

# **Allied Data Publication 34**

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### **NATO Interoperability Standards and Profiles**

**Volume 2**

**Near Term**

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**C3B Interoperability Profiles Capability Team**



## Table of Contents

1. Introduction .....	1
1.1. Scope .....	1
2. Reference Models: Transition from Platform Centric to Service Oriented Models .....	3
3. Standards .....	5
3.1. Introduction .....	5
3.1.1. Releasability Statement .....	6
3.2. Operational Mission/Activities/Tasks .....	6
3.2.1. List of Standards .....	6
3.3. User Information Services .....	6
3.3.1. List of Standards .....	7
3.4. Technical Services .....	7
3.4.1. List of COI Standards .....	8
3.4.2. List of Information Integration Standards .....	16
3.4.3. List of Communications Standards .....	62
3.5. Information Assurance .....	90
3.5.1. List of Standards .....	90
3.6. Service Management and Control .....	106
4. Profiles .....	113
4.1. Introduction .....	113
4.1.1. Profiles derived from NATO Operations .....	113
4.1.2. Profiles derived from NATO member nations .....	113
4.2. Profile Specifications .....	113
4.2.1. NRF Generic Interface Profile .....	114
4.2.2. Tactical ESB - Profile .....	114
4.2.3. AMN - Profile .....	114
A. Technologies .....	115
A.1. Data Strategy .....	115
A.1.1. Data Strategy .....	115
A.1.2. Data Management .....	115
A.1.3. JC3IEDM .....	115
A.1.4. NATO Discovery Metadata Specification (NDMS) .....	115
A.1.5. Extensible Markup Language (XML) .....	116
A.2. Information Modelling .....	117
A.3. Network Infrastructure .....	118
A.3.1. Background .....	118
A.3.2. NGCS 2007 Target Architecture .....	119
A.3.3. Communications & Networking .....	119
A.3.4. Construction of a robust IP-network infrastructure .....	119
Index .....	123

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## List of Figures

A.1. NDMS Usage Conceptual Diagram .....	116
A.2. NGCS Digital User-Network Access Reference Configuration .....	119
A.3. Roadmap to IPv6 .....	122

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## **1. INTRODUCTION**

001. 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.

002. 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)<sup>1</sup>. For the CCEB Chapter 4 is only applicable to the CCEB Nations when taking part in NATO lead operations.

### **1.1. SCOPE**

003. 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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<sup>1</sup>References:NATO Letter AC/322(SC/5)L/144 of 18 October 2000, CCEB Letter D/CCEB/WS/1/16 of 9 November 2000, NATO Letter AC/322(SC/5)L/157 of 13 February 2001

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

004. 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.

005. 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 Java<sup>1</sup> 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.

006. One of the major drivers for supporting net-enabled operations is Service-Oriented Architectures (SOA). SOA is an architectural style 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.

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

008. 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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<sup>1</sup>Registered Trademark of SUN Microsystems, INC.

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## **3. STANDARDS**

### **3.1. INTRODUCTION**

009. 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

010. 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.

### **3.1.1. Releasability Statement**

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

012. 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 membership in these activities is outside the scope of NISP.

## **3.2. OPERATIONAL MISSION/ACTIVITIES/TASKS**

013. 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.

014. 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 (NDPP). Each Operational Service is dependent on one or more Information Services.

### **3.2.1. List of Standards**

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

## **3.3. USER INFORMATION SERVICES**

015. 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.

016. 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**

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

**3.4. TECHNICAL SERVICES**

017. 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.

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

019. 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.

020. 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.

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

022. 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.

023. 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.

024. 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
<b>Generic COI Services</b>				
Meteo				
Map View				
Map Mgmt				
Spatial Geography Visualisation				
		Sensor Planning Service (SPS) (OGC 09-000:2011)		
Document Management				
	Joint Brevity Words Publication (APP-7(E) Change 1, STANAG 1401 ed.14:2011)			
<b>Specific COI Services</b>				
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.2:2010			STANAG 7170 is the reference to the NATO Maritime Concepts standard and describes the product Addition-

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				<p>al Military Layers. This standard includes the Features, Attributes and enumerations 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 stand-</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				ard is DGIWG Feature Data Directory (DFDD) 2006 and DIGEST v2.1 is fading
	Vector Product Format (VPF) (DoD, Mil-Std. 2407:1996)			
	Vector Map (VMap) Level 1 (STANAG 7163 ed.1:2003)			
	NetCDF v1.0 OGC 10-090r3 (OGC:2011)			
	GeoPDF OGC 08-139r3 (OGC:2011)			
	Geospatial Symbols for Digital Displays (GeoSym) (NIMA:2000)			
	DTED (STANAG 3809 ed.4:2006)			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,



SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>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>				
	<p>Specifications for Naval Mine Warfare Information and for Data Transfer - AMP 11 (STANAG 1116 ed.9:2010)</p>			<p>For CCEB interoperability this standard is not applicable</p>
	<p>NATO Handbook of Military Oceanographic Information and Services(STANAG 1171 ed.9:2008)</p>			<p>For CCEB interoperability this standard is only applicable for NATO lead operations</p>
	<p>NATO Oceanographic Data Exchange Format (STANAG 1317 ed.3:2008)</p>			<p>For CCEB interoperability this standard is only applicable for NATO lead operations</p>
	<p>Interoperability between Naval Mine Warfare Data Centres</p>			<p>For CCEB interoperability this standard is not applicable</p>

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	(STANAG 1456 ed.2:2010)			
	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.3:2012)			For CCEB interoperability this standard is only applicable for NATO lead operations
	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			For CCEB interoperability this

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Manual (STANAG 6015 ed.4:2005)			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
	Binary Universal Form for the Representation of meteorological data (BUFR) (WMO FM 94:2002)			
<i>Symbol Mgmt</i>				
<i>Tracking</i>				
		NFFI, STANAG 5527 (study)		<p>Until the development of STANAG 5527 is more stable, document AC/322(SC/5) N(2006)0025 should be used.</p> <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>				

<b>SERVICECAT- EGORY / CAT- EGORY / SUB- CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
<i>Aggregation</i>				
<i>Collaborate and Plan</i>				
<i>Plan Workspace</i>				
<i>Plan Analysis</i>				
<i>Plan Briefing</i>				
<i>Plan Replay</i>				
<i>Plan Synchron- isation</i>				
<i>Plan Collabora- tion</i>				
	Military Mes- saging (STANAG 4406 Ed.2:2006)		ACP120 replaced by ACP145	This includes PCT (protected content type). PCT may be used for protection of data objects in systems.  For CCEB in- teroperability the mandatory stand- ard is ACP145 (Gateway-to- Gateway Mes- saging Protocols)
<i>Simulation</i>				
<i>Collaboration analysis</i>				
<i>Sense and Re- spond</i>				
<i>Tasking</i>				
<i>Plan Deviation Monitor</i>				
JCOP				

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
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>				
		OAGIS 9.4.1:2009, OAGi		
		PLCS, ISO 10303-239:2005		
		S1000D issue 4:2008, ASD-AIA-ATA		
	S2000M issue 4:2005, ASD-AIA-ATA			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	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
<b>Core Enterprise Services</b>				
		WS-Policy v1.5:2007 (OASIS)		Used in Profile: CES
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.  Used in Profiles: AMN, CES (v.3.0.2), tactESB (v2.03)
		UDDI API Spec v.2, OASIS:2002		Used in Profile: tactESB
	Electronic Business Extensible			ebXML is a suite of specifications

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Markup Language (ebXML) ISO/TS 15000-1:2004, -2:2004, -3:2004, -4:2004, -5:2005			for standardizing XML based business messages to facilitate trading between organisation.  Used in Profiles: AMN (v3.0), CES (v3.0)
		ebXML Messaging Service v. 2:2002 (OASIS)		
	ebRIM v3.0, OASIS			ebXML Registry Information Model  Used in Profile: AMN
		WS-Discovery v.1.1:2009, OASIS		<i>Used in Profile: tactESB</i>
		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.
		SPARQL 1.1 Query Language:2012 (W3C)		Part of TIDE specification at ACT.  Used in Profile: AMN

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				For CCEB interoperability 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		Used in Profile: CES
		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.



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

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

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 DBC version 4.1:2006 (JDBC)		JDBC separated from ODBC	
	Distributed RDA (DRDA), v.5 (The Open Group)			
	SQL CLI (ISO/IEC 9075-3:2008)			
		C2 Information Exchange Data		<i>Used in Profile: AMN</i>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		Model (C2IEDM) and Data Exchange Mechanism (DEM)		
	DEM Data Replication Mechanism from MIP baseline 3:2009	DEM Data Replication Mechanism from MIP baseline 4		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</p>

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				<p>sub-schemas of ISO 19107 to be used for defining 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</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>and presented to the user of a set of geographic data.</p> <p>For CCEB interoperability this standard is emerging</p>
	<p>Spatial Referencing by geographic identifiers ISO 19112:2003</p>			<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>
	<p>Simple Feature Access, ISO 19125-1:2004 and ISO 19125-2:2004</p>			<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>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>ISO 19125-2 specifies and SQL schema that support storage, retrieval, 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 visual-</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				ize maps in the Web browser.
	Mobile SVG Profiles: SVG Tiny and SVG Basic, W3C REC 20030114, 2003			SVG profiles for cellphones and PDAs
	Tagged Image File Format for image technology (TIFF) (ISO 12639:1998)			
		Vector Markup Language (VML), W3C Note 19980513, 1998 (W3C)		
		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>
	Controlled Imagery Base (CIB, STANAG 7099 ed.2:2004),			
	JPEG 2000 (ISO/IEC 15444-1:2004, ISO/IEC			JPEG 2000 is the standard used to store raster data (imagery,



SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	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,)			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 Database (MrSid Res. 2)		<i>Used in Profile: AMN</i>
		Enhanced Compressed Wavelet (ECW 3.3)		<i>Used in Profile: AMN</i>
	Compressed ARC Digitized Raster Graphics (CADRG), STANAG 7098 ed.2:2004)			<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 trans-mis-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				sion and interchange of raster graphic data.
	PNG 1.0 (RFC 2083:1997)			Portable Network Graphics PNG is in-tended for the com-pressed 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	Fax Relay for IP Networks, ITU-T T.38:2010		
	TDF (STANAG 5000 ed.3:2006)			For CCEB interoperability the 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		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.

<b>SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				<p>For CCEB interoperability the standard is MIL-STD 6040 and OTH-T GOLD standards</p> <p>Used in Profile: AMN</p>
		<p>Variable Message Format (DoD Mil-Std 6017B:2009)</p>		
	<p>Interoperability of Low-Level Ground-based Air Defence Surveillance, Command and Control Systems (STANAG 4312 Part I, ed.2:2009)</p>			
	<p>EDIFACT (ISO 9735:2002)</p>			<p>EDIFACT can be used to transfer business documents such as purchase orders, invoices, and electronic funds transfer information. ebXML is a UN standard</p>
			<p>GML v3.2 (ISO 19136:2007)</p>	<p>This OpenGIS Consortium recommendation standard may be used as the transfer format between the FA</p>

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				<p>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>
	OpenGIS City Geography Markup Language (CityGML) v1.0 (OGC:2008)			Added in NISP v.6 through RFCP 5-46.
		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>
	World Geodetic System (WGS) 84			WGS specifies the set of

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				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.
	SEDRIS (ISO/IEC 18023-1:2006)			Environmental data representation and inter-

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				change 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(C)/STANAG 2019 ed.6:2011)			For CCEB interoperability this standard is not applicable.  Used in Profile: AMN
	Telecommunications Symbology (STANAG 5042 ed1:1978)			
		Portrayal ISO/DIS 19117:2005		Currently in Draft. International Standard

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				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 (WFS) 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
	Web Coverage Service (WCS)			Used as a means of distributing geo cover-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	v.2.0:2010 (OGC 09-110r3)			<p>ages (raster) data between applications.</p> <p>For CCEB interoperability this standard is emerging</p> <p>Used in Profile: AMN</p>
		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 systems, and units of measure for



SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				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 of it in NISP is un-

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				der 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
	CDIF (EIA/IS-106 to 118:1994)			CDIF (CASE (Computer Aided Software Engineering) Data Interchange Format). An EIA (Electronic Industry of America ) standard for exchanging data between CASE Tools.
	Unified Modeling Language (UML) v2.2:2009 (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,			For CCEB interoperability the country codes

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	STANAG 1059, ed.8:2004			standard is ISO 3166 trigraphs except for military messaging - see CCEB COMAG Policy On Security Labelling  Used in Profile: AMN (ed.9)
	ECMA Script Language Specification (ECMA 262) ed.3:2009			Scripting required for enhanced Web pages  For CCEB interoperability this standard is not applicable
	ECMA Script XML Specification (ECMA 357) ed.3:2009			This standard adds native XML datatypes to the ECMA Script language.
	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	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			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.4:2010)			STANAG 4329 is a cover STANAG of ISO 16388:1999 - Bar code symbolology specifications - Code 39.
	Bar code symbolology 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)			
	Date and Time Formats (W3C NOTE-datetime:1998)			Used in Profile: AMN
	MIME (IETF RFC 2045:1996 updated by 2184:1997, 2231:1997, 5335:2008; 2046:1996 up-	S/MIME ESS (IETF RFC 3850:2004, 3851:2004)		Base64 is included in RFC 2045:1996  Used in Profile: CES

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	dated by 3676:2004, 3798:2004, 5147:2008; 2047:1996 up- dated by 2184:1997, 2231:1997, 5338:2008; 4288:2005, 4289:2005; 2049:1996)			
		MIME Encapsulation of Aggregate Documents, such as HTML (MHTML):1999 (IETF)		Used in Profile: CES
<i>Composition Services</i>				
<i>Translation Services</i>				
Interaction				
	Gidded Binary (GRIB) (WMO:1994)			Gridded Binary - WMO - Standard format for grid fields; WMO Manual Code Nr. 306
	Simple Knowledge Organization System Reference (SKOS) (W3C:2002)			For the description of vocabularies and Term Concept Maps of semantic web services.
<i>Messaging Services</i>				

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	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 MMMHS (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	
			Interoperability of telebriefing systems (STANAG 5059) deleted	
			Interoperability standards for telebriefing systems	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			(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)	eSMTP (IETF RFC 3030:2000)		Used for interpersonal messaging (email)  Used in Profile: AMN
		S/MIME (IETF RFC 5751:2010)		
	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 Implementation Guide for ACP 123/STANAG 4406 Messaging Services Between			Provides gateway between ACP 123A messaging services.  For CCEB interoperability this standard is mandatory.

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Nations - dated September 2008			
<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, CES
	Packet-based Multimedia Comms System (ITU-T H.323:2009) G.722.1C 14kHz audio codec (ITU-T G.722.1 Annex C:2012)			Used in Profile: AMN
		Session Initialisation Protocol (SIP) (IETF RFC 3261:2002, updated by 3265:2002, 3853:2004, 4320:2006, 4916:2007, 5393:2008,		



<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		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)			
		Synchronized Multimedia Integration Lan-		Language for multimedia

<b>SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		gauge (SMIL 3.0):2008 (W3C)		products based on XML.
Infrastructure				
		WS-Federation (OASIS)		Used in Profile: CES
		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)

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				to access other distributed time services (such as NTP as mentioned under Comms Service).
	CORBA/IIOP 2.2:2009 (OMG)			
		RMI-IIOP 1.5.0:2005 (SUN)		
			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)(IEEE 1278.1a: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)			
		FTP Extensions for IPv6 and		

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		NATs (IETF RFC 2428:1998)		
	RTP (IETF RFC 3550:2003)	SRTP (IETF RFC 3711:2004)RTCP Attributes in SDP(IETF RFC 3605:2003)		
	Telnet (IETF STD 8:1983, IETF RFC 0854:1983 updated by RFC 5198:2008, 0855:1983)			
	Network News Transfer Protocol NNTP (IETF RFC 3977:2006)			
	Network Time Protocol (NTP) (RFC 1305:1992)			
	Simple Network Time Protocol (SNTP) (RFC 2030:1996)			
			MPEG-1 (ISO/IEC 11172:1996)	
	MPEG-2 (ISO/IEC 13818:2000)			
	MPEG-4 (ISO/IEC 14496:2004)			Encoding standard for video conferencing
	Compact Disc File System (CDFS) (ISO 9660:1988)			For physical media distribution (CD)

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	UDF 1.0.1 (ISO/IEC 13346:1995)	UDF 2.0.1		UDF (Universal Disk Format)
	Pulse Code Modulation (PCM) (ISO/IEC 11172-3:1993, ITU-T G.711:1988)			PCM used for audio in ISDN Systems
	7 kbit audio-coding in 64 kbit/s (ITU-T G.722:1993)			
	Differential PCM (ITU-T G.726:1990)			
	CS-ACELP (ITU-T G.729:1993)			
	Internet Low Bitrate Coding (iLBC) (IETF RFC 3951:2004)			
	H.263 (ITU-T H.263:2005) H.264 (ITU-T H.264:2012)			ITU-T H.263 (Video coding for low bit rate communication); ITU-T H.264 (The Advanced Video Coding Standard)
			Delta-Modulation DM, EUROCOM D/0	
	GSM-Modulation (GSM 06.10, GSM 06.20 v.8.1.1:1999)			Used for mobile phones

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
			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	
	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			NSIF establishes the format for ex-

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Format (NSIF), STANAG 4545 ed.1:1998 Nato Secondary Imagery Format (NSIF), STANAG 4545 ed 2 (RD)			change of electronic secondary imagery.  Used in Profile: AMN
	BIIF (ISO 12087-5:1998)			
	NSILI (STANAG 4559 ed.3:2010)			NSILI provides interoperability between NATO nations reconnaissance databases and product libraries  Used in Profile: AMN
	NIIRS (STANAG 7194 ed.1:2009)	NIIRS - AIntP-7 (STANAG 7194 ed.2 (Draft))		NIIRS provides evaluation of imagery quality and use of a consistent 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

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	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 magnetic 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)			For further guidance refer to the Bi-SC Data



<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	ed.7:2008, M-Series)			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
		Technical characteristics of the Link 22 TDL system (STANAG 4610 ed.1 (Draft))		
			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

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				maintain. Therefore considered fading
	PDF-Format 1.7 (ISO 32000:2005)		Formets deleted in NCSP v.6	Portable document presentation format, realised in Adobe product version 7. Used in Minerva system at NATO HQ  For CCEB interoperability the primary standard is Adobe Postscript (level I and II) /Encapsulated Postscript (EPS) , and the secondary standard is Adobe PDF  Used in Profile: AMN
	PDF/A (ISO 19005-2:2011)			Electronic document file format for long-term preservation.
	Rich Text Format (RTF) v.1.9.1:2007 (MS)			Basic document interchange format
	ASCII Text, ISO 646:1991			For constrained environments
	UTF-8 (IETF RFC 3629:2003)			Universal Text Format
	Document Object Model (DOM)		Document Object Model (DOM) Level 2 (MS)	Basic Document Object Model .

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Level 3:2004 (MS)			
	Office XP formats:2003 (MS)		Office 2000 formats: Office XP	Of- fice200-formats Not to be used for new systems.  Pertains to the interchange formats of MS Word, Excel and PowerPoint, 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 29500-3:2012			XML variant of Microsoft Office.  <i>Used in Profile: AMN</i>
	HTML 4.01 (RFC 2854:2000)			<i>Used in Profile: AMN</i>
		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>

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Atom Syndication Format (IETF RFC 4287)			Used in Profile: AMN
	XHTML 1.0:2002 (W3C)	XForms 1.0:2003 (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, CES, tactESB
		Content-ID and Message-ID URLs (IETF RFC 2392:1998)		Used in Profile: CES
		HTTP State Change Mgmt. (IETF RFC 2965:2000)		Used in Profiles: CES, tactESB
		AtomPub (IETF RFC 5023:2007)		
	HTTPS (IETF RFC 2818:2000)			Used in Profile: CES
	HTTP Extensions for Web Distributed Authoring and Ver-			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	sioning (Web-DAV) (IETF RFC 4918:2007)			
		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 Specification (JAVA EE v.7:2012), (JCP:2012)			
	Java Standard Edition 6 (JAVA SE v.6:2006), (JCP:2002)			
		Java Remote Method Invoc-		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		ation (JRMI), (JCP)ed.1.5.0:2004		
		Java API for XML Processing (JAXP) v.1.3, (JCP:2004)		
		Java Naming and Directory Interface (JNDI) ed. 1.2, (SUN:1999)		
		DSML v2.0:2002, OAS-IS		DSML provides a Directory Access via a Web interface
	Dublin Core Metadata Element Set (DCES) (ISO 15836:2009)			<i>Used in Profile: AMN</i>
		Binding of Metadata to Data Objects (NC3A TN 1455)		<i>Used in Profile: AMN, CES</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.

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	WSDL v1.1:2001, W3C	WSDL v2.0:2007 Part 1: Core Language, W3C		Used in Profiles: AMN, CES, tactESB
	JNLP v6.0:2011, JCP			
	JAVA Server Pages JSP v2.1:2009, JCP			
	JAVA Servlets v3.0:2009, JCP			
	XML 1.0 3rd ed:2004, W3C	XML 1.1 2nd ed:2006, W3C		Where semantic tags are required, the NC3 Repository serves as an XML registry (see Data Management).  Used in Profiles: CES, tactESB
	XLink 1.0:2001, W3C	XLink 1.1:2012, W3C		XLink is used to point to resources from XML documents.
	XPointer 1.0:2001, W3C			XPointer is used to identify XML fragment inside any given XML documents.
		XQuery 1.0:2003, W3C		Used in Profile: CES
		Relax NG (ISO/IEC 19757-2:2008)		Relax NG may be a replacement for XML schema languages.  Used in Profile: CES

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	XML Base:2001, W3C			
	XMI ed.1:2001 (ISO/IEC 19503:2005)			XMI can be used for any metadata whose metamodel can be expressed in Meta-Object Facility (MOF).
	XML Infoset:2001, W3C			
	XSL Association:1999, W3C			
	Namespaces in XML (xml-names-19990114:1999) W3C			Used in Profiles: AMN, CES, tact-ESB
	Extensible Stylesheet Language Transformation (XSLT) 1.0 (W3C:1999)	XSL Transformations (XSLT) Version 2.0 (W3C:2007)		Used in Profiles: AMN, CES
	Extensible Stylesheet Language (XSL) 1.0:2001	Extensible Stylesheet Language (XSL) 1.1:2006		
	Cascading Style Sheets (CSS) 2.1:2001			<i>Used in Profile: AMN</i>
	XML Schema, Part 1-2:2004			Used in Profiles: AMN, CES, tact-ESB
	Wireless Markup Language (WML) 2.0:2001			WML to be used with Wireless Application Protocol (WAP) for constrained environments



SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		Efficient XML Interchange Format (EXI) v1.0		Efficient implementations of XML in the tactical environment
	XML Path Language (XPath) v2.0:2003, W3C			For CCEB interoperability this profile is mandatory.  Used in Profile: CES
	WS-I Web Service Basic Profile, v1.1:2nd ed. 2006	WS-I Web Service Basic Profile, v1.2:3rd ed. 2007 WS-I Web Service Basic Profile, v2.0 2010		For CCEB interoperability this profile is mandatory.  Used in Profiles: AMN (v1.1), CES (v1.0), tactESB (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 Services.  Used in Profiles: AMN (v1.1), CES (v1.1), tactESB (v1.2)
		WS-I Simple SOAP Binding Profile v1.0:2004		For CCEB interoperability this profile is mandatory.  Used in Profile: tactESB
		WS-I Attachments Profile v1.0:2nd ed. 2006		For CCEB interoperability this

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				profile is mandatory.  Used in Profile: CES
		WS-I Reliable Messaging v1.2:2009		Used in Profile: CES
		WS-Addressing v1.0:2010		Used in Profile: CES
		WS-Notification v1.3:2006		Used in Profile: CES
		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.  For CCEB interoperability this standard is not applicable

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
			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 standard is not applicable
	Motif 2.1:1997		Motif 1.2	For CCEB interoperability this

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				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**

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
<b>Network and Transport Services</b>				
		End-to-End Network – Internet Protocol Framework (NETIP), STANAG 4731 (Draft)		
	DNS (IETF STD 13:1987, RFC 1034:1987 and RFC 1035:1987)	DNSSEC (IETF RFC 4025 - 4033:2005)		Bind version 9 or later should be used.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	updated by RFC 1101:1989, 1183:1990, updated by 5395:2008; 1706:1994, 1876:1996, 1982:1996, 1995:1996, 1996:1996, 2136:1997, 2181:1997, updated by 5452:2009; 2308:1998, 2845:2000, 2931:2000, 3007:2000, 3226:2004, 3425:2002, 3597:2004, 3645:2003, 4033:2005, 4034:2005, 4035:2005, 4343:2006, 4470:2006, 4592:2006)			Used in Profile: AMN
		mDNS (IETF Draft draft-cheshire-dn-sext-multicastdns-06.txt)		Part of TIDE specification at ACT. For CCEB interoperability this standard is not applicable.
		IPSec Material in DNS (RFC 4025:2005)		
				NACOSA Operating Instructions

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				A-03-06 deals with the TCP/IP environment and A-03-07 deals with the OSI environment. Both are due for re-write.
	Assigned Numbers (RFC 3232:2002)			
	IPv4 (STD 5, RFC 791:1981, 792:1981, 894:1984, 919:1984, 922:1984, 950:1985 updated by RFC 1112:1989, 2474:1998, 2507:1999, 2508:1999, 3168:2001, 3260:2002, 3376:2002, 4604:2006, 4884:2007)			Used in Profile: AMN
	IPv6 (RFC 1981:1996, 2375:1998, 2460:1998, 2464:1998, 2467:1998, 2470:1998, 2491:1999, 2492:1999, 2497:1999, 2526:1999,			Note: Category of RFC 2375:1998 is 'Informal'  Used in Profile: AMN

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	2529:1999, 2590:1999, 2710:1999 updated 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, 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)	up- by		

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	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, 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.



<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	IP Encapsulation (RFC 2003:1996)			
			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 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)			
		Internet Protocol Quality of Service (IP QoS),		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
		STANAG 4711 (Draft)		
	Differentiated Services Field (IETF 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
	Resource Reservation Protocol (RSVP) (IETF RFC 2205:1997)			
	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
	IS to IS intra-domain routing information exchange protocol (ISO/IEC 10589:2002)			
	Router Internet Protocol (RIP v2) (IETF STD 56/RFC	RIPng for IPv6 (RFC 2080:1997)		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	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
	Traditional IP Network Address			

<b>SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	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 (RFC 1104:1989, 2753:2000,		

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		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, updated by 5063:2007;		

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		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 up- dated by 3241:2002, 4815:2007)			To allow packet switched services over circuit switched interconnections.
	Layer 2 Tunneling Protocol (L2TP) (RFC 3308:2002)			

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Link Control Protocol (LCP) extensions (RFC 1570:1994 updated by 2484:1999)			Addition to LLC1 (see Link Layer).
	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	

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
			8072:1996)deleted in NCSP v.6	
	TCP (IETF STD 7:1981, RFC 793:1981 updated by RFC 1122:1989, 3168:2001)			Used in Profiles: AMN, tactESB
	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
	Space communications protocol specification (SCPS) - Transport protocol (SCPS-TP) (ISO 15893:2010)			
Mixed DISA standards				
<b>Data Link and Connection Service</b>				
External Networks				
			X.25 (1996, Cor.1:1998)	
	MPLS (IETF RFC 3031: 2001, 3032:2001)			
	Tactical Communications, STANAGs			For CCEB interoperability this



<b>SERVICECAT-EGORY / CAT-EGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	4637ed1:2009, STANAG 4638ed1:2009, 4639ed1:2009, 4640ed1:2009, 4643ed1:2009 4644ed1:2009, 4646ed1:2009, 4647ed1:2009			standard is not applicable
	ISDN: ITU-T G, I Series			ISDN Telephony
		UMTS (3GPP)		
		GPRS (3GPP)		
			ITU-T E, P, Q, V Series	
	Digital Video Broadcasting (DVB) (ET-SI:2009)			
			ITU-T V.90:1998	
			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.

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.5:2011)	Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.6 (RD))		Gateway between Link-11 and Link-16.  For CCEB interoperability the mandatory standard is MIL-STD 6020
	Link 1 STANAG 5501 ed.5:2011	Link 1 STANAG 5501 ed.6 RD:2010		
	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	STANAG 4175 ed.5 (RD)		Communications part for Link-16  Used in Profile: AMN
	MIDS SSS-M-10001			Multifunctional Information Distribution System - System Segment Specification
	STANAG 7085 ed.3:2009 (IDL for Imaging Systems)			STANAG 7085 provides the interoperability standards for 3 classes of imagery DL used for

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				primary imagery data transmission.
	STANAG 4586 ed.3:2012	STANAG 4586 ed.4		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 (ACP 200)			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			
	International Network Numbering for Communications Systems in Use in NATO, STANAG 4705 ed.1 (RD)			
		Gateway Multichannel Cable Link (Optical), STANAG 4290 ed.1 (RD)		

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	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)			For CCEB interoperability this standard is not applicable
	NATO Multi-channel tactical Gateway-Multiplex Group Framing Standards (STANAG 4207: Ed.3:2000)			
	The NATO Military Communications Directory System, STANAG 5046 ed.3	The NATO Military Communications Directory System, STANAG 5046 ed.4 (RD)		
	Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels, STANAG 5067 ed.1:2007 (RD)	Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels, STANAG 5067 ed.2 (Draft)		
LAN Comms				
	Media Access Control (MAC) Bridges (IEEE	Multiple Spanning Trees (IEEE 802.1S:2004)		

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	802.1D:2004)Rapid Reconfiguration of Spanning Tree (IEEE 802.1W:2004)			
	Virtual Bridged Local Area Networks (VLAN) (IEEE 802.1q:2005)			
	Link Layer Discovery Protocol (IEEE 802.1AB:2009)			
Transmission				
	FDDI, ISO 9314:1989			For CCEB interoperability this standard is not applicable.
	STANAG 4444 ed.1:1999 RD (Slow hop ECCM)STANAG 4444 ed.2:2010 RD (Slow hop ECCM)			HF standard for Link-22.  For CCEB interoperability this STANAG is mandatory
	JREAP, STANAG 5518 (RD)			
	ISO/IEC 8802-3:2000 (CSMA/CD)			
				For CCEB interoperability the mandatory standard is Interoperability and Performance Stand-

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				ard for SAT-COM (MIL-STD 188-164).
				For CCEB interoperability the mandatory standard is MIL-STD-188-181B.
				For CCEB interoperability the mandatory standard is Interoperability Standard 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

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				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 (Frequency Division Multiple Access (FDMA) Operations), 13 January 1995, with Notice of Change 1, 9 September 1998, MIL-STD-188-165.
	ACP 190 (B)			
	ACP 190 (B) NATO Suppl 1A			Spectrum Supportability Request/Comment is a two-way commitment between the (host)nation owning the system and each nation hosting the system:  - it is a prerequisite for the procuring nation/agency to operate SDEs in a host nation.

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
				<p>- host nations granting support to a SDE is expected to assign frequencies when requested.</p> <p>Failure to follow this process will have very negative long-term impacts:</p> <ul style="list-style-type: none"> <li>- an ever growing risk of interference between own systems.</li> <li>- 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.</li> </ul> <p>For CCEB interoperability this standard is not applicable.</p>
	<p>ACP 190 (B) NATO Suppl 2</p>			<p>For CCEB interoperability this standard is not applicable</p>



<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	SMADEF XML Rel.3.0.0			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 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	MIDS terminals STANAG 4175 ed. 5 (RD)		
			Single serial line interface (TIA-232- E:1991)	
			Multi-point serial line (TIA-422- B:2005)	

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	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, STANAG 5030ed.4:1995	Extended range single and multi-channel VLF system, STANAG 4724 /Draft)		
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			

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Radio, STANAG 4415 ed.1:1999			
		HF Radios STANAG 4444 ed.2 (RD)		
	Minimum Standards for Naval Shore-to-Ship Broadcast Systems, STANAG 4481 ed.1			
	Characteristics of single tone modulators/demodulators for maritime HF radio links with 1240 Hz bandwidth, STANAG 4529 ed.1			
	Automatic Radio Control System for HF Links STANAG 4538 ed.1:2009	Automatic Radio Control System for HF Links STANAG 4538 ed.2 (Draft)		
	Non-hopping HF Communications Waveforms STANAG 4539 ed.1:2006			
	Minimum Standards for Naval low Frequency (LF) Shore-to-Ship Surface Broadcast Systems (STANAG 5065 ed.1:1999)			

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Profile for HF radio data communications (STANAG 5066 ed.3:2010)			
VHF				
	Technical standards for single channel VHF radio equipment STANAG 4204 ed.3:2008			For CCEB interoperability the mandatory standard is MIL STD 188-242
	Communication between Single Channel and Frequency 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				
	Technical standards for single channel UHF radio equipment STANAG 4205 ed.3:2005			For CCEB interoperability the mandatory standard is MIL STD 188-243

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	Have Quick STANAG 4246 ed.3:2009			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.
	Multi-Hop IP Networking with legacy UHF radios: Mobile ad-hoc Relay Line of Sight Networking (MARLIN), STANAG 4691 ed.1 (RD)			
UHF SATCOM				
		Digital Interoperability between UHF Satellite Communications Terminals - Integrated Waveform (IWF), STANAG 4681 ed.1 (RD)		
	Interoperability Standard for 25 kHz UHF/TDMA/DAMA terminal Waveform STANAG 4231 ed.5:2011			STANAG 4231 ed.5 is identical with MILSTD-188-183C.  For CCEB interoperability the mandatory standard is MILSTD-188-183D

SERVICECATEGORY / CATEGORY / SUB-CATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
				For CCEB interoperability the mandatory standard is Interoperability and Performance Standard for the Data Control Waveform MIL-STD-188-184
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)	Overall Super High Frequency (SHF) Military Satellite Communications (MILSATCOM) interoperability standards (STANAG 4484 ed.3 (RD))		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)	SHF MILSATCOM Non-EPM modem for services conforming to class-A of STANAG 4484 (STANAG 4485 ed.2 (RD))		For CCEB interoperability this standard is not applicable

<b>SERVICECATEGORY / CATEGORY / SUB-CATEGORY</b>	<b>MANDATORY STANDARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
	Super High Frequency (SHF) Military Satellite COMMunications (MILSATCOM) 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) Military Satellite COMMunications (MILSATCOM) Frequency Division Multiple Access (FDMA) Non-EPM modem for services conforming to class-B of STANAG 4484 (STANAG 4486 ed.3:2008)		For CCEB interoperability this standard is not applicable
	Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSATCOM) jam-resistant modem interoperability standards (STANAG 4606 ed.1:2009)	Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSATCOM) jam-resistant modem interoperability standards (STANAG 4606 ed.3 (RD))		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
<b>EHF SATCOM</b>				
	Digital interoperability between EHF Tactical Satellite Commu-			For CCEB interoperability the mandatory stand-

SERVICECATEGORY / CATEGORY / SUBCATEGORY	MANDATORY STANDARDS	EMERGING NEAR TERM	FADING	Remarks
	communications Terminals (STANAG 4233 ed.1:1998)			Standard is MIL-STD-1582D
	EHF MIL SATCOM 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.



SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					Guidance on the use of Common 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

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			WS Secur-ity Policy, v1.3:2009 (OASIS)		Used in Profile: CES
		Security As-assertion Markup Lan-guage, SAML v2.0 (OASIS)			For CCEB in-teroperability the Secur-ity Ascertion Markup Lan-guage (SAML) v1.1 is mandat-ory and SAML 2.0 is emerging  Used in Profile: CES (v2.0)
		XKMS 2.0 (W3C):2005			Used in Pro-files: AMN, tactESB
					See Gener-al Security Key Manage-ment and Distri-bution.  For CCEB in-teroperability the mandat-ory standard is ACP145(A) (Messaging Services Between Na-tions) and X.500 (based on CMI authen-tication frame-work)
Confidentiality					

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		S/MIME with Encrypted Security Service (ESS) (IETF RFCs 3850:2004, 3851:2004)		ACP120 replaced by ACP145	<p>Messaging System independent encapsulation syntax supporting signature and confidentiality functions based on DSA.</p> <p>For CCEB interoperability the standard is S/MIME Version 3 ESS, application layer data confidentiality or link level encryption</p>
			ITU-T X.411:1999		
			SCIP Key Management Plan, SCIP-120 rev.1.0:2010 (IICWG)		
			SCIP X.509 Key Management Plan, SCIP-121 rev.0.8:2012 (IICWG)		
			SCIP Signalling Plan, SCIP-210 rev.3.5:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			SCIP Multimedia Option-Specific MERs for SCIP Devices, SCIP-213 rev.1.0:2012 (IICWG)		
			Generic Packet Data Option, SCIP-213.1 rev.1.0:2010 (IICWG)		
			Network Specific MERs for SCIP Devices, SCIP-214 rev.1.2:2011 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			SCIP over the PSTN, SCIP-214.1 rev.1.0:2008 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			SCIP over RTP, SCIP-214.2 rev.1.0:2010 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			U.S. SCIP/IP Implementation Standard and MER Publication, SCIP-215 rev.2.2:2011 (IICWG)		For CCEB interoperability the SCIP standard is mandatory

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			Minimum Es-sential Re-quirements (MER) for V.150.1 Gate-ways Publica-tion, SCIP-216 rev.2.2:2011 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Mimimum Im-plementation Profile (MIP), SCIP-221 rev.3.0:2011 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Cryptography Specification for SCIP, SCIP-231 rev.1.3:2008 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			SCIP Crypto-graphy Spe-cification - Main Mod-ule, SCIP-233 rev.1.1:2012 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Universal Call Setup Encryp-tion (CSE) Key Materi-al Format and Fill Specifica-tion, SCIP-233.106 rev.1.1:2012 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			MERCATOR Call Setup Encryption (CSE) Key Material Format and Fill Specification, SCIP-233.110 rev.1.0:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			MERCATOR Call Setup Encryption (CSE) Specification, SCIP-233.202 rev.1.0:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			ECDH Key Agreement and TEK Derivation, SCIP-233 rev.1.1:2011 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			MERCATOR ECDH Key Agreement and TEK Derivation Specification, SCIP-233.308 rev.1.0:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Interoperable Terminal Priority (TP) Community of Interest (COI) Specification,		For CCEB interoperability the SCIP standard is mandatory

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			SCIP-233.350 rev.1.0:2010 (IICWG)		
			Application State Vec-tor Processing Specification, SCIP-233.401 rev.1.2:2012 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Point-to-Point Cryptographic Verification w/ Signature, SCIP-233.444 rev.1.0:2011 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			MERCATOR Point-to-Point Cryptographic Verification w/ Signature Spe-cification , SCIP-233.445 rev.1.0:2012 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Secure MELP(e) Voice, SCIP-233.501 rev.1.1:2012 (IICWG)		For CCEB in-teroperability the SCIP stand-ard is mandat-ory
			Secure Almost Full Band-width (AFB) Data, SCIP-233.518		For CCEB in-teroperability the SCIP stand-ard is mandat-ory

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			rev.1.0:2010 (IICWG)		
			Secure Full Bandwidth (FB) Data, SCIP-233.519 rev.1.0:2010 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Secure Packet Data, SCIP-233.531 rev.1.0:2010 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Secure Messaging Processing Specification, SCIP-233.547 rev.1.0:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			Galois/Counter Mode (GCM) Data Integrity Specification, SCIP-233.562 rev.0.1:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			MERCATOR Encryption Algorithm Specification, SCIP-233.604 rev.1.0:2012 (IICWG)		For CCEB interoperability the SCIP standard is mandatory
			NATO XML Labelling version 1.0 (Ref:-		<i>Used in Profiles: AMN, CES, tactESB</i>



SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
			NC3A Technical Note 1455 "NATO Profile for the 'Binding of Metadata to Data Objects' - version 1.0"; and - NC3A Technical Note 1456, "NATO Profile for the 'XML Confidentiality Label Syntax' - version 1.0".)		
		SOAP Message Security 1.1:2004 (OASIS)			Used in Profile: CES
			Username Token Profile, v1.1:2004 (OASIS)		Used in Profile: CES
			X.509 Certificate Token Profile, v1.1:2004 (OASIS)		Used in Profiles: CES, tact-ESB
			NATO PKI (NPKI) Certificate Policy, rev.2 (NATO:2008)		<i>Used in Profile: AMN</i>
			Kerberos Token Profile 1.1:2006 (OASIS)		Used in Profile: CES

<b>SUBAREA / SERVICE CATEGORY</b>	<b>CAT-EGORY / SUBCAT-EGORY</b>	<b>MANDAT-ORY STAND-ARDS</b>	<b>EMERGING NEAR TERM</b>	<b>FADING</b>	<b>Remarks</b>
		SAML Token Profile 1.1:2006 (OASIS)			Used in Profile: CES
			SOAP Messages with Attachments (SwA) Profile 1.1:2006 (OASIS)		Used in Profile: CES
		WS-Security Utility 1.0:2001 (OASIS)			Used in Profile: CES
			WS-Trust 1.4:2007 (OASIS)		Used in Profile: CES
		Basic Security Profile Version 1.1:2010 (WS-I)			Used in Profile: AMN
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), CES, tactESB
		SSH v.2 (IETF RFC 4250-4256:2006)			
			XML Encryption (W3C):2008		Used in Profile: tactESB

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		Key Wrap Advanced Encryption Standard 128 (AES 128, NIST FIPS 197:2002)	Key Wrap Advanced Encryption Standard 256 (AES 256, NIST FIPS 197)		<p>PKI components and applications should utilise AES for key wrap functions.</p> <p>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.</p> <p>For CCEB interoperability AES 128 is emerging.</p>
Integrity					
		IP ESP (RFC 4303:2005)			Encapsulating Security Payload (ESP) may support integrity and authentication depending on the use of algorithms
			NINE IS-pec v1.0.3 (NATO)		
		Digital Signature Algorithm 1024	Elliptic Curve Digital Signature Algorithm	Digital Signature Algorithm	Authentication and integrity algorithm for

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		(DSA-1024, NIST FIPS 186-2 with Change Notice 1, Oct 2001)	(ECDSA 384, NIST FIPS 186-2 with Change Notice 1, Oct 2001)	(original version) not for new systems	<p>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 NATO for verification purposes only.</p>
		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)		Authentication and integrity algorithm for Sub CA and other PKI components (such as Key Recovery Agents)

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					<p>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>
		<p>Secure Hash Algorithm 256 (SHA-256, NIST FIPS 180-2 with Change Notice 1, Feb 2004)</p>	<p>Secure Hash Algorithm 384 (SHA-384, NIST FIPS 180-2 with Change Notice 1, Feb 2004)</p>	<p>Secure Hash Algorithm (SHA-1), NIST FIPS 180-1 replaced by SHA-256</p>	<p>Hash algorithm to accompany the DSA and RSA for use in NMS. SHA-384 is planned for post 2008. Guidance is provided in AC/322-D(2004)0035.</p> <p>For CCEB interoperability</p>

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					the standard is SHA-1, NIST FIPS 180-1 is mandatory. SHA-1 can be used in NATO for verification purposes only.
		XML En-cryption Syn-tax and Pro-cessing, W3C:2002			Used in Profile: CES
Authentication					
		Radius, IETF RFC 2865:2006 up-dated 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 Au-thentication and Secur-ity Layer (SASL) Mech-anism, IETF RFC 4752:2006		Used in Profile: CES
			Single sign on (SSO, the Open Group)		

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		Public-key and attribute certificate frameworks, X.509 v3:2005 (ITU-T)			Used in Profiles: AMN, CES, tactESB
			X.509 Public Key Infrastructure Certificate and CRL Profile (IETF RFC 5280:2008)		
		Identification of Issuers (ISO 7812:2007)			Base profile consisting of parts 1 - 2.
		XML Signature (W3C):2008			
		XACML v2.0:2008 (OASIS)	XACML v3.0:2010 (OASIS)		Used in Profiles: AMN, CES, 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 Tattoo (SMT) Information (ANSI: 2008)		<i>Used in Profile: AMN</i>

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

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



SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
System Mgmt					
			WS-Management v1.0 (DMTF)		Used in Profile: CES
		ITIL (ISO/IEC 20000:2012)			Used in Profile: AMN
		COBIT 5: A Business Framework for the Governance and Management of Enterprise IT (ISACA: 2012)			Used in Profile: AMN
			Configuration Management Database (CMDB) Federation Specification (DMTF DSP0252: 2009)		Used in Profile: AMN
		SNMPv3 Applications (IETF RFC 3413:2002)		SNMPv1 (IETF Std 15) not for new systems	SNMPv3 is considered emerging because of current lack of agreement on the concept of operations for distributed management  For CCEB interoperability this standard is not applicable

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
					Used in Profile: AMN
		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 updated by 5590:2009)			For CCEB interoperability this standard is not applicable
		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			For CCEB interoperability this standard is not applicable

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		5343:2008, 5590:2009)			
		MIB II (IETF Std 17:1991, RFC 1213:1991 up-dated 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
			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			For CCEB interoperability

SUBAREA / SERVICE CATEGORY	CAT-EGORY / SUBCAT-EGORY	MANDAT-ORY STAND-ARDS	EMERGING NEAR TERM	FADING	Remarks
		the Ethernet-like Interface types (IETF RFC 2666:1999, 3635:2003, 3638:2003)			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 this standard is not applicable
		RIP-2 MIB (RFC 1724:1994)			For CCEB interoperability this standard is not applicable
		802.1p (IEEE:2004)			IEEE 802.1p (Quality of Service)
					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

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

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## **4. PROFILES**

### **4.1. INTRODUCTION**

025. 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

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

027. 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.

028. 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:

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

030. 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:

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

#### **4.1.1. Profiles derived from NATO Operations**

032. 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**

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

## **4.2. PROFILE SPECIFICATIONS**

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

### **4.2.1. NRF Generic Interface Profile**

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

### **4.2.2. Tactical ESB - Profile**

036. 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.

037. 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.

038. Details of this profile are contained in: IT-AmtBw\_A5\_RuDi-High\_Level\_Concept\_400.pdf (DEU)

### **4.2.3. AMN - Profile**

039. 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**

040. 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**

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

#### **A.1.2. Data Management**

042. 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**

043. 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.

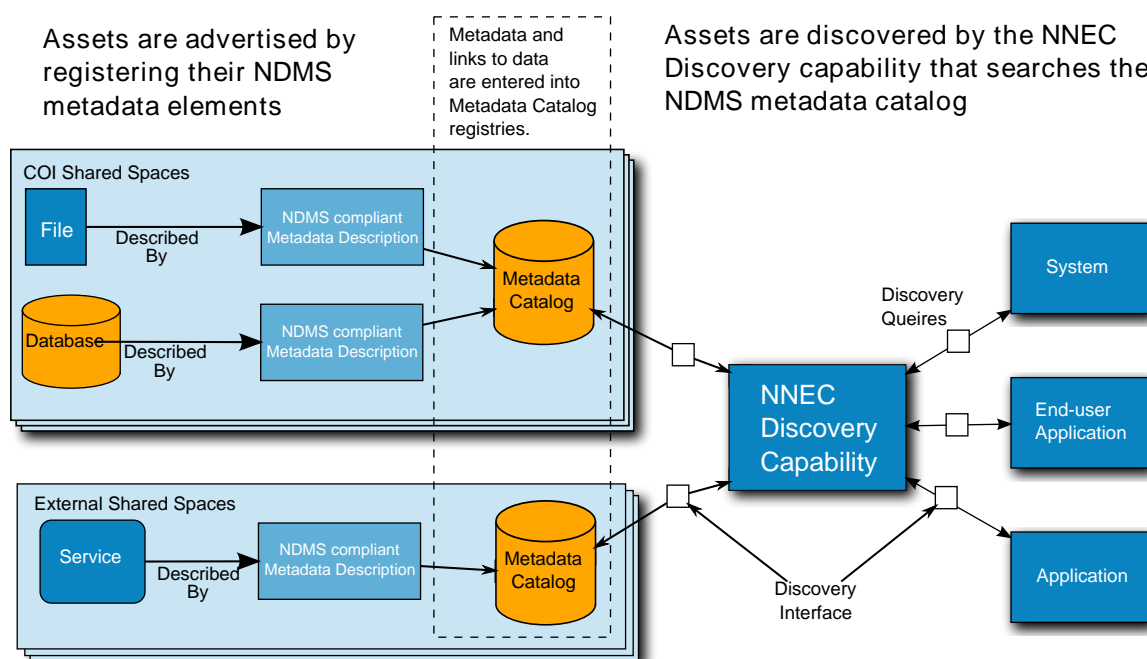
044. The Data Management Authority in NATO publishes the JC3IEDM and Directive and Guidance documents for Data Management in NATO. It will also register and manage both the Standard Data Elements and the Information Exchange Requirements (IER) used in the development process of data assets.

045. 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)**

046. 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.

047. 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**

048. 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)**

049. 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.

050. 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.

051. 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**

052. 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.

053. 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.

054. 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.

055. 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**

056. 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).

057. 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).

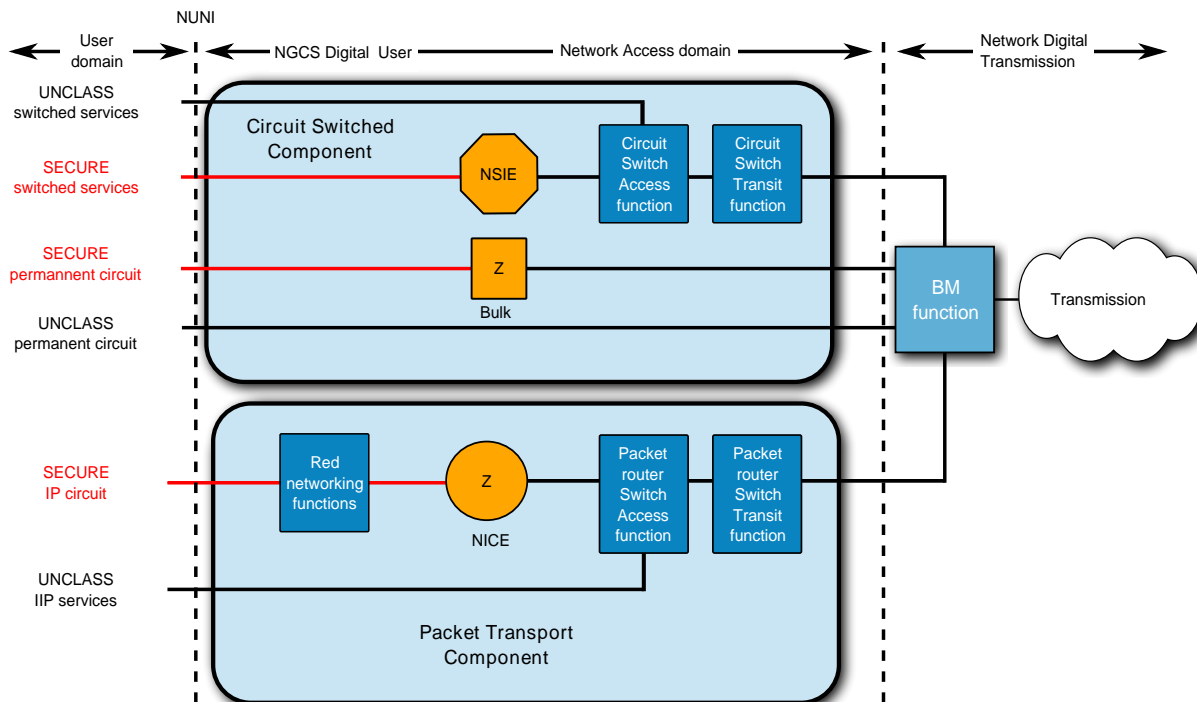
058. This section describes the NATO General-Purpose Segment Communication System (NGCS) Reference Architecture (RA). NGCS is part of the NII, representing the NATO owned capability. It provides the communication services and associated management and security services. Also it describes the timeframe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

059. 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.

060. 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

061. 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)**

062. 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**

063. 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**

064. 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.

065. 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.

066. 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**

067. 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.

068. 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.

069. 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;

070. 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

071. 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.

072. 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:

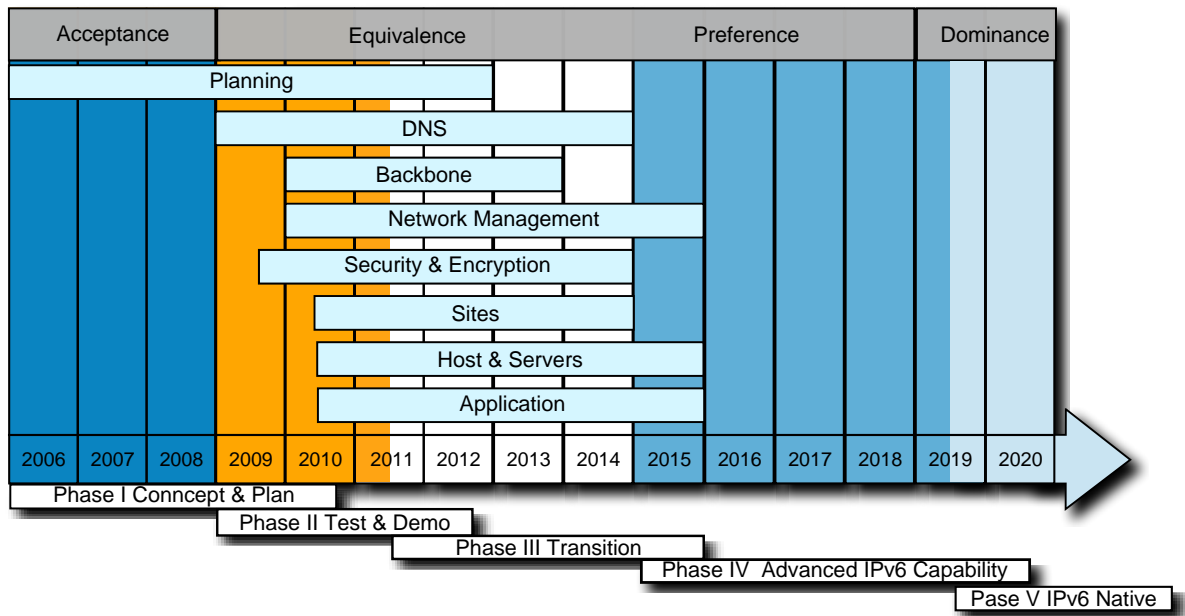
- Specification of a comprehensive set of Classes of Service (CoS) for the ultimate network, which can be initially collapsed to a basic set and further expanded with each implementation step.
- Definition of application mapping to telecommunications services (the CoS).
- Specification of CoS handling 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**

073. 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

074. 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]<sup>1</sup> from which the top-level roadmap is repeated here in Figure A.3.



**Figure A.3. Roadmap to IPv6**

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



# Index

## Symbols

3rd Generation Partnership Project, 75, 75

H.263, 47  
H.264, 47  
SSS-M-10001, 76

## A

ACM

2002-REST-TOIT, 60

Adobe Systems Incorporated

EPS, 52

PDFv. 1.4, 52

Postscript (level I and II), 52

AeroSpace and Defence Industries Association of Europe, 15

S1000D-I9005-01000-00, 15

ANSI

ANSI/NIST-ITL, 105

## C

Combined Communications and Electronic Board

ACP 123A, 40, 40

ACP 133, 19

ACP 133 Suppl.1, 19

ACP 145(A), 42

ACP 190(B), 81

ACP 200, 77, 77

ACP 220(A), 43

ACP145, 14

## D

DMTF

DSP0004, 110

DSP0226, 107

DSP0252, 107

DoD

DIN: DOD\_BTf\_TS\_EBTS\_  
Mar09\_02.00.00, 105

DIN: DOD\_BTf\_TS\_EBTS\_  
Nov06\_01.02.00, 105

MIL-STD 188-110A, 84  
MIL-STD 188-136, 90  
MIL-STD 188-140A, 83  
MIL-STD 188-141A, 84  
MIL-STD 188-145, 83  
MIL-STD 188-1582D, 90  
MIL-STD 188-164, 80, 81  
MIL-STD 188-165, 81  
MIL-STD 188-181B, 80  
MIL-STD 188-182A, 80  
MIL-STD 188-183D, 87  
MIL-STD 188-184, 88  
MIL-STD 188-185, 80  
MIL-STD 188-242, 86  
MIL-STD 188-243, 86  
MIL-STD 2401, 30  
MIL-STD 2525B, 32, 32  
MIL-STD 2525C, 32  
MIL-STD 6011C, 51, 76  
MIL-STD 6016C, 51  
MIL-STD 6016D, 51  
mil-std 6017B, 29  
MIL-STD 6040, 29  
mil-std-2407, 10  
OTH-T, 29

## E

EBXML

ebTA, 17, 17

ECMA

ECMA-262, 37

ECMA-357, 37

ECMA-376, 53

Electronic Industries Association

IS-106, 36

RS-530, 84

TIA/EIA-492000-A, 84

ERDAS, 27

ESRI

shapefile, 30

## I

IEEE

802.1AB, 79

802.1D, 79

802.1p, 110  
802.1Q, 79  
802.1S, 79, 78  
P1516, 45  
IETF  
draft-cheshire-dnsext-multicastdns-06.txt,  
63  
draft-lee-sip-dns-sd-uri-03.txt, 18  
RFC 1212, 108  
RFC 1213, 109  
RFC 1305, 46  
RFC 1332, 72  
RFC 1510, 104  
RFC 1519, 70  
RFC 1570, 73  
RFC 1643, 110  
RFC 1661, 73  
RFC 1724, 70, 110  
RFC 1771, 69  
RFC 1772, 69  
RFC 1812, 68  
RFC 1831, 44  
RFC 1939, 41  
RFC 1990, 73  
RFC 1994, 73  
RFC 2003, 67  
RFC 2021, 110  
RFC 2030, 46  
RFC 2058, 104  
RFC 2080, 68  
RFC 2083, 28  
RFC 2126, 74  
RFC 2205, 68  
RFC 2236, 66  
RFC 2328, 68  
RFC 2362, 69  
RFC 2392, 54  
RFC 2428, 46  
RFC 2452, 109  
RFC 2453, 69  
RFC 2454, 109  
RFC 2460, 65  
RFC 2465, 109  
RFC 2466, 109  
RFC 2472, 73  
RFC 2473, 70  
RFC 2474, 68  
RFC 2545, 69  
RFC 2557, 39  
RFC 2616, 54  
RFC 2740, 68  
RFC 2765, 70  
RFC 2790, 109  
RFC 2818, 54  
RFC 2819, 110  
RFC 2849, 20  
RFC 2965, 54  
RFC 3022, 70  
RFC 3030, 41  
RFC 3162, 104  
RFC 3232, 64  
RFC 3261, 43  
RFC 3308, 72  
RFC 3315, 67  
RFC 3344, 70  
RFC 3501, 41  
RFC 3550, 46  
RFC 3605, 46  
RFC 3633, 67  
RFC 3646, 67  
RFC 3711, 46  
RFC 3768, 73  
RFC 3775, 70  
RFC 3776, 70  
RFC 3898, 67  
RFC 3913, 69  
RFC 3973, 69  
RFC 3977, 46  
RFC 4023, 69  
RFC 4250, 100  
RFC 4287, 54  
RFC 4514, 20  
RFC 4750, 110  
RFC 4752, 104  
RFC 4918, 55  
RFC 5023, 54  
RFC 5246, 100  
RFC 5280, 105

RFC 5555, 67	ISO
RFC 5568, 70	10303-239, 15
RFC 768, 74	12639, 26
RFC 791, 64	15893, 74
RFC 959, 45	19005-2, 52
rfc4025, 63	19107, 22
RFC5519, 109	19109, 23
STD 89, 66	19110, 23
Information Systems Audit and Control Association	19112, 24
Cobit 5, 107	19115, 31
International Hydrographic Organisation	19117, 32
S-100, 33	19503, 58
International Interface Control Working Group	4217, 36
SCIP-120, 93	8601, 38
SCIP-121, 93	8879, 54
SCIP-210, 93	9735, 29
SCIP-213, 94	ISO 15836:2009, 56
SCIP-213.1, 94	iso 32000-1, 52
SCIP-214, 94	ISO/IEC 19794-2:2011, 106
SCIP-214.1, 94	ISO/IEC 19794-5:2005, 106
SCIP-214.2, 94	ISO/IEC 19794-6:2005, 106
SCIP-215, 94	ISO/IEC
SCIP-216, 95	10589, 68
SCIP-221, 95	10646, 38
SCIP-231, 95	10918-4, 50
SCIP-233, 95	11172-3, 47
SCIP-233.106, 95	12087-5, 49
SCIP-233.110, 96	13818, 46
SCIP-233.202, 96	14443, 91
SCIP-233.307, 96	14495-1, 27
SCIP-233.308, 96	14496, 46
SCIP-233.350, 97	15408, 90
SCIP-233.401, 97	15444, 27
SCIP-233.444, 97	15961, 15
SCIP-233.445, 97	15962, 15
SCIP-233.501, 97	17363, 15
SCIP-233.518, 98	17364, 15
SCIP-233.519, 98	17365, 15
SCIP-233.531, 98	17366, 15
SCIP-233.547, 98	17367, 15
SCIP-233.562, 98	18026, 32
SCIP-233.604, 98	26300, 53
	29500-3, 53
	646, 52

- 7810, 91  
 7812, 105  
 7816, 91  
 8802-3, 79  
 9075, 21, 21  
 9594-8, 105  
 DIS 9660, 46  
 FCD 18023-1, 31  
 FCD 18025, 32  
 ITU, 75  
   G.722, 47  
   G.722.1c, 42  
   G.726, 47  
   G.729, 47  
   H.248.1, 43  
   H.320, 43  
   H.323, 42  
   T.120, 43, 43  
   T.30, 28  
   T.38, 28  
   X.411, 93
- J**
- Java Community Process, 56  
   JSR 206, 56  
   JSR 245, 57  
   JSR 270, 55  
   JSR 315, 57  
   JSR 342, 55  
   JSR 56, 57
- M**
- Microsoft, 53, 73  
   Application Note GC0165, 52  
   MS-SMB - v20120705, 44  
   MSDN-ODBCPR, 21  
 Multilateral Interoperability Program  
   MTIDP-SEAWG-ed3.0.10-annex-b, 22, 22
- N**
- NATO, 22  
   AC/322(SC/3)D(2007)0003-Rev5, 83  
   AC/322-D(2004)0024REV2, 99  
   ACP 190(B) NATO Supp 1A, 81  
   ACP 190(B) NATO Supp 2, 82  
   APP-11, 28, 28  
   C-M(2005)0108, 16  
   com-sec-req, 90  
   draft, 18  
   MIL-STD 6020, 76  
   NC3A-RD-2977, 56  
   RTO-MP-IST-091, 99  
   STANAG 1059, 37  
   STANAG 1116, 11  
   STANAG 1171, 11  
   STANAG 1317, 11  
   STANAG 1401, 8  
   STANAG 1456, 12  
   STANAG 2019, 32  
   STANAG 2103, 12  
   STANAG 2211, ed. 6, 32  
   STANAG 3764, 50  
   STANAG 3809, 10  
   STANAG 4061, 12  
   STANAG 4082, 12  
   STANAG 4103, 12  
   STANAG 4140, 12  
   STANAG 4175 ed.4, 76, 76, 83, 83  
   STANAG 4203 ed.3, 84  
   STANAG 4204 ed.3, 86  
   STANAG 4205, 86  
   STANAG 4206 ed.3, 78  
   STANAG 4207 ed.3, 78  
   STANAG 4214 ed.2, 77  
   STANAG 4231 ed.4, 87  
   STANAG 4233, 90  
   STANAG 4246 ed.3, 87  
   STANAG 4285, 84  
   STANAG 4290 RD, 77  
   STANAG 4292, 86  
   STANAG 4312 ed.2, 29  
   STANAG 4329, 38  
   STANAG 4372 ed.3, 87  
   STANAG 4376 ed.1, 88  
   STANAG 4406, 14, 40  
   STANAG 4415, 85  
   STANAG 4444 ed.1 (Draft), 79, 79, 85  
   STANAG 4479 ed.1, 48  
   STANAG 4481 ed.1, 85

STANAG 4484 ed.2, 88, 88  
 STANAG 4485 ed.1, 88, 88  
 STANAG 4486 ed.2, 89, 89  
 STANAG 4522 ed.1, 90  
 STANAG 4529 ed.1, 85  
 STANAG 4538 ed.1, 85, 85  
 STANAG 4539, 85  
 STANAG 4545 ed.1, 49, 49  
 STANAG 4559 ed. 3, 49  
 STANAG 4564 ed.2, 31  
 STANAG 4575 ed. 3, 49  
 STANAG 4578 ed.2, 78  
 STANAG 4586, 77, 77  
 STANAG 4591, 48  
 STANAG 4606 ed.1, 89, 89  
 STANAG 4607 ed.3, 49  
 STANAG 4609 ed.3, 50  
 STANAG 4610, 51  
 STANAG 4622, 89  
 STANAG 4631, 40  
 STANAG 4681, 87  
 STANAG 4691 ed.1, 87  
 STANAG 4705 RD, 77  
 STANAG 4711, 68  
 STANAG 4724, 84  
 STANAG 4731, 62  
 STANAG 5000, 28  
 STANAG 5030 ed.4, 84  
 STANAG 5042, 32  
 STANAG 5046 ed.3, 78, 78  
 STANAG 5065 ed.1, 85  
 STANAG 5066 ed.3, 86  
 STANAG 5067 ed.1 (RD), 78, 78  
 STANAG 5500, 28  
 STANAG 5501 Ed.5, 76, 76  
 STANAG 5511 Ed.7, 51, 76  
 STANAG 5516 Ed.4, 51, 51  
 STANAG 5518ed1, 79  
 STANAG 5522 Ed.2, J-Series, 51, 51  
 STANAG 5523, 18  
 STANAG 5525 ed.1, 25, 25  
 STANAG 5527, 13  
 STANAG 5602 ed.3, 48  
 STANAG 5616 ed.4, 76, 76  
 STANAG 6015, 13  
 STANAG 6022, 13  
 STANAG 7023 ed.4, 50  
 STANAG 7024 ed.2, 50  
 STANAG 7074, 9  
 STANAG 7085 ed.2, 76  
 STANAG 7170 ed.2, 8  
 STANAG 7194 ed. 1, 49, 49  
 stanag7098, 27  
 stanag7099, 26  
 stanag7163, 10  
 TIDE/NVG, 26  
 TIDE/TIDE-ID-RR, 56  
 TIDE/TIDE-ID-SP, 17, 56  
 TN-1313, 19  
 NIMA, 27  
 MIL-PRF 89005, 30  
 MIL-PRF-89045, 10  
 NIST  
 FIPS 180-2 with Change Notice 1, 103, 103  
 FIPS 186-2 with Change Notice 1, 102, 102,  
 102  
 FIPS PUB 197, 101, 101  
 FS 1016, 48  
**O**  
 OASIS, 44, 55, 55, 56, 60, 60, 92, 100  
 ProgrammersAPI\_v2, 16  
 regrep-rim-3.0-os, 17  
 SAML 1.1, 92  
 uddi-v3.00-published-20020719, 16  
 wsdd-discovery-1.1-spec, 17  
 wss-username-token-profile-1.0, 99  
 wss-v1.1-errata-os-SAMLTokenProfile,  
 100  
 wss-v1.1-spec-os-KerberosTokenProfile,  
 99  
 wss-v1.1-spec-os-SOAPMessageSecurity,  
 99  
 wss-v1.1-spec-os-SwAProfile, 100, 100  
 wss-x509-token-profile-1.0, 99  
 ODMG  
 ISBN 1-55860-647-5, 21  
 OMG  
 formal/08-01-02, 62

formal/2002-12-06, 45  
 formal/2011-01-03, 55  
 formal/2011-08-05, 36  
 formal/2012-01-03, 36  
 Open Applications Group  
   OAGIS, 15  
 Open GIS Consortium  
   06-050r3, 53  
   07-067r5, 34  
   08-007r1, 30  
   09-000, 8  
   09-026r1, 30  
   10-100r2, 30  
   OGC 01-024r1, 35  
   OGC 03-081r2, 35  
   OGC 04-038r1, 35  
   OGC 05-047r3, 34  
   OGC 05-078r4, 33  
   OGC 06-042, 33  
   OGC 07-006r1, 35  
   OGC 07-110r4, 35  
   OGC 07-147r2, 34  
   OGC 08-139r3, 10  
   OGC 09-025r1, 33  
   OGC 09-110r3, 34  
   OGC 10-090r3, 10  
 Open Services Infra-Structure Initiative, 55  
 OpenGL  
   glspec40.Core.20100311, 36  
 OSF  
   F201, 44

**P**

PS/SC Working Group  
   pc-sc-spec, 91

**R**

RSA  
   PKCS#1 v2.1, 102

**S**

SUN Microsystems  
   java\_card\_kit-2\_2\_1-fr-spec, 91  
   JNDI, 56  
   JSR 221, 21

rmi-over-iiop, 45

## T

The Open Group  
   C 112, 21  
   C310, 44  
   C702, 44  
   C706, 44  
   F209a, 44  
   P702, 104  
   T525, 61, 61, 61

## W

W3C, 60  
   datetime, 38  
   draft, 18  
   NOTE-VML-19980513, 26  
   NOTE-wsci-20020808, 55  
   NOTE-wsdl-20010315, 57  
   PR-sparql11-query-20121108, 17  
   REC-CSS1-20080411, 58  
   REC-html401-19991224, 53  
   rec-skos-reference-20090818, 39  
   REC-SMIL3-20081201, 44  
   REC-SVGMobile-20030114, 26  
   REC-WebCGM-20011217, 25  
   REC-ws-policy-20070904, 16  
   REC-wsdl20-20070626, 57  
   REC-xforms-20031014, 54  
   REC-xhtml1-20020801, 54  
   REC-xlink-20010627, 57  
   REC-xlink11-20100506, 57  
   REC-xml-20040204, 57  
   REC-xml-infoset-20011024, 58  
   REC-xml-names-19990114, 58  
   REC-xml-styleSheet-19990629, 58  
   REC-xml11-20060816, 57  
   REC-xmlbase-20010627, 58  
   REC-xpath-19991119, 59  
   REC-xsl-20061205, 58  
   REC-xsl11-20061205, 58  
   REC-xslt-19991116, 58  
   REC-xslt20-20070123, 58  
   WD-exi-20070716, 59  
   WD-SVG12-20050413, 25

WD-xquery-20030502, 57

xkms2, 92

xmlsig-core, 100

xmlenc-core, 104, 105

WAP Forum

WAP-238-WML-20010911-a, 58

Web Services Interoperability Organisation,  
53

BasicSecurityProfile-1.1-2010-01-24.html ,  
100

draft, 59

ws-i, 59, 59, 59, 59

World Meteorological Organisation

FM 92-IX Ext. GRIB, 39

fm94, 13

## **X**

X Consortium

X11R7.5, 44, 60

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