Project Summary-Tool

Award No:
0125410

Project Title:
Quantifying the Temporal Characteristics of Congestion Events in the Internet

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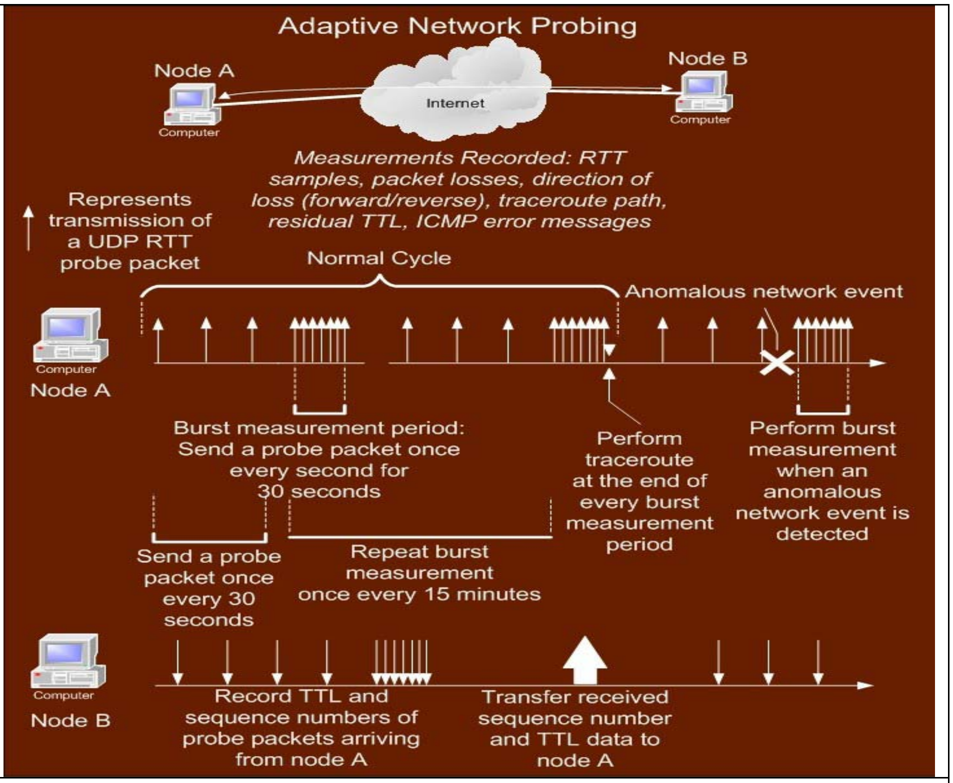
Adaptive Network Probing
Node A
Node B
Internet
Computer
Computer
Measurements Recorded: RTT samples, packet losses, direction of loss (forward/reverse), traceroute path, residual TTL, ICMP error messages
Represents transmission of a UDP RTT probe packet
Normal Cycle
Anomalous network event
Computer
Node A
Burst measurement period: Send a probe packet once every second for 30 seconds
Perform traceroute at the end of every burst measurement period
Perform burst measurement when an anomalous network event is detected
Send a probe packet once every 30 seconds
Repeat burst measurement once every 15 minutes
Computer
Node B
Record TTL and sequence numbers of probe packets arriving from node A
Transfer received sequence number and TTL data to node A

Website:
http://www.ittc.ku.edu/~frost/Characterizing-Internet-Congestion.htm

Description of Graphic Image:
Adaptive network probing tool adjusts to network events, increasing or decreasing the rate at which the network is probed. In normal mode, the network is probed at a low rate in a non-intrusive manner. But when an anomalous network event is detected, the sampling rate increases to collect more information about the cause of the event.

Project Description and Outcome *(Provide content for one or more of the following outcome goals)*

Ideas:

The developed adaptive network-probing tool is an active measurement system based on the client-server model. The client periodically sends UDP RTT probe packets to the server and the server echoes arriving packets back to the client. Client uses sequence numbers and timestamps contained in arriving packets to determine RTT and packet losses. In normal cycle, client sends RTT probe packets once every 30 seconds for 15 minutes. At the end of the 15 minute period, client enters the burst measurement mode sending RTT probes once every second for 30 seconds. After the burst measurement period, client performs a traceroute to the server. Thereafter, the client resumes to probing the network once every 30 seconds. In the normal cycle, when a packet loss is detected, the client initiates an out-of-turn burst measurement period and enters the adaptive cycle. If RTT samples collected during the burst measurement period have a high delay variation or if the packet loss rate is above a minimum threshold then the client continues to probe the network at a high rate at the end of the burst period. Otherwise it resumes to the normal cycle. The server records residual TTL and sequence numbers of all arriving packets. It transfers this data back to the client once every few hours. The client also records the residual TTL of arriving packets, which are used to detect layer 3 route changes. ICMP error messages are recorded and used to detect routing loops. Performance information is collected to and from the server.