shall be assigned to the AV or GDT as required.

Each VSM shall perform the function of translating or converting air vehicle specific data formats into DLI-compliant messages. Each air vehicle type has a potentially unique VSM (generally provided by the air vehicle manufacturer). 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 GDT operation. In the case of systems using a data link that is not compliant with STANAG 7085 (e.g. BLOS/SATCOM), the VSM GDT function shall serve as an isolating interface that allows the UAV system GDT interface to become STANAG 4586 compliant without requiring modifications to the air vehicle or the data link.

The CUCS shall generate and understand common air vehicles and payloads 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/Ground Data Terminal 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/GDT without creating dependencies between the two components. Messages are used to pass a generic set of data between the CUCS and the AV/GDT, and this generic data may be acted upon by both the CUCS and AV/GDT (local host machine). This methodology allows the CUCS to act upon data originating at the AV/GDT, and then transmits the data to an independent location.

The secondary method of communication between the CUCS and the AV/GDT is the use of “services” to pass information between the two components. The services allow the AV/GDT 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/GDT-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/GDT 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.

Defining the DLI generic message structure for the AV/GDT/CUCS communication is the purpose of this Appendix. Existing message protocols and standards are used for the “remote services” on the AV/GDT to facilitate the process of defining the vehicle specific interface. The vehicle specific mechanisms for transferring messages between the CUCS and AV/GDT are outlined in a later section of the 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/GDT 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 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.

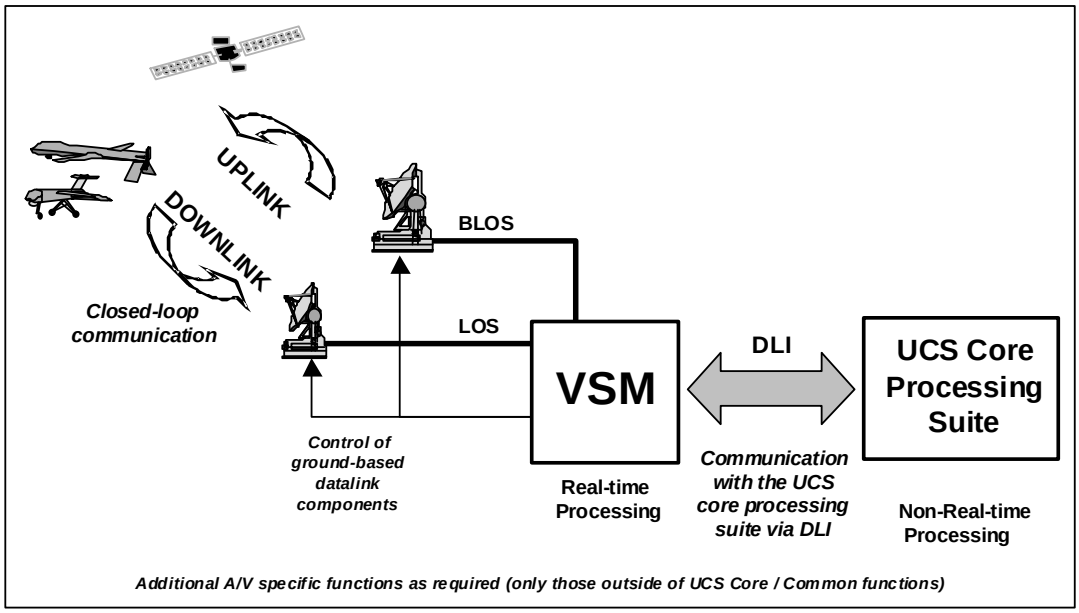

Figure B1 - 3: Role of the VSM

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 Table B1-4 in Section 4 below. 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.

1.4 Vehicle Specific Module Functions.

In the UCS System Architecture, the Vehicle Specific Module (VSM) shall be responsible for the following functions where they are not part of the AV or GDT:

- 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 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.

A VSM is an air vehicle specific function(s) that services the DLI interface between the CUCS elements and the air vehicle system. The VSM shall insulate the CUCS from 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. The VSM shall also provide direct control of the data link(s), if any, associated with the air vehicle.

To accomplish these functions, in most cases, the VSM will reside as a component of the CUCS system. It is envisaged that the VSM will be an embedded processing element that interprets data link control/status messages, interfaces with the Ground Data Terminal (GDT) to initialise and operate the data link, packs data for transmission to/from the air vehicle, and performs ground-based real time control functions (such as loop closures for controlling landing of a UAV onto a moving landing platform, emergency recovery, etc.). The VSM is also envisioned as the element of the CUCS System Architecture that provides a migration path for legacy UAV systems to achieve STANAG 4586 compliance with minimal impact to the air vehicle design.

1.5 Interfaces.

1.5.1 Physical Interfaces

The DLI (notionally depicted in Figure B1 - 3) 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.

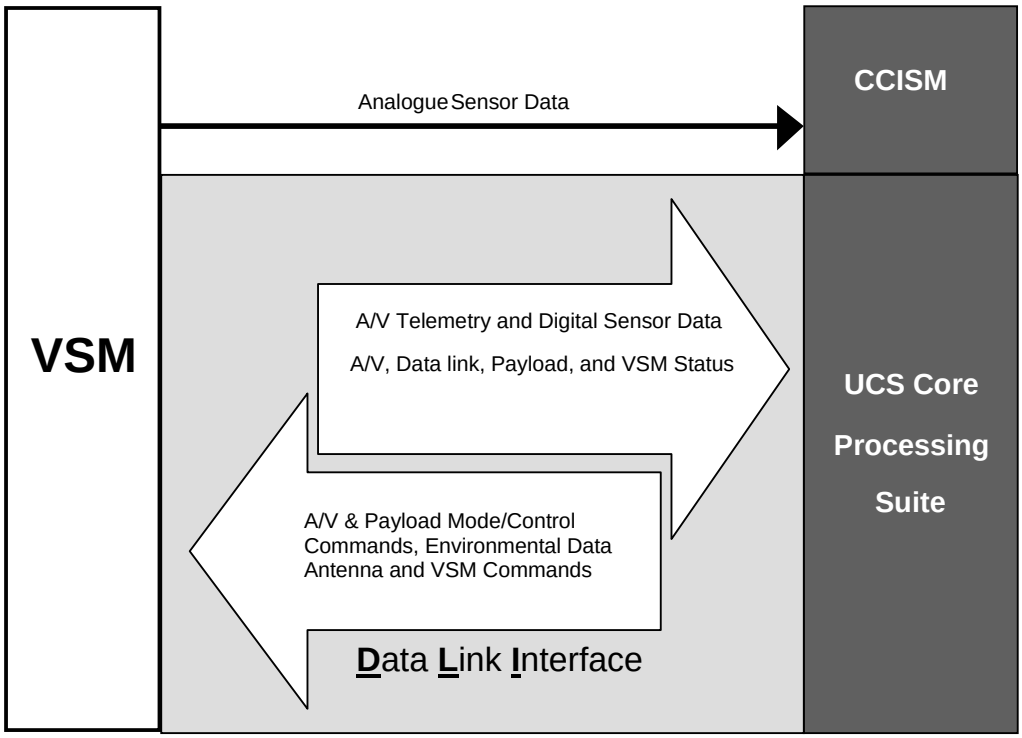

Figure B1 - 4: High-Level Depiction of DLI Interface Content

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. To avoid unnecessary translation from analogue to digital and back to analogue, the VSM shall provide a dedicated physical interface for displays or for external feeds (through the CCISM).

The physical interface between the CUCS and the VSM can differ depending upon where the VSM is physically located. The VSM can either reside on the ground as part of the UCS and/or as a subsystem in the air vehicle. When the VSM interfaces 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.). The VSM then interfaces to the data link and will incorporate the standards as documented in STANAG 7085. When the VSM resides in the air vehicle, the interface to the ADT portion of the data link is defined in STANAG 7085. The GDT/VSM shall support a DLI-compliant interface to the CUCS.

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 GDT 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 various message sets varies with the interoperability level. 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 active LOI.

A correspondence table is provided in Table B1 - 4, Message Summary and Properties, defining applicability of each message.

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 and Bit 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/sec 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 double precision floating-point numbers. 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, 1970 using IEEE double precision floating point numbers.

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} (1024x1024). (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.

1.7.4 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.

1.7.4.1 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 Microsystem 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/

1.7.4.2 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 #1202, 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 1.7.4.1 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 display within the resource allocated by message #1202 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 #1001, 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 #1100 or #1101 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 #1202, 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 4.1.7.3 Message #1202: CUCS Resource Report for additional requirements.

Figure B1 - 4 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 - 5, 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.

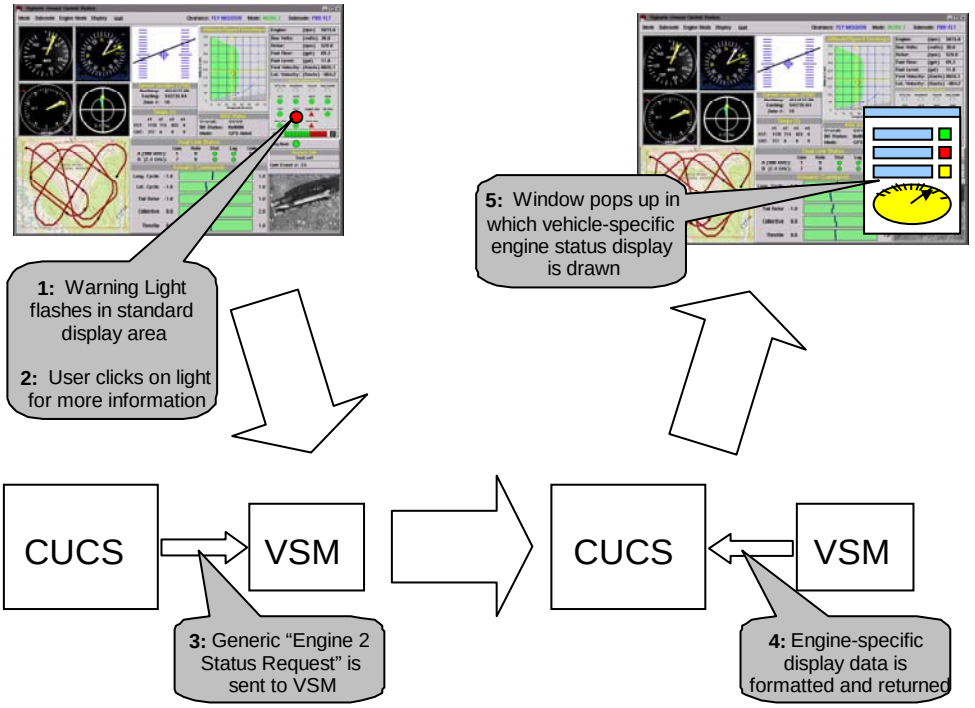

Figure B1 - 5: Typical Scenario for Generating Vehicle-Specific Displays

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.

1.7.5 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 of the country of origin for that CUCS or air vehicle. NATO may assign additional country codes at its discretion. Country code 255 (hexadecimal FF) shall be reserved. The remaining three bytes shall be assigned statically according to procedures and protocols identified and maintained by the respective member countries. Each member country shall be responsible for establishing a system to assure unique ID numbers for each in-service device.

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, the attached table 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.

See the following Table (Table B1 – 1) for the NSIF Country Codes.

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 4.1.1.1) with a broadcast request ID will respond with at least one VSM Authorisation Response Message (Message #21, see Section 4.1.1.3), 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.

APPENDIX 1 to
ANNEX B to
STANAG 4586
Edition 2

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
REPUBLIC of MOLDOVA	111	MDA
RUSSIAN FEDERATION	112	RUS
SWEDEN	113	SWE

Country	NATO number code used in STANAG 4586	NATO (ISO) three letter code
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. GDT 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 were developed that define in detail 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.

- A means for transmitting unstructured data.
  - 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.
  - 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.
  - 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).
- A means of cataloguing an expanding set of message types and tracking changes needed to support evolving technology.
  - 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 Figure B1 - 6. 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.

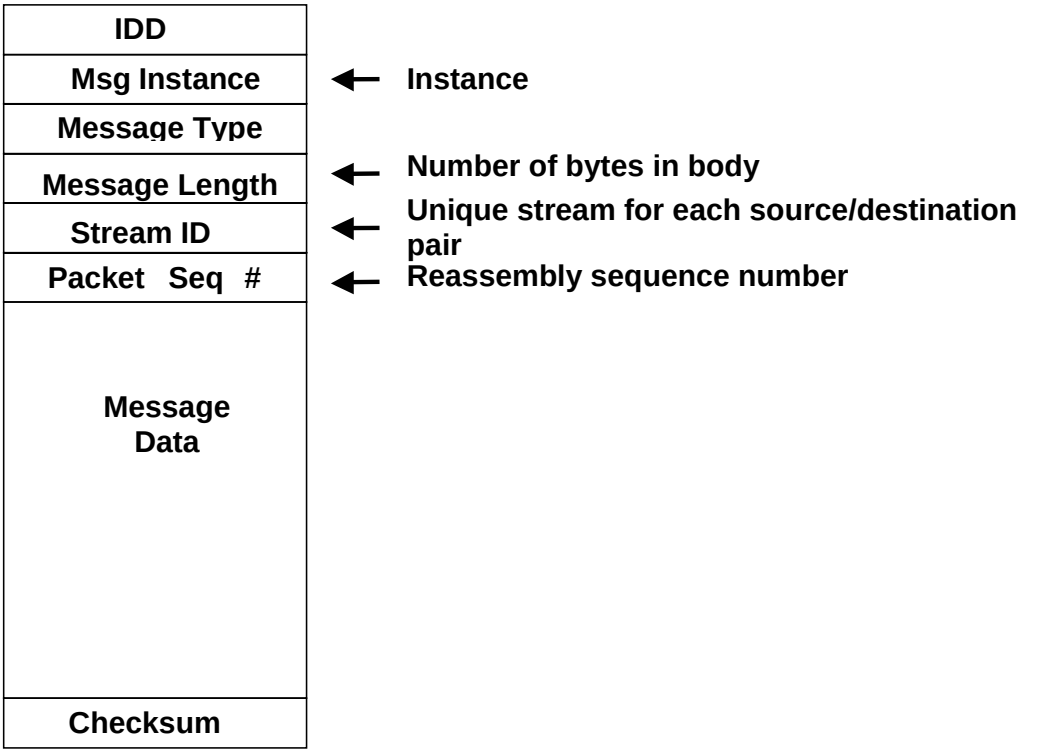

Figure B1 - 6: Message Wrapper Structure

Special Note: Unless otherwise noted, all header entries described below shall be 32-bit unsigned integers generated sequentially by an application call to a core library function. The intent is that the message instance ID and packet sequence numbers 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).

3.3.1.1 Interface Definition Document (IDD) Version.

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 10 byte field and filled with a null-terminated string of ASCII characters. Version identification management shall be used by error checking functions to validate format consistency. Table B1-3 shows the current version of the IDD that has been assigned.

STANAG 4586 Document Version	IDD Version Identification
Edition 1	"1"
Draft Edition 2	"2"
Draft Edition 2, Errata 1	"3"
Draft Edition 2, Errata 2	"4"
Draft Edition 2, Errata 3	"5"
Draft Edition 2, Errata 4	"6"
Draft Edition 2, Errata 5	"7"
Edition 2	"8"
Edition 2, Amendment 1	"9"

Table B1 - 3: STANAG 4586 Document Version

3.3.1.2 Message Instance Identifier.

The instance identifier shall uniquely identify every instance of a message of a given type. Instance identifiers are used by the system to keep streaming data coordinated, and to identify dropped messages of a given type at the application level. Instance identifier numbers shall not be reused unless other provisions for avoiding identifier ambiguity are provided in the message body.

3.3.1.3 Spare.

3.3.1.4 Message Type.

The message type is the integer value associated with the defined messages types below. Message types shall be numbered sequentially from 1 to n, where n is any integer less than 2000 and represents the highest approved message type. 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 type numbers shall be greater than 2000.

3.3.1.5 Message Length.

The length shall be a 32-bit unsigned integer of the number of bytes in the “Message Data”. The length shall be any number between 1 and 538.

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 24 bytes, gives 524 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.

3.3.1.6 Stream ID.

The purpose of Stream IDs is to provide a means for separating flows of data among various processes sharing a single communications channel, and among messages from a given source to multiple destinations. Future capability.

3.3.1.7 Packet Sequence Number.

The purpose of Packet 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”.

3.3.1.8 Spare.

3.3.1.9 Checksum.

Checksum shall be employed to determine the presence of errors during transmission or handling of messages. The checksum shall be a 4-byte unsigned integer and calculated by simple, byte-wise unsigned binary addition of all data contained in the message excluding the checksum, and truncated to four bytes.

4 Message Formats.

4.1 Common Message Formats.

The Message Summary and Properties Table (Table B1-4) and the individual data element descriptions in this section define the required messages that shall be implemented in order to enable the desired UAV NATO LOI via the DLI. Regardless of vehicle type, there are certain pieces of information that shall be passed regularly from the vehicle to the control system, such as position, attitude, general vehicle health, operating state, etc. Control systems will also have a set of common commands and requests for the air vehicle, such as air vehicle or payload operating commands. A primary purpose of this section is to define the set of common message structures for communicating across the DLI between vehicle specific functions and the display and control functions common to STANAG 4586 compliant CUCS implementations. The intent of this Appendix is to provide an expandable structure and preliminary set of message definitions that can grow with UAV technology.

The goal of the common message set is to provide a standard information group required by the CUCS for displays that are common to compliant implementations. Provisions are also made for vehicle-specific message types. Manufacturers may provide any amount of information, whether or not redundant with the common message types, as required by their particular design. However, the common message types shall be supported to guarantee interoperability with CUCS functionality, though not every data element is needed in every application. Receiving processes shall perform range checking and properly handle out-of-range values. Out of range values, invalid data and non-supported messages shall not cause the CUCS/VSM to be adversely affected.

All the messages detailed in Section 4.1.1 below start with a time stamp. The time information in the time stamp shall be the time the data contained in the message was captured (or confirmed as valid).

In Table B1 - 4, each message type is identified with several properties, indicated in the rightmost four columns. The first property is labeled “Push/Pull”. 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 second property (“Source”) identifies the entity from which the message is issued (CUCS or VSM).

The third property in the table is LOI. The LOI associates the formatted DLI messages with the level of control the CUCS has over the air vehicle and/or its payloads, and therefore defines the requirement for the implementation of the messages based on a specified LOI. LOI 2 messages are those messages required by a control station to monitor the status of the AV and its payload from which it is receiving data. However, a ground station that is capable of receiving other STANAG compliant digital payload data (e.g., STANAG 4545, 7023, 4609) and the associated auxiliary data (pointing, position) is STANAG 4586 LOI 2 compliant without having to receive the formatted LOI 2 DLI payload messages, e.g., for these ground systems these messages are optional for LOI 2. The

entries in Table B1-4 for LOI 2 are, however, mandatory for those systems that have no compliant digital payload data as described above. LOI 3 messages are for the control of payloads that may be installed onboard an air vehicle. LOI 4 messages are for the control and monitoring of an air vehicle, without the capability to launch or recover the air vehicle. Since Launch and Recovery is vehicle specific, LOI 5 is not implemented via generic STANAG 4586 messages and shall be implemented through the VSM and the vehicle specific mechanism/messages. As a result, there are no defined LOI 5 formatted DLI messages. While the table specifies which LOIs must be supported for each type of session, any LOI 2 message may be sent during configuration and setup, even if an LOI session has not yet been granted by the VSM. Note however, that there is one exception in that Message #42 does provide control of a LOI 4/5 field. The VSM will configure Message #42 according to the authorized LOI in that case.

In addition, a CUCS authorized at a lower-level LOI may request a specific status message that is normally associated with a higher level LOI through the Generic Information Request or Schedule Message Update Command. If the VSM does not support the higher level LOI, it may choose to ignore the request for a message at the higher level.

The fourth property is captured in the column labelled “Allowable Max Latency (msec)” that defines the maximum transport delay between the HCI and DLI interfaces.

New Msg #	Old Msg #	Description	Push/Pull	Source	LOI			Allowable Max Latency (msec)
					2	3	4 or 5	
SYSTEM ID MESSAGES (Section 4.1.1)								
1	2	CUCS Authorisation Request	Push	CUCS	Y	Y	Y	2,000
2-19	-	Reserved		CUCS				
20	1	Vehicle ID	Push/Pull	VSM	Y	Y	Y	1,000
21	65	VSM Authorisation Response	Push/Pull	VSM	Y	Y	Y	2,000
22-39	-	Reserved		VSM				
FLIGHT VEHICLE COMMAND AND STATUS MESSAGES (Section 4.1.2)								
40	47	Vehicle Configuration Command	Push	CUCS	-	-	Y	2,000
41	62	Loiter Configuration	Push	CUCS	-	-	Y	2,000
42	10	Vehicle Operating Mode Command	Push	CUCS	-	-	Y	1,000
43	11	Vehicle Steering Command	Push	CUCS	-	-	Y	1,000
44	25	Air Vehicle Lights	Push	CUCS	-	-	Y	500
45	72	Engine Command	Push	CUCS	-	-	Y	500
46	16	Flight Termination Command	Push	CUCS	-	-	Y	500
47	-	Relative Route/Waypoint Absolute Reference Message	Push	CUCS	-	Y	Y	1,000
48	-	Mode Preference Command	Push	CUCS	-	-	Y	2000
49 – 99	-	Reserved		CUCS				
100	3	Vehicle Configuration	Pull	VSM	-	-	Y	10,000

New Msg #	Old Msg #	Description	Push/Pull	Source	LOI			Allowable Max Latency (msec)
					2	3	4 or 5	
101	5	Inertial States	Push	VSM	Y	Y	Y	1,000
102	6	Air and Ground Relative States	Push	VSM	-	-	Y	1,000
103	7	Body-Relative Sensed States	Push	VSM	-	-	Y	200
104	8	Vehicle Operating States	Push/Pull	VSM	-	-	Y	1,000
105	9	Engine Operating States	Push/Pull	VSM	-	-	Y	500
106	63	Vehicle Operating Mode Report	Push/Pull	VSM	-	-	Y	2,000
107	71	Vehicle Lights State	Push	VSM	-	-	Y	500
108	64	Flight Termination Mode Report	Push/Pull	VSM	-	-	Y	2,000
109	-	Mode Preference Report	Push	VSM	-	-	Y	2000
110	-	From-To-Next Waypoint States	Push	VSM	Y	Y	Y	2000
111 - 199	-	Reserved		VSM				
PAYLOAD COMMAND AND STATUS MESSAGES (Section 4.1.3)								
200	26	Payload Steering Command	Push	CUCS	-	Y	-	200
201	31	EO/IR/Laser Payload Command	Push	CUCS	-	Y	-	1,000
202	32	SAR Payload Command	Push	CUCS	-	Y	-	1,000
203	28	Stores Management System Command	Push	CUCS	-	Y	-	1,000
204	33	Communications Relay Command	Push	CUCS	-	Y	-	1,000
205	30	Payload Data Recorder Control Command	Push	CUCS	-	Y	-	1,000
206	49	Payload Bay Command	Push	CUCS	-	Y	-	2,000
207		Terrain Data Update	Push	CUCS	Y	Y	-	2,000
208-299	-	Reserved		CUCS				
300	4	Payload Configuration	Push/Pull	VSM	Y	Y	-	1,000
301	23	EO/IR - Configuration State	Pull	VSM	Y	Y	-	200
302	50	EO/IR/Laser Operating State	Push/Pull	VSM	Y	Y	-	2,000
303	24	SAR Operating State	Pull	VSM	Y	Y	-	2,000
304	27	Stores Management System Status	Pull	VSM	Y	Y	-	1,000
305	34	Communications Relay Status	Pull	VSM	Y	Y	-	1,000
306	29	Payload Data Recorder Status	Pull	VSM	Y	Y	-	1,000
307	48	Vehicle Payload/Recorder Configuration	Pull	VSM	-	Y	-	2,000
308	54	Payload Bay Status	Pull	VSM	-	Y	-	2,000
309-399	-	Reserved		VSM				
DATA LINK MESSAGES (Section 4.1.4)								
DATA LINK COMMAND AND STATUS MESSAGES (Section 4.1.4.1)								
400	38	Data Link Set Up Message	Push	CUCS	Y	Y	Y	1,000

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New Msg #	Old Msg #	Description	Push/Pull	Source	LOI			Allowable Max Latency (msec)
					2	3	4 or 5	
401	66	Data Link Control Command	Push	CUCS	Y	Y	Y	2,000
402	68	Pedestal Configuration Message	Push	CUCS	Y	Y	Y	2,000
403	70	Pedestal Control Command	Push	CUCS	Y	Y	Y	2,000
404	-	Data Link Assignment Request	Push	CUCS	Y	Y	Y	2,000
405-499	-	Reserved		CUCS				
500	17	Data Link Configuration/Assignment Message	Pull	VSM	Y	Y	Y	1,000
501	39	Data Link Status Report	Pull	VSM	Y	Y	Y	1,000
502	67	Data Link Control Command Status	Push	VSM	Y	Y	Y	2,000
503	69	Pedestal Status Report	Push	VSM	Y	Y	Y	2,000
504-599	-	Reserved		VSM				
DATA LINK TRANSITION MESSAGES (Section 4.1.4.2)								
600	12	Vehicle Data Link Transition Coordination	Push	CUCS	-	Y	Y	1,000
601-699	-	Reserved		CUCS				
700	14	Handover Status Report	Pull	VSM	-	Y	Y	1,000
701-799	-	Reserved		VSM				
MISSION MESSAGES (Section 4.1.5)								
800	15	Mission Upload Command	Push	CUCS	-	-	Y	1,000
801	41	AV Route	Push/Pull	CUCS/VSM	-	-	Y	2,000
802	56	AV Position Waypoint	Push/Pull	CUCS/VSM	-	-	Y	2,000
803	58	AV Loiter Waypoint	Push/Pull	CUCS/VSM	-	-	Y	2,000
804	59	Payload Action Waypoint	Push/Pull	CUCS/VSM	-	Y	Y	2,000
805	60	Airframe Action Waypoint	Push/Pull	CUCS/VSM	-	-	Y	2,000
806	61	Vehicle Specific Waypoint	Push/Pull	CUCS/VSM	-	-	Y	2,000
807-899	-	Reserved		CUCS				
900	53	Mission Upload/Download Status	Push	VSM	-	Y	Y	2,000
901-999	-	Reserved		VSM				
SUBSYSTEM STATUS MESSAGES (Section 4.1.6)								
1000	21	Subsystem Status Request	Push	CUCS	Y	Y	Y	1,000
1001	22	Subsystem Status Detail Request	Push	CUCS	Y	Y	Y	1,000
1002-1099	-	Reserved		CUCS				
1100	19	Subsystem Status Alert	Push	VSM	Y	Y	Y	1,000
1101	20	Subsystem Status Report	Pull/Push	VSM	Y	Y	Y	1,000
1102-1199	-	Reserved		VSM				
GENERAL CONFIGURATION MESSAGES (Section 4.1.7)								

New Msg #	Old Msg #	Description	Push/Pull	Source	LOI			Allowable Max Latency (msec)
					2	3	4 or 5	
1200	43	Field Configuration Request	Push	CUCS	Y	Y	Y	2,000
1201	55	Display Unit Request	Push	CUCS	Y	Y	Y	2,000
1202	42	CUCS Resource Report	Push	CUCS	Y	Y	Y	2,000
1203	13	Configuration Complete	Push	VSM	Y	Y	Y	2,000
1204-1299	-	Reserved		CUCS				
1300	44	Field Configuration Integer Response	Pull	VSM	Y	Y	Y	2,000
1301	45	Field Configuration Double Response	Pull	VSM	Y	Y	Y	2,000
1302	52	Field Configuration Enumerated Response	Pull	VSM	Y	Y	Y	2,000
1303	46	Field Configuration Command	Push	VSM	Y	Y	Y	2,000
1304	-	VSM Services Report Message	Pull	VSM	Y	Y	Y	2,000
1305-1399	-	Reserved		VSM				
MISCELLANEOUS MESSAGE TYPES (Section 4.1.8)								
1400	40	Message Acknowledgement	Pull	CUCS/VSM	Y	Y	Y	1,000
1401	51	Message Acknowledge Configuration	Push	CUCS/VSM	Y	Y	Y	2,000
1402	57	Schedule Message Update Command	Push	CUCS/VSM	Y	Y	Y	2,000
1403	18	Generic Information Request	Push	CUCS/VSM	Y	Y	Y	1,000
1404-1499	-	Reserved						
IFF COMMAND AND STATUS MESSAGE TYPES (Section 4.1.9)								
1500	35	IFF Code Command	Push	CUCS	-	-	Y	1,000
1501	36	IFF Ident (Squawk) Command	Push	CUCS	-	-	Y	1,000
1502-1599	-	Reserved		CUCS				
1600	37	IFF Status Report	Push/Pull	VSM	-	-	Y	1,000
1601-1699	-	Reserved		VSM				
PRIVATE MESSAGES (Section 4.2)								
2000-2399		VSM-Specific Private Message	Push/Pull	VSM-Specific	(1)	(1)	(1)	1,000

NOTE: (1) VSM-Specific

Table B1 - 4: Message Summary and Properties

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Note: In the development of Edition 2 of STANAG 4586, the messages identified in Table B1-4 have been grouped and numbered according to their functionality, e.g., System ID Messages, Flight Vehicle Command and Status Messages, Payload Command and Status Messages. One of the final changes in this area was re-defining the numbering system so as to assign each functional message group a range of numbers, e.g. Flight Vehicle Command and Status Messages are in a range of 40 through 199. To facilitate the correlation of this message numbering schema to the previous one that the Custodian Support Team (CST) and the national industrial members supporting the CST are familiar with, Columns 1 and 2 of Table B1-4 provide the necessary information.

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 #1400). 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, Message Acknowledgement Configuration (Message #1401) shall be used to fulfil a requirement for such acknowledgement cases.

The default condition shall be that push-type messages are not acknowledged, and pull-type messages form the acknowledgement for the associated request it answers. Message #1401 shall be used to establish acknowledgement requirements other than the default condition.

The Payload and Vehicle subsystems have been developed to provide a set of generic messages for common air vehicle payloads, and for the common air vehicle subsystems. A CUCS and/or VSM do not have to support the generic payload messages or the vehicle subsystem messages that do not apply to the systems configuration. However, if one of the generically identified payload or subsystem messages is applicable for the air vehicle system, the identified formatted DLI messages shall be supported.

A generic set of Payload Types has been identified in the Payload Configuration Message (Message #300). The generic DLI messages associated with each of the payload types is identified in Table B1 – 5.

Payload Type	Required Message	LOI	Msg Type
All LOI 2 & 3	Message #300: Payload Configuration	2 & 3	Configuration
EO/IR & Fixed	Message #301: EO/IR Configuration State	2 & 3	Configuration

Payload Type	Required Message	LOI	Msg Type
	Message #302: EO/IR/Laser Operating State	2 & 3	Status
	Message #200: Payload Steering Command	3	Command
	Message #201: EO/IR/Laser Payload Command	3	Command (Modes)
SAR	N/A : Configuration Message		Configuration
	Message #303: SAR Operating State	2 & 3	Status
	Message #200: Payload Steering Command	3	Command
	Message #202: SAR Payload Commands	3	Command (modes)
Dispensable (Stores)	N/A : Configuration Message		Configuration
	Message #304: Stores Management System Status	2 & 3	Status
	Message #203: Stores Management System Command	3	Command
Comm. Relay	N/A : Configuration		Configuration
	Message #305: Communication Relay Status	2 & 3	Status
	Message #204: Communications Relay Command	3	Command

Table B1 - 5*:* Conditional Payload Message Groups

A generic set of Vehicle Subsystems has been identified for air vehicle systems. If one of these subsystems is installed on an air vehicle, the generic DLI messages associated with the subsystem shall be utilized as shown in Table B1 – 6 and Table B1 - 7.

Type	Required Message	LOI	Msg Type
Recorder	Message #307: Vehicle Payload/Recorder Configuration	3	Configuration
	Message #306: Payload Data Recorder Status	2 & 3	Status
	Message #205: Payload Data Recorder Control Command	3	Command

Table B1 - 6: Conditional Data Recorder Message Group

Type	Required Message	LOI	Msg Type
Payload Bay	Message #206: Payload Bay Command	3	Command

Table B1 - 7: Conditional Payload Bay Doors Message Group

A generic set of data link control messages have been defined for STANAG 7085 compliant data links. The messages, identified in Table B1-8, shall be supported if a STANAG 7085 compliant data link is used. Support for the data link assignment and status messages (Message #404 and Message #500) shall be supported for all data links, regardless of data link type.

Type	Required Message	LOI	Msg Type
Data Link	Message #400: Data Link Set Up	2, 3, 4/5	Configuration
	Message #401: Data Link Control Command	2, 3, 4/5	Command
	Message #402: Pedestal Configuration Message	2, 3, 4/5	Configuration
	Message #403: Pedestal Control Command	2, 3, 4/5	Command
	Message #501: Data Link Status Report	2, 3, 4/5	Status
	Message #502: Data Link Control Command Status	2, 3, 4/5	Status
	Message #503: Pedestal Status Report	2, 3, 4/5	Status

Table B1 - 8: Conditional Data Link Control Message Group

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.

Note: 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)
- Double - IEEE double precision floating point numbers (8 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 to support functionality that is not supported by the STANAG defined values.

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

4.1.1 System ID Messages.

4.1.1.1 Message #1: CUCS Authorisation Request.

This message shall be sent by a CUCS to a VSM or an air vehicle to request a specific LOI connection to the VSM or air vehicle, or to discover a connection(s) to the VSM/air vehicle at an unspecified LOI. If the Vehicle ID/VSM ID for the connection is known by the CUCS then the VSM ID/Vehicle ID field shall be filled in by the CUCS. Where the CUCS is discovering a connection the VSM ID/Vehicle ID field shall be filled with the broadcast VSM ID/vehicle ID. If more than one payload station authorisation is needed with differing LOI(s), this message may be sent multiple times, once for each payload station when the VSM/vehicle ID is known.

This message is designed to allow more than one CUCS to control AV/Payload functions of a single VSM/ vehicle for a given vehicle ID.

A CUCS controlling an AV at LOI 4 or 5 shall maintain AV control until either it breaks the connection, specifically relinquishes control, or is displaced by another CUCS that is asserting override while the current CUCS is not.

A CUCS controlling a payload at LOI 3 shall maintain payload control until it either breaks the connection, specifically relinquished control, or when the CUCS that has LOI 4 or 5 specifically requests control of that payload.

The Controlled Station Mode field shall be filled with “0” for a broadcast request.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0001.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0001.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0001.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0001.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0001.05	**5**	**Data Link ID** Identifies the specific data link to process this message**.**	Integer 4	None	See Section 1.7.5
0001.06	**6**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	Enumerated	See Table B1 - 10
0001.07	**7**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumerated	Vehicle Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0001.08	**8**	**Requested/Handover LOI** Allows request or handover of LOI 2, 3, 4 and 5.	Unsigned 1	Bitmapped	0x00 = Unspecified 0x01= LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
0001.09	**9**	**Controlled Station**	Unsigned 4	Bitmapped	0x0000 = No Change 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.
0001.10	**10**	**Controlled Station Mode**	Unsigned 1	Enumerated	0 = Relinquish/ Handoff Control 1 = Request Control 2 = Override Control
0001.11	**11**	**Wait for Vehicle Data Link Transition Coordination Message** Wait for Message #600.	Unsigned 1	Enumerated	0 = Don't wait 1 = Wait for Message

Table B1 - 9: Message #1: CUCS Authorisation Request

Table B1-10 lists the Vehicle IDs of many current UAVs. (Contact the STANAG 4586 Custodian for the most current Vehicle 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
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
33	Vigilante 496
34	Vigilante 502

Vehicle Type ID	Vehicle Name
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)
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
$69 \leq x \leq 2^{16}$	Reserved

Table B1 - 10: Vehicle Type IDs

4.1.1.2 Message #20: 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 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 vehicle 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
0020.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0020.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0020.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0020.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0020.05	**5**	**Vehicle ID Update** Vehicle ID that will be replace the current Vehicle ID.	Integer 4	None	See Section 1.7.5
0020.06	**6**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	Enumer-ated	See Table B1 – 10
0020.07	**7**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumer-ated	Vehicle Specific
0020.08	**8**	**Owning Country Code** Identifies the owning country, using NATO-assigned numerical identifiers.	Unsigned 1	None	See Section 1.7.5
0020.09	**9**	**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
0020.10	**10**	**Mission ID** Identifies mission and (by reference) flight plan currently executing on this platform.	Character 20	None	Null-terminated Printable ASCII

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0020.11	**11**	**ATC Call Sign**	Character, 32 bytes	None	Printable ASCII, null terminated

Table B1 - 11: Message #20: Vehicle ID

4.1.1.3 Message #21: 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 or for an unspecified LOI, and the CUCS ID received in the 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 has granted control to a CUCS, the VSM/vehicle shall respond with its VSM ID (as applicable) and/or specific/logical vehicle ID(s), the LOI Authorized and LOI Granted fields set as granted to that CUCS for the Controlled station functionality with the Controlled Station mode field set to “Take Control”, 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), LOI Authorized, LOI Granted set as N/A, Controlled station functionality, Vehicle type, and vehicle subtype to the requesting CUCS. Where a VSM is able to monitor and/or control 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 LOI for a specific VSM ID/vehicle ID and functionality in the Authorisation Request message, then the VSM/vehicle shall respond with the requested LOI and Controlled Station mode as appropriate. 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.,b 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 and will know what vehicles/payloads are currently being controlled by other CUCS. This may be necessary to provide the override capability.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0021.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0021.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0021.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0021.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0021.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0021.06	**6**	**LOI Authorized**	Unsigned 1	Bitmapped	0x00 = Connection Not Authorised 0x01= LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
0021.07	**7**	**LOI Granted**	Unsigned 1	Bitmapped	0x00 = N/A 0x01= LOI 2 0x02 = LOI 3 0x04 = LOI 4 0x08 = LOI 5
0021.08	**8**	**Controlled Station**	Unsigned 4	Bitmapped	0x0000 = No Change 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.
0021.09	**9**	**Controlled Station Mode**	Unsigned 1	Enumerated	0 = Not in Control 1 = In Control
0021.10	**10**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian	Unsigned 2	Enumerated	See Table B1 – 10
0021.11	**11**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumerated	Vehicle Specific

Table B1 - 12: Message #21: VSM Authorisation Response

4.1.2 Flight Vehicle Command and Status Messages.

4.1.2.1 Message #40: 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
0040.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0040.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0040.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0040.04	**4**	**Initial Propulsion Energy** Amount of usable propulsion energy with respect to the maximum usable propulsion energy for this configuration.	Float	%	Configuration Dependent

Table B1 - 13: Message #40: Vehicle Configuration Command

4.1.2.2 Message #41: 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 #42, Vehicle Operating Mode Command). The Loiter position shall be defined in Message #43. 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 #48, Mode Preference Command, for additional details.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #41. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0041.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0041.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0041.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0041.04	**4**	**Loiter type**	Unsigned 1	Enumer-ated	1 = Circular 2 = Racetrack 3 = Figure 8 4 = Hover

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0041.05	**5**	**Loiter Radius** Used as radius for circular Loiter, and used as the radius of the half circle at each end of the loiter pattern.	Float	Metres	$1 \leq x \leq 100000$
0041.06	**6**	**Loiter Length** Used for racetrack and figure 8 to define length of pattern, centered around the Loiter Point (defined in Message #43) in the direction of the Loiter Bearing.	Float	Metres	$1 \leq x \leq 100000$
0041.07	**7**	**Loiter Bearing** The bearing of the loiter pattern, referenced to the Loiter Point (defined in Message #43), from True North.	Float	Radians	$-\pi \leq x \leq \pi$
0041.08	**8**	**Loiter Direction** Defines direction of turn when rounding the loiter point defined by "Vehicle Steering Command" Message (Message #43).	Unsigned 1	Enumer-ated	0 = Vehicle Dependent 1 = Clockwise 2 = Counter-Clockwise 3 = Into the wind
0041.09	**9**	**Loiter altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0041.10	**10**	**Altitude Type** Defines altitude type (reference frame) for all altitude related fields in this message.	Unsigned 1	Enumer-ated	0 = Pressure Altitude 1 = Baro Altitude 2 = AGL 3 = WGS-84
0041.11	**11**	**Loiter Speed**	Float	Mps	$0 \leq x \leq 10000$
0041.12	**12**	**Speed Type** Defines speed type (reference frame) for all speed related fields in this message.	Unsigned 1	Enumer-ated	0 = Indicated Airspeed 1 = True Airspeed 2 = Ground Speed

Table B1 - 14: Message # 41: Loiter Configuration

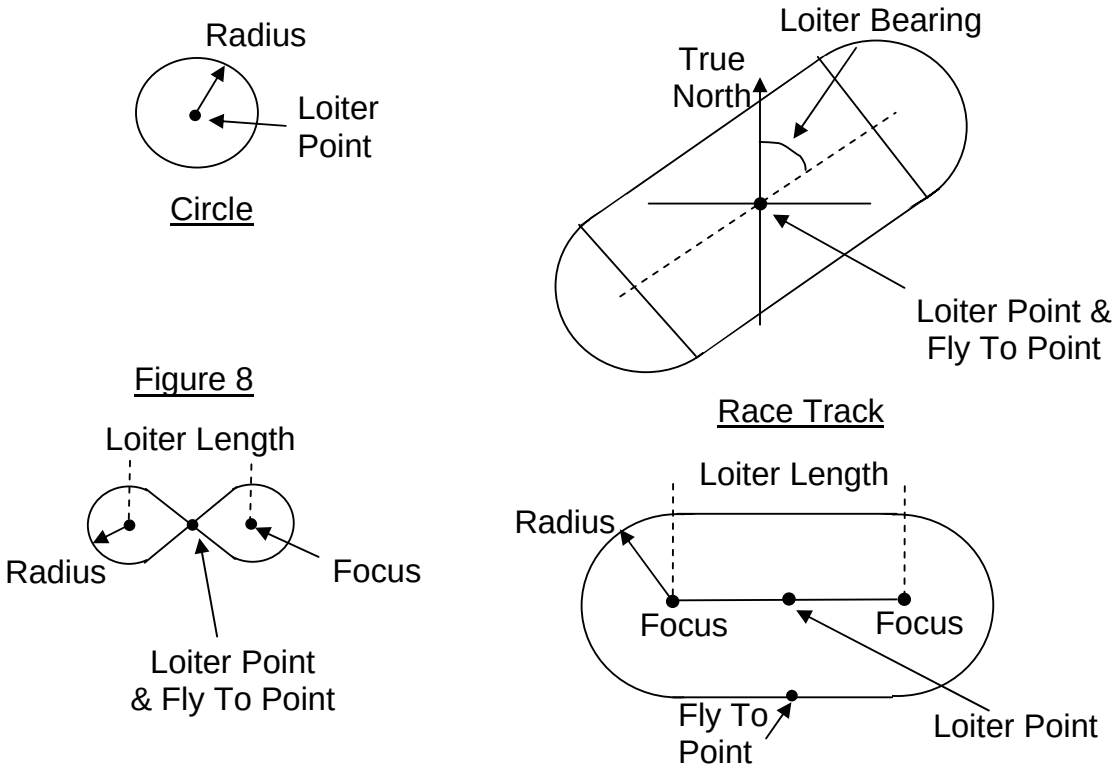

Figure B1 - 7: Loiter Pattern

4.1.2.3 Message #42: 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
0042.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0042.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0042.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0042.04	**4**	**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 #43, where AV autopilot is disengaged) 3-10 = Reserved 11 = Waypoint (Fly to predefined waypoint(s), during first leg altitude is controlled using Message #43) 12 = Loiter (Defined in Message #41) 13 - 14= Reserved 15 = Autopilot (Autopilot engaged, but manual override in near real-time of AV using message #43) 16 = Terrain Avoidance (Uses Message #43, 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 - 15: Message #42: Vehicle Operating Mode Command

4.1.2.4 Message #43: 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 #43, dependent on the current Flight mode (Message #42, Vehicle Operating Mode Command) and the current Altitude

mode, Speed mode and Course/Heading mode states (Message #48, Mode Preference Command). Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0043.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0043.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0043.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0043.04	**4**	**Altitude Command Type**	Unsigned 1	Enumerated	0 = No valid altitude command 1 = Altitude 2 = Vertical Speed 3 = Rate-limited altitude
0043.05	**5**	**Commanded Altitude** Altitude hold value to be achieved (ignored in Altitude Command Type = 2).	Float	Metres	$-1000 \leq x \leq 100000$
0043.06	**6**	**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).	Float	Metres/Sec	$-1000 \leq x \leq 1000$
0043.07	**7**	**Heading Command Type**	Unsigned 1	Enumerated	0 = No Valid Heading Command 1 = Heading 2 = Course 3 = Heading and Course 4 = Roll 5 = Heading Rate
0043.08	**8**	**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)	Float	Radians	$-\pi \leq x \leq \pi$
0043.09	**9**	**Commanded Course** Course value to be achieved (Used in Heading Command Type = 2 and 3, ignored in Heading Command Type = 1, 4 and 5)	Float	Radians	$-\pi \leq x \leq \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0043.10	**10**	**Commanded Turn Rate** Heading or Course turn rate value to be achieved (Used in Heading Command Type = 1 thru 3, and 5)	Float	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	**11**	**Commanded Roll Rate** Roll rate value to be achieved (used in Heading Command Type = 4)	Float	Radians/ Second	Configuration dependent A zero commanded rate indicates that the AV should use its default rates.
0043.12	**12**	**Commanded Roll** (Used in Heading Command Type = 4)	Float	Radians	$-\pi \leq x \leq \pi$
0043.13	**13**	**Commanded Speed**	Float	Metres/Sec	$0 \leq x \leq 10000$
0043.14	**14**	**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	**15**	**Commanded Waypoint Number** As defined in Section 4.1.5, Mission Messages.	Unsigned 2	-	$1 \leq x < 65535$
0043.16	**16**	**Altimeter Setting** Local Barometric pressure at sea level. Used to correct pressure altitude to barometric altitude.	Float	Pascals	$0 \leq x \leq 107500$
0043.17	**17**	**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	**18**	**Loiter Position Latitude** Manual Loiter position latitude command.	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0043.19	**19**	**Loiter Position Longitude** Manual Loiter position longitude command.	Double	Radians	$-\pi \leq x \leq \pi$

Table B1 - 16: Message #43: Vehicle Steering Command

4.1.2.5 Message #44: 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
0044.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0044.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0044.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0044.04	**4**	**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

Table B1 - 17: Message #44: Air Vehicle Lights

4.1.2.6 Message #45: Engine Command.

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 #45. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0045.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0045.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0045.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0045.04	**4**	**Engine Number** ID of engine currently being commanded	Integer 4	None	Configuration Dependent
0045.05	**5**	**Engine Command**	Unsigned 1	Enumerated	0 = Stop 1 = Start 2 = Enable/Run 3-9 = Reserved 10-255 = Vehicle Specific

Table B1 - 18: Message #45: Engine Command

4.1.2.7 Message #46: 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
0046.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0046.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0046.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0046.04	**4**	**Commanded Flight Termination State**	Unsigned 1	Enumerated	0 = Reset FT System 1 = Arm FT System 2 = Execute FT Seq.
0046.05	**5**	**Flight Termination Mode**	Unsigned 1	Enumerated	0 = Not Specified 1-255 = VSM specific

Table B1 - 19: Message #46: Flight Termination Command

4.1.2.8 Message #47: 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	Position	Data Element Name & Description	Type	Units	Range
0047.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0047.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0047.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0047.04	**4**	**Latitude (Y-axis zero)**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0047.05	**5**	**Longitude (X-axis zero)**	Double	Radians	$-\pi \leq x \leq \pi$
0047.06	**6**	**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	**7**	**Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0047.08	**8**	**Orientation** Defines heading of Y-axis.	Float	Radians	$-\pi \leq x \leq \pi$
0047.09	**9**	**Route ID**	Character 20	None	Text identifier of route, or null to update all routes.

Table B1 - 20: Message #47: Relative Route/Waypoint Absolute Reference Message

4.1.2.9 Message #48: Mode Preference Command.

The Message #48, Altitude mode, the Message #48, Speed mode, and the Message #48, 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 #42, 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 #43, Vehicle Steering Command, when the mode setting (report) is "Manual/Override."

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0048.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0048.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0048.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0048.04	**4**	**Altitude Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0048.05	**5**	**Speed Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0048.06	**6**	**Course/Heading Mode**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override

Table B1 - 21: Message #48: Mode Preference Command

"Configuration" enumeration: When in the selected Flight mode (Message #42, 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 #43, 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 #42, 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 #42, Select Flight Path Control Mode), the Altitude, Speed, and Course/Heading commanded values shall always be from Message #43, Vehicle Steering Command.

Table B1 - 22 shows the source message for the altitude/airspeed for each combination of Flight Mode (Msg. #42, Select Flight Path Control Mode) and Altitude or Airspeed Mode (Msg. #48, Altitude Mode, or Msg. #48, 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	43
	2 – Manual/Override	43
11 – Waypoint	0 – Configuration	802
	1 – Manual until reaching the WP, Loiter	43
	2 – Manual/Override	43
12 – Loiter	0 – Configuration	41
	1 – Manual until reaching the WP, Loiter	43
	2 – Manual/Override	43
All other Flight Modes	0 – Configuration	Not defined
	1 – Manual until reaching the WP, Loiter	43
	2 – Manual/Override	43

Table B1 - 22: Source Message for Altitude/Airspeed

Table B1 - 23 shows the source message for the course/heading or the lat/long, dependent on which is valid, for each combination of Flight Mode (Msg. #42, Select Flight Path Control Mode) and Course/Heading Mode (Msg. #48, 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	43	Not valid
	2 – Manual/Override	43	Not valid
11 – Waypoint	0 – Configuration	Not valid	802
	1 – Manual until reaching the WP, Loiter	43	43
	2 – Manual/Override	43	43
12 – Loiter	0 – Configuration	Not defined	Not defined
	1 – Manual until reaching the WP, Loiter	Not valid	43
	2 – Manual/Override	Not valid	43
All other Flight Modes	0 – Configuration	Not defined	Not defined
	1 – Manual until reaching the WP, Loiter	43	43
	2 – Manual/Override	43	43

Table B1 - 23: 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.

4.1.2.10 Message #100: 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
0100.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0100.02	**2**	**Vehicle ID** See Message #20 declaration.	Integer 4	None	See Section 1.7.5
0100.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0100.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0100.05	**5**	**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	$0 \leq x \leq (2^{32} - 1)$
0100.06	**6**	**Propulsion Fuel Capacity** Amount of weight in fuel that can be carried for this configuration.	Float	Kg	Configuration Dependent (<0: Not Applicable)
0100.07	**7**	**Propulsion Battery Capacity**	Float	Joules	Configuration Dependent (<0: Not Applicable)
0100.08	**8**	**Maximum Indicated Airspeed** Not to exceed dash speed	Float	Metres/ Sec	Configuration Dependent
0100.09	**9**	**Optimum Cruise Indicated Airspeed**	Float	Metres/ Sec	Configuration Dependent
0100.10	**10**	**Optimum Endurance Indicated Airspeed**	Float	Metres/ Sec	Configuration Dependent
0100.11	**11**	**Maximum Load Factor** Not-to-exceed G-load tolerance	Float	Metres/ Sec2	Configuration Dependent
0100.12	**12**	**Gross Weight** Calculated gross weight of current configuration, including effects of fuel load changes.	Float	Kg	Determined by Vehicle Configuration
0100.13	**13**	**X_CG** Calculated centre of gravity of current configuration rearward from the nose.	Float	Metres	Determined by Vehicle Configuration
0100.14	**14**	**Number of Engines**	Unsigned 1	None	$0 \leq x \leq 255$

Table B1 - 24: Message #100: Vehicle Configuration

4.1.2.11 Message #101: 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
0101.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0101.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0101.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0101.04	**4**	**Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0101.05	**5**	**Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0101.06	**6**	**Altitude** Distance above (+) or below (-)	Float	Metres	$-1000 \leq x \leq 100000$
0101.07	**7**	**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	**8**	**U_Speed** Speed component along true north vector	Float	Metres/Sec	$-10000 \leq x \leq 10000$
0101.09	**9**	**V_Speed** Speed component along true east vector	Float	Metres/Sec	$-10000 \leq x \leq 10000$
0101.10	**10**	**W_Speed** Inertial vertical speed component pointing down	Float	Metres/Sec	$-10000 \leq x \leq 10000$
0101.11	**11**	**U_Accel** Acceleration component along true north vector	Float	Metres/Sec^2	$-100 \leq x \leq 100$
0101.12	**12**	**V_Accel** Acceleration component along the true east vector	Float	Metres/Sec^2	$-100 \leq x \leq 100$
0101.13	**13**	**W_Accel** Inertial vertical acceleration component pointing down	Float	Metres/Sec^2	$-100 \leq x \leq 100$
0101.14	**14**	**Phi** Roll angle (Euler convention)	Float	Radians	$-\pi \leq x \leq \pi$
0101.15	**15**	**Theta** Pitch angle (Euler convention)	Float	Radians	$-\pi/2 \leq x \leq \pi/2$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0101.16	**16**	**Psi** Yaw angle (Euler convention)	Float	Radians	$-\pi \le x \le \pi$
0101.17	**17**	**Phi_dot** Roll rate (Euler convention)	Float	Radians/ Second	$-1000 \le x \le 1000$
0101.18	**18**	**Theta_dot** Pitch rate (Euler convention)	Float	Radians/ Second	$-1000 \le x \le 1000$
0101.19	**19**	**Psi_dot** Yaw rate (Euler convention)	Float	Radians/ Second	$-1000 \le x \le 1000$
0101.20	**20**	**Magnetic Variation** True = Magnetic + Variation	Float	Radians	$-\pi \le x \le \pi$

Table B1 - 25: Message #101: Inertial States

4.1.2.12 Message #102: 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
0102.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0102.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0102.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0102.04	**4**	**Angle of Attack**	Float	Radians	$-\pi \le x \le \pi$
0102.05	**5**	**Angle of Sideslip**	Float	Radians	$-\pi \le x \le \pi$
0102.06	**6**	**True Airspeed**	Float	Metres/Sec	$0 \le x \le 10000$
0102.07	**7**	**Indicated Airspeed**	Float	Metres/Sec	$0 \le x \le 10000$
0102.08	**8**	**Outside Air Temp**	Float	^{o}K	$172.15 \le x \le 372.15$
0102.09	**9**	**U_Wind** Estimated wind component along true north vector	Float	Metres/Sec	$-10000 \le x \le 10000$
0102.10	**10**	**V_Wind** Estimated wind component along true east vector	Float	Metres/Sec	$-10000 \le x \le 10000$
0102.11	**11**	**Altimeter Setting** Local Barometric pressure at sea level. Used to correct pressure altitude to barometric altitude.	Float	Pascals	$0 \le x \le 107500$
0102.12	**12**	**Barometric Altitude** Altitude based on Altimeter Setting	Float	Metres	$-1000 \le x \le 100000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0102.13	**13**	**Barometric Altitude Rate** Estimated vertical velocity (+ up) based on pressure rate from air data system	Float	Metres/Sec	-1000 ≤ x ≤ 1000
0102.14	**14**	**Pressure Altitude**	Float	Metres	-1000 ≤ x ≤ 100000
0102.15	**15**	**AGL Altitude**	Float	Metres	-1000 ≤ x ≤ 100000
0102.16	**16**	**WGS-84 Altitude**	Float	Metres	-1000 ≤ x ≤ 100000
0102.17	**17**	**U_Ground** Ground Speed component along true north vector	Float	Metres/Sec	-10000 ≤ x ≤ 10000
0102.18	**18**	**V_Ground** Ground Speed component along true east vector	Float	Metres/Sec	-10000 ≤ x ≤ 10000

Table B1 - 26: Message #102: Air and Ground Relative States

4.1.2.13 Message #103: 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
0103.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0103.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0103.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0103.04	**4**	**X_Body_Accel** Longitudinal acceleration, + forward	Float	Metres/Sec2	-100 ≤ x ≤ 100
0103.05	**5**	**Y_Body_Accel** Lateral acceleration, + right	Float	Metres/Sec2	-100 ≤ x ≤ 100
0103.06	**6**	**Z_Body_Accel** Vertical acceleration, + down	Float	Metres/Sec2	-100 ≤ x ≤ 100
0103.07	**7**	**Roll_Rate**	Float	Radians/ Second	-100 ≤ x ≤ 100
0103.08	**8**	**Pitch_Rate**	Float	Radians/ Second	-100 ≤ x ≤ 100
0103.09	**9**	**Yaw_Rate**	Float	Radians/ Second	-100 ≤ x ≤ 100

Table B1 - 27: Message #103: Body-Relative Sensed States

4.1.2.14 Message #104: Vehicle Operating States.

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

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0104.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0104.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0104.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0104.04	**4**	**Commanded Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0104.05	**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
0104.06	**6**	**Commanded Heading**	Float	Radians	$-\pi \leq x \leq \pi$
0104.07	**7**	**Commanded Course**	Float	Radians	$-\pi \leq x \leq \pi$
0104.08	**8**	**Commanded Turn Rate**	Float	Radians/ Second	Configuration dependent
0104.09	**9**	**Commanded Roll Rate**	Float	Radians/ Second	Configuration dependent
0104.10	**10**	**Commanded Speed**	Float	Mps	$0 \leq x \leq 10000$
0104.11	**11**	**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	**12**	**Power Level** Average throttle setting of all engines	Integer 2	Percent	Configuration Dependent (Nominally 0-110%)
0104.13	**13**	**Flap Deployment Angle**	Integer 1	0.02 Radians	$-\pi/2 \leq x \leq \pi/2$
0104.14	**14**	**Speed Brake Deployment Angle**	Integer 1	0.02 Radians	$-\pi/2 \leq x \leq \pi/2$
0104.15	**15**	**Landing Gear State**	Unsigned 1	Enumerated	0 = No Value 1 = Stowed 2 = Cycling 3 = Down 4 = Inoperative
0104.16	**16**	**Current Propulsion Energy Level** Reported as a percentage of maximum usable energy for interoperable gauge displays.	Float	%	0-100%

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0104.17	**17**	**Current Propulsion Energy Usage Rate** Total consumption as a percentage of maximum usable energy of this configuration.	Float	%/s	Configuration Dependent
0104.18	**18**	**Commanded Roll**	Float	Radians	$-\pi \leq x \leq \pi$
0104.19	**19**	**Altitude Command Type**	Unsigned 1	Enumerated	0 = No valid altitude command 1 = Altitude 2 = Vertical Speed 3 = Rate-limited altitude
0104.20	**20**	**Heading Command Type**	Unsigned 1	Enumerated	0 = No Valid Heading Command 1 = Heading 2 = Course 3 = Heading and Course 4 = Roll 5 = Heading Rate

Table B1 - 28: Message #104: Vehicle Operating States

4.1.2.15 Message #105: 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
0105.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0105.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0105.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0105.04	**4**	**Engine Number** ID of engine currently being reported	Integer 4	None	Configuration Dependent
0105.05	**5**	**Engine Status**	Unsigned 1	Enumerated	0 = Stopped 1 = Started 2 = Enabled/Running 3-9 = Reserved 10-255 = Vehicle Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0105.06	**6**	**Reported Engine Command**	Unsigned 1	Enumerated	0 = Stop 1 = Start 2 = Enable/Run 3-9 = Reserved 10-255 = Vehicle Specific
0105.07	**7**	**Engine Power Setting**	Float	Percent	0 <= x <= 110
0105.08	**8**	**Engine Speed**	Float	Radians/ Second	0 <= x <= 21000
0105.09	**9**	**Engine Speed 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	**10**	**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
0105.11	**11**	**Engine Body Temperature Status** For reciprocating engines, this state is nominally reported as cylinder head temperature.	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
0105.12	**12**	**Exhaust Gas Temperature 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
0105.13	**13**	**Coolant Temperature 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
0105.14	**14**	**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
0105.15	**15**	**Lubricant Temperature 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
0105.16	**16**	**Fire Detection Sensor 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

Table B1 - 29: Message #105: Engine Operating States

4.1.2.16 Message #106: Vehicle Operating Mode Report.

This message shall be used to report the vehicle-operating mode, as commanded from the Vehicle Operating Mode Command (Message #42).

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0106.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0106.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0106.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0106.04	**4**	**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 #43, where AV autopilot is disengaged) 3-10 = Reserved 11 = Waypoint (Fly to predefined waypoint(s), during first leg altitude is controlled using Message #43**)** 12 = Loiter (Defined in Message #41) 13 - 14= Reserved 15 = Autopilot (Autopilot engaged, but manual override in near real-time of AV using message #43) 16 = Terrain Avoidance (Uses Message #43, 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 - 30: Message #106: Vehicle Operating Mode Report

4.1.2.17 Message #107: 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
0107.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0107.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0107.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0107.04	**4**	**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 - 31: Message #107: Vehicle Lights State

4.1.2.18 Message #108: 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 #46) and whenever the current status of flight termination changes.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0108.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0108.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0108.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0108.04	**4**	**Reported Flight Termination State**	Unsigned 1	Enumerated	0 = Reset FT System 1 = Arm FT System 2 = Execute FT Seq.
0108.05	**5**	**Reported Flight Termination Mode**	Unsigned 1	Enumerated	0 = Not Specified 1-255 = VSM specific

Table B1 - 32: Message #108: Flight Termination Mode Report

4.1.2.19 Message #109: 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
0109.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0109.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0109.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0109.04	**4**	**Altitude Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0109.05	**5**	**Speed Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override
0109.06	**6**	**Course/Heading Mode State**	Unsigned 1	Enumerated	0 = Configuration 1 = Manual/ Override until reaching the Waypoint or Loiter Point 2 = Manual/ Override

Table B1 - 33: Message #109: Mode Preference Report

4.1.2.20 Message #110: From-To-Next Waypoint States.

This message shall be used to report the vehicle From-To-Next Waypoints while in certain Flight modes as supported by the air vehicle. The From, To, or Next Waypoint may not be valid dependent on the current Flight mode (Message #42, Vehicle Operating Mode Command), therefore, zero values shall be transmitted in the waypoint number field for 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", "Waypoint" and "Slave to Sensor" Flight modes (Message #42, Vehicle Operating Mode Command). 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 #42, 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 #42, 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 #802) loaded to the VSM by a CUCS, except to report those Mission Waypoints.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0110.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0110.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0110.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0110.04	**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
0110.05	**5**	**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	**6**	**From Waypoint – Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0110.07	**7**	**From Waypoint – Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0110.08	**8**	**From Waypoint Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0110.09	**9**	**From Waypoint Time** The Time at which the AV reached the waypoint.	Double	Seconds	See Section 1.7.2
0110.10	**10**	**From Waypoint Number** 0 indicates that the remaining From Waypoint data is not valid	Unsigned 2	None	$0 \leq x < 65535$
0110.11	**11**	**To Waypoint – Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0110.12	**12**	**To Waypoint – Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0110.13	**13**	**To Waypoint Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0110.14	**14**	**To Waypoint Speed**	Float	Mps	$0 \leq x \leq 10000$
0110.15	**15**	**To Waypoint Time** The Time at which the AV will reach the waypoint. Not a countdown.	Double	Seconds	See Sect. 1.7.2

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0110.16	**16**	**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	$0 \leq x \leq 65535$
0110.17	**17**	**Next Waypoint – Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0110.18	**18**	**Next Waypoint – Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0110.19	**19**	**Next Waypoint Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0110.20	**20**	**Next Waypoint Airspeed**	Float	Mps	$0 \leq x \leq 10000$
0110.21	**21**	**Next Waypoint Time** The Time at which the AV will reach the waypoint. Not a countdown.	Double	Seconds	See Section 1.7.2
0110.22	**22**	**Next Waypoint Number** 0 indicates that the remaining Next Waypoint data is not valid	Unsigned 2	None	$0 \leq x < 65535$

Table B1 - 34: Message #110: From-To-Next Waypoint States

4.1.3 Payload Command and 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 command the operating state in an interoperable fashion. Vehicles not carrying such payloads need not support the messages in the group.

4.1.3.1 Message #200: Payload Steering Command.

This message shall be used to steer any steerable payload located at the Station Number specified in the message. Table B1-5, Conditional Payload Message Groups, identifies the common payload types that are required to use the Payload Steering Command. This message shall be used to command the “Field of View” and “Focus” for payloads that support these capabilities.

The VSM shall use the General Configuration Messages to define the payloads capability (specified by Station Number) to support the fields commanded in Message #200, dependent on the current Payload Steering Mode (Message #201, Set EO/IR Pointing Mode and Message #202, SAR Mode) for the Payload type. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0200.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0200.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0200.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0200.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0200.05	**5**	**Set Centreline Azimuth Angle** (+ right of aircraft x axis)	Float	Radians	$-\pi \leq x \leq \pi$
0200.06	**6**	**Set Centreline Elevation Angle** (+ above aircraft waterline)	Float	Radians	$-\pi \leq x \leq \pi$
0200.17	**7**	**Set Zoom** Allows control of the payload zoom by either requesting a specific angle or by requested the payload to soom 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	**8**	**Set Horizontal Field Of View** Applies to the Addressed Sensor specified in message #201.	Float	Radians	$0 \leq x \leq 2\pi$
0200.08	**9**	**Set Vertical Field Of View** Applies to the Addressed Sensor specified in message #201.	Float	Radians	$0 \leq x \leq 2\pi$
0200.09	**10**	**Horizontal Slew Rate** (+ Slew FOV right)	Float	Radians/ Second	-2π to 2π
0200.10	**11**	**Vertical Slew Rate** (+ Slew FOV up)	Float	Radians/ Second	-2π to 2π
0200.11	**12**	**Latitude** Commanded Stare point latitude: latitude of centre of FOV	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0200.12	**13**	**Longitude** Commanded Stare point longitude: longitude of centre of FOV	Double	Radians	$-\pi \leq x \leq \pi$

0200.13	**14**	**Altitude** Altitude of centre of FOV	Float	Metres	-1000 ≤ x ≤ 100000
0200.14	**15**	**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
0200.15	**16**	**Set Focus** Applies to the Addressed Sensor specified in message #201.	Unsigned 1	Enumerated	0 = No change 1 = Focus closer 2 = Focus farther
0200.16	**17**	**Focus Type** Applies to the Addressed Sensor specified in message #201.	Unsigned 1	Enumerated	0 = Auto 1 = Manual

Table B1 - 35: Message #200: Payload Steering Command

4.1.3.2 Message #201: EO/IR/Laser Payload Command.

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 #200).

Notes:

- Payloads with optics are assumed to either have fixed focus optics or to have automatic focus capability with the option of manual focus override.
- 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 Message #201. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0201.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0201.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0201.05	**5**	**Addressed Sensor** Identifies which sensor (s) to control where applicable.	Unsigned 1	Bitmapped	0x01 = EO 0x02 = IR 0x04 = PAYLOAD-Specific
0201.06	**6**	**System Operating Mode**	Unsigned 1	Enumerated	0 = Stow 1 = Off 2 = Cage 3 = Initialise 4 = Standby 5 = Active 6 = Calibrate 7-9 Reserved 10-255 = PAYLOAD-Specific
0201.07	**7**	**Set EO Sensor Mode**	Unsigned 1	Enumerated	0 = BW Mode 1 = Colour Mode
0201.08	**8**	**Set IR Polarity**	Unsigned 1	Enumerated	0 = Black Hot 1 = White Hot
0201.09	**9**	**Image Output**	Unsigned 1	Enumerated	0 = None 1 = EO 2 = IR 3 = Both 4 = PAYLOAD-Specific
0201.10	**10**	**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) 6-9 = Reserved 10-255 = PAYLOAD-Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0201.11	**11**	**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	**12**	**Select Laser Rangefinder First/Last Pulse**	Unsigned 1	Enumerated	1 = First 2 = Last
0201.13	**13**	**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
0201.14	**14**	**Initiate Laser Designator**	Unsigned 1	Enumerated	0000 0000 = Turn Off 0011 0011 = Turn On 0100 0100 = Deactivate Laser 0101 0101 = Activate Laser
0201.15	**15**	**Preplan Mode**	Unsigned 1	Enumeration	0 = Operate in Preplanned Mode 1 = Operate in Manual Mode

Table B1 - 36: Message #201: EO/IR/Laser Payload Command

4.1.3.3 Message #202: 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 #200).

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0202.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0202.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0202.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0202.04	**4**	**Station Number**	Unsigned 4	Bitmap-ped	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.
0202.05	**5**	**Set Radar State**	Unsigned 1	Enumer-ated	0 = Turn Off 1 = Turn On 2 = Go To Standby 3 = Deploy 4 = Activate 5 = Deactivate 6 = Stow 7-9 = Reserved 10-255 = PAYLOAD-Specific
0202.06	**6**	**Set MTI Radar Mode**	Unsigned 1	Enumer-ated	1 = Clutter Map 2 = Moving Target 3-9 = Reserved 10-255 = PAYLOAD-Specific
0202.07	**7**	**Set SAR Modes**	Character 6	NA	Per the NSIF Registry, AEDP-4, Annex D. See message #303, field 7 for details)
0202.08	**8**	**Set Radar Resolution**	Integer 2	Cm	0=unknown $1 \leq x \leq 10{,}000$

Table B1 - 37: Message #202: SAR Payload Command

4.1.3.4 Message #203: 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 Message #203. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0203.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0203.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0203.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0203.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0203.05	**5**	**Power Command**	Unsigned 1	Enumerated	0 = N/A 1 = Power Off 2 = Power On
0203.06	**6**	**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	**7**	**Active Target Acquisition Mode Select**	Unsigned 1	Enumerated	0 = N/A 1 = Coordinates 2 = Sensor-Based Tracking 3-9 = Reserved 10-255 = PAYLOAD-Specific
0203.08	**8**	**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	**9**	**Rack/Rail Ejector Enable (Hung ordnance)**	Unsigned 1	Enumerated	0 = N/A 1 = Lock 2 = Unlock
0203.10	**10**	**Safety Enable Discrete Command**	Unsigned 1	Enumerated	0 = N/A 1 = Enable 2 = Inhibit

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0203.11	**11**	**Set Target Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0203.12	**12**	**Set Target Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0203.13	**13**	**Set Target Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0203.14	**14**	**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	**15**	**Set Target Inertial Speed (Vx)**	Float	M/Sec	$-1000 \leq x \leq 1000$
0203.16	**16**	**Set Target Inertial Speed (Vy)**	Float	M/Sec	$-1000 \leq x \leq 1000$
0203.17	**17**	**Set Target Inertial Speed (Vz)**	Float	M/Sec	$-1000 \leq x \leq 1000$

Table B1 - 38: Message #203: Stores Management System Command

4.1.3.5 Message #204: 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 Message #204. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0204.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0204.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0204.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0204.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0204.05	**5**	**Set Relay State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go To Standby 3 = Deploy 4 = Activate 5 = Deactivate 6 = Stow 7-9 = Reserved 10-255 = PAYLOAD-Specific

Table B1 - 39: Message #204: Communications Relay Command

4.1.3.6 Message #205: 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.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0205.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0205.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0205.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0205.04	**4**	**Recording Device Number**	Unsigned 1	None	0 – 255
0205.05	**5**	**Set Recording Index Type**	Unsigned 1	Enumerated	0 = Time 1 = Block Number 2 = Event Mark 3 = Session Number
0205.06	**6**	**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	**7**	**Set Recording Rate**	Float	Mbit/s	$.001 \leq x \leq 40000$
0205.08	**8**	**Initial Recording Index**	Integer 4	None	$0 \leq x \leq (2^{31} - 1)$, where 0 = No Active Index
0205.09	**9**	**Set Replay Mode**	Unsigned 1	Enumerated	0 = Stop 1 = Ready 2 = Reading 3-9 = Reserved 10-255 = PAYLOAD-Specific
0205.10	**10**	**Replay Clock Rate**	Float	Mbit/s	$.001 \leq x \leq 40000$
0205.11	**11**	**Seek Replay Index**	Integer 4	None	$0 \leq x \leq (2^{31} - 1)$, where 0 = No Active Index

Table B1 - 40: Message #205: Payload Data Recorder Control Command

4.1.3.7 Message #206: Payload Bay Command.

This message shall be used to control each payload bay.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0206.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0206.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0206.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0206.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0206.05	**5**	**Payload Bay Doors**	Unsigned 1	Enumerated	0 = Close 1 = Open

Table B1 - 41: Message #206: Payload Bay Command

4.1.3.8 Message #207: 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
0207.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0207.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0207.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
207.04	**4**	**Latitude** of terrain data point	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0207.05	**5**	**Longitude** of terrain data point	Double	Radians	$-\pi \leq x \leq \pi$
0207.06	**6**	**Elevation** of terrain data point Distance above (+) or below (-) the WGS-84 reference geoid	Float	Metres	$-1000 \leq x \leq 100000$

Table B1 - 42: Message #207: Terrain Data Update

4.1.3.9 Message #300: Payload Configuration.

This message shall be used to identify payload configuration by vehicle station. 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 VSM/vehicle shall send this message in response to a CUCS Authorisation Request Message (Message #1). One instance

of this message shall be sent by the VSM/vehicle for each employed payload station when requested by the CUCS. An instance of the message shall be sent each time the configuration changes.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0300.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0300.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0300.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0300.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0300.05	**5**	**Payload Stations Available**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0300.06	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0300.07	**7**	**Payload Type** Type ID associated with deployable or dispensable payloads (e.g., chaff, weapons) Payload types will be identified per an enumerated list of types that will be published and maintained by NATO.	Unsigned 2	Enumerated	0 = Not Specified 1 = EO 2 = IR 3 = EO/IR 4 = SAR 5 = Fixed Camera 6 = Comms Relay 7 = Dispensable Payload 8 –50 = Reserved 51-256 = VSM Specific
0300.08	**8**	**Station Door**	Unsigned 1	Enumerated	0 = No 1 = Yes
0300.09	**9**	**Number of Payload Recording Devices**	Unsigned 1	None	$0 \leq x \leq 255$

Table B1 - 43: Message #300: Payload Configuration

4.1.3.10 Message #301: 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
0301.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0301.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0301.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0301.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0301.05	**5**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0301.06	**6**	**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	**7**	**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	**8**	**EO Vertical Image Dimension** Number of pixel rows	Integer 2	None	$0 \leq x \leq 32767$, where 0 = Off
0301.09	**9**	**EO Horizontal Image Dimension** Number of pixel columns	Integer 2	None	$0 \leq x \leq 32767$, where 0 = Off
0301.10	**10**	**IR Vertical Image Dimension** Number of pixel rows	Integer 2	None	$0 \leq x \leq 32767$, where 0 = Off
0301.11	**11**	**IR Horizontal Image Dimension** Number of pixel columns	Integer 2	None	$0 \leq x \leq 32767$, where 0 = Off
0301.12	**12**	**Field of Regard – Elevation Min**	Float	Radians	$-\pi \leq x \leq \pi$
0301.13	**13**	**Field of Regard – Elevation Max**	Float	Radians	$-\pi \leq x \leq \pi$
0301.14	**14**	**Field of Regard – Azimuth Min**	Float	Radians	$-\pi \leq x \leq \pi$
0301.15	**15**	**Field of Regard – Azimuth Max**	Float	Radians	$-\pi \leq x \leq \pi$

Table B1 - 44: Message #301: EO/IR Configuration State

4.1.3.11 Message #302: 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
0302.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0302.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0302.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0302.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0302.05	**5**	**Addressed Sensor** Identifies which sensor(s) is under control where applicable.	Unsigned 1	Bitmapped	0x01 = EO 0x02 = IR 0x04 = PAYLOAD-Specific
0302.06	**6**	**System Operating Mode State**	Unsigned 1	Enumerated	0 = Stowed 1 = Off 2 = Caged 3 = Initialising 4 = Standby 5 = Active 6 = Calibrating 7-9 = Reserved 10-255 = PAYLOAD-Specific
0302.07	**7**	**EO Camera Status**	Unsigned 1	Enumerated	0 = B/W mode 1 = Colour Mode
0302.08	**8**	**IR Polarity Status**	Unsigned 1	Enumerated	0 = Black Hot 1 = White Hot
0302.09	**9**	**Image Output State**	Unsigned 1	Enumerated	0 = None 1 = EO 2 = IR 3 = Both 4 = PAYLOAD-Specific
0302.10	**10**	**Actual Centreline Elevation Angle** (+ above aircraft waterline)	Float	Radians	$-\pi \leq x \leq \pi$
0302.11	**11**	**Actual Vertical Field of View**	Float	Radians	$0 \leq x \leq 2\pi$
0302.12	**12**	**Actual Centreline Azimuth Angle** (+ right of aircraft x axis)	Float	Radians	$-\pi \leq x \leq \pi$
0302.13	**13**	**Actual Horizontal Field of View**	Float	Radians	$0 \leq x \leq 2\pi$
0302.14	**14**	**Actual Sensor Rotation Angle** (+ Clockwise rotation from aircraft normal (Up))	Float	Radians	$-\pi \leq x \leq \pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0302.15	**15**	**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	**16**	**Latitude** of image centre	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0302.17	**17**	**Longitude** of image centre	Double	Radians	$-\pi \leq x \leq \pi$
0302.18	**18**	**Altitude** Distance above (+) or below (-) the WGS-84 reference geoid of image centre.	Float	Metres	$-1000 \leq x \leq 100000$
0302.19	**19**	**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) 6-9 = Reserved 10-255 = PAYLOAD-Specific
0302.20	**20**	**Preplan Mode**	Unsigned 1	Enumerated	0 = Operate in Preplanned Mode 1 = Operate in Manual Mode
0302.21	**21**	**Reported Range** If > 0, then reported range is valid for the current reported location in this message	Float	Metres	0 = Range is invalid 0-100,000
0302.22	**22**	**Fire Laser Pointer/Rangefinder Status**	Unsigned 1	Enumerated	0 = Off 1 = On – Not Firing 2 = On – Recharging 3 = Lasing 4 = Laser Masked
0302.23	**23**	**Selected Laser Rangefinder First/Last Pulse**	Unsigned 1	Enumerated	1 = First 2 = Last
0302.24	**24**	**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
0302.25	**25**	**Laser Designator Status**	Unsigned 1	Enumerated	0 = Off 1 = On - Deactivated 2 = On – Activated

Table B1 - 45: Message #302: EO/IR/Laser Operating State

4.1.3.12 Message #303: 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
0303.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0303.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0303.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0303.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0303.05	**5**	**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	**6**	**SAR Type Revision Level** Number identifying modification level of the type specified in the SAR Type Field.	Unsigned 1	Enumerated	0 <= x <= 255
0303.07	**7**	**Radar Operating Mode** (Reference: NSIF Registry, AEDP-4, Annex D.)	Character 5	None	See NSIF Registry
0303.08	**8**	**Radar Operating Status**	Unsigned 1	Enumerated	0 = Powered Off 1 = Powered On 2 = Standby 3 = Deployed 4 = Activated 5 = Deactivated 6 = Stowed 7-9 = Reserved 10-255 = PAYLOAD-Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0303.09	**9**	**Radar MTI Mode Status**	Unsigned 1	Enumerated	1 = Clutter Map 2 = Moving target 3-9 = Reserved 10-255 = PAYLOAD-Specific
0303.10	**10**	**Resolution -** Current pixel resolution of SAR product	Float	Metres	0 = unknown 1<= x <= 100.00
0303.11	**11**	**Current Field of View –** Elevation Min (above body x axis)	Float	Radians	$-\pi \leq x \leq \pi$
0303.12	**12**	**Current Field of View – Elevation Max** (above body x axis)	Float	Radians	$-\pi \leq x \leq \pi$
0303.13	**13**	**Current Field of View – Azimuth Min** (right of body x axis)	Float	Radians	$-\pi \leq x \leq \pi$
0303.14	**14**	**Current Field of View – Azimuth Max** (right of body x axis)	Float	Radians	$-\pi \leq x \leq \pi$

Table B1 - 46: Message #303: SAR Operating State

3.1.3.13 Message #304: 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
0304.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0304.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0304.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0304.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 Etc.
0304.05	**5**	**Active Weapon Type**	Unsigned 1	Enumerated	0 = No Mode 1 = Air-To-Air Weapon 2 = Air-To-Ground Weapon 3 = Air-To-Surface Weapon
0304.06	**6**	**Active Weapon Sensors**	Unsigned 1	Enumerated	0 = No Mode 1 = EO 2 = Laser 3 = EM 4 = IR

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0304.07	**7**	**Active Weapon Number per Station**	Unsigned 1	None	0 = None Selected 1 = One Weapon 2 = Two Weapons … 255 = 255 Weapons
0304.08	**8**	**Active Target Acquisition Mode**	Unsigned 1	Enumerated	0 = No Mode 1 = Coordinates 2 = Sensor-Based Tracking 3-9 = Reserved 10-255 = PAYLOAD-Specific
0304.09	**9**	**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	**10**	**Weapon Initialising**	Unsigned 1	Enumerated	0 = No Mode 1 = Sensors Initial Alignment 2 = Seeker Steering Mode 3 = Navigation Data Loading 4 = Target Data Loading
0304.11	**11**	**Weapon Release Clearance**	Unsigned 1	Enumerated	0 = Not Clear 1 = Clear
0304.12	**12**	**Clearance Validity**	Unsigned 1	Enumerated	0 = Not clear 1 = Clear
0304.13	**13**	**Weapon Power State**	Unsigned 1	Enumerated	0 = Unpowered 1 = Powered
0304.14	**14**	**Weapon Status**	Unsigned 1	Enumerated	0 = N/A 1 = Ready 2 = Armed
0304.15	**15**	**Rack/Rail/Ejector Unlock**	Unsigned 1	Enumerated	0 = Unlocked 1 = Locked
0304.16	**16**	**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	**17**	**Launch Acceptable Region (LAR) Status**	Unsigned 1	Enumerated	0 = N/A 1 = Green (Acceptable) 2 = Yellow (Marginal) 3 = Red (Not Acceptable)
0304.18	**18**	**Safe Separation Status (Weapon)**	Unsigned 1	Enumerated	0 = N/A 1 = Green (Released) 2 = Red (Hung Store)
0304.19	**19**	**Number of Stores Available**	Unsigned 1	None	0 = Empty or N/A 1 to 254 = Count 255 = 255 or Greater Count

Table B1 - 47: Message #304: Stores Management System Status

4.1.3.14 Message #305: 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
0305.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0305.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0305.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0305.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0305.05	**5**	**Report Relay State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go To Standby 3 = Deploy 4 = Activate 5 = Deactivate 6 = Stow 7-9 = Reserved 10-255 = PAYLOAD-Specific

Table B1 - 48: Message #305: Communications Relay Status

4.1.3.15 Message #306: 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
0306.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0306.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0306.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0306.04	**4**	**Recording Device Number**	Unsigned 1	None	0 – 255
0306.05	**5**	**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	**6**	**Recording Status**	Unsigned 1	Enumerated	0 = Stop 1 = Active, Not Ready 2 = Ready/Pause 3 = Recording
0306.07	**7**	**Record Rate**	Float	Mbit/Sec	$.001 \leq x \leq 40000$
0306.08	**8**	**Current Recording Index**	Integer 4	None	$0 \leq x \leq (2^{31} - 1)$, where 0 = No Active Index
0306.09	**9**	**Record Index Time Stamp** For events, time of the event, for blocks or sessions, the time of block or session start.	Double	Seconds	See Section 1.7.2
0306.10	**10**	**Replay Status**	Unsigned 1	Enumerated	0 = Stop 1 = Active, Not Ready 2 = Ready/Pause 3 = Reading
0306.11	**11**	**Replay Rate**	Float	Mbit/Sec	$.001 \leq x \leq 40000$
0306.12	**12**	**Current Replay Index**	Integer 4	None	$0 \leq x \leq (2^{31} - 1)$, where 0 = No Active Index
0306.13	**13**	**Health Status Code**	Integer 2	None	Recorder Specific

Table B1 - 49: Message #306: Payload Data Recorder Status

4.1.3.16 Message #307: 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
0307.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0307.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0307.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0307.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0307.05	**5**	**Payload Recorder**	Unsigned 1	None	0 – 255

Table B1 - 50: Message #307: Vehicle Payload/Recorder Configuration

4.1.3.17 Message #308: 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
0308.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0308.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0308.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0308.04	**4**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0308.05	**5**	**Payload Bay Door Status**	Unsigned 1	Enumerated	0 = Closed 1 = Open

Table B1 - 51: Message #308: Payload Bay Status

4.1.4 Data Link Messages.

4.1.4.1 Data Link Command and Status Messages.

4.1.4.1.1 Message #400: Data Link Set Up Message.

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

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0400.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0400.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0400.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0400.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0400.05	**5**	**Addressed Terminal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0400.06	**6**	**Select Channel**	Unsigned 2	N/A	Link Dependent
0400.07	**7**	**Select Primary Hop Pattern**	Unsigned 1	N/A	Link Dependent
0400.08	**8**	**Set Forward Link (FL) Carrier Frequency**	Float	Hz	Link Dependent
0400.09	**9**	**Set Return Link (RL) Carrier Frequency**	Float	Hz	Link Dependent
0400.10	**10**	**Set PN Code**	Unsigned 1	None	Link Dependent

Table B1 - 52: Message #400: Data Link Set Up Message

4.1.4.1.2 Message #401: Data Link Control Command.

This message shall be used to send instructions to the VSM to command the components of the ADT and/or GDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0401.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0401.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0401.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0401.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0401.05	**5**	**Addressed Terminal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0401.06	**6**	**Set Data Link State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Rx Only 2 = Tx / Rx 3 = Tx High Power / Rx
0401.07	**7**	**Set Antenna Mode**	Unsigned 1	Enumerated	0 = Omni 1 = Directional 2 = Auto
0401.08	**8**	**Communication Security Mode**	Unsigned 1	Enumerated	0 = Normal 1 = Zeroize
0401.09	**9**	**Link Channel Priority**	Unsigned 1	Enumerated	0 = Primary 1 = Secondary 2 = Tertiary…. 255 = Last

Table B1 - 53: Message #401: Data Link Control Command

4.1.4.1.3 Message #402: Pedestal Configuration Message.

This message shall be used to configure the location of the GDT pedestal.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0402.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0402.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0402.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0402.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0402.05	**5**	**Set GDT Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0402.06	**6**	**Set GDT Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0402.07	**7**	**Set GDT Altitude**	Float	Metres	$-1000 < x \leq 100000$

Table B1 - 54: Message #402: Pedestal Configuration Message

4.1.4.1.4 Message #403: Pedestal Control Command.

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

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0403.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0403.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0403.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0403.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0403.05	**5**	**Addressed Pedestal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0403.06	**6**	**Set Pedestal Mode**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go To Standby 3 = Deploy 4 = Stow 5 = Manual – Position 6 = Manual -Rate 7 = Acquire (Search) 8 = Track (Auto)
0403.07	**7**	**Set Antenna Azimuth**	Float	Radians	$0 \leq x \leq 2\pi$
0403.08	**8**	**Set Antenna Elevation**	Float	Radians	$-\pi/2 \leq x \leq \pi/2$
0403.09	**9**	**Set Azimuth Offset** Offset relative to Antenna Azimuth	Float	Radians	$0 \leq x \leq 2\pi$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0403.10	**10**	**Set Elevation Offset** Offset relative to Antenna Elevation	Float	Radians	$-\pi/2 \leq x \leq \pi/2$
0403.11	**11**	**Set Azimuth Slew Rate.** Valid for Manual Rate control mode.	Float	Radians/ Second	$-\pi \leq x \leq \pi$
0403.12	**12**	**Set Elevation Slew Rate.** Valid for Manual Rate control mode.	Float	Radians/ Second	$-\pi \leq x \leq \pi$

Table B1 - 55: Message #403: Pedestal Control Command

4.1.4.1.5 Message #404: Data Link Assignment Request.

When a CUCS is required to communicate with a data link (GDT) 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. To conduct a data link broadcast request, the CUCS shall transmit Message #404 with the "Data Link ID" field set to the broadcast address (i.e.; 255.255.255.255), and the VSM ID field set to the broadcast address (i.e.; 255.255.255.255). The vehicle ID shall be set to the null Vehicle ID when the data link is not being "discovered" for a specific vehicle ID, or to a specific (logical) vehicle ID when it is being associated with a specific vehicle or VSM. The Vehicle Type and Subtype fields shall be filled appropriate to the request. The "Control Assignment Request" field is not applicable to a Broadcast Request, but shall be transmitted as "Release Control" for a Broadcast Request. Where the CUCS knows the 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 (i.e.; by vehicle ID, VSM ID, vehicle type, and vehicle subtype).

The CUCS may request control over a Data Link ID with no associated VSM (i.e.; The GDT is connected directly to the network or CUCS, and not through a VSM.). Refer to the following Figure.

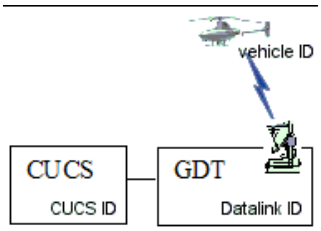

Figure B1 - 8: CUCS GDT Connection

The transmission of the Data Link Assignment Request message with both a Vehicle ID and a Data Link ID shall be to request or release control of the specified Data Link ID for the

specified Vehicle ID in accordance with the "Control Assignment request" field. The VSM ID shall be transmitted as the null ID (i. e; 255.0.0.0) in this instance. The GDT with the specified Data Link ID, per Message #404, should intercept and transmit all the other DLI messages with the specified vehicle ID, per Message #404, and forward those messages to the specified vehicle ID and vice versa when the CUCS has control of the data link for the selected vehicle ID.

Where a VSM is between the GDT (Data Link ID) and the CUCS, the VSM shall be responsible for transferring the Data Link Command and Status messages (Section 4.1.4.1) between the specified Data Link ID (GDT) and the CUCS. Refer to the following Figure.

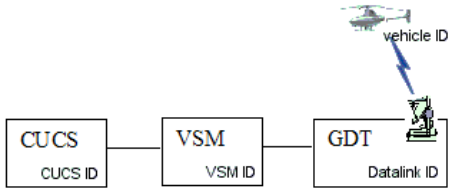

Figure B1 - 9: CUCS VSM GDT Connection

Where all three components of a VSM, data link, and vehicle exist, Message #404 ties these components together through their IDs for control over the specified air vehicle, payload and data link functionality.

The response to this message is Message #500, Data Link Configuration/Assignment Message.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0404.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0404.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0404.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0404.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0404.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0404.06	**6**	**Control Assignment Request**	Unsigned 1	Enumerated	0 = Request Control 1 = Release Control 2 = Override Control

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0404.07	**7**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	Enumerated	See Table B1 - 10
0404.08	**8**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumerated	Vehicle Specific

Table B1 - 56: Message #404: Data Link Assignment Request

4.1.4.1.6 Message #500: 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 a Message #404 Broadcast Request by appropriately filling this message with the reported Data Link IDs capabilities and setting the "Data Link Control Availability" field with either "Available for Control" or "Unavailable for Control" as appropriate. The "Data Link Control Availability" field shall never be set to "Request Granted" in response to a Data Link Broadcast Request.

This message is used by a standalone GDT to identify its capabilities to the CUCS. Refer to Figure TDB. Where a real vehicle is not associated (connected) with the GDT, and the GDT is connected directly to the network (CUCS), the null vehicle ID and null VSM ID is transmitted with the supported Vehicle type and Vehicle subtype identified in this message, once for each vehicle type/subtype combination possible. The GDT is 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 VSM to identify to a CUCS the data link capabilities associated with a VSM, where the data links are attached to the air vehicle's VSM. Refer to Figure 10. Where a real vehicle is not associated (connected) with the GDT, and the GDT is connected through the VSM, the VSM shall assign a "null" 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 GDT (resource sharing), each instance of support shall be reported to the CUCS with the same Data Link ID, but with different vehicle type and subtypes.

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

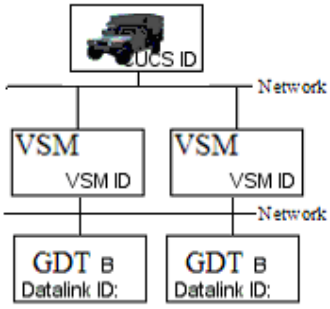

Figure B1 - 10: Shared Data Links

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 as unavailable, 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 "Data Link Control Availability" field. Where the GDT 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 shall be filled with the controlled vehicle ID.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0500.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0500.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0500.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0500.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
0500.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0500.06	**6**	**Data Link Control Availability**	Unsigned 1	Enumerated	0 = Available for Control 1 = Unavailable for Control 2 = Request Granted
0500.07	**7**	**Terminal Type**	Unsigned 1	Enumerated	0 = GDT 1 = ADT

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0500.08	**8**	**Data Link Type**	Unsigned 1	Enumerated	0 = STANAG 7085 1 - 7 = Reserved 8-255 = VSM Specific
0500.09	**9**	**Data Link Name** Text identifier for data link.	Character 20	None	Null terminated Printable ASCII
0500.10	**10**	**Antenna Type**	Unsigned 1	Bitmapped	0x01 = Omni 0x02 = Directional
0500.11	**11**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian	Unsigned 2	Enumerated	See Table B1 – 10
0500.12	**12**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumerated	Vehicle Specific

Table B1 - 57: Message #500: Data Link Configuration/Assignment Message

4.1.4.1.7 Message #501: Data Link Status Report.

This message shall be used by the VSM to send the CUCS information on the status of the ADT and/or GDT data link communications equipment.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0501.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0501.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0501.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0501.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0501.05	**5**	**Addressed Terminal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0501.06	**6**	**Data Link State**	Unsigned 1	Enumerated	0 = Off 1 = Rx Only 2 = Tx / Rx 3 = Tx High Power / Rx

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0501.07	**7**	**Antenna State**	Unsigned 1	Enumerated	0 = Omni 1 = Directional
0501.08	**8**	**Reported Channel**	Unsigned 2	N/A	Link Dependent
0501.09	**9**	**Reported Primary Hop Pattern**	Unsigned 1	N/A	Link Dependent
0501.10	**10**	**Reported Forward Link (FL) Carrier Frequency**	Float	Hz	Link Dependent
0501.11	**11**	**Reported Return Link (RL) Carrier Frequency**	Float	Hz	Link Dependent
0501.12	**12**	**Downlink Status**	Integer 2	Percent	$0 \leq x \leq 100$
0501.13	**13**	**Communication Security State**	Unsigned 1	Enumerated	0 = Not Installed 1 = Not Keyed 2 = Keyed 3 = Zeroized 4 = Bypass
0501.14	**14**	**Link Channel Priority State**	Unsigned 1	Enumerated	0 = Primary 1 = Secondary 2 = Tertiary…. 255 = Last

Table B1 - 58: Message #501: Data Link Status Report

4.1.4.1.8 Message #502: Data Link Control Command Status.

This message is sent from the VSM to the CUCS, and shall report the status of the instructions to the VSM for the command of the components of the data link.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0502.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0502.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0502.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0502.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0502.05	**5**	**Addressed Terminal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0502.06	**6**	**Reported Demanded Data Link State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Rx Only 2 = Tx / Rx 3 = Tx High Power / Rx

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0502.07	**7**	**Reported Demanded Antenna Mode**	Unsigned 1	Enumerated	0 = Omni 1 = Directional 2 = Auto
0502.08	**8**	**Reported Demanded Communication Security Mode**	Unsigned 1	Enumerated	0 = Normal 1 = Zeroize

Table B1 - 59: Message #502: Data Link Control Command Status

4.1.4.1.9 Message #503: Pedestal Status Report.

This message shall be used by the VSM to send the CUCS information on the status of the ADT and/or GDT pedestal.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0503.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0503.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0503.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0503.04	**4**	**Data Link ID**	Integer 4	None	See Section 1.7.5
0503.05	**5**	**Addressed Pedestal**	Unsigned 1	Enumerated	0 = GDT 1 = ADT
0503.06	**6**	**Pedestal Mode State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go To Standby 3 = Deploy 4 = Stow 5 = Manual – Position 6 = Manual - Rate 7 = Acquire (Search) 8 = Track (Auto)
0503.07	**7**	**Reported antenna azimuth** (Relative to True North)	Float	Radians	$0 \leq x \leq 2\pi$
0503.08	**8**	**Reported antenna elevation** (Relative to local horizontal)	Float	Radians	$-\pi/2 \leq x \leq \pi/2$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0503.09	**9**	**Reported Antenna Azimuth Slew rate.**	Float	Radians/ Second	$-\pi \leq x \leq \pi$
0503.10	**10**	**Reported Antenna Elevation Slew rate.**	Float	Radians/ Second	$-\pi \leq x \leq \pi$
0503.11	**11**	**Reported GDT Latitude** Not applicable to ADT.	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0503.12	**12**	**Reported GDT Longitude** Not applicable to ADT.	Double	Radians	$-\pi \leq x \leq \pi$
0503.13	**13**	**Reported GDT Altitude** Not applicable to ADT.	Float	Metres	$-1000 \leq x \leq 100000$

Table B1 - 60: Message #503: Pedestal Status Report

4.1.4.2 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.

4.1.4.2.1 Message #600: 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
0600.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0600.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0600.03	**3**	**CUCS ID** (Controlling)	Integer 4	None	See Section 1.7.5
0600.04	**4**	**Data Link ID** (ADT Data Link ID for air vehicle transition)	Integer 4	None	See Section 1.7.5
0600.05	**5**	**Acquiring CUCS ID**	Integer 4	None	See Section 1.7.5
0600.06	**6**	**Set Forward Link (FL) Carrier Frequency (ADT)**	Float	Hz	Link Dependent
0600.07	**7**	**Set Return Link (RL) Carrier Frequency (ADT)**	Float	Hz	Link Dependent
0600.08	**8**	**Set PN Code (ADT)**	Unsigned 1	None	Link Dependent
0600.09	**9**	**Acquiring GDT Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0600.10	**10**	**Acquiring GDT Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0600.11	**11**	**Acquiring GDT Altitude**	Float	Metres	$-1000 \leq x \leq 100000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0600.12	**12**	**Data Link Time-out Limit**	Double	Seconds	See Sect. 1.7.2

Table B1 - 61: Message #600: Vehicle Data Link Transition Coordination

4.1.4.2.2 Message #700: 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
0700.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0700.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0700.03	**3**	**CUCS ID** (relinquishing control)	Integer 4	None	See Section 1.7.5
0700.04	**4**	**CUCS ID** (acquiring control)	Integer 4	None	See Section 1.7.5
0700.05	**5**	**Status**	Unsigned 1	Enumer-ated	0 – Handover not requested 1 – Handover in Progress 2 – Handover Successful 3 – Handover Failed
0700.06	**6**	**Air Data Link ID** (Data Link ID for air vehicle transition)	Integer 4	None	See Section 1.7.5

Table B1 - 62: Message #700: Handover Status Report

4.1.5 Mission 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.

4.1.5.1 Message #800: Mission Upload Command.

The Mission Upload command shall be used to control the overall mission upload, download and storage of a mission. The mission shall be uploaded from a CUCS to a VSM as a series of individual waypoints based on Message #802, AV Position Waypoint message, for which there may be a number of optional associated messages. The optional associated messages include Message #803, AV Loiter Waypoint, Message #804, Payload Action Waypoint, Message #805, Airframe Action Waypoint, and Message #806, Vehicle Specific Waypoint. A Message #800, 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.

The VSM shall use the General Configuration Messages to define the air vehicles capability to support the fields commanded in Message #800. Refer to Section 4.1.7 General Configuration Messages for additional details.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0800.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0800.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0800.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0800.04	**4**	**Mission ID**	Character 20	None	Text Identifier of Mission
0800.05	**5**	**Mission Plan Mode**	Unsigned 1	Enumerated	1 = Clear Mission 2 = Load Mission 3 = Download Mission 4 = Download Single Waypoint 5 = Cancel Upload/ Download
0800.06	**6**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$

Table B1 - 63: Message #800: Mission Upload Command

4.1.5.2 Message #801: 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 #802, 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 #800, “Download Mission” request to report the AV route types loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0801.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0801.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0801.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0801.04	**4**	**Initial Waypoint Number** First Waypoint in defined route.	Unsigned 2	None	$0 \leq x < 65535$
0801.05	**5**	**Route ID**	Character 33	None	Text identifier of route

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0801.06	**6**	**Route Type**	Unsigned 1	Enumerated	0 = Launch 1 = Approach 2 = Flight 3 = Contingency A 4 = Contingency B

Table B1 - 64: Message #801: AV Route

4.1.5.3 Message #802: 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.
This message shall be transmitted from the VSM/AV in response to a Message #800, "Download Mission" request to report the AV Position Waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0802.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0802.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0802.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0802.04	**4**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$
0802.05	**5**	**Waypoint to Latitude or Relative Y**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0802.06	**6**	**Waypoint to Longitude or Relative X**	Double	Radians	$-\pi \leq x \leq \pi$
0802.07	**7**	**Location Type**	Unsigned 1	Enumerated	0 = Absolute 1 = Relative (See Message #47)
0802.08	**8**	**Waypoint to Altitude**	Float	Metres	$-1000 \leq x \leq 100000$
0802.09	**9**	**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	**10**	**Waypoint to Speed**	Float	Mps	$0 \leq x \leq 10000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0802.11	**11**	**Waypoint Speed Type**	Unsigned 1	Enumerated	0 = Indicated Airspeed 1 = True Airspeed 2 = Groundspeed 3 = Arrival Time
0802.12	**12**	**Next Waypoint** Next waypoint to fly to when this waypoint is reached. If value = 0, this is the last waypoint in the series.	Unsigned 2	None	$0 \leq x < 65535$
0802.13	**13**	**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	$0 \leq x < 65535$
0802.14	**14**	**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	$0 \leq x < 65535$
0802.15	**15**	**Arrival Time**	Double	Seconds	See Section 1.7.2
0802.16	**16**	**Turn Type**	Unsigned 1	Enumerated	0 = Short Turn 1 = Flyover

Table B1 - 65: Message #802: AV Position Waypoint

4.1.5.4 Message #803: AV Loiter Waypoint.

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 #800, "Download Mission" request to report the loiter characteristics waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0803.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0803.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0803.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0803.04	**4**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$
0803.05	**5**	**Waypoint Loiter Time**	Unsigned 2	Seconds	0 = No Loiter
0803.06	**6**	**Waypoint Loiter Type**	Unsigned 1	Enumerated	1= Circular 2 = Racetrack 3 = Figure 8 4 = Hover
0803.07	**7**	**Loiter Radius** Used as radius for circular Loiter, else used as the width perpendicular to line between loiter points.	Float	Metres	$1 \leq x \leq 100000$
0803.08	**8**	**Loiter Length** Used for racetrack and figure 8 to define length of pattern, centred around the Loiter Point (defined in Message #802) in the direction of the Loiter Bearing.	Float	Metres	$1 \leq x \leq 100000$
0803.09	**9**	**Loiter Bearing** The bearing of the loiter pattern, referenced to the Loiter Point (defined in Message #802), from True North.	Double	Radians	$0 \leq x \leq 2\pi$
0803.10	**10**	**Loiter Direction** Defines direction of turn when rounding the loiter point defined by the AV Position Waypoint Message (Message # 802).	Unsigned 1	Enumerated	0 = Vehicle Dependent 1 = Clockwise 2 = Counter-Clockwise 3 = Into the Wind

Table B1 - 66: Message #803: AV Loiter Waypoint

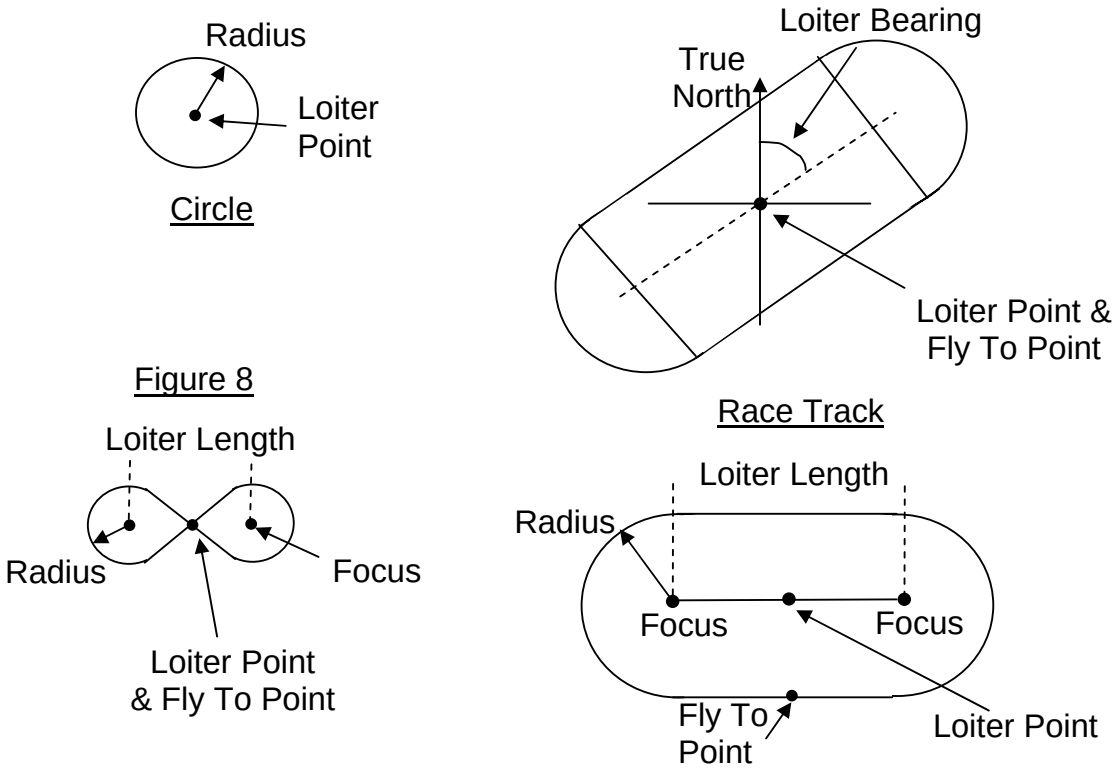

Figure 8

Figure B1 - 11: Loiter Pattern

4.1.5.5 Message #804: 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 #800, "Download Mission" request to report the Payload Action Waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0804.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0804.04	**4**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$
0804.05	**5**	**Station Number**	Unsigned 4	Bitmapped	0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
0804.06	**6**	**Set Sensor 1 Mode**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby
0804.07	**7**	**Set Sensor 2 Mode**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby
0804.08	**8**	**Sensor Output**	Unsigned 1	Enumerated	0 = None 1 = Sensor 1 2 = Sensor 2 3 = Both Sensors
0804.09	**9**	**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	**10**	**Starepoint Latitude**	Double	Radians	$-\pi/2 \leq x \leq \pi/2$
0804.11	**11**	**Starepoint Longitude**	Double	Radians	$-\pi \leq x \leq \pi$
0804.12	**12**	**Starepoint Altitude**	Float	Metres	$-1000 \leq x \leq 100000$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0804.13	**13**	**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	**14**	**Payload Az (wrt AV)**	Float	Radians	$-\pi \leq x \leq \pi$
0804.15	**15**	**Payload El (wrt AV)**	Float	Radians	$-\pi/2 \leq x \leq \pi/2$
0804.16	**16**	**Payload Sensor Rotation Angle**	Float	Radians	$-\pi/2 \leq x \leq \pi/2$

Table B1 - 67: Message #804: Payload Action Waypoint

4.1.5.6 Message #805: 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 #800, "Download Mission" request to report the Airframe Action Waypoints loaded onboard.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0805.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0805.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0805.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0805.04	**4**	**Waypoint Number**	Unsigned 2	None	$1 \leq x < 65535$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0805.05	**5**	**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	**6**	**Enumerated State**	Unsigned 1	Enumerated	0 = Turn Off 1 = Turn On 2 = Go to Standby 3 = Receive Only 4 = Transmit Only

Table B1 - 68: Message #805: Airframe Action Waypoint

4.1.5.7 Message #806: 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
0806.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0806.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0806.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0806.04	**4**	**Waypoint Number**	Unsigned 2	None	$0 \leq x < 65535$

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0806.05	**5**	**Tag Type**	Unsigned 1	Enumerated	0 = None 1 = Start Tag 2 = Stop Tag
0806.06	**6**	**Tag/Data**	Character 20	None	Null Terminated ASCII String

Table B1 - 69: Message #806: Vehicle Specific Waypoint

4.1.5.8 Message #900: Mission Upload/Download Status.

This message shall be used to provide status on a mission upload/download from a VSM to a CUCS.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
0900.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
0900.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
0900.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
0900.04	**4**	**Status**	Unsigned 1	Enumerated	0 = In progress 1 = Complete 2 = Aborted / Rejected
0900.05	**5**	**Percent Complete**	Unsigned 1	Percentage	$0 \leq x \leq 100$

Table B1 - 70: Message #900: Mission Upload/Download Status

4.1.6 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 or configuration-specific status messages can provide detailed diagnostic information peculiar to that configuration.

Support is provided for up to four engines and primary and auxiliary support systems. 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.

4.1.6.1 Message #1000: Subsystem Status Request.

This message shall be used by the CUCS to request Subsystem information from the VSM.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1000.01	**1**	**Time Stamp**	Double	Seconds	See section 1.7.2
1000.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1000.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1000.04	**4**	**Subsystem ID** Identifier associated with the subsystem for which status information is being requested	Unsigned 4	Bitmapped	0x0001 = Engine 0x0002 = Mechanical 0x0004 = Electrical 0x0008 = Comms 0x0010 = Propulsion Energy 0x0020 = Navigation 0x0040 = Payload 0x0080 = Recovery System 0x0100 = Environmental Control System 0x0200 = VSM Status 0x0400 = ADT 0x0800 = GDT 0x1000 through 0x80000 = Reserved 0x100000 through 0x80000000 = VSM Specific

Table B1 - 71: Message #1000: Subsystem Status Request

4.1.6.2 Message #1001: Subsystem Status Detail Request.

This message shall be used by the CUCS to request more information from the VSM about a specific subsystem. The VSM shall respond using a vehicle specific service specified in Section 1.7.4.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1001.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1001.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1001.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1001.04	**4**	**Subsystem State Report Reference** The Report Reference is the Vehicle Specific information reference previously Provided by the VSM.	Integer 4	None	$-1 \leq x \leq (2^{31} - 1)$, where -1 = No More Info Available

Table B1 - 72: Message #1001: Subsystem Status Detail Request

4.1.6.3 Message #1100: Subsystem Status Alert Message.

This message shall be used by the VSM to create a Subsystem Status Alert. Examples are:

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

Subsystem State Report Reference shall be assigned by the VSM. The purpose of this field is to provide a reference number for subsequent requests for more information. If the CUCS requires additional information, the CUCS shall respond with a request using Message # 1001. Alert messages of Type 1 (Not clearable by operator) can be cleared by the VSM sending the alert with a priority of 0.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1100.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1100.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1100.04	**4**	**Priority**	Unsigned 1	Enumer-ated	0 = Cleared 1 = Nominal 2 = Caution 3 = Warning 4 = Emergency 5 = Failed
1100.05	**5**	**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	$-1 \leq x \leq (2^{31} - 1)$, where -1 = No More Info Available

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.06	**6**	**Subsystem ID** Identifier associated with the subsystem for which status information is being reported.	Unsigned 1	Enumer-ated	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 = ADT 11 = GDT 12-19 = Reserved 20 – 31= VSM Specific
1100.07	**7**	**Type**	Unsigned 1	Enumer-ated	0 = Clear 1 = Not Clearable By Operator 2 = Clearable By Operator 3 = Display For Fixed Time Then Automatically Clear
1100.08	**8**	**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	First Instance, -<Warning ID> Note: Warning ID is a unique value generated by the VSM for use when additional message #1100s is sent about the same alert. The first instance is always a negative value.
1100.09	**9**	**Text**	Character 80	None	Null Terminated ASCII String

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1100.10	**10**	**Persistence** This field determine the minimum time an alert will displayed. This time is referenced to when this message is received by the CUCS.	Signed 1	Second	<0 = Not defined 0 = Clear immediately >0 = Display for at least this many seconds

Table B1 - 73: Message #1100: Subsystem Status Alert

4.1.6.4 Message #1101: Subsystem Status Report.

This message shall be used by the VSM to produce a Subsystem Status Report. Configuration of the subsystem ID field in this message shall be defined by the configuration of the Message #1000, Subsystem ID.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1101.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1101.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1101.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1101.04	**4**	**Subsystem ID** Identifier associated with the subsystem for which status information is being reported. IDs above 20 are used for vehicle and payload specific subsystems.	Unsigned 1	Enumer-ated	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 = ADT 11 = GDT 12-19 = Reserved 20 – 31= VSM Specific

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1101.05	**5**	**Subsystem State**	Unsigned 1	Enumer-ated	0 = No Status 1 = Nominal 2 = Caution 3 = Warning 4 = Emergency 5 = Failed
1101.06	**6**	**Subsystem State Report Reference** The Report Reference is the Vehicle Specific information reference, provided by the VSM, which the CUCS can use to request additional information from the VSM on the reported alert.	Integer 4	None	$-1 \leq x \leq (2^{31} - 1)$, where -1 = No More Info Available

Table B1 - 74: Message #1101: Subsystem Status Report

4.1.7 General Configuration Messages.

4.1.7.1 Message #1200: 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 shall respond with one or more Field Configuration Integer Response (Message #1300) message(s), Field Configuration Double Response (Message #1301) message(s), Field Configuration Enumerated Response (Message #1302) message(s) or Field Configuration Command (Message #1303) message(s) with the static configuration for each of the configuration items specified in this document that are supported by the VSM.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1200.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1200.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1200.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1200.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1200.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A
1200.06	**6**	**Request Type**	Unsigned 1	Enumer-ated	0 = Single Parameter 1 = LOI 2 2 = LOI 3 3 = LOI 4 4 = LOI 5 5 = Data Link 6 = Abort configuration
1200.07	**7**	**Requested Message**	Unsigned 4	None	See Table B1-4 0 = N/A
1200.08	**8**	**Requested Field**	Unsigned 1	None	$0 \leq x \leq 255$ 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1200.09	**9**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1200.10	**10**	**Sensor Select**	Unsigned 1	Enumer-ated	0 = N/A 1 = Sensor 1 2 = Sensor 2 3 = Sensor 3

Table B1 - 75: Message #1200: Field Configuration Request

4.1.7.2 Message #1201: 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
1201.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1201.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1201.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1201.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1201.05	**5**	**Distance**	Unsigned 1	Enumer-ated	0 = Meters 1 = Feet
1201.06	**6**	**Altitude**	Unsigned 1	Enumer-ated	0 = Meters 1 = Feet
1201.07	**7**	**Speed**	Unsigned 1	Enumer-ated	0 = Meters/Second 1 = Knots 2 = MPH 3 = Km/Hour

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1201.08	**8**	**Position (Latitude, Longitude)**	Unsigned 1	Enumer-ated	0 = Degrees 1 = UTM 2 = MGRS
1201.09	**9**	**Temperature**	Unsigned 1	Enumer-ated	0 = Centigrade 1 = Fahrenheit
1201.10	**10**	**Mass/Weight**	Unsigned 1	Enumer-ated	0 = Kg 1 = Pounds
1201.11	**11**	**Angles**	Unsigned 1	Enumer-ated	0 = Radians 1 = Degrees
1201.12	**12**	**Pressure – Barometric**	Unsigned 1	Enumer-ated	0 = mb 1 = inHg 2 = Pascals
1201.13	**13**	**Fuel Quantity**	Unsigned 1	Enumer-ated	0 = Litres 1 = Pounds 2 = Kg

Table B1 - 76: Message #1201: Display Unit Request

4.1.7.3 Message #1202: 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. This message shall be transmitted from the CUCS to the VSM/vehicle/data link to authorise the VSM/vehicle/data link to present the Remote Displays to 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.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1202.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1202.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1202.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1202.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1202.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A
1202.06	**6**	**Web Browser Available** This field will be deleted in future Editions of STANAG 4586.	Unsigned 1	Enumerated	1 = Yes
1202.07	**7**	**JAVA Engine Available** This field will be deleted in future Editions of STANAG 4586	Unsigned 1	Enumerated	1 = Yes
1202.08	**8**	Spare	Unsigned 1	None	None
1202.09	**9**	**X Window Server Available** This field will be deleted in future Editions of STANAG 4586	Unsigned 1	Enumerated	1 = Yes
1202.10	**10**	**(X Window) Display Number**	Integer 1	None	N/A
1202.11	**11**	**(X Window) Screen Number**	Integer 1	None	N/A
1202.12	**12**	**Vertical Offset from Top Left Corner** Location of top corner of remote display.	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.13	**13**	**Horizontal Offset from Top Left Corner** Location of left corner of remote display.	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.14	**14**	**Display Window Horizontal Width (Pixels)**	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.15	**15**	**Display Window Vertical Height(Pixels)**	Unsigned 2	Pixels	$0 \leq x \leq 65535$
1202.16	**16**	**CUCS IP Address**	Unsigned 4	None	$0 \leq x \leq (2^{32} - 1)$

Table B1 - 77: Message #1202: CUCS Resource Report

4.1.7.4 Message #1203: 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 #1200, Field Configuration Request, for the identified VSM, air vehicle, data link, or payload station.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1203.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1203.02	**2**	**Vehicle ID**	Integer 4	None	See Section

Unique ID	Field	Data Element Name & Description	Type	Units	Range
					1.7.5
1203.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1203.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1203.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A
1203.06	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1203.07	**7**	**Vehicle Type** Identifies the type name of vehicle; numbers to be assigned by STANAG Custodian.	Unsigned 2	Enumerated	See Table B1 - 10
1203.08	**8**	**Vehicle Subtype** Identifies the design block number as designated by the manufacturer.	Unsigned 2	Enumerated	Vehicle Specific

Table B1 - 78: Message #1203: Configuration Complete

4.1.7.5 Message #1300: Field Configuration Integer Response.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 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 B1-4, Message Summary and Properties for the referenced messages. e.g.; Message #104 is an LOI 4/5 message therefore parameter Message #104, Power Level is an LOI 4/5 parameter required in response to an LOI 4/5 configuration request. This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 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. If no configuration message is received by the CUCS during the VSM response(s) to Message #1200, 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 #1100, Priority enumeration of "Caution." The High Warning Limit and Low Warning limit shall be equivalent to Message #1100, 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:

- Message #104, Power Level
- Message #104, Flap Deployment Angle
- Message #104, Speed Brake Deployment Angle
- Message #400, Select Channel
- Message #400, Select Primary Hop Pattern
- Message #400, Set PN Code
- Message #802, Waypoint Number

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1300.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1300.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1300.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1300.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.06	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1300.07	**7**	**Requested Message**	Unsigned 4	None	See Table B1-4
1300.08	**8**	**Requested Field**	Unsigned 1	None	$1 \leq x \leq 255$
1300.09	**9**	**Field Supported**	Unsigned 1	Enumer-ated	0 = Field Not Supported 1 = Field Supported
1300.10	**10**	**Max Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.11	**11**	**Min Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.12	**12**	**Max Display Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.13	**13**	**Min Display Value**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.14	**14**	**Minimum Display Resolution**	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.15	**15**	**High Caution Limit** Minimum value that will cause a Caution	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.16	**16**	**High Warning Limit** Minimum value that will cause a Warning	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.17	**17**	**Low Caution Limit** Maximum value that will cause a Caution	Integer 4	See Field In Requested Message	See Field In Requested Message

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1300.18	**18**	**Low Warning Limit** Maximum value that will cause a Warning	Integer 4	See Field In Requested Message	See Field In Requested Message
1300.19	**19**	**Help Text**	Character 80	None	Null Terminated ASCII String
1300.20	**20**	**Subsystem ID** Identifier subsystem for which this field is associated	Unsigned 1	Enumer-ated	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 = ADT 11 = GDT 12-18 = Reserved 19 = Not Assigned 20 – 31= VSM Specific

Table B1 - 79: Message #1300: Field Configuration Integer Response

4.1.7.6 Message #1301: Field Configuration Double Response.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 as required for each of the parameters within the list (below) that are required by the LOI configuration request. 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 B1-4, Message Summary and Properties for the referenced messages. e.g.; Message #43 is an LOI 4/5 message therefore parameter Message #43, Commanded Altitude is an LOI 4/5 parameter required in response to an LOI 4/5 configuration request. This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 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 float/double, by the VSM/vehicle/data link filling in the message for the requested DLI message parameter(s) and transmitting it to the CUCS. 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.”

The CUCS will use this information to configure the display and control of VSM data elements. If no configuration message is received by the CUCS during the VSM response(s) to Message #1200, the CUCS will display the field with its full range enabled.

In the list, 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 #43, Commanded Altitude and Message #41, 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 #1100, Priority enumeration of “Caution.” The High Warning Limit and Low Warning limit shall be equivalent to Message #1100, 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 #41, Loiter Radius
- Message #41, Loiter Length
- Message #41 Loiter Altitude – uses the Message #43, Commanded Altitude configuration
- Message #41 Loiter Speed – uses the Message #43, Commanded Speed configuration
- Message #43, Commanded Altitude – the configuration for this parameter is from this message, but the support for this parameter is dependent on the Message #43, Altitude Command Type of “Altitude” and "Rate-limited attitude" being supported
    - i.e.; if Message #43, Altitude Command Type “Altitude” and "Rate-limited attitude" is not supported (see Message #1303), this parameter is not supported

- Message #43, Commanded Vertical Speed – the configuration for this parameter is from this message, but the support for this parameter is dependent on the Message #43, Altitude Command Type of “Altitude Rate” being supported.
    - i.e.; if Message #43, Altitude Command Type “Altitude rate” is not supported (see Message #1303), this parameter is not supported.
- Message #43, Commanded Turn Rate
- Message #43, Commanded Roll Rate
- Message #43, Commanded Speed
- Message #43, Altimeter Setting
- Message #43, Commanded Roll
- Message #101, Altitude
- Message #101, Phi (Roll)
- Message #101, Theta (Pitch)
- Message #101, Phi_dot (Roll Rate)
- Message #101, Theta_dot (Pitch Rate)
- Message #101, Psi_dot (Yaw Rate)
- Message #101, U_Speed
- Message #101, V_Speed
- Message #101, W_Speed
- Message #101, U_Accel
- Message #101, V_Accel
- Message #101, W_Accel
- Message #102, Angle of Attack
- Message #102, Angle of Sideslip
- Message #102, Indicated Airspeed
- Message #102, True Airspeed
- Message #102, Outside Air Temperature
- Message #102, Altimeter Setting
- Message #102, Barometric Altitude
- Message #102, Barometric Altitude Rate
- Message #102, U_Ground
- Message #102, V_Ground
- Message #103, X_Body_Accel
- Message #103, Y_Body_Accel
- Message #103, Z_Body_Accel

- Message #103, Roll_Rate
- Message #103, Pitch_Rate
- Message #103, Yaw_Rate
- Message #104, Current Propulsion Energy Level
- Message #104, Current Propulsion Energy Usage Rate
- Message #104, Commanded Roll
- Message #105, Engine Speed
- Message #200, Set Horizontal Field of View – uses the Message #301 configuration
- Message #200, Set Vertical Field of View – uses the Message #301 configuration
- Message #200, Horizontal Slew Rate
- Message #200, Vertical Slew Rate
- Message #200, Altitude
- Message #302, Reported Range
- Message #400, Set Forward Link Carrier Frequency
- Message #400, Set Return Link Carrier Frequency
- Message #402, Set GDT Altitude
- Message #403, 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 #403, 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 #403, 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 #403, Set Antenna Elevation
- Message #403, Set Azimuth Slew Rate
- Message #403, Set Elevation Slew Rate
- Message #802, Waypoint to Speed
- Message #802, Waypoint to Altitude
- Message #803 Loiter Radius

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1301.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1301.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1301.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A
1301.06	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1301.07	**7**	**Requested Message**	Unsigned 4	None	See Table B1-4
1301.08	**8**	**Requested Field**	Unsigned 1	None	$1 \leq x \leq 255$
1301.09	**9**	**Field Supported**	Unsigned1	Enumerated	0 = Field Not Supported 1 = Field Supported
1301.10	**10**	**Max Value**	Double	See Field In Requested Message	See Field In Requested Message
1301.11	**11**	**Min Value**	Double	See Field In Requested Message	See Field In Requested Message
1301.12	**12**	**Max Display Value**	Double	See Field In Requested Message	See Field In Requested Message
1301.13	**13**	**Min Display Value**	Double	See Field In Requested Message	See Field In Requested Message
1301.14	**14**	**Minimum Resolution**	Double	See Field In Requested Message	See Field In Requested Message
1301.15	**15**	**High Caution Limit** Minimum value that will cause a Caution	Double	See Field In Requested Message	See Field In Requested Message

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1301.16	**16**	**High Warning Limit** Minimum value that will cause a Warning	Double	See Field In Requested Message	See Field In Requested Message
1301.17	**17**	**Low Caution Limit** Maximum value that will cause a Caution	Double	See Field In Requested Message	See Field In Requested Message
1301.18	**18**	**Low Warning Limit** Maximum value that will cause a Warning	Double	See Field In Requested Message	See Field In Requested Message
1301.19	**19**	**Help Text**	Character 80	None	Null Terminated ASCII String
1301.20	**20**	**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 = ADT 11 = GDT 12-18 = Reserved 19 = Not Assigned 20 – 31= VSM Specific

Table B1 - 80: Message #1301: Field Configuration Double Response

4.1.7.7 Message #1302: Field Configuration Enumerated Response.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 as required for the parameters within the list (below) in accordance with LOI configuration request. i.e.; based on the Request type for LOI, only if the complete enumerated field or bit field is NOT supported by the VSM/vehicle/data link. Message #1303, Field Configuration Command, is used to identify if individual enumerations within an enumerated field are supported or not.

The LOI for each of the referenced parameters in the list shall be in accordance with Table B1-4, Message Summary and Properties for the referenced messages. e.g.; Message #42 is

an LOI 4/5 message therefore parameter Message #42, Select Flight Path Control Mode is an LOI 4/5 parameter required in response to an LOI 4/5 configuration request if it is not supported by the VSM/vehicle/data link.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 in response to 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 DLI message parameter, this message shall be sent with the "Field Supported" parameter filled as "Field Not Supported."

The CUCS shall use this message to configure the User Interface for the display or control of VSM/vehicle/data link information. If no configuration message is received by the CUCS during the VSM response(s) to Message #1200, 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 #42, Select Flight Path Control Mode
- Message #45, Engine Command
- Message #46, Flight Termination Mode
- Message #200, Set Focus
- Message #500, Data Link Type
- Message #805, Function
- Message #1000, Subsystem ID

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 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.

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
1302.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1302.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1302.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1302.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1302.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A
1302.06	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1302.07	**7**	**Requested Message**	Unsigned 4	None	See Table B1-4
1302.08	**8**	**Requested Field**	Unsigned 1	None	$1 \leq x \leq 255$
1302.09	**9**	**Field Supported**	Unsigned 1	Enumer-ated	0 = Field Not Supported 1 = Field Supported
1302.10	**10**	**Enumeration Count**	Unsigned 1	None	Number Of Vehicle Specific Enumeration States For This Field
1302.11	**11**	**Enumeration Index**	Unsigned 1	None	Actual Enumeration Index
1302.12	**12**	**Enumeration Text**	Character 16	None	Null Terminated ASCII String. Text To Display For Selected Enumeration
1302.13	**13**	**Help Text**	Character 80	None	Null Terminated ASCII String

Table B1 - 81: Message #1302: Field Configuration Enumerated Response

4.1.7.8 Message #1303: Field Configuration Command.

This message shall be transmitted from the VSM/vehicle/data link to the CUCS after the reception of Message #1200 as required for each of the parameters within the list (below) that are required by the LOI configuration request. 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

B1-4, Message Summary and Properties for the reference messages. (i.e., Message #48 is an LOI 4/5 message therefore parameter Message #48, Altitude Mode is an LOI 4/5 parameter required in response to an LOI 4/5 configuration request). This message shall define the level of support provided to the CUCS for control over a specified commanded DLI data element. This message shall report whether or not an enumerated parameter is supported in part, i.e.; if not all the enumerations in an enumerated field are supported by the VSM, they are identified by instances of this message in response to the Message #1200 configuration request. This message shall be used by the CUCS to configure any components associated with the control of the referenced DLI message parameter. If no configuration message is received by the CUCS during the VSM response(s) to Message #1200, the CUCS will display the field with its full range enabled.

This message shall be sent from the VSM to the CUCS anytime the controllable state of a commanded DLI message parameter, or an enumeration within an enumerated DLI message parameter, changes thus altering the allowable states of control over the specified parameter at the VSM, i.e., the VSM reports if a DLI message field is currently available to control or if it is unavailable (Field Available) and if specific enumerations within an enumerated data element field are available or unavailable for control.

In summary, the VSM/vehicle/data link supports this message for the DLI data element fields in the following situations:

- Where the VSM does not support each of the enumerations within an enumerated data element;
- Where the state of a data element may change as identified within this message, both enumerated and regular fields (float, integer fields).

In the list, the support of some DLI message fields depends on the configuration of other fields. This is to ensure consistency between fields of the exact same type, therefore these are not required to be reported by the VSM to the CUCS as part of the configuration process. The VSM and CUCS shall use the primary parameter, the parameter that the other's configuration follows, to report configuration, support and availability of these parameters.

The CUCS, as a minimum, shall support the reception of the following mandatory DLI message parameters from the VSM/vehicle/data link:

- Message #41, Speed Type
- Message #41, Loiter Type
- Message #41, Loiter Direction
- Message #41, Altitude Type
- Message #42, Select Flight Path Control Mode
- Message #43, Altitude Command Type

- Message #43, Heading Command Type
- Message #43, Speed Type
- Message #43, Altitude Type
- Message #43, Commanded Altitude (Support for field based on Message #43, Altitude Command Type)
- Message #43, Commanded Vertical Speed (Support for field based on Message #43, Altitude Command Type)
- Message #43, Commanded Heading (Support for field based on Message #43, Heading Command Type)
- Message #43, Commanded Course (Support for field based on Message #43, Heading Command Type)
- Message #43, Commanded Turn Rate (Support for field based on Message #43, Heading Command Type)
- Message #43, Commanded Roll Rate (Support for field based on Message #43, Heading Command Type)
- Message #43, Commanded Roll (Support for field based on Message #43, Heading Command Type)
- Message #43, Commanded Airspeed
- Message #44, Set Lights
- Message #45, Engine Command
- Message #47, Altitude Type
- Message #48, Altitude Mode
- Message #48, Speed Mode
- Message #48, Course/Heading Mode
- Message #200, Altitude Type
- Message #201, System Operating Mode
- Message #201, Set EO Sensor Mode
- Message #201, Set IR Polarity
- Message #201, Set EO/IR Pointing Mode
- Message #202, Set Radar State
- Message #202, Set MTI Radar Mode
- Message #203, Active Weapon Mode Command
- Message #203, Target Altitude Type
- Message #204, Set Relay State
- Message #401, Set Data Link State
- Message #401, Set Antenna Mode

- Message #401, Communication Security Mode
- Message #403, Set Pedestal Mode
- Message #500, Data Link Type
- Message #500, Antenna Type
- Message #800, Mission Plan Mode
- Message #802, Waypoint Altitude Type
- Message #802, Waypoint Speed Type
- Message #803, Loiter Direction
- Message #804, Set Sensor Pointing Mode
- Message #804, Set Sensor 1 Mode
- Message #804, Set Sensor 2 Mode
- Message #804, Starepoint Altitude Type
- Message #805, Function
- Message #805, Enumerated State
- Message #1000, Subsystem ID
- Message #1100, Subsystem ID – Note: Not implemented with Message #1303, use Message #1000, Subsystem ID configuration
- Message #1101, Subsystem ID – Note: Not implemented with Message #1303, use Message #1000, Subsystem ID configuration

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1303.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1303.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1303.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1303.11	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1303.04	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5 0 = N/A

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1303.05	**6**	**Station Number**	Unsigned 4	Bitmapped	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1303.06	**7**	**Reported Message**	Unsigned 4	None	See Table B1-4
1303.07	**8**	**Reported Field**	Unsigned 1	None	0 = Message Not Supported $1 \leq x \leq 255$ = Field Identifier
1303.08	**9**	**Field Available** If Reported Field = 0, then the entire message is not supported	Unsigned 1	Enumera-ted	0 = Not Available For Selection 1 = Available For Selection
1303.09	**10**	**Reported Enumerated Index** Reported enumerated index for enumerated fields	Unsigned 1	None	Controlled By "Field Available"
1303.10	**11**	**Enumerated Index Enable**	Integer 1	None	-2 = Not Implemented -1 = State Unavailable For Selection 0 = State Available For Selection

Table B1 - 82: Message #1303: Field Configuration Command

4.1.7.9 Message #1304: 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 #1202) 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
1304.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1304.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1304.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1304.04	**4**	**VSM Home Web Page URL**	Character, 249 bytes	None	N/A Blank if service not provided by VSM
1304.05	**5**	**FTP URL**	Character, 249 bytes	None	N/A Blank if service not provided by VSM

Table B1 - 83: Message #1304: VSM Services Report Message

4.1.8 Miscellaneous Message Types.

4.1.8.1 Message #1400: Message Acknowledgement.

This message shall be used to acknowledge standard message types that require acknowledgement per the Message Acknowledge Configuration Message (Message #1401). Vehicle specific 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.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1400.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1400.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1400.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1400.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1400.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
1400.06	**6**	**Original Message Time Stamp**	Double	Seconds	See section 1.7.2
1400.07	**7**	**Original Message Instance ID**	Unsigned 4	NA	0 to 2^{32}-1
1400.08	**8**	**Original Message Type**	Unsigned 4	NA	0 to 2^{32}-1

Table B1 - 84: Message #1400: Message Acknowledgement

4.1.8.2 Message #1401: Message Acknowledge Configuration.

This message shall be used to configure the CUCS, VSM, air vehicle, or data link to acknowledge the specified message using Message #1400. This message can be sent to a CUCS by a VSM, air vehicle or data link after a Message #1200 has been received from that same CUCS, and vice versa, to request acknowledgement of configuration messages only, otherwise it shall not be sent until a connection has been established.

The message acknowledgements requested using this message shall only be valid until a Message #1200 configuration request has been aborted or until a Message #21 relinquish control message has been transmitted from the VSM, air vehicle or data link to terminate the connection or the connection has been lost.

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

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1401.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1401.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1401.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1401.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1401.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
1401.06	**6**	**Message Type**	Unsigned 4	None	See Table B1-4

Table B1 - 85: Message #1401: Message Acknowledge Configuration

4.1.8.3 Message #1402: 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.

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1402.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1402.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1402.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1402.04	**4**	**Requested Message Type**	Unsigned 4	None	See Table B1-4
1402.05	**5**	**Frequency**	Float	Hz	0 <= x < =100 0 = Cancel Automatic Send of Requested Message

Table B1 - 86: Message #1402: Schedule Message Update Command

4.1.8.4 Message #1403: Generic Information Request Message.

This message shall be used to request the VSM, air vehicle, data link or CUCS to send the specified message. This message shall not be used to request Message #1300, Message #1301, Message #1302, and Message #1303, as this is specifically achieved with Message #1200.

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

Unique ID	Field	Data Element Name & Description	Type	Units	Range
1403.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1403.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1403.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1403.04	**4**	**VSM ID**	Integer 4	None	See Section 1.7.5
1403.05	**5**	**Data Link ID**	Integer 4	None	See Section 1.7.5
1403.06	**6**	**Station Number**	Unsigned 4	None	0x0000 = N/A 0x0001 = Stn #1 0x0002 = Stn #2 0x0004 = Stn #3 0x0008 = Stn #4 etc.
1403.07	**7**	**Message Type** Type number of the message being requested	Unsigned 4	None	See Table B1-4

Table B1 - 87: Message #1403: Generic Information Request Message

4.1.9 IFF Command and Status Messages.

4.1.9.1 Message #1500: 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
1500.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1500.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1500.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1500.04	**4**	**Mode 1 Code**	Integer 1	Units	First digit 0..7 2nd digit 0..3, transmitted as decimal
1500.05	**5**	**Mode 1 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.06	**6**	**Mode 2 Code**	Integer 2	Units	Octal 0000 to 7777, transmitted as decimal
1500.07	**7**	**Mode 2 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.08	**8**	**Mode 3/A Code**	Integer 2	None	Octal 0000 to 7777, transmitted as decimal
1500.09	**9**	**Mode 3/A Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.10	**10**	**Mode C Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.11	**11**	**Mode 4 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1500.12	**12**	**Mode 4 A/B**	Unsigned 1	Enumerated	A = 0 B = 1
1500.13	**13**	**Mode 4 Hold**	Unsigned 1	Enumerated	1 = Hold 0 = Normal
1500.14	**14**	**Mode 4 Zeroize**	Unsigned 1	Enumerated	1 = Zeroize 0 = Normal
1500.15	**15**	**Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = Normal 3 = Emergency

Table B1 - 88: Message #1500: IFF Code Command

4.1.9.2 Message #1501: 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
1501.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1501.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1501.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1501.04	**4**	**Mode 3/A Ident**	Unsigned 1	Enumerated	0 = Normal 1 = Ident

Table B1 - 89: Message #1501: IFF Ident (Squawk) Command

4.1.9.3 Message #1600: 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
1600.01	**1**	**Time Stamp**	Double	Seconds	See Section 1.7.2
1600.02	**2**	**Vehicle ID**	Integer 4	None	See Section 1.7.5
1600.03	**3**	**CUCS ID**	Integer 4	None	See Section 1.7.5
1600.04	**4**	**Mode 1 Code**	Integer 1	Units	First Digit 0..7 2nd Digit 0..3, Transmitted As Decimal
1600.05	**5**	**Mode 1 Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.06	**6**	**Mode 2 Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.07	**7**	**Mode 3/A Code**	Integer 2	None	Octal 0000 to 7777, Transmitted As Decimal
1600.08	**8**	**Mode 3/A Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.09	**9**	**Mode C Enabled**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.10	**10**	**Mode 4 Enable**	Unsigned 1	Enumerated	0 = Off 1 = On
1600.11	**11**	**Mode 4 A/B**	Unsigned 1	Enumerated	A = 0 B = 1
1600.12	**12**	**Mode 4 Hold**	Unsigned 1	Enumerated	1 = Hold 0 = Normal
1600.13	**13**	**Mode**	Unsigned 1	Enumerated	0 = Off 1 = Standby 2 = Normal 3 = Emergency

Table B1 - 90: Message #1600: IFF Status Report

4.2 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 1.7.4.1, 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 B3 (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 UCS Core 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 to
ANNEX B to
STANAG 4586
Edition 2

COMMAND AND CONTROL INTERFACE

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1 Introduction.

1.1 Scope.

STANAG 4586, Annex B Appendix B2 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.

Standardisation 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 B2 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 B2 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 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.

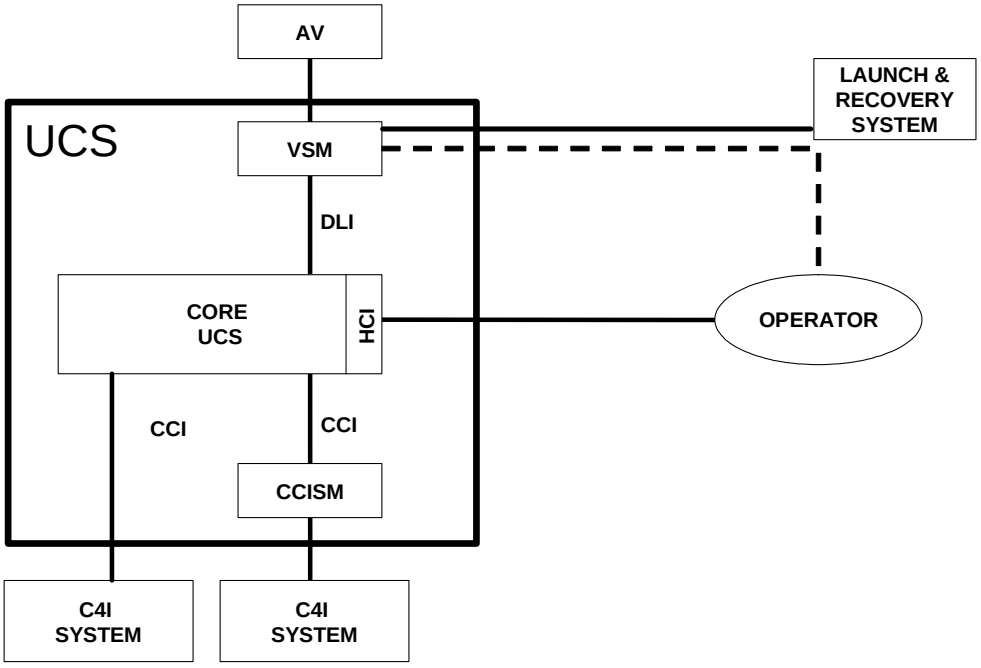

Figure B2 - 1: UCS Interface Functional Architecture

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 NATO C3 Technical Architecture (NC3TA), cited in Annex B, to ensure that such communications can take place.

1.3 Appendix B2 Overview.

Appendix B2 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.

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.

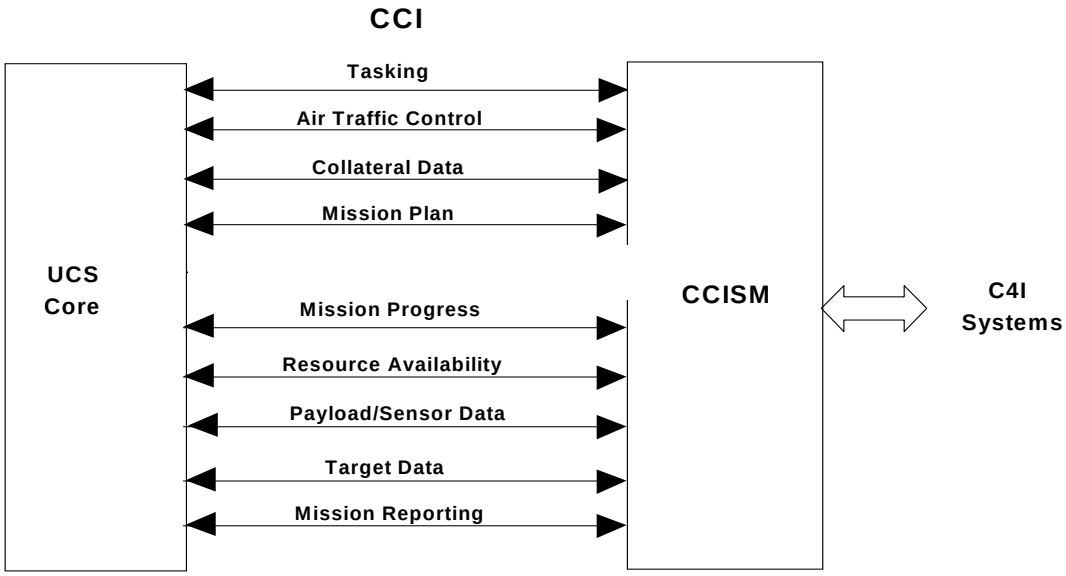

Figure B2 - 2: Types of CCI Data

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 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 CCISM, and ultimately the C4I systems.

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 NC3 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 currently at the thirteenth edition dated 1996.

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 planning, data link planning (including frequency planning), and UAV emergency recovery planning (rules of safety). The combined results of these four 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.

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 B1, 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

Ideally, the same data format will be used for each transfer of the mission plan data. 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 plan, and associated to waypoints in the route.

2.5.5 Data Link Planning.

Data link planning includes the details of the 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 B1, Data Link Control Command).

2.5.6 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).

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.

<table>
<tr><td colspan="3">Total number of payloads</td></tr>
<tr><td rowspan="4">Payload type
(Repeated for each payload type)</td><td colspan="2">Number of payloads of this type</td></tr>
<tr><td rowspan="3">Payload ID(Repeated for each payload)</td><td>Payload Configuration</td></tr>
<tr><td>Payload Status (see 2.8.1.4)</td></tr>
<tr><td>UAV Tail number</td></tr>
</table>

Table B2 - 3: Payload Availability

2.8.1.3 Air Data Terminals (ADT).

Total number of ADTs		
ADT Type (repeated for each ADT type)	Number of ADTs 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: ADT 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.

Number of UCSs available to support UAV operations		
UCS ID (Repeated for each UCS)	UCS Configuration (including AV Types supported, and LOI)	
	UCS Status	(see 2.8.1.4)
	CCI Dissemination Capability	C4I Products Supported
		C4I Systems Supported

Table B2 - 6: UCS Availability Data

2.8.2.2 Launch Systems.

Number of launch systems available to support UAV operations		
Launch System ID (repeated for each launch system)	Launch System Configuration (including AV Types supported)	
	Launch System Configuration (including AV Types supported)	
	Status	(see 2.8.1.4)

Table B2 - 7: Launch System Availability

2.8.2.3 Recovery Systems.

Number of recovery systems available to support UAV operations		
Recovery system ID (repeated for each recovery system)	Recovery System Configuration (including AV Types supported)	
	Status	(see 2.8.1.4)

Table B2 - 8: Recovery System Availability

2.8.2.4 Ground Data Terminals (GDT).

Number of GDTs available		
GDT type (repeated for each GDT type)	Number of GDT type available	
	Link status (repeated for each GDT type)w	Primary (see 2.8.1.4)
		Secondary (see 2.8.1.4)

Table B2 - 9: GDTs 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
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, the CCISM will need 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.

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

Index	Identifier	Format Name
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
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
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 tape is used for delivery, the tape reader should conform to STANAG 7024 (to be superseded by 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, payload plan, data link plan, and emergency recovery plan. There is currently no international standard agreed upon that fully defines these four elements of a mission plan. However, there is an ongoing US initiative to specify a Common Route Definition (CRD) that is applicable to a route plan and a limited

payload plan. The CRD specification, for reference purpose, is provided as an attachment to STANAG 4586. In the future it will also be available on a NATO Website. The website address will be provided when available.

To communicate with C4I systems or other UCSs, the CUCS shall be capable of transmitting and receiving mission plans in the CRD format. If a particular C4I system is not compatible with the CRD format and the CRD format is desired, a CCISM shall be used to translate to and from the CRD format. The capability to transmit and receive mission plans shall be provided for LOI 4, and is recommended for LOI 3.

The ROS are likely to be included in the VSM (Appendix B1) for two re[illegible]CRD

- 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

Index	Identifier	Format Name
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 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/his

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.

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

Index	Identifier	Format Name
		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
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

Index	Identifier	Format Name
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
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

NOTES:

OP 2.4.2.1	Provide Indications and Warnings for the Joint Operations Area
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.

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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

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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.										
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

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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

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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

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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

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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 Air and Ground Data Terminals	D/L type & availability	Data Links, UCS	UCS; any capable C2 node	Yes	Variable; Minutes to Hours

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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

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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
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

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**
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
MSI, HSI	OP 2.2.5, OP 2.4	1, 2, 3, 4, 5	STANAG 4545 STANAG 7023		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**
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					
Weapon Payloads – Unman-ned Combat Aerial Vehicles (UCAV) Platforms					Future Implement					

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Product/ Action (1)	**Rationale (UJTL#) (2)**	**LOI (3)**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
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.										
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

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Product/ Action [(1)]	**Rationale (UJTL#) [(2)]**	**LOI [(3)]**	**NATO or Internat'l Standard**	**Format**	**Remarks**	**Info/Char**	**Sending Node**	**Receiving Node**	**Critical**	**Timeliness**
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
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

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**
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 Connection	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 B2, 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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
J113 (Tx/Rx)	CIINTSUM	Counter-Intelligence and Security Summary	The CIINTSUM is used to inform addressees 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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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
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

Index Ref No	MTF Identifier	MTF Name	Function or purpose	LOI	Comments
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

APPENDIX 3 to
ANNEX B to
STANAG 4586
Edition 2

HUMAN COMPUTER INTERFACE

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1 Introduction.

1.1 Scope.

NATO Standardisation Agreement (STANAG 4586) Annex B Appendix B3 specifies the Human Computer Interface (HCI) requirements that a CUCS should 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 B3 specified requirements 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 B3 establishes the general requirements for information to be displayed by the UCS. The requirements detail the functions and interactions that the UCS should allow the operator to perform.

Annex B Appendix B3 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).

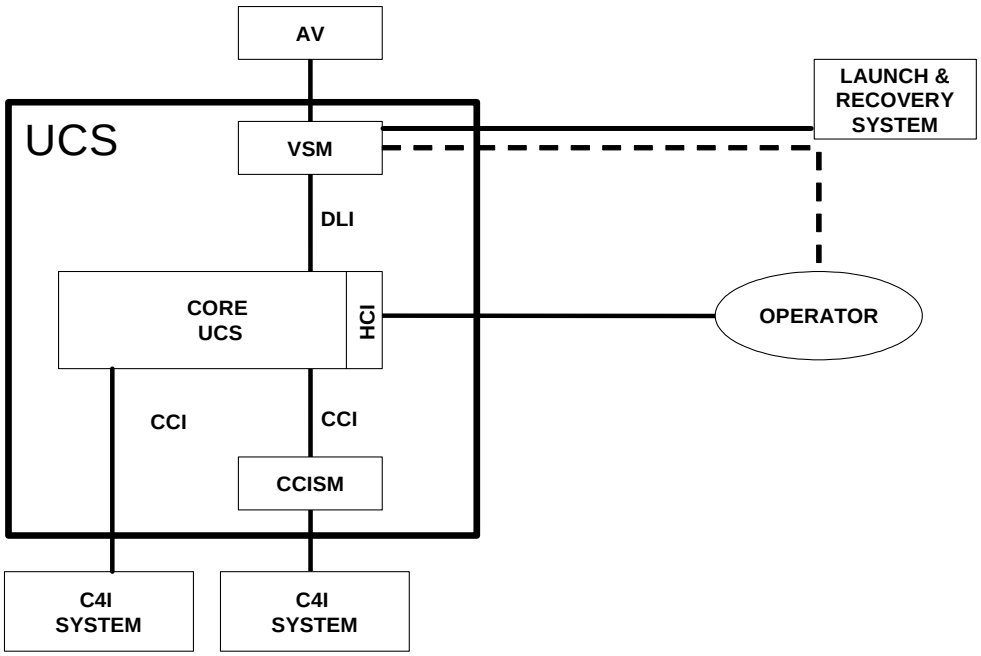

Figure B3 - 1. UCS Functional Architecture

Although portions of the HCI will have a physical implementation within a CUCS, Annex B Appendix B3 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 corporate 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 ship, which may require a different HCI.

Within this appendix, the applicable levels of interoperability (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 MO/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 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 B1 (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 B1 (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 Air Data Terminal (ADT) and the GDT. 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. Reference should be made to Appendix B1: Data Link Interface.

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
- ADT/GDT

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.