STACS®RADIOHUB™

A COMPREHENSIVE, SECURE, TACTICAL P25 CONVENTIONAL RADIO COMMUNICATION SYSTEM

ADCOM TECHNOLOGIES

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STACS®RadioHub™
Digital Radio Infrastructure

Applying Infrastructure Radio Capabilities to Tactical Environments

Until now, tactical deployment of advanced radio systems have been limited to preconfigured networks in fixed configurations. Satisfying the unique radio communication needs of tactical radio users requires network solution that provides the ability to configure and direct communication needs over the network in a real time. Whether a scenario is search and rescue, disaster recovery or any other environment where resources are brought and connected together to provide temporary communications, command and control personnel must have the ability to direct and connect resources as events unfold.

The RadioHub P25 conventional solution is an enabling technology providing analog and digital voting, ROIP, radio call routing, disparate radio network interoperability and a host of other capabilities to the tactical environment while providing full end-to-end encryption when communication security is required. With an initial focus on Project 25 and Project 25 interoperability, RadioHub maximizes the communication capabilities of tactical P25 radio users.

Advanced link management allows for operation on a wide range of network topologies and configurations where link latency, jitter, and error rates may not be understood or controlled. Provided a backhaul network can satisfy RadioHub's low bandwidth communication requirements; the solution operates in voted and non-voted configurations over a multitude of networks and network topologies with no pre-configuration of the system. RadioHub automatically monitors network conditions and adjusts internal network management protocols to match network characteristics providing for plug-and-play deployments under those wide range of network conditions.

RadioHub automatically monitors link latency and jitter and adjusts its voting windows and other parameters to achieve the minimum audio latency required to maintain high quality audio. Managed expensive microwave links and leased lines are no longer required to deploy a voted radio network. As a pure software-based system, RadioHub stores multiple pre-validated configurations to satisfy most known tactical scenarios without requiring duplicate equipment or time-consuming field configurations. Configurations can be tested during exercises, documented using automatically generated Word™ and PDF documents and exchanged with other agencies with just a few clicks.

A Wizard based configuration tool allows for the application of new scenarios, including complex interoperable networks to be configured and designed to be deployed in minutes by non-technical staff with very basic knowledge of radios and networks. After providing very basic information, the RadioHub server loads as many voters, arbitrators, and other virtual devices as required and automatically configures all remote gateways, interoperability bridge interfaces, recording servers, radios, and VPN gateways.

All server components can be hosted in multiple environments including cloud servers, datacenter rack servers, Windows™ based notebooks, tablets, and other embedded, low power devices. RadioHub is SD-WAN compatible, vendor agnostic, and pre-certified with CISCO VPN, SD-WAN, and Cradlepoint VPN solutions. All components can be used in mixed environments allowing EOC data-center based server redundancy, backed up by cloud server instances, and on-site embedded devices (and or any other combination).

Sample Deployment Scenarios

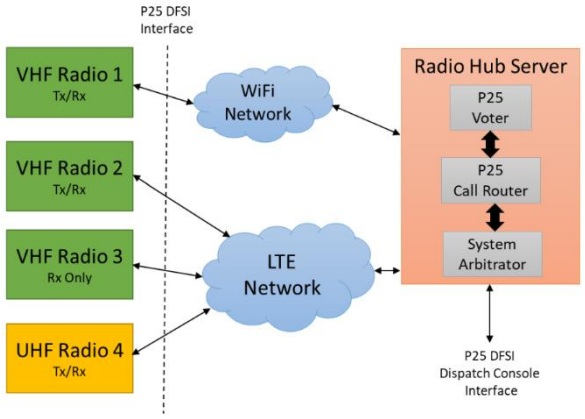
Special events require the rapid deployment of resources in response to special circumstances. This could be a response to an emergency incident that requires the immediate deployment of manpower and materials. It could also be a planned event, such as a large gathering of people, which may require additional resources that could tax existing infrastructure.

At its simplest RadioHub allows radio endpoint to be connected together, providing P25 communication and arbitration for users over a wide geographic area and across multiple radio bands. This allows users to maintain communication on specific Talk Groups and radio bands using the RadioHub's voting and routing capabilities.

A basic configuration of RadioHub allows DSFSI enabled radios to connect to the RadioHub core. The system has been architected to provide both local operation and/or centralized control, based on where the RadioHub core software is located.

In the example below, the RadioHub is connected to multiple P25 radios, via DFSI links. The radios consist of combination of receive and transmit end points. Incoming calls received from potentially multiple endpoints are voted on by the RadioHub core. Radio Hub constructs the best data stream possible and routes the stream to appropriate transmitters. This could be a single transmit point or configured for multiple transmitters based on equipment locations and bands of operation.

See figure:



Calls are routed based on P25 TGID or NAC codes. This allows partitioning of calls based on group communication needs. The ability to assign priorities based on TGID, NAC and or a communication port ensure higher priority calls are transmitted.

Clear or encrypted P25 calls are supported by end-to-end encryption through the system ensuring maximum call protection.

Example Call 1 – Standard Voted Call

- A P25 VHF subscriber user begins a transmission.
- The call is received by multiple VHF receivers.
- The radio hub P25 voter receives the transmissions and constructs the best received signal.
- The recovered signal is sent to the router where is it routed to the selected transmit ports based on received call attributes, NAC or TGID.
- The system arbitrator determines the call priority and provides it to selected transmitter(s) and / or a consoles sub-system for rebroadcast

Example Call 2 – Cross Band Voted Call

- A P25 UHF subscriber user begins a transmission.
- The call is received by the UHF receiver.
- The radio hub P25 voter receives the transmissions.
- The recovered signal is sent to the router where is it routed to the selected transmit ports based on the received calls attributes. This includes VHF and UHF transmitters.
- The system arbitrator determines the call priority and provides it to selected transmitter(s) and / or a consoles sub-system for rebroadcast.

Example Call 3 – Priority Call Collision

- Two or more subscribers simultaneously access a channel.
- The calls are processed accordingly.
- The system arbitrator determines the highest priority call and gives that call priority.
- Optionally, the blocked call is recorded and retransmitted when resources become available.

Example Call 4 – Console Pre-emption

- A call is active per example 1 or 2.
- A dispatch operator accesses the channel being used.
- The active call is muted, and the channel is provided to the dispatcher.

The RadioHub server is easy to configure, complex radio architectures can be designed and setup in minutes. Adding channels and call attributes is done using a point and select approach allowing for users to rapidly build or reconfigure call groups. In addition, RadioHub provides the ability to save and recall configurations allowing changes to be recalled at later dates.

Fully redundant configurations are available supporting full online redundancy in voting, arbitration, and all other server functionality. Redundant online backhaul links between the server network and the radio gateways, as well as, redundant links, between the server networks are supported. Full online redundancy means glitch free failover for backhaul links and all server components. Servers and backhaul links are automatically brought back online after a failure is resolved, and full telemetry is available on local or remote status consoles, as well as, on RadioHub tactical dispatch consoles.

Future releases will provide Interoperability bridges allowing multiple agencies with different security keys to maintain secure communication across links while continuing to manage their own P25 encryption keys.

RadioHub Solution Virtual Components

The following provides an overview of additional features and capabilities provided by RadioHub.

DFSI V1 and DFSI V2 radio interfaces with support for DFSI based base stations and repeaters and proprietary radios via RIC-M gateways devices.
Digital Voter with voice and data voting capabilities and full end-to-end encryption support
Analog Voter – requires gateways and operates on high-latency, high-jitter backhaul networks without degrading audio quality.
Programmable Arbitrator – prioritize transmit traffic to ensure clear communications and delivery of the highest priority traffic on busy networks.
ROIP Router – routes digital and analog voice data to non-voted radios for simple or complex radio interoperability networks.
P25 and Analog Voice Routers – P25 voice traffic can be routed to multiple endpoints based on NAC, talk group ID, subscriber emergency status or encryption details. Analog traffic can be routed based on CTCSS, DCS and other selective call protocols.
P25 Data Routers and Gateways – route data traffic from your subscriber units to one or more data gateways by traffic type (registration, location, OTAR, etc.) with voting on inbound traffic and automatic tracking of the best radio to provide data responses from the gateways.
OTAR Gateway – proven gateways to major vendor KMF systems (including US Federal systems) for P25 subscriber units.
Tactical KMF – built in FIPS compliant KMF for KVL or OTAR rekeying of radios in a tactical environment.
Voice and Data Recorder – record all voice and data traffic, including voter inputs and outputs with full telemetry information to a digital recording system. Encrypted traffic is recorded in its original encrypted state without keys on the recording system preserving the integrity of secure systems.
Analog Gateway and Radio Support – small, lower power gateways devices link analog radios and gateways to the RadioHub network with support for four-wire, line level, headphone level, re-discriminator audio and a variety of signaling protocols including CTCSS, DCS and TRS.
Audio Format Conversion – convert analog audio to/from P25 digital compressed formats, as well as other industry standard codecs (G.711, G.729, OPUS, MELP and Codec2 currently).
Signal Encryption/Decryption – encryption, decrypt or re-encrypt P25 digital traffic using AES-256 encryption with internal key management and support for OTAR as well as a KVL interface.
Third Party Dispatch Interface – industry standard DFSI dispatch ports for interfacing with third party dispatch systems.
Tactical Dispatch Console – a comprehensive Windows™ based tactical dispatch console system with full support for the RadioHub system including telemetry and AES-256 encryption. Dispatch stations are automatically configured from the RadioHub wizard-based configuration data and multiple dispatch roles with separate endpoint configurations are supported.