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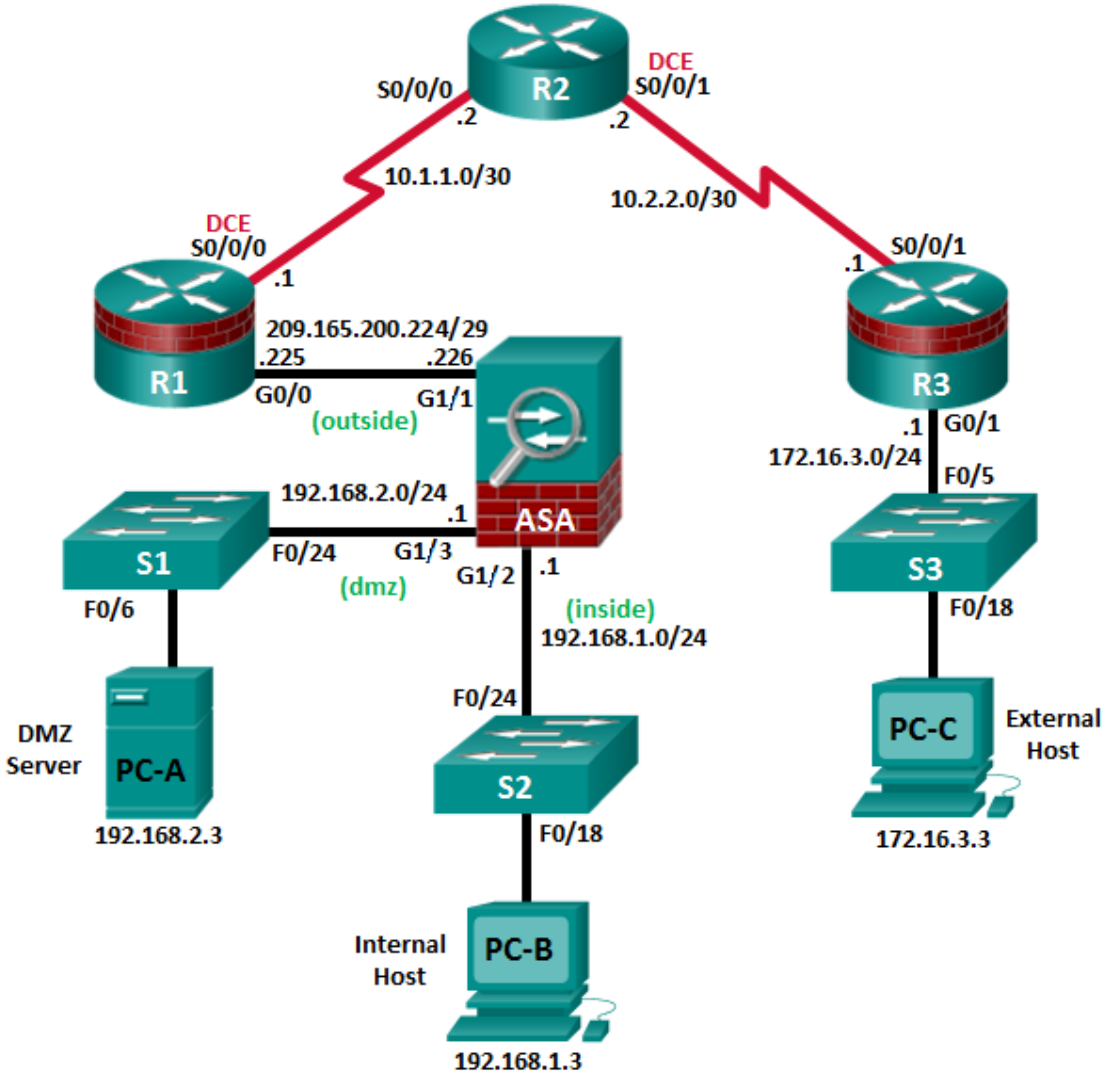
CCNA Security

Chapter 9 Lab A: Configuring ASA Basic Settings and Firewall Using CLI

This lab has been updated for use on NETLAB+

Topology



Note: ISR G2 devices use GigabitEthernet interfaces instead of FastEthernet interfaces.

IP Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R1	G0/0	209.165.200.225	255.255.255.248	N/A	ASA G1/1
	s1/0 S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A	N/A
R2	s1/0 S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
	s1/1 S0/0/1 (DCE)	10.2.2.2	255.255.255.252	N/A	N/A
R3	g4/0 G0/1	172.16.3.1	255.255.255.0	N/A	S3 F0/5
	s1/1 S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
ASA	gi0/0 G1/2	192.168.1.1	255.255.255.0	NA	S2 F0/24
ASA	gi0/2 G1/1	209.165.200.226	255.255.255.248	NA	R1 G0/0
ASA	gi0/1 G1/3	192.168.2.1	255.255.255.0	NA	S1 F0/24
PC-A	NIC	192.168.2.3	255.255.255.0	192.168.2.1	S1 F0/6
PC-B	NIC	192.168.1.3	255.255.255.0	192.168.1.1	S2 F0/18
PC-C	NIC	172.16.3.3	255.255.255.0	172.16.3.1	S3 F0/18

Objectives

Part 1: Basic Router/Switch/PC Configuration

- Configure hostnames and interface IP addresses for routers, switches, and PCs.
- Configure static routing, including default routes, between R1, R2, and R3.
- Enable HTTP and SSH access for R1.
- Configure PC host IP settings.
- Verify connectivity between hosts, switches, and routers.
- Save the basic running configuration for each router and switch.

Part 2: Accessing the ASA Console and Using CLI Setup Mode to Configure Basic Settings

- Access the ASA console and view hardware, software, and configuration settings.
- Determine the ASA version, interfaces, and license.
- Determine the file system and contents of flash memory.
- Use CLI Setup mode to configure basic settings (hostname, passwords, clock, etc.).

Part 3: Configuring Basic ASA Settings and Interface Security Levels Using the CLI.

- Configure the hostname and domain name.
- Configure the login and enable passwords.
- Set the date and time.
- Configure the inside and outside interfaces.
- Test connectivity to the ASA.
- Configure SSH access to the ASA.

- Configure HTTPS access on the ASA for ASDM.

Part 4: Configuring Routing, Address Translation, and Inspection Policy Using the CLI

- Configure a static default route for the ASA.
- Configure PAT and network objects.
- Modify the MPF application inspection global service policy.

Part 5: Configuring DHCP, AAA, and SSH

- Configure the ASA as a DHCP server/client.
- Configure Local AAA user authentication.
- Configure SSH remote access to the AAA.

Part 6: Configuring DMZ, Static NAT, and ACLs

- Configure the DMZ interface VLAN 3 on the ASA.
- Configure static NAT for the DMZ server using a network object.
- Configure an ACL to allow access to the DMZ for Internet users.
- Verify access to the DMZ server for external and internal users.

Background/Scenario

The Cisco Adaptive Security Appliance (ASA) is an advanced network security device that integrates a stateful firewall, VPN, and other capabilities. This lab employs an ASA 5506 to create a firewall and protect an internal corporate network from external intruders while allowing internal hosts access to the Internet. The ASA creates three security interfaces: Outside, Inside, and DMZ. It provides outside users limited access to the DMZ and no access to inside resources. Inside users can access the DMZ and outside resources.

The focus of this lab is the configuration of the ASA as a basic firewall. Other devices will receive minimal configuration to support the ASA portion of this lab. This lab uses the ASA CLI, which is similar to the IOS CLI, to configure basic device and security settings.

In Part 1 of this lab, you will configure the topology and non-ASA devices. In Parts 2 through 4 you will configure basic ASA settings and the firewall between the inside and outside networks. In part 5 you will configure the ASA for additional services, such as DHCP, AAA, and SSH. In Part 6, you will configure a DMZ on the ASA and provide access to a server in the DMZ.

Your company has one location connected to an ISP. R1 represents a CPE device managed by the ISP. R2 represents an intermediate Internet router. R3 represents an ISP that connects an administrator from a network management company, who has been hired to remotely manage your network. The ASA is an edge security device that connects the internal corporate network and DMZ to the ISP while providing NAT and DHCP services to inside hosts. The ASA will be configured for management by an administrator on the internal network and by the remote administrator. Layer 3 interfaces provide access to the three areas created in the lab: Inside, Outside, and DMZ. The ISP has assigned the public IP address space of 209.165.200.224/29, which will be used for address translation on the ASA.

Note: The router commands and output in this lab are from a Cisco 1941 with Cisco IOS Release 15.4(3)M2 image with a Security Technology license. Other routers and Cisco IOS versions can be used. See the Router Interface Summary Table at the end of this lab to determine which interface identifiers to use based on the equipment in your class. Depending on the router model and Cisco IOS version, the available commands and output produced might vary from what is shown in this lab.

The ASA used with this lab is a Cisco model 5506 with an 8-port integrated router, running OS version 9.8(1), Adaptive Security Device Manager (ASDM) version 7.8(1), and comes with a Base license.

Part 1: Basic Router/Switch/PC Configuration

In Part 1 of this lab, you will configure basic settings on the routers, such as interface IP addresses and static routing.

Note: Do not configure ASA settings at this time.

Step 1: Configure basic settings for routers and switches.

a. Configure hostnames as shown in the topology for each router.

b. Configure router interface IP addresses as shown in the IP Addressing Table.

c. Configure a clock rate for routers with a DCE serial cable attached to their serial interface. R1 is shown here as an example.

```
R1(config)# interface S0/0/0
R1(config-if)# clock rate 64000
```

d. Configure the host name for the switches. Other than the host name, the switches can be left in their default configuration state. Configuring the VLAN management IP address for the switches is optional.

Step 2: Configure static routing on the routers.

a. Configure a static default route from R1 to R2 and from R3 to R2.

```
R1(config)# ip route 0.0.0.0 0.0.0.0 Serial0/0/0
R3(config)# ip route 0.0.0.0 0.0.0.0 Serial0/0/1
```

b. Configure a static route from R2 to the R1 G0/0 subnet (connected to ASA interface Gi1/1) and a static route from R2 to the R3 LAN.

```
R2(config)# ip route 209.165.200.224 255.255.255.248 Serial0/0/0
R2(config)# ip route 172.16.3.0 255.255.255.0 Serial0/0/1
```

Step 3: Enable the HTTP server and configure a user account, encrypted passwords, and crypto keys for SSH.

Note: Passwords in this task are set to a minimum of 10 characters but are relatively simple for the purposes of this lab. More complex passwords are recommended in a production network.

a. Enable HTTP access to R1 using the **ip http server** command in global config mode. Set the console and VTY passwords to cisco. This will provide web and SSH targets for testing later in the lab.

```
R1(config)# ip http server
```

b. Configure a minimum password length of 10 characters using the **security passwords** command.

```
R1(config)# security passwords min-length 10
```

c. Configure a domain name.

```
R1(config)# ip domain-name ccnasecurity.com
```

d. Configure crypto keys for SSH.

```
R1(config)# crypto key generate rsa general-keys modulus 1024
```

e. Configure an admin01 user account using algorithm-type scrypt for encryption and a password of admin01pass.

```
R1(config)# username admin01 algorithm-type scrypt secret admin01pass
```

f. Configure line console 0 to use the local user database for logins. For additional security, the **exec-timeout** command causes the line to log out after five minutes of inactivity. The **logging synchronous** command prevents console messages from interrupting command entry.

Note: To avoid repetitive logins during this lab, the **exec-timeout** command can be set to 0 0, which prevents it from expiring. However, this is not considered to be a good security practice.

```
R1(config)# line console 0
R1(config-line)# login local
R1(config-line)# exec-timeout 5 0
R1(config-line)# logging synchronous
```

g. Configure line vty 0 4 to use the local user database for logins and restrict access to only SSH connections.

```
R1(config)# line vty 0 4
R1(config-line)# login local
R1(config-line)# transport input ssh
R1(config-line)# exec-timeout 5 0
```

h. Configure the enable password with strong encryption.

```
R1(config)# enable algorithm-type scrypt secret admin01pass
```

Step 4: Configure PC host IP settings.

Configure a static IP address, subnet mask, and default gateway for PC-A, PC-B, and PC-C as shown in the IP Addressing Table.

Step 5: Verify connectivity.

Because the ASA is the focal point for the network zones, and it has not yet been configured, there will be no connectivity between devices that are connected to it. However, PC-C should be able to ping the R1 interface. From PC-C, ping the R1 G0/0 IP address (209.165.200.225). If these pings are not successful, troubleshoot the basic device configurations before continuing.

Note: If you can ping from PC-C to R1 G0/0 and S0/0/0 you have demonstrated that static routing is configured and functioning correctly.

Step 6: Save the basic running configuration for each router and switch.

Part 2: Accessing the ASA Console and Using CLI Setup to Configure Basic Settings

In Part 2 of this lab, you will access the ASA via the console and use various **show** commands to determine hardware, software, and configuration settings. You will clear the current configuration and use the CLI interactive setup utility to configure basic ASA settings.

Note: Do not configure ASA settings at this time.

Step 1: Access the ASA console.

a. Enter privileged mode with the **enable** command and password (if a password has been set). The password is blank by default. Press **Enter**. If the password has been changed to what is specified in this lab, enter the word **class**. The default ASA hostname and prompt is *ciscoasa*>.

```
ciscoasa> enable
Password: class (or press Enter if none set)
```

Step 2: Determine the ASA version, interfaces, and license.

The ASA 5506 comes with eight Gigabit Ethernet ports.

Use the **show version** command to determine various aspects of this ASA device.

```
ciscoasa# show version

Cisco Adaptive Security Appliance Software Version 9.8(2)
Firepower Extensible Operating System Version 2.2(2.52)
Device Manager Version 7.8(1)

Compiled on Sun 27-Aug-17 13:06 PDT by builders
System image file is "disk0:/asa982-lfbff-k8.SPA"
Config file at boot was "startup-config"

ciscoasa up 10 mins 59 secs

Hardware:   ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4
cores)
Internal ATA Compact Flash, 8000MB
BIOS Flash M25P64 @ 0xfed01000, 16384KB

Encryption hardware device : Cisco ASA Crypto on-board accelerator (revision
0x1)
                             Number of accelerators: 1

 1: Ext: GigabitEthernet1/1  : address is 00f2.8b8e.69ef, irq 255
 2: Ext: GigabitEthernet1/2  : address is 00f2.8b8e.69f0, irq 255
 3: Ext: GigabitEthernet1/3  : address is 00f2.8b8e.69f1, irq 255
 4: Ext: GigabitEthernet1/4  : address is 00f2.8b8e.69f2, irq 255
 5: Ext: GigabitEthernet1/5  : address is 00f2.8b8e.69f3, irq 255
 6: Ext: GigabitEthernet1/6  : address is 00f2.8b8e.69f4, irq 255
 7: Ext: GigabitEthernet1/7  : address is 00f2.8b8e.69f5, irq 255
 8: Ext: GigabitEthernet1/8  : address is 00f2.8b8e.69f6, irq 255
<output omitted>
```

What software version is this ASA running?

Cisco Adaptive Security Appliance Software Version 9.9(1)

What is the name of the system image file and from where was it loaded?

System image file is "boot:/asa991-smp-k8.bin"

The ASA can be managed using a built-in GUI known as ASDM. What version of ASDM is this ASA running?

Device Manager (ASDM) Version 7.9(1)

How much RAM does this ASA have?
2048 MB RAM

How much flash memory does this ASA have?
8192 MB (Internal ATA Compact Flash)

How many network ports does this ASA have?
8 network ports (Management0/0 and GigabitEthernet0/0 to GigabitEthernet0/6)

What type of license does this ASA have?
Smart Licensing (Currently Unlicensed)

How many VLANs can be created with this license?
Maximum VLANs: 50

Step 3: Determine the file system and contents of flash memory.

a. Display the ASA file system using the **show file system** command. Determine what prefixes are supported.

```
ciscoasa# show file system
File Systems:
     Size(b)      Free(b)      Type      Flags  Prefixes
* 7859437568    4465147904    disk      rw      disk0: flash:
              -             -  disk      rw      disk1:
              -             -  network   rw      tftp:
              -             -  opaque    rw      system:
              -             -  network   ro      http:
              -             -  network   ro      https:
              -             -  network   rw      scp:
              -             -  network   rw      ftp:
              -             -  network   wo
```

What is another name for flash:? disk0

b. Display the contents of flash memory using one of these commands: **show flash**, **show disk0**, **dir flash:**, or **dir disk0:**.

c.
```
ciscoasa# show flash
--#--  --length--  -----date/time------  path
  103       33        Nov 29 2017 10:34:52  .boot_string
   11     4096        Jan 09 2016 19:43:02  log
```

```
      13    65486       Nov 29 2017 11:28:45  log/asa-appagent.log
      20    4096        Jan 09 2016 19:43:52  crypto_archive
      21    4096        Jan 09 2016 19:43:56  coredumpinfo
      22    59          Jan 09 2016 19:43:56  coredumpinfo/coredump.cfg
     104    08563072    Nov 24 2017 14:55:22  asa982-lfbff-k8.SPA
     105    5209829     Oct 17 2017 21:50:48  anyconnect-win-4.5.02033-
        webdeploy-k9.pkg
     106     26916068    Nov 24 2017 15:22:28  asdm-781.bin
7859437568 bytes total (4465147904 bytes free)
```

What is the name of the ASDM file in flash:? asdm-781.bin

Step 4: Determine the current running configuration.

The ASA 5506 is commonly used as an edge security device that connects a small business or teleworker to an ISP device, such as a DSL or cable modem, for access to the Internet.

Display the current running configuration using the **show running-config** command.

```
ciscoasa# show running-config
: Saved
: Serial Number: JAD2002064E
: Hardware:   ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4
cores)
:
ASA Version 9.8(2)
!
hostname ciscoasa
enable password
$sha512$5000$ftqbmZLcP1yvT9in1bvjlg==$+GU2ZHobKrNifvyb45nWEQ== pbkdf2
xlate per-session deny tcp any4 any4
xlate per-session deny tcp any4 any6
xlate per-session deny tcp any6 any4
xlate per-session deny tcp any6 any6
xlate per-session deny udp any4 any4 eq domain
xlate per-session deny udp any4 any6 eq domain
xlate per-session deny udp any6 any4 eq domain
xlate per-session deny udp any6 any6 eq domain
names
!
interface GigabitEthernet1/1
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/2
```

```
 shutdown
 no nameif
 no security-level
 no ip address
!
<output omitted>
```

Note: To stop the output from a command using the CLI, press **Q**.

You can restore the ASA to its factory default settings by using the **configure factory-default** command.

```
ciscoasa# conf t
ciscoasa(config)# configure factory-default

WARNING: The boot system configuration will be cleared.
The first image found in disk0:/ will be used to boot the
system on the next reload.
Verify there is a valid image on disk0:/ or the system will
not boot.

Begin to apply factory-default configuration:
Clear all configuration
Executing command: …
Executing command: …
Executing command: …
Factory-default configuration is completed
<output omitted>
```

Note: If you receive a prompt for Anonymous Error reporting, proceed by answering **No**.

Review this output and pay attention to the VLAN interfaces, NAT-related, and DHCP-related sections. These will be configured later in this lab using the CLI.

You may want to capture and print the factory-default configuration as a reference. Use the terminal emulation program to copy it from the ASA and paste it into a text document. You can then edit this file if desired, so that it contains only valid commands. You should remove password commands and enter the **no shut** command to bring up the desired interfaces.

Step 5: Clear the previous ASA configuration settings.

Use the **write erase** command to remove the startup-config file from flash memory.

```
ciscoasa# write erase
Erase configuration in flash memory? [confirm]
[OK]
ciscoasa#

ciscoasa# show start
No Configuration
```

Note: The IOS command **erase startup-config** is not supported on the ASA.

Use the **reload** command to restart the ASA. This causes the ASA to come up in CLI Setup mode. If prompted that the config has been modified and needs to be saved, respond with **N**, and then press **Enter** to proceed with the reload.

```
ciscoasa# reload
Proceed with reload? [confirm]
ciscoasa#
*** --- START GRACEFUL SHUTDOWN ---
Shutting down isakmp
Shutting down webvpn
Shutting down sw-module
Shutting down License Controller
Shutting down File system
*** --- SHUTDOWN NOW ---
Process shutdown finished
Rebooting.....
CISCO SYSTEMS
Cisco Systems ROMMON, Version 1.1.8, RELEASE SOFTWARE<output omitted>
```

Step 6: Use the Setup interactive CLI mode to configure basic settings.

When the ASA completes the reload process, it should detect that the startup-config file is missing and present a series of interactive prompts to configure basic ASA settings. If it does not come up in this mode, repeat Step 5. As an alternative, you can run the **setup** command at the global configuration mode prompt,

Note: The interactive prompt mode does not configure the ASA with factory defaults as described in Step 4. This mode can be used to configure minimal basic settings, such as hostname, clock, and passwords. You can also go directly to the CLI to configure the ASA settings, as described in Part 3.

Respond to the Setup interactive prompts as shown here, after the ASA reloads.

```
Pre-configure Firewall now through interactive prompts [yes]? <Enter>
Firewall Mode [Routed]: <Enter>
Enable password [<use current password>]: class
Allow password recovery [yes]? <Enter>
Clock (UTC):
  Year [2017]: <Enter>
  Month [Oct]: <Enter>
  Day [4]: <Enter>
  Time [09:09:08]: <Enter>
Management IP address: 192.168.100.1
Management network mask: 255.255.255.0
Host name: ASA-Init
Domain name: generic.com
IP address of host running Device Manager: <Enter>

The following configuration will be used:
Enable password: class
Allow password recovery: yes
Clock (UTC): 09:09:08 Oct 4 2017
Firewall Mode: Routed
Management IP address: 192.168.1.1
```

```
Management network mask: 255.255.255.0
Host name: ASA-Init
Domain name: generic.com

Use this configuration and save to flash? [yes] <Enter>

INFO: Security level for "management" set to 0 by default.
Cryptochecksum: 83d45883 a8343ed5 68b4810c 6f60ef05

4047 bytes copied in 0.80 secs
ASA-Init>
```

Note: In the above configuration, the IP address of the host running ASDM was left blank. It is not necessary to install ASDM on a host. It can be run from the flash memory of the ASA device itself using the browser of the host.

Note: The responses to the prompts are automatically stored in the startup-config and the running config. However, additional security-related commands, such as a global default inspection service policy, are inserted into the running-config by the ASA OS.

a. Enter privileged EXEC mode with the **enable** command. Enter **class** for the password.

b. Issue the **show run** command to see the additional security-related configuration commands that are inserted by the ASA.

c. Issue the **copy run start** command to capture the additional security-related commands in the startup-config file.

Part 3: Configuring ASA Settings and Interface Security Using the CLI

In Part 3, you will configure basic settings by using the ASA CLI, even though some of them were already configured using the Setup mode interactive prompts in Part 2. In this part, you will start with the settings configured in Part 2 and then add to or modify them to create a complete basic configuration.

Tip: Many ASA CLI commands are similar to, if not the same, as those used with the Cisco IOS CLI. In addition, the process of moving between configuration modes and sub-modes is essentially the same.

Note: You must complete Part 2 before beginning Part 3.

Step 1: Configure the hostname and domain name.

a. Enter global configuration mode using the **config t** command. The first time you enter configuration mode after running Setup, you will be prompted to enable anonymous reporting. Respond with no.

```
ASA-Init# config t
ASA-Init(config)#

****************************** NOTICE ******************************

Help to improve the ASA platform by enabling anonymous reporting,
which allows Cisco to securely receive minimal error and health
information from the device. To learn more about this feature,
please visit: http://www.cisco.com/go/smartcall
```

```
Would you like to enable anonymous error reporting to help improve
the product? [Y]es, [N]o, [A]sk later: n

In the future, if you would like to enable this feature,
issue the command "call-home reporting anonymous".
```

b. Configure the ASA hostname using the **hostname** command.

```
ASA-Init(config)# hostname CCNAS-ASA
```

c. Configure the domain name using the **domain-name** command.

```
CCNAS-ASA(config)# domain-name ccnasecurity.com
```

Step 2: Configure the login and enable mode passwords.

a. The login password is used for Telnet connections (and SSH prior to ASA version 8.4). By default, it is set to cisco, but since the default startup configuration was erased you have the option to configure the login password using the **passwd** or **password** command. This command is optional because later in the lab we will configure the ASA for SSH, and not Telnet access.

```
CCNAS-ASA(config)# passwd cisco
```

b. Configure the privileged EXEC mode (enable) password using the **enable password** command.

```
CCNAS-ASA(config)# enable password class
```

Step 3: Set the date and time.

The date and time can be set manually using the **clock set** command. The syntax for the **clock set** command is **clock set** *hh:mm:ss {month day | day month} year*. The following example shows how to set the date and time using a 24-hour clock:

```
CCNAS-ASA(config)# clock set 11:14:00 November 20 2017
```

Step 4: Configure the inside and outside interfaces.

ASA 5506 interface notes:

The 5506 is different than the 5505 ASA model. With the 5506 ASA, the physical ports can be assigned a Layer 3 IP address directly, much like a Cisco router. In this step, you will configure internal and external interfaces, name them, assign IP addresses, and set the interface security level.

If you completed the initial configuration Setup utility, the MGMT interface is configured with an IP address of 192.168.100.1. You will configure another interface as the inside interface for this lab. You will only configure the inside and outside interfaces at this time. The dmz interface will be configured in Part 5 of the lab.

a. Configure the Gi1/2 interface for the inside network (192.168.1.0/24) and set the security level to the highest setting of 100.

```
CCNAS-ASA(config)# interface gi1/2
CCNAS-ASA(config-if)# nameif inside
CCNAS-ASA(config-if)# ip address 192.168.1.1 255.255.255.0
CCNAS-ASA(config-if)# security-level 100
CCNAS-ASA(config-if)# no shutdown
```

b. Configure the G1/1 interface for the outside network (209.165.200.224/29), set the security level to the lowest setting of 0, and access the Gi1/1 interface.

```
CCNAS-ASA(config-if)# interface G1/1
CCNAS-ASA(config-if)# nameif outside
INFO: Security level for "outside" set to 0 by default.
CCNAS-ASA(config-if)# ip address 209.165.200.226 255.255.255.248
CCNAS-ASA(config-if)# no shutdown
```

Interface security-level notes:

You may receive a message that the security level for the inside interface was set automatically to 100, and the outside interface was set to 0. The ASA uses interface security levels from 0 to 100 to enforce the security policy. Security level 100 (inside) is the most secure and level 0 (outside) is the least secure.

By default, the ASA applies a policy where traffic from a higher security level interface to one with a lower level is permitted and traffic from a lower security level interface to one with a higher security level is denied. The ASA default security policy permits outbound traffic, which is inspected, by default. Returning traffic is allowed due to stateful packet inspection. This default "routed mode" firewall behavior of the ASA allows packets to be routed from the inside network to the outside network, but not vice-versa. In Part 4 of this lab, you will configure NAT to increase the firewall protection.

c. Use the **show interface** command to ensure that ASA ports Gi1/1 and Gi1/2 are both up. An example is shown for Gi1/1. If either port is shown as down/down, check the physical connections. If either port is administratively down, bring it up with the **no shutdown** command.

```
CCNAS-ASA# show interface gig1/1
Interface GigabitEthernet1/1 "outside", is up, line protocol is up
  Hardware is Accelerator rev01, BW 1000 Mbps, DLY 10 usec<output omitted>
```

d. Display the status for all ASA interfaces using the **show interface ip brief** command.

Note: This command is different from the **show ip interface brief** IOS command. If any of the physical or logical interfaces previously configured are not up/up, troubleshoot as necessary before continuing.

Tip: Most ASA **show** commands, as well as **ping**, **copy**, and others, can be issued from within any configuration mode prompt without the **do** command that is required with IOS.

```
CCNAS-ASA# show interface ip brief
Interface                  IP-Address      OK? Method Status
Protocol
Virtual0                   127.1.0.1       YES unset  up
up
GigabitEthernet1/1         209.165.200.226 YES manual up
up
GigabitEthernet1/2         192.168.1.1     YES manual up
up GigabitEthernet1/3         unassigned      YES unset  administratively
down down
GigabitEthernet1/4         unassigned      YES unset  administratively down
down
GigabitEthernet1/5         unassigned      YES unset  administratively down
down
GigabitEthernet1/6         unassigned      YES unset  administratively down
down
GigabitEthernet1/7         unassigned      YES unset  administratively down
down
```

```
GigabitEthernet1/8          unassigned      YES unset  administratively down
down
Internal-Control1/1         127.0.1.1       YES unset  up
up
Internal-Data1/1            unassigned      YES unset  up
down
Internal-Data1/2            unassigned      YES unset  up
up
Internal-Data1/3            unassigned      YES unset  up
up
Management1/1               192.168.100.1   YES manual down          down
```

e. Display the information for the Layer 3 interfaces using the **show ip address** command.

```
CCNAS-ASA# show ip address
System IP Addresses:
Interface                Name                   IP address      Subnet mask
Method
GigabitEthernet1/1       outside                209.165.200.226
255.255.255.248 manual
GigabitEthernet1/2       inside                 192.168.1.1     255.255.255.0
manual
Management1/1            management             192.168.100.1   255.255.255.0
manual
Current IP Addresses:
Interface                Name                   IP address      Subnet mask
Method
GigabitEthernet1/1       outside                209.165.200.226
255.255.255.248 manual
GigabitEthernet1/2       inside                 192.168.1.1     255.255.255.0
manual
```

Management1/1 management 192.168.100.1 255.255.255.0 manual

f. You may also use the **show running-config interface type/number** command to display the configuration for a particular interface from the running configuration.

```
CCNAS-ASA# show running-config interface gig1/1
!
interface GigabitEthernet1/1
 nameif outside
 security-level 0
ip address 209.165.200.226 255.255.255.248
```

Step 5: Test connectivity to the ASA.

a. Ensure that PC-B has a static IP address of 192.168.1.3, a subnet mask of 255.255.255.0, and a default gateway of 192.168.1.1 (the IP address of the Gi1/2 inside interface).

b. You should be able to ping from PC-B to the ASA inside interface address and ping from the ASA to PC-B. If the pings fail, troubleshoot the configuration as necessary.

```
CCNAS-ASA# ping 192.168.1.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.3, timeout is 2 seconds:
```

```
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
```

c. From PC-C, ping the Gi1/1 (outside) interface at IP address 209.165.200.226. You should **Not** be able to ping this address.

Step 6: Configure ASDM access to the ASA.

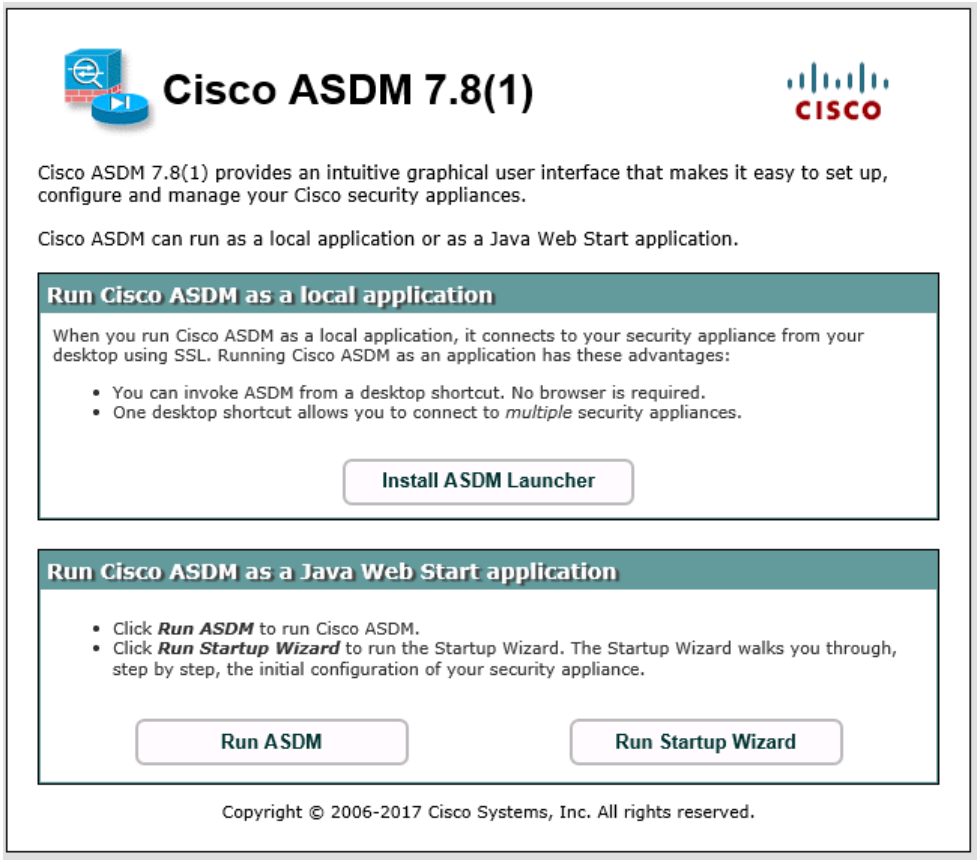
a. You can configure the ASA to accept HTTPS connections using the **http** command. This allows access to the ASA GUI (ASDM). Configure the ASA to allow HTTPS connections from any host on the inside network (192.168.1.0/24).

```
CCNAS-ASA(config)# http server enable
CCNAS-ASA(config)# http 192.168.1.0 255.255.255.0 inside
```

b. Open a browser on PC-B and test the HTTPS access to the ASA by entering **https://192.168.1.1**. You will be prompted with a security certificate warning. Click **Continue**. Click **Yes** for any other security warnings. You should see the Cisco ASDM Welcome screen that allows you to: Install ASDM Launcher and Run ASDM, Run ASDM, or Run Startup Wizard.

Note: If you are unable to launch ASDM, the IP address must be added to the allowed list of IP addresses in Java.

1. Access the Windows Control Panel and click **Java**.
2. In the Java Control Panel, select **Security** tab. Click **Edit Site List**.
3. In the Exception Site list, click **Add**. In the Location field, type **https://192.168.1.1**.
4. Click **OK** to add the IP address.
5. Verify that the IP address has been added. Click **OK** to accept the changes.



c. Otherwise, Close the browser.

In the next lab, you will use ASDM extensively to configure the ASA. The objective here is not to use the ASDM configuration screens, but to verify HTTP/ASDM connectivity to the ASA. If you are unable to access ASDM, check your configurations. If the configurations are correct contact your instructor for further assistance.

Part 4: Configuring Routing, Address Translation, and Inspection Policy Using the CLI

In Part 4 of this lab, you will provide a default route for the ASA to reach external networks. You will configure address translation using network objects to enhance firewall security. You will then modify the default application inspection policy to allow specific traffic.

Note: You must complete Part 3 before proceeding to Part 4.

Step 1: Configure a static default route for the ASA.

In Part 3, you configured the ASA outside interface with a static IP address and subnet mask. However, the ASA does not have a gateway of last resort defined. To enable the ASA to reach external networks, you will configure a default static route on the ASA outside interface.

Note: If the ASA outside interface was configured as a DHCP client, it could obtain a default gateway IP address from the ISP. However, in this lab, the outside interface is configured with a static address.

a. Ping from the ASA to R1 G0/0 at IP address 209.165.200.225. Was the ping successful?

Si , fue satisfactorio el ping

b. Ping from the ASA to R1 S0/0/0 at IP address 10.1.1.1. Was the ping successful?

No, el ASA no tiene una ruta para la 10.1.1.0/30

c. Create a “quad zero” default route using the **route** command, associate it with the ASA outside interface, and point to the R1 G0/0 at IP address 209.165.200.225 as the gateway of last resort. The default administrative distance is one by default.

```
CCNAS-ASA(config)# route outside 0.0.0.0 0.0.0.0 209.165.200.225
```

d. Issue the **show route** command to display the ASA routing table and the static default route you just created.

```
CCNAS-ASA# show route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static
route
       o - ODR, P - periodic downloaded static route, + - replicated route
```

```
Gateway of last resort is 209.165.200.225 to network 0.0.0.0

S*    0.0.0.0 0.0.0.0 [1/0] via 209.165.200.225, outside
C        192.168.1.0 255.255.255.0 is directly connected, inside
L        192.168.1.1 255.255.255.255 is directly connected, inside
C        209.165.200.224 255.255.255.248 is directly connected, outside
L        209.165.200.226 255.255.255.255 is directly connected, outside
```

e. Ping from the ASA to R1 S0/0/0 IP address 10.1.1.1. Was the ping successful?

si fue satisfactorio

Step 2: Configure address translation using PAT and network objects.

Note: Beginning with ASA version 8.3, network objects are used to configure all forms of NAT. A network object is created, and it is within this object that NAT is configured. In Step 2a, the network object **INSIDE-NET** is used to translate the inside network addresses (192.168.10.0/24) to the global address of the outside ASA interface. This type of object configuration is called Auto-NAT.

a. Create the network object **INSIDE-NET** and assign attributes to it using the **subnet** and **nat** commands.

```
CCNAS-ASA(config)# object network INSIDE-NET
CCNAS-ASA(config-network-object)# subnet 192.168.1.0 255.255.255.0
CCNAS-ASA(config-network-object)# nat (inside,outside) dynamic interface
CCNAS-ASA(config-network-object)# end
```

b. The ASA splits the configuration into the object portion that defines the network to be translated and the actual **nat** command parameters. These appear in two different places in the running configuration. Display the NAT object configuration using the **show run object** and **show run nat** commands.

```
CCNAS-ASA# show run object
object network INSIDE-NET
 subnet 192.168.1.0 255.255.255.0

CCNAS-ASA# show run nat
!
object network INSIDE-NET
 nat (inside,outside) dynamic interface
```

c. From PC-B, attempt to ping the R1 G0/0 interface at IP address **209.165.200.225**. Notice the pings are not successful at this time as the default inspection policy does not allow ICMP to pass through the firewall.

d. Issue the **show nat** command on the ASA to see the translated and untranslated hits. Notice that, of the pings from PC-B, three were translated and three were not because ICMP is not being inspected by the global inspection policy. The outgoing pings (echoes) were translated, and the returning echo replies were blocked by the firewall policy. You will configure the default inspection policy to allow ICMP in the next step. **Note:** Depending on the processes and daemons running on the particular computer used as PC-B, you may see more translated and untranslated hits than the three echo requests and echo replies.

```
CCNAS-ASA# show nat

Auto NAT Policies (Section 2)
1 (inside) to (outside) source dynamic INSIDE-NET interface
```

```
    translate_hits = 3, untranslate_hits = 3
```

e. Ping from PC-B to R1 again and quickly issue the **show xlate** command to see the addresses being translated.

```
CCNAS-ASA# show xlate
1 in use, 1 most used
Flags: D - DNS, e - extended, I - identity, i - dynamic, r - portmap,
       s - static, T - twice, N - net-to-net

ICMP PAT from inside:192.168.1.3/1 to outside:209.165.200.226/1 flags ri idle 0:00:01
timeout 0:00:30
```

Note: The flags (r and i) indicate that the translation was based on a port map (r) and was done dynamically (i).

f. Open a browser on PC-B and enter the IP address of R1 G0/0 (209.165.200.225). In a pop-up window, you should be prompted by R1 that authentication is required. TCP-based HTTP traffic is permitted, by default, by the firewall inspection policy.

g. On the ASA, reissue the **show nat** and **show xlate** commands to see the hits and addresses being translated for the HTTP connection.

Step 3: Modify the default MPF application inspection global service policy.

For application layer inspection, as well as other advanced options, the Cisco MPF is available on ASAs. Cisco MPF uses three configuration objects to define modular, object-oriented, and hierarchical policies:

- **Class maps** - Define a match criterion.
- **Policy maps** - Associate actions to the match criteria.
- **Service policies** - Attach the policy map to an interface, or globally to all interfaces of the appliance.

a. Display the default MPF policy map that performs the inspection on inside-to-outside traffic. Only traffic that was initiated from the inside is allowed back in to the outside interface. Notice that the ICMP protocol is missing.

```
CCNA-ASA# show run | begin class
class-map inspection_default
 match default-inspection-traffic
!
!
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum client auto
  message-length maximum 512
  no tcp-inspection
policy-map global_policy
 class inspection_default
  inspect ftp
  inspect h323 h225
  inspect h323 ras
  inspect ip-options
  inspect netbios
```

```
  inspect rsh
  inspect rtsp
  inspect skinny
  inspect esmtp
  inspect sqlnet
  inspect sunrpc
  inspect tftp
  inspect sip
  inspect xdmcp
  inspect dns preset_dns_map
policy-map type inspect dns migrated_dns_map_2
 parameters
  message-length maximum client auto
  message-length maximum 512
  no tcp-inspection
policy-map type inspect dns migrated_dns_map_1
 parameters
  message-length maximum client auto
  message-length maximum 512
  no tcp-inspection
!
service-policy global_policy global
<output omitted>
```

b. Add the inspection of ICMP traffic to the policy map list using the following commands:

```
CCNAS-ASA(config)# policy-map global_policy
CCNAS-ASA(config-pmap)# class inspection_default
CCNAS-ASA(config-pmap-c)# inspect icmp
```

c. Display the default MPF polich map to verify ICMP is now listed in the inspection rules.

```
CCNA-ASA(config-pmap-c)#  show run policy-map
!
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum client auto
  message-length maximum 512
  no tcp-inspection
policy-map global_policy
 class inspection_default
  inspect ftp
  inspect h323 h225
  inspect h323 ras
  inspect ip-options
  inspect netbios
  inspect rsh
  inspect rtsp
```

```
 inspect skinny
 inspect esmtp
 inspect sqlnet
 inspect sunrpc
 inspect tftp
 inspect sip
 inspect xdmcp
 inspect dns preset_dns_map
 inspect icmp
!
```

d. From PC-B, attempt to ping the R1 G0/0 interface at IP address 209.165.200.225. The pings should be successful this time because ICMP traffic is now being inspected and legitimate return traffic is being allowed.

Part 5: Configuring DHCP, AAA, and SSH

In Part 5, you will configure ASA features, such as DHCP and enhanced login security, using AAA and SSH.

Note: You must complete Part 4 before beginning Part 5.

Step 1: Configure the ASA as a DHCP server.

The ASA can be both a DHCP server and a DHCP client. In this step, you will configure the ASA as a DHCP server to dynamically assign IP addresses for DHCP clients on the inside network.

a. Configure a DHCP address pool and enable it on the ASA inside interface. This is the range of addresses to be assigned to inside DHCP clients. Attempt to set the range from 192.168.1.5 through 192.168.1.100.

```
CCNAS-ASA(config)# dhcpd address 192.168.1.5-192.168.1.100 inside
```

Were you able to do this on this ASA?

Sí, pude configurar el servidor DHCP correctamente.

b. (Optional) Specify the IP address of the DNS server to be given to clients.

```
CCNAS-ASA(config)# dhcpd dns 209.165.201.2
```

Note: Other parameters can be specified for clients, such as WINS server, lease length, and domain name. By default, the ASA sets its own IP address as the DHCP default gateway, so there is no need to configure it. However, to manually configure the default gateway, or set it to a different networking device's IP address, use the following command:

```
CCNAS-ASA(config)# dhcpd option 3 ip 192.168.1.1
```

c. Enable the DHCP daemon within the ASA to listen for DHCP client requests on the enabled interface (inside).

```
CCNAS-ASA(config)# dhcpd enable inside
```

d. Verify the DHCP daemon configuration by using the **show run dhcpd** command.

```
CCNAS-ASA(config)# show run dhcpd
dhcpd dns 209.165.201.2
dhcpd option 3 ip 192.168.1.1
!
```

```
dhcpd address 192.168.1.5-192.168.1.100 inside
dhcpd enable inside
!
```

e. Access the Network Connection IP Properties for PC-B, and change it from a static IP address to a DHCP client so that it obtains an IP address automatically from the ASA DHCP server. The procedure to do this varies depending on the PC operating system. It may be necessary to issue the **ipconfig /renew** command on PC-B to force it to obtain a new IP address from the ASA.

Step 2: Configure AAA to use the local database for authentication.

a. Define a local user named admin by entering the **username** command. Specify a password of **admin01pass**.

```
CCNAS-ASA(config)# username admin password admin01pass
```

b. Configure AAA to use the local ASA database for SSH user authentication.

```
CCNAS-ASA(config)# aaa authentication ssh console LOCAL
```

Note: For added security, starting with ASA version 8.4(2), configure AAA authentication to support SSH connections. The Telnet/SSH default login is not supported. You can no longer connect to the ASA using SSH with the default username and the login password.

Step 3: Configure SSH remote access to the ASA.

You can configure the ASA to accept SSH connections from a single host or a range of hosts on the inside or outside network.

a. Generate an **RSA** key pair, which is required to support SSH connections. The modulus (in bits) can be 512, 768, 1024, or 2048. The larger the key modulus size you specify, the longer it takes to generate an RSA. Specify a modulus of **1024** using the **crypto key** command.

```
CCNAS-ASA(config)# crypto key generate rsa modulus 1024
INFO: The name for the keys will be: <Default-RSA-Key>
Keypair generation process begin. Please wait...
```

Note: You may receive a message that a RSA key pair is already defined. To replace the RSA key pair enter **yes** at the prompt.

b. Save the RSA keys to persistent flash memory using either the **copy run start** or **write mem** command.

```
CCNA-ASA# write mem
Building configuration...
Cryptochecksum: 43b3e351 6b3fd965 fc8c4869 b46424c8


4844 bytes copied in 0.280 secs
[OK]
```

c. Configure the ASA to allow SSH connections from any host on the inside network (192.168.1.0/24) and from the remote management host at the branch office (172.16.3.3) on the outside network. Set the SSH timeout to **10** minutes (the default is 5 minutes).

```
CCNAS-ASA(config)# ssh 192.168.1.0 255.255.255.0 inside
CCNAS-ASA(config)# ssh 172.16.3.3 255.255.255.255 outside
CCNAS-ASA(config)# ssh timeout 10
```

d. On PC-C, use an SSH client (such as PuTTY) to connect to the ASA outside interface at the IP address **209.165.200.226**. The first time you connect you may be prompted by the SSH client to accept the RSA

host key of the ASA SSH server. Log in as user **admin** and provide the password **admin01pass**. You can also connect to the ASA inside interface from a PC-B SSH client using the IP address **192.168.1.1**.

Part 6: Configuring DMZ, Static NAT, and ACLs

Previously, you configured address translation using PAT for the inside network. In this part of the lab, you will create a DMZ on the ASA, configure static NAT to a DMZ server, and apply ACLs to control access to the server.

To accommodate the addition of a DMZ and a web server, you will use another address from the ISP range assigned 209.165.200.224/29 (.224-.231). Router R1 G0/0 and the ASA outside interface are already using 209.165.200.225 and .226. You will use the public address 209.165.200.227 and static NAT to provide address translation access to the server.

Step 1: Configure the DMZ interface Gi1/3 on the ASA.

a. Configure DMZ interface Gi1/3, which is where the public access web server will reside. Assign Gi1/3 the IP address **192.168.2.1/24**, name it **dmz**, and assign a security level of **70**.

```
CCNAS-ASA(config)# int gi1/3
CCNAS-ASA(config-if)# ip address 192.168.2.1 255.255.255.0
CCNAS-ASA(config-if)# nameif dmz
INFO: Security level for "dmz" set to 0 by default.INFO: Security level for
"dmz" set to 0 by default.

CCNAS-ASA(config-if)# security-level 70
CCNAS-ASA(config-if)# no shut
```

b. Display the status for all ASA interfaces using the **show interface ip brief** command.

```
CCNAS-ASA# show int ip brief
Interface                  IP-Address      OK? Method Status
Protocol
Virtual0                   127.1.0.1       YES unset  up
up
GigabitEthernet1/1         209.165.200.226 YES manual up
up
GigabitEthernet1/2         192.168.1.1     YES manual up
up
GigabitEthernet1/3         192.168.2.1     YES manual up
up
GigabitEthernet1/4         unassigned      YES unset  administratively down
down
GigabitEthernet1/5         unassigned      YES unset  administratively down
down
GigabitEthernet1/6         unassigned      YES unset  administratively down
down
GigabitEthernet1/7         unassigned      YES unset  administratively down
down
GigabitEthernet1/8         unassigned      YES unset  administratively down
down
Management1/1            192.168.100.1   YES manual down                down
<output omitted>
```

c. Display the information for the interfaces using the **show ip address** command.

```
CCNAS-ASA# show ip address
System IP Addresses:
Interface                  Name                   IP address      Subnet mask
Method
GigabitEthernet1/1         outside                209.165.200.226
255.255.255.248 manual
GigabitEthernet1/2         inside                 192.168.1.1     255.255.255.0
manual
GigabitEthernet1/3         dmz                    192.168.2.1     255.255.255.0
manual
Management1/1              management             192.168.100.1   255.255.255.0
manual
Current IP Addresses:
Interface                  Name                   IP address      Subnet mask
Method
GigabitEthernet1/1         outside                209.165.200.226
255.255.255.248 manual
GigabitEthernet1/2         inside                 192.168.1.1     255.255.255.0
manual
GigabitEthernet1/3         dmz                    192.168.2.1     255.255.255.0
manual
Management1/1              management             192.168.100.1   255.255.255.0
manual
<output omitted>
```

Step 2: Configure static NAT to the DMZ server using a network object.

Configure a network object named **dmz-server** and assign it the static IP address of the DMZ server (**192.168.2.3**). While in object definition mode, use the **nat** command to specify that this object is used to translate a DMZ address to an outside address using static NAT, and specify a public translated address of **209.165.200.227**.

```
CCNAS-ASA(config)# object network dmz-server
CCNAS-ASA(config-network-object)# host 192.168.2.3
CCNAS-ASA(config-network-object)# nat (dmz,outside) static 209.165.200.227
```

Step 3: Configure an ACL to allow access to the DMZ server from the Internet.

Configure a named access list (**OUTSIDE-DMZ**) that permits any IP protocol from any external host to the internal IP address of the DMZ server. Apply the access list to the ASA outside interface in the **IN** direction.

```
CCNAS-ASA(config)# access-list OUTSIDE-DMZ permit ip any host 192.168.2.3
CCNAS-ASA(config)# access-group OUTSIDE-DMZ in interface outside
```

Note: Unlike IOS ACLs, the ASA ACL **permit** statement must permit access to the internal private DMZ address. External hosts access the server using its public static NAT address, the ASA translates it to the internal host IP address, and then applies the ACL.

You can modify this ACL to allow only services that you want to be exposed to external hosts, such as web (HTTP) or file transfer (FTP).

Step 4: Test access to the DMZ server.

a. Create a loopback 0 interface on Internet R2 representing an external host. Assign **Lo0** IP address **172.30.1.1** and a mask of **255.255.255.0**. Ping the DMZ server public address from R2 using the loopback interface as the source of the ping. The pings should be successful.

```
R2(config-if)# interface lo0
R2(config-if)# ip address 172.30.1.1 255.255.255.0
R2(config-if)# end
R2# ping 209.165.200.227 source lo0

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.227, timeout is 2 seconds:
Packet sent with a source address of 172.30.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

b. Clear the NAT counters using the **clear nat counters** command.

```
CCNAS-ASA# clear nat counters
```

c. Ping from PC-C to the DMZ server at the public address **209.165.200.227**. The pings should be successful.

d. Issue the **show nat** and **show xlate** commands on the ASA to see the effect of the pings. Both the PAT (inside to outside) and static NAT (dmz to outside) policies are shown.

```
CCNA-ASA# show nat

Auto NAT Policies (Section 2)
1 (dmz) to (outside) source static dmz-server 209.165.200.227
    translate_hits = 0, untranslate_hits = 4
2 (inside) to (outside) source dynamic INSIDE-NET interface
    translate_hits = 0, untranslate_hits = 0
```

Note: Pings from inside to outside are translated hits. Pings from outside host PC-C to the DMZ are considered untranslated hits.

```
CCNA-ASA# show xlate
1 in use, 6 most used
Flags: D - DNS, e - extended, I - identity, i - dynamic, r - portmap,
       s - static, T - twice, N - net-to-net
NAT from dmz:192.168.2.3 to outside:209.165.200.227
    flags s idle 0:00:02 timeout 0:00:00
```

Note: This time the flag is "**s**", which indicates a static translation.

e. You can also access the DMZ server from a host on the inside network because the ASA inside interface is set to a security level of 100 (the highest) and the DMZ interface is set to 70. The ASA acts like a router between the two networks.

Ping the DMZ server (PC-A) internal address (**192.168.2.3**) from inside network host PC-B (192.168.1.X). The pings should be successful because of the interface security level and the fact that ICMP is being inspected on the inside interface by the global inspection policy. The pings from PC-B to PC-A will not

affect the NAT translation counts because both PC-B and PC-A are behind the firewall, and no translation takes place.

f. The DMZ server cannot ping PC-B on the inside network because the DMZ interface has a lower security level.
Try to ping from the DMZ server PC-A to PC-B at IP address **192.168.1.3**. The pings should **Not** be successful.

g. Use the **show run** command to display the configuration for Gi1/3.

```
CCNAS-ASA# show run interface gi1/3
!
interface GigabitEthernet1/3
 nameif dmz
 security-level 70
 ip address 192.168.2.1 255.255.255.0
```

Note: An access list can be applied to the inside interface to control the type of access to be permitted or denied to the DMZ server from inside hosts.

Reflection

1. How does the configuration of the ASA firewall differ from that of an ISR?

Existen más características de seguridad y configuraciones predeterminadas, tales como niveles de seguridad de las interfaces, ACLs integradas, y políticas de inspección predeterminadas

2. What does the ASA use to define address translation and what is the benefit?

Los objetos y grupos permiten la creación de estructuras modulares y la configuración de atributos

3. How does the ASA 5506 use physical interfaces to manage security and how does this differ from other ASA models?

Se debe crear interfaces virtuales de capa 3 (SVI) lógicas y asignarlas a puertos en un ASA 5505, como en un switch de capa 3. Estas interfaces de VLAN de capa 3 se asignan a niveles de seguridad para controlar el tráfico de una interfaz a otra. Otros ASA pueden asignar direcciones IP y niveles de seguridad directamente a un puerto físico, como en un router ISR

Router Interface Summary Table

Router Interface Summary				
Router Model	**Ethernet Interface #1**	**Ethernet Interface #2**	**Serial Interface #1**	**Serial Interface #2**
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)

Note: To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.