VoIP Services in Tactical Networks

Application Note

Bittium

VoIP Challenges in Tactical Networks

As IP technology is being widely adopted in tactical communication networks, also tactical voice networks are moving towards the use of Voice over IP (VoIP). When considering the right VoIP solution for a tactical environment, typical commercial VoIP server solutions have several handicaps.

Typically VoIP servers require preparing a dial plan in advance, which defines the trunk connections between servers. Similarly the users have a fixed location in the network. This approach works well in fixed networks, but tactical networks are mobile by definition, thus routes between servers may change and some may become temporarily unavailable. Furthermore, user locations in tactical networks can also change at any time and the VoIP system has to adapt accordingly. In addition, traditionally tactical networks assign priorities for each service (voice, fire commands, data) and services may have priority sub-categories within themselves. Lack of priority setting capabilities in IP networks generally promotes a notion of VoIP being an unreliable solution.

Another challenge in the transition is the use of legacy voice systems, such as tactical voice radios. Often it is necessary to continue using legacy technology side by side with the new one and intercommunication between the VoIP world and legacy systems becomes crucial for efficient operations.
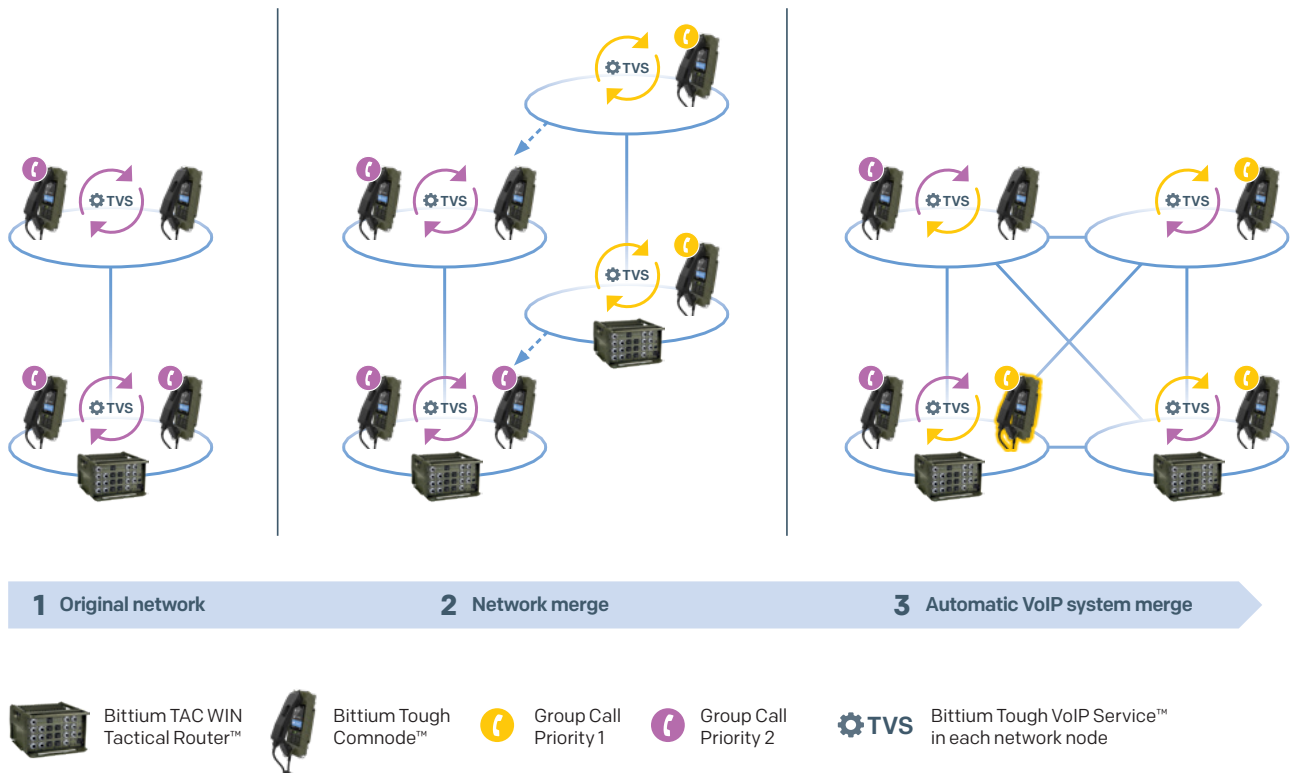
VOIP CHALLENGES IN TACTICAL NETWORKS

- Centralized VoIP solutions are vulnerable and offer limited mobility in tactical use

- Configuration changes in the field are difficult

- Integration of VoIP and legacy audio in the same network is challenging

- Quality of service and priority of calls are not supported

Bittium Tough VoIP™ Solution

Bittium Tough VoIP Service™ is designed specifically for tactical environments and is a solution that is truly distributed, i.e. a loss of a single element in a central role will not cripple the service; instead any node in the system is capable of claiming that role. The server entity is typically installed on each network router node such as Bittium TAC WIN Tactical Router™, Bittium Tough Comnode™ or Bittium Tough SDR™ radios. Each one of the servers can work independently providing local VoIP service to local users. Full set of tactical features can be provided without being dependent on any centralized service beyond the local router.

When the network expands and connection to other tactical nodes is established, Tough VoIP Service automatically forms connections also between the VoIP servers. If the network connections break, and reconnect, or the network topology changes, the VoIP network will also recover without any user interaction. This self-healing capacity of the Tough VoIP Service makes it superior in tactical use. See Figure 2 illustrating priority and mobility features of the Tough VoIP Service network.

| **1** Original network | **2** Network merge | **3** Automatic VoIP system merge |

Bittium TAC WIN Tactical Router™

Bittium Tough Comnode™

Group Call Priority 1

Group Call Priority 2

TVS Bittium Tough VoIP Service™ in each network node

Figure 2: Priority and mobility features of the Tough VoIP Service network.

Tough VoIP Service is a true zero-configuration system. It is ready for operation directly after installation. Users are not bound to a single server node, and network topology is fully dynamic.

Also integration to other VoIP and mobile networks is simple. Tough VoIP Service supports standard SIP (Session Initiation Protocol) interfaces towards VoIP clients, and other VoIP systems. This enables the use of any terminal devices and trunk connections to third party VoIP systems, also building a connection between a tactical and a commercial network is feasible without additional equipment or software. This allows communication between tactical networks and mobile networks, for example LTE.

Often it is also necessary to be able to form a direct voice connection to legacy voice radio systems. Bittium provides an integrated solution that can connect a VoIP network to an analog one through a RoIP (Radio over IP) gateway. The gateway can be hosted by the TAC WIN Tactical Router and the Comnode. The gateway will have its own phone number, allowing the VoIP network users to connect into the analog voice network.

See Figure 3 with trunk connections to an operational network and connectivity to legacy voice radio networks.

In addition, Bittium provides a unique solution for prioritizing VoIP calls in tactical networks. VoIP calls not only have a configurable priority within the voice service, but also the Bittium TAC WIN network implements a Call Admission Control (CAC) system which can manage calls in the network. This means that the user will receive feedback if the network capacity is not sufficient for the call. Also ongoing low priority calls can be released in case it is required to release network capacity for higher priority calls. As a result, the reliability of the voice service is remarkably improved, and the behavior of the service is more consistent.

Bittium's Tough VoIP product offering forms a complete solution from voice service to end-user terminals and applications. In addition to Bittium's applications it is possible to integrate third party applications and solutions, for example by using an SDK for the integration. Together with Bittium TAC WIN, Comnode, and Tough SDR networks and nodes, the system provides mobile connectivity from command posts to dismounted soldiers.

BITTIUM TOUGH VOIP SERVICE PROVIDES A UNIQUE VOIP SOLUTION THAT IS OPTIMIZED FOR TACTICAL NETWORKS:

- Distributed, self-healing system with high mobility
- Truly a zero-configuration system
- Smooth integration to legacy voice radios using RoIP and standard SIP towards other networks
- Prioritization and state-of-the-art Call Admission Control together with Bittium TAC WIN system
- Seamless integration to anything from legacy voice radio to mobile networks, for example LTE.
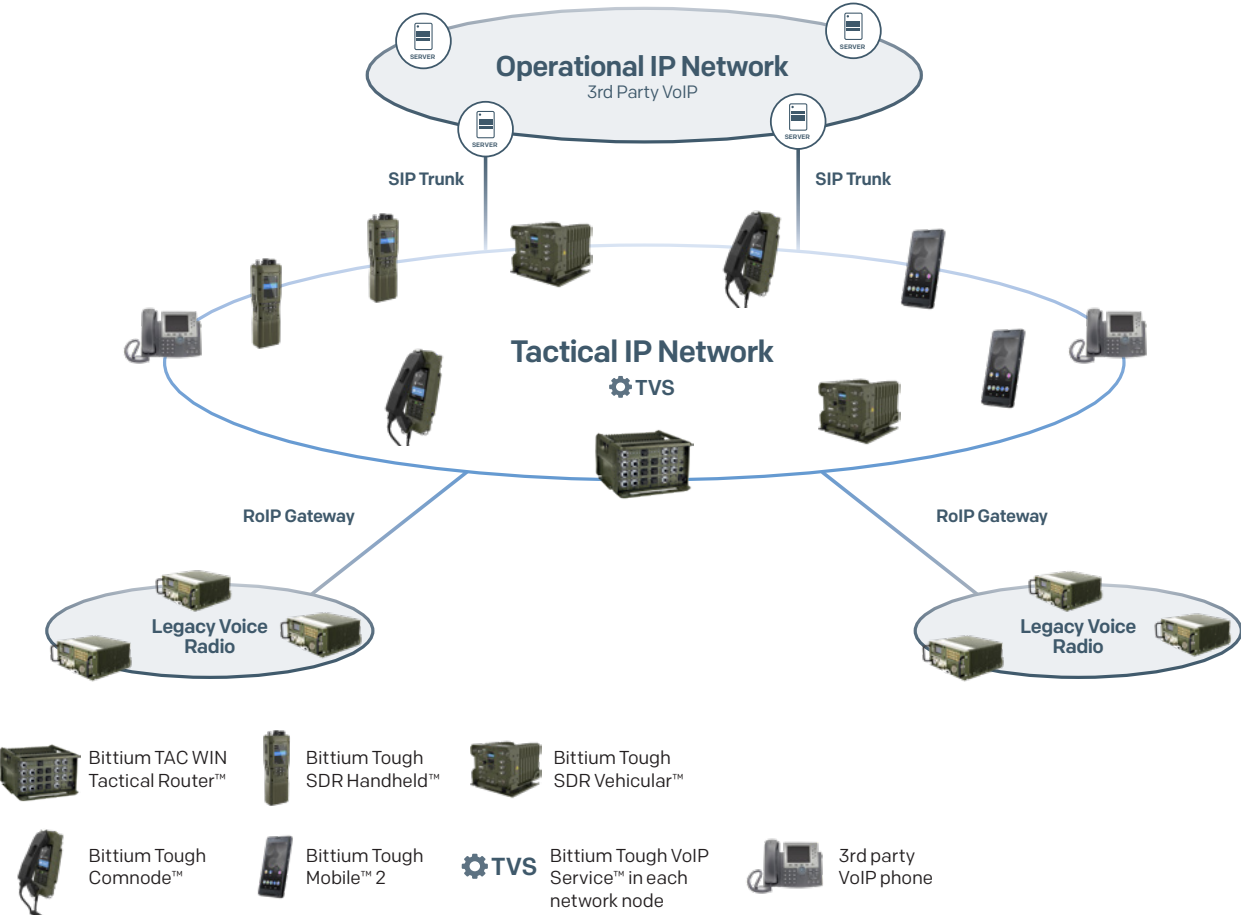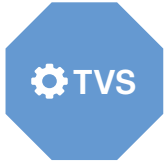

Figure 3: Trunk connections and legacy voice radio connectivity

Related Products

Bittium Tough VoIP Service™
Distributed VoIP service

Bittium Tactical Wireless IP Network™ (TAC WIN)
Tactical IP backbone network

Bittium Tough Comnode™
Versatile terminal and IP communication device

Bittium Tough Mobile™ 2
New standard for ultra secure mobile communications

Bittium Tough SDR™
Tactical software defined handheld and vehicular radios

Bittium Tough VoIP Field Phone™
Rugged VoIP phone

Bittium Tough VoIP Softphone™
Software VoIP client

Service

Network

Clients