TCM-TF Recommendations

Delay Limits and Multiplexing Policies to be employed with Tunneling Compressed Multiplexed Traffic Flows

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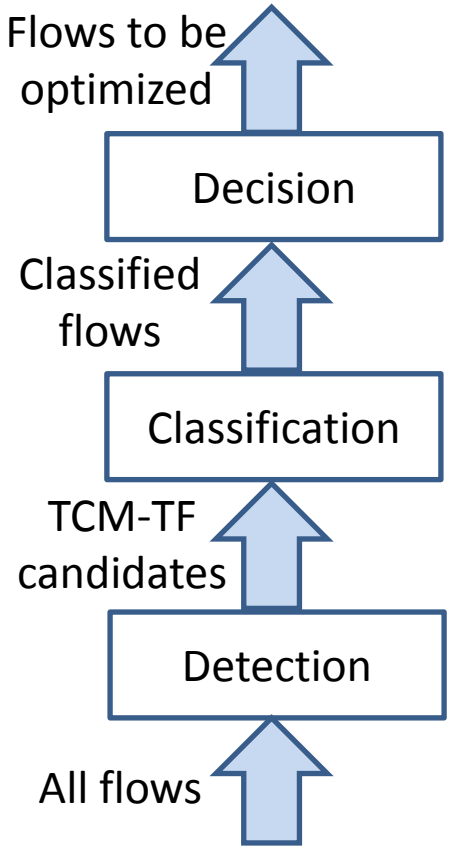
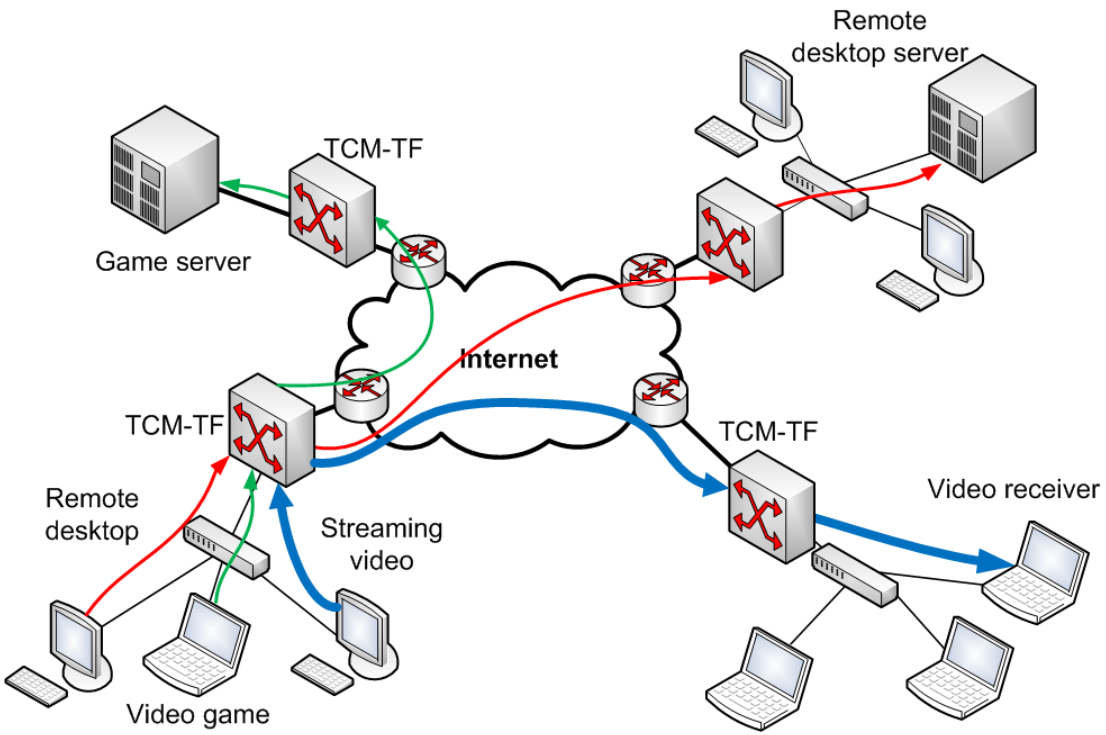
Problem

- Applying TCM-TF reduces the packet rate and bandwidth usage, at a cost of introducing an additional delay
- The additional delay may degrade the Quality of Experience (QoE) of the service, especially for real time services
- TCM-TF should maintain or even increase QoE
- Setup policies and mechanisms that enable positive gains of TCM-TF without significantly degrading QoE

TCM-TF pre-procedures





Limiting the delays

- Introduced delays
  - Header compression
  - Tunneling
  - ***Multiplexing process*** (usually one way)
- Multiplexing policies
  - Fixed number of packets
  - Timeout
  - Period
  - Size limit

  } Create an upper bound on the delay
- Size limit + period
  - High number of flows -> very small amount of added delay

Suggested delay recommendations

Service	Tolerable latency (RTT)	Multiplexing period
Voice communication	< 300 ms	< 30 ms
Omnipresent games	< 600 ms	< 60 ms
First person avatar games	< 160 ms	< 15 ms
Third person avatar games	< 240 ms	< 25 ms
Remote desktop	< 400 ms	< 40ms
Web browsing	< 4 s	< 400ms
Instant messaging	< 10 s	< 1s
M2M (metering)	< 1 hour	< 1s

- Tolerable delay values
  - ITU-T
  - QoE research papers
- Introduced delays in practice should be a lot shorter than the limit