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NATO Interoperability Standards and Profiles

Volume 3

Candidate Interoperability Standards and Profiles (Version 10)

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C3B Interoperability Profiles Capability Team

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1. STANDARDS

1.1. INTRODUCTION

001. The purpose of this chapter is to specify the candidate NISP standards. The document organizes these standards, following baseline 2.0 NATO's C3 Taxonomy, as endorsed by the NATO C3 Board per AC/322-N(2016)0021-AS1 on 11 February 2016. A graphical representation of this taxonomy is included in volume 1.

002. For some standards it was not clear yet which service identified in the C3 Taxonomy should be used. Therefore, as an interim solution, the taxonomy was extended with user-defined "Cloud Services". In a separate section, all standards are listed for which could not yet be defined how they should be linked to the C3 Taxonomy.

003. The standards are presented in tabular form. The left column of the table corresponds to a service in the C3 Taxonomy. The section headers correspond to a service at a higher (or the same) level. In general, a service is only listed if at least one standard is assigned to this service.

004. When STANAG X Ed Y is in ratification process, this is indicated by STANAG (RD) X Ed Y, and when it is a study draft, this is indicated by STANAG (Study) X Ed Y.

1.1.1. Releasability Statement

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

1.2. OPERATIONAL CAPABILITIES

Service	Standards

1.3. USER APPLICATIONS

Service	Standards
User Applications	• Secure Communications Interoperability Protocol (SCIP) - AComP-5068 EDITION A (NSO STANAG 5068 Ed 1:2017)[1]

[1]STANAG 5068 Ed 1 - This is a candidate standard in the NISP, but promulgated according to the NSO on 2017-03-03.

1.4. TECHNICAL SERVICES

006. The "Technical Services" include those services required to enable "User Applications". They are part of the "Back-End Capabilities" while "User Applications" are part of "User-Facing Capabilities".

007. According to the C3 Taxonomy, they consist of "Community Of Interest (COI) Services", "Core Services" and "Communications Services". The complete collection of Technical Services is sometimes referred to as the "Technical Services Framework" (TSF) or "NNEC Services Framework" (NSF).

008. In addition to the "Technical Services" identified in the C3 Taxonomy, a taxonomy layer "Cloud Computing" has been added. This enables a more useful categorization of cloud-based standards (currently only included as candidate standards).

1.4.1. Community Of Interest (COI) Services

Service	Standards
Symbology Services	• NATO Transformational Baseline 3.0:2009 (ACT) (NATO TIDE/TTB:2009) • NATO Vector Graphics (NVG) Protocol version 2.0:2012 (ACT) (NATO TIDE/NVG20:2012) • Common Warfighting Symbology (DOD MIL-STD-2525C:2008) • Web Coverage Service Implementation Standard v1.1.2 (OGC 07-067r5:2007) • GML in JPEG 2000 for Geographic Imagery (GMLJP2) (OGC 05-047r3:2006)
Track Services	• Tactical Data Exchange - Link 11/11B (NSO STANAG 5511 (RD) Ed 7:2008) • Tactical Data Exchange - Link 16 (NSO STANAG 5516 (RD) Ed 5:2009) • NATO Bit-Oriented Message (BOM) Tactical Data Exchange - Link 16 (NSO-Expected STANAG 5516 Ed 6) • NATO Bit-Oriented Message (BOM) Tactical Data Exchange - Link 16 - ATDLP-5.16 Edition A (NSO-Expected STANAG 5516 Ed 7) • Tactical Data Link – Link 22 (NSO STANAG 5522 (RD) Ed 3:2009) • Technical Characteristics of the Link 22 TDL System (NSO STANAG 4610 (Study) Ed 1) • Standard for Joint Range Extension Application Protocol (JREAP) - ATDLP-5.18 Edition A (NSO STANAG 5518 (RD) Ed 2:2015) • Standard for Joint Range Extension Application Protocol (JREAP) - ATDLP-5.18 Edition B (NSO STANAG 5518 (RD) Ed 3:2015) • Link-22 (NSO-Expected STANAG 5522 Ed 4) • Link-22 - ATDLP-5.22 Edition A (NSO-Expected STANAG 5522 Ed 5) • NATO Qualification Levels for Tactical Data Link Personnel - ATDLP-5.55 Edition A (NSO STANAG 5555 (RD) Ed 1:2016) • Standards for Interface of Data Links 1, 11, and 11B Through a Buffer - ATDLP-6.01 Edition A (NSO STANAG 5601 Ed 7:2016)[1]

Service	Standards
Modeling and Simulation Enabling Services	• OMG Systems Modeling Language (OMG SysML) 1.4 (OMG formal-2015-06-03:2015)

[1]STANAG 5601 Ed 7 - This is a candidate standard in the NISP, but promulgated according to the NSO.

1.4.2. Core Services

Service	Standards
Business Support CIS Security Services	• Common Biometric Exchange Formats Framework (CBEFF) (ANSI incits-398:2008) • Electronic Biometric Transmission Specification (EBTS) (FBI IAFIS-DOC-01078-8.1:2008)
Unified Communication and Collaboration Services	• Synchronized Multimedia Integration Language 3.0 (W3C REC-SMIL3-20081201:2008) • Office Open XML (ECMA ECMA-376:2008) • HyperText Markup Language (HTML), Version 5.0, Reference Specification (W3C WD-html5-20121025:2012)
Military Messaging Services	• Variable Message Format (VMF) (DOD mil-std 6017B:2009) • SOAP Messages with Attachments (SwA) Profile 1.1 (OASIS wss-v1.1-spec-os-SwAProfile:2006) • Registration of Military Message Handling System (MMHS) Header Fields for Use in Internet Mail (IETF RFC 6477:2012) • NATO Message Catalogue, APP-11 Edition D v2 (NSO STANAG 7149 Ed 6/APP-11 Edition D v2:2017)[1]
Informal Messaging Services	• SMTP Service Extensions for Transmission of Large and Binary MIME Messages (IETF RFC 3030:2000)
Fax Services	• Procedures for real-time Group 3 facsimile communication over IP networks (ITU-T T.38:2010)
Information Management Services	• Application Vulnerability Description Language (AVDL) version 1.0 (OASIS AVDL Specification - 01:2004)
Geospatial Services	• Geospatial Data Abstraction Library (GDAL) (GDAL gdal:2013) • Esri Open GeoServices REST Specification, v.1.0 (ESRI REST:2010) • OpenGIS Web Processing Service (OGC 05-007r7:2007) • OpenGIS Web Map Tile Service Implementation Standard (OGC 07-057r7:2010)
Geospatial Coordinate Services	• OpenGIS Coordinate Transformation Services (OGC 01-009:2001)

Service	Standards
SOA Platform Services	• Atom Publishing Protocol (IETF RFC 5023:2007) • Web Services Business Process Execution Language (WSBPEL) version 2.0 (OASIS ws-bpel:2007) • BPML Business Process Model and Notation version 2.0.2:2014 (OMG formal/2011-01-03:2014) • WS-I Basic Profile 2.0 (WS-I wsbp:2010) • Simple SOAP Binding Profile Version 1.0 (WS-I SimpleSoapBindingProfile-1.0-2004-08-24:2004) • Attachments Profile Version 1.0 (WS-I AttachmentsProfile-1.0-2006-04-20:2004) • Web Services Addressing 1.0 - Core (W3C REC-ws-addr-core-20060509:2006) • WS-BaseNotification (OASIS ws-notif:2006) • WS-BrokeredNotification 1.3 (OASIS wsn-ws_brokered_notification-1.3-spec-os:2006) • WS-Topics 1.3 (OASIS wsn-ws_topics-1.3-spec-os:2006) • Representational State Transfer (REST) (ACM 2002-REST-TOIT:2000) • WS-I Basic Profile 1.2 (WS-I BP 1.2:2010)
Security Token Services	• RADIUS and IPv6 (IETF RFC 3162:2001) • The Kerberos Network Authentication Service (V5) (IETF RFC 1510:1993) • The Kerberos v5 Simple Authentication and Security Layer (SASL) Mechanism (IETF RFC 4752:2006) • Single Sign On (Open Group P702:1997) • Internet X.509 Public Key Infrastructure Certificate and CRL Profile (IETF RFC 5280:2008)
Policy Decision Point Services	• NATO Public Key Infrastructure (NPKI) Certificate Policy (CertP) Rev2. (NATO AC/322-D(2004)0024REV2:2008) • eXtensible Access Control Markup Language core specification (OASIS xacml-3.0-core-spec-os:2013) • DOD EBTS (DOD DIN: DOD_BTF_TS_EBTS_Nov06_01.02.00:2006) • DOD EBTS (DOD DIN: DOD_BTF_TS_EBTS_Mar09_02.00.00:2009) • Data Format for the Interchange of Fingerprint Facial, and Scar Mark and Tattoo (SMT) Information (ANSI/NIST ITL 1-2000:2000) • Biometric data interchange formats -- Part 2: (ISO ISO/IEC 19794-2:2011:2007) • Biometric data interchange formats -- Part 5: Face image data (ISO ISO/IEC 19794-5:2005:2007)

Service	Standards
	• Biometric data interchange formats -- Part 6: Iris image data (ISO ISO/IEC 19794-6:2011:2007)
SOA Platform SMC Services	• Web Services for Management (WS-Management) Specification (DMTF DSP0226:2010) • WS-Management CIM Binding Specification (DMTF DSP0227:2010) • Enhanced Telecom Operations Map (TM-FORUM eTOM Rel.13:2012) • Configuration Management Database (CMDB) Federation Specification (DMTF DSP0252:2009) • IPv6 MIB (IETF RFC 2465:1998) • ICMPv6 MIB (IETF RFC 2466:1998) • Multicast Group Membership Discovery MIB (IETF RFC 5519:2009) • IP Version 6 Management Information Base for the Transmission Control Protocol (IETF RFC 2452:1998) • IP Version 6 Management Information Base for the User Datagram Protocol (IETF RFC 2454:1998) • Remote Network Monitoring Management Information Base, RMON-MIB version 2 using SMIv2 (IETF RFC 2021:1997) • Common Information Model (CIM) v2.2 (DMTF DSP0004:1999)
Service Discovery Services	• OASIS ebXML Messaging Services Specification (OASIS ebms2:2002) • Web Services Dynamic Discovery Version 1.1 (OASIS wsdd-discovery-1.1-spec:2009) • TIDE Service Discovery (NATO TIDE/TIDE-ID-SP:2008) • DNS-Based Service Discovery (IETF RFC 6763:2013) • Web Services Description Language (WSDL) Version 2.0 Part 1: Core Language (W3C REC-wsdl20-20070626:2007)
Message-Oriented Middleware Services	• SOAP Version 1.2 (W3C SOAP Version 1.2:2001)
Web Platform Services	• Content-ID and Message-ID Uniform Resource Locators (IETF RFC 2392:1998) • Extensible Markup Language (XML) version 1.1 (Second Edition) (W3C REC-xml11-20060816:2006) • XML Linking Language (XLink) Version 1.1 (W3C REC-xlink11-20100506:2010)
Web Presentation Services	• Web Services for Remote Portlets Specification (OASIS wsrp-specification-2.0:2008)
Information Discovery Services	• OpenSearch 1.1 (Opensearch OpenSearch 1.1 Draft 4)

Service	Standards
Information Access Services	• RSS 2.0 Specification (RSS 2.0:2009) • A Standards Based Approach for Geo-enabling RSS feeds, v1.0 (OGC 06-050r3:2006) • XForms 1.0 (W3C REC-xforms-20031014:2003) • MIME Encapsulation of Aggregate Documents, such as HTML (MHTML) (IETF RFC 2557:2006)
Metadata Repository Services	• Web Services Metadata Exchange (WS-MetadataExchange) (W3C REC-ws-metadata-exchange-20111213:2011)
Choreography Services	• W3C Web Service Choreography Interface version 1.0 (W3C NOTE-wsci-20020808:2002)
Mediation Services	• Services to forward Friendly Force Information to Weapon Delivery Assets - ADatP-37 Edition A (NSO STANAG 5528 (RD) Ed 1:2017)
Data Format Transformation Services	• XML Query Language (XQuery) (W3C WD-xquery-20030502:2003)
Infrastructure Services	• Distributed File System (DFS) DCE DFS (Open Group F209a:1997) • The Secure Real-time Transport Protocol (SRTP) (IETF RFC 3711:2004) • Real Time Control Protocol (RTCP) attribute in Session Description Protocol (SDP) (IETF RFC 3605:2003) • NATO Imagery Interpretability Rating Scale (NIIRS) - AIntP-7 Edition A (NSO STANAG 7194 (Study) Ed 2)
Directory Storage Services	• LDAP: String Representation of Distinguished Names (IETF RFC 4514:2006)
Relational Database Storage Services	• MIP Baseline 4 (MIP MIP BL 4) • MIP Information Model (MIP MIM 2.0:2014)
Infrastructure Networking Services	• DCE 1.1: Remote Procedure Call (Open Group C706:1997) • X/Open Network File System (C702 Protocols for Inter-working: XNFS, Version 3W) (Open Group C702:1998) • Server Message Block (SMB) (Microsoft MS-SMB - 20130118:2013) • Default Address Selection for Internet Protocol version 6 (IPv6) (IETF RFC 6724:2012) • Very high speed digital subscriber line transceivers 2 (VDSL2) (ITU-T G. 993-2:2011)
Host Configuration Services	• Dynamic Host Configuration Protocol for IPv6 (DHCPv6) (IETF RFC 3315:2003) • IPv6 Prefix Options for Dynamic Host Configuration Protocol (DHCP) version 6 (IETF RFC 3633:2003)

Service	Standards
Data Transfer Services	• FTP Extensions for IPv6 and NATs (IETF RFC 2428:1998)
Domain Name Services	• Networking Framework for All-IP Transport Services (NETIP) - AComP-4731 Edition A (NSO STANAG 4731 (RD) Ed 1:2015) • Multicast DNS (IETF RFC 6762:2013) • A Method for Storing IPsec Keying Material in DNS (IETF RFC 4025:2005) • DNS Configuration options for Dynamic Host Configuration Protocol for IPv6 (DHCPv6) (IETF RFC 3646:2003) • Network Information Service (NIS) Configuration Options for DHCPv6 (IETF RFC 3898:2004)
Distributed Time Services	• DCE 1.1: Time Services (Open Group C310:1994)

[1]STANAG 7149 Ed 6/APP-11 Edition D v2 - APP-11 ed D ver 2 should be noted as an emerging standard that will extend the message formats in APP-11(D)(1) with new Urgent Operational Requirements, this version will be available from early 2017.

1.4.3. Communications Services

Service	Standards
Communications Services	• ZigBee (IEEE 802.15.4:2005) • Wireless USB Specification (USB.ORG wusb:2005) • IPv6 over Low Power Wireless Personal Area Networks (IETF RFC 4919:2007) • Mobile WiMax (IEEE 802.16e:2005) • Mobile Broadband Wireless Access (Draft) (IEEE 802.20:2006) • Wireless Broadband (IEEE 802.16e:2004) • Broadband Radio Access Networks (BRAN) HiperMAN (ETSI TS 102 624-1:2009) • Ad-hoc On-Demand Distance Vector Routing (AODV) (IETF RFC 3561:2003) • Dynamic Source Routing (DSR) Draft- version 1.0 (IETF draft-ietf-manet-dsr-09:2003) • Ultra-Wide Band (ECMA 368:2008) • The Open Grid Services Architecture (OGSA) version 1.5 (OGF draft-ogf-ogsa-spec-1.5-011:2006) • Multiple Spanning Trees (IEEE 802.1S:2002) • Technical Standards for an Automatic Radio Control System (ARCS) for HF Communication Links (NSO-Expected STANAG 4538 Ed 2) • Interoperability Standard for Satellite SHF Deployable Terminals Control and Command Services (NSO STANAG 4706 (RD) Ed 1:2015) • Common Alerting Protocol Version 1.2 (OASIS CAP 1.2:2010)

Service	Standards
Communications Access Services	• 3GPP UMTS Series (3GPP) • Tactical Data Exchange - Link 11/11B (NSO STANAG 5511 (RD) Ed 7:2008) • Standard Interfaces of UAV Control System (UCS) for NATO UAV Interoperability - AEP-84 Edition A (NSO STANAG 4586 (Study) Ed 4) • Technical Characteristics of the Multifunctional Information Distribution System (MIDS) - VOL I & VOL II - ATDLP-1.75 Edition A (NSO-Expected STANAG 4175 Ed 6) • Standards for Data Forwarding between Tactical Data Systems employing Link 11/11B and Tactical Data Systems employing Link-16 (NSO STANAG 5616 (RD) Ed 6:2011) • Standards for Data Forwarding between Tactical Data Systems employing Link-11/11B and Link-16 - ATDLP-6.16 Edition A (NSO-Expected STANAG 5616 Ed 7) • Multi-Link Standard Operating Procedures for Tactical Data Systems Employing Link 16, Link 11, Link 11B, IJMS, Link 1, Link 1 and ATDL-3 (NSO-Expected ATDLP-7.33(A)(1)) • xTDL Framework Document [for Representation of TDL in eXtensible Markup Language (XML)] (NSO-Expected ATDLP-7.04(A)(1)) • Standard Operating Procedures for the CRC-SAM Interface - VOL I & II (NSO-Expected ATDLP-7.12(A)(1)) • Standard Operating Procedures for Link 1 (NSO-Expected ATDLP-7.31(A)(1))
Transport Services	• Interoperability Point Quality of Service (IP QoS) - AComP-4711 Edition A (NSO STANAG 4711 (RD) Ed 1:2016) • IP QoS for the NII (NATO TN-1417) • Routing Information Protocol next generation for IPv6 (RIPng) (IETF RFC 2080:1997) • Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing (IETF RFC 2545:1999) • BGP Extended Communities Attribute (IETF RFC 4360:2006) • BGP Support for Four-Octet Autonomous System (AS) Number Space (IETF RFC 6793:2012) • 4-Octet AS Specific BGP Extended Community (IETF RFC 5668:2009) • Border Gateway Multicast Protocol (BGMP) (IETF RFC 3913:2004) • Simplified Multicast Forwarding (SMF) (IETF RFC 6621:2012) • Protocol Independent Multicasting Dense Mode (PIM-DM) (IETF RFC 3973:2005) • Stateless IP/ICMP Translation Algorithm (SIIT) (IETF RFC 2765:2000)

Service	Standards
	• Generic Packet Tunneling in IPv6 (IETF RFC 2473:1998) • Mobility Support in IPv6 (IETF RFC 3775:2004) • Mobile IPv6 Fast Handovers (IETF RFC 5568:2009) • Using IPsec to Protect Mobile IPv6 Signaling Between Mobile Nodes and Home Agents (IETF RFC 3776:2004) • IP Version 6 over PPP (IETF RFC 2472:1998)
Packet-based Transport Services	• Mobile IPv6 Support for Dual Stack Hosts and Routers (IETF RFC 5555:2009)
Packet Routing Services	• Standard for Interconnection of IPv4 Networks at Mission Secret and Unclassified Security Levels (NSO-Expected STANAG 5067 Ed 2)
Wireless LOS Mobile Transmission Services	• Bluetooth 4.2 (Bluetooth SIG bluetooth42:2014)

1.4.4. Cloud Services

Service	Standards
Virtualisation	• Open Virtualization Format (OVF) specification (ISO/IEC 17203:2011)
Cloud Computing	• Information technology - Cloud computing - Overview and vocabulary (ISO/IEC 17788:2014) • Information technology - Cloud computing - Reference architecture (ISO/IEC 17789:2014) • Information technology - Cloud Data Management Interface (CDMI) (ISO/IEC 17826:2012) • Information technology - Cloud Data Management Interface (CDMI) (ISO/IEC CD 17826) • Information Technology - Cloud Computing - Interoperability and Portability (ISO/IEC AWI 19941) • Information Technology # Cloud Computing # Data and their Flow across Devices and Cloud Services (ISO/IEC WD 19944) • Information technology - Distributed Application Platforms and Services (DAPS) - General technical principles of Service Oriented Architecture (ISO/IEC TR 30102:2012)
IT Infrastructure Management	• Web Services for Management (WS-Management) Specification (ISO/IEC 17963:2013)

1.5. UNASSIGNED STANDARDS

009. The following standards have been declared candidate standards for NATO common funded systems. However, no information of how to map the standard to the C3 Taxonomy have been provided.

Service	Standards
Undefined Taxonomy Node	• Systems and software engineering -- Architecture Processes (ISO CD42020:2016) • Trouble Ticket REST API Specification R14.5.1 Interface (TM-FORUM TMF621:2015) • Product Ordering API REST Specification R14.5.1 Interface (TM-FORUM TMF622:2015) • API REST Conformance Guidelines R15.5.1 Standard (TM-FORUM TR250:2016) • Service Oriented Architecture Modeling Language (SOAML), Version 1.0.1 (OMG formal-2012-05-10:2012) • Biometric data interchange formats -- Part 14: DNA Data (ISO/IEC 19794-6:2013)

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A. CANDIDATE PROFILES

A.1. INTRODUCTION

010. The NATO Interoperability Standards and Profiles include the set of Candidate Profiles listed below.

Table A.1. Candidate Profiles

Service Area	Title
Abstract	
URI	
Federated Mission Networking	FMN Spiral 2 Profile (Candidate)
This document defines the Standards Profile for Federated Mission Networking (FMN) Spiral 2. The FMN Standards Profiles provides a suite of interoperability standards and other standardized profiles for interoperability of selected community of interest services, core services and communications services in a federation of mission networks. It places the required interoperability requirements, standards and specifications in context for FMN Affiliates.	
FMN Spiral 2 Profile (Proposed)	

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