What is OMNEO?

OMNEO is a media networking architecture that provides for high-quality multichannel media transmission and powerful, reliable system control via standard Ethernet IP networks. It enables the development of media products capable of interoperating and exchanging media content and control data using industry-standard IP digital network equipment.

What does "OMNEO" stand for? Is it an acronym?

OMNEO is not an acronym, it is simply the name of the architecture.

Where will OMNEO be used?

The OMNEO technology will eventually be employed in many Bosch Communications products where media transport and system control is required. This will impact nearly all the markets Bosch Communications currently serves and will be used in products from the Bosch, Electro-Voice, DYNACORD, and RTS brands.

Who or what is OMNEO for?

OMNEO is targeted at professional AV applications where high quality, reliable and secure communications and control are required for networks of up to 10,000 devices.

When will OMNEO be available?

OMNEO will be incorporated into Bosch Communications audio products beginning in 2013, and will become a central feature of Bosch Communications product offerings.

Why is yet another media networking standard needed when there are already so many available?

Currently, several options are available for media networking, including CobraNet, Ethersound, RockNet and many others. However, these solutions all have compromises that range from proprietary and/or non-standards based implementation to difficult operation and maintenance. Additionally, none of these current solutions are truly IP compatible, which creates significant challenges when trying to integrate them into new or existing networks. Finally, while these existing solutions address the transport of content, no current solution addresses the need for system control. OMNEO provides a solution that addresses all of these issues by providing an easy-to-use, standards-compliant solution for both program transport and system control.

Is OMNEO proprietary?

No. Bosch believes that open public media networking standards will provide the best value options for customers in the long run. OMNEO will be compliant with public standards when appropriate standards, such as AVB, become available.

Who is developing OMNEO*?*

OMNEO is being developed by a team in Breda. Members of all business lines, including R&D and Product Management from all Communications Brand business lines are involved in the project.

What are the main goals of OMNEO?

OMNEO has been specified and designed to provide the following core functions:

- ➔ Studio-quality audio with precision timing and network-wide sync
- ➔ Up to 256 bidirectional channels on gigabit Ethernets
- ➔ Integrated signal transport and system control
- ➔ Easy network setup
- ➔ Public standards compliance when possible
- ➔ Scalability: 2 to 10,000 nodes, local or wide area
- ➔ High-reliability design for critical applications
- ➔ Encryption available for both audio and control

What are the main components of OMNEO?

The main components of OMNEO are:

Program transport

- **Dante** routable audio stream transport network technology from Audinate of Sydney, Australia.

System control

- **OCA (Open Control Architecture)**, a robust system control architecture for professional media networks. OCA is an emerging standard being developed and promoted by the OCA Alliance, a trade association that Bosch helped found in 2011.

Dante

What is Dante?

Dante is a high performance digital media transport system that runs over standard IP networks. It has been developed by Audinate, a company based in Sydney, Australia. Dante™ offers a no hassle, self-configuring, plug and play digital audio networking experience. It is a total solution for transporting low latency uncompressed audio over standard IP Ethernet networks with sample-accurate synchronization, automatic device and channel discovery, and easy to use signal routing.

Dante is a powerful technology that allows many channels of audio to be transmitted and received over a single Ethernet cable without the complexities and limitations of earlier solutions. Dante's low latency and tight play-out synchronization meet the most demanding of professional audio and installed sound requirements using off-the-shelf networking equipment. It is easy to set up, configure, and manage because Dante-enabled devices discover one another over the network and learn each other's capabilities (number of input and output channels, sample rates and bit depths supported etc.)

automatically. As well, Dante devices and channels can be given "friendly" names meaning audio can be routed without having to use or remember magic numbers.

Can I Connect Dante to a PC or Mac?

Yes to both. The Dante Virtual Soundcard is software that turns a Windows or Mac OSX computer into a Dante-enabled device, allowing a user to record, play out and process audio to and from a network with other Dante devices.

Dante Virtual Soundcard uses the computer's standard Ethernet port -- no special hardware is required. Dante Virtual Soundcard behaves exactly like a physical soundcard with an ASIO (Windows) or Core Audio (Mac OSX) interface, and so it can be used with virtually any popular Digital Audio Workstation product. Other Dante-enabled devices on the network see the Dante Virtual Soundcard as a normal Dante peer device.

How is Dante different from other program transport technologies such as CobraNet?

Dante offers several advantages over alternate media networking technologies, including ease of setup and operation, high channel count, and low latency. Additionally, since Dante uses IP standards, it provides unique network-friendly features.

Can an OMNEO device send and receive audio from non-OMNEO Dante devices?

Yes. Since OMNEO uses Dante as the foundation for its audio transport, OMNEO devices are able to exchange program streams with other Dante devices

What other manufacturers are using Dante at this time?

Dante is a rapidly growing technology that has already been embraced by some of the industry's largest manufacturers, including Bosch, Yamaha, Whirlwind, Allen & Heath and many others. A complete list of Dante compatible products can be found here. (http://dev.audinate.com/kb/product_catalogue/webhelp/#product_types/product_types.htm)

OCA

What is OCA?

OCA, or the Open Control Architecture, is a high-function control protocol supporting a rich repertoire of control and monitoring operations. OCA provides a highly flexible and uniform control structure for control, monitoring and configuration of diverse devices. OCA provides valuable features such as encryption, multiple controller support and high reliability.

What is the OCA Alliance?

The Alliance is a group of nine professional audio manufacturers who have come together to help the Open Control Architecture (OCA) become an open public

communications standard for control and monitoring of devices in professional media networks.

The mission of the Alliance is to complete the technical definition of OCA, then to transfer that definition to an accredited standards development organization which will render it into an open public standard.

Who are the founding members of the OCA Alliance?

The founding members are:

- Bosch Communications Systems
- d&b audiotechnik GmbH
- Duran Audio
- LOUD Technologies, Inc.
- Media Technology Systems
- PreSonus
- Salzbrenner Stagetec Mediagroup
- TC Group
- Yamaha Commercial Audio

The OCA Alliance has incorporated as a non-profit trade association as of June 1, 2012 and has begun to accept new members. In 2013 Audinate, Waves, Attero Tech, and RCF have joined The OCA Alliance.

AVB

What is AVB?

The acronym AVB (**A**udio **V**ideo **B**ridging) may refer to three related, but separate things.

1. The IEEE1 802.1 Audio Video Bridging standards suite for Ethernets. This is a set of four standards for enhanced Ethernet switches that support transmission of time-synchronized, low-latency data through Ethernets. Together, these standards create an Ethernet environment that is friendly to media networking. Ethernets that comply with these standards are often called "AVB Ethernets".

2. The IEEE standards suite that uses AVB Ethernets to transport multiple channels of audio and video. These standards are officially designated **IEEE 1722** and **IEEE 1722.1**.

1 Institute of Electrical and Electronic Engineers, one of the main standards bodies in the field of networking.

3. An new specification that will use AVB Ethernets in combination with the IP internet protocol to provide multichannel media transport over large networks and/or long distances. It's still under development and doesn't have an official designation yet -- its working title is **IP Pro AV.**

In addition to these, the press has sometimes used "AVB" as a general term for any kind of media networking that uses public standards. This is not a correct use of the term, but you will see it frequently.

What is the AVnu Alliance?

The AVnu Alliance is a trade association dedicated to the advancement of professional-quality audio video by promoting the adoption of the IEEE 802.1 Audio Video Bridging (AVB definition 1, above), the related IEEE 1722 and IEEE 1722.1 standards (AVB definition 2), and, in the future, IP Pro AV (AVB definition 3).

AVnu aims to offer compliance and interoperability testing services to ensure interoperability of networked AVB devices. As well, AVnu promotes awareness of the AVB benefits and collaborates with other associations to optimize AVB use.

AVnu's scope includes automotive, professional, and consumer electronics markets.

Bosch is a Promoter Member of the AVnu Alliance and actively works in the Technical Working Group and the Marketing Working group. Additional information on AVnu Alliance can be found here.

Is OMNEO competing with AVB?

No. OMNEO will be compatible with all three definitions of AVB listed above. This interoperability has been demonstrated at InfoComm 2012.

Standards

Why is it important to standardize OMNEO?

- ➔ Proprietary communication and media transport schemes lock customers out of valuable functionality by imprisoning them in closed technology loops.
- ➔ As OMNEO becomes standards-compliant, Bosch systems will gain value by integrating important products from other companies -- large format digital mixers, for instance.

Bosch has taken a leadership role in media networking standards because public networking standards provide the best value for customers in the long run.

But won't open standards hurt Bosch?

Not at all. While Bosch is standardizing OMNEO to support multi-vendor interoperability, this does not mean that Bosch will be opening up all of its underlying technology. Bosch's unique technology solutions and methods will remain the province of Bosch.

Products that are based on standards will be easier to sell into existing systems that are expanding, will be easier to integrate with complex designs, and will be able to meet the requirements of projects that require standards-based solutions.

What is the current status of standardizing OMNEO?

There are three sets of standards, as follows:

➔ **IEEE 802.1 AVB**

Table 1 summarizes the versions and status of the various IEEE AVB specifications as of April, 2013.

Standard	Title	Status	Date
IEEE 802.1BA-2011	Audio Video Bridging Systems	Ratified and published	30 September 2011
IEEE 802.1Qav	Forwarding and Queuing Enhancements for Time-Sensitive Streams	Ratified and published	5 January 2010
IEEE 802.1Qat	Stream Reservation Protocol	Ratified and published	30 September 2010
IEEE 802.1Q-2011	Incorporates IEEE 802.1Qav and IEEE 802.1Qat	Ratified and published	31 August 2011
IEEE 802.1AS	Timing and Synchronization for Time-Sensitive Applications in Bridged Local Area Networks	Ratified and published	30 March 2011
IEEE 1722	Layer 2 Transport Protocol for Time Sensitive Applications in a Bridged Local Area Network	Ratified and published	6 May 2011
IEEE 1733	Layer 3 Transport Protocol for Time Sensitive Applications in Local Area Networks	Ratified and published	25 April 2011
IEEE 1722.1	Device Discovery, Enumeration, Connection Management and Control Protocol for 1722-Based Devices	Draft 20	June 2012

Table 1: The current status of AVB Standards

➔ **Dante**

Audinate has announced its intent to:

- Make Dante compatible with Ethernet AVB network equipment (AVB definition 1);
- Make Dante able to exchange audio signals with AVB-compliant devices (AVB definition 2).
- Make Dante compatible with IP media transport standards (IP definition 3) when they become available.

➔ **OCA Standardization Status**

- The OCA Alliance completed OCA 1.0 in May, 2012. The AES has been chosen to ratify this release as an open public standard.
- OCA has been openly published as a proposed standard and is on track to be standardized by the AES under the project designation X-210.

FAQ - RTS OMNEO Products

What is the data rate for OMNEO which would be required for the choice of SFP (both SM and MM)? What is the recommended SFP module (MM and SM)?

The SFP modules are 1G. Both modules are available from RTS.

Can I use my other available slots for other cards in the frame? The OMI cards draw less current than AIO cards. Is the 512 per ADAM frame/256 ADAM-M a limitation of the TDM backplane?

You can use the other available slots for other cards as long as the cards are below the power limits of the systems. For the ADAM-M, the back-card also has a heat limit since the ADAM-M doesn't have moving air in the rear. The limitations are not related to the TDM backplane. The number of ports is limited by the AZedit Intercom Configuration.

Is it possible to have automatic redundant OMNEO connections to the keypanels?

This is not currently supported.

Where is the channel license file stored in an OMI card? Front or back?

It is in the front card.

If you are using OMNEO as a transport mechanism for audio and you insert a 5.1 surround sound signal will be time and phase aligned? Are OMNEO channels phase coherent?

The OMNEO stream has been designed for phase coherency. The mechanism for synchronizing the endpoints will ensure the audio is played out at nearly the same time. The ADAM TDM infrastructure however does not support it.

Can I connect an OMI directly to another OMI without any network equipment via a cross-over cable?

This will work (ie. for creating trunks), however, without a PC on the network, you would not be able to use IPedit to configure them (although AZedit would work because it goes through the control bus, except for status reporting). You would also not be able to download firmware.

If I configure an OKI CH 2 to talk to another OKI CH 2 does the audio go via the matrix between each other or does it go direct via the network?

You cannot configure two OKI devices to talk to each other (nor can you configure two RVON-1/2 devices to talk to each other).

If I talk between OMNEO devices on the network does audio always go via the matrix?

Keypanel audio always goes through the matrix (ie. OKI to OMI, potentially across TDM, or even between TBX cards to another frame, to another OMI, then out to a different OKI).

Can I change the UDP and TCP ports OMNEO uses?

It is not possible to change the TCP and UDP ports

If an ARNI fails in a network, what happens? Can I have redundant ARNI devices?

ARNI-S and ARNI-E can be deployed redundantly (a redundant pair uses CARP – Common Address Resolution Protocol – such that both devices share an IP address). If one fails, the other takes over seamlessly (no configuration changes required).

If your OKI and OMI devices are set for DHCP and they momentarily go away will the pop back up with their previous address? At which point would it not retain it's previous address?

Yes, a device will almost always get the same IP address via DHCP, even after a reset. Basically the only time a device might not get the same IP address back is if it was gone for long enough that the DHCP Server ran out of IP addresses to assign and had to re-use one that it had previously assigned to your device (but only after your lease had expired).

In subnets with less than 128 devices an OMNEO device is handling the synchronisation of audio (acting as an ARNI) would this device usually be an OMI? What happens if this device fails?

If there is no ARNI as the clock master, the devices will elect a clock master (typically an OMI card). If this card fails, a new clock master is elected. The clock master informs the ARNI-E that it is handling the clock for that subnet.

If you change IP addresses of devices (change between DHCP and fixed) although it would be assigned the same IP you would have to re-add devices in IPedit. The 'old' device would show offline, include the updated IP address but not come back online. You would have to re-add this device with all the parameters of the 'old' device.

This is a known limitation in the first release of IPedit. It is planned to be improved, but it will not make the first release of the software. This behaviour has to do with how the

devices are identified in the catalog. The same thing happens with RVON devices (if some other IPedit session changes the IP address of an RVON device, your catalog will not be updated, and you have to re-add the device).

When changing IP addresses as the device name remained the same the connection would be working. The destination IP address on a channel would be the 'old' address. You would then need to re-assign it, click another device in the catalog and then click back to the device you were configuring for the changes to be shown (new IP address, highlighted in yellow).

Audio connections are made via Device Name, not by IP address. If the IP address changes, the Audio connections are re-established (essentially both ends resolve the device name to the current IP address and make the connection). IPedit shows the IP address that is reported by the OMNEO devices. The OMNEO devices are not currently updating the IP address of their partners when it changes. This will be fixed by the time the firmware is released.

If you change device names at a keypanel then does the connection drop because the OMI card would still be connecting the old device name?

Changing the device name of an OMNEO device is the same as changing the IP address of an RVON device. If you change it, you have to also change the other end to point to the new name/IP.

Can you configure the catalog in IPedit – drag and drop items into user configurable lists?

This is not currently supported

Can the controller DHCP Server send out addresses to Dante equipment as well as third-party devices (PCS etc)? Is there a way of showing a DHCP list of all devices connected on the network and obtaining addresses via the controller?

Yes, the MCII-e DHCP Server will work with any device requesting an IP address. There is currently no way to view which IP address have been allocated to which devices, though there are plans to add a screen to AZedit to show the DHCP Server status.

What are the dimensions of the ARNI?

The ARNI is 8¾" wide by 8" deep by 3" high (including ¼" rubber feet).

When is an ARNI required?

ARNI is required on a network with 128 – 450 devices

This is to do with the PTP (Precision Time Protocol, i.e. clock synchronization). Below 128 devices, one of the OMNEO devices is elected the clock master, and distributes the clock to all of the other devices on the subnet. Above this, though, the load on the OMNEO device starts to get too high, and so we require an ARNI. The ARNI itself can handle about 450 devices before its loading gets too high.

What is the difference between the ARNI-E (Enterprise) and ARNI-S (Standard)?

Physically, the hardware is the same. A license prevents an ARNI-S from being turned into an ARNI-E. An ARNI-S handles devices on a single subnet (e.g. where you have more than 128 devices). An ARNI-E is required whenever you have devices on multiple subnets (e.g. even if you have just 2 OMNEO devices, if they are on different subnets, you require an ARNI-E). An ARNI-E can handle devices in its own subnet, as well as devices in other subnets (without necessarily requiring an ARNI-S); however, other subnets with more than 128 devices still require an ARNI-S.

Does the ARNI support dual power supplies?

The ARNI has a single external power brick with a terminal block type connector. Redundancy is handled by the spare ARNI for any failure mode.

Will there be any problem if there is an external DHCP Server connected to the OMNEO Network under the ZERO Configuration Mode?

The OMNEO devices will use any DHCP server if it responds to them (so the devices will not come up in Zero Config if a DHCP server is present). You can use a third-party DHCP server (instead of an ARNI or the MCII-e), and this is fine in a single subnet system. However, if you have a multi-subnet system, with ARNI, then you have to make sure that your third-party DHCP server is handing out the correct DNS Server information. In most cases, it would be better to configure your third-party DHCP server to exclude your OMNEO devices and use the ARNI or MCII-e as the DHCP server.

What is the “ENABLE DHCP RELAY” option stated at AZEDIT under the DHCP Server Configuration Window?

DHCP Relay allows the MCII-e DHCP Server to hand out IP addresses to devices on a different subnet. This works if the router between subnets is capable of, and configured to allow, DHCP Relay. When a device on the other subnet makes a DHCP request, the router forwards that request to the MCII-e, which can then hand out an IP address for that subnet. To support that, the MCII-e must be configured so that it has a range of IP addresses available to hand out on that subnet. Normally, if you try to configure the MCII-e DHCP Server via AZedit with a range of IP addresses that are not on the same subnet as the MCII-e itself, AZedit will warn you. The “Enable DHCP Relay” option in AZedit disables that warning, because you are telling AZedit that you expect the MCII-e to be able to support DHCP Relay

Is NAT (network address translation) supported for the OMNEO Network?

NAT is not supported by OMNEO devices.

How are OMNEO connections established in the network?

OMNEO connections are made by device name, not IP address. You can give each device a static IP address, so you don't have to use DHCP, but when you configure a channel to point to another device you do it by device name not by IP address.

The devices use DNS- SD to find each other (by name) and then resolve the names to IP addresses. Each device has a default name (based on the MAC address), so you don't have to name each device if you don't want to. You can pre-program the devices to point at each other (by device name) without even knowing what the IP addresses will be (though you can set those statically too if you like). However, it is easier to program the devices if they are already on the network because you can use device discovery to choose devices from a list.

The device discovery mechanism is based on Bonjour, though it is a much improved version customized by Bosch. It is built into the devices. On your PC, you install the Bosch DNS- SD service so that AZedit and IPedit can discover devices to present to the user. On a small local subnet, the devices use mDNS (multicast, not broadcast) but if an ARNI is used they use DNS-SD (directed messages).

If you had the two checkboxes (limit to local domain and other check box) then an OKI would not establish a connection to an OMI card. What are these checkboxes for and why would this stop the system working currently?

These checkboxes are for future compatibility with systems using ARNI.

The ARNI is not currently supported by OMNEO devices, which are limited to devices on the ".local" domain. The first checkbox (which should be checked by default) tells AZedit/IPedit not to bother trying to locate an ARNI-E (for multi-domain support).

Without this checkbox checked, AZedit/IPedit will first try to find an ARNI-E, and then try browsing the ".local" domain for devices. So if there is no ARNI-E present, AZedit/IPedit will not discovery any OMNEO devices for about 10-15 seconds at startup. Having the box checked allows AZedit/IPedit to skip trying to find the ARNI-E, and populate its list of available OMNEO device on the ".local" domain right away.

The state of this checkbox should have no effect on OMNEO devices themselves.

The second checkbox selects whether AZedit/IPedit uses fully qualified devices names in populating device name fields for OMNEO configuration. A fully qualified device name (or FQDN) includes the full domain along with the device name, so for instance, “FRED” would be “FRED.local” or “FRED.subnet1.bosch.omneo” (depending on whether the system was using ARNI’s and multiple domains, or not).

Currently, the OMNEO devices do not support fully qualified device names (if you configure a channel to connect to “FRED.local” instead of “FRED”, the connection will not be made). However, when support for ARNI is added, the OMNEO devices will require fully qualified device names so that connections are unambiguous. You could, for instance have two panels named “FRED”, one on subnet1 and one on subnet2, and their FQDNs would be “FRED.subnet1.bosch.omneo” and “FRED.subnet2.bosch.omneo”. When you are configuring a channel, you would need to use the FQDN to ensure that there was no ambiguity as to which device you wanted to connect.

Note that it should still be possible simply to enter “FRED” for the channel configuration, and the OMNEO device should be able to find “FRED.subnet1.bosch.omneo” or “FRED.subnet2.bosch.omneo”, if the OMNEO device is in either subnet1 or subnet2, it would choose the “FRED” device in the same subnet first.

So, currently, this checkbox is unchecked by default, and if you check it the channels will be configured using FQDNs which are not currently supported by the OMNEO devices (and channels will not connect).

Can the controller DHCP Server send out addresses to Dante equipment as welll as third-party devices (PCS etc)? Is there a way of showing a DHCP list of all devices connected on the network and obtaining addresses via the controller?

Yes, the MCII-e DHCP Server will work with any device requesting an IP address. There is currently no way to view which IP address have been allocated to which devices, though there are plans to add a screen to AZedit to show the DHCP Server status. A review of feature enhancements to OMNEO will be done in Q4. All requests will be evaluated at that time.