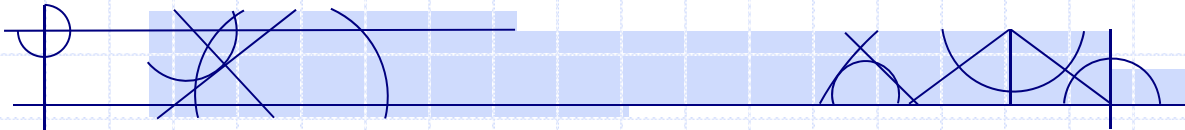


Radio over IP

Network Troubleshooting



IWCE 2019

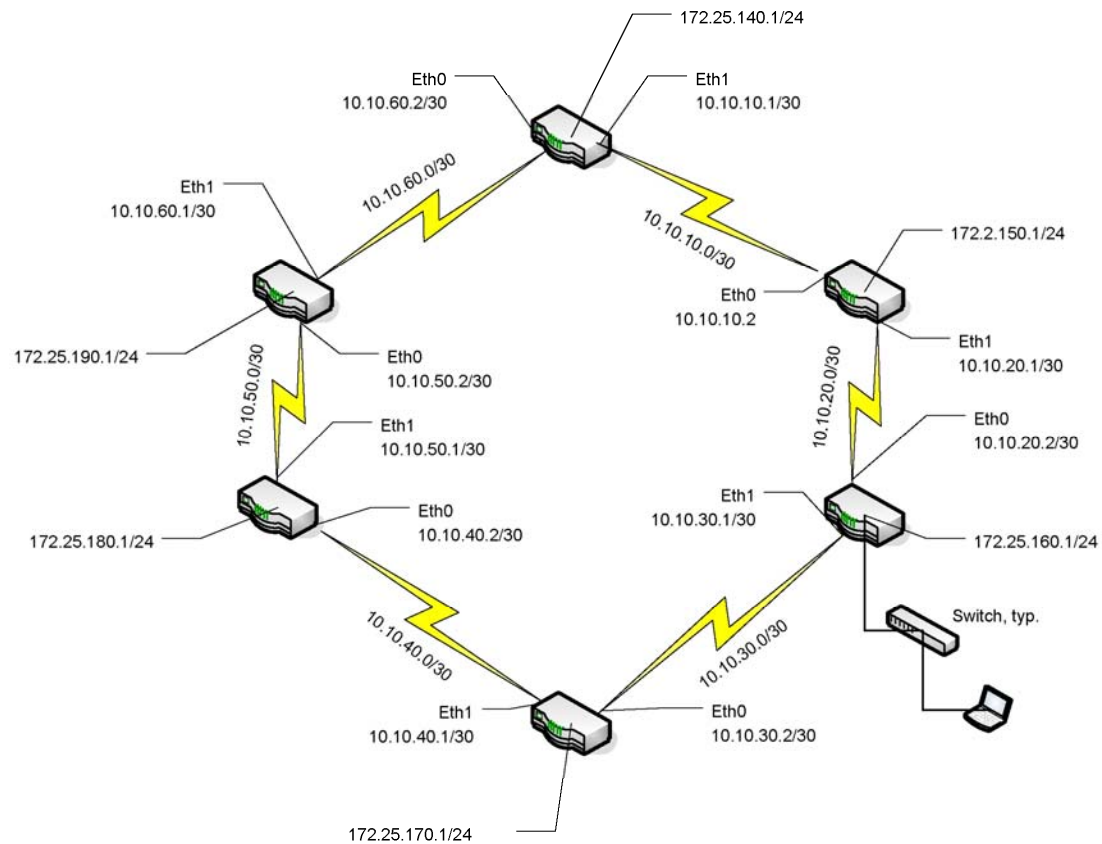
Las Vegas Convention Center

Las Vegas, Nevada

Demo Network Configuration

Notes:

1. Failure of any link causes traffic to be rerouted.



IP Class
Network Configuration

10/26/2018

Demo Router Config - Dashboard

The screenshot displays the EdgeRouter X SFP v1.9.7+hotfix.4 dashboard. The top navigation bar includes 'Dashboard', 'Traffic Analysis', 'Routing', 'Firewall/NAT', 'Services', 'VPN', 'QoS', and 'Users'. The main content area is divided into several sections:

- Services:** A sidebar menu with sections for Routes, OSPF, NAT, Firewall, and DHCP, each showing counts for various configurations.
- Interfaces:** A list of interfaces (br0, eth0-eth5, switch0) with checkboxes for selection.
- Traffic Analysis:** Two bar charts showing Tx Rate (Kbps) and Rx Rate (Kbps) over time.
- Table:** A table listing interface details including Description, Interface, Type, PoE, IP Addr, MTU, Tx, Rx, Status, and Actions.

Description	Interface	Type	PoE	IP Addr	MTU	Tx	Rx	Status	Actions
br0	br0	bridge		172.25.160.1/24	1500	33.45 Kbps	848 bps	Connected	View
eth0	eth0	ethernet	off	10.10.20.2/30	1500	2.52 Kbps	2.86 Kbps	Connected	View
eth1	eth1	ethernet	off	10.10.30.1/30	1500	3.14 Kbps	2.52 Kbps	Connected	View
eth2	eth2	ethernet	off		1500	33.58 Kbps	1.30 Kbps	Connected	View
eth3	eth3	ethernet	off		1500	0 bps	0 bps	Disconnected	View
eth4	eth4	ethernet	off		1500	0 bps	0 bps	Disconnected	View
eth5	eth5	ethernet			1500	0 bps	0 bps	Disconnected	View

Showing 1 to 8 of 8 entries

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Router login: adcomm

Password: adcomm

Demo Router Config - Routing

The screenshot displays the EdgeMAX web interface for an EdgeRouter X SFP v1.9.7-hotfix.4. The 'Routing' tab is active, showing the OSPF configuration. The routing table is displayed with columns for Selected, Description, Destination, Next Hop, Interface, Route Type, and in FIB. The table contains 14 entries, showing various OSPF routes and their associated interfaces and next hops.

Selected	Description	Destination	Next Hop	Interface	Route Type	in FIB
Yes		10.10.10.0/30	10.10.20.1	eth0	ospf	Yes
Yes		10.10.20.0/30		eth0	connected	Yes
Yes		10.10.30.0/30		eth1	connected	Yes
Yes		10.10.40.0/30	10.10.30.2	eth1	ospf	Yes
Yes		10.10.50.0/30	10.10.30.2	eth1	ospf	Yes
Yes		10.10.60.0/30	10.10.20.1	eth0	ospf	Yes
Yes		127.0.0.0/8		lo	connected	Yes
Yes		172.25.140.0/24	10.10.20.1	eth0	ospf	Yes
Yes		172.25.150.0/24	10.10.20.1	eth0	ospf	Yes
Yes		172.25.160.0/24		br0	connected	Yes
Yes		172.25.170.0/24	10.10.30.2	eth1	ospf	Yes
Yes		172.25.180.0/24	10.10.30.2	eth1	ospf	Yes
Yes		172.25.190.0/24	10.10.20.1	eth0	ospf	Yes
Yes		172.25.190.0/24	10.10.30.2	eth1	ospf	Yes

Showing 1 to 14 of 14 entries

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Demo Router IP Addresses

- **172.25.140.1**
- **172.25.150.1**
- **172.25.160.1**
 - ZeppoMarx Wi-Fi AP (open)
- **172.25.170.1**
- **172.25.180.1**
- **172.25.190.1**
 - GrouchoMarx Wi-Fi AP (PSK: GrouchoMarx)

Demo Gadget IP Addresses

- **172.25.140.101** Temperature Sensor
- **172.25.150.51** Serial-to-IP Adapter
- **172.25.150.101** Telex IP-223
- **172.25.160.50** Serial-to-IP Adapter
- **172.25.160.101** Telex IP-223
- **172.25.170.50** Serial-to-IP Adapter
- **172.25.180.51** Serial-to-IP Adapter

Basic Command-Line Tools

■ ping

- Determine whether particular host is reachable
- Sends ICMP “echo request” packets to target
- Measures round-trip packet time & packet loss

examples: `ping -t 172.25.140.1`
 `ping www.yahoo.com`

■ traceroute (tracert)

- Determines route taken by packets across an IP network

examples: `tracert 172.25.160.1`
 `tracert www.google.com`

Basic Command-Line Tools

- **ipconfig**
 - MS Windows console application
 - Displays current TCP/IP network configuration values
 - IP address
 - Subnet mask
 - Gateway
 - DHCP server
 - DNS servers
 - other details

Basic Command-Line Tools

- **telnet**

- Interactive remote login tool
- Generally used to access a command line interface on a remote host (or device)
- Default TCP port 23
- Not installed by default in Windows 10/8/7, but can be enabled in Control Panel

example: telnet 172.25.140.50

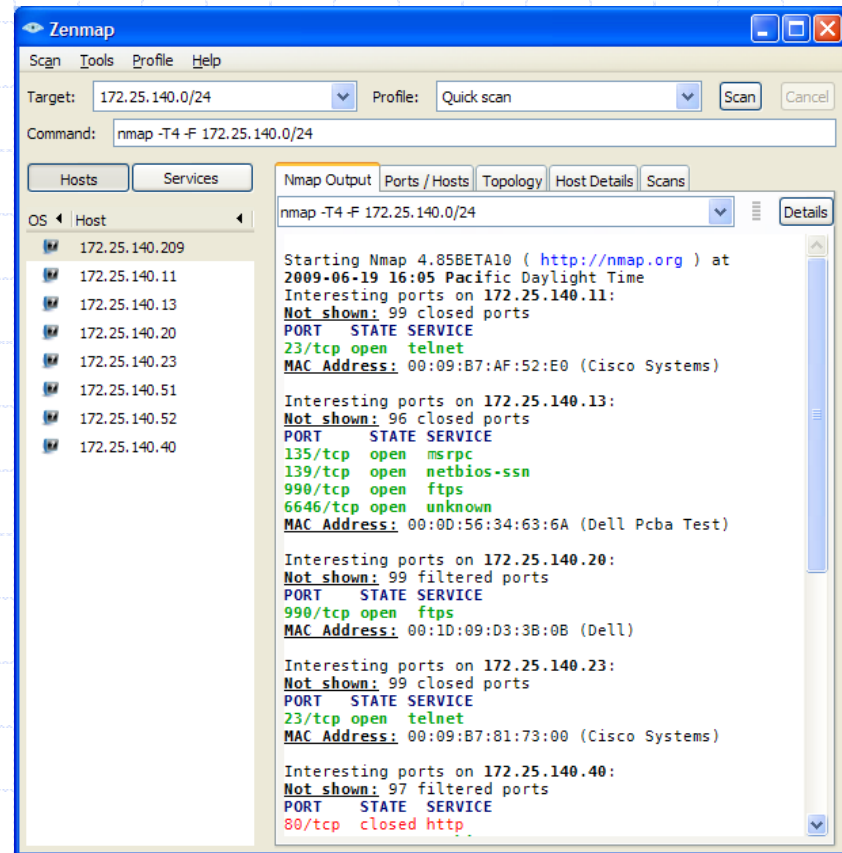
- **netstat -r**

- Display PC routing table

Windows Tools

- **NMAP/Zenmap**
 - “Network Mapper”
 - Network exploration tool
 - Identifies Hosts & Running Services
 - TCP/UDP port scanner
 - NMAP: command line
 - Zenmap: GUI

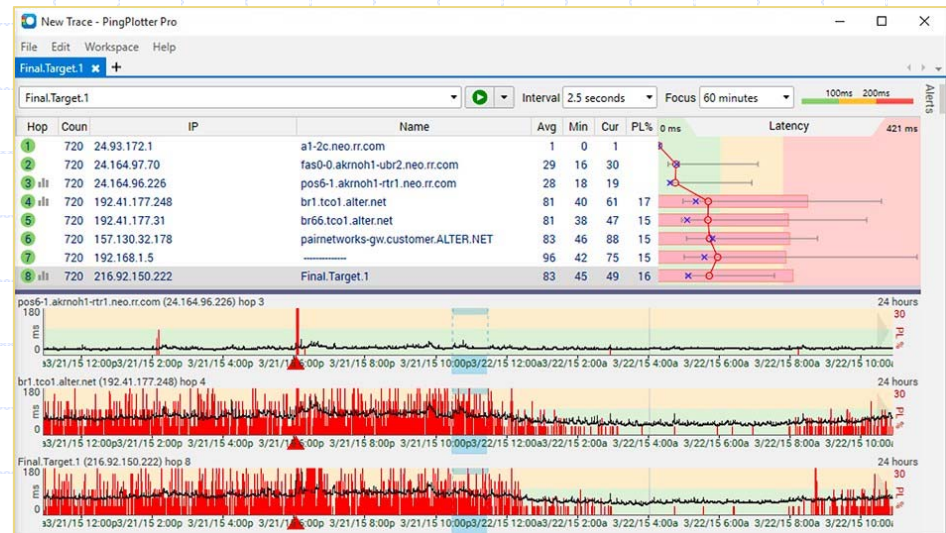
<https://nmap.org/>



Windows Tools

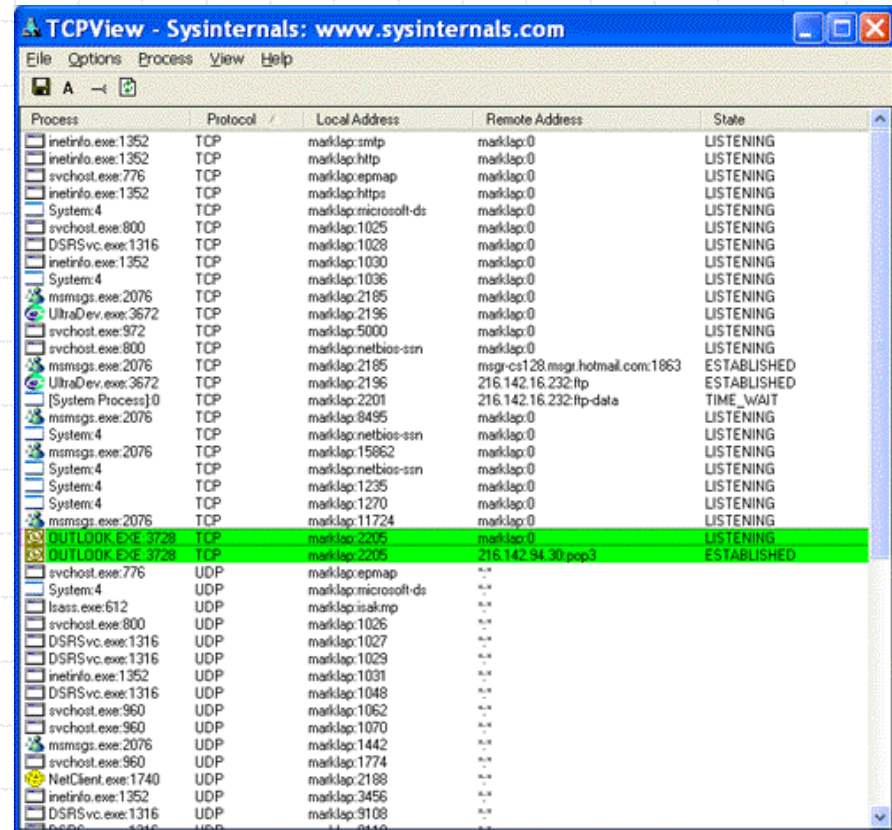
- **PingPlotter**
 - Graphical traceroute software
 - Graphs latency and packet loss to visualize network performance at every hop between computer and target device
 - Logging capability
 - Pro, Standard, Free versions
 - Also available for Mac and iOS

<https://www.pingplotter.com/>



Windows Tools

- **TCPView**
 - Lists all TCP & UDP port endpoints on a PC
 - Similar to *netstat* command in Linux/Unix and Windows



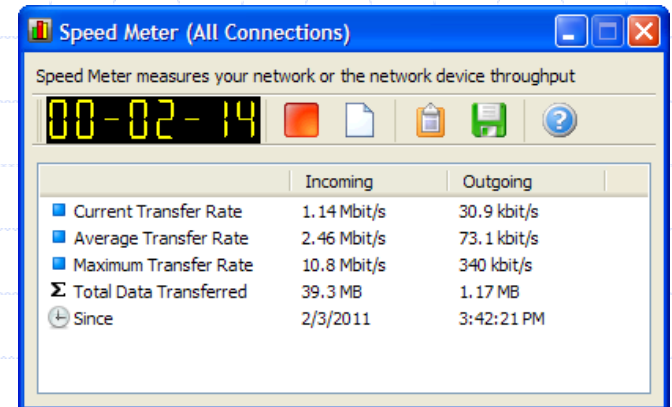
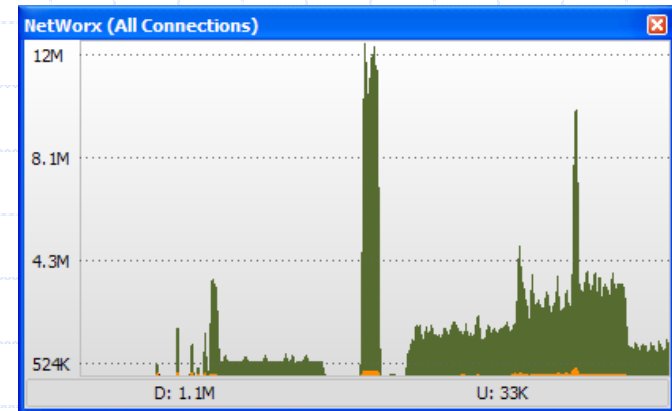
The screenshot shows the TCPView application window with a table of network connections. The table has five columns: Process, Protocol, Local Address, Remote Address, and State. Two rows are highlighted in green: one for a listening TCP connection on port 2205 and another for an established TCP connection to 216.142.94.30 on port 30.

Process	Protocol	Local Address	Remote Address	State
inetinfo.exe:1352	TCP	marklap:smtp	marklap:0	LISTENING
inetinfo.exe:1352	TCP	marklap:http	marklap:0	LISTENING
svchost.exe:776	TCP	marklap:epmap	marklap:0	LISTENING
inetinfo.exe:1352	TCP	marklap:https	marklap:0	LISTENING
System:4	TCP	marklap:microsoft-ds	marklap:0	LISTENING
svchost.exe:800	TCP	marklap:1025	marklap:0	LISTENING
DSRSvc.exe:1316	TCP	marklap:1028	marklap:0	LISTENING
inetinfo.exe:1352	TCP	marklap:1030	marklap:0	LISTENING
System:4	TCP	marklap:1036	marklap:0	LISTENING
messaging.exe:2076	TCP	marklap:2185	marklap:0	LISTENING
UltraDev.exe:3672	TCP	marklap:2196	marklap:0	LISTENING
svchost.exe:972	TCP	marklap:5000	marklap:0	LISTENING
svchost.exe:800	TCP	marklap:netbios-ssn	marklap:0	LISTENING
messaging.exe:2076	TCP	marklap:2185	msgr-cs128.msgr.hotmail.com:1863	ESTABLISHED
UltraDev.exe:3672	TCP	marklap:2196	216.142.16.232:ftp	ESTABLISHED
[System Process]0	TCP	marklap:2201	216.142.16.232:ftp-data	TIME_WAIT
messaging.exe:2076	TCP	marklap:8455	marklap:0	LISTENING
System:4	TCP	marklap:netbios-ssn	marklap:0	LISTENING
messaging.exe:2076	TCP	marklap:15862	marklap:0	LISTENING
System:4	TCP	marklap:netbios-ssn	marklap:0	LISTENING
System:4	TCP	marklap:1235	marklap:0	LISTENING
System:4	TCP	marklap:1270	marklap:0	LISTENING
messaging.exe:2076	TCP	marklap:11724	marklap:0	LISTENING
OUTLOOK.EXE:3726	TCP	marklap:2205	marklap:0	LISTENING
OUTLOOK.EXE:3726	TCP	marklap:2205	216.142.94.30:30	ESTABLISHED
svchost.exe:776	UDP	marklap:epmap	.*	.*
System:4	UDP	marklap:microsoft-ds	.*	.*
lsass.exe:612	UDP	marklap:isakmp	.*	.*
svchost.exe:800	UDP	marklap:1026	.*	.*
DSRSvc.exe:1316	UDP	marklap:1027	.*	.*
DSRSvc.exe:1316	UDP	marklap:1029	.*	.*
inetinfo.exe:1352	UDP	marklap:1031	.*	.*
DSRSvc.exe:1316	UDP	marklap:1048	.*	.*
svchost.exe:960	UDP	marklap:1062	.*	.*
svchost.exe:960	UDP	marklap:1070	.*	.*
messaging.exe:2076	UDP	marklap:1442	.*	.*
svchost.exe:960	UDP	marklap:1774	.*	.*
NetClient.exe:1740	UDP	marklap:2188	.*	.*
inetinfo.exe:1352	UDP	marklap:3456	.*	.*
DSRSvc.exe:1316	UDP	marklap:9108	.*	.*

<https://docs.microsoft.com/en-us/sysinternals/downloads/tcpview>

Windows Tools

- **Networx**
 - Live monitoring of incoming & outgoing TCP/IP bandwidth
 - Also built-in ping, traceroute, netstat, and other advanced features
 - Free 30-day trial for current version
 - See also: *Windows Resource Monitor*



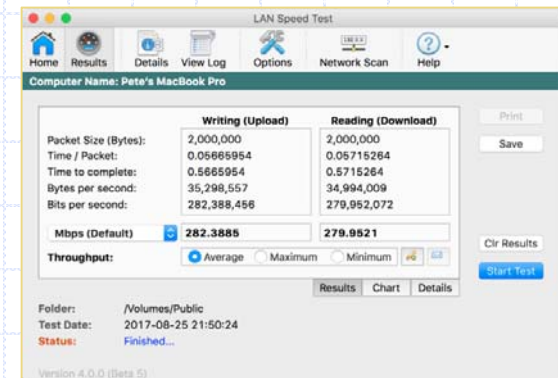
<https://www.softperfect.com/products/networx/>

Windows Tools

- Private-network speed test tools

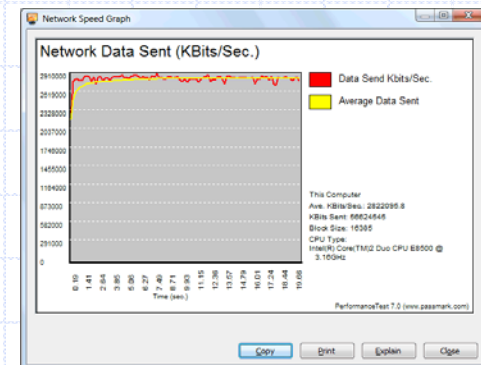
- LAN Speed Test/Server

- Free "lite" mode, advanced paid mode (\$10)
 - <https://totusoft.com/lanspeed>



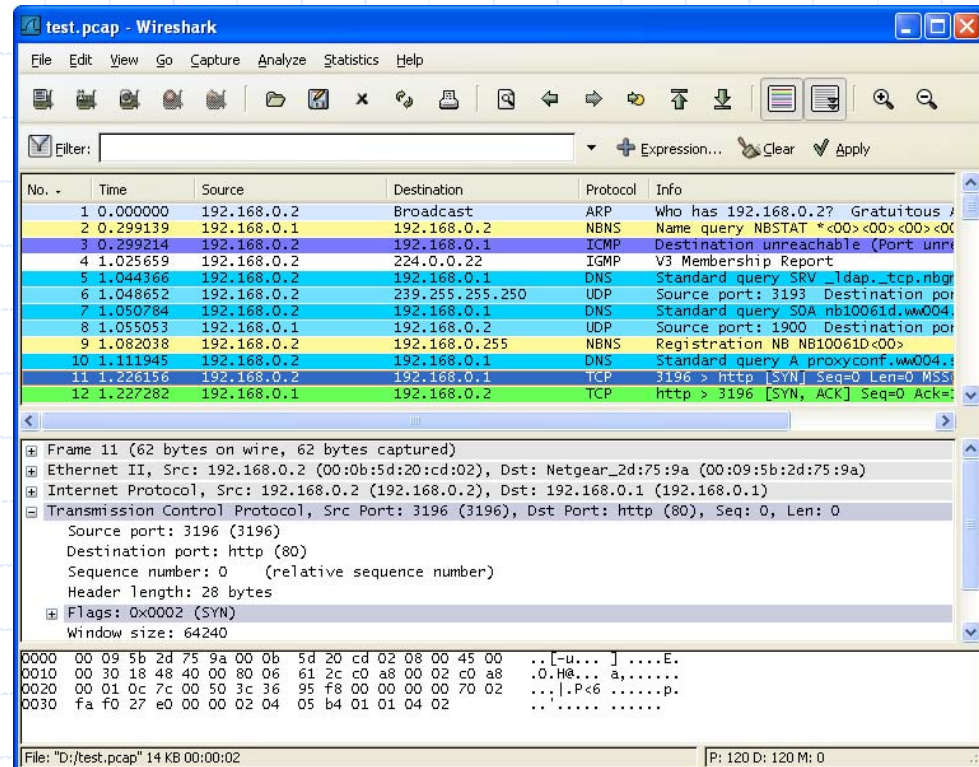
- PassMark Performance Test

- *Advanced Networking Test*
 - Free 30-day evaluation, \$28 to buy
 - <https://www.passmark.com/products/pt.htm>



Advanced Tools

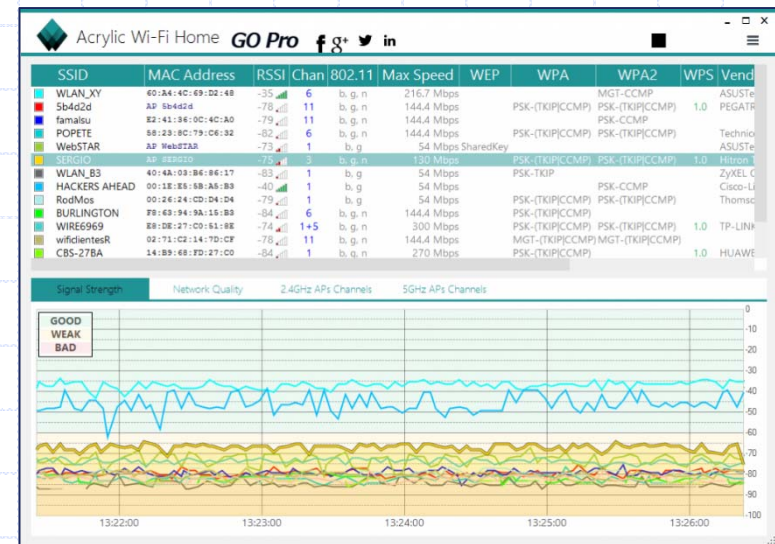
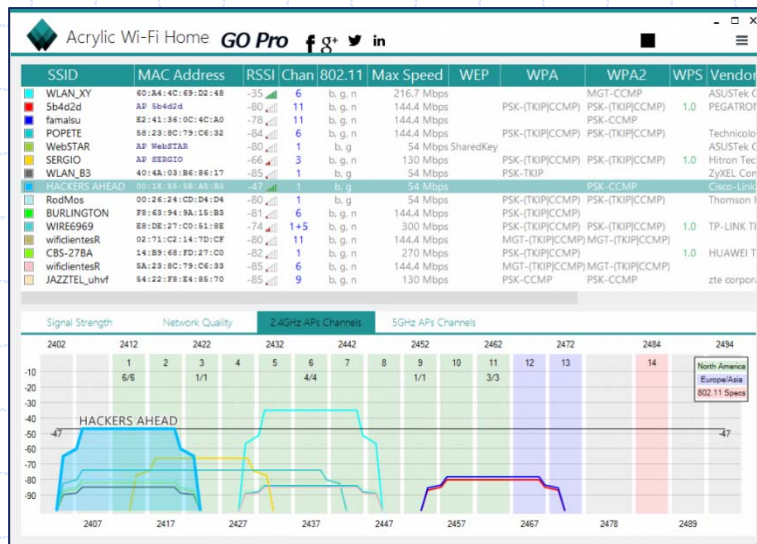
- **Wireshark**
 - “Deep packet inspection”
 - Network protocol analyzer



<https://www.wireshark.org>

Wireless Tools

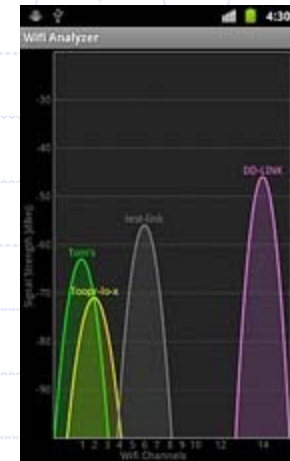
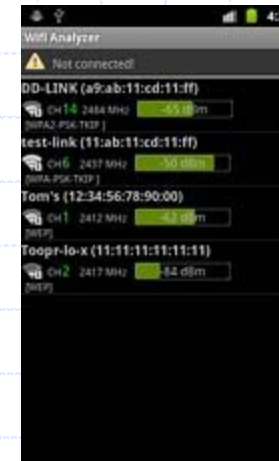
- Acrylic WiFi Free/Home
– Wireless network “sniffer”



<http://www.acrylicwifi.com/en/wlan-wifi-wireless-network-software-tools/wlan-scanner-acrylic-wifi-free/>

Wireless Tools

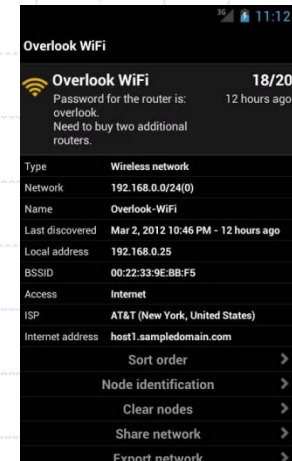
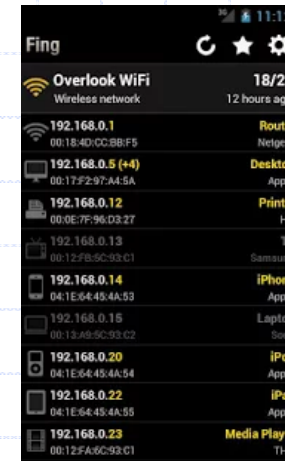
- Mobile Apps
 - Android **WiFi Analyzer**
 - Graphical or tabular display of Wi-Fi networks in range
 - Shows signal strength vs. channel or time
 - Similar functionality as Acrylic, for mobile devices
 - Not available for Apple iOS devices (iPhone, iPad, etc.)
 - Note reduced functionality in Android 9 (Pie)



<https://play.google.com/store/apps/details?id=com.farproc.wifi.analyzer>

Wireless Tools

- Mobile Apps
 - Android, iOS **Fing** - Network Scanner
 - Discover devices connected to network
 - Port scanning
 - Ping, traceroute
 - Other network tools
 - Similar functionality as NMAP, for mobile devices



<https://itunes.apple.com/us/app/fing-network-scanner/id430921107>

<https://play.google.com/store/apps/details?id=com.overlook.android.fing>

Questions?

- Thank you!

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