

Standards-Based Radio Networks: Improve Tactical Integration



Challenge

Military organizations require tactical networks for data, voice, and video communications that are versatile and reliable. While tactical networks are crucial for modern military communications, easy radio integration and connectivity into these networks can present unique challenges. The necessary standards are lacking in today's radio communications architectures, making it difficult to use radios simply and efficiently to build IP-based networks. Most radios in use today were designed not to connect to broad-reaching IP-based networks, but only to communicate with other like devices. The dissimilar connection methods of radios greatly complicate the process of creating a tactical military network or easily adding new radio types and technologies.

New software-defined radios allow a single radio to operate with multiple waveforms to provide a wide range of capabilities depending on frequency, waveform characteristics, and bandwidth. However, that variability also makes it difficult to establish and maintain IP connectivity. Moreover, radio-based communications can be unreliable, and if routers are unaware of each radio's condition, they cannot make effective routing decisions. Finally, network routers and radios must be able to form ad hoc networks with minimal configuration or changes. All of these challenges hinder the military's ability to have real-time access to mission-critical information.

A Call for Standards

These challenges demand a standardized way for routers to connect and exchange data over different radios, just as disparate technologies can be connected in the IP environment. Such a standard would enable data-capable radios to be added to a network quickly and easily. Additionally, routers and other network devices must be able to obtain continuous status information to make smarter routing decisions by dynamically adapting to changes in the RF environment.

To support this evolution of radio-based networks, Cisco has introduced the concept of Radio Aware Routing, a methodology for standards-based connectivity of routers and radios. It promises to make building radio-based IP internetworks an extension of the way the Internet is constructed: with standardized interfaces. The underlying goal is to make radio-based networks with routers as easy to implement, connect to, and use as the wired networks that form today's global internetwork.

Standards Enable Easy Connectivity

Fundamentally, Radio Aware Routing requires a well-defined set of standards that enable a wide variety of radio types to operate easily and efficiently with IP routers. Radio Aware Routing is establishing these standards for both radios and

routers to define how they communicate with each other. The successful adoption of standards for interoperability (such as ATM and X.25) among routers and underlying networks within the Internet can be regarded as a mature case study on the benefits of this approach.

At the heart of a truly interoperable tactical military network is the IP suite of networking standards. IP networks have demonstrated their reliability for more than three decades and offer a robust foundation for vital military traffic. Today, network administrators can connect individual networks into an internetwork using well-defined and widely adopted standards. This approach needs to be embraced when interconnecting RF nodes into the IP world.

The Importance of Radio-to-Router Connectivity

With current technologies, configuring each new link in a radio-based network requires costly, time-consuming integration of proprietary interfaces and protocols. Standards for radio-router interaction would help minimize integration time and maximize network performance. The standards would cover both the physical interface and the way that metrics about connectivity health, available radios, bandwidth, link quality, and the like are communicated to routers.

With Radio Aware Routing, you could take a standards-compliant radio, connect it to a router, and instantly have the router optimize the radio's network communications. All connected computers would operate just as they do today, unaware that some of their traffic is being carried over a radio network. And it would be easy to add new radio links. Such a system would provide the robustness and versatility that tactical military networks demand.

Innovative Global Government Solutions

Cisco is turning its experience and expertise on networking toward the research and development of technologies that will make Radio Aware Routing a reality. Working with vendors that are willing to implement the necessary hardware interfaces and software protocols, we foresee solutions that will benefit not only military users, but any group that needs reliable, versatile mobile networks.

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For More Information

To receive a copy of the white paper "Internet Protocol and Radio Frequency Networks: Creating Robust Military Networks," please contact your Cisco sales representative.

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