

# Infoblox Trinzic HW Appliances

FIPS 140-2 Non-Proprietary Security Policy  
Security Level 2 Validation

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Prepared by:



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## 1. Overview

This document is a non-proprietary FIPS 140-2 Security Policy for Infoblox's TrinziC Appliances running the Network Identity Operating System (NIOS). This policy describes how these Infoblox TrinziC HW Appliances (hereafter referred to as the "module") meet the requirements of FIPS 140-2. This document also describes how to configure the module into the FIPS 140-2 Approved mode. This document was prepared as part of a FIPS 140-2 overall Security Level 2 validation for a multi-chip standalone hardware module.

The Federal Information Processing Standards Publication 140-2 - Security Requirements for Cryptographic Modules (FIPS 140-2) details the United States Federal Government requirements for cryptographic modules. Detailed information about the FIPS 140-2 standard and validation program is available on the NIST (National Institute of Standards and Technology) website at <https://csrc.nist.gov/projects/cryptographic-module-validation-program>.

## 2. Introduction

Infoblox Trinzic HW appliances are available in a variety of options to match an organization's specific requirements. They integrate with a broad array of automation and orchestration platforms and are simple to deploy through flexible licensing. Appliances within a given series share the same hardware model, and are differentiated by licensing features.

The following models were tested as part of this validation with the NIOS version 8.5.2 with Hotfix-NIOS\_8.5.2\_409296\_J81082-506fbabaabd86fbe9c99de0b49c9a7f8-Mon-Oct-25-08-19-32-2021 firmware.

Trinzic Hardware Model	Trinzic Appliance	CAVP Operational Environment
<b>805</b>	TE-815	Intel Core i3 (Skylake) with AES-NI
	TE-825	
	TR-805	
	ND-805	
<b>1405</b>	TE-1415	Intel Xeon E3 (Skylake) with AES-NI
	TE-1425	
	TR-1405	
	ND-1405	
<b>2205</b>	TE-2215	Intel Xeon E5 (Broadwell) with AES-NI
	TE-2225	
	TR-2205	
	ND-2205	
<b>4005</b>	TE-4015	Intel Xeon E5 (Broadwell) with AES-NI
	TE-4025	
	TR-4005	
	ND-4005	

Table 1 Hardware Versions

### 2.1. Infoblox Trinzic 805 Series Appliances



Figure 1 Trinzic 805 Series Appliance

The Infoblox 805 Series are 1-U platforms that can be installed in a standard equipment rack.

The Trinzic TE-815 and TE-825 network services appliances provide core network services, including DNS (Domain Name System), DHCP (Dynamic Host Configuration Protocol), IPAM (IP Address Management), and NTP (Network Time Protocol). You can configure and manage the Trinzic 805 series appliances through the Infoblox Grid Manager. The TE-815 and TE-825 appliances are recommended to operate as Grid members, and can operate with a second appliance of the same model in high availability (HA) mode.

Key features of the appliances include the following:

- Support for Grid management and all administrative features for Infoblox IPAM, DNS, DDNS, and DHCP

- High availability support
- LOM (Lights Out Management) support

The Network Insight ND-805 is a high performance network appliance that provides an expanded device discovery and network discovery feature set, using SNMP and other protocols to discover, query, and catalogue network devices such as enterprise Ethernet switches, routers, firewalls and other security devices, VoIP softswitches, load balancers, and end host devices. You can configure and manage the ND-805 through the Grid Manager. For more information about Discovery features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the ND-805 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support Device Discovery features, and one interface (MGMT) designated for device management (the HA port is inactive and reserved for future use)
- Management through the Infoblox Grid
- LOM (Lights Out Management) support

The Trinzic Reporting TR-805 is a reporting appliance that collects data from Infoblox Grid members, stores the data in the reporting database, and generates reports that provide statistical information about IPAM, DNS, DHCP, and system activities and performance. You can configure and manage the TR-805 and view reports through the Grid Manager. For more information about Reporting features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the TR-805 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to collect data for event reporting, and one interface (MGMT) designated for device management (the HA port is inactive and reserved for future use)
- Management through the Infoblox Grid
- LOM (Lights Out Management) support

## 2.2. Infoblox Trinzic 1405 Series Appliances



*Figure 2 Trinzic 1405 Series Appliance*

The Infoblox 1405 Series platforms are 1-U appliances that you can efficiently mount in a standard equipment rack.

The Trinzic TE-1415 and TE-1425 are high performance network appliances that provide core network services, including DNS (Domain Name System), DHCP (Dynamic Host Configuration Protocol), IPAM (IP Address Management), and NTP (Network Time Protocol). A TE-1415 and TE-1425 appliance can be set up as a Grid member or a Grid Master. The appliance can operate with a second appliance of the same model in high availability (HA) mode. You configure and manage these appliances through the Infoblox Grid Manager.

Key features of the appliances are as follows:

- Support for Grid management and all administrative features for Infoblox IPAM, DNS, DDNS, DHCP, DNS Firewall, Advanced DNS Protection, and Threat Insight.
- High availability support.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives.
- Hot-swappable AC power supplies.
- Additional AC power supply for a redundant 1+1 configuration.
- Optional DC power supplies.
- Optional 10GbE or 1GBE SFP+/SFP system configurations for fiber or copper support.

The Network Insight ND-1405 is a high performance network appliance that provides powerful device discovery and network discovery features, using SNMP and other protocols to discover, query, manage and catalogue network devices such as enterprise Ethernet switches, routers, firewalls and other security devices, VoIP softswitches, load balancers, and end host devices. You configure and manage ND-1405 appliances through the Grid Manager. For more information about the discovery features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the Network Insight ND-1405 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support Device Discovery features, and one interface (MGMT) for device management. (The HA port is reserved for future use.)
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives.
- Hot-swappable AC power supplies.
- Additional AC power supply for a redundant 1+1 configuration.
- Optional DC power supplies.
- Optional 10GbE or 1GBE SFP+/SFP system configurations for fiber or copper support.

The Trinzic Reporting TR-1405 is a high performance network appliance that collects data from Infoblox Grid members, stores the data in the reporting database, and generates reports that provide statistical information about IPAM, DNS, DHCP, and system activities and performance. You configure and manage the TR-1405 and view reports through the Grid Manager. For more information about Reporting features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the TR-1405 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support reporting features across the network, and one interface (MGMT) for device management. (The HA port is reserved for future use.)
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives.
- RAID 1 redundant hard disk array.
- Hot-swappable AC or DC power supplies in a redundant 1+1 configuration.
- Optional 10GbE or 1GBE SFP+/SFP system configurations for fiber or copper support.



## 2.3. Infoblox 2205 Series DDI Appliances



*Figure 3 Trinzic 2205 Series Appliance*

The Infoblox 2205 series are 2-U appliances that you can efficiently mount in a standard equipment rack.

Trinzic TE-2215 and TE-2225 are high performance network appliances that provide core network services, including DNS (Domain Name System), DHCP (Dynamic Host Configuration Protocol), IPAM (IP Address Management), and NTP (Network Time Protocol). A TE-2215 and TE-2225 appliance can be set up as a Grid member or a Grid Master. The appliance can operate with a second appliance of the same model in high availability (HA) mode. You configure and manage the Trinzic appliances through the Infoblox Grid Manager.

Key features of the appliances are as follows:

- Support for Grid management and all administrative features for Infoblox IPAM, DNS, DDNS, and DHCP.
- High availability support.
- LOM (Lights Out Management) support.
- Field replaceable hard disk drives and fan modules.
- Hot-swappable AC or DC power supplies with support for a redundant 1+1 configuration.
- Optional 10GbE or 1GbE SFP+/SFP system configurations for fiber or copper support.

The Network Insight ND-2205 is a high performance network appliance that provides device discovery and network discovery features, using SNMP and other protocols to discover, query, manage and catalogue network devices such as enterprise Ethernet switches, routers, firewalls and other security devices, VoIP softswitches, load balancers, end host devices and more. You configure the ND-2205 appliance through Infoblox Grid Manager. For more information about the Discovery features, refer to the Infoblox NIOS Administrator Guide.

Key features of the Network Insight ND-2205 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support Device Discovery features, and one interface (MGMT) for device management. (The HA port is inactive and reserved for future use.)
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives and fan modules.
- Hot-swappable AC or DC power supplies in a redundant 1+1 configuration.
- Alternative system configurations for the support of copper or fiber SFP 1GbE and SFP+ 10GbE

interfaces, with support for mixed copper/fiber configurations.

The Trinzic Reporting TR-2205 is a high performance network appliance that collects data from Infoblox Grid members, stores the data in the reporting database, and generates reports that provide statistical information about IPAM, DNS, DHCP, and system activities and performance. You configure and manage the TR-2205 and view its reports through the Infoblox Grid Manager. For more information about Reporting features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the Trinzic Reporting TR-2205 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support event reporting features across the network, and one interface (MGMT) designated for device management. (The HA port is inactive and reserved for future use.)
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives and fan modules.
- Hot-swappable AC or DC power supplies in a redundant 1+1 configuration.
- Optional 10GbE or 1GBE SFP+/SFP system configurations for fiber or copper support.

## 2.4. Infoblox 4005 Series DDI Appliances



*Figure 4 Trinzic 4005 Series Appliance*

The Infoblox 4005 Series are 2-U appliances that you can efficiently mount in a standard equipment rack.

The Trinzic TE-4015 and TE-4025 are high performance network appliances that provide core network services, including DNS (Domain Name System), DHCP (Dynamic Host Configuration Protocol), IPAM (IP Address Management), and NTP (Network Time Protocol). A TE-4015 and TE-4025 appliance can be set up as a Grid member or a Grid Master. The appliance can operate with a second appliance of the same model in high availability (HA) mode. You configure and manage the Trinzic appliances through the Infoblox Grid Manager.

Key features of the IB-4015 and IB-4025 include the following:

- Support for Grid management and all administrative features for Infoblox IPAM, DNS, DDNS, and DHCP.
- Optional 10GbE or 1GBE SFP+/SFP system configurations for fiber or copper support.
- High availability support.
- LOM (Lights Out Management) support.
- Field replaceable hard disk drives and fan modules.

- Hot-swappable AC supplies.
- Optional DC power supplies.

The Network Insight ND-4005 is a high performance network appliance that supports device discovery and network discovery features, using SNMP and other protocols to discover, query, manage and catalogue network devices such as enterprise Ethernet switches, routers, firewalls and other security devices, VoIP softswitches, load balancers, end host devices and more. You configure the ND-4005 appliance through Infoblox Grid Manager. For more information about the Discovery features, refer to the Infoblox NIOS Administrator Guide.

Key features of the Network Insight ND-4005 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support Device Discovery features, and one interface (MGMT) for device management. (The HA port is inactive and reserved for future use.)
- Optional 10GbE or 1GbE SFP+/SFP system configurations for fiber or copper support.
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives and fan modules.
- Hot-swappable AC or DC power supplies in a redundant 1+1 configuration.

The Infoblox Reporting TR-4005 is a high performance network appliance that collects data from Infoblox Grid members, stores the data in the reporting database, and generates reports that provide statistical information about IPAM, DNS, DHCP, and system activities and performance. You configure and manage the TR-4005 and view its reports through the Infoblox Grid Manager. For more information about Reporting features and licensing, refer to the Infoblox NIOS Administrator Guide.

Key features of the Trinzic Reporting TR-4005 appliance include the following:

- Three (3) active 1GbE Ethernet interfaces: two (2) active interfaces to support event reporting features across the network, and one interface (MGMT) designated for device management. (The HA port is inactive and reserved for future use.)
- Optional 10GbE or 1GbE SFP+/SFP system configurations for fiber or copper support.
- Management through the Infoblox Grid.
- LOM (Lights Out Management) support.
- Replaceable hard disk drives and fan modules.
- Hot-swappable AC or DC power supplies in a redundant 1+1 configuration.

### 3. Cryptographic Module Specification

#### 3.1. Security Level Summary

The security level claimed for each section of the FIPS 140-2 standard is as follows:

Section	Title	Level
1	Cryptographic Module Specification	2
2	Module Ports and Interfaces	2
3	Roles, Services, and Authentication	2
4	Finite State Model	2
5	Physical Security	2
6	Operational Environment	Not Applicable
7	Cryptographic Key Management	2
8	EMI/EMC	2
9	Self-Tests	2
10	Design Assurance	2
11	Mitigation of Other Attacks	Not Applicable
<b>Overall</b>		<b>2</b>

*Table 2 Security Level Summary*

#### 3.2. Cryptographic Boundary

The cryptographic boundary for the module is the edge (front, back, left, right, top, and bottom surfaces) of the physical enclosure.

### 3.3. Block Diagram

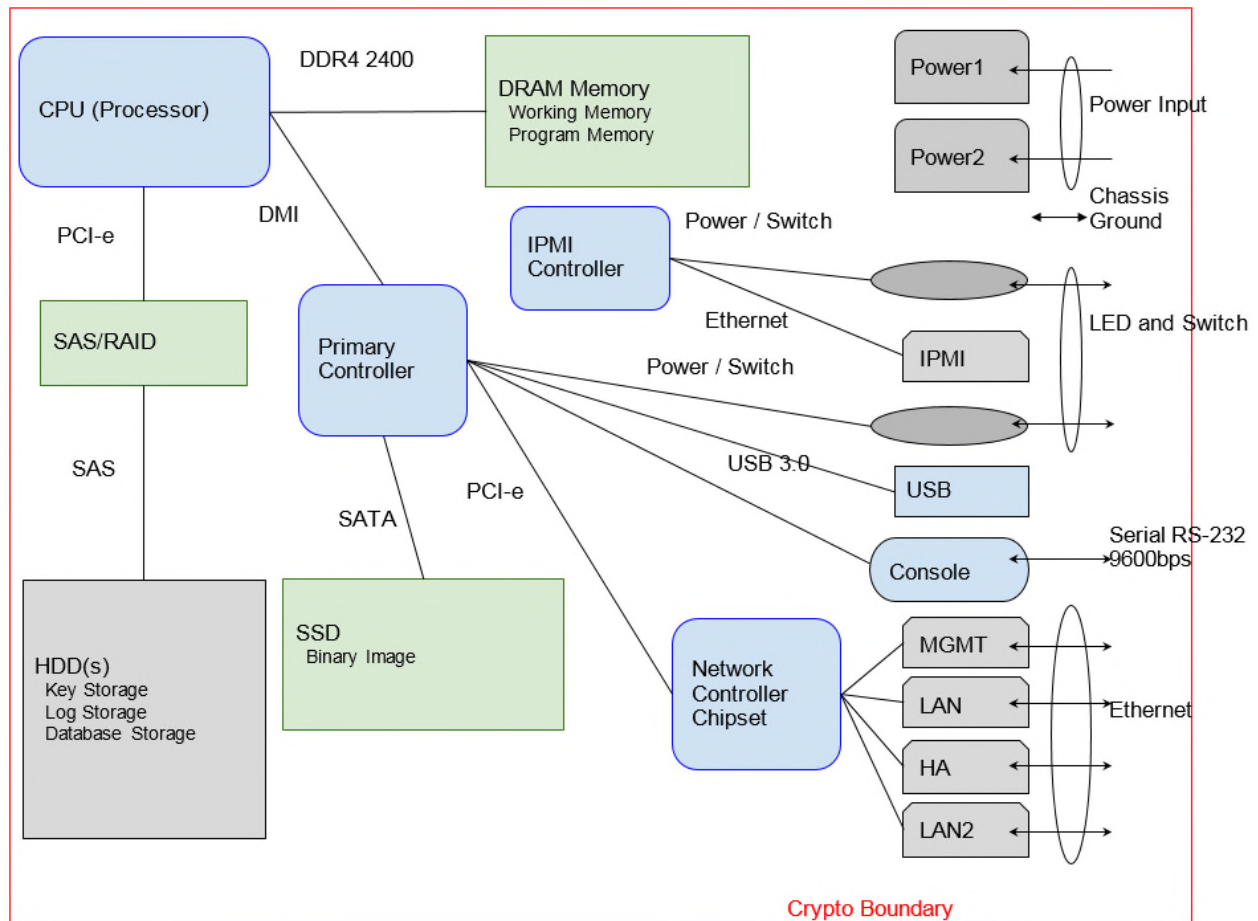


Figure 5 Block Diagram

### 3.4. Secure Initialization

The following steps should be followed to initialize the module into the FIPS Approved mode of operation:

- The module must be running NIOS version 8.5.2 with Hotfix-NIOS\_8.5.2\_409296\_J81082-506fbabaabd86fbe9c99de0b49c9a7f8-Mon-Oct-25-08-19-32-2021.bin2.
- Tamper evident labels must be applied according to [Section 6.1](#) of this document.
- FIPS mode must be enabled in the NIOS CLI via command 'set fips\_mode'.
- The password policy must be set such that the Minimum Password Length is at least 6 characters. This can be accomplished via the procedures outlined in the Infoblox NIOS Administrator Guide, section "Managing Passwords"
- The BloxTools feature must not be enabled when operating in the FIPS Approved mode.
- The Support Access feature must not be enabled when operating in the FIPS Approved mode.
- RADIUS Authentication must not be used in the FIPS Approved mode.
- TACACS+ Authentication must not be used in the FIPS Approved mode.
- Cisco ISE Integration must not be used in the FIPS Approved mode.
- Microsoft Server Integration must not be used in the FIPS Approved mode.
- SNMPv1/v2 must not be used in the FIPS Approved mode.
- The module must not be connected to a NIOS grid in the FIPS Approved mode.
- The HTTPS protocol must be used for the vDiscovery service.
- Keys/CSPs generated in FIPS mode cannot be used in non-FIPS mode and vice-versa.

Failure to follow the above procedures will result in the module operating in a non-approved mode.

### 3.5. Approved Algorithms

The module supports the following approved algorithms for use in the approved mode. Although the module's cryptographic implementation supports more options than listed below, only those listed are usable by the module.

CAVP Cert	Algorithm	Standard	Mode/Method	Key Lengths, Curves or Moduli	Use
<b>A2507</b>	AES	FIPS 197	CBC, CBC-CS3, CFB128	128, 256	Data Encryption / Decryption
<b>Vendor Affirmed</b>	CKG	SP 800-133r2	Sections 5.1, 5.2, and 6.1		Key Generation
<b>A2507</b>	KAS-ECC-SSC	SP 800-56A Rev3	KAS ECC (ephemeralUnified)	P-256, P-384, P-521	Key Agreement
<b>A2507</b>	KAS-FFC-SSC	SP 800-56A Rev3	KAS FFC (dhEphem)	MODP-2048, FFDHE2048	Key Agreement
<b>A2507</b>	CVL (TLS <sup>1</sup> 1.0/1.1/1.2)	SP 800-135 Rev1		TLS 1.2: SHA-256, SHA-384	Key Derivation
<b>A2505</b>	CVL (SNMP)	SP 800-135Rev1			Key Derivation
<b>A2506</b>	CVL (SSH)	SP 800-135Rev1		SHA-1, SHA-256, SHA-384, SHA-512	Key Derivation
<b>KAS-SSC Cert. #A2507, CVL Cert. #A2506</b>	KAS	SP 800-56A Rev3	KAS-FFC and KAS-ECC with SSH KDF	2048 bits (KAS FFC), 256, 384, and 521 bits (KAS ECC)	Key establishment methodology provides 112 bits (KAS-FFC) or between 128 and 256 bits (KAS-ECC) of encryption strength.
<b>KAS-SSC Cert. #A2507, CVL Cert. #A2507</b>	KAS	SP 800-56A Rev3	KAS-FFC with TLS 1.0/1.1/1.2 KDF	2048 bits	Key establishment methodology provides 112 bits of encryption strength.
<b>A2503</b>	DRBG	SP 800-90A Rev1	HMAC-SHA-256		Deterministic Random Bit Generation

<sup>1</sup> No parts of the TLS, SSH, SNMP protocols other than the KDF have been reviewed or tested by the CAVP and CMVP

<b>A2507</b>	DRBG	SP 800-90A Rev1	HMAC-SHA-256		Deterministic Random Bit Generation
<b>N/A</b>	ENT (NP)	SP 800-90B			Entropy Source
<b>A2507</b>	ECDSA	FIPS 186-4		P-256 , P-384, P-521 (w/ SHA-224, SHA-256, SHA-384, or SHA-512)	ECC Key Generation <sup>2</sup> , Digital Signature Verification
<b>A2507</b>	HMAC	FIPS 198-1	HMAC-SHA-1-96 HMAC-SHA-1, HMAC-SHA-256,	160, 256	Message Authentication
<b>A2507</b>	KTS	SP 800-38F	AES-CBC, HMAC-SHA-1	AES: 128, 256 HMAC: 160	Key Transport. Key establishment methodology provides 128 or 256 bits of encryption strength.
<b>A2507</b>	RSA	FIPS 186-4	X9.31 PKCS1_V1_5 PSS	2048, 3072, 4096 (w/ SHA-224, SHA-256, SHA-384, or SHA-512)	Key Generation, Digital Signature Generation and Verification
<b>A2507</b>	SHS	FIPS 180-4	SHA-1, SHA-256		Message Digest

Table 3 Approved Algorithms

### 3.6. Allowed Algorithms

The following algorithms are non-approved but allowed for use in the approved mode.

Algorithm	Caveat	Use
<b>RSA</b>	Key Wrapping, key establishment methodology provides between 112 and 150 bits of encryption strength	Key Wrapping

Table 4 Allowed Algorithms

### 3.7. Allowed Algorithms With No Security Claimed

The following algorithms are non-approved but allowed for use in the approved mode with no security claimed.

Algorithm	Caveat	Use
<b>HMAC-MD5</b>	Only allowed for use with TLS protocol.	TLS 1.0/1.1, Internals (i.e. objects comparison)

<sup>2</sup> The ECC keys used for EC-Diffie-Hellman are generated according to FIPS 186-4

		HMAC for cookie.
<b>MD5</b>	Only allowed for use with TLS protocol.	TLS 1.0/1.1, Internals (i.e. objects comparison) HMAC for cookie.

Table 5 Allowed Algorithms With No Security Claimed

### 3.8. Non-Approved Algorithms Table

The following algorithms are non-approved for use in the approved mode.

Algorithm	Caveat	Use
<b>DES</b>		Encryption/Decryption
<b>KAS-FFC</b>	Non-compliant when used with key sizes less than 2048 bits in length	Key Agreement
<b>DSA (non-compliant)</b>		Key Generation Signature Generation Signature Verification
<b>HMAC-MD5</b>		Keyed Hash
<b>MD5</b>		Message Digest
<b>OpenVPN KDF</b>		Key Derivation for OpenVPN protocol.
<b>RSA</b>	Non-compliant when used with key sizes less than 2048 bits in length	Key Wrapping

Table 6 Non-Approved Algorithms



## 4. Cryptographic Module Ports and Interfaces

### 4.1. Logical and Physical Interfaces

The module's interfaces can be categorized under the following FIPS 140-2 logical interfaces.

- Data Input
- Data Output
- Control Input
- Status Output
- Power Input Interface

The following table provides a mapping of the module's interfaces to the FIPS 140-2 defined interface categories.

Physical Interface <sup>3</sup>	Logical Interface(s)	Description	Notes
Network Interfaces	Data Input, Data Output, Control Input, Status Output	<p><b>Trinzic 805, 1405, 2205, and 4005 series:</b></p> <ul style="list-style-type: none"> <li>• Two 10/100/1000 Base-T Ethernet (LAN ports)</li> <li>• One 10/100/1000 Base-T Ethernet (HA port)</li> <li>• One 10/100/1000 Base-T Ethernet (MGMT port)</li> </ul> <p><b>Trinzic 1405, 2205, and 4005 series:</b></p> <ul style="list-style-type: none"> <li>• Four 10GbE SFP/SFP+ ports in expansion slot</li> </ul>	LED link lights are part of status output.
Serial Port	Data Input, Data Output, Control Input, Status Output	<p><b>Trinzic 805, 1405, 2205, and 4005 series:</b></p> <ul style="list-style-type: none"> <li>• DB-9 (9600/8n1, Xon/Xoff)</li> </ul>	
Unit Identification	Control Input, Status Output	<p><b>Trinzic 805, 1405, 2205, and 4005 series:</b></p>	

<sup>3</sup> Although the module includes a USB port, this port is disabled and unused by the module as of the most recent FIPS 140-2 validation.

		<ul style="list-style-type: none"> <li>• Front and back</li> </ul>	
AC Power Supply	Power Input, Status Output	<p><b>Trinzic 805 series:</b></p> <ul style="list-style-type: none"> <li>• Input voltage: 100–240 VAC switchable, 50–60 Hz</li> <li>• Output power: 350W</li> </ul> <p><b>Trinzic 1405 series:</b></p> <ul style="list-style-type: none"> <li>• One hot-swappable PSU</li> <li>• Input voltage: 100–240 VAC switchable, 50–60 Hz</li> <li>• Output power: 600W</li> </ul> <p><b>Trinzic 2205 and 4005 series:</b></p> <ul style="list-style-type: none"> <li>• Two hot-swappable PSUs</li> <li>• Input voltage: 100–240 VAC switchable, 50–60 Hz</li> <li>• Output power: 600W</li> </ul>	FIPS kit Tamper Evident Label required
DC Power Supply	Power Input, Status Output	<p><b>Trinzic 1405 series:</b></p> <ul style="list-style-type: none"> <li>• One hot-swappable PSU</li> <li>• Input voltage: -44–65DC; 600W</li> </ul> <p><b>Trinzic 2205 and 4005 series:</b></p> <ul style="list-style-type: none"> <li>• Two hot-swappable PSUs</li> <li>• Input voltage: -44–65DC; 600W</li> </ul>	FIPS kit Tamper Evident Label required
Chassis Ground	Power Input	<b>Trinzic 805, 1405, 2205, and 4005 series:</b>	

		<ul style="list-style-type: none"> <li>• Included (ground lug)</li> </ul>	
System Power Switch	Control Input	<b>Trinzic 805, 1405, 2205, and 4005 series:</b> <ul style="list-style-type: none"> <li>• Pin-Hole access “pc standard” Soft Power Switch</li> </ul>	
System Power LED	Status Output	<b>Trinzic 805, 1405, 2205, and 4005 series:</b> <ul style="list-style-type: none"> <li>• LED indicating system power status</li> </ul>	

*Table 7 Logical and Physical Interfaces*

## 5. Roles, Services, and Authentication

### 5.1. Roles

The module defines user permissions based on roles. Roles are assigned to user groups. Custom roles can be created to restrict access to particular services.

FIPS Role	Trinzic Role	Description
<b>Crypto-Officer</b>	Superuser	The Superuser role has full access to all resources on the appliance. Superusers can create limited-access admin groups and grant them specific permissions for Crypto Officer services.
	Limited-Access Admin	An admin belonging to a limited-access group which has been granted permissions to Crypto Officer services.
<b>User</b>	Limited-Access User	An admin belonging to a limited-access group which has only been granted read permissions to Grid Manager services.

### 5.2. Services

Listed below are the services for each of the module's roles that are approved for use in the FIPS approved mode.

Key/CSP Access is specified as:

- Generate (G) – The module generates the Key/CSP
- Read (R) – The module reads the Key/CSP
- Write (W) – The module writes/modifies the Key/CSP
- Execute (E) – The module uses the Key/CSP
- Delete (D) – The module deletes the Key/CSP

#### 5.2.1. Crypto-Officer Services

Name	Description	Inputs	Outputs	Key/CSP Access (G/R/W/E/D)
------	-------------	--------	---------	----------------------------

<b>Infoblox Console</b>	Access NIOS CLI via console to manage appliance.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• Superuser/Admin Password (E)</li> </ul>
<b>Infoblox Remote Console</b>	Access NIOS CLI via SSH to manage appliance.	SSH inputs, commands, and data	SSH outputs, commands, and data	<ul style="list-style-type: none"> <li>• Superuser/Admin Password (E)</li> <li>• DRBG CSPs (G/E/D)</li> <li>• SSHv2 private key (E)</li> <li>• SSHv2 public key (E)</li> <li>• SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Encryption Key (G/E/D)</li> <li>• SSHv2 Authentication Key(G/E/D)</li> </ul>
<b>Infoblox Grid Manager</b>	Access NIOS web interface to manage appliance	TLS inputs, commands, and data	TLS outputs, commands, and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key(G/E/D)</li> <li>• TLS Diffie-Hellman Public Key(G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• Superuser/Admin Password (E)</li> <li>• X. 509 User Certificate (E)</li> <li>• X. 509 CA Certificate (E)</li> </ul>
<b>Show Status</b>	View currently logged in user in Grid Manager	N/A	Status and data	None
<b>Configure Dashboards</b>	Home page in Grid Manager providing quick access to task, grid and network status.	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Smart Folders</b>	Organize core networking service data in Grid Manager.	Commands and configuration data	Status of commands and configuration data	None
<b>Manage Licenses</b>	Manage appliance licenses from CLI or Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Manage Users</b>	Setting up users, groups, roles, and permissions from Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• Superuser/Admin/User Password (W/D)</li> </ul>

<b>Manage Remote Authentication Services</b>	Configure remote authentication services for Active Directory, LDAPS, or Certificate Authentication from Grid Manager.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>LDAPS Bind User Password (W/D)</li> <li>X. 509 CA Certificate (R/W/D)</li> </ul>
<b>Deploy Independent appliances</b>	Deploy Infoblox appliance as a standalone via Grid Manager and CLI.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>Superuser/Admin Password (E/D)</li> </ul>
<b>Deploy Cloud Network Automation</b>	Configuring Cloud platform appliances to provide DNS and DHCP service in the cloud from Grid Manager.	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Syslog Backups</b>	Configure Syslog to backup over FTP or SCP in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>DRBG CSPs (G/E/D)</li> <li>SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>SSHv2 Encryption Key (G/E/D)</li> <li>SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>Capture and Export Network Traffic</b>	Capture network traffic on appliance interfaces and export capture file via SCP or TLS.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>DRBG CSPs (G/E/D)</li> <li>X.509 HTTPS Certificate (E)</li> <li>TLS Diffie-Hellman Private Key (G/E/D)</li> <li>TLS Diffie-Hellman Public Key (G/E/D)</li> <li>TLS pre-master secret (G/E/D)</li> <li>TLS master secret (G/E/D)</li> <li>TLS encryption key (G/E/D)</li> <li>TLS authentication key (G/E/D)</li> <li>SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>SSHv2 Encryption Key (G/E/D)</li> <li>SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>Manage NTP</b>	Manage network time protocol service in Grid Manager	Commands and configuration data	Status of commands and configuration data	None

<b>Manage Captive Portal</b>	Manage network captive portal in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Manage IPAM</b>	Managing IP address management services in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Manage File Distribution Service</b>	Managing transfer of files through TFTP, FTP and HTTP in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Managing NIOS Software and Configuration Files</b>	Performing software upgrades and downgrades in Grid Manager.  (New firmware versions within the scope of this validation must be validated through the FIPS 140-2 CMVP. Any other firmware loaded into this module is out of the scope of this validation and requires a separate FIPS 140-2 validation.)	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• Software/Firmware Load Test Public Key (W/E)</li> </ul>
<b>Configure RIR Registration Updates</b>	Managing Regional Internet Registries in Grid Manager.	Commands and configuration data	Status of commands and configuration data	None
<b>Configure IP Address Management</b>	Managing network and IP addresses in Grid Manager and CLI.	Commands and configuration data	Status of commands and configuration data	None
<b>Configure IP Discovery and vDiscovery</b>	IP discovery for detecting and obtaining information about active hosts in predefined networks in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>

<b>Configure Infoblox Network Insight</b>	Configure united network discovery for geographically dispersed networks in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Advisor Discovery Properties</b>	Configure Advisor properties to monitor lifecycle and vulnerabilities of discovered devices in Grid Manager.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Configure DNS</b>	Configuring DNS services in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure DNSSEC</b>	Configure DNSSEC services in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• DNSSEC KSK Private Key (G/E/D)</li> <li>• DNSSEC KSK Public Key (G/W/E/D)</li> <li>• DNSSEC ZSK Private Key (G/W/E/D)</li> <li>• DNSSEC ZSK Public Key (G/W/E/D)</li> </ul>
<b>Configure DHCP</b>	Configuring DHCP services in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Authenticated DHCP</b>	Configure DHCP to authenticate users using configured Remote Authentication servers in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Appliance Monitoring</b>	Configure monitoring state of appliance, service, database capacity, and ports in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure DHCP Fingerprint Detection</b>	DHCP fingerprint detection to identify IPv4 and IPv6 devices in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure SNMPv3</b>	Configure SNMPv3 in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• SNMPv3 Auth Password (W/D)</li> <li>• SNMPv3 Privacy Password (W/D)</li> </ul>



<b>Configure SMTP</b>	Configure SMTP Notifications in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Configure Infoblox Reporting and Analytics</b>	Configure automated collection, analysis and presentation of core networking data in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Infoblox Advanced DNS protection</b>	Configure threat protection rules to detect, report and stop DoS, DDoS and other network attacks targeting DNS in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Infoblox DNS Firewall</b>	Configure DNS Resource policy zones to control DNS lookups in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Infoblox Threat Insight</b>	Configure for protecting mission critical DNS infrastructure in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Ecosystem – Outbound Notifications</b>	Using RESTful API and DXL for obtaining core network service information	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• Superuser/Admin Password (E)</li> <li>• X. 509 User Certificate (E)</li> <li>• X. 509 CA Certificate (E)</li> </ul>
<b>Configure Informational GUI Banner</b>	Configure informational banner to display in Grid Manager	Commands and configuration data	Status of commands and configuration data	None
<b>Configure Dynamic DNS Services</b>	Configure Kerberos Authenticated Dynamic DNS services in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• GSS-TSIG Encryption Key (W/D)</li> <li>• GSS-TSIG Authentication Key (W/D)</li> </ul>

<b>Configure Proxy Server</b>	Configure HTTP/HTTPS proxy server in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Download Support Bundle</b>	Export support bundle for configuration troubleshooting in Grid Manager	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Backup Configuration</b>	Backup module configuration via HTTPS or SCP in Grid Manager.	Commands and configuration data	Status of commands and configuration data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Encryption Key (G/E/D)</li> <li>• SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>Zeroization</b>	Zeroize all keys/CSPs	Commands and configuration data	Status of commands and configuration data	All (D)

*Table 8 Crypto-Officer Services*

### 5.2.2. User Services

Name	Description	Inputs	Outputs	Key/CSP Access
<b>Authenticated DHCP</b>	Authenticate to DHCP server via Remote Access Server	Remote authentication inputs and data.	Status and Client network configuration	<ul style="list-style-type: none"> <li>• User Password (E)</li> <li>• LDAPS Bind User Password (E)</li> <li>• X. 509 CA Certificate (E)</li> </ul>

<b>Infoblox Grid Manager</b>	Access NIOS web interface over TLS.	TLS inputs, commands, and data	TLS outputs, commands, and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• Superuser/Admin Password (E)</li> <li>• X.509 User Certificate (E)</li> <li>• X.509 CA Certificate (E)</li> </ul>
<b>Show Status</b>	View currently logged in user in Grid Manager	N/A	Status and data	None
<b>Change User Password</b>	Change password of currently authenticated user	Commands and configuration data	Command status and data	<ul style="list-style-type: none"> <li>• User Password (W/D)</li> </ul>
<b>Configure Dashboards</b>	Configure home page in Grid Manager providing quick access to task, grid and network status.	Commands and configuration data	Status and data	None
<b>View Dashboards</b>	Home page in Grid Manager providing quick access to task, grid and network status.	Commands and data	Status and data	None
<b>Access Smart Folders</b>	Organize core networking service data in Grid Manager.	Commands and data	Status and data	None
<b>View Licenses</b>	View appliance licenses from Grid Manager	Commands and data	Status and data	None
<b>Infoblox Advanced DNS protection</b>	Utilize threat protection rules to detect, report and stop DoS, DDoS and other network attacks targeting DNS in Grid Manager	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• None</li> </ul>
<b>DNSSEC</b>	Utilize signed DNS queries.	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• DNSSEC KSK Private Key (G/E/D)</li> <li>• DNSSEC KSK Public Key (G/W/E/D)</li> </ul>

				<ul style="list-style-type: none"> <li>• DNSSEC ZSK Private Key (G/W/E/D)</li> <li>• DNSSEC ZSK Public Key (G/W/E/D)</li> </ul>
<b>Discovery (without Network Insight)</b>	IP discovery for detecting and obtaining information about active hosts in predefined networks in Grid Manager	Commands and data	Status and data	None
<b>vDiscovery</b>	Discovery of assets in AWS, Azure, OpenStack or VMWare environments in Grid Manager	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Advisor Discovery</b>	Monitor equipment lifecycle and vulnerability data for devices discovered by Network Insight	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Cloud Network Automation</b>	Manage devices discovered by vDiscovery	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• DRBG CSPs (G/E/D)</li> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> </ul>
<b>Port Scanning</b>	Nmap scans of network.	Commands and data	Status and data	None

<b>NetBIOS Scanning</b>	NetBIOS scan of network.	Commands and data	Status and data	None
<b>View and Export Log Files</b>	View and export log files from Grid Manager.	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Encryption Key (G/E/D)</li> <li>• SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>Export Syslog Backups</b>	Export syslog to external syslog server via FTP or SCP.	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Encryption Key (G/E/D)</li> <li>• SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>Capture and Export Network Traffic</b>	Capture network traffic on appliance interfaces and export capture file via SCP or TLS.	Commands and data	Status and data	<ul style="list-style-type: none"> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Private Key (G/E/D)</li> <li>• SSHv2 Elliptic-Curve Diffie-Hellman Public Key (G/E/D)</li> <li>• SSHv2 Encryption Key (G/E/D)</li> <li>• SSHv2 Authentication Key (G/E/D)</li> </ul>
<b>SNMPv3</b>	Send SNMPv3 traps	SNMPv3 inputs, commands, and data	SNMPv3 outputs, status, and data	<ul style="list-style-type: none"> <li>• SNMPv3 encryption key (G/E/D)</li> <li>• SNMPv3 authentication key (G/E/D)</li> </ul>

<b>Infoblox Reporting and Analytics</b>	Collect automated collection, analysis and presentation of core networking data.	Commands and data	Status and data	None
<b>Ecosystem – Outbound Notifications</b>	Using RESTful API and DXL for obtaining core network service information	TLS inputs, commands, and data	TLS outputs, status, and data	<ul style="list-style-type: none"> <li>• X.509 HTTPS Certificate (E)</li> <li>• TLS Diffie-Hellman Private Key (G/E/D)</li> <li>• TLS Diffie-Hellman Public Key (G/E/D)</li> <li>• TLS pre-master secret (G/E/D)</li> <li>• TLS master secret (G/E/D)</li> <li>• TLS encryption key (G/E/D)</li> <li>• TLS authentication key (G/E/D)</li> <li>• Superuser/Admin Password (E)</li> <li>• X.509 User Certificate (E)</li> <li>• X.509 CA Certificate (E)</li> </ul>

Table 9 User Services

### 5.2.3. Unauthenticated Services

Name	Description	Inputs	Outputs
<b>Captive Portal</b>	Access captive portal.	Commands and data	Command status and data
<b>DNS</b>	Domain Name Service queries.	Commands and data	Command status and data
<b>DHCP</b>	Receive network configuration from appliance DHCP server.	Commands and data	Command status and data
<b>File Distribution Service</b>	Appliance hosted FTP, TFTP, or HTTP file distribution service.  *Cannot be used to distribute keys or CSPs.	Commands and data	Command status and data
<b>NTP</b>	Receive network time protocol updates from appliance NTP service.	Commands and data	Command status and data
<b>View Console Status</b>	DB-9 Console Output.	None	Status and data

<b>On-Demand Self-Tests</b>	On-demand self-tests invoked by rebooting the module.	None	Status and data
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*Table 10 Unauthenticated Services*

#### 5.2.4. Non-Approved Services

The following services are non-approved for use in the FIPS approved mode.

<b>Name</b>	<b>Description</b>
<b>Support Access</b>	Support Access SSH service
<b>bloxTools</b>	Pre-installed environment to host custom webbased applications
<b>RADIUS Authentication</b>	Remote user authentication using RADIUS protocol
<b>TACACS+ Authentication</b>	Remote user authentication using TACACS+ protocol
<b>Cisco ISE Integration</b>	Authenticating to Cisco Identity Services Engine
<b>Microsoft Server Integration</b>	Managing Microsoft DNS/DHCP servers using BIND
<b>SNMPv1/v2</b>	Simple Network Management Protocol versions 1 and 2
<b>Deploy Grid</b>	Creating and managing Grid master and members via Grid Manager and CLI.

*Table 11 Non-approved Services*

### 5.3. Authentication

The module has the following methods of role based authentication:

- **Local password-based authentication**
- **Remote password-based authentication** (Active Directory, LDAPS)
- **Remote SAML-based authentication**
- **Certificate authentication**
- **Two-Factor authentication**

#### **Local password-based authentication, Remote password-based authentication**

Assuming that the Secure Initialization routine is followed, Infoblox enforces a 6 character minimum password, using a 72 character set of **a-z, A-Z, 0-9, and "!@#%^&\*()"**. This results in a bare minimum of 139,314,069,504 ( $72^6$ ) possible passwords. Thus the FIPS 140-2 requirement that for a single random password attempt the probability of success must be less than 1 in 1,000,000 is satisfied.

FIPS 140-2 requires that in a 1-minute span, the probability of guessing the password correct (at random) must be less than 1 in 100,000.

The web interface only allows 5 unsuccessful login attempts per minute. This calculates to a 1 in 27,862,813,900.8 ( $(72^6)/5$ ) chance of a successful password attempt in a minute, which is less than the 1 in 100,000 requirement.

The SSH interface implements a maximum of 3 tries per login attempt with each failed attempt adding an incremented delay of 5 seconds. 3 failed attempts will take 30 seconds (5 + 10 + 15), therefore, in 1 minute only 6 attempts can be made. This calculates to a 1 in 23,219,011,584 ( $(72^6)/6$ ) chance of a successful password attempt in a minute, which is less than the 1 in 100,000 requirement.

The console interface implements a delay of three seconds per invalid login attempt. As such, a maximum of 20 invalid login attempts are possible per minute. This calculates to a 1 in 6965703475.2 ( $(72^6)/20$ ) chance of a successful password attempt in a minute, which is less than the 1 in 100,000 requirement.

For remote password-authentication the module defers password verification to a trusted authenticator (Active Directory, or LDAPS). This connection is protected by TLS.

#### **Certificate authentication/Two-Factor authentication** (Password + X.509 certificate authentication)

If Certificate authentication or Two-Factor authentication is used, the calculations are based on the security-strength of the algorithm of the X.509 certificate. For example, if the X.509 certificate is RSA-2048 w/ SHA-256, then the security-strength is 112 bits (based on SP 800-57). Based on this, a 1 in  $2^{112}$  chance is much less than 1 in 1,000,000 per single attempt. With the worst case assumption that the network interface can support up to 29,296,875 ( $(1,000,000,000 \text{ bps} / 2048 \text{ bits}) * 60 \text{ seconds}$ ) connection attempts per minute. The chance of a successful authentication attempt in a minute calculates to a  $(2^{112})/29,296,875$ , which satisfies the 1 in 100,000 requirement.

Infoblox Two-Factor authentication provides option 'Username/password request'. If you select this option NIOS populates the username from the certificate and requests password from the user. If you do not select this option, only the certificate is necessary to log in to the appliance.



NIOS performs lookup against local users by default. You can enable remote lookup for user membership (Active Directory or LDAPS). A password must not be empty.

Certificates are validated by an OCSP responder.

### **Remote SAML-based authentication**

NIOS uses SAML (Security Assertion Markup Language) 2.0 authentication support for Single-Sign-On in NIOS. SAML provides a standard vendor-independent grammar and protocol for transferring information about a user from one web server to another independent of the server DNS domains. NIOS as a Service Provider uses SAML to defer authentication of users to a trusted authenticator called an Identity Provider (IDP). The IDP provides NIOS with a public-key signed authentication assertion. Refer to the certificate authentication strength justification above.

## 6. Physical Security





The module must be opaque within the visible spectrum and have tamper evident labels for doors or removable covers in order to be compliant with FIPS 140-2 Security Level 2 requirements. Infoblox provides tamper evident labels (TELs) which must be installed for the module to operate in the FIPS approved mode. The Crypto Officer is responsible for inspecting the TELs regularly<sup>4</sup> for signs of tamper, and should contact Infoblox customer support if any signs of tamper are found.

Label Kit – Description	Label Kit - Part Number
Infoblox Tamper Evident Seal Kit	IB-FIPS

Table 12 Tamper Evident Labels

### 6.1. Tamper Evident Label Placement

The tamper evident labels must be affixed to the module by the Crypto Officer at the following locations after ensuring the applying surface is clean.

Infoblox Trinzic 805 Series Tamper Evident Label Placement (3 labels)	
<p>Front</p> 	<p>Rear</p> 
<p>Left</p> 	<p>Right</p> 
Top	Bottom

<sup>4</sup> The inspection interval for the TELs is at the discretion of the Crypto Officer, and their standard operating procedures.

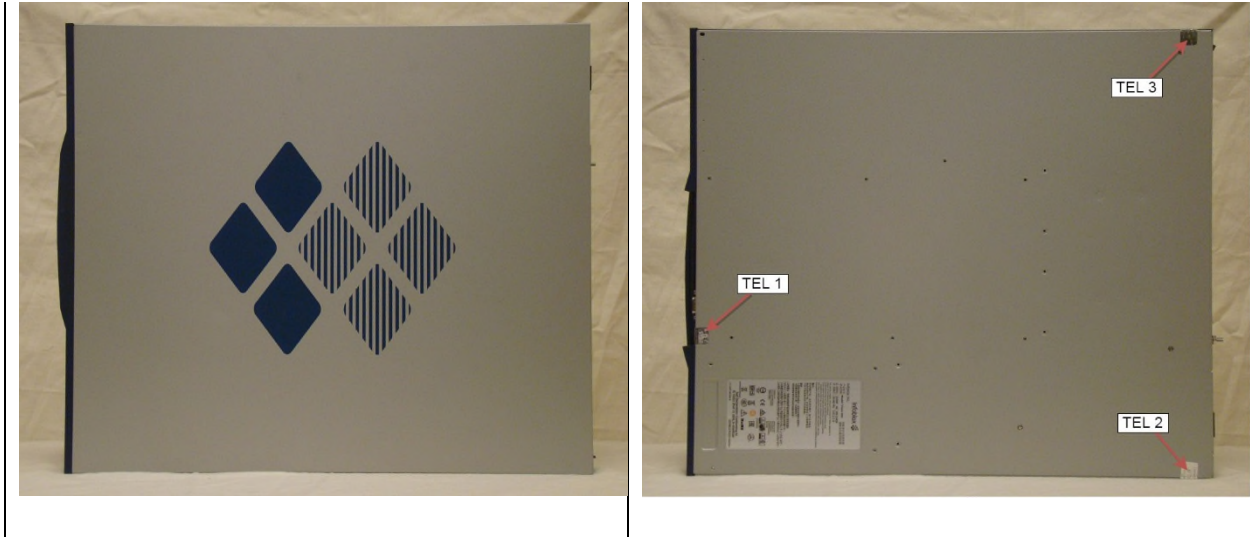
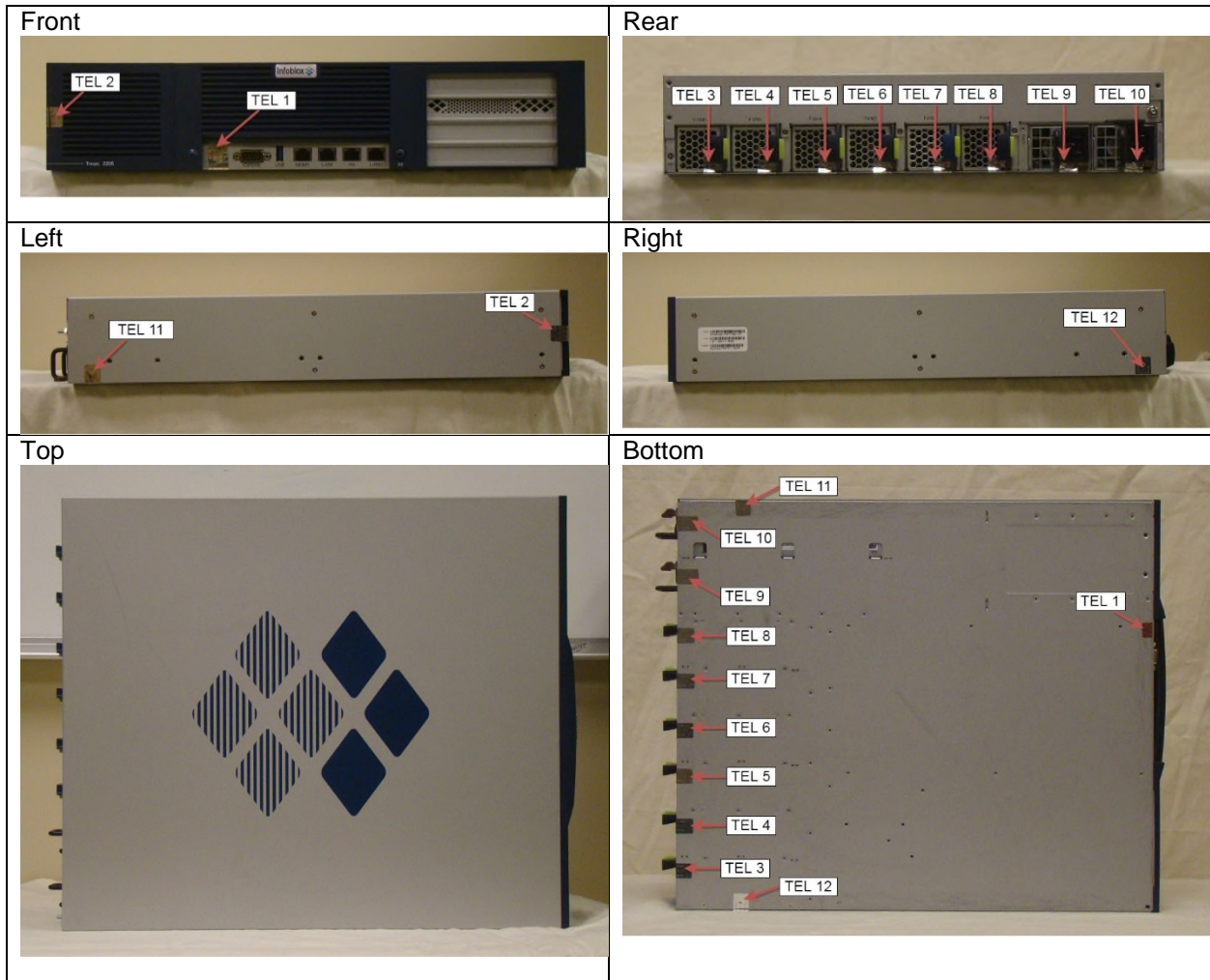


Table 13 Infoblox TrinziC 805 series Tamper Evident Label Placement

Infoblox TrinziC 1405 Series Tamper Evident Label Placement (6 labels)	
<p><b>Front</b></p>	<p><b>Rear</b></p>
<p><b>Left</b></p>	<p><b>Right</b></p>
<p><b>Top</b></p>	<p><b>Bottom</b></p>

Table 14 Infoblox TrinziC 1405 Series Tamper Evident Label Placement

**Infoblox TrinziC 2205 and 4005 Series Tamper Evident Label Placement (12 labels)**



*Table 15 Infoblox TrinziC 2205 and 4005 series Tamper Evident Label Placement*

## 7. Operational Environment

The module is a multi-chip standalone hardware module operating with a non-modifiable operational environment.

## 8. Cryptographic Key Management

Key/CSP Name	Key/CSP Type	Key/CSP Size	Generation/ Input <sup>5</sup>	Output	Storage	Zeroization	Use <sup>6</sup>
<b>Superuser / Admin / User Password</b>	Password	6 (or more) characters, <b>a-z, A-Z, 0-9</b> , or <b>“!@#%^&amp;*()”</b>	Input into module encrypted (via SSH or TLS)	N/A	The password is stored in the module's persistent memory (DB)	Via zeroization service.	Authentication for Superuser, Limited-Access Admin, or User
<b>LDAPS Bind User Password</b>	Password	6 (or more) characters, <b>a-z, A-Z, 0-9</b> , or <b>“!@#%^&amp;*()”</b>	Input into module encrypted (via TLS)	N/A	The password is stored in the module's persistent memory (DB)	Via zeroization service.	Authentication for credential for remote LDAPS server.
<b>Integrity Test Public Key</b>	RSA Public Key (with SHA256 Signature Algorithm)	4096 bits	Generated internally.	N/A	Stored in the module's persistent memory	Via zeroization service.	Integrity Test
<b>Integrity Test Private Key</b>	RSA Private Key	4096 bits	Generated internally.	N/A	Stored in the module's persistent memory	Via zeroization service.	Integrity Test
<b>Software / Firmware Load Test Public Key</b>	RSA Public Key (with SHA256 Signature Algorithm)	2048 bits	This key is not generated by the module.	N/A	This key is hard-coded into the module; stored in the module's persistent memory.	N/A	Software / Firmware Load Test
<b>X.509 CA Certificate</b>	x.509 Certificate with ECDSA, or RSA Public Key (with SHA-224, SHA-256, SHA-384, or SHA-512 Signature Algorithm)	ECDSA: P-256 (256 bits), P-384 (384 bits), P-521 (521 bits)  RSA: 2048 bits, 3072 bits, 4096 bits	Generated Externally	Encrypted (via TLS)	Stored in the module's persistent memory (DB)	Via zeroization service.	External Trusted CA Certificate

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For all keys marked as “generated internally”, the resulting symmetric key or the generated seed to be used in the asymmetric key generation is an unmodified output from the DRBG unless otherwise noted.

<sup>6</sup> Keys/CSPs generated in FIPS mode cannot be used in non-FIPS mode and vice-versa.



<b>X.509 HTTPS Certificate</b>	X.509 Certificate with RSA Public Key (with SHA-256 Signature Algorithm)	2048 bits, 4096 bits	Generated internally, or input into module encrypted (via TLS)	Encrypted (via TLS)	Stored in the module's persistent memory (DB)	Via zeroization service.	HTTPS Server Certificate
<b>X.509 HTTPS Certificate Private Key</b>	RSA	2048 bits, 4096 bits	Generated Internally	N/A	Stored in the module's persistent memory (DB)	Via zeroization service.	Private key for HTTPS Server Certificate
<b>X.509 Client Certificate</b>	X.509 Certificate with RSA Public Key (with SHA-256 Signature Algorithm)	2048 bits	Generated Internally	Encrypted (via TLS)	Stored in the module's persistent memory (DB)	Via zeroization service.	Authenticating the Module to an external server.
<b>X.509 Client Certificate Private Key</b>	RSA	2048 bits	Generated Internally	N/A	Stored in the module's persistent memory (DB)	Via zeroization service.	Private Key for Client Certificate
<b>X.509 User Certificate</b>	X.509 Certificate with RSA Public Key (with SHA-256 or SHA-512 Signature Algorithm)	2048 bits, 3072 bits, 4096 bits	Generate Externally	Plaintext	Stored in the module's dynamic memory	After user is authenticated	Authenticate user to module.
<b>SSHv2 Private Key</b>	RSA	2048 bits	Generated internally	N/A	Stored in the module's persistent memory.	Upon session re-key or termination.	This is the private host key used for SSHv2 authentication
<b>SSHv2 Public Key</b>	RSA	2048 bits	Generated internally	Plaintext	Stored in the module's persistent memory.	Via zeroization service.	This is the public host key used for SSHv2 authentication
<b>SSHv2 Diffie-Hellman Private Key</b>	KAS-FFC	2048 bits	Generated internally	N/A	Stored in dynamic memory.	Upon negotiation of shared secret	SSH Key Agreement

<b>SSHv2 Diffie-Hellman Public Key</b>	KAS-FFC	2048 bits	Generated internally	Plaintext	Stored in dynamic memory	Upon negotiation of shared secret	SSH Key Agreement
<b>SSHv2 Elliptic-Curve Diffie-Hellman Private Key</b>	KAS-ECC	256 bits, 384 bits, 521 bits	Generated internally	N/A	Stored in dynamic memory	Upon negotiation of shared secret	SSH Key Agreement
<b>SSHv2 Elliptic-Curve Diffie-Hellman Public Key</b>	KAS-ECC	P-256 (256 bits), P-384 (384 bits), P-521 (521 bits)	Generated internally	Plaintext	Stored in dynamic memory	Upon negotiation of shared secret	SSH Key Agreement
<b>SSHv2 Encryption Key</b>	AES-128-CBC, AES-256-CBC	128 bits, 256 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	This is the SSHv2 session key; used to encrypt SSHv2 data traffic
<b>SSHv2 Authentication Key</b>	HMAC-SHA1	160 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	This is the SSHv2 authentication key; used to authenticate SSHv2 data traffic
<b>snmpEngineID</b>	Unique ID	32-byte maximum length	Generated externally	Plaintext	Hardcoded, stored in the module's persistent memory.	N/A	This is the SnmpEngineID as defined in RFC3411, used to identify the SNMP engine
<b>SNMPv3 Auth Password</b>	Password	6 (or more) characters, a-z, A-Z, 0-9, or "!@#%^&*()"	Input into module encrypted (via SSH or TLS)	N/A	This password is stored in the module's persistent memory (DB) in AES encrypted form	Via zeroization service.	Authentication for SNMPv3



<b>SNMPv3 Privacy Password</b>	Password	6 (or more) characters, <b>a-z, A-Z, 0-9</b> , or <b>“!@#%^&amp;*()”</b>	Input into module encrypted (via SSH or TLS)	N/A	This password is stored in the module’s persistent memory (DB) in AES encrypted form	Via zeroization service.	Privacy for SNMPv3
<b>SNMPv3 Encryption Key</b>	AES-128 CFB	128 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	Encryption for SNMPv3
<b>SNMPv3 Authentication Key</b>	HMAC-SHA-1-96	160 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	Encryption for SNMPv3
<b>TLS Diffie-Hellman Private Key</b>	KAS-FFC	2048 bits	Generated internally	N/A	Stored in dynamic memory.	Upon negotiation of shared secret	TLS Key Agreement
<b>TLS Diffie-Hellman Public Key</b>	KAS-FFC	2048 bits	Generated internally	Plaintext	Stored in dynamic memory	Upon negotiation of shared secret	TLS Key Agreement
<b>TLS Pre-master Secret</b>	Key Material	384 bits (RSA Key Transport), 2048 bits (KAS-FFC Key Agreement)	Entered into the module protected by RSA, or derived via KAS-FFC	N/A	Ephemeral	Upon completion of key derivation.	Used to derive TLS master secret
<b>TLS Master Secret</b>	Key Material	48 bytes (384 bits)	Derived from pre-master secret	N/A	Ephemeral	Upon completion of key derivation.	Used to produce keys in TLS handshake
<b>TLS Encryption Key</b>	AES-128 CBC, AES-256 CBC	128 bits, 256 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	Used to encrypt traffic in TLS

<b>TLS Authentication Key</b>	HMAC-SHA-1	160 bits	Derived via the SP800-135 KDF	N/A	Ephemeral	Upon session re-key or termination.	Used to authenticate traffic in TLS
<b>DNSSEC KSK Private Key</b>	RSA Private Key	2048 bits, 3072 bits, 4096 bits	Generated Internally	N/A	Stored in persistent memory	Via zeroization service.	Used to sign all DNSKEY records
<b>DNSSEC KSK Public Key</b>	RSA Public Key (with SHA-256 or SHA-512 signatures)	2048 bits, 3072 bits, 4096 bits	Generated Internally	Plaintext	Stored in persistent memory	Via zeroization service.	Used to sign all DNSKEY records
<b>DNSSEC ZSK Private Key</b>	RSA Private Key	2048 bits, 3072 bits, 4096 bits	Generated Internally	N/A	Stored in persistent memory	Via zeroization service.	Used to sign each RRset in a zone
<b>DNSSEC ZSK Public Key</b>	RSA Public Key (with SHA-256 or SHA-512 signatures)	2048 bits, 3072 bits, 4096 bits	Generated Internally	Plaintext	Stored in persistent memory	Via zeroization service.	Used to sign each RRset in a zone
<b>HMAC DRBG entropy input</b>	2400-bit entropy input for DRBG Cert. #A2503 <sup>7</sup> , 256-bit for DRBG Cert. #A2507 <sup>8</sup>		Generated by the module's Entropy Source	N/A	Ephemeral	Upon reseed and shutdown.	Random Number Generation
<b>HMAC DRBG seed</b>	Seed	440-bits	Derived via the SP800-90A Mechanisms	N/A	Ephemeral	Upon reseed and shutdown.	DRBG Seed
<b>HMAC DRBG V</b>	Internal State Value	256 bits	Derived via the SP800-90A Mechanisms	N/A	Ephemeral	Upon reseed and shutdown.	DRBG Internal State

<sup>7</sup> The module's entropy source, ENT (NP), provides an estimated 58 bits of entropy per 64-bit output. DRBG Cert. #A2503 requests 2400-bits of output from the ENT (NP). Therefore, DRBG Cert. #A2503 is seeded with at least 2175 bits of entropy and fully seeded.

<sup>8</sup> DRBG Cert. #A2507 requests 256-bits of entropy output from DRBG Cert. #A2503, which is considered a vetted conditioner providing full entropy per FIPS 140-2 IG 7.19.

<b>HMAC DRBG Key</b>	Internal State Value	256 bits	Derived via the SP800-90A Mechanisms	N/A	Ephemeral	Upon reseed and shutdown.	Random Number Generation
<b>GSS-TSIG Encryption Key</b>	AES-128-CTS, AES-256-CTS Kerberos Key	128 bits, 256 bits	Generated externally. Input into module encrypted (via TLS)	Output encrypted (via TLS)	Stored encrypted in persistent memory.	Via zeroization service.	Used for Secure DDNS Updates
<b>GSS-TSIG Authentication Key</b>	HMAC-SHA-1-96 Kerberos Key	160 bits	Generated externally. Input into module encrypted (via TLS)	Output encrypted (via TLS)	Stored encrypted in persistent memory.	Via zeroization service.	Used for Secure DDNS Updates
<b>Key Encryption Key (KEK)</b>	AES-128-CBC key	128 bits	Generated internally	N/A	Stored in persistent memory.	Via zeroization service.	Used for encrypting database keys.

Table 16 Cryptographic Keys and CSPs

## 9. Self-Tests

Output via the Data Output interface is inhibited during the performance of self-tests. The module enters the error state upon any self-test failure. The following self-tests are executed automatically without any need for input or actions from the user.

### 9.1. Power-on Self-Tests

The results of the power-on self-tests are output via the console and to the system syslog.

- Integrity Test
- SHA-1 Known Answer Test
- HMAC-SHA-1/256/384/512 Known Answer Tests
- AES ECB encrypt / decrypt Known Answer Test (128-bit key)
- RSA sign / verify Known Answer Test (2048-bit key, PKCS #1 v1.5 with SHA-256)
- ECDSA sign / verify Known Answer Test (P-256 with SHA-256)
- HMAC\_DRBG w/ SHA-256 Known Answer Tests (Instantiate, Reseed, Generate)<sup>9</sup>
- Primitive “Z” Computation Known Answer Test for KAS-FFC
- Primitive “Z” Computation Known Answer Test for KAS-ECC
- SP 800-90B Startup Health Tests (Repetition Count Test and Adaptive Proportion Test)
- SP 800-135 TLS 1.0/1.1 KDF Known Answer Test
- SP 800-135 TLS 1.2 KDF Known Answer Test
- SP 800-135 SSH KDF Known Answer Test

### 9.2. Conditional Self-Tests

- Continuous Random Number Generator Test (CRNGT) on the SP800-90A HMAC\_DRBG w/ SHA-256
- Health Tests (Instantiate, Reseed, Generate) on the SP800-90A HMAC\_DRBG's w/ SHA-256
- SP800-90B Health Tests (Repetition Count Test and Adaptive Proportion Test)
- ECDSA Pair-wise Consistency Test
- RSA Pair-wise Consistency Test
- KAS-FFC Pair-wise Conditional Test
- KAS-ECC Pair-wise Conditional Test
- Conditional Tests for Assurances (as specified in SP800-56A Sections 5.5.2, 5.6.2 and 5.6.3)
- Firmware Load Test

### 9.3. Critical Functions Tests

- Memory test – All memory is tested and isolated faulty memory is disabled

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<sup>9</sup> Tested for DRBG Certs. #A2503 and #A2507

## A. Appendices

Table of Acronyms:

Acronym	Definition
8N1	Eight Data Bits, No Parity Bit, One Stop Bit
AC	Alternating Current
AES	Advanced Encryption Standard
CA	Certificate Authority
CVL	Component Validation List
DB9/DB-9	D-Subminiature 9
DC	Direct Current
DDI	DNS, DHCP, and IPAM
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name System
DRBG	Deterministic Random Bit Generator
DSA	Digital Signature Algorithm
DTC	DNS Traffic Control
ECDSA	Elliptic Curve Digital Signature Algorithm
EMI	Electromagnetic Interference
EMC	Electromagnetic Compatibility
FIPS	Federal Information Processing Standard
FTP	File Transfer Protocol
HA	High Availability
HMAC	Hash-based Message Authentication Code
HSM	Hardware Security Module
IKE	Internet Key Exchange
IP	Internet Protocol
IPAM	Internet Protocol Address Management
IPMI	Intelligent Platform Management Interface
IPsec	Internet Protocol Security
KAS	Key Agreement Scheme
KDF	Key Derivation Function
LAN	Local Area Network
LBDN	Load Balanced Domain Name
LDAP	Lightweight Directory Access Protocol
LCD	Liquid-Crystal Display
LOM	Lights-Out Management
MAC	Media Access Control
MD5	Message Digest 5
MGMT	Management
NEBS	Network Equipment-Building System
NDRNG	Non-Deterministic Random Number Generator
PKI	Public Key Infrastructure
PRNG	Pseudo-Random Number Generator
PSU	Power Supply Unit
RADIUS	Remote Authentication Dial-In User Service
RAID	Redundant Array of Independent Disks
RC4	Rivest Cipher 4
RSA	Rivest, Shamir and Adleman (cryptosystem)
SAML	Security Assertion Markup Language
SHA	Secure Hash Algorithm
SHS	Secure Hash Standard
SNMP	Simple Network Management Protocol

<b>SSH</b>	Secure Shell
<b>TACACS+</b>	Terminal Access Controller Access-Control System
<b>TLS</b>	Transport Layer Security
<b>TFTP</b>	Trivial File Transfer Protocol
<b>USB</b>	Universal Serial Bus
<b>VAC</b>	Voltage in Alternating Current
<b>XOFF</b>	Pause Transmission
<b>XON</b>	Resume Transmission

