MOTOBRIDGE IP INTEROPERABILITY SOLUTION

PROVEN MISSION CRITICAL PERFORMANCE YOU CAN COUNT ON

Communication interoperability is a well-recognized imperative for public safety, homeland security, law enforcement, or any other organization that has a need to share intelligence, coordinate plans, and mount successful joint operations with others operating on disparate systems. Federal, state and local agencies with incompatible voice systems can communicate with a MOTOBRIDGE radio over IP interoperability solution.

MOTOBRIDGE is an easy and fast way to establish communications between disparate systems in support of day-to-day operations and emergency response. Any number of connections between disparate radio and phone systems can be activated quickly.

POWERFUL FLEXIBLE SOLUTION

More than a simple audio patch, traditional IP gateway, or pure software solution, MOTOBRIDGE is a flexible solution with capabilities that allow it to fulfill a more advanced role in an organization's interoperability strategy. In addition to providing interoperability across disparate networks, MOTOBRIDGE provides:

- IP dispatch functionality
- Full-duplex conferencing
- Direct phone access to radio networks
- Connectivity and control for smart phones
- Over-IP radio voting
- Network management

With Motorola, there is no reason to reach out to multiple providers to enable your organization to meet its interoperability needs. We can provide a complete interoperability solution, including access radios, industry leading maintenance and installation services, and 24/7 system monitoring.

SUPERIOR MISSION CRITICAL DESIGN

When an operation is mission critical, it is important that the supplier of your interoperability solutions understands public safety communications. MOTOBRIDGE is a product designed from the ground up for interoperability across IP networks, when mission critical reliability and performance counts.

ROBUST REDUNDANT ARCHITECTURE

MOTOBRIDGE features a fully distributed architecture of Voice over IP gateways for peer-to-peer based interoperability services. It is expertly designed by Motorola to assure the highest possible level of survivability and reliability, with maximum fault tolerance and built in redundancy.

The distributed MOTOBRIDGE gateways handle all the audio processing and advanced signaling. With no central audio switch through which audio and data must be routed, dispatch commands and voice are processed immediately, regardless of how busy the system becomes. With other systems that have a centralized architecture, dispatch commands and audio can get backed up in a "queue" at the central switch, resulting in delayed communication.

In addition, established talk-paths are sustained by the MOTOBRIDGE gateways and are un-impacted in the event of a PC or management server failure.

MOTOBRIDGE is optimized to operate on existing standard SIP-based customer networks without modifications, special multicast routers or proprietary network hardware. Audio clarity and integrity is designed to endure longer packet delays and jitter inherent to IP networks.

SUPERIOR AUDIO QUALITY

MOTOBRIDGE gateways are designed with on-board security and sophisticated audio and signal processing to meet mission critical time constraints for establishing communication paths, with optimized voice quality and intelligibility. Users experience fast PTT and reliable audio over IP, plus Quality of Service (QoS) support ensuring real-time audio gets highest priority over other types of traffic.

Dedicated processors intelligently manage different resources simultaneously:

- **Audio encryption processor** handles more than 1000 AES-256 encryption packets per second, so encrypted audio performance is the same as clear

- **Digital signaling processor** manages all of the audio vocoding/buffering/filtering, data compression, and signal processing in real time, making sure voice communications are clear with minimum delay

- **Three communication processors** control and manage the three LAN segments present in each gateway; WAN between gateways, local dispatch LAN, and potential external networks

- **Data processor** handles all of the radio data in/out from up to 8 radios connected per gateway, maximizing voice availability

ADVANCED SIGNALING

Agencies with radio systems that support advanced call signaling can count on MOTOBRIDGE to retain the signaling. Standard signals supported include: emergency alarm notification between disparate users, permit/deny tone detection for all trunked radio systems and intelligent MDC-1200 and DTMF encoding/decoding. To further support mission critical operations, the audio streams are always encrypted over the IP network without requiring additional equipment or bandwidth and without delaying or degrading audio.

MOTOBRIDGE provides full remote control of radio functions, such as channel selection, through the dispatch applications. In additional, multiple PTT priority levels can be managed for each user and radio connected to the system.
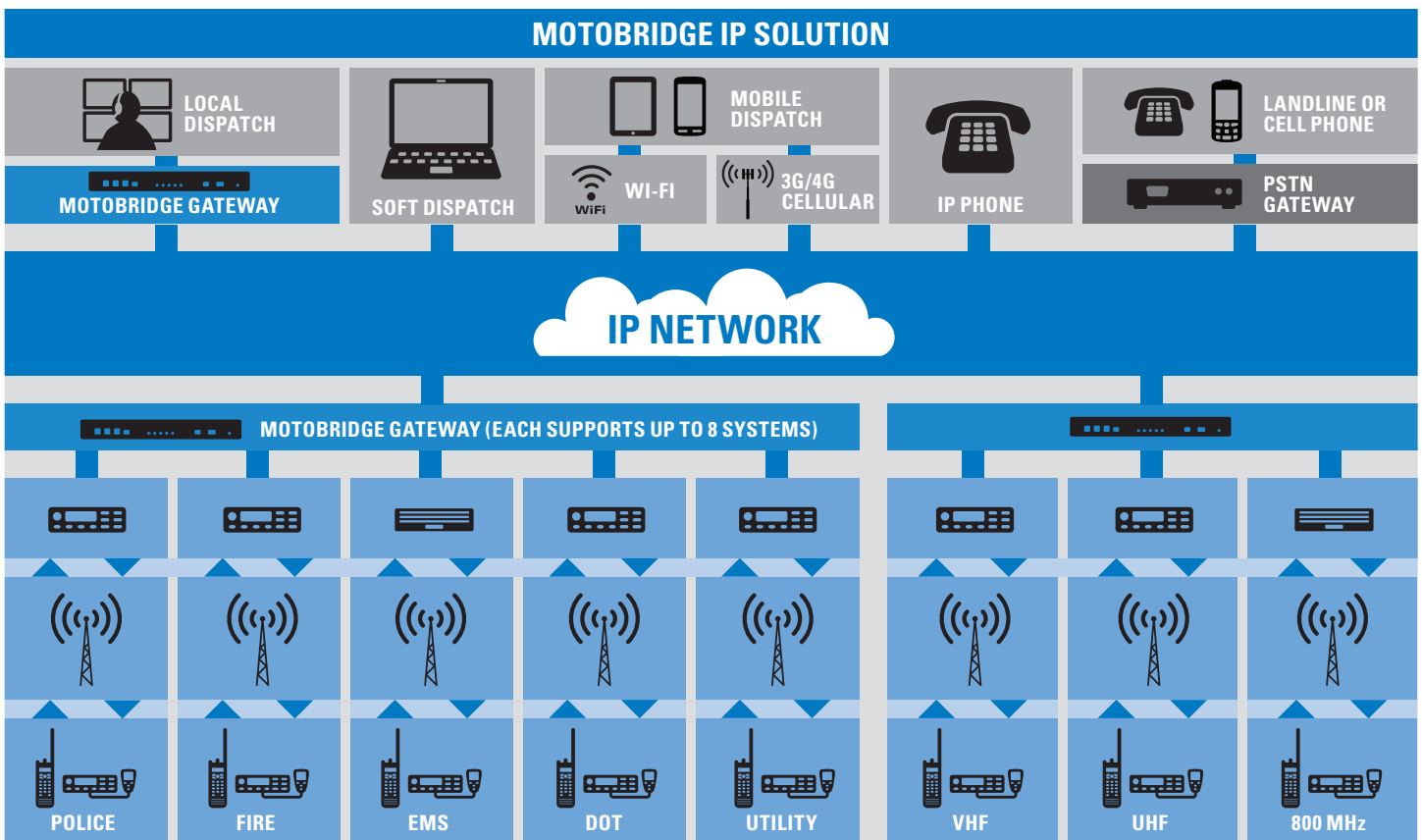
PUBLIC SAFETY GRADE VOICE QUALITY
Up to 3 seconds of radio access time is used to detect a "permit tone" or other radio indication before sending audio between disparate systems. This helps to avoid lost words such as the phrase "Don't Shoot" becoming "Shoot".

A SINGLE INVESTMENT
INTEROPERABILITY, DISPATCH, TELEPHONY AND CONFERENCING SERVICES

The MOTOBRIDGE system allows legacy systems to interoperate, facilitates phased migration of a system to new technology, enables instant communication between dispatch centers, and provides a full suite of telephony options.

With MOTOBRIDGE, first responders and field workers with any type of land mobile radio, mobile phone or portable PC can be connected together, along with IP Phones, land-line phones and office or dispatch PCs, for rapid integrated response and coordination.

MOTOBRIDGE IP SOLUTION

LOCAL DISPATCH — SOFT DISPATCH — MOBILE DISPATCH — WI-FI — 3G/4G CELLULAR — IP PHONE — LANDLINE OR CELL PHONE

MOTOBRIDGE GATEWAY — PSTN GATEWAY

IP NETWORK

MOTOBRIDGE GATEWAY (EACH SUPPORTS UP TO 8 SYSTEMS)

POLICE — FIRE — EMS — DOT — UTILITY — VHF — UHF — 800 MHz

FLEXIBLE CONFIGURATIONS
ON-SITE. WIDE AREA. MOBILE.

Ease of growth and scalability has been planned into the MOTOBRIDGE modular solution design. An IP network solution which maintains high quality audio regardless of the system size, can start as a single gateway connecting a few disparate systems and grow to a complex solution that can serve large scale interoperability operations, up to 5000 radio systems.

Due to the peer-to-peer gateway design, any number or combination of dispatchers present in the MOTOBRIDGE IP network can simultaneously manage communications without delays. The efficient design uses unicast on the Wide Area IP Network and multicast on the Local Area Network, to enable hundreds of dispatchers to use the same radio network at once.

In addition to traditional fixed deployments, MOTOBRIDGE is ideal for transportable deployments, such as a mobile operations center, since it does not rely on a backbone or centralized equipment. It can operate standalone or be connected to a larger MOTOBRIDGE network over a wireless IP infrastructure such as a VSAT satellite system.

CONTROL YOUR NETWORK RESOURCES
FLEXIBLE IP DISPATCH

MOTOBRIDGE provides state-of-the-art software tools for a range of uses and environments to enable the right people to communicate and make decisions, regardless of where they are at the time of an incident. Featuring an intuitive, easy to learn graphical user interface, the dispatch applications can be customized for use by personnel in a dispatch center, office setting or mobile command center.

Mission critical dispatchers in a fixed setting or a command vehicle can depend on robust MOTOBRIDGE gateways to maintain and sustain high quality audio and connectivity, even if access to the user interface is interrupted. Users in the field have the flexibility to connect via PCs or smartphones over IP, Wi-Fi or 3G/4G. Incident commanders can manage communications on scene and patch first responders as needed.

LOCAL DISPATCH APPLICATION

Designed for public safety dispatchers, Local Dispatch is a feature rich application, directly connected through a MOTOBRIDGE gateway for mission critical reliability. Radio connections and speaker and microphone audio are managed by the gateway, with the PC providing the graphical user interface (GUI) only. The audio gateway ensures critical communication between patched radio users and between dispatch and radio personnel is un-impacted if access to the GUI is lost.

REMOTE SHARED DISPATCH APPLICATION

The Remote Shared Dispatch application is available to users who require a remote connection to a dispatch gateway over an IP network for ease of mobility or shared back up dispatch operations. With this application, radio connections are still managed by a dispatch gateway, but PC accessories are used for speaker and mic audio and the connection to the gateway is over the IP network.

State-of-the art, intuitive and easy to use GUI which uses the latest Microsoft technology, providing the ultimate graphic quality and user experience.

PHONE MODULE

Up to four phone modules can be displayed on-screen per dispatch workstation gateway. Phone modules, in either minimized or expanded configuration, are present on the GUI only when in use.

MIMIC RADIO CONTROL

Radio icons can be configured on-screen to mimic the radio's control head, for users more familiar with direct radio control. Available for select Motorola radios. XTL5000 Mimic control shown here.

THOUSANDS OF USERS CAN
STAY IN TOUCH DURING AN EMERGENCY

SOFTWARE-ONLY DISPATCH APPLICATION

Through a laptop or PC a user can connect directly into the MOTOBRIDGE IP network to access any radio systems connected to the radio gateways, without the need to operate through a workstation gateway. The Software-Only Dispatch application is well suited for non mission critical dispatchers or users in an office or transportable environment that may need to monitor, PTT, or patch radio users.

Since Software-Only Dispatch can be operated on a multicast LAN inside the MOTOBRIDGE network, a large number of users can share audio from a single radio system at once.

THE RADIO PTT APPLICATION

The Radio PTT application is a software-only application with scaled down functionality, ideal for non dispatch environments such as an Emergency Operations Center. It can be configured for each specific user with customized features; select multiple channels from pre-defined groups of radio resources to monitor, establish PTT operations per channel, set the volume per channel and even customize the background logo.

This application is very easy to use so individuals with no background in dispatching, such as those called to an Emergency Operation Center, can easily navigate the application with minimal training.

MOBILE DISPATCH APPLICATION

SmartPhone users can PTT through any radio system in the MOTOBRIDGE network with the Mobile Dispatch application. Capabilities beyond PTT, which are typically only available to PC users, include; radio patching, conferencing with other dispatchers over the IP network, monitoring of up to four radio systems at once, volume control per channel, identification of individual transmitting, and virtual control of connected Motorola radios. Mobile Dispatch users can direct audio to speaker and PTT through the application; or for more private or covert operation, use the earpiece or headset and PTT from a side button on the device.

MOTOBRIDGE IP DISPATCH FEATURES

Each dispatch application features a state-of-the-art GUI with easy to use drag-and-drop or select-and-click operation and a rich array of features and functionality. A few highlighted features are:

- Radio-to-radio patch and radio-to-phone patch viewed in a list or graphical diagram format

- Up to 15 active channels patched together in the same virtual group

- Uni-Directional patch, a unique feature, enables one agency to control when communication audio flows from one-way to two-way

- Pre-defined Drawer Plans allow users to quickly implement complex emergency communication plans

- Full-duplex conferencing enables users to conduct joint response planning without using the radio networks

- Video images from remote IP cameras displayed on the MOTOBRIDGE dispatch screen

- Virtual Radio Control or Mimic Radio Control allow users to perform all functions of a connected Motorola radio, such as frequency/mode select, emergency, call alert, private call

IP DISPATCH CAPABILITIES	LOCAL	REMOTE SHARED	SOFTWARE-ONLY	RADIO PTT	MOBILE (SMARTPHONE)
Maximum Available Channels	All channels in MOTOBRIDGE network, dependent on assigned user privileges				
Maximum Active Channels	24	24	12	4	4
Volume Per Channel	X	X	X	X	X
Phone Support (up to 4 active lines)	X	X			
Run Conference Bridge over IP	X	X			
Participate in Conference Bridge over IP	X	X	X		X
Intercom (local dispatch-to-dispatch)	X	X	X		X
Radio to Radio Patching	X	X	X		X
Radio to Phone Patching	X	X			
Uni-Directional (+bi-directional) patching	X	X	X		X
Virtual Radio Control	X	X	X		X
Drawer Plans	X	X			
Emergency Alert/Acknowledge	X	X	X		
PTT ID Aliasing	X	X	X	X	X
Multi-Select	X	X	X	X	X
Private Call	X	X	X		X
Alert Tones	X	X	X		
MDC1200 Signaling	X	X	X		
Trunked Confirmation Tones (any manufacturer system)	X	X	X	X	X
Coded/Clear Channels	X	X	X		X
Channel Mute/All Mute	X	X	X	X	X
Dispatch Position Cross Mute	X	X			
Instant Recall Recording Per Channel	X	X			
Repeater Control	X	X			
Takeover	X	X			
DTMF	X	X			
Frequency and Mode Select	X	X	X		X
Multi-language Support	X	X	X		
Monitoring of IP Voice Links	X	X	X		
Video Display	X	X	X		
Up to 8 External Speakers	X				
Audio Encryption	X	X	X	X	X
User Authentication	X	X	X	X	X

OVER-IP RADIO VOTING

MOTOBRIDGE can also be used to seamlessly connect systems that experience coverage issues. The Radio Voting feature is designed to enhance the performance of analog radio systems by providing services in a large or difficult coverage area. Multiple receivers from the same system can be placed in an area where mobile radios would otherwise experience "dead spot" audio coverage issues. Each receiver is connected to the MOTOBRIDGE network where audio signal strength is "voted" by a gateway. Gateways programmed for voting will support up to 64 receive sites. This unique solution provides over-IP radio voting capability using the same components used for interoperability. Voted audio is sent over IP to MOTOBRIDGE dispatch, which then applies the voting logic in the outbound direction using one of several possible methods, such as Transmitter Steering or Wide-Area voting.

ROBUST NETWORK MANAGEMENT ADMINISTRATION

Larger MOTOBRIDGE networks will benefit from a management server(s) for enhanced functionality, and to offload the gateways allowing the system to be even more survivable and scalable.

Operations Management Center (OMC) Server – register and manage all the system users and resources (administrators, dispatchers, and radios) and store and control all system-wide information (active patches and conferences, security parameters).

Administrator Control Panel (ACP) Client – provides up to 10 user level interfaces to the OMC to view and monitor the status of the entire MOTOBRIDGE distributed network, as well as override any commands made at the dispatcher level. It can configure the system, provision users, assign user privileges (up to 9 levels) and PTT priority levels (up to 8), monitor network quality of service performance, enable fault management and alarming, centrally download new system software versions, and manage audio encryption keys.

Administrator Control Panel provides a unique customer driven map with the location and status of each system component.

Session Initiation Protocol (SIP) Proxy Server – establishes real-time, interactive communication sessions between disparate devices over IP networks. It manages VoIP connections, IP addresses, unique registration identity (URI) for each resource, and IP telephony connectivity.
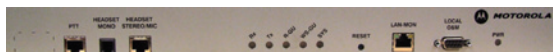
MOTOBRIDGE SYSTEM CAPABILITIES

MAXIMUM CAPACITY BY FEATURE	NUMBER
Configured Radio Resources	5,000
Connected Radios per gateway	8
Simultaneous talk-paths per radio gateway	60
Simultaneous talk-paths per system	64,000
Software-only dispatch clients	3,840*
Mobile dispatch (SmartPhone) clients	3,840*
Active local dispatch points	1,000
Active interoperability groups	2,500
Active channels per interoperability group	15
Full-duplex conference participants	8
Dial ports (users)	5,000
Voting nodes per voting gateway	64
Assignable PTT priority levels	8
Assignable user privilege levels	9
Administrator clients per OMC	10

* Includes both Software-Only and Mobile Dispatch clients

MOTOBRIDGE GATEWAY SPECIFICATIONS (MODEL F2840 OR F4031)

MOTOBRIDGE Gateway can be used to connect up to 4 radios, up to 8 radios, or up to 8 dispatch workstations into the network. When no network is present a single gateway can be used for both radio and dispatch. The MOTOBRIDGE Gateway internally combines audio for all connected radios with a single Ethernet connection to the IP network. Enables efficient PTT (30ms + Network Delay) and Voice Processing (50ms +Network Delay + Jitter Delay) and contains a dedicated encryption processor that can do more than 1000 Packets of AES 256 bit encryption per second.

MOTOBRIDGE supports the Bridging Systems Interface (BSI) specification from the US Department of Homeland Security's Office for Interoperability and Compatibility. BSI links large MOTOBRIDGE networks together or connects users to users of other bridging solutions or third party client applications.

DIMENSIONS

Height	1 rack unit (1.75 in)
Width	Desk mount = 17 in Rack mount = 19 in (incl. HW)
Depth	9.5 in

ENVIRONMENT

Operating	0° to 50°C
Non-Operating	−20° to 80°C
Humidity	10% to 90%

POWER

GU Input Power	+22 to +26 VDC
Dissipation	20W

RADIO

Output Voltage	−25dBm to +10dBm @ 600 Ohms
Output Impedance	600 Ohms
Input Voltage	20mV to 3V RMS @ 10K Ohms
Input Impedance	10K Ohms

AUDIO

Mic	+10V, 2K Ohm pull-up
Headset Input Impedance (Mic)	2K Ohm
Headset Output Impedance (Earpiece)	50 Ohm
Speaker Output Impedance	1 K

COMMUNICATIONS/PORTS

8 DB25 Audio Ports
2 RJ45 10/100 MB Ethernet Ports
1 DB9 MMI local configuration port
1 Speaker output
1 Headset Stereo/Mono connection
1 PTT connection

COMPACT WORKSTATION GATEWAY SPECIFICATIONS (MODEL F2688)

The Compact Workstation Gateway is used to connect MOTOBRIDGE dispatcher PCs to the network, in a reduced hardware footprint. It is designed to be placed on a desktop in an office environment.

DIMENSIONS

Height	1.52 in
Width	8.96 in
Depth	6.06 in

ENVIRONMENT

Operating	0° to 50°C
Non-Operating	−20° to 80°C
Humidity	10% to 90%

POWER

Input Power	9 to 15 VDC
Dissipation	10W

AUDIO

Mic	8V, 2k Ohm pull-up
Headset Input Impedance (Mic)	2K Ohm
Headset Output Impedance (Earpiece)	50 Ohm
Speaker Output Impedance	1 K Ohm

COMMUNICATIONS/PORTS

2 RJ45 10/100 MB Ethernet Ports
1 DB9 MMI local configuration port
1 3.5mm mini-jack Speaker output
1 3.5mm mini-jack Headset stereo output connection
1 3.5mm mini-jack Mic connection

MOTOROLA