SerializationDelay

Serialization Delay (or *Transmission Delay*)

Serialization delay is the time it takes for a unit of data, such as a packet, to be serialized for transmission on a narrow (e.g. serial) channel such as a cable. Serialization delay is dependent on size, which means that longer packets experience longer delays over a given network path. Serialization delay is also dependent on channel capacity ("bandwidth"), which means that for equal-size packets, the faster the link, the lower the serialization delay.

Serialization delays are incurred at processing nodes, when packets are stored-and-copied between links and (router/switch) buffers. This includes the copying over internal links in processing nodes, such as router backplanes/switching fabrics.

In the core of the Internet, serialization delay has largely become a non-issue, because link speeds have increased much faster over the past years than packets sizes. Therefore, the "hopcount" as shown by e.g. traceroute is a bad predictor for delay today.

Example Serialization Delays

To illustrate the effects of link rates and packet sizes on serialization delay, here is a table of some representative values. Note that the maximum packet size for most computers is 1500 bytes today, but 9000-byte "jumbo frames" are already supported by many research networks.

%TABLE{ sort="on" tableborder="0" cellpadding="1" cellspacing="3" headerbg="#000099" headercolor="#FFFFCC" databg="#C8CB8F, #DBDDB5" headerrows="2" footerrows="1" }%

Link Rate	64 kb/s	1 Mb/s	10 Mb/s	100 Mb/s	1 Gb/s	10 Gb/s
Packet Size						
64 bytes	8 ms	0.512 ms	51.2 µs	5.12 µs	0.512 µs	51.2 ns
512 bytes	64 ms	4.096 ms	409.6 µs	40.96 µs	4.096 µs	409.6 ns
1500 bytes	187.5 ms	12 ms	1.2 ms	120 µs	12 µs	1.2 µs
9000 bytes	1125 ms	72 ms	7.2 ms	720 µs	72 µs	7.2 µs

– Main.SimonLeinen - 28 Oct 2004 - 17 Jun 2010