NDT: Update
Duplex Mismatch Detection

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NDT Background

- Web100 enhanced server handles testing and diagnostic services
- Java based and command line clients allows testing from any client (local or remote)
- Performance and configuration faults reported back to client
- Drill-down functions provide more details & error reporting capabilities
Future Directions

- Focus on improving problem detection algorithms
  - Duplex mismatch
  - Link detection
  - Improve performance tuning messages
Duplex Mismatch effort

- NIH/NLM funded project
- Accurately describe how mismatch condition creates loss
- Define methods to reliably detect and report this condition
- Paper being published in PAM 05 proceedings
Duplex Mismatch effort

- When collisions occur
  - Full duplex interface will loose frame
  - Half duplex interface may loose or retransmit frame

- Generate analytical models for loss
  - Using Poisson streams (Thrulay)
  - Using UDP packet trains (TTCP)
  - Using TCP flows (NDT)
Receiver is put is various states

• Switch = full & Host = full or half
• Switch = half & Host = full or half

Test environment
Mismatch loss probability

\[
p_{\text{F, per cent}} \quad \text{vs.} \quad c_{\text{H, Mb/s}}
\]

Data points for different values of \(c_F\) are shown, with predicted values indicated by a straight line.
Mismatch behavior 1
Remote server with local client

Switch = Full, and Host = Half
- TCP experiences multiple packet loss events
- Ack packet ‘syncs up’ with multiple data packets

![Diagram showing server and receiver side views of packet transmission with losses marked by 'X'.]
Mismatch behavior 2
Remote source with local client

- Switch = Half, and Host = FULL
  - TCP Data packets delayed
  - Ack packet lost

Server Side view

Receiver Side view
Packet Train behavior 2

![Graph showing packet train behavior](image-url)
TCP behavior 2

home-ndt:3003 --> 192.168.1.103:39672 (time sequence graph)
Underlying assumption

- Model is correct if inter-packet gap is less than time to generate and transmit Ack packet.
- Tight links (T1, DSL, Cable Modem) violate this assumption.
  - Mismatch on home LAN would not be detected by remote server.
Conclusions

- New duplex mismatch detection algorithm being developed
- Existing trace files being analyzed to examine difference
- NDT administrators being contacted to review their log files
- Investigating packet train model for detecting mid-path mismatch