



Worldwide Secure Interoperability Forums For Tactical Communications Forum (TCF) 2022

20 September 2022

Leo F. Kimminau (MITRE)
US Air Force Life Cycle Management Center/International Programs
(AFLCMC/HNAI)

DISTRIBUTION STATEMENT F: Further dissemination only as directed by the controlling DoD office (Cases #HNAI-22-077 & #MN22WFNM0468 applies); Administrative/Operational use; 20 September 2022. Other requests for this document shall be referred to AFLCMC/HNAI, 5 Eglin Street, Building 1624, Hanscom Air Base, Massachusetts, 01731 or DoD higher authority AFLCMC/HNA, Hanscom AFB, Massachusetts 01731.

DESTRUCTION NOTICE: Destroy by any method that will prevent disclosure or reconstruction of contents.

U.S. Government information is furnished to the countries listed below upon the condition that it will not be released to another nation without specific authority of the Department of the Air Force of the United States, that it will be used for military purposes only, that individual or corporate rights originating in the information, whether patented or not, will be respected, that the recipient will report promptly to the United States any known or suspected compromise, and that the information will be provided substantially the same degree of security afforded it by the Department of Defense of the United States. Also, regardless of any other markings on the document, it will not be downgraded or declassified without written approval of the originating U.S. Agency.

This briefing, presentation, or document is for information only. No U.S. Government commitment to sell, loan, lease, co-develop or co-produce defense articles or provide defense services is implied or intended.



Briefing Purpose

➤ **Introduce worldwide forums that USAF AFLCMC/HNAI International Programs branch personnel and programs support for US-partner secure interoperability**

- Interoperability is the keystone of our Tactical Data Link (TDL) world, and the glue that holds the information, terminals, platforms, systems, users and nations together to accomplish the mission and keep our warfighters safe

How can HNAI and TCF work together to advance Secure Interoperability in Europe, and worldwide?



Considerations



- **Many TDL and related forums exist**
- **TDL and Secure Interoperability community and capabilities are growing**
- **With modernization efforts, mandates, capabilities, policy, and more changing:**
 - Do all stakeholder organizations and offices have the same, correct, most current information to make the decision?
- **Ensure all functional and program offices receive information**
 - Communicate before and after meetings – share information to greatest extent possible and use methods that work best for your groups!
 - Establish information Points of Contact (PoCs) among your HQ, services and system/platform offices



Interoperability Forums



- **JICRB / MIRB / MJIRB and Side Sessions**
- **NATO TDL Symposium (NTDLS)**
- **Link 16 Spectrum Multi-national Working Group (MNWG)**
- **Worldwide Interoperability Working Group (WWIWG)**
- **F-16 Worldwide Review (WWR)**
- **F-15 Worldwide Review (WWR)**
- **Tactical Communications Forum (TCF)**
- **International Data Link Society (IDLS) Symposium**
- **Others**
 - US C2 Interoperability Program (C2IP), CCIB, etc.
 - US-partner Executive Committee/Joint Committee (EC/JC)
 - SATURN waveform, civilian identification, cybersecurity?



Joint International Review Board (JICRB)
MIDS International Review Board (MIRB)
MIDS JTRS International Review Board (MJIRB)



➤ **Purpose**

- “Co-Located Forum”: JICRB / MIRB / MJIRB for Link 16 customers to meet with program managers, Link 16 SMEs, software developers and industry to:
 - Distribute current JTIDS, MIDS LVT and MIDS JTRS information to customer and Third Parties Sales (TPS) nations
 - Discuss, Review & Prioritize Software Problem Reports
 - Present TDL interoperability concerns and solutions
 - Provide programmatic / national / operational / topical briefings

➤ **Frequency – meets 2 times per year**

➤ **Next Meeting – Hawaii, December 2022**

➤ **Points of Contact (PoCs)**

- Partner Nation’s Head of Delegation (HoD) is first PoC!
- Co-chairs: AFLCMC/HNAI and MIDS Program Office (PO)



JICRB / MIRB / MJIRB – Side Sessions



➤ **Software Updates**

- MIDS PRR, JTIDS Software and MIDS JTRS Software

➤ **Terminals**

- MIDS-LVT and MIDS JTRS

➤ **Platforms**

- Maritime, AEW&C and Fighter Aircraft

➤ **Command and Control (C2) Ground Architecture**

- Security, modernization, Integration and Interoperability

➤ **TDL Support Tools**

➤ **Network Design Panels**



JICRB / MIRB / MJIRB – Fighter Side Sessions



➤ Fighter (aircraft) Side Sessions

- Ongoing coordination for fighter aircraft TDL modernization requirements
- Nations provide many questions pertaining to platform modernization and integration efforts
- Co-Chairs ask community for topics to develop briefings that address problems and questions for partners
 - F-16
 - F-15
 - F-35
 - F-18
 - Other air platforms also participate in this session



JICRB / MIRB / MJIRB – Ground C2 Architecture Side Sessions



➤ Ground C2 Architecture Side Sessions (air defense focus)

- Coordination for ground Command and Control (C2) TDL requirements and modernization
- Nations provide questions pertaining to security policy, platform modernization, Integration and Interoperability efforts
- Co-Chairs ask community for topics to develop briefings that address problems and questions for partners
- Co-Chairs: AFLCMC/HNAI and Finland AF

How will partners modernize C2 ground systems and Link 16 sites?



JICRB / MIRB / MJIRB – Support Tools Side Sessions



➤ Support Tool Side Sessions

- Topical and unbiased sessions that rotate support tools focus based on customer feedback, for example: network monitoring, JICO and training support tools
- Nations provide questions pertaining to various TDL support tools
- Co-Chairs ask community for topics to develop briefings that address problems and questions for partners
- AFLCMC/HNAI Co-Chairs



JICRB / MIRB / MJIRB – Network Design Panels



➤ Network Design Panels

- Panels present technical briefings on network issues, design tools, modernized networks and customer questions
- Nations provide questions pertaining to Network Design and tools
- Panel includes representatives from USAF, US Army, US Navy and USMC Network Design Facilities (NDFs)



NATO Tactical Data Link Symposium (NTDLS)



➤ Purpose

- NTDLS is an international forum open to NATO and Interoperability Platform Partner Nations to provide participants, military and civilian personnel, an opportunity to exchange experiences, introduce national approaches and discuss general concepts on NATO Tactical Data Links (TDLs) on an expert level to improve knowledge, sustain and increase the of interoperability of TDLs.

➤ Frequency – meets 1 time per year

➤ Next Meeting – Spring 2023, Calpe, Spain

➤ Point of Contact (PoC) – NHQC3S@HQ.NATO.INT

➤ Website – <https://nhqc3s.hq.nato.int/>



Link 16 Spectrum Multi-national Working Group (MNWG)



➤ Purpose

- The *Link 16 Spectrum Multinational Working Group (MNWG)* is an ad hoc spectrum support working group, who provides a forum for all nations that deploy or intend to deploy Link 16 or similar systems, for nations that are impacted by Link 16 operations, for civil and federal aviation authorities, operators, and network designers, to address and resolve issues related to spectrum access in the 960 - 1215 MHz band.

➤ Frequency – meets 1 time per year

➤ Next Meeting – 2023

➤ Website – <http://link16mnwg.org/>



Worldwide Interoperability Working Group (WWIWG)



➤ Purpose

- WWIWG provides interoperability information to improve Joint and Partner Nation integration, while supporting U.S. Combatant Command (COCOM) operational needs as part of the Joint Operations Interface Training Program as directed in CJCSI 6240.01E

➤ Frequency – meets 1 time per year

➤ Next Meeting – December 2022, online forums

➤ Website (JID):

- <https://www.jcs.mil/Doctrine/Joint-Training/Joint-Functional-Schools/JID/>



F-16 Worldwide Review (WWR)



➤ Purpose

- The F-16 and Proven Aircraft Technical Coordination Groups (TCGs) are part of the AFMC managed Technical Coordination Program (TCP). TCGs provide follow-on sustainment support services (technical, engineering, and logistics assistance) for aircraft, missile, precision attack pods, and related equipment owned by various Partner Nations (PNs).

➤ Frequency – meets 1 time per year

➤ Next Meeting – Spring 2023, Ogden, Utah

➤ Points of Contact (PoC)

- Randy Titus, Chief, F-16 Technical Coordination Group
AFLCMC/WWMIG

➤ Website: <https://worldwidereview.org/>



F-15 Worldwide Review (WWR)



➤ Purpose

- F-15 WWR allows six Foreign Partners of the F-15 Technical Coordination Program (TCP) to meet representatives from USAF and Industry to discuss issues, concerns, improvements and modifications to the F-15 platform. The Partners are Israel, Japan, Korea, Saudi Arabia, Singapore and Qatar.

➤ Frequency – meets 1 time per year

➤ Next Meeting – 14-18 November 2022

➤ Point of Contact (PoC)

- Sheree Quattlebaum, AFLCMC/WWQIB
Sheree.quattlebaum@us.af.mil

➤ Website (2022):

<https://www.edgereg.net/er/EventHomePage/CustomPage.jsp?ActivityID=40331&ItemID=133093>



Tactical Communication Forum (TCF)



➤ Purpose

- TCF provides an environment for presentations and discussions for Military, Government and Industry personnel, is open for all attendees to provide useful presentations. A Tactical Data Link (TDL) forum and also discuss interface and boundaries of other tactical communication systems. Explore Interoperability (IO) of Tactical/TDL communication issues, challenges, problems and initiatives such as: Requirements Management; Operational; Technical; Procurement; Interoperability; Training; Interoperability Test and Verification

➤ Frequency – meets 1 time per year

➤ Next Meeting – September 2022

➤ Point of Contact (PoC) – Al Gore, TCF Chairman

➤ Website - <https://www.tactical-comms-forum.com/>



International Data Link Society (IDLS) and Symposium



➤ Purpose

- To provide a Government-Industry forum to inform each other of accomplishments, trends and developments in military and civil data link technology
- To further interoperability
- To further the effectiveness of digital information exchange
- To create a framework of co-operation across nations
- To share lessons learned and best practices
- The identification and promotion of key issues relating to the successful application of data links worldwide

➤ Frequency – meets 1 time per year

➤ Next Meeting – 8-10 November 2022, Halifax, Nova Scotia, Canada

➤ Website – <https://idlsocweb.org/>



Summary



- **Many TDL and related forums exist and community is growing**
- **Modernization efforts, mandates, capabilities, policy, and more changing**
- **How do organizations ensure functional and program offices receive information?**

How can HNAI and TCF work together to advance Secure Interoperability in Europe, and worldwide?



**MIDS International Review Board (MIDS) /
Joint International Configuration Review Board (JICRB)
MIDS JTRS International Review Board (MJIRB)**



***C2 Ground Architecture Side Session*
*- Overview***

**13-17 June 2022
Helsinki, Finland**



Disclaimer



This Presentation provides information on products and vendors for informational purposes and to foster discussion that may be useful by readers to establish their requirements.

The presence of these references is NOT an endorsement or recommendation by the USAF, or Author for any particular product or vendor.

The briefing session is NOT a forum to determine end user requirements, or to evaluate products or vendors as they pertain to end user requirements.



Outline



- **Overview**
- **C2 Ground Architecture – Link 16 Example**
- **Today’s Agenda**
- **C2 Ground Architecture – Parts**
- **Side Session Scope and Topics**
- **Summary – Identify Options and Recommendations**



Overview



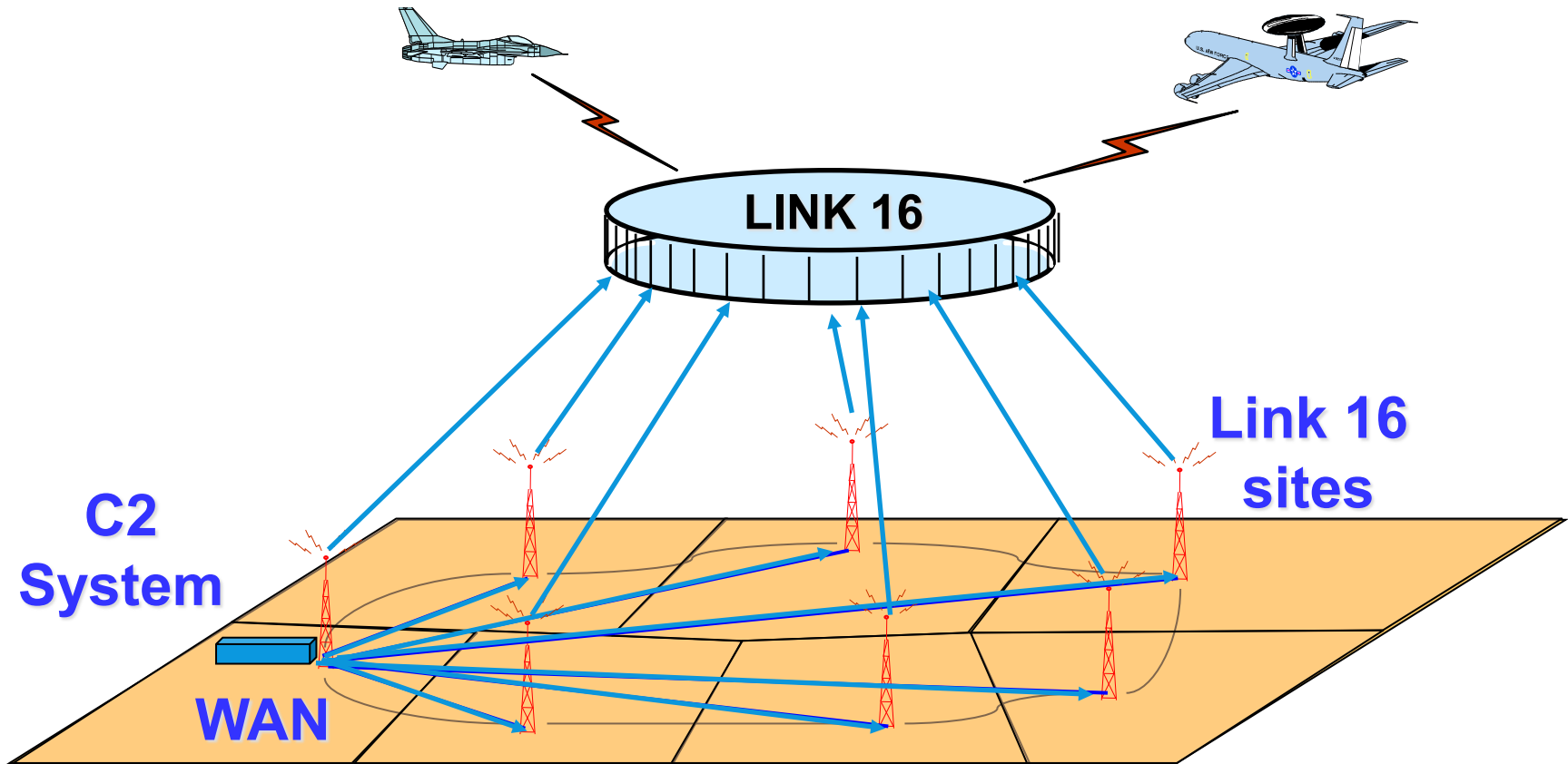
- **Command and Control (C2) is based on effective communications among systems and platforms throughout Area of Responsibility (AoR) and Operating Areas**

- **Side Session to discuss Link 16 in C2 systems ‘on the ground’**
 - Focus has been land-based Air Defense C2 systems that participate with Link 16-equipped aircraft, and can include
 - Mobile/portable C2 ground elements
 - Link 16 sites for Line-of-Sight (LoS) and Beyond LOS comms

 - C2 Ground Architecture are options for design and operating
 - Not “views, lines and boxes”
 - Potential system requirements
 - Must be affordable, effective and efficient!



C2 Ground Architecture – Link 16 Example



Scope For C2 Ground Side Session



Today's Agenda



- **Introductions – Side Session Co-Chairs**
- **US DoD CIO & Joint Staff/J6 Follow-Up Questions & Answers (Q&A)**
- **DSCA Updates for Link 16 C2 Ground Systems**
- **Partners AF TDL Management and Operations Centers Overviews**
- **National Briefings Follow-up (from Main Session presentations)**
- **Networks Lessons Learned**
 - USAF ACC / TDLOMO
- **Modernized Network Design Lessons Learned / Way Ahead**
 - Network Design Facilities (NDFs), USAF/USN/USA/USMC, others
- **C2 System Link 16 Architecture, Requirements and Security Domains**
- **C2 Ground Architecture Parts, Side Session Scope and Future Topics**



C2 Ground Architecture – Parts?

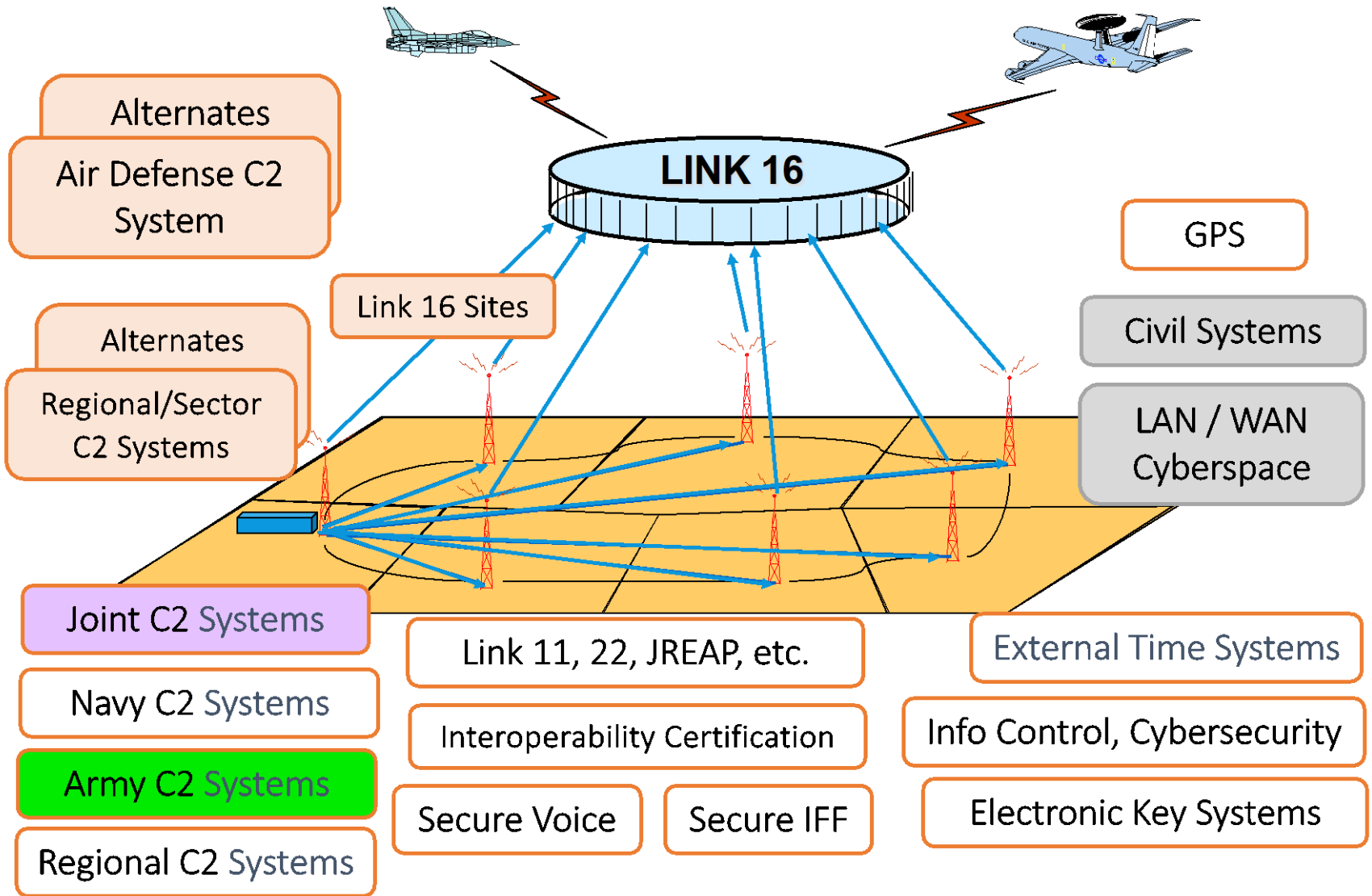


- **Components – hardware / software / data / information**
 - Link 16 terminals and ancillary equipment
 - Link 16 network designs
 - Communications security (COMSEC) encryption keys
 - Air Tasking Order (ATO) / OPTASKLINK, etc.
 - C2 systems software and hardware
 - Computer networking (local/wide area networks, LAN/WAN)
- **Secure Voice (in addition to J-Voice)**
- **Secure Identification Friend or Foe (IFF)**
- **Functional Pictures (notional)**
- **Information Control and Cybersecurity**
- **Other parts?**

Need Options and Recommendations!



Side Session Scope





Future Topics



- **Data Link Management Cell (DLMC)**
- **Joint Interface Control Officer (JICO)**
- **Functional Pictures (air, land, maritime, missile, space, etc.)**
- **Information Controls and Cybersecurity**
- **Interoperability Engineering and Assessment**
- **Interoperability Testing and Certification**
- **Modernized Link 16 terminals ‘on the ground’**
- **Third Party Transfer (TPT)**
- **Mission Assurance**
- **And more ...**



Summary



- **Nations must consider C2 Ground Architecture Options for Secure Interoperability**
 - Examples: overlap, redundancy, WAN topology, time, security and others
- **Options are potential requirements and fielded/planned systems have unique architectures**
- **Nations need Options and Recommendations to inform system definition and development efforts**
- **C2 Ground Architecture Side Session to identify Options and Recommendations for architectures with multiple ground sites**



Questions?



Acronyms



AFLCMC	Air Force Life Cycle Management Center
AoR	Area of Responsibility
BLoS	Beyond Line-of-Sight
C2	Command and Control
CIO	Chief Information Officer
COP	Common Operational Picture
DoD	[U.S.] Department of Defense
DLMC	Data Link Management Cell
DSCA	[U.S. DoD] Defense Security Cooperation Agency
FCA	Frequency Clearance Agreement
FMS	Foreign Military Sale
GPS	Global Positioning System
HNAI	AFLCMC International Programs
HoD	Head of Delegation
IA	Information Assurance
IFF	Identification Friend or Foe
JICO	Joint Interface Control Officer
LAN	Local Area Network
LoS	Line-of-Sight
NDF	Network Design Facility
PM	Program Manager
TDL	Tactical Data Link
TSDF	Time Slot Duty Factor
USAF	United States Air Force
WAN	Wide Area Network
