Network Performance Analysis

Outline

L4.1  Motivation and overview
L4.2  Lab setup and instructions
Network Performance Analysis
Motivation and Overview

L4.1 Motivation and overview
L4.2 Lab setup and instructions
Motivation and Overview

Performance Analysis

• Performance analysis can be performed on:
  – medium (wired vs. wireless)
  – network resources (bandwidth, processing, memory)
  – constraints (energy, delay)
  – protocols (TCP, IP, etc.)
  – etc.

• Purpose of this lab is to understand the effects of
  – Explicit Congestion Notification (ECN)
  – Random Early Detection (RED)

• … on the TCP layer in wired medium
Network Performance Analysis
Lab Setup and Instructions

L4.1  Motivation and overview
L4.2  Lab setup and instructions
Lab Setup and Instructions

Lab Setup

- 4 Cisco 1700 routers
  - running Cisco IOS
- Each router is connected to a desktop host computer
  - running Fedora 13 OS
- Each pair of routers are interconnected with a T1 link
- Router to host connections use 100 Mbps Ethernet
- Tools to be used as root user:
  - iperf
  - tcptrace
  - xplot
  - minicom
There are three subnets:

- 192.168.3.0/24 between routers
- 192.168.2.0/24 between host 1 and router 1
- 192.168.4.0/24 between host 2 and router 2
Lab Setup and Instructions

Experiment Steps

• Following scenarios to experiment:
  - baseline scenario (ECN and RED turned off)
  - TCP performance analysis with ECN
  - TCP performance analysis with RED

• Start the iperf server on one host
  - `iperf -s`

• Monitor the connection with tcpdump
  - `tcpdump -w tcpdump.dmp`

• Start the iperf client on the other host
  - `iperf -c 192.168.4.1 -t 30`
Lab Setup and Instructions

Experiment Steps

- Stop monitoring when iperf finishes sending traffic
- Generate plots with tcptrace
  - tcptrace -S tcpdump.dmp
- View plots with xplot
  - xplot a2b_tsg.xpl
- Modify the host ECN parameter as superuser
  - ECN can be turned on via following command
    - # echo “1” > /proc/sys/net/ipv4/tcp_ecn
  - ECN can be turned off via following command
    - # echo “0” > /proc/sys/net/ipv4/tcp_ecn
• Modify the router parameters
  - router ECN parameter modification steps
    • Router>enable
    • Router#configure terminal
    • Router(config)#(no) ip tcp ecn
    • Router(config)#exit
  - router RED parameter modification steps
    • Router>enable
    • Router#configure terminal
    • Router(config)#interface serial 0
    • Router(config-if)#random-detect
    • Router(config-if)#exit
Lab Setup and Instructions

Experiment Steps

• Login to router can be done via following command
  - minicom com1

• When host is rebooted firewall needs to be turned off
  - service iptables stop
Lab Setup and Instructions

Lab Report Submission Guidelines

• Write 1-2 page summary of what you did in the lab
• Report should include the following sections:
  - experiment setup and procedure
  - results
  - conclusions
• Use screenshots of tcptrace graphs for results section
• You can discuss with group members but …
  … everyone must submit individual report
• Send report in pdf format to GTA and cc Dr. Sterbenz
Network Performance Analysis

References

• Floyd & Jacobson,
  *Random Early Detection Gateways for Congestion Avoidance*
  *IEEE/ACM TON, Vol. 1, No. 4, Aug. 1993*

• RFC 2309, RFC 2884, RFC 2914

• Cisco TCP ECN notes:

• Cisco Weighted RED configuration notes:

• *tcptrace*
Network Performance Analysis

Acknowledgements

Justin P. Rohrer for feedback on the slides and input from EECS 881 Lab