OMNEO Network Requirements and Considerations

Introduction

RTS OMNEO is an audio over IP solution utilising Audinate's Dante technology, making it compatible with any third party Dante-capable device. OMNEO uses standard IP protocols enabling it to work on standard Ethernet devices. OMNEO supports additional features above standard the Dante such as supporting daisy chaining of devices, multi-subnet support (via an additional device called an ARNI) and direct routing.

There are certain network requirements that need to be followed.

Software Requirements.

To configure OMNEO an OMNEO Suite package is provided containing the following:

- IPedit – Used for discovery of all OMI and OKI devices and to configure the channels per device.
- AZedit – Used to assign ports to the OMI, view and configure IP address settings. Can also set up a DHCP server function on the MCII-e controllers.
- Bosch DNS-SD discovery service – Used to browse and discovery all Bosch OMNEO devices on a network.
- Firmware Upload Tool – Used to update OMI and OKI devices.
    - The automatic OMNEO Suite installs the Firmware Upload Tool plus various additional plugins that are required. Installing the Firmware Upload Tool individually is not recommended due to not installing all the necessary plug-ins.

The following software is recommended:

- Audinate Dante Controller software – used to route audio between RTS OMNEO devices and third party Dante devices.

Network Requirements and Constraints

- Current OMNEO firmware using OCP requires that the maximum point to point latency must be guaranteed to be less than 1ms, 2.95 Mbps in each direction. With the OMNEO OCA implementation release in the future this will be selectable from 1,2,5,10 and 20ms. 2,5,10 and 20ms will use 2.05 Mbps.
- Currently OMNEO is limited to a single subnet with less than 128 OMNEO devices. An ARNI is required when installing more than 128 devices or using multiple subnets. This will be available at the end of 2015.

  - For multi-subnet systems or large systems above 128 devices an ARNI is required to act as the DHCP server, the DNS server and the PTP server to synchronise the audio. There are two types of ARNI depending on the application. With an ARNI in the system Dante devices cannot be set to 'slave to external wordclock'.

- Within a single subnet system the device discovery is handled via mDNS on port 224.0.0.251 on port 5353. In large 128 device or more systems the ARNI handles the DNS via uDNS.

- Daisy chains of devices must be limited to 20

- OMNEO and Dante devices use Precision Time Protocol (PTP) for clock synchronisation. PTP uses multicast packets for this information to be sent across the network. All PTP packets multicast to address 224.0.1.129 on UDP port 319 and 320.

- OMNEO requires 2.9Mb of bandwidth in each direction. The maximum bandwidth of the system needs to be calculated and must not exceed 70% of the weakest link.

- It is recommended that OMNEO is installed on a separate VLAN

- Switches recommended to be Gigabit Ethernet, non-blocking, full duplex, hardware switching capabilities and must support RSTP and QOS settings. It must also support the ability to disable Energy Efficient Ethernet (EEE).

- The following ports need to be opened on the network:

Port Number	Protocol	Description
9470	TCP	Used for discovery and registration in OCP firmware
9472	UDP	Events in OCP firmware
9473	UDP	Reset events in OCP firmware
5353	UDP	mDNS in OCP/OCA firmware
49152 - 65535	TCP	OCA firmware
9474	TCP/UDP	ARNI
14336 – 14600	UDP	Audio
4440, 4444, 4445, 4455	UDP	Dante Routing
4321	UDP	Dante Multicast audio
2100	TCP/UDP	IPedit remote administration
2200	UDP	Proprietary messages
8000	TCP	OMI device connections

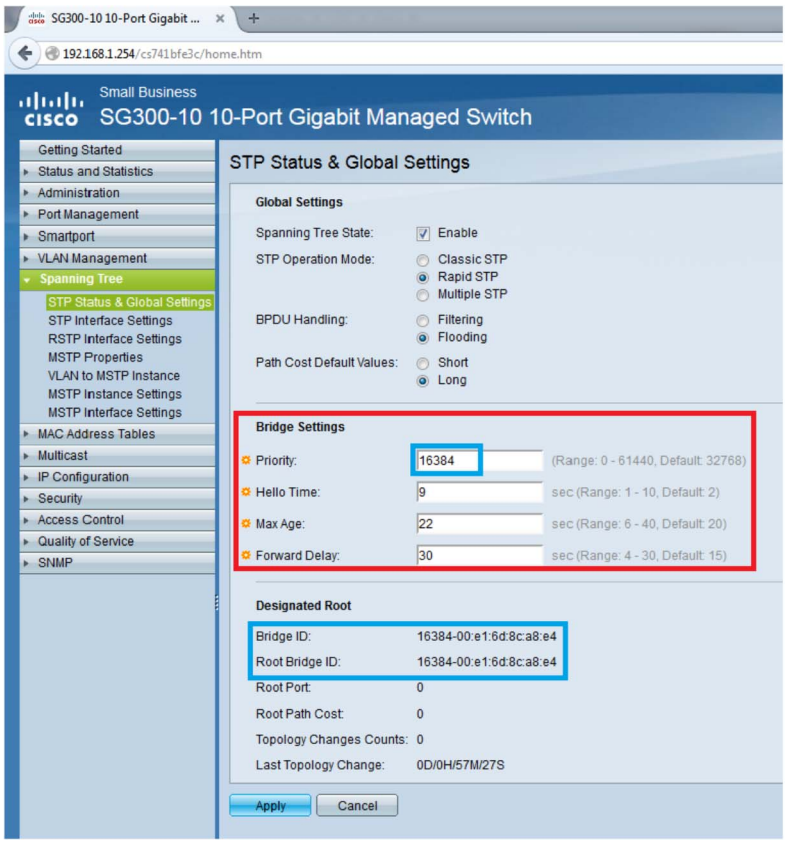
- Differentiated Services Code Point (DSCP) is used for QOS. Switches must have at least 4 output queues with strict priority packet scheduling (not weighted round robin). Time critical PTP events uses DSCP value 56 and this needs to be assigned to queue 4. Audio and PTP uses DSCP value 46. Assign this to output queue 3. Assign DSCP value 8 to queue 2. VoIP QOS settings are different and should not be relied upon. If QOS is applied to all network traffic then it becomes irrelevant.

- OMNEO devices run RSTP (Rapid Spanning Tree Protocol) for fast network convergence. If RSTP is not supported on your network a non-RSTP version of firmware for the OMI is available. OMNEO devices send BPDUs, make sure the network does not block these and switches do not shut down ports for connected devices sending these.
- Verify that switches are running an RSTP version that is compatible with IEEE802.1w. There are other versions of SPT which is not compatible with RSTP and will cause problems.
- It is recommended that RSTP is configured on the network switches. The key values to enter are:

  Hello Time: 9 seconds

  Max Age: 22 seconds

  Forward Delay: 30 seconds



- A priority value will need to be entered. Each OMNEO device has a priority value of 61440 configured so that it never becomes a root bridge. The maximum number of 20 devices for daisy chaining devices is a limitation of RSTP. You must ensure that the maximum number of hops from the Root Bridge does not exceed 21.

- Supports fixed, DHCP or link local addressing
- If using a third party DHCP server it must be capable of handling addressing within 1 second. The performance may influence system start up times otherwise.
- OMI requires two IP addresses; one for the OMI controller and one for the audio device. Both IP addresses and MAC addresses are shown in IPedit and AZedit.
- When using a redundant ARNI configuration you will require 3 x IP addresses. One for each of the ARNI devices and one for shared communication between them.
- OMNEO does not support glitch-free primary and secondary connections that other Dante devices do. If redundancy is required, cabling can be wired to provide this but switches must support and be configured for RSTP.
- Standard network cable types (CAT5E, CAT6) lengths must be adhered to (i.e. less than 100m).
- OMNEO does not support Energy Efficient Ethernet (EEE) so this needs to be disabled on network switches.
- Verify the OMNEO software suite installed on any PCs are not being blocked by a firewall.
- Disable IGMP Snooping on edge ports.
- Updating OMNEO firmware is done via the Firmware Upload Tool. The FWUT uses TFTP to transfer the files to OMNEO devices so this must be globally enabled on the network switches and not blocked.

OMNEO Configuration

See separate configuration document.