Cisco HyperFlex Systems HX Series

Common Criteria Security Target

Version 2.0

10 July 2018

Americas Headquarters:
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Acronyms and Abbreviations

The following acronyms and abbreviations are common and may be used in this Security Target:

Table 1 Acronyms and Abbreviations

Acronyms / Abbreviations	Definition
AAA	Administration, Authorization, and Accounting
ACL	Access Control Lists
API	Application Programming Interface
CC	Common Criteria

Acronyms / Abbreviations	Definition
CEM	Common Evaluation Methodology
CIMC	Cisco Integrated Management Controller
CIM-XML	Common Information Model XML
CLI	Command Line Interface
CM	Configuration Management
EAL	Evaluation Assurance Level
FC	Fibre Channel
HDD	Hard-disk drives
HTTPS	Hyper-Text Transport Protocol Secure
IP	Internet Protocol
OS	Operating System
SAR	Security Assurance Requirement
SFP	Security Functional Policy
SFR	Security Functional Requirement
SM	Service Module
SSD	Solid-state disk
SSL	Secure Socket Layer
ST	Security Target
TCP	Transport Control Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TLS	Transport Layer Security
TOE	Target of Evaluation
TSC	TSF Scope of Control
TSF	TOE Security Function
TSP	TOE Security Policy
UCS	[Cisco] Unified Computing System
UCSM	UCS Manager
UDP	User datagram protocol
VIB	VMware ESXi vSphere Installation Bundles
VLAN	Virtual Local Area Network
VM	Virtual Machine, a virtualized guest operating system installed to a hypervisor.
VMM	Virtual Machine Manager, a hypervisor.
VSAN	Virtual Storage Area Network
XML	Extensible Markup Language
XML API	The UCS Manager XML API is a programmatic interface for managing UCS via CLI.

Terminology

The following terms are common for this technology and may be used in this Security Target:

Table 2 Terms

Term	Definition
Cluster	A collection of hosts that are interconnected for the purpose of improving reliability, availability, serviceability, load balancing and performance. In this document, cluster implies the storage cluster, unless otherwise stated.
Cluster Access Policy	HX Data Platform (TOE) configurable feature that specifies storage cluster data management when the nodes or disks fail in the storage cluster. For example, when the storage cluster changes to read-only mode to protect data.

Term	Definition
Datastore	A logical container, similar to a file system on a logical volume. Datastores are where the host places virtual disk files and other VM files. Datastores hide the specifics of physical storage devices and provide a uniform model for storing VM files.
Hyperconvergence	Turning standard servers of choice into a single pool of compute and storage resources.
HyperFlex HX Data Platform Controller (also referenced as controller VM)	The HyperFlex HX Data Platform controller resides on each node and implements the distributed file system. The controller VM runs in user space within a virtual machine, intercepts, and handles all I/O from guest virtual machines (VM).
IO Visor	This [TOE] VIB provides a network file system (NFS) mount point so that the ESXi hypervisor can access the HyperFlex HX Data Platform virtual disk drives that are attached to individual virtual machines. From the hypervisor's perspective, it is simply attached to a network file system.
Storage Cluster	The storage cluster contains the converged nodes and their associated storage that the HX Data Platform (TOE) manages. This storage cluster can also include compute nodes, that do not include storage, and that the HX Data Platform (TOE) monitors.
Users	The users of the TOE are the processes and applications on the VMs that are on the TOE that access the storage clusters and datastores which are provided by the TOE.
Virtual Local Area Network (VLAN)	The VLANs enable efficient traffic separation, provide better bandwidth utilization, and alleviate scaling issues by logically segmenting the physical local-area network (LAN) infrastructure into different subnets so that VLAN packets are presented to interfaces within the same VLAN. The most important requirement of VLANs is the ability to identify the origination point for packets with a VLAN tag to ensure packets can only travel to interfaces for which they are authorized.
Virtual Machines (VMs)	The virtual machines are the virtual servers on the TOE that access the storage clusters and datastores, which are provided by the TOE.
vMotion	Enables the live migration of running virtual machines from one physical server to another with zero downtime, continuous service availability, and complete transaction integrity. It is transparent to users.
VMware vStorage API for Array Integration (VAAI)	This storage offload [TOE] API allows vSphere to request advanced file system operations such as snapshots and cloning. The controller causes these operations to occur through manipulation of metadata rather than actual data copying, providing rapid response, and thus rapid deployment of new application environments
Whitelist	A whitelist may consist of a list of users, applications or processes that are viewed with approval or being provided a particular privilege. Entities on the whitelist will be approved, recognized and/or accepted. For the TOE, the whitelist consist of IP addresses of the VMs that have access to the HyperFlex HX Data storage clusters and datastores that are controlled and enforced by the TOE.

DOCUMENT INTRODUCTION

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This document provides the basis for an evaluation of a specific Target of Evaluation (TOE), the Cisco HyperFlex Systems HX Series running Cisco HyperFlex HX Data Platform Software, version 2.5(1c). This Security Target (ST) defines a set of assumptions about the aspects of the environment, a list of threats that the product intends to counter, a set of security objectives, a set of security requirements, and the IT security functions provided by the TOE which meet the set of requirements.

1 SECURITY TARGET INTRODUCTION

The Security Target contains the following sections:

- Security Target Introduction [Section 1]
- Conformance Claims [Section 2]
- Security Problem Definition [Section 3]
- Security Objectives [Section 4]
- IT Security Requirements [Section 5]
- TOE Summary Specification [Section 6]
- Rationale [Section 7]

The structure and content of this ST comply with the requirements specified in the Common Criteria (CC), Part 1, Annex A, and Part 3, Chapter 4

1.1 ST and TOE Reference

This section provides information needed to identify and control this ST and its TOE.

Table 3 ST and TOE Identification

Name	Description
ST Title	Cisco HyperFlex Systems HX Series Common Criteria Security Target
ST Version	2.0
Publication Date	10 July 2018
ST Author	Cisco Systems, Inc.
Developer of the TOE	Cisco Systems, Inc.
TOE Reference	Cisco HyperFlex Systems HX Series
TOE Hardware Models	• Cisco HyperFlex HX220c M4 Node • Cisco HyperFlex HX240c M4 Node • Cisco HyperFlex HX240c M4 Nodes with Cisco UCS B200 Blade Servers • Cisco HyperFlex HX220c M5 Node • Cisco HyperFlex HX240c M5 Node
TOE Software Version	Cisco HyperFlex HX Data Platform Software, version 2.5(1c)
TOE Guidance	Cisco HyperFlex Systems HX Series Common Criteria Operational User Guidance and Preparative Procedures, Version 2.0
Keywords	HyperFlex, Convergent, Cluster, Storage, Data Protection, Authentication

1.2 TOE Overview

The TOE is the Cisco HyperFlex Systems HX Series (herein after also referred to as Converged Hosts or TOE). The TOE is a hyper-convergent software-centric solution that tightly integrates computing, storage, networking and virtualization resources in a single hardware platform.

The TOE is installed in a hypervisor environment, such as VMware vSphere. The TOE manages the storage of a storage cluster that has a minimum three servers (HyperFlex HX Series Nodes (Converged Host)) with Solid-state disk (SSD) and Hard-disk drives (HDD) attached storage. The clustered servers are networked with switches and fabric interconnects. Optionally, non-storage servers, (compute nodes), can be included in the storage cluster. HX Data Platform manages the storage for the data and VMs stored on the associated storage cluster.

The HyperFlex HX Series installer is loaded on a UCS platform that is networked to the storage cluster to be managed. During the installation of the TOE, the initial cluster with at least three HyperFlex HX Series Nodes is created. The datastores are added to the storage cluster after the installation is complete. The HyperFlex HX Series provides a highly fault-tolerant distributed storage system that preserves data integrity and optimizes performance for virtual machine (VM) storage workloads.

The HyperFlex HX Series includes CLI commands that are used to monitor and manage the storage clusters. The CLI also provides the Authorized Administrator the ability to add nodes as the storage capacity and the storage needs grow within the organization.

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

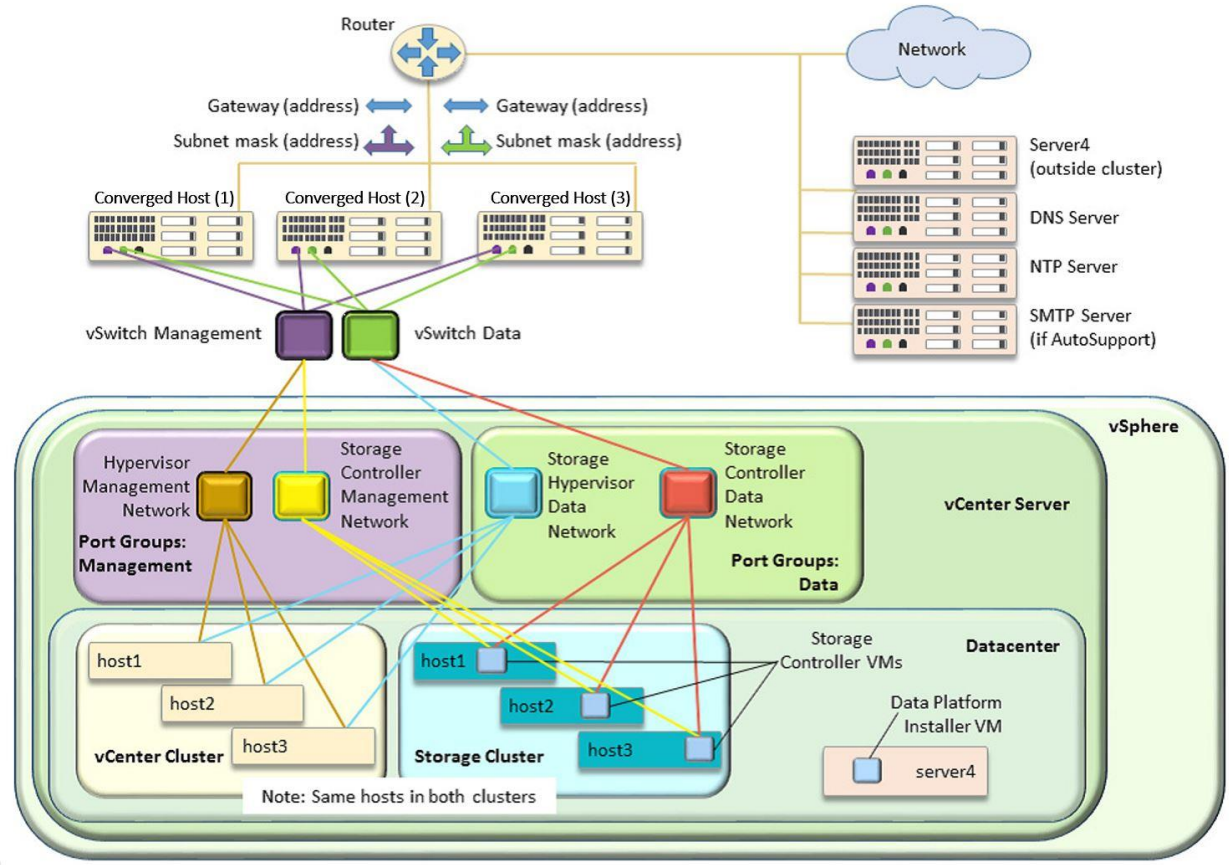


Figure 1 TOE Example Deployment

Trunk ports with VLANs are the access points between the physical and virtual environments. The VLANs are VLAN tagged External Switch VLAN Tagging (EST). The VLAN used for HX storage traffic must be able to traverse the network uplinks from the UCS domain, reaching FI A from FI B, and vice-versa. The VLANs are configured during install of the TOE, then managed by VMware ESXi. There are four required zones,

- Management Zone: This zone comprises the connections needed to manage the physical hardware, the hypervisor hosts, and the storage platform controller virtual machines (SCVM).
- VM Zone: This zone comprises the connections needed to service network IO to the guest VMs that will run inside the HyperFlex HX Series hyperconverged system.
- Storage Zone: This zone comprises the connections used by the Cisco HX Data Platform software, ESXi hosts, and the storage controller VMs to service the HX Distributed Data Filesystem.
- VMotion Zone: This zone comprises the connections used by the ESXi hosts to enable vMotion of the guest VMs from host to host.

Following is a diagram illustrates the logical data path and network design

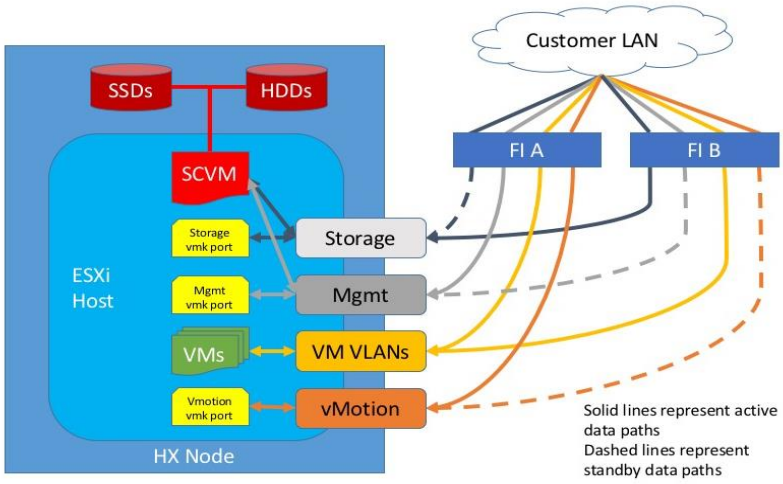


Figure 2 Cisco HX Data logical data paths

1.2.1 TOE Product Type

The Cisco HyperFlex Systems HX Series product type is a type of infrastructure system with a software-centric architecture that tightly integrates compute, storage, networking and virtualization resources.

The HyperFlex Systems HX Series provides connectivity and security services onto a single, secure device. The TOE offers:

- Enterprise-class data management features that are required for complete lifecycle management and enhanced data protection in distributed storage
- Simplified data management that integrates storage functions into existing management tools and allowing instant provisioning for dramatically simplified daily operations
- Independent scaling of the computing, caching, and capacity tiers, giving you the flexibility to scale the environment based on evolving business needs
- Continuous data optimization with inline data deduplication and compression that increases resource utilization with more headroom for data scaling
- Dynamic data placement in node memory, enterprise-class flash memory (on solid-state disk [SSD] drives), and persistent storage tiers (on hard-disk drives [HDDs]) to optimize performance and resiliency—and to readjust data placement as you scale your cluster

The HyperFlex Systems HX Series delivers the combination of the essential features in a single solution.

1.2.2 Supported non-TOE Hardware/ Software/ Firmware

The TOE supports the following hardware, software, and firmware components in its operational environment. Each component is identified as being required or not based on the claims made in this Security Target. All of the following environment components are supported by all TOE evaluated configurations.

Table 4 IT Environment Components

Component	Required	Usage/Purpose Description for TOE performance
DNS Server	Yes	The DNS Server is required to support IP addresses that are provided as host names for the various components that may be used for traffic and access control.
Fabric Interconnects (FI) (Cisco UCS)	Yes	The FIs provides the connections to the larger network including the switches and servers. The TOE deployment requires a minimum of two FIs for each Cisco HyperFlex Cluster to create high availability. The FI provides the single point of connectivity and hardware management that integrates Cisco HyperFlex HX Series nodes and Cisco UCS B-Series Blade Servers into a single unified cluster. The two FIs must be directly connected together using Ethernet cables between the two FI ports. This allows both the FIs to continuously monitor the status of each other. Cisco UCS Manager is an embedded software on the pair of fabric interconnects.
Management Workstation	Yes	This includes any IT Environment Management workstation installed with the SSHv2 client to support the TOE CLI interface for management of the TOE. The connection of the management workstation to the TOE is protected through SSHv2 channel.
NTP Server	Yes	The TOE supports communications with an NTP server to receive clock updates.
SNMP Server	No	The server is required for the AutoSupport service, an alert notification service that is an optional service.
Switches	Yes	The switches provide data transmission and tracking
VMware vSphere	Yes	The supported versions include 6.0 U1b, 6.0 U2, 6.0 U2 Patch 3, with VMware vSphere Editions of Enterprise, Enterprise Plus, Standard, Essentials Plus,

Component	Required	Usage/Purpose Description for TOE performance
		ROBO. vSphere contains both vCenter and ESXi. The vCenter version must always be equal to or higher than the ESXi version[1].

1.3 TOE DESCRIPTION

This section provides an overview of the Cisco HyperFlex Systems HX Series Target of Evaluation (TOE). The TOE is comprised of both software and hardware.

The TOE software is Cisco HyperFlex HX Data Platform Software, version 2.5(1c). Cisco HyperFlex HX Data Platform™ Software is a Cisco-developed highly configurable proprietary operating system that provides for efficient and effective scaling for storage capacity and performance.

The TOE hardware is the Cisco HyperFlex HX Series Nodes and Cisco UCS B-Series Blade Servers that includes the following models:

The Cisco HyperFlex HX220c M4 Node is a small footprint one rack unit (1RU) that efficiently stores data and optimizes performance with two Intel Xeon E5 2600 v3 processors, 256 Gb to 512 Gb 2133 MHz DIMMs, 480-Gb high-endurance (Intel 3610) cache SSD and 6 x 1.2 TB 10,000 RPM 12-Gbps SAS disks.

Figure 3 Cisco HyperFlex HX220c M4Node

The Cisco HyperFlex HX240c M4 Node is a two rack unit (2RU) that allows for cluster scaling with maximum storage capacity. The HyperFlex HX240c M4 Node has two Intel Xeon E5 2600 v3 processors, 256 Gb to 784 Gb 2133 MHz DIMMs 1.6-Tb high-endurance (Intel 3610) cache SSDs and 15 x 1.2 TB 10K RPM 12gbps SAS disks.

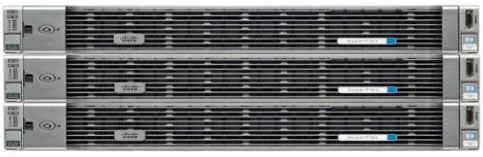


Figure 4 Cisco HyperFlex HX240c M4Node

The Cisco HyperFlex HX240c M4 Nodes with Cisco UCS B200 Blade Servers efficiently stores data and optimizes for performance so you never worry about running out of one resource while

[1] HyperFlex Systems may be pre-installed VMware vSphere with licensing applied at purchase

having too much of another. The HyperFlex HX240c M4 Nodes with Cisco UCS B200 Blade Servers has two 2 x Intel Xeon E5 2600 v3 processors plus 2x Intel Xeon E5 2600 v3 processors in Cisco UCS B200 servers, 256 Gb to 784 Gb 2133 MHz DIMMs and 1.6-Tb high-endurance (Intel 3610) cache SSDs and 15 x 1.2-TB 10,000 RPM 12-gbps SAS disks.

Figure 5 Cisco HyperFlex HX240c M4 Nodes with Cisco UCS B200 Blade Servers

The Cisco HyperFlex HX220c M5 Node is a one-rack unit (1RU) that efficiently stores data and optimizes performance with one or two Intel Xeon Scalable processors, 3 Intel UPI channels per processor, 24 DDR4 DIMM slots, 16-, 32-, 64-, or 128-GB DIMM slots, up to 8x1.2-TB or 1.8-SAS HDDs, 1 x 240-GB SSD log drive, 12-Gbps modular SAS.

Figure 6 Cisco HyperFlex HX220c M5 Node

The Cisco HyperFlex HX240c M5 Node is a two-rack unit (2RU) that efficiently stores data and optimizes performance with one or two Intel Xeon Scalable processors, 24 DDR4 DIMM slots, 16-, 32-, 64-, or 128-GB DIMM slots, up to 23x3.8-TB or 23x960-GB SSDs, 1 240-SD log drive, 1 x 240-GB SSD log drive, 12-Gbps modular SAS.

Figure 7 Cisco HyperFlex HX240c M5 Node

The Cisco HyperFlex HX Series Cluster contains a minimum of three and a maximum of eight converged HX-nodes (Cisco HyperFlex HX220c M4, Cisco HyperFlex HX240c M4, Cisco HyperFlex HX220c M5 or Cisco HyperFlex HX240c M5) with an option of adding compute-only nodes (Cisco B200 M4) to provide additional compute power if there is no need for extra storage. Each server in a HyperFlex HX Cluster may also be referred as a Converged hosts or HX node.

The following drawing illustrates the HyperFlex HX Series (Converged Host) required hardware components and the relative connections between the components.

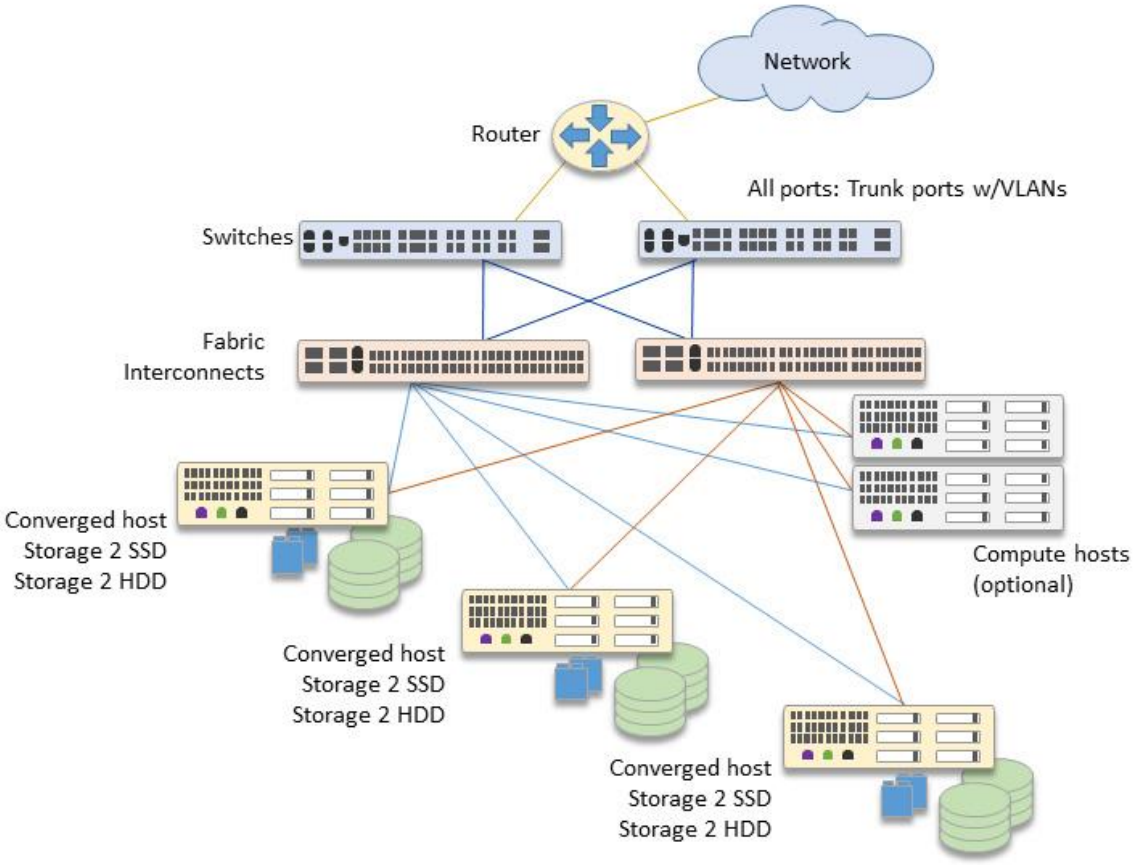


Figure 8 Cisco HX Data Platform Hardware Overview

For each of the TOE Converged hosts (HyperFlex HX Series Nodes) depicted in the diagram above, that provide the storage in the storage cluster. The SSDs are depicted as the blue squares and the HDDs are depicted as the green-layered circles).

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

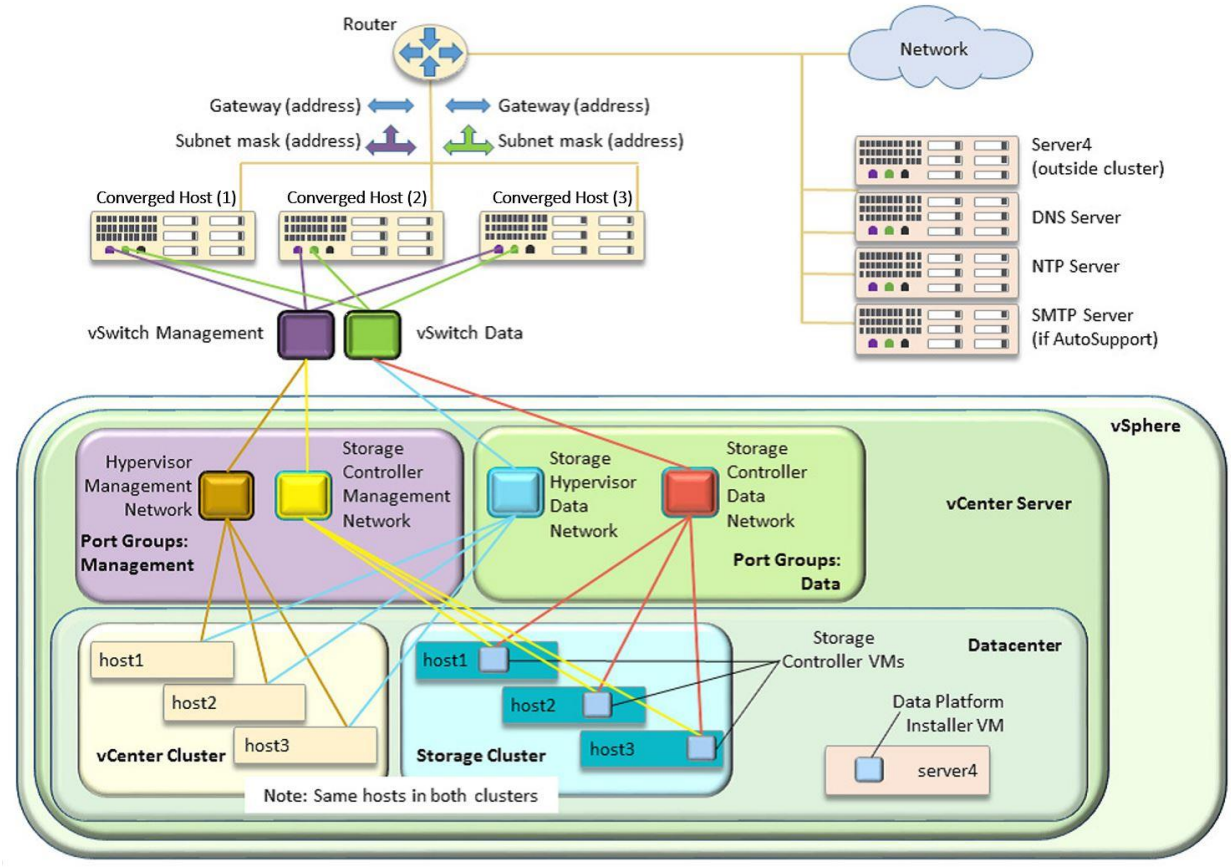


Figure 9 TOE Example Deployment

The diagram above includes the following TOE components:

- vCenter cluster - the original vSphere cluster containing the VM hosts that use and access the storage clusters. Note, as depicted in the drawing above, the VM hosts are in both the vCenter Cluster and the HyperFlex HX Series Storage Cluster. These are the same VM hosts, but they belong to both clusters.
- Storage cluster - the created HyperFlex HX Series cluster containing the listed hosts from the vCenter cluster. A cluster requires a minimum of three TOE Converged Hosts (HyperFlex HX Series Nodes). Data is replicated across at least two of these nodes, and a third node is required for continuous operation in the event of a single-node failure. Each node that has disk storage is equipped with at least one high-performance SSD drive for data caching and rapid acknowledgment of write requests. Each node also is equipped with up to the platform's physical capacity of spinning disks for maximum data capacity.
- HyperFlex HX Series controller - resides on each TOE Converged Hosts (HyperFlex HX Series Nodes) and implements the distributed file system. It uses the node's memory and SSD drives as part of a distributed caching layer, and it uses the node's HDDs for distributed storage.
- HyperFlex HX Series Installer VM - remains available for additional cluster creation, cluster expansion with TOE Converged hosts, or compute nodes.

- HyperFlex Controller VM – runs on each of the TOE Converged Hosts (HyperFlex HX Series Nodes) in the cluster. The Controller VMs cooperate to form and coordinate the Cisco HX Distributed Filesystem, and service all the guest VM IO requests. The Controller VMs are deployed as a vSphere ESXi agent, and the agent is tied to a specific host. Each ESXi hypervisor host has a single ESXi agent deployed, which is the Controller VM for that node, and it cannot be moved or migrated to another host.

1.4 TOE Evaluated Configuration

The TOE consists of one or more physical devices as specified in section 1.5 Physical Scope of the TOE below and includes the Cisco HyperFlex HX Data Platform Software, version 2.5(1c).

The TOE is installed in a hypervisor environment, such as VMware vSphere where it manages the storage clusters and datastores that has a minimum three servers, (TOE Converged hosts), with SSD and HDD attached storage. The clustered servers (TOE Converged hosts) are networked with switches and fabric interconnects. Optionally, non-storage servers, (compute nodes), can be included in the storage cluster (TOE Converged hosts). HyperFlex HX Series manages the storage for the data and VMs stored on the associated storage cluster (TOE Converged hosts).

The evaluated configuration is the configuration of the TOE that satisfies the requirements as defined in this Security Target (ST). For example,

- Security audit – The TOE generates audit records to assist the Authorized Administrator in monitoring the security state of the HX Data Platform as well as trouble shooting various problems that arise throughout the operation of the system
- User Data Protection – The TOE provides access controls to the TOE Converged hosts, clusters and datastores.
- Identification and authentication – The TOE ensures that all Authorized Administrator are successfully identified and authenticated prior to gaining access to the TOE and terminates connection after a configured period of inactivity.
- Secure Management – The TOE provides secure administrative services for management of general TOE configuration and the security functionality provided by the TOE. All TOE administration occurs through the CLI (over SSHv2). All of these management functions are restricted to Authorized Administrator. The term "Authorized Administrator" is used in this ST to refer to any user account that has been assigned the privileges to perform the relevant action. The TOE provides the ability to perform the following actions:
    - Administer the TOE remotely
    - Manage access control attributes
    - Manage Authorized Administrator’s security attributes
    - Review audit record logs
    - Configure and manage the system time
- Protection of the TSF - The TOE protects against interference and tampering by untrusted subjects by implementing identification and authentication, access control to the TOE Converged hosts, clusters and datastores and limits configuration options to the Authorized Administrator. Additionally Cisco HyperFlex HX Series is not a general-purpose operating system and access to Cisco HyperFlex HX Series memory space is restricted to only Cisco

HyperFlex HX Series functions. The TOE also provides the capability to protect unavailability of capabilities and system resources and to revert to a saved space in the case of hardware or system disruption of failure. The TOE internally maintains the date and time. This date and time is used as the timestamp that is applied to audit records generated by the TOE. Authorized Administrator can update the TOE's clock manually or can configure the TOE to use NTP to synchronize the TOE's clock with an external time source.

- TOE Access - The TOE can enforce the termination of inactive sessions after an Authorized Administrator configurable time-period. Once a session has been terminated, the TOE requires the Authorized Administrator to re-authenticate to establish a new session.
- Resource Utilization - Ensures the system, resources and data is preserved in case of a failure or degradation of services.
- Trusted Path/Channel – Ensures a trusted path is established between the TOE and the CLI using SSHv2.

The TOE is remotely administered using the CLI, therefore, the management station must be connected to an internal network and SSHv2 must be used to securely connect to the TOE.

The TOE is also configured to connect to an NTP server on its internal protected network for time services, which is only accessible via the protected internal network. The NTP server is used for clock synchronization between services running on the Cisco HyperFlex HX Series Nodes, the storage controller VMs (storage controller) and ESX hosts (Hypervisor).

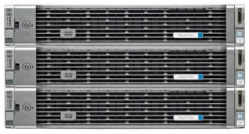
1.5 Physical Scope of the TOE

The TOE is a hardware and software solution that makes up the Cisco HyperFlex Systems HX Series. The hardware platforms include the Cisco HyperFlex HX Series Nodes and Cisco UCS B-Series Blade Servers. The software is the Cisco HyperFlex HX Data Platform™ Software v2.5(1c). The network, on which they reside, is considered part of the environment.

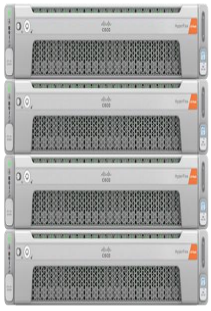
The TOE guidance documentation that is considered to be part of the TOE can be found listed in the Cisco HyperFlex Systems HX Series Common Criteria Operational User Guidance and Preparative Procedures document and can be obtained from the http://cisco.com web site.

The TOE is comprised of the following physical specifications as illustrated and described in the Figures and Tables below:

Table 5 Hardware Models and Specifications

Hardware	Picture	Size	Power	Interfaces
Cisco HyperFlex HX220c M4 Node		**Height** 1.7 in. (4.32 cm) **Width** 16.89 in. (43.0 cm) including handles: 18.98 in. (48.2 cm) **Depth** 29.8 in. (75.6 cm) including handles: 30.98 in. (78.7 cm)	Two 770 W (AC) hot swappable power supplies	**Rear panel** • One DB15 VGA connector • One RJ45 serial port connector • Two USB 3.0 port connectors • One RJ-45 10/100/1000 Ethernet management port, using Cisco Integrated • Management Controller (CIMC) firmware • Two Intel i350 embedded (on the motherboard) GbE LOM ports • One flexible modular LAN on motherboard (mLOM) slot that • Accommodates the Cisco UCS VIC1227 VIC MLOM - Dual Port 10Gb SFP+ interface card. • Two PCIe 3.0 slots **Front panel** • One KVM console connector (supplies two USB 2.0 connectors, one VGA • DB15 connector, and one serial port (RS232) RJ45 connector)
Cisco HyperFlex HX240c M4 Node		**Height** 3.43 in. (8.70 cm) **Width** (including slam latches) 17.65 in.(44.8 cm) Including handles: 18.96 in (48.2 cm) **Depth** 29.0 in. (73.8 cm) Including handles: 30.18 in (76.6 cm)	Up to two hot-pluggable, redundant 650W, 930W DC, 1200W, or 1400W power supplies	**Rear panel** • One DB15 VGA connector • One RJ45 serial port connector • Two USB 3.0 port connectors • One RJ-45 10/100/1000 Ethernet management port, using Cisco Integrated • Management Controller (CIMC) firmware • Two Intel i350 embedded (on the motherboard) GbE LOM ports • One flexible modular LAN on motherboard (mLOM) slot that • Accommodates the Cisco UCS VIC1227 VIC MLOM - Dual Port 10Gb SFP+ interface card. • Two PCIe 3.0 slots **Front panel** • One KVM console connector (supplies two USB 2.0 connectors, one VGA • DB15 video connector, and one serial port (RS232) RJ45 connector)

Hardware	Picture	Size	Power	Interfaces
Cisco HyperFlex HX240c M4 Nodes with Cisco UCS B200 Blade Servers		Same as above for the node and the following blade size **Height** 1.95 in. (50 mm) **Width** 8.00 in.(203 mm) **Depth** 24.4 in. (620 mm)	Same as above for the node and blade	Same as above for the node and the following blade interface: **Front panel** • One console connector
Cisco HyperFlex HX220c M5 Node		**Height** 1.7 in (4.32 cm) **Width** 16.89 in (43.0 cm), including handles 18.98 in (48.2 cm) **Depth** 29.8 in (75.6 cm) Including handles 30.98 in (78.7 cm)	Up to two of the following hot-swappable power supplies: 770W (AC), 1050W (AC), 1050W (DC)	**Rear panel** • One 1-Gbps RJ-45 management port (Marvell 88E6176) • Two 10GBase-T LOM ports (Intel X550 controller embedded on the motherboard • One RS-232 serial port (RJ45 connector) • One DB15 VGA connector • Two USB 3.0 port connectors • One flexible modular LAN on motherboard (mLOM) slot that can accommodate various interface cards **Front panel** • One KVM console connector (supplies two USB 2.0 connectors, one VGA DB15 video connector, and one serial port (RS232) RJ45 connector)

Hardware	Picture	Size	Power	Interfaces
Cisco HyperFlex HX240c M5 Node		**Height** 3.43 in (8.70 cm) **Width** 17.65 in (43.0 cm), including handles 18.96 in (48.2 cm) **Depth** 29.0 in (73.8 cm) Including handles 30.18 in (76.6 cm)	Up to two of the following hot-swappable power supplies: 1050W (AC), 1050W (DC) 1600W (AC)	One slot for a micro-SD card on PCIe Riser **Rear panel** • One 1-Gbps RJ-45 management port (Marvell 88E6176) • Two 10GBase-T LOM ports (Intel X550 controller embedded on the motherboard • One RS-232 serial port (RJ45 connector) • One DB15 VGA connector • Two USB 3.0 port connectors • One flexible modular LAN on motherboard (mLOM) slot that can accommodate various interface cards **Front panel** One KVM console connector (supplies two USB 2.0 connectors, one VGA DB15 video connector, and one serial port (RS232) RJ45 connector)

1.6 Logical Scope of the TOE

The TOE is comprised of several security features. Each of the security features identified above consists of several security functionalities, as identified below.

- Security audit
- User data protection
- Identification and authentication
- Secure Management
- Protection of the TSF
- Resource Utilization
- TOE Access
- Trusted Path

These features are described in more detail in the subsections below.

1.6.1 Security Audit

The TOE generates audit messages that identify specific TOE operations. For each event, the TOE records the date and time of each event, the type of event, the subject identity, and the outcome of the event. Auditable events include:

- all use of the user identification mechanism;
- all use of the authentication mechanism;
- all modification in the behavior of the functions in the TSF;

- all modifications of the default settings;
- all modifications to the values of the TSF data;
- use of the management functions;
- changes to the time;
- terminations of an interactive session; and
- attempts to use the trusted path functions

The TOE will write audit records to the local logging buffer by default. The TOE provides an interface available for the Authorized Administrator to delete audit data stored locally on the TOE to manage the audit log space.

The logs can be viewed on the TOE using Task View CLI commands. The records include the date/time the event occurred, the event/type of event, the user associated with the event, and additional information of the event and its success and/or failure.

1.6.2 User Data Protection

The TOE provides the Authorized Administrator with the ability to control remote host (VMs) access to the TOE Converged hosts, clusters and datastores with whitelisting.

The whitelist controls access using IP addresses. If the Remote Host (VM) host IP address is included on the whitelist and there is sufficient storage capacity, access is granted otherwise access is denied.

The three sets of addressing that may be used:

- Management addresses identify the TOE Converged hosts and their clusters and datastores and the Storage Controller VM management interfaces
- VM addresses identify the guest VMs that run in the TOE HyperFlex hyperconverged system
- Storage addresses that are used by Cisco HX Data Platform software, ESXi hosts, and the storage controller VMs to service the HX Distributed Filesystem. These interfaces and IP addresses need to be able to communicate with each other at all times for proper operation.

1.6.3 Identification and authentication

The TOE provides authentication services for the Authorized Administrator to connect to the TOEs secure CLI administrator interface. The TOE requires the Authorized Administrator to authenticate prior to being granted access to any of the management functionality. The TOE can be configured to enforce password minimum length as well as mandatory password complexity rules. The TOE provides administrator authentication against a local user database. Password-based authentication is performed on the SSHv2 CLI session interfaces secured connection.

For each Authorized Administrator account, they must have a unique user name. For authentication purposes, a password is required for each Authorized Administrator account.

1.6.4 Security Management

The TOE provides secure administrative services for management of general TOE configuration and the security functionality provided by the TOE. All TOE administration occurs through the CLI interface via SSHv2 secure connection.

The TOE provides the ability to securely:

- Administer the TOE remotely
- Manage access control attributes
- Manage Authorized Administrator's security attributes, noting the TOE allows for more than one administrator account to be configured. Each Authorized Administrator must be assigned a unique username and password
- Review audit record logs
- Configure and manage the system time

1.6.5 Protection of the TSF

The TOE protects against interference and tampering by untrusted subjects by implementing identification, authentication and limit configuration options to the Authorized Administrator. Additionally, Cisco HyperFlex HX Data Platform™ Software v2.5(1c) is not a general-purpose operating system and access to Cisco HyperFlex HX Data Platform™ Software v2.5(1c) memory space is restricted to only Cisco HyperFlex HX Data Platform™ Software v2.5(1c) functions.

The TOE provides the capability called native snapshot to save the current state of the VMs, so the Authorized Administrator has the option to revert to the saved state in the case of disruption or failure.

The TOE internally maintains the date and time. This date and time is used as the timestamp that is applied to audit records generated by the TOE. Authorized Administrators can update the TOE's clock manually or configure the TOE to use NTP to synchronize the TOE's clock with an external time source. It is recommended that NTP server be configured to connect to an NTP server on its internal protected network for time services, which is only accessible via the protected internal network. The NTP server is used for clock synchronization between services running on the Cisco HyperFlex HX Series Nodes, the storage controller VMs (storage controller) and ESX hosts (Hypervisor).

1.6.6 Resource Utilization

The TOE protects against unavailability of capabilities and system resources caused by failure or degradation of services by supporting redundancy and failover capabilities of the storage management network and the storage data networks.

1.6.7 TOE Access

The TOE enforces the termination of inactive sessions after an Authorized Administrator configurable time-period has expired. Once a session has been terminated, the TOE requires the Authorized Administrator to re-authenticate to establish a new session.

1.6.8 Trusted Path

The TOE allows trusted paths to be established to itself from remote administrators over SSHv2 for remote CLI access.

1.7 Excluded Functionality

The following functionality is excluded from the evaluation.

- Telnet: Sends authentication data in plain text. This feature is disabled by default and must remain disabled in the evaluated configuration.

1.8 TOE Documentation

This section identifies the guidance documentation included in the TOE. The documentation for the Cisco HyperFlex Systems HX Series comprises:

- Cisco HyperFlex Systems HX Series Common Criteria Operational User Guidance and Preparative Procedures, v2.0 dated [DD MMM YYYY].

2 CONFORMANCE CLAIMS

2.1 Common Criteria Conformance Claim

The ST and the TOE it describes are conformant with the following CC specifications:

- Common Criteria for Information Technology Security Evaluation Part 2: Security Functional Components, Version 3.1, Revision 4, September 2012
  - Part 2 Conformant
- Common Criteria for Information Technology Security Evaluation Part 3: Security Assurance Components, Version 3.1, Revision 4, September 2012
  - Part 3 Conformant

The ST and TOE are package conformant to evaluation assurance package:

- EAL2

2.2 Protection Profile Conformance

This ST claims no compliance to any Protection Profiles

3 SECURITY PROBLEM DEFINITION

This section describes the following security environment in which the TOE is intended to be used.

- Significant assumptions about the TOE's operational environment
- IT related threats to the organization countered by the TOE
- Environmental threats requiring controls to provide sufficient protection
- Organizational security policies for the TOE as appropriate

This document identifies assumptions as A.assumption with "assumption" specifying a unique name. Threats are identified as T.threat with "threat" specifying a unique name.

3.1 Assumptions

The specific conditions listed in the following subsections are assumed to exist in the TOE's environment. These assumptions include both practical realities in the development of the TOE security requirements and the essential environmental conditions on the use of the TOE.

Table 6 TOE Assumptions

Assumptions	Assumption Definition
A.ADMIN	All Authorized Administrator are assumed not evil, will follow the administrative guidance and will not disrupt the operation of the TOE intentionally.
A.CONNECTIONS	The operational environment in which the TOE is installed will allow the users of the TOE to access the stored information.
A.LOCATE	The processing resources of the TOE and those services provided by the operational environment will be located within controlled access facilities, which will prevent unauthorized physical access.

3.2 Threats

The following table lists the threats addressed by the TOE and the IT Environment. The assumed level of expertise of the attacker for all the threats identified below is Basic.

Table 7 Threats

Threat	Threat Definition
T.ACCOUNTABILITY	An authorized administrative is not held accountable for their actions on the TOE because the audit records are not generated or reviewed.
T.NOAUTH	An unauthorized person (attacker) may attempt to bypass the security of the TOE so as to access and use security functions and/or non-security functions provided by the TOE to disrupt operations of the TOE.
T.RESOURCE_AVAILABILITY	The TOE data (user) could become corrupted or unavailable due to hardware or system operation failures.
T.TIME	Evidence of a compromise by an unauthorized user (attacker) or malfunction of the TOE may go unnoticed or not be properly

Threat	Threat Definition
	traceable if recorded events (audit data) are not properly sequenced through application of correct timestamps.

3.3 Organizational Security Policies

No Organizational Security Polices (OSPs) have been defined for this TOE.

4 SECURITY OBJECTIVES

This Section identifies the security objectives of the TOE and the IT Environment. The security objectives identify the responsibilities of the TOE and the TOE's IT environment in meeting the security needs.

This document identifies objectives of the TOE as O.objective with objective specifying a unique name. Objectives that apply to the IT environment are designated as OE.objective with objective specifying a unique name.

4.1 Security Objectives for the TOE

The following table, Security Objectives for the TOE, identifies the security objectives of the TOE. These security objectives reflect the stated intent to counter identified threats and/or comply with any security policies identified. An explanation of the relationship between the objectives and the threats/policies is provided in the rationale section of this document.

Table 8 Security Objectives for the TOE

TOE Objective	TOE Security Objective Definition
O.ACCESS_CONTROL	The TOE will restrict access to the TOE management functions to the Authorized Administrator.
O.ADMIN	The TOE will provide the Authorized Administrator with a set of privileges to isolate administrative actions and to make the administrative functions available remotely.
O.AUDIT_GEN	The TOE will generate audit records that will include the time that the event occurred, the identity of the user performing the event and the outcome of the event.
O.AVAILABILITY	The TOE will provide mechanisms to maintain a secure state and mitigate against data loss or corruption due to hardware or system operation failures.
O.AUDIT_VIEW	The TOE will provide the Authorized Administrator the capability to review audit data.
O.DATA	The TOE will protect the configuration and user data from unauthorized modifications.
O.IDAUTH	The TOE must uniquely identify and authenticate the claimed identity of all administrative users before granting management access.
O.SELFPRO	The TOE must protect itself against attempts by unauthorized users to bypass, deactivate, or tamper with TOE security functions.
O.TIME	The TOE will provide a reliable time stamp for its own use.

4.2 Security Objectives for the Environment

All of the assumptions stated in Section 3.1 are considered to be security objectives for the environment. The following are the non-IT security objectives, which, in addition to those assumptions, are to be satisfied without imposing technical requirements on the TOE. That is, they will not require the implementation of functions in the TOE hardware and/or software. Thus, they will be satisfied largely through application of procedural or administrative measures.

Table 9 Security Objectives for the Environment

Environment Security Objective	IT Environment Security Objective Definition
OE.ADMIN	The Authorized Administrator are well trained and trusted to manage the TOE and to configure the IT environment and required non-TOE devices for the proper network support.
OE.CONNECTION	The operational environment will have the required protected network support for the operation of the TOE to prevent unauthorized access to the TOE.
OE.LOCATE	The processing resources of the TOE and those services provided by the operational environment will be located within controlled access facilities, which will prevent unauthorized physical access.

5 SECURITY REQUIREMENTS

This section identifies the Security Functional Requirements for the TOE. The Security Functional Requirements included in this section are derived from Part 2 of the *Common Criteria for Information Technology Security Evaluation, Version 3.1, Revision 4, dated: September 2012* and all international interpretations.

5.1 Conventions

The CC defines operations on Security Functional Requirements: assignments, selections, assignments within selections and refinements. This document uses the following font conventions to identify the operations defined by the CC:

- Assignment: allows the specification of an identified parameter. Assignments are indicated using bold and are surrounded by brackets (e.g., [**assignment**]). Note that an assignment within a selection would be identified in italics and with embedded bold brackets (e.g., [**[*selected-assignment*]**]).
- Selection: allows the specification of one or more elements from a list. Selections are indicated using bold italics and are surrounded by brackets (e.g., [***selection***]).
- Iteration: allows a component to be used more than once with varying operations. In the ST, iteration is indicated by a number placed at the end of the component. For example FDP_IFF.1(1) and FDP_IFF.1(2) indicate that the ST includes two iterations of the FDP_IFF.1 requirement, (1) and (2).
- Refinement: allows the addition of details. Refinements are indicated using bold, for additions, and strike-through, for deletions (e.g., "… **all** objects …" or "… ~~some~~ **big** things …").
- Extended Requirements (i.e., those not found in Part 2 of the CC) are identified with "(EXT)" in of the functional class/name.
- Other sections of the ST use bolding to highlight text of special interest, such as captions.

5.2 TOE Security Functional Requirements

This section identifies the Security Functional Requirements for the TOE. The TOE Security Functional Requirements that appear in the following table are described in more detail in the following subsections.

Table 10 Security Functional Requirements

Functional Component	
Requirement Class	**Requirement Component**
FAU: Security audit	FAU_GEN.1: Audit data generation
	FAU_GEN.2: User identity association
	FAU_SAR.1: Audit review
	FAU_STG.1: Protected audit trail storage
FDP: User data protection	FDP_ACC.2: Complete access control
	FDP_ACF.1: Security attribute based access control
FIA: Identification and authentication	FIA_ATD.1 User attribute definition
	FIA_SOS.1 Verification of secrets
	FIA_UAU.2 User authentication before any action
	FIA_UAU.7: Protected authentication feedback

Functional Component	
	FIA_UID.2 User identification before any action
FMT: Security management	FMT_MSA.1 Secure Security Attributes (Access Control)
	FMT_MSA.3 Static Attribute Initialization (Access Control)
	FMT_MTD.1: Management of TSF data
	FMT_SMF.1: Specification of management functions
	FMT_SMR.1: Security roles
FPT: Protection of the TSF	FPT_FLS.1 Failure with preservation of secure state
	FPT_STM.1: Reliable time stamps
FRU: Resource Utilization	FRU_FLT.2 Limited fault tolerance
FTA: TOE Access	FTA_SSL.3: TSF-initiated termination
FTP: Trusted Path	FTP_TRP.1: Trusted Path

5.2.1 Security audit (FAU)

5.2.1.1 FAU_GEN.1 Audit data generation

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

a) Start-up and shut-down of the audit functions;
b) All auditable events for the [***not specified***] level of audit **specified in** Table 11 Auditable Events; and
c) [**no additional events**]..

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

a) Date and time of the event, type of event, subject identity, and the outcome (success or failure) of the event; and
b) For each audit event type, based on the auditable event definitions of the functional components included in the ~~PP/~~ST, [**information specified in the Additional Audit Record Contents column of** Table 11 Auditable Events].

Table 11 Auditable Events

Requirement	Auditable Events	Additional Audit Record Contents
FAU_GEN.1	None.	
FAU_GEN.2	None.	
FAU_SAR.1	None.	
FAU_STG.1	None.	
FDP_ACC.2	None	
FDP_ACF.1	None	
FIA_ATD.1	None	
FIA_SOS.1	None	

Requirement	Auditable Events	Additional Audit Record Contents
FIA_UAU.2	All use of the authentication mechanism.	Provided user identity, origin of the attempt (e.g., IP address).
FIA_UAU.7	None	
FIA_UID.2	All use of the identification mechanism.	Provided user identity, origin of the attempt (e.g., IP address).
FMT_MSA.1	None	
FMT_MSA.3	Modifications of the default setting of permissive or restrictive rules and all modifications of the initial values of security attributes.	None
FMT_MTD.1	All modifications to the values of TSF data	The identity of the authorized administrator performing the operation.
FMT_SMF.1	Use of the management functions	The identity of the authorized administrator performing the operation.
FMT_SMR.1	None	
FPT_FLS.1	Failure of the TSF	None
FPT_STM.1	Changes to the time.	The identity of the authorized administrator performing the operation.
FRU_FLT.2	Any failure detected by the TSF	None
FTA_SSL.3	Termination of an interactive session by the session locking mechanism.	None
FTP_TRP.1	Attempts to use the trusted path functions.	Identification of the user associated with all trusted path invocations including failures, if available.

5.2.1.2 FAU_GEN.2 User Identity Association

FAU_GEN.2.1 For audit events resulting from actions of identified users, the TSF shall be able to associate each auditable event with the identity of the user that caused the event.

5.2.1.1 FAU_SAR.1 Audit Review

FAU_SAR.1.1 The TSF shall provide [**Authorized Administrator,**] with the capability to read [**all TOE audit trail data**] from the audit records.

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

5.2.1.2 FAU_STG.1 Protected audit trail storage

FAU_STG.1.1 The TSF shall protect the stored audit records in the audit trail from unauthorised deletion.

FAU_STG.1.2 The TSF shall be able to [***prevent***] unauthorised modifications to the stored audit records in the audit trail.

5.2.1 User data protection (FDP)

5.2.1.1 FDP_ACC.2 Complete access control

FDP_ACC.2.1 The TSF shall enforce the [**Access Control SFP**] on [

Subjects:

- **Remote Host (VMs)**

Objects:

- **Clusters (Converged Host)**
- **Datastores**]

and all operations among subjects and objects covered by the SFP.

FDP_ACC.2.2 The TSF shall ensure that all operations between any subject controlled by the TSF and any object controlled by the TSF are covered by an access control SFP.

5.2.1.2 FDP_ACF.1 Security attribute based access control

FDP_ACF.1.1 The TSF shall enforce the [**Access Control SFP**] to objects based on the following: [

Subject security attributes:

- **Remote Host IP address**

Object security attributes:

- **Cluster Datastore IP address**
- **Whitelist**
- **Storage capacity**

].

FDP_ACF.1.2 The TSF shall enforce the following rules to determine if an operation among controlled subjects and controlled objects is allowed: [**if the Remote Host IP address is on the Cluster Datastore whitelist, access is granted**].

FDP_ACF.1.3 The TSF shall explicitly authorise access of subjects to objects based on the following additional rules: [**none**].

FDP_ACF.1.4 The TSF shall explicitly deny access of subjects to objects based on the following additional rules: [**if the Cluster Datastore storage space is not available, access is denied**].

5.2.2 Identification and authentication (FIA)

5.2.2.1 FIA_ATD.1 User Attribute Definition

FIA_ATD.1.1 The TSF shall maintain the following list of security attributes belonging to individual users: [**For interactive users:**

a) user identity;

b) password].

5.2.2.2 FIA_SOS.1 Verification of secrets

FIA_SOS.1.1 The TSF shall provide a mechanism to verify that secrets meet [**at least eight characters long; includes upper and lower alpha characters and alpha numeric characters**].

5.2.2.3 FIA_UAU.2 User Authentication Before Any Action

FIA_UAU.2.1 The TSF shall require each user to be successfully authenticated before allowing any other TSF mediated actions on behalf of that user.

5.2.2.4 FIA_UAU.7: Protected authentication feedback

FIA_UAU.7.1 The TSF shall provide ~~only~~ [**no feedback or any locally visible representation of the user-entered password**] to the user while the authentication is in progress.

5.2.2.5 FIA_UID.2 User Identification Before Any Action

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

5.2.3 Security management (FMT)

5.2.3.1 FMT_MSA.1 Management of security attributes

FMT_MSA.1.1 The TSF shall enforce the [**Access Control SFP**] to restrict the ability to [***modify***, **[*none*]**] the security attributes [**listed in section FDP_ACF1.1**] to [**Authorized Administrator**]

5.2.3.1 FMT_MSA.3 Static attribute initialization

FMT_MSA.3.1 The TSF shall enforce the [**Access Control SFP**] to provide [***restrictive***] default values for security attributes that are used to enforce the SFP.

FMT_MSA.3.2 The TSF shall allow [**Authorized Administrator**] to specify alternative initial values to override the default values when an object or information is created.

5.2.3.2 FMT_MTD.1 Management of TSF Data

FMT_MTD.1.1 The TSF shall restrict the ability to [***modify***] the [**all TSF data**] to [**Authorized Administrator**].

5.2.3.3 FMT_SMF.1 Specification of Management Functions

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

- **Ability to administer the TOE remotely**
- **Manage the access control security attributes**
- **Manage Authorized Administrator's security attributes**
- **Review audit record logs**
- **Configure and manage the system time**].

5.2.3.4 FMT_SMR.1 Security Roles

FMT_SMR.1.1 The TSF shall maintain the following roles [**Authorized Administrator**].

FMT_SMR.1.2 The TSF shall be able to associate users with roles.

5.2.4 Protection of the TSF (FPT)

5.2.4.1 FPT_FLS.1 Failure with preservation of secure state

FPT_FLS.1.1 The TSF shall preserve a secure state when the following types of failures occur: [

- **Failure of a Node (HX Data Platform) within a Cluster**
- **Failure of one or more HDD of a Node (HX Data Platform) within a Cluster**

- **Failure of one or more SSD of a Node (HX Data Platform) within a Cluster**
  ].

5.2.4.2 FPT_STM.1 Reliable time stamps

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

5.2.5 Resource Utilisation (FRU)

5.2.5.1 FRU_FLT.2 Limited fault tolerance

FRU_FLT.2.1 The TSF shall ensure the operation of all the TOE's capabilities when the following failures occur: [

- **Failure of a Node (HX Data Platform) within a Cluster**
- **Failure of one or more HDD of a Node (HX Data Platform) within a Cluster**
- **Failure of one or more SSD of a Node (HX Data Platform) within a Cluster**
  ].

5.2.6 TOE Access (FTA)

5.2.6.1 FTA_SSL.3: TSF-initiated termination

FTA_SSL.3.1 The TSF shall terminate a remote interactive session after a [***Authorized Administrator configurable time interval of session inactivity***].

5.2.7 Trusted Path (FTP)

5.2.7.1 FTP_TRP.1 Trusted path

FTP_TRP.1.1 The TSF shall provide a communication path between itself and [***remote***] users that is logically distinct from other communication paths and provides assured identification of its end points and protection of the communicated data from [***modification, disclosure***].

FTP_TRP.1.2 The TSF shall permit [***remote users***] to initiate communication via the trusted path.

FTP_TRP.1.3 The TSF shall require the use of the trusted path for [***initial user authentication***, **[*management of the TOE via administrative interfaces*]**].

> ***Application note:*** Remote administrative interfaces relevant to this SFR include the HX Data Platform CLI (via SSHv2).

5.3 TOE SFR Dependencies Rationale

This section of the Security Target demonstrates that the identified TOE Security Functional Requirements include the appropriate hierarchical SFRs and dependent SFRs. The following table

lists the TOE Security Functional Components and the Security Functional Components each are hierarchical to and dependent upon and any necessary rationale.

Table 12 SFR Dependency Rationale

SFR	Dependency	Rationale
FAU_GEN.1	FPT_STM.1	Met by: FPT_STM.1
FAU_GEN.2	FAU_GEN.1 FIA_UID.1	Met by: FAU_GEN.1 FIA_UID.2
FAU_SAR.1	FAU_GEN.1	Met by: FAU_GEN.1
FAU_STG.1	FAU_GEN.1	Met by: FAU_GEN.1
FDP_ACC.2	FDP_ACF.1	Met by: FDP_ACF.1
FDP_ACF.1	FDP_ACC.1 FMT_MSA.3	Met by: FDP_ACC.2 FMT_MSA.3
FIA_ATD.1	No dependencies	N/A
FIA_SOS.1	No dependencies	N/A
FIA_UAU.2	FIA_UID.1	Met by: FIA_UID.1
FIA_UAU.7	FIA_UAU.1	Met by: FIA_UAU.2
FIA_UID.2	No dependencies	N/A
FMT_MSA.1	FDP_ACC.1 FMT_SMR.1 FMT_SMF.1	Met by: FDP_ACC.1 FMT_SMR.1 FMT_SMF.1
FMT_MSA.3	FMT_MSA.1 FMT_SMR.1	Met by: FMT_SMR.1 FMT_MSA.1
FMT_MTD.1	FMT_SMF.1 FMT_SMR.1	Met by: FMT_SMF.1 FMT_SMR.1
FMT_SMF.1	No dependencies	N/A
FMT_SMR.1	FIA_UID.1	Met by: FIA_UID.2
FPT_FLS.1	No dependencies	N/A
FPT_STM.1	No dependencies	N/A
FRU_FLT.2	FPT_FLS.1	Met by: FPT_FLS.1
FTA_SSL.3	No dependencies	N/A
FTP_TRP.1	No dependencies	N/A

5.4 Security Assurance Requirements

5.4.1 SAR Requirements

The TOE assurance requirements for this ST are EAL2 derived from Common Criteria Version 3.1, Revision 4. The assurance requirements are summarized in the table below.

Table 13 Assurance Measures

Assurance Class	Components	Components Description
Development	ADV_ARC.1	Architectural Design with domain separation and non-bypassability
	ADV_FSP.2	Security-enforcing functional specification
	ADV_TDS.1	Basic design
Guidance Documents	AGD_OPE.1	Operational user guidance
	AGD_PRE.1	Preparative User guidance
Life Cycle Support	ALC_CMC.2	Use of a CM system
	ALC_CMS.2	Parts of the TOE CM coverage
	ALC_DEL.1	Delivery procedures
Tests	ATE_COV.1	Evidence of coverage
	ATE_FUN.1	Functional testing
	ATE_IND.2	Independent testing – sample
Vulnerability Assessment	AVA_VAN.2	Vulnerability analysis

5.4.2 Security Assurance Requirements Rationale

This Security Target claims conformance to EAL2. This target was chosen to ensure that the TOE has a moderate level of assurance in enforcing its security functions when instantiated in its intended environment which imposes no restrictions on assumed activity on applicable networks.

5.5 Assurance Measures

The TOE satisfies the identified assurance requirements. This section identifies the Assurance Measures applied by Cisco to satisfy the assurance requirements. The table below lists the details.

Table 14 Assurance Measures

Component	How the requirement will be met
ADV_ARC.1	The architecture description provides the justification how the security functional requirements are enforced, how the security features (functions) cannot be bypassed, and how the TOE protects itself from tampering by untrusted active entities. The architecture description also identifies the system initialization components and the processing that occurs when the TOE is brought into a secure state (e.g. transition from a down state to the initial secure state (operational)).
ADV_FSP.2	The functional specification describes the external interfaces of the TOE; such as the means for a user to invoke a service and the corresponding response of those services. The description includes the interface(s) that enforces a security functional requirement, the interface(s) that supports the enforcement of a security functional requirement, and the interface(s) that does not enforce any security functional requirements. The interfaces are described in terms of their purpose (general goal of the interface), method of use (how the interface is to be

Component	How the requirement will be met
	used), parameters (explicit inputs to and outputs from an interface that control the behavior of that interface), parameter descriptions (tells what the parameter is in some meaningful way), and error messages (identifies the condition that generated it, what the message is, and the meaning of any error codes).The development evidence also contains a tracing of the interfaces to the SFRs described in this ST.
ADV_TDS.1	The TOE design describes the TOE security functional (TSF) boundary and how the TSF implements the security functional requirements. The design description includes the decomposition of the TOE into subsystems and/or modules, thus providing the purpose of the subsystem/module, the behavior of the subsystem/module and the actions the subsystem/module performs. The description also identifies the subsystem/module as SFR (security function requirement) enforcing, SFR supporting, or SFR non-interfering; thus identifying the interfaces as described in the functional specification. In addition, the TOE design describes the interactions among or between the subsystems/modules; thus providing a description of what the TOE is doing and how.
AGD_OPE.1	The Administrative Guide provides the descriptions of the processes and procedures of how the administrative users of the TOE can securely administer the TOE using the interfaces that provide the features and functions detailed in the guidance.
AGD_PRE.1	The Installation Guide describes the installation, generation, and startup procedures so that the users of the TOE can put the components of the TOE in the evaluated configuration.
ALC_CMC.2 ALC_CMS.2	The Configuration Management (CM) document(s) describes how the consumer (end-user) of the TOE can identify the evaluated TOE (Target of Evaluation). The CM document(s), identifies the configuration items, how those configuration items are uniquely identified, and the adequacy of the procedures that are used to control and track changes that are made to the TOE. This includes details on what changes are tracked, how potential changes are incorporated, and the degree to which automation is used to reduce the scope for error.
ALC_DEL.1	The Delivery document describes the delivery procedures for the TOE to include the procedure on how to download certain components of the TOE from the Cisco website and how certain components of the TOE are physically delivered to the user. The delivery procedure detail how the end-user may determine if they have the TOE and if the integrity of the TOE has been maintained. Further, the delivery documentation describes how to acquire the proper license keys to use the TOE components.
ATE_COV.1 ATE_FUN.1	The Test document(s) consist of a test plan describes the test configuration, the approach to testing, and how the subsystems/modules and TSFI (TOE security function interfaces) has been tested against its functional specification and design as described in the TOE design and the security architecture description. The test document(s) also include the test cases/procedures that show the test steps and expected results, specify the actions and parameters that were applied to the interfaces, as well as how the expected results should be verified and what they are. Actual results are also included in the set of Test documents.
ATE_IND.2	Cisco will provide the TOE for testing.
AVA_VAN.2	Cisco will provide the TOE for testing.

6 TOE SUMMARY SPECIFICATION

6.1 TOE Security Functional Requirement Measures

This section identifies and describes how the Security Functional Requirements identified above are met by the TOE.

Table 15 How TOE SFRs Measures

<table>
<tr><th>TOE SFRs</th><th>How the SFR is Met</th></tr>
<tr><td>FAU_GEN.1
FAU_GEN.2</td><td>Auditing is on by default at TOE startup and cannot be turned off A record is generated when the TOE starts and when the TOE is shutdown, thus indicating the starting and stopping of auditing.

Each auditable event, the recorded information includes the user that triggered the event, the outcome or result of the event and when the event occurred.

The user that triggered the event could be a human user where the user identity or related session ID would be included in the audit record. For an IT entity or device, the IP address, MAC address, host name, or other configured identification is presented.

The auditable events include:
<table>
<tr><th>Auditable Events</th><th>Rationale</th><th>Additional Audit Record Contents</th></tr>
<tr><td>FIA_UAU.2 - All use of the authentication mechanism.</td><td rowspan="2">All login attempts (Successful and failed) to the TOE CLI are logged. The record is logged to the local audit storage</td><td rowspan="2">Provided user identity, origin of the attempt (e.g., IP address).</td></tr>
<tr><td>FIA_UID.2 - All use of the identification mechanism.</td></tr>
<tr><td>FMT_MSA.3 - Modifications of the default setting of permissive or restrictive rules and all modifications of the initial values of security attributes</td><td>Successful and failed attempts to change the configuration data are logged in the local audit log</td><td>None</td></tr>
<tr><td>FMT_MTD.1 - All modifications to the values of TSF data</td><td>Successful and failed attempts to change the configuration data are logged in the local audit log</td><td>The identity of the authorized administrator performing the operation.</td></tr>
<tr><td>FMT_SMF.1 - Use of the management functions</td><td>Successful and failed attempts to change the configuration data are logged in the local audit log</td><td>The identity of the authorized administrator performing the operation.</td></tr>
<tr><td>FPT_FLS.1 – Failure with a preservation of secure state</td><td>Failure of the TSF</td><td>None</td></tr>
</table>
</td></tr>
</table>

TOE SFRs	How the SFR is Met		
	FPT_STM.1 - Changes to the time	Successful and failed attempts to change the time zone and any time-related parameters including NTP server configuration are logged in the local audit log. Manual setting of the clock can only be performed via the CLI	The identity of the authorized administrator performing the operation.
	FRU_FLT.2 – Limited fault tolerance	Any failure detected by the TSF.	None
	FTA_SSL.3 - Termination of an interactive session by the session locking mechanism	Termination of the inactive session.	None
	FTP_TRP.1 - Attempts to use the trusted path functions.	Successful and failed attempts to use SSHv2 or HTTPS/TLS are logged in the local audit log	Identification of the user associated with all trusted path invocations including failures, if available.
FAU_SAR.1	The TOE provides the Authorized Administrator the ability to delete the audit records to manage audit log space. These audit records are available for review through the CLI interface. There are no other methods to view the audit records. The audit records include sufficient information for the Authorized Administrator to determine the event, the user who initiated the event, the date and time of the event and the outcome. Audit records are generated for all of the Converged Host clusters and datastores.		
FAU_STG.1	The audit records are stored in an internal file and this internal file cannot be altered. Using the CLI commands, Task Viewer, the Authorized Administrator can view the audit records once they have been successfully identified and authenticated. The CLI commands interface also provides the Authorized Administrator the capability to delete the audit logs to manage the audit log space.		
FDP_ACC.2 and FDP_ACF.1	The Converged Host spans three or more Cisco HyperFlex HX Series nodes to create a highly available Cluster and datastores. Each node includes a Cisco HyperFlex HX Data Platform controller that implements the distributed file system using internal flash-based SSD drives and high-capacity HDDs to store data. The TOE implements whitelist access controls of the Remote Host access to the Converged Host clusters and datastores. The whitelist is an IP table that includes the IP addresses of the Host VMs that have access to the HX nodes clusters and datastores. If the IP address is included on the whitelist and if there is sufficient storage capacity, access is granted otherwise access is denied. The Cisco HyperFlex HX Data Platform controller handles all read and write requests for volumes that the hypervisor accesses and thus mediates all I/O from the virtual machines. The data platform implements a log-structured file system that uses a caching layer in SSD drives to accelerate read requests and write responses, and a persistence layer implemented with HDDs.		

TOE SFRs	How the SFR is Met
FIA_ATD.1	The TOE supports definition of Authorized Administrator by individual user IDs. For each Authorized Administrator, the TOE maintains the following attributes: a) user identity b) password Authorized Administrator are administrators that are granted access to specific resources and permission to perform specific tasks.
FIA_SOS.1	To prevent users from choosing insecure passwords, password should meet the following requirements: • At least eight characters long • includes upper and lower characters • Includes alpha numeric characters This requirement applies to the local password database and on the password selection functions provided by the TOE.
FIA_UID.2 and FIA_UAU.2	By default, the TOE uses the local database for identification and authentication. No access is allowed prior encountering an authentication prompt and then being successfully identified and authenticated. Only after authentication, is the Authorized Administrator able to perform any actions.
FIA_UAU.7	When a user enters their password for remote session authentication, the TOE does not echo any characters as they are entered.
FMT_MSA.1	The TOE provides the Authorized Administrator the ability to modify the default security attribute values used for resource and access control.
FMT_MSA.3	The TOE provides restrictive default values for resources and access control. No access is allowed to the protected resources unless the attributes match and resources are available.
FMT_MTD.1	The TOE provides the ability for Authorized Administrator to access TOE data, such as audit data, configuration data, security attributes, session thresholds and updates.
FMT_SMF.1	The TOE provides all the capabilities necessary to securely manage the TOE. The Authorized Administrator can connect to the TOE using the CLI to perform these functions via SSHv2. The specific management capabilities available from the TOE include: • Administer the TOE remotely • Manage access control attributes • Manage Authorized Administrator's security attributes • Review audit record logs • Configure and manage the system time
FMT_SMR.1	The TOE maintains Authorized Administrator role to administer the TOE remotely. The TOE maintains Authorized Administrator role to administer the TOE remotely. During the installation of the TOE Authorized Administrator user is created. Additional Authorized Administrator users may be created; each must be assigned a unique user name and password.

TOE SFRs	How the SFR is Met
	All users of the TOE are considered Authorized Administrators. It is assumed all administrators are trusted, trained, knowledgeable, and will follow the guidance to ensure the TOE is properly monitored and operated in a secure manner. The Authorized Administrator can connect to the TOE using the CLI to perform these functions via a secure SSHv2 connection.
FPT_FLS.1	The TOE provides the capability to take a snapshot in time of the HX Data Platform VMs. Snapshots help facilitate backup and remote-replication operations where the organization requires an 'always-on' data availability. The snapshot is a reproduction of the VM that includes the state of the data on all VM disks and the VM poser state ((on, off or suspended) at the time, the snapshot is taken. The snapshot is saved so the Authorized Administrator has the option to revert to the saved state. For each VM in your storage cluster, you can schedule hourly, daily, or weekly snapshots. You can schedule snapshots to adjust to the organizations backup requirements. For example, you can retain more frequent snapshots of critical data so if there is a failure, you can restore the most recent snapshots. For example, the initial HyperFlex native snapshot with the virtual machine powered off. This creates what is called the Sentinel snapshot. The Sentinel snapshot becomes a base snapshot that all future snapshots are added. Snapshots can be schedule to occur at specific days and times. If a disk failure happens, the TOE cluster states turns to 'unhealthy' and a rebalancing job is triggered to return the system to the specified replication factor, replicating the missing data on the disk from the remaining copies and once the job completes the cluster returns to a healthy state.
FPT_STM.1	The TOE provides a source of date and time information used in audit event timestamps. The TOE hardware supports a clock, though NTP is required to provide the timestamp for the TOE. NTP time source is used to synchronize the timestamp for the audit records and to track inactivity of administrative sessions. The timestamps are synchronized across the HyperFlex Systems HX Series Nodes and Controller VMs.
FRU_FLT.2	The TOEs High Availability (HA) feature ensures that the storage cluster maintains at least two copies of all data during normal operation with three or more fully functional nodes. If one or more nodes in the storage cluster fail, the state of the storage cluster is affected. If more than one node and/or disk fail, it is called a simultaneous failure. The number of nodes in the storage cluster, and the Data Replication Factor and Access Policy settings determine the state of the storage cluster that results from node failures. Data Replication Factor provides the option to set the number of redundant replicas of data across the storage cluster.
FTA_SSL.3	When a session is inactive (i.e. no session input) for more than the Authorized Administrator configured time, the TOE will terminate the session and no further activity is allowed, requiring the Authorized Administrator to log in (be successfully identified and authenticated) again to establish a new session. The timeout value is configurable. The default setting is 120 minutes of idle time.
FTP_TRP.1	The TOE ensures the communication path and the remote administer interfaces is protected and distinct from other communications paths. The CLI uses SSHv2.

6.2 TOE Bypass and interference/logical tampering Protection Measures

The TOE consists of a hardware platform in which all operations in the TOE scope are protected from interference and tampering by untrusted subjects. All administration and configuration operations are performed within the physical boundary of the TOE. In addition, all security policy enforcement functions must be invoked and succeed prior to functions proceeding.

The TOE has been designed so that all locally maintained TSF data can only be manipulated via the CLI interface. There are no undocumented interfaces for managing the product.

All sub-components included in the TOE rely on the main chassis for power and memory while the TOE software provides the management functions and control. In order to access any portion of the TOE, the Identification and Authentication mechanisms of the TOE must be invoked and succeed.

No processes outside of the TOE are allowed direct access to any TOE memory. The TOE only accepts traffic through legitimate TOE interfaces. Specifically, processes outside the TOE are not able to execute code on the TOE. None of these interfaces provides any access to internal TOE resources.

Only the Authorized Administrator has access to the TOE security functions.

There are no unmediated traffic flows into or out of the TOE or unauthenticated access, thus providing a distinct protected domain for the TOE that is logically protected from interference and is not bypassable.

7 RATIONALE

This section describes the rationale for the Security Objectives and Security Functional Requirements as defined within this Security Target.

7.1 Rationale for TOE Security Objectives

Table 16 Threats & IT Security Objectives Mappings

	T.ACCOUNTABILITY	T.NOAUTH	T.RESOURCE_AVAILABILITY	T.TIME
O.ACCESS_CONTROL		X		
O.ADMIN		X	X	
O.AUDIT_GEN	X			X

	T.ACCOUNTABILITY	T.NOAUTH	T.RESOURCE_AVAILABILITY	T.TIME
O.AVAILABILITY			X	
O.AUDIT_VIEW	X			
O.DATA		X		
O.IDAUTH		X		
O.SELFPRO		X		
O.TIME	X			X

Table 17 TOE Threat/Policy/Objective Rationale

Threat / Policy	Rationale for Coverage
T.ACCOUNTABILITY	An authorized administrative is not held accountable for their actions on the TOE because the audit records are not generated or reviewed. The O.AUDIT_GEN objective mitigates the threat by requiring the TOE generate audit records for events performed on the TOE. The O.AUDIT_VIEW requires the TOE to provide the authorized administrator with the capability to view audit data. The O.TIME objective mitigates this threat by providing the accurate time to the TOE for use in the audit records O.AUDIT_GEN.
T.NOAUTH	O.SELFPRO objective ensures that an unauthorized person (attacker) that may attempt to bypass the security of the TOE to access and use security functions and/or non-security functions provided by the TOE to disrupt operations of the TOE is not successful. The O.DATA objective protects the configuration and user data from unauthorized modifications. The O.IDAUTH objective requires the administrative user to enter a unique identifier and authentication credentials before management access is granted. The O.ADMIN objective ensures the authorized administrator has access to the TOE to configure access controls and the O.ACCESS_CONTROL objective restricts access to the TOE management functions to the Authorized Administrator.
T.RESOURCE_AVAILABILITY	The TOE data (user) could become corrupted or unavailable due to hardware or system operation failures. The O.AVAILABILITY objective to maintain a secure state and to protect data from loss or corruption due to hardware or system operation failures. The O.ADMIN ensures the administrator

Threat / Policy	Rationale for Coverage
	has the capabilities to ensure proper configuration for maintaining a secure state and resource availability.
T.TIME	Evidence of a compromise by an unauthorized user (attacker) or malfunction of the TOE may go unnoticed or not be properly traceable if recorded events are not properly sequenced through application of correct timestamps. The O.TIME objective mitigates this threat by providing the accurate time to the TOE for use in the audit records O.AUDIT_GEN.

7.2 Rationale for the Security Objectives for the Environment

The security requirements are derived according to the general model presented in Part 1 of the Common Criteria. Specifically, the tables below illustrate the mapping between the security requirements and the security objectives and the relationship between the threats, policies and IT security objectives. The functional and assurance requirements presented in this Security Target are mutually supportive and their combination meets the stated security objectives.

Table 18 Threats & IT Security Objectives Mappings for the Environment

	A.ADMIN	A.CONNECTIONS	A.LOCATE
OE.ADMIN	X		
OE.CONNECTION		X	
OE.LOCATE			X

Table 19 Assumptions/Threats/Objectives Rationale

Assumptions	Rationale for Coverage of Environmental Objectives
A.ADMIN	All Authorized Administrator are assumed not evil, will follow the administrative guidance and will not disrupt the operation of the TOE intentionally. The OE.ADMIN objective ensures that Authorized Administrator are not careless, willfully negligent, or hostile, and will follow and abide by the instructions provided by the TOE documentation, including the administrator guidance; however, they are capable of error.

Assumptions	Rationale for Coverage of Environmental Objectives
A.CONNECTIONS	The operational environment in which the TOE is installed will allow the users of the TOE to access the stored information. The OE.CONNECTION objective ensures the operational environment provides a protected network to prevent unauthorized access to the TOE.
A.LOCATE	The processing resources of the TOE and those services provided by the operational environment will be located within controlled access facilities, which will prevent unauthorized physical access. The OE.LOCATE objective ensures the processing resources of the TOE and those services provided by the operational environment will be located within controlled access facilities, which will prevent unauthorized physical access.

7.3 Rationale for requirements/TOE Objectives

The security requirements are derived according to the general model presented in Part 1 of the Common Criteria. Specifically, the tables below illustrate the mapping between the security requirements and the security objectives and the relationship between the threats, and IT security objectives.

Table 20 Security Objective to Security Requirements Mappings

	O.ACCESS_CONTROLL	O.ADMIN	O.AUDIT_GEN	O.AVAILABILITY	O.AUDIT_VIEW	O.DATA	O.IDAUTH	O.SELPRO	O.TIME
FAU_GEN.1	X		X						X
FAU_GEN.2	X		X						
FAU_SAR.1					X				
FAU_STG.1	X								
FDP_ACC.1						X		X	
FDP_ACF.1						X		X	
FIA_ATD.1	X	X					X		
FIA_SOS.1							X		

	O.ACCESS_CONTROLL	O.ADMIN	O.AUDIT_GEN	O.AVAILABILITY	O.AUDIT_VIEW	O.DATA	O.IDAUTH	O.SELPRO	O.TIME
FIA_UAU.2							X	X	
FIA_UAU.7							X		
FIA_UID.2							X	X	
FMT_MSA.1	X	X						X	
FMT_MSA.3	X	X						X	
FMT_MTD.1	X	X							
FMT_SMF.1	X	X							
FMT_SMR.1	X	X							
FPT_FLS.1				X					
FPT_STM.1			X						X
FRU_FLT.2				X					
FTA_SSL.3	X						X	X	
FTP_TRP.1		X					X	X	

Table 21 Objectives to Requirements Rationale

Objective	Rationale
O.ACCESS_CONTROL	The TOE will restrict access to the TOE Management functions to the Authorized Administrator. The TOE is required to provide the ability to restrict the use of TOE management/administration/security functions to Authorized Administrator of the TOE. The Authorized Administrator performs these functions on the TOE. Only Authorized Administrator of the TOE may modify TSF data [FMT_MTD.1] and delete audit data stored locally on the TOE [FAU_STG.1]. The TOE must be able to recognize the administrative privilege level that exists for the TOE [FIA_ATD.1, FMT_SMR.1]. The TOE must allow the Authorized Administrator to specify alternate initial values when an object is created [FMT_MSA.1, FMT_MSA.3]. The TOE ensures that all user actions resulting in the access to TOE security functions and

Objective	Rationale
	configuration data are controlled [FMT_SMF.1] and audited [FAU_GEN.1, FAU_GEN.2]. The SFR FTA_SSL.3 also meets this objective by terminating a session due to meeting/exceeding the inactivity time limit.
O.ADMIN	The TOE will provide administrative functions to isolate administrative actions by configuring and assigning Authorized Administrator accounts [FIA_ATD.1, FMT_SMR.1], thus controlling access to the TSF data and configuration [FMT_MSA.1, FMT_MSA.3, FMT_MTD.1, FMT_SMF.1, FMT_SMR.1]. The TOE will also make the administrative functions available remotely via SSHv2 [FTP_TRP.1].
O.AUDIT_GEN	The TOE will generate audit records which will include the time [FPT_STM.1] that the event occurred and if applicable, the identity of the user performing the event [FAU_GEN.2]. All TOE security relevant events are auditable and will include the required information to identify when the event occurred, the event, who performed the action, and the success or failure of the event [FAU_GEN.1 and FAU_GEN.2]. Timestamps associated with the audit record must be reliable [FPT_STM.1].
O.AVAILABILITY	The TOE will provide mechanisms to maintain a secure state and mitigate against data loss or corruption due to hardware or system operation failures [FPT_FLS.1, FRU_FTL.2].
O.AUDIT_VIEW	The TOE will provide the Authorized Administrator the capability to review Audit data via the CLI interface. Security relevant events are available for review by Authorized Administrator [FAU_SAR.1].
O.DATA	The TOE is required to protect the TSF data from unauthorized modifications and access therefore each Authorized Administrator must be identified and authenticated prior to gaining access [FIA_UAU.2 and FIA_UID.2]. The TOE ensures that access to TOE configuration settings (CLI commands), data and resources is done in accordance with the management functions [FMT_SMF.1]. The TOE is also required to restrict access to the HX clusters and datastores [FDP_ACC.1, FDP_ACF.1].
O.IDAUTH	The TOE must uniquely identify and authenticate the claimed identity of all administrative users before granting management access. The Authorized Administrators' password must meet formatting requirements to prevent the use of weak credentials [FIA_SOS.1]. The TOE is required to store user security attributes to enforce the authentication policy of the TOE and to associate security attributes with users [FIA_ATD.1]. Users authorized to access the TOE must be defined using an identification and authentication process and all users must be successfully identified and authenticated [FIA_UID.2 and FIA_UAU.2]. The password is obscured when entered [FIA_UAU.7]. If the period of inactivity has been exceeded, the user is required to re-authenticate to re-establish the session [FTA_SSL.3].

Objective	Rationale
O.SELFPRO	The TOE must protect itself against attempts by unauthorized users to bypass, deactivate, or tamper with TOE security functions. [FDP_ACC.1, FDP_ACF.1, FIA_UID.2 and FIA_UAU.2] supports this objective by ensuring access to the resources is controlled and only Authorized Administrator can manage the resources [FMT_MSA.1 and FMT_MSA.3]. The [FTP_TRP.1] ensures the communication path and the remote administer interfaces is protected and distinct from other communications paths. The SFR [FTA_SSL.3] also meet this objective by terminating a session due to meeting/exceeding the inactivity time limit thus ensuring the session does not remain active and subject to attack.
O.TIME	The TSF will provide a reliable time stamp for its own use. The TOE is required to provide reliable timestamps for use with the audit record [FAU_GEN.1, FPT_STM.1]. An NTP Server is required in the operational environment; therefore, the TOE is configured to allow clock updates from the designated NTP server.

8 ANNEX A: REFERENCES

The following documentation was used to prepare this ST:

Table 22 References

Identifier	Description
[CC_PART1]	Common Criteria for Information Technology Security Evaluation – Part 1: Introduction and general model, dated September 2012, version 3.1, Revision 4, CCMB-2012-009-001
[CC_PART2]	Common Criteria for Information Technology Security Evaluation – Part 2: Security functional components, dated September 2012, version 3.1, Revision 4, CCMB-2012-009-002
[CC_PART3]	Common Criteria for Information Technology Security Evaluation – Part 3: Security assurance components, dated September 2012, version 3.1, Revision 4, CCMB-2012-009-003
[CEM]	Common Methodology for Information Technology Security Evaluation – Evaluation Methodology, dated September 2012, version 3.1, Revision 4, CCMB-2012-009-004