What Makes a Network Slow?

Several effects can slow down the responsiveness that users perceive. They are:

- "Dropped" packets
- Speed-limited links
- Routing delays
- Overloaded servers

Although the bottleneck or cause of network slowness on a particular network may be difficult to deduce, MacPing can help differentiate between the causes above.

Dropped packets are the most common, and most fixable cause of network slowness. As mentioned before, the transmitter must wait a while (generally two to five times the expected time) for an ack to return from the receiver. If no ack arrives, it re-sends the data. Note that the loss of either of the transmitted data packet or the ack packet will result in a slowdown. If occasional packets (less than the 1-2%) are lost, the data transfer doesn't slow too much. If packet loss occurs more frequently, the waiting for acks builds up, and the user perceives a "slow network".

Speed-limited links can also cause slow service. Apple Remote Access (ARA) is the most common slow link encountered on an AppleTalk network. Even the highest speed modems will be dramatically slower than LocalTalk (230.4 kbps) or Ethernet (10 million bps) speeds.

Note that with slow links, a long packet will take considerably longer to transmit than a short packet: a transmitter should take this delay into account when waiting for acks to return. You can use MacPing to show the difference in round-trip time between long and short packets, and indicating a slow link in the path.

Routing delays can be caused by having many routers (as well as slow links) between the transmitter and receiver. Each router takes a finite time (between 0.1 to 10 msec) to process and forward a packet. Each router introduces a bit more delay on the packet's path. Although these times can occasionally get long in very large networks, most commercial network routers are fast enough that the delay doesn't slow the network significantly. MacPing measures the time between the transmitter and receiver, you can judge whether the round-trip times can be causing trouble.

Overloaded servers will seem slow when lots of people are using them. For example, file-sharing with more than a few connections, or a Mac Plus running the AppleShare file server software will probably seem quite slow. The slowness is caused because the server machine has trouble responding to the multitude of requests coming from each of its client. MacPing won't help you detect an overloaded server. Instead, you can estimate the change in speed as you add additional users. The best fix for an overloaded server is selecting a more powerful processor: since this may be expensive, you should make sure the rest of the network is working properly before investing in new hardware. It's also important to note that using a faster processor will not make up for any of the other problems listed above: their effect is cumulative.