Executive Summary

RTS

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IP Networks used for Intercom
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Executive Summary

The purpose of this White Paper is to highlight the IP network needs in an RTS ONMEO Intercom environment. There is a companion paper that specifies switch settings and other technical details in more depth.

Target Audience: RTS Sales Team and their customers

What is the need? To provide field tested information regarding the implementation of the RTS OMNEO product line within an IP network.

Contents

Introduction

With the growing trend of IP networks being used as a mechanism to transport different formatted content, RTS has joined this world with the launch of the new range of OMNEO, Audio over IP products. This now adds the world of intercom to this domain providing advantages; interoperability, simplified installation; multi-channel distribution and scalability. RTS's OMNEO technology uses Audinate's Dante Audio Over IP solution to transport the audio, offering complete compatibility with any available Dante enabled device on the market today. It is based on standard Layer 2 Ethernet and Layer 3 IP making it routable across networks and because of this it will work with existing network infrastructure and devices rather than requiring dedicated specific format-compliant switches. OMNEO transports low latency, high quality multi-channel audio over a simple TCP/IP network connection - gone are the days of only using one manufacturer; There are over 200 companies that have implemented Dante into their product ranges from commentator panels, TW beltpack systems, I/O converter boxes, audio consoles and more. Instead of having to send multiple channels from a router or audio console containing program feeds / mix minuses via analogue or MADI to the intercom matrix for IFB sources, this can now be achieved via one network cable whether it be a fibre or CAT5. This offers tremendous flexibility and scalability.

Problem Statement

Networking can be expensive: Use IP networks for your intercom. These networks offer great flexibility and scalability while *keeping costs down*. Historically, specific individual cabling would have connected keypanels, audio sources and destinations to an intercom matrix. This is costly in terms of configuration and also the amount of physical dedicated cabling required. Using an IP network infrastructure allows standard off the shelf Ethernet cables to be used.

Background

OMNEO not only provides an audio transport mechanism but also provides a control element, synchronisation via a standard protocol; Precision Time Protocol (PTP) and the ability to create directories. This is unique to OMNEO as other standards available today do not offer the same functionality. What does this have to offer intercom? It allows intercom panels to be connected to a matrix via a standard IP cable, which can be distributed through normal network switches. Up to 20 keypanels can also be daisy-chained to avoid having to run multiple direct cables to a remote location. Daisy-chaining of devices also supports loop

back redundancy which is realised using RSTP (Rapid Spanning Tree Protocol). Keypanels side by side in a desk or an area can happily co-exist with high quality audio with no perceivable latency.

The OMNEO devices allow a choice of using fixed IP addressing, link local or DHCP addressing. Link local offers a plug and play facility for a simple system, taking the need for giving devices IP addresses away. The DHCP function allows for OMNEO devices to obtain an address from the network, either from the intercom matrix or via a third party DHCP router. The advantage of this is that a panel can obtain an IP address as soon as it is added into the network, requiring no input from the user. Pre-configured keypanels, once they have an address, will then connect to the matrix and receive any port information containing the key layouts, and therefore become a fully functioning intercom keypanel with minimal input from the user.

Dante offers simple service discovery and label-based routing making it easy for the end-user and it uses mDNS to manage names and allows a device to learn the IP addresses of other Dante devices and the database is distributed across all devices in the network. This makes connecting one device to another device very easy and intuitive, there is no need to remember IP addresses, the configuration software can browse the network and display the names of all devices on the network and then channels can easily be mapped to each other.

OMNEO and Dante devices advertise themselves and their capabilities on the network using a service discovery mechanism which is called DNS-Service Discovery that uses Bonjour protocols.

Why the need for DNS?
There is the need to know more than just an IP address of the device in order to establish connectivity and subsequently audio routing. The users need the ability to plug various manufacturers' devices onto the network and use one software platform to identify available channels and quickly establish audio routes. Channel connectivity in the OMNEO world is created via our own software tool; IPedit, however OMNEO devices are available and seen in Audinate's Dante Controller Software application, allowing the mapping of OMNEO channels directly to any third party Dante Device. This is achieved very quickly and easily via a crosspoint routing grid.

OMNEO is IEEE 1588 compliant; this means audio across the network is synchronised and played out at the same time. The protocol compensates for network delays and is critical for applications such as intercom where keypanels are likely to be placed next to each other listening to the same audio source.

OMNEO is not limited to a single subnet. OMNEO supports up to 128 devices including Dante devices on a single subnet, and in this scenario a device is elected as the clock master. When more than 128 devices or multiple subnets are required, an additional device, ARNI (Audio Routed Network Interface) is used. It performs the functions of the clock master to synchronise the audio as well as acting as a DNS and DHCP server.

Using an IP network as the transport mechanism does come with certain restrictions in terms of network configuration but the benefits far outweigh the historical connectivity methods. It does require the user to have some understanding of network rules such as network <u>cable length restrictions, IP addressing, Subnetting, Multicast, RSTP and QOS</u>. Almost all communications is migrating to the world of IP so it is evitable that RTS continues adding IP functionality to our product as we havce done for many years. OMNEO running on top of DANTE is only our most recent addition to RTS Intercoms using TCP/IP.

Solution

A remote location can be instantly connected to a central technical area or OB truck via installation of a single network cable; fibre or CAT5 to a switch or router and this can provide up to 64 channels of audio. Many manufacturers have implemented Dante into their product ranges which offers compatibility between vendors. To install a commentator box, rather than using analog connectivity, we can use the IP network to establish connections between it and an intercom and an audio console, likewise if we need to add a beltpack this can be done via Dante. If there is a need for a device that a specific manufacturer doesn't provide, it may be sourced from any number of third party Dante products and they will interoperate, sharing audio with each other. Dante is an de facto industry standard so there aren't different implementations of it

Conclusion

Using RTS OMNEO as part of an intercom solution saves money, eases cabling configurations when compared to analog cable requirements and makes future reconfigurations much easier and faster.

Understanding the TCP/IP networking rules prior to implementing an OMNEO solution will ensure a smooth introduction of OMNEO over DANTE for your intercom installation.

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