Introduction to the Secure Firewall ASA

The Secure Firewall ASA provides advanced stateful firewall and VPN concentrator functionality in one device. The ASA includes many advanced features, such as multiple security contexts (similar to virtualized firewalls), clustering (combining multiple firewalls into a single firewall), transparent (Layer 2) firewall or routed (Layer 3) firewall operation, advanced inspection engines, IPsec VPN, SSL VPN, and clientless SSL VPN support, and many more features.

Hardware and Software Compatibility

For a complete list of supported hardware and software, see Cisco ASA Compatibility.

VPN Compatibility

See Supported VPN Platforms, Cisco ASA Series.

New Features

This section lists new features for each release.

Note New, changed, and deprecated syslog messages are listed in the syslog message guide.

New Features in ASA 9.18(4)

Released: October 3, 2023

Feature	Description
High Availability and Scalability Features	
Reduced false failovers for ASA high availability	We now introduced an additional heartbeat module in the data plane of the ASA high availability. This heartbeat module helps to avoid false failovers or split-brain scenarios that can happen due to traffic congestion in the control plain or CPU overload. *Also in 9.20(1).*
show failover statistics includes client statistics	The failover client packet statistics are now enhanced to improve debuggability. The **show failover statistics** command is enhanced to display **np-clients** (data-path clients) and **cp-clients** (control-plane clients) information. Modified commands: **show failover statistics cp-clients**, **show failover statistics dp-clients** *Also in 9.20(2).*
show failover statistics events includes new events	The **show failover statistics events** command is now enhanced to identify the local failures notified by the App agent: failover link uptime, supervisor heartbeat failures, and disk full issues. Modified commands: **show failover statistics events** *Also in 9.20(2).*
Interface Features	
FXOS local-mgtm **show** command improvements	See the following additions for interface show commands in FXOS local-mgmt: • Added the **show portmanager switch tail-drop-allocated buffers all** command • Include Ethernet port ID in **show portmanager switch status** command • For the Secure Firewall 3100, added the **show portmanager switch default-rule-drop-counter** command New/Modified FXOS commands: **show portmanager switch tail-drop-allocated buffers all**, **show portmanager switch status**, **show portmanager switch default-rule-drop-counter**
Administrative, Monitoring, and Troubleshooting Features	

Feature	Description
show tech support improvements	Added output to **show tech support** for: • **show storage detail**, **show slot expand detail** for the Secure Firewall 3100 in **show tech support brief** • Recent messages from dpdk.log in the flash for the ASA Virtual • Control link state for the Firepower 1010 • **show failover** statistics • FXOS local-mgmt **show portmanager switch tail-drop-allocated buffers all** • **show controller** • DPDK mbuf pool statistics New/Modified commands: **show tech support**

New Features in ASA 9.18(3)

Released: February 16, 2023

Feature	Description
Platform Features	
Firepower 1010E	We introduced the Firepower 1010E. This model is the same as the Firepower 1010 except it doesn't have Power Over Ethernet ports. ASDM support in 7.19(1.90) or 7.18(2.1). ASDM 7.19(1) does not support this model. *Also in 9.18(2.218). This model is not supported in 9.19(1).*
Interface Features	
Default Forward Error Correction (FEC) on Secure Firewall 3100 fixed ports changed to cl108-rs from cl74-fc for 25 GB+ SR, CSR, and LR transceivers	When you set the FEC to Auto on the Secure Firewall 3100 fixed ports, the default type is now set to cl108-rs instead of cl74-fc for 25 GB SR, CSR, and LR transceivers. New/Modified commands: **fec** *Also in 9.19(1) and 9.18(2.7).*
VPN Features	
AnyConnect connection authentication using SAML	In a DNS load balancing cluster, when SAML authentication is configured on ASAs, you can specify a local base URL that uniquely resolves to the device on which the configuration is applied. New/Modified commands: **local-base-url***url*

New Features in ASA 9.18(2)

Released: August 10, 2022

Feature	Description
Interface Features	
Loopback interface support for BGP and management traffic	You can now add a loopback interface and use it for the following features: • AAA • BGP • SNMP • SSH • Syslog • Telnet New/Modified commands: **interface loopback**, **logging host**, **neighbor update-source**, **snmp-server host**, **ssh**, **telnet**
ping command changes	To support pinging a loopback interface, the **ping** command now has changed behavior. If you specify the interface in the command, the source IP address matches the specified interface IP address, but the actual egress interface is determined by a route lookup using the data routing table. New/Modified commands: **ping**

New Features in ASA 9.18(1)

Released: June 6, 2022

Feature	Description
Platform Features	
ASAv-AWS Security center integration for AWS GuardDuty	You can now integrate Amazon GuardDuty service with ASAv. The integration solution helps you to capture and process the threat analysis data or results (malicious IP addresses) reported by Amazon GuardDuty. You can configure and feed these malicious IP addresses in the ASAv to protect the underlying networks and applications.
Firewall Features	

Feature	Description
Forward referencing of ACLs and objects is always enabled. In addition, object group search for access control is now enabled by default.	You can refer to ACLs or network objects that do not yet exist when configuring access groups or access rules. In addition, object group search is now enabled by default for access control for *new* deployments. Upgrading devices will continue to have this command disabled. If you want to enable it (recommended), you must do so manually. **Caution** If you downgrade, the **access-group** command will be rejected because it has not yet loaded the **access-list** commands. This outcome occurs even if you had previously enabled the **forward-reference enable** command, because that command is now removed. Before you downgrade, be sure to copy all **access-group** commands manually, and then after downgrading, re-enter them. We removed the **forward-reference enable** command and changed the default for new deployments for **object-group-search access-control** to enabled.
Routing Features	
Path monitoring metrics in PBR.	PBR uses the metrics to determine the best path (egress interface) for forwarding the traffic. Path monitoring periodically notifies PBR with the monitored interface whose metric got changed. PBR retrieves the latest metric values for the monitored interfaces from the path monitoring database and updates the data path. New/Modified commands: **clear path-monitoring**, **policy-route**, **show path-monitoring**
Interface Features	
Pause Frames for Flow Control for the Secure Firewall 3100	If you have a traffic burst, dropped packets can occur if the burst exceeds the buffering capacity of the FIFO buffer on the NIC and the receive ring buffers. Enabling pause frames for flow control can alleviate this issue. New/Modified commands: **flowcontrol send on**
Breakout ports for the Secure Firewall 3130 and 3140	You can now configure four 10GB breakout ports for each 40GB interface on the Secure Firewall 3130 and 3140. New/Modified commands: **breakout**
License Features	
Secure Firewall 3100 support for the Carrier license	The Carrier license enables Diameter, GTP/GPRS, SCTP inspection. New/Modified commands: **feature carrier**
Certificate Features	
Mutual LDAPS authentication.	You can configure a client certificate for the ASA to present to the LDAP server when it requests a certificate to authenticate. This feature applies when using LDAP over SSL. If an LDAP server is configured to require a peer certificate, the secure LDAP session will not complete and authentication/authorization requests will fail. New/Modified commands: **ssl-client-certificate**.

Feature	Description
Authentication: Validate certificate name or SAN	When a feature specific reference-identity is configured, the peer certificate identity is validated with the matching criteria specified under **crypto ca reference-identity** <*name*> submode commands. If there is no match found in the peer certificate Subject Name/SAN or if the FQDN specified with reference-identity submode command fail to resolve, the connection is terminated The reference-identity CLI is configured as a submode command for aaa-server host configuration and ddns configuration. New/Modified commands: **ldap-over-ssl**, **ddns update method** , and **show update method**.
Administrative, Monitoring, and Troubleshooting Features	
Multiple DNS server groups	You can now use multiple DNS server groups: one group is the default, while other groups can be associated with specific domains. A DNS request that matches a domain associated with a DNS server group will use that group. For example, if you want traffic destined to inside eng.cisco.com servers to use an inside DNS server, you can map eng.cisco.com to an inside DNS group. All DNS requests that do not match a domain mapping will use the default DNS server group, which has no associated domains. For example, the DefaultDNS group can include a public DNS server available on the outside interface. New/Modified commands: **dns-group-map**, **dns-to-domain**
Dynamic Logging Rate-limit	A new option to limit logging rate when block usage exceeds a specified threshold value was added. It dynamically limits the logging rate as the rate limiting is disabled when the block usage returns to normal value. New/Modified commands: **logging rate-limit**
Packet Capture for Secure Firewall 3100 devices	The provision to capture switch packets was added. This option can be enabled only for Secure Firewall 3100 devices. New/Modified commands: **capture real-time**
VPN Features	
IPsec flow offload.	On the Secure Firewall 3100, IPsec flows are offloaded by default. After the initial setup of an IPsec site-to-site VPN or remote access VPN security association (SA), IPsec connections are offloaded to the field-programmable gate array (FPGA) in the device, which should improve device performance. New/Modified commands: **clear flow-offload-ipsec**, **flow-offload-ipsec**, **show flow-offload-ipsec**
Certificate and SAML for Authentication	You can configure remote access VPN connection profiles for certificate and SAML authentication. Users can configure VPN settings to authenticate a machine certificate or user certificate before a SAML authentication/authorization is initiated. This can be done using DAP certificate attributes along with user specific SAML DAP attributes. New/Modified commands: **authentication saml certificate**, **authentication certificate saml** , **authentication multiple-certificate saml**

Firewall Functional Overview

Firewalls protect inside networks from unauthorized access by users on an outside network. A firewall can also protect inside networks from each other, for example, by keeping a human resources network separate from a user network. If you have network resources that need to be available to an outside user, such as a web or FTP server, you can place these resources on a separate network behind the firewall, called a *demilitarized zone* (DMZ). The firewall allows limited access to the DMZ, but because the DMZ only includes the public servers, an attack there only affects the servers and does not affect the other inside networks. You can also control when inside users access outside networks (for example, access to the Internet), by allowing only certain addresses out, by requiring authentication or authorization, or by coordinating with an external URL filtering server.

When discussing networks connected to a firewall, the *outside* network is in front of the firewall, the *inside* network is protected and behind the firewall, and a *DMZ*, while behind the firewall, allows limited access to outside users. Because the ASA lets you configure many interfaces with varied security policies, including many inside interfaces, many DMZs, and even many outside interfaces if desired, these terms are used in a general sense only.

Security Policy Overview

A security policy determines which traffic is allowed to pass through the firewall to access another network. By default, the ASA allows traffic to flow freely from an inside network (higher security level) to an outside network (lower security level). You can apply actions to traffic to customize the security policy.

Permitting or Denying Traffic with Access Rules

You can apply access rules to limit traffic from inside to outside, or allow traffic from outside to inside. For bridge group interfaces, you can also apply an EtherType access rule to allow non-IP traffic.

Applying NAT

Some of the benefits of NAT include the following:

- You can use private addresses on your inside networks. Private addresses are not routable on the Internet.
- NAT hides the local addresses from other networks, so attackers cannot learn the real address of a host.
- NAT can resolve IP routing problems by supporting overlapping IP addresses.

Protecting from IP Fragments

The ASA provides IP fragment protection. This feature performs full reassembly of all ICMP error messages and virtual reassembly of the remaining IP fragments that are routed through the ASA. Fragments that fail the security check are dropped and logged. Virtual reassembly cannot be disabled.

Applying HTTP, HTTPS, or FTP Filtering

Although you can use access lists to prevent outbound access to specific websites or FTP servers, configuring and managing web usage this way is not practical because of the size and dynamic nature of the Internet.

You can configure Cloud Web Security on the ASA. You can also use the ASA in conjunction with an external product such as the Cisco Web Security Appliance (WSA).

Applying Application Inspection

Inspection engines are required for services that embed IP addressing information in the user data packet or that open secondary channels on dynamically assigned ports. These protocols require the ASA to do a deep packet inspection.

Applying QoS Policies

Some network traffic, such as voice and streaming video, cannot tolerate long latency times. QoS is a network feature that lets you give priority to these types of traffic. QoS refers to the capability of a network to provide better service to selected network traffic.

Applying Connection Limits and TCP Normalization

You can limit TCP and UDP connections and embryonic connections. Limiting the number of connections and embryonic connections protects you from a DoS attack. The ASA uses the embryonic limit to trigger TCP Intercept, which protects inside systems from a DoS attack perpetrated by flooding an interface with TCP SYN packets. An embryonic connection is a connection request that has not finished the necessary handshake between source and destination.

TCP normalization is a feature consisting of advanced TCP connection settings designed to drop packets that do not appear normal.

Enabling Threat Detection

You can configure scanning threat detection and basic threat detection, and also how to use statistics to analyze threats.

Basic threat detection detects activity that might be related to an attack, such as a DoS attack, and automatically sends a system log message.

A typical scanning attack consists of a host that tests the accessibility of every IP address in a subnet (by scanning through many hosts in the subnet or sweeping through many ports in a host or subnet). The scanning threat detection feature determines when a host is performing a scan. Unlike IPS scan detection that is based on traffic signatures, the ASA scanning threat detection feature maintains an extensive database that contains host statistics that can be analyzed for scanning activity.

The host database tracks suspicious activity such as connections with no return activity, access of closed service ports, vulnerable TCP behaviors such as non-random IPID, and many more behaviors.

You can configure the ASA to send system log messages about an attacker or you can automatically shun the host.

Firewall Mode Overview

The ASA runs in two different firewall modes:

- Routed
- Transparent

In routed mode, the ASA is considered to be a router hop in the network.

In transparent mode, the ASA acts like a “bump in the wire,” or a “stealth firewall,” and is not considered a router hop. The ASA connects to the same network on its inside and outside interfaces in a "bridge group".

You might use a transparent firewall to simplify your network configuration. Transparent mode is also useful if you want the firewall to be invisible to attackers. You can also use a transparent firewall for traffic that would otherwise be blocked in routed mode. For example, a transparent firewall can allow multicast streams using an EtherType access list.

Routed mode supports Integrated Routing and Bridging, so you can also configure bridge groups in routed mode, and route between bridge groups and regular interfaces. In routed mode, you can replicate transparent mode functionality; if you do not need multiple context mode or clustering, you might consider using routed mode instead.

Stateful Inspection Overview

All traffic that goes through the ASA is inspected using the Adaptive Security Algorithm and either allowed through or dropped. A simple packet filter can check for the correct source address, destination address, and ports, but it does not check that the packet sequence or flags are correct. A filter also checks *every* packet against the filter, which can be a slow process.

Note The TCP state bypass feature allows you to customize the packet flow.

A stateful firewall like the ASA, however, takes into consideration the state of a packet:

- Is this a new connection?

  If it is a new connection, the ASA has to check the packet against access lists and perform other tasks to determine if the packet is allowed or denied. To perform this check, the first packet of the session goes through the “session management path,” and depending on the type of traffic, it might also pass through the “control plane path.”

  The session management path is responsible for the following tasks:

  - Performing the access list checks
  - Performing route lookups
  - Allocating NAT translations (xlates)
  - Establishing sessions in the “fast path”

  The ASA creates forward and reverse flows in the fast path for TCP traffic; the ASA also creates connection state information for connectionless protocols like UDP, ICMP (when you enable ICMP inspection), so that they can also use the fast path.

Note For other IP protocols, like SCTP, the ASA does not create reverse path flows. As a result, ICMP error packets that refer to these connections are dropped.

  Some packets that require Layer 7 inspection (the packet payload must be inspected or altered) are passed on to the control plane path. Layer 7 inspection engines are required for protocols that have two or more

channels: a data channel, which uses well-known port numbers, and a control channel, which uses different port numbers for each session. These protocols include FTP, H.323, and SNMP.

- Is this an established connection?

  If the connection is already established, the ASA does not need to re-check packets; most matching packets can go through the "fast" path in both directions. The fast path is responsible for the following tasks:

  - IP checksum verification
  - Session lookup
  - TCP sequence number check
  - NAT translations based on existing sessions
  - Layer 3 and Layer 4 header adjustments

  Data packets for protocols that require Layer 7 inspection can also go through the fast path.

  Some established session packets must continue to go through the session management path or the control plane path. Packets that go through the session management path include HTTP packets that require inspection or content filtering. Packets that go through the control plane path include the control packets for protocols that require Layer 7 inspection.

VPN Functional Overview

A VPN is a secure connection across a TCP/IP network (such as the Internet) that appears as a private connection. This secure connection is called a tunnel. The ASA uses tunneling protocols to negotiate security parameters, create and manage tunnels, encapsulate packets, transmit or receive them through the tunnel, and unencapsulate them. The ASA functions as a bidirectional tunnel endpoint: it can receive plain packets, encapsulate them, and send them to the other end of the tunnel where they are unencapsulated and sent to their final destination. It can also receive encapsulated packets, unencapsulate them, and send them to their final destination. The ASA invokes various standard protocols to accomplish these functions.

The ASA performs the following functions:

- Establishes tunnels
- Negotiates tunnel parameters
- Authenticates users
- Assigns user addresses
- Encrypts and decrypts data
- Manages security keys
- Manages data transfer across the tunnel
- Manages data transfer inbound and outbound as a tunnel endpoint or router

The ASA invokes various standard protocols to accomplish these functions.

Security Context Overview

You can partition a single ASA into multiple virtual devices, known as security contexts. Each context is an independent device, with its own security policy, interfaces, and administrators. Multiple contexts are similar to having multiple standalone devices. Many features are supported in multiple context mode, including routing tables, firewall features, IPS, and management; however, some features are not supported. See the feature chapters for more information.

In multiple context mode, the ASA includes a configuration for each context that identifies the security policy, interfaces, and almost all the options you can configure on a standalone device. The system administrator adds and manages contexts by configuring them in the system configuration, which, like a single mode configuration, is the startup configuration. The system configuration identifies basic settings for the ASA. The system configuration does not include any network interfaces or network settings for itself; rather, when the system needs to access network resources (such as downloading the contexts from the server), it uses one of the contexts that is designated as the admin context.

The admin context is just like any other context, except that when a user logs into the admin context, then that user has system administrator rights and can access the system and all other contexts.

ASA Clustering Overview

ASA Clustering lets you group multiple ASAs together as a single logical device. A cluster provides all the convenience of a single device (management, integration into a network) while achieving the increased throughput and redundancy of multiple devices.

You perform all configuration (aside from the bootstrap configuration) on the control unit only; the configuration is then replicated to the member units.

Special and Legacy Services

For some services, documentation is located outside of the main configuration guides and online help.

Special Services Guides

Special services allow the ASA to interoperate with other Cisco products; for example, by providing a security proxy for phone services (Unified Communications), or by providing Botnet traffic filtering in conjunction with the dynamic database from the Cisco update server, or by providing WCCP services for the Cisco Web Security Appliance. Some of these special services are covered in separate guides:

- Cisco ASA Botnet Traffic Filter Guide
- Cisco ASA NetFlow Implementation Guide
- Cisco ASA Unified Communications Guide
- Cisco ASA WCCP Traffic Redirection Guide
- SNMP Version 3 Tools Implementation Guide

Legacy Services Guide

Legacy services are still supported on the ASA, however there may be better alternative services that you can use instead. Legacy services are covered in a separate guide:

Cisco ASA Legacy Feature Guide

This guide includes the following chapters:

- Configuring RIP
- AAA Rules for Network Access
- Using Protection Tools, which includes Preventing IP Spoofing (**ip verify reverse-path**), Configuring the Fragment Size (**fragment**), Blocking Unwanted Connections (**shun**), Configuring TCP Options (for ASDM), and Configuring IP Audit for Basic IPS Support (**ip audit**).
- Configuring Filtering Services