Ground Based Air Defense Interoperability

Dr. Leigh Moore

Chairman

NATO Joint Capability Group on

Ground Based Air Defense

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Disclaimer

- The views presented here are those of the Chairman, JCG GBAD and do not necessarily reflect the view of the North Atlantic Treaty Organization, nation or organization.

Interoperability Definitions

- The ability to act together coherently, effectively and efficiently to achieve Allied tactical, operational and strategic objectives.
  - (AAP-06, 2018, Page 68)
- Ability of a system (such as a weapon system) to work with or use the parts or equipment or another system.
  - Merriam-Webster Dictionary
  - First known use of the term in 1965.

GBAD and the Threat

Category	System-Examples	Type GBAD Threats (Random Order)
VSHORAD	Guns	• LSS and Hi-G Stealthy UAS (ISR/Attack)
	Stinger, Mistral	• Advanced Rotary and Fixed Wing
	RBS-70	• Air Launched Standoff Weapons
		• Electronic Warfare/Cyber Attacks
SHORAD	NASAMS, Hawk	• Counter Rockets, Artillery and Mortars
	SA-6, AVENGER	• Low Altitude Maneuvering Subsonic and Hypersonic Stealth Cruise Missiles
		• Long Range Missiles
MRSAM	Patriot/SAMP-T	
29 Nations	30 Different Systems	

The requirement to counter a rapidly evolving complex threat requires an increasingly complex integrated GBAD systems capability.

Interoperability Over Time

- ## 1960-1990: Buy common equipment from a single nation.
  - Interoperability between Army and Corps.
- ## 1990-2010: National economy and defense related jobs (Money stays at home).
  - Interoperability at Division/Brigade level.
- ## 2010+: Digital vs Analogue Technology.
  - Interoperability at Battery/Battalion level.
  - Multinational Task Force.
  - Reduced manpower (<20 % by 2100)

- Top-Down:
  - It is important.
  - Lets talk about it (some more).
  - Trouble identifying strong positive action.
- Bottom-UP
  - It is _really_ important to the warfighters.
  - Have to work hard to make it happen.
  - STANAGS have to be written and implemented.
  - Endless cycles of testing to validate.

  It is being address, but there is more to be done.

- Example: Engagement Operations.
  - Multi-nation/Multi-Sensor type data fusion.
  - Any Sensor-Any Effector (Shooter).

- Operational Environment:
  - Different systems
  - Different nations
  - Different Original Equipment Manufactures (OEMs) within a nation.
    - Business Model – Competitive Advantage.

- JCG GBAD:
  - C4I Subgroup
    - STANAG development (STANAG 2618/ATP-82(A)).
    - Focus is TOC-to-TOC interoperability.
    - Interface with GBAD C2 MOU Steering Group.
      - Engagement Operations Working Group.
      - Force Operations Working Group.
      - Communications Services Working Group
  - Countering Emerging Air Threats Team of Experts.
  - Terminology and Capability Subgroup.

- Requirements are rapidly evolving by multiple agencies and organizations.

- Implemented by nations and organizations within nations are on different schedules.

- Implementation is impacted by:
  - Technology evolution.
  - National resources.
  - National internal priorities.

- Unstable Dynamic Baseline.

STANAG 2618/ATP-82(A)

- Title: Allied Doctrine for Ground Based Air Defense.

- Doctrinal bases for GBAD operations within NATO.

- Ratified by 24 nations.

Introduction. The preferred interoperability concept for NATO GBAD operations will seek the highest level(s) of interoperability practical for engagement and force operations. Interoperability levels are identified as degrees of interoperability in the NATO C3 Systems Interoperability Directive, and are summarized:

a. **Degree 0** – Isolated Interoperability in a Manual Environment. The key feature of Degree 0 is human intervention to provide interoperability where systems are isolated from each other.

b. **Degree 1** – Connected Interoperability in a Peer-to-Peer Environment. The key feature of Degree 1 is physical connectivity providing direct interaction between systems.

c. **Degree 2** – Functional Interoperability in a Distributed Environment. The key feature of Degree 2 is the ability of independent applications to exchange and use independent data components in a direct or distributed manner among systems.

d. **Degree 3** – Domain Interoperability in an Integrated Environment. The key feature of Degree 3 is a domain perspective that includes domain data models and procedures where data is shared among the independent applications which may begin to work together in an integrated fashion.

e. **Degree 4** – Enterprise Interoperability in a Universal Environment. The key feature of Degree 4 is a top-level perspective that includes enterprise data models and procedures, where data is seamlessly shared among the applications that work together across domains in a universal access environment.

Contributing to GBAD. Nations will generally seek Degrees 2 or 3, especially for engagement operations where events need to occur in short time spans (seconds, milliseconds). Degrees 0 or 1 are difficult interoperability levels to use for engagement operations, where guaranteed channel access and guaranteed speed of service are hard requirements. For force operations data exchanges with longer time spans (minutes, hours), guaranteed speed of service is not a hard requirement. Guaranteed delivery is a requirement, but with the slower time spans, there is more flexibility to operate in a switched network, with variable delays. In these cases, although Degrees 2 or 3 are advised and achievable within limits, Degrees 0 or 1 can be acceptable alternatives.

Summary

- GBAD Interoperability is recognized as being a critical force multiplier capability.

- Difficult task but significant work is taking place within the GBAD international community.

- GBAD and TMD/BMD integration and interoperability activities are also taking place.

But there is more work to be done.

Questions or Comments

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- Command and Control Interoperability.
  - Critical enabler between units and nations.
  - Enabled standardization, digital technology, AI.
- Examples.
  - JCG GBAD C4I Subgroup.
  - GBAD C2 MOU.
  - European GBAD Working Group.
- Exercises.
  - Tobruk Legacy.
  - Joint Project Optic Windmill.

- NATO Standards.
  - STANAG 4312, Part Two (1997).
    - Interoperability of Low-Level Ground Based Air Defense Surveillance, Command and Control System.
    - Part 2: Common Interface Requirements and Bit-Oriented Messages.
  - STANAG 2618/ATP-82(A).
    - Allied Doctrine for Ground Based Air Defense.
    - Ratified by 24 nations.
  - STANAG 2619/ATP-86.
    - Allied Doctrine for GBAD Operations using JREAP-C and Link 16 (Under Development).
    - Companion to STANAG 2618/ATP-82(A).