

Nmap Scanning - Getting Started By Anmol K Sachan **Nmap** is the most popular scanning tool used on the Internet, created by Gordon Lyon(Fyodar) (http://www.insecure.org), it was featured in the Matrix Reloaded movie.

**Nmap** Free Security Scanner, Port Scanner, & Network Exploration Tool is an open source software for Linux, Windows, UNIX, FreeBSD, etc.

Zenmap is GUI version for nmap.

Written in: C, C++, Python, Lua

Refer to help or manual in unix/linux for reading more.

# man nmap

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Standard **TCP communications** are controlled by flags in the TCP packet header.

The flags are as follows:

Synchronize - also called "SYN"

Used to initiate a connection between hosts.

Acknowledgement - also called "ACK"

Used in establishing a connection between hosts

Push - "PSH"

Instructs receiving system to send all buffered data immediately

Urgent - "URG"

States that the data contained in the packet should be processed immediately

Finish - also called "FIN"

Tells remote system that there will be no more transmissions

Reset - also called "RST"

Also used to reset a connection.

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### SYN Scanning:

Syn scanning, a technique that is widely across the Internet today.

The syn scan, also called the "half open" scan, is the ability to determine a ports state without making a full connection to the host.

Many systems do not log the attempt, and discard it as a communications error. You must first learn 3-way handshake to understand the Syn scan.

#### How 3-way handshake works?

192.168.1.2:2342 -----syn----> 192.168.1.3:80

192.168.1.2:2342 <-----syn/ack----- 192.168.1.3:80

192.168.1.2:2342 -----ack----> 192.168.1.3:80

Connection Established

#### Stealth Scan

Computer A Computer B

192.168.1.2:2342 -----syn-----> 192.168.1.3:80

192.168.1.2:2342 <-----syn/ack----- 192.168.1.3:80

192.168.1.2:2342 ------RST-----> 192.168.1.3:80

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#### **Xmas Scan**

Xmas scan directed at open port:

Computer A Computer B

192.5.5.92:4031 ------FIN/URG/PSH----->192.5.5.110:23

192.5.5.92:4031 <------192.5.5.110:23

Xmas scan directed at closed port:

192.5.5.92:4031 -----FIN/URG/PSH----->192.5.5.110:23

192.5.5.92:4031<------RST/ACK------192.5.5.110:23

XMAS scan only works OS system's TCP/IP implementation is developed according to <b>RFC 793</b> .
FIN Scan
Computer A Computer B
FIN scan directed at open port:
192.5.5.92:4031FIN>192.5.5.110:23
192.5.5.92:4031 <no response192.5.5.110:23<="" td=""></no>
FIN scan directed at closed port:
192.5.5.92:4031FIN192.5.5.110:23
192.5.5.92:4031 <rst ack192.5.5.110:23<="" td=""></rst>
FIN scan only works OS system's TCP/IP implementation is developed according to RFC 793.
NULL Scan
NULL Scan
NULL Scan  Computer A Computer B
NULL Scan  Computer A  Computer B  NULL scan directed at open port:
NULL Scan  Computer A  Computer B  NULL scan directed at open port:  192.5.5.92:4031NO FLAGS SET>192.5.5.110:23
NULL Scan         NULL scan directed at open port:         192.5.5.92:4031NO FLAGS SET>192.5.5.110:23         192.5.5.92:4031 <no response192.5.5.110:23<="" td=""></no>
NULL Scan         Computer B           NULL scan directed at open port:           192.5.5.92:4031NO FLAGS SET>192.5.5.110:23           192.5.5.92:4031 <no response192.5.5.110:23<="" td="">           NULL scan directed at closed port:</no>

### ICMP echo scanning

This isn't really port scanning, since ICMP doesn't have a port abstraction.

But it is sometimes useful to determine what hosts in a network are up by pinging them all.

nmap -P cert.org/24 152.148.0.0/16

C:\Program Files (x86)\Nmap>nmap.exe -P cert.org/24 152.148.0.0/16 Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:30 India Standard Time

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### **Scan Options**

- -sT (TcpConnect)
- -sS (SYN scan)
- -sF (Fin Scan)
- -sX (Xmas Scan)
- -sN (Null Scan)
- -sP (Ping Scan)
- -sU (UDP scans)
- -sO (Protocol Scan)
- -sl (Idle Scan)
- -sA (Ack Scan)
- -sW (Window Scan)
- -sR (RPC scan)
- -sL (List/Dns Scan)

### **Nmap Port Scan types**

Scan using TCP connect nmap -sT 192.168.1.1

```
Nmap done: 1 IP address (1 host up) scanned in 17.88 seconds

C:\Program Files (x86)\Nmap>nmap.exe -sT 192.168.43.50

Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:07 India Standard Time Nmap scan report for 192.168.43.50

Host is up (0.00075s latency).

Not shown: 992 filtered ports

PORT STATE SERVICE

135/tcp open msrpc

139/tcp open netbios-ssn

443/tcp open https

445/tcp open iss-realsecure

912/tcp open apex-mesh

5357/tcp open wsdapi

49160/tcp open wsdapi
```

Scan using TCP SYN scan (default) nmap -sS 192.168.1.1

```
Nmap done: 1 IP address (1 host up) scanned in 47.43 seconds

C:\Program Files (x86)\Nmap\nmap.exe -sS 192.168.43.50

Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:08 India Standard Time

Nmap scan report for 192.168.43.50

Host is up (0.0015s latency).

Not shown: 9920 closed ports

PORT STATE SERVICE

135/tcp open msrpc

139/tcp open netbios-ssn

443/tcp open https

445/tcp open iss-realsecure

912/tcp open apex-mesh

5357/tcp open wsdapi

49160/tcp open unknown
```

Scan UDP ports nmap -sU -p 123,161,162 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -sU -p 123,161,162 192.168.43.50
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:09 India Standard Time
Nmap scan report for 192.168.43.50
Höst is up (0.0050s latency).

PORT STATE SERVICE
123/udp closed ntp
161/udp closed insnmp
162/udp closed snmptrap

Nmap done: 1 IP address (1 host up) scanned in 5.51 seconds
```

Scan selected ports - ignore discovery nmap -Pn -F 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -Pn -F 192.168.43.50
Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:09 India Standard Time Nmap scane report for 192.168.43.50
Host is up (0.00067s latency).
Not shown: 95 closed ports
PORT STATE SERVICE
135/tcp open msrpc
139/tcp open netbios-ssn
443/tcp open https
445/tcp open microsoft-ds
5357/tcp open microsoft-ds
5357/tcp open scane of the s
```

#### **Ping Detection**

-P0 (don't ping)

-PT (TCP ping)

-PS (SYN ping)

-PI (ICMP ping)

-PB (= PT + PI)

-PP (ICMP timestamp)

-PM (ICMP netmask)

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A quick simple scan on google.com reveals a little about our target: Scan a host

nmap www.testhostname.com

```
C:\ProgrameFiles (x86)\Nmap>nmap.exe google.com
Starting Nmap 7.80 (https://nmap.org) at 2020-02-06 23:34 India Standard Time
Nmap scan report for google.com (216.58.200.174)
Host is up (0.027s latency).
"DNS" record for 216.58.200.174: dell1s06-in-f14.1e100.net
Not shown: 995 filtered ports
PORT STATE SERVICE
21/tcp open ftp
80/tcp open https
554/tcp open https
554/tcp open pptp
Start of Spybet Reminder vignaharts
Nmap done: 1 IP address (1 host up) scanned in 25.66 seconds
```

# Scan a single IP nmap 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap 10.10.10.1
Starting Nmap 7.80 (https://nmap.org) at 2020-02-06 23:39 India Standard Time
Nmap scan report for 10.10.10.1
Host is up (0.019s latency).
Not shown: 997 filtered ports
PORT STATE SERVICE
21/tcp Service open rtsp
1723/tcp open rtsp
1723/tcp open pptp
Nmap done: 18-18-8 address (19 host up) scanned in 20.53 seconds
```

Scan a range of IPs nmap 192.168.1.100-120

It scans the whole range of given 20 hosts on the network.

```
Nmap scan report for 100.115.23.119
Host is up (0.035s latency).
All 1000 scanned ports on 100.115.23.119 are filtered
MAC Address: FE:FF:OA:46:96:60 (Unknown)
Nmap scan report for 100.115.23.120
Host is up (0.035s latency).
All 1000 scanned ports on 100.115.23.120 are filtered
MAC Address: FE:FF:0A:46:96:60 (Unknown)
Nmap scan report for 100.115.23.103
Host is up (0.00013s latency).
Not shown: 992 closed ports
PORT
        STATE SERVICE
135/tcp mopen msrpc
139/tcp open
               netbios-ssn
443/tcp mopen https
445/tcp open
902/tcp scopen
               microsoft-ds
               iss-realsecure
912/tcp mopen
               apex-mesh
5357/tcp open
49160/tcp open
               unknown
Nmap done: 21 IP addresses (21 hosts up) scanned in 647.66 seconds
```

# Scan a subnet nmap 192.168.1.0/24

```
C:\Program Files (x86)\Nmap>nmap.exe 192.168.43.0/24
Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:31 India Standard Time
Nmap scan report for 192.168.43.1
Host is up (0.0051s latency).
Not shown: 999 closed ports
PORT STATE SERVICE
53/tcp open domain
MAC Address: 70:BB:E9:32:

(Xiaomi Communications)

Nmap scan report for 192.168.43.221
Host is up (0.012s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:9B:

(Apple)

Nmap scan report for 192.168.43.50
Host is up (0.000070s latency).
Not shown: 992 closed ports
PORT STATE SERVICE
135/tcp open msrpc
135/tcp open msrpc
139/tcp open mttps:
443/tcp://open.open.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses.com/map.en/popen.https://discourses
```

# Scan targets from a text file nmap -iL list-of-ips.txt

```
C:\Priogram Files (188)\Wampynam, ere -il. C:\Users\FRI3MD\Desktop\list-of-ips.trt
Starting Wamp 7:80 ( https://mamp.org ) at 2020-02-07 00:36 India Standard Time
Mamp scan report for localhost (127.0.0.1)
Host is up (0.00043s latency).
Host is up (0.00043s latency).
Host is up (0.00043s latency).
Host is up onen sarpe.

443/top onen sizers

445/top onen district

902/top onen sizers

401/top onen sizers

401/top onen sizers

401/top onen aprasch

401/top onen aprasch

401/top onen unknown

Mamp scan report for yoogle.com (not scanned): 2001:4860:4802:32::75 216.239.38.117 216.239.36.117 216.2

902/top onen intips

43/top onen http

43/top onen http

Mamp scan report for 192.168.43.1

Host is up (0.00048z latency).

Mat shown: 999 closed ports

FORT STATE SERVICE

50/top onen domain

Mac Address: 70:BB:E9:32: (Xiaomi Communications)

Masp scan report for 192.168.43.50

Masp scan re
```

## **Nmap Port Selection**

Scan a single Port nmap -p 22 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -p 445 100.115.23.103
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:00 India Standard Time
Nmap scan report for 100.115.23.103
Host is up (0.0050s latency).

STATE SERVICE
445/tcp open microsoft-ds

Nmap done: 1 IP address (1 host up) scanned in 5.60 seconds
```

#### nmap -p 1-100 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -p 1-1000 192.168.43.50
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:04 India Standard Time
Nmap scan report for 192.168.43.50
Host is up (0.0011s latency).
Not shown: 993 closed ports
PORT STATE SERVICE
135/tcp open msrpc
137/tcp filtered netbios-ns
139/tcp open netbios-ssn
443/tcp open https
445/tcp open microsoft-ds
902/tcp open iss-realsecure
912/tcp open apex-mesh
Nmap done: 18-IP-saddress (1 host up) scanned in 6.61 seconds
```

# Scan 100 most common ports (Fast) nmap -F 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -F 192.168.43.50
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:05 India Standard Time Nmap scan report for 192.168.43.50
Host is up (0.0011s latency).
Not shown: 95 closed ports
PORT STATE SERVICE
135/tcp open msrpc
139/tcp open netbios-ssn
443/tcp open https
445/tcp open microsoft-ds
5357/tcp open wsdaping
```

Scan all 65535 ports nmap -p- 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -p- 192.168.43.50
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:06 India Standard Time
Vmap scan report for 192.168.43.50
Host is up (0.000077s latency).
Not shown: 65518 closed ports
PORT
          STATE
                    SERVICE
135/tcp
          open
                    msrpc
137/tcp
          filtered netbios-ns
139/tcp
445/tcp
                    microsoft-ds
902/tcp
912/tcp
                    iss-realsecure
                    apex-mesh
5040/tcp open
5357/tcp open
7680/tcp open
                    pando-pub
19160/tcp open
19664/tcp open
                    unknown
19665/tcp open
19666/tcp open
                    unknown
19668/tcp open
49669/tcp open
Imap done: 1 Paddress (1 host up) scanned in 17.88 seconds
```

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### **Service and OS Detection**

Detect OS and Services nmap -A 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -A 192.168.43.221
Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:22 India Standard Time
Nmap scan report for 192.168.43.221
Host is up (0.039s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:98: ... (Apple)
Too many fingerprints match this host to give specific OS details
Network Distance: 1 hop

Web Booker Zeemap GUI
TRACEROUTE
HOP RTT ADDRESS
1 39.42 ms 192.168.43.221

OS and Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
Nmap done: 1 IP address (1 host up) scanned in 25.10 seconds
```

# Standard service detection nmap -sV 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -sV 192.168.43.221
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:22 India Standard Time Nmap scan report for 192.168.43.221
Host is up (0.0072s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:98:
```

# More aggressive Service Detection nmap -sV --version-intensity 5 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -sV --version-intensity 5 192.168.43.221
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:23 India Standard Time
Nmap scan report for 192.168.43.221
Host is up (0.018s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:9B:

(Apple)

Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
Nmap done: 1 IP address (1 host up) scanned in 15.26 seconds
```

## Lighter banner grabbing detection nmap -sV --version-intensity 0 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -sV -version-intensity 0 192.168.43.221
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:23 India Standard Time
Nmap scan report for 192.168.43.221
Host is up (0.0044s latency).
All 1000 scanned ports on 192.168.
MAC Address: F0:18:98:9B:5F:20 (Apple)

Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
Nmap done: 1 IP address (1 host up) scanned in 16.15 seconds
```

### **Nmap Output Formats**

Save default output to file nmap -oN outputfile.txt 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -oN C:\Users\FR13ND\Desktop\on_out.txt 192.168.43.221
Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:40 India Standard Time
Nmap scan report for 192.168.43.221
Host, is up (0.0050s latency).
All 11000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:9B: (Apple)
Nmap done: 1 IP address (1 host up) scanned in 16.56 seconds
C:\Program Files (x86)\Nmap\type C:\Users\FR13ND\Desktop\on_out.txt
# Nmap 7.80 scan initiated Fri Feb 07 00:40:38 2020 as: nmap.exe -oN C:\Users\\FR13ND\Desktop\\on_out.txt 192.168.43.221
Host is up (0.0050s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:9B: (Apple)
# Nmap done at Fri Feb 07 00:40:50 2020 -- 1 IP address (1 host up) scanned in 16.56 seconds
```

Save results as XML nmap -oX outputfile.xml 192.168.1.1

```
tarting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:43 India Standard Time map scan report for 192.168.43.221 ostals up (0.005/s latency). India standard Time ostals up (0.005/s latency). India standard Time ostals up (0.005/s latency). India standard Time (1.000 scanned ports on 192.168.43.221 are closed (Apple)
                                                                                                                                                                                                                         P + ⊕ ☆ ∰ ®
 C:\Users\FR13ND\Desktop\ox_out.xml
                                                                                                                                                           → C Search...
@ Nmap Scan Report - Scann... ×
           Nmap Scan Report - Scanned at Fri Feb 07 00:44:01 2020
                   Scan Summary | 192.168.43.221
           Scan Summary
          Nmap 7.80 was initiated at Fri Feb 07 00:44:01 2020 with these argument nmap.exe -oX C:\\Users\\FR13ND\\Desktop\\ox_out.xml 192.168.43.221
           Verbosity: 0; Debug level 0
          Nmap done at Fri Feb 07 00:44:11 2020; 1 IP address (1 host up) scanned in 12.60 seconds
          192.168.43.221
          Address
               • 192.168.43.221 (ipv4)
• F0:18:98:98
          The 1000 ports scanned but not shown below are in state: closed
               . 1000 ports replied with: resets
```

# Save results in a format for grep nmap -oG outputfile.txt 192.168.1.1

```
C:\Program Files (x86)\Nmap\nmap.exe -oG C:\Users\FR13ND\Desktop\og_out.txt 192.168.43.221
Starting Nmap 7.80 ( https://nmap.org ) at 2020-02-07 00:48 India Standard Time
Nmap scan report for 192.168.43.221
Host is up_(0.0047s, latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:9B:

(Apple)

Nmap done: 1 IP address (1 host up) scanned in 12.90 seconds

C:\Program Files (x86)\Nmap\type C:\Users\FR13ND\Desktop\og_out.txt
# Nmap 7.80 scan initiated Fri Feb 07 00:48:27 2020 as: nmap.exe -oG C:\Users\\FR13ND\Desktop\\og_out.txt 192.168.43.22

Host: 192.168.43.221 () Status: Up
Host: 192.168.43.221 () Status: Up
# Nmap done at Fri Feb 07 00:48:38 2020 -- 1 IP address (1 host up) scanned in 12.90 seconds
```

### Save in all formats

nmap -oA outputfile 192.168.1.1

```
C:\Program Files (x86)\Nmap>nmap.exe -oA C:\Users\FR13ND\Desktop\oa_out 192.168.43.221
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:49 India Standard Time
Nmap scan report for 192.168.43.221
Host is up (0.0057s latency).
All 1000 scanned ports on 192.168.43.221 are closed
MAC Address: F0:18:98:98 (Apple)

Nmap done: 1 IP address (1 host up) scanned in 14.19 seconds
```

#### **IP Address information**

Find Information about IP address nmap --script=asn-query,whois,ip-geolocation-maxmind 192.168.1.0/24

.....

### **Detect Heartbleed SSL Vulnerability (CVE-2014-0160)**

Heartbleed is a security bug in the OpenSSL cryptography library, which is a widely used implementation of the Transport Layer Security protocol. It was introduced into the software in 2012 and publicly disclosed in April 2014. Heartbleed may be exploited regardless of whether the vulnerable OpenSSL instance is running as a TLS server or client.

Reference: heartbleed.com

nmap.exe -sV -p 443 --script=ssl-heartbleed lpu.in

```
C:\Program Files (x86)\Nmap\nmap.exe -sV -p 443 --script=ssl-heartbleed lpu.in
Starting Nmap 7.80 (https://nmap.org) at 2020-02-07 00:57 India Standard Time
Nmap scan report for lpu.in (49.50.65.62)
Host is up (0.17s latency).
Other addresses for lpu.in (not scanned): 2402:3a80:1fff:3f::3132:413e

PORT STATE SERVICE VERSION
443/tcp open ssl/http Microsoft HTTPAPI httpd 2.0 (SSDP/UPnP)
http-server-header:
    Microsoft-HTTPAPI/2.0
    Microsoft-HTPAPI/2.0
    Service Info: 0S: Windows; CPE: cpe:/o:microsoft:windows

Service detection performed. Please report any incorrect results at https://nmap.org/submit/.
Nmap done: 1 IP address (1 host up) scanned in 25.72 seconds
```

#### **Zenmap** is the official Nmap Security Scanner GUI.

It is a multi-platform (Linux, Windows, Mac OS X, BSD, etc.) free and open source application which aims to make Nmap easy for beginners to use while providing advanced features for experienced Nmap users.

Source: nmap.org/zenmap/

