The New Nmap

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Nmap Scripting Engine (NSE)

```
# nmap -A -PN -T4 www.ebay.com
Starting Nmap ( http://nmap.org )
Interesting ports on hp-core.ebay.com
(66.135.200.145):
Not shown: 1715 filtered ports
PORT    STATE  SERVICE VERSION
80/tcp  open   http    Apache Tomcat/Coyote JSP
engine 1.1
|  robots.txt: has 3 disallowed entries
|_ /help/confidence/ /help/policies/ /disney/
|_ HTML title: eBay - New &amp;amp; used electronics,
cars, apparel, collectibles...
443/tcp closed https
[...]
Nmap done: 1 IP address (1 host up) scanned in 30.91
seconds
```

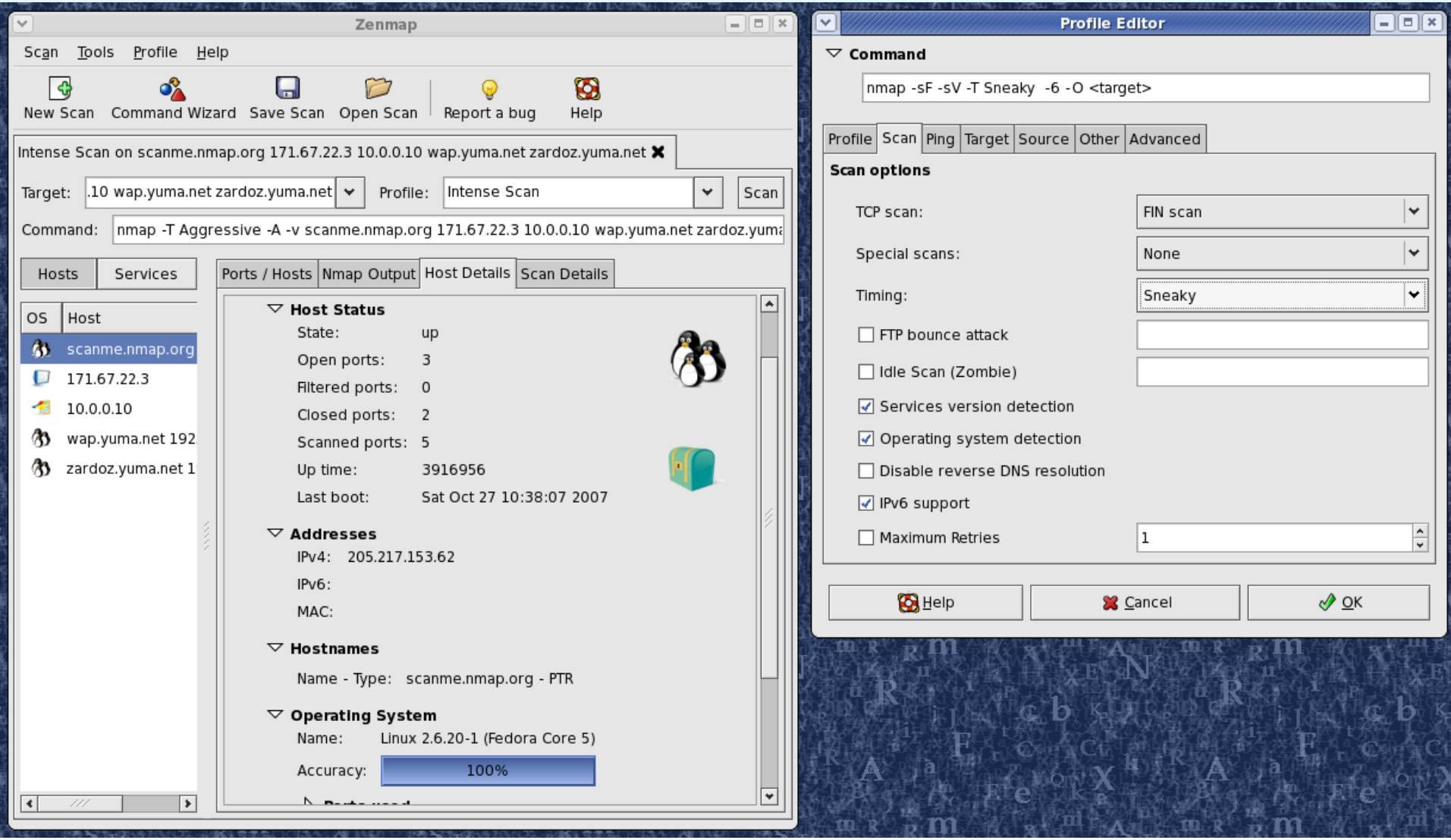
NSE Demo

```
# ./nmap -PN -v -sU -p53 -T4 --script=dns-test-open-
recursion,dns-safe-recursion-port.nse,dns-safe-recursion-
txid.nse dns-1.blackhat.com archimedes.shmoo.com

Interesting ports on dns-1.blackhat.com (216.231.63.55):
PORT   STATE SERVICE
53/udp open  domain
|_ DNS source port randomness: ERROR: Server refused
recursion
|_ DNS TXID randomness: ERROR: Server refused recursion

Interesting ports on archimedes.shmoo.com (12.21.210.234):
PORT   STATE SERVICE
53/udp open  domain
|_ Nameserver open recursive querys (CVE-1999-0024) (BID
136, 678): Recursion seems enabled
|_ DNS source port randomness: 12.21.210.234 is GREAT: 51
queries in 3.2 seconds from 51 ports with std dev 16099
|_ DNS TXID randomness: 12.21.210.234 is GREAT: 52 queries
in 3.3 seconds from 52 txids with std dev 20996
```

Zenmap GUI


Zenmap
Scan Tools Profile Help
New Scan
Command Wizard
Save Scan
Open Scan
Report a bug
Help
Intense Scan on scanme.nmap.org 171.67.22.3 10.0.0.10 wap.yuma.net zardoz.yuma.net
Target: .10 wap.yuma.net zardoz.yuma.net
Profile: Intense Scan
Scan
Command: nmap -T Aggressive -A -v scanme.nmap.org 171.67.22.3 10.0.0.10 wap.yuma.net zardoz.yuma
Hosts
Services
OS
Host
scanme.nmap.org
171.67.22.3
10.0.0.10
wap.yuma.net 192
zardoz.yuma.net 1
Ports / Hosts
Nmap Output
Host Details
Scan Details
Host Status
State: up
Open ports: 3
Filtered ports: 0
Closed ports: 2
Scanned ports: 5
Up time: 3916956
Last boot: Sat Oct 27 10:38:07 2007
Addresses
IPv4: 205.217.153.62
IPv6:
MAC:
Hostnames
Name - Type: scanme.nmap.org - PTR
Operating System
Name: Linux 2.6.20-1 (Fedora Core 5)
Accuracy: 100%
Profile Editor
Command
nmap -sF -sV -T Sneaky -6 -O <target>
Profile
Scan
Ping
Target
Source
Other
Advanced
Scan options
TCP scan: FIN scan
Special scans: None
Timing: Sneaky
FTP bounce attack
Idle Scan (Zombie)
Services version detection
Operating system detection
Disable reverse DNS resolution
IPv6 support
Maximum Retries
1
Help
Cancel
OK

Version Detection

```
# nmap -A -T4 scanme.nmap.org
Starting Nmap ( http://nmap.org )
Interesting ports on scanme.nmap.org (64.13.134.52):
Not shown: 1709 filtered ports
PORT    STATE  SERVICE VERSION
22/tcp  open   ssh     OpenSSH 4.3 (protocol 2.0)
25/tcp  closed smtp
53/tcp  open   domain  ISC BIND 9.3.4
70/tcp  closed gopher
80/tcp  open   http    Apache httpd 2.2.2 ((Fedora))
|_ HTML title: Site doesn't have a title.
113/tcp closed auth
Device type: general purpose
Running: Linux 2.6.X
OS details: Linux 2.6.20-1 (Fedora Core 5)
Uptime: 40.425 days (since Tue May 13 12:46:59 2008)
Nmap done: 1 IP address scanned in 30.567 seconds
Raw packets sent: 3464 (154KB) | Rcvd: 60 (3KB)
```

Optimizing Host Discovery

- Default discover often insufficient
- TCP SYN probes (-PS)
- TCP ACK probes (-PA)
- UDP probes (-PU)
- ICMP echo request, timestamp, netmask probes (-PE, -PP, -PM)
- Protocol probes (-PO)

Default Host Discovery Effectiveness

```
# nmap -n -sL -iR 50000 -oN - | grep "not scanned" |
awk '{print $2}' | sort -n > 50K_IPs

# nmap -sP -T4 -iL 50K_IPs
Starting Nmap ( http://nmap.org )
Host dialup-4.177.9.75.Dial1.SanDiego1.Level3.net
(4.177.9.75) appears to be up.
Host dialup-4.181.100.97.Dial1.SanJose1.Level3.net
(4.181.100.97) appears to be up.
Host firewall2.baymountain.com (8.7.97.2) appears to
be up.
[thousands of lines cut]
Host 222.91.121.22 appears to be up.
Host
105.237.91.222.broad.ak.sn.dynamic.163data.com.cn
(222.91.237.105) appears to be up.
Nmap done: 50000 IP addresses (3348 hosts up)
scanned in 1598.067 seconds
```

Enhanced Host Discovery Effectiveness

```
# nmap -sP -PE -PP -PS21,22,23,25,80,113,31339
-PA80,113,443,10042 --source-port 53 -T4 -iL 50K_IPs
Starting Nmap 4.65 ( http://nmap.org ) at 2008-06-22
19:07 PDT
Host sim7124.agni.lindenlab.com (8.10.144.126)
appears to be up.
Host firewall2.baymountain.com (8.7.97.2) appears to
be up.
Host 12.1.6.201 appears to be up.
Host psor.inshealth.com (12.130.143.43) appears to
be up.
[thousands of hosts cut]
Host ZM088019.ppp.dion.ne.jp (222.8.88.19) appears
to be up.
Host
105.237.91.222.broad.ak.sn.dynamic.163data.com.cn
(222.91.237.105) appears to be up.
Host 222.92.136.102 appears to be up.
Nmap done: 50000 IP addresses (4473 hosts up)
scanned in 4259.281 seconds
```

Enhanced Discovery Results

- Enhanced discovery:
  - took 71 minutes vs. 27 (up 167%)
  - Found 1,125 more live hosts (up 34%)

Top 10 TCP Host Discovery Ports

- 80/http
- 25/smtp
- 22/ssh
- 443/https
- 21/ftp
- 113/auth
- 23/telnet
- 53/domain
- 554/rtsp
- 3389/ms-term-server

Top Ports Project

- A massive scan of millions of Internet IPs to determine most commonly open TCP and UDP ports.
- Some large organizations also contributed scan data to give a behind-the-firewall perspective.
- nmap-services file augmented with frequency data for each port.

Default Scan Ports

- In Nmap 4.68: 1715 ports for TCP scans, plus 1488 for UDP scans. Ports 1-1024, plus all named ports above that.
- With augmented nmap-services: Top 1000 ports for each protocol. Finishes faster, and often finds more open ports.

Fast Scan (-F) Ports

- In Nmap 4.68: 1276 ports for TCP scans, plus 1017 for UDP scans. Includes all named ports.
- With augmented nmap-services: Top 100 ports for each protocol.

Fast Scan Example Times

- Nmap -sUV -F -T4 scanme.nmap.org
  - With 4.68: 1 hour, 2 minutes, 62 seconds
  - With bhdc08: 6 minutes, 29 seconds
  - With bhdc08 & “--version-intensity 0”: 13 sec
  - All three found the same open port (53)

New –top-ports and –port-ratio features

- --top-ports <n> scans the most commonly open <n> ports for each protocol requested.
- --port-ratio <n> (where <n> is between 0 and 1) scans all ports with a frequency of at least the given level.

Top 10 TCP ports

- 80 (http)
- 23 (telnet)
- 22 (ssh)
- 443 (https)
- 3389 (ms-term-serv)
- 445 (microsoft-ds)
- 139 (netbios-ssn)
- 21 (ftp)
- 135 (msrpc)
- 25 (smtp)

TCP effectiveness of –top-port values

- --top-ports 10: 48%
- --top-ports 50: 65%
- --top-ports 100: 73%
- --top-ports 250: 83%
- --top-ports 500: 89%
- --top-ports 1000: 93%
- --top-ports 2000: 96%
- --top-ports 3674: 100%

Top 10 UDP ports

- 137 (netbios-ns)
- 161 (snmp)
- 1434 (ms-sql-m)
- 123 (ntp)
- 138 (netbios-dgm)
- 445 (microsoft-ds)
- 135 (msrpc)
- 67 (dhcps)
- 139 (netbios-ssn)
- 53 (domain)

UDP effectiveness of –top-port values

- --top-ports 10: 50%
- --top-ports 50: 86%
- --top-ports 100: 90%
- --top-ports 250: 94%
- --top-ports 500: 97%
- --top-ports 1017: 100%
- Note: -p- UDP data not yet available

Packet Rate Control

- --min-rate <packets per second>
- --max-rate <packets per second>

```
nmap –min-rate 500 scanme.nmap.org
```

2nd Generation OS Detection

```
# nmap -A -T4 scanme.nmap.org
[...]
Device type: general purpose
Running: Linux 2.6.X
OS details: Linux 2.6.20-1 (Fedora Core 5)
```

More info:
http://nmap.org/book/osdetect.html

--reason

```
# nmap --reason -T4 scanme.nmap.org
[...]
Interesting ports on scanme.nmap.org
(205.217.153.62):
Not shown: 1709 filtered ports
Reason: 1709 no-responses
PORT    STATE  SERVICE REASON
22/tcp  open   ssh     syn-ack
25/tcp  closed smtp    reset
53/tcp  open   domain  syn-ack
70/tcp  closed gopher  reset
80/tcp  open   http    syn-ack
113/tcp closed auth    reset
```

--packet-trace

```
# nmap --packet-trace -p 25,113
scanme.nmap.org

Starting Nmap ( http://nmap.org )
[...]
RCVD (0.1430s) TCP 64.13.134.52:25 >
192.168.0.8:46736 RA ttl=55 id=0
iplen=40  seq=0 win=0 ack=2914477947
RCVD (0.1440s) TCP 64.13.134.52:113 >
192.168.0.8:46736 RA ttl=55 id=0
iplen=40  seq=0 win=0 ack=2914477947
[...]

Nmap done: 1 IP address (1 host up)
scanned in 0.15 seconds
```

Advanced Traceroute

```
# nmap –traceroute scanme.nmap.org
[...]
TRACEROUTE (using port 22/tcp)
HOP RTT   ADDRESS
1   0.60  wap.nmap-int.org (192.168.0.6)
[...]
6   9.74  151.164.251.42
7   10.89 so-1-0-0.mpr1.sjc2.us.above.net
(64.125.30.174)
8   10.52 so-4-2-0.mpr3.pao1.us.above.net
(64.125.28.142)
9   14.25 metro0.sv.svcolo.com
(208.185.168.173)
10  12.80 scanme.nmap.org (64.13.134.52)
```

Performance and Accuracy

```
# nmap -T4 --max_rtt_timeout 200
--initial_rtt_timeout 150
--min_hostgroup 512 –max_retries
0 -n -P0 -p80 -oG pb3.gnmap
216.163.128.0/20
Starting Nmap
[...]
Nmap run completed -- 4096 IP
addresses (4096 hosts up) scanned
in 46.052 seconds
```

TCP and IP Header Options

```
# nmap  -vv -n -sS -P0 -p 445
--ip-options "L 10.4.2.1"
10.5.2.1
```

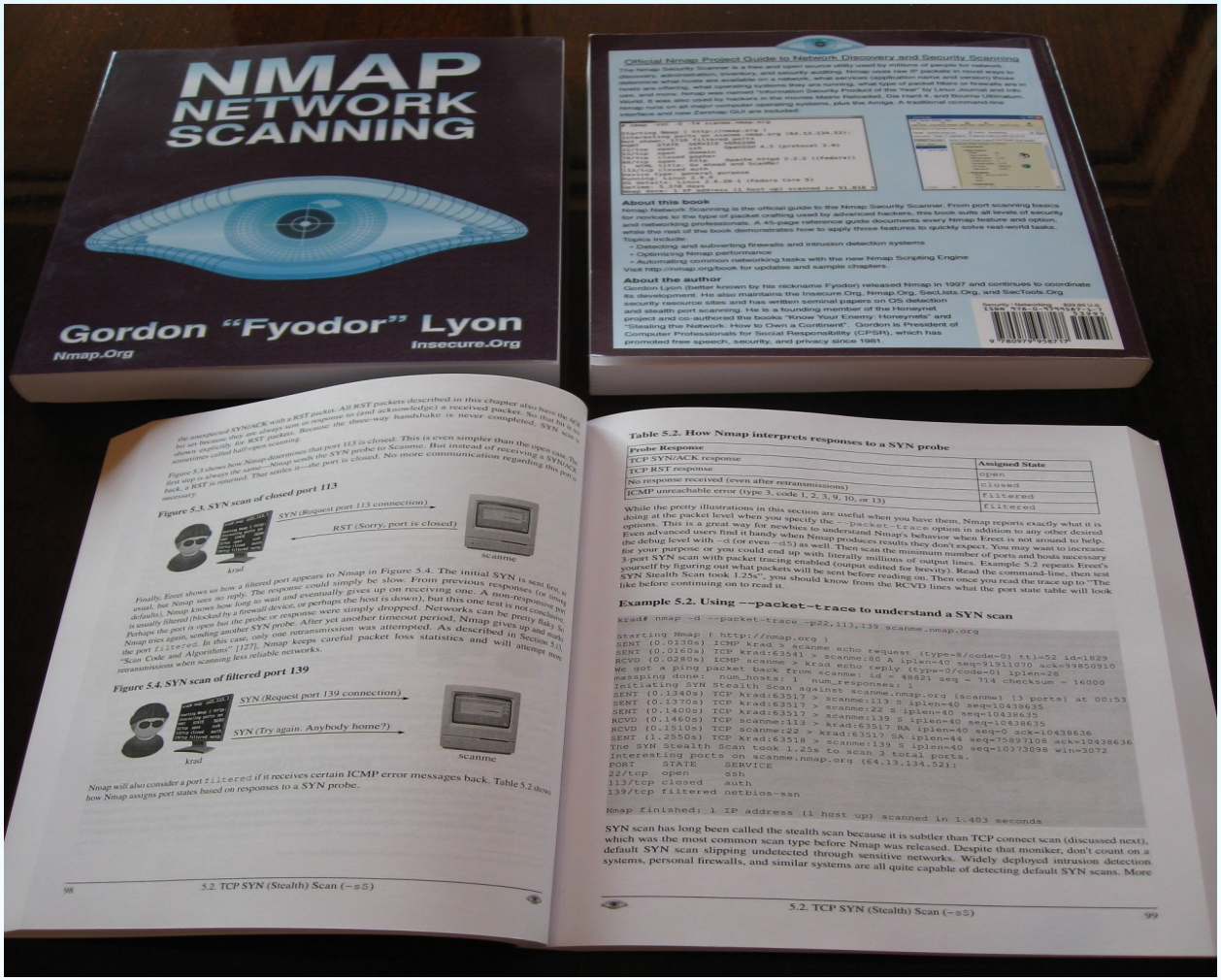
Ncat

- A modern interpretation of Hobbit's venerable Netcat
- Supports virtually all of the Netcat 1.10 features, except the basic portscanner.
- Also supports SSL, IPv6, multiple platforms, connection brokering, port redirection, proxies (client, server, chaining), shell execution, access control, and more.
- In development since 2005, nearly ready for release. Current dev lead is Kris Katterjohn.
- Available from svn://svn.insecure.org/ncat (login: guest/guest)

Ndiff

- Compares two (or more) scans, displays changes (new/removed hosts, ports, changed services, etc.)
- Great for quick change detection with recurring scans.
- Perl version available from: svn://svn.insecure.org/nmap-exp/ndiff

Nmap Network Scanning
http://nmap.org/book/



Upgrade your Nmap

- Many bug fixes and performance improvements in version 4.68. See http://nmap.org/changelog.html
- For even newer, try the svn release. See http://nmap.org/book/install.html#inst-svn
- For all the goods in this presentation: svn co –username guest –password “” svn://svn.insecure.org/nmap-exp/bhdc08

Top Nmap Contributors since 4.50

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Questions and Resources

- Download Nmap from http://nmap.org
- Download these slides from: http://insecure.org/presentations/iSec08/
- Nmap Network Scanning book info: http://nmap.org/book
- Top-ports Nmap: svn://svn.insecure.org/nmap-exp/bhdc08