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Technical FAQ

Which VoIP Connection Method is Best For Your Radio Network?

Interoperability Gateways

Radio Dispatch Systems

Location Services

Radio over IP

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There are many ways in which VoIP devices can be connected over a network. In this FAQ, the three main connection methods for the Omnitronics range of VoIP gateways are discussed and compared.

Network Basics

Protocols Used by IPR VoIP Gateways

Real Time Protocol: Is a standard protocol used for transmitting audio over IP networks. It is used to transfer the actual audio content of all VoIP calls. In addition, Omnitronics uses this protocol to transfer Busy/Push to Talk or COR information.

Session Initiation Protocol: Is a standard protocol used to set up VoIP calls. The purpose of Session Initiation Protocol (SIP) is to make communication possible: it helps the caller find the IP address and port of the called device. It also helps with the negotiation of the media types and formats. It is only used to make and break connections. No audio is transmitted via SIP, its purpose is to set up the VoIP session. How a session is set up involves three key functions:

- Determining the IP address of the remote device
- Determining the UDP Port numbers to use for RTP
- Negotiating what features can be used (the audio codecs to use).

Internet Protocol Addressing

In normal Internet Protocol (Version 4), all devices have an address. This address is sometimes described as a Unicast address. This address is used for a one-to-one message transfer.

The Internet Protocol also supports broadcast addresses and a special class of address called a multicast address. A multicast address is a group address. Multiple IP devices can join this group and will receive all messages sent to the group address. Multicast allows one-to-many communications. Using multicast addressing, a single data packet is routed to multiple destinations; and the network will only duplicate the packet if it needs to go to several different locations. However, to be able to use multicasting on a network, all the routers in the network must support multicast addressing and it is not possible to use multicasting over the general internet.

Network Address Translation

The process of Network Address Translation (NAT) involves over-writing the source and destination addresses of IP packets as they pass through an ADSL modem or router. Systems using NAT do so in order to enable multiple hosts on a private network to access the internet using a single public IP address. As well as over-writing the IP addresses sometimes the IP port number can also be changed; this is sometimes called port forwarding.

So, for a VoIP link to work through a router that is performing Network Address Translation, additional configuration is required both at the IPR device and at the router.

Advantages and Disadvantages

Each of the connection methods that can be used with the IPR devices have various advantages, the table below shows a breakdown of these.

Connection Method	Advantages	Disadvantages
Unicast RTP	Constantly connected	Requires static IP addresses for all parties
	Can be configured to work via NAT	Can only support limited operator positions
		Requires more configuration
Multicast RTP	Constantly connected	Limited to LANs and WANs, cannot be supported over internet
	Bandwidth efficient	Requires all network infrastructure to support multicast
	Can be used with Dynamic IP (DHCP)	Issues can occur when used with more than a single switch on a LAN
	Can allow more console positions	
SIP	Connected only when required	Maintaining connections on lossy networks is complex
	Can be used with Dynamic IP (DHCP)	
	Simple to configure	

Dispatch Consoles & VoIP Connection Methods

Unicast RTP

The most recent release of IPR dispatch now supports making a direct unicast connection to IPR Devices. This makes IPR dispatch the same as another IPR Device. IP Address and the port number used by the IPR dispatch needs to be configured in all the IPR devices that will talk with a particular instance of IPR Dispatch. None of these addresses can be dynamic, so they all need to be configured in advance.

Network Address Translation: If used in this mode, all port numbers and IP addresses used are hard configured, so it is possible to configure the network routers to allow the RTP streams to pass correctly. How this is configured on the router depends on the make and model of the router.

Using this method of connection, the IPR400 can support up to 3 console positions and the IPR100 can support up to 6 positions

Multicast RTP

The latest releases of IPR dispatch and 960SIP support the ability to connect to IPR devices using RTP on a multicast address. This provides a very good solution for LANs and WANs with lots of advantages: it is bandwidth efficient, allows more operator console positions, may be used with PCs using dynamic IP addressing (DHCP) and is relatively simple to configure.

Unfortunately, multicast requires the appropriate network infrastructure. This can be:

- a) LAN with ALL devices connected to a single unmanaged switch
- b) LAN / WAN with managed switches and routers, all of which support and are configured for multicasting.

If a customer cannot provide a network that matches these configurations, multicast cannot be used.

NOTE: Most if not all ADSL modems do not support multicasting.



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