

TCP and Long Thin Networks (LTNs)

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LTN Characteristics (from PILC BOF Agenda Listing)

Long delay links.

Links with variable bandwidth-delay products (such as multi-channel ISDN, or LEOs).

Links with varying delay.

Links with link-layer flow control.

Links with asymmetric bandwidth.

Links with unusually high error rates.

Links with inconsistent error rates.

Links with significant monetary, resource-scarcity, or delay cost for establishing connections and/or keeping connections open.

Significantly low bandwidth links.

Links with intermittent outages.

Ten out of seventeen PILC agenda "problem areas"

Problems with TCP on LTNs

Windows open slowly (IW=1 + delayed ACKs)

Windows don't remain open (errors != congestion)

Link layers can't tell far-end TCPs about handoffs/radio interruptions (detection is timeout-based)

Poor TCP throughput costs a LOT of money (dedicated cellular resources are idle, waiting for TCP timers to pop)

Third-generation Cellular bit rates are much faster - but waiting for TCP timers to pop is still slow!

Where the LTN Community is today

Implement recommendations from TCPIMPL and TCPSAT

Track and implement LFN research topics from TCPSAT

Insert Performance-Enhancing Proxies (PEP) - SNOOP

At the low end - abandon TCP (and in some cases, even IP) over wireless links - MOWGLI, MNCP, WAP

Open Issues - at least to us

Performance characteristics of PEP, especially PEPs that translate TCP into “something else”

Unambiguous losses due to errors (ECN isn't unambiguous during high congestion periods)

RTT estimation interaction with radio interruptions and handoffs

Questions I Hope We Answer in This BOF

Can we still have one (“Highlander”) TCP?

If we can specify one TCP that fixes our problems,
how long until it’s deployed?

Should we be twiddling with TCP, or should we be
doing something else (RUTS?)