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NATO Interoperability Standards and Profiles

Volume 2

Near Term

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C3 CCSC NATO Open Systems Working Group

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1. INTRODUCTION

001. This agreed document was developed by the NATO Open Systems Working Group (NOSWG) under the authority of the NATO Consultation, Command and Control Board (NC3B). It was noted by the NATO C3 Board (AC/322-N(2011)0021-REV2-AS1 Dated 26 Apr 2011) making the Volume 2 standards and profiles mandatory for use in NATO common funded systems, and made available to the general public as a replacement for ADatP-34(D).

002. Volume 2 of the NISP focuses on interoperability standards and profiles in the near-term or a timeframe of 0 to 2 years into the future. This is the short-term step describing the state-of-the-art of NATO systems today and the framework for new systems actually under procurement or specification. For new systems, it describes the initial step towards the NII.

003. The Combined Communications Electronics Board (CCEB) nations will use NISP Volume 2 Chapter 3, Section 3.2, Section 3.3, Section 3.4, Section 3.5 and Section 3.6 tables to publish the interoperability standards for the CCEB under the provisions of the NATO-CCEB List of Understandings (LoU) detailed in Volume 1 Annex A. For the CCEB Chapter 4 is only applicable to the CCEB Nations when taking part in NATO lead operations.

1.1. SCOPE

004. The scope of this volume will include:

- Identifying the standards, profiles and technologies that are relevant to a service oriented environment, as described in the NATO NNEC Technical Services Strategy,
- Describing the near term standards, profiles, and technologies to support the initial step towards NNEC Technical Services,
- Planning the transition of legacy systems.

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2. REFERENCE MODELS: TRANSITION FROM PLATFORM CENTRIC TO SERVICE ORIENTED MODELS

005. Information technology is undergoing a fundamental shift from platform-oriented computing to network-oriented computing. Platform-oriented computing emerged with the widespread proliferation of personal computers and the global business environment. These factors and related technologies have created the conditions for the emergence of network-oriented computing. This shift from platform to network is what enables the more flexible and more dynamic network-oriented operation. The shift from viewing partners as independent to viewing partners as part of a continuously adapting ecosystem fosters a rich information sharing environment.

006. This shift is most obvious in the explosive growth of the Internet, intranets, and extranets. Internet users no doubt will recognize transmission control protocol/internet protocol (TCP/IP), hypertext transfer protocol (HTTP), hypertext markup language (HTML), Web browsers, search engines, and Java¹ Computing. These technologies, combined with high-volume, high-speed data access (enabled by the low-cost laser) and technologies for high-speed data networking (hubs and routers) have led to the emergence of network-oriented computing. Information “content” now can be created, distributed, and easily exploited across the extremely heterogeneous global computing environment. The “power” or “payoff” of network-enabled computing comes from information-intensive interactions between very large numbers of heterogeneous computational nodes in the network, where the network becomes the dynamic information grid established by interconnecting partners participating in a collaborative, coalition environment. At the structural level, network-enabled warfare requires an operational architecture to enable the common processes to be shared by all parties.

007. One of the major drivers for supporting net-enabled operations is Service-Oriented Architectures (SOA). SOA is enterprise architecture that leverages heterogeneity, and thus inherently platform-neutral. It is focused on the composition of Services into flexible processes and is more concerned with the Service interface and above (including composition metadata, security policy, and dynamic binding information), more so than what sits beneath the abstraction of the Service interface. SOA requires a different kind of platform, because runtime execution has different meanings within SOA. SOA enables business users and business process architects to compose Services into processes, and then manage and evolve those processes, in a declarative fashion. Runtime execution of such processes is therefore a metadata-centric operation of a different kind of platform -- a Service-oriented composite application platform.

008. Network-enabled operations are characterized by new concepts of speed of command and self-synchronization.

009. The most important SOA within an enterprise is the one that links all its systems. Existing platforms can be wrapped or extended in order to participate in a wider SOA environment. NATO use of the NISP will provide a template for new systems development, as well as assist in defining the path for existing systems to migrate towards net-enabled operations.

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3. STANDARDS

3.1. INTRODUCTION

010. This purpose of this chapter is to specify the NISP near term standards. The document organises these standards into five service areas and included service categories:

- Operational Mission/Activities/Tasks
- User Information Services
- Technical Services
 - COI Services
 - Generic COI Services
 - Specific COI Services
 - Information Integration
 - Core Enterprise Services
 - Discovery
 - Service Discovery Services
 - Information Discovery Services
 - Repository
 - Metadata Registry Services
 - Enterprise Directory Services
 - Mediation
 - Composition Services
 - Translation Services
 - Interaction
 - Messaging Services
 - Publish/Subscribe Services
 - Transaction Services
 - Collaboration Services
 - Infrastructure
 - Application Services
 - Storage Services
 - Communication Services
 - Network and Transport Services
 - Data Link and Connection Services
 - Information Assurance
 - SMI Services
 - Confidentiality
 - Encryption
 - Integrity
 - Authentication
 - Detection
 - Transsec
 - Service Management and Control

011. This section describes the role and requirements of each service area, and presents all associated standards in tabular form. The tables refine each service area into one or more service categories, with service components mapping to one or more mandatory, emerging near term or fading categories (see NISP vol. 1). A remarks column provides optional supplementary information on each standard plus CCEB-specific information. The NISP Rationale Document (RD) provides further explanation on why service and standards categories have been selected.

3.1.1. Releasability Statement

012. In principle, NISP includes only standards/STANAGs/documents, which are generally available for NATO/Nato member nations/CCEB.

013. However, a subset of documents are only available for those nations/ organisations, who are joining a specific mission (e.g. ISAF) or are member of a special working group (I-ICWG). The mebership in these activities is outside the scope of NISP.

3.2. OPERATIONAL MISSION/ACTIVITIES/TASKS

014. In the military organisations operational missions are generally planned activities that can be viewed in terms of distinct chronological stages of completion which in turn consist of shorter tasks. Operational missions do not involve combat (see combat mission, and can vary in duration from a few hours to several weeks, though usually in peacetime are limited to the working week.

015. This set of services is described in mission related terms to provide consistency with the set of possible NATO missions identified through the NATO Defense Planning process. Each Operational Service is dependent on one or more Information Services.

3.2.1. List of Standards

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks

3.3. USER INFORMATION SERVICES

016. These services are hierarchically organised and focused on information: content, management, processes, and standards. Each Information Service is enabled by one or more NNEC Services.

017. These NNEC services represent the technology required to enable the Information Services to make information available to user communities of interest. At the lowest level, NNEC Services are composed of components, processes, management.

3.3.1. List of Standards

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks

3.4. TECHNICAL SERVICES

018. Technical services provide fundamental support to service based frameworks both in the form of information integration and communication services, and in the form of COI independent general service building blocks.

019. COI services provide more specialized services in order to give the business more specific business benefits within a “domain” or “area of interest”.

020. A COI is a collaborative group of users who have shared goals, interests, missions or business processes that result in information exchange and shared vocabulary.

021. Information services include services that are either made available to all users by the infrastructure, or are mandatory to be provided by all users, by all providers or by all consumers. Information services also include specification of services of general interest that may be voluntarily exchanged by any parties on the network.

022. Actually information services are based only on core enterprise services (CES), but may be extended in the future.

023. Any service based framework, such as the Business Process Infrastructure Framework (BPIF), needs to provide a basic set of services that support and facilitate implementation and deployment of actual business services and processes. Such basic services are usually referred to as Core Enterprise Services.

024. Here we will provide an overview of such CESs in a BPIF context in terms of the way such services are categorized. A few examples of CESs in each category is also provided, but a complete set of well defined core services cannot be provided as it to a large extent will depend on the actual implementation of the BPIF.

025. Core services in a BPIF context are divided into two main categories according to their primary role in the implementation of business services and processes.

3.4.1. List of COI Standards

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
Generic COI Services				
Meteo				
Map View				
Map Mgmt				
Spatial Geography Visualisation				
Document Management				
	Joint Brevity Words Publication (APP-7(E), STANAG 1401 ed.13:2010)			
Specific COI Services				
Communicate and Inform				
<i>Battlespace Mgmt</i>				
<i>Orbat Mgmt</i>				
<i>Overlay Mgmt</i>				
	Additional military Layers for digital geospatial data products (AML), STANAG 7170 ed.1:2003	AAML, STANAG 7170 RD ed.2:2010		STANAG 7170 is the reference to the NATO Maritime Concepts standard and describes the product Additional Military Layers. This standard includes the Features, Attributes and enumera-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>tions specified by AML, but not covered by the IHO S-57 version 3.1.2 (June 2009) Object Catalogue. Once all required maritime definitions are included in DFDD/NG-FCD, reference to STANAG 7170 may be unnecessary.</p>
	<p>DIGEST V2.0 and DIGEST V2.1, STANAG 7074 ed.2:1998, AgeoP-3 (VMaps, USRP, ASRP)</p>			<p>IGEOWG is in the process of implementing DFDD as a STANAG called the NG-FCD (NATO Geospatial Feature Concept Dictionary). The IGEOWG will regulate any proposals that DGIWG may put forward with respect to DIGEST replacements.</p> <p>For CCEB interoperability the mandatory standard is DGIWG Feature Data Directory (DFDD) 2006 and DI-</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				GEST v2.1 is fading
	DTED (STANAG 3809 ed.4:2006)			<p>Digital Terrain Elevation Exchange Format STANAG 3809 is based on US MIL-PRF-89020B, Digital Terrain Elevation Data (DTED), dated 23 May 2000. The USA, custodians of DTED, are working with the DGIWG to define and develop appropriate replacement standards for the exchange format in order to address new and emerging elevation requirements.</p> <p>Used in Profile: AMN</p>
<i>Meteo Svc</i>				
	Specifications for Naval Mine Warfare Information and for Data Transfer - AMP 11 (STANAG 1116 ed.9:2010)			For CCEB interoperability this standard is not applicable
	NATO Handbook of Mil-			For CCEB interoperability this

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Mandatory Oceanographic Information and Services(STANAG 1171 ed.9:2008)			standard is only applicable for NATO lead operations
	NATO Oceanographic Data Exchange Format (STANAG 1317 ed.3:2008)			For CCEB interoperability this standard is only applicable for NATO lead operations
	Interoperability between Naval Mine Warfare Data Centres (STANAG 1456 ed.2:2010)			For CCEB interoperability this standard is not applicable
	Warning and Reporting and Hazard Prediction of Chemical, Biological, Radiological and Nuclear Incidents (STANAG 2103 ed.10:2010)			For CCEB interoperability this standard is only applicable for NATO lead operations
	Adoption of a Standard Ballistic Meteorological Message (STANAG 4061 ed.4:2000)			For CCEB interoperability this standard is only applicable for NATO lead operations
	Adoption of a Standard Artillery Computer Meteorological Message (STANAG 4082 ed.2:2000)	Adoption of a Standard Artillery Computer Meteorological Message (STANAG		For CCEB interoperability this standard is only applicable for NATO lead operations

SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		4082 ed.3:2010 RD)		
	Format of Requests for Meteorological Messages for Ballistic and Special Purposes (STANAG 4103 ed.4:2001)			For CCEB interoperability this standard is only applicable for NATO lead operations
	Adoption of a Standard Target Acquisition Meteorological Message (STANAG 4140 ed.2:2001)			For CCEB interoperability this standard is only applicable for NATO lead operations
	NATO Meteorological Codes Manual (STANAG 6015 ed.4:2005)			For CCEB interoperability this standard is only applicable for NATO lead operations
	Adoption of a Standard Gridded Data Meteorological Message (STANAG 6022 ed.2:2010)			For CCEB interoperability this standard is only applicable for NATO lead operations
<i>Symbol Mgmt</i>				
<i>Tracking</i>				
		NFFI, STANAG 5527 (study)		Until the development of STANAG 5527 is more stable, document AC/322(SC/5) N(2006)0025 should be used.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>For CCEB interoperability this standard is not applicable.</p> <p>Used in Profile: AMN</p>
<i>Synchronisation</i>				
<i>Distribution</i>				
<i>Notification</i>				
<i>Aggregation</i>				
Collaborate and Plan				
<i>Plan Workspace</i>				
<i>Plan Analysis</i>				
<i>Plan Briefing</i>				
<i>Plan Replay</i>				
<i>Plan Synchronisation</i>				
<i>Plan Collaboration</i>				
	<p>Military Messaging (STANAG 4406 Ed.2:2006)</p>		<p>ACP120 replaced by ACP145</p>	<p>This includes PCT (protected content type). PCT may be used for protection of data objects in systems.</p> <p>For CCEB interoperability the mandatory standard is ACP145 (Gateway-to-Gateway Messaging Protocols)</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
<i>Simulation</i>				
<i>Collaboration analysis</i>				
Sense and Respond				
<i>Tasking</i>				
<i>Plan Deviation Monitor</i>				
JCOP				
Logistics Svcs				
	RFID Application Interface, ISO 15961:2004			
	RFID Data Encoding Rules, ISO 15962:2004			
	RFID - Freight containers, ISO 17363:2007			
	RFID - Returnable transport items, ISO 17364:2009			
	RFID - Transport units, ISO 17365:2009			
	RFID - Product packaging, ISO 17366:2009			
	RFID - Product tagging, ISO 17367:2009			
<i>Supply Chain Svcs</i>				

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		OAGIS 9.4.1:2009, OAGi		
		PLCS, ISO 10303-239:2005		
		S1000D issue 4:2008, ASD- AIA-ATA		
	NATO Policy for Systems Life Cycle Mgmt (SLCM), C- M(2005)0108			SLCM is primarily based on AAP 48 and ISO/IEC 15288

3.4.2. List of Information Integration Standards

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
Core Enterprise Services				
		WS-Policy v1.5:2007 (OAS- IS)		
Discovery				
<i>Service Discovery Services</i>				
	Universal Description, Discovery and Integration (UDDI) v2.0, W3C	UDDI v3.0, W3C		UDDI 2.0 provides a platform-independent way of describing- and discovering service. For CCEB interoperability UDDI 3.0 is mandatory.

SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				Used in Profiles: AMN, tactESB (v2.03)
		UDDI API Spec v.2, OASIS:2002		Used in Profile: tactESB
		Electronic Business Extensible Markup Language (ebXML) ISO/TS 15000-1:2004, -2:2004, -3:2004, -4:2004, -5:2005		ebXML is a suite of specifications for standardizing XML based business messages to facilitate trading between organisation. Used in Profile: AMN (v3.0)
		ebXML Messaging Service v. 2:2002 (OASIS)		
	ebRIM v3.0, OASIS			ebXML Registry Information Model Used in Profile: AMN
		TIDE Service Discovery, v.2.2.0:2008 (ACT)		<i>Used in Profile: AMN</i>
		Resource Description Framework (RDF):2004 (W3C)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable.
		Protocol and RDF Query Lan-		Part of TIDE specification at ACT. For CCEB in-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		guage (SPARQL):2008 (W3C)		teroperability this standard is not applicable.
		DNS Service Discovery (DNS-SD):2010 (ACT TIDE)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable.
<i>Information Discovery Services</i>				
		WS-Metadata Exchange:2010, W3C		
		Web Ontology Language (OWL):2009, W3C		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable.
		ISAF Minimum Metadata Implementation Policy (NATO:2010)		<i>Used in profile: AMN</i>
Repository				
			NC3 Repository	Common repository for standard data elements and their related tool for the NATO Corporate Data Model for Data Administration. See also XML. As this is currently not a form-

SERVICECAT- EGORY / CAT- EGORY / SUB- CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				al standard, this entry is under further consideration within the NC3B. For CCEB interoperability this standard is partially applicable Used in Profile: AMN
<i>Metadata Registry Services</i>				
		NATO Metadata Registry and Repository (NMRR) (NC3A TN-1313:2008)		For CCEB interoperability this standard is not applicable.
<i>Enterprise Directory Services</i>				
	Common Directory Services and Procedures (ACP 133C:2007)	Common Directory Services and Procedures (ACP 133D:2009)	ACP 133B	Contains a common directoryschema.
	Common Directory Services and Procedures Supplement (ACP 133 Suppl.1:2009)			
	LDAP v3 (NATO LDAP Profile)			LDAP is an IETF protocol and close to a functional subset of DAP. Many Web-browsers can act as LDAP clients,

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>which is highly desirable.</p> <p>Used in Profile: AMN</p>
		<p>LDAP: String Representation of Distinguished Names:2006 (IETF)</p>		
	<p>LDIF (IETF RFC 2849:2000)</p>			<p>LDIF defines a flexible and almost universally accepted means of exchanging directory information via flat files.</p>
			<p>DSP (ITU-T X.500:2008)</p>	<p>DSP defines X.500 server to server communication, including chaining.</p> <p>For CCEB interoperability this standard is not applicable</p>
			<p>DSIP (ITU-T X.500:2008)</p>	<p>DISP defines X.500 based information shadowing/replication.</p> <p>For CCEB interoperability this standard is not applicable</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			DOP (ITU-T X.500:2008)	Contains operational management. For CCEB interoperability this standard is not applicable
Mediation				
	SQL 3 (ISO/IEC 9075(-1 to -14):2008)		Full Level and ISO/IEC 9075:1999 canceled, new Version ISO/IEC 9075(-1 to -14):2008, Parts 1, 2 and 11 encompass the minimum requirements of the language. Other parts define extensions.	Used in Profile: AMN
	ODMG 3.0:2000 (ODMG)			
	ODBC 3.8 (MS)			
	JAVA JDBC version 4.1:2006 (JDBC)		JDBC separated from ODBC	
	SQL CLI (ISO/IEC 9075-3:2008)			
		C2 Information Exchange Data Model (C2IEDM) and Data Exchange Mechanism (DEM)		<i>Used in Profile: AMN</i>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	DEM Data Replication Mechanism from MIP baseline 3:2009			Used in Profile: AMN
			NATO Corporate Data Model v2 (ADatP-32)	For CCEB interoperability this standard is partially applicable
		ASTERIX, ed.1 (ADatP-35:2010)		<p>This profile is based on ADatP-35 and a corresponding series of EUROCONTROL specifications</p> <p>For CCEB interoperability this profile is only applicable for NATO lead operations.</p>
	Spatial Schema ISO 19107:2003, DGI-WG/TSMAD profiles of ISO 19107			<p>ISO 19107 provides conceptual schemas for describing and manipulating the spatial characteristics of geographic features.</p> <p>The DGI-WG/TSMAD profiles are intended to define sub-schemas of ISO 19107 to be used for defining</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>data interchange formats.</p> <p>For CCEB interoperability this standard is emerging</p>
	<p>Rules for application schema ISO 19109:2005</p>			<p>ISO 19109 defines rules for creating and documenting application schemas, including the principles for the definition of features. Required for Geo to ensure consistency of use in the definition and use of the geographic features.</p> <p>For CCEB interoperability this standard is emerging</p>
	<p>Methodology for feature cataloguing ISO 19110:2005</p>			<p>ISO 19110 defines the methodology for cataloguing feature types and specifies how the classification of feature types is organized into a feature catalogue and presented to the user of a set of geographic data.</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				For CCEB interoperability this standard is emerging
	Spatial Referencing by geographic identifiers ISO 19112:2003			<p>ISO 19112 defines the conceptual schema for spatial references based on geographic identifiers. This standard enables gazetteers to be constructed in a consistent manner.</p> <p>For CCEB interoperability this standard is emerging</p>
	Simple Feature Access, ISO 19125-1:2004 and ISO 19125-2:2004			<p>ISO 19125-1 establishes a common architecture for geographic information (simple feature profile of ISO 19107) and defines terms to use within the architecture. It also standardizes names and geometric definitions for Types for Geometry.</p> <p>ISO 19125-2 specifies and SQL schema that support storage, re-</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>trieval, query and update of simple geospatial feature collections via the SQL Call Level Interface (SQL/CLI) and establishes and architecture for the implementation of feature tables.</p> <p>For CCEB interoperability this standard is emerging</p>
	<p>Joint C3 Information Exchange Data Model (JC3IEDM, STANAG 5525 ed.1:2007) for the Land environment</p>	<p>Joint C3 Information Exchange Data Model (JC3IEDM, STANAG 5525 ed.1:2007) for the Joint, Maritime and Air environments</p>	<p>C2IEDM replaced by JC3IEDM</p>	<p>C2IEDM replaced by JC3IEDM.</p> <p>For CCEB JC3IEDM is mandatory for all environments.</p> <p>Used in profile: AMN</p>
	<p>WebCGM (Web Computer Graphics Metafile), W3C REC 20011217, 2001</p>		<p>CGM (ISO/IEC 8632:1999) not for new systems</p>	<p>Primarily intended for vector-based images.</p>
	<p>SVG 1.2:2005 (W3C)</p>			<p>The preferred format to visualize maps in the Web browser.</p>
	<p>Mobile SVG Profiles: SVG Tiny and SVG Ba-</p>			<p>SVG profiles for cellphones and PDAs</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	sic, W3C REC 20030114, 2003			
		NVG - NATO Vector Graphics Protocol v.1.5:2010 (ACT)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable. Used in Profile: AMN
		Geographical Tagged Image Format (GeoTIFF)		<i>Used in Profile: AMN</i>
	JPEG 2000 (ISO/IEC 15444-1:2004, ISO/IEC 15444-2:2004, ISO/IEC 15444-3:2007, including Amd 2:2003, ISO/IEC 15444-4:2004, ISO/IEC 15444-5:2003, ISO/IEC 15444-6:2003,)			JPEG 2000 is the standard used to store raster data (imagery, scanned maps, matrix data) and provides the ability to include spatial referencing information within the standard. For CCEB interoperability ISO/IEC 15444-2 Cor. 3 is not applicable.
		JPEG LS (ISO/IEC 14495:2003)		Loss-less and near loss-less compression of continuous tone still images.
		Multiresolution seamless Image		<i>Used in Profile: AMN</i>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		Database (MrSid Res. 2)		
		Enhanced Compressed Wavelet (ECW 3.3)		<i>Used in Profile: AMN</i>
		Compressed ARC Digitized Raster Graphics (CADRG) (NIMA:1994)		<i>Used in Profile: AMN</i>
		Raster product format (RPF) (NIMA):2010		<i>Used in Profile: AMN</i>
			GIF (version 89a) not for new systems	Graphics Interchange Format is intended for the on-line transmission and interchange of raster graphic data.
	PNG 1.0 (RFC 2083:1997)			Portable Network Graphics PNG is intended for the compressed storage of raster images. PNG provides a patent-free replacement for GIF.
	Fax G.3, ITU-T T.4:2003			
	Fax Transmission, ITU-T T.30:2005			
	TDF (STANAG 5000 ed.3:2006)			For CCEB interoperability the

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				SCIP standard is mandatory
	ADatP-3(A), CONFORMETS (STANAG 5500, ed. 7:2010)			Used in Profile: AMN
	APP-11(C) Change 1, NATO Message Catalogue (STANAG 7149 ed.5:2010)	APP-11(C) Change 2		<p>APP-11 (STANAG 7149) as the single source for NATO Military Messages for command and control of NATO forces at all levels of the Chain of Command down to and including individual units.</p> <p>For CCEB interoperability the standard is MIL-STD 6040 and OTH-T GOLD standards</p> <p>Used in Profile: AMN</p>
	EDIFACT (ISO 9735:2002)			EDIFACT can be used to transfer business documents such as purchase orders, invoices, and electronic funds transfer information. ebXML is a UN standard

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			GML v3.2 (ISO 19136:2007)	<p>This OpenGIS Consortium recommendation standard may be used as the transfer format between the FA providing the published operational data (e.g. COP) and the Core Map Application Server.</p> <p>For CCEB interoperability GML 3.1 is emerging</p> <p>Used in Profile: AMN</p>
		GML Simple Feature Profile v2.0 (OGC):2010		<i>Used in Profile: AMN</i>
		Filter Encoding v2.0 (OGC):2010		<i>Used in Profile: AMN</i>
		ESRI Shapefile Specification (ESRI:2008)		<i>Used in Profile: AMN</i>
	DLMS/DFAD1, Mil-PRF-89005:1994 (NGA)			<p>DLMS/DFAD1 must be used until DIGEST/VMAP 1 covers the whole world.</p> <p>For CCEB interoperability this standard is not applicable</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	World Geodetic System (WGS) 84			WGS specifies the set of parameters that define mathematically the shape of the earth
	Geographic Information - Metadata - ISO 19115:2003			<p>This provides the most comprehensive metadata specification for digital geographic data. This shall be used for the geo metadata which forms the foundation of the Core Geo Catalogue. It is likely that a NATO profile of this standard will have to be produced based on the DGIWG profile.</p> <p>For CCEB interoperability this standard is emerging</p> <p>Used in Profile: AMN</p>
	WECDIS (STANAG 4564 ed.2:2007)			Standard for Warship Electronic Chart Display and Information Systems.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	SEDRIS (ISO/IEC 18023-1:2006)			Environmental data representation and interchange specification
	EDCS (ISO/IEC 18025:2005)			Environmental data coding specification
	SRM (ISO/IEC 18026:2009)			Spatial reference model
	Geodetic Projections, STANAG 2211 ed.6:2001			
	Common Warfighting Symbology (Mil-Std 2525B)			For CCEB interoperability the mandatory standard is MIL-STD 2525B COMMON WARFIGHTING SYMBOLOGY and the emerging standard is MIL-STD 2525C Used in Profile: AMN
	Joint Symbology (APP-6(B)/STANAG 2019 ed.5:2008)			For CCEB interoperability this standard is not applicable. Used in Profile: AMN
	Telecommunications Symbology (STANAG 5042 ed1:1978)			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		Portrayal ISO/DIS 19117:2005		Currently in Draft. International Standard specifies the interface to standard symbol sets, not the symbols themselves.
			Symbols on Land Maps, Aeronautical Charts and special Naval Charts (STANAG 3675 ed.2:2000)	For CCEB interoperability this standard is applicable and fading.
	IHO S-100, 2000		IHO S-57	
	Web Map Service (WMS) Implementation Specification v.1.3:2006 (OGC 06-042)			Used as a means of distributing compiled mapping data between applications. Used in Profile: AMN
		OpenGIS Styled Layer Descriptor Profile of the Web Map Service (SLD 1.1.0) (OGC 05-078r4)		<i>Used in Profile: AMN</i>
	Web Feature Service v.2.0:2009 (OGC 09-025r1)			Used as a means of distributing geo feature (vector) data between applications. For CCEB interoperability this standard is emerging

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Web Coverage Service v.2.0:2010 (OGC 09-110r3)			Used as a means of distributing geo coverages (raster) data between applications. For CCEB interoperability this standard is emerging Used in Profile: AMN
		Web Coverage Service Implementation Specification v1.1.2 (OGC)		<i>Used in Profile: AMN (v1.1.1)</i>
		KeyholeMarkup Language (KML) v.2.2:2008 (OGC 07-147r2)		Used in Profile: AMN
		GML in JPEG 2000 for Geographic Imagery (GMLJP2) v.1.0.0 (OGC 05-047r3):2006		This evolving OGC standard describes minimally required GML definition for georeferencing images and gives guidelines for augmenting that definition to address the additional encoding of metadata, features, annotations, styles, coordinate reference

SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				systems, and units of measure for data encoded in JP2K
		OGC GIS Web Terrain Service RFC v.05:2004		Used as a means to perform Web Service based Terrain analysis and communicate terrain data to clients
		Catalogue Service for the Web (CSW) v.2.0.2 (OGC)		Used as a means of discovering geo metadata. Used in Profile: AMN
		CSW-ebRIM Registry Service, Part 1: ebRIM profile for CSW v.1.0.1 (OGC)		<i>Used in Profile: AMN</i>
		OGC - ISO 19115:2003/ ISO 19119:2005 Application Profile for CSW 2.0		Describes the organisation and implementation of Catalogue Services based on the ISO 19115 / ISO 19119 Application Profile
		Web Registry Service v.0.0.2:2001 (OGC Ref. 01-024r1)		Used as a means of publishing and finding geo services. As this standard is declared deprecated by OGC, the further inclusion

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				of it in NISP is under consideration within the NC3B.
			Computer Graphics Interface (CGI ISO/IEC 9636:1991)	For CCEB interoperability this standard is not applicable
	OpenGL v4.0:2010			For CCEB interoperability this standard is not applicable
	Unified Modeling Language (UML) v2.0:2010 (OMG)			For CCEB interoperability this standard is not applicable
		Unified Profile for DoDAF and MODAF (UPDM v.2):2008 (OMG)		For CCEB interoperability this standard is not applicable.
	Codes for the representation of Currencies and Funds (ISO 4217:2008)			
	Letters for Geographic Entities, STANAG 1059, ed.8:2005	Letters for Geographic Entities, STANAG 1059, ed.9		For CCEB interoperability the country codes standard is ISO 3166 trigraphs except for military messaging - see CCEB COMAG Policy On Security Labelling Used in Profile: AMN (ed.9)

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	ECMA Script Language Specification (ECMA 262) ed.3:2009			Scripting required for enhanced Web pages For CCEB interoperability this standard is not applicable
	Zip			Implementations of zip (e.g. Winzip) also includes gzip (RFC 1952:1996) and tar/compress
			7-bit Coded Character-set for Info Exchange (ASCII) (ISO/IEC 646:1991)	
			8-bit Single-Byte Coded Graphic Char Sets (ISO/IEC 8859-1-6,8-10:1999; 7:2003)	
	Universal Multiple Octet Coded Char Set (UCS) - Part 1 (ISO/IEC 10646:2003)			
	NATO Standard Bar Code Symbolology (STANAG 4329 ed.3:2010)			STANAG 4329 is a cover STANAG of ISO 16388:1999 - Bar code symbolology specifications - Code 39.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Bar code symbology specification - Code 128 (ISO/IEC 15417:2007), Bar code print quality test specification -Linear symbols (ISO/IEC 15416:2000)			
	Representation of Dates and Times (ISO 8601:2004)			Used in Profile: AMN
	MIME (IETF RFC 2045:1996 updated by 2184:1997, 2231:1997, 5335:2008; 2046:1996 updated by 3676:2004, 3798:2004, 5147:2008; 2047:1996 updated by 2184:1997, 2231:1997, 5338:2008; 4288:2005, 4289:2005; 2049:1996)	S/MIME ESS (IETF RFC 3850:2004, 3851:2004)		Base64 is included in RFC 2045:1996
		MIME Encapsulation of Aggregate Documents, such as HTML (MHTML):1999 (IETF)		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
<i>Composition Services</i>				
<i>Translation Services</i>				
Interaction				
<i>Messaging Services</i>				
	Military Messaging (STANAG 4406 Ed.2:2006)		Use of PCT within STANAG 4406 is fading	Used for Formal Messaging. STANAG 4406 contains the upper layer protocol profile down to the requested Transport Service. For CCEB interoperability the mandatory standard is ACP123A.
	Enhanced Security Services (ESS) for S/MIME, STANAG 4631 Ed.1:2008			STANAG 4631 contains an additional S/MIME profile for MMH-HS (in addition to PCT) For CCEB interoperability the mandatory standard is ACP123A.
			X.400:1993 deleted for informal messaging, as no concrete requirement from MMH-SWG	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			Interoperability of telebriefing systems (STANAG 5059) deleted	
			Interoperability standards for telebriefing systems (STANAG 4339) deleted	
	SMTP (IETF RFCs 1870:1995, 1985:1996, 2034:1996, 2920:2000, 3207:2002, 3461:2003 updated by 3798:2004, 3885:2004, 4954:2007, 5321:2008)			Used for interpersonal messaging (email) Used in Profile: AMN
	POP3 (IETF RFC 1939:1996 updated by 1957:1996, 2449:1998)			For CCEB interoperability this standard is not applicable
	IMAP4 (IETF RFC 3501:2003 updated by 4466:2006, 4469:2006, 4551:2006, 5032:2007, 5182:2008, 5738:2010)			For CCEB interoperability this standard is not applicable
		ACP 145(A) - Interim Imple-		Provides gateway between ACP

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		mentation Guide for ACP 123/STANAG 4406 Messaging Services Between Nations - dated September 2008		123A messaging services. For CCEB interoperability this standard is mandatory.
<i>Publish/Subscribe Services</i>				
<i>Transaction Services</i>				
<i>Collaboration Services</i>				
		XMPP (IETF RFC 3920:2004 - 3923:2004)		For CCEB interoperability this standard is mandatory Base profile includes as extensions XEP-0184 and XEP-0202 Used in Profile: AMN
	Packet-based Multimedia Comms System (ITU-T H.323:2009)			Used in Profile: AMN
		Session Initialisation Protocol (SIP) (IETF RFC 3261:2002, updated by 3265:2002, 3853:2004, 4320:2006, 4916:2007,		

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		5393:2008, 5621:2009, 5626:2009, 5630:2009, 5922:2010)		
	Multinational Videoconferencing Services (ACP 220:2008)			
	Narrow-band visual telephone systems and terminal equipment (ITU-T H.320:2004)			
	Media Gateway Control Protocol v3(ITU-T H.248.1:2005)			Protocol for managing the multimedia gateways between circuit switched and packet switched networks.
	ITU Multi-point still image and Annotation Conference Protocol Spec (ITU-T T.120:2007), T.126:2007 (Reference to T.122 - T.125)			
	Data Protocols for Multimedia Conferencing (ITU-T T.120:2007, T.128:2008)			
Infrastructure				

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		WS-Federation (OASIS)		
		Distributed Computing Environment (DCE) v1.1:1997 (OSF)		
		ONC RPC v.2 (IETF RFC 1831:1995)		
		DCE RPC v1.1:1997 (The Open Group)		
		Remote Procedure Call (MS-RPC:2003) (MS)		As part of MS Windows 2000 Interfaces
	X Window X11R7.5:2009, (X.Org) (see UI Svc)			
		DCE DFS v1.1:1997 (The Open Group)		
		X/Open Network File System (XNFS) v.3W:1998 (The Open Group)		Includes RFC 1094:1989 (NFS 89) and RFC 1813:1995 (NFS95)
		Server Message Block (MS-SMB) v20100711:2010 (MS)		As part of MS Windows 2000
		DCE DTS v1.1:1995 (The Open Group)		DCE DTS uses TPI (Time Provider Interface) to access other distributed time services (such

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				as NTP as mentioned under Comms Service).
		CORBA/IIOP 2.2:2009 (OMG)		
			MS-DCOM v.12.0:2010 (MS)	As part of MS Windows 2000 Interfaces; DCOM only in local environment, not for outside.
			Distributed Interactive Simulation (DIS) (STANAG 4482 ed.1:2010)	For CCEB interoperability the mandatory standard is IEEE Std 1278.1a:1998 STANAG 4482 should also be migrated to IEEE Std 1278:1998
		Modeling and Simulation High Level Architecture (HLA) (IEEE 1516:2000)		For CCEB interoperability this standard is mandatory
<i>Application Services</i>				
	FTP (IETF STD 9:1985,IETF RFC 0959:1985 updated by RFC 2228:1997, 2640:1999, 2773:2000, 3659:2007)			

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		FTP Extensions for IPv6 and NATs (IETF RFC 2428:1998)		
	Telnet (IETF STD 8:1983, IETF RFC 0854:1983 up- dated by RFC 5198:2008, 0855:1983)			
	Network News Transfer Protocol NNTP (IETF RFC 3977:2006)			
	Network Time Protocol (NTP) (RFC 1305:1992)			
			MPEG-1 (ISO/ IEC 11172:1996)	
	MPEG-2 (ISO/ IEC 13818:2000)			
	MPEG-4 (ISO/ IEC 14496:2004)			Encoding stand- ard for video con- ferencing
	Compact Disc File System (CDFS) (ISO 9660:1988)			For physical me- dia distribution (CD)
	Pulse Code Mod- ulation (PCM) (ISO/IEC 11172-3:1993, ITU-T G.711:1988)			PCM used for au- dio in ISDN Sys- tems

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	Differential PCM (ITU-T G.726:1990)			
			Delta-Modulation DM, EUROCOM D/0	
	GSM-Modulation (GSM 06.10, GSM 06.20 v.8.1.1:1999)			Used for mobile phones
		Voice Coding Algorithm (STANAG 4444 ed.1:1999).		Used for HF voice communications as defined in STANAG 4444.
			Linear Predictive Coding-10 (STANAG 4198 ed.1:1984)	
	Code Excited Linear Prediction coding (CELP) (FS 1016:1991)			CELP is used military aircraft voice communications in narrow band UHF networks. CELP has higher throughput than LPC-10, but a lower range.
	Mixed Excitation Linear Predictive coding (MELPe) (STANAG 4591 ed.1:2008)			MELPe is used for HF voice communications in narrow band systems.
			STANAG 4421 deleted as it is cancelled by NATO	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Parameters and Coding Standards for 800 bps. Digital Speech Encoder/Decoder (STANAG 4479 ed.1:2002)			For CCEB interoperability this standard is not applicable
	SIMPLE (STANAG 5602 ed.3:2010)			SIMPLE provides specifications to interconnect ground rigs of all types for TDL interoperability testing
	Nato Secondary Imagery Format (NSIF), STANAG 4545 ed 1.:1998			NSIF establishes the format for exchange of electronic secondary imagery. Used in Profile: AMN
	BIIF (ISO 12087-5:1998)			
	NSILI (STANAG 4559 ed.2:2007)			NSILI provides interoperability between NATO nations reconnaissance databases and product libraries Used in Profile: AMN
	NIIRS (STANAG 7194 ed.1:2009)			NIIRS provides evaluation of imagery quality and use of a consistent

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				measure for such evaluations
	NADS (STANAG 4575 ed.3:2009)			NADS defines an interface for advanced digital storage systems.
	GMTIF (STANAG 4607 ed.3:2010)			GMTIF defines a ground moving target indicator format. Used in Profile: AMN
	DMIS (STANAG 4609 ed.3:2009)			DMIS defines a digital motion imagery standard. For CCEB interoperability this standard is not applicable. Used in Profile: AMN
	NPIF (STANAG 7023 ed.4:2009)			NPIF establishes a standard data format and a standard transport architecture for the transfer of reconnaissance and surveillance imagery and associated auxiliary
	AR-TRI (STANAG 7024 ed.2:2001)			AR-TRI establishes the physical format for the exchange of mag-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				netic tape cartridges
	Exchange of Imagery (STANAG 3764 ed.6:2008)			
	Implementing JPEG 2000 in NITFS/BIIF/NSIF (ISO 10918-4:1999)			This profile defines the limits of the international standard that can be used within NITF 2.1.
	Link-11 (STANAG 5511 ed.6:2008, M-Series)	Link-11 (STANAG 5511 ed.7:2008 RD, M-Series)		For further guidance refer to the Bi-SC Data Link Migration Strategy, November 2000. For CCEB interoperability the standard is MIL-STD 6011C
	Link-16 (STANAG 5516 ed.4:2008, J-Series)	Link-16 (STANAG 5516 ed.5:2009 RD, J-Series)		For CCEB interoperability the mandatory standard is MIL-STD 6016C Change 1 and the emerging standard is MIL-STD 6016D Used in Profile: AMN
	Link-22 (STANAG 5522 ed.2:2008, J-Series)	Link-22 (STANAG 5522 ed.3:2009 RD, J-Series)		Used in Profile: AMN

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			Link-14 (STANAG 5514 ed.2:2002)	The Link-14 is a legacy system that most NATO nations have no intention to implement in new platforms other than interfacing data link buffers and have ceased to use or maintain. Therefore considered fading
	PDF-Format 1.4 ed.1 (ISO 19005-1:2005)		Formets deleted in NCSP v.6	<p>Portable document presentation format, realised in Adobe product versions 5 and 6. Used in Minerva system at NATO HQ</p> <p>For CCEB interoperability the primary standard is Adobe Postscript (level I and II) /Encapsulated Postscript (EPS) , and the secondary standard is Adobe PDF</p> <p>Used in Profile: AMN</p>
	Rich Text Format (RTF)			Basic document interchange format

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	v.1.9.1:2007 (MS)			
	ASCII Text, ISO 646:1991			For constrained environments
	UTF-8 (IETF RFC 3629:2003)			Universal Text Format
	Document Object Model (DOM) Level 3:2004 (MS)		Document Object Model (DOM) Level 2 (MS)	Basic Document Object Model .
	Office XP formats:2003 (MS)		Office 2000 formats: Office XP	Office200-formats Not to be used for new systems. Pertains to the interchange formats of MS Word, Excel and Power-Point, irrespective of the actual MS Office version or general office automation package being used.
	OpenDocument (ODF) ISO/IEC 26300:2006			Formerly published as OASIS standard.
		Office Open XML, ed.1 (ECMA-376)		<i>Used in Profile: AMN</i>
		Office Open XML, ISO/IEC 29500:2008		XML variant of Microsoft Office. Used in Profile: AMN

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	HTML 4.01 (RFC 2854:2000)			Used in Profile: AMN
		Real Simple Syndication (RSS 2.0) (WS-I:2010)		<i>Used in Profile: AMN</i>
		GeoRSS (GeoRSS 1.0):2007 (OGC)		<i>Used in Profile: AMN</i>
	Atom Syndication Format (IETF RFC 4287)			Used in Profile: AMN
	XHTML 1.0:2002 (W3C)			XHTML is specified in XML Used in Profile: AMN
	SGML (ISO 8879:1986)			For high value complex documents
<i>Storage Services</i>				
<i>Web Services</i>				
	HTTP v. 1.1 (IETF RFC 2616:1999 updated by RFC 2817:2000), URL (RFC 4248:2005, 4266:2005), URI (RFC 3986:2005)			Used in Profiles: AMN, tactESB
		Content-ID and Message-ID URLs (IETF RFC 2392:1998)		
		HTTP State Change Mgmt. (IETF RFC 2965:2000)		Used in Profile: tactESB

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		AtomPub (IETF RFC 5023:2007)		
	HTTPS (IETF RFC 2818:2000)			
		Web Services Business Process Execution Language (WSBPEL) v.2:2007, OASIS		
		Web Services Federation (WSFED):2010, OASIS		<i>Used in Profile: AMN</i>
		Web Service Choreography Interface (WSCI) v.1:2002		
		Business Process Model and Notation (BPMN) v.2.0:2010		
		Open Services Infrastructure (OpenSiS) v.1.9.5.6, OpenSIS		
		Java Enterprise Edition 1.4 Specification (JAVA EE v.6:2009), (JCP:2002)		
		Java Remote Method Invocation (JRMI), (JCP)ed.1.5.0:2004		

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		DSML v2.0:2002, OASIS		DSML provides a Directory Access via a Web interface
		Dublin Core Metadata Element Set (ISO 15836:2009)		<i>Used in Profile: AMN</i>
		Binding of Metadata to Data Objects (NC3A RD 2977)		<i>Used in Profile: AMN</i>
		NATO TIDE Information Discovery (Request-Response), v.2.3:2009 (ACT)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable. Used in Profile: AMN
		NATO TIDE Service Discovery (Subscribe-Publish), v.2.2.0:2008 (ACT)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable.
	WSDL v1.1:2001, W3C			Used in Profiles: AMN, tactESB
	XML 1.0 3rd ed:2004, W3C			Where semantic tags are required, the NC3 Repository serves as an XML registry (see Data Management).

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				Used in Profile: tactESB
		XLink 1.0:2001, W3C		XLink is used to point to resources from XML docu- ments.
		XPointer 1.0:2001, W3C		XPointer is used to identify XML fragment inside any given XML documents.
		XQuery 1.0:2003, W3C		
		Relax NG (ISO/ IEC 19757-2:2008)		Relax NG may be a replacement for XML schema lan- guages.
	XML Base:2001, W3C			
	XML In- fuset:2001, W3C			
	XSL Associ- ation:1999, W3C			
	Namespaces in XML (xml- names-19990114:1999) W3C			Used in Profiles: AMN, tactESB
	Extensible Stylesheet Lan- guage Transform- ation (XSLT) 1.0:1999			Used in Profile: AMN
	Extensible Stylesheet Lan- guage (XSL) 1.0:2001			

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		Cascading Style Sheets (CSS) 2.1:2001		<i>Used in Profile: AMN</i>
	XML Schema, Part 0-2:2001			Used in Profiles: AMN, tactESB
	Wireless Markup Language (WML) 2.0:2001			WML to be used with Wireless Ap- plication Protocol (WAP) for con- strained environ- ments
		Efficient XML Interchange Format (EXI) v1.0		Efficient imple- mentations of XML in the tac- tical environment
		XML Path Lan- guage (XPath) v2.0:2003, W3C		For CCEB in- teroperability this standard is man- datory.
	WS-I Web Ser- vice Basic Pro- file, v1.1:2nd ed. 2006	WS-I Web Ser- vice Basic Pro- file, v1.2:3rd ed. 2007		For CCEB in- teroperability this profile is mandat- ory. Used in Profiles: AMN (v1.1), tact- ESB (v1.1)
	Simple Object Access Protocol v1.1 (SOAP), W3C	Simple Object Access Protocol v1.2 (SOAP), W3C		Could be used in support of the Geo Web Ser- vices. Used in Profiles: AMN (v1.1), tact- ESB (v1.2)
		WS-I Simple SOAP Binding Profile v1.0:2004		For CCEB in- teroperability this

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				profile is mandatory. Used in Profile: tactESB
		WS-I Attachments Profile v1.0:2nd ed. 2006		For CCEB interoperability this profile is mandatory.
		WS-I Reliable Messaging v1.2:2009		
		WS-Addressing v1.0:2010		
		WS-Notification v1.3:2006		
		Representational State Transfer (REST):2002, (ACM)		<i>Used in Profile: AMN</i>
<i>Device Independent Console</i>				
	X Window System 11 R7.5:2009		X Window System 11 R5	The R6.6 release addresses a portion of the backlog of bug reports since Release 6.5.1 patch 1, along with additional fixes from the Xfree86 community. R5 should not be used for future systems.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				For CCEB interoperability this standard is not applicable
			Win 32 APIs	As part of MS Windows 2000 Interfaces For CCEB interoperability this standard is not applicable
	CDE 2.1:1997		CDE 1.0	Common Desktop Environment is the UNIX Windows Desktop equivalent. For CCEB interoperability this standard is not applicable
	Motif/CDE Style Guide Rev 2.1:1997		Motif Style Guide Rev 1.2	Toolkit specific style guides For CCEB interoperability this standard is not applicable
			MS Windows Interface Guidelines for Software Design	Toolkit specific style guides. As part of MS Windows 2000 Interfaces. For CCEB interoperability this

SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				standard is not applicable
	Motif 2.1:1997		Motif 1.2	For CCEB interoperability this standard is not applicable
			US DoD HCI Style Guide Version 4.0 Dec 2000 not for use in new systems	For CCEB interoperability this standard is not applicable
			UK Army CIS Style Guide V 2.0 not for use in new systems	For CCEB interoperability this standard is not applicable
<i>Content Mgmt</i>				
		Semantics of Business Vocabulary and Business Rules, Vers. 1.0 (SBVR); OMG 2008		

3.4.3. List of Communications Standards

SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
Network and Transport Services				
	DNS (IETF STD 13:1987, RFC 1034:1987 and RFC 1035:1987 updated by RFC 1101:1989,			Bind version 9 or later should be used. Used in Profile: AMN

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				environment and A-03-07 deals with the OSI environment. Both are due for rewrite.
	Assigned Numbers (RFC 3232:2002)			
	IPv4 (STD 5, RFC 791:1981, 792:1981, 894:1984, 919:1984, 922:1984, 950:1985 up-dated by RFC 1112:1989, 2474:1998, 2507:1999, 2508:1999, 3168:2001, 3260:2002, 3376:2002, 4604:2006, 4884:2007)	IPv6 (RFC 1981:1996, 2375:1998, 2460:1998, 2464:1998, 2467:1998, 2470:1998, 2491:1999, 2492:1999, 2497:1999, 2526:1999, 2529:1999, 2590:1999, 2710:1999 up-dated by RFC 3590:2003, 2711:1999, 2894:2000, 3056:2001, 3111:2001, 3122:2001, 3146:2001, 3306:2002, 3307:2002, 3483:2003, 3510:2003, 3544:2003, 3587:2003, 3595:2003, 3697:2004,		Note: Category of RFC 2375:1998 is 'Informal' Used in Profile: AMN

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		3736:2004, 3810:2004, 3879:2004, 3956:2004, 4001:2005, 4007:2005, 4213:2005, 4291:2006, 4311:2005, 4338:2006, 4489:2006, 4443:2006, 4489:2006, 4604:2006, 4861:2007, 4862:2007, 4884:2007, 4941:2007, 5095:2007, 5494:2009)		
		IGMP v.3 (RFC 3376:2002 updated by 4604:2006)		RFC 3367:2002 obsoleted 2236:1997 updates RFC 1112:1989 and is widely implemented, RFC 3376:2002 obsoleted RFC 2236:1997
	Host requirements (STD 3, IETF RFC 1122:1989 updated by 2474:1998, 2181:1997, 3168:2001, 3260:2002,			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	4033:2005, 4034:2005, 4035:2005, 4343:2006, 4379:2006, 4470:2009, 5452:2009, 5462:2009)			
			Bootstrap Protocol, BOOTP (RFC 951:1985 updated by RFC 1542:1993, 2132:1997, 3442:2002, 3942:2004, 4361:2006, 4833:2007, 5494:2009)	Will be overtaken by the richer DHCP. BOOTP is still available in older implementations and is expected to phase out.
			Clarifications and Extensions for the Bootstrap Protocol (RFC 1542:1993)	
		DHCP for IPv6 (RFC 3315:2003 updated by 4361:2006, 5494:2009)	DHCP Options and BOOTP Vendor Extensions not to be used in new systems	
		Dual Stack IPv6 mobility support (RFC 5555:2009)		
		IPv6 Prefix Options for DHCPv6 (RFC 3633:2003)		
		DNS Configuration Options for		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		DHCPv6 (RFC 3646:2003)		
		NIS-Options for DHCPv6 (RFC 3898:2004)		
	Dynamic Host Configuration Protocol, DHCP (RFC 2131:1997 updated by RFC 3396:2002, 4361:2006, 5494:2009)			
	Differentiated Services Field (RFC 2474:1998 updated by 3168:2001, 3260:2002)			DiffServ re-defines use of former TOS field; first, but not sufficient RFC to differentiate traffic classes. RFC for DiffServ still missing. Applicable to both IPv4 and IPv6
	Requirements for IPv4 routers (RFC 1812:1995 updated by 2644:1999)			
	Open Shortest Path First (OSPFv2) RFC 2328:1998)	OSPF for IPv6 (RFC 5340:2008)		Suitable for LANs as well as WANs (including tactical networks) with sufficient bandwidth
	Router Internet Protocol (RIP v2) (IETF	RIPng for IPv6 (RFC 2080:1997)		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	STD 56/RFC 2453:1998 updated by 4822:2007)			
	Border Gateway Protocol (BGP4) (RFC 4271:2006)	Multiprotocol Extensions for BGP-4 (RFC 4760:2007); Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing (RFC 2545:1999)		
		BGMP (RFC 3913:2004)		
	Application of BGP-4 (RFC 1772:1995)			
	Protocol Independent Multicast Sparse Mode(PIM-SM) (RFC 4601:2006, updated by 5059:2008)			PIM-SM is implemented by the router market leaders.
		Protocol Independent Multicasting Dense Mode(PIM-DM) (RFC 3973:2005)		PIM-DM is included as a second concept for tactical networks
		Generic Routing Encapsulation (GRE) (RFC 4023:2005, updated by 5332:2008)		GRE is included as a general routing encapsulation mechanism

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Traditional IP Network Address Translator (RFC 3022:2001)			
		Stateless IP/ICMP Translation Algorithm (SIIT) (RFC 2765:2000)		
		Generic Packet Tunneling in IPv6 (RFC 2473:1998)		This RFC is a generic tunnel mechanism, which can be applied for several protocols.
	Router Internet Protocol (RIP v2) MIB extension (RFC 1724:1994)			To be used in static networks. See also System Management.
	Classless Inter Domain Routing (CIDR) (RFC 4632:2006)			CIDR is only valid for IPv4
	Mobile IPv4 (RFC 3344:2002 updated by 4721:2007)	Mobile IPv6 (RFC 3775:2004)		
		Mobile IPv6 Fast Handovers (RFC 5568:2009)		
		IPSec and Mobile IPv6 (RFC 3776:2004 updated by 4877:2007)		
		Policy-based Network Management - General		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		(RFC 1104:1989, 2753:2000, 3198:2001, 3334:2002)		
		Policy-based Network Management - DiffServ (RFC 2963:2000, 2998:2000, 3086:2001, 3260:2002, 3287:2002, 3289:2002, 3290:2002, 3308:2002, 3496:2003)		
		Policy-based Network Management - IntServ (RFC 2205:1997 updated by 2750:2000, 3936:2004, 4495:2006, 2206 - 2210:1997, 2380:1998, 2382:1998, 2430:1998, 2490:1999, 2745 - 2746:2000, 2747:2000 updated by 3097:2001, 2749:2000, 2750:2000, 2755:2000, 2814:2000, 2872:2000, 2961:2001, up-		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		dated by 5063:2007; 2996:2000, 3097:2001, 3175:2001, up- dated by 5350:2008; 3181:2001, 3182:2001, 3209:2001 up- dated by 3936:2004, 4874:2007; 3210:2001, 3468:2003, 3473:2003 up- dated by 4003:2005; 3474:2003, 3476:2003, 3477:2003 4201:2005, 4783:2006, 4873:2007, 4874:2007, 5250:2008, 5420:2009		
	Point to Point Protocol (PPP) Internet Protocol Control Protocol (IPCP) (RFC 1332:1992 updated by 3241:2002, 4815:2007)			To allow packet switched services over circuit switched interconnections.
	Link Control Protocol (LCP) extensions (RFC			Addition to LLC1 (see Link Layer).

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	1570:1994 updated by 2484:1999)			
	Point to Point Protocol (PPP) (STD 51, RFC 1661:1994 updated by 2153:1997; 1662:1994, updated by 5342:2008)	IPv6 over PPP (RFC 5072:2007, 5172:2008)		
	PPP Challenge Handshake Authentication Protocol (CHAP) (RFC 1994:1996 updated by 2484:1999)			Used in routers
	PPP Multilink (MP) (RFC 1990:1996)			Allows for aggregation of bandwidth via multiple simultaneous data link connections
	Virtual Router Redundancy Protocol (VRRP), IETF RFC 3768:2004			
	Winsock 2 (Revision 2.2)			
			Transport Service (ISO 8072:1996)deleted in NCSP v.6	
	TCP (IETF STD 7:1981, RFC			Used in Profiles: AMN, tactESB

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	793:1981 updated by RFC 1122:1989, 3168:2001)			
	UDP (IETF STD 6:1980, RFC 0768:1980)			Used in Profile: tactESB
	OSI transport svc over TCP/IP (RFC 2126:1997)			Includes the ISO Transport Protocol
Mixed DISA standards				
Data Link and Connection Service				
External Networks				
			X.25 (1996, Cor.1:1998)	
	Tactical Communications, STANAGs 4637ed1:2009, STANAG 4638ed1:2009, 4639ed1:2009, 4640ed1:2009, 4643ed1:2009 4644ed1:2009, 4646ed1:2009, 4647ed1:2009			For CCEB interoperability this standard is not applicable
	ISDN: ITU-T G, I Series			ISDN Telephony
			ITU-T E, P, Q, V Series	
			ITU-T V.90:1998	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			ITU-T V.42:2002 Corrigendum 1:2003	
			User Network Interface - UNI v4.0 (af-sig-0061.000)	
			Private Network - Network Interface - PNNI v1 (af-pnni-0055.000)	
			LAN Emulation over ATM - LANE v2.0 (af-lane-0084.000, af-lane-0112.000)	For CCEB interoperability this standard is not applicable.
	Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.4:2008)	Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.5:2009)		Gateway between Link-11 and Link-16. For CCEB interoperability the mandatory standard is MIL-STD 6020
	Link 11 STANAG 5511 ed.6:2008	Link 11 STANAG 5511 ed.7:2008		Communications part for Link-11 For CCEB interoperability the standard is MIL-STD 6011C Used in Profile: AMN
	STANAG 4175 ed.4:2009			Communications part for Link-16

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				Used in Profile: AMN
	STANAG 7085 ed.2:2004 (IDL for Imaging Systems)			STANAG 7085 provides the interoperability standards for 3 classes of imagery DL used for primary imagery data transmission.
	STANAG 4586 ed.2:2007	STANAG 4586 ed.3:2008		STANAG 4586 facilitates communication between a UCS and different UAVs and their payloads as well as multiple C4I users.
Tactical Area Comms				
		Maritime Tactical Wide Area Networking		For CCEB interoperability the mandatory standard is ACP 200 :Maritime Tactical Wide Area Networking
	Routing and Directory for tactical Systems, STANAG 4214 ed.2:2005			
		Gateway Multichannel Cable Link (Optical), STANAG 4290 ed.1 (RD)		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Enhanced Digital Strategic Tactical Gateway (ED-STG) (STANAG 4578 ed. 2:2009)		STANAG 4249 replaced by the more fundamental STANAG 4206. STANAG 4206 not to be used for new systems.	STANAG is currently under review for a new edition. For CCEB interoperability this standard is not applicable.
	NATO Multi-channel tactical digital Gateway (STANAG 4206: Ed.3:1999)			The overlapping area between STANAG 4206 and STANAG 4578 has to be resolved by SC/6. For CCEB interoperability this standard is not applicable
	The NATO Military Communications Directory System, STANAG 5046 ed.3	The NATO Military Communications Directory System, STANAG 5046 ed.4:2010		
		Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels, STANAG 5067 ed.1 (RD)Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels,		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		STANAG 5067 ed.1:2007 (RD)		
Transmission				
	FDDI, ISO 9314:1989			For CCEB interoperability this standard is not applicable.
		STANAG 4444 ed.1:1999 RD (Slow hop ECM)		HF standard for Link-22. For CCEB interoperability this STANAG is mandatory
	JREAP, MIL-STD 3011			
	ISO/IEC 8802-3:2000 (CSMA/CD)			
				For CCEB interoperability the mandatory standard is Interoperability and Performance Standard for SATCOM (MIL-STD 188-164).
				For CCEB interoperability the mandatory standard is MIL-STD-188-181B.
				For CCEB interoperability the mandatory standard is Interoperability Standard

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				for 5-Khz UHF DAMA Terminal Waveform MIL-STD-188-182A.
				For CCEB interoperability the mandatory standard is DoD Interface Standard, Interoperability of UHF MILSAT-COM DAMA Control System MIL-STD-188-185.
				For CCEB interoperability the mandatory standard is Interoperability and Performance Standards for C-Band, X-Band, and Ku-Band SHF Satellite Communications Earth Terminals, 13 Jan 1995 MIL-STD-188-164.
				For CCEB interoperability the mandatory standard is Interoperability and Performance Standards for SHF Satellite Communications PSK Modems (Fre-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>quency Division Multiple Access (FDMA) Operations), 13 January 1995, with Notice of Change 1, 9 September 1998, MIL-STD-188-165.</p>
	ACP 190 (B)			
	ACP 190 (B) NATO Suppl 1A			<p>Spectrum Supportability Request/Comment is a two-way commitment between the (host)nation owning the system and each nation hosting the system:</p> <ul style="list-style-type: none"> - it is a prerequisite for the procuring nation/agency to operate SDEs in a host nation. - host nations granting support to a SDE is expected to assign frequencies when requested. <p>Failure to follow this process will have very negative long-term impacts:</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>- an ever growing risk of interference between own systems.</p> <p>- the ever-increasing pressure from the commercial sector: having an accurate view of military use of spectrum is an essential precondition to be able to defend it against civil encroachment.</p> <p>For CCEB interoperability this standard is not applicable.</p>
	ACP 190 (B) NATO Suppl 2			For CCEB interoperability this standard is not applicable
	SMADEF XML Rel.1.2.2	SMADEF XML Rel.1.2.3		For CCEB interoperability Rel.1.2.3 is mandatory
				For CCEB interoperability the mandatory standard is Equipment Technical Design Standards for Common Long Haul/Tactical Radio Com-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				communications in the LF Band and Lower Frequency Bands MIL STD 188-140A
				For CCEB interoperability the mandatory standard is Digital Line-of-Sight (LOS) Microwave Radio Equipment, 7 May 1987 MIL STD 188-145
	MIDS terminals STANAG 4175 ed. 4:2009			
			Single serial line interface (TIA-232-E:1991)	
			Multi-point serial line (TIA-422-B:2005)	
	Serial binary data exchange at DTE and DCE (TIA-530-A)			
	Generic specification for optical wave-guide fibers (EIA 4920000:1997)			
VLF				
	VLF and LF Broadcast OOK Systems,			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	STANAG 5030ed.4:1995			
HF				
	Conditions for interoperability of 2400 BPS / HF (STANAG 4197 ed.1:1984)			(QSTAG 1108)
	Technical standards for single channel HF radio equipment, STANAG 4203 ed.3:2007			For CCEB interoperability the mandatory standard is MIL STD 188-141A
	Characteristics of 1200/2400/ 3600 bps single tone modulators/demodulators for HF Radio links (STANAG 4285 ed.1:1989)			For CCEB interoperability the mandatory standard is MIL-STD-188-110A
	Non-Hopping Serial TONE HF Radio, STANAG 4415 ed.1:1999			
		HF Radios STANAG 4444 ed.1:1999		
	Minimum Standards for Naval Shore-to-Ship Broadcast Systems, STANAG 4481 ed.1			
	Automatic Radio Control System for HF Links			

SERVICECAT- EGORY / CAT- EGORY / SUB- CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	STANAG 4538 ed.1:2009			
	Non-hopping HF Communications Waveforms STANAG 4539 ed.1:2006			
	Profile for HF ra- dio data commu- nications (STANAG 5066 ed.2:2008)			
VHF				
	Technical stand- ards for single channel VHF ra- dio equipment STANAG 4204 ed.3:2008			For CCEB in- teroperability the mandatory stand- ard is MIL STD 188-242
	Communication between Single Channel and Fre- quency Hopping Radios in VHF, STANAG 4292 ed.2:1987			
	Non-secure Voice Interoperability for VHF Radios, STANAG 4448 ed.1:2006			
	Secure Voice and Data Interface for VHF Radios, STANAG 4449 ed.1:2006			
UHF				

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Technical standards for single channel UHF radio equipment STANAG 4205 ed.3:2005			For CCEB interoperability the mandatory standard is MIL STD 188-243
			UHF Radios STANAG 4246 ed.2:1987	For CCEB interoperability this standard is not applicable
	STANAG 4372 ed.3:2008 (Saturn)			UHF standard for Link-22, but can also carry Link-11 and Link-16 messages.
UHF SATCOM				
	Interoperability Standard for 25 kHz UHF/TDMA/DAMA terminal Waveform STANAG 4231 ed.4:2004			STANAG 4231 ed.4 is identical with MILSTD-188-183B. For CCEB interoperability the mandatory standard is MIL-STD-188-183D
				For CCEB interoperability the mandatory standard is Interoperability and Performance Standard for the Data Control Waveform MIL-STD-188-184

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			UHF MILSATCOM interoperability standards for paging receiver (Draft) (STANAG 4492 ed. 1)	For CCEB interoperability this standard is not applicable
SHF SATCOM				
	Super High Frequency (SHF) Military Satellite (MILSATCOM) jam-resistant modem (STANAG 4376 ed.1:1998)			For CCEB interoperability this standard is not applicable
	Overall Super High Frequency (SHF) Military Satellite Communications (MILSATCOM) interoperability standards (STANAG 4484 ed.2:2003)			For CCEB interoperability this standard is not applicable
	SHF MILSATCOM Non-EPM modem for services conforming to class-A of STANAG 4484 (STANAG 4485 ed.1:2002)			For CCEB interoperability this standard is not applicable
	Super High Frequency (SHF) Military Satellite COMMunic-			For CCEB interoperability this standard is not applicable

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	ations (MILSAT-COM) Frequency Division Multiple Access (FDMA) Non-EPM modem for services conforming to class-B of STANAG 4484 (STANAG 4486 ed.2:2002)			
	Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSAT-COM) jam-resistant modem interoperability standards (STANAG 4606 ed.1:2009)	Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSAT-COM) jam-resistant modem interoperability standards (STANAG 4606 ed.2)		For CCEB interoperability this standard is not applicable
		Interoperability standard for Satellite Broadcast Services (SBS) (Draft) (STANAG 4622 ed.1 RD2)		For CCEB interoperability this standard is not applicable
EHF SATCOM				
	Digital interoperability between EHF Tactical Satellite Communications Terminals (STANAG 4233 ed.1:1998)			For CCEB interoperability the mandatory standard is MIL-STD-1582D

SERVICECATEGORY / CATEGORY / SUBCATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	EHF MIL SAT-COM interoperability standards for medium data rate services STANAG 4522 ed.1:2006			For CCEB interoperability the mandatory standard is MIL-STD-188-136
QoS				
			DoD Guide to selecting computerbased multimedia standards, technologies, products and practices deleted in NCSP v.6	

3.5. INFORMATION ASSURANCE

3.5.1. List of Standards

SUBAREA / SERVICE CATEGORY	CATEGORY / SUBCATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			Community Security Requirements Statement abstract, v1.1 (NATO:2010)		<i>Used in profile: AMN</i>
		Common Criteria (ISO/IEC 15408-1:2009, -2 to-3:2008)			Procedural document dealing with the evaluation criteria for IT security. Guidance on the use of Com-

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					mon Criteria within NATO is provided with AC/322-D(2010)0043.
		Physical characteristics (ISO/IEC 7810:2003)			
		Integrated circuit(s) with electrical contacts (ISO/IEC 7816:2006)			Base profile, consisting of parts 1-5)
		Interface between the card aware applications and cards, PC/SC Specs. v.2.0.1.9:2005			
		Card-resistance applications, JAVACARDkit v.2.2.2:2006			
		Contactless cards (ISO/IEC 14443:2008)			Base profile, consisting of parts 1 - 3.
SMI Service					
			Web-Services Security Profile (WSS), v1.0 (OASIS)		Used in Profile: AMN
			WS Security Policy,		

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			v1.3:2009 (OASIS)		
			Security Assertion Markup Language, SAML v2.0 (OASIS)		For CCEB interoperability the Security Assertion Markup Language (SAML) v1.1 is mandatory and SAML 2.0 is emerging
			XKMS (W3C):2001		Used in Profiles: AMN, tactESB
					See General Security Key Management and Distribution. For CCEB interoperability the mandatory standard is ACP145(A) (Messaging Services Between Nations) and X.500 (based on CMI authentication framework)
Confidentiality					
		S/MIME with Encrypted Security Service (ESS) (IETF RFCs		ACP120 replaced by ACP145	Messaging System independent encapsulation syntax supporting signa-

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		3850:2004, 3851:2004)			ture and confidentiality functions based on DSA. For CCEB interoperability the standard is S/MIME Version 3 ESS, application layer data confidentiality or link level encryption
			ITU-T X.411:1999		
			SCIP Signalling Plan, SCIP-210 rev.3.3:2010 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Minimum Requirements for SCIP, SCIP-214 rev.1.1:2010 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Cryptography Specification for SCIP, SCIP-231 rev.1.3:2008 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			XML Confidentiality Label Syntax 1.0 (NATO RTG-031)		<i>Used in Profiles: AMN</i>

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			SOAP Mes- sage Secur- ity 1.1:2004 (OASIS)		
			Username Token Pro- file, v1.1:2004 (OASIS)		
			X.509 Certific- ate Token Pro- file, v1.1:2004 (OASIS)		
			NATO PKI (NPKI) Certi- ficate Policy, rev.2 (NATO:2008)		<i>Used in Profile: AMN</i>
			Kerberos Token Pro- file 1.1:2006 (OASIS)		
			SAML Token Profile 1.1:2006 (OASIS)		
			SOAP Mes- sages with At- tachments (SwA) Pro- file 1.1:2006 (OASIS)		
			WS-Security Utility 1.0:2001 (OASIS)		

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			WS-Trust 1.4:2007 (OASIS)		
Encryption					
		TLS v1.2 (IETF RFC 5246:2008)		SSL excluded in NCSP v.6	Used as a transport layer security protocol. Used in Profiles: AMN (v1.1), tactESB
			XML Encryption (W3C):2008		Used in Profile: tactESB
		Key Wrap Advanced Encryption Standard 128 (AES 128, NIST FIPS 197:2002)	Key Wrap Advanced Encryption Standard 256 (AES 256, NIST FIPS 197)		PKI components and applications should utilise AES for key wrap functions. AES 256 should be utilized post 2008 for Root CA and Sub CA PKI components together with SHA-384 and 512. End entities can still utilize AES 128 together with SHA-256. For CCEB interoperability AES 128 is emerging.
Integrity					

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		IP ESP (RFC 2406:1998)			Encapsulating Security Payload (ESP) may support integrity and authentication depending on the use of algorithms
		Digital Signature Algorithm 1024 (DSA-1024, NIST FIPS 186-2 with Change Notice 1, Oct 2001)	Elliptic Curve Digital Signature Algorithm (ECDSA 384, NIST FIPS 186-2 with Change Notice 1, Oct 2001)	Digital Signature Algorithm (original version) not for new systems	<p>Authentication and integrity algorithm for End Entities as mandated by the interoperability protocol PCT for implementing digital signatures for a NATO Public Key Infrastructure (PKI) in the NATO messaging system. ECDSA 384 is planned for post 2008. Guidance is provided in AC/322-D(2004)0035.</p> <p>For CCEB interoperability the Digital Signature Algorithm (DSA) NIST FIPS 186-2 is mandatory. DSA FIPS 186-2 can be used in</p>

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					NATO for verification purposes only.
		RSA 2048 (PKCS#1 v2.1 RSA Cryptography Standard, RSA Laboratories, June 2002)	Elliptic Curve Digital Signature Algorithm (ECDSA 384, NIST FIPS 186-2 with Change Notice 1, Oct 2001)		<p>Authentication and integrity algorithm for Sub CA and other PKI components (such as Key Recovery Agents) as mandated by the interoperability protocol PCT for implementing digital signatures for a NATO Public Key Infrastructure (PKI) in the NATO messaging system. ECDSA 384 is planned for post 2008. Guidance is provided in AC/322-D(2004)0035.</p> <p>For CCEB interoperability the Digital Signature Algorithm (DSA) NIST FIPS 186-2 is mandatory.</p>
		Secure Hash Algorithm 256 (SHA-256,	Secure Hash Algorithm 384 (SHA-384,	Secure Hash Algorithm	Hash algorithm to accompany the DSA

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		NIST FIPS 180-2 with Change Notice 1, Feb 2004)	NIST FIPS 180-2 with Change Notice 1, Feb 2004)	(SHA-1), NIST FIPS 180-1 re-placed by SHA-256	and RSA for use in NMS. SHA-384 is planned for post 2008. Guidance is provided in AC/322-D(2004)0035. For CCEB interoperability the standard is SHA-1, NIST FIPS 180-1 is mandatory. SHA-1 can be used in NATO for verification purposes only.
Authentication					
		Radius, IETF RFC 2865:2006 updated by RFC 2868:2000, 3575:2003, 5080:2007	Radius and IPv6, IETF RFC 3162:2001		
			Kerberos v.5, IETF RFC 1510:1993		<i>Used in Profile: AMN</i>
			The Kerberos v5 Simple Authentication and Security Layer (SASL) Mechanism, IETF RFC 4752:2006		

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			Single sign on (SSO, the Open Group)		
			Public-key and attribute certificate frameworks, X.509 v3:2005 (ITU-T)		Used in Profiles: AMN, tactESB
			X.509 Public Key Infrastructure Certificate and CRL Profile (IETF RFC 2459:1999)		
		Identification of Issuers (ISO 7812:2007)			Base profile consisting of parts 1 - 2.
			XML Signature (W3C):2008		
			XACML v2.0:2008 (OASIS)		Used in Profiles: AMN, tactESB
			DOD EBTS 1.2 (DoD: 2000)		<i>Used in Profile: AMN</i>
			DOD EBTS 2.0 (DoD: 2000)		<i>Used in Profile: AMN</i>
			Data Format for the Interchange of Fingerprint, Facial, and Scar Mark and Tat-		<i>Used in Profile: AMN</i>

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			too (SMT) Information (ANSI: 2008)		
			Biometric data interchange formats -- Part 2 (ISO 19794-2:2007)		<i>Used in Profile: AMN</i>
			Biometric data interchange formats -- Part 5: Face Image Data (ISO 19794-5)		<i>Used in Profile: AMN</i>
			Biometric data interchange formats -- Part 6: Iris Image Data (ISO 19794-6)		<i>Used in Profile: AMN</i>
Detection					
Transsec					

3.6. SERVICE MANAGEMENT AND CONTROL

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
Mgmt Info Publisher					
Mgmt Info Subscriber					
Mgmt Info Collector					
Mgmt Info Provider					

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
Asset Mgmt					
User Mgmt					
System Mgmt					
			WS-Management v1.0 (DMTF)		
		SNMPv3 Applications (IETF RFC 3413:2002)		SNMPv1 (IETF Std 15) not for new systems	<p>SNMPv3 is considered emerging because of current lack of agreement on the concept of operations for distributed management</p> <p>For CCEB interoperability this standard is not applicable</p> <p>Used in Profile: AMN</p>
		Message Processing and Dispatching for the SNMP (RFC 3412:2002 updated by 5590:2009)			For CCEB interoperability this standard is not applicable
		User-based Security Model (USM) for SNMPv3 (RFC 3414:2002 up-			For CCEB interoperability this standard is not applicable

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		dated by 5590:2009)			
		View-based Access Control Model (VACM) for the SNMP (RFC 3415:2002)			For CCEB interoperability this standard is not applicable
		Structure of Mgt Info (IETF Std 16:1990, IETF RFC 1155:1990 and 1212:1991)			For CCEB interoperability this standard is not applicable
		Architecture for SNMP Mgt Frameworks (RFC 3411:2002 updated by 5343:2008, 5590:2009)			For CCEB interoperability this standard is not applicable
		MIB II (IETF Std 17:1991, RFC 1213:1991 updated by 4293:2006, 4022:2005, 4113:2005)			For CCEB interoperability this standard is not applicable
			IPv6 MIB (IETF RFC 4293:2006)		For CCEB interoperability this standard is not applicable

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			ICMPv6 MIB (IETF RFC 4293:2006)		For CCEB interoperability this standard is not applicable
			Multicast Group Membership Discovery MIB (IETF RFC 5519:2009)		For CCEB interoperability this standard is not applicable
			IPv6 MIB for TCP (IETF RFC 4022:2005)		For CCEB interoperability this standard is not applicable
			IPv6 MIB for UDP (IETF RFC 4113:2005)		For CCEB interoperability this standard is not applicable
		Host Resources MIB (IETF RFC 2790:2000)			For CCEB interoperability this standard is not applicable
		Defs of Mgt Objects for the Ethernet-like Interface types (IETF RFC 2666:1999, 3635:2003, 3638:2003)			For CCEB interoperability this standard is not applicable
		RMON MIB v. 1 (RFC 2819:2000)	RMON 2 MIB (RFC 4502:2006)		For CCEB interoperability this standard is not applicable
		OSPF MIB v.2 (RFC 4750:1996)			For CCEB interoperability

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					this standard is not applicable
		RIP-2 MIB (RFC 1724:1994)			For CCEB interoperability this standard is not applicable
					In addition same standards as within LAN Management for SNMP can be used Quad C used for management of coalition WANs
			Common Information Model (CIM) (DMTF:1999)	CMIS (ISO 9595:1998) deleted in NISP v.1	For CCEB interoperability this standard is not applicable
				CMIP (ISO/IEC 9596-1:1998) deleted in NISP v.1	Primarily used for Telecom Management
				CMIP PICS (ISO/IEC 9596-2:1993) deleted in NISP v.1	
				GDMO (ISO/IEC 10165-4:1996) deleted in NISP v.1	

4. PROFILES

4.1. INTRODUCTION

026. The purpose of this chapter is to specify the NISP near term profiles. The document organises these profiles under the following considerations:

- Profiles derived from NATO Reference Architectures
- Profiles derived from NATO Operations
- Profiles derived from NATO member nations

027. The above list will be enhanced dynamically, based on updated profile definitions being developed in relevant NATO bodies.

028. The standards being used in these profiles may differ in version from those being listed in chapter 3. This is based on the time for the development of these standards and may be modified in newer versions of these profiles.

029. Standards, which are listed in NISP Vol. 2 and are belonging to one or more profiles, as listed in chap. 4 of this document or in NISP Vol. 4, are marked in the Remarks column as follows:

030. Used in Profile(s): standard1 (, standard2, ...)

031. Standards, which are not included by a valid RFCP in NISP, Vol.2, but are only included in a profile, are marked in the Remarks column in *italics* as follows:

032. Used in Profile(s):*standard1* (, *standard2*, ...)

4.1.1. Profiles derived from NATO Operations

033. This chapter contains profiles from current or future planned NATO operations. Currently, the following operations are recognised:

- Afghan Mission Network (AMN)

4.1.2. Profiles derived from NATO member nations

034. This chapter contains profiles from member nations being proposed for interoperability purposes in NATO and between NATO nations.

4.2. PROFILE SPECIFICATIONS

035. This section summarizes the profiles, listed in volume 4:

4.2.1. NRF Generic Interface Profile

036. The purpose of this profile is to support NRF rotation specific profile development.

4.2.2. Tactical ESB - Profile

037. The aim of this specification is to describe a profile for a tactical Enterprise Service Bus (tact ESB) to be used in a coalition, highly mobile and distributed environment. The profile focuses specifically on requirements from military usage and goes beyond the ESB specification, available in civil implementations/products.

038. The profile is a generic specification; following the principle construction elements, it allows for national implementations a derivation from the proposed one, not losing the interoperability aspects.

039. Details of this profile are contained in: IT-AmtBw_A5_RuDi-High_Level_Concept_400.pdf (DEU)

4.2.3. AMN - Profile

040. The purpose of this specification is to define an Interoperability Standards Profile to support the Afghanistan Mission Network (AMN) and transition from today's legacy systems to NNEC by defining a basic level of system interoperability in order to enhance the exchange of information within and across the AMN. To support the goal of widespread interoperability the AMN Interoperability Profile defines a minimum profile of services and standards for Technical Interfaces, Data Interchange Standards and Application Profile Standards that are sufficient to provide a useful level of interoperability.

A. TECHNOLOGIES

041. This annex describes the technologies that are projected to be available today or in the near term period which will enable the transformation towards the NII.

A.1. DATA STRATEGY

A.1.1. Data Strategy

042. Reference: NNEC DATA STRATEGY - AC/322(SC/1)N(2008)0034(INV) 18 DEC 2008

A.1.2. Data Management

043. Data management will apply an integrated, federated, and scalable data framework to link disparate information sources and provide robust knowledge management to permit conclusions based on contextual relationships.

A.1.3. JC3IEDM

044. The JC3IEDM is a merger of both the C2IEDM (C2 IEDM, developed by the Multilateral Interoperability Programme (MIP)) and the Reference Data Model of the NATO Corporate Data Model, which was developed by a predecessor of the DMSWG. The JC3IEDM is published under cover of STANAG 5525.

045. The Data Management Authority in NATO publishes the JC3IEDM and Directive and Guidance documents for Data Management in NATO. It will also register and manage both the Standard Data Elements and the Information Exchange Requirements (IER) used in the development process of data assets.

046. The main tool for Data Management in an NCW-environment is the NATO Metadata Registry and Repository. A version of the NMRR is currently posted under the DoD XML Registry.

A.1.4. NATO Discovery Metadata Specification (NDMS)

047. The NATO Discovery Metadata Specification defines discovery metadata elements for resources posted to NATO shared spaces. "Discovery" is the ability to locate data assets through a consistent and flexible search method. The NDMS specifies a set of information fields that are to be used to describe any data or service asset that is made known to NATO. It serves as a reference for developers, system architects, and engineers by identifying a minimum set of metadata elements in support of Discovery Services. Whilst discovery of data assets is the primary use of the NDMS it is also important to note that widespread use of the metadata elements will also improve documents record management in general. The NDMS will be employed consistently throughout the organization but it is not intended or necessary for it to displace other specifications that offer different semantics.

048. To support data asset discovery, NATO has developed the NDMS as the common set of descriptive metadata elements that are to be associated with each data asset that is made visible to the enterprise discovery capability. Metadata is often defined as being “data that describes and defines other data”. Data assets available in the enterprise must be described with metadata, using the elements defined in this document to permit discovery through the enterprise discovery capability. The NDMS defines a minimum set of elements that must be used to describe data assets made visible to the enterprise. Users and system agents acting on their behalf that search the enterprise will discover data assets that have been tagged and entered into catalogues or repositories that respond to search queries specified in terms of NDMS entries as depicted in the NDMS Usage Conceptual Diagram in Figure A.1.

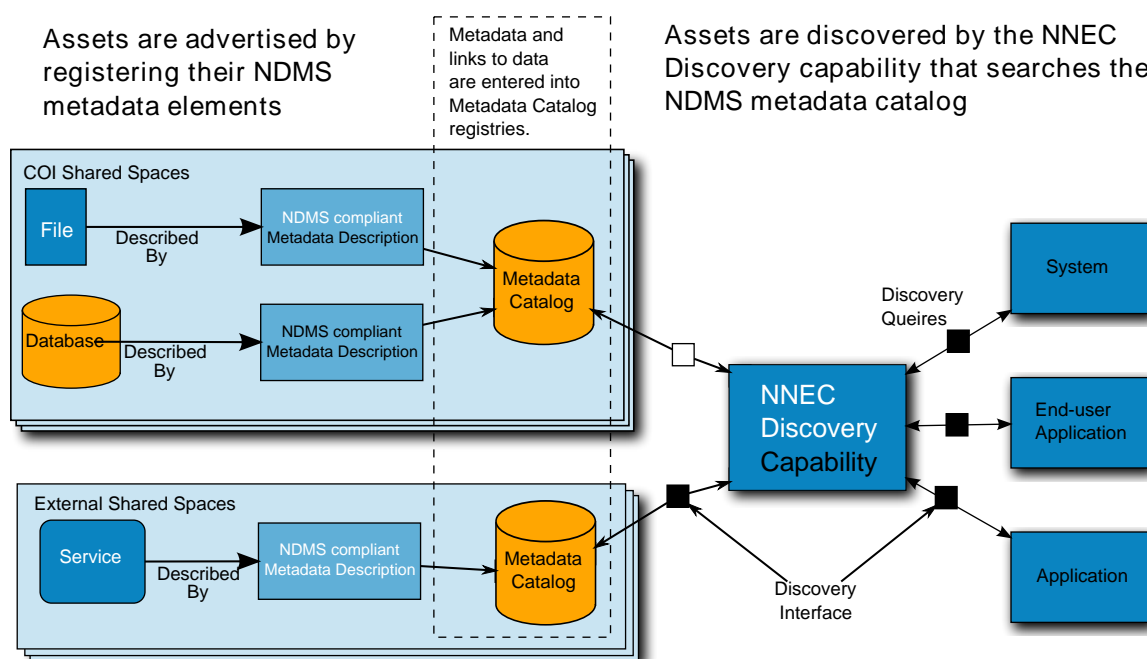


Figure A.1. NDMS Usage Conceptual Diagram

049. The elements specified in the NDMS are designed to be platform, language, and implementation independent. This allows system developers to generate and retain discovery metadata using any implementation approaches, including using COTS products. As future enterprise discovery interface specifications are defined, programs should have the appropriate discovery metadata available for their data assets and will only be required to format this metadata in accordance with the interface specifications.

A.1.5. Extensible Markup Language (XML)

050. The Extensible Markup Language (XML) is a simple, very flexible text format, much like HTML, used to structure, store and to send information. XML was designed to describe data and to focus on what data is. XML is also playing an increasingly important role in the exchange of a wide variety of data on the Web and elsewhere.

051. Role of XML in the Web Services model is lies within communication. When one application talks to another to perform a web service, the application doing the talking must package the message it is sending in a format that is understandable by the listening application. XML is the format of the message content in this communication process.

052. The Extensible Markup Language tags provide information about a document's components. The Uniform Resource Identifiers contained in the XML tags expand the concept of Uniform Resource Locators (URLs) by adding IDs for objects, concepts and values that are not dependent on location.

A.2. INFORMATION MODELLING

053. The ability to share information is a key factor for military success. As such, NATO and National Information Systems have to provide the means for information exchange in all mission types. The basic resource for all information systems is data, which, through the right interpretation, becomes information, and knowledge in turn. As NNEC is considered the core theme for C3 systems within NATO transformation, a fundamental requirement is to work in the most effective manner through semantic interoperability at the data level for NATO/national C3 systems. The expanding missions of NATO involve consultation based on the sharing of information. Alliance members and partners are engaged in collective decision-making, with each nation retaining sovereignty and responsibility for its own decisions and taking action only on the basis of unanimity. In this environment, it is critically important that the Alliance members and partners have access to all shared information at the same time and that both the consultation process and the decisions taken are adequately documented. Information modelling and information management initiatives must be formalized throughout the NATO Enterprise to leverage the collective assets of NATO and national systems in support of information operations.

054. Information management is the handling of information acquired by one or many disparate sources in a way that optimizes access by all who have a share in that information or a right to that information. Information modelling establishes a conceptual schema that defines how the managed elements in an information environment are represented as a common set of objects and relationships between them. This allows multiple parties to exchange management information about these managed elements. Additionally, it provides means to actively control and manage these elements. By using a common model of information, management software can be written once and work with many implementations of the common model without complex and costly conversion operations or loss of information.

055. Appropriate Information management will enable:

- Awareness -- Products identified by metadata (keywords) and cataloged with a common schema providing a simple yet integrated query search for the right information (product);
- Access -- with information tags to define privileges; and,
- Delivery -- Assured delivery of the information product over the right network and to the right location.

056. This integrated approach to information modelling leverages the concepts of Net Centricity throughout all information resource providers and consumers in a coalition operation. Key components of this strategy include a dissemination capability, with associated management services, that directs end-to-end information flows throughout the NII in accordance with command policy. The NISP will contribute to the core technical model for systems designers to develop new platforms capable of the intensive compilation, cataloguing, caching, distribution, and retrieval of data necessary to provide the life cycle information management and necessary information sharing across NATO members.

A.3. NETWORK INFRASTRUCTURE

A.3.1. Background

057. With the NATO Network Enabled Capability Feasibility Study (NNEC FS) a new concept of ensuring service interoperability was introduced that complements and reuses the architectural views. This concept dubbed the Interoperability Performance Parameters (IPP), inspired by the US developed concept of Key Performance Parameters (KPP), forces the system architects and designers to specify a wider context of their capabilities sufficient to allow secure service interoperability in a Federation of Systems (FOS). The interfaces at which interoperability between separate infrastructure capabilities is to be managed are called the Service Interoperability Points (SIOP).

058. The principle is that an individual capability needs to work seamlessly with and within a FOS. The infrastructure services in a FOS and the international interoperability interfaces are described in the context of the total C4ISR systems architecture, often referred to as the Overarching Architecture (OAA).

059. This section describes the NATO General-Purpose Segment Communication System (NGCS) Reference Architecture (RA). NGCS is part of the NII, representing the NATO owned capability. It provides the communication services and associated management and security services. Also it describes the timeframe for NGCS up to 2014, first implementations are in progress.

060. The major change to classical network infrastructures is the coherence and interoperability of infrastructure capabilities brought by different coalition partners that needs to be achieved. In the NNEC FS the concept of a Maturity Model was introduced to describe, qualify and quantify the different levels of infrastructure capability. Increasing levels of maturity are characterised by enhanced sets of services, performances, and support, including advances in the associated Doctrine, Organisation, Training, Materials, Personnel, Leadership, Facilities (DOTM-LPF) spectrum.

061. Interoperability of separate infrastructure capabilities is managed by the earlier mentioned concept of IPP. The IPP allows a more comprehensive description and specification of those parameters that are essential for providing scalable end-to-end services over combined infrastructure capabilities.

A.3.2. NGCS 2007 Target Architecture

062. A reference model of the baseline network infrastructure for NGCS RA is depicted in Figure A.2. This architecture is described in the NGCS RA ed1. At the time of writing the NSIE and the NATO IP Cryptographic Equipment / Secure Access Router(NICE/SAR) had not been fielded, but the implementation projects were in progress. The Bandwidth Manager Function (BMF) had been fielded.

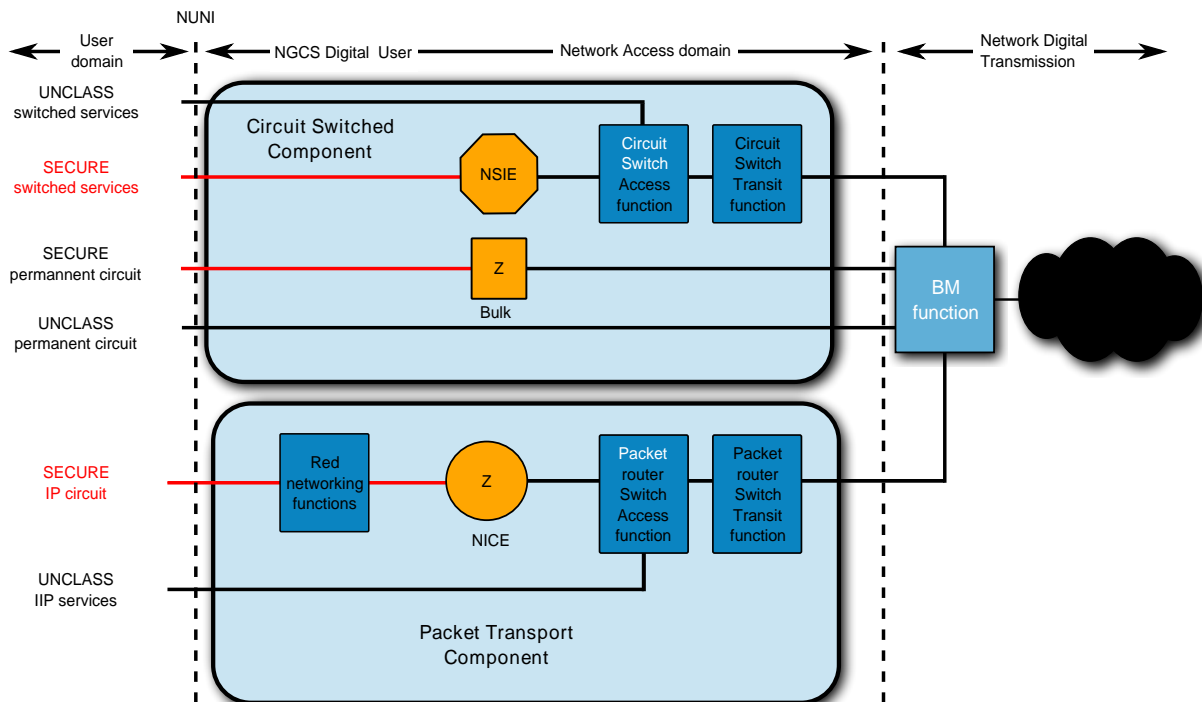


Figure A.2. NGCS Digital User-Network Access Reference Configuration

A.3.3. Communications & Networking

A.3.3.1. Internet Protocol Version 4 (IPv4)

063. Internet Protocol Version 4 (IPv4) is currently the dominant network layer protocol used in the communication between networked devices. IPv4 is a data-oriented protocol to be used on a packet switched inter-network (e.g., Ethernet). It is a best effort protocol in that it doesn't guarantee delivery. It doesn't make any guarantees on the correctness of the data; it may result in duplicated packets and/or packets out-of-order. All of these things are addressed by an upper layer protocol (e.g. UDP).

A.3.4. Construction of a robust IP-network infrastructure

064. Operational relevant service availability should be one of the main design criteria and operational evaluation criteria for the NGCS. Despite the migration of users onto a single network

and the introduction of significant additional complexity, e.g. QoS, the service availability has to be improved. Service availability and performance are exponents of infrastructure, organization, human aspects and others. The assessment of operational service readiness and performance is a structural activity required in the NGCS product life-cycle management. It should give input to transformational processes and for the development of Target Architectures (TA) that underpin infrastructure investment projects.

A.3.4.1. NGCS Overview

065. The NATO General Purpose Communications System (NGCS) has a Circuit Switched Component (CSC) and a Packet Transport Component (PTC). The services offered are presented at the NGCS User Network Interface (NUNI). The NGCS user-network access domain incorporates functions for user access of circuit switched functions and packet transport functions. The circuit switched component provides on-demand switched access and also access to semi-permanent circuits. Both can be provided either in secure or non-secure modes. The packet transport component provides for both secure and non-secure IP access services.

066. A secure service offered by the network at the NUNI provides for interconnection within a single security domain. If telecommunication services are required for a second security domain, this is implemented by installation of another cryptographic device - e.g. NATO Secure ISDN Equipment (NSIE) offering bulk encryption or NATO IP Cryptographic Equipment (NICE) (with the associated RED networking functions). In order to provide greater throughput, more than one instance of this might exist for a single security domain.

067. In mid-term, a complete migration to a fully IP based network is planned for the NGCS.

A.3.4.2. Definition and implementation of a QoS architecture

068. In the public standardization bodies, e.g. IETF, ITU, ETSI, ANSI, many initiatives are ongoing regarding the specification of a global QoS architecture in support of network convergence. Likewise many government organizations are doing the same.

069. The operation and control of QoS enabled IP-services requires many new Operation and Support Systems as well as a thorough reassessment of the management organization.

070. The complexity and the novelty of IP QoS warrant a step-by-step introduction. The entities affected by the introduction are:

- The end-user;
- The applications;
- The infrastructure;
- The OSS/BSS;
- The policies;

- The third party providers, e.g. SP, NDN;

071. The introduction should follow the developments in the commercial sector, and each successive introduction step in NATO should be done when the technology is stable and mature. Nevertheless NATO may want to implement additional functionality like additional CoS to implement MLPP, but this always be based on an underlying commercial standard based QoS architecture. Eventually the QoS architecture must take account of the requirements in military tactical radio networks and future QoS enabled MANETs. It is envisaged however that commercial standards for wireless MANETs will be developed among others by the ZigBee Alliance

072. The model of spiral development should be applied. Each step is first tested in the laboratory (applications, infrastructure and OSS/BSS), evaluated against user requirements, operational issues, architectural principles, before it is gradually rolled out in the operational network.

073. Business cases for network convergence are becoming increasingly viable. As more and more services are uniquely available on IP and standardization for IP based service support is becoming mature, it becomes more cost effective to migrate an existing infrastructure based on TDM and IP bearers to a single IP-bearer service system. However, network convergence does not come for free. Following items and activities are required:

- Specification of a comprehensive set of Classes of Service (CoS) for the ultimate network, which can be initially collapsed to a basic set and further expanded with each implementation step.
- Definition of application mapping to telecommunications services (the CoS).
- Specification of CoS handling in the network
- NATO policy with the objective to have uniform QoS handling in the multinational network.
- Supporting management and control systems (NGOSS compliant) that need to be integrated in the total SLM complex.
- Proof of concept testing.

A.3.4.3. The migration of applications onto an IP-bearer

074. All the applications that are often traditionally carried on the CSC, i.e. telephony, switched VTC, leased line (for real-time data, for bandwidth pipe) need to be adapted so that they can also perform on an IP-bearer. Most of the applications require an QoS enabled IP infrastructure. In addition the connection oriented application services require call signalling, DNS, directory (for the gatekeeper) and resource reservation functionality. This infrastructure should be provided as a common core functionality for all application services requiring it. Target architectures for VoIP (SVoIP and VoSIP) and VTCoIP therefore need to be coordinated. For interoperability purposes NATO needs to standardize the signalling at the respective Service Interoperability Points.

A.3.4.4. Transition to IPv6

075. IPv6 is an enabler for establishing coalition wide connectivity in a network enabled NII. The transition strategy of the NATO CIS to IPv6 is described in [TN1088]¹ from which the top-level roadmap is repeated here in Figure A.3.

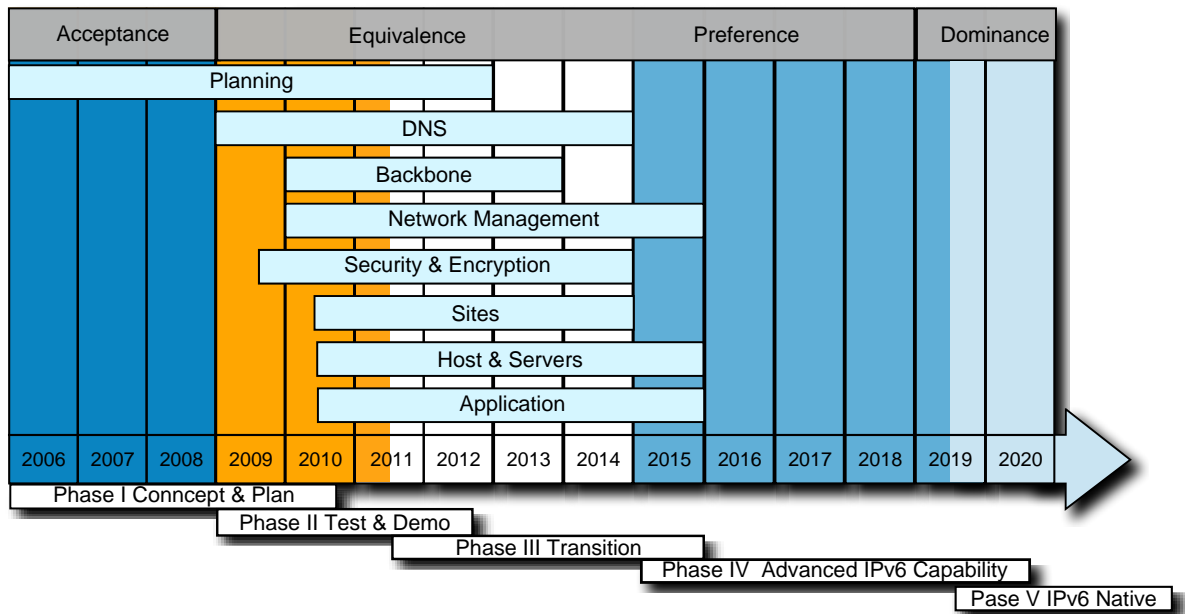


Figure A.3. Roadmap to IPv6

¹Derived from Technical Note 1088: NATO IPv6 Transition Plan, Preliminary Version, NC3A, June 2006

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