

Integration of Tactical Communications for Fires in Multinational Environments

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As modern warfare evolves, military planning and training for large-scale combat operations (LSCO) increasingly emphasize a multinational and coalition environment. The integration of fires—particularly surface-to-surface, multinational field artillery, and precision strike capabilities—is critical to achieving operational success. Vital to this integration is the ability to communicate effectively, reliably and securely across different national systems. Technical interoperability is essential, enabling digital fire control systems, command platforms and communication networks to exchange mission-critical data.

Tactical communications form the backbone of interoperability, serving as the primary means of linking national systems and ensuring synchronized fires on the battlefield. Yet they are often among the most complex elements to align in a coalition framework. This paper examines the core challenges in multinational tactical communications and discusses best practices for effectively integrating tactical communications for fires in LSCO



CHALLENGES IN TACTICAL COMMUNICATIONS

Multinational fires face persistent tactical communication challenges that directly hinder speed and coordination. Incompatible radio systems, encryption standards and fill devices often prevent direct communication between coalition partners. U.S. units may operate on frequency modulation (FM), Mobile User Objective System (MUOS) or Tactical Scalable MANET (TSM), while allies may use national variants that do not share the same frequency or waveform capabilities. Even when units coordinate frequency plans, late changes or misaligned fills can render radios useless at the critical moment.

Spectrum and frequency management also pose a critical challenge, especially during large-scale exercises where multiple nations operate a dense array of radios. Each nation arrives with its own frequency plans, often resulting in overlapping assignments. In some cases, nations are unwilling to share detailed frequency allocations due to security policies, which complicates spectrum management.

Digital interoperability between multinational fire control systems

presents persistent challenges due to differences in data formats, message structures and communication protocols. Systems like the Advanced Field Artillery Tactical Data System (AFATDS – U.S.), ADLER (Germany), ATLAS (France) or BATES (U.K.) are built on unique software architectures. This leads to mismatches in how fire mission data is generated and interpreted, often resulting in rejected or unreadable messages. Version mismatches and unsynchronized software updates further complicate compatibility. Firewalls may also block necessary ports or protocols, preventing communication even when other settings are correct. These factors degrade the reliability of rapid fire coordination.

Sharing a common operating picture (COP) in multinational operations is also a challenge due to the use of different national systems like the Command Post Computing Environment (CPCE), JASMIN and the Land Command and Control Information Service (LC2IS), each with unique data formats, symbology and map engines. Even with shared protocols like NATO Friendly Force Information (NFFI) or the Multilateral Interoperability Program (MIP), inconsistent implementation often leads to missing or misaligned data.



Firewalls, classification boundaries and isolated networks further obstruct data exchange. These issues result in fragmented situational awareness.

BEST PRACTICES

Despite these challenges, several strategies and practices can enhance the integration of tactical communications for fires in multinational environments.

1) TACTICAL RADIO SOLUTIONS

Overcoming radio communication issues requires a mix of technical solutions, planning and coordination. Encryption incompatibility can be mitigated by using coalition-approved radios with Type 1 interoperable encryption or by preloading shared crypto fills coordinated through crypto planning cells prior to operations. Frequency deconfliction is also essential. Coalition partners must align on frequency assignments to avoid interference. At the Joint Multinational Readiness Center (JMRC), this is typically managed during Signal Working Groups in the planning phase of rotational exercises. When radios remain incompatible, some units employ Voice over IP (VoIP) over coalition networks like the Mission Partner Environment (MPE) as a workaround.

2) INTEGRATION OF FIRE CONTROL SYSTEM INTERFACE BRIDGES

Overcoming digital interoperability in multinational fire control systems depends on the use of interface bridges, particularly Artillery Systems Cooperation Activities (ASCA) gateways. NATO's ASCA message structure provides a common language that enables partner nations to communicate based on the Common Technical Interface Design Plan. These gateway systems process ASCA messages into national formats compatible with platforms like the U.S. M777A2 or Germany's PzH 2000. System database construction is critical to ensure that messages are properly routed. Without NATO aliases for each participating platform built into the database, fire missions can fail. Success depends on robust testing through risk reduction exercises and technical rehearsals. When properly employed, the ASCA protocol enables real-time interoperability between otherwise incompatible systems.

3) TACTICAL DATA NETWORKS & GATEWAYS

Network integration is critical for secure communications across coalition forces. Shared networks like MPE provide a common infrastructure that allows participating nations to exchange data and coordinate operations.



By standardizing IP addresses, firewall rules and access controls, MPE ensures national systems can communicate over a trusted network. This enables COP sharing between systems like CPCE, JASMIN and LC2IS, ensuring common graphics and battlefield updates. Network integration not only enables technical exchange but ensures these exchanges occur securely during dynamic operations.

4) PRE-EXERCISE INTEROPERABILITY REHEARSALS

To mitigate challenges across fire control systems, multinational formations must prioritize early technical integration. The most effective approach is conducting pre-exercise interoperability testing, where nations connect their digital systems through interface bridges such as ASCA to validate message exchange. Exercises like Dynamic Front, Combined Resolve and Saber Junction underscore the importance of rehearsals. For instance, during Dynamic Front 24, U.S., German and Polish units successfully transmitted fires data via ASCA. However, initial network configuration mismatches caused delays—highlighting the value of rehearsals and cross-checks to ensure systems are aligned before execution.

5) LIAISON OFFICER INTEGRATION

Assigning liaison officers (LOs) between coalition elements ensures smooth coordination. An LO serves as a critical human enabler for communications and fire mission success. During Combined Resolve 25-01, the Lithuanian Multinational Fires Battalion provided LOs and communications equipment to U.S. and U.K. batteries. These LOs, equipped with Lithuanian VHF radios and terminals, bridged communication gaps between headquarters and fire direction centers. Their presence ensured fire missions could proceed even in the absence of full digital interoperability.

CONCLUSION

Effective integration of tactical communications for fires in multinational environments is essential to achieving synchronized effects on the battlefield. While interoperability challenges exist, they can be mitigated with shared networks, interface bridges, and rehearsed technical integration. Observations from exercises like Dynamic Front 24 reinforce the importance of early interoperability efforts and technical coordination. By investing in these efforts, coalition forces significantly improve their ability to deliver decisive fire support in large-scale combat operations.



ABOUT THE AUTHOR

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