Physical Layer Ethernet Errors (8/96)

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TOPIC ---

This article describes physical layer Ethernet errors and some of their common
causes.

DISCUSSION --

Integrity of the physical layer of an Ethernet network is required for upper
layer protocols like TCP/IP and AppleTalk to function effectively. Errors at the
physical layer generally result from faulty wiring, defective transceivers,
network interface cards, or hub ports. Apple products adhere to industry
standards for Ethernet and troubleshooting methods generic to the industry can
be used to recognize physical layer issues.

Protocol analysis can be used to monitor physical layer health. While physical
errors are a normal occurrence, they should not exceed two percent of available
bandwidth as a general rule of thumb.

Common physical layer errors include collisions, cyclic redundancy check/
alignment errors, and frame length errors.

Collisions

Collisions on an network are normal due to the collision detect (CSMA/CD) nature
of the Ethernet access method. If no problems exist on the network, but there
are slow file transfers, a minor collision rate from a workstation does not
indicate a problem. Collisions above one percent of overall network traffic
should be taken seriously and normally indicate either a faulty cable,
transceiver, or network interface.

CRC/ Alignment Errors

Cyclic redundancy check (CRC)/ alignment errors generally indicate improper
byte-alignment for Ethernet packets. CRC errors greater than two percent of
overall traffic require attention. Most commonly CRC errors can be isolated to a
particular workstation with a faulty network interface card. Alternatively, a
faulty transceiver, cable, or hub port can be responsible for CRC errors.

If CRC errors cannot be isolated to a unique workstation address, cabling is the
likely cause. Faulty connectors, improper grounding of thin coax wiring, or

defective wiring concentrators could be the root problem.

Frame Length Errors

Standard Ethernet packets vary in length from 64 to 1,518 bytes. Any packet with
a length outside of the standard range constitutes an error. Packets shorter
than 64 bytes are often referred to as "runts" or "short frames". "Long packets"
exceed 1,518 bytes. Troubleshooting frame length errors can be troublesome since
the packets generally do not contain reliable address fields. Fault isolation
usually requires removal of physical devices until the symptom is removed, with
the last device removed then labeled as suspect. The root cause of the errors
could be a defective network interface, transceiver, or a corrupt network
interface driver.

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