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Assurance Activity Report for Brocade Communications Systems, Inc. Brocade MLX® and NetIron® Family Devices with Multi-Service IronWare R05.8.00

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Revision History

Revision	Date	Authors	Summary
Version 1.0	03/06/15	Compton/Keenan/Van	Completed to include final evaluation findings
Version 1.1	03/31/15	Compton	Addressed ECR Comments

The TOE Evaluation was sponsored by:

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Common Criteria Versions:

- Common Criteria for Information Technology Security Evaluation Part 1: Introduction, Version 3.1, Revision 4, September 2012
- Common Criteria for Information Technology Security Evaluation Part 2: Security functional components, Version 3.1, Revision 4, September 2012
- Common Criteria for Information Technology Security Evaluation Part 3: Security assurance components, Version 3.1 Revision 4, September 2012
- Common Methodology for Information Technology Security Evaluation, Evaluation Methodology, Version 3.1, Revision 4, September 2012

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1. Introduction

This Assurance Activity Report (AAR) presents evaluations results of the Brocade MLX® and NetIron® Family Devices with Multi-Service IronWare R05.8.00 Protection Profile for Network Devices (NDPP) evaluation.

Note that additional testing results can be found in a separate, proprietary Detailed Test Report: Evaluation Team Test Report for Brocade MLX® and NetIron® Family Devices with Multi-Service IronWare R05.8.00, Version 1.1, 03/31/2015 (DTR).

2. Protection Profile SFR Assurance Activities

This section of the AAR identifies each of the assurance activities included in the claimed Protection Profile and describes the findings in each case.

The following evidence was used to complete the Assurance Activities:

AA report v11

- Brocade Communications Systems, Inc. Brocade MLX® and NetIron® Family Devices with Multi-Service IronWare R05.8.00 Security Target, Version 0.4, March 31, 2015
- Multi-Service IronWare Federal Information Processing Standards and Common Criteria Guide Supporting Multi-Service IronWare R05.8.00a, 53-1003269-01, 20 March 2015. (**FIPS Guide**)
- Multi-Service IronWare Administration Configuration Guide Supporting Multi-Service IronWare R05.8.00, 53-1003254-01, 13 January 2015. (**Administration Guide**)
- Multi-Service IronWare Security Configuration Guide Supporting Multi-Service IronWare R05.8.00, 53-1003255-01, 13 January 2015 (**Security Configuration Guide**)

2.1 Security audit (FAU)

2.1.1 Audit Data Generation (FAU_GEN.1)

2.1.1.1 FAU_GEN.1.1

TSS Assurance Activities: **For protocol related audit events:** The evaluator shall check to ensure that the TSS contains a list (possibly empty except for authentication failures for user-level connections) of the protocol failures that are auditable.

Section 6.1 references the table of audit events in the SFR. The reference is a list of events, including protocol failures, starting and stopping the audit function, administrator commands, and authentication events.

Guidance Assurance Activities: The evaluator shall check the administrative guide and ensure that it lists all of the auditable events and provides a format for audit records. Each audit record format type must be covered, along with a brief description of each field. The evaluator shall check to make sure that every audit event type mandated by the PP is described and that the description of the fields contains the information required in FAU_GEN1.2, and the additional information specified in Table 1 **of the NDPP**.

The evaluator shall also make a determination of the administrative actions that are relevant in the context of this PP. The evaluator shall examine the administrative guide and make a determination of which administrative commands, including subcommands, scripts, and configuration files, are related to the configuration (including enabling or disabling) of the mechanisms implemented in the TOE that are necessary to enforce the requirements specified in the PP. The evaluator shall document the methodology or approach taken while determining which actions in the administrative guide are security relevant with respect to this PP. The evaluator may perform this activity as part of the activities associated with ensuring the AGD_OPE guidance satisfies the requirements.

Requirement	Auditable Events	Additional Audit Record Contents	Guidance Location
FAU_GEN.1	Startup and shutdown of audit		FIPS Guide, Annex C SSH login by *user* from src IP *ip-address*, src MAC *mac-address* to USER EXEC mode using RSA as Server Host Key. SSH logout by *user* from src IP *ip-address*, src MAC *mac-address* from USER EXEC mode using RSA as Server Host Key.
FCS_HTTPS_EXT.1	Failure to establish a HTTPS Session. Establishment/Termination of a HTTPS session. [1]	Reason for failure. Non-TOE endpoint of connection (IP address) for both successes and failures.	Administration Guide, Appendix A Informational Message Security telnet | SSH | web access [by *username*] from src IP *source ip address*, src MAC *source MAC address* rejected, *n* attempts.. Security telnet | SSH | web access [by *username*] from src IP *source ip address*
FCS_SSH_EXT.1	Failure to establish an SSH session. Establishment/Termination of an SSH session. [1]	Reason for failure Non-TOE endpoint of connection (IP address) for both successes and failures.	Administration Guide, Appendix A Informational Message Security telnet | SSH | web access [by *username*] from src IP *source ip address*, src MAC *source MAC address* rejected, *n* attempts.. SSH login by *user* from src IP *ip-address*, src MAC *mac-address* to USER EXEC mode using RSA as Server Host Key.
FCS_TLS_EXT.1	Failure to establish a TLS	Reason for	Administration Guide, Appendix A

[1] Auditing session establishment failures is highly dependent on the implementation and is currently not standardized in the industry. In this ST, no specific list or types of such failures is mandated as being auditable. More specifically in this case, only user-level authentication failures are necessarily associated with SSH, HTTPS or TLS session establishment failure.

Requirement	Auditable Events	Additional Audit Record Contents	Guidance Location
	Session. Establishment/Termination of a TLS session. [1]	failure. Non-TOE endpoint of connection (IP address) for both successes and failures.	Informational Message Security telnet | SSH | web access [by *username*] from src IP *source ip address*, src MAC *source MAC address* rejected, *n* attempts.. Security telnet | SSH | web access [by *username*] from src IP *source ip address*, FIPS Guide, Annex C SSL Syslog server *ip-address:portnum* is now connected.
FIA_UIA_EXT.1	All use of the identification and authentication mechanism.	Provided user identity, origin of the attempt (e.g., IP address).	Administration Guide, Appendix A Informational Message Console: Success Security: console login by *username* to USER | PRIVILEGE EXEC mode The specified user logged into the device console into the specified EXEC mode. Security console logout {by <*user*>I<*null*>} from USER EXEC mode SSH: Success Security {telnet I ssh} login {by *userInull*} from src {IP *ip* I IPv6 *ipv6-addr*} to Privileged EXEC mode Failure telnet | SSH | web access [by *username*] from src IP source *ip address*, src MAC *source MAC address* rejected, *n* attempts access attempts from the specified source IP and MAC address. • [by user *username*] does not appear if telnet or SSH clients are specified. • *n* is the number of times this SNMP trap occurred in the last five minutes, or other configured number of minutes. HTTPS/TLS: Success Security telnet | SSH | web access [by

Requirement	Auditable Events	Additional Audit Record Contents	Guidance Location
			username] from src IP *source ip address* Failure telnet | SSH | web access [by *username*] from src IP source *ip address*, src MAC *source MAC address* rejected, *n* attempts access attempts from the specified source IP and MAC address. • [by user *username*] does not appear if telnet or SSH clients are specified. • *n* is the number of times this SNMP trap occurred in the last five minutes, or other configured number of minutes.
FIA_UAU_EXT.2	All use of the authentication mechanism.	Origin of the attempt (e.g., IP address).	See FIA_UIA_EXT.1
FPT_STM.1	Changes to the time.	The old and new values for the time. Origin of the attempt (e.g., IP address).	FIPS Guide, Annex C Clock Changed from old time <*old time*> GMT+00 <*old date*> to new time <*new time*> GMT+00 <*new date*> FIPS Guide Time is updated by NTP server *ip-address* from NO_CLOCK to <*new time*> GMT+00 <*new date*
FPT_TUD_EXT.1	Initiation of update.	No additional information.	Administration Guide, Appendix A Informational Message startup-config was changed or startup-config was changed by *user-name* A configuration change was saved to the startup-config file. The *user-name* is the user ID, if they entered a user ID to log in. OR Warm Start The system software (flash code) has been reloaded.
FTA_SSL_EXT.1	Any attempts at unlocking of an interactive session.	No additional information.	The TOE doesn’t support session locking or unlocking. Sessions can only be terminated

Requirement	Auditable Events	Additional Audit Record Contents	Guidance Location
			and the user must the log back in (see FIA_UIA_EXT.1).
FTA_SSL.3	The termination of a remote session by the session locking mechanism.	No additional information.	Administration Guide, Appendix A Informational Message Security: telnet | SSH logout by *username* from src IP *ip-address*, src MAC *mac-address* to USER | PRIVILEGE EXEC mode The specified user logged out of the device. The user was using Telnet or SSH to access the device from either or both the specified IP address and MAC address. The user logged out of the specified EXEC mode Security console logout {by <*user*>I<*null*>} from Privileged EXEC mode Security {telnet I ssh I web} logout {by <*user*>I<*null*>} from src {IP <*ip*> I IPv6 <*ipv6-addr*>} from Privileged EXEC mode
FTA_SSL.4	The termination of an interactive session.	No additional information.	Administration Guide, Appendix A Informational Message Security: console logout by *username* The specified user logged out of the device console
FTP_ITC.1	Initiation of the trusted channel. Termination of the trusted channel. Failure of the trusted channel functions.	Identification of the initiator and target of failed trusted channels establishment attempt.	See SSH and TLS event types
FTP_TRP.1	Initiation of the trusted channel. Termination of the trusted channel. Failures of the trusted path functions.	Identification of the claimed user identity.	See SSH and HTTPS event types
FMT_SMF.1 (Administrator actions)	Changes to the audit configuration		FIPS Guide, Annex C SSL Syslog server *ip-address:portnum* is now connected

Requirement	Auditable Events	Additional Audit Record Contents	Guidance Location
			SSL Syslog server *ip-address:portnum* is now disconnected FIPS Guide Logging CLI_CMD operation enabled by *user* from console session. "logging cli-command" by *user* from console Note: All CLI commands are recorded with the CLI_CMD event type
	User Account creation and password management		Administration Guide, Appendix A Informational Message Security user *username* added | deleted | modified A user created, modified, or deleted a local user account through the Web, SNMP, console, SSH, or Telnet session Security Enable super | port-config | read-only password deleted | added | modified from console | telnet | ssh | web | snmp OR Line password deleted | added | modified from console | telnet | ssh | web | snmp A user created, re-configured, or deleted an Enable or Line password through the Web, SNMP, console, SSH, or Telnet session
	Login policy management (time restrictions, minimum password length)		The CLI_CMD event type records all administrator commands from the CLI interface. All login policy changes are recorded using this event type
	Enabling FIPS mode		The CLI_CMD event type records all administrator commands from the CLI interface. Changes to the FIPS mode are recorded using this event type

The following commands (more or less in the order they appear in the Detailed Test Report (DTR)) were identified by the evaluators as security-related. Each command is identified and a brief purpose is provided. These commands were found in the user guidance and consist of all the commands needed to configure or examine the security settings though the process of testing. As such, they are all identified in the DTR, along with the results and corresponding audit records. Note that every administrator command issued by the evaluators during testing was found to be audited without exception

- fips
  - (no) fips enable common-criteria (turn fips and cc modes on or off)
  - fips show (show the current fips configuration)
  - fips zerozie all (clears all keys)
- write memory (write the current configuration settings to persistent memory)
- crypto key generate (generate RSA key pair to enable SSH)
- openssl s_server (set syslog port, key and cipher)
- (no) logging host <ip-address> ssl-port <port> (configure or remove the secure logging host)
- ip
  - ip ssh pub-key-file (load a user's public key for authentication)
  - ip ssh idle-time <time> (set SSH idle timeout period)
- aaa
  - aaa authentication (configure authentication settings)
  - aaa authentication enable default tacacs+ local (enable tacacas+)
  - aaa authentication login default tacacs+ local (enable console login to use passwords and tacacs+)
  - aaa authentication web-server default local (set password authentication for web server)
- tacacs-server
  - tacacs-server host <<ipaddr>> ssl-auth-port <<port>> default (configure tcacs+ server)
  - tacacs-server retransmit <<restransmit period>>
  - tacacs-server timeout <<timeout>> (configure timeout period)
  - tacacs-server key <<key>> (configure tacacs+ key)
- enable
  - enable aaa (enable login at console)
  - enable password-min-length 15 (configure min password size)
  - enable user password-masking (set as part of turning on FIPS mode)
- username <user> password (set a user password)
- clock set <time> (set time)
- server <ntp server ip> minpoll <time> (configure NTP poll interval)
- show
  - show flash (show flash info)
  - show ver (show version)
  - show clock (query time)
  - show ip client-pub-key (show the client public key used for SSH login)
  - show ip ssl (show ssl connections)
  - show logging (show current logging configuration and log buffer)
  - show run | <options> (show running configuration details)

- reload (reboot the current flash image)
- console timeout <time> (set console idle timeout period)
- web-management session-timeout <time> (set HTTPS idle timeout period)
- banner motd * (set the login banner – message of the day)
- exit (logout or exit current shell)
- ntp (switch to ntp configuration mode)
- config t (switch to configuration mode)
- crypto-ssl certificate generate (generate HTTPS server certificate)

Testing Assurance Activities: The evaluator shall test the TOE's ability to correctly generate audit records by having the TOE generate audit records for the events listed in table 1 **of the NDPP** and administrative actions. This should include all instances of an event--for instance, if there are several different I&A mechanisms for a system, the FIA_UIA_EXT.1 events must be generated for each mechanism. The evaluator shall test that audit records are generated for the establishment and termination of a channel for each of the cryptographic protocols contained in the ST. If HTTPS is implemented, the test demonstrating the establishment and termination of a TLS session can be combined with the test for an HTTPS session. For administrative actions, the evaluator shall test that each action determined by the evaluator above to be security relevant in the context of this PP is auditable. When verifying the test results, the evaluator shall ensure the audit records generated during testing match the format specified in the administrative guide, and that the fields in each audit record have the proper entries.

Note that the testing here can be accomplished in conjunction with the testing of the security mechanisms directly. For example, testing performed to ensure that the administrative guidance provided is correct verifies that AGD_OPE.1 is satisfied and should address the invocation of the administrative actions that are needed to verify the audit records are generated as expected.

For protocol related audit events: The evaluator shall test all identified audit events during protocol testing/audit testing.

The evaluator created a mapping for the required audit events to test cases where the associated function was tested. The evaluator then collected the audit event when running the security functional tests. For example, the required event for FCS_SSH.1 is Establishment/Termination of an SSH session. The evaluator collected these audit records when establishing the SSH sessions to test password based authentication for SSH and recorded them in the Detailed Test Report (DTR). The security management events are handled in a similar manner. When the administrator was required to set a value for testing, the audit record associated with the administrator action was collected and recorded in the DTR.

2.1.1.2 FAU_GEN.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.1.2 User identity association (FAU_GEN.2)

2.1.2.1 FAU_GEN.2.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.1.3 External Audit Trail Storage (FAU_STG_EXT.1)

2.1.3.1 FAU_STG_EXT.1.1

TSS Assurance Activities: For both types of TOEs (those that act as an audit server and those that send data to an external audit server), there is some amount of local storage. The evaluator shall examine the TSS to ensure it describes the amount of audit data that are stored locally; what happens when the local audit data store is full; and how these records are protected against unauthorized access. The evaluator shall also examine the operational guidance to determine that it describes the relationship between the local audit data and the audit data that are sent to the audit log server (for TOEs that are not acting as an audit log server). For example, when an audit event is generated, is it simultaneously sent to the external server and the local store, or is the local store used as a buffer and 'cleared' periodically by sending the data to the audit server.

TOE acts as audit server

The evaluator shall examine the TSS to ensure it describes the connection supported from non-TOE entities to send the audit data to the TOE, and how the trusted channel is provided. Testing of the trusted channel mechanism will be performed as specified in the associated assurance activities for the particular trusted channel mechanism.

TOE is not an audit server

The evaluator shall examine the TSS to ensure it describes the means by which the audit data are transferred to the external audit server, and how the trusted channel is provided. Testing of the trusted channel mechanism will be performed as specified in the associated assurance activities for the particular trusted channel mechanism.

Section 6.1 explains how the audit trail is protected. Only the TOE User role can access the audit trail and use of that role requires a valid logon. Only administrators log onto the TOE. Section 6.1 also explains there is a local audit log and the possibility of a remote audit log. The local log stores up to 50 entries after which the audit entries will be overwritten, oldest first. The administrator (with Super User privilege) can choose to configure one or more external syslog servers where the TOE will send a copy of the audit records if so desired. The TOE can be configured to use TLS to protect audit logs exported to an external server.

Guidance Assurance Activities: **TOE acts as audit server**

The evaluator shall also examine the operational guidance to ensure it describes how to establish the trusted channel with the TOE, as well as describe any requirements for other IT entities to connect and send audit data to the TOE (particular audit server protocol, version of the protocol required, etc.), as well as configuration of the TOE needed to communicate with other IT entities.

TOE is not an audit server

The evaluator shall also examine the operational guidance to ensure it describes how to establish the trusted channel to the audit server, as well as describe any requirements on the audit server (particular audit server protocol, version of the protocol required, etc.), as well as configuration of the TOE needed to communicate with the audit server.

The Common Criteria section of the FIPS Guide has a section entitled “Configuring encrypted Syslog servers in Common Criteria mode.” This section provides detailed instructions for how to setup an encrypted syslog server including installing certificates and establishing a connection.

Testing Assurance Activities: **TOE acts as audit server**

Testing of the trusted channel mechanism will be performed as specified in the associated assurance activities for the particular trusted channel mechanism. The evaluator shall perform the following test for this requirement:

Test 1: The evaluator shall establish a session between an external IT entity and the TOE according to the configuration guidance provided. The evaluator shall then examine the traffic that passes between the IT entity and the TOE during several activities of the evaluator’s choice designed to generate audit data to be transferred to the TOE. The evaluator shall observe that these data are not able to be viewed in the clear during this transfer, and that they are successfully received by the TOE. The evaluator shall perform this test for each protocol selected in the second selection.

TOE is not an audit server

Testing of the trusted channel mechanism will be performed as specified in the associated assurance activities for the particular trusted channel mechanism. The evaluator shall perform the following test for this requirement:

Test 1: The evaluator shall establish a session between the TOE and the audit server according to the configuration guidance provided. The evaluator shall then examine the traffic that passes between the audit server and the TOE during several activities of the evaluator's choice designed to generate audit data to be transferred to the audit server. The evaluator shall observe that these data are not able to be viewed in the clear during this transfer, and that they are successfully received by the audit server. The evaluator shall record the particular software (name, version) used on the audit server during testing.

The evaluator followed the procedures in the FIPS Guide, Appendix B for setting up the syslog server connection. The audit server tested was CentOS release 6.4 final; openSSL 1.0.1e-fips 11 feb 2013. The evaluator used Wireshark to observe the traffic between the TOE and the audit log server. The evaluator was able to establish a connection with each of the claimed TLS ciphers while performing this test. The evaluator used the syslog server to store audit as recommended by the Brocade for the duration of testing so many audit records were recorded during the course of testing.

2.2 Cryptographic support (FCS)

2.2.1 Cryptographic Key Generation (for asymmetric keys) (FCS_CKM.1)

2.2.1.1 FCS_CKM.1.1

TSS Assurance Activities The evaluator shall ensure that the TSS contains a description of how the TSF complies with 800-56A and/or 800-56B, depending on the selections made. This description shall indicate the sections in 800-56A and/or 800-56B that are implemented by the TSF, and the evaluator shall ensure that key establishment is among those sections that the TSF claims to implement.

Any TOE-specific extensions, processing that is not included in the documents, or alternative implementations allowed by the documents that may impact the security requirements the TOE is to enforce shall be described.

FCS_CKM.1.1 selected ***NIST Special Publication 800-56B***, so the evaluator expected to find only that publication addressed in the TSS.

Section 6.2, Table 6, addresses SP 800-56B with section references, indications of whether identified features are implemented and where the implementation disagrees with the recommendation a rationale is provided. Note that no such deviations are identified.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall use the key pair generation portions of 'The FIPS 186-3 Digital Signature Algorithm Validation System (DSA2VS)', 'The FIPS 186-3 Elliptic Curve Digital Signature Algorithm Validation System (ECDSA2VS)', and either 'The RSA Validation System (RSAVS)' (for FIPS 186-2) or "The 186-3 RSA Validation System (RSA2VS)" (for FIPS 186-3)as a guide in testing the requirement above, depending on the selection performed by the ST author. This will require that the evaluator have a trusted reference implementation of the algorithms that can produce test vectors that are verifiable during the test.

The TOE has been FIPS approved. The RSA certificate numbers are 1413 and 1411.

2.2.2 Cryptographic Key Zeroization (FCS_CKM_EXT.4)

2.2.2.1 FCS_CKM_EXT.4.1

TSS Assurance Activities: The evaluator shall check to ensure the TSS describes each of the secret keys (keys used for symmetric encryption), private keys, and CSPs used to generate key; when they are zeroized (for example, immediately after use, on system shutdown, etc.); and the type of zeroization procedure that is performed (overwrite with zeros, overwrite three times with random pattern, etc.). If different types of memory are used to store the materials to be protected, the evaluator shall check to ensure that the TSS describes the zeroization procedure in terms of the memory in which the data are stored (for example, 'secret keys stored on flash are zeroized by overwriting once with zeros, while secret keys stored on the internal hard drive are zeroized by overwriting three times with a random pattern that is changed before each write').

Section 6.2, a list is presented (after Table 11) that identifies secret keys, private keys, and CSPs with a brief summary of purpose. Following the list, is a description of where keys are stored and when and how they are destroyed.

1. **Describe each secret key, private key, and CSP:** The list identified above serves to describe each key to some degree.

2. **When they are zeroized:** The paragraph following the list identified above indicates they are destroyed when no longer needed and that is followed up with more detail in some cases.
3. **Type of zeroization procedure:** The paragraph following the list identified above indicates that in FLASH values are either overwritten once with zeros or overwritten with a new value. In RAM values are overwritten once with zeroes.

The description in the TSS indicates that the TOE stores persistent keys in Flash and ephemeral keys in RAM.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.2.3 Cryptographic Operation (for data encryption/decryption) (FCS_COP.1(1))

2.2.3.1 FCS_COP.1(1).1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall use tests appropriate to the modes selected in the above requirement from 'The Advanced Encryption Standard Algorithm Validation Suite (AESAVS)', 'The XTS-AES Validation System (XTSVS)', 'The CMAC Validation System (CMACVS)', 'The Counter with Cipher Block Chaining-Message Authentication Code (CCM) Validation System (CCMVS)', and 'The Galois/Counter Mode (GCM) and GMAC Validation System (GCMVS)' (these documents are available from http://csrc.nist.gov/groups/STM/cavp/index.html) as a guide in testing the requirement above. This will require that the evaluator have a reference implementation of the algorithms known to be good that can produce test vectors that are verifiable during the test.

The TOE has been FIPS approved. The AES certificate numbers are 2717 and 2715.

2.2.4 Cryptographic Operation (for cryptographic signature) (FCS_COP.1(2))

2.2.4.1 FCS_COP.1(2).1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall use the signature generation and signature verification portions of 'The Digital Signature Algorithm Validation System' (DSA2VS), 'The Elliptic Curve Digital Signature Algorithm Validation System' (ECDSA2VS), and 'The RSA Validation System' (RSAVS (for 186-2) or RSA2VS (for 186-3)) as a guide in testing the requirement above. The Validation System used shall comply with the conformance standard identified in the ST (i.e., FIPS PUB 186-2 or FIPS PUB 186-3). This will require that the evaluator have a reference implementation of the algorithms known to be good that can produce test vectors that are verifiable during the test.

The TOE has been FIPS approved. The RSA certificate numbers are 1413 and 1411.

2.2.5 Cryptographic Operation (for cryptographic hashing) (FCS_COP.1(3))

2.2.5.1 FCS_COP.1(3).1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall use 'The Secure Hash Algorithm Validation System (SHAVS)' as a guide in testing the requirement above. This will require that the evaluator have a reference implementation of the algorithms known to be good that can produce test vectors that are verifiable during the test.

The TOE has been FIPS approved. The SHA certificate numbers are 2282 and 2280.

2.2.6 Cryptographic Operation (for keyed-hash message authentication) (FCS_COP.1(4))

2.2.6.1 FCS_COP.1(4).1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall use 'The Keyed-Hash Message Authentication Code (HMAC) Validation System (HMACVS)' as a guide in testing the requirement above. This will require that the evaluator have a reference implementation of the algorithms known to be good that can produce test vectors that are verifiable during the test.

The TOE has been FIPS approved. The HMAC certificate numbers are 1696 and 1694.

2.2.7 Explicit: HTTPS (FCS_HTTPS_EXT.1)

2.2.7.1 FCS_HTTPS_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.2.7.2 FCS_HTTPS_EXT.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall check the TSS to ensure that it is clear on how HTTPS uses TLS to establish an administrative session, focusing on any client authentication required by the TLS protocol vs. security administrator authentication which may be done at a different level of the processing stack.

Section 6.8 indicates that when a client attempts to connect to the TOE using TLS/HTTPS, the TOE and client will negotiate the most secure algorithm supported by both ends. RSA is used for key exchange and authentication. Only once a session is successfully negotiated and established will the TOE require the administrator to login. If that fails, the session is dropped.

Note that section 6.2 also identified RFC 2246 and RFC 2818 conformance for TLS and HTTPS respectively.

Testing for this activity is done as part of the TLS testing; this may result in additional testing if the TLS tests are done at the TLS protocol level.

The web interface was tested with to ensure that an administrator could make a connection with each of the claimed ciphers. This testing was performed as part of the TLS tests.

2.2.8 Extended: Cryptographic Operation (Random Bit Generation) (FCS_RBG_EXT.1)

2.2.8.1 FCS_RBG_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.2.8.2 FCS_RBG_EXT.1.2

TSS Assurance Activities: Documentation shall be produced—and the evaluator shall perform the activities—in accordance with Annex D, Entropy Documentation and Assessment **of the NDPP**.

The Entropy description is provided in a separate (non-ST) document that has been delivered to CCEVS for approval and has been accepted.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall also perform the following tests, depending on the standard to which the RBG conforms.

Implementations Conforming to FIPS 140-2, Annex C

The reference for the tests contained in this section is The Random Number Generator Validation System (RNGVS) [RNGVS]. The evaluator shall conduct the following two tests. Note that the 'expected values' are produced by a reference implementation of the algorithm that is known to be correct. Proof of correctness is left to each Scheme.

The evaluator shall perform a Variable Seed Test. The evaluator shall provide a set of 128 (Seed, DT) pairs to the TSF RBG function, each 128 bits. The evaluator shall also provide a key (of the length appropriate to the AES algorithm) that is constant for all 128 (Seed, DT) pairs. The DT value is incremented by 1 for each set. The seed values shall have no repeats within the set. The evaluator ensures that the values returned by the TSF match the expected values.

The evaluator shall perform a Monte Carlo Test. For this test, they supply an initial Seed and DT value to the TSF RBG function; each of these is 128 bits. The evaluator shall also provide a key (of the length appropriate to the AES algorithm) that is constant throughout the test. The evaluator then invokes the TSF RBG 10,000 times, with the DT value being incremented by 1 on each iteration, and the new seed for the subsequent iteration produced as specified in NIST-Recommended Random Number Generator Based on ANSI X9.31 Appendix A.2.4 Using the 3-Key Triple DES and AES Algorithms, Section 3. The evaluator ensures that the 10,000th value produced matches the expected value.

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The evaluator shall perform 15 trials for the RBG implementation. If the RBG is configurable, the evaluator shall perform 15 trials for each configuration. The evaluator shall also confirm that the operational guidance contains appropriate instructions for configuring the RBG functionality.

If the RBG has prediction resistance enabled, each trial consists of (1) instantiate drbg, (2) generate the first block of random bits (3) generate a second block of random bits (4) uninstantiate. The evaluator verifies that the second block of random bits is the expected value. The evaluator shall generate eight input values for each trial. The first is a count (0 – 14). The next three are entropy input, nonce, and personalization string for the instantiate operation. The next two are additional input and entropy input for the first call to generate. The final two are additional input and entropy input for the second call to generate. These values are randomly generated. “generate one block of random bits” means to generate random bits with number of returned bits equal to the Output Block Length (as defined in NIST SP 800-90).

If the RBG does not have prediction resistance, each trial consists of (1) instantiate drbg, (2) generate the first block of random bits (3) reseed, (4) generate a second block of random bits (5) uninstantiate. The evaluator verifies that the second block of random bits is the expected value. The evaluator shall generate eight input values for each trial. The first is a count (0 – 14). The next three are entropy input, nonce, and personalization string for the instantiate operation. The fifth value is additional input to the first call to generate. The sixth and seventh are additional input and entropy input to the call to reseed. The final value is additional input to the second generate call.

The following paragraphs contain more information on some of the input values to be generated/selected by the evaluator.

- Entropy input: the length of the entropy input value must equal the seed length.

- Nonce: If a nonce is supported (CTR_DRBG with no df does not use a nonce), the nonce bit length is one-half the seed length.

- Personalization string: The length of the personalization string must be <= seed length. If the implementation only supports one personalization string length, then the same length can be used for both values. If more than one string length is support, the evaluator shall use personalization strings of two different lengths. If the implementation does not use a personalization string, no value needs to be supplied.

- Additional input: the additional input bit lengths have the same defaults and restrictions as the personalization string lengths.

The Entropy description is provided in a separate (non-ST) document that has been delivered to CCEVS for approval. Note that the entropy analysis has been accepted by CCEVS/NSA.

The TOE has been FIPS approved. The RSA certificate numbers are 452 and 454.

2.2.9 Explicit: SSH (FCS_SSH_EXT.1)

2.2.9.1 FCS_SSH_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.2.9.2 FCS_SSH_EXT.1.2

TSS Assurance Activities: The evaluator shall check to ensure that the TSS contains a description of the public key algorithms that are acceptable for use for authentication, that this list conforms to FCS_SSH_EXT.1.5, and ensure that password-based authentication methods are also allowed.

Section 6.2 indicates the SSH implementation supports AES CBC 128 and 256, HMAC-SHA-1, and RSA. These values match the SFR. Section 6.2 also indicates that both public-key and password based authentication can be configured.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall also perform the following tests:

Test 1: The evaluator shall, for each public key algorithm supported, show that the TOE supports the use of that public key algorithm to authenticate a user connection. Any configuration activities required to support this test shall be performed according to instructions in the operational guidance.

Test 2: Using the operational guidance, the evaluator shall configure the TOE to accept password-based authentication, and demonstrate that a user can be successfully authenticated to the TOE over SSH using a password as an authenticator.

The evaluator used the Putty client to connect to the TOE using password authentication. The evaluator performed this test using ASE 128 and ASE 256 encryption.

2.2.9.3 FCS_SSH_EXT.1.3

TSS Assurance Activities: The evaluator shall check that the TSS describes how 'large packets' in terms of RFC 4253 are detected and handled.

Section 6.2 explains that there is a 256K packet buffer and as SSH packets are received they are combined to form a complete packet to be decrypted, but if the packet is not completed when the buffer becomes full the packet will be dropped.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall also perform the following test:

Test 1: The evaluator shall demonstrate that if the TOE receives a packet larger than that specified in this component, that packet is dropped.

The evaluator created a test program that sends a packet of length 257K to the SSH server on the TOE. When the large packet was sent to the TOE, the SSH connection was closed.

2.2.9.4 FCS_SSH_EXT.1.4

TSS Assurance Activities: The evaluator shall check the description of the implementation of this protocol in the TSS to ensure that optional characteristics are specified, and the encryption algorithms supported are specified as well. The evaluator shall check the TSS to ensure that the encryption algorithms specified are identical to those listed for this component.

Section 6.2 indicates the SSH implementation supports AES CBC 128 and 256, HMAC-SHA-1, and RSA. These values match the SFR. The description also indicates that a maximum packet size of 256K is supported and that is also consistent with the SFR.

Guidance Assurance Activities: The evaluator shall also check the operational guidance to ensure that it contains instructions on configuring the TOE so that SSH conforms to the description in the TSS (for instance, the set of algorithms advertised by the TOE may have to be restricted to meet the requirements).

The ST identifies the ciphers, hashes, and authentication methods as indicated in the TSS findings above.

The FIPS Guide explains how to enable CC mode which serves to limit the ciphers to those claimed in the ST.

Testing Assurance Activities: The evaluator shall also perform the following test:

Test 1: The evaluator shall establish a SSH connection using each of the encryption algorithms specified by the requirement. It is sufficient to observe (on the wire) the successful negotiation of the algorithm to satisfy the intent of the test.

The evaluator used the SecureCRT client to connect to the TOE using ASE 128 and ASE 256 encryption. The evaluator captured the network traffic and verified the algorithms.

2.2.9.5 FCS_SSH_EXT.1.5

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.2.9.6 FCS_SSH_EXT.1.6

TSS Assurance Activities: The evaluator shall check the TSS to ensure that it lists the supported data integrity algorithms, and that that list corresponds to the list in this component.

Section 6.2 indicates the SSH implementation supports AES CBC 128 and 256, HMAC-SHA-1, and RSA. These values match the SFR. The description also indicates that a maximum packet size of 256K is supported and that is also consistent with the SFR.

Guidance Assurance Activities: The evaluator shall also check the operational guidance to ensure that it contains instructions to the administrator on how to ensure that only the allowed data integrity algorithms are used in SSH connections with the TOE (specifically, that the 'none' MAC algorithm is not allowed).

The ST identifies the ciphers, hashes, and authentication methods as indicated in the TSS findings above.

The FIPS Guide explains how to enable CC mode which serves to limit the ciphers to those claimed in the ST.

Testing Assurance Activities:

The evaluator shall also perform the following test:

Test 1: The evaluator shall establish a SSH connection using each of the integrity algorithms specified by the requirement. It is sufficient to observe (on the wire) the successful negotiation of the algorithm to satisfy the intent of the test.

This test was completed in conjunction with FCS_SSH_EXT.1.5. The evaluator used the SecureCRT client to connect to the TOE using ASE 128 and ASE 256 encryption and hmac-sha1 (the only applicable integrity algorithm). The evaluator captured the network traffic and verified the algorithm.

2.2.9.7 FCS_SSH_EXT.1.7

TSS Assurance Activities: If this capability is 'hard-coded' into the TOE, the evaluator shall check the TSS to ensure that this is stated in the discussion of the SSH protocol.

Section 6.2 indicates that DH14 is a supported key exchange method.

Guidance Assurance Activities: The evaluator shall ensure that operational guidance contains configuration information that will allow the security administrator to configure the TOE so that all key exchanges for SSH are performed using DH group 14 and any groups specified from the selection in the ST.

The ST identifies the ciphers, hashes, and authentication methods as indicated in the TSS findings above.

The Common Criteria Certification (section 3) of the FIPS guide indicates that while operating in CC mode diffie-hellman-group1-sha1 is disabled and only diffie-hellman-group14-sha1 is supported.

Testing Assurance Activities: The evaluator shall also perform the following test:

Test 1: The evaluator shall attempt to perform a diffie-hellman-group1-sha1 key exchange, and observe that the attempt fails. For each allowed key exchange method, the evaluator shall then attempt to perform a key exchange using that method, and observe that the attempt succeeds.

The evaluator was able to observe from previous tests that diffie-hellman-group14-sha1 key exchange was used in all negotiations. The evaluator attempted a diffie-hellman-group1-sha1 key exchange and the request was rejected.

2.2.10 Explicit: TLS (FCS_TLS_EXT.1)

2.2.10.1 FCS_TLS_EXT.1.1

TSS Assurance Activities: The evaluator shall check the description of the implementation of this protocol in the TSS to ensure that the ciphersuites supported are specified. The evaluator shall check the TSS to ensure that the ciphersuites specified are identical to those listed for this component.

The SFR claims only the required 4 ciphers and those are identified in section 6.2 of the TSS. Section 6.2 also indicates that TLSv1.0, v1.1, and v1.2 are supported, matching the SFR claim.

The ST includes a statement in section 6.5 "(note that the TOE does not support client authentication)".

Guidance Assurance Activities: The evaluator shall also check the operational guidance to ensure that it contains instructions on configuring the TOE so that TLS conforms to the description in the TSS (for instance, the set of ciphersuites advertised by the TOE may have to be restricted to meet the requirements).

The ST indicates that TLSv1.0, 1.1, and 1.2 is supported and identifies the following required ciphersuites: TLS_RSA_WITH_AES_128_CBC_SHA, TLS_RSA_WITH_AES_256_CBC_SHA, TLS_DHE_RSA_WITH_AES_128_CBC_SHA, and TLS_DHE_RSA_WITH_AES_256_CBC_SHA.

The FIPS Guide suggests that 2048-bit keys are required for private key generation, and also that HTTPS is disabled ("`HTTPS SSL 3.0 : Disabled`").

Testing Assurance Activities: The evaluator shall also perform the following test:

Test 1: The evaluator shall establish a TLS connection using each of the ciphersuites specified by the requirement. This connection may be established as part of the establishment of a higher-level protocol, e.g., as part of a HTTPS session. It is sufficient to observe the successful negotiation of a ciphersuite to satisfy the intent of the test; it is not necessary to examine the characteristics of the encrypted traffic in an attempt to discern the ciphersuite being used (for example, that the cryptographic algorithm is 128-bit AES and not 256-bit AES).

Test 2: The evaluator shall setup a man-in-the-middle tool between the TOE and the TLS Peer and shall perform the following modifications to the traffic:

- [Conditional: TOE is a server] Modify at least one byte in the server's nonce in the Server Hello handshake message, and verify that the server denies the client's Finished handshake message.
- [Conditional: TOE is a client] Modify the server's selected ciphersuite in the Server Hello handshake message to be a ciphersuite not presented in the Client Hello handshake message. The evaluator shall verify that the client rejects the connection after receiving the Server Hello.
- [Conditional: TOE is a client] If a DHE or ECDHE ciphersuite is supported, modify the signature block in the Server's KeyExchange handshake message, and verify that the client rejects the connection after receiving the Server KeyExchange.
- [Conditional: TOE is a client] Modify a byte in the Server Finished handshake message, and verify that the client sends a fatal alert upon receipt and does not send any application data.

Test 1 - The connection between the syslog server and the TOE is secured using TLS. The evaluator established a connection between the two machine using each of the claimed ciphersuites. The evaluator repeated this test with the management connection on the MLX machine.

Test 2 – The evaluator created a TLS connection between the TOE and a test server. The evaluator then created packets that modified each of the required options. In all cases the negotiation failed as indicated in packet captures.

2.3 User data protection (FDP)

2.3.1 Full Residual Information Protection (FDP_RIP.2)

2.3.1.1 FDP_RIP.2.1

TSS Assurance Activities: 'Resources' in the context of this requirement are network packets being sent through (as opposed to 'to', as is the case when a security administrator connects to the TOE) the TOE. The concern is that once a network packet is sent, the buffer or memory area used by the packet still contains data from that packet, and that if that buffer is re-used, those data might remain and make their way into a new packet. The evaluator shall check to ensure that the TSS describes packet processing to the extent that they can determine that no data will be reused when processing network packets. The evaluator shall ensure that this description at a minimum describes how the previous data are zeroized/overwritten, and at what point in the buffer processing this occurs.

Section 6.3 indicates that when packets are sent they are placed in a buffer pool and subsequently overwritten. If a packet exceeds the size of a buffer, the residual space is overwritten with zeros (i.e., padded).

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.4 Identification and authentication (FIA)

2.4.1 Password Management (FIA_PMG_EXT.1)

2.4.1.1 FIA_PMG_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: The evaluator shall examine the operational guidance to determine that it provides guidance to security administrators on the composition of strong passwords, and that it provides instructions on setting the minimum password length.

The **Configuring the strict password rules** section of the **Security Configuration Guide** describes how to turn on strict password enforcement**.** When strict-password-enforcement is on, passwords must be eight characters and contain:

- At least two upper case characters
- At least two lower case characters
- At least two numeric characters
- At least two special characters

There is a section of the **Security Configuration Guide** called **Specifying a minimum password length** that explains the command needed to set a minimum password length.

Testing Assurance Activities: The evaluator shall also perform the following tests. Note that one or more of these tests can be performed with a single test case.

Test 1: The evaluator shall compose passwords that either meet the requirements, or fail to meet the requirements, in some way. For each password, the evaluator shall verify that the TOE supports the password. While the evaluator is not required (nor is it feasible) to test all possible compositions of passwords, the evaluator shall ensure that all characters, rule characteristics, and a minimum length listed in the requirement are supported, and justify the subset of those characters chosen for testing.

The evaluator ran three tests to address this requirement. The first step had the administrator set the minimum password length to 15. The first test has 14 characters including those to meet the strict enforcement and failed. The second test had 15 characters including those to meet the strict enforcement and passed. The last test included all the claimed special characters and passed. The evaluator felt this sample was adequate because the minimum settable length was tested and the combination of password characters was included.

2.4.2 Protected Authentication Feedback (FIA_UAU.7)

2.4.2.1 FIA_UAU.7.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall perform the following test for each method of local login allowed:

Test 1: The evaluator shall locally authenticate to the TOE. While making this attempt, the evaluator shall verify that at most obscured feedback is provided while entering the authentication information.

The evaluator observed during testing that passwords are obscured on the console login.

2.4.3 Extended: Password-based Authentication Mechanism (FIA_UAU_EXT.2)

2.4.3.1 FIA_UAU_EXT.2.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: Assurance activities for this requirement are covered under those for FIA_UIA_EXT.1. If other authentication mechanisms are specified, the evaluator shall include those methods in the activities for FIA_UIA_EXT.1.

All authentication mechanisms are included in the testing for FIA_UIA_EXT.1 (covered throughout testing).

2.4.4 User Identification and Authentication (FIA_UIA_EXT.1)

2.4.4.1 FIA_UIA_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.4.4.2 FIA_UIA_EXT.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall examine the TSS to determine that it describes the logon process for each logon method (local, remote (HTTPS, SSH, etc.)) supported for the product. This description shall contain information pertaining to the credentials allowed/used, any protocol transactions that take place, and what constitutes a "successful logon".

Section 6.4 describes that the TOE supports password authentication and can be configured on a per user basis to support (i.e., by uploading the user's public key)SSH public-key-based authentication mechanisms. Administrators define and assign attributes to users and those determine the privileges the user will have once logged on.

Section 6.4 describes that a user is presented with a command prompt upon successfully completing authentication (and thus logon).

The evaluator shall examine the operational guidance to determine that any necessary preparatory steps (e.g., establishing credential material such as pre-shared keys, tunnels, certificates, etc.) to logging in are described. For each supported the login method, the evaluator shall ensure the operational guidance provides clear instructions for successfully logging on. If configuration is necessary to ensure the services provided before login are limited, the evaluator shall determine that the operational guidance provides sufficient instruction on limiting the allowed services.

The evaluator shall perform the following tests for each method by which administrators access the TOE (local and remote), as well as for each type of credential supported by the login method:

Test 1: The evaluator shall use the operational guidance to configure the appropriate credential supported for the login method. For that credential/login method, the evaluator shall show that providing correct I&A information results in the ability to access the system, while providing incorrect information results in denial of access.

Test 2: The evaluator shall configure the services allowed (if any) according to the operational guidance, and then determine the services available to an external remote entity. The evaluator shall determine that the list of services available is limited to those specified in the requirement.

Test 3: For local access, the evaluator shall determine what services are available to a local administrator prior to logging in, and make sure this list is consistent with the requirement.

The **Setting Passwords** section of the **Security Configuration Guide** discusses the different logon options. It clearly describes that a username and password are required for logging into the machine. The **Configuring Secure Shell** section of the **Security Configuration Guide** explains how to setup and use SSH authentication. It describes the process for creating a public-private key pair and how to provide the public key to the user. The **Configuring DSA or RSA challenge-response authentication** section provides a step by step process of the authentication process with SSH. There are also descriptions in the same area for password authentication. The **Configuring TACACS or TACACS+ security** section of the **Security Configuration Guide** provides step by step authentication instructions for using TACACS+. The **Configuring SSL Security for Web Management** section of the **Security Configuration Guide** explains how to configure and secure the web management interface.

The evaluator configured the TOE for local console access and for remote SSH and web (MLX platform) access. The evaluator then performed an unsuccessful and successful logon of each type using bad and good credentials respectively. The evaluator repeated the tests using a TACACS+ server to verify interaction with the TACACS+ server. The evaluator conformed the web login interface does not work with the TACACS+ server. The evaluator was able to observe the TOE routed traffic on the traffic and it displayed a banner to the user before login. No functions were available to the administrator accessing the console with the exception of acknowledging the banner

2.5 Security management (FMT)

2.5.1 Management of TSF Data (for general TSF data) (FMT_MTD.1)

2.5.1.1 FMT_MTD.1.1

TSS Assurance Activities: The evaluator shall examine the TSS to determine that, for each administrative function identified in the operational guidance; those that are accessible through an interface prior to administrator log-in are identified. For each of these functions, the evaluator shall also confirm that the TSS details how the ability to manipulate the TSF data through these interfaces is disallowed for non-administrative users.

Section 6.4 indicates that the TOE doesn't offer any functions prior to logging in.

Section 6.5 explains that there are privilege levels and the Super User privilege is used to denote an Authorized Administrator. The TSF data manipulation commands are restricted to that privilege level.

The evaluators have not identified any additional commands available prior to logging in.

See FMT_SMF.1. The evaluator has found guidance for each of the identified management functions. All management functions are available only after having logged in and if the user has the appropriate management privilege level. The functions available prior to login – network traffic and warning banner – are configurable, but otherwise the evaluator found no evidence that other function, particularly the management functions, would be available without first logging in.

Guidance Assurance Activities: The evaluator shall review the operational guidance to determine that each of the TSF-data-manipulating functions implemented in response to the requirements of this PP is identified, and that configuration information is provided to ensure that only administrators have access to the functions.

The ST identifies the following as restricted: audit configuration data, information flow policy ACLs, user and administrator security attributes (including passwords and privilege levels), authentication method lists, the logon failure threshold, the remote access user list; and cryptographic support settings.

The following functions are identified in FMT_SMF.1 in the ST: remote and local administration, update the TOE, Configure TOE-provided services available before authentication (routing and warning banner), configure cryptographic functionality.

As such, instructions have been identified by the evaluators for the following list of functions suggested by the ST:

- Audit configuration data
    - The FIPS Guide includes instructions for "Configuring an encrypted syslog server".
    - The Security Configuration Guide includes instructions for "ACL deny logging" and "ACL accounting".
    - The Administration Guide includes instructions for "Configuring the Syslog service".

- Information flow policy ACLs
    - The Security Configuration Guide includes instructions for “Layer 2 Access Control Lists”, “Access Control List”, “Configuring an IPv6 Access Control List”, “Configuring 802.1X Port Security”, “Using MAC Port Security Feature”, “Protecting against Denial of Service Attacks”, and “Configuring Multi-Device Port Authentication” that collectively provide instructions for configuring information flow rules.
- User and administrator security attributes (including passwords and privilege levels)
    - The Security Configuration Guide includes instructions for “Setting up local user accounts” that allows user accounts to be defined and assigned password and management privilege levels.
- Authentication method lists
    - Passwords
        - The Security Configuration Guide includes instructions for “Configuring a local user account” that can be used to log into the configured interfaces with an assigned password.
    - SSH public-key based authentication
        - The Security Configuration Guide includes instructions for “Configuring SSH2 client public key authentication”
    - We Management
        - The Security Configuration Guide includes instructions for “Configuring SSL security for the Web Management Interface.”
- Logon failure threshold
    - The Security Configuration Guide includes instructions for “Setting the number of SSH server authentication retries”.
- Remote access user list/Remote and local administration
    - The Security Configuration Guide, section 1, addresses local (CLI) and remote (including web) access restrictions. Section 5 provides instructions for configuring SSHv2 and SCP while section 10 provides instructions to configure the SNMP interface (disabled in the FIPS/CC configuration for access to security related objects).
- Cryptographic support settings/Configure cryptographic functionality
    - The FIPS Guide provides instructions to enable FIPS and Common Criteria modes.
- Update the TOE
    - The FIPS Guide includes instructions for “Software Upgrade for FIPS devices” and “Simplified Upgrade and Auto Upgrade”. These instructions also explain how to query the current version.
- Configure TOE-provided services available before authentication
    - Network routing
        - The Security Configuration Guide includes instructions for “Layer 2 Access Control Lists”, “Access Control List”, “Configuring an IPv6 Access Control List”, “Configuring 802.1X Port Security”, “Using MAC Port Security Feature”, “Protecting against Denial of Service

Attacks", and "Configuring Multi-Device Port Authentication" that collectively provide instructions for configuring information flow rules.

- Warning banner
  - The Security Configuration Guide includes instructions for "Setting a message of the day banner" which provides instructions for a Banner image.

The evaluator observed the banner during testing for each of the console, SSH session, and Web interface.

Testing Assurance Activities: None Defined

2.5.2 Specification of Management Functions (FMT_SMF.1)

2.5.2.1 FMT_SMF.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The security management functions for FMT_SMF.1 are distributed throughout the PP and are included as part of the requirements in FMT_MTD, FPT_TST_EXT, and any cryptographic management functions specified in the reference standards. Compliance to these requirements satisfies compliance with FMT_SMF.1.

The evaluator was able to use the guidance documentation to configure the TOE to perform the other tests required by the NDPP. All administrator commands are recorded in the audit trail.

2.5.3 Restrictions on Security Roles (FMT_SMR.2)

2.5.3.1 FMT_SMR.2.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.5.3.2 FMT_SMR.2.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.5.3.3 FMT_SMR.2.3

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall review the operational guidance to ensure that it contains instructions for administering the TOE both locally and remotely, including any configuration that needs to be performed on the client for remote administration. In the course of performing the testing activities for the evaluation, the evaluator shall use all supported interfaces, although it is not necessary to repeat each test involving an administrative action with each interface. The evaluator shall ensure, however, that each supported method of administering the TOE that conforms to the requirements of this PP be tested; for instance, if the TOE can be administered through a local hardware interface; SSH; and TLS/HTTPS; then all three methods of administration must be exercised during the evaluation team's test activities.

The FIPS Guide refers to instructions to configure both SSHv2 and HTTPS (w/TLS) (on the MLX platform). It suggests that in FIPS mode telnet and HTTP are disallowed. The CLI seems to be the default initial interface and no configuration is needed.

The Security Configuration Guide, section 1 Securing Access Methods, indicates that Serial CLI, telnet, SSH, SNMP, and TFTP. Of these telnet and TFTP are disabled in FIPS mode and SNMP access to critical security parameters is also disabled (but not tested). Instructions are provided specifically to manage access to the available management interfaces including CLI, SSHv2, and HTTPS.

Note that the local CI and remote SSH interfaces are identical in that the same commands can be issued in each case.

The evaluator performed administration using the console as well as the SSH connection. Both resulted in a command line interface so both were addressed thoroughly. The HTTPS interface on the MLX platform was tested as well through sampling to ensure it produced the same results.

2.6 Protection of the TSF (FPT)

2.6.1 Extended: Protection of Administrator Passwords (FPT_APW_EXT.1)

2.6.1.1 FPT_APW_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.6.1.2 FPT_APW_EXT.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall examine the TSS to determine that it details all authentication data that are subject to this requirement, and the method used to obscure the plaintext password data when stored. The TSS shall also detail passwords are stored in such a way that they are unable to be viewed through an interface designed specifically for that purpose, as outlined in the application note **in the NDPP**.

Section 6.6 states that the TOE does not offer any interfaces that will disclose to any user a plain text password. Additionally, locally defined passwords are not stored in plaintext form.

2.6.2 Extended: Protection of TSF Data (for reading of all symmetric keys) (FPT_SKP_EXT.1)

2.6.2.1 FPT_SKP_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall examine the TSS to determine that it details how any pre-shared keys, symmetric keys, and private keys are stored and that they are unable to be viewed through an interface designed specifically for that purpose, as outlined in the application note **in the NDPP**. If these values are not stored in plaintext, the TSS shall describe how they are protected/obscured.

Section 6.6 states that the TOE does not offer any interfaces that will disclose to any user cryptographic keys.

2.6.3 Reliable Time Stamps (FPT_STM.1)

2.6.3.1 FPT_STM.1.1

TSS Assurance Activities: The evaluator shall examine the TSS to ensure that it lists each security function that makes use of time. The TSS provides a description of how the time is maintained and considered reliable in the context of each of the time related functions.

Section 6.6 states the OE provides a hardware clock for reliable time stamps. The description explains the clock is mainly used for timestamps in audit records but also supports the timing elements of cryptographic functions. By virtue of being a real-time clock, the evaluator assumes it is reliable.

Guidance Assurance Activities: The evaluator examines the operational guidance to ensure it instructs the administrator how to set the time. If the TOE supports the use of an NTP server, the operational guidance instructs how a communication path is established between the TOE and the NTP server, and any configuration of the NTP client on the TOE to support this communication.

The **Administration Guide** in the **Setting the system clock** section discusses using the clock set command to set the local clock. The **Administration Guide** also has a section for NTP called **Configuring NTP.** In that section, there is an extensive discusses about how to establish communication with an NTP server and how to configure the client. Commands are provided for each topic and examples are given.

Testing Assurance Activities: Test 1: The evaluator uses the operational guide to set the time. The evaluator shall then use an available interface to observe that the time was set correctly.

Test2: [conditional] If the TOE supports the use of an NTP server; the evaluator shall use the operational guidance to configure the NTP client on the TOE, and set up a communication path with the NTP server. The evaluator will observe that the NTP server has set the time to what is expected. If the TOE supports multiple protocols for establishing a connection with the NTP server, the evaluator shall perform this test using each supported protocol claimed in the operational guidance.

The evaluator set the local clock from the console and observed the time change. The evaluator then configured a NTP server and had the appliance connect to the NTP server and update the time. The evaluator observed the time update from the NTP server.

2.6.4 TSF Testing (FPT_TST_EXT.1)

2.6.4.1 FPT_TST_EXT.1.1

TSS Assurance Activities: The evaluator shall examine the TSS to ensure that it details the self tests that are run by the TSF on start-up; this description should include an outline of what the tests are actually doing (e.g., rather than saying 'memory is tested', a description similar to 'memory is tested by writing a value to each memory location and reading it back to ensure it is identical to what was written' shall be used). The evaluator shall ensure that the TSS makes an argument that the tests are sufficient to demonstrate that the TSF is operating correctly.

Section 6.6 provides a discussion of the self-tests. The self-tests include basic read-write memory, flash read, software checksum tests, and device detection tests. Additionally, the TOE is designed to query each pluggable module which in turn includes its own diagnostics that will serve to help identify any failing modules.

Guidance Assurance Activities: The evaluator shall also ensure that the operational guidance describes the possible errors that may result from such tests, and actions the administrator should take in response; these possible errors shall correspond to those described in the TSS.

In the **Reloading the device** section of the **FIPS Guide**, there is a discussion of the FIPS self-tests. This discussion also the possible errors that may arise such as:

- `Crypto module initialization and KNown Answer Test (KAT) failed with reason:(Error Code 0x80000000)'CKR_VENDOR_DEFINED'`
- `FIPS: MP Primary image verification failed`
- `FIPS: MP Secondary image verification failed`
- `FIPS: MP Monitor image verification failed`

The Hardware Installation Guides for each model provides a Table 4 which contains all of the LEDs on the appliance and explains what each indicator means depending on its color. For example, if the PS1 LED is yellow, the power supply is not functioning properly.

The TSS description about the self-tests focuses on the FIPS self-tests. As such, the discussion in the FIPS Guide discusses the possible errors that may arise and how to possibly address some of the errors

Testing Assurance Activities: None Defined

2.6.5 Extended: Trusted Update (FPT_TUD_EXT.1)

2.6.5.1 FPT_TUD_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.6.5.2 FPT_TUD_EXT.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.6.5.3 FPT_TUD_EXT.1.3

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: Updates to the TOE either have a hash associated with them, or are signed by an authorized source. If digital signatures are used, the definition of an authorized source is contained in the TSS, along with a description of how the certificates used by the update verification mechanism are contained on the device. The evaluator ensures this information is contained in the TSS. The evaluator also ensures that the TSS (or the operational guidance) describes how the candidate updates are obtained; the processing associated with verifying the digital signature or calculating the hash of the updates; and the actions that take place for successful (hash or signature was verified) and unsuccessful (hash or signature could not be verified) cases.

Section 6.6 of the ST discusses TOE software updates. Updates can either be manually obtained by the administrator using CLI commands over SCP. Prior to actually installing and using the new software image, its digital certificate is verified by the TOE using the public key in the certificate configured in the TOE. An unverified image cannot be installed. Note that the TOE comes preinstalled with an applicable Brocade public certificate.

The evaluator shall perform the following tests:

Test 1: The evaluator performs the version verification activity to determine the current version of the product. The evaluator obtains a legitimate update using procedures described in the operational guidance and verifies that it is successfully installed on the TOE. Then, the evaluator performs a subset of other assurance activity tests to demonstrate that the update functions as expected. After the update, the evaluator performs the version verification activity again to verify the version correctly corresponds to that of the update.

Test 2: The evaluator performs the version verification activity to determine the current version of the product. The evaluator obtains or produces an illegitimate update, and attempts to install it on the TOE. The evaluator verifies that the TOE rejects the update.

The evaluator updated the TOE to a later development version of the TOE. The version did update properly. For the improper update, the evaluator attempted to load a correct image and incorrect signature and the reverse. The signature verification failed in each case.

2.7 TOE ACCESS (FTA)

2.7.1 TSF-INITIATED TERMINATION (FTA_SSL.3)

2.7.1.1 FTA_SSL.3.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall perform the following test:

Test 1: The evaluator follows the operational guidance to configure several different values for the inactivity time period referenced in the component. For each period configured, the evaluator establishes a remote interactive session with the TOE. The evaluator then observes that the session is terminated after the configured time period.

The evaluator set the SSH time period to 1 minute and observed a SSH timeout. The evaluator then set the SSH timeout to 2 minutes and observed a SSH timeout. Note that when the session terminated, the screen was left as-is and a new login prompt was presented. This was repeated for the web interface (on the MLX platform) with the same results.

2.7.2 User-initiated Termination (FTA_SSL.4)

2.7.2.1 FTA_SSL.4.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall perform the following test:

Test 1: The evaluator initiates an interactive local session with the TOE. The evaluator then follows the operational guidance to exit or log off the session and observes that the session has been terminated.

The evaluator established a local session and manually 'exit'ed per the command identified in the guidance. In each case the session was terminated and a logout audit record was logged.

2.7.3 TSF-initiated Session Locking (FTA_SSL_EXT.1)

2.7.3.1 FTA_SSL_EXT.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall perform the following test:

Test 1: The evaluator follows the operational guidance to configure several different values for the inactivity time period referenced in the component. For each period configured, the evaluator establishes a local interactive session with the TOE. The evaluator then observes that the session is either locked or terminated after the configured time period. If locking was selected from the component, the evaluator then ensures that re-authentication is needed when trying to unlock the session.

The evaluator set the console time period to 1 minute and observed a console timeout. The evaluator then set the console timeout to 2 minutes and observed a console timeout. Note that when the session terminated, the screen was left as-is and a new login prompt was presented.

2.7.4 Default TOE Access Banners (FTA_TAB.1)

2.7.4.1 FTA_TAB.1.1

TSS Assurance Activities: The evaluator shall check the TSS to ensure that it details each method of access (local and remote) available to the administrator (e.g., serial port, SSH, HTTPS).

Section 6.7 identifies that the administrator can access the TOE using any of the following methods: console, SSH, or TLS/HTTPS interfaces.

Guidance Assurance Activities: None Defined

Testing Assurance Activities: The evaluator shall also perform the following test:

Test 1: The evaluator follows the operational guidance to configure a notice and consent warning message. The evaluator shall then, for each method of access specified in the TSS, establish a session with the TOE. The evaluator shall verify that the notice and consent warning message is displayed in each instance.

The evaluator set a login banner and then tested the banner is displayed from the console login as well as an SSH login for both CER and MLX platforms and web login on the MLX platform.

2.8 Trusted path/channels (FTP)

2.8.1 Inter-TSF trusted channel (FTP_ITC.1)

2.8.1.1 FTP_ITC.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.8.1.2 FTP_ITC.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.8.1.3 FTP_ITC.1.3

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall examine the TSS to determine that, for all communications with authorized IT entities identified in the requirement, each communications mechanism is identified in terms of the allowed protocols for that IT entity. The evaluator shall also confirm that all protocols listed in the TSS are specified and included in the requirements in the ST.

Section 6.8 indicates that TLS is required to communicate with a SYSLOG server and SCP (based on SSH) is used to communicate with an update server. This is consistent with the choices made in FPT_ITC.1.

The TSS also states that in Common Criteria mode, the TOE prevents the use of TFTP to retrieve a new TOE firmware image.

The evaluator shall confirm that the operational guidance contains instructions for establishing the allowed protocols with each authorized IT entity, and that it contains recovery instructions should a connection be unintentionally broken. The evaluator shall also perform the following tests:

a. Test 1: The evaluators shall ensure that communications using each protocol with each authorized IT entity is tested during the course of the evaluation, setting up the connections as described in the operational guidance and ensuring that communication is successful.

b. Test 2: For each protocol that the TOE can initiate as defined in the requirement, the evaluator shall follow the operational guidance to ensure that in fact the communication channel can be initiated from the TOE.

c. Test 3: The evaluator shall ensure, for each communication channel with an authorized IT entity, the channel data are not sent in plaintext.

d. Test 4: The evaluators shall, for each protocol associated with each authorized IT entity tested during test 1, the connection is physically interrupted. The evaluator shall ensure that when physical connectivity is restored, communications are appropriately protected.

Further assurance activities are associated with the specific protocols.

Test 1 – The syslog server communication path was tested as part of setting up the syslog server connection. The update server connection was tested as part of testing an update.

Test 2 - The syslog server communication path (TLS) was tested as part of setting up the syslog server connection. The update server connection (SSH) was tested as part of testing an update.

Test 3 – The establishment of the syslog sever connection ensured the syslog path is encrypted. The evaluators also captured a transfer of an image using scp to ensure the communication path is encrypted.

Test 4 – For both the syslog and update server connections, the evaluator interrupted the communications path. In both case, the connection resumed in an encrypted form. This was verified using Wireshark

2.8.2 Trusted Path (FTP_TRP.1)

2.8.2.1 FTP_TRP.1.1

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.8.2.2 FTP_TRP.1.2

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

2.8.2.3 FTP_TRP.1.3

TSS Assurance Activities: None Defined

Guidance Assurance Activities: None Defined

Testing Assurance Activities: None Defined

Component Assurance Activities: The evaluator shall examine the TSS to determine that the methods of remote TOE administration are indicated, along with how those communications are protected. The evaluator shall also confirm that all protocols listed in the TSS in support of TOE administration are consistent with those specified in the requirement, and are included in the requirements in the ST.

Section 6.8 indicates that SSH or HTTPS/TLS is required for remote administration.

The evaluator shall confirm that the operational guidance contains instructions for establishing the remote administrative sessions for each supported method. The evaluator shall also perform the following tests:

Test 1: The evaluators shall ensure that communications using each specified (in the operational guidance) remote administration method is tested during the course of the evaluation, setting up the connections as described in the operational guidance and ensuring that communication is successful.

Test 2: For each method of remote administration supported, the evaluator shall follow the operational guidance to ensure that there is no available interface that can be used by a remote user to establish a remote administrative sessions without invoking the trusted path.

Test 3: The evaluator shall ensure, for each method of remote administration, the channel data is not sent in plaintext.

Further assurance activities are associated with the specific protocols.

Test 1 – The evaluator tested SSH when testing the FCS_SSH_EXT.1 requirement and tested HTTPS when testing the FCS_HTTPS_EXT.1 requirement.

Test 2 – The evaluator was unable to find a method of using SSH without invoking the trusted path. The communications path was always encrypted and used the servers key. Likewise the HTTPS connection already required encryption.

Test 3 – The evaluator tested the correctness of the SSH encryption when testing the FCS_SSH_EXT.1 requirement and tested HTTPS when testing the FCS_HTTPS_EXT.1 requirement.

3. Protection Profile SAR Assurance Activities

The following sections address assurance activities specifically defined in the claimed Protection Profile that correspond with Security Assurance Requirements.

3.1 Development (ADV)

3.1.1 Basic functional specification (ADV_FSP.1)

Assurance Activities: There are no specific assurance activities associated with these SARs. The functional specification documentation is provided to support the evaluation activities described in Section 4.2 **of the NDPP**, and other activities described for AGD, ATE, and AVA SARs. The requirements on the content of the functional specification information is implicitly assessed by virtue of the other assurance activities being performed; if the evaluator is unable to perform an activity because the there is insufficient interface information, then an adequate functional specification has not been provided.

3.2 Guidance documents (AGD)

3.2.1 Operational user guidance (AGD_OPE.1)

Assurance Activities: Some of the contents of the operational guidance will be verified by the assurance activities in Section 4.2 **of the NDPP** and evaluation of the TOE according to the CEM. The following additional information is also required.

The operational guidance shall at a minimum list the processes running (or that could run) on the TOE in its evaluated configuration during its operation that are capable of processing data received on the network interfaces (there are likely more than one of these, and this is not limited to the process that 'listens' on the network interface). It is acceptable to list all processes running (or that could run) on the TOE in its evaluated configuration instead of attempting to determine just those that process the network data. For each process listed, the administrative guidance will contain a short (e.g., one- or two-line) description of the process' function, and the privilege with which the service runs. 'Privilege' includes the hardware privilege level (e.g., ring 0, ring 1), any software privileges specifically associated with the process, and the privileges associated with the user role the process runs as or under.

The operational guidance shall contain instructions for configuring the cryptographic engine associated with the evaluated configuration of the TOE. It shall provide a warning to the administrator that use of other cryptographic engines was not evaluated nor tested during the CC evaluation of the TOE.

The documentation must describe the process for verifying updates to the TOE, either by checking the hash or by verifying a digital signature. The evaluator shall verify that this process includes the following steps:

1. For hashes, a description of where the hash for a given update can be obtained. For digital signatures, instructions for obtaining the certificate that will be used by the FCS_COP.1(2) mechanism to ensure that a signed update has been received from the certificate owner. This may be supplied with the product initially, or may be obtained by some other means.

2. Instructions for obtaining the update itself. This should include instructions for making the update accessible to the TOE (e.g., placement in a specific directory).

3. Instructions for initiating the update process, as well as discerning whether the process was successful or unsuccessful. This includes generation of the hash/digital signature..

The TOE will likely contain security functionality that does not fall in the scope of evaluation under this PP. The operational guidance shall make it clear to an administrator which security functionality is covered by the evaluation activities.

The FIPS Guide includes an Appendix E to provide a complete list of system processes. This list is for all system (aka privileged) processes on the appliance. In addition to providing the list, the document identifies the priority of each process.

The FIPS Guide provides detailed instructions (separately for the MLX and CER/CES devices) for copying the new signature and new imagine onto the device and loading the new signature image. The steps discuss where to put the image and the commands to install it. The steps also verify the signature. A list of potential error message is described and some troubleshooting tips are included in case the upgrade fails.

3.2.2 Preparative procedures (AGD_PRE.1)

Assurance Activities: As indicated in the introduction above, there are significant expectations with respect to the documentation—especially when configuring the operational environment to support TOE functional requirements. The evaluator shall check to ensure that the guidance provided for the TOE adequately addresses all platforms claimed for the TOE in the ST.

Hardware Installation Manuals for all product families – MLX and CER – are available on-line. The more general manuals (and those specifically subject to evaluation) like FIPS Guide and the Security Configuration Guide apply to all models. The completeness of the manuals is addressed by their use in the AA's carried out in the evaluation.

3.3 Life-cycle support (ALC)

3.3.1 Labelling of the TOE (ALC_CMC.1)

Assurance Activities: The evaluator shall check the ST to ensure that it contains an identifier (such as a product name/version number) that specifically identifies the version that meets the requirements of the ST. The evaluator shall ensure that this identifier is sufficient for an acquisition entity to use in procuring the TOE (including the appropriate administrative guidance) as specified in the ST. Further, the evaluator shall check the AGD guidance and TOE samples received for testing to ensure that the version number is consistent with that in the ST. If the vendor maintains a web site advertising the TOE, the evaluator shall examine the information on the web site to ensure that the information in the ST is sufficient to distinguish the product.

The evaluator verified that the ST, TOE and Guidance are all labeled with the same hardware versions and software The evaluator checked the TOE software version and hardware identifiers during testing by examining the actual machines in the Brocade Lab used for testing.

3.3.2 TOE CM coverage (ALC_CMS.1)

Assurance Activities: The 'evaluation evidence required by the SARs' in this PP is limited to the information in the ST coupled with the guidance provided to administrators and users under the AGD requirements. By ensuring that the TOE is specifically identified and that this identification is consistent in the ST and in the AGD guidance (as done in the assurance activity for ALC_CMC.1), the evaluator implicitly confirms the information required by this component.

See 3.3.1 for an explanation of how all CM items are addressed.

3.4 Tests (ATE)

3.4.1 Independent testing - conformance (ATE_IND.1)

Assurance Activities: The evaluator shall prepare a test plan and report documenting the testing aspects of the system. The test plan covers all of the testing actions contained in the CEM and the body of this PP’s Assurance Activities. While it is not necessary to have one test case per test listed in an Assurance Activity, the evaluator must document in the test plan that each applicable testing requirement in the ST is covered.

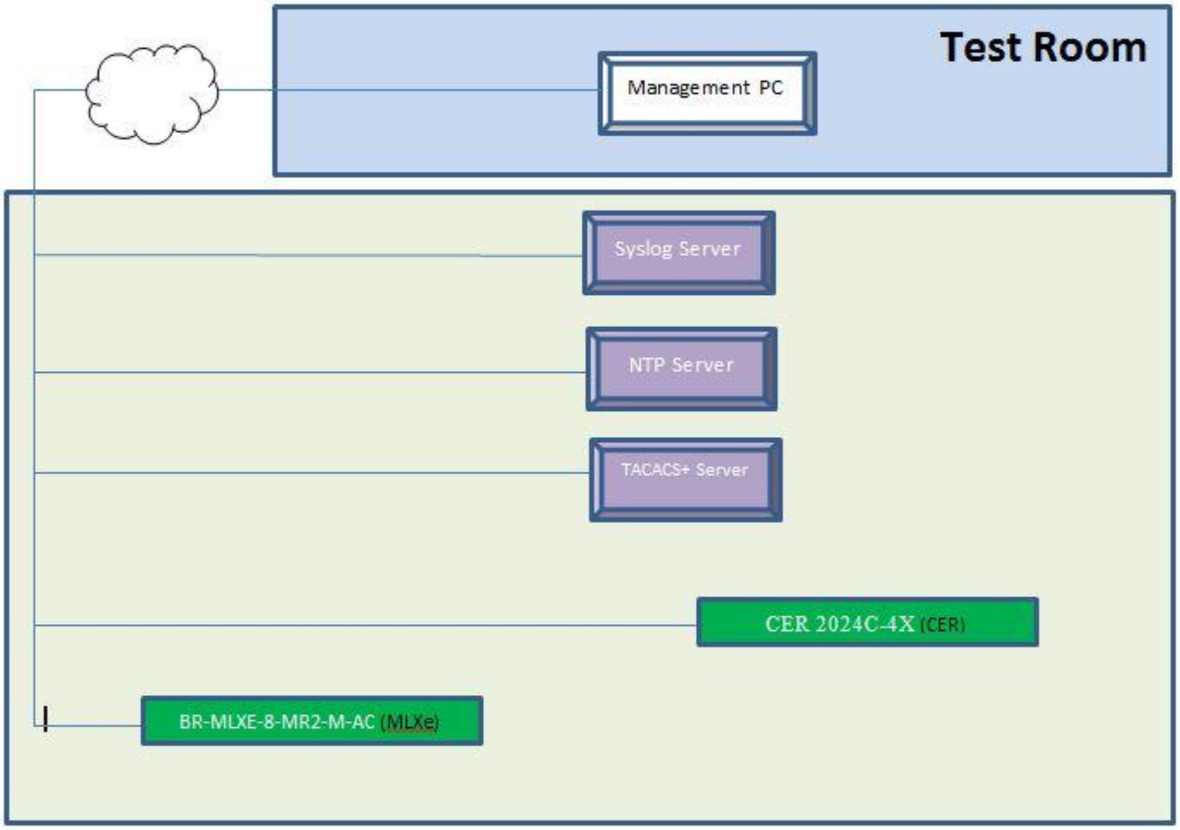
The test plan identifies the platforms to be tested, and for those platforms not included in the test plan but included in the ST, the test plan provides a justification for not testing the platforms. This justification must address the differences between the tested platforms and the untested platforms, and make an argument that the differences do not affect the testing to be performed. It is not sufficient to merely assert that the differences have no affect; rationale must be provided. If all platforms claimed in the ST are tested, then no rationale is necessary.

The test plan describes the composition of each platform to be tested, and any setup that is necessary beyond what is contained in the AGD documentation. It should be noted that the evaluator is expected to follow the AGD documentation for installation and setup of each platform either as part of a test or as a standard pre-test condition. This may include special test drivers or tools. For each driver or tool, an argument (not just an assertion) should be provided that the driver or tool will not adversely affect the performance of the functionality by the TOE and its platform. This also includes the configuration of the cryptographic engine to be used. The cryptographic algorithms implemented by this engine are those specified by this PP and used by the cryptographic protocols being evaluated (IPsec, TLS/HTTPS, SSH).

The test plan identifies high-level test objectives as well as the test procedures to be followed to achieve those objectives. These procedures include expected results. The test report (which could just be an annotated version of the test plan) details the activities that took place when the test procedures were executed, and includes the actual results of the tests. This shall be a cumulative account, so if there was a test run that resulted in a failure; a fix installed; and then a successful re-run of the test, the report would show a 'fail' and 'pass' result (and the supporting details), and not just the 'pass' result.

The evaluator created a Detailed Test Report: Evaluation Team Test Report for Brocade MLX® and NetIron® Family Devices with Multi-Service IronWare R05.8.00, Version 1.1, 03/31/2015 (DTR) to address all aspects of this requirement. The DTR discusses the test configuration, test cases, expected results, and test results.

The following is the test configuration used by the evaluation team:



The evaluated configuration of the TOE includes the following series and specific models:

a) Brocade NetIron MLXe Series Hardware Platforms (BR-MLXE-16-MR2-M-AC, BR-MLXE-16-MR2-M-DC, BR-MLXE-8-MR2-M-AC, BR-MLXE-8-MR2-M-DC, BR-MLXE-4-MR2-M-AC, and BR-MLXE-4-MR2-M-DC);

b) Brocade NetIron CER 2000 Series Hardware Platforms (NI-CER-2024C-ADVPREM-AC, NI-CER-2024C-ADVPREM-DC, NI-CER-2024F-ADVPREM-AC, NI-CER-2024F-ADVPREM-DC, NI-CER-2048C-ADVPREM-AC, NI-CER-2048C-ADVPREM-DC, NI-CER-2048CX-ADVPREM-AC, NI-CER-2048CX-ADVPREM-DC, NI-CER-2048F-ADVPREM-AC, NI-CER-2048F-ADVPREM-DC, NI-CER-2048FX-ADVPREM-AC, NI-CER-2048FX-ADVPREM-DC, BR-CER-2024C-4X-RT-AC, BR-CER-2024C-4X-RT-DC, BR-CER-2024F-4X-RT-AC, and BR-CER-2024F-4X-RT-DC); and

c) Brocade NetIron CES 2000 Series Hardware Platforms (BR-CES-2024C-4X-AC, BR-CES-2024C-4X-DC, BR-CES-2024F-4X-AC, and BR-CES-2024F-4X-DC)

The CER series and CER series both share the same software/firmware image based on a proprietary operating system. As such, one platform was selected from the group. The MLXe Series has a different image and one platform from that series was selected.

The differences between the models of a given family include AC vs. DC power, fiber vs. copper network connections, and number of available network ports. None of these differences was considered security relevant since none of the NDPP security requirements, nor the functions to address them, are related to any of these product characteristics. It is also assumed that the vendor would certainly do reasonable functional testing to ensure that fiber and copper connections, AC and DC power, and the ability to use available network ports work as expected.

Other than hardware-specific installation manuals addressing physical differences (note that the CER and CES series share the same hardware manual), the user guidance (administration, security, FIPS, and upgrade manuals in particular) are the same.

The evaluators ran the entire test suite on the BR-CER-2024C-4X-AC (CER) and BR-MLXE-8-MR2-M-AC (MLX) models, covering both operating system variants. The test procedures were based on the available guidance and provided identical in each case. Similarly, the results prove to be identical in each case.

3.5 Vulnerability assessment (AVA)

3.5.1 Vulnerability survey (AVA_VAN.1)

Assurance Activities: As with ATE_IND, the evaluator shall generate a report to document their findings with respect to this requirement. This report could physically be part of the overall test report mentioned in ATE_IND, or a separate document. The evaluator performs a search of public information to determine the vulnerabilities that have been found in network infrastructure devices and the implemented communication protocols in general, as well as those that pertain to the particular TOE. The evaluator documents the sources consulted and the vulnerabilities found in the report. For each vulnerability found, the evaluator either provides a rationale with respect to its non-applicability, or the evaluator formulates a test (using the guidelines provided in ATE_IND) to confirm the vulnerability, if suitable. Suitability is determined by assessing the attack vector needed to take advantage of the vulnerability. For example, if the vulnerability can be detected by pressing a key combination on boot-up, a test would be suitable at the assurance level of this PP. If exploiting the vulnerability requires expert skills and an electron microscope, for instance, then a test would not be suitable and an appropriate justification would be formulated.

The vulnerability analysis is in the Detailed Test Report (DTR) prepared by the evaluator. The vulnerability analysis includes a public search for vulnerabilities and a port scan. Nether the public search for vulnerabilities or the port scan uncovered any residual vulnerability.