Ping times - should they add up?

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Question

The ping times don't always seem to add up logically to me. For example, I commonly see the average time for a single hop being longer than the total return trip number. This doesn't make sense to me.

Solution

The latencies (average, current, minimum, maximum) do not need to be added together - each hop represents the total amount of time it takes for a packet to get to that hop/router, and then back to your computer. If you're collecting data for a route that is 10 hops long, the data at hop 10 has to go through all the previous hops too, and the round trip time represented in PingPlotter is the time for it to make the entire trip.

This starts to seem impossible, though, when an intermediate hop reports latencies higher than the final destination does. How can that be possible?

Some routers might down-prioritize ICMP requests that are 'expired'. Traceroute (and PingPlotter) uses expired packets to discover and measure intermediate hops. A router might be relatively lazy about responding to those packets but pass other packets downstream quickly and with high priority. This sometimes manifests itself as packet loss or high latency while other hops further downstream don't have these symptoms. This might indicate that there is a high load on this router, but doesn't mean that for sure.

Another thing to keep in mind is that each hop is being queried individually - we send a packet to each hop for each sample set. This means that you might see lost packets at an intermediate hop that might not be lost further downstream. Often, you'll see statistical similarities, though, where the packet loss percentage is similar through all downstream hops, even if the packet loss (or latency problems) don't happen at exactly the same time point.

For more details on how Ping Plotter and traceroute in general works, check out How PingPlotter Works.

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