

Network Tools and Protocols Lab Series

Jorge Crichigno
University of South Carolina

2020 Western Academy Support and Training Conference
Summer Conference
June 15 – June 19

Overview Network Tools and Protocols Lab Series

NTP Lab Series

The lab series provides learners an emulated WAN infrastructure operating at high speeds, up to 50 Gbps, and devices running real protocol stacks

It helps students to acquire hands-on skills on

- Performance and measurement tools
- Configuration of devices for high-speed networks
- Emulate scenarios using real protocol stacks

NTP Lab Series

The lab series can be partitioned into three parts

- Measurement (throughput, latency, packet loss) and emulation (link bandwidth, buffer size, delay) tools
- TCP features for high speed transfers, router buffer size
- Active Queue Management (AQM) algorithms

NTP Lab Series

Lab experiments

- Lab 1: Introduction to Mininet
- Lab 2: Introduction to iPerf
- Lab 3: WANs with latency, Jitter
- Lab 4: WANs with Packet Loss, Duplication, Corruption
- Lab 5: Setting WAN Bandwidth with Token Bucket Filter (TBF)
- Lab 6: Traditional TCP Congestion Control (HTCP, Cubic, Reno)
- Lab 7: Rate-based TCP Congestion Control (BBR)
- Lab 8: Bandwidth-delay Product and TCP Buffer Size
- Lab 9: Enhancing TCP Throughput with Parallel Streams
- Lab 10: Measuring TCP Fairness
- Lab 11: Router's Buffer Size
- Lab 12: TCP Rate Control with Pacing
- Lab 13: Impact of Maximum Segment Size on Throughput
- Lab 14: Router's Bufferbloat
- Lab 15: Hardware Offloading on TCP Performance
- Lab 16: Random Early Detection
- Lab 17: Stochastic Fair Queueing
- Lab 18: Controlled Delay (CoDel) Active Queue Management
- Lab 19: Proportional Integral Controller-Enhanced (PIE)
- Lab 20: Classifying TCP traffic using Hierarchical Token Bucket (HTB)

Organization of Lab Manuals

Each lab starts with a section *Overview*

- Objectives
- Lab settings: passwords, device names
- Roadmap: organization of the lab

Section 1

- Background information of the topic being covered (e.g., fundamentals of TCP congestion control)
- Section 1 is optional (i.e., the reader can skip this section and move to lab directions)

Section 2... n

- Step-by-step directions