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NATO Interoperability
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Volume 2

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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	7
3.2. Technical Services	7
3.2.1. List of Core Enterprise Services	8
3.2.2. Community Of Interest (COI) Services	23
3.2.3. Communications Services	27
3.2.4. Cloud Services	36
Index	37

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List of Figures

3.1. C3 Classification Taxonomy	6
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1. INTRODUCTION

001. Volume 2 of the NISP focuses on agreed interoperability standards.

002. The NISP references Standards from different standardization bodies¹. In the case of a ratified STANAG, NATO Standardization procedures apply. The NISP only references these STANAG's without displaying the country-specific reservations. The country-specific reservations can be found in the NATO Standardization Agency Standards database.

003. The Combined Communications Electronics Board (CCEB) nations will use NISP Volume 2 Chapter 3 and Section 3.2 tables to publish the interoperability standards for the CCEB under the provisions of the NATO-CCEB List of Understandings (LoU)².

1.1. SCOPE

004. The scope of this volume includes:

- Identifying the standards and technologies that are relevant to a service oriented environment,
- Describing the standards and technologies to support federation.

¹In case of conflict between any recommended non-NATO standard and relevant NATO standard, the definition of the latter prevails.

²References: 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

005. Information technology has undergone 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 NATO and partner Nations as independent to viewing them as part of a continuously adapting network ecosystem fosters a rich information sharing environment.

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

007. 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 users and process architects to compose Services into processes, and then manage and evolve those processes, in a declarative fashion. Runtime execution of such processes is therefore a metadata-centric operation of a different kind of platform -- a Service-oriented composite application platform.

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

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

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3. STANDARDS

3.1. INTRODUCTION

010. This purpose of this chapter is to specify the NISP standards. The document organizes these standards into five service areas, following NATO's C3B Classification Taxonomy, as published on June 15, 2012. A graphical representation of this taxonomy is given in the following figure and a description of it can be obtained at: http://tide.act.nato.int/tidepedia/index.php?title=NATO_C3_Classification_Taxonomy

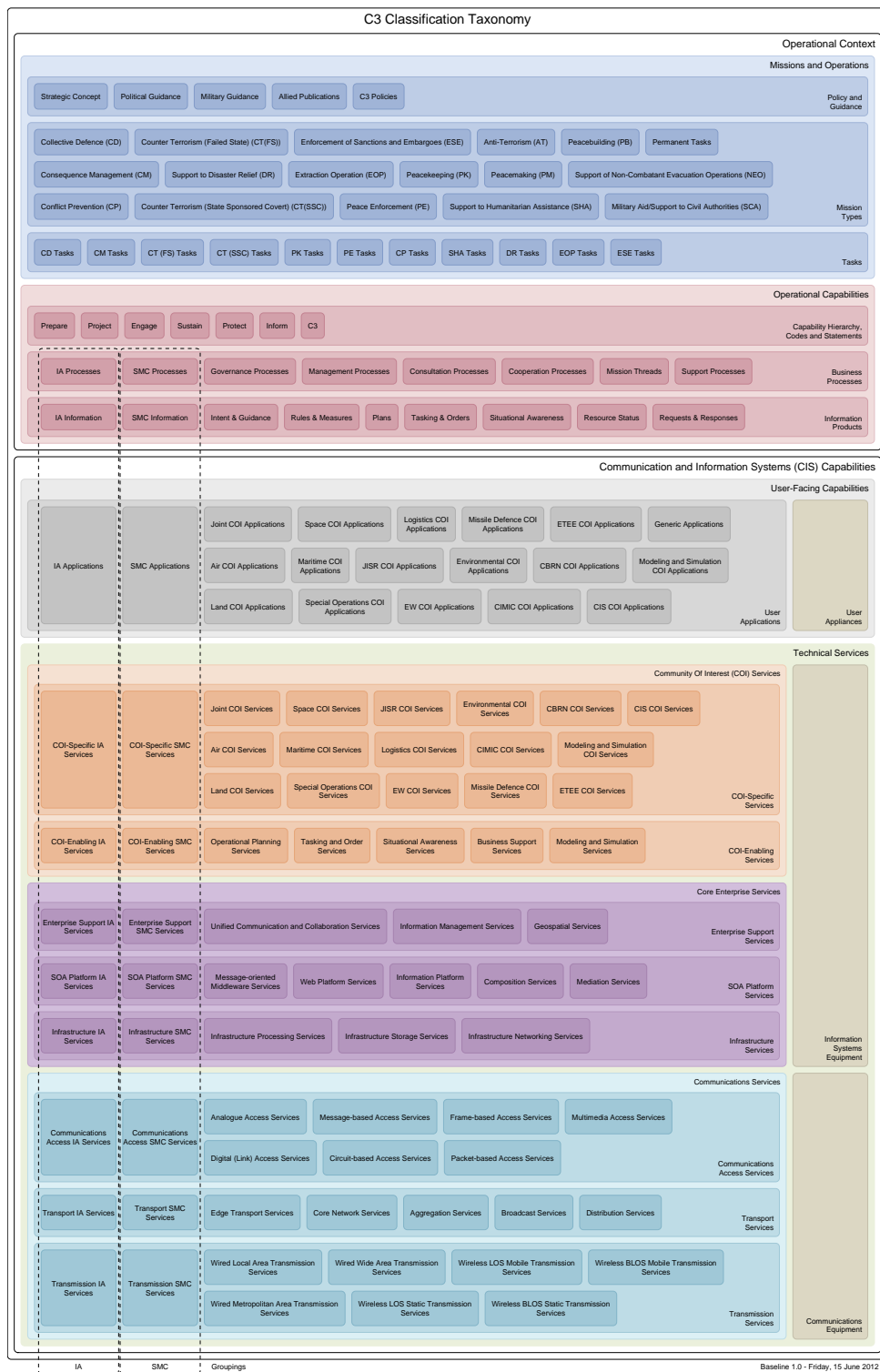


Figure 3.1. C3 Classification Taxonomy

011. This section describes the role and requirements of each service area, and presents all associated standards in tabular form. The tables refine each service area into one or more service

categories, with service components mapping to one or more mandatory, emerging 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

012. In principle, NISP only contains or references standards or related documents, which are generally available for NATO/NATO member nations/CCEB.

013. However, a subset of documents may only be available for those nations or organisations, which are joining a specific mission or are members of a special working group. The membership in these activities is outside the scope of NISP.

3.2. TECHNICAL SERVICES

014. 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.

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

016. 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.

017. 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. Currently, information services are based only on Core Enterprise Services (CES), but may be extended in the future.

018. 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.

019. 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.

020. 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.

3.2.1. List of Core Enterprise Services

Service	Standards
Core Enterprise Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Common Criteria (ISO/IEC 15408-1:2009, -2 to-3:2008) • Physical characteristics (ISO/IEC 7810:2003) • Integrated circuit(s) with electrical contacts (ISO/IEC 7816:2006) • 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) • Java Enterprise Edition Specification (JAVA EE v.7:2012), (JCP:2012) • Java Standard Edition 6 (JAVA SE v.6:2006), (JCP:2002) • JNLP v6.0:2011, JCP • JAVA Server Pages JSP v2.1:2009, JCP • JAVA Servlets v3.0:2009, JCP <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Community Security Requirements Statement abstract, v1.1 (NATO:2010) • Java Remote Method Invocation (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)
Enterprise Support Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Semantics of Business Vocabulary and Business Rules, Vers. 1.0 (SBVR); OMG 2008
Unified Communication and Collaboration Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Media Gateway Control Protocol v3(ITU-T H.248.1:2005) • Advanced Distributed Learning (ADL) (STANAG 2591:2013) • PDF 1.7/A (ISO 32000-1:2008) • Rich Text Format (RTF) v.1.9.1:2007 (MS) • ASCII Text, ISO 646:1991 • UTF-8 (IETF RFC 3629:2003) • Document Object Model (DOM) Level 3:2004 (MS) • Office XP formats:2003 (MS) • OpenDocument (ODF) ISO/IEC 26300:2006 • Office Open XML, ISO/IEC 29500:2012 • HTML 4.01 (ISO/IEC 15445:2000) • HTML 4.01 (RFC 2854:2000)

Service	Standards
	<ul style="list-style-type: none"> • Data Form (XMPP Standards Foundation, XEP-0004:2007) • Data Form (Service Discovery, XEP-0030:2007) • XMPP (IETF RFC 6120:2011 - 6121:2011) • Multinational Videoconferencing Services (ACP 220:2008) • Narrow-band visual telephone systems and terminal equipment (ITU-T H.320:2004) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Synchronized Multimedia Integration Language (SMIL 3.0):2008 (W3C) • Office Open XML, ed.1 (ECMA-376) • HTML 5.0 (W3C ED html5:2012) <p><i>Fading</i></p> <ul style="list-style-type: none"> • Document Object Model (DOM) Level 2 (MS) • Office 2000 formats: Office XP
Audio-based Collaboration Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Packet-based Multimedia Comms System (ITU-T H.323:2009) • G.722.1C 14kHz audio codec (ITU-T G.722.1 Annex C:2012)
Formal Messaging Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Military Messaging (STANAG 4406 Ed.2:2006) • ADatP-3(A), CONFORMETS (STANAG 5500, ed. 7:2010) • APP-11(C) Change 1, NATO Message Catalogue (STANAG 7149 ed.5:2010) • Interoperability of Low-Level Ground-based Air Defence Surveillance, Command and Control Systems (STANAG 4312 Part I, ed.2:2009) • S/MIME with Encrypted Security Service (ESS) (IETF RFCs 3850:2004, 3851:2004) • Military Messaging (STANAG 4406 Ed.2:2006) • Nato Secondary Imagery Format (NSIF), STANAG 4545 ed.2:2013 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • APP-11(D) • ITU-T X.411:1999 • SOAP Messages with Attachments (SwA) Profile 1.1:2006 (OASIS) • MMHS Header Fields for use in SMTP (IETF RFC 6477:2012) <p><i>Fading</i></p>

Service	Standards
	<ul style="list-style-type: none"> • X.400:1993
Informal Messaging Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • SMTP (IETF RFCs 1870:1995, 1985:1996, 2034:1996, 2821:2001, 2920:2000, 3207:2002, 3461:2003 updated by 3798:2004, 3885:2004, 4954:2007, 5321:2008, 5322:2008) • POP3 (IETF RFC 1939:1996 updated by 1957:1996, 2449:1998) • IMAP4 (IETF RFC 3501:2003 updated by 4466:2006, 4469:2006, 4551:2006, 5032:2007, 5182:2008, 5738:2010) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • eSMTP (IETF RFC 3030:2000)
Application Sharing Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Data Protocols for Multimedia Conferencing (ITU-T T.120:2007, T.128:2008)
Fax Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Fax G.3, ITU-T T.4:2003 • Fax Transmission, ITU-T T.30:2005 • TDF (STANAG 5000 ed.3:2006) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Fax Relay for IP Networks, ITU-T T.38:2010
Document Sharing Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • ITU Multi-point still image and Annotation Conference Protocol Spec (ITU-T T.120:2007), T.126:2007 (Reference to T.122 - T.125) • HTTP Extensions for Web Distributed Authoring and Versioning (WebDAV) (IETF RFC 4918:2007)
Enterprise Support IA Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • SAML Token Profile 1.1:2006 (OASIS) • WS-Security Utility 1.0:2001 (OASIS) • WS-Trust 1.4:2007 (OASIS) • Basic Security Profile Version 1.1:2010 (WS-I) • NPKI Certificate Policy (CertP), AC/322D(2004)0024REV2 • Machine readable passport (ISO/IEC 7501-1:2008) <p><i>Emerging</i></p>

Service	Standards
	<ul style="list-style-type: none"> • Common Biometric Exchange Formats Framework (CBEFF) • DOD EBTS 8.1 (FBI IAFIS-DOC-01078-8.1: 2008) <p><i>Fading</i></p> <ul style="list-style-type: none"> • NC3 Repository
Enterprise Support Guard Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • XML Confidentiality Label Syntax (FFI 00961:2010) • Binding of Metadata to Data objects (FFI 00962:2010) • NATO XML Labelling version 1.0 (Ref:-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".) • ACP 145(A) - Interim Implementation Guide for ACP 123/STANAG 4406 Messaging Services Between Nations - dated September 2008 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Binding of Metadata to Data Objects (NC3A TN 1455)
Geospatial Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Additional military Layers for digital geospatial data products (AML), STANAG 7170 ed.3:2015 • DIGEST V2.0 and DIGEST V2.1, STANAG 7074 ed.2:1998, AgeoP-3 (VMaps, USRP, ASRP) • DTED (STANAG 3809 ed.4:2006) • Spatial Schema ISO 19107:2003, DGIWG/TSMAD profiles of ISO 19107 • Methodology for feature cataloguing ISO 19110:2005 • Spatial Referencing by geographic identifiers ISO 19112:2003 • Simple Feature Access, ISO 19125-1:2004 and ISO 19125-2:2004 • Geographical Tagged Image Format (GeoTIFF) v.1.8.2 (OS-GEO:2000) • Compressed ARC Digitized Raster Graphics (CADRG), STANAG 7098 ed.2:2004) • GML 3.2.1 (OGC:2007) • GML Simple Feature Profile v2.0 (OGC 10-100r2:2010) • OpenGIS City Geography Markup Language (CityGML) v1.0 (OGC:2008) • DLMS/DFAD1, Mil-PRF-89005:1994 (NGA) • World Geodetic System (WGS) 84 (NIMA TR 8350.2:2004) • Geographic Information - Metadata - ISO 19115:2003

Service	Standards
	<ul style="list-style-type: none"> • NATO Geospatial Metadata Profile (STANAG 2586 ed.1:2013) • WECDIS (STANAG 4564 ed.2:2007) • SEDRIS (ISO/IEC 18023-1:2006) • EDCS (ISO/IEC 18025:2005) • SRM (ISO/IEC 18026:2009) • Geodetic Projections, STANAG 2211 ed.6:2001 • KeyholeMarkup Language (KML) v.2.2:2008 (OGC 07-147r2) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Filter Encoding v2.0 (OGC 09-026r1:2010) • Geospatial Data Abstraction Library (GDAL:2013) • Open Esri GeoServices REST specification, v.1.0:2010 • OpenGIS Web Processing Service (WPS), v.1.0.0:2007 (OGC) <p><i>Fading</i></p> <ul style="list-style-type: none"> • GML v3.1 (ISO 19136:2007) • ESRI Shapefile Specification (ESRI:2008)
Geospatial Information Provision Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • OpenGIS Web Map Tile Service Implementation Standard (WMTS 1.0.0) (OGC 07-057r7)
Geospatial Coordinate Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Coordinate Transformation Services (OGC 01-009:2001)
Information Management Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • AVDL • EDXL-DE
Enterprise Search Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Dublin Core Metadata Element Set (DCES) (ISO 15836:2009) • NATO TIDE Information Discovery (Request-Response), v.2.3.0:2009 (ACT)
Infrastructure Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • X Window X11R7.5:2009, (X.Org) (see UI Svc) • FTP (IETF STD 9:1985, IETF RFC 0959:1985 updated by RFC 2228:1997, 2640:1999, 2773:2000, 3659:2007) • RTP (IETF RFC 3550:2003) • Telnet (IETF STD 8:1983, IETF RFC 0854:1983 updated by RFC 5198:2008, 0855:1983)

Service	Standards
	<ul style="list-style-type: none"> • Network News Transfer Protocol NNTP (IETF RFC 3977:2006) • Network Time Protocol (NTP)(RFC 5905:2010) • Simple Network Time Protocol (SNTP)(RFC 2030:1996) • MPEG-2 (ISO/IEC 13818:2000) • MPEG-4 (ISO/IEC 14496:2004) • UDF 1.0.1 (ISO/IEC 13346:1995) • Pulse Code Modulation (PCM) (ISO/IEC 11172-3:1993, ITU-T G.711:1988) • 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.729:2012) • Internet Low Bitrate Coding (iLBC) (IETF RFC 3951:2004) • H.263 (ITU-T H.263:2005) • H.264 (ITU-T H.264:2012) • GSM-Modulation (GSM 06.10, GSM 06.20 v.8.1.1:1999) • Code Excited Linear Prediction coding (CELP) (FS 1016:1991) • Mixed Excitation Linear Predictive coding (MELPe) (STANAG 4591 ed.1:2008) • Parameters and Coding Standards for 800 bps. Digital Speech Encoder/Decoder (STANAG 4479 ed.1:2002) • BIIF (ISO 12087-5:1998) • NSILI (STANAG 4559 ed.3:2010) • NIIRS (STANAG 7194 ed.1:2009) • NADSI (STANAG 4575 ed.3:2009) • GMTIF (STANAG 4607 ed.3:2010) • DMIS (STANAG 4609 ed.3:2009) • NPIF (STANAG 7023 ed.4:2009) • AR-TRI (STANAG 7024 ed.2:2001) • Exchange of Imagery (STANAG 3764 ed.6:2008) • Implementing JPEG 2000 in NITFS/BIIF/NSIF (ISO 10918-4:1999) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • DCE DFS v1.1:1997 (The Open Group) • RMI-IIOP 1.5.0:2005 (SUN) • SRTP (IETF RFC 3711:2004) • RTCP Attributes in SDP(IETF RFC 3605:2003) • UDF 2.0.1 • NIIRS - AIntP-7 (STANAG 7194 ed.2 (Draft)) • NADSI (STANAG 4575 ed.4 (RD)) <p><i>Fading</i></p> <ul style="list-style-type: none"> • MS-DCOM v.12.0:2010 (MS)

Service	Standards
	<ul style="list-style-type: none"> • MPEG-1 (ISO/IEC 11172:1996) • Delta-Modulation DM, EUROCOM D/0
Infrastructure IA Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Allied Naval and Maritime Air Communication Instructions (ACP 176 NATO Supp 1:1967) • S/MIME (IETF RFC 5751:2010)
Infrastructure Guard Services	
Infrastructure SMC Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Open Services Infrastructure (OpenSiS) v.1.9.5.6, OpenSIS
Infrastructure Net-working Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • 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) • X/Open Network File System (XNFS) v.3W:1998 (The Open Group) • Server Message Block (MS-SMB) v20100711:2010 (MS) • Default Address Selection for Internet Protocol Version 6 (IPv6) (RFC 6724:2012) • VDSL2
Distributed Time Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Working with Time Zones (W3C Note-timezone:2005) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • DCE DTS v1.1:1995 (The Open Group)
Domain Name Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • DNS (IETF STD 13:1987, RFC 1034:1987 and RFC 1035:1987 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) • Dynamic Host Configuration Protocol, DHCP (RFC 2131:1997 updated by RFC 3396:2002, 4361:2006, 5494:2009) <p><i>Emerging</i></p>

Service	Standards
	<ul style="list-style-type: none"> • End-to-End Network – Internet Protocol Framework (NETIP), STANAG 4731 (Draft) • DNSSEC (IETF RFC 4025 - 4033:2005) • mDNS (IETF RFC 6762) • IPSec Material in DNS (RFC 4025:2005) • DNS Configuration Options for DHCPv6 (RFC 3646:2003) • NIS-Options for DHCPv6 (RFC 3898:2004)
Host Configuration Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • DHCP for IPv6 (RFC 3315:2003 updated by 4361:2006, 5494:2009) • IPv6 Prefix Options for DHCPv6 (RFC 3633:2003) <p><i>Fading</i></p> <ul style="list-style-type: none"> • DHCP Options and BOOTP Vendor Extensions not to be used in new systems
Data Transfer Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • FTP Extensions for IPv6 and NATs (IETF RFC 2428:1998)
Infrastructure Processing Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Open Virtualisation Format (OVF) v.2.0.1 (DMTF DSP0243:2013) • X Window System 11 R7.5:2009 <p><i>Fading</i></p> <ul style="list-style-type: none"> • US DoD HCI Style Guide Version 4.0 Dec 2000 not for use in new systems
File System Storage Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Compact Disc File System (CDFS) (ISO 9660:1988)
Relational Database Storage Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • SQL 3 (ISO/IEC 9075(-1 to -14):2008) • ODMG 3.0:2000 (ODMG) • ODBC 3.8 (MS) • JAVA DBC version 4.1:2006 (JDBC) • Distributed RDA (DRDA), v.5 (The Open Group) • SQL CLI (ISO/IEC 9075-3:2008) • DEM (Data Replication Mechanism from MIP baseline) 3.1:2011 • Rules for application schema ISO 19109:2005 • Joint C3 Information Exchange Data Model (MIP BL 3.1.4: 2012; MIP JC3IEDM 3.1.4:2012)

Service	Standards
	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Exchange Mechanism from MIP 4 • ASTERIX, ed.1 (ADatP-35:2010) • MIP Information Model <p><i>Fading</i></p> <ul style="list-style-type: none"> • 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. • JDBC separated from ODBC • C2 Information Exchange Data Model (C2IEDM) and Data Exchange Mechanism (DEM) • NATO Corporate Data Model v2 (ADatP-32)
Directory Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Common Directory Services and Procedures (ACP 133D:2009) • Common Directory Services and Procedures Supplement (ACP 133 Suppl.1ed.A:2009) • LDAP v3 (NATO LDAP Profile) • LDIF (IETF RFC 2849:2000) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • LDAP: String Representation of Distinguished Names:2006 (IETF) • DSML v2.0:2002, OASIS <p><i>Fading</i></p> <ul style="list-style-type: none"> • ACP 133C • DSP (ITU-T X.500:2008) • DSIP (ITU-T X.500:2008) • DOP (ITU-T X.500:2008)
SOA Platform Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • ebRIM v3.0:2005 (OASIS) • WS-I Web Service Basic Profile, v1.1:2nd ed. 2006 • Simple Object Access Protocol v1.1 (SOAP), W3C • WS-Addressing 1.0 - Metadata:2007 • WS-Addressing 1.0 - SOAP Bindings:2006 <p><i>Emerging</i></p>

Service	Standards
	<ul style="list-style-type: none"> • AtomPub (IETF RFC 5023:2007) • Web Services Business Process Execution Language (WSBPEL) v.2:2007, OASIS • Business Process Model and Notation (BPMN) v.2.0:2010 • WS-I Web Service Basic Profile, v1.2:3rd ed. 2007 • WS-I Web Service Basic Profile, v2.0 2010 • Simple Object Access Protocol v1.2 (SOAP), W3C • WS-I Simple SOAP Binding Profile v1.0:2004 • WS-I Attachments Profile v1.0:2nd ed. 2006 • WS-Addressing v1.0 - Core:2010 • WS-Notification v1.3:2006 • WS-BrokeredNotification v1.3:2006 • WS-Topics v1.3:2006 • Representational State Transfer (REST):2002, (ACM)
Mediation Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Enhanced Security Services (ESS) for S/MIME, STANAG 4631 Ed.1:2008 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Services to Forward Friendly Force Information to Weapon Delivery Assets (STANAG 5528 ed.1 (Study))
Data Format Transformation Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • XML Path Language (XPath) v2.0:2003, W3C <p><i>Emerging</i></p> <ul style="list-style-type: none"> • XQuery 1.0:2003, W3C
Composition Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Unified Modeling Language (UML) v2.2:2009 (OMG)
Choreography Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • Web Service Choreography Interface (WSCI) v.1:2002
Message-oriented Middleware Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • SOAP Message Security 1.1:2004 (OASIS) • WS-ReliableMessaging v1.2:2009 (OASIS) • WS-Reliable Messaging 1.2 <p><i>Emerging</i></p>

Service	Standards
	<ul style="list-style-type: none"> • SOAP Message Security 1.2:2001 (W3C)
Web Platform Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • HTTP v. 1.1 (IETF RFC 2616:1999 updated by TLS (RFC 2817:2000), URL (RFC 4248:2005, 4266:2005), URI (RFC 3986:2005) • HTTPS (IETF RFC 2818:2000) • Cascading Style Sheets (CSS) 2.1 (W3C css-lev2:2001) • Wireless Markup Language (WML) 2.0:2001 • XML 1.0 5th ed:2008, W3C • XLink 1.0:2001, W3C • XPointer 1.0:2001, W3C • XML Base:2001, W3C • XMI ed.1:2001 (ISO/IEC 19503:2005) • XML Infoset:2001, W3C • XSL Association:1999, W3C • Namespaces in XML (xml-names-19990114:1999) W3C • Extensible Stylesheet Language Transformation (XSLT) Version 2.0 (W3C:2007) • Extensible Stylesheet Language (XSL) 1.0:2001 • XML Schema, Part 1-2:2004 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Content-ID and Message-ID URLs (IETF RFC 2392:1998) • HTTP State Change Mgmt. (IETF RFC 2965:2000) • Cascading Style Sheets (CSS) level 3 • XML 1.1 2nd ed:2006, W3C • XLink 1.1:2012, W3C • Relax NG (ISO/IEC 19757-2:2008) • Extensible Stylesheet Language (XSL) 1.1:2006 • Efficient XML Interchange Format (EXI) v1.0
Web Hosting Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Web-Services Security Profile (WSS), v1.0 (OASIS) • WS-Security Policy, v1.3:2009 (OASIS) • Security Assertion Markup Language, SAML v2.0 (OASIS) • XKMS 2.0 (W3C):2005 • Public-key and attribute certificate frameworks, X.509 v3:2008 (ITU-T)
Portlet Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Java Portlet Specification v.1.0, JSR 168:2003 (JCP)

Service	Standards
	<ul style="list-style-type: none"> • Remote Portlet Specification v1.0, WSRP 1.0:2003(OASIS) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Java Portlet Specification v.2.0, JSR 286:2008 (JCP) • Remote Portlet Specification v2.0, WSRP 2.0:2008(OASIS)
SOA Platform SMC Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • CIM Schema v2.30.0 (DMTF) • CMDB Federation Specification v1.0.1 (DMTF) • ITIL (ISO/IEC 20000:2012) • COBIT 5: A Business Framework for the Governance and Management of Enterprise IT (ISACA: 2012) • SNMPv3 Applications (IETF RFC 3413:2002) • Message Processing and Dispatching for the SNMP (RFC 3412:2002 updated by 5590:2009) • User-based Security Model (USM) for SNMPv3 (RFC 3414:2002 updated by 5590:2009) • View-based Access Control Model (VACM) for the SNMP (RFC 3415:2002) • Structure of Mgt Info (IETF Std 16:1990, IETF RFC 1155:1990 and 1212:1991) • Architecture for SNMP Mgt Frameworks (RFC 3411:2002 updated by 5343:2008, 5590:2009) • MIB II (IETF Std 17:1991, RFC 1213:1991 updated by 4293:2006, 4022:2005, 4113:2005) • Host Resources MIB (IETF RFC 2790:2000) • Defs of Mgt Objects for the Ethernet-like Interface types (IETF RFC 2666:1999, 3635:2003, 3638:2003) • RMON MIB v. 1 (RFC 2819:2000) • OSPF MIB v.2 (RFC 4750:1996) • RIP-2 MIB (RFC 1724:1994) • 802.1p (IEEE:2004) • Performance objectives and procedures for provisioning and maintenance of IP-based networks (ITU-T M.2301:2002) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • WS-Management v1.0 (DMTF) • WS-Management CIM Binding Specification, v1.0.0 (DMTF) • enhanced Telecom Operations Map (eTOM, rel. 13:2012 (TM-Forum)) • Configuration Management Database (CMDB) Federation Specification (DMTF DSP0252: 2009)

Service	Standards
	<ul style="list-style-type: none"> • IPv6 MIB (IETF RFC 4293:2006) • ICMPv6 MIB (IETF RFC 4293:2006) • Multicast Group Membership Discovery MIB (IETF RFC 5519:2009) • IPv6 MIB for TCP (IETF RFC 4022:2005) • IPv6 MIB for UDP (IETF RFC 4113:2005) • RMON 2 MIB (RFC 4502:2006) • Common Information Model (CIM) (DMTF:1999) <p><i>Fading</i></p> <ul style="list-style-type: none"> • SNMPv1 (IETF Std 15) not for new systems • CMIS (ISO 9595:1998) deleted in NISP v.1 • CMIP (ISO/IEC 9596-1:1998) deleted in NISP v.1 • CMIP PICS (ISO/IEC 9596-2:1993) deleted in NISP v.1 • GDMO (ISO/IEC 10165-4:1996) deleted in NISP v.1
Service Discovery Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Universal Description, Discovery and Integration (UDDI) 3.0, W3C • Electronic Business Extensible Markup Language (ebXML) ISO/TS 15000-1:2004, -2:2004, -3:2004, -4:2004, -5:2005 • ebXML Registry Services and Protocols, v.3.0:2005 (OASIS) • NATO TIDE Service Discovery (Subscribe-Publish), v.2.2.0:2008 (ACT) • WSDL v1.1:2001, W3C <p><i>Emerging</i></p> <ul style="list-style-type: none"> • UDDI API Spec v.2, OASIS:2002 • ebXML Messaging Service v. 2.0:2002 (OASIS) • WS-Discovery v.1.1:2009, OASIS • TIDE Service Discovery, v.2.2.0:2008 (ACT) • DNS-Based Service Discovery (DNS-SD):2013 (IETF) • WSDL v2.0:2007 Part 1: Core Language, W3C
SOA Platform IA Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Key Wrap Advanced Encryption Standard 128 (AES 128, NIST FIPS 197) • IP ESP (RFC 4303:2005) • Digital Signature Algorithm 1024 (DSA-1024, NIST FIPS 186-2 with Change Notice 1, Oct 2001) • RSA 2048 (PKCS#1 v2.1 RSA Cryptography Standard, RSA Laboratories, June 2002)

Service	Standards
	<ul style="list-style-type: none"> • Secure Hash Algorithm 256 (SHA-256, NIST FIPS 180-2 with Change Notice 1, Feb 2004) • XML Encryption Syntax and Processing, W3C:2002 • XML Signature (W3C):2008 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Key Wrap Advanced Encryption Standard 256 (AES 256, NIST FIPS 197) • NINE ISpec v1.0.3 (NATO) • Elliptic Curve Digital Signature Algorithm (ECDSA 384, NIST FIPS 186-2 with Change Notice 1, Oct 2001) • Secure Hash Algorithm 384 (SHA-384, NIST FIPS 180-2 with Change Notice 1, Feb 2004) <p><i>Fading</i></p> <ul style="list-style-type: none"> • Digital Signature Algorithm (original version) not for new systems • Secure Hash Algorithm (SHA-1), NIST FIPS 180-1 replaced by SHA-256
SOA Platform Guard Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • TLS v1.2 (IETF RFC 5246:2008) • SSH v.2 (IETF RFC 4250-4256:2006)
Security Token Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • WS-Policy v1.5:2007 (OASIS) • WS-Policy 1.5 - Guidelines (OASIS:2007) • WS Policy 1.5 - Primer (OASIS:2007) • WS-Federation v1.2 (OASIS) • Radius, IETF RFC 2865:2006 updated by RFC 2868:2000, 3575:2003, 5080:2007 • Identification of Issuers (ISO 7812:2007) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Radius and IPv6, IETF RFC 3162:2001 • Kerberos v.5, IETF RFC 1510:1993 • The Kerberos v5 Simple Authentication and Security Layer (SASL) Mechanism, IETF RFC 4752:2006 • Single sign on (SSO, the Open Group) • X.509 Public Key Infrastructure Certificate and CRL Profile (IETF RFC 5280:2008)

Service	Standards
Policy Decision Point (PDP) Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • XACML v2.0:2008 (OASIS) • Biometrics Data, Interchange, Watchlisting and Reporting (STANAG 4715 ed.1:2013) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • NPKI Certificate Policy (CertP), AC/322D(2004)0024REV2 • XACML v3.0:2010 (OASIS) • DOD EBTS 1.2 (DoD: 2000) • DOD EBTS 2.0 (DoD: 2000) • Data Format for the Interchange of Fingerprint, Facial, and Scan Mark and Tattoo (SMT) Information (ANSI ITL-1: 2000) • Biometric data interchange formats -- Part 2 (ISO 19794-2:2007) • Biometric data interchange formats -- Part 5: Face Image Data (ISO 19794-5) • Biometric data interchange formats -- Part 6: Iris Image Data (ISO 19794-6)
Information Discovery Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • SPARQL 1.1 Query Language:2012 (W3C) • Web Ontology Language (OWL):2009, W3C <p><i>Emerging</i></p> <ul style="list-style-type: none"> • OpenSearch 1.1, OpenSearch • ISAF Minimum Metadata Implementation Policy (NATO:2010) • OWL-S
Metadata Repository Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • XML Encryption (W3C):2008 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • NATO Metadata Registry and Repository (NMRR) (NC3A TN-1313:2008) • WS-Metadata Exchange:2010, W3C
Information Access Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Resource Description Framework (RDF):2004 (W3C) • Atom Syndication Format (IETF RFC 4287) • XHTML 1.0:2002 (W3C) • SGML (ISO 8879:1986)

Service	Standards
	<ul style="list-style-type: none"> • MIME (IETF RFC 2045:1996 updated by 2184:1997, 2231:1997, 5335:2008; 2046:1996 updated by 3676:2004, 3798:2004, 5147:2008; 2047:1996 updated by 2184:1997, 2231:1997, 5338:2008; 2049:1996; 4288:2005; 4289:2005) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Real Simple Syndication (RSS 2.0) (WS-I:2010) • GeoRSS (GeoRSS 1.0):2007 (OGC) • XForms 1.0:2003 (W3C) • S/MIME ESS (IETF RFC 3850:2004, 3851:2004) • MIME Encapsulation of Aggregate Documents, such as HTML (MHTML):1999 (IETF)

3.2.2. Community Of Interest (COI) Services

Service	Standards
COI-Enabling Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • CDIF (EIA/IS-106 to 118:1994) • Codes for the representation of Currencies and Funds (ISO 4217:2008) • ECMA Script Language Specification (ECMA 262) ed.3:2009 • ECMA Script XML Specification (ECMA 357) ed.3:2009 • Zip • Universal Multiple Octet Coded Char Set (UCS) - Part 1 (ISO/IEC 10646:2003) • NATO Standard Bar Code Symbology (STANAG 4329 ed.4:2010) • Bar code symbology specification - Code 128 (ISO/IEC 15417:2007), Bar code print quality test specification -Linear symbols (ISO/IEC 15416:2000) • Representation of Dates and Times (ISO 8601:2004) • Date and Time Formats (W3C NOTE-datetime:1998) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Unified Profile for DoDAF and MODAF (UPDM v.2):2008 (OMG) <p><i>Fading</i></p> <ul style="list-style-type: none"> • 7-bit Coded Character-set for Info Exchange (ASCII) (ISO/IEC 646:1991) • 8-bit Single-Byte Coded Graphic Char Sets (ISO/IEC 8859-1-6,8-10:1999; 7:2003)

Service	Standards
Symbology Services	<p data-bbox="485 318 632 353"><i>Mandatory</i></p> <ul data-bbox="485 389 1402 1570" style="list-style-type: none"> • 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) • WebCGM (Web Computer Graphics Metafile), W3C REC 20011217, 2001 • SVG 1.2:2005 (W3C) • Mobile SVG Profiles: SVG Tiny and SVG Basic, W3C REC 20030114, 2003 • Tagged Image File Format for image technology (TIFF) (ISO 12639:1998) • NVG - NATO Vector Graphics Protocol v.1.5:2010 (ACT) • Controlled Imagery Base (CIB, STANAG 7099 ed.2:2004), • JPEG 2000 (ISO/IEC 15444-1:2004, ISO/IEC 15444-2:2004, ISO/IEC 15444-3:2007, including Amd 2:2003, ISO/IEC 15444-4:2004, ISO/IEC 15444-5:2003, ISO/IEC 15444-6:2003,) • PNG 1.0 (RFC 2083:1997) • Common Warfighting Symbology (Mil-Std 2525B) • Joint Symbology (APP-6(C)/STANAG 2019 ed.6:2011) • Telecommunications Symbology (STANAG 5042 ed1:1978) • IHO S-100, 2000 • Web Map Service (WMS) Implementation Specification v.1.3:2006 (OGC 06-042) • OpenGIS Styled Layer Descriptor Profile of the Web Map Service (SLD 1.1.0) (OGC 05-078r4) • Web Feature Service (WFS) v.1.1.0:2005 (OGC 04-094) • Web Coverage Service (WCS) v.2.0.1:2012 (OGC 09-110r4) • CSW-ebRIM Registry Service, Part 1: ebRIM profile for CSW v.1.0.1 (OGC 07-110r4:2009) • OpenGL v4.0:2010 <p data-bbox="485 1606 616 1641"><i>Emerging</i></p> <ul data-bbox="485 1677 1402 1928" style="list-style-type: none"> • Vector Markup Language (VML), W3C Note 19980513, 1998 (W3C) • TIDE Transformational Baseline 3.0:2009 (ACT) • NVG - NATO Vector Graphics Protocol v.2.0:2012 (ACT) • JPEG LS (ISO/IEC 14495:2003) • Multiresolution seamless Image Database (MrSid Res. 2) • Enhanced Compressed Wavelet (ECW 3.3)

Service	Standards
	<ul style="list-style-type: none"> • Raster product format (RPF) (NIMA):2010 • Common Warfighting Symbology (Mil-Std 2525C) • Portrayal ISO/DIS 19117:2005 • Web Feature Service (WFS) v.2.0:2009 (OGC 09-025r1) • WCS Implementation Specification v1.1.2 (OGC 07-067r5:2007) • GML in JPEG 2000 for Geographic Imagery (GMLJP2) v.1.0.0 (OGC 05-047r3:2006) • OGC GIS Web Terrain Service RFC v.05:2004 • Catalogue Service for the Web (CSW) v.2.0.2 (OGC) • OGC - ISO 19115:2003/ ISO 19119:2005 Application Profile for CSW 2.0 • Web Registry Service v.0.0.2:2001 (OGC Ref. 01-024r1) <p><i>Fading</i></p> <ul style="list-style-type: none"> • CGM (ISO/IEC 8632:1999) not for new systems • GIF (version 89a) not for new systems • IHO S-57 • WCS Implementation Specification v1.0 (OGC 03-065r6:2003) • Computer Graphics Interface (CGI ISO/IEC 9636:1991)
Track Management Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • JREAP, STANAG 5518 (RD) • ISO/IEC 8802-3:2000 (CSMA/CD) • ACP 190 (D) • ACP 190 (B) NATO Suppl 1A • ACP 190 (B) NATO Suppl 2 • SMADEF XML Rel.3.0.0 • Link-16 (STANAG 5516 ed.4:2008, J-Series) • Link-22 (STANAG 5522 ed.2:2008, J-Series) • Link-11 (STANAG 5511 ed.6:2008, M-Series) • SIMPLE (STANAG 5602 ed.4:2015) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Link-11 (STANAG 5511 ed.7:2008, M-Series) • Link-16 (STANAG 5516 ed.5:2009 RD, J-Series) • Link-22 (STANAG 5522 ed.3:2009 RD, J-Series) • Technical characteristics of the Link 22 TDL system (STANAG 4610 ed.1 (Draft)) • NFFI, STANAG 5527 (study) <p><i>Fading</i></p>

Service	Standards
	<ul style="list-style-type: none"> • SIMPLE (STANAG 5602 ed.3:2010)
Modeling and Simulation Services	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • OMG Systems Modeling Language (OMG SysML) Version 1.1, November 2008. SysML is a Systems Engineering standard.
Air Information Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Joint Brevity Words Publication (APP-7(E) Change 1, STANAG 1401 ed.14:2011)
Meteorology Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Specifications for Naval Mine Warfare Information and for Data Transfer - AMP 11 (STANAG 1116 ed.9:2010) • NATO Handbook of Military Oceanographic Information and Services(STANAG 1171 ed.9:2008) • Interoperability between Naval Mine Warfare Data Centres (STANAG 1456 ed.2:2010) • Warning and Reporting and Hazard Prediction of Chemical, Biological, Radiological and Nuclear Incidents (STANAG 2103 ed.10:2010) • Adoption of a Standard Ballistic Meteorological Message (STANAG 4061 ed.4:2000) • Adoption of a Standard Artillery Computer Meteorological Message (STANAG 4082 ed.3:2012) • Format of Requests for Meteorological Messages for Ballistic and Special Purposes (STANAG 4103 ed.4:2001) • Adoption of a Standard Target Acquisition Meteorological Message (STANAG 4140 ed.2:2001) • NATO Meteorological Codes Manual (STANAG 6015 ed.4:2005) • Adoption of a Standard Gridded Data Meteorological Message (STANAG 6022 ed.2:2010) • Binary Universal Form for the Representation of meteorological data (BUFR) (WMO FM 94:2002) • Gidded Binary (GRIB) (WMO:1994) • Simple Knowledge Organization System Reference (SKOS) (W3C:2002)
Logistics COI Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • EDIFACT (ISO 9735:2002) • RFID Application Interface, ISO 15961:2004 • RFID Data Encoding Rules, ISO 15962:2004 • RFID - Freight containers, ISO 17363:2007

Service	Standards
	<ul style="list-style-type: none"> • 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 • S2000M issue 4:2005, ASD-AIA-ATA • NATO Policy for Systems Life Cycle Mgmt (SLCM), C-M(2005)0108 <p><i>Emerging</i></p> <ul style="list-style-type: none"> • OAGIS 9.4.1:2009, OAGi • PLCS, ISO 10303-239:2005 • S1000D issue 4:2008, ASD-AIA-ATA
Sensor Planning Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Sensor Planning Service (SPS) (OGC 09-000:2011)
Modeling and Simulation COI Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • CORBA/IIOP 2.2:2009 (OMG) • Modeling and Simulation High Level Architecture (HLA) (IEEE 1516:2000) <p><i>Fading</i></p> <ul style="list-style-type: none"> • Distributed Interactive Simulation (DIS)(IEEE 1278.1a:1998)

3.2.3. Communications Services

Service	Standards
Communications Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Media Access Control (MAC) Bridges (IEEE 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) • Gigabit Ethernet, 1000BASE-LX10 (IEEE 802.3-2013) • Generic cabling for customer premises (ISO/IEC 11801:2002) • Optical Fibre Cables (ITU--T G.652:2009) • LC connectors with protective housings (IEC 61754-20:2012) • FDDI, ISO 9314:1989 • Characteristics of 1200/2400/ 3600 bps single tone modulators/demodulators for HF Radio links (STANAG 4285 ed.1:1989) • Non-Hopping Serial TONE HF Radio, STANAG 4415 ed.2:2015 (AComP-4415 ed.A)

Service	Standards
	<ul style="list-style-type: none"> • 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 • 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) • Profile for HF radio data communications (STANAG 5066 ed.3:2010) • Communication between Single Channel and Frequency Hopping Radios in VHF, STANAG 4292 ed.2:1987 • Have Quick STANAG 4246 ed.3:2009 • STANAG 4372 ed.3:2008 (Saturn) • Multi-Hop IP Networking with legacy UHF radios: Mobile ad-hoc Relay Line of Sight Networking (MARLIN), STANAG 4691 ed.1 (RD) • Super High Frequency (SHF) Military Satellite (MILSATCOM) jam-resistant modem (STANAG 4376 ed.1:1998) • Digital Interoperability between UHF Satellite Communications Terminals - Integrated Waveform (IWF), STANAG 4681 ed.1 <p data-bbox="480 1227 614 1261"><i>Emerging</i></p> <ul style="list-style-type: none"> • ZigBee 1.0 • WiBree • W-USB • IPv6 over Low-Power Wireless Personal Area Networks (6LoWPANs) • 5G • Mobile WiMax • IEEE 802.20 Mobile Broadband Wireless Access (MBWA) • IEEE Std 802.16e-2005 Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands • Broadband Radio Access Networks (BRAN); HiperMAN; Conformance Testing for the Network layer of HiperMAN/WiMAX terminal devices;Part 1: Protocol Implementation Conformance Statement (PICS) proforma • FLASH (Fast Low-latency Access with Seamless Handoff) OFDM (Orthogonal Frequency Division Multiplexing)

Service	Standards
	<ul style="list-style-type: none"> • RFC 3561 Ad hoc On-Demand Distance Vector (AODV) Routing, July 2003 • The Dynamic Source Routing Protocol (DSR)for Mobile Ad Hoc Networks for IPv4, February 2007 • ECMA-368: High Rate Ultra Wideband PHY and MAC Standard, 3rd Edition, December 2008 • Open Grid Services Architecture (OGSA) • Open Services Gateway Initiative (OSGi) • RFC 4460: Stream Control Transmission Protocol (SCTP) Specification Errata and Issues • OASIS: Common Alerting Protocol, v. 1.1, October 2005 • Multiple Spanning Trees (IEEE 802.1S:2004) • Automatic Radio Control System for HF Links STANAG 4538 ed.2 (Draft) • Interoperability Standard for Satellite SHF Deployable Terminals Control and Command Services (STANAG 4706:2013)
Transmission Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • MIDS terminals STANAG 4175 ed. 5 • TIA-530-A: High Speed 25-Position Interface for Data Terminal Equipment and Data Circuit-Terminating Equipment, Including Alternative 26-Position Connector (ANSI/TIA/EIA-530-A-92) (R98), June 1992 • Generic specification for optical wave-guide fibers (EIA 4920000:1997) • VLF and LF Broadcast OOK Systems, STANAG 5030ed.4:1995 • Extended range single and multi-channel VLF system, STANAG 4724 Ed.1(AComP-4724 Ed.A) <p><i>Fading</i></p> <ul style="list-style-type: none"> • MIDS terminals STANAG 4175 ed. 4:2009 • Single serial line interface (TIA-232-E:1991) • Electrical Characteristics of Balanced Voltage Digital Interface Circuits
Wireless LOS Mobile Narrowband Transmission Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Technical standards for single channel HF radio equipment, STANAG 4203 ed.3:2007 • Technical standards for single channel VHF radio equipment STANAG 4204 ed.3:2008 • Technical standards for single channel UHF radio equipment STANAG 4205 ed.3:2005

Service	Standards
	<ul style="list-style-type: none"> • Interoperability Standard for 25 kHz UHF/ TDMA/DAMA terminal Waveform STANAG 4231 ed.5:2011 • STANAG 4444 ed:2:2015 (Slow hop ECCM) • Overall Super High Frequency (SHF) Military Satellite COMMunications (MILSATCOM) interoperability standards (STANAG 4484 ed.3) <p><i>Fading</i></p> <ul style="list-style-type: none"> • STANAG 4444 ed.1:1999 (Slow hop ECCM) • Overall Super High Frequency (SHF) Military Satellite COMMunications (MILSATCOM) interoperability standards (STANAG 4484 ed.2:2003)
Wireless BLOS Static Wideband Transmission Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSATCOM) jam-resistant modem interoperability standards (STANAG 4606 ed.3) • Interoperability standard for Satellite Broadcast Services (SBS) (Draft) (STANAG 4622 ed.1) <p><i>Fading</i></p> <ul style="list-style-type: none"> • Super High Frequency (SHF) Medium Data Rate (MDR) Military Satellite COMMunications (MILSATCOM) jam-resistant modem interoperability standards (STANAG 4606 ed.1:2009)
Wireless BLOS Mobile Transmission Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Digital interoperability between EHF Tactical Satellite Communications Terminals (STANAG 4233 ed.1:1998) • EHF MIL SATCOM interoperability standards for medium data rate services STANAG 4522 ed.1:2006 • SHF MILSATCOM Non-EPM modem for services conforming to class-A of STANAG 4484 (STANAG 4485 ed.2) • 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) <p><i>Fading</i></p> <ul style="list-style-type: none"> • SHF MILSATCOM Non-EPM modem for services conforming to class-A of STANAG 4484 (STANAG 4485 ed.1:2002)

Service	Standards
	<ul style="list-style-type: none"> • 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)
Communications Access Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Tactical Communications, STANAGs 4637ed1:2009, STANAG 4638ed1:2009, 4639ed1:2009, 4640ed1:2009, 4643ed1:2009 4644ed1:2009, 4646ed1:2009, 4647ed1:2009 • ISDN: ITU-T G, I Series • Physical/electrical characteristics of hierarchical digital interfaces, ITU-T G.703 (11/2001) • Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels, ITU-T G.704 (10/1998) • Digital Video Broadcasting (DVB) (ETSI:2009) • Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.5:2011) • MIDS SSS-M-10001 • STANAG 7085 ed.3:2009 (IDL for Imaging Systems) • Link 11 STANAG 5511 ed.6:2008 • STANAG 4586 ed.3:2012 • STANAG 4175 ed.5 • Link 1 STANAG 5501 ed.7 (ATDLP-5.01 ed.A) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • UMTS (3GPP) • GPRS (3GPP) • Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 (STANAG 5616 ed.6 (RD)) • Link-11 (STANAG 5511 ed.7:2008) • STANAG 4586 ed.4 <p><i>Fading</i></p> <ul style="list-style-type: none"> • X.25 (1996, Cor.1:1998) • ITU-T E, P, Q, V Series • 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) • STANAG 4175 ed.4:2009

Service	Standards
	<ul style="list-style-type: none"> • Link 1 STANAG 5501 ed.5:2011 • Link 1 STANAG 5501 ed.6
Tactical Messaging Access Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Maritime Tactical Wide Area Networking (ACP 200) • 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 • Enhanced Digital Strategic Tactical Gateway (EDSTG) (STANAG 4578 ed. 2:2009) • NATO Multi-channel tactical digital Gateway (STANAG 4206: Ed.3:1999) • NATO Multi-channel tactical Gateway-Multiplex Group Framing Standards (STANAG 4207: Ed.3:2000) • Gateway Multichannel Cable Link (Optical), STANAG 4290 ed.1 • The NATO Military Communications Directory System, STANAG 5046 ed.4 <p><i>Fading</i></p> <ul style="list-style-type: none"> • STANAG 4249 replaced by the more fundamental STANAG 4206. • The NATO Military Communications Directory System, STANAG 5046 ed.3
Packet-based Access Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • IP packet transfer and availability performance parameters (ITU-T Y.1540:2011) • Network performance objectives for IP-based services (ITU-T Y.1541:2011) • Framework for achieving end-to-end IP performance objectives (ITU-T Y.1542:2006) • Quality of service ranking and measurement methods for digital video services delivered over broadband IP networks (ITU-T J.241:2005)
Call Management Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Session Initialisation Protocol (SIP) (IETF RFC 3261:2002, updated by 3265:2002, 3853:2004, 4320:2006, 4916:2007, 5393:2008, 5621:2009, 5626:2009, 5630:2009, 5922:2010)
Transport Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Differentiated Services Field (IETF RFC 2474:1998 updated by 3168:2001, 3260:2002)

Service	Standards
	<ul style="list-style-type: none"> • Configuration Guidelines for DiffServ Service Classes (RFC 4594:2006) • 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) • IS to IS intra-domain routing information exchange protocol (ISO/IEC 10589:2002) • Router Information Protocol (RIP v2) (IETF STD 56/RFC 2453:1998 updated by 4822:2007) • Border Gateway Protocol (BGP4) (RFC 4271:2006) • Multiprotocol Extensions for BGP-4 (RFC 4760:2007) • BGP Communities Attribute (RFC 1997:1996) • Capabilities Advertisement with BGP-4 (RFC 5492:2009) • Application of BGP-4 (RFC 1772:1995) • Protocol Independent Multicast Sparse Mode(PIM-SM) (RFC 4601:2006, updated by 5059:2008) • Multicast Source Discovery Protocol (MSDP) (RFC 3618:2003) • Generic Routing Encapsulation (GRE) (RFC 4023:2005, updated by 5332:2008) • Traditional IP Network Address Translator (RFC 3022:2001) • Router Information Protocol (RIP v2) MIB extension (RFC 1724:1994) • Classless Inter Domain Routing (CIDR) (RFC 4632:2006) • Mobile IPv4 (RFC 3344:2002 updated by 4721:2007) • Point to Point Protocol (PPP) Internet Protocol Control Protocol (IP-CP) (RFC 1332:1992 updated by 3241:2002, 4815:2007) • Layer 2 Tunneling Protocol (L2TP) (RFC 3308:2002) • Link Control Protocol (LCP) extensions (RFC 1570:1994 updated by 2484:1999) • Point to Point Protocol (PPP) (STD 51, RFC 1661:1994 updated by 2153:1997; 1662:1994, updated by 5342:2008) • PPP Challenge Handshake Authentication Protocol (CHAP) (RFC 1994:1996 updated by 2484:1999) • PPP Multilink (MP) (RFC 1990:1996) • Virtual Router Redundancy Protocol (VRRP), IETF RFC 3768:2004 • Winsock 2 (Revision 2.2) • TCP (IETF STD 7:1981, RFC 793:1981 updated by RFC 1122:1989, 3168:2001) • UDP (IETF STD 6:1980, RFC 0768:1980) • OSI transport svc over TCP/IP (RFC 2126:1997) • Space communications protocol specification (SCPS) - Transport protocol (SCPS-TP) (ISO 15893:2010)

Service	Standards
	<p data-bbox="485 318 614 349"><i>Emerging</i></p> <ul data-bbox="485 383 1399 1720" style="list-style-type: none"> • Internet Protocol Quality of Service (IP QoS), STANAG 4711 (Draft) • IP QoS for the NII, NC3A TN-1417 • OSPF for IPv6 (RFC 5340:2008) • RIPng for IPv6 (RFC 2080:1997) • Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing (RFC 2545:1999) • BGP Extended Communities Attribute (RFC 4360:2006) • BGP Support for Four-Octet Autonomous System (AS) Number Space (RFC 6793:2012) • 4-Octet AS Specific BGP Extended Community (RFC 5668:2009) • BGMP (RFC 3913:2004) • Simplified Multicast Forwarding (SMF) (RFC 6621:2012) • Protocol Independent Multicasting Dense Mode(PIM-DM) (RFC 3973:2005) • Stateless IP/ICMP Translation Algorithm (SIIT) (RFC 2765:2000) • Generic Packet Tunneling in IPv6 (RFC 2473:1998) • 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, 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; 2996:2000, 3097:2001, 3175:2001, updated by 5350:2008; 3181:2001, 3182:2001, 3209:2001 updated by 3936:2004, 4874:2007; 3210:2001, 3468:2003, 3473:2003 updated by 4003:2005; 3474:2003, 3476:2003, 3477:2003 4201:2005, 4783:2006, 4873:2007, 4874:2007, 5250:2008, 5420:2009) • IPv6 over PPP (RFC 5072:2007) <p data-bbox="485 1756 579 1787"><i>Fading</i></p> <ul data-bbox="485 1823 1238 1854" style="list-style-type: none"> • Transport Service (ISO 8072:1996)deleted in NCSP v.6
IP-based Transport Services	<i>Mandatory</i>

Service	Standards
	<ul style="list-style-type: none"> • Assigned Numbers (RFC 3232:2002) • IPv4 (STD 5, RFC 791:1981, 792:1981, 826:1982, 894:1984, 919:1984, 922:1984, 950:1985 updated by RFC 1112:1989, 2365:1998, 2474:1998, 2507:1999, 2508:1999, 2908:2000, 3168:2001, 3171:2001, 3260:2002, 3376:2002, 4604:2006, 4884:2007) • IPv6 (RFC 1981:1996, 2375:1998, 2460:1998, 2464:1998, 2467:1998, 2470:1998, 2491:1999, 2492:1999, 2497:1999, 2526:1999, 2529:1999, 2590:1999, 2710:1999 updated by 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, 4443:2006, 4489:2006, 4604:2006, 4861:2007, 4862:2007, 4884:2007, 4941:2007, 5095:2007, 5172:2007, 5494:2009) • IGMP v.3 (RFC 3376:2002 updated by 4604:2006) • 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) • IP Encapsulation (RFC 2003:1996) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Dual Stack IPv6 mobility support (RFC 5555:2009) <p><i>Fading</i></p> <ul style="list-style-type: none"> • Bootstrap Protocol, BOOTP (RFC 951:1985 updated by RFC 1542:1993, 2132:1997, 3442:2002, 3942:2004, 4361:2006, 4833:2007, 5494:2009) • Clarifications and Extensions for the Bootstrap Protocol (RFC 1542:1993)
Packet Routing Services	<p><i>Mandatory</i></p> <ul style="list-style-type: none"> • Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels, STANAG 5067 ed.1:2007 (RD) <p><i>Emerging</i></p> <ul style="list-style-type: none"> • Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels, STANAG 5067 ed.2 (Draft)

3.2.4. Cloud Services

Service	Standards
Virtualisation	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • ISO/IEC 17203:Information technology - Open Virtualization Format (OVF) specification
Cloud Computing	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • ISO/IEC 17788: Information technology - Cloud computing - Overview and vocabulary • ISO/IEC 17789: Information technology - Cloud computing - Reference architecture • ISO/IEC 17826: Information technology - Cloud Data Management Interface (CDMI) • ISO/IEC CD 17826: Information technology - Cloud Data Management Interface (CDMI) • ISO/IEC DIS 10986-1: Information technology - Cloud computing - Service level agreement (SLA) framework - Part 1: Overview and concepts • ISO/IEC NP 19086-2: Information technology - Cloud computing - Service level agreement (SLA) framework and Technology - Part 2: Metrics • ISO/IEC NP 19086-3: Information technology - Cloud computing - Service level agreement (SLA) framework and Technology - Part 3: Core requirements • ISO/IEC AWI 19941: Information Technology - Cloud Computing - Interoperability and Portability • ISO/IEC WD 19944: Information Technology - Cloud Computing - Data and their Flow across Devices and Cloud Services • ISO/IEC TR 30102: Information technology - Distributed Application Platforms and Services (DAPS) - General technical principles of Service Oriented Architecture
IT Infrastructure Management	<p><i>Emerging</i></p> <ul style="list-style-type: none"> • ISO/IEC 17963: Web Services for Management (WS-Management) Specification

Index

Symbols

3rd Generation Partnership Project, 31, 31

A

ACM

2002-REST-TOIT, 17

AeroSpace and Defence Industries

Association of Europe

S1000D-I9005-01000-00, 27

s2000m, 27

ANSI

incits-398, 11

ANSI/NIST

ITL 1-2000, 22

ATM-Forum

af-lane-0084.000, af-lane-0112.000, 31

af-pnni-0055.000, 31

af-sig-0061.000, 31

B

Bluetooth SIG

Core Version 4.0, 28

C

Chairman of the Joint Chiefs of Staff

SSS-M-10001, 31

Combined Communications and Electronic Board

ACP 133, 16

ACP 133 ed.C, 16

ACP 133 Suppl.1edA, 16

ACP 145(A), 11

ACP 176 NATO SUPPL-1, 14

ACP 190(D), 25

ACP 200, 32

ACP 220(A), 9

CompuServe

gif89a, 25

D

DMTF

cim_schema_v2300, 19

DSP0004, 20

DSP0226, 19

DSP0227, 19

DSP0243, 15

DSP0252, 19, 19

DoD

DIN: DOD_BTf_TS_EBTS_
Mar09_02.00.00, 22

DIN: DOD_BTf_TS_EBTS_
Nov06_01.02.00, 22

dodis, 15

MIL-STD 2525B, 24

mil-std-2407, 24

MIL-STD-2525C, 25

E

EBXML

ebTA, 20

ECMA

368, 29

ECMA-262, 23

ECMA-357, 23

ECMA-376, 9

Electronic Industries Association

IS-106, 23

RS-422/423, 29

RS-530, 29

TIA-232, 29

TIA/EIA-492000-A, 29

ERDAS

ecw, 24

ESRI

REST, 12

shapefile, 12

EUROCOM Specifications

D/0, 14

European Telecommunication Standardisation Institute

TS 102 624-1, 28

F

Federal Bureau of Investigation

IAFIS-DOC-01078-8.1, 11

G

Geospatial Data Abstraction Library

gdal, 12

Global Grid Forum

draft-ggf-ogsa-spec-1.5-011, 29

I

IEC

61754-20, 27

IEEE

802.15.4, 28

802.16e, 28, 28

802.1AB, 27

802.1D, 27

802.1p, 19

802.1Q, 27

802.1S, 27, 29

802.20, 28

802.3-2012, 27

P1278, 27

P1516, 27

IETF

draft-ietf-manet-dsr-09, 29

RFC 1212, 19

RFC 1213, 19

RFC 1332, 33

RFC 1510, 21

RFC 1519, 33

RFC 1570, 33

RFC 1643, 19

RFC 1661, 33

RFC 1724, 19, 33

RFC 1772, 33

RFC 1812, 33

RFC 1831, 14

RFC 1939, 10

RFC 1990, 33

RFC 1994, 33

RFC 1997, 33

RFC 2003, 35

RFC 2021, 20

RFC 2030, 13

RFC 2058, 21

RFC 2080, 34

RFC 2083, 24

RFC 2126, 33

RFC 2205, 33

RFC 2236, 35

RFC 2328, 33

RFC 2392, 18

RFC 2428, 15

RFC 2452, 20

RFC 2453, 33

RFC 2454, 20

RFC 2460, 35

RFC 2465, 20

RFC 2466, 20

RFC 2472, 34

RFC 2473, 34

RFC 2474, 32

RFC 2545, 34

RFC 2557, 23

RFC 2616, 18

RFC 2740, 34

RFC 2765, 34

RFC 2790, 19

RFC 2818, 18

RFC 2819, 19

RFC 2849, 16

RFC 2965, 18

RFC 3022, 33

RFC 3030, 10

RFC 3162, 21

RFC 3232, 35

RFC 3261, 32

RFC 3308, 33

RFC 3315, 15

RFC 3344, 33

RFC 3501, 10

RFC 3550, 12

RFC 3561, 29

RFC 3605, 13

RFC 3618, 33

RFC 3633, 15

RFC 3646, 15

RFC 3711, 13

RFC 3768, 33

RFC 3775, 34

RFC 3776, 34	ISO
RFC 3898, 15	10303-239, 27
RFC 3913, 34	12639, 24
RFC 3973, 34	15836, 12
RFC 3977, 13	15893, 33
RFC 4023, 33	19107, 11
RFC 4025, 15	19109, 15
RFC 4250, 21	19110, 11
RFC 4271, 33	19112, 11
RFC 4287, 22	19115, 11
RFC 4360, 34	19117, 25
RFC 4514, 16	19136, 12
RFC 4594, 33	19503, 18
RFC 4601, 33	32000-1, 8
RFC 4750, 19	4217, 23
RFC 4752, 21	8601, 23
RFC 4760, 33	8879, 22
RFC 4918, 10	9735, 26
RFC 4919, 28	ISO/IEC 19794-2:2011, 22
RFC 5023, 17	ISO/IEC 19794-5:2005, 22
RFC 5246, 21	ISO/IEC 19794-6:2011, 22
RFC 5280, 21	ISO/IEC
RFC 5492, 33	10021, 10
RFC 5519, 20	10165-4, 20
RFC 5555, 35	10589, 33
RFC 5568, 34	10646, 23
RFC 5668, 34	10918-4, 13
RFC 5905, 13	11172, 14
RFC 6477, 9	11172-3, 13
RFC 6621, 34	11801, 27
RFC 6724, 14	12087-5, 13
RFC 6762, 15	13818, 13
RFC 6763, 20	14443, 8
RFC 6793, 34	14495-1, 24
RFC 768, 33	14496, 13
RFC 791, 35	15408, 8
RFC 959, 12	15444, 24
STD 89, 35	15445, 8
Information Systems Audit and Control Association	15961, 26
Cobit 5, 19	15962, 26
International Hydrographic Organisation	17203, 36
S-100, 24	17363, 26
S-57, 25	17364, 27
	17365, 27

- 17366, 27
 17367, 27
 17788, 36
 17789, 36
 17826, 36
 17963, 36
 18026, 12
 26300, 8
 646, 8, 23
 7501-1, 10
 7810, 8
 7812, 21
 7816, 8
 8632, 25
 8802-3, 25
 8859, 23
 9075, 15, 15, 16
 9594-1, 16, 16, 16
 9594-8, 18
 9595, 20
 9596, 20, 20
 9636, 25
 AWI 19941, 36
 CD 17826, 36
 DIS 19086-1, 36
 DIS 9660, 15
 FCD 18023-1, 12
 FCD 18025, 12
 NP 19086-2, 36
 NP 19086-3, 36
 TR 30102, 36
 WD 19944, 36
- ITU
 G.726, 13
 G.729, 13
- ITU Standardisation
 EPQV, 31
 G. 993-2, 14
 G.652, 27
 G.703, 31
 G.704, 31
 G.722, 13
 G.722.1c, 9
 GI, 31
- H.248.1, 8
 H.263, 13
 H.264, 13
 H.320, 9
 H.323, 9
 J.241, 32
 M.2301, 19
 T.120, 10, 10
 T.30, 10
 T.38, 10
 X.25, 31
 X.411, 9
 Y.1540, 32
 Y.1541, 32
 Y.1542, 32
- J**
 Java Community Process
 JSR 168, 18
 JSR 206, 8
 JSR 245, 8
 JSR 270, 8
 JSR 286, 19
 JSR 315, 8
 JSR 342, 8
 JSR 56, 8
 JSR 66, 8
- L**
 Lizard Tech
 MG2, 24
- M**
 Microsoft, 33
 Application Note GC0165, 8
 MS Office 2000, 9
 MS Office XP, 8
 MS-SMB - 20130118, 14
 MSDN-ODBCPR, 15
 Multilateral Interoperability Program
 JC3IEDM, 15, 15
 MIM 2.0, 16
 MIP BL 4, 16

N**NATO**

- AC/322(SC/3)D(2007)0003-Rev5, 25
- AC/322-D(2004)0024REV2, 10, 22
- ACP 190(B) NATO Supp 1A, 25
- ACP 190(B) NATO Supp 2, 25
- APP-11, 9
- APP-11(D), 9
- C-M(2005)0108, 27
- c2iedm, 16
- com-sec-req, 8
- draft, 22
- NC3A-RD-2977, 11
- RTO-MP-IST-091, 11
- TIDE/NVG, 24
- TIDE/NVG20, 24
- TIDE/TIDE-ID-RR, 12
- TIDE/TIDE-ID-SP, 20, 20
- TIDE/TTB, 24
- TN-1313, 22
- TN-1417, 34
- NATO Standardization Office**
- STANAG 1116, 26
- STANAG 1171, 26
- STANAG 1401, 26
- STANAG 1456, 26
- STANAG 2019, 24
- STANAG 2103, 26
- STANAG 2211, ed. 6, 12
- STANAG 2586, 12
- STANAG 2591, 8
- STANAG 3764, 13
- STANAG 3809, 11
- STANAG 4061, 26
- STANAG 4082, 26
- STANAG 4103, 26
- STANAG 4140, 26
- STANAG 4175 ed.4, 29, 31
- STANAG 4175 ed.5, 29, 31
- STANAG 4203 ed.3, 29
- STANAG 4204 ed.3, 29
- STANAG 4205, 29
- STANAG 4206 ed.3, 32, 32
- STANAG 4207 ed.3, 32
- STANAG 4214 ed.2, 32
- STANAG 4231 ed.4, 30
- STANAG 4233, 30
- STANAG 4246 ed.3, 28
- STANAG 4285, 27
- STANAG 4290, 32
- STANAG 4292, 28
- STANAG 4312 ed.2, 9
- STANAG 4329, 23
- STANAG 4372 ed.3, 28
- STANAG 4376 ed.1, 28
- STANAG 4406, 9, 9
- STANAG 4415, 27
- STANAG 4444 ed.1 (Draft), 30
- STANAG 4444 ed.2, 30
- STANAG 4479 ed.1, 13
- STANAG 4481 ed.1, 28
- STANAG 4484 ed.2, 30
- STANAG 4484 ed.3, 30
- STANAG 4485 ed.1, 30
- STANAG 4485 ed.2, 30
- STANAG 4486 ed.2, 31
- STANAG 4486 ed.3, 30
- STANAG 4522 ed.1, 30
- STANAG 4529 ed.1, 28
- STANAG 4538 ed.1, 28
- STANAG 4538 ed.2, 29
- STANAG 4539, 28
- STANAG 4545 ed.2, 9
- STANAG 4559 ed. 3, 13
- STANAG 4564 ed.2, 12
- STANAG 4575 ed. 3, 13
- STANAG 4575 ed. 4, 13
- STANAG 4578 ed.2, 32
- STANAG 4586, 31, 31
- STANAG 4591, 13
- STANAG 4606 ed.1, 30
- STANAG 4606 ed.3, 30
- STANAG 4607 ed.3, 13
- STANAG 4609 ed.3, 13
- STANAG 4610, 25
- STANAG 4622, 30
- STANAG 4631, 17
- STANAG 4681, 28

- STANAG 4691 ed.1, 28
- STANAG 4705, 32
- STANAG 4706, 29
- STANAG 4711, 34
- STANAG 4715, 22
- STANAG 4724, 29
- STANAG 4731, 15
- STANAG 5000, 10
- STANAG 5030 ed.4, 29
- STANAG 5042, 24
- STANAG 5046 ed.3, 32
- STANAG 5046 ed.4, 32
- STANAG 5065 ed.1, 28
- STANAG 5066 ed.3, 28
- STANAG 5067 ed.1 (RD), 35
- STANAG 5067 ed.2 (RD), 35
- STANAG 5500, 9
- STANAG 5501 Ed.5, 32
- STANAG 5501 Ed.6, 32
- STANAG 5501 Ed.7, 31
- STANAG 5511 Ed.6, 25, 31
- STANAG 5511 Ed.7, 25, 31
- STANAG 5516 Ed.4, 25
- STANAG 5516 Ed.5, 25
- STANAG 5518ed1, 25
- STANAG 5522 Ed.2, J-Series, 25
- STANAG 5522 Ed.3, J-Series, 25
- STANAG 5523, 11, 16
- STANAG 5527, 25
- STANAG 5528 ed.1, 17
- STANAG 5602 ed.3, 26
- STANAG 5602 ed.4, 25
- STANAG 5616 ed.5, 31
- STANAG 5616 ed.6, 31
- STANAG 6015, 26
- STANAG 6022, 26
- STANAG 7023 ed.4, 13
- STANAG 7024 ed.2, 13
- STANAG 7074, 11
- STANAG 7085 ed.3, 31
- STANAG 7098, 11
- STANAG 7099, 24
- STANAG 7163, 24
- STANAG 7170 ed.3, 11
- STANAG 7194 ed.1, 13
- STANAG 7194 ed.2, 13
- NIMA
 - MIL-PRF 89005, 11
 - MIL-PRF-89045, 24
 - MIL-STD-2411, 25
 - TR 8350.2, 11
- NIST
 - FIPS 180-1, 21
 - FIPS 186-2, 21
 - FS 1016, 13
- Norwegian Defence Research Establishment
 - 2010-00961, 11
 - 2010-00962, 11
- O**
- OASIS
 - AVDL Specification - 01, 12
 - CAP-V1.1, 29
 - dsml, 16
 - ebms2, 20
 - EDXL-DE-V1.0, 12
 - ProgrammersAPI_v2, 20
 - regrep-rim-3.0-os, 16
 - regrep-rs-3.0-os, 20
 - relmes, 17, 17
 - uddi-v3.00-published-20020719, 20
 - ws-bpel, 17
 - ws-notif, 17
 - wsdd-discovery-1.1-spec, 20
 - wsfed, 21
 - wsn-ws_brokered_notification-1.3-spec-os, 17
 - wsn-ws_topics-1.3-spec-os, 17
 - wsrp-specification-1.0, 19
 - wsrp-specification-2.0, 19
 - wss-v1.1-errata-os-SAMLTokenProfile, 10
 - wss-v1.1-spec-os-SOAPMessageSecurity, 17
 - wss-v1.1-spec-os-SwAProfile, 9
 - wsspol-1.3, 18
 - wssutil, 10
 - wstrust-1.4, 10
 - xacml-3.0-core-spec-os, 22
- ODMG

- ISBN 1-55860-647-5, 15
- OMG
 - formal-2012-06-01, 26
 - formal/08-01-02, 8
 - formal/2002-12-06, 27
 - formal/2011-01-03, 17
 - formal/2011-08-05, 17
 - formal/2012-01-03, 23
- Open Applications Group
 - OAGIS, 27
- Open GIS Consortium
 - 01-009, 12
 - 01-024r1, 25
 - 03-065r6, 25
 - 04-038r1, 25
 - 04-094, 24
 - 05-007r7, 12
 - 05-047r3, 25
 - 05-078r4, 24
 - 06-042, 24
 - 06-050r3, 23
 - 07-006r1, 25
 - 07-036, 11
 - 07-057r7, 12
 - 07-067r5, 25
 - 07-110r4, 24
 - 07-147r2, 12
 - 08-007r1, 11
 - 08-139r3, 24
 - 09-000, 27
 - 09-025r1, 25
 - 09-026r1, 12
 - 09-110r4, 24
 - 10-090r3, 24
 - 10-100r2, 11
 - OGC 03-081r2, 25
- Open Services Infra-Structure Initiative, 14
- Open Source Geospatial Foundation
 - 1.8.2, 11
- OpenGL
 - glspec40.Core.20100311, 24
- OpenSearch.org
 - OpenSearch 1.1 Draft 4, 22
- OSF
 - F201, 14
- P**
 - PS/SC Working Group
 - pc-sc-spec, 8
- R**
 - RSA
 - PKCS#1 v2.1, 20
 - RSS Advisory Board
 - 2.0, 23
- S**
 - SUN Microsystems
 - java_card_kit-2_2_1-fr-spec, 8
 - JNDI, 8
 - JSR 221, 15, 16
 - rmi-over-iiop, 13
- T**
 - The Open Group
 - C 112, 15
 - C310, 14
 - C702, 14
 - C706, 14
 - F209a, 13
 - P702, 21
 - tm-forum
 - eTOM Rel.13, 19
- U**
 - USB.org
 - wusb, 28
- W**
 - W3C
 - datetime, 23
 - draft, 22
 - NOTE-SOAP-20000508, 16
 - NOTE-VML-19980513, 24
 - NOTE-ws-policy-guidelines-20071112, 21
 - NOTE-ws-policy-primer-20071112, 21
 - NOTE-wsci-20020808, 17
 - NOTE-wsdl-20010315, 20
 - PR-sparql11-query-20121108, 22

- REC-CSS2-2011067, 18
 - REC-html401-19991224, 8
 - rec-skos-reference-20090818, 26
 - REC-SMIL3-20081201, 9
 - REC-SVGMobile-20030114, 24
 - REC-WebCGM-20011217, 24
 - REC-ws-addr-core-20060509, 17
 - REC-ws-addr-metadata-20070904, 16
 - REC-ws-addr-soap-20060509, 16
 - REC-ws-policy-20070904, 21
 - REC-wsdl20-20070626, 20
 - REC-xforms-20031014, 23
 - REC-xhtml1-20020801, 22
 - REC-xlink-20010627, 18
 - REC-xlink11-20100506, 18
 - REC-xml-20081126, 18
 - REC-xml-infoset-20011024, 18
 - REC-xml-names-19990114, 18
 - REC-xml-styleSheet-19990629, 18
 - REC-xml11-20060816, 18
 - REC-xmlbase-20010627, 18
 - REC-xpath-19991119, 17
 - REC-xsl-20061205, 18
 - REC-xsl11-20061205, 18
 - REC-xslt20-20070123, 18
 - SOAP Version 1.2, 18
 - SUBM-OWL-S-20041122, 22
 - timezone, 14
 - WD-exi-20070716, 18
 - WD-html5-20121025, 9
 - WD-SVG12-20050413, 24
 - WD-xquery-20030502, 17
 - xkms2, 18
 - xmlsig-core, 21, 22
 - xmlenc-core, 21
 - WAP Forum
 - WAP-238-WML-20010911-a, 18
 - Web Services Interoperability Organisation
 - AttachmentsProfile-1.0-2006-04-20, 17
 - BasicSecurityProfile-1.1-2010-01-24.html , 10
 - BP11, 16
 - BP12, 17
 - SimpleSoapBindingProfile-1.0-2004-08-24, 17
 - wsbp, 17
 - World Meteorological Organisation
 - FM 92-IX Ext. GRIB, 26
 - fm94, 26
- X**
- X Consortium
 - X11R7.5, 12, 15
 - XMPP Standards Foundation
 - XEP-0004, 9
 - XEP-0030, 9