

## Routing Delays and Other Troubles

MacPing measures the round-trip time between the transmitter and receiver, so you can judge whether the round-trip times can be causing trouble. Delays can arise from having several routers (or slow links) between the transmitter and receiver. Each router takes a finite time (generally 50  $\mu$ sec to 10 msec) to process and forward a packet. Most commercial network routers are fast enough that the delay doesn't slow the network significantly.

An overloaded router, on the other hand, can give bad response. You will see a large time difference between Long and Short Echo packets. A critical distinction between the reliable-but-slow link (described in the previous section) and an overloaded router is the variance between timings. As network equipment approaches its maximum capacity, the delay before a packet is processed gets larger. If a packet arrives while the router is busy, it will be delayed more than when the router is idle. This will be shown as a large spread between the Minimum (Min), Average (Avg), and Maximum (Max) times.

In addition to a high variance of round-trip times, a busy router may begin to drop packets. This will occur when packets are arriving faster than the router can send them out. (This can happen to a router with two ports—a wide-area link and an Ethernet—when it receives a burst of traffic from the Ethernet. It may not have enough buffers to hold the packets, and they will be dropped.) This increases the Percent Dropped figure, as well as the variance in numbers.