

INTEROPERABILITY FOR DEFENCE COMMUNICATIONS



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*"The secret of war lies in the communications."
-Napoleon Bonaparte*

Recent happenings in London, Madrid, the United States, and around the globe have again highlighted the need for interoperable group communications to successfully respond to these events. All military units, service branches, and joint operations must be able to communicate seamlessly both day-to-day and during emergency events, both between themselves and with public safety and other agencies at the international, national, and local level.

The lack of interoperable group communications is a challenging and expensive problem for organizations worldwide. Professionals through out the world rely on unrelated, proprietary communications systems, including two-way land mobile radio systems utilizing various frequencies and based on many different analog and digital radio technologies. In addition to radio systems, wired communications systems using traditional circuit-switched technologies as well as newer, IP-based technologies are utilized for both tactical and permanent communications.

In order to successfully bring users together for interoperable communications, limited-scope environments can be addressed simply by replacing incompatible communication systems with a single, shared system. For many situations, however, this simply is not an option, either because of the diversity of the systems used by the participants, lack of funding to replace the existing systems or simply because of the constantly-changing nature of the technologies used by each organization. To achieve true, sustaining interoperability that allows new technologies to participate, a flexible, common interoperability infrastructure must be deployed.

IP convergence has proven to be a successful approach to interoperability in that it establishes a "common thread" among each of the participating systems, allowing organizations to maintain control of their independent systems and leverage their current technology investments.

Twisted Pair Solutions, Inc., through its WAVE(tm) software technology, delivers an IP communications platform that enables the convergence of voice, data and video over IP. WAVE has been utilized by customers worldwide to implement interoperable voice communications using software based on non-proprietary, open standards that runs on commercial off-the-shelf computing

hardware. This distinguishing approach provides agencies and organizations with true interoperable communications using their existing equipment. WAVE is a robust application and development suite that lets customers connect two way radios, cellular phones, traditional and IP telephones, PCs, PDAs, and other communications devices of any technology from any vendor. WAVE delivers cost-effective communications interoperability while protecting customer investments in existing communications infrastructure and positioning them to make use of new and emerging communications technologies when required.

The WAVE software solution can be deployed quickly within a multi-vendor environment and supports robust security and operational protocols. In the military and public sectors, WAVE allows multiple agencies to quickly and easily interoperate over secured and survivable connections for day-

to-day operations and in emergency situations. WAVE is currently being used today by defense organizations today with some of the highest standards for security and reliability, including the military units in the US, UK, Australia and the Netherlands.

There are three key areas to address when considering interoperable communications:

- Time — time to reach interoperability;
- Cost — the full picture: Total Cost of Ownership, Return on Assets, and price;
- Scope — radios, other devices, gateways, and networks.

Military personnel need to be able to quickly achieve cost-effective interoperability for all of their communications devices within their existing technology infrastructures. In order to achieve interoperability quickly, personnel must all have a common fabric in place for communications.

TIME

Fully building out a new network takes time. Waiting for other authorities to build out their new networks might take even more time. A key cause of delay in achieving interoperability, and something of a myth, is that an entirely new platform for communications must be built. Building the PSTN (public switched telephone network) and mobile phone networks has taken decades.



Replacing every single radio would take almost as long. Even in situation where shared-agency, single-technology systems are being deployed (such as TETRA-based systems in many European countries) the transition of all agencies to the use of the new system takes time, however interoperability is needed quickly and throughout the transition. Personnel can quickly and affordably achieve a higher level of interoperability by using an Internet Protocol or IP-based solution, rather than a radio-centric approach that calls for whole new networks to be built and every single radio replaced. In addition such a solution incorporates far more than just radio communication systems, achieving a broader scope of interoperability.

COST

A cost-effective solution requires getting more from existing technology investments and extending the life of existing radios, IP gateways, and infrastructure. The mainstream and pervasive IP network is the common fabric used by military personnel today for their email, Web access, and increasingly, their telephony.

In order to achieve cost-effective interoperability, military and public safety require open standards-based solutions that leverage their existing radio, gateway, and communications investments, as well as providing the platform for future technology investments like TETRA. Proprietary and radio-centric interoperability is expensive to support and limits future flexibility. Communications devices, including radios, are constantly evolving and incorporating new capabilities and benefits. Military and public safety must rely on open standards to ensure that they can leverage these innovations when they become available. Simply replacing legacy radio networks with new ones does not leverage the value of your existing communications assets. Moving to a new radio standard means not only new hardware, but also a substantial investment in new software and often, very expensive radio handsets.

SCOPE

Interoperability clearly involves more than two-way radio communications. Although it is critical for tactical radio systems to interoperate with each other, it is just as critical for these radios to communicate with PCs, mobile phones, landline phones, IP phones, PDAs as well as systems used by public safety personnel. Interoperability also means interoperability on the back end. Personnel need the flexibility to make their own decisions on gateways, tactical units, and IP infrastructure. Open standards-based software running on IP networks means commanders and personnel can retain control of their networks and devices.

As military missions have grown more complex, robust communications links have become crucial. Tactical units must be able to communicate with nearby forces on land, at sea, and in the air as well as groups that are not geographically close by. Strategic commands need to communicate with Joint and Coalition forces, as well as with their own tactical units in the field. And military units must be able to communicate with civilian public safety agencies during homeland security operations. Clearly, military communications must securely bridge between these diverse systems to achieve true interoperability.

WAVE

A secure, reliable, and massively scalable interoperability solution exists today, through WAVE. WAVE is designed to work with anything systems, devices, etc that you currently have in place. The software acts as a universal adhesive, able to bond military communications systems together, but also enforcing operational rules to allow the communications to be manageable. The advantages of an IP-based system do not stop at voice and radios alone. Data, video, voice can all be transmitted to and from any device, a radio, a cellular phone, a PC or PDA.



HOW WAVE WORKS

WAVE is comprised of several software components, distributed as required to achieve the level of interoperability and operational redundancy needed.

WAVE Management Server - The Management Server is used by an administrator to define the structure, users and rights of each participant. The initial logical structure is to define a “domain” of communications. This domain may represent a unit, brigade, division or whatever size of grouping that is appropriate for the mission at hand. The structure of a domain can mirror an existing organizational structure, but could also cross organizational boundaries and include users from many groups. The users that participate in this domain - be they radio user, participants on telephones, PCs or other devices connected to IP networks - are configured in WAVE to have access to a combination of “channels” of communications. Each domain contains many channels, each representing a source of commu-

nications from one of the systems participating in the interoperable communications. For example, a domain might include 100 users who participate via clients on their PCs, 50 users who communicate using cell phones or landline phones, as well as 75 users who participate through their tactical radios. **WAVE Clients** - Users who participate in communications via PCs, PDAs or other computing devices listen to and talk on channels through their associated clients. For users who simply need to monitor and/or communicate on various WAVE channels, they can use the **WAVE Desktop Communicator**. This client allows for its user to see the status and activity of several channels, communicate on those channels through a push-to-talk paradigm as well as record and play-back the content of each channel through a simple interface.

For users who not only need to participate in communications, but also need to control - in real time - who can talk to each other in the role of a “dispatcher”, they use the **WAVE Dispatch Communicator**. These users have a complete “pallet” of channels that they can combine into sessions in order group users as needed to support the missions at hand. Users of this client can place outbound calls through a dial-pad, organize teams by combining users into a tabbed interface as well as have access to all the functions provided by the Desktop Communicator.

WAVE Media Server - the Media Server is an aggregation point for devices or systems that can't directly communicate on WAVE channels. Devices such as telephones and radios are connected to channels through gateway devices. These gateways may either incorporate Media Server software directly on them (and thus participate directly in WAVE channels) or simply convert the media streams to IP and hand the results to a Media Server for representation on to WAVE channels. Media Server software - wherever it's actually running - performs critical functions like real-time transcoding, supports both unicast and multicast IP communications, performs recording on configured channels, etc.

REAL WORLD APPLICATIONS

IP-based systems have already been quickly deployed for a number of tactical missions, including Joint and Coalition Interoperability during peacetime exercises, Unmanned Aerial Vehicle (UAV) command posts, special ops, and radio interoperability. IP solutions are also establishing a role in strategic systems, including Command, Control, and Communications (C3) architectures and new naval warfare platforms. A good IP-based software application's ability to link legacy communications with modern IP networks makes it one of the most valuable tools in your kit.

