



## CobraNet vs. Dante



# CobraNet vs. Dante

- Digital Audio Networks
- Network Basics
- CobraNet
  - Overview
  - Advantages/Disadvantages
- Dante
  - Overview
  - Details
  - Dante Controller
  - Dante Virtual Soundcard
  - Advantages/Disadvantages
  - Info
- CobraNet vs. Dante

# 1. Digital Audio Networks

# 1. Digital Audio Networks

Compared to analog signal transmission, digital signal transmission of audio or video signals offers a lot of advantages:

- No signal degradation
- Simple signal distribution
- Simple signal routing
- Simple recording / playback
- Large numbers of audio channels on a single cable
- May be able to use existing network infrastructure and cabling

Once audio or video signals are existent in digital format, they can be easily interchanged between different devices on a digital media network.

# 1. Digital Audio Networks

In the last two decades *Ethernet* has evolved as THE networking standard for LAN networks. Due to the high number of available network components it's advantageous to develop digital media networks based on Ethernet.

In the case of digital audio networks, during the last ten years CobraNet has developed itself as industry standard, especially in fixed installation. CobraNet is generally credited as first commercially successful implementation of Audio over Ethernet. But it does not take advantage of all tools and protocols available, such as IP that can be found in modern networks, and several disadvantages result from that fact.

Recently, a new media networking technology has entered the market, that fully utilizes the possibilities of modern Ethernet equipment – *Dante*. Dante in principle\* also allows transmission of video data.

## 2. Basics

## 2. Basics

In the following some basics are briefly repeated, to be able to better classify advantages and disadvantages of different digital audio transmission protocols like CobraNet and Dante.

These Basics are:

- Ethernet
- Internet Protocol
- OSI Layer model

## 2.1. Ethernet

*„Ethernet is a technology, which specifies software (protocols etc.) and hardware (cables, distributors, network cards etc.) for wired data networks ... was originally intended for local data networks (LANs) and thus is also called LAN technology. It allows data exchange in the form of data packets between the devices connected to a local network (LAN)...*

*Currently transmission rates of 10 Megabit/s, 100 Megabit/s (Fast Ethernet), 1000 Megabit/s (Gigabit-Ethernet) up to 10 Gigabit/s are specified...*

*The Ethernet protocols involve definitions for cable types and plugs...*

*In the OSI model by Ethernet both the Physical Layer (**OSI Layer 1**) and the Data Link Layer (**OSI Layer 2**) are defined. Ethernet complies to the greatest possible extent with the IEEE norm 802.3. Since the 1990s it became the most used LAN technology.“*

Translated from the source: <http://de.wikipedia.org/wiki/Ethernet>



## 2.2. Internet Protocol

*„The Internet Protocol (IP) is in computer networks a widely-used network protocol and represents the basis for the Internet. It is the implementation of the Internet Layer of the TCP/IP model or rather the Network Layer of the OSI model.“*

Hint: Network Layer = **OSI Layer 3**

*„IP presents the first medium independent layer of the internet protocol family. This means, that via IP address and subnet mask for IPv4, or rather prefix length for IPv6, computers within a network can be grouped in logical units, so-called subnets.*

*On this basis it's possible, to address computers in larger networks and establish connections to these, as logical addressing is the basis for routing (choosing paths and forwarding of network packets).“*

Translated from the source: [http://de.wikipedia.org/wiki/Internet\\_Protocol](http://de.wikipedia.org/wiki/Internet_Protocol)

## 2.3. The OSI Layer Model

OSI-Schicht	Einordnung	DoD-Schicht	Einordnung	Protokollbeispiel	Einheiten	Kopplungselemente
7 Anwendungen (Application)	Anwendungs-orientiert	Anwendung	Ende zu Ende (Multihop)	HTTP FTP HTTPS SMTP LDAP NCP	Daten	Gateway, Content-Switch, Layer-4-7-Switch
6 Darstellung (Presentation)						
5 Sitzung (Session)						
4 Transport (Transport)	Transport-orientiert	Transport	Ende zu Ende (Multihop)	TCP UDP SCTP SPX	Segmente	Router, Layer-3-Switch
3 Vermittlung (Network)						
2 Sicherungsschicht (Data Link)		Netzzugriff		Punkt zu Punkt	Ethernet Token Ring FDDI ARCNET	
1 Bitübertragung (Physical)	Bits		Repeater, Hub			

Source: <http://de.wikipedia.org/wiki/OSI-Modell>

## 2.3. The OSI Layer Model

OSI-Schicht	Einordnung	DoD-Schicht	Einordnung	Protokollbeispiel	Einheiten	Kopplungselemente	
7 Anwendungen (Application)	Anwendungs-orientiert	Anwendung		HTTP FTP HTTPS SMTP LDAP NCP	Daten	Gateway, Content-Switch, Layer-4-7-Switch	
6 Darstellung (Presentation)							
5 Sitzung (Session)							
4 Transport (Transport)	Transport-orientiert	Transport	Ende zu Ende (Multihop)	TCP UDP SCTP SPX	Segmente		
3 Vermittlung (Network)				Vermittlung			ICMP IGMP IP IPsec IPX
		2 Sicherungsschicht (Data Link)			Netzzugriff		Punkt zu Punkt
1 Bitübertragung (Physical)				Bits		Repeater, Hub	

Source: <http://de.wikipedia.org/wiki/OSI-Modell>

# 3. CobraNet

## 3.1. CobraNet – Overview

- Developed by the company *Peak Audio* in 1996.
- Combination of software, hardware and network protocol.
- Uncompressed, multichannel digital audio transmission.
- Default latency of 5,33 ms.
- Addressing on OSI Layer 2 (Ethernet).
- Audio data transmission and routing in *Bundles* :
  - Up to 8 channels at 20 Bit resolution (7 channels at 24 Bit) per Bundle
  - Unicast Bundle (Point to point)
  - Multicast Bundle (Point to multi point)
  - Bundle number defines if Unicast / Multicast (> 255 / < 255)
- CobraNet CM-1 module supports up to 8 Bundles (4 In / 4 Out).
- CobraNet CM-1 module supports up to 64 channels (32 In / 32 Out).
- Optimized for 100 MBit/s Ethernet networks.

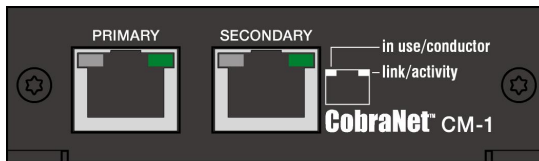
## 3.2. CobraNet – Advantages

- Proven technology.
- Many licensees.
- Many products.
- Widespread.

## 3.3. CobraNet – Disadvantages

- Not routable, as OSI Layer 2 is used for data transmission.  
-> Only usable in a LAN (Local Area Network).
- Maximum Switch Hop Count (Number of passed through switches) of 7.
- Reduction of latency is possible, but means a reduction of the send-/receivable Bundles in the CM-1 module:
  - 5,33 ms     8 Bundles (4 In / 4 Out)
  - 2,66 ms     4 Bundles (2 In / 2 Out, but also e. g. 3 In / 1 Out)
  - 1,33 ms     2 Bundles (1 In / 1 Out, but also e. g. 2 In / 0 Out)
- Either too high latency or too few channels for Live Sound applications.
- High planning effort -> for complex systems a simulation with CobraCAD is highly recommended.
- Audio only routable in Bundles -> low flexibility for routing changes.
- No recent updates by Cirrus Logic (like e. g. a 1 GBit/s module).

## 3.4. CobraNet CM-1 Module



- Module for installation in Dynacord P 64 digital audio matrix.
- *Primary* 100Base-TX Ethernet interface.
- *Secondary* 100Base-TX Ethernet interface.
- Automatic switching from Primary to Secondary in case of a network fault -> Building redundant networks is possible.
- Maximum 32 digital audio channels via 4 CobraNet™ bundles in.
- Maximum 32 digital audio channels via 4 CobraNet™ bundles out.
- Always only one port active, either Primary or Secondary. Short, but nearly inaudible audio dropout in case of redundancy switching.



# 4. Dante

## 4.1. Dante – Overview

- Developed by the company *Audinate* in 2006.
- The fundamentals for Dante were developed by a team of NICTA (National Information and Communication Technology Australia) as of 2003.
- Combination of software, hardware and network protocol.
- Uncompressed, multichannel digital audio transmission.
- Default latency of 1 ms (Gigabit network, up to 10 Gigabit switches).
- Addressing on OSI Layer 3 (IP).
- Channel-based audio transmission and routing (uni-/multicast possible).
- Dante *DM-1* module supports up to 64 channels (32 In / 32 Out).
- Dante *Virtual Soundcard* supports up to 128 channels (64 In / 64 Out).
- Dante *PCIe Soundcard* supports up to 256 channels (128 In / 128 Out).  
Optimized for 1 GBit/s Ethernet networks.

## 4.2. Dante – Details

### Network

- OSI Layer 1 + 2 *Ethernet* for physical connections / hardware
- OSI Layer 3 *IP* (Internet Protocol) for logical addressing
- OSI Layer 4 *UDP* (User Datagram Protocol) for audio streaming

### Addressing

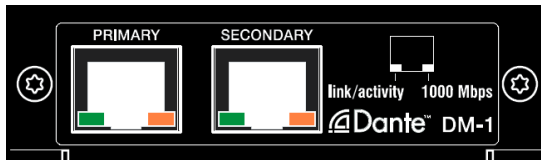
- *DHCP* (Dynamic Host Configuration Protocol)
  - Assigning an IP address via DHCP server
- *IPv4 Link Local / ZeroConf*
  - Automatic mechanism for IP address assignment in *Zero Configuration* networks
  - Is used if no DHCP server is present
  - IP address range 169.254.X.Y

## 4.2. Dante – Details

### Device configuration

- Dante devices use *DNS* (Domain Name Service) for mutual identification.
  - Dante devices discover each other via their names, not their IP address
    - > very user friendly!
  - Devicename.local -> 169.254.X.Y, z. B. P64\_1.local -> 169.254.1.55
- Dante uses *mDNS* (multicast DNS) to manage device names.
  - Allows a device to learn the IP addresses of the other devices.
  - The data base is distributed on the network.
- Dante devices present themselves on the network with their abilities via a service discovery mechanism *DNS-SD* (Bonjour software)

## 4.3. Dante DM-1 Module



- Module for installation in Dynacord P 64 digital audio matrix.
- *Primary* 100/1000Base-TX Ethernet interface.
- *Secondary* 100/1000Base-TX Ethernet interface.
- Automatic switching from Primary to Secondary in case of a network fault -> Building redundant networks is possible.
- Maximum 32 digital audio channels in.
- Maximum 32 digital audio channels out.
- Always both Primary and Secondary port active. No audio dropout in case of redundancy switching.

## 4.4. Dante Controller Software

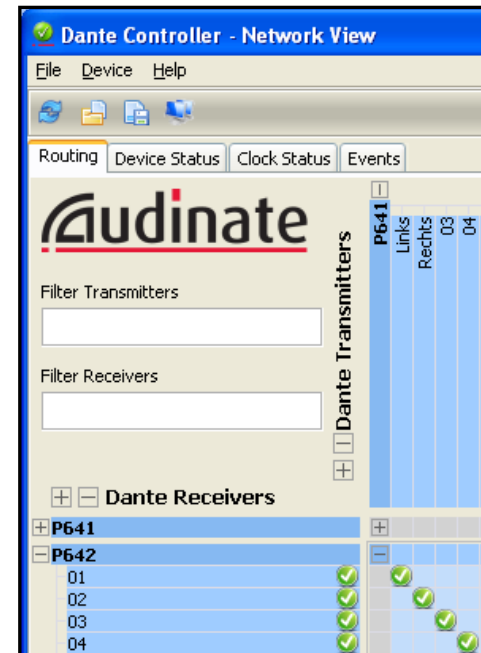
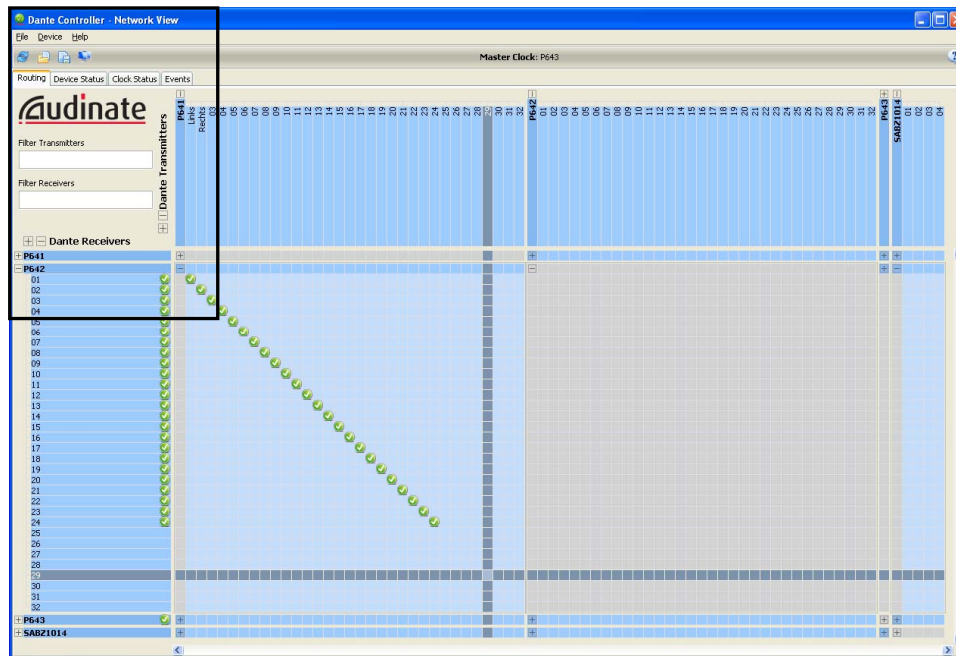


The *Dante Controller* software shows all Dante-enabled devices in a network as one big matrix.

- All Dante interfaces are automatically detected and present themselves with their Dante abilities.
- All Dante interfaces are represented via their names, which drastically simplifies identification.
- All Dante channels can be labeled.
- Via the Dante Controller also e. g. latency settings are accessible.

## 4.4. Dante Controller Software – Network View

Devices appear with their names and their Transmit / Receive channels. Audio channels can be labeled, e. g. as *Left*, *Right*, etc. .



## 4.4. Dante Controller Software – Device View

Audio channels are displayed as Channelname@Devicename, e. g. Left@P641 or Right@P641.

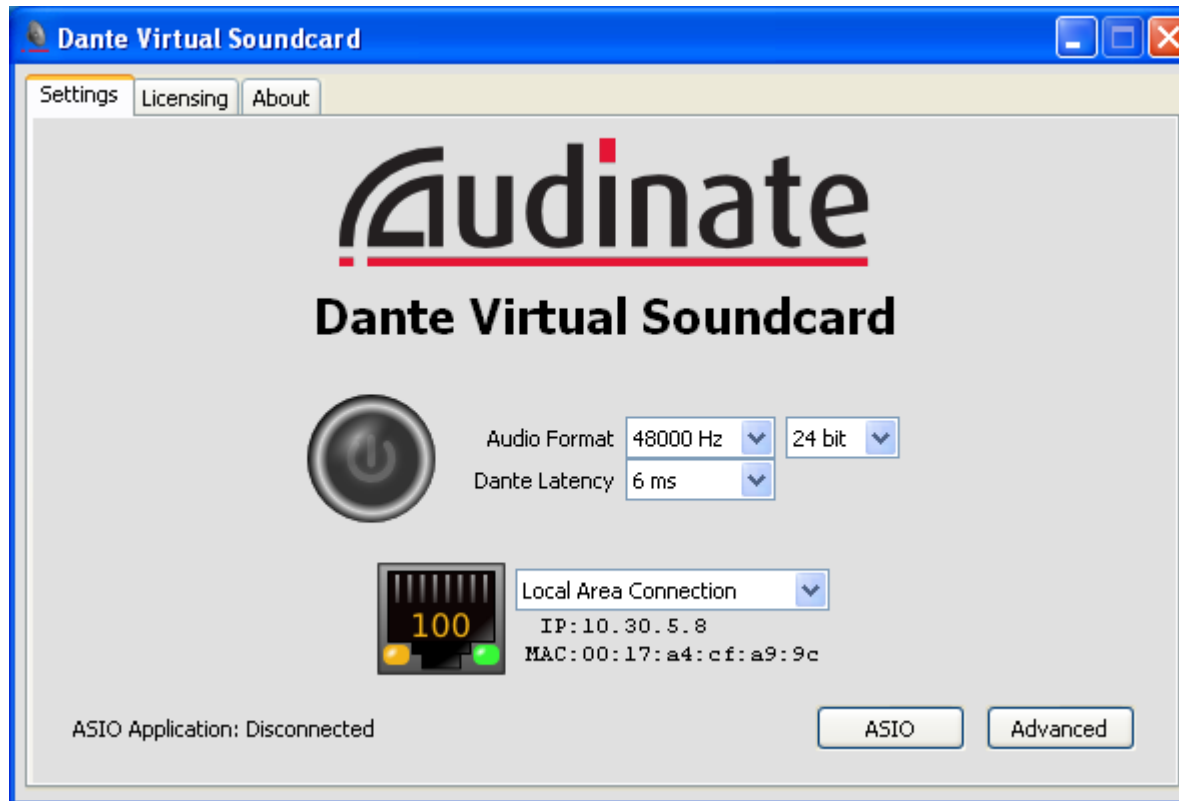
Channel	Connected to	Status
01	Links@P641	✓
02	Rechts@P641	✓
03	03@P641	✓
04	04@P641	✓
05	05@P641	✓
06	06@P641	✓
07	07@P641	✓
08	08@P641	✓
09	09@P641	✓
10	10@P641	✓

Available Channels

- P641
  - Links
  - Rechts
  - 03
  - 04
  - 05
  - 06
  - 07
  - 08
  - 09
  - 10
  - 11
  - 12



## 4.5. Dante Virtual Soundcard



## 4.5. Dante Virtual Soundcard

The *Dante Virtual Soundcard* is a software implementation of a Dante network interface and can be configured with the following numbers of channels:

- 2 x 2
- 4 x 4
- 8 x 8
- 16 x 16
- 32 x 32
- 64 x 64

The maximum possible channel number and the minimum latency depends on the processing power of the PC and its network port.

Audio and recording software supporting ASIO drivers can be used in conjunction with the Dante Virtual Soundcard.

## 4.5. Dante Virtual Soundcard

The *Dante Virtual Soundcard* software is for free.

The following licenses for the Virtual Soundcard are available:

- Free of charge test license (14 days)
- Time limited licenses(7 / 30 days)
- Unlimited license

Available for PC and Mac.

## 4.6. Dante – Advantages

- Routable, as OSI Layer 3 is used for transmission.  
-> Can also be used in excess of a LAN (Local Area Network).
- Scalable Switch Hop Count (Number of passed switches).
- Very good latency for Live Sound applications.
- Low planning effort.
- User-friendly configuration
- Audio routable on a per-channel basis.
- High flexibility in case of routing changes.
- Many updates and new product developments from Audinate.
- *Virtual Soundcard* available.
- *PCIe-Soundcard* available.

## 4.7. Dante – Disadvantages

- 1 GBit/s network is recommended, only limited use of 100 MBit/s
- Not yet so wide spread.
- Not yet so many products.

## 4.8. Dante – Info

On the website [www.audinate.com](http://www.audinate.com) a lot of additional information can be found. Especially recommended are the following general documents which can be found under *Technology and Solutions -> White Papers*:

- Analog to Digital Audio in the 21st Century.pdf
- Audinate AVB White Paper v1.2.pdf
- Audio Networks Past Present and Future.pdf

Of course also detailed descriptions about the Virtual Soundcard and other Dante products and technologies are also available.

To get access to the documents mentioned above one needs to register on the Audinate website.

A video about “Video over Dante” can be found here:

[Video over Dante ISE 2011](#)

# 5. CobraNet vs. Dante

## 5.1. CobraNet vs. Dante – Similarities

- Combination of software, hardware and network protocol.
- Uncompressed, multichannel digital audio transmission.
- Hardware based on Ethernet.



## 5.2. CobraNet vs. Dante – Differences

	<b>CobraNet</b>	<b>Dante</b>
Developed in:	1996	2006
Developed by:	Peak Audio	Audinate
P 64 hardware:	<b>CM-1</b> module <ul style="list-style-type: none"><li>• 100 MBit/s</li></ul>	<b>DM-1</b> module <ul style="list-style-type: none"><li>• 1 GBit/s / 100 MBit/s</li></ul>
Default latency:	<b>5,33 ms</b>	<b>1 ms</b>
Audio routing:	<b>In Bundles -&gt; inflexible</b> <b>via numbers -&gt; complicated</b>	<b>Per-channel -&gt; flexible</b> <b>via labels -&gt; easy</b>
Addressing:	MAC address -> OSI layer 2	IP address -> OSI layer 3
Routing (IP):	<b>not possible</b>	<b>possible</b>
Switch Hop limit:	<b>7</b>	<b>flexible, latency scalable</b>
Redundancy:	Primary/Secondary ports <ul style="list-style-type: none"><li>-&gt; <b>only one port active</b></li><li>-&gt; <b>switching audible</b></li></ul>	Primary/Secondary ports <ul style="list-style-type: none"><li>-&gt; <b>both ports always active</b></li><li>-&gt; <b>switching inaudible</b></li></ul>

## 5.2. CobraNet vs. Dante – Differences

	<b>CobraNet</b>	<b>Dante</b>
Max. channels (48 kHz)		
• 100 MBit/s:	64 x 64	48 x 48
• 1 GBit/s:	Not so easy to say ... Max. 4 x Multicast = 32 channels, so 32 x X + ?	> 512 x 512

## 5.2. CobraNet vs. Dante – Differences

A very important detail results from the fact that on a CM-1 module only one port is active, whereas on a DM-1 module both ports are always active. In case of a redundant network, e. g. based on a double ring structure, network connections between Primary and Secondary network are:

- mandatory on a CobraNet network
- not allowed on a Dante network

Also helpful to know is the fact, that a CM-1 module only switches to its Secondary port if the Primary connection is physically down. In the Dynacord P 64 the *Task Engine* can be used to configure more advanced switching.

Please contact the Dynacord Tech Support Team for planning assistance.

Thank you for your attention!

## Version History:

Original version:	v01	T. Pirtsch	14.10.2011
Last modified:	v01.1	E. Wetzell	
		T. Pirtsch	28.03.2012