DISA briefing to the US-AUS-NZ, Strategic Defense Communications Management Group General Meeting On DoD HF Modernization efforts

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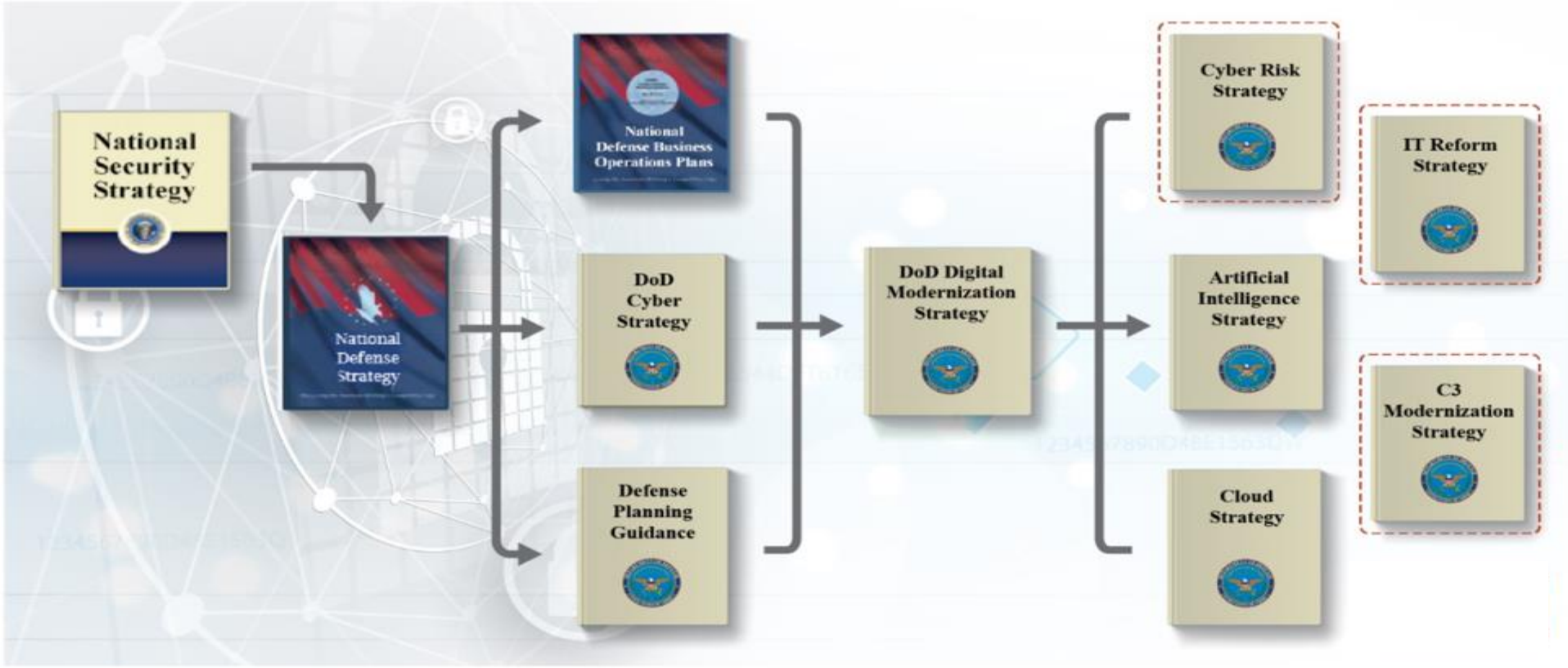
AGENDA

- DoD HF Modernization efforts
  - Pedigree
  - DoD HF Working Group
  - DoD HF Reference Information Lab
  - Interoperability Testing
- Pacific Regional HF
  - MCIP
    - Pacific Endeavor
    - INDO-Pacific Relief Network
  - PACAF Modernization effort
  - High Frequency Global Communications System
  - National Guard Bureau
  - BoldQuest 22 & 23

HF Comms Pedigree



What exists today

ENABLE SERVICE HF MODERNIZATION

DoD C3 Strategy (signed out by DepSECDEF September 2020)

- LOE 4.6: Develop and deliver advanced BLOS capabilities for SATCOM-denied environments
  - Expand the use of innovative solutions to BLOS throughput shortfalls
  - Support research, development, and transition of advanced BLOS technologies
  - Modernize the **High Frequency Global Communication System (HFGCS)** ground system to incorporate **digital adaptive beamforming** techniques, **new waveforms**, **Networking** and **Automatic Link Establishment** techniques and similarly modernize HF-equipped forces
  - Leverage other High Frequency systems such as Over The Horizon Radars
  - Field modernized HF waveform

What comes next? How do we decompose this further?

- Series of studies to produce vetted information?
- Examples: WBHF spectrum availability, HF Comms in the Arctic region, etc.

DoD HF Working Group

- Is to be a venue for stakeholders to coordinate strategy and policies that can inform, synchronize, and deconflict when required, the development of requirements, acquisition, sustainment, modernization and enhancement of the HF command, control, communications, computers, and intelligence (C41) enterprise to support DoD wide requirements.
- Encompasses end-to-end (user terminals, network management infrastructure, communication relays, ground infrastructure) C4I HF capabilities for all users of the HF spectrum regardless of whether it is a primary, alternate, contingency or emergency (PACE) method of communication.
- Recognizes various Joint Staff and Combatant Commands Oplans
- Guide strategy and policy development for the DoD C4I HF enterprise.
- Oversee modernization efforts to ensure no loss of capability to the CCMD.
- Provide a venue/body for the C4l HF enterprise community to capture and consolidate user & spectrum requirements for HF users.
- Identify issues of concern to the HF community and facilitate consensus-based solutions within the HF WG.
- Support development of Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy (DOTmLPF-P), as required, to ensure national security related missions can be successfully executed on current and/or modernized equipment.
- Use HF .WG meetings as a venue where academia, industry, and Services can present current and advanced research projects related to the development of HF capabilities or technologies.
- Provide input to the DoD process to interact with international bodies to coordinate spectrum access or other issues that have stakeholders beyond the DoD.

High Frequency Reference Implementation Laboratory

BLUF:

OUSD R&E requested Joint Interoperability Test Command to establish a distributed High Frequency Reference Implementation Laboratory (HF RIL) in support of DoD C3 Modernization Strategy Line of Effort 4.6.

Modeled after NIWC PAC MUOS/MUSIC RIL Lab

Problem Statement: Lack of interoperability in next generation HF waveforms and applications:

4G WALE - MIL-STD-188-141D Appendix G

WBHF - MIL-STD-188-110D Appendix D

Chat and e-mail – STANAG 5066 Ed. 4

RoCCE

Purpose & Function:

Accelerate the deployment of next generation interoperable HF communications, in conjunction with industry, vendors, and Program Offices, by resolving interoperability barriers.

Concerns:

Sustainability after OUSD R&E seed money. Will require DOD HF Governance to mandate HF RIL services, along with HF Interoperability Certification

High Frequency Reference Implementation Laboratory (Cont.)

HF RIL Partners:

1. Joint Interoperability Test Command (JITC)
2. Defense Information Systems Agency (DISA)
3. Joint Tactical Networking Center (JTNC)
4. Naval Information Warfare Command (NIWC) Pacific/Atlantic (PAC/LANT)
5. USN PMW-170
6. US Army Combat Capabilities Development Command (DEVCOM)
7. High Frequency Global Communications System (HFGCS)
8. US Army Network Enterprise Technology Command HF Gateway/ US Army MARS (HF Gateway)
9. USAF Contractor, Dr. Eric Johnson, MIL-STD author

Way Ahead:

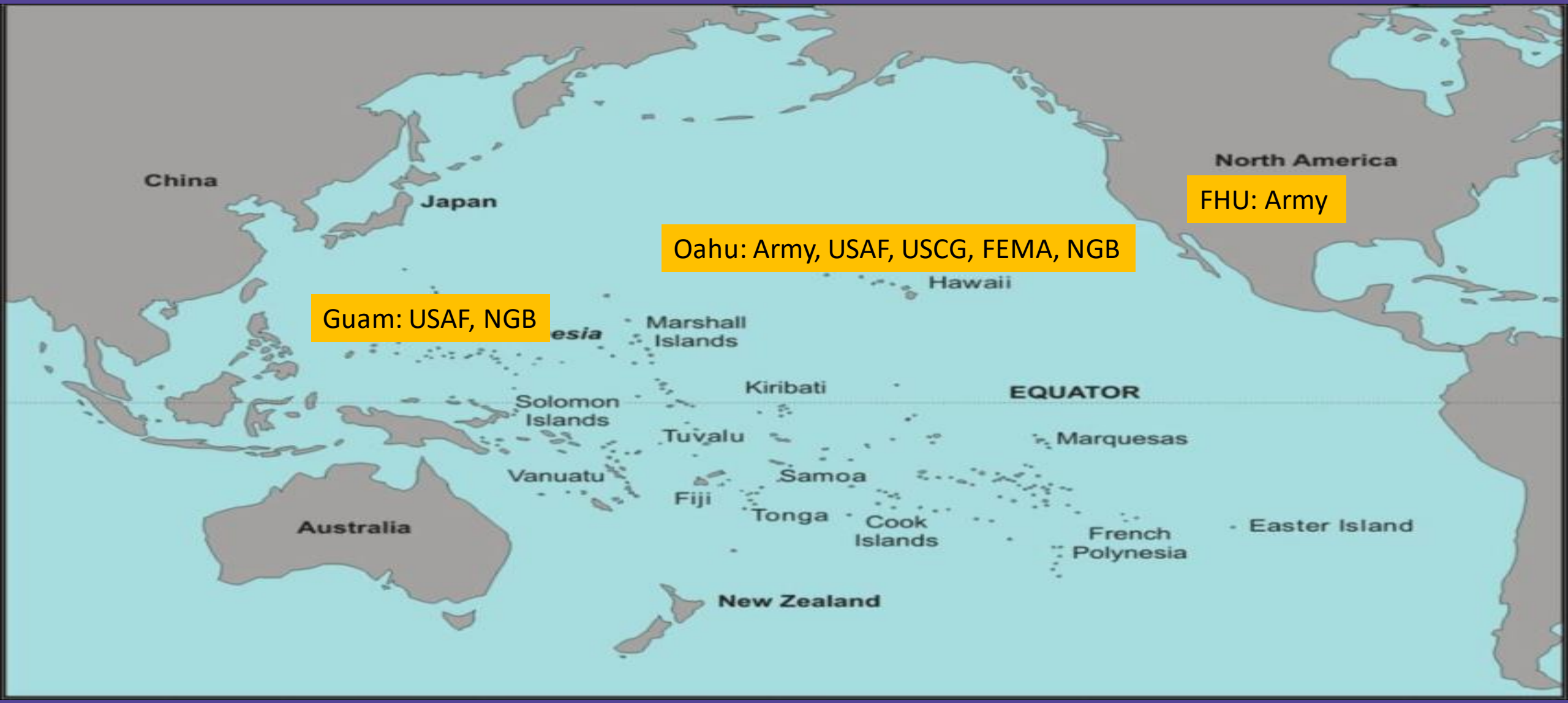
1. Four phased approach:
    1. 4G ALE, WBHF
    2. Chat and E-mail application
    3. ROCCE
    4. Sustainment
        a) Mandated WSCT & Interoperability Certifications
        b) Vendor Integration

JITC Interoperability Testing

Basic Interoperability Requirements

- SSB analog voice
- MELPe / TSVCIS compliant digital voice communications
  - 600 BPS digital voice
  - Internal or external vocoder (vocoder implementation should not matter)
  - MIL-STD 188-110D Appendix A or D
- Data
  - STANAG 5066 / STANAG 4538 / STANAG 4539 (MIL-STD 188-110D)
  - Chat
    - ASCII
    - Common IP protocol
    - P2P (point to point)
    - P2M (point to many)
  - Email
  - Files
- Linking waveform capabilities (not required to be enabled in all scenarios)
  - MIL-STD 188-141D Appendix A, Appendix B, and Appendix C / STANAG 4538 (3G ALE)
    - 3G ALE narrowband & wideband modes with backwards compatibility to 2G ALE
  - Any call / clear hailing / manually configured link
  - Late net entry (ability to join any net regardless of preconfigured comms plan)
  - Link protection
  - Time of day (TOD) manual configuration for asynchronous link establishment
- Compatible Crypto
  - OTAR / OTAD capable (ability to pass crypto parameters wirelessly)
  - TSVCIS compliant
- Portability of HF waveforms

Pacific Regional HF Activity



MCIP

The Multinational Communications Interoperability Program (MCIP) is a United States Indo-Pacific Command (USINDOPACOM) program. MCIP brings together Indo-Pacific Nations and civilian partners to advance reliable interoperable communications and cyber operations as key enablers to a multilateral Humanitarian Assistance and Disaster Relief (HADR) response effort. MCIP engages militaries, United Nations agencies, the International Humanitarian Community (IHC), academia and industry partners to build new partnerships and sustain existing partnerships to reduce risk through information sharing and capacity building.

Components include:

- Technical Interoperability Assessments
- Indo-Pacific Response Network – High Frequency
- Cyber Endeavor
- SATCOM Endeavor
- Information Sharing

Outcome IPRN-HF 22-1 (Feb 2022)

Legend

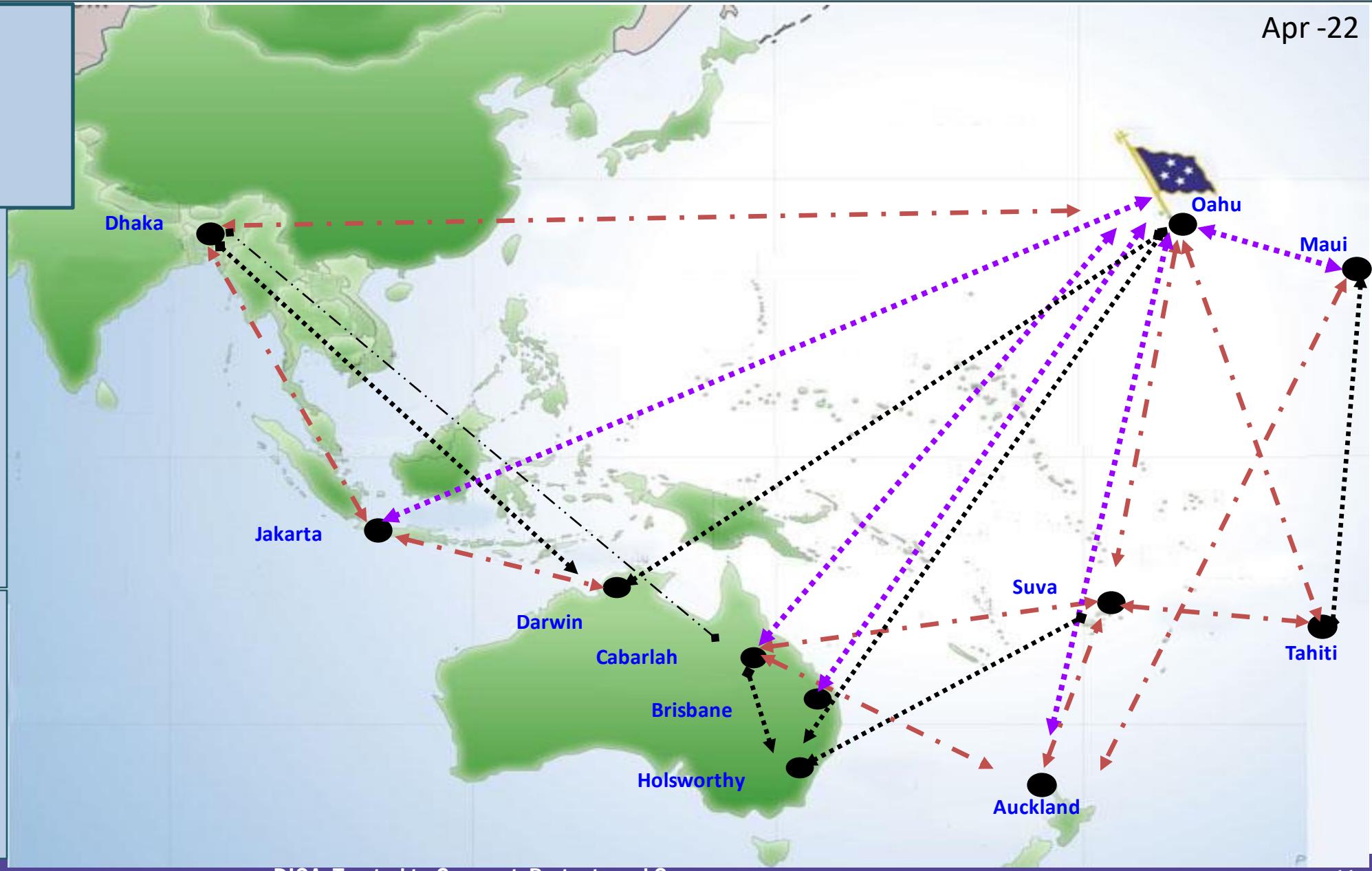
- Successful Voice
- Successful Data
- Successful ALE
- One-way only (Voice)
- Unsuccessful Voice/Data

Country (Locations)

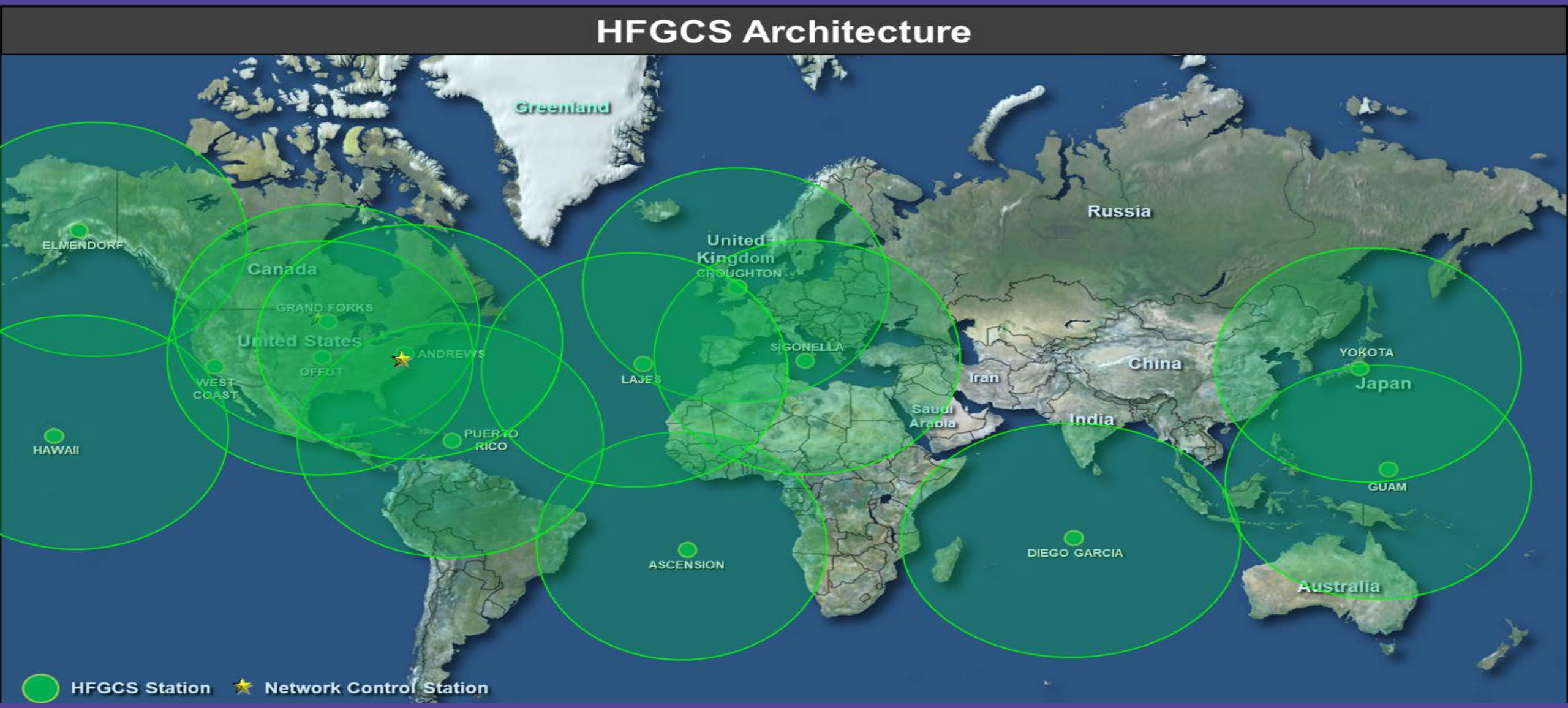
- Australia (Cabarlah – 7th)
- Australia (Darwin – 1CSR)
- Australia (Holsworthy – 145th)
- Bangladesh (Tangail - Army)
- Bangladesh (Dhaka - Navy)
- Bangladesh (Dhaka - Air Force)
- Fiji (Suva)
- Indonesia (Jakarta)
- New Zealand (Auckland - Army)
- New Zealand (Auckland – Air Force)
- Tahiti (Papeete – ALPACI)
- US (Oahu - USINDOPACOM)
- US (Maui - 292)

Highlights

- 5 ALE Successful links
  - 1 ALE encrypted link
  - Oahu – New Zealand (encrypted)
- 15 Successful two-way links established
  - 1 US to other US units
  - 8 US to PNs
  - 6 PNs to PNs
- 231 Tests conducted
- 57% Voice successful rate



HFGCS Architecture



BQ 22 HF Thread

Bold Quest

What Is Bold Quest?

Joint and Multinational capability demonstration and assessment in coalition operational context; Reference: CJCSI 6265.01

- "Coalition of the Willing"; participants fund own costs while Joint Staff resources some "common benefit" support (e.g. network operations, facilities).
- Joint and Coalition Interoperability focused.
- Flexible to evolving priorities of Partners; e.g. Cyber; Counter-Unmanned Aerial Systems.
- 23 operational demonstrations since 2003 at venues throughout the US; and three in Europe (2005; 2010; 2019)

Standards

BQ community's long history with interoperability standards and associated Coordinated Implementation (e.g. Digitally Aided CAS Coordinated Implementation; STANAGs; MILSTDs):

- Validating new standards in the hands of coalition warfighters, with stress of representative scenarios, vignettes.
- Periodic confirmation of adherence to established standards despite new HW/SW.
- Early identification of needed standards for new capabilities; and a forum for collaborative development.

Where are We Going?

- Align with C2 Initiatives (US and Partner Nation) for Coordinated Implementation
  - BQ as a pacing mechanism for assessing progress and addressing needs.
- Leverage and position BQ demonstrations for interoperability requirements for major training exercises and specific regional war plans.
  - Pre-exercise interoperability assessment; both technical and procedural.
  - Post-exercise development and demonstration of solutions to identified needs.
- Align with NORDIC and other EUR partners to demonstrate and sustain a persistent Mission Partner Environment as a model for regional and global replication.
- Expand BQ capacity on the forward edge of capability demonstration in contested environment context (e.g. GNSS Denial), and for elimination of "white carding".

Current BQ Coalition

Managing the Annual Rhythm

BQ community of interest, and resourcing drive the annual cycle and level of effort. Demonstrations on a major scale require 12-18 month spacing between them.

Major events have:

- Most BQ operational threads
- Significant demonstration force (ground, air, maritime, cyber) and support teams
- Significant operating environment; multi domain; installation support
- BQMN/FMN with significant Service Providers and Hosted Users in a widely distributed international network.

Sensor to Shooter Interoperability; Cross Domain Fires; Coalition Networking

Ground Situational Awareness

- Friendly Force Tracking data sharing
- Command and Control Battle Space Object sharing
- Ground to Air Situational Awareness
- GPS denial impact assessment

Digitally Aided Close Air Support

- Digital interoperability linking Joint Terminal Attack Controllers, aircrew, and C2 agencies.
- Gateway integration and management.
- Contested Spectrum baseline.

JADC2 Environment

- Focus on development and testing of capabilities in seven JADC2 Core Enablers areas:
  - DevSecOps
  - Identity Cred., Access Mgmt. (ICAM)
  - Zero Trust
  - Cloud Services
  - Transport and Networking Svcs.
  - Data Services
  - Mission Partner Environment

Coalition Intelligence, Surveillance & Reconnaissance

- Joint and coalition partnership to share intelligence from multiple surface and air sources.
- Intelligence collection and management tools and procedures.
- Targeting process.

Live / Virtual Environment

- Warfighters in multiple international sites in virtual/constructive sim linked via distributed BQMN.
- Identify and work joint and national information sharing policies as limiting factors in distributed simulation.

Federated Mission Networking

- Network Contributing Mission Partners (NCMP) federating their national networks / systems to form the Bold Quest Mission Network (BQMN), allowing all nations to seamlessly share data and collaborate.
- Guided by collaboratively developed Joining Membership and Exiting Instructions (JMEIs) and FMN Spiral 3 Specifications.
- Mission Network for data sharing at common classification: "SECRET // REL to USA, AUS, FIN, NZL, SWE, NATO".
- Also supports connections to national networks.

Joint Fire Support

- Digital interoperability from Forward Observer to Task Force level coordination and control.
- Extensive cross-service and national mission threads.

Mode 5 IFF

- Identification Friend or Foe and Tactical Data Link interoperability

Cyber

- BQ Mission Network cyber defense.
- Multinational cyber operations security cell procedures and tools.

BQ 22 HF Thread

BQ 22 High Frequency (HF) Communications Thread

Problem Statement

Joint and Coalition Forces require resilient and reliable Beyond-Line-of-Sight (BLOS) Command, Control, and Communications (C3) capabilities in order to build robust Primary, Alternate, Contingency, and Emergency (PACE) plans in support of current and future operations in denied, degraded, intermittent, and limited (DDIL) bandwidth environments.

Purpose of the HF Initiative

Provide Joint and Coalition forces an opportunity to test and exercise current and emerging HF capabilities and technologies and demonstrate HF communications as a viable, reliable means of enabling resilient BLOS C3 at all levels of command.

HF Thread Concept

Pursue operational objectives via HF, continue interoperability testing, leverage emerging technology, and employ the BLOS transmission of operational data in DDIL bandwidth environments from the strategic level to the tactical edge.

Vignettes & Objectives

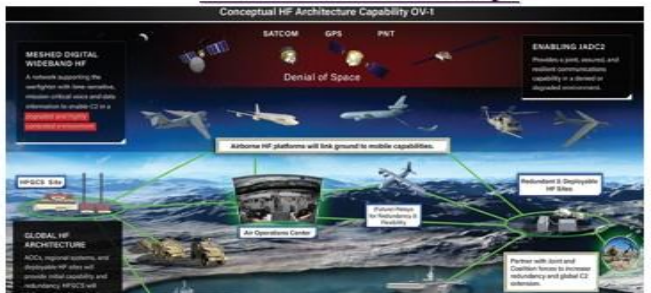
6+ vignettes employing Wideband HF (WBHF) and Narrowband HF (NBHF) voice & data connectivity to achieve operational objectives, demonstrate resilient communications, and ensure coalition collaboration & interoperability.

BQ 22 HF Thread Locations

Joint Interoperability Test Command (JITC) & Joint Tactical Networking Center (JTNC) Interoperability Testing

AUS – CAN – US Interoperability Testing

HF Architecture Concept



BQ 22 HF Vignette Summary

Vig #	Description	Objectives / Comments
1	**Employ BLOS WBHF data connectivity to TX/RX operational data/files to achieve operational objectives.** -Establish WBHF data connections between AOCs, ASOCs, and/or other operational recipients. - BQMN integration	- RX/TX/Distribute ATOs, COP updates, SITREPs, etc. - Transmit Joint Range Extension Applications Protocol – C (JREAP-C) data - Share Link-16 Picture via JREAP-C (7 ASOC / TACP)
2	**Establish Narrowband HF (NBHF) radio nets** to include Single Channel (SC)/Plain Text (PT), SC/Cipher Text (CT), 2G Automatic Link Establishment (ALE), and L3Harris 3G ALE via the US Army Network Enterprise Technology Command (NETCOM) HF Gateway and US Northern Command (USNORTHCOM).	- This vignette will accommodate PRC-150s, PRC-160s, Rockwell Collins, and other commercial HF radios. - Communications will be UNCLAS plain and cipher text; analog/Harris ME6 voice and Harris Tactical Chat version 2.1 (non-IP) - Net will support single channel, (2G) ALE, and Harris 3G ALE - Test and compare data transmission to WBHF
3	**Joint Interoperability Test Command (JITC) & Joint Tactical Networking Center (JTNC) Vendor Interoperability Testing:** Test and resolve data interoperability gaps across L3Harris, Collins Aerospace, Rohde & Schwarz, BAE/Flex, General Dynamics; vendors that support the DoD, Department of Homeland Security, government agencies, and allied partners.	- JITC, the Joint Tactical Networking Center (JTNC), the US Army NETCOM HF Gateway, and multiple vendors to continue **testing to achieve data interoperability across radio systems.** - 4G WALE/WBHF Capable Vendors to Conduct Testing to Resolve Interoperability Issues in ALE linking, Wideband HF, Chat, and Email
6	Employ the High Frequency Global Communications System (HFGCS), the Australian Defence High Frequency Communications System (DHFCS), and Canadian high-powered HF system to **demonstrate resilient BLOS communications and coalition collaboration & interoperability.**	- Leverage the High Frequency Global Communications System (HFGCS) and the Defence High Frequency Communications System (DHFCS) to establish HF connections from these high-powered strategic systems to the tactical edge. - CAN has joined this effort with their strategic system - Bi-Weekly AUS – CAN – US HF Sync
7	**Naval Information Warfighting Development Center (NIWDC)**	- The objective is to connect ship to shore using HFGCS system - Demonstrate both voice and BFTN (digital) connectivity
9	Partner nation integration and objectives.	- Australia, Belgium, Canada, Denmark, France, Germany, Lithuania, the Netherlands, Norway, Poland, Sweden, and the UK – Observers and/or participants - Australia, Belgium, Canada, Norway, Poland, and Sweden to pursue HF connections from their nations to the US.

BOLD QUEST – 23 Preview

- **BQ 23 (Late July – August) will be aligned with Island Marauder 2023**
  - Island Marauder is a Large Scale Exercise (LSE) led by the 3rd Marine Littoral Regiment in the Hawaiian Islands
  - Focused on Expeditionary Advanced Base of Operations (EABO)
- **HF Thread injects into Island Marauder:**
  - Agile Combat Employment (ACE) & Agile Basing
  - Expeditionary Operations / Flightlines – Crisis Response
  - BLOS Communications reach-back to “Higher Headquarters”
  - LDI/LPD operations
  - DDIL Bandwidth Operating Environments
  - Leverage USN & USCG
  - Incorporate airborne platform connectivity
- **BQ 23 Denmark Event**
  - Late October – November 2023

BOLD QUEST – Australian Play

JP9101 Ph1 Enhanced Defence High Frequency Communications System

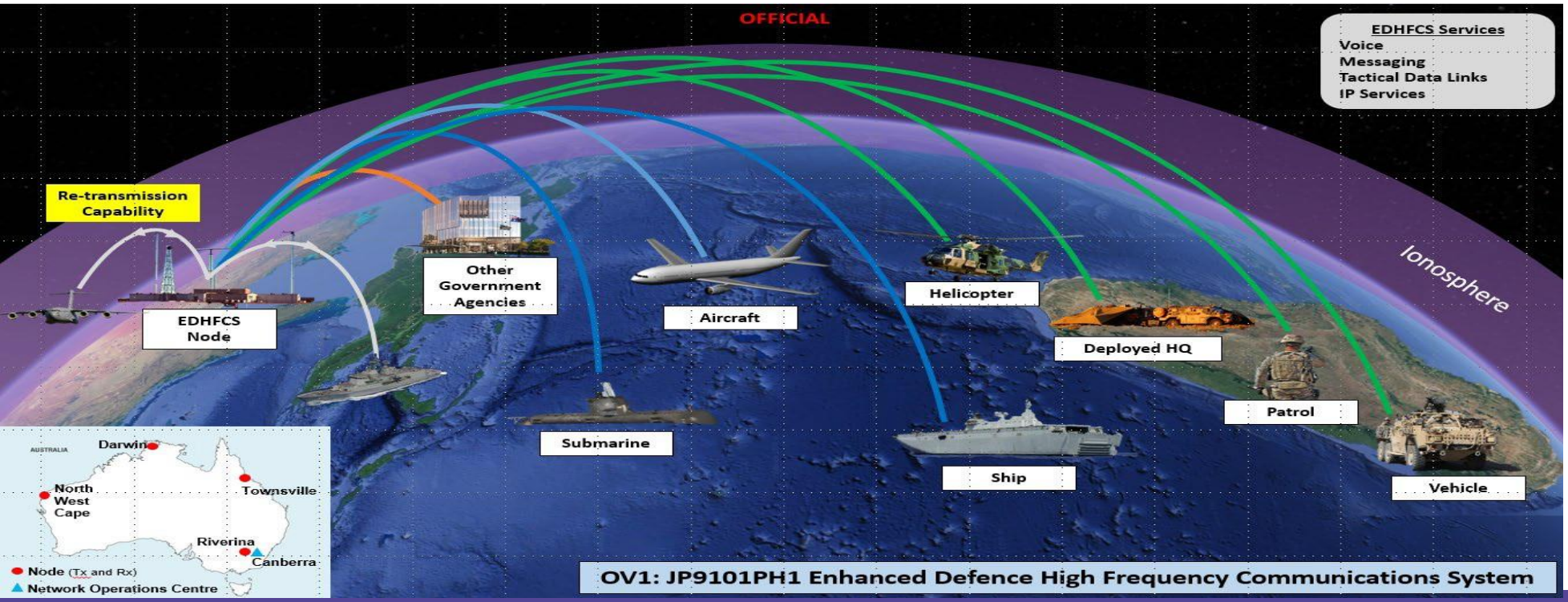
Purpose: Refresh and upgrade the existing system and extend LoT to 2040

Strategic Drivers / Guidance

- Retaining a secure, resilient and reliable strategic high frequency (HF) communications capability is essential to command and control of units operating without SATCOM or fibre.
- Together, HF , fibre optic cables and SATCOM beyond line of sight communication technologies deliver the Joint Force complementary and resilient strategic communications depth.

What success looks like

- Provide the greater communications capacity, coverage, flexibility, speeds and survivability needed to address the full suite of potential and emerging threat scenarios. This sovereign, secure, resilient and reliable capability will deliver high levels of interoperability with the Joint Force, other Government agencies and international partners.)



Scope

- Enhance the DHFCS and sustain it through to 2040.
- Introduce modern technology, replace ageing equipment and upgrade facilities.
- Establish a new Darwin Receive Site at Mount Bundey.

Urgency

- The in-service Defence HF Communications System Life of Type is 2025.
- DHFCS faces emergent cyber threats, obsolescence issues and interoperability limitations.

Questions