1. CCNA Security

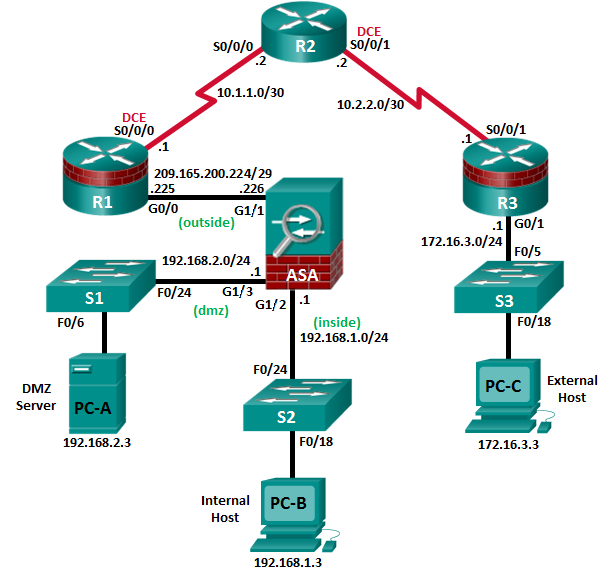
Chapter 9 Lab A: Configuring ASA Basic Settings and Firewall Using CLI (Instructor Version)

(ASA-5506 / Equiv)

**Instructor Note**: Red font color or gray highlights indicate text that appears in the instructor copy only.

|  |  |
| --- | --- |
|  | **This lab has been updated for use on NETLAB+.**  [**www.netdevgroup.com**](https://www.netdevgroup.com/) |

1. Topology



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

1. 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 |
| S0/0/0 (DCE) | 10.1.1.1 | 255.255.255.252 | N/A | N/A |
| R2 | S0/0/0 | 10.1.1.2 | 255.255.255.252 | N/A | N/A |
| S0/0/1 (DCE) | 10.2.2.2 | 255.255.255.252 | N/A | N/A |
| R3 | G0/1 | 172.16.3.1 | 255.255.255.0 | N/A | S3 F0/5 |
| S0/0/1 | 10.2.2.1 | 255.255.255.252 | N/A | N/A |
| ASA | G1/2 | 192.168.1.1 | 255.255.255.0 | NA | S2 F0/24 |
| ASA | G1/1 | 209.165.200.226 | 255.255.255.248 | NA | R1 G0/0 |
| ASA | 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 |

1. 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.

1. 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.

**Instructor Note**: Instructions for initializing the network devices are provided in the Chapter 0.0.0.0 Instructions for erasing the ASA and accessing the console are provided in this lab.

**Instructor Notes:**

* This lab is divided into six parts. Part 1 can be performed separately, but must be performed before parts 2 through 6. Part 2 uses the CLI Setup mode. Parts 3 through 6 can be performed individually or in combination with other parts as time permits, but should be performed sequentially. In some cases, a task assumes the configuration of certain features in a prior task.
* The goal is to use an ASA to implement firewall and other services that might previously have been configured on an ISR. In this lab, the student configures the most common basic ASA settings and services, such as NAT, ACL, DHCP, AAA, and SSH.
* The final running configurations for all devices are found at the end of this lab. The ASA factory default configuration is also provided.

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.

* + 1. Configure basic settings for routers and switches.
       1. Configure hostnames as shown in the topology for each router.
       2. Configure router interface IP addresses as shown in the IP Addressing Table.
       3. 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**

* + - 1. 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.
    1. Configure static routing on the routers.
       1. 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**

* + - 1. 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**

* + 1. 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.

* + - 1. 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**

* + - 1. Configure a minimum password length of 10 characters using the **security passwords** command.

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

* + - 1. Configure a domain name.

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

* + - 1. Configure crypto keys for SSH.

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

* + - 1. 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**

* + - 1. 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**

* + - 1. 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**

* + - 1. Configure the enable password with strong encryption.

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

* + 1. 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.

* + 1. 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.

* + 1. Save the basic running configuration for each router and switch.

1. 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.

* + 1. Access the ASA console.
       1. 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)

* + 1. 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?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA in this lab uses version 9.8(2).

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The system image file in the ASA for this lab is asa982-lfbff-k8.SPA, and it was loaded from disk0: (or flash:).

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA in this lab uses ASDM version 7.8(1).

How much RAM does this ASA have?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA in this lab has 4 GB RAM.

How much flash memory does this ASA have?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA in this lab has 8 GB Flash

How many network ports does this ASA have?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA in this lab has eight ports and one management interface.

What type of license does this ASA have?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The ASA has either Base or the Security Plus license.

How many VLANs can be created with this license?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Five VLANs can be created with the Base license or 30 with the Security Plus license.

* + 1. Determine the file system and contents of flash memory.
       1. 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:

* + - 1. Display the contents of flash memory using one of these commands: **show flash**, **show disk0**, **dir flash:**, or **dir disk0:**.
      2. ciscoasa# **show flash**

--#-- --length-- -----date/time------ path

1. 33 Nov 29 2017 10:34:52 .boot\_string

11 4096 Jan 09 2016 19:43:02 log

1. 65486 Nov 29 2017 11:28:45 log/asa-appagent.log

20 4096 Jan 09 2016 19:43:52 crypto\_archive

1. 4096 Jan 09 2016 19:43:56 coredumpinfo
2. 59 Jan 09 2016 19:43:56 coredumpinfo/coredump.cfg
3. 08563072 Nov 24 2017 14:55:22 asa982-lfbff-k8.SPA
4. 5209829 Oct 17 2017 21:50:48 anyconnect-win-4.5.02033-webdeploy-k9.pkg
5. 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

**Instructor Note:** Check the contents of flash memory occasionally to see if there are many upgrade\_startup\_error log files. The ASA generates these as a result of erasing the startup config. You can delete the log files by issuing the command **del flash:upgrade\_startup\_errors\*** from the Enable prompt and pressing **Enter** at each prompt.

ciscoasa # **del flash:upgrade\_startup\_errors\***

Delete filename [upgrade\_startup\_errors\*]?

Delete disk0:/upgrade\_startup\_errors\_201109141157.log? [confirm] <**Enter**>

Delete disk0:/upgrade\_startup\_errors\_201109141224.log? [confirm] <**Enter**>

<output omitted>

* + 1. 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 particular 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.

* + 1. 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>

* + 1. 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.

* + - 1. Enter privileged EXEC mode with the **enable** command. Enter **class** for the password.
      2. Issue the **show run** command to see the additional security-related configuration commands that are inserted by the ASA.
      3. Issue the **copy run start** command to capture the additional security-related commands in the startup-config file.

1. 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.

* + 1. Configure the hostname and domain name.
       1. 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".

* + - 1. Configure the ASA hostname using the **hostname** command.

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

* + - 1. Configure the domain name using the **domain-name** command.

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

* + 1. Configure the login and enable mode passwords.
       1. 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**

* + - 1. Configure the privileged EXEC mode (enable) password using the **enable password** command.

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

* + 1. 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**

* + 1. 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.

* + - 1. 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**

* + - 1. 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.

* + - 1. 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>

* + - 1. 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

* + - 1. 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

* + - 1. 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

* + 1. Test connectivity to the ASA.
       1. 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).
       2. 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

* + - 1. 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.
    1. Configure ASDM access to the ASA.
       1. 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**

* + - 1. 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:** You will need to accept all security messages and/or add the ASA IP address to the allowed list of IP addresses in Java.

If the “*Run ASDM*” button via Java is not accessible, access your ASA via **https://<ip\_address>/admin/public/asdm.jnlp** to download the JNLP file and then open the file to continue using ASDM.

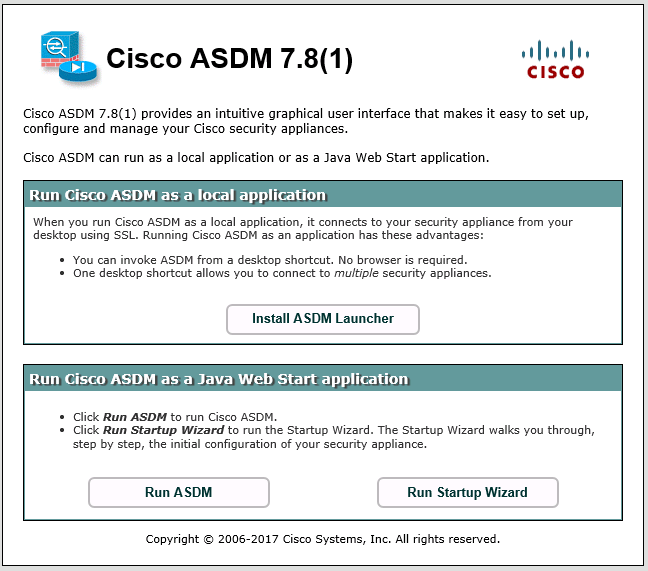
Access the Windows Control Panel and click **Java**.

In the Java Control Panel, select **Security** tab. Click **Edit Site List**.

In the Exception Site list, click **Add**. In the Location field, type **https://192.168.1.1**.

Click **OK** to add the IP address.

Verify that the IP address has been added. Click **OK** to accept the changes.



* + - 1. 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.

1. 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.

* + 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.

* + - 1. Ping from the ASA to R1 G0/0 at IP address 209.165.200.225. Was the ping successful?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Yes, 209.165.200.224/248 is a directly connected network for both R1 and the ASA.

* + - 1. Ping from the ASA to R1 S0/0/0 at IP address 10.1.1.1. Was the ping successful?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

No, the ASA does not have a route to 10.1.1.0/30.

* + - 1. 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**

* + - 1. 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

* + - 1. Ping from the ASA to R1 S0/0/0 IP address 10.1.1.1. Was the ping successful?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Yes. The ASA now has a default route to unknown networks.

* + 1. Configure address translation using PAT and network objects.

**Instructor Notes:**

**Pre-ASA 8.3 NAT configuration:**

Prior to ASA version 8.3, NAT configuration from the CLI was the same as the older PIX firewalls. Configuration was performed using the **nat**, **global**,and **static** commands. These commands have been deprecated with 8.3 and newer versions and are no longer supported, with the exception of the **nat** command under certain circumstances.

An example of configuring PAT using the old commands is presented here for historical reference. In the example, inside addresses from the 192.168.1.0/24 network are being translated using the address of the outside interface.

If you use the older commands as shown in the example with ASA version 8.3 and newer you will receive the error result shown here.

CCNAS-ASA(config)# **nat (inside) 1 192.168.10.0 255.255.255.0**

ERROR: This syntax of nat command has been deprecated.

Please refer to "help nat" command for more details.

CCNAS-ASA(config)# global (outside) 1 interface

ERROR: This syntax of nat command has been deprecated.

Please refer to "help nat" command for more details.

**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.

* + - 1. 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**

* + - 1. 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

* + - 1. 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.
      2. 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

* + - 1. 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).

* + - 1. 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.
      2. On the ASA, reissue the **show nat** and **show xlate** commands to see the hits and addresses being translated for the HTTP connection.
    1. 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.
  + - 1. 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>

* + - 1. 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**

* + - 1. 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

!

* + - 1. 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.

1. 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.

* + 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.

* + - 1. 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?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Yes.

* + - 1. (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**

* + - 1. Enable the DHCP daemon within the ASA to listen for DHCP client requests on the enabled interface (inside).

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

* + - 1. 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

!

* + - 1. 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.
    1. Configure AAA to use the local database for authentication.
       1. Define a local user named admin by entering the **username** command. Specify a password of **admin01pass**.

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

* + - 1. 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.

* + 1. 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.

* + - 1. 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.

* + - 1. 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]

* + - 1. 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**

* + - 1. 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**.

1. 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.

* + 1. Configure the DMZ interface Gi1/3 on the ASA.
       1. 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**

* + - 1. 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>

* + - 1. 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>

* + 1. 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**

* + 1. 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).

* + 1. Test access to the DMZ server.
       1. 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

* + - 1. Clear the NAT counters using the **clear nat counters** command.

CCNAS-ASA# **clear nat counters**

* + - 1. Ping from PC-C to the DMZ server at the public address **209.165.200.227**. The pings should be successful.
      2. 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.

* + - 1. 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.

* + - 1. 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.
      2. 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.

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

There are more security features and default settings, such as interface security levels, built-in ACLs, and default inspection policies.

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Objects and groups allow the creation of modular structures and the configuration of attributes.

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

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

The 5506 ASA can assign IP addresses and security levels directly to a physical port like an ISR.

The older 5505 ASAs must create logical L3 SVIs and assign them to ports, like an L3 switch.

**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. | | | | |

1. Device Configs

**Note**: ISR G2 devices have GigabitEthernet interfaces instead of FastEthernet Interfaces.

1. ASA 5506 Final Config
2. CCNA-ASA# show run
3. : Saved
4. :
5. : Serial Number: JAD2002064E
6. : Hardware: ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4 cores)
7. :
8. ASA Version 9.8(2)
9. !
10. hostname CCNA-ASA
11. domain-name ccnasecurity.com
12. enable password $sha512$5000$u/roJBYuwUQD6fM12q4fVQ==$P/yQ1z0JoX1EiF3OAWGnqg== pbkdf2
13. xlate per-session deny tcp any4 any4
14. xlate per-session deny tcp any4 any6
15. xlate per-session deny tcp any6 any4
16. xlate per-session deny tcp any6 any6
17. xlate per-session deny udp any4 any4 eq domain
18. xlate per-session deny udp any4 any6 eq domain
19. xlate per-session deny udp any6 any4 eq domain
20. xlate per-session deny udp any6 any6 eq domain
21. passwd 2KFQnbNIdI.2KYOU encrypted
22. names
23. !
24. interface GigabitEthernet1/1
25. nameif outside
26. security-level 0
27. ip address 209.165.200.226 255.255.255.248
28. !
29. interface GigabitEthernet1/2
30. nameif inside
31. security-level 100
32. ip address 192.168.1.1 255.255.255.0
33. !
34. interface GigabitEthernet1/3
35. nameif dmz
36. security-level 70
37. ip address 192.168.2.1 255.255.255.0
38. !
39. interface GigabitEthernet1/4
40. shutdown
41. no nameif
42. no security-level
43. no ip address
44. !
45. interface GigabitEthernet1/5
46. shutdown
47. no nameif
48. no security-level
49. no ip address
50. !
51. interface GigabitEthernet1/6
52. shutdown
53. no nameif
54. no security-level
55. no ip address
56. !
57. interface GigabitEthernet1/7
58. shutdown
59. no nameif
60. no security-level
61. no ip address
62. !
63. interface GigabitEthernet1/8
64. shutdown
65. no nameif
66. no security-level
67. no ip address
68. !
69. interface Management1/1
70. management-only
71. nameif management
72. security-level 0
73. ip address 192.168.100.1 255.255.255.0
74. !
75. ftp mode passive
76. dns server-group DefaultDNS
77. domain-name ccnasecurity.com
78. object network INSIDE-NET
79. subnet 192.168.1.0 255.255.255.0
80. object network dmz-server
81. host 192.168.2.3
82. access-list OUTSIDE-DMZ extended permit ip any host 192.168.2.3
83. pager lines 24
84. mtu management 1500
85. mtu inside 1500
86. mtu outside 1500
87. mtu dmz 1500
88. icmp unreachable rate-limit 1 burst-size 1
89. no asdm history enable
90. arp timeout 14400
91. no arp permit-nonconnected
92. arp rate-limit 16384
93. !
94. object network INSIDE-NET
95. nat (inside,outside) dynamic interface
96. object network dmz-server
97. nat (dmz,outside) static 209.165.200.227
98. access-group OUTSIDE-DMZ in interface outside
99. route outside 0.0.0.0 0.0.0.0 209.165.200.225 1
100. timeout xlate 3:00:00
101. timeout pat-xlate 0:00:30
102. timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 sctp 0:02:00 icmp 0:00:02
103. timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
104. timeout sip 0:30:00 sip\_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
105. timeout sip-provisional-media 0:02:00 uauth 0:05:00 absolute
106. timeout tcp-proxy-reassembly 0:01:00
107. timeout floating-conn 0:00:00
108. timeout conn-holddown 0:00:15
109. timeout igp stale-route 0:01:10
110. user-identity default-domain LOCAL
111. aaa authentication ssh console LOCAL
112. aaa authentication login-history
113. http server enable
114. http 192.168.1.0 255.255.255.0 inside
115. no snmp-server location
116. no snmp-server contact
117. service sw-reset-button
118. crypto ipsec security-association pmtu-aging infinite
119. crypto ca trustpool policy
120. telnet timeout 5
121. ssh stricthostkeycheck
122. ssh 192.168.1.0 255.255.255.0 inside
123. ssh 172.16.3.3 255.255.255.255 outside
124. ssh timeout 10
125. ssh key-exchange group dh-group1-sha1
126. console timeout 0
127. dhcpd dns 209.165.201.2
128. dhcpd option 3 ip 192.168.1.1
129. !
130. dhcpd address 192.168.1.5-192.168.1.100 inside
131. dhcpd enable inside
132. !
133. threat-detection basic-threat
134. threat-detection statistics access-list
135. no threat-detection statistics tcp-intercept
136. dynamic-access-policy-record DfltAccessPolicy
137. username admin password $sha512$5000$xdxP5F+5rbyhJFtjBs/fyw==$iwusJdax6/MZXcS032h4FQ== pbkdf2
138. !
139. class-map inspection\_default
140. match default-inspection-traffic
141. !
142. policy-map type inspect dns preset\_dns\_map
143. parameters
144. message-length maximum client auto
145. message-length maximum 512
146. no tcp-inspection
147. policy-map global\_policy
148. class inspection\_default
149. inspect ftp
150. inspect h323 h225
151. inspect h323 ras
152. inspect ip-options
153. inspect netbios
154. inspect rsh
155. inspect rtsp
156. inspect skinny
157. inspect esmtp
158. inspect sqlnet
159. inspect sunrpc
160. inspect tftp
161. inspect sip
162. inspect xdmcp
163. inspect dns preset\_dns\_map
164. inspect icmp
165. policy-map type inspect dns migrated\_dns\_map\_2
166. parameters
167. message-length maximum client auto
168. message-length maximum 512
169. no tcp-inspection
170. policy-map type inspect dns migrated\_dns\_map\_1
171. parameters
172. message-length maximum client auto
173. message-length maximum 512
174. no tcp-inspection
175. !
176. service-policy global\_policy global
177. prompt hostname context
178. no call-home reporting anonymous
179. call-home
180. profile CiscoTAC-1
181. no active
182. destination address http https://tools.cisco.com/its/service/oddce/services/DDCEService
183. destination address email callhome@cisco.com
184. destination transport-method http
185. subscribe-to-alert-group diagnostic
186. subscribe-to-alert-group environment
187. subscribe-to-alert-group inventory periodic monthly
188. subscribe-to-alert-group configuration periodic monthly
189. subscribe-to-alert-group telemetry periodic daily
190. Cryptochecksum:2874abed9144c0623214f84755749a67
191. : end
192. Router R1

R1# **show run**

Building configuration...

Current configuration : 2092 bytes

!

! Last configuration change at 15:20:30 UTC Mon Jan 5 2015

!

version 15.4

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R1

!

boot-start-marker

boot-end-marker

!

security passwords min-length 10

enable secret 9 $9$PETYP6OCQskm/U$owkftniLc75J9F5vcFRtCAz.I0DO56yEw.pLVqbbVVM

!

no aaa new-model

memory-size iomem 15

!

ip domain name ccnasecurity.com

ip cef

no ipv6 cef

!

multilink bundle-name authenticated

!

cts logging verbose

!

voice-card 0

!

license udi pid CISCO2911/K9 sn FTX1713ALKC

license accept end user agreement

license boot module c2900 technology-package securityk9

license boot module c2900 technology-package uck9

license boot module c2900 technology-package datak9

!

username admin01 secret 9 $9$2MQQ/afWI/FPe.$udkJcdAwonEatM5FLu3kX5sK908CJc8v0K9oKRi0jNc

!

redundancy

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

ip address 209.165.200.225 255.255.255.248

duplex auto

speed auto

!

interface GigabitEthernet0/1

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/2

no ip address

shutdown

duplex auto

speed auto

!

interface Serial0/0/0

ip address 10.1.1.1 255.255.255.252

clock rate 128000

!

interface Serial0/0/1

no ip address

shutdown

!

ip forward-protocol nd

!

ip http server

no ip http secure-server

!

ip route 0.0.0.0 0.0.0.0 Serial0/0/0

!

control-plane

!

mgcp behavior rsip-range tgcp-only

mgcp behavior comedia-role none

mgcp behavior comedia-check-media-src disable

mgcp behavior comedia-sdp-force disable

!

mgcp profile default

!

gatekeeper

shutdown

!

line con 0

exec-timeout 5 0

logging synchronous

login local

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

exec-timeout 5 0

login local

transport input ssh

!

scheduler allocate 20000 1000

!

end

1. Router R2

R2# **show run**

Building configuration...

Current configuration : 1870 bytes

!

! Last configuration change at 13:00:00 UTC Wed Nov 29 2017

!

version 15.4

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R2

!

boot-start-marker

boot-end-marker

!

no aaa new-model

memory-size iomem 15

!

ip cef

no ipv6 cef

!

multilink bundle-name authenticated

!

cts logging verbose

!

voice-card 0

!

license udi pid CISCO2911/K9 sn FTX1713ALJP

license boot module c2900 technology-package securityk9

license boot module c2900 technology-package uck9

license boot module c2900 technology-package datak9

!

redundancy

!

interface Loopback0

ip address 172.30.1.1 255.255.255.0

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/1

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/2

no ip address

shutdown

duplex auto

speed auto

!

interface Serial0/0/0

ip address 10.1.1.2 255.255.255.252

!

interface Serial0/0/1

ip address 10.2.2.2 255.255.255.252

clock rate 128000

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

ip route 172.16.3.0 255.255.255.0 Serial0/0/1

ip route 209.165.200.224 255.255.255.248 Serial0/0/0

!

control-plane

!

mgcp behavior rsip-range tgcp-only

mgcp behavior comedia-role none

mgcp behavior comedia-check-media-src disable

mgcp behavior comedia-sdp-force disable

!

mgcp profile default

!

gatekeeper

shutdown

!

line con 0

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

login

transport input none

!

scheduler allocate 20000 1000

!

end

1. Router R3

R3# **show run**

Building configuration...

Current configuration : 1821 bytes

!

! Last configuration change at 15:13:52 UTC Mon Jan 5 2015

!

version 15.4

service timestamps debug datetime msec

service timestamps log datetime msec

no service password-encryption

!

hostname R3

!

boot-start-marker

boot-end-marker

!

no aaa new-model

memory-size iomem 15

!

ip cef

no ipv6 cef

!

multilink bundle-name authenticated

!

cts logging verbose

!

voice-card 0

!

license udi pid CISCO2911/K9 sn FTX1713ALJV

license accept end user agreement

license boot module c2900 technology-package securityk9

license boot module c2900 technology-package uck9

license boot module c2900 technology-package datak9

!

vtp domain TSHOOT

vtp mode transparent

!

redundancy

!

interface Embedded-Service-Engine0/0

no ip address

shutdown

!

interface GigabitEthernet0/0

no ip address

shutdown

duplex auto

speed auto

!

interface GigabitEthernet0/1

ip address 172.16.3.1 255.255.255.0

duplex auto

speed auto

!

interface GigabitEthernet0/2

no ip address

shutdown

duplex auto

speed auto

!

interface Serial0/0/0

no ip address

shutdown

clock rate 125000

!

interface Serial0/0/1

ip address 10.2.2.1 255.255.255.252

!

ip forward-protocol nd

!

no ip http server

no ip http secure-server

!

ip route 0.0.0.0 0.0.0.0 Serial0/0/1

!

control-plane

!

mgcp behavior rsip-range tgcp-only

mgcp behavior comedia-role none

mgcp behavior comedia-check-media-src disable

mgcp behavior comedia-sdp-force disable

!

mgcp profile default

!

gatekeeper

shutdown

!

line con 0

line aux 0

line 2

no activation-character

no exec

transport preferred none

transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh

stopbits 1

line vty 0 4

login

transport input none

!

scheduler allocate 20000 1000

!

end

1. Switches S1, S2, and S3 – Use default configs, except for host name