11.3.1.2 Lab – CCNA Security ASA 5506-X Comprehensive Answers

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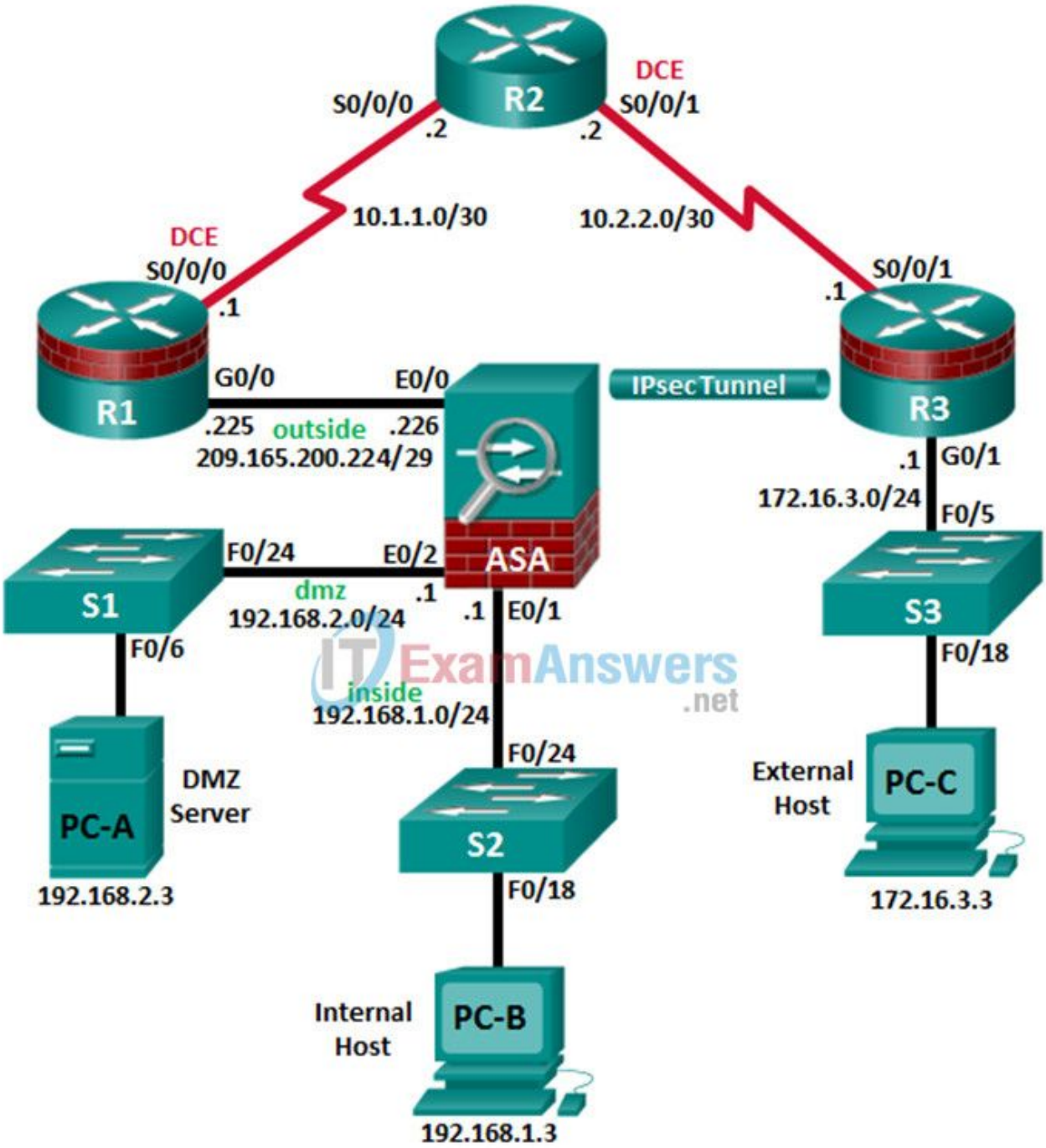
Contents

11.3.1.2 Lab – CCNA Security ASA 5506-X Comprehensive (Instructor Version)

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

Topology



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
R1	S0/0/0 (DCE)	10.1.1.1	255.255.255.252	N/A	N/A

Device	Interface	IP Address	Subnet Mask	Default Gateway	Switch Port
R2	S0/0/0	10.1.1.2	255.255.255.252	N/A	N/A
R2	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
R3	S0/0/1	10.2.2.1	255.255.255.252	N/A	N/A
ASA	G1/1 (outside)	209.165.200.226	255.255.255.248	NA	R1 G0/0
ASA	G1/2 (inside)	192.168.1.1	255.255.255.0	NA	S2 F0/24
ASA	G1/3 (dmz)	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: Create a Basic Technical Security Policy
Part 2: Configure Basic Device Settings
Part 3: Configure Secure Router Administrative Access

- Configure encrypted passwords and a login banner.
- Configure the EXEC timeout value on console and VTY lines.
- Configure login failure rates and VTY login enhancements.
- Configure Secure Shell (SSH) access and disable Telnet.
- Configure local authentication, authorization, and accounting (AAA) user authentication.
- Secure the router against login attacks, and secure the IOS image and the configuration
- Configure a router NTP server and router NTP clients.
- Configure router syslog reporting and a syslog server on a local host.

Part 4: Configure a Zone-Based Policy Firewall and Intrusion Prevention System

- Configure a Zone-Based Policy Firewall (ZPF) on an ISR using the CLI.
- Configure an intrusion prevention system (IPS) on an ISR using the CLI.

Part 5: Secure Network Switches

- Configure passwords and a login banner.
- Configure management VLAN access.
- Secure access ports.
- Protect against Spanning Tree Protocol (STP) attacks.
- Configure port security and disable unused ports.

Part 6: Configure ASA Basic Settings and Firewall

- Configure basic settings, passwords, date, and time.
- Configure the inside and outside interfaces.
- Configure port address translation (PAT) for the inside network.
- Configure a Dynamic Host Configuration Protocol (DHCP) server for the inside network.
- Configure administrative access via Telnet and SSH.
- Configure a static default route for the Adaptive Security Appliance (ASA).
- Configure Local AAA user authentication.
- Configure a DMZ with a static NAT and ACL.
- Verify address translation and firewall functionality.

Part 7 Configure a DMZ, Static NAT, and ACLs on an ASA

Part 8: Configure ASA Clientless SSL VPN Remote Access Using ASDM

- Configure a remote access SSL VPN using the Cisco Adaptive Security Device Manager (ASDM).
- Verify SSL VPN access to the portal.

Part 9: Configure a Site-to-Site VPN between the ASA and ISR

- Configure an IPsec site-to-site VPN between the ASA and R3 using ASDM and the CLI.
- Activate and verify the IPsec site-to-site VPN tunnel between the ASA and R3.

Background/Scenario

This comprehensive lab is divided into nine parts. The parts should be completed sequentially. In Part 1, you will create a basic technical security policy. In Part 2, you will configure the basic device settings. In Part 3, you will secure a network router using the command-line interface (CLI) to configure IOS features, including AAA and SSH. In Part 4, you will configure a ZPF and IPS on an ISR. In Part 5, you will configure a network switch using the CLI. In Parts 7 and 8, you will configure the ASA firewall functionality and clientless SSL VPN remote access. In Part 9, you will configure a site-to-site VPN between the ASA and R3.

Note: The router commands and output in this lab are from a Cisco 1941 router with Cisco IOS Release 15.4(3)M2 (with a Security Technology Package license). The switch commands and output are from Cisco WS-C2960-24TT-L switches with Cisco IOS Release 15.0(2)SE4 (C2960-LANBASEK9-M image). Other routers, switches, and Cisco IOS versions can be used. See the Router Interface Summary Table at the end of the lab to determine which interface identifiers to use based on the equipment in the lab. Depending on the router, or switch model and Cisco IOS version, the commands available and the output produced might vary from what is shown in this lab.

The ASA used with this lab is a Cisco model 5506-X with an 8-port integrated switch, running OS version 9.10(1), Adaptive Security Device Manager (ASDM) version 7.10(1), and comes with a Base license that allows a maximum of five VLANs.

Note: Before beginning, ensure that the ASA, routers and switches have been erased and have no startup configurations.

Instructor Note: Instructions for initializing the ASA, switches, and routers are provided in Chapter 0.0.0.0.

Required Resources

- 3 Routers (Cisco 1941 with Cisco IOS Release 15.4(3)M2 image with a Security Technology Package license)
- 3 Switches (Cisco 2960 with cryptography IOS image for SSH support – Release 15.0(2)SE7 or comparable)
- 1 ASA 5506-X (OS version 10(1) and ASDM version 7.10(1) and Base license or comparable)
- 3 PCs (Windows, SSH Client,TFTP Server, Syslog Server, and Java version compatible with installed ASDM version)
- Serial and Ethernet cables, as shown in the topology
- Console cables to configure Cisco networking devices

Part 1: Create a Basic Technical Security Policy (Chapters 1 and 11)

In Part 1, you will create a Network Device Security Guidelines document that can serve as part of a comprehensive network security policy. This document addresses specific router and switch security measures and describes the security requirements to be implemented on the infrastructure equipment.

Task 1: Identify Potential Sections of a Basic Network Security Policy.

A network security policy should include several key sections that can address potential issues for users, network access, device access, and other areas. List some key sections you think could be part of a basic security policy.

Answers will vary but could include the following:
• Introduction
• Acceptable Use Policy
• E-mail and Communications Activities
• Antivirus Policy
• Identity Policy
• Password Policy
• Encryption Policy
• Remote Access Policy
• Virtual Private Network (VPN) Policy
• Extranet Policy
• Device Management Policy
• Physical Device Security Policy

Task 2: Create a "Network Equipment Security Guidelines" Document As a Supplement to a Basic Security Policy

Step 1: Review the objectives from previous CCNA Security labs.

a. Open each of the labs completed from chapters 1 to 9, and review the objectives listed for each one.

b. Copy the objectives to a separate document and use it as a starting point. Focus on the objectives that involve security practices and device configuration.

Step 2: Create a "Network Device Security Guidelines" document for router and switch security.

Create a high-level list of tasks to include for network access and device security. This document should reinforce and supplement the information presented in a basic security policy. It is based on the content of previous CCNA Security labs and on the networking devices present in the course lab topology.

Note: The "Network Device Security Guidelines" document should be no more than two pages, and will be the basis for the equipment configuration in the remaining parts of the lab.

Step 3: Submit the "Network Device Security Guidelines" to your instructor.

Provide the "Network Device Security Guidelines" document to your instructor for review before starting Part 2 of this lab. You can send the document as an e-mail attachment or put it on removable storage media, such as a flash drive.

Instructor Note: The following is an example of how the "Network Device Security Guidelines" document might look. Ensure that the students have addressed the categories and steps shown here.

Technical Policies Supplement to Security Policies
Network Device Security Guidelines

Unless otherwise indicated, these policy guidelines apply to all primary network devices, such as switches and routers.

Router Administrative Access

The following steps must be taken to secure and harden routers:

1) Configure the enable secret, console, and VTY passwords.
2) Encrypt all passwords with the highest level of encryption available. Passwords should be a minimum of 10 characters and include a combination of uppercase letters, lowercase letters, numbers, and special characters.
3) Configure a login banner that warns unauthorized users of the penalties of accessing this device.
4) Configure a local database administrative user with privilege level 15 and a secret password.
5) Configure an SSH server and disable Telnet access.
6) Configure a centralized synchronized time source using NTP with authentication.
7) Configure syslog support on edge routers.
8) Enable HTTP secure server for web-based access.
9) Configure centralized authentication for each site using AAA and RADIUS.
10) Disable unnecessary services.
11) Configure static routing between edge routers and the ISP.

Router Firewalls and Intrusion Prevention

Configure a ZPF on edge routers. The firewall must allow external SSH connections, VPN traffic, and NTP.

Configure a Cisco IOS IPS on the internal and external interfaces of the edge router.

Switch Security Measures

The following steps should be taken to secure and harden switches:

1) Configure the enable secret, console, and VTY passwords.
2) Encrypt all passwords with the highest level of encryption available. Passwords should be a minimum of 10 characters and include a combination of uppercase letters, lowercase letters, numbers, and special characters.
3) Configure a login banner that warns unauthorized users of the penalties of accessing this device.
4) Configure a local database administrative user with privilege level 15 and a secret password.
5) Configure NTP with authentication to access a centralized synchronized time source.
6) Configure an SSH server and disable Telnet access.

7) Disable the HTTP server.
8) Configure centralized authentication using AAA and RADIUS.
9) Configure forced trunking mode on trunk ports.
10) Change the native VLAN for trunk ports to an unused VLAN.
11) Enable storm control for broadcasts.
12) Configure all active non-trunk ports as access ports.
13) Enable PortFast, BPDU guard, and loop guard on appropriate active ports.
14) Configure port security.
15) Disable unused ports.

Device Operating System and Configuration File Security

1) Back up the device's IOS images to a TFTP server.
2) Back up the device's running configs to a TFTP server.
3) Secure the Cisco IOS image and configuration files.

VPN Remote Access

1) Configure corporate router support for remote access IPsec VPN connections.
2) Provide the Cisco VPN Client on external hosts.

Part 2: Configure Basic Device Settings (Chapters 2 and 6)

Step 1: Cable the network as shown in the topology.

Attach the devices, as shown in the topology diagram, and cable as necessary.

Step 2: Configure basic settings for all routers.

a. Configure hostnames, as shown in the topology.

b. Configure the interface IP addresses, as shown in the IP addressing table.

c. Configure a serial interface DCE clock rate of 128000 for the routers, if using routers other than those specified with this lab.

Instructor Note: The Cisco ISR 1941 IOS and WICs used in this lab will auto configure the clock rate on serial DCE interfaces and set it to 2000000.

d. Disable DNS lookup on each router.

```
R1(config)# no ip domain-lookup
```

Step 3: Configure static default routes on R1 and R3 and static routes on R2.

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 10.1.1.2

R3(config)# ip route 0.0.0.0 0.0.0.0 10.2.2.2
```

b. Configure static routes from R2 to the R1 outside network (209.165.200.224/29) and from R2 to the R3 LAN.

```
R2(config)# ip route 209.165.200.224 255.255.255.248 10.1.1.1
R2(config)# ip route 172.16.3.0 255.255.255.0 10.2.2.1
```

Step 4: Configure basic settings for each switch.

a. Configure hostnames, as shown in the topology.

b. Configure the VLAN 1 management address on each switch, as shown in the IP Addressing table.

```
S1(config)# interface vlan 1
S1(config)# ip address 192.168.2.11 255.255.255.0
S1(config)# no shutdown

S2(config)# interface vlan 1
S2(config)# ip address 192.168.1.11 255.255.255.0
S2(config)# no shutdown

S3(config)# interface vlan 1
S3(config)# ip address 172.16.3.11 255.255.255.0
S3(config)# no shutdown
```

c. Configure the IP default gateway for each of the three switches.

```
S1(config)# ip default-gateway 192.168.2.1

S2(config)# ip default-gateway 192.168.1.1

S3(config)# ip default-gateway 172.16.3.1
```

d. Disable DNS lookup on each switch.

```
S1(config)# no ip domain-lookup
```

Step 5: Configure PC host IP settings.

Configure a static IP address, subnet mask, and default gateway for each PC, as shown in the IP Addressing table.

Step 6: Verify connectivity between PC-C and R1 G0/0.

```
PC-C:\> ping 209.165.200.225
Pings should be successful.
```

Step 7: Save the basic running configuration for each router and switch.

Part 3: Configure Secure Router Administrative Access (Chapters 2 and 3)

You will use the CLI to configure passwords and device access restrictions.

Task 1: Configure Settings for R1 and R3.

Step 1: Configure a minimum password length of 10 characters.

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

Step 2: Encrypt plaintext passwords.

```
R1(config)# service password-encryption
```

Step 3: Configure a login warning banner.

Configure a warning to unauthorized users with a message-of-the-day (MOTD) banner that says: Unauthorized access strictly prohibited and prosecuted to the full extent of the law!.

```
R1(config)# banner motd $Unauthorized access strictly prohibited!$
```

Step 4: Configure the enable secret password.

Use cisco12345 as the enable secret password. Use the strongest encryption type available.

```
R1(config)# enable algorithm-type scrypt secret cisco12345
```

Step 5: Configure the local user database.

Create a local user account of Admin01 with a secret password of Admin01pa55 and a privilege level of 15. Use the strongest encryption type available.

```
R1(config)# username Admin01 privilege 15 algorithm-type scrypt secret Admin01pa55
```

Step 6: Enable AAA services.

```
R1(config)# aaa new-model
```

Step 7: Implement AAA services using the local database.

Create the default login authentication method list. Use case-sensitive local authentication as the first option and the enable password as the backup option to be used if an error occurs in relation to local authentication.

```
R1(config)# aaa authentication login default local-case enable
```

Step 8: Configure the console line.

Configure the console line for privilege level 15 access on login. Set the exec-timeout value to log out after 15 minutes of inactivity. Prevent console messages from interrupting command entry.

```
R1(config)# line con 0
R1(config-line)# privilege level 15
R1(config-line)# exec-timeout 15 0
R1(config-line)# logging synchronous
```

Step 9: Configure the VTY lines.

Configure the VTY lines for privilege level 15 access on login. Set the exec-timeout value to log out a session after 15 minutes of inactivity. Allow for remote access using SSH only.

```
R1(config)# line vty 0 4
R1(config-line)# privilege level 15
R1(config-line)# exec-timeout 15 0
R1(config-line)# transport input ssh
```

Step 10: Configure the router to log login activity.

a. Configure the router to generate system logging messages for successful and failed login attempts. Configure the router to log every successful login. Configure the router to log every second failed login attempt.

```
R1(config)# login on-success log
R1(config)# login on-failure log every 2
R1(config)# exit
```

b. Issue the show login command. What additional information is displayed?

```
No login delay has been applied.
No Quiet-Mode access list has been configured.
All successful login is logged.
Every 2 failed login is logged.

Router NOT enabled to watch for login Attacks
```

Step 11: Enable HTTP access.

a. Enable the HTTP server on R1 to simulate an Internet target for later testing.

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

b. Configure HTTP authentication to use the local user database on R1.

```
R1(config)# ip http authentication local
```

Task 2: Configure the SSH Server on R1 and R3

Step 1: Configure the domain name.

Configure a domain name of ccnasecurity.com.

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

Step 2: Generate the RSA encryption key pair.

Configure the RSA keys with 1024 as the number of modulus bits.

```
R1(config)# crypto key generate rsa general-keys modulus 1024
The name for the keys will be: R1.ccnasecurity.com
% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]
R1(config)#
*Nov 29 19:08:58.215: %SSH-5-ENABLED: SSH 1.99 has been enabled
```

Step 3: Configure the SSH version.

Specify that the router accept only SSH version 2 connections.

```
R1(config)# ip ssh version 2
```

Step 4: Configure SSH timeouts and authentication parameters.

The default SSH timeouts and authentication parameters can be altered to be more restrictive. Configure SSH timeout to 90 seconds and the number of authentication attempts to 2.

```
R1(config)# ip ssh time-out 90
R1(config)# ip ssh authentication-retries 2
```

Step 5: Verify SSH connectivity to R1 from PC-C.

a. Launch the SSH client on PC-C, enter the R1 S0/0/0 IP address (10.1.1.1), and log in as Admin01 with the password Admin01pa55. If prompted by the SSH client with a security alert regarding the server's host key, click Yes.

b. Issue the show run command from the SSH session on PC-C. The configuration for R1 should be displayed.

Task 3: Secure against Login Attacks and Secure the IOS and Configuration File on R1

Step 1: Configure enhanced login security.

If a user experiences two failed login attempts within a 30-second time span, disable logins for 1 minute. Log all failed login attempts.

```
R1(config)# login block-for 60 attempts 2 within 30
R1(config)# login on-failure log
```

Step 2: Secure the Cisco IOS image and archive a copy of the running configuration.

a. The secure boot-image command enables Cisco IOS image resilience, which hides the file from the dir and show commands. The file cannot be viewed, copied, modified, or removed using EXEC mode commands. (It can be viewed in ROMMON mode.)

```
R1(config)# secure boot-image
.Dec 17 25:40:13.170: %IOS_RESILIENCE-5-IMAGE_RESIL_ACTIVE: Successfully secured
running image
```

b. The secure boot-config command takes a snapshot of the router running configuration and securely archives it in persistent storage (flash).

```
R1(config)# secure boot-config
*Apr 25 05:08:39.247: %IOS_RESILIENCE-5-CONFIG_RESIL_ACTIVE: Successfully secured
config archive [flash:.runcfg-20140425-050838.ar]
```

Step 3: Verify that your image and configuration are secured.

a. You can use only the show secure bootset command to display the archived filename. Display the status of configuration resilience and the primary bootset filename.

```
R1# show secure bootset
IOS resilience router id FTX1205Y0PT

IOS image resilience version 15.1 activated at 05:08:30 UTC Fri Apr 25 2014
Secure archive flash:c1841-advipservicesk9-mz.151-4.M8.bin type is image (elf) []
file size is 45756600 bytes, run size is 45922284 bytes
Runnable image, entry point 0x8000F000, run from ram

IOS configuration resilience version 15.1 activated at 05:08:38 UTC Fri Apr 25 2014
Secure archive flash:.runcfg-20140425-050838.ar type is config
configuration archive size 3272 bytes
```

What is the name of the archived running config file and on what is the name based?

Answers will vary, but will be in the following format: runcfg-20140425-050838.ar. It is based on the date and time archived by the secure boot-config command.

b. Save the running configuration to the startup configuration from the privileged EXEC mode prompt.

Step 4: Restore the IOS and configuration files back to the default setting.

You have verified the Secure IOS and configuration file settings. Now, use the no secure boot-image and no secure boot config commands to restore the default settings for these files.

```
R1(config)# no secure boot-image
R1(config)# no secure boot-config
```

Task 4: Configure a Synchronized Time Source Using NTP

R2 will be the master NTP clock source for R1 and R3.

Step 1: Set up the NTP master using Cisco IOS commands.

R2 is the master NTP server in this lab. All other routers and switches learn the time from it, either directly or indirectly. For this reason, you must ensure that R2 has the correct UTC set.

a. Use the show clock command to display the current time set on the router.

```
R2# show clock
*19:48:38.858 UTC Wed Apr 27 2015
```

b. Use the clock set time command to set the time on the router.

```
R2# clock set 12:55:00 Apr 27 2015
R2#
*Apr 27 12:55:00.000: %SYS-6-CLOCKUPDATE: System clock has been updated from 11:14:08
UTC Thu Feb 25 2010 to 12:55:00 UTC Mon Apr 27 2015, configured from console by
console.
```

c. Configure NTP authentication by defining the authentication key number 1 with md5 hashing, and a password of NTPpassword. The password is case sensitive.

```
R2# config t
R2(config)# ntp authentication-key 1 md5 NTPpassword
```

d. Configure the trusted key that will be used for authentication on R2.

```
R2(config)# ntp trusted-key 1
```

e. Enable the NTP authentication feature on R2.

```
R2(config)# ntp authenticate
```

f. Configure R2 as the NTP master using the ntp master stratum-number command in global configuration mode. The stratum number indicates the distance from the original source. For this lab, use a stratum number of 3 on R2. When a device learns the time from an NTP source, its stratum number becomes one greater than the stratum number of its source.

```
R2(config)# ntp master 3
```

Step 2: Configure R1 and R3 as NTP clients using the CLI.

a. Configure NTP authentication by defining the authentication key number 1 with md5 hashing, and a password of NTPpassword.

```
R1# config t
R1(config)# ntp authentication-key 1 md5 NTPpassword
```

b. Configure the trusted key that will be used for authentication. This command provides protection against accidentally synchronizing the device with a time source that is not trusted.

```
R1(config)# ntp trusted-key 1
```

c. Enable the NTP authentication feature.

```
R1(config)# ntp authenticate
```

d. R1 and R3 will become NTP clients of R2. Use the ntp server hostname global configuration mode command. Use R2's serial IP address for the hostname. Issue the ntp update-calendar command on R1 and R3 to periodically update the calendar with the NTP time.

```
R1(config)# ntp server 10.1.1.2
R1(config)# ntp update-calendar

R3(config)# ntp server 10.2.2.2
R3(config)# ntp update-calendar
```

e. Use the show ntp associations command to verify that R1 has made an association with R2. You can also use the more verbose version of the command by adding the detail argument. It might take some time for the NTP association to form.

```
R1# show ntp associations

address    ref clock    st  when  poll reach  delay  offset   disp
~10.10.10.2  127.127.1.1   3    14    64     3  0.000  -280073  3939.7
*sys.peer, # selected, +candidate, -outlyer, x falseticker, ~ configured
```

f. Verify the time on R1 and R3 after they have made NTP associations with R2.

```
R1# show clock
*20:34:50.270 UTC Thu May 15 2014*20:12:24.859 UTC Wed Apr 27 2015
```

Task 5: Configure Syslog Support on R3 and PC-C

Step 1: Install the syslog server on PC-C.

Free or trial versions of syslog server can be downloaded from the Internet. Use a web browser to search for "free windows syslog server" and refer to the software documentation for more information. Your instructor may also recommend a suitable syslog server for classroom use.

If a syslog server is not currently installed on the host, download a syslog server and install it on PC-C. If it is already installed, go to Step 2.

Step 2: Configure R3 to log messages to the syslog server using the CLI.

a. Start the syslog server.

b. Verify that you have connectivity between R3 and PC-C by pinging the R3 G0/1 interface IP address 172.16.3.1. If it is unsuccessful, troubleshoot as necessary before continuing.

c. NTP was configured in Task 2 to synchronize the time on the network. Displaying the correct time and date in syslog messages is vital when using syslog to monitor a network. If the correct time and date of a message is not known, it can be difficult to determine what network event caused the message.

Verify that the timestamp service for logging is enabled on the router by using the show run command. Use the service timestamps log datetime msec command if the timestamp service is not enabled.

```
R3(config)# service timestamps log datetime msec
```

d. Configure the syslog service on the router to send syslog messages to the syslog server.

```
R3(config)# logging host 172.16.3.3
```

Step 3: Configure the logging severity level on R3.

Logging traps can be set to support the logging function. A trap is a threshold that triggers a log message. The level of logging messages can be adjusted to allow the administrator to determine what kinds of messages are sent to the syslog server. Routers support different levels of logging. The eight levels range from 0 (emergencies), which indicates that the system is unstable, to 7 (debugging), which sends messages that include router information.

Note: The default level for syslog is 6 (informational logging). The default for console and monitor logging is 7 (debugging).

a. Use the logging trap command to set the severity level for R3 to level 4 (warnings).

```
R3(config)# logging trap warnings
```

b. Use the show logging command to see the type and level of logging enabled.

```
R3# show logging
Syslog logging: enabled (0 messages dropped, 1 messages rate-limited,
                0 flushes, 0 overruns, xml disabled, filtering disabled)

No Active Message Discriminator.
No Inactive Message Discriminator.

    Console logging: level debugging, 271 messages logged, xml disabled,
                     filtering disabled
    Monitor logging: level debugging, 0 messages logged, xml disabled,
                     filtering disabled
    Buffer logging:  disabled, xml disabled,
                     filtering disabled
    Logging Exception size (4096 bytes)
    Count and timestamp logging messages: disabled
    Persistent logging: disabled

No active filter modules.

ESM: 0 messages dropped

    Trap logging: level warnings, 0 message lines logged
        Logging to 172.16.1.3  (udp port 514,  audit disabled,
              authentication disabled, encryption disabled, link up),
              0 message lines logged,
              0 message lines rate-limited,
              0 message lines dropped-by-MD,
              xml disabled, sequence number disabled
              filtering disabled
```

Part 4: Configure a Zone-Based Policy Firewall and Intrusion Prevention System (Chapters 4 and 5)

In Part 4, you will configure a ZPF and IPS on R3 using the CLI.

Task 1: Configure a ZPF on R3 using the CLI

Step 1: Creating the security zones.

a. Create the INSIDE and OUTSIDE security zones.

```
R3(config)# zone security INSIDE
R3(config)# zone security OUTSIDE
```

b. Create an inspect class-map to match the traffic to be allowed from the INSIDE zone to the OUTSIDE zone. Because we trust the INSIDE zone, we allow all the main protocols. Use the match-any keyword to instruct the router that the following match protocol statements will qualify as a successful match. This results in a policy being applied. Match for TCP, UDP, or ICMP packets.

```
R3(config)# class-map type inspect match-any INSIDE-PROTOCOLS
R3(config-cmap)# match protocol tcp
R3(config-cmap)# match protocol udp
R3(config-cmap)# match protocol icmp
```

c. Create an inspect policy-map named INSIDE-TO-OUTSIDE. Bind the INSIDE-PROTOCOLS class-map to the policy-map. All packets matched by the INSIDE-PROTOCOLS class-map will be inspected.

```
R3(config)# policy-map type inspect INSIDE-TO-OUTSIDE
R3(config-pmap)# class type inspect INSIDE-PROTOCOLS
R3(config-pmap-c)# inspect
```

d. Create a zone-pair called INSIDE-TO-OUTSIDE that allows traffic initiated from the internal network to the external network but does not allow traffic originating from the external network to reach the internal network.

```
R3(config)# zone-pair security INSIDE-TO-OUTSIDE source INSIDE destination OUTSIDE
```

e. Apply the policy-map to the zone-pair.

```
R3(config)# zone-pair security INSIDE-TO-OUTSIDE
R3(config-sec-zone-pair)# service-policy type inspect INSIDE-TO-OUTSIDE
```

f. Assign R3's G0/1 interface to the INSIDE security zone and the S0/0/1 interface to the OUTSIDE security zone.

```
R3(config)# interface g0/1
R3(config-if)# zone-member security INSIDE
R3(config)# interface s0/0/1
R3(config-if)# zone-member security OUTSIDE
```

g. Verify your ZPF configuration by using the show zone-pair security, show policy-map type inspect zone-pair, and show zone security commands.

```
R3# show zone-pair security
Zone-pair name INSIDE-TO-OUTSIDE
    Source-Zone INSIDE  Destination-Zone OUTSIDE
    service-policy INSIDE-TO-OUTSIDE

R3# show policy-map type inspect zone-pair

policy exists on zp INSIDE-TO-OUTSIDE
  Zone-pair: INSIDE-TO-OUTSIDE

  Service-policy inspect : INSIDE-TO-OUTSIDE

    Class-map: INSIDE-PROTOCOLS (match-any)
      Match: protocol tcp
        0 packets, 0 bytes
        30 second rate 0 bps
      Match: protocol udp
        0 packets, 0 bytes
        30 second rate 0 bps
      Match: protocol icmp
        0 packets, 0 bytes
        30 second rate 0 bps

   Inspect
        Session creations since subsystem startup or last reset 0
        Current session counts (estab/half-open/terminating) [0:0:0]
        Maxever session counts (estab/half-open/terminating) [0:0:0]
        Last session created never
        Last statistic reset never
        Last session creation rate 0
        Maxever session creation rate 0
        Last half-open session total 0
        TCP reassembly statistics
        received 0 packets out-of-order; dropped 0
        peak memory usage 0 KB; current usage: 0 KB
        peak queue length 0


    Class-map: class-default (match-any)
      Match: any
      Drop
        0 packets, 0 bytes
R3# show zone security
zone self
Description: System Defined Zone

zone INSIDE
 Member Interfaces:
 GigabitEthernet0/1

zone OUTSIDE
```

```
Member Interfaces:
Serial0/0/1
```

Task 2: Configure IPS on R3 using the CLI.

Step 1: Prepare router R3 and the TFTP server.

To configure Cisco IOS IPS 5.x, the IOS IPS signature package file and public crypto key files must be available on the PC with the TFTP server installed. R3 uses PC-C as the TFTP server. Ask your instructor if these files are not on the PC. Install a TFTP server on PC-C as necessary.

a. Verify that the IOS-Sxxx-CLI.pkg signature package file is in the default TFTP folder. The xxx is the version number and varies depending on which file was downloaded from Cisco.com.

b. Verify that the realm-cisco.pub.key.txt file is available and note its location on PC-C. This is the public crypto key used by Cisco IOS IPS.

c. Verify or create the IPS directory (ipsdir) in router flash on R3. From the R3 CLI, display the content of flash memory and check to see if the ipsdir directory exists.

```
R3# show flash
```

d. If the ipsdir directory is not listed, create it in privileged EXEC mode, using the mkdir command.

```
R3# mkdir IPSDIR
Create directory filename [IPSDIR]?
Created dir flash:IPSDIR
```

Note: If the IPSDIR directory is listed and there are files in it, contact your instructor. This directory must be empty before configuring IPS. If there are no files in it, you may proceed to configure IPS.

Step 2: Verify the IOS IPS signature package location and TFTP server setup.

a. Use the ping command to verify connectivity between R3, PC-C, and the TFTP server.

b. Start Tftpd32 (or another TFTP server) and set the default directory to the one with the IPS signature package in it. Note the filename for use in the next step.

Step 3: Copy and paste the crypto key file into R3's configuration.

In global configuration mode, select and copy the crypto key file named realm-cisco.pub.key.txt. Paste the copied crypto key content at the global configuration mode prompt.

Note: The contents of the realm-cisco.pub.key.txt file have been provided below:

```
crypto key pubkey-chain rsa
 named-key realm-cisco.pub signature
  key-string
   30820122 300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101
   00C19E93 A8AF124A D6CC7A24 5097A975 206BE3A2 06FBA13F 6F12CB5B 4E441F16
   17E630D5 C02AC252 912BE27F 37FDD9C8 11FC7AF7 DCDD81D9 43CDABC3 6007D128
   B199ABCB D34ED0F9 085FADC1 359C189E F30AF10A C0EFB624 7E0764BF 3E53053E
   5B2146A9 D7A5EDE3 0298AF03 DED7A5B8 9479039D 20F30663 9AC64B93 C0112A35
   FE3F0C87 89BCB7BB 994AE74C FA9E481D F65875D6 85EAF974 6D9CC8E3 F0B08B85
   50437722 FFBE85B9 5E4189FF CC189CB9 69C46F9C A84DFBA5 7A0AF99E AD768C36
   006CF498 079F88F8 A3B3FB1F 9FB7B3CB 5539E1D1 9693CCBB 551F78D2 892356AE
   2F56D826 8918EF3C 80CA4F4D 87BFCA3B BFF668E9 689782A5 CF31CB6E B4B094D3
   F3020301 0001
  quit
```

Step 4: Configure the IPS settings on R3 from the CLI.

a. Create an IPS rule, and name the rule IOSIPS.

```
R3(config)# ip ips name IOSIPS
```

b. Set the IPS Signature storage location to the IPSDIR directory you created in flash in step 1d.

```
R3(config)# ip ips config location flash:IPSDIR
```

c. Enable HTTP server and IPS SDEE event notification.

```
R3(config)# ip http server
R3(config)# ip ips notify sdee
```

d. Configure IOS IPS to use one of the pre-defined signature categories.

Note: When configuring IOS IPS, it is required to first retire all the signatures in the “all” category and then unretire selected signature categories.

Instructor Note: The order in which the signature categories are configured on the router is also important. IOS IPS processes the category commands in the order listed in the configuration. Some signatures belong to multiple categories. If multiple categories are configured and a signature belongs to more than one of them, IOS IPS uses the signature properties (for example, retired/unretired, actions, etc.) in the last configured category.

After you have retired all signatures in the all category, unretire the ios_ips basic category.

```
R3(config)# ip ips signature-category
R3(config-ips-category)# category all
R3(config-ips-category-action)# retired true
R3(config-ips-category-action)# exit
R3(config-ips-category)# category ios_ips basic
R3(config-ips-category-action)# retired false
R3(config-ips-category-action)# exit
R3(config-ips-category)# exit
Do you want to accept these changes? [confirm]

Apr 27 01:32:37.983: Applying Category configuration to signatures ...
```

e. Apply the IPS rule to inbound traffic to R3's S0/0/1 interface.

```
R3(config)# interface serial0/0/1
R3(config-if)# ip ips IOSIPS in
R3(config-if)#
*************************************************************
The signature package is missing or was saved by a previous version
IPS Please load a new signature package
*************************************************************e
*Apr 28 11:45:38.820: %IPS-3-SIG_UPDATE_REQUIRED: IOS IPS requires a signature update
package to be loaded
*Apr 28 11:45:39.820: %SYS-6-LOGGINGHOST_STARTSTOP: Logging to host 172.16.3.3 port
514 started - CLI initiated
*Apr 28 11:45:41.084: %SYS-5-CONFIG_I: Configured from console by console
```

Step 5: Start the TFTP server on PC-C and verify the IPS file directory.

Verify that PC-C has the IPS Signature package file in a directory on the TFTP server. This file is typically named IOS-Sxxx-CLI.pkg. The xxx is the signature file version.

Note: If this file is not present, contact your instructor before continuing.

Step 6: Copy the signature package from the TFTP server to R3.

a. Use the copy tftp command to retrieve the signature file and load it into the Intrusion Detection Configuration. Use the idconf keyword at the end of the copy command.

Note: Signature compiling begins immediately after the signature package is loaded to the router. You can see the messages on the router with logging level 6 or above enabled.

```
R3# copy tftp://172.16.3.3/IOS-S854-CLI.pkg idconf
Loading IOS-S854-CLI.pkg from 172.16.3.3 (via GigabitEthernet0/1):
!!!!!OO!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

[OK - 22509689 bytes]

*Apr 28 12:06:22.470: %IPS-6-ENGINE_BUILDS_STARTED: 12:06:22 UTC Apr 28 2015
*Apr 28 12:06:22.482: %IPS-6-ENGINE_BUILDING: atomic-ip - 539 signatures - 1 of 13
engines
*Apr 28 12:06:28.006: %IPS-6-ENGINE_READY: atomic-ip - build time 5524 ms - packets
for this engine will be scanned
*Apr 28 12:06:28.006: %IPS-6-ENGINE_BUILDING: normalizer - 10 signatures - 2 of 13
engines
*Apr 28 12:06:28.006: %IPS-6-ENGINE_READY: normalizer - build time 0 ms - packets for
this engine will be scanned
*Apr 28 12:06:28.038: %IPS-6-ENGINE_BUILDING: service-http - 1834 signatures - 3 of
13 engines
*Apr 28 12:06:30.054: %IPS-6-ENGINE_READY: service-http - build time 2016 ms -
packets for this engine will be scanned
*Apr 28 12:06:30.058: %IPS-6-ENGINE_BUILDING: service-smb-advanced - 76 signatures -
4 of 13 engines
*Apr 28 12:06:30.678: %IPS-6-ENGINE_READY: service-smb-advanced - build time 620 ms -
packets for this engine will be scanned
*Apr 28 12:06:30.678: %IPS-6-ENGINE_BUILDING: service-msrpc - 37 signatures - 5 of 13
engines
*Apr 28 12:06:30.786: %IPS-6-ENGINE_READY: service-msrpc - build time 108 ms -
packets for this engine will be scanned
*Apr 28 12:06:30.786: %IPS-6-ENGINE_BUILDING: state - 39 signatures - 6 of 13 engines
*Apr 28 12:06:30.878: %IPS-6-ENGINE_READY: state - build time 92 ms - packets for
this engine will be scanned
*Apr 28 12:06:30.878: %IPS-6-ENGINE_BUILDING: service-ftp - 3 signatures - 7 of 13
engines
*Apr 28 12:06:30.882: %IPS-6-ENGINE_READY: service-ftp - build time 4 ms - packets
for this engine will be scanned
*Apr 28 12:06:30.946: %IPS-6-ENGINE_BUILDING: string-tcp - 3770 signatures - 8 of 13
engines
*Apr 28 12:06:35.602: %IPS-6-ENGINE_READY: string-tcp - build time 4656 ms - packets
for this engine will be scanned
*Apr 28 12:06:35.610: %IPS-6-ENGINE_BUILDING: service-rpc - 79 signatures - 9 of 13
engines
*Apr 28 12:06:35.702: %IPS-6-ENGINE_READY: service-rpc - build time 92 ms - packets
for this engine will be scanned
*Apr 28 12:06:35.706: %IPS-6-ENGINE_BUILDING: service-dns - 39 signatures - 10 of 13
engines
*Apr 28 12:06:35.738: %IPS-6-ENGINE_READY: service-dns - build time 32 ms - packets
for this engine will be scanned
*Apr 28 12:06:35.742: %IPS-6-ENGINE_BUILDING: string-udp - 80 signatures - 11 of 13
engines
*Apr 28 12:06:35.818: %IPS-6-ENGINE_READY: string-udp - build time 76 ms - packets
for this engine will be scanned
*Apr 28 12:06:35.830: %IPS-6-ENGINE_BUILDING: multi-string - 607 signatures - 12 of
13 engines
```

```
*Apr 28 12:06:36.518: %IPS-6-ENGINE_READY: multi-string - build time 688 ms - packets
for this engine will be scanned
*Apr 28 12:06:36.518: %IPS-6-ENGINE_BUILDING: string-icmp - 3 signatures - 13 of 13
engines
*Apr 28 12:06:36.518: %IPS-6-ENGINE_READY: string-icmp - build time 0 ms - packets
for this engine will be scanned
*Apr 28 12:06:36.518: %IPS-6-ALL_ENGINE_BUILDS_COMPLETE: elapsed time 14048 ms
```

b. Use the dir flash command to see the contents of the IPSDIR directory you created earlier in this lab. There should be six files, as shown here.

```
R3# dir flash:IPSDIR
Directory of flash0:/IPSDIR/

    7  -rw-         255  Feb 27 2010 12:22:58 +00:00  iosips-sig-delta.xmz
    6  -rw-       16625  Feb 27 2010 12:23:50 +00:00  iosips-sig-typedef.xmz
    5  -rw-      143447  Feb 27 2010 12:23:54 +00:00  iosips-sig-category.xmz
    4  -rw-         304  Feb 27 2010 12:23:00 +00:00  iosips-seap-delta.xmz
    3  -rw-         835  Feb 27 2010 12:23:00 +00:00  iosips-seap-typedef.xmz
    2  -rw-     1628152  Feb 27 2010 12:25:08 +00:00  iosips-sig-default.xmz

256487424 bytes total (173850624 bytes free)
```

c. Use the show ip ips signature count command to see the counts for the compiled signature package.

```
R3# show ip ips signature count

Cisco SDF release version S854.0
Trend SDF release version V0.0

Signature Micro-Engine: atomic-ip: Total Signatures 539
      atomic-ip enabled signatures: 93
      atomic-ip retired signatures: 518
      atomic-ip compiled signatures: 21
      atomic-ip obsoleted signatures: 9

Signature Micro-Engine: normalizer: Total Signatures 10
      normalizer enabled signatures: 9
      normalizer retired signatures: 1
      normalizer compiled signatures: 9

Signature Micro-Engine: service-http: Total Signatures 1828
      service-http enabled signatures: 280
      service-http retired signatures: 1772
      service-http compiled signatures: 56
      service-http obsoleted signatures: 1

Signature Micro-Engine: service-smb-advanced: Total Signatures 76
      service-smb-advanced enabled signatures: 16
      service-smb-advanced retired signatures: 62
      service-smb-advanced compiled signatures: 14
      service-smb-advanced obsoleted signatures: 2

Signature Micro-Engine: service-msrpc: Total Signatures 37
      service-msrpc enabled signatures: 4
      service-msrpc retired signatures: 32
      service-msrpc compiled signatures: 5
      service-msrpc obsoleted signatures: 2

Signature Micro-Engine: state: Total Signatures 39
      state enabled signatures: 0
      state retired signatures: 28
      state compiled signatures: 11

Signature Micro-Engine: service-ftp: Total Signatures 3
      service-ftp enabled signatures: 1
      service-ftp retired signatures: 2
      service-ftp compiled signatures: 1

Signature Micro-Engine: string-tcp: Total Signatures 3705
      string-tcp enabled signatures: 659
      string-tcp retired signatures: 3580
      string-tcp compiled signatures: 125

Signature Micro-Engine: service-rpc: Total Signatures 79
      service-rpc enabled signatures: 3
      service-rpc retired signatures: 55
```

```
      service-rpc compiled signatures: 24

Signature Micro-Engine: service-dns: Total Signatures 39
      service-dns enabled signatures: 14
      service-dns retired signatures: 16
      service-dns compiled signatures: 23
      service-dns obsoleted signatures: 1

Signature Micro-Engine: string-udp: Total Signatures 75
      string-udp enabled signatures: 0
      string-udp retired signatures: 69
      string-udp compiled signatures: 6

Signature Micro-Engine: multi-string: Total Signatures 607
      multi-string enabled signatures: 179
      multi-string retired signatures: 603
      multi-string compiled signatures: 4
      multi-string obsoleted signatures: 5

Total Signatures: 7037
   Total Enabled Signatures: 1258
   Total Retired Signatures: 6738
   Total Compiled Signatures: 299
   Total Obsoleted Signatures: 20
```

Note: You may see an error message during signature compilation, such as "%IPS-3-INVALID_DIGITAL_SIGNATURE: Invalid Digital Signature found (key not found)". The message means the public crypto key is invalid. Refer to Task 3, Configure the IPS Crypto Key, to reconfigure the public crypto key.

d. Use the show ip ips all command to view the IPS configuration status summary.

```
R3# show ip ips all

IPS Signature File Configuration Status
    Configured Config Locations: flash:IPSDIR
    Last signature default load time: 12:06:36 UTC Apr 28 2015
    Last signature delta load time: -none-
    Last event action (SEAP) load time: -none-

    General SEAP Config:
    Global Deny Timeout: 3600 seconds
    Global Overrides Status: Enabled
    Global Filters Status: Enabled

IPS Auto Update is not currently configured

IPS Syslog and SDEE Notification Status
    Event notification through syslog is enabled
    Event notification through SDEE is enabled

IPS Signature Status
    Total Active Signatures: 299
    Total Inactive Signatures: 6738

IPS Packet Scanning and Interface Status
    IPS Rule Configuration
      IPS name IOSIPS
    IPS fail closed is disabled
    IPS deny-action ips-interface is false
    Obsolete tuning is disabled
    Regex compile threshold (MB) 25
    Interface Configuration
      Interface Serial0/0/1
        Inbound IPS rule is IOSIPS
        Outgoing IPS rule is not set

IPS Category CLI Configuration:
    Category all:
        Retire: True
    Category ios_ips basic:
        Retire: False

IPS License Status:             Not Required
        Current Date:           Apr 28 2015
        Expiration Date:        Not Available
        Extension Date:         Not Available
        Signatures Loaded:      Feb 23 2015     S854.0
        Signature Package:      Feb 23 2015     S854.0
```

Part 5: Secure Network Switches (Chapter 6)

Note: Not all security features in this part of the lab will be configured on all switches. However, in a production network all security features would be configured on all switches.

Instructor Note: In the interest of time, the security features are configured on just S1, except where noted.

Step 1: Configure basic security settings on S1

a. HTTP access to the switch is enabled by default. Prevent HTTP access by disabling the HTTP server and HTTP secure server.

```
S1(config)# no ip http server
S1(config)# no ip http secure-server
```

Use an enable secret password of cisco12345. Use the strongest encryption available.

```
S1(config)# enable algorithm-type scrypt secret cisco12345
```

b. Encrypt plaintext passwords.

```
S1(config)# service password-encryption
```

c. Configure a warning to unauthorized users with an MOTD banner that says “Unauthorized access strictly prohibited!”.

```
S1(config)# banner motd $Unauthorized access strictly prohibited!$
```

Step 2: Configure SSH server settings on S1.

a. Configure a domain name.

```
S1(config)# ip domain-name ccnasecurity.com
```

b. Configure username Admin01 in the local database with a password of Admin01pa55. Configure this user to have the highest possible privilege level. The strongest encryption method available should be used for the password.

```
S1(config)# username Admin01 privilege 15 algorithm-type scrypt secret Admin01pa55
```

c. Configure the RSA keys with 1024 modulus bits.

```
S1(config)# crypto key generate rsa general-keys modulus 1024
The name for the keys will be: S1.ccnasecurity.com

% The key modulus size is 1024 bits
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

00:15:36: %SSH-5-ENABLED: SSH 1.99 has been enabled
```

d. Enable SSH version 2.

```
S1(config)# ip ssh version 2
```

e. Set the SSH time-out to 90 seconds and the number of authentication retries to 2.

```
S1(config)# ip ssh time-out 90
S1(config)# ip ssh authentication-retries 2
```

Step 3: Configure the console and VTY lines.

a. Configure a console to use the local database for login. If the user has the highest privileges, then automatically enable privilege exec mode upon login. Set the exec-timeout value to log out after five minutes of inactivity. Prevent console messages from interrupting command entry.

```
S1(config)# line console 0
S1(config-line)# login local
S1(config-line)# privilege level 15
S1(config-line)# exec-timeout 5 0
S1(config-line)# logging synchronous
```

b. Configure VTY lines to use the local database for login. If the user has the highest privileges, then automatically enable privilege exec mode upon login. Set the exec-timeout value to log out after five minutes of inactivity. Allow remote SSH access to all VTY lines

```
S1(config)# line vty 0 15
S1(config-line)# login local
S1(config-line)# privilege level 15
S1(config-line)# exec-timeout 5 0
S1(config-line)# transport input ssh
```

Step 4: Configure Port Security and Disable Unused Ports

Note: Configuration changes made in step 4 to interface F0/6 in a NETLAB+ environment may have an adverse effect on lab results because of a hidden control switch between S1 and PC-A. If you are performing this lab on a NETLAB+ pod, it is recommended that you perform configuration changes to F0/7 (an inactive port) instead of F0/6 for this step only.

a. Disable trunking on port F0/6.

```
S1(config)# interface FastEthernet 0/6
S1(config-if)# switchport mode access
```

b. Enable PortFast on F0/6.

```
S1(config-if)# spanning-tree portfast
```

c. Enable BPDU guard on F0/6.

```
S1(config-if)# spanning-tree bpduguard enable
```

d. Apply basic default port security on F0/6. This sets the maximum MAC addresses to 1 and the violation action to shut down. Use the sticky option to allow the secure MAC address that is dynamically learned on a port to the switch running configuration.

```
S1(config-if)# shutdown
S1(config-if)# switchport port-security
S1(config-if)# switchport port-security mac-address sticky
S1(config-if)# no shutdown
```

e. Disable unused ports on S1.

```
S1(config)# interface range f0/2–5, f0/7-23, g0/1-2
S1(config-if-range)# shutdown
```

Step 5: Set loop guard as the default for all non-designated ports on S1.

```
S1(config)# spanning-tree loopguard default
```

Step 6: Save the running configuration to the startup configuration for each switch.

Part 6: Configure ASA Basic Settings and Firewall (Chapter 9)

Task 1: Prepare the ASA for ASDM Access

This lab assumes the ASA has no residual configuration. To begin, connect to the ASA console port. If you are prompted with “Pre-configure Firewall now through interactive prompts [yes]?” then proceed to Step 2. If you are not prompted, then the ASA may have been pre-configured and therefore perform Step 1.

Step 1: Clear the previous ASA configuration settings.

a. 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#
```

b. Use the reload command to restart the ASA.

```
ciscoasa# reload
System config has been modified. Save? [Y]es/[N]o: N
Proceed with reload? [confirm]
ciscoasa#
```

Step 2: Bypass Setup Mode and configure the ASDM VLAN interfaces using the CLI.

a. When prompted to preconfigure the firewall through interactive prompts (Setup mode), respond with no.

```
Pre-configure Firewall now through interactive prompts [yes]? no
```

b. Enter privileged EXEC mode. The password should be blank (no password) at this point.

c. Enter global configuration mode. Respond with no to the prompt to enable anonymous reporting.

d. The interface G1/2 will be used by PC-B to access ASDM on ASA. Configure interface G1/2 and name it inside. The Security Level should be automatically set to the highest level of 100. Specify IP address 192.168.1.1 and subnet mask 255.255.255.0.

```
ciscoasa(config)# interface G1/2
ciscoasa(config-if)# nameif inside
INFO: Security level for "inside" set to 100 by default.
ciscoasa(config-if)# security-level 100
ciscoasa(config-if)# ip add 192.168.1.1 255.255.255.0
ciscoasa(config-if)# no shutdown
```

e. Configure interface G1/1, name it outside, assign IP address 209.165.200.226, and the subnet mask 255.255.255.248. Notice that the security level for outside is automatically assigned a 0.

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

f. Configure interface G1/3, which is where the public access web server will reside. Assign it IP address 192.168.2.1/24, name it dmz, and assign it a security level of 70.

```
ciscoasa(config-if)# interface G1/3
ciscoasa(config-if)# nameif dmz
INFO: Security level for "dmz" set to 0 by default.
ciscoasa(config-if)# security-level 70
ciscoasa(config-if)# ip address 192.168.2.1 255.255.255.0
ciscoasa(config-if)# no shutdown
```

g. Display the status of all ASA interfaces by using the show interface ip brief command.

```
ciscoasa(config-if)# 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         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
Internal-Control1/1        unassigned      YES unset  down                  down
Internal-Data1/1           unassigned      YES unset  down                  down
Internal-Data1/2           unassigned      YES unset  down                  down
Internal-Data1/3           unassigned      YES unset  up                    up
Internal-Data1/4           169.254.1.1     YES unset  up                    up
Internal-Data1/5           unassigned      YES unset  down                  down
Management1/1              unassigned      YES unset  administratively down down
```

h. Display the information for the interfaces by using the show ip address command.

```
ciscoasa(config-if)# 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
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
```

Step 3: Configure and verify access to the ASA from the inside network.

a. From PC-B, ping the ASA's inside interface (192.168.1.1). Pings should be successful.

b. Use the http command to configure the ASA to accept HTTPS connections and to allow access to ASDM from any host on the inside network (192.168.1.0/24).

ciscoasa(config)# http server enable
ciscoasa(config)# http 192.168.1.0 255.255.255.0 inside

c. Open a browser on PC-B and test the HTTPS access to the ASA by entering https://192.168.1.1.

d. You may be presented with security warnings. These warning vary depending on the browser used but you must proceed and accept the security warnings. For example, when using Firefox, the browser would present a “Your Connection is not Secure” warning. In this case, you would choose Advanced > Add Exception… which opens the Add Security Exception window. Click on Confirm Security Exemption.

e. ASDM will then open the Authentication Required window. Leave these fields empty and click OK.

f. At the ASDM welcome page, click Install ASDM Launcher to install the Launcher or Run ASDM to start the Launcher.

Note: If one of the choices is Install Java Web Start, you will need to input https://192.168.1.1/admin/public/startup.jnlp in a browser if you do not want to install the Launcher. Proceed to accept the security warnings.

g. When prompted for a username and password, leave them blank and click OK.

Task 2: Configure Basic ASA Settings Using the ASDM Startup Wizard

Step 1: Access the Configuration menu and launch the Startup wizard.

At the top left of the screen, click Configuration > Launch Startup wizard.

Note: When using the wizard, you will need to select Next to proceed to the next window. If you accidently select Finish, you will be exited from the wizard without applying the configured choices and will have to restart the wizard.

Step 2: Configure the hostname, domain name, and the enable password.

a. On the first Startup wizard screen, select the Modify Existing Configuration option.

b. On the Startup Wizard Step 2 screen, configure the ASA hostname CCNAS-ASA and domain name ccnasecurity.com. Change the enable mode password from blank (no password) to cisco12345.

Step 3: Verify the interface settings.

a. On the Startup Wizard Step 3 screen, do not change the current settings; these were previously defined using the CLI.

b. On the Startup Wizard Step 4 screen, verify that port G1/1, G1/2, and G1/3 are configured according to the IP Addressing Table.

c. On the Startup Wizard Step 5 screen, click Next to continue. You will be configuring the routes in a later step.

Step 4: Configure DHCP, address translation, and administrative access.

a. On the Startup Wizard Step 6 screen – DHCP Server, select Enable DHCP server on the inside interface and specify a starting IP address of 192.168.1.5 and an ending IP address of 192.168.1.30. Enter the DNS Server 1 address of 10.3.3.3 and enter ccnasecurity.com for the domain name. Do NOT check the box to enable auto-configuration from interface. Click Next to continue.

b. On the Startup Wizard Step 7 screen – Address Translation (NAT/PAT), configure the ASA to Use Port Address Translation (PAT) and select the Use the IP address of the outside interface option. Click Next to continue.

c. On the Startup Wizard Step 8 screen – Administrative Access, HTTPS/ASDM access is currently configured for hosts on the inside network (192.168.1.0/24). Add SSH access to the ASA for the inside network (192.168.1.0) with a subnet mask of 255.255.255.0. Click OK to continue, verify the SSH access and click Next to continue.

d. On the Startup Wizard Step 9 screen, click Next to continue as we do not want to enable the auto update feature.

e. On the Startup Wizard Step 10 screen, click Next to continue as we do not want to enable the call home feature.

f. On the Startup Wizard Step 11 screen, review the pending configuration and click Finish to apply the commands to the ASA.

Note: If prompted to log in again, leave the Username field blank and enter cisco12345 as the password.

Task 3: Configuring ASA Settings from the ASDM Configuration Menu

Step 1: Set the ASA date and time.

a. At the Configuration > Device Setup screen, click System Time > Clock. Set the time zone, current date and time.

b. Click Apply to deliver the commands to the ASA.

Step 2: Configure a static default route for the ASA.

a. Open the ASDM Configuration screen and select the Device Setup screen.

b. Click Routing > Static Routes.

c. Click the IPv4 button and then Add to add a static route for the outside interface. Specify any4 for the Network and a Gateway IP of 209.165.200.225 (R1 G0/0). Click OK > Apply the static route to the ASA.

d. On the ASDM Tools menu, select Ping and enter the IP address of router R1 S0/0/0 (10.1.1.1). The ping should succeed.

Step 3: Test access to an external website from PC-B.

a. Open a browser on PC-B and enter the IP address of the R1 S0/0/0 interface (10.1.1.1) to simulate access to an external website. The R1 HTTP server was enabled in Part 2 of this lab.

b. You should be prompted with a user authentication login dialog box from the R1 GUI device manager. This verifies that inside hosts have web access to outside resources.

c. Exit the browser.

Note: Pings from PC-B to R1 S0/0/0 would fail because the default ASA application inspection policy does not permit ICMP from the internal network. This policy will be altered in a later step.

Step 4: Configure AAA for SSH client access.

a. Open the ASDM Configuration screen and select the Device Management screen.

b. Click Users/AAA > User Accounts > Add. Create a new user named Admin01 with a password of Admin01pa55. Allow this user Full access (ASDM, SSH, Telnet, and console) and set the privilege level to 15. Click OK to continue and then Apply to send the user account to the ASA.

c. From the Configuration > Device Management screen, click Users/AAA > AAA Access. On the Authentication tab, require authentication for HTTP/ASDM and SSH connections and specify the LOCAL server group for each connection type. Click Apply to send the commands to the ASA.

Note: The next action you attempt within ASDM will require that you log in as Admin01 with the password Admin01pa55.

d. From PC-B, open an SSH client and attempt to access the ASA inside interface at 192.168.1.1. You should be able to establish the connection. When prompted to log in, enter username Admin01 and the password Admin01pa55.

e. After logging in to the ASA using SSH, enter the enable command and provide the password cisco12345. Issue the show run command in order to display the current configuration you have created using ASDM. Close the SSH session.

Task 4: Modify the Default Modular Policy Framework using ASDM.

Step 1: Modify the MPF application inspection policy.

The default global inspection policy does not inspect ICMP therefore inside hosts cannot ping outside addresses. To enable hosts on the internal network to ping external hosts and receive replies, ICMP traffic must be inspected.

a. Open the ASDM Configuration screen and select Firewall > Service Policy Rules.

b. Select the inspection_default policy and click Edit to modify the default inspection rules. In the Edit Service Policy Rule window, click the Rule Actions tab and select the ICMP check box. Do not change the other default protocols that are checked. Click OK > Apply to send the commands to the ASA.

Note: If prompted, log in as Admin01 with the password Admin01pa55.

Step 2: Verify that returning ICMP traffic is allowed.

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

Part 7: Configuring a DMZ, Static NAT, and ACLs (Chapter 10)

In Part 6 of this lab, you configured address translation using PAT for the inside network using ASDM. In this part, you will use ASDM to configure the DMZ, Static NAT, and ACLs on the ASA.

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). R1 G0/0 and the ASA outside interface already use 209.165.200.225 and .226. You will use public address 209.165.200.227 and static NAT to provide address translation access to the server.

Step 1: Configure static NAT to the DMZ server using a network object.

a. Open the ASDM Configuration screen and select the Firewall > Public Servers option.

b. Click Add to define the DMZ server and services offered. In the Add Public Server dialog box, specify the Private Interface as dmz, the Public Interface as outside, and the Public IP address as 209.165.200.227.

c. Click the ellipsis button to the right of Private IP Address. In the Browse Private IP Address window, click Add to define the server as a Network Object. Enter the name DMZ-SERVER, select Host for the Type, enter the Private IP Address of 192.168.2.3, and a Description of PC-A. Click OK to continue.

d. From the Browse Private IP Address window, verify that the DMZ-SERVER appears in the Selected Private IP Address field and click OK to return to the Add Public Server dialog box. If DMZ-SERVER does not appear in the Private IP Address field, then expand Network

Objects and double-click DMZ-SERVER to add it to the Private IP Address field.

e. In the Add Public Server dialog, click the ellipsis button to the right of Private Service. In the Browse Private Service window, double-click to select the following services: tcp/ftp, tcp/http and icmp/echo (scroll down to see all services). Click OK to continue and return to the Add Public Server dialog.

f. Click OK to add the server. Click Apply at the Public Servers screen to send the commands to the ASA.

Step 2: View the DMZ Access Rule (ACL) generated by ASDM.

With the creation of the DMZ server object and selection of services, ASDM automatically generates an Access Rule (ACL) to permit the appropriate access to the server and applies it to the outside interface in the incoming direction.

a. View this Access Rule in ASDM by clicking Configuration > Firewall > Access Rules. It appears as an outside incoming rule.

b. Use the rule and use the horizontal scroll bar to see all of the components.

Step 3: Test access to the DMZ server from the outside network.

a. From PC-C, ping the IP address of the static NAT public server address (209.165.200.227). The pings should be successful.

b. You should also be able to access the DMZ server from a host on the inside network. Ping the DMZ server (PC-A) internal address (192.168.2.3) from PC-B. The pings should succeed because ICMP is now being inspected in the global inspection policy and because the G1/2 inside interface has a security level of 100 which is higher than the DMZ G1/3 interface security level (70).

c. The DMZ server should not be able to ping PC-B because the DMZ interface G1/3 has a lower security level. Try to ping from the DMZ server PC-A to PC-B. The pings should not be successful.

Part 8: Configure ASA Clientless SSL VPN Remote Access (Chapter 10)

In Part 8 of this lab, you will use ASDM's Clientless SSL VPN wizard to configure the ASA to support clientless SSL VPN remote access. You will verify your configuration by using a browser from PC-C.

Step 1: Start the VPN wizard.

a. From the ASDM menu, click Wizards > VPN Wizards > Clientless SSL VPN Wizard to open the SSL VPN wizard Clientless SSL VPN Connection screen.

b. Click Next to continue.

Step 2: Configure the SSL VPN user interface.

a. On the SSL VPN Interface screen, configure VPN-PROFILE as the Connection Profile Name and specify outside as the interface to which outside users will connect.

b. Click Next to continue.

Step 3: Configure AAA user authentication.

a. On the User Authentication screen, click Authenticate using the local user database and enter the username VPNuser with a password of Remotepa55.

b. Click Add to create the new user.

c. Click Next to continue.

Step 4: Configure the VPN group policy.

a. On the Group Policy screen, create a new group policy named VPN-GROUP.

b. Click Next to continue.

Step 5: Configure the bookmark list.

a. From the Clientless Connections Only – Bookmark List screen, click Manage to create an HTTP server bookmark in the bookmark list.

b. In the Configure GUI Customization Objects window, click Add to open the Add Bookmark List window. Name the list WebServer.

c. Add a new bookmark with Web Mail as the Bookmark Title. Enter the server destination IP address of 192.168.1.3 (PC-B is simulating an internal web server) as the URL.

d. Click OK to close the window and then click OK again to exit the Add Bookmark window, and click OK once more to complete the bookmark list.

e. Click Next to continue.

f. Review the summary and click Finish to apply the commands to the ASA.

Step 6: Verify VPN access from the remote host.

a. Open the browser on PC-C and enter the login URL for the SSL VPN into the address field (https://209.165.200.226). Use secure HTTP (HTTPS) because SSL is required to connect to the ASA.

Note: Accept security notification warnings.

b. The Login window should display. Enter the previously configured username VPNuser, enter the password Remotepa55, and click Login to continue.

Note: If connection is unsuccessful, configure the VPNuser manually on the ASA CLI using the username VPNuser password Remotepa55 privilege 15 command.

Step 7: Access the web portal window.

After the user authenticates, the ASA SSL web portal webpage will be displayed. This webpage lists the bookmarks previously assigned to the profile. If the bookmark points to a valid server IP address or hostname that has HTTP web services installed and functional, the outside user can access the server from the ASA portal.

Note: In this lab, the web mail server is not installed on PC-B.

Part 9: Configure a Site-to-Site IPsec VPN between R3 and the ASA. (Chapters 8 & 10)

In Part 9 of this lab, you will use the CLI to configure an IPsec VPN tunnel on R3 and use ASDM's Site-to-Site Wizard to configure the other side of the IPsec tunnel on the ASA.

Task 1: Configure the Site-to-Site IPsec VPN Tunnel on R3

Step 1: Enable IKE and configure the ISAKMP policy parameters.

a. Verify that IKE is supported and enabled.

```
R3(config)# crypto isakmp enable
```

b. Create an ISAKMP policy with a priority number of 1. Use pre-shared key as the authentication type, 3des for the encryption algorithm, sha as the hash algorithm, and the Diffie-Helman group 2 key exchange.

```
R3(config)# crypto isakmp policy 1
R3(config-isakmp)# authentication pre-share
R3(config-isakmp)# encryption 3des
R3(config-isakmp)# hash sha
R3(config-isakmp)# group 2
```

c. Configure the pre-shared key of Site2SiteKEY1 and point it to the ASA's outside interface IP address.

```
R3(config)# crypto isakmp key Site2SiteKEY1 address 209.165.200.226
```

d. Verify the IKE policy with the show crypto isakmp policy command.

```
R3# show crypto isakmp policy

Global IKE policy
Protection suite of priority 1
        encryption algorithm:   Three key triple DES
        hash algorithm:         Secure Hash Standard
        authentication method:  Pre-Shared Key
        Diffie-Hellman group:   #2 (1024 bit)
        lifetime:               3600 seconds, no volume limit
```

Step 2: Configure the IPsec transform set and lifetime.

Create a transform set with tag TRNSFRM-SET and use an ESP transform with an AES 256 cipher with ESP and the SHA hash function.

```
R3(config)# crypto ipsec transform-set TRNSFRM-SET esp-3des esp-sha-hmac
```

Step 3: Define interesting traffic.

Configure the IPsec VPN interesting traffic ACL. Use extended access list number 101. The source network should be R3's LAN (172.16.3.0/24), and the destination network should be the ASA's LAN (192.168.1.0/24).

```
R3(config)# access-list 101 permit ip 172.16.3.0 0.0.0.255 192.168.1.0 0.0.0.255
```

Step 4: Create and apply a crypto map.

a. Create the crypto map on R3, name it CMAP, and use 1 as the sequence number.

```
R3(config)# crypto map CMAP 1 ipsec-isakmp
% NOTE: This new crypto map will remain disabled until a peer
and a valid access list have been configured.
```

b. Use the match address command to specify which access list defines which traffic to encrypt.

```
R3(config-crypto-map)# match address 101
```

c. Set the peer address to the ASA's remote VPN endpoint interface IP address (209.165.200.226).

```
R3(config-crypto-map)# set peer 209.165.200.226
```

d. Set the transform set to TRNSFRM-SET.

```
R3(config-crypto-map)# set transform-set TRNSFRM-SET
```

e. Apply the crypto map to R3's S0/0/1 interface.

```
R3(config)# interface S0/0/1
R3(config-if)# crypto map CMAP
```

Step 5: Verify IPsec configuration on R3.

Use the show crypto map and show crypto ipsec sa commands to verify R3's IPsec VPN configuration.

```
R3# show crypto map
Crypto Map IPv4 "CMAP" 10 ipsec-isakmp
        Peer = 209.165.200.226
        Extended IP access list 101
            access-list 101 permit ip 172.16.3.0 0.0.0.255 192.168.1.0 0.0.0.255
        Current peer: 209.165.200.226
        Security association lifetime: 4608000 kilobytes/900 seconds
        Responder-Only (Y/N): N
        PFS (Y/N): Y
        DH group:  group2
        Mixed-mode : Disabled
        Transform sets={
                TRNSFRM-SET:  { esp-3des esp-sha-hmac  } ,
        }
        Interfaces using crypto map CMAP:
           Serial0/0/1

        Interfaces using crypto map NiStTeSt1:

R3# show crypto ipsec sa
interface: Serial0/0/1
    Crypto map tag: CMAP, local addr 10.2.2.1

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.16.3.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
   current_peer 209.165.200.226 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 0, #pkts encrypt: 0, #pkts digest: 0
    #pkts decaps: 0, #pkts decrypt: 0, #pkts verify: 0
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

     local crypto endpt.: 10.2.2.1, remote crypto endpt.: 209.165.200.226
     plaintext mtu 1500, path mtu 1500, ip mtu 1500, ip mtu idb Serial0/0/1
     current outbound spi: 0x0(0)
     PFS (Y/N): N, DH group: none
<Output Omitted>
```

Task 2: Configure Site-to-Site VPN on ASA using ASDM

Step 1: Use a browser on PC-B to establish an ASDM session to the ASA.

a. From the ASDM menu, select Wizards > VPN Wizards > Site-to-Site VPN Wizard to open the Site-to-site VPN wizard screen.

b. Click Next to continue.

c. Set the Peer IP Address to R3's S0/0/1 IP address (10.2.2.1). Verify that outside is selected for the VPN Access Interface and click Next to continue.

d. Identify the traffic to protect. Set the Local Network to inside-network/24. Click on the Local Network ellipsis and double-click inside-network to add it to the Local Network field displayed as inside-network/24. Click OK to continue.

e. Set the Remote Network to 172.16.3.0/24 and click Next to continue.

f. Configure the pre-shared key. Enter the Pre-shared Key of Site2SiteKEY1 and click Next to continue.

g. Enable NAT exemption. Check the Exempt ASA side host/network from address translation box and verify that the inside interface is selected and click Next to continue.

Step 2: Apply IPsec configuration to the ASA.

Click Finish to apply the site-to-site configuration to the ASA.

Task 3: Test the Site-to-Site IPsec VPN Connection between the ASA and R3

Step 1: From PC-B, ping R3's LAN interface.

This should access the IPsec Site-to-site VPN connection between the ASA and R3.

Step 2: Verify the IPsec Site-to-Site VPN session is active.

a. From PC-C, issue the command tracert 192.168.1.3. If the site-to-site VPN tunnel is working correctly, you will not see traffic being routed through R2 (10.2.2.2).

b. From ASDM on PC-B, click the Monitoring > VPN menu. A connection profile IP address of 10.2.2.1 should be displayed in the middle of the screen.

c. Click the Details button to see IKE and IPsec session details.

d. Issue the show crypto isakmp sa command to verify that an IKE security association (SA) is active.

```
R3# show crypto isakmp sa
IPv4 Crypto ISAKMP SA
dst             src             state          conn-id status
10.2.2.1        209.165.200.226 QM_IDLE           1021 ACTIVE
```

e. Issue the show crypto ipsec sa command on R3 to view the number of packets that have been encapsulated and decapsulated. Verify that there are no failed packet attempts or send and receive errors.

```
R3# show crypto ipsec sa

interface: Serial0/0/1
    Crypto map tag: CMAP, local addr 10.2.2.1

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.16.3.0/255.255.255.0/0/0)
   remote ident (addr/mask/prot/port): (192.168.1.0/255.255.255.0/0/0)
   current_peer 209.165.200.226 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 54, #pkts encrypt: 54, #pkts digest: 54
    #pkts decaps: 56, #pkts decrypt: 56, #pkts verify: 56
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0

     local crypto endpt.: 10.2.2.1, remote crypto endpt.: 209.165.200.226
     plaintext mtu 1446, path mtu 1500, ip mtu 1500, ip mtu idb Serial0/0/1
     current outbound spi: 0x1E438A04(507742724)
     PFS (Y/N): N, DH group: none

     inbound esp sas:
      spi: 0x3BA892E7(1000903399)
        transform: esp-3des esp-sha-hmac ,
        in use settings ={Tunnel, }
        conn id: 2003, flow_id: Onboard VPN:3, sibling_flags 80000040, crypto map:
CMAP
        sa timing: remaining key lifetime (k/sec): (4152954/1976)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE(ACTIVE)

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0x1E438A04(507742724)
        transform: esp-3des esp-sha-hmac ,
        in use settings ={Tunnel, }
        conn id: 2004, flow_id: Onboard VPN:4, sibling_flags 80000040, crypto map:
CMAP
        sa timing: remaining key lifetime (k/sec): (4152954/1976)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE(ACTIVE)

     outbound ah sas:

     outbound pcp sas:
```

Router Interface Summary Table

Router Interface Summary

Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1700	Fast Ethernet 0 (F0)	Fast Ethernet 1 (F1)	Serial 0 (S0)	Serial 1 (S1)
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.

Device Configs

Router R1 – After Part 3

```
R1# show run
Building configuration...

Current configuration : 2182 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R1
!
boot-start-marker
boot-end-marker
!
security passwords min-length 10
enable secret 9 $9$U2qcQGNsJmShGU$wMx1iLyYli4hhKRZ4.jqE5pCbO2e9MKbxeM0dQUc3rU
!
aaa new-model
!
aaa authentication login default local-case enable
!
aaa session-id common
memory-size iomem 15
!
no ip domain lookup
ip domain name ccnasecurity.com
ip cef
login on-failure log
login on-success log
no ipv6 cef
!
multilink bundle-name authenticated
!
cts logging verbose
!
!
username Admin01 privilege 15 secret 9
$9$rNEk42v4Bn7SE.$nYoZXVyjwr1.xd6o9aFKFck9ZAMho/NKMiJkZJrABn6
!
redundancy
!
ip ssh time-out 90
ip ssh authentication-retries 2
ip ssh version 2
!
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 Serial0/0/0
 ip address 10.1.1.1 255.255.255.252
 clock rate 64000
!
interface Serial0/0/1
 no ip address
 shutdown
!
ip forward-protocol nd
!
ip http server
ip http authentication local
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
ip route 0.0.0.0 0.0.0.0 10.1.1.2
!
control-plane
!
banner motd ^CUnauthorized access strictly prohibited!^C
!
line con 0
 exec-timeout 15 0
 privilege level 15
 logging synchronous
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 15 0
 privilege level 15
 transport input ssh
!
scheduler allocate 20000 1000
ntp authentication-key 1 md5 09627A39090404011C03162E 7
ntp authenticate
ntp trusted-key 1
ntp update-calendar
ntp server 10.1.1.2
```

```
!
end
```

Router R2 – After Part 3

```
R2# show run
Building configuration...

Current configuration : 1480 bytes
!
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
!
redundancy
!
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 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 64000
!
ip forward-protocol nd
!
```

```
no ip http server
no ip http secure-server
!
ip route 172.16.3.0 255.255.255.0 10.2.2.1
ip route 209.165.200.224 255.255.255.248 10.1.1.1
!
control-plane
!
line con 0
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 login
 transport input none
!
scheduler allocate 20000 1000
ntp authentication-key 1 md5 0228306B1B071C325B411B1D 7
ntp authenticate
ntp trusted-key 1
ntp master 3
!
end
```

Router R3 – After Part 3

```
R3# Show run
Building configuration...

Current configuration : 2098 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
security passwords min-length 10
enable secret 9 $9$MmxxymdH3cKtM.$Tub5YnedlBjCEHA3FJOODmlnCVNskbdhUk7JtYniDjw
!
aaa new-model
!
aaa authentication login default local-case enable
!
aaa session-id common
memory-size iomem 15
!
no ip domain lookup
ip domain name ccnasecurity.com
ip cef
login on-failure log
login on-success log
no ipv6 cef
!
multilink bundle-name authenticated
!
cts logging verbose
!
username Admin01 privilege 15 secret 9
$9$D9LW7mhAhrXkv.$DgDPIzyTuLLU/XX8AOaLXfNH1YNbZIS.kV6TYkmyZ6s
!
redundancy
!
ip ssh time-out 90
ip ssh authentication-retries 2
ip ssh version 2
!
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 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 10.2.2.2
!
logging trap warnings
logging host 172.16.3.3
!
control-plane
!
banner motd ^CUnauthorized access strictly prohibited!^C
!
line con 0
 exec-timeout 15 0
 privilege level 15
 logging synchronous
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 15 0
 privilege level 15
 transport input ssh
!
scheduler allocate 20000 1000
ntp authentication-key 1 md5 09627A39090404011C03162E 7
ntp authenticate
ntp trusted-key 1
ntp update-calendar
ntp server 10.2.2.2
```

```
!
end
```

Router R3 – After Part 4

```
R3# show run
Building configuration...

Current configuration : 3543 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
security passwords min-length 10
enable secret 9 $9$MmxxymdH3cKtM.$Tub5YnedlBjCEHA3FJOODmlnCVNskbdhUk7JtYniDjw
!
aaa new-model
!
aaa authentication login default local-case enable
!
aaa session-id common
memory-size iomem 15
!
no ip domain lookup
ip domain name ccnasecurity.com
ip ips config location flash:IPSDIR retries 1
ip ips notify SDEE
ip ips name IOSIPS
!
ip ips signature-category
  category all
   retired true
  category ios_ips basic
   retired false
!
ip cef
login on-failure log
login on-success log
no ipv6 cef
!
multilink bundle-name authenticated
!
cts logging verbose
!
username Admin01 privilege 15 secret 9
$9$D9LW7mhAhrXkv.$DgDPIzyTuLLU/XX8AOaLXfNH1YNbZIS.kV6TYkmyZ6s
!
redundancy
!
crypto key pubkey-chain rsa
```

```
 named-key realm-cisco.pub signature
  key-string
   30820122 300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101
   00C19E93 A8AF124A D6CC7A24 5097A975 206BE3A2 06FBA13F 6F12CB5B 4E441F16
   17E630D5 C02AC252 912BE27F 37FDD9C8 11FC7AF7 DCDD81D9 43CDABC3 6007D128
   B199ABCB D34ED0F9 085FADC1 359C189E F30AF10A C0EFB624 7E0764BF 3E53053E
   5B2146A9 D7A5EDE3 0298AF03 DED7A5B8 9479039D 20F30663 9AC64B93 C0112A35
   FE3F0C87 89BCB7BB 994AE74C FA9E481D F65875D6 85EAF974 6D9CC8E3 F0B08B85
   50437722 FFBE85B9 5E4189FF CC189CB9 69C46F9C A84DFBA5 7A0AF99E AD768C36
   006CF498 079F88F8 A3B3FB1F 9FB7B3CB 5539E1D1 9693CCBB 551F78D2 892356AE
   2F56D826 8918EF3C 80CA4F4D 87BFCA3B BFF668E9 689782A5 CF31CB6E B4B094D3
   F3020301 0001
  quit
!
ip ssh time-out 90
ip ssh authentication-retries 2
ip ssh version 2
!
class-map type inspect match-any INSIDE-PROTOCOLS
 match protocol tcp
 match protocol udp
 match protocol icmp
!
policy-map type inspect INSIDE-TO-OUTSIDE
 class type inspect INSIDE-PROTOCOLS
  inspect
 class class-default
  drop
!
zone security INSIDE
zone security OUTSIDE
zone-pair security INSIDE-TO-OUTSIDE source INSIDE destination OUTSIDE
 service-policy type inspect INSIDE-TO-OUTSIDE
!
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
 zone-member security INSIDE
 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 ips IOSIPS in
 zone-member security OUTSIDE
!
ip forward-protocol nd
!
ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.2.2.2
!
logging trap warnings
logging host 172.16.3.3
!
control-plane
!
banner motd ^CUnauthorized access strictly prohibited!^C
!
line con 0
 exec-timeout 15 0
 privilege level 15
 logging synchronous
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 15 0
 privilege level 15
 transport input ssh
!
scheduler allocate 20000 1000
ntp authentication-key 1 md5 09627A39090404011C03162E 7
ntp authenticate
ntp trusted-key 1
ntp update-calendar
ntp server 10.2.2.2
!
end
```

Switch S1 – After Part 5

```
S1# show run
Building configuration...

Current configuration : 2325 bytes
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname S1
!
boot-start-marker
boot-end-marker
!
enable secret 9 $9$Sn6JgGzP3iSF7p$LUT5D6KIm8ArrtM/WvkBO36SleXHjEV/TTraAYUokrI
!
username Admin01 privilege 15 secret 9
$9$O9LYizXaivNP0I$7zeokcVXywdfg8km33Li7BbnCfY1rIeYwCdA.j4sEz2
no aaa new-model
system mtu routing 1500
!
ip domain-name ccnasecurity.com
!
spanning-tree mode pvst
spanning-tree loopguard default
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
ip ssh time-out 90
ip ssh authentication-retries 2
ip ssh version 2
!
interface FastEthernet0/1
 shutdown
!
interface FastEthernet0/2
 shutdown
!
interface FastEthernet0/3
 shutdown
!
interface FastEthernet0/4
 shutdown
!
interface FastEthernet0/5
 shutdown
!
interface FastEthernet0/6
!
```

```
interface FastEthernet0/7
 switchport mode access
 switchport port-security mac-address sticky
 switchport port-security
 shutdown
 spanning-tree portfast
 spanning-tree bpduguard enable
!
interface FastEthernet0/8
 shutdown
!
interface FastEthernet0/9
 shutdown
!
interface FastEthernet0/10
 shutdown
!
interface FastEthernet0/11
 shutdown
!
interface FastEthernet0/12
 shutdown
!
interface FastEthernet0/13
 shutdown
!
interface FastEthernet0/14
 shutdown
!
interface FastEthernet0/15
 shutdown
!
interface FastEthernet0/16
 shutdown
!
interface FastEthernet0/17
 shutdown
!
interface FastEthernet0/18
 shutdown
!
interface FastEthernet0/19
 shutdown
!
interface FastEthernet0/20
 shutdown
!
interface FastEthernet0/21
 shutdown
!
interface FastEthernet0/22
 shutdown
```

```
!
interface FastEthernet0/23
 shutdown
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
 shutdown
!
interface GigabitEthernet0/2
 shutdown
!
interface Vlan1
 ip address 192.168.2.11 255.255.255.0
!
ip default-gateway 192.168.2.1
no ip http server
no ip http secure-server
!
banner motd ^CUnauthorized access strictly prohibited!^C
!
line con 0
 exec-timeout 5 0
 privilege level 15
 logging synchronous
 login local
line vty 0 4
 exec-timeout 5 0
 privilege level 15
 login local
 transport input ssh
line vty 5 15
 exec-timeout 5 0
 privilege level 15
 login local
 transport input ssh
!
end
```

ASA Firewall – After Part 6

```
CCNAS-ASA# show run
: Saved

:
: Hardware:   ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4 cores)
:
ASA Version 9.10(1)
!
hostname CCNAS-ASA
domain-name cnasecurity.com
enable password ***** pbkdf2
names
no mac-address auto

!
interface GigabitEthernet1/1
 nameif outside
 security-level 0
 ip address 209.165.200.226 255.255.255.248
!
interface GigabitEthernet1/2
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!
interface GigabitEthernet1/3
 nameif dmz
 security-level 70
 ip address 192.168.2.1 255.255.255.0
!
interface GigabitEthernet1/4
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/5
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/6
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/7
 shutdown
 no nameif
 no security-level
```

```
 no ip address
!
interface GigabitEthernet1/8
 shutdown
 no nameif
 no security-level
 no ip address
!
interface Management1/1
 management-only
 shutdown
 no nameif
 no security-level
 no ip address
!
ftp mode passive
dns server-group DefaultDNS
 domain-name cnasecurity.com
pager lines 24
mtu inside 1500
mtu outside 1500
mtu dmz 1500
icmp unreachable rate-limit 1 burst-size 1
no asdm history enable
arp timeout 14400
no arp permit-nonconnected
arp rate-limit 16384
!
nat (inside,outside) after-auto source dynamic any interface
route outside 0.0.0.0 0.0.0.0 209.165.200.225 1
timeout xlate 3:00:00
timeout pat-xlate 0:00:30
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 sctp 0:02:00 icmp 0:00:02
timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
timeout sip 0:30:00 sip_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
timeout sip-provisional-media 0:02:00 uauth 0:05:00 absolute
timeout tcp-proxy-reassembly 0:01:00
timeout floating-conn 0:00:00
timeout conn-holddown 0:00:15
timeout igp stale-route 0:01:10
user-identity default-domain LOCAL
aaa authentication http console LOCAL
aaa authentication ssh console LOCAL
aaa authentication login-history
http server enable
http 192.168.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
service sw-reset-button
crypto ipsec security-association pmtu-aging infinite
crypto ca trustpool policy
telnet timeout 5
```

```
ssh stricthostkeycheck
ssh 192.168.1.0 255.255.255.0 inside
ssh timeout 5
ssh version 2
ssh key-exchange group dh-group1-sha1
console timeout 0

dhcpd address 192.168.1.5-192.168.1.30 inside
dhcpd dns 10.3.3.3 interface inside
dhcpd domain ccnasecurity.com interface inside
dhcpd enable inside
!
threat-detection basic-threat
threat-detection statistics access-list
no threat-detection statistics tcp-intercept
dynamic-access-policy-record DfltAccessPolicy
username Admin01 password ***** pbkdf2 privilege 15
!
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
  inspect icmp
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
prompt hostname context
no call-home reporting anonymous
call-home
 profile CiscoTAC-1
  no active
  destination address http
https://tools.cisco.com/its/service/oddce/services/DDCEService
  destination address email callhome@cisco.com
  destination transport-method http
  subscribe-to-alert-group diagnostic
  subscribe-to-alert-group environment
  subscribe-to-alert-group inventory periodic monthly
  subscribe-to-alert-group configuration periodic monthly
  subscribe-to-alert-group telemetry periodic daily
Cryptochecksum:815d03e5dc466e5bf4a61a62a36d8c7f
: end
```

ASA 5506 – After Part 8

```
CCNAS-ASA# show run
: Saved

:
: Hardware:   ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4 cores)
:
ASA Version 9.10(1)
!
hostname CCNAS-ASA
domain-name cnasecurity.com
enable password ***** pbkdf2
names
no mac-address auto

!
interface GigabitEthernet1/1
 nameif outside
 security-level 0
 ip address 209.165.200.226 255.255.255.248
!
interface GigabitEthernet1/2
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!
interface GigabitEthernet1/3
 nameif dmz
 security-level 70
 ip address 192.168.2.1 255.255.255.0
!
interface GigabitEthernet1/4
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/5
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/6
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/7
 shutdown
 no nameif
 no security-level
```

```
 no ip address
!
interface GigabitEthernet1/8
 shutdown
 no nameif
 no security-level
 no ip address
!
interface Management1/1
 management-only
 shutdown
 no nameif
 no security-level
 no ip address
!
ftp mode passive
dns server-group DefaultDNS
 domain-name cnasecurity.com
object network DMZ-SERVER
 host 192.168.2.3
 description PC-A
object-group service DM_INLINE_SERVICE_0
 service-object icmp echo
 service-object tcp destination eq ftp
 service-object tcp destination eq www
access-list outside_access extended permit object-group DM_INLINE_SERVICE_0 any4
object DMZ-SERVER
pager lines 24
mtu inside 1500
mtu outside 1500
mtu dmz 1500
icmp unreachable rate-limit 1 burst-size 1
no asdm history enable
arp timeout 14400
no arp permit-nonconnected
arp rate-limit 16384
!
object network DMZ-SERVER
 nat (dmz,outside) static 209.165.200.227
!
nat (inside,outside) after-auto source dynamic any interface
access-group outside_access in interface outside
route outside 0.0.0.0 0.0.0.0 209.165.200.225 1
timeout xlate 3:00:00
timeout pat-xlate 0:00:30
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 sctp 0:02:00 icmp 0:00:02
timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
timeout sip 0:30:00 sip_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
timeout sip-provisional-media 0:02:00 uauth 0:05:00 absolute
timeout tcp-proxy-reassembly 0:01:00
timeout floating-conn 0:00:00
timeout conn-holddown 0:00:15
```

```
timeout igp stale-route 0:01:10
user-identity default-domain LOCAL
aaa authentication http console LOCAL
aaa authentication ssh console LOCAL
aaa authentication login-history
http server enable
http 192.168.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
service sw-reset-button
crypto ipsec security-association pmtu-aging infinite
crypto ca trustpool policy
telnet timeout 5
ssh stricthostkeycheck
ssh 192.168.1.0 255.255.255.0 inside
ssh timeout 5
ssh version 2
ssh key-exchange group dh-group1-sha1
console timeout 0

dhcpd address 192.168.1.5-192.168.1.30 inside
dhcpd dns 10.3.3.3 interface inside
dhcpd domain ccnasecurity.com interface inside
dhcpd enable inside
!
threat-detection basic-threat
threat-detection statistics access-list
no threat-detection statistics tcp-intercept
webvpn
 enable outside
 cache
  disable
 error-recovery disable
group-policy VPN-GROUP internal
group-policy VPN-GROUP attributes
 vpn-tunnel-protocol ssl-clientless
 webvpn
  url-list value WebServer
dynamic-access-policy-record DfltAccessPolicy
username Admin01 password ***** pbkdf2 privilege 15
username VPNuser password ***** pbkdf2 privilege 0
username VPNuser attributes
 vpn-group-policy VPN-GROUP
tunnel-group VPN-PROFILE type remote-access
tunnel-group VPN-PROFILE general-attributes
 default-group-policy VPN-GROUP
!
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
  inspect icmp
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
prompt hostname context
no call-home reporting anonymous
call-home
 profile CiscoTAC-1
  no active
  destination address http
https://tools.cisco.com/its/service/oddce/services/DDCEService
  destination address email callhome@cisco.com
  destination transport-method http
  subscribe-to-alert-group diagnostic
  subscribe-to-alert-group environment
  subscribe-to-alert-group inventory periodic monthly
  subscribe-to-alert-group configuration periodic monthly
  subscribe-to-alert-group telemetry periodic daily
Cryptochecksum:1446b41e8c44baf756d9185e4dcc62a1
: end
```

Router R3 – Final

```
R3#  show run
Building configuration...

Current configuration : 3948 bytes
!
version 15.4
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname R3
!
boot-start-marker
boot-end-marker
!
security passwords min-length 10
enable secret 9 $9$MmxxymdH3cKtM.$Tub5YnedlBjCEHA3FJOODmlnCVNskbdhUk7JtYniDjw
!
aaa new-model
!
aaa authentication login default local-case enable
!
aaa session-id common
memory-size iomem 15
!
no ip domain lookup
ip domain name ccnasecurity.com
ip ips config location flash:IPSDIR retries 1
ip ips notify SDEE
ip ips name IOSIPS
!
ip ips signature-category
  category all
   retired true
  category ios_ips basic
   retired false
!
ip cef
login on-failure log
login on-success log
no ipv6 cef
!
multilink bundle-name authenticated
!
cts logging verbose
!
username Admin01 privilege 15 secret 9
$9$D9LW7mhAhrXkv.$DgDPIzyTuLLU/XX8AOaLXfNH1YNbZIS.kV6TYkmyZ6s
!
redundancy
!
crypto key pubkey-chain rsa
```

```
 named-key realm-cisco.pub signature
  key-string
   30820122 300D0609 2A864886 F70D0101 01050003 82010F00 3082010A 02820101
   00C19E93 A8AF124A D6CC7A24 5097A975 206BE3A2 06FBA13F 6F12CB5B 4E441F16
   17E630D5 C02AC252 912BE27F 37FDD9C8 11FC7AF7 DCDD81D9 43CDABC3 6007D128
   B199ABCB D34ED0F9 085FADC1 359C189E F30AF10A C0EFB624 7E0764BF 3E53053E
   5B2146A9 D7A5EDE3 0298AF03 DED7A5B8 9479039D 20F30663 9AC64B93 C0112A35
   FE3F0C87 89BCB7BB 994AE74C FA9E481D F65875D6 85EAF974 6D9CC8E3 F0B08B85
   50437722 FFBE85B9 5E4189FF CC189CB9 69C46F9C A84DFBA5 7A0AF99E AD768C36
   006CF498 079F88F8 A3B3FB1F 9FB7B3CB 5539E1D1 9693CCBB 551F78D2 892356AE
   2F56D826 8918EF3C 80CA4F4D 87BFCA3B BFF668E9 689782A5 CF31CB6E B4B094D3
   F3020301 0001
  quit
!
ip ssh time-out 90
ip ssh authentication-retries 2
ip ssh version 2
!
class-map type inspect match-any INSIDE-PROTOCOLS
 match protocol tcp
 match protocol udp
 match protocol icmp
!
policy-map type inspect INSIDE-TO-OUTSIDE
 class type inspect INSIDE-PROTOCOLS
  inspect
 class class-default
  drop
!
zone security INSIDE
zone security OUTSIDE
zone-pair security INSIDE-TO-OUTSIDE source INSIDE destination OUTSIDE
 service-policy type inspect INSIDE-TO-OUTSIDE
!
crypto isakmp policy 1
 encr aes
 authentication pre-share
 group 2
crypto isakmp key Site2SiteKEY1 address 209.165.200.226
!
crypto ipsec transform-set TRNSFRM-SET esp-3des esp-sha-hmac
 mode tunnel
!
crypto map CMAP 1 ipsec-isakmp
 set peer 209.165.200.226
 set transform-set TRNSFRM-SET
 match address 101
!
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
 zone-member security INSIDE
 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 ips IOSIPS in
 zone-member security OUTSIDE
 crypto map CMAP
!
ip forward-protocol nd
!
ip http server
no ip http secure-server
!
ip route 0.0.0.0 0.0.0.0 10.2.2.2
!
logging trap warnings
logging host 172.16.3.3
!
access-list 101 permit ip 172.16.3.0 0.0.0.255 192.168.1.0 0.0.0.255
!
control-plane
!
banner motd ^CUnauthorized access strictly prohibited!^C
!
line con 0
 exec-timeout 15 0
 privilege level 15
 logging synchronous
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 exec-timeout 15 0
```

```
 privilege level 15
 transport input ssh
!
scheduler allocate 20000 1000
ntp authentication-key 1 md5 09627A39090404011C03162E 7
ntp authenticate
ntp trusted-key 1
ntp update-calendar
ntp server 10.2.2.2
!
end
```

ASA 5506-X – Final

```
CCNAS-ASA# show run
: Saved

:
: Hardware:   ASA5506, 4096 MB RAM, CPU Atom C2000 series 1250 MHz, 1 CPU (4 cores)
:
ASA Version 9.10(1)
!
hostname CCNAS-ASA
domain-name cnasecurity.com
enable password ***** pbkdf2
names
no mac-address auto

!
interface GigabitEthernet1/1
 nameif outside
 security-level 0
 ip address 209.165.200.226 255.255.255.248
!
interface GigabitEthernet1/2
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!
interface GigabitEthernet1/3
 nameif dmz
 security-level 70
 ip address 192.168.2.1 255.255.255.0
!
interface GigabitEthernet1/4
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/5
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/6
 shutdown
 no nameif
 no security-level
 no ip address
!
interface GigabitEthernet1/7
 shutdown
 no nameif
 no security-level
```

```
 no ip address
!
interface GigabitEthernet1/8
 shutdown
 no nameif
 no security-level
 no ip address
!
interface Management1/1
 management-only
 shutdown
 no nameif
 no security-level
 no ip address
!
ftp mode passive
dns server-group DefaultDNS
 domain-name cnasecurity.com
object network DMZ-SERVER
 host 192.168.2.3
 description PC-A
object network NETWORK_OBJ_172.16.3.0_24
 subnet 172.16.3.0 255.255.255.0
object network NETWORK_OBJ_192.168.1.0_24
 subnet 192.168.1.0 255.255.255.0
object-group service DM_INLINE_SERVICE_0
 service-object icmp echo
 service-object tcp destination eq ftp
 service-object tcp destination eq www
access-list outside_access extended permit object-group DM_INLINE_SERVICE_0 any4
object DMZ-SERVER
access-list outside_cryptomap extended permit ip 192.168.1.0 255.255.255.0 172.16.3.0
255.255.255.0
pager lines 24
mtu inside 1500
mtu outside 1500
mtu dmz 1500
icmp unreachable rate-limit 1 burst-size 1
no asdm history enable
arp timeout 14400
no arp permit-nonconnected
arp rate-limit 16384
nat (inside,outside) source static NETWORK_OBJ_192.168.1.0_24
NETWORK_OBJ_192.168.1.0_24 destination static NETWORK_OBJ_172.16.3.0_24
NETWORK_OBJ_172.16.3.0_24 no-proxy-arp route-lookup
!
object network DMZ-SERVER
 nat (dmz,outside) static 209.165.200.227
!
nat (inside,outside) after-auto source dynamic any interface
access-group outside_access in interface outside
route outside 0.0.0.0 0.0.0.0 209.165.200.225 1
```

```
timeout xlate 3:00:00
timeout pat-xlate 0:00:30
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 sctp 0:02:00 icmp 0:00:02
timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
timeout sip 0:30:00 sip_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
timeout sip-provisional-media 0:02:00 uauth 0:05:00 absolute
timeout tcp-proxy-reassembly 0:01:00
timeout floating-conn 0:00:00
timeout conn-holddown 0:00:15
timeout igp stale-route 0:01:10
user-identity default-domain LOCAL
aaa authentication http console LOCAL
aaa authentication ssh console LOCAL
aaa authentication login-history
http server enable
http 192.168.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
service sw-reset-button
crypto ipsec ikev1 transform-set ESP-AES-128-SHA esp-aes esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-128-MD5 esp-aes esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-192-SHA esp-aes-192 esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-192-MD5 esp-aes-192 esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-256-SHA esp-aes-256 esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-256-MD5 esp-aes-256 esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-128-SHA-TRANS esp-aes esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-128-SHA-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-AES-128-MD5-TRANS esp-aes esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-128-MD5-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-AES-192-SHA-TRANS esp-aes-192 esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-192-SHA-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-AES-192-MD5-TRANS esp-aes-192 esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-192-MD5-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-AES-256-SHA-TRANS esp-aes-256 esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-AES-256-SHA-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-AES-256-MD5-TRANS esp-aes-256 esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-AES-256-MD5-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-3DES-SHA esp-3des esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-3DES-MD5 esp-3des esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-3DES-SHA-TRANS esp-3des esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-3DES-SHA-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-3DES-MD5-TRANS esp-3des esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-3DES-MD5-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-DES-SHA esp-des esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-DES-MD5 esp-des esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-DES-SHA-TRANS esp-des esp-sha-hmac
crypto ipsec ikev1 transform-set ESP-DES-SHA-TRANS mode transport
crypto ipsec ikev1 transform-set ESP-DES-MD5-TRANS esp-des esp-md5-hmac
crypto ipsec ikev1 transform-set ESP-DES-MD5-TRANS mode transport
crypto ipsec ikev2 ipsec-proposal AES256
 protocol esp encryption aes-256
 protocol esp integrity sha-1 md5
```

```
crypto ipsec ikev2 ipsec-proposal AES192
 protocol esp encryption aes-192
 protocol esp integrity sha-1 md5
crypto ipsec ikev2 ipsec-proposal AES
 protocol esp encryption aes
 protocol esp integrity sha-1 md5
crypto ipsec ikev2 ipsec-proposal 3DES
 protocol esp encryption 3des
 protocol esp integrity sha-1 md5
crypto ipsec ikev2 ipsec-proposal DES
 protocol esp encryption des
 protocol esp integrity sha-1 md5
crypto ipsec security-association pmtu-aging infinite
crypto map outside_map 1 match address outside_cryptomap
crypto map outside_map 1 set peer 10.2.2.1
crypto map outside_map 1 set ikev1 transform-set ESP-AES-128-SHA ESP-AES-128-MD5 ESP-
AES-192-SHA ESP-AES-192-MD5 ESP-AES-256-SHA ESP-AES-256-MD5 ESP-3DES-SHA ESP-3DES-MD5
ESP-DES-SHA ESP-DES-MD5
crypto map outside_map 1 set ikev2 ipsec-proposal AES256 AES192 AES 3DES DES
crypto map outside_map interface outside
crypto ca trustpool policy
crypto ikev2 policy 1
 encryption aes-256
 integrity sha
 group 5 2
 prf sha
 lifetime seconds 86400
crypto ikev2 policy 10
 encryption aes-192
 integrity sha
 group 5 2
 prf sha
 lifetime seconds 86400
crypto ikev2 policy 20
 encryption aes
 integrity sha
 group 5 2
 prf sha
 lifetime seconds 86400
crypto ikev2 policy 30
 encryption 3des
 integrity sha
 group 5 2
 prf sha
 lifetime seconds 86400
crypto ikev2 policy 40
 encryption des
 integrity sha
 group 5 2
 prf sha
 lifetime seconds 86400
crypto ikev2 enable outside
```

```
crypto ikev1 enable outside
crypto ikev1 policy 10
 authentication pre-share
 encryption aes-256
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 20
 authentication rsa-sig
 encryption aes-256
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 40
 authentication pre-share
 encryption aes-192
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 50
 authentication rsa-sig
 encryption aes-192
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 70
 authentication pre-share
 encryption aes
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 80
 authentication rsa-sig
 encryption aes
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 100
 authentication pre-share
 encryption 3des
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 110
 authentication rsa-sig
 encryption 3des
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 130
 authentication pre-share
 encryption des
```

```
 hash sha
 group 2
 lifetime 86400
crypto ikev1 policy 140
 authentication rsa-sig
 encryption des
 hash sha
 group 2
 lifetime 86400
telnet timeout 5
ssh stricthostkeycheck
ssh 192.168.1.0 255.255.255.0 inside
ssh timeout 5
ssh version 2
ssh key-exchange group dh-group1-sha1
console timeout 0

dhcpd address 192.168.1.5-192.168.1.30 inside
dhcpd dns 10.3.3.3 interface inside
dhcpd domain ccnasecurity.com interface inside
dhcpd enable inside
!
threat-detection basic-threat
threat-detection statistics access-list
no threat-detection statistics tcp-intercept
webvpn
 enable outside
 cache
  disable
 error-recovery disable
group-policy GroupPolicy_10.2.2.1 internal
group-policy GroupPolicy_10.2.2.1 attributes
 vpn-tunnel-protocol ikev1 ikev2
group-policy VPN-GROUP internal
group-policy VPN-GROUP attributes
 vpn-tunnel-protocol ssl-clientless
 webvpn
  url-list value WebServer
dynamic-access-policy-record DfltAccessPolicy
username Admin01 password ***** pbkdf2 privilege 15
username VPNuser password ***** pbkdf2 privilege 0
username VPNuser attributes
 vpn-group-policy VPN-GROUP
tunnel-group VPN-PROFILE type remote-access
tunnel-group VPN-PROFILE general-attributes
 default-group-policy VPN-GROUP
tunnel-group 10.2.2.1 type ipsec-l2l
tunnel-group 10.2.2.1 general-attributes
 default-group-policy GroupPolicy_10.2.2.1
tunnel-group 10.2.2.1 ipsec-attributes
 ikev1 pre-shared-key *****
 ikev2 remote-authentication pre-shared-key *****
```

```
 ikev2 local-authentication pre-shared-key *****
!
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
  inspect icmp
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
prompt hostname context
no call-home reporting anonymous
call-home
 profile CiscoTAC-1
  no active
  destination address http
https://tools.cisco.com/its/service/oddce/services/DDCEService
  destination address email callhome@cisco.com
  destination transport-method http
  subscribe-to-alert-group diagnostic
  subscribe-to-alert-group environment
```

```
  subscribe-to-alert-group inventory periodic monthly
  subscribe-to-alert-group configuration periodic monthly
  subscribe-to-alert-group telemetry periodic daily
Cryptochecksum:c248b8c5000bd28714ccb870f3950fec
: end
```