National Information Assurance Partnership

TM

Common Criteria Evaluation and Validation Scheme Validation Report

Cisco Systems, Inc., 170 West Tasman Dr., San Jose, CA 95134

Cisco Catalyst Switches (3560-X and 3750-X)

Report Number: CCEVS-VR-10488-2012
Dated: May 23, 2012
Version: 0.1

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ACKNOWLEDGEMENTS

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1 Executive Summary

This report documents the assessment of the National Information Assurance Partnership (NIAP) validation team of the evaluation of Cisco Catalyst Switches (3560-X and 3750-X) solution provided by Cisco Systems, Inc. It presents the evaluation results, their justifications, and the conformance results. This Validation Report is not an endorsement of the Target of Evaluation by any agency of the U.S. government, and no warranty is either expressed or implied.

The evaluation was performed by the Science Applications International Corporation (SAIC) Common Criteria Testing Laboratory (CCTL) in Columbia, Maryland, United States of America, and was completed in June 2012. The information in this report is largely derived from the Evaluation Technical Report (ETR) and associated test reports, all written by SAIC. The evaluation determined that the product is both **Common Criteria Part 2 Extended and Part 3 Conformant**, and meets the assurance requirements of EAL 2 augmented with ALC_FLR.2 and ALC_DVS.1.

The TOE is the Cisco Catalyst Switches (3560-X and 3750-X) running IOS 15.0(1)SE2. The TOE is a purpose-built, switching and routing platform with OSI Layer2 and Layer3 traffic filtering capabilities.

The Target of Evaluation (TOE) identified in this Validation Report has been evaluated at a NIAP approved Common Criteria Testing Laboratory using the Common Methodology for IT Security Evaluation (Version 3.1, Rev 3) for conformance to the Common Criteria for IT Security Evaluation (Version 3.1, Rev 3). This Validation Report applies only to the specific version of the TOE as evaluated. The evaluation has been conducted in accordance with the provisions of the NIAP Common Criteria Evaluation and Validation Scheme and the conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence provided.

The validation team monitored the activities of the evaluation team, observed evaluation testing activities, provided guidance on technical issues and evaluation processes, and reviewed the individual work units and successive versions of the ETR. The validation team found that the evaluation showed that the product satisfies all of the functional requirements and assurance requirements stated in the Security Target (ST). Therefore the validation team concludes that the testing laboratory's findings are accurate, the conclusions justified, and the conformance results are correct. The conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence produced.

The SAIC evaluation team concluded that the Common Criteria requirements for Evaluation Assurance Level (EAL 2 augmented with ALC_FLR.2 and ALC_DVS.1) have been met.

The technical information included in this report was obtained from the Cisco Catalyst Switches (3560-X and 3750-X) Security Target and analysis performed by the Validation Team.

2 Identification

The CCEVS is a joint National Security Agency (NSA) and National Institute of Standards effort to establish commercial facilities to perform trusted product evaluations. Under this program, security evaluations are conducted by commercial testing laboratories called Common Criteria Testing Laboratories (CCTLs) using the Common Evaluation Methodology (CEM) for Evaluation Assurance Level (EAL) 1 through 4 in accordance with National Voluntary Laboratory Assessment Program (NVLAP) accreditation.

The NIAP Validation Body assigns Validators to monitor the CCTLs to ensure quality and consistency across evaluations. Developers of information technology products desiring a security evaluation contract with a CCTL and pay a fee for their product's evaluation. Upon successful completion of the evaluation, the product is added to NIAP's Validated Products List.

Table 1 provides information needed to completely identify the product, including:

- The Target of Evaluation (TOE): the fully qualified identifier of the product as evaluated.
- The Security Target (ST), describing the security features, claims, and assurances of the product.
- The conformance result of the evaluation.
- The Protection Profile to which the product is conformant.
- The organizations and individuals participating in the evaluation.

Table 1: Evaluation Identifiers

Item	Identifier
Evaluation Scheme	United States NIAP Common Criteria Evaluation and Validation Scheme
TOE:	Cisco Catalyst Switches 3560-X and 3750-X running IOS 15.0(1)SE2 (Specific models identified in the Validated Products List Entry)
Protection Profile	None
ST:	Cisco Catalyst Switches (3560-X and 3750-X) Security Target, Version 1.0, May 23, 2012
Evaluation Technical Report	Evaluation Technical Report For Cisco Catalyst Switches (3560-X and 3750-X) (Proprietary), Version 2.0, May 23, 2012
CC Version	Common Criteria for Information Technology Security Evaluation, Version 3.1, rev 3
Conformance Result	CC Part 2 extended, CC Part 3 conformant
Sponsor	Cisco Systems, Inc.
Developer	Cisco Systems, Inc.
Common Criteria Testing Lab (CCTL)	SAIC, Columbia, MD

Item	Identifier
CCEVS Validators	Kenneth Stutterheim, Aerospace Corporation, Columbia, MD
	James Donndelinger, Aerospace Corporation, Columbia, MD

3 Architectural Information

Note: The following architectural description is based on the description presented in the Security Target.

The Catalyst Switches that comprise the TOE have common hardware characteristics. These characteristics affect only non-TSF relevant functions of the switches (such as throughput and amount of storage) and therefore support security equivalency of the switches in terms of hardware.

The Cisco Catalyst 3750-X and 3560-X Series primary features

- Central processor that supports all system operations
- Dynamic memory, used by the central processor for all system operations
- Flash memory (EEPROM), used to store the Cisco IOS image (binary program)
- USB port (note, none of the USB devices are included in the TOE)
    - Type A for Storage, all Cisco supported USB flash drives
    - Type mini-B as console port in the front
- Non-volatile read-only memory (ROM) is used to store the bootstrap program and power-on diagnostic programs
- Non-volatile random-access memory (NVRAM) is used to store switch configuration parameters used to initialize the system at start-up
- Physical network interfaces (minimally two) (e.g. RJ45 serial and standard 10/100 Ethernet ports). Some models have a fixed number and/or type of interfaces; some models have slots that accept additional network interfaces
- 24 and 48 10/100/1000 PoE+, non-PoE models, and 12 and 24 GE SFP port models
- Four optional uplink network modules with GE or 10GE ports
- Industry first PoE+ with 30W power on all ports in 1 rack unit (RU) form factor
- Dual redundant, modular power supplies and fans

In addition to the above features, the Cisco Catalyst 3750-X switches also offer:

- Cisco StackPower™ technology: An innovative feature for sharing power among stackmembers
- Cisco StackWise Plus technology for ease of use and resiliency with 64 Gbps of throughput

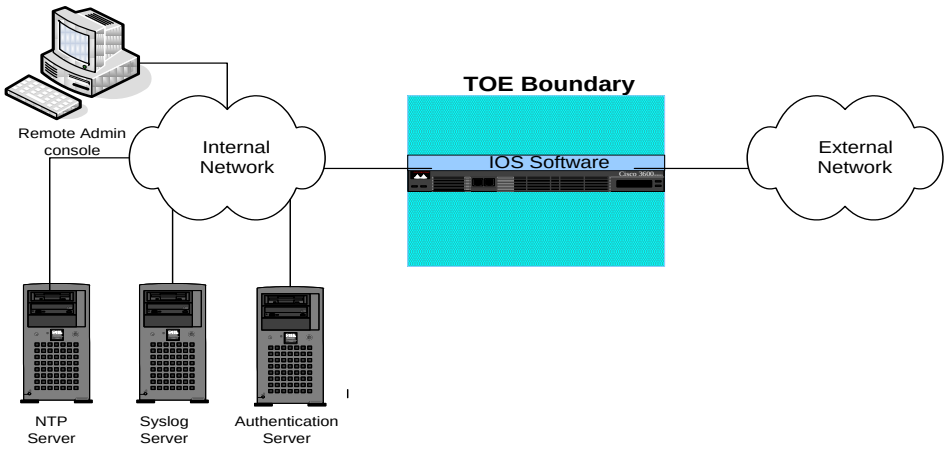
Cisco IOS is a Cisco-developed highly configurable proprietary operating system that provides for efficient and effective routing and switching. Although IOS performs many networking functions, this TOE only addresses the functions that provide for the security of the TOE itself as described in Section 1.7 Logical Scope of the TOE below.

3.1 TOE Evaluated Configuration

The TOE consists of one or more physical devices; the Catalyst Switch with Cisco IOS software. The Catalyst Switch has two or more network interfaces and is connected to at least one internal and one external network. The Cisco IOS configuration determines how packets are handled to and from the switches' network interfaces. The switch configuration will determine how traffic flows received on an interface will be handled. Typically, packet flows are passed through the internetworking device and forwarded to their configured destination. BGPv4, EIGRP, PIM-SMv2, and OSPFv2, Routing protocols are used on all of the Catalyst Switch models. EIGRP supports routing updates with IPv6 or IPv4, as does BGPv4 and PIM-SMv2 while OSPFv2 routing protocol support routing updates for IPv4 only.

The TOE can optionally connect to an NTP server on its internal network for time services. Also, if the Catalyst Switch is to be remotely administered, then the management station must be connected to an internal network, SSHv2 must be used to connect to the switch. A syslog server can also be used to store audit records. If these servers are used, they must be attached to the internal (trusted) network. The internal (trusted) network is meant to be separated effectively from unauthorized individuals and user traffic; one that is in a controlled environment where implementation of security policies can be enforced.

The following figure provides a visual depiction of an example TOE deployment.



3.2 Physical Scope of the TOE

The TOE is a hardware and software solution that makes up the following switch models; Cisco Catalyst 3560-X and 3750-X running Cisco IOS 15.0(1)SE2. The network, on which they reside, is part of the environment.

The Catalyst Switches are available in three feature sets:

- LAN Base: Enhanced Intelligent Services
- IP Base: Baseline Enterprise Services
- IP Services: Enterprise Services

The LAN Base feature set offers enhanced intelligent services that include comprehensive Layer 2 features, with up-to 255 VLANs. The IP Base feature set provides baseline enterprise services in addition to all LAN Base features, with 1K VLANs. IP Base also includes the support for routed access, StackPower (available only on the Catalyst 3750-X). The IP Services feature set provides full enterprise services that include advanced Layer 3 features such as Border Gateway Protocol (BGP)v4, Enhanced Interior Gateway Routing Protocol (EIGRP), Open Shortest Path First (OSPF)v2, and Protocol Independent Multicast – Sparse Mode (PIM-SM)v2.

The IP Services feature set is only available as an upgrade option at the time of ordering or through a license at a later time; there is no dedicated IP Services switch model. The Cisco Catalyst 3750-X Series Switches with LAN Base feature set can only stack with other Cisco Catalyst 3750-X Series LAN Base switches. A mixed stack of LAN Base switch with IP Base or IP Services features set is not supported. Customers can transparently upgrade the software feature set in the Cisco Catalyst 3750-X and 3560-X Series Switches through Cisco IOS® Software activation. Software activation authorizes and enables the Cisco IOS Software feature sets. A special file contained in the switch, called a license file, is examined by Cisco IOS Software when the switch is powered on. Based on the license's type, Cisco IOS Software activates the appropriate feature set. License types can be changed, or upgraded, to activate a different feature set. For detailed information about Software Activation, visit http://www.cisco.com/go/sa.

The Cisco Catalyst 3560-X Series Configurations

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
LAN Base	WS-C3560-X-24T-L/Standalone	24	350W	-
	WS-C3560-X-48T-L/Standalone	48		
	WS-C3560-X-24P-L/Standalone	24 PoE+	715W	435W
	WS-C3560-X-	48 PoE+		

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
	48P-L/Standalone			
	WS-C3560-X-48PF-L/Standalone	48 PoE+	1100W	800W
IP Base	WS-C3560-X-24T-S/Standalone	24	350W	-
	WS-C3560-X-48T-S/Standalone	48		
	WS-C3560-X-24P-S/Standalone	24 PoE+	715W	435W
	WS-C3560-X-48P-S/Standalone	48 PoE+		
	WS-C3560-X-48PF-S/Standalone	48 PoE+	1100W	800W

The Cisco Catalyst 3750-X Series Configurations

Front and back view

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
LAN Base	WS-C3750X-24T-L	24	350W	-
	WS-C3750X-48T-L	48		
	WS-C3750X-24P-L	24 PoE+	715W	435W
	WS-C3750X-48P-L	48 PoE+		
	WS-C3750X-48PF-L	48 PoE+	1100W	800W
IP Base	WS-C3750X-24T-S	24	350W	-
	WS-C3750X-	48		

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
	48T-S			
	WS-C3750X-24P-S	24 PoE+	715W	435W
	WS-C3750X-48P-S	48 PoE+		
	WS-C3750X-48PF-S	48 PoE+	1100W	800W
	WS-C3750X-12S-S	12 GE SFP	350W+	-
	WS-C3750X-24S-S	24 GE SFP	350W	-
IP Services	WS-C3750X-12S-E	12 GE SFP	350W	-
	WS-C3750X-24S-E	24 GE SFP		
	WS-C3750X-24T-E	24		
	WS-C3750X-48T-E	48		
	WS-C3750X-24P-E	24	715W	435W
	WS-C3750X-48P-E	48		
	WS-C3750X-48PF-E	48	1100W	800W

StackPower Connector

StackPower can be deployed in either power sharing mode or redundancy mode. In power sharing mode, the power of all the power supplies in the stack is aggregated and distributed among the switches in the stack. In redundant mode, when the total power budget of the stack is calculated, the wattage of the largest power supply is not included. That power is

held in reserve and used to maintain power to switches and attached devices when one power supply fails, enabling the network to operate without interruption. Following the failure of one power supply, the StackPower mode becomes power sharing.

StackPower allows customers to simply add one extra power supply in any switch of the stack and provide either power redundancy for any of the stack members or simply add more power to the shared pool. StackPower eliminates the need for an external redundant power system or installation of dual power supplies in all the stack members.

3.3 Supported non-TOE Hardware/ Software/ Firmware

The TOE supports (in some cases optionally) the following hardware, software, and firmware in its environment:

Table 1 IT Environment Components

Component	Required	Usage/Purpose Description for TOE performance
Authentication Server	No	The authentication server (RADIUS and TACACS+) provides central authentication for user authorized to use the TOE. The TOE correctly leverages the services provided by the authentication server.
Management Workstation with SSH Client	Yes	This includes any IT Environment Management workstation with a SSH client installed that is used by the TOE administrator to support TOE administration through SSH protected channels. Any SSH client that supports SSHv2 may be used.
Syslog server	No	The syslog audit server is used for remote storage of audit records that have been generated by and transmitted from the TOE.
NTP Server	No	The TOE supports communications with an NTP server to synchronize time.

4 Security Policy

This section summaries the security functionality of the TOE:

1. Security audit
2. Cryptographic support
3. User data protection
4. Identification and authentication
5. Secure Management
6. Protection of the TSF
7. TOE access

4.1 Security Audit

The TOE generates a comprehensive set of audit logs that identify specific TOE operations. For each event, the TOE records the date and time of each event, the type of event, the subject identity, and the outcome of the event. Auditable events include; modifications to the group of users that are part of the authorized administrator roles (assigned the

appropriate privilege level), all use of the user identification mechanism, any use of the authentication mechanism, any change in the configuration of the TOE, any matching of packets to access control entries in ACLs when traversing the TOE; and any failure of a packet to match an access control list (ACL) rule allowing traversal of the TOE. The TOE will write audit records to the local logging buffer by default and can be configured to send audit data via syslog to a remote audit server, or display to the local console. The TOE does not have an interface to modify audit records, though there is an interface available for the authorized administrator to delete audit data stored locally on the TOE.

4.2 Cryptographic Support

The TOE provides cryptography support for secure communications and protection of information when operated in FIPS mode. The crypto module is FIPS 140-2 SL2 validated (certificate 1657). The cryptographic services provided by the TOE include: symmetric encryption and decryption using AES; digital signature using RSA; cryptographic hashing using SHA1; and keyed-hash message authentication using HMAC-SHA1. In the evaluated configuration, the TOE must be in FIPS mode of operation per the FIPS Security Policy. The TOE also implements SSHv2 secure protocol for secure remote administration.

4.3 Traffic Filtering and Switching (VLAN Processing and ACLs)

VLANs control whether Ethernet frames are passed through the switch interfaces based on the VLAN tag information in the frame header. IP ACLs or ICMP ACLs control whether routed IP packets are forwarded or blocked at Layer 3 TOE interfaces (interfaces that have been configured with IP addresses). VACLs (using access mapping) control whether non-routed frames (by inspection of MAC addresses in the frame header) and packets (by inspection of IP addresses in the packet header) are forwarded or blocked at Layer 2 ports assigned to VLANs. The TOE examines each frame and packet to determine whether to forward or drop it, on the basis of criteria specified within the VLANs access lists and access maps applied to the interfaces through which the traffic would enter and leave the TOE. For those interfaces configured with Layer-3 addressing the ACLs can be configured to filter IP traffic using: the source address of the traffic; the destination address of the traffic; and the upper-layer protocol identifier. Layer-2 interfaces can be made part of Private VLANs (PVLANs), to allow traffic to pass in a pre-defined manner among a primary, and secondary (‘isolated’ or ‘community’) VLANs within the same PVLAN.

VACL access mapping is used to match IP ACLs or MAC ACLs to the action to be taken by the TOE as the traffic crosses the interface, causing the packet to be forwarded or dropped. The traffic is matched only against access lists of the same protocol type; IP packets can be matched against IP access lists, and any Ethernet frame can be matched against MAC access lists. Both IP and MAC addresses can be specified within the VLAN access map.

Use of Access Control Lists (ACLs) also allows restriction of remote administration connectivity to specific interfaces of the TOE so that sessions will only be accepted from approved management station addresses identified as specified by the administrator.

The TOE supports routing protocols including BGPv4, EIGRP, PIM-SMv2, and OSPFv2 to maintain routing tables, or routing tables can configured and maintained manually. Since routing tables are used to determine which egress ACL is applied, the authority to modify the routing tables is restricted to authenticated administrators, and authenticated neighbor routers. The only aspects of routing protocols that are security relevant in this TOE is the TOE's ability to authentication neighbor routers using shared passwords. Other security features and configuration options of routing protocols are beyond the scope of this Security Target and are described in administrative guidance.

The TOE supports VACLs (VLAN ACLs), which can filter traffic traversing VLANs on the TOE based on IP addressing and MAC addressing.

The TOE also ensures that packets transmitted from the TOE do not contain residual information from previous packets. Packets that are not the required length use zeros for padding so that residual data from previous traffic is never transmitted from the TOE.

4.4 Identification and Authentication

The TOE performs authentication, using Cisco IOS platform authentication mechanisms, to authenticate access to user EXEC and privileged EXEC command modes. All users wanting to use TOE services are identified and authenticated prior to being allowed access to any of the services. Once a user attempts to access the management functionality of the TOE (via EXEC mode), the TOE prompts the user for a user name and password. Only after the administrative user presents the correct identification and authentication credentials will access to the TOE functionality be granted.

The TOE supports use of a remote AAA server (RADIUS and TACACS+) as the enforcement point for identifying and authenticating users, including login and password dialog, challenge and response, and messaging support. Encryption of the packet body is provided through the use of RADIUS (note RADIUS only encrypts the password within the packet body), while TACACS+ encrypts the entire packet body except the header). Note the remote authentication server is not included within the scope of the TOE evaluated configuration, it is considered to be provided by the operational environment.

The TOE can be configured to display an advisory banner when administrators log in and also to terminate administrator sessions after a configured period of inactivity.

The TOE also supports authentication of other routers using router authentication supported by BGPv4, EIGRP, PIM-SMv2, and OSPFv2. Each of these protocols supports authentication by transmission of MD5-hashed password strings, which each neighbor router uses to authenticate others. It is noted that per the FIPS Security Policy, that MD5 is

not a validated algorithm during FIPS mode of operation. For additional security, it is recommended router protocol traffic also be isolated to separate VLANs.

4.5 Security Management

The TOE provides secure administrative services for management of general TOE configuration and the security functionality provided by the TOE. All TOE administration occurs either through a secure session via SSHv2, a terminal server directly connected to the Catalysis Switch (RJ45), or a local console connection (serial port). The TOE provides the ability to perform the following actions:

- allows authorized administrators to add new administrators,
- start-up and shutdown the device,
- create, modify, or delete configuration items,
- create, modify, or delete information flow policies,
- create, modify, or delete routing tables,
- modify and set session inactivity thresholds,
- modify and set the time and date,
- and create, delete, empty, and review the audit trail

All of these management functions are restricted to the authorized administrator of the TOE.

The TOE switch platform maintains administrative privilege level and non-administrative access. Non-administrative access is granted to authenticated neighbor routers for the ability to receive updated routing tables per the information flow rules. There is no other access or functions associated with non-administrative access. The administrative privilege levels include:

- Administrators are assigned to privilege levels 0 and 1. Privilege levels 0 and 1 are defined by default and are customizable. These levels have a very limited scope and access to CLI commands that include basic functions such as login, show running system information, turn on/off privileged commands, logout.
- Semi-privileged administrators equate to any privilege level that has a subset of the privileges assigned to level 15; levels 2-14. These levels are undefined by default and are customizable. The custom level privileges are explained in the example below.
- Privileged administrators are equivalent to full administrative access to the CLI, which is the default access for IOS privilege level 15.

4.6 Protection of the TSF

The TOE protects against interference and tampering by untrusted subjects by implementing identification, authentication and access controls to limit configuration to authorized administrators. Additionally Cisco IOS is not a general purpose operating system and access to Cisco IOS memory space is restricted to only Cisco IOS functions. The TOE provides secure transmission when TSF data is transmitted between separate

parts of the TOE (encrypted sessions for remote administration (via SSHv2)). Use of separate VLANs are used to ensure routing protocol communications between the TOE and neighbor routers including routing table updates and neighbor router authentication will be logically isolated from traffic on other VLANs.

The TOE is also able to detect replay of information and/or operations. The detection applied to network packets that are terminated at the TOE, such as trusted communications between the administrators to TOE, IT entity (e.g., authentication server) to TOE. If replay is detected, the packets are discarded.

In addition, the TOE internally maintains the date and time. This date and time is used as the time stamp that is applied to TOE generated audit records. Alternatively, an NTP server can be used to synchronize the date-timestamp. Finally, the TOE performs testing to verify correct operation of the switch itself and that of the cryptographic module.

4.7 TOE access

The TOE can terminate inactive sessions after an authorized administrator configurable time-period. Once a session has been terminated the TOE requires the user to re-authenticate to establish a new session.

The TOE can also display a Security Administrator specified banner on the CLI management interface prior to allowing any administrative access to the TOE.

5 Assumptions

The following assumptions were made during the evaluation of Cisco Catalyst Switches (3560-X and 3750-X):

- All authorized administrators are assumed not evil and will not disrupt the operation of the TOE intentionally.
- Administrators will be trained to periodically review audit logs to identify sources of concern
- Personnel will be trained in the appropriate use of the TOE to ensure security.
- The processing resources of the TOE will be located within controlled access facilities, which will prevent unauthorized physical access.
- Copies of TOE configuration data including representations of authentication data maintained off the TOE in hard-copy or soft-copy will be kept confidential and access will be limited to authorized administrators. Audit data transmitted by the TOE and routing table updates exchanged with neighbor routers, and associated neighbor router authentication data will be protected from unauthorized disclosure through isolation of associated network traffic.
- The TOE will be able to function with the software and hardware of other switch vendors on the network.
- The threat of malicious attacks aimed at exploiting the TOE is considered low.

6 Documentation

The following documentation was used as evidence for the evaluation of the Cisco Catalyst Switches (3560-X and 3750-X):

6.1 Design Documentation

1. Cisco Catalyst Switches (3560X and 3750X) Security Architecture Document Draft, Revision 0.2, February 23, 2012
2. Cisco Catalyst Model 3560X and 3750X Switches Functional Specification, Revision 0.2, February 23, 2012
3. Cisco Catalyst Switches (3560X and 3750X) TOE Design Specification, Revision 0.2, February 23, 2012
4. Annex A: Security Relevant CLI Commands, January 2012
5. Annex B: RFC Security Parameter Relevancy, February 23, 2012

6.2 Guidance Documentation

1. Cisco Catalyst Switches (3560-X and 3750-X) Common Criteria Operational User Guidance and Preparative Procedures, version .4, May 23, 2012
2. Release Notes for Catalyst 3750-X, 3750-E, 3560-X, and 3560-E Switches, Cisco IOS Release 15.0(1)SE and Later, Revised March 21, 2011
3. Catalyst 3750-X and 3560-X Hardware Installation Guide
4. Cisco IOS Configuration Fundamentals Configuration Guide, Release 15.0
5. Cisco IOS Security Configuration Guide: Securing User Services, Release 15.0
6. Cisco IOS Network Management Configuration Guide, Release 15.0
7. Catalyst 3750-X and 3560-X Software Configuration Guide, Release 15.0(1)SE
8. Cisco IOS Security Command Reference, April 2011
9. Cisco IOS IP Routing Protocols Configuration Guide

6.3 Life Cycle

1. Configuration Management, Delivery Procedures, Development Security, and Flaw Remediation for Cisco Catalyst Switches (3560X and 3750X) Reference: CAT3K_ALC-CM-DVS-DEL-FLR-v1.0, February 24, Version: 2.0

6.4 Testing

1. Cisco Project Catalyst Switch (3560-X and 3750-X) EAL2 non-NDPP Common Criteria Detailed Test Plan, Revision 2, 05/21/2012

2. CommonCriteriaTestBed.ppt

7 IT Product Testing

This section describes the testing efforts of the developer and the Evaluation Team. It is derived from information contained in the Evaluation Team Test Report for the Cisco Catalyst Switches (3560-X and 3750-X), Version 1.0, May 23, 2012.

7.1 Developer Testing

At EAL2, testing must demonstrate correspondence between the tests and the functional specification. The vendor testing addressed each of the security functions identified in the ST and interfaces in the design. These security functions include:

- Security audit
- Cryptographic support
- User data protection
- Identification and authentication
- Secure Management
- Protection of the TSF
- TOE access

7.2 Evaluation Team Independent Testing

The evaluation team verified the product according the *Cisco Catalyst Switches (3560-X and 3750-X) Common Criteria Operational User Guidance and Preparative Procedures*, ran a subset of vendor test suite and verified the results, then developed and performed functional and vulnerability testing that augmented the vendor testing by exercising different aspects of the security functionality.

The evaluation team testing focused on testing boundary conditions not tested by Cisco. For vulnerability testing the evaluation team performed port and vulnerability scanning as well as other team developed tests.

8 Evaluated Configuration

The evaluated configuration, as defined in the Security Target, is Cisco Catalyst Switches (3560-X and 3750-X) including:

- IOS 15.0(1)SE2
- The following models were evaluated for the 3560-X configuration:

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
LAN Base	WS-C3560-X-	24	350W	-

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
	24T-L/Standalone			
	WS-C3560-X-48T-L/Standalone	48		
	WS-C3560-X-24P-L/Standalone	24 PoE+	715W	435W
	WS-C3560-X-48P-L/Standalone	48 PoE+		
	WS-C3560-X-48PF-L/Standalone	48 PoE+	1100W	800W
IP Base	WS-C3560-X-24T-S/Standalone	24	350W	-
	WS-C3560-X-48T-S/Standalone	48		
	WS-C3560-X-24P-S/Standalone	24 PoE+	715W	435W
	WS-C3560-X-48P-S/Standalone	48 PoE+		
	WS-C3560-X-48PF-S/Standalone	48 PoE+	1100W	800W

- The following models were evaluated for the 3750-X configuration:

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
LAN Base	WS-C3750X-24T-L	24	350W	-
	WS-C3750X-48T-L	48		
	WS-C3750X-24P-L	24 PoE+	715W	435W
	WS-C3750X-	48 PoE+		

Feature Set	Models	Total 10/100/1000 Ethernet Ports	Default AC Power Supply	Available PoE Power
	48P-L			
	WS-C3750X-48PF-L	48 PoE+	1100W	800W
IP Base	WS-C3750X-24T-S	24	350W	-
	WS-C3750X-48T-S	48		
	WS-C3750X-24P-S	24 PoE+	715W	435W
	WS-C3750X-48P-S	48 PoE+		
	WS-C3750X-48PF-S	48 PoE+	1100W	800W
	WS-C3750X-12S-S	12 GE SFP	350W+	-
	WS-C3750X-24S-S	24 GE SFP	350W	-
IP Services	WS-C3750X-12S-E	12 GE SFP	350W	-
	WS-C3750X-24S-E	24 GE SFP		
	WS-C3750X-24T-E	24		
	WS-C3750X-48T-E	48		
	WS-C3750X-24P-E	24	715W	435W
	WS-C3750X-48P-E	48		
	WS-C3750X-48PF-E	48	1100W	800W

To use the product in the evaluated configuration, the product must be configured as specified in the **Cisco Catalyst Switches (3560-X and 3750-X) Common Criteria Operational User Guidance and Preparative Procedures** document.

9 Results of the Evaluation

The results of the assurance requirements are generally described in this section and are presented in detail in the proprietary ETR. The reader of this document can assume that all

EAL2 augmented with ALC_FLR.2 and ALC_DVS.1 work units received a passing verdict.

A verdict for an assurance component is determined by the resulting verdicts assigned to the corresponding evaluator action elements. The evaluation was conducted based upon CC version 3.1 rev 3 and CEM version 3.1 rev 3. The evaluation determined the Cisco Catalyst Switches (3560-X and 3750-X) TOE to be Part 2 extended, and to meet the Part 3 Evaluation Assurance Level (EAL 2) augmented with ALC_FLR.2 and ALC_DVS.1 requirements.

The following evaluation results are extracted from the non-proprietary Evaluation Technical Report provided by the CCTL, and are augmented with the validator's observations thereof.

9.1 Evaluation of the Security Target (ASE)

The evaluation team applied each ASE CEM work unit. The ST evaluation ensured the ST contains a description of the environment in terms of policies and assumptions, a statement of security requirements claimed to be met by the Cisco Catalyst Switches (3560-X and 3750-X) product that are consistent with the Common Criteria, and product security function descriptions that support the requirements.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.2 Evaluation of the Development (ADV)

The evaluation team applied each EAL 2 ADV CEM work unit. The evaluation team assessed the design documentation and found it adequate to aid in understanding how the TSF provides the security functions. The design documentation consists of a functional specification and a high-level design document.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.3 Evaluation of the Guidance Documents (AGD)

The evaluation team applied each EAL 2 AGD CEM work unit. The evaluation team ensured the adequacy of the user guidance in describing how to use the operational TOE. Additionally, the evaluation team ensured the adequacy of the administrator guidance in describing how to securely administer the TOE. Both of these guides were assessed during the design and testing phases of the evaluation to ensure they were complete.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was

conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.4 Evaluation of the Life Cycle Support Activities (ALC)

The evaluation team applied each EAL 2 ALC CEM work unit. The evaluation team ensured the adequacy of the developer procedures to protect the TOE and the TOE documentation during TOE development and maintenance to reduce the risk of the introduction of TOE exploitable vulnerabilities during TOE development and maintenance. The ALC evaluation also ensured the TOE is identified such that the consumer is able to identify the evaluated TOE.

In addition to the EAL 2 ALC CEM work units, the evaluation team applied the ALC_FLR.2 work units from the CEM supplement. The flaw remediation procedures were evaluated to ensure that flaw reporting procedures exist for managing flaws discovered in the TOE.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.5 Evaluation of the Test Documentation and the Test Activity (ATE)

The evaluation team applied each EAL 2 ATE CEM work unit. The evaluation team ensured that the TOE performed as described in the design documentation and demonstrated that the TOE enforces the TOE security functional requirements. Specifically, the evaluation team ensured that the vendor test documentation sufficiently addresses the security functions as described in the functional specification. The evaluation team performed a sample of the vendor test suite, and devised an independent set of team test and penetration tests. The vendor tests, team tests, and penetration tests substantiated the security functional requirements in the ST.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.6 Vulnerability Assessment Activity (VAN)

The evaluation team applied each EAL 2 VAN CEM work unit. The evaluation team ensured that the TOE does not contain exploitable flaws or weaknesses in the TOE based upon the evaluation team's vulnerability analysis, and the evaluation team's performance of penetration tests.

The validator reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

9.7 Summary of Evaluation Results

The evaluation team's assessment of the evaluation evidence demonstrates that the claims in the ST are met. Additionally, the evaluation team's performance of the entire vendor tests suite, the independent tests, and the penetration test also demonstrated the accuracy of the claims in the ST.

The validation team's assessment of the evidence provided by the evaluation team is that it demonstrates that the evaluation team followed the procedures defined in the CEM, and correctly verified that the product meets the claims in the ST.

10 Validator Comments/Recommendations

The validation team considers the evaluated subset of product functions to be consistent with the product's intended purpose and mode of operation. The rationale for excluded features is plausible and introduces no unreasonable constraints.

The evaluation team observed that the vendor's security tests are predominantly manual and apparently not closely integrated with the extensive automated testing performed as a routine part of product development. While these evaluated tests are sufficient to satisfy Common Criteria requirements, the validation team recommends a closer integration in future efforts, in order to improve test integration and provide greater test coverage.

The validation team emphasizes the need for administrators to closely follow the Common Criteria Operational User Guidance and Preparative Procedures Version 0.4 when configuring the switches for use and not to use Cisco's Smart Install for the initial configuration. Administrators should pay particular attention to the evaluated configurations excluded functionality; features such as HTTP/HTTPS, telnet, and SNMP are not to be enabled in the Common Criteria compliant operational environment configuration as those functions may introduce vulnerabilities.

11 Annexes

Not applicable.

12 Security Target

The Security Target is identified as *Cisco Catalyst Switches (3560-X and 3750-X) Security Target, Version 1.0, May 23, 2012*.

13 Glossary

The following definitions are used throughout this document:

- **Common Criteria Testing Laboratory (CCTL)**. An IT security evaluation facility accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and approved by the CCEVS Validation Body to conduct Common Criteria-based evaluations.
- **Conformance**. The ability to demonstrate in an unambiguous way that a given implementation is correct with respect to the formal model.
- **Evaluation**. The assessment of an IT product against the Common Criteria using the Common Criteria Evaluation Methodology to determine whether or not the claims made are justified; or the assessment of a protection profile against the Common Criteria using the Common Evaluation Methodology to determine if the Profile is complete, consistent, technically sound and hence suitable for use as a statement of requirements for one or more TOEs that may be evaluated.
- **Evaluation Evidence**. Any tangible resource (information) required from the sponsor or developer by the evaluator to perform one or more evaluation activities.
- **Feature.** Part of a product that is either included with the product or can be ordered separately.
- **Target of Evaluation (TOE)**. A group of IT products configured as an IT system, or an IT product, and associated documentation that is the subject of a security evaluation under the CC.
- **Validation**. The process carried out by the CCEVS Validation Body leading to the issue of a Common Criteria certificate.
- **Validation Body**. A governmental organization responsible for carrying out validation and for overseeing the day-to-day operation of the NIAP Common Criteria Evaluation and Validation Scheme.

14 Bibliography

The Validation Team used the following documents to produce this Validation Report:

[1] Common Criteria Project Sponsoring Organisations. *Common Criteria for Information Technology Security Evaluation: Part 1: Introduction and General Model*, Version 3.1, Revision 2, dated: September 2007.

[2] Common Criteria Project Sponsoring Organisations. *Common Criteria for Information Technology Security Evaluation: Part 2: Security Functional Requirements*, Version 3.1, Revision 2, dated: September 2007.

[3] Common Criteria Project Sponsoring Organisations. *Common Criteria for Information Technology Security Evaluation: Part 3: Security Assurance Requirements*, Version 3.1, Revision 2, dated: September 2007

[4] Common Criteria Project Sponsoring Organisations. *Common Evaluation Methodology for Information Technology Security* – Part 2: Evaluation Methodology, Version 3.1, Revision 2, dated: September 2007.

[5] Common Criteria, Evaluation and Validation Scheme for Information Technology Security, *Guidance to Validators of IT Security Evaluations*, Scheme Publication #3, Version 1.0, January 2002.

[6] Science Applications International Corporation. *Evaluation Technical Report for the Cisco Catalyst Switches (3560-X and 3750-X) Part 2 (Proprietary)*, Version 2.0, May 23, 2012.

[7] Science Applications International Corporation. *Evaluation Team Test Report for the Cisco Catalyst Switches (3560-X and 3750-X), ETR Part 2 Supplement (SAIC and Cisco Proprietary)*, Version 2.0, May 23, 2012.

Note: This document was used only to develop summary information regarding the testing performed by the CCTL.

[10] Cisco Catalyst Switches (3560-X and 3750-X) Security Target, Version 1.0, May 23, 2012.