NATO STANDARD

AEP- 76

Specifications Defining the Joint Dismounted Soldier System Interoperability Network (JDSSIN)

Edition A Version 1

October 2014

NORTH ATLANTIC TREATY ORGANIZATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

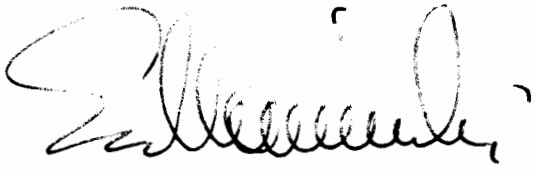
3 October 2014

1. The enclosed Allied Engineering Publication AEP-76, Specifications Defining the Joint Dismounted Soldier System Interoperability Network (JDSSIN), which has been approved by the nations in the NATO Army Armaments Group, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 4677.

2. AEP-76 is effective upon receipt.

3.

4. This publication shall be handled in accordance with C-M(2002)60.



Edvardas MAŽEIKIS
Major General, LTUAF
Director, NATO Standardization Office

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Documents Database for the complete list of existing reservations.	

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Documents Database for the complete list of existing reservations.

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1 AIM

The aim of this standard is to enable interoperability through a standardized exchange of information between Command, Control, Communications and Computers (C4) systems used by dismounted soldiers across North Atlantic Treaty Organization (NATO) or Partner force boundaries. The DSS C4 Interoperability solution is depicted in Figure 1.

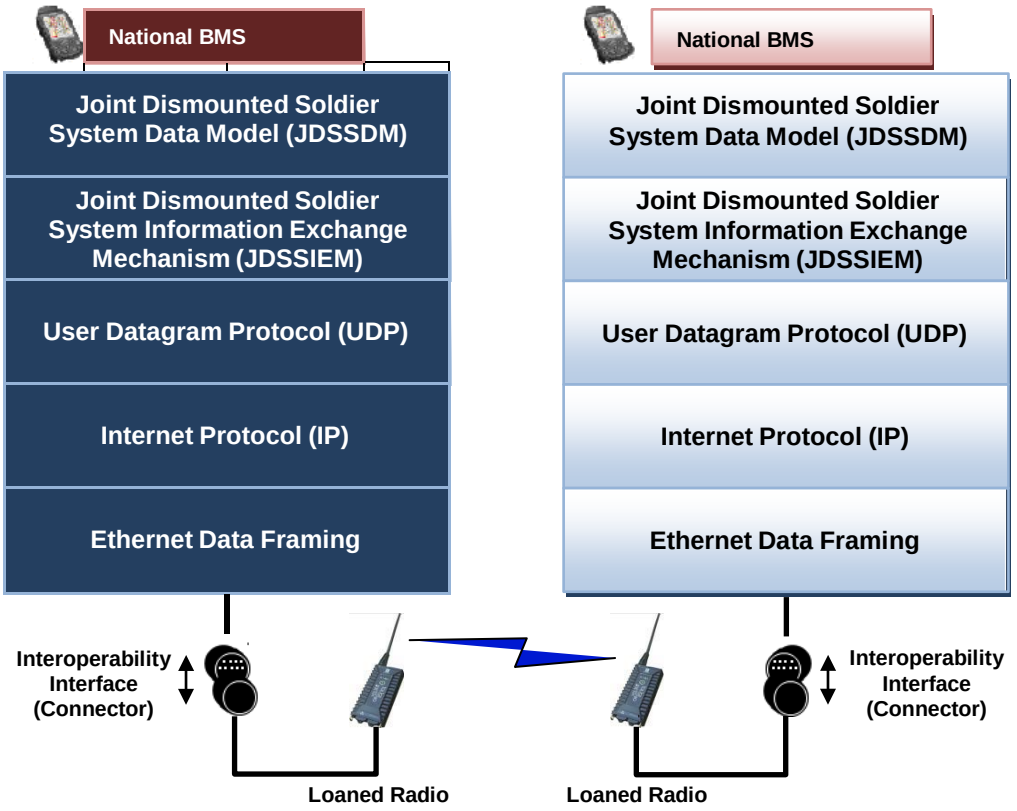

Figure 1. Dismounted Soldier System C4 Interoperability Solution

2 AGREEMENT

1. Ratifying nations agree to enable dismounted soldiers to exchange command and control (C2) information between coalition soldiers in accordance with this agreement. Nations may propose changes at any time to the control authority where they will be processed in the same manner as the original agreement.

2. Land Capability Group 1 (LCG/1) Command, Control, Communications, Computers and Intelligence (C4I) and Systems Architecture Working Group will act as custodian to maintain Configuration Management (CM) and change management of this and its associate AEPs.

3. Ratifying nations have agreed that national orders, manuals and instructions implementing this AEP will include a reference to the STANAG number for purposes of identification.

4. By ratification of STANAG 4677 and associated AEPs, nations agree that enabling soldier systems in accordance with this agreement will be achieved through the mandatory implementation of the complete set of associated AEPs.

5. The intent of STANAG 4677 and associated AEPs is not to replace the standards used on any current national C2 systems but rather to enhance coalition interoperability.

6. Proposals for changes and improvements of STANAG 4677 and its associated set of AEPs shall be sent to the custodian who will collect them and will propose new editions of the STANAG and concerned AEPs as appropriate.

3 RATIFICATION, IMPLEMENTATION AND RESERVATIONS

Ratification, implementation and reservation details are available on request or through the NATO Standardisation Office (NSO) websites (internet: http://nso.nato.int; NATO Secure Wide Area Network (WAN): http://nso.hq.nato.int).

4 FEEDBACK

Any comments concerning this publication should be directed to: NATO/NSA – Bvd Leopold III - 1110 Brussels - BE.

5 GENERAL

1. The NATO Army Armament Group (NAAG) directed the LCG/1 to facilitate exchange of tactical information at dismounted soldier level across national boundaries. The required capability is to increase situational awareness (SA) of soldiers operating in a coalition environment through information exchanges. This, in turn, will lead to reduced risk of fratricide, improved liaison capability[1] and better cross force boundary coordination at the lowest tactical level.

2. LCG/1 member nations have independently identified that digitised information exchange is critical to effective C2 between dismounted units. This is being enabled through the integration of sensors, computers and communications in many national Dismounted Soldier System (DSS) programmes. To improve the success of multinational NATO operations, effective soldier-level information exchange across force boundaries is necessary and needs to be standardised whilst preserving the autonomy of each national DSS programme.

[1] This standard does not replace the role of the liaison officer at higher echelon. The intention of this standard is to enhance the liaison functionality.

3. The communications and networking protocols and interfaces described in this AEP are intended to provide for the seamless transfer of tactical information between soldiers of different nationalities operating at the platoon or squad (group, section) level. While this standard is primarily focused at enabling interoperability for the dismounted soldier, the approach may also be applied to any situation where Battle Management System (BMS) interoperability is required using tactical radios - such as at the tactical mobility platform level.

4. This standard describes how an interoperability network between national dismounted soldier networks operating in a coalition environment is established. This is achieved through:
   - The use of a standardised data message format derived directly from the Multilateral Interoperability Programme's (MIP) Joint Command Control and Consultation Information Exchange Data Model (JC3IEDM) STANAG 5525
   - An Information Exchange Mechanism (IEM) tailored to the tactical radio environments found at the dismounted soldier level
   - The setting up of a radio network across the coalition boundary with all member nations using a designated type of radio system, hereby called the "Loaned Radio".

5. This AEP contains the following 5 volumes, published separately:
   a. Volume 1 : Specifications Defining the Joint Dismounted Soldier System Interoperability Network – Security
   b. Volume 2 : Specifications Defining the Joint Dismounted Soldier System Interoperability Network – Data Model
   c. Volume 3 : Specifications Defining the Joint Dismounted Soldier System Interoperability Network – Loaned Radio
   d. Volume 4 : Specifications Defining the Joint Dismounted Soldier System Interoperability Network – Information Exchange Mechanism
   e. Volume 5 : Specifications Defining the Joint Dismounted Soldier System Interoperability Network – Network Access

6 IMPLEMENTATION OF THE STANADARD

1. Implementation of this AEP by a nation can be confirmed when the nation has issued instructions that all the design and construction of its DSS and related equipment will be manufactured in accordance with the characteristics detailed in this AEP.

2. Planning guidance to help nations become interoperable with this standard have the ability to join a JDSS interoperability network is provided in Annex C - CONCEPT OF EMPLOYMENT (CONEMP) FOR DSS C4 INTEROPERABILITY. This provides a list of best practices to help each nation develop their approach to using this AEP at the training and development, integration, planning, operational and maintenance stages.

3. It is the signatory nation's responsibility to define their tactics, techniques and procedures (TTP) for use of this DSS C4 Interoperability in operations. See Annex C for further guidance.

**ANNEX A TO
AEP-76**

ANNEX A. ABBREVIATIONS

ABBREVIATION	ABBREVIATION LONG-NAME
AAP	Allied Administrative Publication
AEP	Allied Engineering Publication
BMS	Battle Management System
C2	Command and Control
C4	Command, Control, Communications and Computers
C4I	Command, Control, Communications, Computers and Intelligence
CM	Configuration Management
CONEMP	Concept of Employment
DSS	Dismounted Soldier System
IEM	Information Exchange Mechanism
IP	Internet Protocol
JC3IEDM	Joint Command Control and Consultation Information Exchange Data Model
JDSS	Joint Dismounted Soldier System
JDSSDM	Joint Dismounted Soldier System Data Model
JDSSIEM	Joint Dismounted Soldier System Information Exchange Mechanism
JDSSIN	Joint Dismounted Soldier System Interoperability Network
LCG/1	Land Capability Group 1
MAS	Military Agency for Standardisation
MIP	Multilateral Interoperability Programme
NAAG	NATO Army Armament Group
NATO	North Atlantic Treaty Organization
NSA	NATO Standardisation Agency
PfP	Partnership for Peace
SA	Situational Awareness
STANAG	Standardisation Agreement
TTP	Tactics, Techniques and Procedures
UDP	User Datagram Protocol
WAN	Wide Area Network

**ANNEX B TO
AEP-76**

ANNEX B. GLOSSARY

TERM	DEFINITION
Battle Management System (BMS)	A soldier Battle Management System is a sub-system of a Dismounted soldier system and encompasses dismounted soldiers' electrical devices, modules and components that combine to enhance the soldier's ability to prepare for and conduct their missions. The sub system provide amongst other things situational awareness through a common operating picture
Data Model	The coordinated listing of data fields used to enable the exchange of information between two data environments.
Dismounted Soldier System (DSS)	Everything worn, carried and/or consumed for individual use on the battlefield in a tactical environment
EXtensible Mark-up Language (XML)	The eXtensible Mark-up Language is a simple, very flexible text forma derived from SGML (ISO 8879). This is an industry standard high leve Internet protocol that defines, describes and catalogues data. This language is used for DSS message exchange because of its flexibility and easy extensibility. This language also enables future modifications and additions.
Internet Protocol (IP)	The Internet Protocol is a connection-less protocol that provides a "best effort" datagram service (i.e., it does not guarantee packet delivery).
Land Group One (LG/1) LCG/1	Land Group One (LG/1) on Dismounted Soldier. Due to expansion o responsibilities of TG/1, the NAAG created LG/1 as a fully entitled Group. In 2006, the NAAG renamed "Land Group One" to "Land Capability Group On" (LCG/1).
National Soldier System	Nation specific dismounted soldier system (DSS)
Situational Awareness (SA)	Situational Awareness refers to the soldier's ability to attain an understanding of their local battlefield environment. It is achieved by the supply of timely tactical information, displayed in a fashion that is easily understood and accessible within the soldier environment
Owning Nation	The nation who is responsible for procuring and maintaining a piece of equipment. Note that owned equipment may be operated by other nations under a loan agreement (e.g. Loaned Radio).
Sub-System	A group of modules that contribute to given functions and or capabilities. The Dismounted Soldier System architecture, including the definitions of the Sub-Systems, is a national responsibility
TG/1	Topical Group One on Soldier Interoperability. The original group under Work Group 3 to define standards for Soldier Systems
User Datagram Protocol (UDP)	The User Datagram Protocol is one of the core protocols of the internet protocol suite. UDP does not provide the reliability and ordering (i.e., packets may arrive out of order or go missing withou notice). However, as a result, UDP is faster and more efficient fo many lightweight or radio transmission uses. UDP employs datagrams

TERM	DEFINITION
	(a packet may contain more than one datagram).
XML Schema	XML Schemas express shared vocabularies and allows machines to carry out rules made by people. They provide a means for defining the structure, content and semantics of XML documents. Schemas may also provide for the specification of additional document information such as normalisation and defaulting of attribute and element values. Schemas have facilities for self-documentation. Thus, XML Schemas can be used to define, describe and catalogue XML vocabularies for classes of XML documents

**ANNEX C TO
AEP-76**

ANNEX C. CONCEPT OF EMPLOYMENT FOR DSS C4 INTEROPERABILITY

1. Introduction.

   a. The CONEMP envisioned for this standard is to enable a member nation to achieve the capability to join a JDSS interoperability network with as little impact on the national C4 system as possible. This STANAG and its associated AEP provide the structured approach to exchange information between national C4 systems.

   b. In most coalition operations, liaison officers are used to assist in information exchanges and SA. Liaison officers are generally only exchanged at senior organisational levels due to manpower constraints. The exchange of information below these levels requires time to be passed up through the echelons and conveyed across through the liaison. Current combined and joint operations using modern BMS for digitised C2 and SA require more agile exchange methods. Since exchanging liaison officers is not always feasible for the lower echelons, this standard proposes a method for liaison using digital information exchanges.

   c. The basic concept for implementation of this standard is to enable nations to incorporate the JDSS Gateway utilising a common data model and a robust exchange mechanism within their own BMS or supporting device connected by a Loaned Radio. This data model is a tailored subset of the larger JC3IEDM and is focused only on the information needed by the dismounted soldier COI. The exchange mechanism ensures a coherent operational picture at each JDSS Gateway node.

2. Employment Guidance.

   a. The concept to organise the coalition force, in preparation for the use of a JDSS Interoperability Network, requires the NATO Communications leadership to designate the use of this standard for lower echelon interoperability networking. A Loaned Radio would be agreed to by the involved nations based on the interoperability requirements of the forces. This radio, which fulfills the requirements of the AEP Volume 4 on the Loaned Radio for Dismounted Soldier Interoperability, must be provided by one of the nations. In preparation for a mission, the soldier will connect his compliant JDSS Gateway to the Loaned Radio and establish network connectivity in accordance with the AEP Volume 5 on DSS Network Access. This will initialise his system before the mission in order to enable information exchange.

   b. During the mission, information will be exchanged to increase SA when dismounted troops are in close proximity. It will be up to each nation to decide which information they transmit between their national BMS and the JDSS interoperability network. The JDSS Gateway provides the functionality to exchange:

      - Presence
      - Identification

- Contact sighting report
- General Information
- CASEVAC Request
- Nuclear, Biological and Chemical (NBC)
- Sketch
- Overlay (optional)

3. Stages of Employment.

The below figure presents a high level view of how a nation should achieve interoperability using a compliant system. Coalition nations should define and agree on the way in which the system will work at various stages:

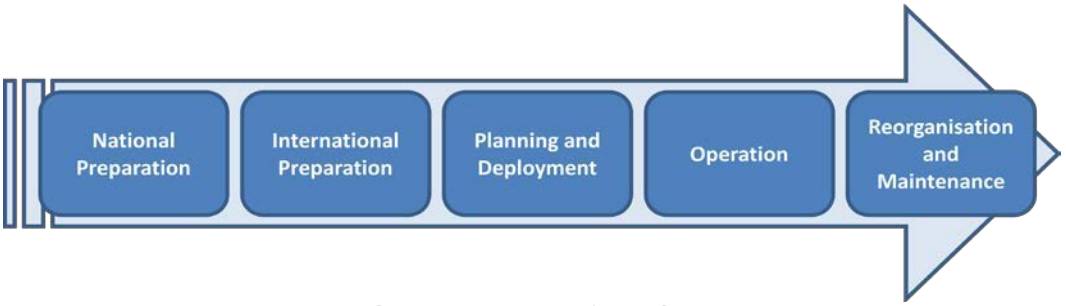

Figure 1. Stages of Employment

a. National Preparation
First and foremost, each nation should agree internally on its approach to JDSS interoperability in relation to its national C4 system.

Individuals operating the JDSS should be adequately trained to use the Loaned Radio as well as manage the information exchange on the JDSS Gateway. Training should also be provided to all lines of support for the system, including mission planning, logistics and liaison. Closely related to training is the equipment fit and power considerations prior to deployment (e.g. batteries, load carriage system, cables, connectors).

Nations should also plan for the support responsibilities if there is agreement that they would lend radios to coalition partners as outlined in the AEP volume 3 on the Loaned Radio.

b. International Preparation
As soon as the potential need for interoperability on operations is identified, liaison should take place between nations to agree as to the approach to interoperability. This liaison should identify the specifics necessary to create the Joint Dismounted Soldier Interoperability Network and identify any potential risks as soon as possible. Examples of interoperability network establishment decisions are:
- Which Nation will supply the Loaned Radio and become Owning Nation

- Frequency spectrum required
- Security/Cryptographic Key material to be used
- IP Addressing scheme

This liaison would provide an opportunity to check compliance with the DSS C4 interoperability for the entire multinational system. This could be achieved through joint exercises or system tests.

c. Planning and Deployment

In theatre and prior to any operation that may require interoperability, an agreement between those nations must be reached under the guidance of the NATO Communications leadership. This should include the consideration of the following planning points must be determined:

- Select the Loaned Radio and Owning Nation
- Select radio and network parameters
- Obtain spectrum allocation for the radio
- Define the information subset from JDSSDM to be exchanged
- Define the JDSSIEM parameters
- Radio Frequency (RF) Connectivity planning

d. Operation

On commencement of the operation, testing of interoperability is required to be demonstrated successfully. This may include the following procedures:

- Download/setup of network members
- Ensure proper function of blue force tracking
- Test exchange of selected message types

In addition to the planning activities, agreements on the actions to take if the unforeseen situations arise, such as:

- Lost or compromised JDSS Gateway/Loaned Radio
- Non-functional JDSS Gateway/Loaned Radio
- What messages do we need to acknowledge
- How to raise concerns about the reliability of the network

e. Reorganisation and Maintenance

Once an operation is complete, there may be the need to establish liaison in order to have nations to agree as to the approach to reorganise and refit the national systems.

**ANNEX D TO
AEP-76**

ANNEX D. NATIONAL DSS BATTLE MANAGEMENT SYSTEM RESPONSIBILITIES

1. Introduction.

   This standard is intended to allow a coalition partner to gain interoperability with as little impact on national BMS as possible. The intent of this annex is to assist Nations with the implementation of this standard.

2. Implementation Guidance.

   The standard can be implemented in several ways to include: the national BMS can add the JDSS Gateway functionality to integrate with the JDSS interoperability network or an additional device could be connected to the national BMS to provide this functionality.

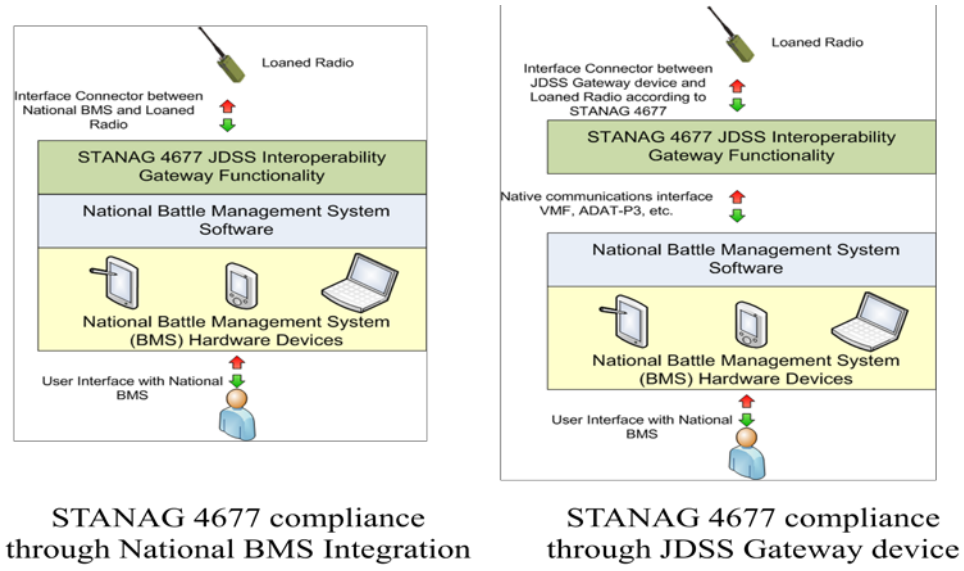

Figure 2. Methods of Implementation

a. Standard Interfaces.
Regardless of the implementation method selected to incorporate STANAG 4677, the implementing Nation must utilise the accompanying AEP volumes to create the interfaces for information exchange between the national systems and the JDSS interoperability network. These interfaces include:

- Physical connection between Loaned Radio and national BMS or physical connection between national BMS and JDSS Gateway Device
- Mapping of JDSS data to the national BMS data for commonality of the data model exchange
- Implementation of the IEM

- Configuration and association of the national BMS with the JDSS interoperability network

b. Implementation Options.
In order to decide on the implementation method, there are certain factors that must be considered:

a. Data Sharing Plan. How the data will be used in the national BMS is critical to the decision on the best way to implement this functionality.
   - If the information is going to be shared amongst all members of the Squad, it may be better to include the functionality in the national BMS to reduce size, weight, and power.
   - If only the Liaison Officer will have this functionality, an additional device may be more appropriate, as the additional size, weight, and power burden will only be carried by one soldier.

b. User Interface Provided by National BMS. The national BMS must be capable of presenting the user with the following information message types in accordance with the AEP. If it is not capable of doing this, then an extension may be required.

c. The State of the Acquisition for the National BMS. If the national BMS is under development, it may be straightforward to implement the JDSS Gateway within the national BMS. If the national BMS is already in service or past its critical design, it may be more advantageous to implement the JDSS Gateway functions during a future engineering change or through an additional device.

3. Security.

JDSS interoperability information exchange is to be protected at the security classification level of NATO Restricted. Some NATO nations do not have a national equivalence security classification level to NATO Restricted. A guide to National equivalence security classification level is provided in the AEP Volume 1 on Security.

Nations with national soldier systems at higher classification levels will have an outbound multi-level-security issue. Nations with national soldier systems which operate with a level of security protection lower than NATO Restricted may participate in the interoperability concept. In this case, all nations participating in the interoperability network must evaluate the security risks and mitigation strategies prior to deployment.