

Working with CobraNet Audio

Considered the first audio-over-Ethernet technology, CobraNet can be ideal for sending uncompressed audio long distances—provided the network's right.

COBRANET: WHAT IT IS AND ISN'T

CobraNet is designed primarily for large-scale audio installations where the audio might travel long distances or to multiple destinations.

CobraNet transmits audio using standard link layer Ethernet packets, which pass easily through hubs, switches, etc. However, CobraNet does NOT use TCP/IP, therefore it cannot be used over the Internet and must be used on a LAN.

CobraNet operates over 100 Mbps Fast Ethernet connections (1 Gbps connections via switched networks).

It does NOT work on 10 Mbps, 10 Base-T Ethernet because of bandwidth limitations.

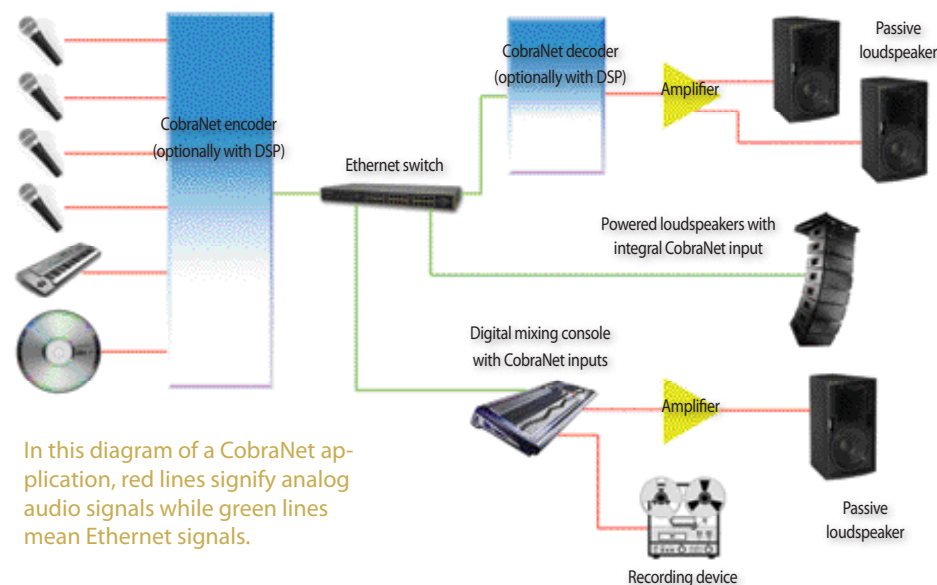
Duplex switches can carry up to 64 channels of 48 KHz 20-bit audio over a 100 Mbps link in either direction.

Older, repeater networks can carry up to 64 channels of 48 KHz 20-bit audio.

A CobraNet infrastructure can be a switched or repeater network, but not both.

CobraNet does not yet work wirelessly. It will function over 802.11x wireless networks, but bandwidth and reliability won't support good audio.

CobraNet over Cat-5 typically is limited to 100 meters; over fiber it can travel 2 kilometers.



In this diagram of a CobraNet application, red lines signify analog audio signals while green lines mean Ethernet signals.

ANATOMY OF A COBRANET AUDIO STREAM

A CobraNet signal comprises up to eight bundles, housing typically eight channels of audio. (The terms "network channel" or "CobraNet channel" have been phased out in favor of "bundles.") Capacity increases when you use 16-bit audio and decreased when you use 24-bit audio. The number of channels is dictated by bitrate and the fixed Ethernet payload limit of 1,500 bytes (i.e., the amount of data transmitted per cycle can't exceed 1,500 bytes). For example:

Yes: 8 audio channels/bundle x 64 samples/cycle x 20 bits/sample = 10,240 bits (1,280 bytes)

No: 8 audio channels/bundle x 64 samples/cycle x 24 bits/sample = 12,288 bits (1,536 bytes)

The main bundle types are multicast and unicast. Multicast bundles go from one CobraNet device to all others, which each process the bundle individually, taking up network bandwidth. Unicast bundles go from one CobraNet device to another (or others), making them more bandwidth-efficient.



A Yamaha CobraNet interface device.

QUICK TIP

CobraNet has a typical propagation delay of 5.33 milliseconds (256 samples). This will be acceptable for most applications, but if you're compensating for microphone placement or trying to eliminate Haas effect, you can use this value to help calculate compensatory delay times.

Programmers can specify a 2.67 milliseconds or 1.33 milliseconds latency for certain CobraNet devices, but reducing latency requires more processing power and places additional demand on the network.

CHOOSING YOUR NETWORK DESIGN

In general, it's recommended you use switched networks for transmitting audio via CobraNet. With Ethernet switches today being so affordable—and with even unmanaged switches offering features repeater hubs don't—there's little reason to go with a repeater network. Switches allow you, for instance, to create virtual LANs to separate audio from data traffic. But situations vary.

Use a switched network if:

1. The distance between the most distant network devices is greater than 2 kilometers.
2. You want to put PCs or other non-CobraNet Ethernet devices on the network.
3. You need fault tolerance or remote fault detection of network components.
4. You plan to plan to distribute more than 64 audio channels, now or in the future.
5. You want to use Gigabit Ethernet.

Consider a repeater network if:

1. Your network is small, particularly a diameter less than 2 kilometers.
2. You are distributing fewer than 64 audio channels.
3. You plan to build a separate, dedicated network for audio. You don't envision needing to expand the network later.

COBRANET DIAGNOSTICS

Having set up a CobraNet-based audio system, there may be times when audio drops out. The following are some of the possible diagnoses.

Auto-negotiation has been disabled. Without auto-negotiation, network switch ports must be manually configured. However, CobraNet devices can't be manually configured, and they use auto-negotiation to determine whether they're attached to a switched or repeater network. Without auto-negotiation, they'll assume a repeater network, configure for half-duplex operation, and activate collision avoidance, resulting in possible audio transmission problems.
Solution: Configure all switch ports for auto-negotiation. This is, in fact, the usual factory default.

Data errors. An Ethernet packet has built-in integrity checking to detect bad packets sent across a network (you can usually get a tally of these errors from a piece of network equipment by logging in using Simple Network Management Protocol). Corrupt packets can be an indicator of many problems, from bad network or CobraNet equipment to cabling issues.

Solution: A cable tester can help isolate problem in Cat-5 wiring, including wrong pairing of connectors. Equipment problems usually require swapping equipment, just keep in mind the problematic equipment isn't necessarily the one reporting problems.

Outdated CobraNet firmware. CobraNet was originally for repeater networks, therefore early versions of the firmware didn't support switched networks. Moreover, the first switched network support was very simple and couldn't handle large installations.

Solution: Contact the manufacturer for firmware updates and upgrade the system using Cobra Discovery software.

A hybrid network of switches and hubs. This kind of problems manifests itself through collisions on a repeater hub. CobraNet works on switched or repeater networks, but not a combination of the two—unless no CobraNet devices are connected to the hub.

Solution: If you're going to run CobraNet, ensure a switched network has no hubs and a repeater network has no switches.