Measurement Tools: RDM

Common network abstraction in models: **Copper Wires**

\[
\text{Delay} = d_0 + \frac{\text{PacketSize}}{\text{Capacity}}
\]

• (Access) Networks are stateful at layer 1 and/or 2
  • Session-awareness in terms of time (transparent)
  • Dormant potential for changes in value-domain

• Key observation **Middlebox:**
  a) in terms of **value** (modifies bits/value)
  b) in terms of **time** (modifies timing)
- **Example: State and history** of time-slotted links
  - Periodic service time

(a) Send time (client)  
(b) Receive time (server)
- **Consequence:** No random start time probes beyond first time-slotted link on a path
- **Example:** reverse link one-way delay measurement HSPA

(a) Round-trip samples  
(b) Hop-by-hop measurement
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- Proposed solution: detect timing impairments
- Representative Delay Measurements (RDM) Tool [1], [2]

**Key Concepts:**
- Active Measurements
- Time-synchronized hosts
- Pre-computed stream definition
  - Random-payload (size)
  - Random start time/IDT
- Configurable start time
- Randomness re-generation in intermediate nodes

Conclusions

- Networks and systems bias on communications
  - At low load, when operating within specifications
  - Applications, communications, and measurements
- Middleboxes
  - “Dormant” middleboxes: session state (packet timing).
  - Time-domain (transparent) vs. value-domain (visible)
- Measurement methodology imperative
  - One-way, hop-by-hop measurements
  - Randomness re-generation in intermediate nodes
  - Scenarios (repeatability)

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Bibliography


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