10BASE-T: Specifications and Configurations

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TOPIC ---

We're configuring a large network and getting conflicting specifications regarding 10BASE-T hubs on Ethernet. We want to install the hubs on an existing thin backbone.

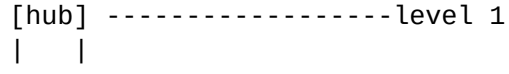
As an example, the Asanté hub has thick, thin, and 12 10BASE-T connections. We recommended hanging the hubs off the backbone via the thin connector and use all 12 RJ45s for computers. Asanté says we can't hang more than four or five hubs off a backbone, but Farallon says our configuration will work. Asanté recommends hanging the first hub off the backbone, and then daisy-chaining the rest using one of the RJ45s from each hub. Farallon says this isn't recommended.

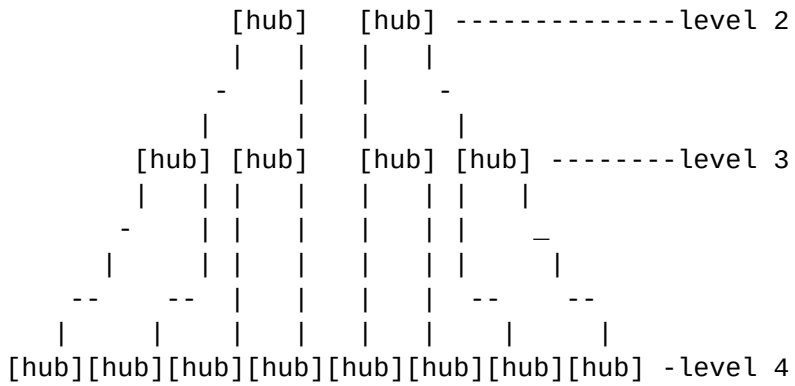
Can you give us some guidance regarding the specifications concerning 10BASE-T in this particular situation? This would help us configure future networks using UTP wiring.

DISCUSSION ---

IEEE 802.3 Specifications

The IEEE 802.3 10baseT specification states that any two communicating stations can't be separated by more than five segments. This means that you can have up to four repeaters within any given communications path. When a transmission path consists of four repeaters and five segments, up to three of the segments may be coax and the remainder must be link segments. Link segments are defined as repeater-to-repeater links such as FOIL, 10BASE-T, 10BASE-FB, and 10BASE-FL This means each 10baseT port is treated as an inter-repeater link so you can cascade up to five concentrators together before you exceed the 802.3 specification. Some hub manufacturers (SynOptics) push the limit past the 802.3 specification and allow up to four levels of cascaded hubs. The maximum transmission path between communicating devices is then seven.





Whether the cascaded hub configuration is a better design than the backbone depends on several factors.

Using an Existing Backbone

If there is an existing backbone, it might be more cost effective just to use it rather than to run new cable to support the cascaded configuration. The environment itself also plays a key role in network design. A 10BASE-T link supports distances of up to 100 meters (approximately 320 feet); a FOIL link supports distances up to 500 meters (in the maximum five segment network). These are both defined as link segments. Multiple devices can't share link segments in the way a backbone configuration would allow. Again, cost might play a key factor in choosing the right design. Running a shared backbone may be more cost effective, or it may be overkill. This is something that careful analysis of the physical location and intended network use will show.

Cascaded Network

Consider the situation where you would like to isolate the traffic from one hub. If you were to use a cascaded design, it might be more difficult to install a router or a bridge between hubs and still offer the partitioned hub reliable backbone service. The partitioned hub might be subject to additional down time in a cascaded design. If one of the hubs above it were to crash, it wouldn't be able to gain access to the backbone. If it were directly attached, it would always have reliable service no matter what other hub crashed. On the other hand, you might isolate your traffic better by putting a significant amount of your low to medium users on a big cascaded network and isolate them from the backbone with only a single router.

Backbone

The cascaded design may also offer some potential retransmission savings from the standpoint of fewer collisions, thus fewer retransmissions. In the cascaded design, the physical topology limits the number of devices on each hub-to-hub link to two (because they are "link" segments). With only two devices attached to a segment the number of collisions is greatly reduced, since only two devices are contending for the cable at any given time. If you attached each of the hubs to a single backbone, the overall throughput could be reduced (depending on the traffic patterns) because of the extra collisions and hence retransmission of data packets. Of course this will depend on predicted traffic patterns for each of the hubs.

Neither design is right or wrong; it really depends on usage requirements and budget.

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