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Network Performance Requirements

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Protocol

The CobraNet protocol operates at the Data Link Layer (OSI Level 2). CobraNet uses three basic packet types. All packets are identified with a unique protocol identifier (0x8819) assigned to Cirrus Logic. CobraNet does not transport audio as IP traffic. CobraNet is a Local Area Network (LAN) technology not a Wide Area Network (WAN) technology. IP transport is most valuable on a WAN.

Beat Packet

Multicast destination address 01:60:2B:FF:FF:00. Contains network operating parameters, clock and transmission permissions. The beat packet is transmitted from a single CobraNet device on the network and indicates the start of the isochronous cycle. Since the beat packet carries the clock for the network, it is sensitive to delivery delay variation. Failure to meet the delay variation specification specified below may prevent devices from being able to lock their local sample clock to the network clock. The beat packet is typically small (100 bytes) but can be large on a network with numerous active bundles.

Isochronous Data Packet

Multicast or unicast destination addressed (depending on number of destinations and bundle type). Buffering is performed in the CobraNet devices thus out of order delivery of data packets is acceptable. To keep overhead in check, data packets are typically large (1000 bytes).

Reservation Packet

Multicast destination address 01:60:2B:FF:FF:01. CobraNet devices typically transmit a reservation packet once per second. The reservation packet is never large.

Timing and Performance

CobraNet provides real-time audio delivery and requires real-time performance from the network on which it is deployed. The best means of insuring a network will deliver the performance required by CobraNet is to verify the design using Cirrus Logic's CobraCAD CobraNet modeling software (available for download at www.cirrus.com). The design check feature in CobraCAD assures that the performance requirements shown in Table 1 are met and that the network is capable of delivering the bandwidth required to support the modeled application.

Table 1: CobraNet Network Performance Requirements

Parameter	Maximum	Comments
Beat Packet Delay Variation	250µs	If delivery of beat packets periodically varies from the nominal delay by more than this value, then the Receivers may loose sample lock or fail to meet clock delivery specifications.
Forwarding Delay, 5-1/3ms latency	500µs	Forwarding delay is the sum of store forward, queuing and propagation delays. Forwarding delay includes delay variation - i.e. 150µs forwarding delay + 250µs delay variation = 400µs. Thus tolerance of forwarding delay is reduced in the presence of delay variation. When forwarding specification is exceeded, audio is delivered reliably with additional latency. rxDelay and rxMinDelay can be used to observe and control this adaptation to forwarding delay.
Forwarding Delay, 2-2/3ms latency	250µs	
Forwarding Delay, 1-1/3ms latency[a]	125µs	
Maximum Forwarding Delay	5000µs	Audio cannot be delivered at any latency with extreme forwarding delays.
Maximum Forwarding Delay Variation, 5-1/3ms latency	1000µs	Delay variation exceeding these specifications will result in unreliable audio transport due unstable rxDelay determination. In some cases this may be addressed through manual rxMinDelay setting.
Maximum Forwarding Delay Variation, 2-2/3ms latency	500µs	

Forwarding Delay Variation, 1-1/3ms latency[a]	250µs	

a. Store-forward delay on a 100Mbit Ethernet connection is 121µs (assuming maximum length packets). This forwarding delay specification is only achievable on an audio-only dedicated network. The lowest latency achievable with CobraNet on a non-dedicated network is 1-2/3ms (using the 1-1/3ms latency mode with an rxMinDelay setting of 0x40 to make receivers tolerant to queuing delays introduced by non-audio traffic).