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Network Security 2

Module 2 – Configure Network Intrusion Detection and Prevention

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Learning Objectives

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–2.1 Cisco IOS Intrusion Prevention System

–2.2 Configure Attack Guards on the PIX Security Appliance

–2.3 Configure Intrusion Prevention on the PIX Security Appliance

–2.4 Configure Shunning on the PIX Security Appliance

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Cisco IOS Intrusion Prevention System

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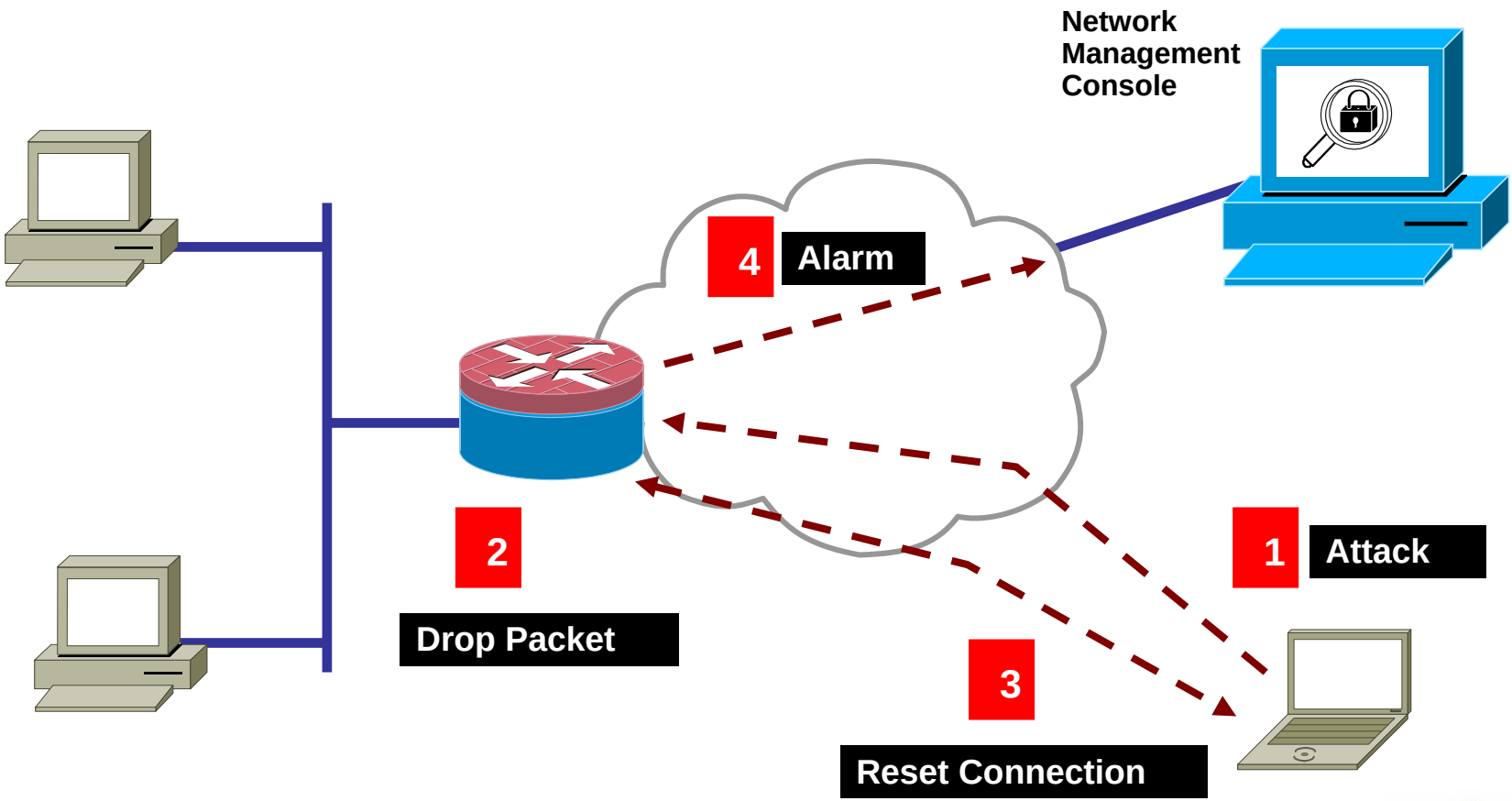

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Configuration Tasks

- Install Cisco IOS IPS on the router.
  - Specify location of the Signature Definition File (SDF).
  - Create an IPS rule.
  - Attach a policy to a signature (Optional).
  - Apply IPS rule at an interface.
- Configure Logging using Syslog or SDEE.
- Verify the configuration.

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Specify Location of SDF

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Router (config)#

```
ip ips sdf location url
```

- (Optional) Specifies the location in which the router will load the SDF, attack-drop.sdf.
- If this command is not issued, the router will load the default, built-in signatures.

```
Router(config)# ip ips sdf location
  disk2:attack-drop.sdf
```

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Create an IPS Rule

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```
Router (config)#
```

```
ip ips name ips-name [list acl]
```

- **Creates an IPS rule.**

```
Router(config)# ip ips name MYIPS
```

- **Creates an IPS rule named MYIPS that will be applied to an interface.**

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Attach a policy to a given signature(Optional)

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```
Router (config)#
```

```
ip ips signature signature-id [:sub-signature-id]
  {delete | disable | list acl-list}
```

- **Attaches a policy to a given signature.**

```
Router(config)# ip ips signature 1000 disable
```

- **Disables signature 1000 in the signature definition file.**

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Apply an IPS Rule at an Interface

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```
Router (config-if)#
```

```
ip ips ips-name {in | out}
```

- **Applies an IPS rule at an interface.**

```
Router(config-if)# ip ips MYIPS in
```

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Upgrade to Latest SDF


```
Router (config)#
ip ips name ips-name
```

- **Creates an IPS rule.**

```
Router (config)#
no ip ips sdf builtin
```

- **Instructs the router not to load the built-in signatures.**

```
Router (config)#
ip ips fail closed
```

- **Instructs the router to drop all packets until the signature engine is built and ready to scan traffic.**

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Upgrade to Latest SDF(Cont.)

Router (config-if)#

```
ip ips ips-name {in | out} [list acl]
```

- **Applies an IPS rule at an interface. This command automatically loads the signatures and builds the signature engines.**

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Monitoring Cisco IOS IPS Signatures

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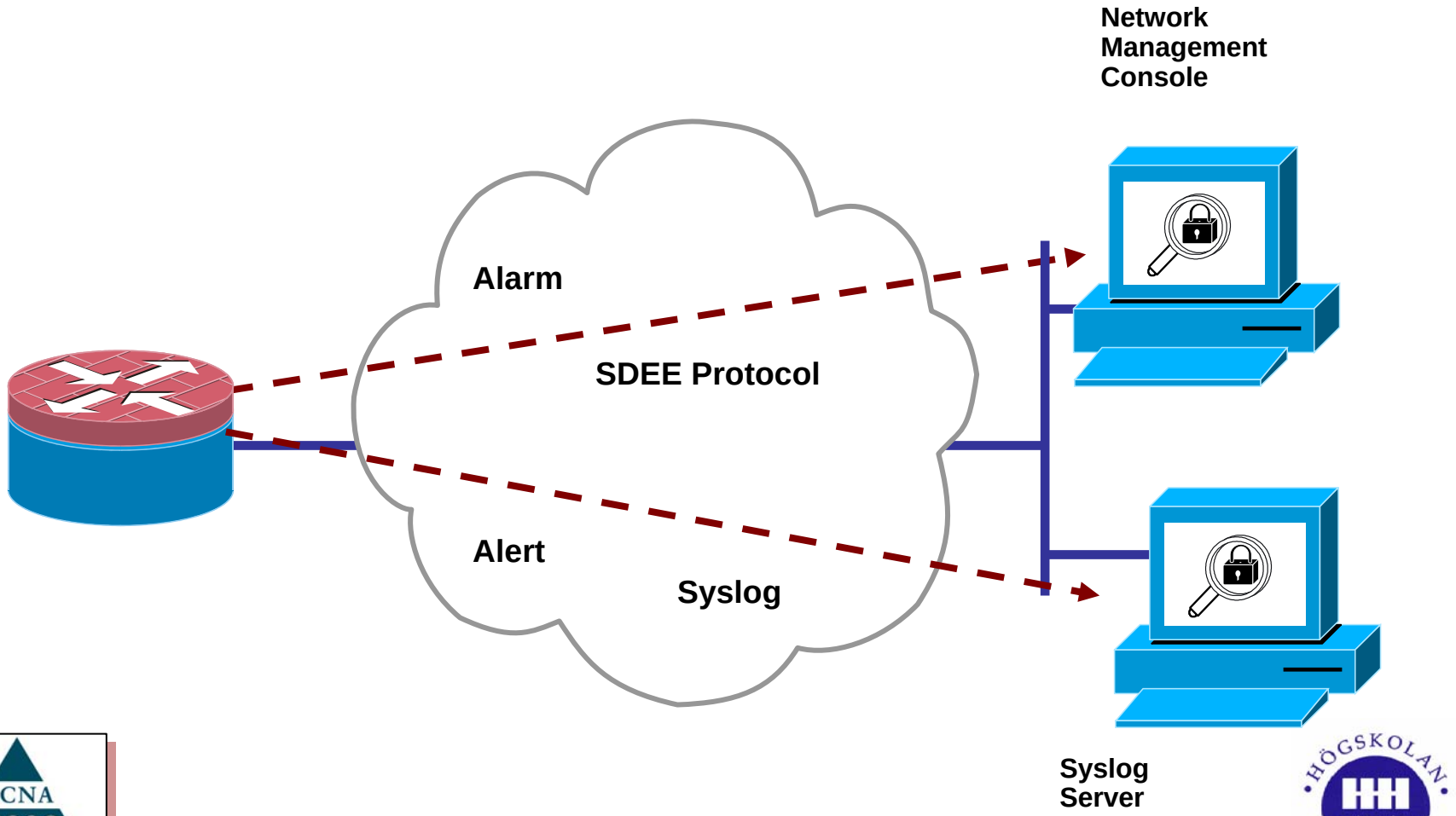

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SDEE Benefits

- Vendor Interoperability – SDEE will become the standard format for all vendors to communicate events to a network management application. This lowers the cost of supporting proprietary vendor formats and potentially multiple network management platforms.
- Secured transport – The use of HTTP over SSL or HTTPS ensures that data is secured as it traverses the network

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Set Notification Type

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```
Router (config)#
```

```
ip ips notify [log | sdee]
```

- **Sets notification type**

```
Router(config)# ip ips notify sdee
Router(config)# ip ips notify log
```

```
Router (config)#
```

```
ip sdee events num_of_events
```

- **Sets the maximum number of SDEE events that can be stored in the event buffer.**

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show Commands

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```
Router#
show ip ips configuration
```

- **Verifies that Cisco IOS IPS is properly configured.**

```
Router#
show ip ips signatures [detailed]
```

- **Verifies signature configuration, such as signatures that have been disabled.**

```
Router#
show ip ips interface
```

- **Display the interface configuration**

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clear Commands

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```
Router#
clear ip ips configuration
```

- **Remove all intrusion prevention configuration entries, and release dynamic resources.**

```
Router#
clear ip ips statistics
```

- **Reset statistics on packets analyzed and alarms sent**

```
Router#
clear ip sdee {events | subscriptions}
```

- **Clear SDEE events or subscriptions.**

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debug Commands

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```
Router# debug ip ips timers
Router# debug ip ips object-creation
Router# debug ip ips object-deletion
Router# debug ip ips function trace
Router# debug ip ips detailed
Router# debug ip ips ftp-cmd
Router# debug ip ips ftp-token
Router# debug ip ips icmp
Router# debug ip ips ip
Router# debug ip ips rpc
Router# debug ip ips smtp
Router# debug ip ips tcp
Router# debug ip ips tftp
Router# debug ip ips udp
```

- **Instead of no, undebug may be used**

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2.2 Configure Attack Guards on the PIX Security Appliance

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Mail Guard

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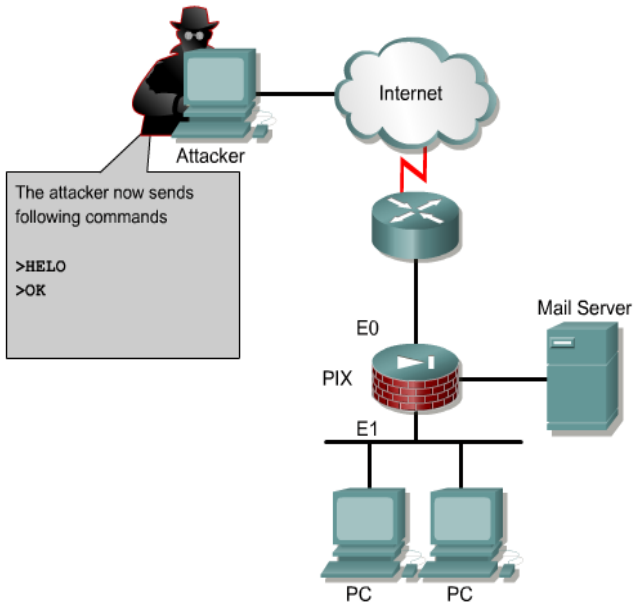
- Provides a safe conduit for Simple Mail Transfer Protocol (SMTP) connections from the outside to an inside e-mail server
- Enables administrators to deploy a mail server within the internal network, without it being exposed to known security problems that exist within some mail server implementations
- Only the SMTP commands specified in RFC 821 section 4.5.1 are allowed to a mail server
- By default, the Cisco Secure PIX Security Appliance inspects port 25 connections for SMTP traffic
- SMTP servers using ports other than port 25 must use the fixup protocol smtp command



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Mail Guard

pixfirewall (config)#

```
fixup protocol smtp port [-port]
```

- **Defines ports on which to activate Mail Guard (default = 25)—Only allows RFC 821, section 4.5.1 commands: HELO, MAIL, RCPT, DATA, RSET, NOOP, and QUIT.**
- **If disabled, all SMTP commands are allowed through the firewall—Potential mail server vulnerabilities are exposed.**

```
pixfirewall(config)# fixup protocol smtp 2525
pixfirewall(config)# fixup protocol smtp 2625-2635
pixfirewall(config)# no fixup protocol smtp 25
```

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DNS Guard

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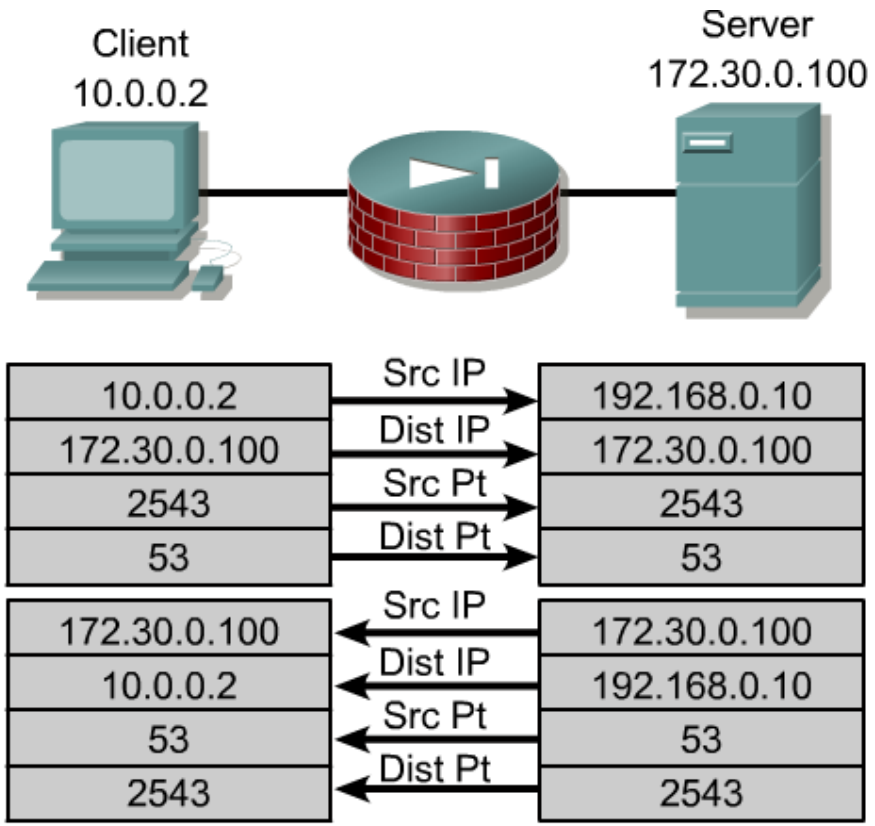
- DNS Guard is always on.
- After the client does a DNS request, a dynamic conduit allows UDP packets to return from the DNS server. The default UDP timer expires in two minutes.
- The DNS server response is recognized by the firewall, which closes the dynamic UDP conduit immediately. The PIX Security Appliance does not wait for the UDP timer to expire.



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FragGuard and Virtual Re-assembly

- The FragGuard and Virtual Re-assembly feature has the following characteristics:
  - Is on by default.
  - Verifies each fragment set for integrity and completeness.
  - Tags each fragment in a fragment set with the transport header.
  - Performs full reassembly of all ICMP error messages and virtual reassembly of the remaining IP fragments that are routed through the PIX Security Appliance.
  - Uses Syslog to log fragment overlapping and small fragment offset anomalies.

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fragment Command

pixfirewall (config)#

```
fragment size database-limit [interface]
```

- Sets the maximum number of packets in the fragment database.

pixfirewall (config)#

```
fragment chain chain-limit [interface]
```

- Specifies the maximum number of packets into which a full IP packet can be fragmented.

pixfirewall (config)#

```
fragment timeout seconds [interface]
```

- Specifies the maximum number of seconds that the PIX Security Appliance waits before discarding a packet that is waiting to be reassembled.

```
pixfirewall(config)# fragment size 1
pixfirewall(config)# fragment chain 1
```

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AAA Flood Guard

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pixfirewall (config)#

```
floodguard enable | disable
```

- **Reclaims attacked or overused AAA resources to help prevent DoS attacks on AAA services (default = enabled).**

```
pixfirewall(config)# floodguard enable
```

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SYN Flood Attack

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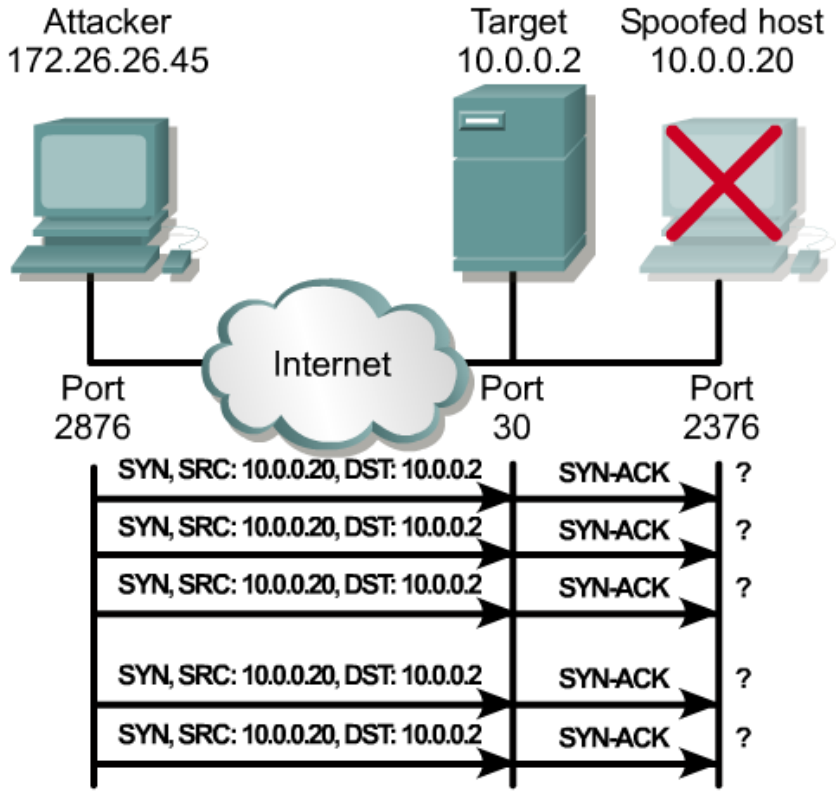
- The attacker spoofs a nonexistent source IP address and floods the target with SYN packets.
- The target responds to the SYN packets by sending SYN-ACK packets to the spoofed hosts.
- The target overflows its port buffer with embryonic connections and stops responding to legitimate requests.



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SYN Flood Guard Configuration

pixfirewall (config)#

```
static [(prenat_interface, postnat_interface)]
  mapped_address | interface real_address [dns][netmask
  mask][norandomseq][connection_limit [em_limit]]
```

- For inbound connections:
  - Use the em_limit to limit the number of embryonic connections.
  - Set the limit to a number lower than the server can handle.

pixfirewall (config)#

```
nat [(if-name)]id address [netmask [outside] [dns]
  [norandomseq] [timeout hh:mm:ss] [conn_limit [em_limit]]]
```

- For outbound connections:
  - Use the em_limit to limit the number of embryonic connections.
  - Set the limit to a number lower than the server can handle.

```
pixfirewall(config)# nat (inside) 1 0 0 0 10000
pixfirewall(config)# static (inside,outside) 192.168.0.11
  172.16.0.2 0 1000
```

TCP Intercept

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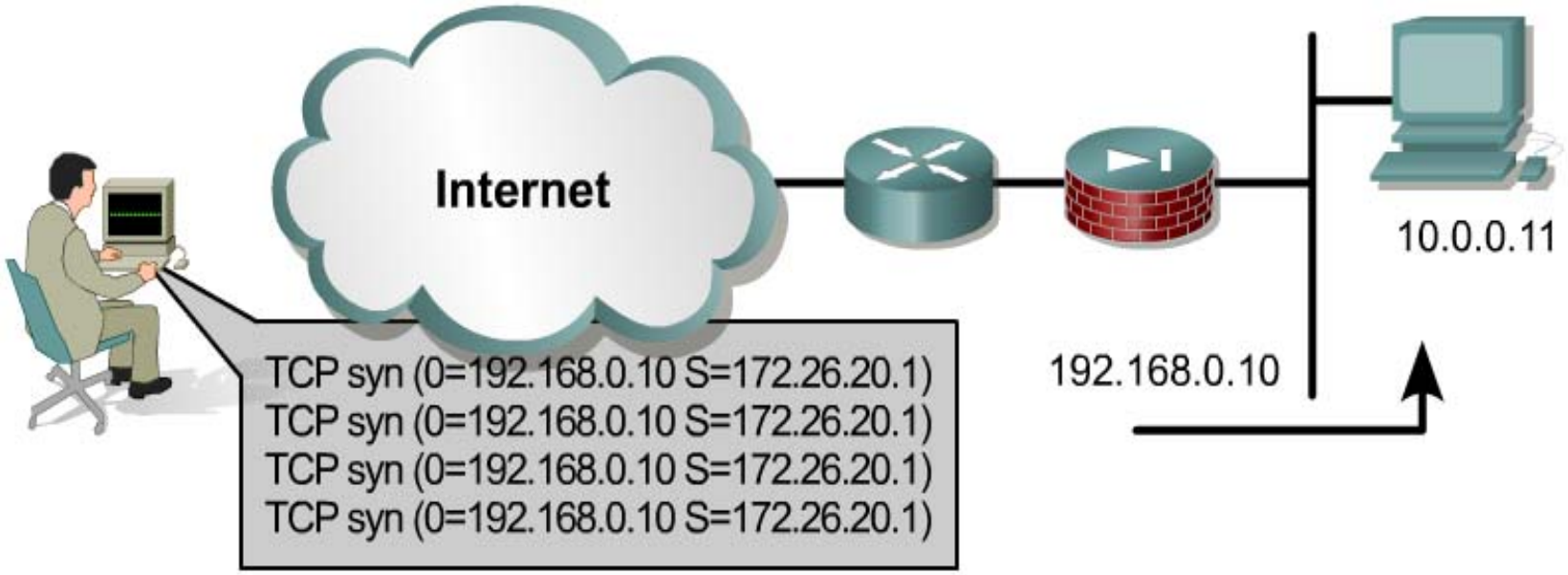


```
pixfirewall(config)# static (inside,outside) 192.168.0.10
  10.0.0.11 netmask 255.255.255.255 1000 100
```

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2.3 Configure Intrusion Prevention on the PIX Security Appliance

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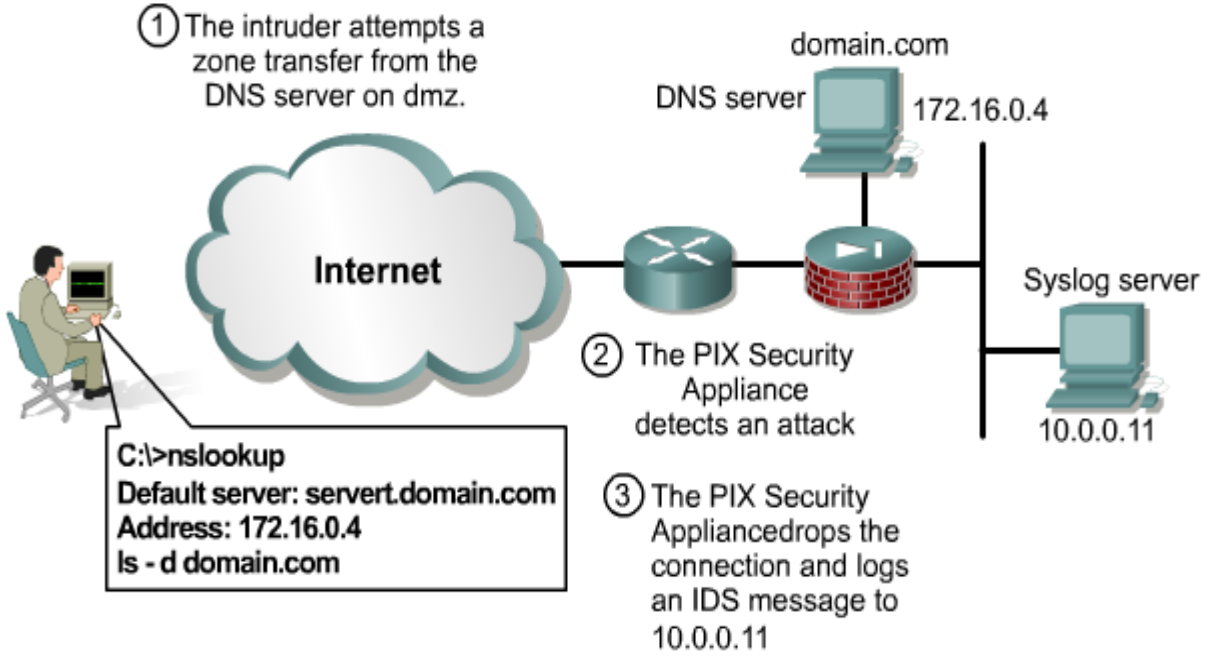
PIX IDS



The steps taken during intrusion detection on a PIX Security Appliance.

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Configure IDS

pixfirewall(config)#

```
ip audit name audit_name info [action [alarm] [drop] [reset]]
```

- **Creates a policy for informational signatures.**

pixfirewall(config)#

```
ip audit name audit_name attack [action [alarm] [drop] [reset]]
```

- **Creates a policy for attack signatures.**

pixfirewall(config)#

```
ip audit interface if_name audit_name
```

- **Applies a policy to an interface.**

```
pixfirewall(config)# ip audit name ATTACKPOLICY attack action
  alarm reset
pixfirewall(config)# ip audit interface outside ATTACKPOLICY
```

- **When the PIX Security Appliance detects an attack signature on its outside interface, it reports an event to all configured Syslog servers, drops the offending packet, and closes the connection if it is part of an active connection.**

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Specify Default Actions for Signatures

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pixfirewall(config)#

```
ip audit attack [action [alarm] [drop] [reset]]
```

- **Specifies the default actions for attack signatures.**

pixfirewall(config)#

```
ip audit info [action [alarm] [drop] [reset]]
```

- **Specifies the default actions for informational signatures.**

```
pixfirewall(config)# ip audit info action alarm drop
```

- **When the PIX Security Appliance detects an info signature, it reports an event to all configured Syslog servers and drops the offending packet.**

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Disable Intrusion Detection Signatures

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pixfirewall(config)#

```
ip audit signature signature_number
 disable
```

– Excludes a signature from auditing.

```
pixfirewall(config)# ip audit signature
 6102 disable
```

- **Disables signature 6102.**

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2.4 Configure Shunning on the PIX Security Appliance

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shun Command

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pixfirewall(config)#

shun *src_ip* [*dst_ip sport dport* [*protocol*]]

– Applies a blocking function to an interface under attack.

```
pixfirewall(config)# shun 172.26.26.45
```

- **No further traffic from 172.26.26.45 is allowed.**

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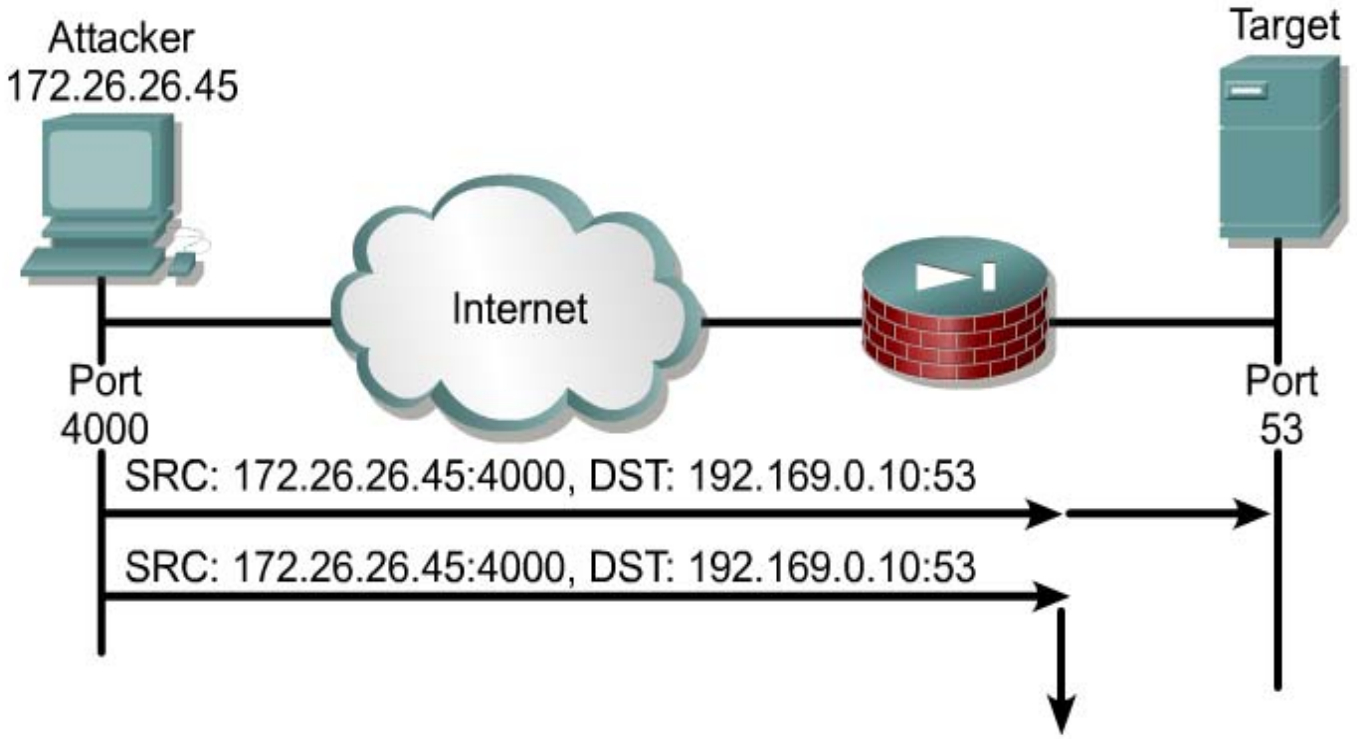
Shunning an Attacker




```
pixfirewall(config)# shun 172.26.26.45
  192.168.0.10 4000 53
```

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