Cisco Networking Academy
Mind Wide Open

Chapitre 9:

Implementing the Cisco Adaptive Security Appliance

CCNA Security v2.0

Chapter Outline

Section 9.1: Introduction au système ASA

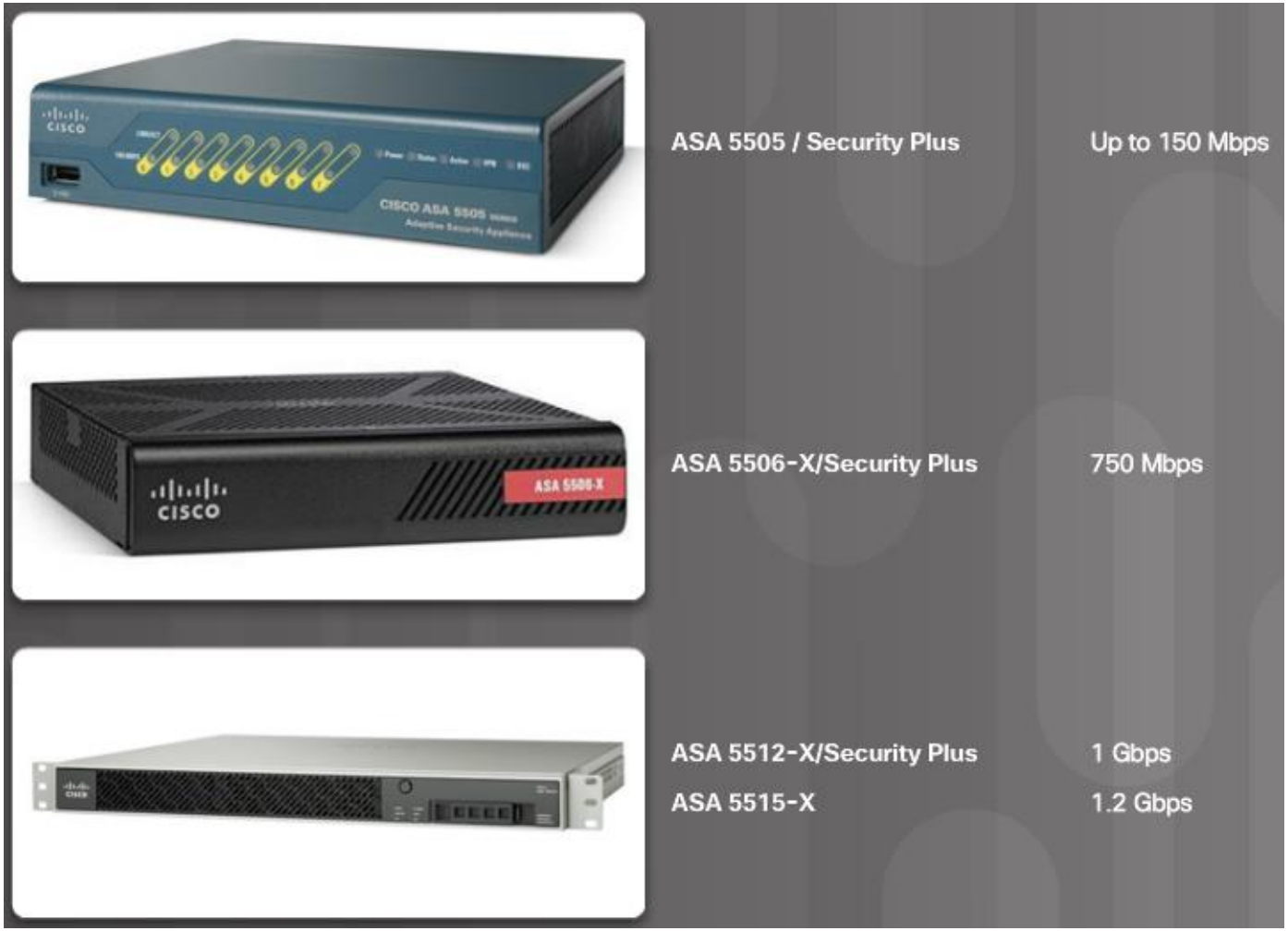
Une fois cette section complétée, vous devriez être en mesure de :

- Comparer les solutions ASA à d'autres technologies de routeurs-pare-feu.
- Expliquer le fonctionnement de l'ASA 5505 avec la configuration par défaut.

Topic 9.1.1:
Les solutions ASA

Modèles de pare-feu ASA

Modèles d'ASA pour les petits bureaux et les succursales



Modèles de pare-feu ASA

Modèles de périphérie d'Internet

ASA Firewall Models (Cont.)

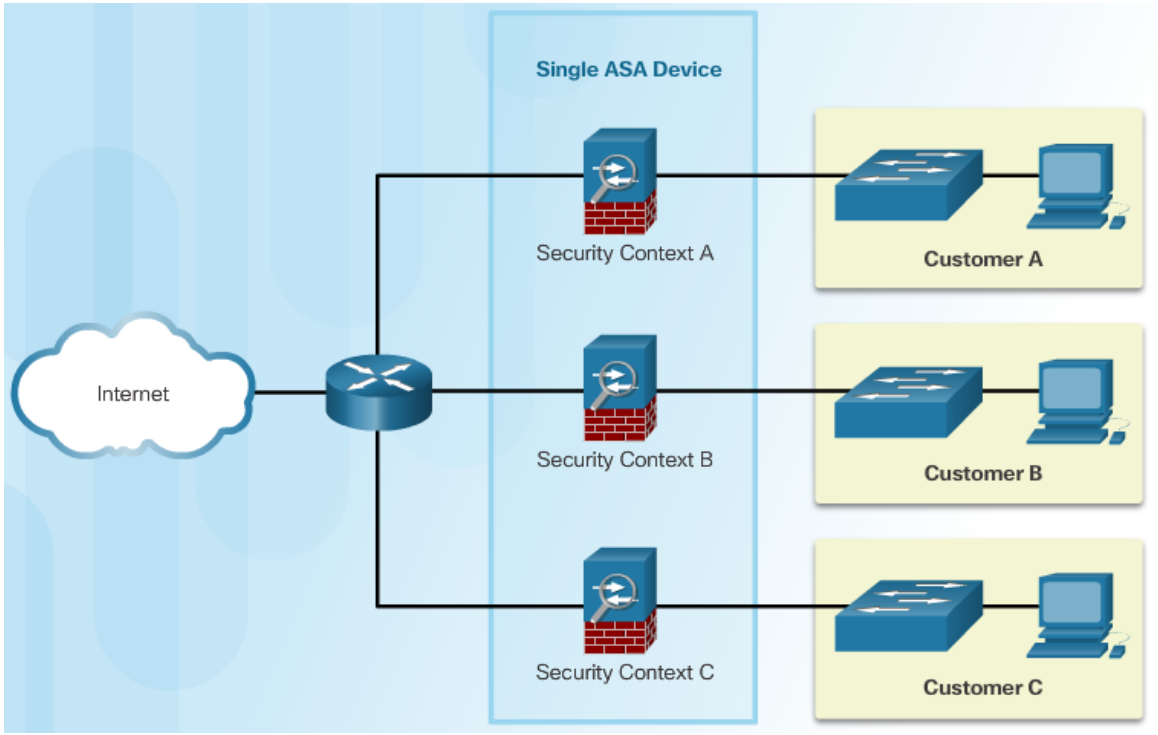
Enterprise Data Center Models

ASA 5585-X SSP10	4 Gbps
ASA 5585-X SSP20	10 Gbps
ASA 5585-X SSP40	20 Gbps
ASA 5585-X SSP60	40 Gbps

ASA Service Module	20 Gbps

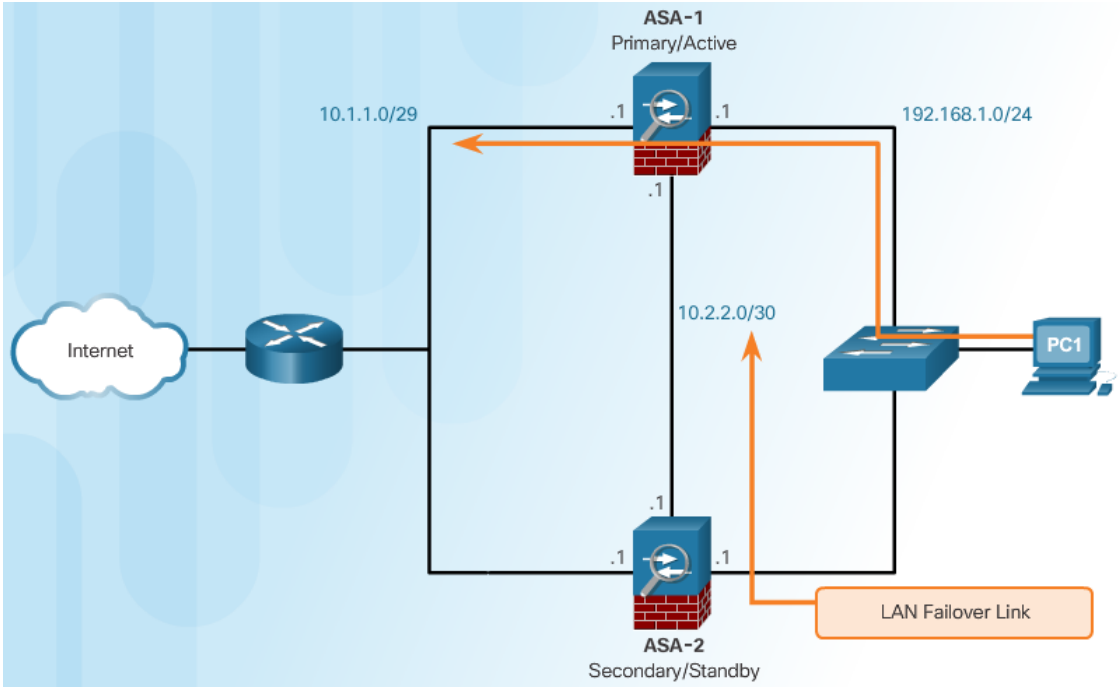
Fonctionnalités avancées de pare-feu ASA Virtualisation ASA

- Un seul ASA peut être partitionné en plusieurs dispositifs virtuels.
- Chaque dispositif virtuel est appelé un contexte de sécurité.
- Chaque contexte est un dispositif indépendant, avec sa propre politique de sécurité, ses interfaces et ses administrateurs



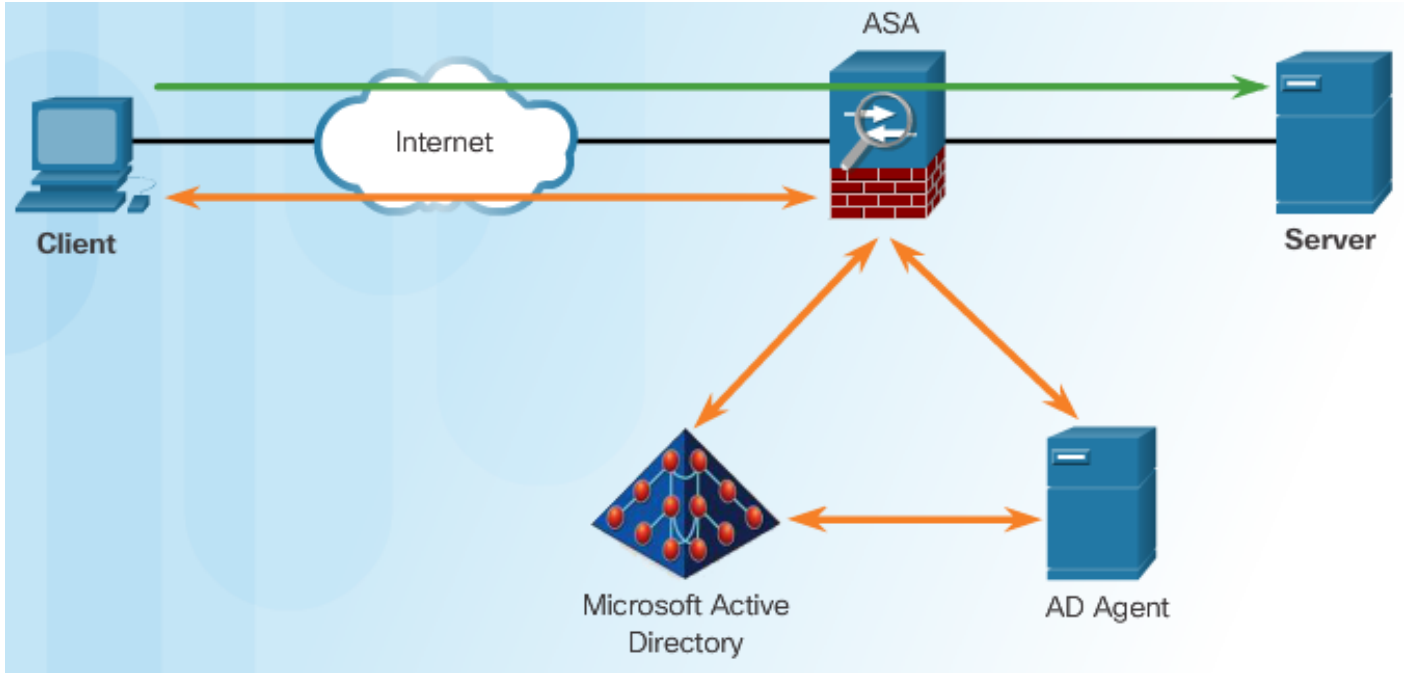
Fonctionnalités avancées de pare-feu ASA Haute disponibilité

- Deux ASA identiques peuvent être couplés dans une configuration de basculement actif / de secours pour assurer la redondance des dispositifs.
- Les deux plateformes doivent être identiques en termes de logiciel, de licence, de mémoire et d'interfaces, y compris le module de services de sécurité (SSM).



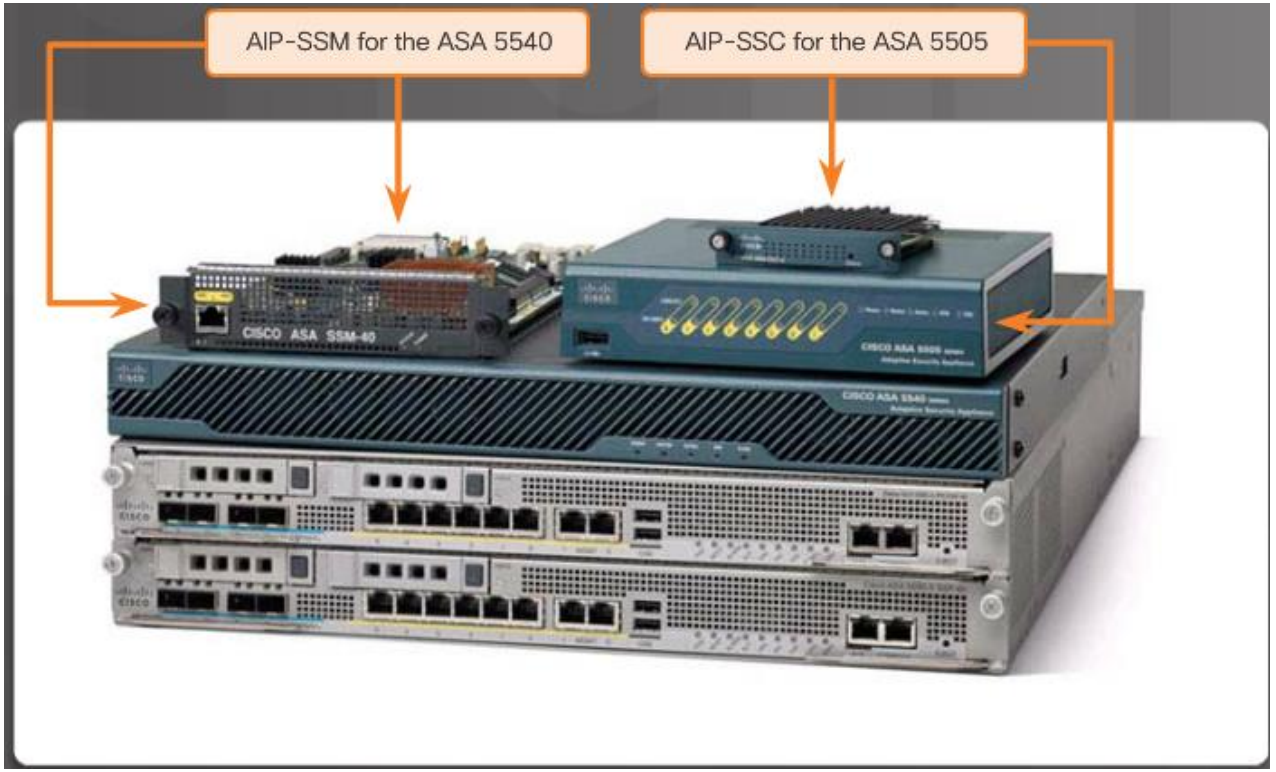
Fonctionnalités avancées de pare-feu ASA Contrôle d'identité

- L'ASA fournit un contrôle d'accès granulaire facultatif basé sur une association d'adresses IP aux informations de connexion de Windows Active Directory.
- Lorsqu'un client tente d'accéder aux ressources du serveur, il doit d'abord être authentifié à l'aide des services de pare-feu basés sur l'identité de Microsoft Active Directory.
- Ces services améliorent les mécanismes existants de contrôle d'accès et de politique de sécurité en permettant de spécifier des utilisateurs, ou des groupes, à la place des adresses IP sources.



Fonctionnalités avancées de pare-feu ASA
Services de contrôle et de confinement des menaces

- Tous les modèles ASA prennent en charge les fonctions de base des IPS.
- Toutefois, des fonctions IPS avancées ne peuvent être fournies qu'en intégrant des modules matériels spéciaux à l'architecture ASA.

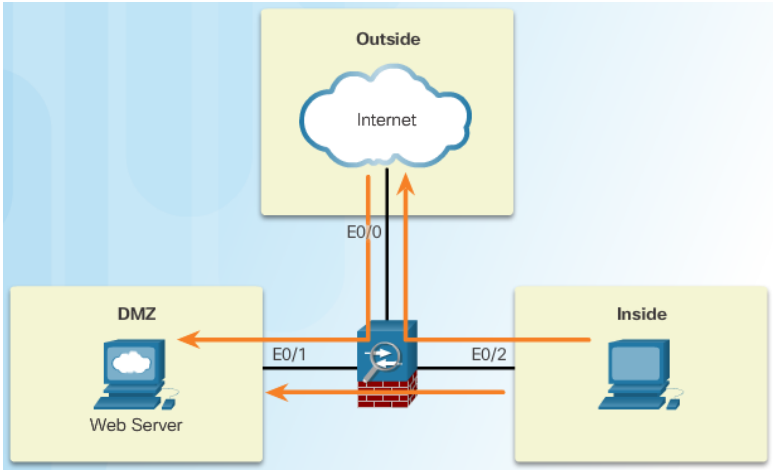


Examen des pare-feu dans la conception des réseaux

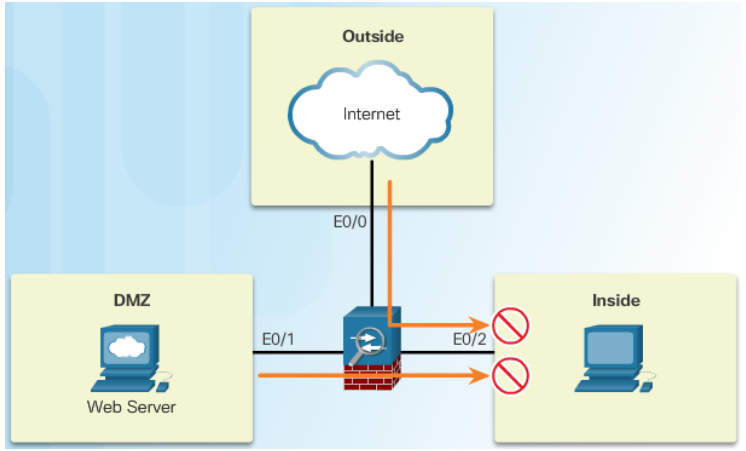
Lorsque l'on parle de réseaux connectés à un pare-feu, il faut tenir compte de certains termes généraux :

- Réseau extérieur
- Réseau interne
- DMZ

Traffic autorisé



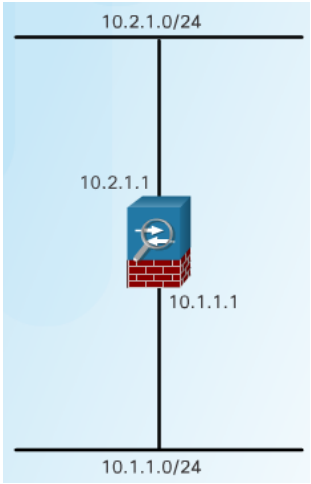
Traffic refusé



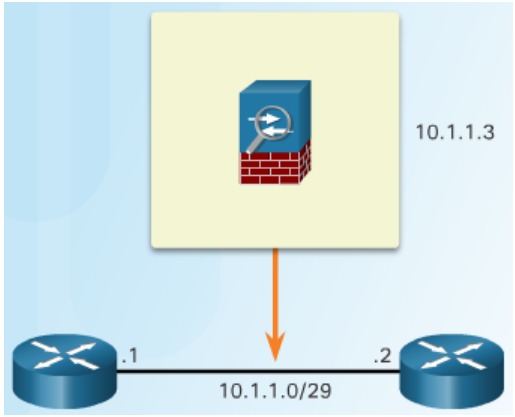
ASA Firewall Modes of Operation

Il existe deux modes de fonctionnement du pare-feu sur les appareils ASA :

- ***Mode routé*** - Deux ou plusieurs interfaces séparent les réseaux de couche 3, c'est-à-dire les domaines.



- ***Mode transparent*** - Souvent appelé "bump in the wire" ou "pare-feu furtif" car l'ASA fonctionne comme un dispositif de couche 2 et n'est pas considéré comme un saut de routeur.



ASA Licensing Requirements

- Une licence spécifie les options qui sont activées sur un ASA donné.
- La plupart des appliances ASA sont préinstallées avec une licence de base ou une licence Security Plus.
- Le modèle Cisco ASA 5505 est livré avec une licence de base et la possibilité de passer à la licence Security Plus.
- La licence de mise à niveau Security Plus permet au Cisco ASA 5505 d'évoluer pour prendre en charge une capacité de connexion plus élevée et jusqu'à 25 utilisateurs de VPN IPsec.
- Elle ajoute une prise en charge complète de la zone démilitarisée (DMZ) et s'intègre dans les environnements de réseau commuté grâce à la prise en charge des liaisons VLAN.

Base License Specifics

Licenses	Description (Base License in Plaintext)			
Firewall Licenses				
Botnet Traffic Filter	Disabled	*Optional Time-based license: Available*		
Firewall Conns, Concurrent	10,000			
GTP/GPRS	No support			
Intercompany Media Engine	Disabled	*Optional license: Available*		
Unified Comm. Sessions	2	*Optional license: 24*		
VPN Licenses				
Adv. Endpoint Assessment	Disabled	*Optional license: Available*		
AnyConnect Essentials	Disabled	*Optional license: Available (25 sessions)*		
AnyConnect Mobile	Disabled	*Optional license: Available*		
AnyConnect Premium (sessions)	2	*Optional Permanent or Time-based licenses:*	10	25
Combined VPN sessions of all types, Maximum	25			
Other VPN (sessions)	10			
VPN Load Balancing	No Support			
VPN Licenses				
Encryption	Base (DES)	*Opt. lic Strong (3DES/AES)*		
Failover	Active/Standby (no stateful failover)			
Interfaces of all types, Max.	120			
Security Contexts	No Support			
Users, concurrent	10	*Optional licenses:*	50	Unlimited
VLANs/Zones, Maximum	Routed mode: 20 Transparent mode: 3 (2 regular zones and 1 failover link)			
VLAN Trunk, Maximum	8 trunks			

ASA Licensing Requirements (Cont.)

- En outre, la licence Security Plus permet de prendre en charge les connexions redondantes des FAI et les services de haute disponibilité actifs/en attente sans état.
- Cette caractéristique contribue à assurer la continuité des activités.
- Pour offrir davantage de fonctionnalités à l'ASA, il est possible d'acheter des licences supplémentaires basées sur le temps ou optionnelles.
- Note : Une seule clé de licence permanente peut être installée. Une fois installée, elle est appelée licence d'exploitation.

Security Plus License Specifics

Licenses	Description (Security Plus Lic. in Plaintext)			
Firewall Licenses				
Botnet Traffic Filter	Disabled	*Optional Time-based license: Available*		
Firewall Conns, Concurrent	25,000			
GTP/GPRS	No support			
Intercompany Media Engine	Disabled	*Optional license: Available*		
Unified Comm. Sessions	2	*Optional license: 24*		
VPN Licenses				
Adv. Endpoint Assessment	Disabled	*Optional license: Available*		
AnyConnect Essentials	Disabled	*Optional license: Available (25 sessions)*		
AnyConnect Mobile	Disabled	*Optional license: Available*		
AnyConnect Premium (sessions)	2	*Optional Permanent or Time-based licenses:*	10	25
Combined VPN sessions of all types, Maximum	25			
Other VPN (sessions)	25			
VPN Load Balancing	No Support			
VPN Licenses				
Encryption	Base (DES)	*Opt. lic Strong (3DES/AES)*		
Failover	Active/Standby (no stateful failover)			
Interfaces of all types, Max.	120			
Security Contexts	No Support			
Users, concurrent	10	*Optional licenses:*	50	Unlimited
VLANs/Zones, Maximum	Routed mode: 20 Transparent mode: 3 (2 regular zones and 1 failover link)			
VLAN Trunk, Maximum	8 trunks			

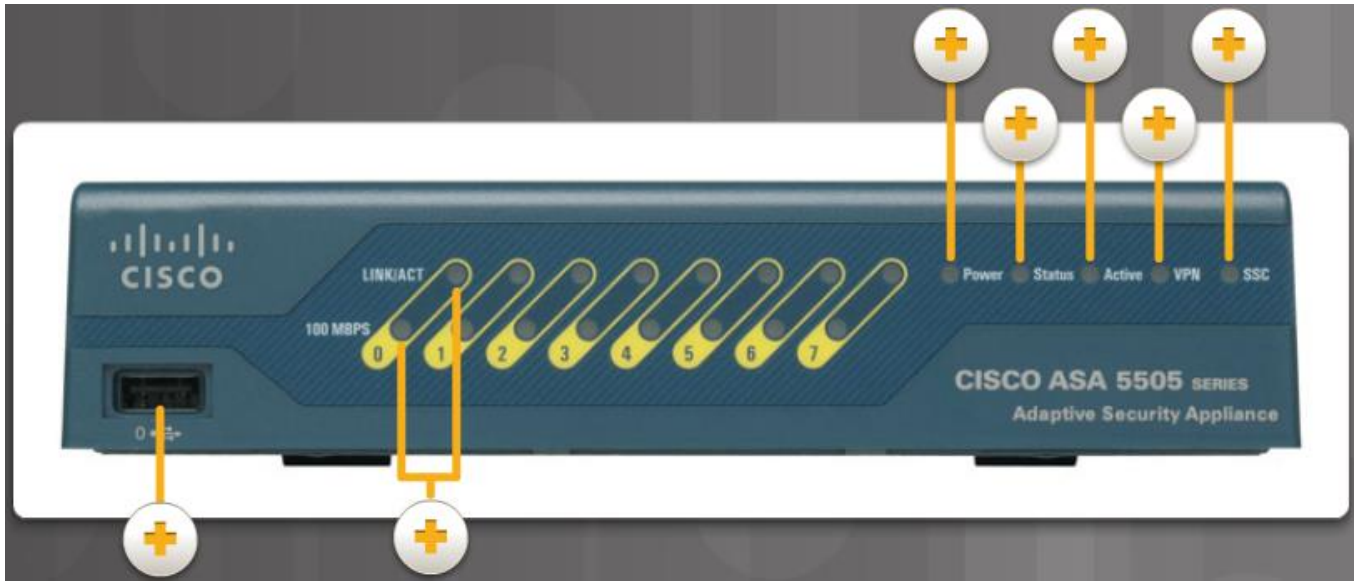
ASA Licensing Requirements

`show version` Command Output

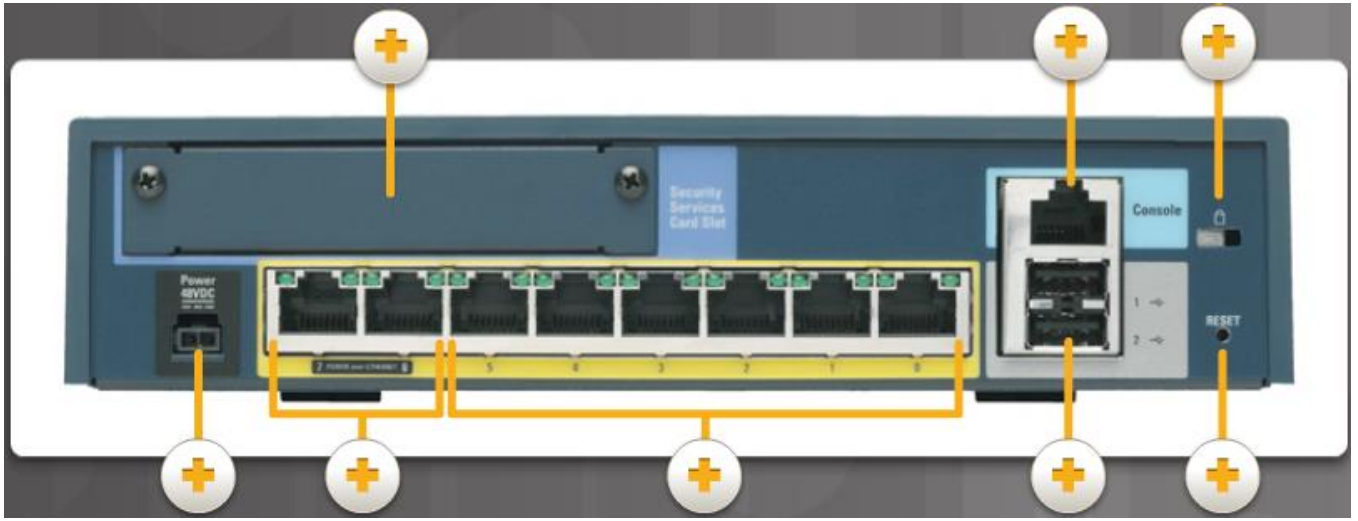
```
CCNAS-ASA# show version

<output omitted>

Licensed features for this platform:
Maximum Physical Interfaces       : 8              perpetual
VLANs                             : 3              DMZ Restricted
Dual ISPs                         : Disabled       perpetual
VLAN Trunk Ports                  : 0              perpetual
Inside Hosts                      : 10             perpetual
Failover                          : Disabled       perpetual
Encryption-DES                    : Enabled        perpetual
Encryption-3DES-AES               : Enabled        perpetual
AnyConnect Premium Peers          : 2              perpetual
AnyConnect Essentials             : Disabled       perpetual
Other VPN Peers                   : 10             perpetual
Total VPN Peers                   : 12             perpetual
Shared License                    : Disabled       perpetual
AnyConnect for Mobile             : Disabled       perpetual
AnyConnect for Cisco VPN Phone    : Disabled       perpetual
Advanced Endpoint Assessment      : Disabled       perpetual
UC Phone Proxy Sessions           : 2              perpetual
Total UC Proxy Sessions           : 2              perpetual
Botnet Traffic Filter             : Disabled       perpetual
Intercompany Media Engine         : Disabled       perpetual
Cluster                           : Disabled       perpetual

This platform has a Base license.
```

Topic 9.1.2:
Basic ASA Configuration

Overview of ASA 5505



ASA 5505 Back Panel

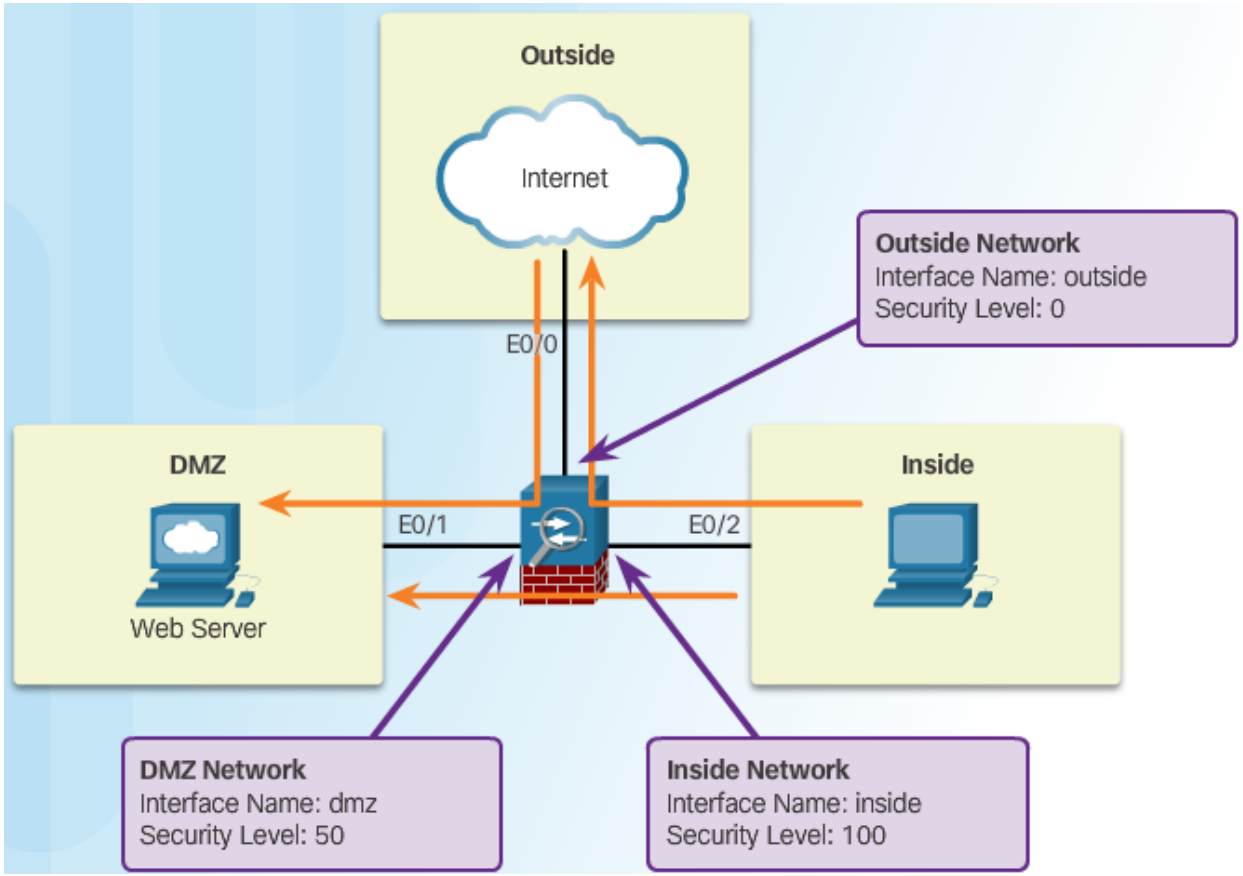


ASA 5505 Front Panel

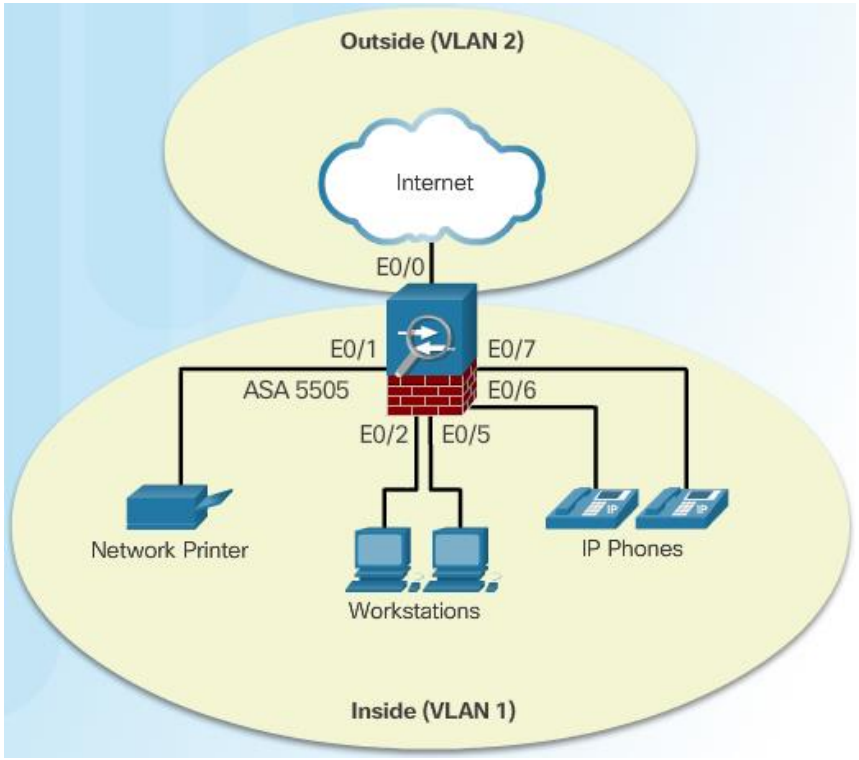
ASA Security Levels

Security Level Control:

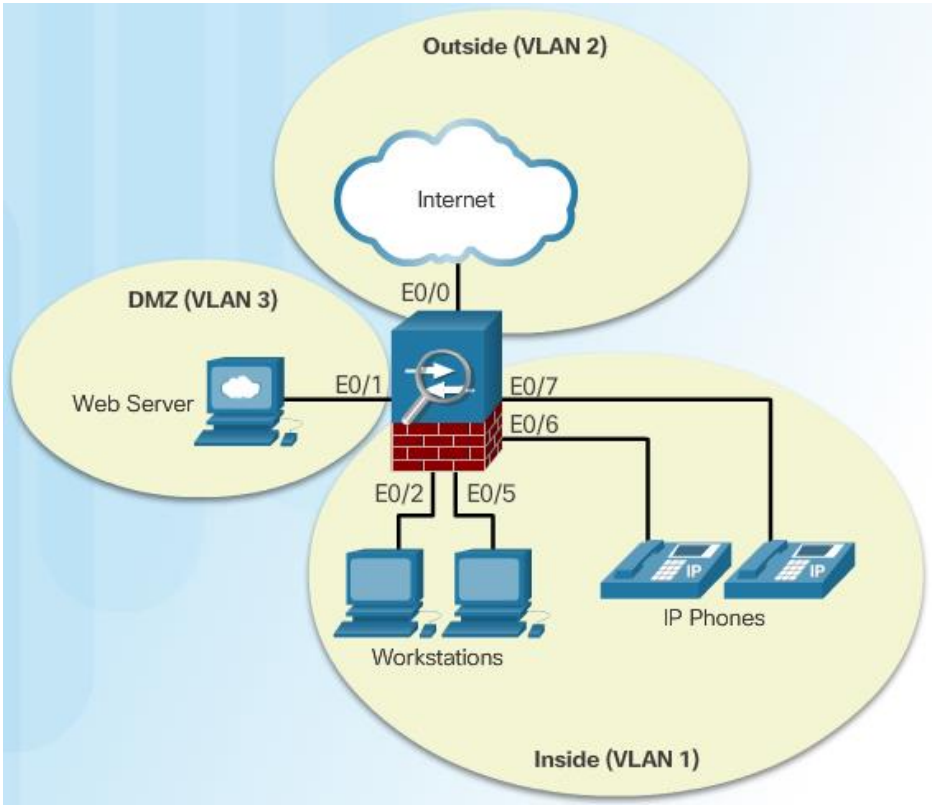
- Network Access
- Inspection Engines
- Application Filtering



ASA 5505 Deployment Scenarios



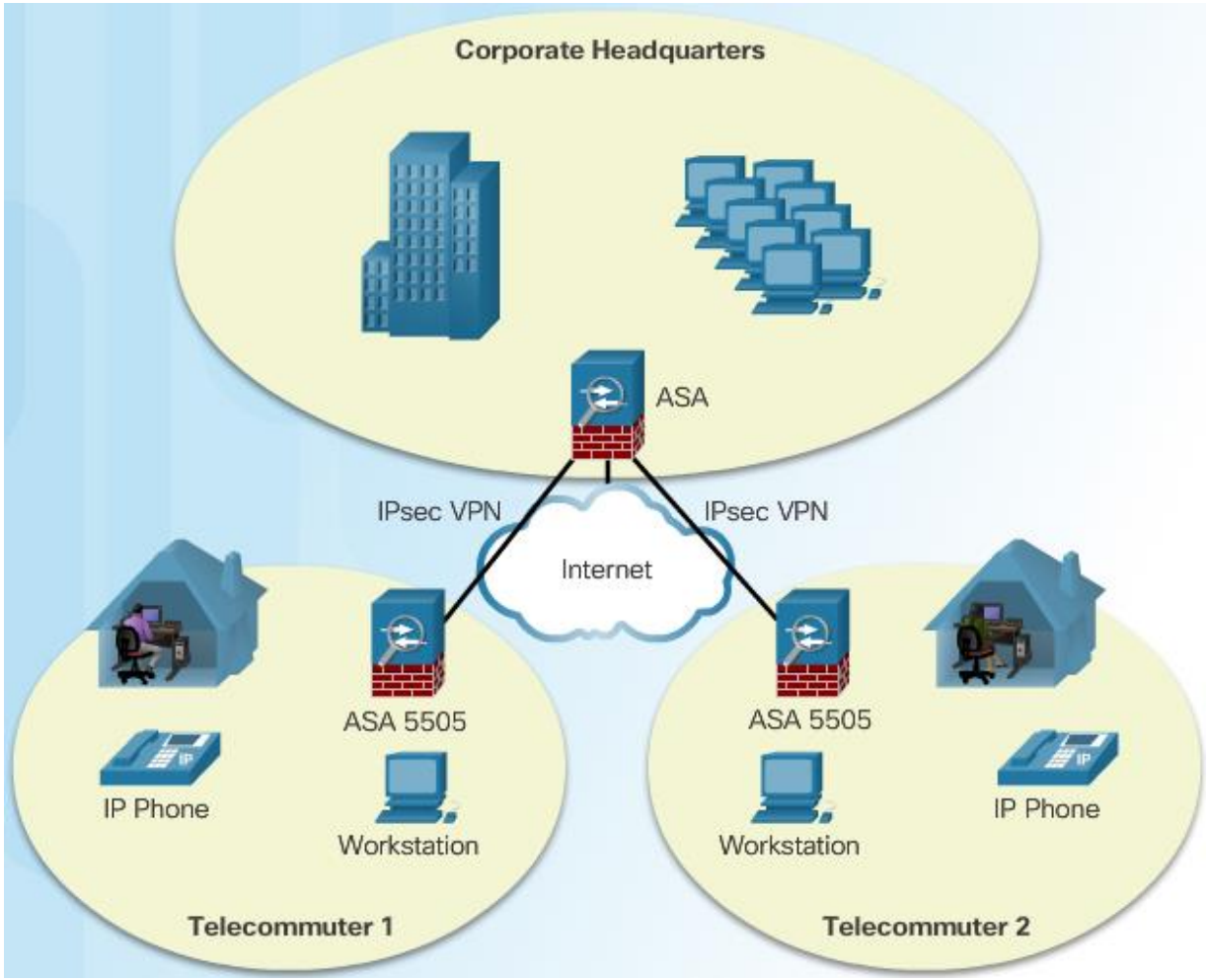
ASA Deployment in a Small Branch



ASA Deployment in a Small Business

ASA 5505 Deployment Scenarios (Cont.)

ASA Deployment in an Enterprise



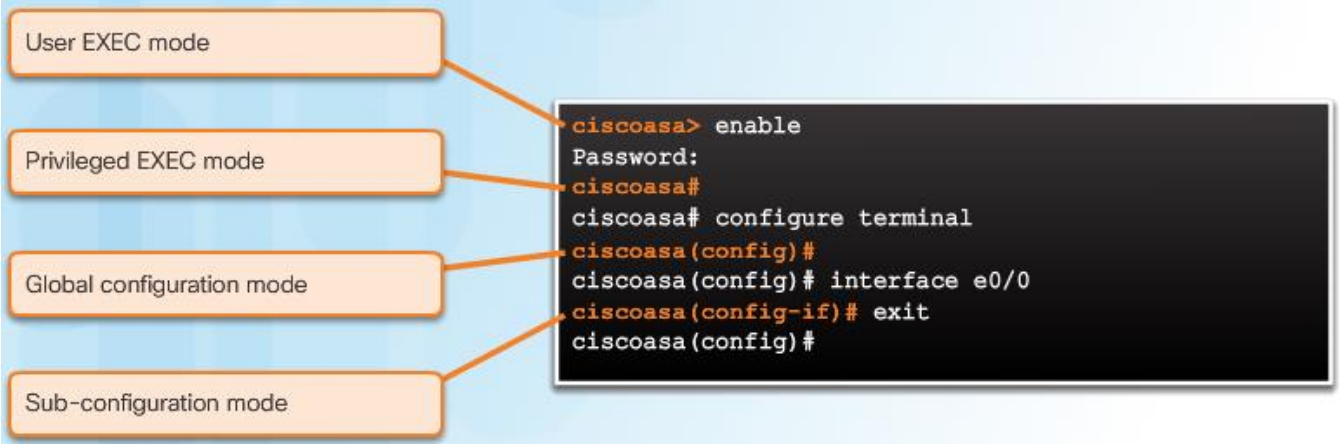
Section 9.2: ASA Firewall Configuration

Upon completion of this section, you should be able to:

- Explain what ASA firewall services are enabled using the default configuration.
- Configure an ASA to provide basic firewall services.
- Configure object groups on an ASA.
- Configure access lists with object groups on an ASA.
- Configure an ASA to provide NAT services.
- Configure access control using the local database and AAA server.
- Explain how the Cisco Modular Framework (MPF) is used to configure ASA policies.

Topic 9.2.1:
The ASA Firewall Configuration

Introduce Basic ASA Settings



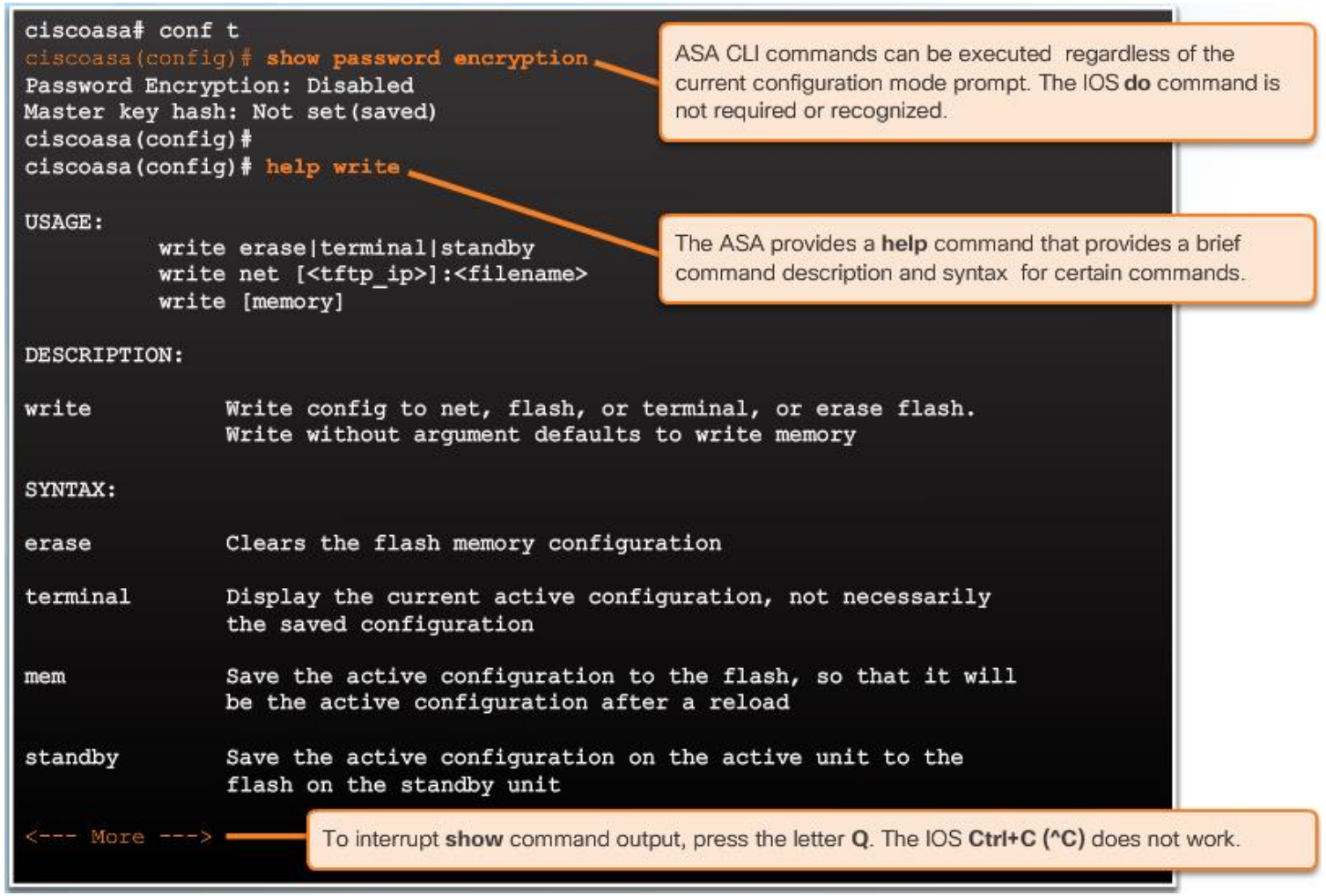
IOS Router Command	Equivalent ASA Command
`enable secret` *password*	`enable password` *password*

`line vty 0 - 4`
`password` *password*
`login`
	`passwd` *password*

`ip route`	`route outside`
`show ip interfaces brief`	`show interfaces ip brief`
`show ip route`	`show route`
`show vlan`	`show switch vlan`
`show ip nat translations`	`show xlate`
`copy running-config startup-config`	`write [memory]`
`erase startup-config`	`write erase`

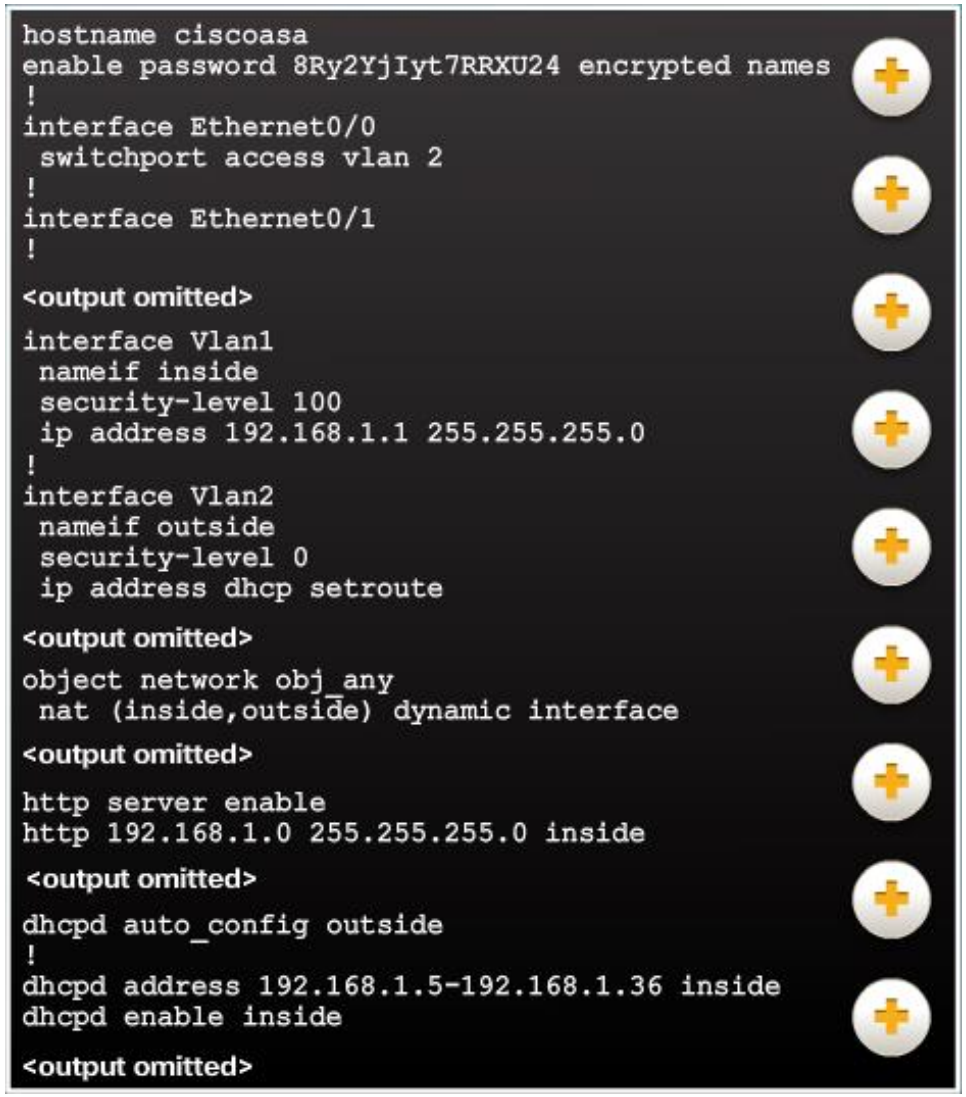
Introduce Basic ASA Settings (Cont.)

`show version` Command Output



ASA Default Configuration

ASA 5505 Default Configuration Overview.



ASA Interactive Setup Initialization Wizard

Entering the ASA 5505 Setup Initialization Wizard

```
Pre-configure Firewall now through interactive prompts [yes]?
Firewall Mode [Routed]:
Enable password [<use current password>]: cisco
Allow password recovery [yes]?
Clock (UTC):
  Year [2015]:
  Month [Mar]: April
  Day [29]: 1
  Time [18:06:03]: 12:00:00
Management IP address: 192.168.1.1
Management network mask: 255.255.255.0
Host name: CCNAS-ASA
Domain name: ccnasecurity.com
IP address of host running Device Manager: 192.168.1.2

The following configuration will be used:
Enable password: cisco
Allow password recovery: yes
Clock (UTC): 12:00:00 April 1 2015
Firewall Mode: Routed
Management IP address: 192.168.1.1
Management network mask: 255.255.255.0
Host name: CCNAS-ASA
Domain name: ccnasecurity.com
IP address of host running Device Manager: 192.168.1.2

Use this configuration and save to flash? [yes]yes
INFO: Security level for "management" set to 0 by default.
```

Topic 9.2.2:
Configuring Management Settings and Services

Enter Global Configuration Mode

Entering Global Configuration Mode Example

```
ciscoasa> enable
Password:
ciscoasa#
ciscoasa# clock set 12:00:00 1 April 2015
ciscoasa#
ciscoasa# configure terminal
ciscoasa(config)#

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

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

Would you like to enable anonymous error reporting to help improve
the product? [Y]es, [N]o, [A]sk later: A
You will be reminded again in 7 days.

If you would like to enable this feature, issue the command
"call-home reporting anonymous".

Please remember to save your configuration.

ciscoasa(config)#
```

Configuring Basic Settings

ASA Basic Configuration Commands

ASA Command	Description
hostname *name*	• Specifies a hostname up to 63 characters. • A hostname must start and end with a letter or digit, and have as interior characters only letters, digits, or a hyphen.
domain-name *name*	• Sets the default domain name
enable password *password*	• Sets the enable password for privileged EXEC mode. • Sets the password as a case-sensitive string of 3 to 32 alphanumeric and special characters (not including a question mark or a space).
banner motd *message*	• Provides legal notification and configures the system to display a message-of-the-day banner when connecting to the ASA
key config-key password-encryption [*new-pass* [*old-pass*]]	• Sets the passphrase between 8 and 128 character long. • Used for generation the encryption key.
password encryption aes	• Enables password encryption and encrypts all user passwords.

Configuring Basic Settings (Cont.)

```
ciscoasa(config)# hostname CCNAS-ASA
CCNAS-ASA(config)# domain-name ccnasecurity.com
CCNAS-ASA(config)# enable password class
CCNAS-ASA(config)#
CCNAS-ASA(config)# banner motd ------------------------------------------------
CCNAS-ASA(config)# banner motd     Authorized access only!
CCNAS-ASA(config)# banner motd     You have logged into a secure device.
CCNAS-ASA(config)# banner motd ------------------------------------------------
CCNAS-ASA(config)# banner motd
CCNAS-ASA(config)# exit
CCNAS-ASA# exit

Logoff

------------------------------------------------------
    Authorized access only!
    You have logged into a secure device.
------------------------------------------------------


Type help or '?' for a list of available commands.
CCNAS-ASA>
```

Configuring Basic Settings

Enabling AES Encryption Example

```
CCNAS-ASA# show password encryption
Password Encryption: Disabled
Master key hash: Not set(saved)
CCNAS-ASA#
CCNAS-ASA# conf t
CCNAS-ASA(config)# key config-key password-encryption cisco123
CCNAS-ASA(config)# password encryption aes
CCNAS-ASA(config)# exit
CCNAS-ASA#
CCNAS-ASA# show password encryption
Password Encryption: Enabled
Master key hash: 0x45ebef8e 0x77a0f287 0x90247f80 0x2a184246 0xe85cbcc4(not saved)
CCNAS-ASA#
CCNAS-ASA# write
Building configuration...
Cryptochecksum: 99934042 e6c6b12b 607a9920 89d8a181

2359 bytes copied in 1.340 secs (2359 bytes/sec)
[OK]
CCNAS-ASA#
```

Configuring Logical VLAN Interfaces

Local VLAN Interface Commands

ASA Command	Description
`interface vlan` *vlan-number*	• Enters VLAN interface configuration mode.
`nameif` *if_name*	• Names the interface using a text string of up to 48 characters. • The name is not case-sensitive. • You can change the name by re-entering this command with a new value. • Do not enter the no form, because that command causes all commands that refer to that name to be deleted.
`security-level` *value*	• Sets the security level, where number is an integer between 0 (lowest) and 100 (highest).

Configuring IP Addresses on VLAN Interfaces

To Configure	ASA Command	Description
Manually	`ip address` *ip-address netmask*	• Assigns an IP address to the interface.
Using DHCP	`ip address dhcp`	• Used to have the interface request an IP address configuration from the upstream device.
	`ip address dhcp setroute`	• Used to have the interface request and install a default route to the upstream device.
Using PPP0E	`ip address pppoe`	• Interface configuration mode command that requests an IP address from the upstream device.
	`ip address pppoe setroute`	• Same command but it also requests and installs a default route to the upstream device.

Configuring Logical VLAN Interfaces (Cont.)

Configuring VLAN Interfaces Example

```
CCNAS-ASA(config)# interface vlan 1
CCNAS-ASA(config-if)# nameif inside
INFO: Security level for "inside" set to 100 by default.
CCNAS-ASA(config-if)# security-level 100
CCNAS-ASA(config-if)# ip address 192.168.1.1 255.255.255.0
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# interface vlan 2
CCNAS-ASA(config-if)# nameif outside
INFO: Security level for "outside" set to 0 by default.
CCNAS-ASA(config-if)# security-level 0
CCNAS-ASA(config-if)# ip address 209.165.200.226 255.255.255.248
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
```

Assigning Layer 2 Ports to VLANs

```
CCNAS-ASA(config)# interface e0/0
CCNAS-ASA(config-if)# switchport access vlan 2
CCNAS-ASA(config-if)# no shut
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config-if)# interface e0/1
CCNAS-ASA(config-if)# switchport access vlan 1
CCNAS-ASA(config-if)# no shut
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
```

Configuring Layer 2 Ports Example

Verifying VLAN Port Assignment Example

```
CCNAS-ASA# show switch vlan
VLAN Name                            Status    Ports
---- ------------------------------- --------- -------------------------------
1    inside                          up        Et0/1, Et0/2, Et0/3, Et0/4
                                               Et0/5, Et0/6, Et0/7
2    outside                         up        Et0/0
CCNAS-ASA#
```

Assigning Layer 2 Ports to VLANs (Cont.)

```
CCNAS-ASA# show interface ip brief
Interface                  IP-Address      OK? Method Status                Protocol
Ethernet0/0                unassigned      YES unset  up                    up
Ethernet0/1                unassigned      YES unset  up                    up
Ethernet0/2                unassigned      YES unset  up                    up
Ethernet0/3                unassigned      YES unset  up                    up
Ethernet0/4                unassigned      YES unset  down                  down
Ethernet0/5                unassigned      YES unset  down                  down
Ethernet0/6                unassigned      YES unset  down                  down
Ethernet0/7                unassigned      YES unset  down                  down
Internal-Data0/0           unassigned      YES unset  up                    up
Internal-Data0/1           unassigned      YES unset  up                    up
Vlan1                      192.168.1.1     YES manual up                    up
Vlan2                      209.165.200.226 YES manual up                    up
Virtual0                   127.1.0.1       YES unset  up                    up
CCNAS-ASA#
```

Verifying Interfaces Example

Verifying IP Addresses Example

```
CCNAS-ASA# show ip address
System IP Addresses:
Interface                  Name                IP address      Subnet mask     Method
Vlan1                      inside              192.168.1.1     255.255.255.0   manual
Vlan2                      outside             209.165.200.226 255.255.255.248 manual
Current IP Addresses:
Interface                  Name                IP address      Subnet mask     Method
Vlan1                      inside              192.168.1.1     255.255.255.0   manual
Vlan2                      outside             209.165.200.226 255.255.255.248 manual
CCNAS-ASA#
```

Configuring a Default Static Route

```
CCNAS-ASA(config)# route outside 0.0.0.0 0.0.0.0 209.165.200.225
CCNAS-ASA(config)#
CCNAS-ASA(config)# show route | begin Gateway
Gateway of last resort is 209.165.200.225 to network 0.0.0.0

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

CCNAS-ASA(config)#
```

Configuring Remote Access Services

Telnet Configuration Commands

ASA Command	Description
`{passwd | password}` *password*	• Sets the login password up to 80 characters in length for Telnet.
`telnet` {*ipv4_address mask* | *ipv6_address/prefix* } *if_name*	• Identifies which inside host or network can Telnet to the ASA interface. • Use the `clear configure telnet` command to remove the Telnet connection.
`telnet timeout` *minutes*	• By default, Telnet sessions left idle for five minutes are closed by the ASA. • The command alters the default exec timeout of five minutes.
`aaa authentication telnet console LOCAL`	• Configures Telnet to refer to the local database for authentication. • The `LOCAL` keyword is case sensitive and is a predefined server tag.
`clear configure telnet`	• Removes the Telnet connection from the configuration.

Telnet Configuration Commands Example

```
CCNAS-ASA(config)# password cisco
CCNAS-ASA(config)# telnet 192.168.1.3 255.255.255.255 inside
CCNAS-ASA(config)# telnet timeout 3
CCNAS-ASA(config)#
CCNAS-ASA(config)# show run telnet
telnet 192.168.1.3 255.255.255.255 inside
telnet timeout 3
CCNAS-ASA(config)#
```

Configuring Remote Access Services (Cont.)

ASA Command	Description
`username` *name* `password` *password*	• Creates a local database entry.
`aaa authentication ssh console LOCAL`	• Configures SSH to refer to the local database for authentication. • The `LOCAL` keyword is case sensitive and is a predefined server tag.
`crypto key generate rsa modulus` *modulus_size*	• Generates the RSA key required for SSH encryption. • The `modulus_size` (in bits) can be 512, 768, 1024, or 2048. • A value of 2048 is recommended.
`ssh` {*ip_address mask* | *ipv6_address/prefix* } *if_name*	• Identifies which inside host or network can SSH to the ASA interface. • Multiple commands can be in the configuration. • If the `if_name` is not specified, SSH is enabled on all interfaces except the outside interface. • Use the clear configure ssh command to remov[illegible] connection.
`ssh version` *version_number*	• (Optional) By default, the ASA allows both SSH (less secure) and Version 2 (more secure). • Enter this command in order to restrict the conn[illegible] specific version.
`ssh timeout` *minutes*	• Alters the default exec timeout of five minutes.

SSH Configuration Commands

Configuring SSH Access Example

```
CCNAS-ASA(config)# username ADMIN password class
CCNAS-ASA(config)#
CCNAS-ASA(config)# aaa authentication ssh console LOCAL
CCNAS-ASA(config)#
CCNAS-ASA(config)# crypto key generate rsa modulus 2048
WARNING: You have a RSA keypair already defined named <Default-RSA-Key>.

Do you really want to replace them? [yes/no]: y
Keypair generation process begin. Please wait...
CCNAS-ASA(config)#
CCNAS-ASA(config)# ssh 192.168.1.3 255.255.255.255 inside
CCNAS-ASA(config)# ssh 192.168.1.4 255.255.255.255 inside
CCNAS-ASA(config)# ssh 172.16.1.3 255.255.255.255 outside
CCNAS-ASA(config)#
CCNAS-ASA(config)# ssh version 2
CCNAS-ASA(config)#
CCNAS-ASA(config)# show ssh
Timeout: 5 minutes
Version allowed: 2
192.168.1.3 255.255.255.255 inside
192.168.1.4 255.255.255.255 inside
172.16.1.3 255.255.255.255 outside
CCNAS-ASA(config)#
```

Configuring Network Time Protocol Services

NTP Authentication Commands

ASA Command	Description
`ntp authenticate`	• Enables authentication with an NTP server.
`ntp trusted-key` *key_id*	• Specifies an authentication key ID to be a trusted key, which is required for authentication with an NTP server.
`ntp authentication-key` *key_id* `md5` *key*	• Sets a key to authenticate with an NTP server.
`ntp server` *ip_address* [`key` *key_id*]	• Identifies an NTP server.

Configuring NTP Example

```
CCNAS-ASA(config)# ntp authenticate
CCNAS-ASA(config)# ntp trusted-key 1
CCNAS-ASA(config)# ntp authentication-key 1 md5 cisco123
CCNAS-ASA(config)# ntp server 192.168.1.254
CCNAS-ASA(config)#
```

Configuring DHCP Services

DHCP Server Commands

ASA Command	Description
dhcpd address *IP_address1* [*-IP_address2*] *if_name*	• Creates a DHCP address pool whereas IP_address1 is the start of the pool and IP_address2 is the end of the pool, separated by a hyphen. • The address pool must be on the same subnet as the ASA interface.
dhcpd dns *dns1* [*dns2*]	• (Optional) Specifies the IP address(es) of the DNS server(s).
dhcpd lease *lease_length*	• (Optional) Changes the lease length granted to the client which is the amount of time in seconds that the client can use its allocated IP address before the lease expires. • The lease_length defaults to 3600 seconds (1 hour) but can be a value from 0 to 1,048,575 seconds.
dhcpd domain *domain_name*	• (Optional) Specifies the domain name assigned to the client.
dhcpd enable *if_name*	• Enables the DHCP server service (daemon) on the interface (typically the inside interface) of the ASA.

Configuring DHCP Server Example

```
CCNAS-ASA(config)# dhcpd address 192.168.1.10-192.168.1.100
ERROR: % Incomplete command
CCNAS-ASA(config)# dhcpd address 192.168.1.10-192.168.1.100 inside
Warning, DHCP pool range is limited to 32 addresses, set address range as:
192.168.1.10-192.168.1.41
CCNAS-ASA(config)# dhcpd address 192.168.1.10-192.168.1.41 inside
CCNAS-ASA(config)# dhcpd lease 1800
CCNAS-ASA(config)#
```

Topic 9.2.3:
Object Groups

Introduction to Objects and Object Groups

```
CCNAS-ASA(config)# object ?

configure mode commands/options:
  network  Specifies a host, subnet or range IP addresses
  service  Specifies a protocol/port
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group ?

configure mode commands/options:
  icmp-type  Specifies a group of ICMP types, such as echo
  network    Specifies a group of host or subnet IP addresses
  protocol   Specifies a group of protocols, such as TCP, etc
  service    Specifies a group of TCP/UDP ports/services
  user       Specifies single user, local or import user group
CCNAS-ASA(config)#
```

Configuring Network Objects

Network Object Commands

ASA Command	Description
host *ip-addr*	• Assigns an IP address to the named object.
subnet *net-address net-mask*	• Assigns a network subnet to the named object.
range *ip-addr-1 ip-addr-n*	• Assigns IP addresses in a range

Configuring a Network Object Example

```
CCNAS-ASA(config)# object network EXAMPLE-1
CCNAS-ASA(config-network-object)# host 192.168.1.3
CCNAS-ASA(config-network-object)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# show running-config object
object network EXAMPLE-1
 host 192.168.1.3
CCNAS-ASA(config)#
CCNAS-ASA(config)# object network EXAMPLE-1
CCNAS-ASA(config-network-object)# host 192.168.1.4
CCNAS-ASA(config-network-object)# range 192.168.1.10 192.168.1.20
CCNAS-ASA(config-network-object)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# show running-config object
object network EXAMPLE-1
 range 192.168.1.10 192.168.1.20
CCNAS-ASA(config)#
```

Configuring Service Objects

Service Object Options Example

```
CCNAS-ASA(config)# object service EXAMPLE-2
CCNAS-ASA(config-service-object)#
CCNAS-ASA(config-service-object)# service ?

service-object mode commands/options:
  <0-255>  Enter protocol number (0 - 255)
  ah
  eigrp
  esp
  gre
  icmp
  icmp6
  igmp
  igrp
  ip
  ipinip
  ipsec
  nos
  ospf
  pcp
  pim
  pptp
  snp
  tcp
  udp

configure mode commands/options:
  call-home          Enable or disable Smart Call-Home
```

Configuring Service Objects (Cont.)

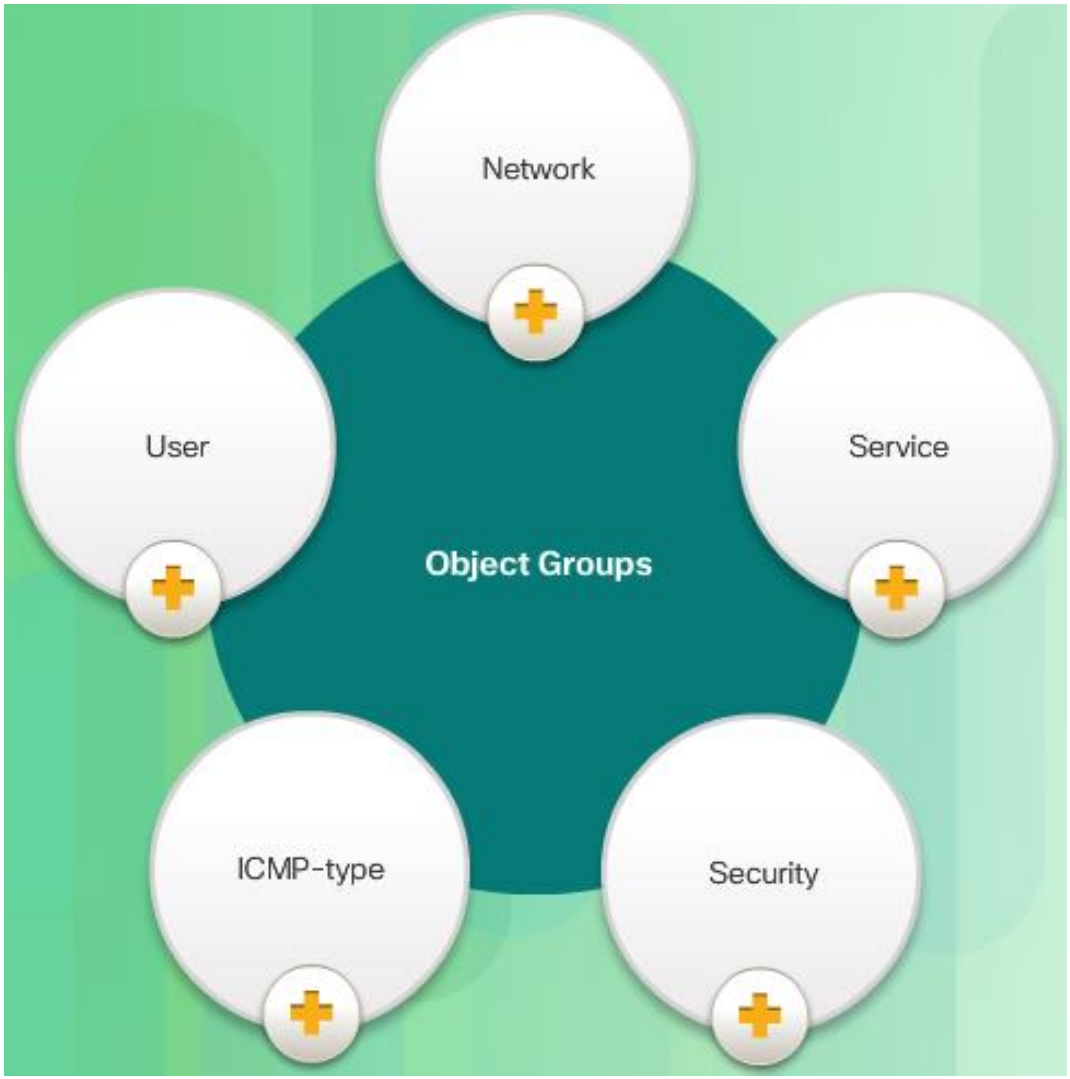
Common Service Object Commands

ASA Command	Description
service *protocol* [**source** [*operator port*]] [**destination** [*operator port*]]	• Specifies an IP protocol name or number.
service tcp [**source** [*operator port*]] [**destination** [*operator port*]]	• Specifies that the service object is for the TCP protocol.
service udp [**source** [*operator port*]] [**destination** [*operator port*]]	• Specifies that the service object is for the UDP protocol.
service icmp *icmp-type*	• Specifies that the service object is for the ICMP protocol.
service icmp6 *icmp6-type*	• Specifies that the service object is for the ICMPv6 protocol.

Configuring a Service Object Example

```
CCNAS-ASA(config)# object service SERV-1
CCNAS-ASA(config-service-object)# service tcp destination eq ftp
CCNAS-ASA(config-service-object)# service tcp destination eq www
CCNAS-ASA(config-service-object)# exit
CCNAS-ASA(config)# show running-config object service
object service SERV-1
 service tcp destination eq www
CCNAS-ASA(config)#
```

Object Groups



Configuring Common Object Groups

```
CCNAS-ASA(config)# object-group network ADMIN-HOST
CCNAS-ASA(config-network-object-group)# description Administrative hosts
CCNAS-ASA(config-network-object-group)# network-object host 192.168.1.3
CCNAS-ASA(config-network-object-group)# network-object host 192.168.1.4
CCNAS-ASA(config-network-object-group)# exit
CCNAS-ASA(config)# object-group network ALL-HOSTS
CCNAS-ASA(config-network-object-group)# description All inside hosts
CCNAS-ASA(config-network-object-group)# network-object 192.168.1.32 255.255.255.240
CCNAS-ASA(config-network-object-group)# group-object ADMIN-HOST
CCNAS-ASA(config-network-object-group)# exit
CCNAS-ASA(config)# show run object-group
object-group network ADMIN-HOST
 description Administrative host IP addresses
 network-object host 192.168.1.3
 network-object host 192.168.1.4
object-group network ALL-HOSTS
 network-object 192.168.1.32 255.255.255.240
 group-object ADMIN-HOST
CCNAS-ASA(config)#
```

Network Object Group Example

```
CCNAS-ASA(config)# object-group icmp-type ICMP-ALLOWED
CCNAS-ASA(config-icmp-object-group)# icmp-object echo
CCNAS-ASA(config-icmp-object-group)# icmp-object time-exceeded
CCNAS-ASA(config-icmp-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# show running-config object-group id ICMP-ALLOWED
object-group icmp-type ICMP-ALLOWED
 icmp-object echo
 icmp-object time-exceeded
CCNAS-ASA(config)#
```

ICMP-type Object Group Example

Configuring Common Object Groups (Cont.)

Services Object Group Example

```
CCNAS-ASA(config)# object-group service SERVICES-1
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq www
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq https
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq pop3
CCNAS-ASA(config-service-object-group)# service-object udp destination eq ntp
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group service SERVICES-2 tcp
CCNAS-ASA(config-service-object-group)# port-object eq www
CCNAS-ASA(config-service-object-group)# port-object eq smtp
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group service SERVICES-3 tcp
CCNAS-ASA(config-service-object-group)# group-object SERVICES-2
CCNAS-ASA(config-service-object-group)# port-object eq ftp
CCNAS-ASA(config-service-object-group)# port-object range 2000 2005
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
```

Configuring Common Object Groups (Cont.)

Services Object Group Example

```
CCNAS-ASA(config)# object-group service SERVICES-1
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq www
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq https
CCNAS-ASA(config-service-object-group)# service-object tcp destination eq pop3
CCNAS-ASA(config-service-object-group)# service-object udp destination eq ntp
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group service SERVICES-2 tcp
CCNAS-ASA(config-service-object-group)# port-object eq www
CCNAS-ASA(config-service-object-group)# port-object eq smtp
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group service SERVICES-3 tcp
CCNAS-ASA(config-service-object-group)# group-object SERVICES-2
CCNAS-ASA(config-service-object-group)# port-object eq ftp
CCNAS-ASA(config-service-object-group)# port-object range 2000 2005
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
```

Topic 9.2.4: ACLS

ASA ACLs

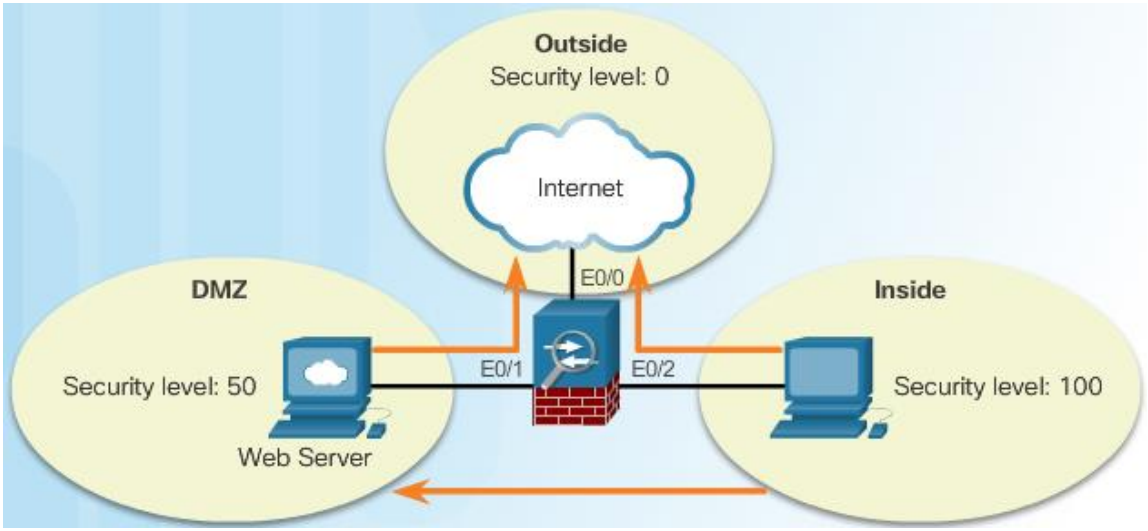
- ACLs are made up of one or more ACEs. An ACE is a single entry in an access list that specifies a permit or deny rule (to forward or drop the packet) and is applied to a protocol, to a source and destination IP address or network, and, optionally, to the source and destination ports.
- ACLs are processed sequentially from top down.
- A criteria match will cause the ACL to be exited.
- There is an implicit deny all at the bottom.
- Remarks can be added per ACE or ACL.
- Only apply one access list per interface, per protocol, per direction.
- ACLs can be enabled/disabled based on time ranges.

ASA ACL and IOS ACL Similarities

ASA ACL and IOS ACL Similarities

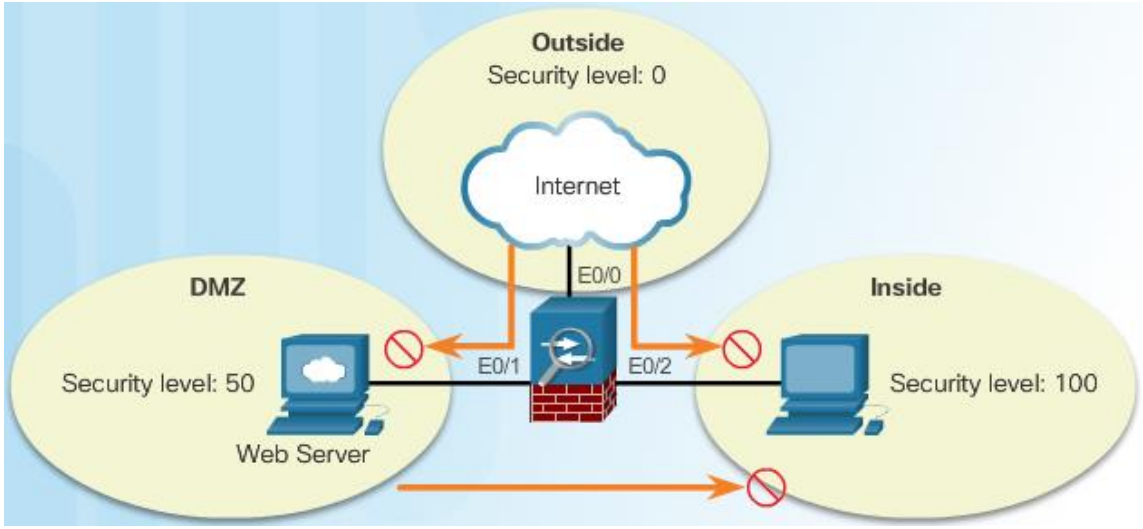
- The ASA uses a network mask (e.g., 255.255.255.0) and not a wildcard mask (e.g. 0.0.0.255).
- ACLs are always named instead of numbered.
- By default, interface security levels apply access control without an ACL configured.

Types of ASA ACL Filtering



Higher Levels Allowed To Lower Levels

Lower Levels Denied To Higher Levels



Types of ASA ACLs

ACL Use	Description
Control network access for IP traffic	• The ASA does not allow any traffic from a lower security interface to a higher security interface unless it is explicitly permitted by an extended access list.
Identify traffic for AAA rules	• AAA rules use access lists to identify traffic.
Identify addresses for NAT	• Policy NAT lets you identify local traffic for address translation by specifying the source and destination addresses in an extended access list.
Establish VPN access	• Extended access list can be used in VPN commands.
Identify traffic for Modular Policy Framework (MPF)	• Access lists can be used to identify traffic in a class map, which is used for features that support MPF. • Features that support Modular Policy Framework include TCP and general connection settings, and inspection.

Extended ACL Examples

ACL Use	Description
Identify OSPF destination network	• Standard access lists include only the destination address. • It can be used to control the redistribution of OSPF routes.

Standard ACL Example

IPv6 ACL Example

ACL Use	Description
Control network access for IPv6 networks	• Can be used to add and apply access lists to control traffic in IPv6 networks.

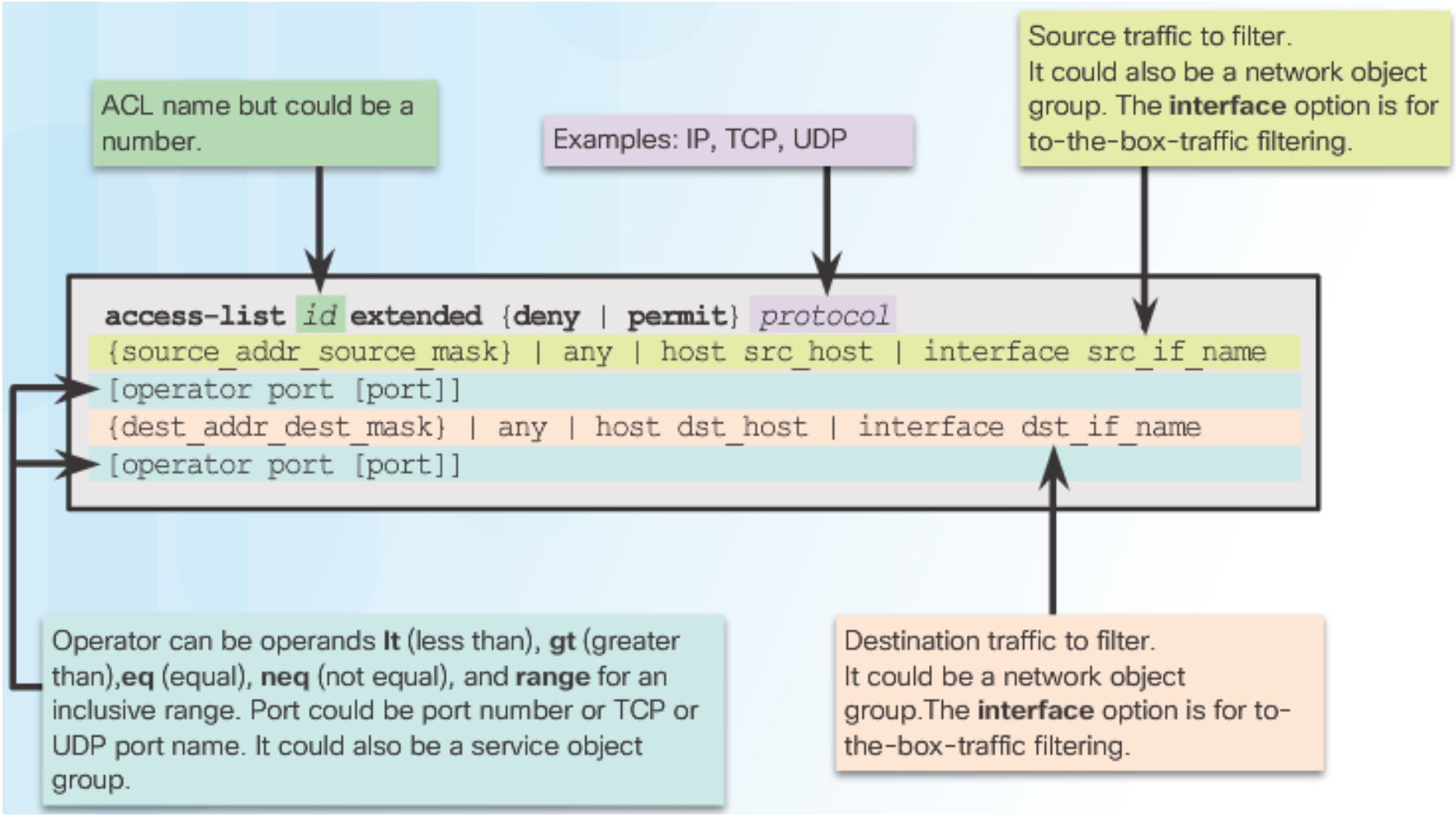
Configuring ACLs

ACL Command Parameters

```
CCNAS-ASA(config)# help access-list

USAGE:


Extended access list:
          Use this to configure policy for IP traffic through the firewall

[no] access-list <id> [line <line_num>] [extended] {deny | permit}
                      {<protocol> | object-group {<service_obj_grp_id> |
                      <protocol_obj_grp_id>} | object <service_object_name>}
                      [user-group [<domain_nickname>\\]<user_group_name> |
                       user [<domain_nickname>\]<user_name> |
                       object-group-user < object_group_user_name>]
                      [security-group {name <sgname> | tag <sgt>} |
                          object-group-security <security_obj_grp_id>]
                      {host <sip> | <sip> <smask> | <sip-prefix> |
                      interface <ifc> | any | any4 | any6
                      object-group <network_obj_grp_id> |
                      object <network_obj_name>}
                      [<operator> <port> [<port>] |
                      object-group <service_obj_grp_id>]
                      [security-group {name <sgname> | tag <sgt>} |
                          object-group-security <security_obj_grp_id>]
                      {host <dip> | <dip> <dmask> | <dip-prefix> |
                      interface <ifc> | any | any4 |any6
<--- More --->
```

Configuring ACLs (Cont.)

Condensed Extended ACL Syntax



Configuring ACLs (Cont.)

Element	Description
ACL id	• The name of the ACL. It can be any alphanumeric name up to 241 characters.
Action	• Can be **permit** or **deny**.
Protocol number - Source	• Can be **ip** for all traffic, or the name / IP protocol number (0-250) including **icmp** (**1**), **tcp** (**6**), **udp** (**17**), or a protocol object-group.
Source	• Identifies the source and can be **any**, a **host**, a network, or a network object group. • For to-the-box-traffic filtering, the **interface** keyword is used to specify the source interface of the ASA.
Source port operator	• (Optional) Operand is used in conjunction with the source port. • Valid operands include **lt** (less than), **gt** (greater than), **eq** (equal), **neq** (not equal), and **range** for an inclusive range.
Source port	• (Optional) Can be the actual TCP or UDP port number, select port name, or service object group.
Destination	• Identifies the destination and like the source, it can be **any**, a **host**, a network, or a network object group. • For to-the-box-traffic filtering, the **interface** keyword is used to specify the destination interface of the ASA.
Destination port operator	• (Optional) Operand is used in conjunction with the destination port. • Valid operands are the same as the source port operands.
Destination port	• (Optional) Can be the actual TCP or UDP port number, select port name, or service object group.
Log	• Can set elements for syslog including severity level and log interval.
Time range	• (Optional) Specify a time range for this ACE.

ASA ACL Elements

Applying ACLs

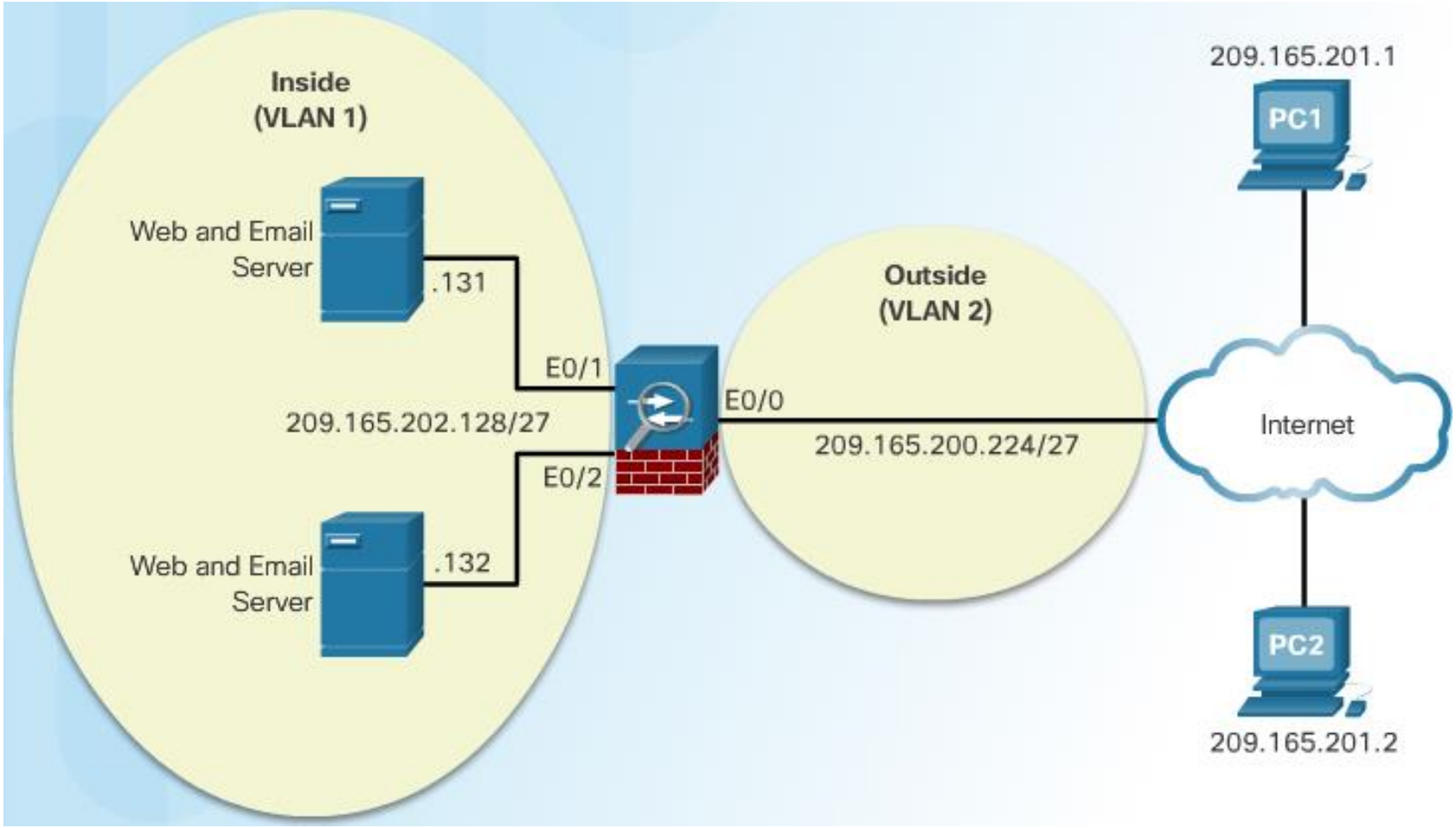
`access-group` Command Syntax

```
access-group id { in | out } interface if_name [ per-user-override | control-plane ]
```

Syntax	Description
access-group	Keyword used to apply an ACL to an interface.
id	The name of the actual ACL to be applied to an interface.
in	The ACL will filter inbound packets.
out	The ACL will filter outbound packets
interface	Keyword to specify the interface to which to apply the ACL.
if_name	The name of the interface to which to apply an ACL.
per-user-override	Option that allows downloadable ACLs to override the entries on the interface ACL.
control-plane	Keyword to specify whether the applied ACL analyzes traffic destined to ASA for management purposes.

ACLs and Object Groups

ACL Reference Topology



ACLs and Object Groups (Cont.)

```
CCNAS-ASA(config)# access-list ACL-IN remark Permit PC-1 -> Server A for HTTP / SMTP
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.131 eq http
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.131 eq smtp
CCNAS-ASA(config)# access-list ACL-IN remark Permit PC-1 -> Server B for HTTP / SMTP
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.132 eq http
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.132 eq smtp
CCNAS-ASA(config)# access-list ACL-IN remark Permit PC-2 -> Server A for HTTP / SMTP
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.131 eq http
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.131 eq smtp
CCNAS-ASA(config)# access-list ACL-IN remark Permit PC-2 -> Server B for HTTP / SMTP
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.132 eq http
CCNAS-ASA(config)# access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.132 eq smtp
CCNAS-ASA(config)# access-list ACL-IN extended deny ip any any log
CCNAS-ASA(config)#
CCNAS-ASA(config)# access-group ACL-IN in interface outside
CCNAS-ASA(config)#
```

Extended ACL Configuration Example

Verifying the ACL

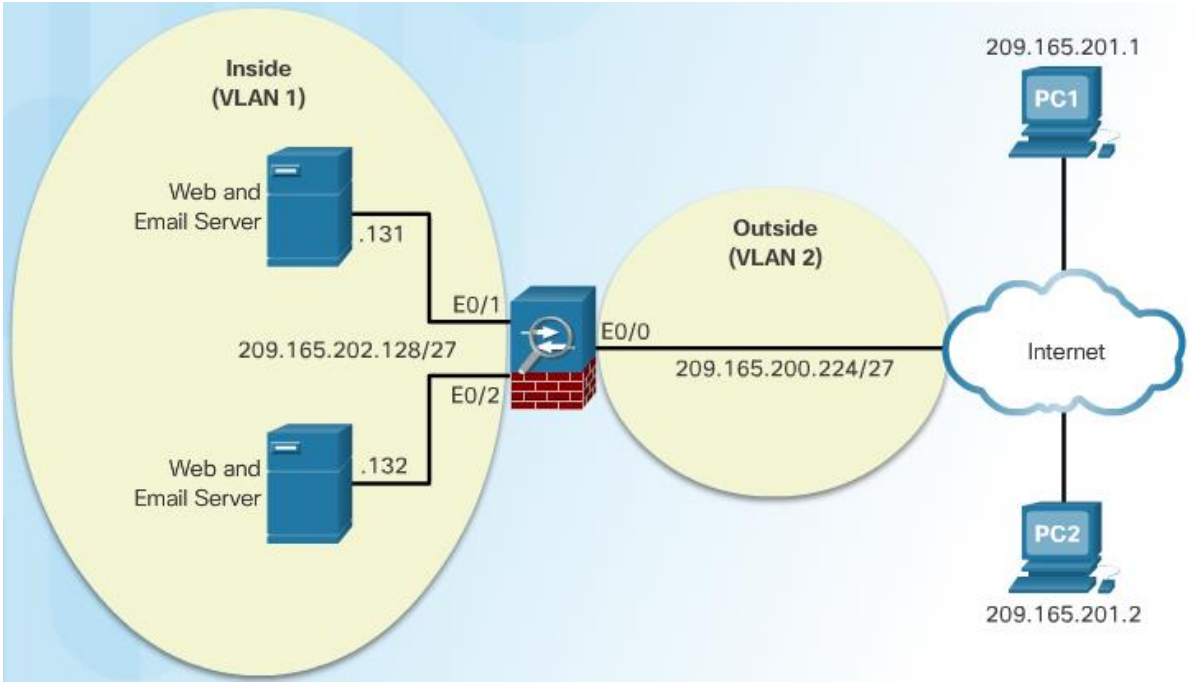
```
CCNAS-ASA(config)# show running-config access-list
access-list ACL-IN remark Permit PC-1 -> Server A for HTTP / SMTP
access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.131 eq www
access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.131 eq smtp
access-list ACL-IN remark Permit PC-1 -> Server B for HTTP / SMTP
access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.132 eq www
access-list ACL-IN extended permit tcp host 209.165.201.1 host 209.165.202.132 eq smtp
access-list ACL-IN remark Permit PC-2 -> Server A for HTTP / SMTP
access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.131 eq www
access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.131 eq smtp
access-list ACL-IN remark Permit PC-2 -> Server B for HTTP / SMTP
access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.132 eq www
access-list ACL-IN extended permit tcp host 209.165.201.2 host 209.165.202.132 eq smtp
access-list ACL-IN extended deny ip any any log
CCNAS-ASA(config)#
CCNAS-ASA(config)# show access-list ACL-IN brief
access-list ACL-IN; 9 elements; name hash: 0x44d1c580
CCNAS-ASA(config)#
```

ACL Using Object Groups Examples

Condensed Extended ACL Syntax with Object Groups

```
access-list id extended { deny | permit } protocol object-group
network-obj-grp-id object-group network-obj-grp-id object-group
service-obj-grp-id
```

ACL Reference Topology



ACL Using Object Groups Examples

```
CCNAS-ASA(config)# object-group network NET-HOSTS
CCNAS-ASA(config-network-object-group)# description OG matches PC-A and PC-B
CCNAS-ASA(config-network-object-group)# network-object host 209.165.201.1
CCNAS-ASA(config-network-object-group)# network-object host 209.165.201.2
CCNAS-ASA(config-network-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group network SERVERS
CCNAS-ASA(config-network-object-group)# description OG matches Web / Email Servers
CCNAS-ASA(config-network-object-group)# network-object host 209.165.202.131
CCNAS-ASA(config-network-object-group)# network-object host 209.165.202.132
CCNAS-ASA(config-network-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object-group service HTTP-SMTP tcp
CCNAS-ASA(config-service-object-group)# description OG matches SMTP / WEB traffic
CCNAS-ASA(config-service-object-group)# port-object eq smtp
CCNAS-ASA(config-service-object-group)# port-object eq www
CCNAS-ASA(config-service-object-group)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# access-list ACL-IN remark Only permit PC-A / PC-B -> Internal Servers
CCNAS-ASA(config)#  access-list ACL-IN extended permit tcp object-group NET-HOSTS
object-group SERVERS object-group HTTP-SMTP
```

ACL and Object Group Configuration Example

Verifying the ACL and Object Group Configuration Example

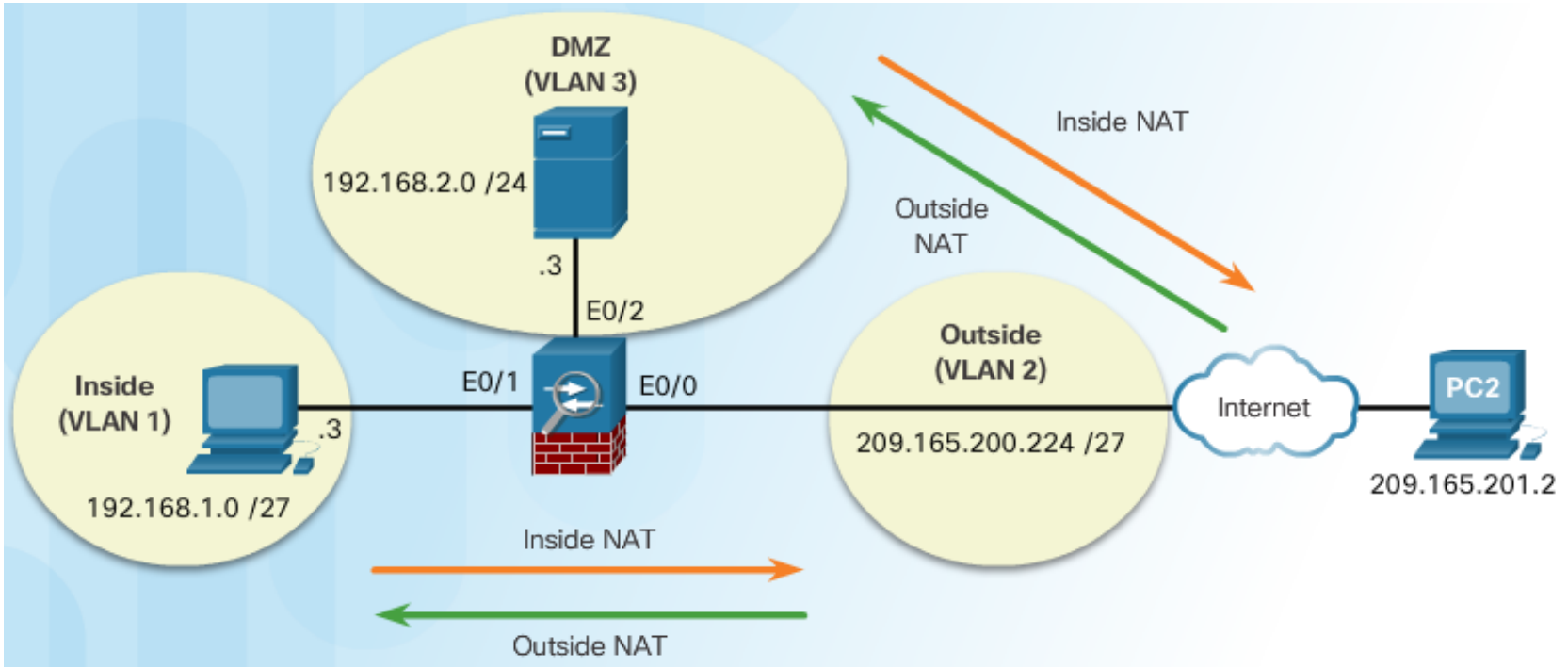
```
CCNAS-ASA(config)# show running-config access-list
access-list ACL-IN remark Only permit PC-A / PC-B -> Internal Servers
access-list ACL-IN extended permit tcp object-group NET-HOSTS object-group SERVERS
object-group HTTP-SMTP
CCNAS-ASA(config)#
```

Topic 9.2.5:
NAT Services on an ASA

ASA NAT Overview

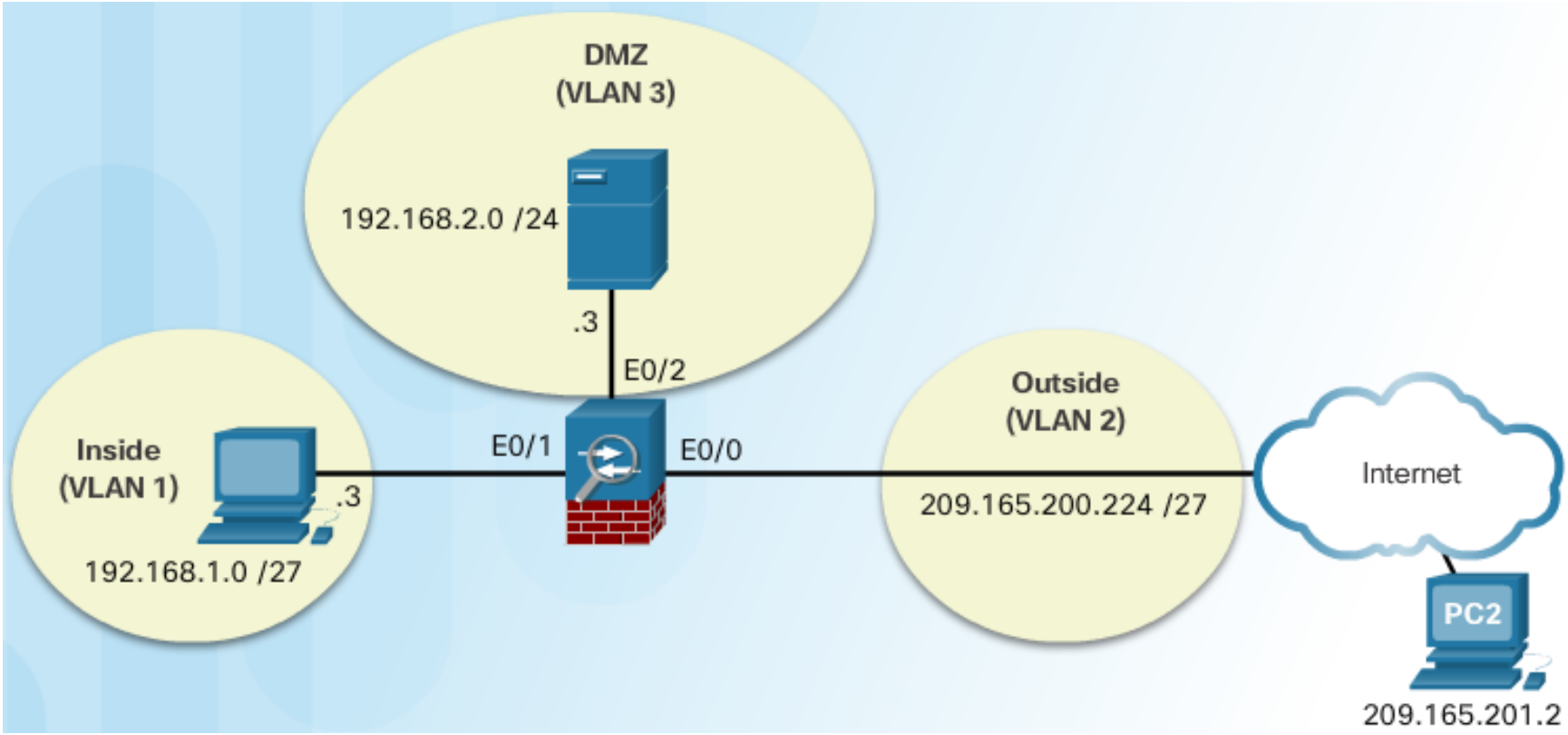
Types of NAT Deployments:

- Inside NAT
- Outside NAT
- Bidirectional NAT



Configuring Dynamic NAT

Dynamic NAT Reference Topology



Configuring Dynamic NAT (Cont.)

```
CCNAS-ASA(config)# object network PUBLIC
CCNAS-ASA(config-network-object)# range 209.165.200.240 209.165.200.248
CCNAS-ASA(config-network-object)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# object network DYNAMIC-NAT
CCNAS-ASA(config-network-object)# subnet 192.168.1.0 255.255.255.224
CCNAS-ASA(config-network-object)# nat (inside,outside) dynamic PUBLIC
CCNAS-ASA(config-network-object)# end
CCNAS-ASA#
```

Dynamic NAT Configuration Example

```
CCNAS-ASA(config)# policy-map global_policy
CCNAS-ASA(config-pmap)# class inspection_default
CCNAS-ASA(config-cmap)# access-list ICMPACL extended permit icmp any any
CCNAS-ASA(config)# access-group ICMPACL in interface outside
CCNAS-ASA(config)#
```

Enable Return Traffic Example

Verifying the Dynamic NAT Configuration Example

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

NAT from inside:192.168.1.3 to outside:209.165.200.242 flags i idle 0:00:02 timeout 3:00:00
CCNAS-ASA(config)#
CCNAS-ASA(config)# show nat

Auto NAT Policies (Section 2)
1 (inside) to (outside) source dynamic DYNAMIC-NAT PUBLIC
    translate_hits = 1, untranslate_hits = 1
CCNAS-ASA(config)#
CCNAS-ASA(config)# show nat detail

Auto NAT Policies (Section 2)
1 (inside) to (outside) source dynamic DYNAMIC-NAT PUBLIC
    translate_hits = 1, untranslate_hits = 1
    Source - Origin: 192.168.1.0/27, Translated: 209.165.200.240-209.165.200.248
CCNAS-ASA(config)#
```

Configuring Dynamic PAT

Dynamic PAT Configuration Example

```
CCNAS-ASA(config)# object network INSIDE-NET
CCNAS-ASA(config-network-object)# subnet 192.168.1.0 255.255.255.224
CCNAS-ASA(config-network-object)# nat (inside,outside) dynamic interface
CCNAS-ASA(config-network-object)# end
CCNAS-ASA#
```

Verifying the Dynamic PAT Configuration Example

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

ICMP PAT from inside:192.168.1.3/1 to outside:209.165.200.226/1 flags ri idle
 0:00:02 timeout 0:00:30
CCNAS-ASA#
```

Configuring Static NAT

```
CCNAS-ASA(config)# interface Vlan3
CCNAS-ASA(config-if)# no forward interface Vlan1
CCNAS-ASA(config-if)# nameif dmz
INFO: Security level for "dmz" set to 0 by default.
CCNAS-ASA(config-if)# security-level 70
CCNAS-ASA(config-if)# ip address 192.168.2.1 255.255.255.0
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# interface Ethernet0/2
CCNAS-ASA(config-if)# switchport access vlan 3
CCNAS-ASA(config-if)# no shut
CCNAS-ASA(config-if)# exit
CCNAS-ASA(config)#
```

Configure the DMZ Interface Example

Static NAT Configuration Example

```
CCNAS-ASA(config)# object network DMZ-SERVER
CCNAS-ASA(config-network-object)# host 192.168.2.3
CCNAS-ASA(config-network-object)# nat (dmz,outside) static 209.165.200.227
CCNAS-ASA(config-network-object)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# access-list OUTSIDE-DMZ extended permit ip any host 192.168.2.3
CCNAS-ASA(config)# access-group OUTSIDE-DMZ in interface outside
CCNAS-ASA(config)#
CCNAS-ASA(config)# policy-map global_policy
CCNAS-ASA(config-pmap)# class inspection_default
CCNAS-ASA(config-pmap-c)# access-list ICMPACL extended permit icmp any any
CCNAS-ASA(config)# access-group ICMPACL in interface dmz
CCNAS-ASA(config)#
```

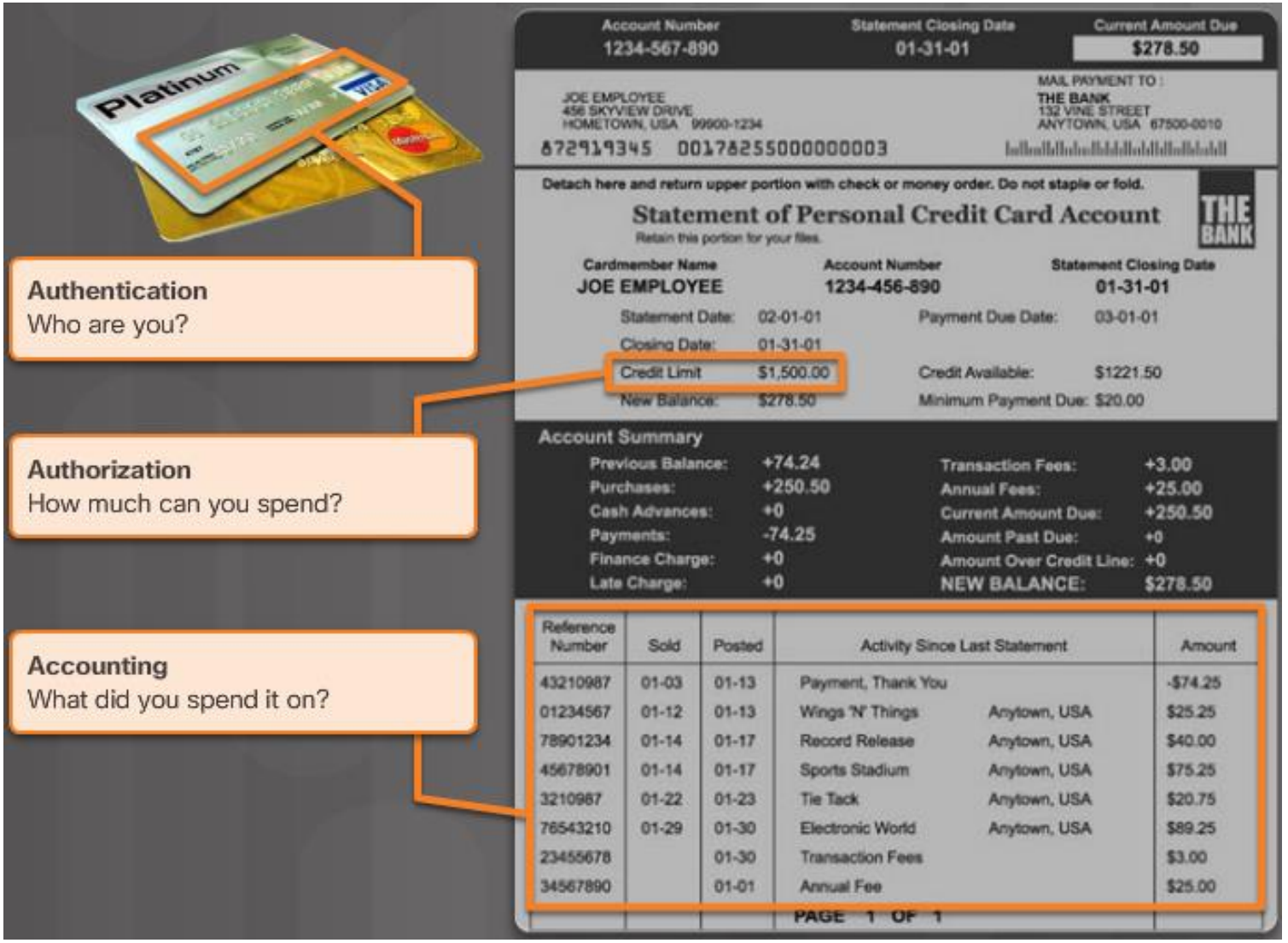
Configuring Static NAT (Cont.)

Verifying the Static NAT Configuration Example

```
CCNAS-ASA(config)# show xlate
2 in use, 2 most used
Flags: D - DNS, e - extended, I - identity, i - dynamic, r - portmap,
       s - static, T - twice, N - net-to-net
NAT from dmz:192.168.2.3 to outside:209.165.200.227
    flags s idle 0:00:21 timeout 0:00:00

NAT from inside:192.168.1.3 to outside:209.165.200.242 flags i idle 0:09:06 timeout
 3:00:00
CCNAS-ASA(config)#
CCNAS-ASA(config)# show nat detail

Auto NAT Policies (Section 2)
1 (dmz) to (outside) source static DMZ-SERVER 209.165.200.227
    translate_hits = 1, untranslate_hits = 1
    Source - Origin: 192.168.2.3/32, Translated: 209.165.200.227/32
2 (inside) to (outside) source dynamic DYNAMIC-NAT PUBLIC
    translate_hits = 1, untranslate_hits = 1
    Source - Origin: 192.168.1.0/27, Translated: 209.165.200.240-209.165.200.248
CCNAS-ASA(config)#
```

Topic 9.2.6: AAA

AAA Review



Local Database and Servers

RADIUS and TACACS+ Server Commands

ASA Command	Description
`aaa-server` *server-tag* `protocol` *protocol*	• Creates a TACACS+ or RADIUS AAA server group.
`aaa-server` *server-tag* [(*interface-name*)] `host` {*server-ip* | *name*} [*key*]	• Configures a AAA server as part of a AAA server group. • Also configures AAA server parameters that are host-specific.

Sample AAA TACACS+ Server Configuration

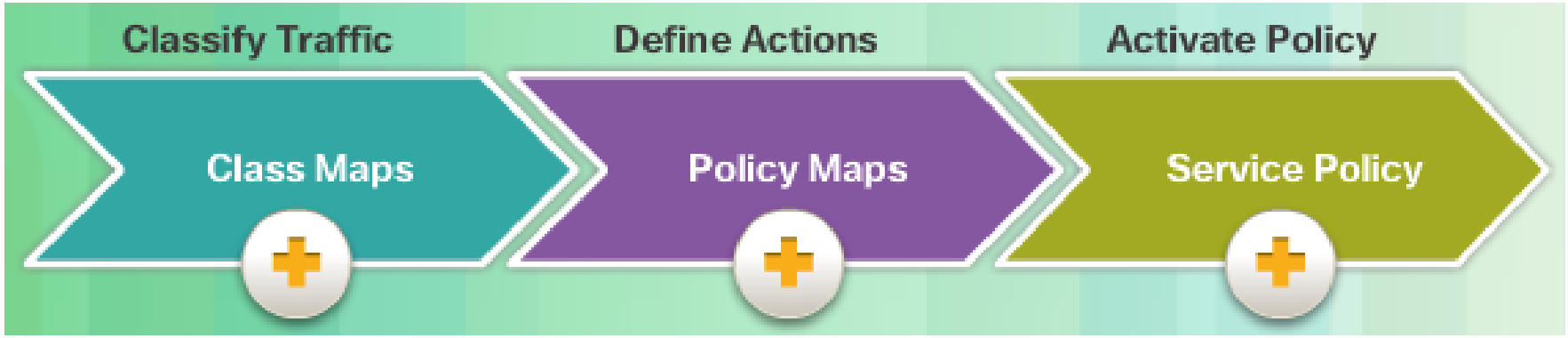
```
CCNAS-ASA(config)# username Admin password class privilege 15
CCNAS-ASA(config)#
CCNAS-ASA(config)# show run username
username Admin password obYXcKAuUW.jT5NE encrypted privilege 15
CCNAS-ASA(config)#
CCNAS-ASA(config)# aaa-server TACACS-SVR protocol tacacs+
CCNAS-ASA(config-aaa-server-group)# aaa-server TACACS-SVR (dmz) host 192.168.2.3
CCNAS-ASA(config-aaa-server-host)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# show run aaa-server
aaa-server TACACS-SVR protocol tacacs+
aaa-server TACACS-SVR (dmz) host 192.168.2.3
 key *****
CCNAS-ASA(config)#
```

AAA Configuration

```
CCNAS-ASA(config)# aaa authentication http console TACACS-SVR LOCAL
CCNAS-ASA(config)# aaa authentication enable console TACACS-SVR LOCAL
CCNAS-ASA(config)# aaa authentication http console TACACS-SVR LOCAL
CCNAS-ASA(config)# aaa authentication serial console TACACS-SVR LOCAL
CCNAS-ASA(config)# aaa authentication ssh console TACACS-SVR LOCAL
CCNAS-ASA(config)# aaa authentication telnet console TACACS-SVR LOCAL
CCNAS-ASA(config)#
CCNAS-ASA(config)# show run aaa
aaa authentication enable console TACACS-SVR LOCAL
aaa authentication http console TACACS-SVR LOCAL
aaa authentication serial console TACACS-SVR LOCAL
aaa authentication ssh console TACACS-SVR LOCAL
aaa authentication telnet console TACACS-SVR LOCAL
CCNAS-ASA(config)# exit
CCNAS-ASA# disable
CCNAS-ASA> exit

Logoff

Username: Admin
Password: *****
Type help or '?' for a list of available commands.
CCNAS-ASA>
```

Topic 9.2.7:
Service Policies on an ASA

Overview of MPF



Configuring Class Maps

```
CCNAS-ASA(config)# access-list UDP permit udp any any
CCNAS-ASA(config)# access-list TCP permit tcp any any
CCNAS-ASA(config)# access-list SERVER permit ip any host 10.1.1.1
CCNAS-ASA(config)#
CCNAS-ASA(config)# class-map ALL-TCP
CCNAS-ASA(config-cmap)# description "This class-map matches all TCP traffic"
CCNAS-ASA(config-cmap)# match access-list TCP
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# class-map ALL-UDP
CCNAS-ASA(config-cmap)# description "This class-map matches all UDP traffic"
CCNAS-ASA(config-cmap)# match access-list UDP
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# class-map ALL-HTTP
CCNAS-ASA(config-cmap)# description "This class-map matches all HTTP traffic"
CCNAS-ASA(config-cmap)# match port TCP eq http
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# class-map TO-SERVER
CCNAS-ASA(config-cmap)# description "Class map matches traffic    10.1.1.1"
CCNAS-ASA(config-cmap)# match access-list SERVER
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)#
```

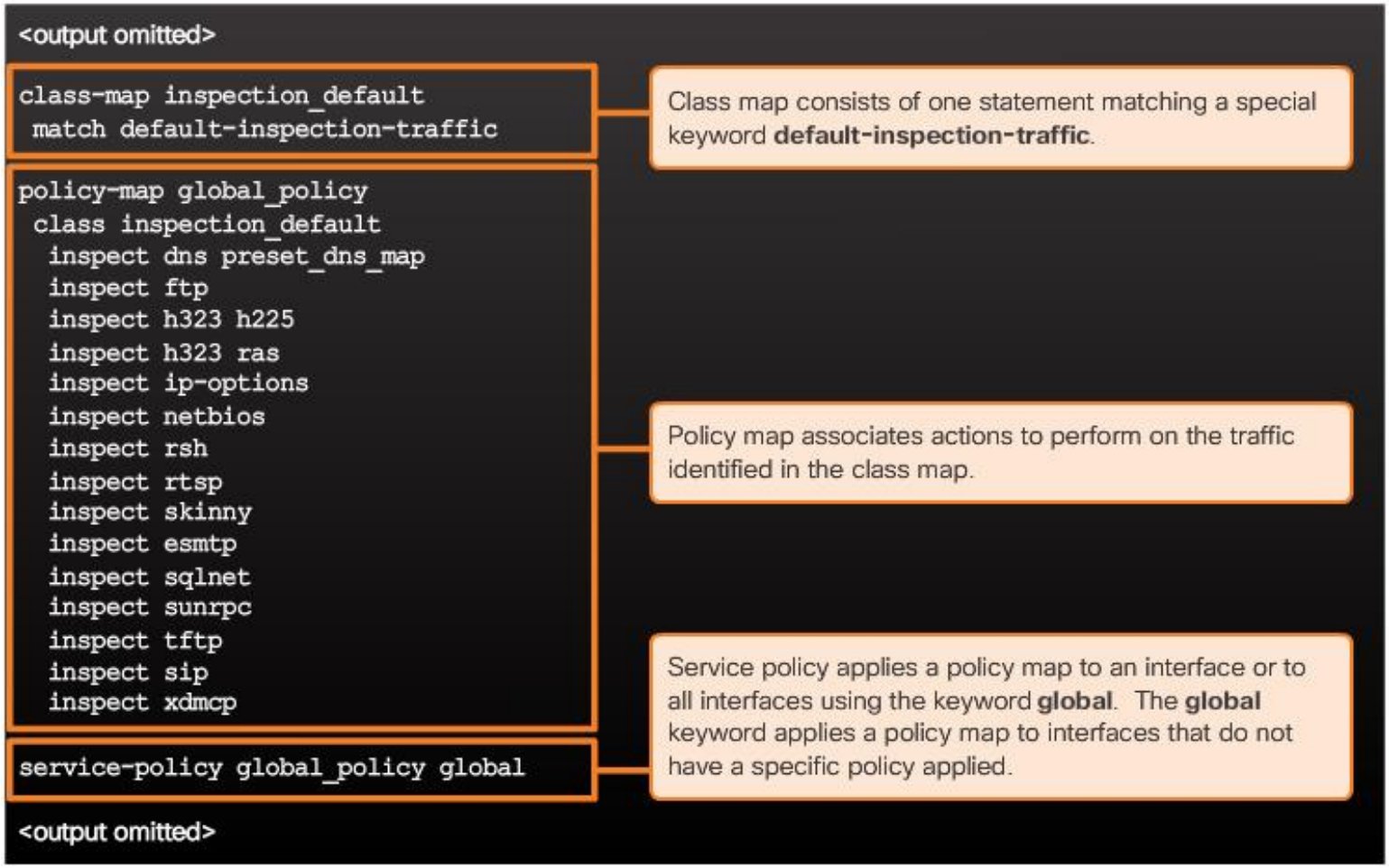
Define and Activate a Policy

Implementing Modular Policy Framework

```
CCNAS-ASA(config)# access-list TFTP-TRAFFIC permit udp any any eq 69
CCNAS-ASA(config)#
CCNAS-ASA(config)# class-map CLASS-TFTP
CCNAS-ASA(config-cmap)# match access-list TFTP-TRAFFIC
CCNAS-ASA(config-cmap)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# policy-map POLICY-TFTP
CCNAS-ASA(config-pmap)# class CLASS-TFTP
CCNAS-ASA(config-pmap-c)# inspect tftp
CCNAS-ASA(config-pmap-c)# exit
CCNAS-ASA(config-pmap)# exit
CCNAS-ASA(config)#
CCNAS-ASA(config)# service-policy POLICY-TFTP global
CCNAS-ASA(config)#
```

ASA Default Policy

Default Service Policy Configuration



Section 9.3: Summary

Chapter Objectives:

- Explain how the ASA operates as an advanced stateful firewall.
- Implement an ASA firewall configuration.

Thank you.

Cisco Networking Academy

Mind Wide Open

Instructor Resources

- **Remember**, there are helpful tutorials and user guides available via your NetSpace home page. (https://www.netacad.com)
- These resources cover a variety of topics including navigation, assessments, and assignments.
- A screenshot has been provided here highlighting the tutorials related to activating exams, managing assessments, and creating quizzes.