```
Router(config)#service password-encryption
Router(config)#security password min-length 8
Router(config)#login block-for 120 attempts 3 within 60
Router(config)#line vty 0 4
Router(config-line)#exec-timeout 10
Router(config-line)#end
Router#show running-config
-more-
!
line vty 0 4
 password 7 03095A0F034F38435B49150A1819
 exec-timeout 10
 login
```

Enable SSH

DCE

```
R1#conf t
R1(config)#ip domain-name span.com
R1(config)#crypto key generate rsa general-keys modulus 1024
The name for the keys will be: R1.span.com
% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
R1(config)#
*Dec 13 16:19:12.079: %SSH-5-ENABLED: SSH 1.99 has been enabled
R1(config)#username Bob secret cisco
R1(config)#line vty 0 4
R1(config-line)#login local
R1(config-line)#transport input ssh
R1(config-line)#exit
```

Step 1: Configure the IP domain name.
Step 2: Generate one-way secret keys.
Step 3: Verify or create a local database entry.
Step 4: Enable VTY inbound SSH sessions.

The status of nearly every process or function of the router can be displayed using a **show** command. Some of the more popular show commands are:

show running-config (Figure 1)

show interfaces (Figure 2)

show arp (Figure 3)

show ip route (Figure 4)

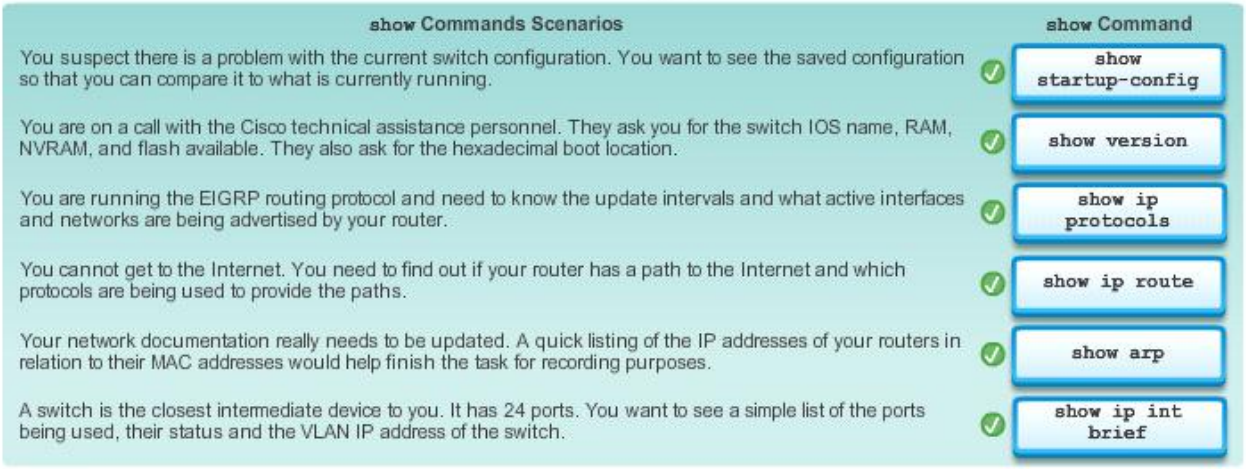
show protocols (Figure 5)

show version (Figure 6)

Click the buttons in the figure to see more information about the **show** commands.

The DNS Client service on Windows PCs optimizes the performance of DNS name resolution by storing previously resolved names in memory, as well. The **ipconfig /displaydns** command displays all of the cached DNS entries on a Windows computer system.

show cdp neighbors
show cdp neighbors detail



Switch# clock set 15:08:00 Oct 26 2012
Switch# show clock

S1(config)# no ip domain-lookup

Switch(config)# hostname S1

S1(config)# enable secret class
S1(config)# line con 0
S1(config-line)# password cisco
S1(config-line)# login
S1(config-line)# exit
S1(config)# line vty 0 4
S1(config-line)# password cisco
S1(config-line)# login
S1(config-line)# end
S1#

S1(config)# banner motd #ok#

Erase switch
Switch# show flash
Switch# delete vlan.dat
Switch# erase startup-config
Switch# reload

S1# config t
S1#(config)# interface vlan 1
S1(config-if)# ip address 192.168.1.2 255.255.255.0
S1(config-if)# no shut
S1(config-if)# exit
S1(config)# (**ip default-gateway** *ip-address*)

Installing TelnetClient in Windows7
C:\Users\NetAcad> pkgmgr /iu:"TelnetClient"
C:\Users\NetAcad> telnet 192.168.1.2

R1> show arp
Switch> show mac address-table
S2# clear mac address-table dynamic

C:\Users\User1> arp –a
C:\windows\system32> arp –d *
C:\windows\system32> arp –d 192.168.1.12
C:\windows\system32> arp –s 192.168.1.12 0c-d9-96-d2-40-40

Route table
C:\Users\User1> netstat –r (or route print)
R1> show ip route

Wireshark observation remove all previous DNS results
ipconfig /flushdns
nslookup www.google.com as an alternative

Enable IPv6 routing on R1
R1 # configure terminal
R1(config)# ipv6 unicast-routing
R1(config)# exit
R1#

R1(config)# interface g0/0
R1(config-if)# ipv6 address 2001:db8:acad:a::1/64
R1(config-if)# no shutdown

R1# show ipv6 interface brief
R1# show ipv6 interface g0/0

Change the default Local-Link
R1# config t
Enter configuration commands, one per line.
End with CNTL/Z.
R1(config)# interface g0/0
R1(config-if)# ipv6 address fe80::1 link-local

Set the clocking rate on all DCE serial interfaces to 128000. ?
HQ(config-if)# clock rate 128000

SSH
Router(config)# hostname R1
R1(config)# ip domain-name ccna-lab.com
R1(config)# crypto key generate rsa modulus 1024

R1(config)# username admin privilege 15 secret adminpass
R1(config)# line vty 0 4
R1(config-line)# transport input telnet ssh
R1(config-line)# login local
R1(config-line)# end
R1#
R1# copy running-config startup-config

172 16 00000001 0
172 16 00000010 0
172 16 00000011 0

172 16 11111100 0
252
172.16.0.0 /22

172.20.0.0 /16
172 00010100 0 0
172 00010101 0 0
172 00010110 0 0
172 00010111 0 0

172.20.0.0 /14
niyunsuan

192 168 00000000 0 /23
192 168 00000010 0 /23
192 168 00000100 0 /22
192 168 00001000 0 /21

192 168 0 0 /20

R1# erase startup-config
R1# reload

S1# erase startup-config
S1# del vlan.dat
S1# reload
S1# show flash
Switch# show run | include valn
Switch# show vlan
Switch# show vtp status

IP Address 209. . .
Subnet Mask 255.255.255.248
Default Gateway 209. . .

Configure Router 1

Router> enable
Router#
Router# config terminal
Router(config)#
Router(config)# hostname R1
R1(config)# no ip domain-lookup
R1(config)# enable secret cisco

Assign Password/establish, timeout, enable login, logging synchronous

R1(config)# line con 0
R1(config-line)# password cisco
R1(config-line)# exec-timeout 5 0
R1(config-line)# login
R1(config-line)# logging synchronous
R1(config-line)# exit
R1(config)#

Assign ciscovtypass as the vty password, establish a timeout, enable login, and add the logging synchronous command.

R1(config)# line vty 0 4
R1(config-line)# password cisco
R1(config-line)# exec-timeout 5 0
R1(config-line)# login
R1(config-line)# logging synchronous

R1(config-line)# exit
R1(config)#

Encrypt the clear text passwords.
R1(config)# service password-encryption
R1(config)# banner motd #Unauthorized access prohibited!#

Configure an IP address and interface description. Activate both interfaces on the router.
R1(config)# int s0/0/0
R1(config-if)# description Connection to R2
R1(config-if)# ip address 172.16.12.1 255.255.255.0
R1(config-if)# no shutdown
R1(config-if)# int g0/1
R1(config-if)# description Connection to S1
R1(config-if)# ip address 192.168.1.1 255.255.255.252
R1(config-if)# clock rate 128000
R1(config-if)# no shutdown
R1(config-if)# exit
R1(config)#ip route 0.0.0.0 0.0.0.0 s0/0/0
R1(config)# ^Z
R1(config)# exit
R1#

Configure Router R2 (ISP)

R2#
Router> enable
Router#
Router# config terminal
Router(config)#
Router(config)# hostname R2
R2(config)# no ip domain-lookup
R2(config)# enable secret cisco

R2(config-if)# int g0/0
R2(config-if)# description Connection to ISP
R2(config-if)# ip address 209. . . 255.255.255.248
R2(config-if)# no shutdown
R2(config-if)# exit

R2(config-if)# interface lo0

```
R2(config-if)# description Simulated Web Server
R2(config-if)# ip address 10.10.10.10 255.255.255.255
R2(config-if)# exit
R2(config)# ip route 0.0.0.0 0.0.0.0 g0/0
R2(config)# exit
R2(config)# exit
R2#
```

Configure Router R3

```
R3#
Router> enable
Router#
Router# config terminal
Router(config)#
Router(config)# hostname R3
R3(config)# no ip domain-lookup
R3(config)# enable secret cisco
```

Create loopback interfaces:

```
R3(config-if)# interface lo4
R3(config-if)# description Simulated Web Server
R3(config-if)# ip address 10.10.10.10 255.255.255.255
R3(config-if)# exit

R3(config-if)# interface lo5
R3(config-if)# description Simulated Web Server
R3(config-if)# ip address 192.168.5.1 255.255.255.0
R3(config-if)# exit

R3(config-if)# interface lo6
R3(config-if)# description Simulated Web Server
R3(config-if)# ip address 192.168.6.1 255.255.255.0
R3(config-if)# exit
R3(config)# ip route 0.0.0.0 0.0.0.0 s0/0/1
R3(config)# ^Z
R3(config)# exit
R3#
```

Configure Switch S1

S1#
Switch# configure terminal
Switch(config)# hostname S1

Configuring Console
S1(config)# line console 0
S1(config-line)# password cisco
S1(config-line)# login
S1(config-line)# exit
S1(config)# exit

Configuring Telnet
S1(config)# line vty 0 4
S1(config-line)# password cisco
S1(config-line)# login
S1(config-line)# exit
S1(config)#

Secure Privilage mode access
S1> enable
S1# configure terminal
S1(config)# enable password class
S1(config)# exit

Encrypted Password
S1# config t
S1(config)# enable secret class
S1(config)# exit

Verify that the enabled secret password is added to configure file
S1# show run

Encrypt the enable and console passwords
S1# config t
S1(config)# service password-encryption
S1(config)# exit

Configure a message of the day (MOTD) banner.
S1# config t
S1(config)# banner motd @ Unauthorized Access is Prohibited! @
S1(config)# exit

Save the configuration file

S1# copy running-config startup-config
Destination filename [startup-config]?[Enter]
Building configuration...
[OK]

Configure Switch S3

S3# configure terminal
S3(config)# hostname S3

PING in PUTIN

R1> ping 172.16.12.2 / R1-R2
R2> ping 172.16.23.2 R2 R3

Internet PC Default Gateway 209. . .

Configure S1

S1(config)# vlan 31
S1(config-vlan)# name Accounting
S1(config-vlan)# vlan 33
S1(config-vlan)# name Engineering
S1(config-vlan)# vlan 99
S1(config-vlan)# name Management
S1(config-vlan)# end
S1# show vlan

S1(config)# interface vlan 99
S1(config-vlan)# ip address 192.168.99.2 255.255.255.0
S1(config-vlan)# exit
S1(config)# ip default-gateway 192.168.99.1

S1(config)# interface f0/3
S1(config-if)# switchport mode trunk
S1(config-if)# switchport trunk native vlan 1

S1(config)# interface range f0/1-2
S1(config-if-range)# switchport mode access

S1(config)# interface range G0/1-2
S1(config-if-range)# switchport mode access

Assign PC-A to the Accounting VLAN.

S1(config)# interface f0/6
S1(config-if)# switchport mode access
S1(config-if)# switchport access vlan 31
S1(config-if)# exit

S1(config)# interface range F0/1-2
S1(config-if-range)# shutdown

S1(config)# interface range G0/1-2
S1(config-if-range)# shutdown

R1 Configure 802.1Q (Router)

R1(config)# int g0/1.31
R1(config-if)# description Accounting LAN
R1(config-if)# encapsulation dot1q 31
R1(config-if)# ip address 192.168.31.1 255.255.255.0
R1(config-if)# end

R1(config)# interface g0/1
R1(config-if)# no shutdown

S1 to R1, VLAN 99 address 192.168.99.1
S3 to R1, VLAN 99 address 192.168.99.1

S1 to R1, VLAN 31 address 192.168.31.1
S3 to R1, VLAN 33 address 192.168.33.1

Configure OSPFv2 on R1.

R1(config)# router ospf 1
R1# show ip protocols
look for router-id 1.1.1.1

R1(config-router)# network 172.16.12.0 0.0.0.3 area 0
R1(config-router)# network 192.168.31.0 0.0.0.255 area 0

R1(config)# router ospf 1
R1(config-router)# passive-interface g0/1.31
R1(config-router)# end

R1(config)# router ospf 1
R1(config-router)# auto-cost reference-bandwidth 1000

R1# interface s0/0/0
R1(config-if)# bandwidth 128
R1(config-if)# ip ospf cost 7500

DHCP R1 vlans 31 33 on Router 1

R1# config vlan 31
R1(config)# ip dhcp excluded-address 192.168.31.1 192.168.31.20

R1(config)# ip dhcp pool ACCT
R1(dhcp-config)# network 192.168.31.0 255.255.255.0
R1(dhcp-config)# dns-server 10.10.10.11
R1(dhcp-config)# domain-name .com
R1(dhcp-config)# default-router 192.168.31.1

Configure Static and Dynamic NAT on R2.

R2(config)# username webuser privilege 15 secret cisco12345
R2(config)# ip http server
R2(config)# ip http authentication local
R2(config)# ip nat inside source static 10.10.10.10 209. . .
R2(config)# interface lo0
R2(config)# ip nat inside
R2(config)# interface g0/0
R2(config)# ip nat outside
R2(config)# access-list 1 permit 192.168.31.0 0.0.0.255
R2(config)# ip nat pool INTERNET 209. . . 209. . . netmask 255.255.255.248
R2(config)# ip nat inside source list 1 pool INTERNET

Access Control Lists on Router 2

R2(config)# ip access-list standard ADMIN-MGT
R2(config)# permit host 172.16.12.1

R2(config)# line vty 0 4
R2(config-line)# access-class ADMIN-MGT in
R2(config-line)# exit

R2(config)# access-list 101 permit tcp any host 209. . . eq www
R2(config)# access-list 101 permit icmp any any echo-reply
R2(config)# access-list 101 deny ip any any
R2(config)# Interface g0/0 ip access-group 101 in

DHCP verification
R1# show ip dhcp binding
R1# show ip dhcp server statistics
R1# show ip dhcp pool
R1# show run | section dhcp
R1# show run interface

NAT verification
R1# show ip nat translations
R1# show ip nat statistics

Access Control lists (ACL) verification
R1# show access-lists
R1# show ip interface g0/1
R1(config)# ip access-list ?
R1(config)# ip access-list standard ?
R1(config)# ip access-list standard ADMIN-MGT

OSPF Verification
show ip ospf neighbor
show ip protocols
show ip ospf
show ip ospf interface
show ip ospf interface brief

Single-Area OSPF Configuration

show ipv6 ospf neighbor

show ipv6 protocols
show ipv6 route ospf
show ipv6 ospf interface brief

Show cdp neighbors
Show controller s0/0/0