Security Target for Cisco Firewall Services Module (FWSM)

April 2007

This document includes the following sections:

Security Target Introduction

This section includes the following topics:

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Security Target Identification

TOE Identification: Cisco Systems Firewall Services Module (FWSM) Version 3.1 (3.17) for Cisco Catalyst® 6500 switches and Cisco 7600 Series routers.

ST Identification: Security Target for Cisco Firewall Services Module (FWSM), Version 1.0, March 30, 2007.

Assurance Level: Evaluation Assurance Level (EAL) 4 augmented with Common Criteria (CC) component ALC_FLR.1.

ST Author: Cisco Systems, 170 West Tasman Drive, San Jose, CA 95124-1706.

Keywords: Firewall, Packet Filtering, Application-level.

CC Identification: Common Criteria for Information Technology Security Evaluation, Version 2.2, January 2004, plus applicable CCIMB and US National interpretations up to March 25, 2004. Where specific changes result from application of an interpretation or precedent, this is noted in the security target document.

Security Target Overview

The Cisco FWSM is a stateful packet filtering firewall. A stateful packet filtering firewall controls the flow of Internet Protocol (IP) traffic by matching information contained in the headers of connection-oriented or connectionless IP packets with a set of rules specified by the firewall's authorized administrator. This header information includes source and destination host (IP) addresses, source and destination port numbers, and the transport service application protocol (TSAP) held within the data field of the IP packet. Depending upon the rule and the results of the match, the firewall either passes or drops the packet. The stateful firewall remembers the state of the connection from information gleaned from prior packets flowing on the connection and uses it to regulate current packets. The packet will be denied if the security policy is violated.

In addition to IP header information, the Cisco FWSM mediates information flows on the basis of other information, such as the direction (incoming or outgoing) of the packet on any given firewall network interface. For connection-oriented transport services, the firewall either permits connections and subsequent packets for the connection or denies the connection and subsequent packets associated with the connection.

CC Conformance

The TOE is Part 2 conformant, Part 3 conformant, and meets the requirements of EAL4 augmented with the CC component ALC_FLR.1.

Related Documents

[ALFWPP-MR] “U.S. Department of Defense Application-level Firewall Protection Profile for Medium Robustness Environments,” Version 1.0, June 28, 2000.

[FIPS 197] “FIPS 197 Specification for the Advanced Encryption Standard (AES),” November 26, 2001.

[FIPS 46-3] “FIPS 46-3 Data Encryption Standard (DES),” October 25, 1999 (TDEA only).

[RFC 4251] “The Secure Shell (SSH) Protocol Architecture,” January 2006.

Cryptography

The cryptography used in this product has not been FIPS certified, nor has it been analyzed or tested to conform to cryptographic standards during this evaluation. All cryptography has only been asserted as tested by the vendor.

Conventions

The following conventions have been applied in this document:

- All requirements in this ST document are reproduced relative to the requirements defined in [ALFWPP-MR].
- Security Functional Requirements – Part 2 of the CC defines the approved set of operations that may be applied to functional requirements: assignment, selection, refinement, and iteration.
  - The **refinement** operation is used to add detail to a requirement, and thus further restricts a requirement. Refinement of security requirements is denoted by **boldface text**. For an example, see FMT_SMR.1 in this security target document.
  - The **selection** operation is used to select one or more options provided by the CC in stating a requirement. Selections are denoted by *italicized text*. For an example, see FDP_RIP.1 in this security target document.
  - The **assignment** operation is used to assign a specific value to an unspecified parameter, such as the length of a password. Assignment is indicated by showing the value in square brackets, [assignment_value]. For an example, see FIA_AFL.1 in this security target document.
  - The **iteration** operation is used when a component is repeated with varying operations. Iteration is denoted by showing the iteration number in parenthesis following the component identifier, (iteration_number). For example, see FMT_MSA in this security target document.

Underlining is used to identify operations completed in the security target document, to distinguish them from those completed in [ALFWPP-MR].

Other sections of the ST document use boldface and italics to highlight text of special interest, such as captions.

TOE Description

This section includes the following topics:

Overview

This section presents an overview of the Cisco Firewall Services Module (FWSM)) version 3.1(3.17) to assist potential users in determining whether it meets their needs.

The Cisco FWSM is a high-speed, integrated firewall module for Cisco Catalyst® 6500 switches and Cisco 7600 Series routers, and allows for high speed firewall data rates: 5 Gbps throughput, 100,000 CPS, and 1 M concurrent connections. Up to four FWSMs can be installed in a single chassis, providing scalability up to 20 Gbps per chassis.

The FWSM leverages Cisco PIX technology and runs the Cisco PIX Operating System (OS), a real-time, hardened, embedded system. At the heart of the system, a protection scheme based on the Adaptive Security Algorithm (ASA) offers stateful connection-oriented firewalling. Using ASA, the FWSM creates a connection table entry for a session flow, based on the source and destination addresses, randomized TCP sequence numbers, port numbers, and additional TCP flags. The FWSM controls all inbound and outbound traffic by applying the security policy to these connection table entries.

The TOE provides a single point of defense, as well as controlled and audited access to services between networks by permitting or denying the flow of information traversing the firewall.

TOE Description

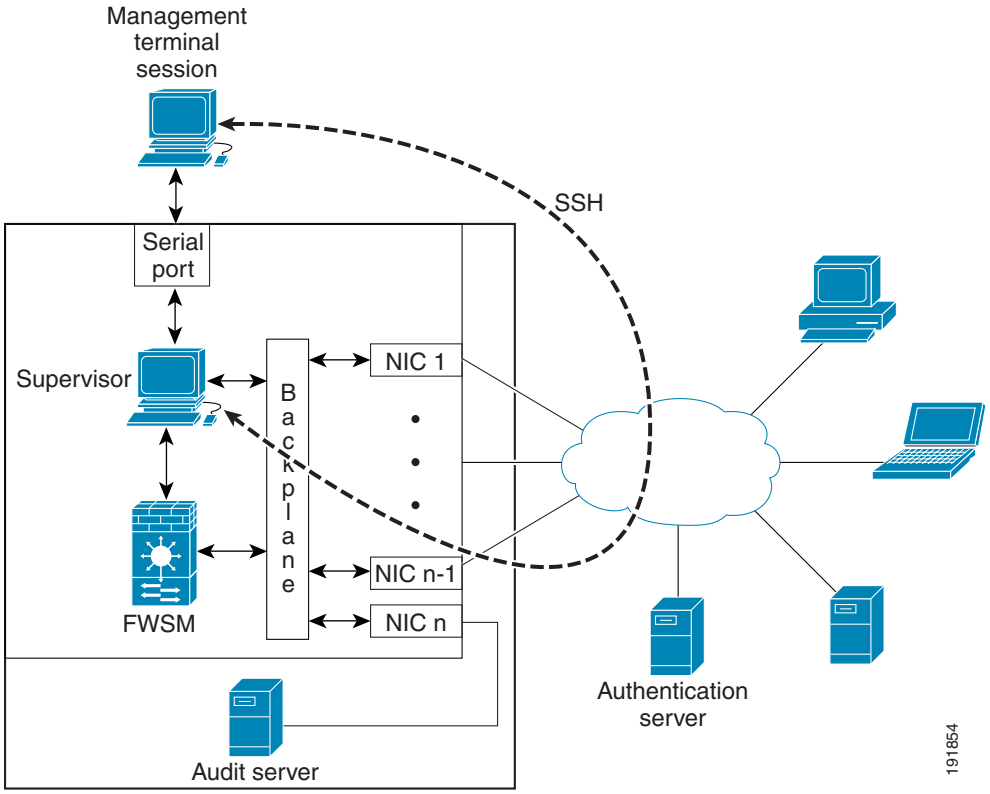
Figure 1 shows the FWSM in the context of a switch or router and an example of Internet connections. This section includes the following topics:

Physical Boundaries

The TOE configuration consists of a Cisco FWSM that controls the flow of IP traffic between logical network interfaces over a single physical network connection. Up to four FWSMs may be inserted into the chassis of Cisco Catalyst® 6500 switches and Cisco 7600 Series routers. When installed inside a Cisco Catalyst 6500 Series Switch or Cisco 7600 Internet Router, the FWSM allows any port on the device to operate as a firewall port, and integrates firewall security inside the network infrastructure.

The FWSM relies on certain limited security features of the host switch or router and the associated supervisor module, and these are included within the scope of the TOE.

Figure 1 TOE Context



The TOE includes a Windows 2000 or Windows XP server for the purpose of storing the audit data generated by the TOE. The certified versions of these operating systems, as listed in Table 1, must be used. This server may be combined with the network console, if desired.

A console may be connected to the FWSM via a physical serial port on the Supervisor, and a virtual traffic path that is used to reach a Telnet prompt on the FWSM from the Supervisor.

The TOE environment includes a commercially available, single-use TACACS+ or RADIUS authentication server for the administration of authentication of remote sessions.

Both the console itself and the authentication server are outside the scope of the TOE.

The physical scope of the TOE includes the hardware and software elements identified in Table 1, and shown in Figure 1.

Table 1 TOE Component Identification

Hardware	FWSM	FWSM Part No. WS-SVC-FWM-1-K9
	Supervisor	Sup720 or Sup2
	Switch or Router	7600 series chassis (7603, 7606, 7609, or 7613) with Supervisor Engine 720. Catalyst 6500 series (6503, 6506, 6509-NEB, 6509, 6513) with Cisco Catalyst 6500 Series Supervisor Engine 2 with Multilayer Switch Feature Card 2 (MSFC2) or Cisco Catalyst 6500 Series Supervisor Engine 720
	Audit Server	PC

Table 1 TOE Component Identification (continued)

Software	FWSM	Cisco FWSM Firewall image, Version 3.1(3.17)
	Supervisor	Cisco IOS Software Release 12.2(18)SXF5
	Audit Server	Windows 2000 Professional Service Pack 3 and Q326886 hotfix or Windows XP Professional Service Pack 2 (including hotfixes 896423, 899587, 899588, 896422, 890859, 873333, 885250, 888302, 885835, and 907865) or Service Pack 2 (for audit server) PIX Firewall Syslog Server (PFSS) 5.1(3)

Users can only physically connect to the FWSM module console through the supervisor module on the switch. Users must also enter a username and password in order to authenticate to the FWSM module. The FWSM username and password are separate from the supervisor **enable** password.

The external interfaces to the TOE for network traffic are the network interface cards used in the Cisco Catalyst® 6500 switches and Cisco 7600 Series routers. Thes external interfaces e are listed in the following tables.

7600 Modules

Packet Over SONET/SDH (POS)

OSM-1OC48-POS-xx+	Enhanced one-port OC-48/STM-16 SONET/SDH 4 GE OSM: SM-SR, SM-IR, or SM-LR
OSM-2OC12-POS-xx+	Enhanced two-port OC-12/STM-4 SONET/SDH 4 GE OSM: MM or SI
OSM-4OC12-POS-SI+	Enhanced four-port OC-12/STM-4 SONET/SDH OSM, SM-IR with 4 Gigabit Ethernet
OSM-4OC3-POS-SI+	Enhanced four-port OC-3/STM-1 SONET/SDH OSM, SI with 4 GE
OSM-8OC3-POS-xx+	Enhanced eight-port OC-3/STM-1 SONET/SDH OSM: SI with 4 GE, or SL with 4 GE

Ethernet

OSM-2+4GE-WAN+	Enhanced four-port Gigabit Ethernet OSM

Asynchronous Transfer Mode (ATM)

OSM-2OC12-ATM-xx+	Enhanced two-port OC-12 ATM, 4GE OSM: IR or MM

Channelized

OSM-1CHOC12/T3-SI	One-Port OC-12 to T3 with 4 Gigabit Ethernet Single Mode Intermediate Reach (LC)
OSM-1CHOC12/T1-SI	One-Port Channelized OC-12/STM-4 to DS-0 Optical Services Module, Single Mode Intermediate Reach (LC)
OSM-12CT3/T1	Twelve-Port Channelized T3 to DS-0 Optical Services Module

Dynamic Packet Transport (DPT)

OSM-2OC48/1DPT-xx	Two-port OC-48c/STM-16 SONET/SDH configurable to be one-port OC-48c/STM-16 DPT 4GE OSM: SM-SR1, SM-IR2, or SM-SL3

Catalyst 6500 Modules

WS-X6748-SFP	48-port High Performance Mixed Media Gigabit Ethernet interface module. Requires SFPCEF720.
WS-X6724-SFP	24-port High Performance Mixed Media Gigabit Ethernet interface module. Requires SFP CEF720.
WS-F6700-DFC3BXL	Distributed Forwarding Card-3BXL Upgrade for WS-X67xx line cards using WS-SUP720-3BXL.
WS-F6700-DFC3B	Distributed Forwarding Card-3B Upgrade for WS-X67xx line cards using WS-SUP720-3B.
WS-F6700-DFC3A	Distributed Forwarding Card-3A Upgrade for WS-X67xx line cards using WS-SUP720.
WS-X6816-GBIC	1- port dCEF256 Gigabit Ethernet interface module for the Cisco Catalyst 6500 Series switches with dual fabric channel interfaces and distributed forwarding requires GBICs and distributed forwarding card.
WS-F6K-DFC3A	Distributed forwarding card-3A for 65xx; 6816 modules used with SUP720.
WS-F6K-DFC	Distributed forwarding card for 65xx; 6816 modules used with SUP2.

10/100/1000

WS-X6748-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Cisco Express Forwarding 720 Interface Module; field-upgradeable to support distributed forwarding with the addition of the distributed forwarding daughter card (part number WS-F6700-DFC3A=)

WS-X6548-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Cisco Express Forwarding 256 Interface Module; field-upgradeable to support Cisco Prestandard PoE daughter card (part number WS-F6K-VPWR-GE=) or 802.3af PoE daughter card (part number WS-F6K-GE48-AF=)
WS-X6548-GE-45AF	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Cisco Express Forwarding 256 Interface Module with 802.3af PoE daughter card (that is, includes daughter card [part number WS-F6K-GE48-AF=])
WS-X6548V-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Cisco Express Forwarding 256 Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card [part number WS-F6K-VPWR-GE=])
WS-X6516-GE-TX	Cisco Catalyst 6500 Series 16-Port 10/100/1000 RJ-45 Cisco Express Forwarding 256 Interface Module; field-upgradeable to support distributed forwarding with the addition of the distributed forwarding daughter card (part number WS-F6K-DFC= or DFC3)
WS-X6148A-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Classic Interface Module; field-upgradeable to support 802.3af PoE daughter card (part number WS-F6K-GE48-AF=)
WS-X6148-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Classic Interface Module; field-upgradeable to support Cisco Prestandard PoE Daughter Card (part number WS-F6K-VPWR-GE=) or 802.3af PoE daughter card (part number WS-F6K-GE48-AF=)
WS-X6148A-GE-45AF	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Classic Interface Module with 802.3af PoE daughter card (that is, includes daughter card (part number WS-F6K-GE48-AF=)
WS-X6148-GE-45AF	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Classic Interface Module with 802.3af PoE daughter card (that is, includes daughter card (part number WS-F6K-GE48-AF=)
WS-X6148V-GE-TX	Cisco Catalyst 6500 Series 48-Port 10/100/1000 RJ-45 Classic Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card (part number WS-F6K-VPWR-GE=)
10/100	
WS-X6548-RJ-45	Cisco Catalyst 6500 Series 48-Port Cisco Express Forwarding 256 10/100 RJ-45 Interface Module; field-upgradeable to support distributed forwarding with the addition of the distributed forwarding daughter card (part number WS-F6K-DFC= or DFC3)
WS-X6548-RJ-21	Cisco Catalyst 6500 Series 48-Port, Cisco Express Forwarding 256 10/100 RJ-21 Interface Module; field-upgradeable to support distributed forwarding with the addition of the distributed forwarding daughter card (part number WS-F6K-DFC= or DFC3)

WS-X6348-RJ45	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module; field-upgradeable to support Cisco Prestandard PoE daughter card (part number WS-F6K-VPWR=)
WS-X6348-RJ45V	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card [part number WS-F6K-VPWR=])
WS-X6348-RJ21V	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-21 Classic Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card [part number WS-F6K-VPWR=])
WS-X6148X2-RJ-45	Cisco Catalyst 6500 Series 96-Port 10/100 RJ-45 Classic Interface Module; field-upgradeable to support 802.3af PoE daughter card (part number WS-F6K-FE48X2-AF=)
WS-X6148X2-45AF	Cisco Catalyst 6500 Series 96-Port 10/100 RJ-45 Classic Interface Module with 802.3af PoE daughter card (that is, includes daughter card [part number WS-F6K-FE48X2-AF=])
WS-X6196-RJ-21	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-21 Classic Interface Module; field-upgradeable to support 802.3af PoE daughter card (part number WS-F6K-FE48X2-AF=)
WS-X6196-21AF	Cisco Catalyst 6500 Series 96-Port 10/100 RJ-21Classic Interface Module with 802.3af PoE daughter card (that is, includes daughter card [part number WS-F6K-FE48X2-AF=])
WS-X6148A-RJ-45	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module; field-upgradeable to support 802.3af PoE daughter card (part number WS-F6K-GE48-AF=)
WS-X6148-RJ-45	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module; upgradeable to support Cisco Prestandard PoE daughter card (part number WS-F6K-VPWR=) or to IEEE 802.3af PoE daughter card (part number WS-X6148-45AF-UG=)
WS-X6148A-45AF	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module with IEEE 802.3af PoE daughter card
WS-X6148-45AF	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module with IEEE 802.3af PoE daughter card
WS-X6148-RJ45V	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-45 Classic Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card [part number WS-F6K-VPWR=])
WS-X6148-RJ-21	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-21 Classic Interface Module; upgradeable to support Cisco Prestandard PoE daughter card (part number WS-F6K-VPWR=) or to IEEE 802.3af PoE daughter card (part number WS-X6148-21AF-UG=)

WS-X6148-21AF	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-21 Classic Interface Module with IEEE 802.3af PoE daughter card
WS-X6148-RJ21V	Cisco Catalyst 6500 Series 48-Port 10/100 RJ-21 Classic Interface Module with Cisco Prestandard PoE daughter card (that is, includes daughter card [part number WS-F6K-VPWR=])

Cisco Catalyst 6500 Series Power Over Ethernet Daughter Cards

WS-F6K-GE48-AF=	Cisco Catalyst 6500 Series 802.3af PoE daughter card for 10/100/1000 modules (part numbers WS-X6148-GE-TX, WS-X6148V-GE-TX, WS-X6548-GE-TX, and WS-X6548V-GE-TX)
WS-F6K-FE48X2-AF=	Cisco Catalyst 6500 Series 802.3af PoE daughter card for WS-X6148X2-RJ-45) module
WS-X6148-45AF-UG=	Cisco Catalyst 6500 Series 802.3af PoE Advanced Upgrade for (part number WS-X6148-RJ45 or WS-X6148-RJ45V)
WS-X6148-21AF-UG=	Cisco Catalyst 6500 Series 802.3af PoE Advanced Upgrade for (part number WS-X6148-RJ21 or WS-X6148-RJ21V)
WS-F6K-VPWR=	Cisco Catalyst 6500 Series Cisco Prestandard PoE daughter card for 10/100 modules (for WS-X6148-RJxx and WS-X6348-xx)
WS-F6K-VPWR-GE=	Cisco Catalyst 6500 Series Cisco Prestandard PoE daughter card for 10/100/1000 modules (part numbers WS-X6148-GE-TX and WS-X6548-GE-TX)

Cisco Catalyst 6500 Series 10/100 and 100/1000 Distributed Forwarding Cards

WS-F6K-DFC	Cisco Catalyst 6500 Series DFC3A for Cisco Catalyst 6500 Series; Cisco Catalyst 6816 modules used with Supervisor Engine 2
WS-F6K-DFC3A	Cisco Catalyst 6500 Series DFC3A for Cisco Catalyst 6500; Cisco Catalyst 6816 modules used with Supervisor Engine 720
WS-F6K-DFC3B	Cisco Catalyst 6500 Series DFC3B for Cisco Catalyst 6500; Cisco Catalyst 6816 modules used with Supervisor Engine 720
WS-F6K-DFC3BXL	Cisco Catalyst 6500 Series DFC3BXL for Cisco Catalyst 6500; Cisco Catalyst 6816 modules used with Supervisor Engine 720
MEM-DFC-256MB	256 MB DRAM option for DFC
MEM-DFC-512MB	512 MB DRAM option for DFC
WS-F6700-DFC3A	Cisco Catalyst 6500 Series DFC3A for Cisco Catalyst 6700 Series modules

WS-F6700-DFC3B	Cisco Catalyst 6500 Series DFC3B for Cisco Catalyst 6700 Series modules
WS-F6700-DFC3BXL	Cisco Catalyst 6500 Series DFC3BXL for Cisco Catalyst 6700 Series modules

The FWSM module does not contain a hardware clock, and therefore must receive time from the switch. The module receives time generated from the switch upon boot-up or when changed by the supervisor administrator, and then maintains the time locally using a software clock. The audit server includes its own hardware clock.

Logical Scope and Boundaries

The scope of the TOE includes the following security functions:

- Information Flow Control between firewall interfaces
- Security Management to enable, disable, or modify the behavior of the TOE
- Audit
- Identification and Authentication of administrators
- Provision of a Secure Environment, with residual information protection and assured invocation of security functions
- Provision of accurate Date and Time information

Information Flow Control

The TOE controls the flow of Internet Protocol (IP) traffic (datagrams) between logical network interfaces by matching information contained in the headers of connection-oriented or connectionless IP packets according to a set of rules specified by the firewall's authorized administrator. This header information includes source and destination host (IP) addresses, source and destination port numbers, and the transport service application protocol (TSAP) held within the data field of the IP packet. Depending upon the rule and the results of the match, the firewall either passes or drops the packet. In addition to IP header information, the TOE mediates information flows on the basis of other information, such as the direction (incoming or outgoing) of the packet on any given firewall logical network interface. For connection-oriented transport services, the firewall either permits connections and subsequent packets for the connection or denies the connection and subsequent packets associated with the connection.

The types of traffic through or to the TOE that can be filtered are Ethernet, ARP, CTIQBE, DNS, Echo, Finger, H.323, IP, ICMP, TCP, UDP, FTP, GTP, HTTP, ILS, MGCP, POP3, RSH, RTSP, Skinny, SIP, ESMTP, SunRPC, Telnet, TFTP and XDMCP. Application inspection is also provided within the TOE for the following protocols and applications: CTIQBE, DNS, H.323, ICMP, FTP, GTP, HTTP, ILS, MGCP, RSH, RTSP, Skinny, SIP, SMTP/ESMTP, SunRPC, TFTP, and XDMCP.

The Cisco FWSM (the TOE) provides interconnections between networks. With the Cisco FWSM, it is possible to identify each logical network interface as either internal or external. If an interface is identified as external, then the network to which it attaches is classed as being outside of the firewall. If an interface is identified as internal, then the network to which it attaches is classed as being inside (or behind) the firewall. All networks inside (or behind) the firewall can be protected by the Cisco FWSM from those outside of the firewall, and similarly traffic from inside to outside can be regulated. The Cisco FWSM firewall can also provide protection between networks connecting to the different internal network logical interfaces of the TOE.

The TOE allows for Network Address Translation (NAT). NAT is used to map IP addresses from an inside logical interface to an outside logical interface. Using this feature, an IP address on an inside interface is mapped to a range of global IP addresses that can be addressed from the outside. The feature can also be used in the opposite direction to map addresses from the outside interface to the inside interface. Port numbers can also be mapped in this way, and this function is often referred to as Port Address Translation (PAT).

The firewall can run in one of the following modes:

- Routed - The FWSM is considered to be a router hop in the network.
- Transparent - The FWSM acts like a "bump in the wire," and is not a router hop. The FWSM connects the same network on its inside and outside ports, but each port must be on a different VLAN. In this mode, no dynamic routing protocols or NAT are required.

In multiple-context mode, up to 100 separate security contexts can be created (depending on the software license). A security context is a virtual firewall that has its own security policy and interfaces. Each context can support 256 VLANs in routed mode. Transparent mode supports only two logical interfaces per context. Multiple contexts are similar to having multiple standalone firewalls. All security contexts can be run in routed mode or in transparent mode.

To avoid bypass of the TOE security policy, all traffic between each network attached to the TOE must flow through the Cisco FWSM.

Security Management

The TOE can be managed by authorized administrators via a physically secure local connection. The TOE can also be managed remotely from a connected network, through use of an encrypted link using SSH [RFC 4251] with [FIPS 46-3] or [FIPS 197]. These two types of communication are shown in Figure 2.1. For remote communication, commands are passed to the FWSM via the NIC of the switch and router and the Supervisor.

Audit

The FWSM also interacts with a Windows 2000 or Windows XP server running the PIX Firewall Syslog Server (PFSS) for the purpose of storage and analysis of the audit data generated by the TOE. PFSS (for firewall logs) and Windows Event Viewer (for the audit server log) are the tools that are included as part of the TOE. Use of other tools is not addressed by the evaluation. Windows access controls will ensure that the integrity of the audit logs is not compromised by use of these tools. The FWSM, through the export of audit data, supports the capability to perform audit analysis. The audit server is on a separate trusted network and is accessible only by trusted administrators.

Identification and Authentication

The TOE supports the authentication of authorized administrators by means of user ID and password, and supports the use of third-party, single-use authentication servers in the environment.

Secure Environment

A multitasking environment is provided for the firewall, within which each process is managed separately in memory. Memory is flushed before reallocation.

After initial installation of the FWSM module in the switch, the supervisor module must be used to assign VLANs to the FWSM module. This must be performed correctly in order for the TOE to function correctly.

The TOE will ensure that all traffic is routed via the firewall, so that the firewall is not bypassed.

The Windows operating system for the audit server also provides protection to support the audit recording and retrieval operations of the TOE, allocating and protecting memory locations for each process.

Date and Time

The FWSM module does not contain a hardware clock, and therefore must receive time from the underlying hardware of the host switch. The supervisor engine is relied upon to provide a reliable time source to the FWSM.

Exclusions from the Scope of the TOE

Software and hardware features outside the scope of the defined TOE Security Functions (TSF), and thus not evaluated are:

- Routing Information Protocol (RIP)
- Simple Network Management Protocol (SNMP)
- Dynamic Host Control Protocol (DHCP) Server
- Virtual Private Networks

The external Authentication, Authorization and Accounting (AAA) server used to provide single-use authentication is outside the scope of the TOE, although use made by the TOE of this server is within scope.

CCEVS Precedents

The TOE definition in this ST document makes use of the following precedent under the CCEVS: PD-0113.

PP Conformance

The TOE Security Functional Requirements are specified to be consistent with the U.S. Department of Defense Application-level Firewall Protection Profile for Medium Robustness Environments, Version 1.0, June 28, 2000 [ALFWPP-MR], but conformance to this PP is not claimed, and this aspect is not evaluated.

Assurance Requirements

The TOE is designed to meet the EAL4 assurance requirements augmented with ALC_FLR.1.

TOE Security Environment

This section includes the following topics:

Assumptions

The assumptions for the TOE security environment are the same as those for the [ALFWPP-MR]. Table 2 lists the assumptions for the TOE security environment.

Table 2 Assumptions

No.	Assumption Name	Description
1	A.PHYSEC	The TOE is physically secure.
2	A.MODEXP	The threat of malicious attacks aimed at discovering exploitable vulnerabilities is considered moderate.
3	A.GENPUR	There are no general-purpose computing capabilities (for example, the ability to execute arbitrary code or applications) and storage repository capabilities on the TOE.
4	A.PUBLIC	The TOE does not host public data.
5	A.NOEVIL	Authorized administrators are non-hostile and follow all administrator guidance; however, they are capable of error.
6	A.SINGEN	Information can not flow among the internal and external networks unless it passes through the TOE.
7	A.DIRECT	Human users within the physically secure boundary protecting the TOE may attempt to access the TOE from some direct connection (for example, a console port) if the connection is part of the TOE.
8	A.NOREMO	Human users who are not authorized administrators can not access the TOE remotely from the internal or external networks.
9	A.REMACC	Authorized administrators may access the TOE remotely from the internal and external networks.

Threats to Security of the TOE

Table 3 defines security threats for the TOE. The asset under attack is the information that transits the TOE in accordance with the security policy, as represented by the TOE rule set. In general, the threat agent includes, but is not limited to: 1) people with TOE access who are expected to possess “low” expertise, resources and motivation, or 2) failure of the TOE.

Table 3 Threats for the TOE

No.	Threat Name	Threat Description
1	T.NOAUTH	An unauthorized person may attempt to bypass the security of the TOE so as to access and use security functions and/or non-security functions provided by the TOE.
2	T.REPEAT	An unauthorized person may repeatedly try to guess authentication data in order to use this information to launch attacks on the TOE.
3	T.REPLAY	An unauthorized person may use valid identification and authentication data obtained to access functions provided by the TOE.
4	T.ASPOOF	An unauthorized person on an external network may attempt to by-pass the information flow control policy by disguising authentication data (for example, spoofing the source address) and masquerading as a legitimate user or entity on an internal network.

Table 3 Threats for the TOE (continued)

5	T.MEDIAT	An unauthorized person may send impermissible information through the TOE which results in the exploitation of resources on the internal network.
6	T.OLDINF	Because of a flaw in the TOE functioning, an unauthorized person may gather residual information from a previous information flow or internal TOE data by monitoring the padding of the information flows from the TOE.
7	T.PROCOM	An unauthorized person or unauthorized external IT entity may be able to view, modify, and/or delete security related information that is sent between a remotely located authorized administrator and the TOE.
8	T.AUDACC	Persons may not be accountable for the actions that they conduct because the audit records are not reviewed, thus allowing an attacker to escape detection.
9	T.SELPRO	An unauthorized person may read, modify, or destroy security critical TOE configuration data.
10	T.AUDFUL	An unauthorized person may cause audit records to be lost or prevent future records from being recorded by taking actions to exhaust audit storage capacity, thus masking an attackers actions.
11	T.MODEXP	A skilled attacker with low attack potential may attempt to bypass the TSF to gain access to the TOE or the assets it protects.

Threats to Security of the Environment

This subsection defines the threats to the IT environment, which are listed in Table 4. The asset under attack is the information transiting the TOE. In general, the threat agent includes, but is not limited to: 1) people with TOE access who are expected to possess “average” expertise, few resources and moderate motivation, or 2) failure of the TOE.

Table 4 Threats to Security for the IT Environment

No.	Threat Name	Threat Description
1	T.TUSAGE	The TOE may be inadvertently configured, used and administered in an insecure manner by either authorized or unauthorized persons.

Organizational Security Policies

Table 5 Organizational Security Policies

No.	Policy Name	Policy Description
1	P.CRYPTO	Triple DES encryption (as specified in FIPS 46-3 [3]) or AES encryption (as specified in FIPS 197) must be used to protect remote administration functions.

Security Objectives

This section includes the following topics:

Security Objectives for the TOE

Table 6 Security Objectives for the TOE

No.	Objective Name	Objective Description
1	O.IDAUTH	The TOE must uniquely identify and authenticate the claimed identity of all users, before granting a user access to TOE functions.
2	O.SINUSE	The TOE must prevent the reuse of authentication data for users attempting to authenticate to the TOE from a connected network.
3	O.MEDIAT	The TOE must mediate the flow of all information between clients and servers located on internal and external networks governed by the TOE, disallowing passage of non-conformant protocols and ensuring that residual information from a previous information flow is not transmitted in any way.
4	O.SECSTA	Upon initial start-up of the TOE or recovery from an interruption in TOE service, the TOE must not compromise its resources or those of any connected network.
5	O.ENCRYP	The TOE must protect the confidentiality of its dialogue with an authorized administrator through encryption, if the TOE allows administration to occur remotely from a connected network.
6	O.SELPRO	The TOE must protect itself against attempts by unauthorized users to bypass, deactivate, or tamper with TOE security functions.
7	O.AUDREC	The TOE must provide a means to record a readable audit trail of security-related events, with accurate dates and times, and a means to search and sort the audit trail based on relevant attributes.
8	O.ACCOUN	The TOE must provide user accountability for information flows through the TOE and for authorized administrator use of security functions related to audit.
9	O.SECFUN	The TOE must provide functionality that enables an authorized administrator to use the TOE security functions, and must ensure that only authorized administrators are able to access such functionality.
10	O.LIMEXT	The TOE must provide the means for an authorized administrator to control and limit access to TOE security functions by an authorized external IT entity.
11	O.EAL	The TOE must be structurally tested and shown to be resistant to obvious vulnerabilities.

Security Objectives for the Environment

Table 7 Security Objectives for the Environment

No.	Objective Name	Objective Description
1	OE.IDAUTH	The claimed identity of a remote user must be uniquely identified and authenticated before granting the user access to TOE functions or, for certain specified services, to a connected network. **Note** The objectives IDAUTH and SINUSE are present for both the TOE and the IT environment. This reflects the use of an authentication server in the environment to generate authentication credentials, in which single-use authentication is applied for remote users.
2	OE.SINUSE	The reuse of authentication data must be prevented for users attempting to authenticate to the TOE from a connected network.
3	OE.PHYSEC	The TOE and its operating environment are physically secure.

Table 7 Security Objectives for the Environment (continued)

4	OE.MODEXP	The threat of malicious attacks aimed at discovering exploitable vulnerabilities is considered moderate.
5	OE.GENPUR	There are no general-purpose computing capabilities (for example, the ability to execute arbitrary code or applications) and storage repository capabilities on the TOE.
6	OE.PUBLIC	The TOE and the authentication server do not host public data.
7	OE.NOEVIL	Authorized administrators are non-hostile and follow all administrator guidance; however, they are capable of error.
8	OE.SINGEN	Information can not flow among the internal and external networks unless it passes through the TOE.
9	OE.DIRECT	Human users within the physically secure boundary protecting the TOE may attempt to access the TOE from some direct connection (for example, a console port) if the connection is part of the TOE.
10	OE.NOREMO	Human users who are not authorized administrators can not access the TOE remotely from the internal or external networks.
11	OE.REMACC	Authorized administrators may access the TOE remotely from the internal and external networks.
12	OE.GUIDAN	The TOE must be delivered, installed, administered, and operated in a manner that maintains security.
13	OE.ADMTRA	Authorized administrators are trained as to establishment and maintenance of security policies and practices.

IT Security Requirements

This section includes the following topics:

TOE Security Functional Requirements

All security functional requirements have been drawn from Part 2 of the CC. They are repeated in the ST document to demonstrate these refinements. For the conventions used for refinements, see Conventions, page 3.

This section includes the following topics:

Security Audit

FAU_GEN.1 Audit data generation

Hierarchical to: No other components.

FAU_GEN.1.1 The TSF shall be able to generate an audit record of the following auditable events:

a. Startup and shutdown of the audit functions

b. All auditable events for the *not specified* level of audit

c. [The events in Table 9].

FAU_GEN.1.2 The TSF shall record within each audit record at least the following information:

a. Date and time of the event, type of event, subject identity, and the outcome (success or failure) of the event

b. For each audit event type, based on the auditable event definitions of the functional components included in the PP/ST [information specified in column three of Table 9].

Dependencies: FPT_STM.1 Reliable time stamps

Table 9 Auditable Events

Functional Component	Auditable Event	Additional Audit Record Contents
FCS_COP.1	Success and failure, and the type of cryptographic operation	The identity of the external IT entity attempting to perform the cryptographic operation.
FDP_IFF.1	All decisions on requests for information flow.	The presumed addresses of the source and destination subject.
FIA_AFL.1	The reaching of the threshold for unsuccessful authentication attempts and the subsequent **restoration by the authorized administrator of the user's capability to authenticate.**	The identity of the offending user and the authorized administrator.
FIA_UAU.5	The final decision on authentication.	The user identity and the success or failure of the authentication.
FIA_UID.2	All use of the user identification mechanism.	The user identities provided to the TOE.
FMT_MOF.1	Use of the functions listed in this requirement pertaining to audit.	The identity of the authorized administrator performing the operation.

Table 9 Auditable Events (continued)

FMT_SMR.1	Modifications to the group of users that are part of **the authorized administrator** role. Unsuccessful attempts to authenticate the authorized administrator	The identity of the authorized administrator performing the modification and the user identity being associated with the authorized administrator role. The user identity and the role.
FPT_STM.1	Changes to the time.	The identity of the authorized administrator performing the operation.

Application Note: The **boldface** text in the table is an addition to the CC Part 2 requirement.

FAU_SAR.1 Audit review

Hierarchical to No other components.

FAU_SAR.1.1 The TSF shall provide [an authorized audit administrator] with the capability to read [all audit trail data] from the audit records.

FAU_SAR.1.2 The TSF shall provide the audit records in a manner suitable for the user to interpret the information.

Dependencies FAU_GEN.1 Audit data generation

FAU_SAR.3 Selectable audit review

Hierarchical to No other components.

FAU_SAR.3.1 The TSF shall provide the ability to perform *searches and sorting* of audit data based on [:

a. User identity

b. Presumed subject address

c. Ranges of dates

d. Ranges of times

e. Ranges of addresses]

Dependencies FAU_SAR.1 Audit review

FAU_STG.1 Protected audit trail storage

Hierarchical to No other components.

FAU_STG.1.1 The TSF shall protect the stored audit records from unauthorized deletion.

FAU_STG.1.2 The TSF shall be able to *prevent* modifications to the audit records**.**

Dependencies FAU_GEN.1 Audit data generation

FAU_STG.4 Prevention of audit data loss

Hierarchical to FAU_STG.3

FAU_STG.4.1 The TSF shall *prevent auditable events, except those taken by the authorized **administrator*** and [shall limit the number of audit records lost] if the audit trail is full.

Dependencies FAU_GEN.1 Audit data generation

Cryptographic Operation

FCS_COP.1 Cryptographic operation

Hierarchical to No other components.

FCS_COP.1.1 The TSF shall perform [encryption of remote authorized

firewall and supervisor administrator sessions] in accordance with a specified cryptographic algorithm [: Triple Data Encryption Standard (DES) as specified in FIPS PUB 46-3 and implementing any mode of operation specified in FIPS PUB 46-3 with Keying Option 1 (K1, K2, and K3 are independent keys) or Advanced Encryption Standard (AES) as specified in FIPS PUB 197] and cryptographic key sizes [that are 192 binary digits in length] that meet the following [: FIPS PUB 46-3 with Keying Option 1 (for Triple DES) or FIPS PUB 197 (for AES)].

Note AES is the FIPS-approved symmetric algorithm of choice.

Dependencies [FDP_ITC.1 Import of user data without security attributes or

FCS_CKM.1 Cryptographic key generation]

FCS_CKM.4 Cryptographic key destruction

FMT_MSA.2 Secure security attributes

Application Note This requirement is applicable only if the TOE includes the capability for the authorized firewall or supervisor administrator to perform security functions remotely from a connected network.

User Data Protection

FDP_IFC.1 (1) Subset information flow control

Hierarchical to No other components.

FDP_IFC.1.1(1) The TSF shall enforce the [UNAUTHENTICATED SFP] on [:

a. Subjects - Unauthenticated external IT entities that send and receive information through the TOE to one another

b. Information - Traffic sent through the TOE from one subject to another

c. Operation - Pass information].

Dependencies FDP_IFF.1 Simple security attributes

FDP_IFC.1 (2) Subset information flow control

Hierarchical to No other components.

FDP_IFC.1.1(2) The TSF shall enforce the [AUTHENTICATED SFP] on [:

a. Subjects - A human user or external IT entity that sends and receives FTP and Telnet information through the TOE to one another, only after the human user initiating the information flow has authenticated at the TOE per FIA_UAU.5

b. FTP and Telnet traffic sent through the TOE from one subject to another

c. Operation - Initiate service and pass information].

Dependencies FDP_IFF.1 Simple security attributes

FDP_IFF.1 (1) Simple security attributes

Hierarchical to No other components.

FDP_IFF.1.1(1) The TSF shall enforce the [UNAUTHENTICATED SFP] based on the following types of subject and information security attributes: [

a. Subject security attributes:

- Presumed address
- No other subject security attributes]

b. Information security attributes:

- Presumed address of source subject
- Presumed address of destination subject
- Transport layer protocol
- TOE interface on which traffic arrives and departs
- Service
- No other information security attributes].

FDP_IFF.1.2(1) The TSF shall permit an information flow between a controlled subject and **another** controlled **subject** via a controlled operation if the following rules hold: [

a. Subjects on an internal network can cause information to flow through the TOE to another connected network if:

- All the information security attribute values are unambiguously permitted by the information flow security policy rules, where such rules may be composed from all possible combinations of the values of the information flow security attributes, created by the authorized firewall administrator.
- The presumed address of the source subject, in the information, translates to an internal network address.
- The presumed address of the destination subject, in the information, translates to an address on the other connected network.

b. Subjects on an external network can cause information to flow through the TOE to another connected network if:

- All the information security attribute values are unambiguously permitted by the information flow security policy rules, in which such rules may be composed from all possible combinations of the values of the information flow security attributes, created by the authorized firewall administrator.
- The presumed address of the source subject, in the information, translates to an external network address.
- The presumed address of the destination subject, in the information, translates to an address on the other connected network].

FDP_IFF.1.3(1) The TSF shall enforce the [none].

FDP_IFF.1.4(1) The TSF shall provide the following [none].

FDP_IFF.1.5(1) The TSF shall explicitly label an information flow based on the following rules: [none].

FDP_IFF.1.6(1) The TSF shall explicitly deny an information flow based on the following rules:[

a. The TOE shall reject requests for access or services, in which the information arrives on an external TOE interface, and the presumed address of the source subject is an external IT entity on an internal network.

b. The TOE shall reject requests for access or services, in which the information arrives on an internal TOE interface, and the presumed address of the source subject is an external IT entity on the external network.

c. The TOE shall reject requests for access or services, in which the information arrives on either an internal or external TOE interface, and the presumed address of the source subject is an external IT entity on a broadcast network.

d. The TOE shall reject requests for access or services, in which the information arrives on either an internal or external TOE interface, and the presumed address of the source subject is an external IT entity on the loopback network.

e. The TOE shall reject requests in which the subject specifies the route in which information shall flow en route to the receiving subject.

f. For application protocols supported by the TOE (for example DNS, HTTP, and SMTP), the TOE shall deny any access or service requests that do not conform to its associated published protocol specification (for example, RFC). This shall be accomplished through protocol filtering proxies that are designed for that purpose].

Application Notes

1. Rule f applies when an application-level proxy is provided for DNS, HTTP, SMTP, and POP3.

2. Network Address Translation and Port Address Translation were specifically tested, even though they were not explicitly referenced in an SFR.

Dependencies FDP_IFC.1 Subset information flow control

FMT_MSA.3 Static attribute initialization

FDP_IFF.1 (2) Simple security attributes

Hierarchical to No other components.

FDP_IFF.1.1(2) The TSF shall enforce the [AUTHENTICATED SFP] based on the following types of subject and information security attributes: [

a. Subject security attributes:

- Presumed address
- No other subject security attributes]

b. Information security attributes:

- User identity
- Presumed address of source subject
- Presumed address of destination subject
- Transport layer protocol
- TOE interface on which traffic arrives and departs
- Service (that is, FTP and Telnet)
- Security-relevant service command
- No other information security attributes].

FDP_IFF.1.2(2) The TSF shall permit an information flow between a controlled subject and **another** controlled **subject** via a controlled operation if the following rules hold: [

a. Subjects on an internal network can cause information to flow through the TOE to another connected network if:

- The human user initiating the information flow authenticates according to FIA_UAU.5.

Note This bullet has been moved from FDP_IFF.1.2(1), after PD-0026.

- All the information security attribute values are unambiguously permitted by the information flow security policy rules, in which such rules may be composed from all possible combinations of the values of the information flow security attributes, created by the authorized firewall administrator.
- The presumed address of the source subject, in the information, translates to an internal network address.
- The presumed address of the destination subject, in the information, translates to an address on the other connected network.

b. Subjects on an external network can cause information to flow through the TOE to another connected network if:

- The human user initiating the information flow authenticates according to FIA_UAU.5.

Note This bullet has been moved from FDP_IFF.1.2(1), after PD-0026.

- All the information security attribute values are unambiguously permitted by the information flow security policy rules, in which such rules may be composed from all possible combinations of the values of the information flow security attributes, created by the authorized firewall administrator.
- The presumed address of the source subject, in the information, translates to an external network address.
- The presumed address of the destination subject, in the information, translates to an address on the other connected network].

FDP_IFF.1.3(2) The TSF shall enforce the [none].

FDP_IFF.1.4(2) The TSF shall provide the following [none].

FDP_IFF.1.5(2) The TSF shall explicitly label an information flow based on the following rules: [none].

FDP_IFF.1.6(2) The TSF shall explicitly deny an information flow based on the following rules: [

a. The TOE shall reject requests for access or services, in which the information arrives on an external TOE interface, and the presumed address of the source subject is an external IT entity on an internal network.

b. The TOE shall reject requests for access or services, in which the information arrives on an internal TOE interface, and the presumed address of the source subject is an external IT entity on the external network.

c. The TOE shall reject requests for access or services, in which the information arrives on either an internal or external TOE interface, and the presumed address of the source subject is an external IT entity on a broadcast network.

d. The TOE shall reject requests for access or services, in which the information arrives on either an internal or external TOE interface, and the presumed address of the source subject is an external IT entity on the loopback network.

e. The TOE shall reject requests in which the subject specifies the route in which information shall flow en route to the receiving subject.

f. The TOE shall reject Telnet or FTP command requests that do not conform to generally accepted published protocol definitions (for example, RFCs). This must be accomplished through protocol filtering proxies designed for that purpose].

Dependencies FDP_IFC.1 Subset information flow control

FMT_MSA.3 Static attribute initialization

FDP_RIP.1 Subset residual information protection

Hierarchical to No other components.

FDP_RIP.1.1 The TSF shall ensure that any previous information content of a resource is made unavailable upon the *allocation of the resource to* [all objects].

Dependencies No dependencies

Identification and Authentication

FIA_AFL.1 Authentication failure handling

Hierarchical to No other components.

FIA_AFL.1.1 The TSF shall detect when [**a non-zero number** determined by

The authorized administrator] **of** unsuccessful authentication attempts occur related to [authorized TOE administrator access or authorized TOE IT entity access].

FIA_AFL.1.2 When the defined number of unsuccessful authentication attempts has been met or surpassed, the TSF shall [prevent the offending external IT entity from successfully authenticating until an authorized administrator takes some action to make authentication possible for the external IT entity in question].

Dependencies FIA_UAU.1 Timing of authentication

Application Note Although the TOE is capable of limiting the number of authentication attempts by external IT entities, in practice this represents an opportunity for a denial of service attack.

This requirement applies only to authentication for the local user database, and not to local or remote authentication deferred through FIA_UAU.5 to a remote AAA server. This does not represent a dilution of the requirement, because such deferred remote authentication is not within the scope of the TOE.

FIA_ATD.1 (1) User attribute definition

Hierarchical to No other components.

FIA_ATD.1.1 (1) The TSF shall maintain the following list of security attributes belonging to individual users: [

a. Identity

b. Association of a human user with the authorized administrator role

c. Password].

Dependencies No dependencies

FIA_UAU.5 (1) Multiple authentication mechanisms

Note In accordance with US PD-115, items a, b, and c of this security functional requirement are addressed by the TOE environment.

Hierarchical to No other components.

FIA_UAU.5.1 (1) The TSF shall provide [password and single-use authentication mechanisms] to support user authentication.

FIA_UAU.5.2 (1) The TSF shall authenticate any user's claimed identity according to the [following multiple authentication mechanism rules:

a. Single-use authentication mechanism shall be used for authorized firewall and supervisor administrators to access the TOE remotely such that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized firewall and supervisor administrator.

b. Single-use authentication mechanism shall be used for authorized external IT entities accessing the TOE such that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized external IT entity.

c. Single-use authentication mechanism shall be used for human users sending or receiving information through the TOE using FTP or Telnet such that successful authentication must be achieved before allowing any other non-TSF-mediated actions on behalf of that human user.

d. Reusable password mechanism shall be used for authorized administrators to access the TOE via a directly connected terminal, so that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized administrator.]

Dependencies No dependencies

Application Note The TOE shall be responsible for correctly invoking the external single-use authentication mechanism, and for taking the correct actions based on authentication decisions. In keeping with industry practice, the choice of authentication server is not mandated by this ST document.

FIA_UID.2 (1) User identification before any action

Hierarchical to No other components.

FIA_UID.2.1 (1) The TSF shall require each user to identify itself before allowing any other TSF mediated actions on behalf of that user.

Dependencies No dependencies.

Security Management

FMT_MOF.1 (1) Management of security functions behavior

Hierarchical to No other components.

FMT_MOF.1.1 (1) The TSF shall restrict the ability to *enable, disable* the functions [:

a. Operation of the TOE

b. Single-use authentication function described in FIA_UAU.5] to [an authorized administrator].

Dependencies FMT_SMF.1 Specification of management functions

FMT_SMR.1 Security roles

FMT_MOF.1 (2) Management of security functions behavior

Hierarchical to No other components.

FMT_MOF.1.1 (2) The TSF shall restrict the ability to *enable, disable, determine and modify the behavior of* the functions [:

a. Audit trail management

b. Backup and restore for TSF data, information flow rules, and audit trail data

c. Communication of authorized external IT entities with the TOE] to [an authorized administrator.

Note For audit data the restriction applies to the audit administrator.

Dependencies FMT_SMF.1 Specification of management functions

FMT_SMR.1 Security roles

Application Note Determine and modify the behavior of element c) (communication of authorized external IT entities with the TOE) is intended to cover functionality such as providing a range of addresses from which the authorized external entity can connect.

FMT_MSA.1 (1) Management of security attributes

Hierarchical to No other components.

FMT_MSA.1.1 (1) The TSF shall enforce the [UNAUTHENTICATED_SFP] to restrict the ability to [delete attributes from a rule, modify attributes in a rule and add attributes to a rule] the security attributes [listed in section FDP_IFF1.1(1)] to [the authorized firewall administrator].

Dependencies [FDP_ACC.1 Subset access control or

FDP_IFC.1 Subset information flow control]

FMT_SMF.1 Specification of management functions

FMT_SMR.1 Security roles

FMT_MTD.2 Management of limits on TSF data

Hierarchical to No other components.

FMT_MTD.2.1 The TSF shall restrict the specification of the limits for [the number of authentication failures] to [the authorized administrator].

FMT_MTD.2.2 The TSF shall take the following actions, if the TSF data is at, or exceeds, the indicated limits: [actions specified in FIA_AFL.1.2].

Dependencies FMT_MTD.1 Management of TSF data

FMT_SMR.1 Security roles

FMT_SMF.1 Specification of management functions

Hierarchical to No other components.

FMT_SMF.1.1 The TSF shall be capable of performing the following security management functions:

a. [Enable or disable the operation of the TOE.

b. Enable or disable the single-use authentication function described in FIA_UAU.5.

c. Enable, disable, determine, and modify the behavior of the audit trail.

d. Enable, disable, determine, and modify the behavior of the backup and restore function for TSF data, information flow rules, and audit trail data.

e. Enable, disable, determine, and modify the behavior of communication of authorized external IT entities with the TOE.

f. Delete attributes from a rule, modify attributes in a rule, and add attributes to a rule for the security attributes listed in section FDP_IFF1.1(1).

g. Delete and create the information flow rules described in FDP_IFF.1(1).

h. Query, modify, delete, and assign the user attributes defined in FIA_ATD.1.1.

i. Set the time and date used to form the timestamps in FPT_STM.1.1.

j. Specify of the limits for the number of authentication failures].

Dependencies No dependencies

FMT_SMR.1 Security roles

Hierarchical to No other components.

FMT_SMR.1.1 The TSF shall maintain the roles [authorized firewall administrator, authorized supervisor administrator, authorized audit administrator].

FMT_SMR.1.2 The TSF shall be able to associate **human** users with **the authorized administrator** roles.

Dependencies FIA_UID.1 Timing of identification

Application Note Supervisor administrators, firewall administrators and audit administrators can exist as separate populations. Where references are made in this ST document, without further qualification, to administrators, then the reference includes all populations. This does not weaken the security functional requirements in any way, but merely identifies that the administrator role within the TOE is split. Firewall administrators are administrators of the FWSM module. Audit administrators are administrators of the Windows audit server.

Protection of the TSF

FPT_RVM.1 Non-bypassability of the TSP

Hierarchical to No other components.

FPT_RVM.1.1 The TSF shall ensure that TSP enforcement functions are invoked and succeed before each function within the TSC is allowed to proceed.

Dependencies No dependencies

FPT_SEP.1 TSF domain separation

Hierarchical to No other components.

FPT_SEP.1.1 The TSF shall maintain a security domain for its own execution that protects it from interference and tampering by untrusted subjects.

FMT_SEP.1.2 The TSF shall enforce separation between the security domains of subjects in the TSC.

Dependencies No dependencies

FPT_STM.1 Reliable time stamps

Hierarchical to No other components.

FPT_STM.1.1 The TSF shall be able to provide reliable time stamps for its own use.

Dependencies No dependencies

Application Note The word “reliable” in the listed requirement means that the order of the occurrence of auditable events is preserved. Reliable time stamps, which include both date and time, are especially important for TOEs composed of greater than one component.

The required minimum strength of function for security functional requirements is SOF-Medium. Strength of function shall be demonstrated for the password authentication mechanism (FIA_UAU.5.2(1)d), so that the probability that authentication data can be guessed on any single login attempt is no greater than one in two to the fortieth (2^{40}).

TOE Environment Security Functional Requirements

The following functional requirements are met partially by the TOE and partially by the environment.

FIA_ATD.1 (2) User attribute definition

Hierarchical to No other components.

FIA_ATD.1.1 (2) The IT environment shall maintain the following list of security attributes belonging to individual users:

a. [Identity

b. Association of a human user with the authorized administrator role

c. Password].

Dependencies No dependencies

FIA_UAU.5 (2) Multiple authentication mechanisms

Note In accordance with US PD-115, items a, b, and c of this security functional requirement are addressed partially by the TOE environment, while item d is addressed by the TOE.

Hierarchical to No other components.

FIA_UAU.5.1 (2) The IT environment shall provide [password and single-use authentication mechanisms] to support user authentication.

FIA_UAU.5.2 (2) The IT environment shall authenticate any user's claimed identity according to the [following multiple authentication mechanism rules:

a. Single-use authentication mechanism shall be used for authorized firewall administrators to access the TOE remotely, so that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized firewall administrator.

b. Single-use authentication mechanism shall be used for authorized external IT entities accessing the TOE, so that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized external IT entity.

c. Single-use authentication mechanism shall be used for human users sending or receiving information through the TOE using FTP or Telnet, so that successful authentication must be achieved before allowing any other non-TSF-mediated actions on behalf of that human user.

d. Reusable password mechanism shall be used for authorized administrators to access the TOE via a directly connected terminal, so that successful authentication must be achieved before allowing any other TSF-mediated actions on behalf of that authorized administrator.].

Dependencies No dependencies

Application Note The TOE shall be responsible for correctly invoking the external single-use authentication mechanism, and for taking the correct actions based on authentication decisions. In keeping with industry practice, the choice of authentication server is not mandated by this ST document.

FIA_UID.2 (2) User identification before any action

Hierarchical to No other components.

FIA_UID.2.1 (2) The IT environment shall require each user to identify itself before allowing any other TSF mediated actions on behalf of that user.

Dependencies No dependencies

TOE Security Assurance Requirements

Table 10 describes the TOE assurance requirements drawn from Part 3 of the CC. The security assurance requirements represent EAL4 augmented with ALC_FLR.1.

This section includes the following topics:

Table 10 **TOE Assurance Components**

Assurance Class	Assurance Components
Configuration Management (ACM)	Partial CM Automation (ACM_AUT.1)
	Generation support and acceptance procedures (ACM_CAP.4)
	Problem tracking CM coverage (ACM_SCP.2)
Delivery and operation (ADO)	Detection of modification (ADO_DEL.2)
	Installation, generation, and start-up procedures (ADO_IGS.1)
Development (ADV)	Fully defined external interfaces (ADV_FSP.2)
	Security enforcing high-level design (ADV_HLD.2)
	Subset of the implementation of the TSF (ADV_IMP.1)
	Descriptive low-level design (ADV_LLD.1)
	Informal correspondence demonstration (ADV_RCR.1)
	Informal TOE security policy model (ADV_SPM.1)
Guidance documents (AGD)	Administrator guidance (AGD_ADM.1)
	User guidance (AGD_USR.1)
Life cycle support (ALC)	Identification of security measures (ALC_DVS.1)
	Basic flaw remediation (ALC_FLR.1)
	Developer defined life-cycle model (ALC_LCD.1)
	Well-defined development tools (ALC_TAT.1)
Tests (ATE)	Analysis of coverage (ATE_COV.2)
	Testing: high-level design (ATE_DPT.1)
	Functional testing (ATE_FUN.1)
	Independent testing – sample (ATE_IND.2)
Vulnerability assessment (AVA)	Validation of analysis (AVA_MSU.2)
	Strength of TOE security function evaluation (AVA_SOF.1)
	Independent vulnerability analysis (AVA_VLA.2)

Configuration Management

ACM_AUT.1 Partial CM automation

Dependencies ACM_CAP.3 Authorization controls

Developer action elements:

ACM_AUT.1.1D The developer shall use a CM system.

ACM_AUT.1.2D The developer shall provide a CM plan.

Content and presentation of evidence elements:

ACM_AUT.1.1C The CM system shall provide an automated means by which only authorized changes are made to the TOE implementation representation.

ACM_AUT.1.2C The CM system shall provide an automated means to support the generation of the TOE.

ACM_AUT.1.3C The CM plan shall describe the automated tools used in the CM system.

ACM_AUT.1.4C The CM plan shall describe how the automated tools are used in the CM system.

Evaluator action elements:

ACM_AUT.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ACM_CAP.4 Generation support and acceptance procedures

Dependencies ALC_DVS.1 Identification of security measures

Developer action elements:

ACM_CAP.4.1D The developer shall provide a reference for the TOE.

ACM_CAP.4.2D The developer shall use a CM system.

ACM_CAP.4.3D The developer shall provide CM documentation.

Content and presentation of evidence elements:

ACM_CAP.4.1C The reference for the TOE shall be unique to each version of the TOE.

ACM_CAP.4.2C The TOE shall be labeled with its reference.

ACM_CAP.4.3C The CM documentation shall include a configuration list, a CM plan, and an acceptance plan.

ACM_CAP.4.4C The configuration list shall uniquely identify all configuration items that comprise the TOE.

ACM_CAP.4.5C The configuration list describes the configuration items that comprise the TOE.

ACM_CAP.4.6C The CM system shall describe the method used to uniquely identify the configuration items.

ACM_CAP.4.7C The CM system shall uniquely identify all configuration items.

ACM_CAP.4.8C The CM plan shall describe how the CM system is used.

ACM_CAP.4.9C The evidence shall demonstrate that the CM system is operating in accordance with the CM plan.

ACM_CAP.4.10C The CM documentation shall provide evidence that all configuration items have been and are being effectively maintained under the CM system.

ACM_CAP.4.11C The CM system shall provide measures such that only authorized changes are made to the configuration items.

ACM_CAP.4.12C The CM system shall support the generation of the TOE.

ACM_CAP.4.13C The acceptance plan shall describe the procedures used to accept modified or newly created configuration items as part of the TOE.

Evaluator action elements:

ACM_CAP.4.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ACM_SCP.2 Problem tracking CM coverage

Dependencies ACM_CAP.3 Authorization controls

Developer action elements:

ACM_SCP.2.1D The developer shall provide a list of configuration items for the TOE.

Content and presentation of evidence elements:

ACM_SCP.2.1C The list of configuration items shall include the following: implementation representation; security flaws; and the evaluation evidence required by the assurance components in the ST.

Evaluator action elements:

ACM_SCP.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

Delivery and Operation

ADO_DEL.2 Detection of modification

Dependencies ACM_CAP.3 Authorization controls

Developer action elements:

ADO_DEL.2.1D The developer shall document procedures for delivery of the TOE or parts of it to the user.

ADO_DEL.2.2D The developer shall use the delivery procedures.

Content and presentation of evidence elements:

ADO_DEL.2.1C The delivery documentation shall describe all procedures that are necessary to maintain security when distributing versions of the TOE to a user's site.

ADO_DEL.2.2C The delivery documentation shall describe how the various procedures and technical measures provide for the detection of modifications, or any discrepancy between the developer's master copy and the version received at the user site.

ADO_DEL.2.3C The delivery documentation shall describe how the various procedures allow detection of attempts to masquerade as the developer, even in cases in which the developer has sent nothing to the user's site.

Evaluator action elements:

ADO_DEL.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADO_IGS.1 Installation, generation, and start-up procedures

Dependencies AGD_ADM.1 Administrator guidance

Developer action elements:

ADO_IGS.1.1D The developer shall document procedures necessary for the secure installation, generation, and start-up of the TOE.

Content and presentation of evidence elements:

ADO_IGS.1.1C The installation, generation and start-up documentation shall describe all the steps necessary for secure installation, generation, and start-up of the TOE.

Evaluator action elements:

ADO_IGS.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADO_IGS.1.2E The evaluator shall determine that the installation, generation, and start-up procedures result in a secure configuration.

Development

ADV_FSP.2 Fully defined external interfaces

Dependencies ADV_RCR.1 Informal correspondence demonstration

Developer action elements:

ADV_FSP.2.1D The developer shall provide a functional specification.

Content and presentation of evidence elements:

ADV_FSP.2.1C The functional specification shall describe the TSF and its external interfaces using an informal style.

ADV_FSP.2.2C The functional specification shall be internally consistent.

ADV_FSP.2.3C The functional specification shall describe the purpose and method of use of all external TSF interfaces, providing complete details of all effects, exceptions and error messages.

ADV_FSP.2.4C The functional specification shall completely represent the TSF.

ADV_FSP.2.5C The functional specification shall include rationale that the TSF is completely represented.

Evaluator action elements:

ADV_FSP.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADV_FSP.2.2E The evaluator shall determine that the functional specification is an accurate and complete instantiation of the TOE security functional requirements.

ADV_HLD.2 Security enforcing high-level design

Dependencies ADV_FSP.1 Informal functional specification

ADV_RCR.1 Informal correspondence demonstration

Developer action elements:

ADV_HLD.2.1D The developer shall provide the high-level design of the TSF.

Content and presentation of evidence elements:

ADV_HLD.2.1C The presentation of the high-level design shall be informal.

ADV_HLD.2.2C The high-level design shall be internally consistent.

ADV_HLD.2.3C The high-level design shall describe the structure of the TSF in terms of subsystems.

ADV_HLD.2.4C The high-level design shall describe the security functionality provided by each subsystem of the TSF.

ADV_HLD.2.5C The high-level design shall identify any underlying hardware, firmware, and/or software required by the TSF with a presentation of the functions provided by the supporting protection mechanisms implemented in that hardware, firmware, or software.

ADV_HLD.2.6C The high-level design shall identify all interfaces to the subsystems of the TSF.

ADV_HLD.2.7C The high-level design shall identify which of the interfaces to the subsystems of the TSF are externally visible.

ADV_HLD.2.8C The high-level design shall describe the purpose and method of use of all interfaces to the subsystems of the TSF, providing details of effects, exceptions, and error messages, as appropriate.

ADV_HLD.2.9C The high-level design shall describe the separation of the TOE into TSP enforcing and other subsystems.

Evaluator action elements:

ADV_HLD.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADV_ HLD.2.2E The evaluator shall determine that the high-level design is an accurate and complete instantiation of the TOE security functional requirements.

Application Note The elements within this family define a requirement that the evaluator determine that the high-level design is an accurate and complete instantiation of the TOE security functional requirements. This provides a direct correspondence between the TOE security functional requirements and the high level design, in addition to the pair-wise correspondences required by the ADV_RCR family. It is expected that the evaluator will use the evidence provided in ADV_RCR as an input to making this determination, and the requirement for completeness is intended to be relative to the level of abstraction of the high-level design.

ADV_IMP.1 Subset of the implementation of the TSF

Dependencies ADV_LLD.1 Descriptive low-level design

ADV_RCR.1 Informal correspondence demonstration

ALC_TAT.1Well-defined development tools

Developer action elements:

ADV_IMP.1.1D The developer shall provide the implementation representation for a selected subset of the TSF.

Content and presentation of evidence elements:

ADV_IMP.1.1C The implementation representation shall unambiguously define the TSF to a level of detail such that the TSF can be generated without further design decisions.

ADV_IMP.1.2C The implementation representation shall be internally consistent.

Evaluator action elements:

ADV_IMP.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADV_ IMP.1.2E The evaluator shall determine that the least abstract TSF representation provided is an accurate and complete instantiation of the TOE security functional requirements.

ADV_LLD.1 Descriptive low-level design

Dependencies ADV_HLD.2 Security enforcing high-level design

ADV_RCR.1 Informal correspondence demonstration

Developer action elements:

ADV_LLD.1.1D The developer shall provide the low-level design of the TSF.

Content and presentation of evidence elements:

ADV_LLD.1.1C The presentation of the low-level design shall be informal.

ADV_LLD.1.2C The low-level design shall be internally consistent.

ADV_LLD.1.3C The low-level design shall describe the TSF in terms of modules.

ADV_LLD.1.4C The low-level design shall describe the purpose of each module.

ADV_LLD.1.5C The low-level design shall define the interrelationships between the modules in terms of provided security functionality and dependencies on other modules.

ADV_LLD.1.6C The low-level design shall describe how each TSP-enforcing function is provided.

ADV_LLD.1.7C The low-level design shall identify all interfaces to the modules of the TSF.

ADV_LLD.1.8C The low-level design shall identify which of the interfaces to the modules of the TSF are externally visible.

ADV_LLD.1.9C The low-level design shall describe the purpose and method of use of all interfaces to the modules of the TSF, providing details of effects, exceptions and error messages, as appropriate.

ADV_LLD.1.10C The low-level design shall describe the separation of the TOE into TSP enforcing and other modules.

Evaluator action elements:

ADV_LLD.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ADV_LLD.1.2E The evaluator shall determine that the low-level design is an accurate and complete instantiation of the TOE security functional requirements.

ADV_RCR.1 Informal correspondence demonstration

Dependencies No dependencies.

Developer action elements:

ADV_RCR.1.1D The developer shall provide an analysis of correspondence between all adjacent pairs of TSF representations that are provided.

Content and presentation of evidence elements:

ADV_RCR.1.1C For each adjacent pair of provided TSF representations, the analysis shall demonstrate that all relevant security functionality of the more abstract TSF representation is correctly and completely refined in the less abstract TSF representation.

Evaluator action elements:

ADV_RCR.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

Application Note The intent of this requirement is for the vendor to provide, and the evaluator to confirm, that there exists accurate, consistent, and clear mappings between each level of design decomposition. Thus, there can be no TOE security functions defined at a lower layer of abstraction absent from a higher level of abstraction and vice versa.

ADV_SPM.1 Informal TOE security policy model

Dependencies ADV_FSP.1 Informal functional specification

Developer action elements:

ADV_SPM.1.1D The developer shall provide a TSP model.

ADV_SPM.1.2D The developer shall demonstrate correspondence between the functional specification and the TSP model.

Content and presentation of evidence elements:

ADV_SPM.1.1C The TSP model shall be informal.

ADV_SPM.1.2C The TSP model shall describe the rules and characteristics of all policies of the TSP that can be modeled.

ADV_SPM.1.3C The TSP model shall include a rationale that demonstrates that it is consistent and complete with respect to all policies of the TSP that can be modeled.

ADV_SPM.1.4C The demonstration of correspondence between the TSP model and the functional specification shall show that all of the security functions in the functional specification are consistent and complete with respect to the TSP model.

Evaluator action elements:

ADV_SPM.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

Guidance Documents

AGD_ADM.1 Administrator guidance

Dependencies ADV_FSP.1 Informal functional specification

Developer action elements:

AGD_ADM.1.1D The developer shall provide administrator guidance addressed to system administrative personnel.

Content and presentation of evidence elements:

AGD_ADM.1.1C The administrator guidance shall describe the administrative functions and interfaces available to the administrator of the TOE.

AGD_ADM.1.2C The administrator guidance shall describe how to administer the TOE in a secure manner.

AGD_ADM.1.3C The administrator guidance shall contain warnings about functions and privileges that should be controlled in a secure processing environment.

AGD_ADM.1.4C The administrator guidance shall describe all assumptions regarding user behavior that are relevant to secure operation of the TOE.

AGD_ADM.1.5C The administrator guidance shall describe all security parameters under the control of the administrator, indicating secure values as appropriate.

AGD_ADM.1.6C The administrator guidance shall describe each type of security-relevant event relative to the administrative functions that need to be performed, including changing the security characteristics of entities under the control of the TSF.

AGD_ADM.1.7C The administrator guidance shall be consistent with all other documentation supplied for evaluation.

AGD_ADM.1.8C The administrator guidance shall describe all security requirements for the IT environment that are relevant to the administrator.

Evaluator action elements:

AGD_ADM.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

AGD_USR.1 User guidance

Dependencies ADV_FSP.1 Informal functional specification

Developer action elements:

AGD_USR.1.1D The developer shall provide user guidance.

Content and presentation of evidence elements:

AGD_USR.1.1C The user guidance shall describe the functions and interfaces available to the non-administrative users of the TOE.

AGD_USR.1.2C The user guidance shall describe the use of user-accessible security functions provided by the TOE.

AGD_USR.1.3C The user guidance shall contain warnings about user-accessible functions and privileges that should be controlled in a secure processing environment.

AGD_USR.1.4C The user guidance shall clearly present all user responsibilities necessary for secure operation of the TOE, including those related to assumptions regarding user behavior found in the statement of TOE security environment.

AGD_USR.1.5C The user guidance shall be consistent with all other documentation supplied for evaluation.

AGD_USR.1.6C The user guidance shall describe all security requirements for the IT environment that are relevant to the user.

Evaluator action elements:

AGD_USR.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

Application Note This assurance component is trivially met since neither authorized external IT entities nor human users who are not authorized administrators are permitted on the TOE.

Life Cycle Support

ALC_DVS.1 Identification of security measures

Dependencies No dependencies.

Developer action elements:

ALC_DVS.1.1D The developer shall produce development security documentation.

Content and presentation of evidence elements:

ALC_DVS.1.1C The development security documentation shall describe all the physical, procedural, personnel, and other security measures that are necessary to protect the confidentiality and integrity of the TOE design and implementation in its development environment.

ALC_DVS.1.2C The development security documentation shall provide evidence that these security measures are followed during the development and maintenance of the TOE.

Evaluator action elements:

ALC_DVS.1.1E The evaluator shall confirm that the information provided meets all requirements for content, presentation, and evidence.

ALC_DVS.1.2E The evaluator shall confirm that the security measures are being supplied.

ALC_FLR.1 Basic flaw remediation

Dependencies No dependencies.

Developer action elements:

ALC_FLR.1.1D The developer shall provide flaw remediation procedures addressed to TOE developers.

Content and presentation of evidence elements:

ALC_FLR.1.1C The flaw remediation procedures documentation shall describe the procedures used to track all reported security flaws in each release of the TOE.

ALC_FLR.1.2C The flaw remediation procedures shall require that a description of the nature and effect of each security flaw be provided, as well as the status of finding a correction to that flaw.

ALC_FLR.1.3C The flaw remediation procedures shall require that corrective actions be identified for each of the security flaws.

ALC_FLR.1.4C The flaw remediation procedures documentation shall describe the methods used to provide flaw information, corrections and guidance on corrective actions to TOE users.

Evaluator action elements:

ALC_FLR.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ALC_LCD.1 Developer defined life-cycle model

Dependencies No dependencies.

Developer action elements:

ALC_LCD.1.1D The developer shall establish a life-cycle model to be used in the development and maintenance of the TOE.

ALC_LCD.1.2D The developer shall provide life-cycle definition documentation.

Content and presentation of evidence elements:

ALC_LCD.1.1C The life-cycle definition documentation shall describe the model used to develop and maintain the TOE.

ALC_LCD.1.2C The life-cycle model shall provide for the necessary control over the development and maintenance of the TOE.

Evaluator action elements:

ALC_LCD.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ALC_TAT.1 Well-defined development tools

Dependencies ADV_IMP.1 Subset of the implementation of the TSF

Developer action elements:

ALC_TAT.1.1D The developer shall identify the development tools being used for the TOE.

ALC_TAT.1.2D The developer shall document the selected implementation-dependent options of the development tools.

Content and presentation of evidence elements:

ALC_TAT.1.1C All development tools used for implementation shall be well-defined.

ALC_TAT.1.2C The documentation of the development tools shall unambiguously define the meaning of all statements used in the implementation.

ALC_TAT.1.3C The documentation of the development tools shall unambiguously define the meaning of all implementation-dependent options.

Evaluator action elements:

ALC_TAT.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

Tests

ATE_COV.2 Analysis of coverage

Dependencies ADV_FSP.1 Informal functional specification

ATE_FUN.1 Functional testing

Developer action elements:

ATE_COV.2.1D The developer shall provide an analysis of the test coverage.

Content and presentation of evidence elements:

ATE_COV.2.1C The analysis of the test coverage shall demonstrate the correspondence between the tests identified in the test documentation and the TSF, as described in the functional specification.

ATE_COV.2.2C The analysis of the test coverage shall demonstrate that the correspondence between the TSF as described in the functional specification and the tests identified in the test documentation is complete.

Evaluator action elements:

ATE_COV.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ATE_FUN.1 Functional testing

Dependencies No dependencies.

Developer action elements:

ATE_FUN.1.1D The developer shall test the TSF and document the results.

ATE_FUN.1.2D The developer shall provide test documentation.

Content and presentation of evidence elements:

ATE_FUN.1.1C The test documentation shall consist of test plans, test procedure descriptions, expected test results, and actual test results.

ATE_FUN.1.2C The test plans shall identify the security functions to be tested and describe the goal of the tests to be performed.

ATE_FUN.1.3C The test procedure descriptions shall identify the tests to be performed and describe the scenarios for testing each security function. These scenarios shall include any ordering dependencies on the results of other tests.

ATE_FUN.1.3C The test procedure descriptions shall identify the tests to be performed and describe the scenarios for testing each security function. These scenarios shall include any ordering dependencies on the results of other tests.

ATE_FUN.1.4C The expected test results shall show the anticipated outputs from a successful execution of the tests.

ATE_FUN.1.5C The test results from the developer execution of the tests shall demonstrate that each tested security function behaved as specified.

Evaluator action elements:

ATE_FUN.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ATE_IND.2 Independent testing – sample

Dependencies ADV_FSP.1 Informal functional specification
AGD_ADM.1 Administrator guidance
AGD_USR.1 User guidance
ATE_FUN.1 Functional testing

Developer action elements:

ATE_IND.2.1D The developer shall provide the TOE for testing.

Content and presentation of evidence elements:

ATE_IND.2.1C The TOE shall be suitable for testing.

ATE_IND.2.2C The developer shall provide an equivalent set of resources to those that were used in the developer's functional testing of the TSF.

Evaluator action elements:

ATE_IND.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

ATE_IND.2.2E The evaluator shall test a subset of the TSF as appropriate to confirm that the TOE operates as specified.

ATE_IND.2.3E The evaluator shall execute a sample of tests in the test documentation to verify the developer test results.

Vulnerability Assessment

AVA_MSU.2 Validation of analysis

Dependencies ADO_IGS.1 Installation, generation, and start-up procedures
ADV_FSP.1 Informal functional specification
AGD_ADM.1 Administrator guidance
AGD_USR.1 User guidance

Developer action elements:

AVA_MSU.2.1D The developer shall provide guidance documentation.

AVA_MSU.2.2D The developer shall document an analysis of the guidance documentation.

Content and presentation of evidence elements:

AVA_MSU.2.1C The guidance documentation shall identify all possible modes of operation of the TOE (including operation following failure or operational error), their consequences and implications for maintaining secure operation.

AVA_MSU.2.2C The guidance documentation shall be complete, clear, consistent, and reasonable.

AVA_MSU.2.3C The guidance documentation shall list all assumptions about the intended environment.

AVA_MSU.2.4C The guidance documentation shall list all requirements for external security measures (including external procedural, physical and personnel controls).

AVA_MSU.2.5C The analysis documentation shall demonstrate that the guidance documentation is complete.

Evaluator action elements:

AVA_MSU.2.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

AVA_MSU.2.2E The evaluator shall repeat all configuration and installation procedures and other procedures selectively, to confirm that the TOE can be configured and used securely using only the supplied guidance documentation.

AVA_MSU.2.3E The evaluator shall determine that the use of the guidance documentation allows all insecure states to be detected.

AVA_MSU.2.4E The evaluator shall confirm that the analysis documentation shows that guidance is provided for secure operation in all modes of operation of the TOE.

AVA_SOF.1 Strength of TOE security function evaluation

Dependencies ADV_FSP.1 Informal functional specification

ADV_HLD.1 Descriptive high-level design

Developer action elements:

AVA_SOF.1.1D The developer shall perform the strength of TOE security function analysis for each mechanism identified in the ST document as having the strength of TOE security function claim.

Content and presentation of evidence elements:

AVA_SOF.1.1C For each mechanism with the strength of TOE security function claim, the strength of TOE security function analysis shall show that it meets or exceeds the minimum strength level defined in the PP/ST document.

AVA_SOF.1.2C For each mechanism with a specific strength of TOE security function claim, the strength of TOE security function analysis shall show that it meets or exceeds the specific strength of function metric defined in the PP/ST document.

Evaluator action elements:

AVA_SOF.1.1E The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.

AVA_SOF.1.2E The evaluator shall confirm that the strength claims are correct.

AVA_VLA.2 Independent vulnerability analysis

Dependencies ADV_FSP.1 Informal functional specification
ADV_HLD.2 Security enforcing high-level design
ADV_IMP.1 Subset of the implementation of the TSF
ADV_LLD.1 Descriptive low-level design
AGD_ADM.1 Administrator guidance
AGD_USR.1 User guidance

Developer action elements:

AVA_VLA.2.1D The developer shall perform a vulnerability analysis.

AVA_VLA.2.2D The developer shall provide vulnerability analysis documentation.

Content and presentation of evidence elements:

AVA_VLA.2.1C The vulnerability analysis documentation shall describe the analysis of the TOE deliverables performed to search for ways in which a user can violate the TSP.

AVA_VLA.2.2C The vulnerability analysis documentation shall describe the disposition of identified vulnerabilities.

AVA_VLA.2.3C The vulnerability analysis documentation shall show, for all identified vulnerabilities, that the vulnerability cannot be exploited in the intended environment for the TOE.

AVA_VLA.2.4C The vulnerability analysis documentation shall justify that the TOE, with the identified vulnerabilities, is resistant to obvious penetration attacks.

Evaluator action elements:

AVA_VLA.2.1E	The evaluator shall confirm that the information provided meets all requirements for content and presentation of evidence.
AVA_VLA.2.2E	The evaluator shall conduct penetration testing, building on the developer vulnerability analysis, to ensure the identified vulnerabilities have been addressed.
AVA_VLA.2.3E	The evaluator shall perform an independent vulnerability analysis.
AVA_VLA.2.4E	The evaluator shall perform independent penetration testing, based on the independent vulnerability analysis, to determine the exploitability of additional identified vulnerabilities in the intended environment.
AVA_VLA.2.5E	The evaluator shall determine that the TOE is resistant to penetration attacks performed by an attacker possessing a low attack potential.

TOE Summary Specification

This section includes the following topics:

TOE Security Functions

This section includes the following topics:

Security Management Function

The Security Management Function permits an authorized administrator (from a physically secure local connection, via SSH from an internal trusted host, or via an encrypted link (SSH) from a remotely connected network) to perform the following actions:

1. Enable or disable the operation of the TOE.
2. Enable or disable the single-use authentication function.
3. Enable or disable administrator accounts, or modify their security attributes.
4. Enable, disable, determine, and modify the behavior of the audit trail.
5. Enable, disable, determine, and modify the behavior of the backup and restore function for TSF data, information flow rules, and audit trail data.

6. Enable, disable, determine, and modify the behavior of communication of authorized external IT entities with the TOE.
7. Delete attributes from a rule, modify attributes in a rule, and add attributes to a rule for the security attributes.
8. Delete and create the information flow rules.
9. Set the time and date used to form the timestamps.
10. Specify of the limits for the number of authentication failures.

These listed management functions can only be performed by an authorized administrator. Items 2, 6, 7 and 8 are relevant for the firewall administrator only.

Audit Function

The Audit Function provides auditing that can be switched on or off (this action is audited). When active, the following events are recorded:

1. All decisions on requests for information flow.
2. The reaching of the threshold for unsuccessful authentication attempts and the subsequent restoration by the authorized administrator of the user's capability to authenticate.
3. Any use of the identification or authentication mechanisms.
4. Modifications to the group of users that are part of the authorized administrator roles.
5. Changes to the time.
6. Audit trail management activities.
7. Backup for TSF data.
8. Use of the single-use authentication function.
9. Activation or deactivation of the single-use authentication function.

For each event the Audit Function will record the following:

1. Date and time of the event.
2. Source and destination IP address (for connections only).
3. Type of event or service.
4. Specific information related to the event.
5. Success or failure of the event.

To provide date and time information, the Audit Function uses the Clock Function.

Audit records are sent by the firewall for storage using the Firewall Syslog Server (PFSS) on the Windows 2000 or Windows XP server. PFSS creates seven rotating system log files named monday.log, tuesday.log, wednesday.log, thursday.log, friday.log, saturday.log, and sunday.log. If a week has passed since the last log file was created, it will rename the old log file to *day.mmddyy,* where *day* is the current day, *mm* is the month, *dd* is the day, and *yy* is the year. An authorized audit administrator can gain read access to audit records through PFSS. Audit events generated on the audit server can be viewed using the Windows event viewer.

Note The evaluated configuration requires use of the CC certified versions of these products, that is, Microsoft Windows 2000 Professional Server, SP3 (including hotfix Q326886) or Microsoft Windows XP Professional; SP 2 (including hotfixes 896423, 899587, 899588, 896422, 890859, 873333, 885250, 888302, 885835, and 907865).

PFSS provides the ability to search and sort audit records based on one or a combination of many of the following:

1. Source IP address or address range
2. Source port or range of ports
3. Destination IP address or address range
4. Destination port or range of ports
5. Service
6. Start date and end date
7. Start time and end time
8. System log message number
9. Interface name

Audit records are protected from modification or unauthorized deletion through permission settings in Windows 2000 or Windows XP.

If it is not possible to write audit records to the audit trail, then actions other than those taken by an authorized administrator are prevented.

Information Flow Control Function

The Information Control Function of the TOE allows authorized firewall administrators to set up rules between interfaces of the firewall. These rules control whether a packet is transferred from one interface to another based on:

1. User identity
2. Source address
3. Destination address
4. Service used
5. Port number
6. Security-relevant service command
7. Network interface on which the connection request occurs

The service requested, if permitted by the information control rules may comprise of Ethernet, ARP, CTIQBE, DNS, Echo, Finger, H.323, IP, ICMP, TCP, UDP, FTP, GTP, HTTP, ILS, MGCP, POP3, RSH, RTSP, Skinny, SIP, ESMTP, SunRPC, Telnet, TFTP and XDMCP. Application inspection is also provided within the TOE for the following protocols and applications: CTIQBE, DNS, H.323, ICMP, FTP, GTP, HTTP, ILS, MGCP, RSH, RTSP, Skinny, SIP, SMTP / ESMTP, SunRPC, TFTP, and XDMCP. Packets will be dropped unless a specific rule has been set up to allow the packet to pass.

In providing the Information Flow Control function, the TOE has the ability to translate network addresses contain within a packet, called Network Address Translation. Depending upon the TOE configuration the address can be translated into a permanently defined static address, an address selected

from a range or into a single address with a unique port number (Port Address Translation). Also, Network Address Translation can be disabled, so that addresses are not changed when passing through the TOE.

The TOE has the ability to reject requests in which the subject specifies the route in which information flows en route to the receiving subject. Through use of protocol filtering proxies the TOE can also reject Telnet or FTP command requests that do not conform to generally accepted published protocol definitions.

The information flow control policy applies only to traffic flow through the TOE, and only to traffic flow between connected networks. However, the TOE can enforce traffic filtering to the TOE and for RADIUS/TACACS+. The access list rules do not apply to traffic flow within any single VLAN, as multiple interfaces on the same VLAN are within the same network. In the default evaluated configuration all traffic to the TOE is denied unless specifically permitted.

Identification and Authentication Function

Administrators are required to identify themselves and be authenticated before any further access to the TOE is granted (that is, before they become authorized administrators).

Authentication performed by the TOE makes use of a reusable password mechanism for local access to the TOE by authorized administrators. This is a permutational mechanism that meets the minimum strength of function rating of Medium.

Following a non-zero number of failed authentication attempts (set by an authorized administrator) accounts will be locked until released by an authorized administrator. This function is not implemented for remote access, because of the ease with which a DOS attack could be mounted.

Note This does not apply for privilege level 15 accounts.

Authentication is implemented for firewall administrators on the FWSM module, for supervisor administrators on the supervisor, and for audit administrators on the audit server. At the console the firewall administrator must first login to the supervisor, and then to the FWSM module. Authentication failure locking is not implemented on the supervisor, which is configured to use the external authentication server.

Single-use authentication for remote authorized administrators and authorized external IT entities is provided by means of TOE functions that correctly invoke it and act correctly, based on the decisions of an external authentication server in the TOE environment.

Protection Function

The Protection function provides a multitasking environment for the firewall. All processes on the FSWM are allocated separate memory locations and memory separation, and protection is provided by the operating system. Whenever memory is re-allocated, it is flushed of data before re-allocation. The TOE accounts for all packets traversing the firewall in relation to the associated information stream. Therefore no residual information relating to other packets will be reused on that stream.

IOS is not a general purpose operating system, and access to IOS memory space is restricted to only IOS functions. Additionally, IOS is the only software running on the TOE supervisor.

The Windows operating system for the audit server also provides protection to support the audit recording and retrieval operations of the TOE, allocating and protecting memory locations for each process.

The protection function also ensures that TSP enforcement functions are invoked and succeed before each function within the TSC is allowed to proceed. This function includes the use of an encrypted link for remote management functions.

The TOE will ensure that all traffic is routed via the firewall, so that the firewall is not bypassed.

Clock Function

The Clock Function of the TOE provides a source of date and time information for the firewall, used in audit timestamps and in validating service requests.

The FWSM module does not contain a hardware clock, and therefore must receive time from the underlying hardware of the host switch. The FWSM module receives the time generated from the switch at boot-up or to the setting changed by the supervisor administrator, and then maintains the time locally.

This function can only be accessed from within the configuration EXEC mode via the privileged mode.

The audit server also includes a hardware clock that is used to provide audit timestamps for audit events generated on the audit server.

Assurance Measures

Table 11 identifies the deliverables that will meet the assurance requirements of Common Criteria EAL4, augmented with ALC_FLR.1. The identified deliverables describe the approach taken to meet the assurance requirements, and meet all of the assurance requirements contained in this assurance package.

Table 11 Assurance Measures

Assurance Class	Assurance Components	Assurance Measures (Cisco Documentation)
Security Target (ASE)	*All*	This security target meets all of the requirements within class ASE.

Table 11 Assurance Measures (continued)

Configuration Management (ACM)	*Partial CM Automation (ACM_AUT.1)* *Generation support and acceptance procedures (ACM CAP 4)* *Problem tracking CM coverage (ACM_SCP.2)*	Configuration Management and Delivery Procedures for Cisco Firewall Services Module, Version 3.1. Installation Guide for the Cisco Firewall Services Module, Version 3.1 Configuration Guide for the Cisco Firewall Services Module, Version 3.1
Delivery and Operation (ADO)	*Detection of modification (ADO_DEL.2)*	
	Installation, generation, and start-up procedures (ADO_IGS.1)	The Configuration Management and Delivery Procedures describe the use of an automated configuration management system that meets the requirements of ACM_CAP.4 and ACM_AUT.1. All documentation required by ACM_SCP.1 is held under configuration control. These procedures also describe secure delivery process to preserve the integrity of the TOE, meeting the requirements of ADO_DEL.2. The Installation Guide, Configuration Guide, and Release Notes provide information on how to bring the delivered TOE into an operational state in accordance with ADO_IGS.1.

Table 11 Assurance Measures (continued)

Development (ADV)	*Fully defined external interfaces (ADV_FSP.2)*	Functional Specification for Cisco Firewall Services Module, Version 3.1. This document describes the external interfaces to the TOE in a manner consistent with the requirements of ADV_FSP.2.
	Security enforcing high-level design (ADV_HLD.2)	High-level design for Cisco Firewall Services Module, Version 3.1. This document describes the TOE in terms of subsystems, and documents the interfaces between them.
	Subset of the implementation of the TSF (ADV_IMP.1)	Various source code for Cisco Firewall Services Module, Version 3.1. A sample of the TOE source code selected by the evaluators meets this requirement.
	Descriptive low-level design (ADV_LLD.1)	Low-level design for Cisco Firewall Services Module, Version 3.1. This document describes the decomposition of the TOE subsystems into modules, and documents the interfaces between them.
	Informal correspondence demonstration (ADV_RCR.1)	Correspondence demonstration for Cisco Firewall Services Module, Version 3.1. A description of correspondence between the TOE summary specification, the high-level design, the low-level design and source code is provided by means of cross-references in this document.
	Informal TOE security policy model(ADV_SPM.1)	Security Policy Model for Cisco Firewall Services Module, Version 3.1. The security policy model describes in an informal style the policies that underlie the TOE security functional requirements. These are traced to the functional specification.
Guidance Documents (AGD)	*Administrator guidance (AGD_ADM.1)*	Installation Guide for the Cisco Firewall Services Module Version 3.1.
	User guidance (AGD_USR.1)	Configuration Guide for the Cisco Firewall Services Module, Version 3.1 Command Reference Guide for the Cisco Firewall Services Module, Version 3.1 CC Evaluated Configuration Guide for the Cisco Firewall Services Module, Version 3.1 These documents provide detailed guidance on the administration of the TOE in a secure manner. They also provide information on achieving the evaluated configuration.

Table 11 Assurance Measures (continued)

Life Cycle Support (ALC)	*Identification of security measures (ALC_DVS.1)*	Development Security for Cisco Secure PIX Firewall, Cisco Adaptive Security Appliances, and Cisco Systems Firewall Services Module (FWSM). This document defines the procedures used to maintain the security of the development environment. These measures provide a combination of procedural, personnel, and technical measures that safeguard the integrity and confidentiality of the TOE.
	Basic flaw remediation (ALC_FLR.1)	Configuration and delivery procedures for Cisco Firewall Services Module, Version 3.1. This document describes the procedures and tools that are used in development and maintenance of the TOE. These procedures provide a controlled approach to management of the TOE life cycle. Procedures covering handling of reported flaws in the TOE are also provided.
	Developer defined life cycle model (ALC_LCD.1)	
	Well-defined development tools (ALC_TAT.1)	
Tests (ATE)	*Analysis of coverage (ATE_COV.2)*	Testing plan and analysis for Cisco Firewall Services Module, Version 3.1. The test documentation describes how each external security functional interface is tested, and also how it is demonstrated that the subsystem interfaces are also operating correctly. The documentation describes the test environments used, the tests that are carried out, and the results that are expected and obtained. The TOE is made available to the evaluators for testing.
	Testing: high-level design (ATE_DPT.1)	
	Functional testing (ATE_FUN.1)	
	Independent testing – sample (ATE_IND.2)	
Vulnerability Assessment (AVA)	*Validation of analysis (AVA_MSU.2)*	Misuse analysis for Cisco Firewall Services Module, Version 3.1. The misuse analysis provides an analysis of the guidance documentation, demonstrating that the TOE can be managed in a predictable and secure manner.
	Strength of TOE security function evaluation (AVA_SOF.1)	Strength of function analysis for Cisco Firewall Services Module, Version 3.1. The strength of function analysis provides an analysis of the password mechanism that demonstrates that the SOF claims are upheld.
	Independent vulnerability analysis (AVA_VLA.2)	Vulnerability analysis for Cisco Firewall Services Module, Version 3.1. Cisco carries out and documents an analysis of the TOE deliverables searching for weaknesses that might allow an attacker to violate the TOE security policy. This analysis is provided to the evaluators.

Protection Profile Claims

This ST document does not claim conformance to the [ALFWPP-MR]. However, this section provides information about the ST document's relationship to [ALFWPP-MR] and includes the following topics:

Environment Rationale

The assumptions in this ST document are the same as those in the [ALFWPP-MR].

The threats in this ST document are the same as those in the [ALFWPP-MR], adjusted slightly to reflect attackers with a low attack potential.

The organizational security policy in this ST document has updated that from the [ALFWPP-MR] to include AES, and to remove the reference to FIPS 140-1.

Objectives Rationale

The security objectives in this ST document differ from those in the [ALFWPP-MR] in the following ways:

a. The TOE security objective O.IDAUTH has been abbreviated to exclude connected networks. This functionality is provided in the TOE environment, where the objective is transcribed completely. The limited objective is retained in the TOE security objectives to cover local authentication of administrators. This change is consistent with PD-0115.

b. The TOE security objective O.MEDIAT has been clarified to refer to “users,” rather than “clients and servers.”

c. The IT environment security objective OE.PHYSEC has been modified to include the TOE’s operating environment. This clarifies the intent of the objective, but does not weaken it.

d. The IT environment security objective OE.PUBLIC has been modified to include the authentication server, and the environment security objectives OE.IDAUTH and OE.SINUSE have been added. Because PD-0115 permits exclusion of the authentication server from the scope of the TOE, this renders the objectives consistent with the intent of the [ALFWPP-MR].

Security Functional Requirements Rationale

The security functional requirements in this ST document differ from those in the [ALFWPP-MR] in the following ways:

a. All operations have been completed in a manner consistent with the [ALFWPP-MR].

b. The TOE security functional requirements FIA_ATD.1, FIA_UAU.5 and FIA_UID.2 have been duplicated for the TOE and for the IT environment. This reflects the removal of the authentication server from the scope of the TOE, and is consistent with PD-0115.

Security Assurance Requirements Rationale

The assurance requirements in this ST document are different from those in the [ALFWPP-MR]. The differences are identified in Table 12.

Because the audit server meets the criteria listed in PD-0113, the modified assurance requirements stated therein will be applied to that part of the TOE.

Rationale

This section includes the following topics:

Security Objectives Rationale

The security objectives rationale is the same as the [ALFWPP-MR]. It has been included in this document for the sake of completeness. Also, in some areas minor errors in the [ALFWPP-MR] have been corrected. For example, O.IDAUTH objective includes not only user identification, but also the user authentication.

Table 13 shows the mapping between threats and policies, and IT security objectives. A check in every row means that every security objective is necessary. A check in every column implies that all threats are countered and policies are met.

Table 13 **Summary of Mappings between Threats, Policies, and IT Security Objectives**

	T. NOAUTH	T. REPEAT	T. REPLAY	T. ASPOOF	T. MEDIAT	T. OLDINF	T. PROCOM	T. AUDACC	T. SELPRO	T. AUDFUL	T. MODEXP	P. CRYPTO
O.IDAUTH	x											
O.SINUSE		x	x									
O.MEDIAT				x	x	x						
O.SECSTA	x								x			
O.ENCRYP	x						x					x
O.SELPRO	x								x	x		
O.AUDREC								x				
O.ACCOUN								x				
O.SECFUN	x		x							x		
O.LIMEXT	x											
O.EAL											x	

Rationale for Security Objectives for the Environment

The security objectives rationale for the environment is based on that for the [ALFWPP-MR].

OE.IDAUTH	This security objective is necessary to counter the threat: T.NOAUTH because it requires that remote users be uniquely identified and authenticated before accessing the TOE.
OE.PHYSEC	The TOE and its operating environment are physically secure.
OE.MODEXP	The threat of malicious attacks aimed at discovering exploitable vulnerabilities is considered low.
OE.GENPUR	There are no general-purpose computing capabilities (for example the ability to execute arbitrary code or applications) and storage repository capabilities on the TOE.
OE.PUBLIC	The TOE and the authentication server do not host public data.
OE.NOEVIL	Authorized administrators are non-hostile and follow all administrator guidance; however, they are capable of error.
OE.SINGEN	Information can not flow among the internal and external networks unless it passes through the TOE.

OE.DIRECT	Human users within the physically secure boundary protecting the TOE may attempt to access the TOE from some direct connection (for example a console port) if the connection is part of the TOE.
OE.NOREMO	Human users who are not authorized administrators can not access the TOE remotely from the internal or external networks.
OE.REMACC	Authorized administrators may access the TOE remotely from the internal and external networks.
OE.GUIDAN	This non-IT security objective is necessary to counter the threat: T.TUSAGE and T.AUDACC because it requires that those responsible for the TOE ensure that it is delivered, installed, administered, and operated in a secure manner.
OE.ADMTRA	This non-IT security objective is necessary to counter the threat: T.TUSAGE and T.AUDACC because it ensures that authorized administrators receive the proper training.
OE.SINUSE	This security objective is necessary to counter the threats: T.REPEAT and T.REPLAY because it requires that the IT environment contributes to preventing the reuse of authentication data so that even if valid authentication data is obtained, it will not be used to mount an attack.

Table 14 shows the relationship between threats and four of the security objectives for the environment.

Table 14 **Summary of Mappings Between Threats and Security Objectives for the Environment**

	T.NOAUTH	T.REPEAT	T.REPLAY	T.TUSAGE	T.AUDACC
OE.IDAUTH	x				
OE.GUIDAN				x	x
OE.ADMTRA				x	x
OE.SINUSE		x	x		

Because the rest of the security objectives for the environment are, in part, a restatement of the security assumptions, those security objectives trace to all aspects of the assumptions.

TOE Security Functional Requirements (SFR) Rationale

The functional and assurance requirements presented in this ST document are mutually supportive, and their combination meets the stated security objectives. The security requirements were derived according to the general model presented in Part 1 of the Common Criteria. The following paragraphs and Table 15 show the mapping between the security requirements and the security objectives. Table 13 shows the relationship between the threats, policies, and IT security objectives. These two tables show the completeness and sufficiency of the requirements.

The minimum strength of function claim of SOF-Medium has been selected as appropriate to meet the security objective O.IDAUTH and the selected assurance level of EAL4. The metric required in this ST document is an acceptable metric for SOF-Medium.

FAU_GEN.1 Audit data generation

This component outlines what data must be included in audit records and what events must be audited. This component traces back to, and aids in meeting the following objectives: O.AUDREC and O.ACCOUN.

FAU_SAR.1 Audit review

This component ensures that the audit trail is understandable. This component traces back to, and aids in meeting the following objective: O.AUDREC

FAU_SAR.3 Selectable audit review

This component ensures that a variety of searches and sorts can be performed on the audit trail. This component traces back to, and aids in meeting the following objective: O.AUDREC.

FAU_STG.1 Protected audit trail storage

This component is chosen to ensure that the audit trail is always protected from tampering, the security functionality is limited to the authorized administrator, and that start-up and recovery does not compromise the audit records. This component traces back to, and aids in meeting the following objectives: O.SECSTA, O.SELPRO, and O.SECFUN.

FAU_STG.4 Prevention of audit data loss

This component ensures that the authorized administrator will be able to take care of the audit trail if it should become full, and resources will not be compromised upon recovery. This component also ensures that no other non-administrative auditable events as defined in FAU_GEN.1 occur. Thus the authorized administrator is permitted to perform potentially auditable actions, though these events will not be recorded until the audit trail is restored to a non-full status. This component traces back to, and aids in meeting the following objectives: O.SECSTA, O.SELPRO, and O.SECFUN.

If TCP system log messaging is enabled (required for the evaluated configuration), the maximum that can be lost on power failure, audit storage failure, audit trail full or other disabling of the audit storage function is the number of logs generated as a result of the last 50 packets before user traffic is stopped. While this is not strictly quantifiable, the maximum length an audit queue can grow to is limited to 8192 messages (2MB). The number of maximum network traffic packets that would be allowed to pass through the firewall before all traffic is blocked is 50. This limit is applicable whether the TOE fails or PFSS fails.

FCS_COP.1 Cryptographic operation

This component ensures that Triple-DES or AES is used by authorized administrators to communicate with the TOE remotely from an internal or external network. This component is necessitated by the postulated threat environment. This component traces back to, and aids in meeting the following objective: O.ENCRYP.

FDP_IFC.1(1) Subset information flow control

This component identifies the entities involved in the UNAUTHENTICATED information flow control SFP (that is, users sending information to other users and vice versa). This component traces back to and aids in meeting the following objective: O.MEDIAT.

FDP_IFC.1(2) Subset information flow control

This component identifies the entities involved in the AUTHENTICATED information flow control SFP (that is, users of the services FTP or Telnet sending information to servers and vice versa). This component traces back to and aids in meeting the following objective: O.MEDIAT.

FDP_IFF.1(1) Simple security attributes

This component identifies the attributes of the users sending and receiving the information in the UNAUTHENTICAED SFP, as well as the attributes for the information itself. Then the policy is defined by saying under what conditions information is permitted to flow. This component traces back to, and aids in meeting the following objective: O.MEDIAT.

FDP_IFF.1(2) Simple security attributes

This component identifies the attributes of the users sending and receiving the information in the AUTHENTICATED SFP, as well as the attributes for the information itself. Then the policy is defined by saying under what conditions information is permitted to flow. This component traces back to, and aids in meeting the following objective: O.MEDIAT.

FDP_RIP.1 Subset residual information protection

This component ensures that neither information that had flowed through the TOE nor any TOE internal data are used when padding is used by the TOE for information flows. This component traces back to, and aids in meeting the following objective: O.MEDIAT.

FIA_AFL.1 Authentication failure handling

This component ensures that human users who are not authorized administrators can not endlessly attempt to authenticate. After some number of failures that the authorized administrator decides, which must not be zero, the user becomes unable from that point on in attempts to authenticate. This goes on until an authorized administrator makes authentication possible again for that user. This component traces back to, and aids in meeting the following objective: O.SELPRO.

FIA_ATD.1(1) User attribute definition

This component exists to permit the TOE to distinguish one user from another, for accountability purposes and to associate the role chosen in FMT_SMR.1 with a user. This component traces back to, and aids in meeting the following objectives: O.IDAUTH and O.SECFUN.

FIA_UAU.5(1) Multiple authentication mechanisms

This component was chosen to ensure that multiple authentication mechanisms are used appropriately in all attempts to authenticate at the TOE from an internal or external network. An additional SOF metric for this requirement is defined in section 0 to ensure that the mechanism is of adequate cryptological strength. This component traces back to, and aids in meeting the following objectives: O.SINUSE and O.IDAUTH.

Note: This requirement is partially satisfied by the TOE and partially by the TOE environment. Its presence under TOE security functional requirements is to address authentication of local administrators only.

FIA_UID.2(1) User identification before any action

This component ensures that before anything occurs on behalf of a user, the user is identified to the TOE. This component traces back to, and aids in meeting the following objectives: O.IDAUTH and O.ACCOUN.

FMT_MOF.1(1) Management of security functions behavior

This component ensures that the TSF restricts the ability of the TOE start up and shut down operation and single-use authentication function (described in FIA_UAU.5) to the authorized administrator. This component traces back to, and aids in meeting the following objectives: O.SECSTA, O.SECFUN, and O.LIMEXT.

FMT_MOF.1(2) Management of security functions behavior

This component ensures that the TSF restricts the ability to modify the behavior of functions such as audit trail management, back and restore for TSF data, and communication of authorized external IT entities with the TOE to an authorized administrator. This component traces back to, and aids in meeting the following objectives: O.SECSTA, O.SECFUN and O.LIMEXT.

FMT_MSA.1(1) Management of security attributes

This component ensures the TSF enforces from TOE start-up the UNAUTHENTICATED SFP to restrict the ability to add, delete and modify specified security attributes that are listed in section 3.1.1.1 (FDP_IFF1.1(1)). This component traces back to, and aids in meeting the following objectives: O.MEDIAT, O.SECSTA, and O.SECFUN.

FMT_MSA.1(2) Management of security attributes

This component ensures the TSF enforces from TOE start-up the AUTHENTICATED SFP to restrict the ability to add, delete and modify specified security attributes that are listed in section 3.1.1.2 (FDP_IFF1.1(2)). This component traces back to, and aids in meeting the following objectives: O.MEDIAT, O.SECSTA, and O.SECFUN

FMT_MSA.1(3) Management of security attributes

This component ensures the TSF enforces from TOE start-up the UNAUTHENTICATED SFP to restrict the ability to create or delete specified security attributes that are listed in information flow rules in section 3.1.1.1 (FDP_IFF1.1(1)). This component traces back to, and aids in meeting the following objectives: O.MEDIAT, O.SECSTA, and O.SECFUN.

FMT_MSA.1(4) Management of security attributes

This component ensures the TSF enforces from TOE start-up the AUTHENTICATED SFP to restrict the ability to create or delete specified security attributes that are listed in information flow rules in section 3.1.1.2 (FDP_IFF1.1(2)). This component traces back to, and aids in meeting the following objectives: O.MEDIAT, O.SECSTA, and O.SECFUN.

FMT_MSA.3 Static attribute initialization

This component ensures that there is a default-deny policy for the information flow control security rules. This component traces back to, and aids in meeting the following objectives: O.MEDIAT and O.SECSTA.

FMT_MTD.1(1) Management of TSF data

This component ensures that the TSF restrict abilities to query, modify, delete and assign certain user attributes as defined in FIA_ATD.1.1 to only the authorized administrator. This component traces back to, and aids in meeting the following objective: O.SECFUN.

FMT_MTD.1(2) Management of TSF data

This component ensures that the TSF restrict abilities to set the time and date used to form timestamps to only the authorized administrator. This component traces back to, and aids in meeting the following objective: O.SECFUN.

FMT_MTD.2 Management of limits on TSF data

This component ensures that the TSF restrict the specification of limits on the number of unauthenticated failures to the authorized administrator and specifies the action be taken if limits are reached or exceeded. This component traces back to, and aids in meeting the following objective: O.SECFUN.

FMT_SMF.1 Specification of management functions

This component requires that security management functions be implemented in the TOE. It traces back to, and aids in meeting the following objective: O.SECFUN.

FMT_SMR.1 Security roles

Each of the CC class FMT components in this ST depend on this component. This component traces back to, and aids in meeting the following objective: O.SECFUN.

FPT_RVM.1 Non-bypassability of the TSP

This component ensures that the TSF are always invoked from initial start-up. This component traces back to, and aids in meeting the following objective: O.SELPRO and O.SECSTA.

FPT_SEP.1 TSF domain separation

This component ensures that the TSF has a domain of execution that is separate and that cannot be violated by unauthorized users. This component also ensures that the domains of execution for the various processes are isolated and cannot be violated by unauthorized users. This component traces back to, and aids in meeting the following objective: O.SELPRO.

FPT_STM.1 Reliable time stamps

FAU_GEN.1 depends on this component. It ensures that the date and time on the TOE is dependable. This is important for the audit trail. This component traces back to, and aids in meeting the following objective: O.AUDREC.

A check in every row in the table below means that every SFR is necessary. A check in every column implies that all security objectives are met. O.EAL objective is satisfied by the Security Assurance Requirements.

Table 15 Summary of Mappings Between TOE Security Functional Requirements and IT Security Objectives

	O. IDAUTTH	O. SINUSE	O. MEDIAT	O. SECSTA	O. ENCRYP	O. SELPRO	O. AUDREC	O. ACCOUN	O. SECFUN	O. LIMEXT	O.EAL
FAU_GEN.1							x	x			
FAU_SAR.1							x				
FAU_SAR.3							x				
FAU_STG.1				x		x			x		
FAU_STG.4				x		x			x		
FCS_COP.1					x						
FDP_IFC.1(1)			x								
FDP_IFC.1(2)			x								
FDP_IFF.1(1)			x								
FDP_IFF.1(2)			x								
FDP_RIP.1			x								
FIA_AFL.1						x					
FIA_ATD.1 (1)	x								x		
FIA_UAU.5 (1)	x	x									
FIA_UID.2 (1)	x							x			
FMT_MOF.1 (1)				x					x	x	
FMT_MOF.1 (2)				x					x	x	
FMT_MSA.1 (1)			x	x					x		
FMT_MSA.1 (2)			x	x					x		

Table 15 Summary of Mappings Between TOE Security Functional Requirements and IT Security Objectives (continued)

FMT_MSA.1 (3)			x	x					x		
FMT_MSA.1 (4)			x	x					x		
FMT_MSA.3			x	x							
FMT_MTD.1 (1)									x		
FMT_MTD.1 (2)									x		
FMT_MTD.2									x		
FMT_SMF.1									x		
FMT_SMR.1									x		
FPT_RVM.1				x		x					
FPT_SEP.1						x					
FPT_STM.1							x				

TOE Environment Security Functions Rationale

Apart from OE.IDAUTH and OE.SINUSE, all of the security objectives for the environment are met by non-IT measures.

The following rationale is provided to support security functional requirements that are partially met within the TOE environment.

FIA_ATD.1(2) User attribute definition

This component exists to permit the TOE to distinguish one user from another, for accountability purposes and to associate the role chosen in FMT_SMR.1 with a user. This component traces back to, and aids in meeting the following objectives: OE.IDAUTH and OE.SINUSE. Its presence under TOE environment security functional requirements is to address authentication of remote authorized administrators and external IT entities only.

FIA_UAU.5(2) Multiple authentication mechanisms

This component was chosen to ensure that multiple authentication mechanisms are used appropriately in all attempts to authenticate at the TOE from an internal or external network. This component traces back to, and aids in meeting the following objective: OE.IDAUTH. Note that this requirement is partially satisfied by the TOE and partially by the TOE environment. Its presence under TOE environment security functional requirements is to address authentication of remote authorized administrators and external IT entities only.

FIA_UID.2(2) User identification before any action

This component ensures that before anything occurs on behalf of a user, the user is identified to the TOE. This component traces back to, and aids in meeting the following objective: OE.IDAUTH.

Security Assurance Requirements (SAR) Rationale

The ST document is written with EAL4, augmented with ALC_FLR.1 and AVA_VLA.3.

EAL4 was chosen because it permits a developer to gain maximum assurance from positive security engineering based on good commercial development practices. EAL4 provides the developers and users a moderate to high level of independently assured security in conventional commercial TOEs.

EAL4 is augmented by ALC_FLR.1 to ensure that the customers can report the flaws and the flaws can be systematically corrected.

To ensure high security of information processed by the TOE, not only must vulnerability analysis by the developer be performed, but the evaluator of the TOE must perform independent penetration testing to determine that the TOE is resistant to penetration attacks performed by attackers possessing a moderate attack potential. For this reason, EAL4 is augmented with AVA_VLA.3.

The chosen assurance level as supported by O.EAL is consistent with the postulated threat environment. Specifically, that the threat of malicious attacks is not greater than moderate, and the product will have undergone EAL4 assurance, and vulnerability analysis by the developer and independent penetration testing by the evaluator.

Rationale for Not Satisfying All Dependencies

With the exception of the functional component FCS_COP.1, all dependencies are contained in this security target document.

Functional component FCS_COP.1 depends on the following functional components: FCS_CKM.1 Cryptographic key generation, FCS_CKM.4 Cryptographic key destruction, and FMT_MSA.2 Secure Security Attributes. Because for this evaluation the cryptography is asserted by the vendor, rather than evaluated, the dependencies of key generation, key destruction, and secure key values will not be examined and are not included in the security target document.

FIA_AFL.1 has a dependency on FIA_UAU.1. This authentication functionality is required to support the operation of authentication failure locking. In this ST document, the necessary authentication functionality is required through inclusion of FIA_UAU.5, in which Item a. of the completed operation contains similar wording to FIA_UAU.2 (which is hierarchical to FIA_UAU.1).

TOE Summary Specification Rationale

This section shows that the security functions as described in the TOE Summary Specification, page 54 are necessary and sufficient to implement the SFRs and SARs.

Table 16 **Summary of Mappings Between TOE Security Functional Requirements and TOE Security Functions**

	Security Management	Audit	Information Flow Control	Identification and Authentication Protection	Protection	Clock
FAU_GEN.1		x				x
FAU_SAR.1		x				
FAU_SAR.3		x				
FAU_STG.1		x				
FAU_STG.4		x				
FCS_COP.1	x				x	
FDP_IFC.1(1)			x			
FDP_IFC.1(2)			x			
FDP_IFF.1(1)			x			
FDP_IFF.1(2)			x			

Table 16 **Summary of Mappings Between TOE Security Functional Requirements and TOE Security Functions**

FDP_RIP.1					x	
FIA_AFL.1				x		
FIA_ATD.1 (1)				x		
FIA_UAU.5 (1)				x		
FIA_UID.2 (1)				x		
FMT_MOF.1(1)	x					
FMT_MOF.1(2)	x	x				
FMT_MSA.1 (1)	x		x			
FMT_MSA.1 (2)	x		x			
FMT_MSA.1 (3)	x		x			
FMT_MSA.1 (4)	x		x			
FMT_MSA.3	x		x			
FMT_MTD.1 (1)	x			x		
FMT_MTD.1 (2)	x					x
FMT_MTD.2	x			x		
FMT_SMF.1	x	x	x	x		x
FMT_SMR.1	x	x	x	x		x
FPT_RVM.1					x	
FPT_SEP.1					x	
FPT_STM.1						x

The **Security Management Function** permits the authorized administrator (FMT_SMR.1) to perform the following actions (FMT_SMF.1), locally and remotely via an encrypted link (FCS_COP.1):

- Modify the time (FMT_MTD.1(2)).
- Control the operation of the single use authentication mechanism (FMT_MOF.1(1)).
- Manage the audit trail and communication with the TOE by external IT entities, (FMT_MOF.1(2).
- Back up TSF data (FMT_MOF.1(2)).
- Manipulate the Information Flow Policy Rules (FMT_MSA.1(1), FMT_MSA.1(2), FMT_MSA.1(3), FMT_MSA.1(4), and FMT_MSA.3).
- Manage administrator accounts (FMT_MTD.1(1).
- Manage the authentication failure lockout mechanism (FMT_MTD.2).

The **Information Control Flow Function** allows authorized firewall administrators (FMT_SMR.1) to set up traffic flow rules between pairs of network interfaces on the firewall (FMT_MSA.1(1), FMT_MSA.1(2), FMT_MSA.1(3), FMT_MSA.1(4), FMT_MSA.3, and FMT_SMF.1). By default, the firewall prevents all network connections and will only allow connections through the firewall if a rule has been set up to allow the type of communication to pass (FMT_MSA.3).

Through use of the Information Control Flow Function, an authorized firewall administrator can restrict and control the flow of network between the network interfaces of the firewall. This is based on the flowing attributes of the packets arriving at a network interface:

- The interface on which the request arrives (FDP_IFF.1(1), FDP_IFF.1(2), FDP_IFC.1(1), and FDP_IFC.1(2))
- The presumed source IP address of the packet (FDP_IFF.1(1), FDP_IFF.1(2), FDP_IFC.1(1), and FDP_IFC.1(2))
- The destination IP address of the packet (FDP FDP_IFF.1(1), FDP_IFF.1(2), FDP_IFC.1(1), and FDP_IFC.1(2))
- The service related to the packet (FDP_ IFF.1(1) and FDP_IFF.1(2))
- The transport layer protocol contained within the packet (FDP_IFF.1(1) and FDP_IFF.1(2))

The packets can have their address translated into another address (FDP_IFF.1(1) and FDP_IFF.1(2)).

If a packet arrives at one of the interfaces of the firewall and fails to meet a requirement for the rules set on an interface, it will be blocked. Unless a rule specifically states that a particular packet can pass from one network interface to another of the firewall, the packet will be blocked (FDP_IFF.1(1), FDP_IFF.1(2), and FPT_RVM.1).

The **Audit Function** provides reliable audit trail of network connections and other events (FAU_GEN.1) that can be managed by an authorized administrator (FMT_MOF.1(2) and FMT_SMF.1). For all events, the Audit Function will record the following information:

- Date and time of the event (FAU_GEN.1), using the date and time information provided by the Clock Function
- Source and destination IP address (for network traffic only) (FAU_GEN.1)
- Type of event or service (FAU_GEN.1)
- Success or failure of the event (FAU_GEN.1)

Audit records are stored securely on the audit server (FAU_STG.1), where they can be viewed and analyzed by an authorized administrator (FMT_SMR.1) using the PFSS (FAU_SAR.1 and FAU_SAR.3). The analysis capabilities of PFSS, as described in the TOE summary specification, address all of the security functional requirements in this area.

Loss of audit data is limited (FAU_STG.4). If TCP system log messaging is enabled, the maximum that can be lost in the event of failure is the number of logs generated as a result of last 50 packets. While this is not strictly quantifiable, the maximum length an audit queue can grow is limited to 8192 messages (2MB).

The **Protection Function** provides a separation of information streams traversing the TOE. The TOE includes a dedicated firewall device, with no general purpose operating system, disk storage or programming interface. It also includes an audit server. Interfaces are provided for administrators and for traffic using supported protocols. The administrative interface is protected by authentication and by physical controls (firewall and audit server), and by means of encryption when used remotely (FCS_COP.1). The protocol converters ensure traversing packets are treated as objects, and all processes running are trusted. No untrusted processes are permitted on any processor platform of the TOE (FPT_SEP.1). Before providing memory to a new process, this function flushes the memory to be allocated to the new process (FDP_RIP.1). Furthermore, the Protection Function also ensures that before any function within the TSC is processed, the TSF ensures that function is successfully validated by the TSF (FPT_RVM.1).

The **Identification and Authentication Function** requires that administrators be identified (FIA_UID.2(1) and FIA_ATD.1(1)) and authenticated (FIA_UAU.5(1) and FIA_ATD.1(1)) before being granted access to any other TOE functions. Authentication failures are monitored, and accounts are locked if the predefined limit of failures is exceeded (FIA_AFL.1).

The function is controlled by authorized administrators (FMT_SMF.1 and FMT_SMR.1), who may modify administrator attributes (FMT_MTD.1(1)), and manage the number of permitted authentication attempts (FMT_MTD.2).

The claimed strength of function for the password mechanism is SOF-Medium. This is consistent with the overall claim for the TOE of SOF-Medium.

The **Clock Function** provides a reliable source of time and date information. This function permits authorized administrators (FMT_SMF.1 and FMT_SMR.1) to set and change the time and date (FMT_MTD.1(2)). The Clock Function also provides the audit function (FAU_GEN.1) with time stamps (FPT_STM.1).

Mutually Supportive IT Security Functions

The mutually supportive nature of the IT security functions can be derived from the mutual support of the SFRs (shown in TOE Security Functional Requirements (SFR) Rationale, page 66), because each of the IT functions can be mapped to one or more SFRs, as shown in Table 16.

List of Acronyms

AAA	Authentication, Authorization and Accounting
ARP	Address Resolution Protocol
CC	Common Criteria
CTIQBE	Computer Telephony Interface Quick Buffer Encoding
DHCP	Dynamic Host Control Protocol
DNS	Domain Name System
ESMTP	Extended Simple Mail Transfer Protocol
FTP	File Transfer Protocol
GPRS	General packet radio Service
GTP	GPRS Tunneling Protocol
HTTP	HyperText Transfer Protocol
ICMP	Internet Control Message Protocol
ILS	Internet Locator Service
IP	Internet Protocol
MGCP	Media Gateway Control Protocol

POP3	Post Office Protocol 3
PP	Protection Profile
RIP	Routing Information Protocol
RPC	Remote Procedure Call
RSH	Remote Shell
RTSP	Real Time Streaming Protocol
SAR	Security Assurance Requirements
SFR	Security Functional Requirements
SIP	Session Initiation Protocol
Skinny (SCCP)	Skinny Client Control Protocol
SNMP	Simple Network Management Protocol
ST	Security Target
TCP	Transmission Control Protocol
TFTP	Trivial File Transfer Protocol
TOE	Target of Evaluation
UDP	User Datagram Protocol
XDMCP	X Display Manager Control Protocol

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, obtaining support, providing documentation feedback, security guidelines, and also recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html