OPSWAT

Security Target

OPSWAT NetWall Optical Diode
Evaluation Assurance Level (EAL): 4 augmented with ALC_DVS.2, ALC_FLR.2, and AVA_VAN.5

TOE Reference:	OPSWAT NetWall OD-101
Version	v1.7
Date	2024-05-22
Classification:	PUBLIC

Version history

Version	Date	Author	Description
v1.0	2023-04-14	Miguel Ángel Fernández Otero	The first version of the Security Target.
v1.1	2023-07-10	Miguel Ángel Fernández Otero	Amendments based on the 1st analysis cycle
v1.2	2023-09-27	Miguel Ángel Fernández Otero	Amendments based on the 2nd analysis cycle
v1.3	2023-10-16	Miguel Ángel Fernández Otero	Final package version added, amendments based on the 3rd analysis cycle
v1.4	2023-12-22	Miguel Ángel Fernández Otero	TOE reference changed to match the rest of CC documentation
v1.5	2024-01-18	Miguel Ángel Fernández Otero	Update of the references
v1.6	2024-04-04	Miguel Ángel Fernández Otero	Update Assumptions
v1.7	2024-05-22	Miguel Ángel Fernández Otero	Final changes requested by certification body

Table of Contents

1 Introduction

1.1 ST References

Table 1 – ST Reference

ST Title	OPSWAT NetWall Optical Diode Security Target
ST Version	1.7
ST Creation Date	2024-05-22

1.2 TOE Reference

Table 2 – TOE Reference

TOE Name	OPSWAT NetWall Optical Diode
TOE Reference	OPSWAT NetWall OD-101
TOE Version	1.0.1
TOE Short Name	OD-101

1.3 TOE Overview

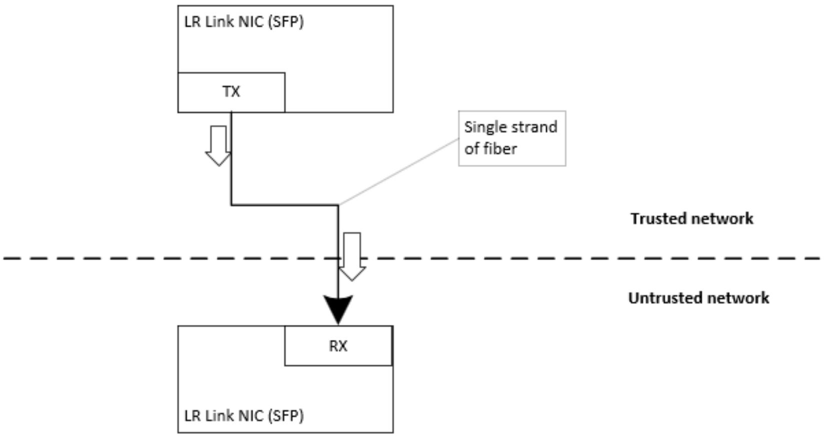
The Target of Evaluation (TOE) consists of a TX Module that connects with a sending or trusted network and a RX Module that connects to a receiving or untrusted network. Both modules enforce in hardware a one-way information flow control policy on network traffic flowing through the TOE. These modules are running on a Linux based system on both the BLUE and RED devices.

The connection between the TX Module and RX Module consists of an optical link cable.

OPSWAT NetWall OD-101 follows the hardware philosophy shown in the following figure. It uses Unidirectional TX only transceiver at the sending server and RX only transceiver at the receiving server with an optical cable to connect the TX side to the RX side. These optic transceivers have been modified to allow only transmission on the TX side and reception on the RX side. Other transmission paths are physically disabled.

This creates a physical layer enforced one-way transfer of data with no back channel. OPSWAT NetWall OD-101 supports redundant optical connection providing a higher level of data delivery assurance.

Figure 1 – Hardware philosophy



OD-101 hardware uses one or more Ethernet Fiber Optic cards as the transport medium to send data from the sending network to the receiving network.

1.3.1 TOE Boundary

The figure below illustrates the OD-101 architecture and defines the TOE boundary.

TOE is divided into two different modules, OPSWAT TX Module and OPSWAT RX Module. These modules are composed of different components as indicated in the picture. DiodeSend, SFPTX1 and SFPTX2 in the TX module and DiodeReceive, SFPRX1 and SFPRX2 constitute the TOE boundary. The OPSWAT TX Module and OPSWAT RX Module modules are placed in the BLUE and RED appliances. The different configurations of these appliances are described in section 1.4.1 Physical scope of the TOE.

Figure 2 – TOE Boundary

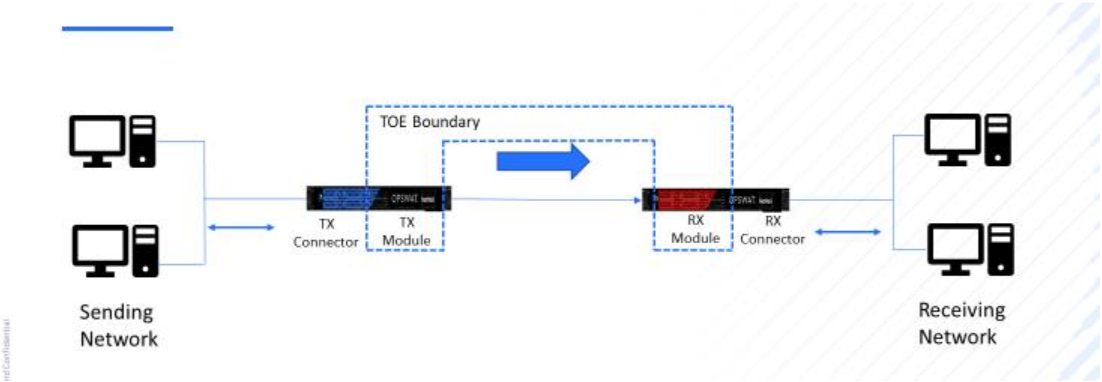
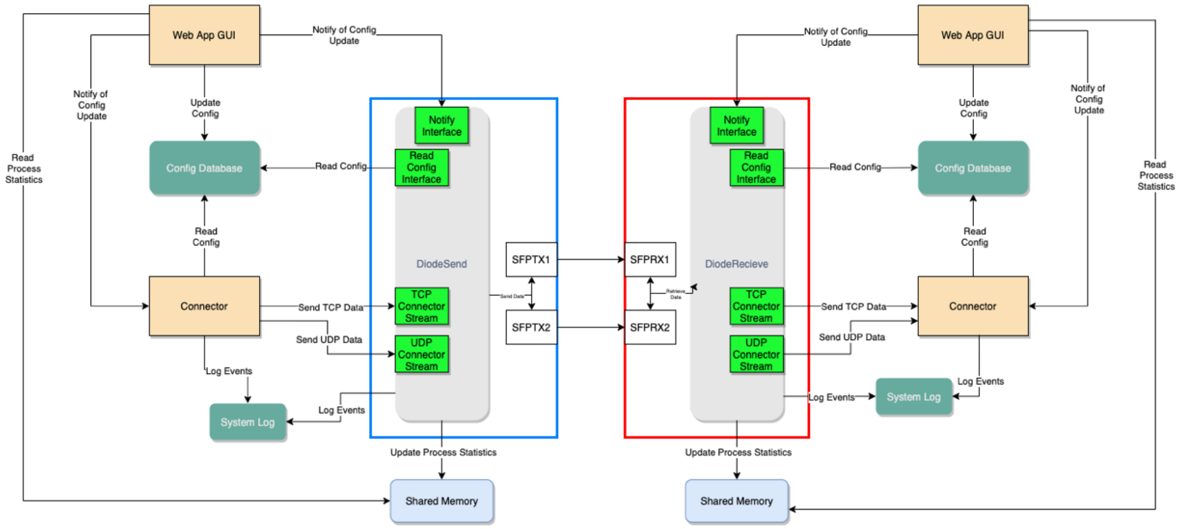


Figure 3 shows the TOE architecture containing the TOE and non-TOE components. The blue and red brackets are indicating the TOE itself. The TSFIs can be found in the green (inside DiodeSend or DiodeReceive) and white boxes in the blue and red brackets.

Figure 3 – System architecture



The TOE is a software component of the whole OPSWAT NetWall Optical Diode product. The BLUE and RED appliances are running a Linux based operating system and the following services:

- **TOE components:**

    - TX Module
    - RX Module
- **NON-TOE components:**
    - Web App GUI
    - Config Database
    - Connector
    - System Log
    - Shared Memory

1.3.2 TOE Type

The Target of Evaluation (TOE) is a unidirectional security gateway software using optical diodes for data transfer containing a TX Module and a RX Module services that enforce in software and hardware a one-way data flow. TX Module connects to the sending or trusted network and a RX Module connects to the receiving or untrusted Network.

1.3.3 TOE Usage and Major Security Features

The TOE allows information such as real time process control data, syslog event records, or files to be transferred from the industrial control network to the corporate network over a non-networked connection. The TOE prevents any data from flowing back to the industrial network and prevents source network identifying information such as IP address and MAC address of systems in the industrial networks from being transferred to the destination network. Only the data payload is transferred. The sending Network is fully protected against any network based cyber-attacks initiated at the receiving network, since no data can be sent from the receiving network to the sending network.

A typical usage scenario consists of a source network that represents an industrial control network, and a receiving network that represents the corporate network. Information can be shared from the industrial network to the corporate network without have corporate network connect directly to the industrial control network, preventing an attack from the external network that might impact its integrity or result in a denial of service. The TOE allows information to flow from the industrial network to the corporate network, while preventing any information from flowing back through the data diode to the industrial network. This serves to prevent a wide range of online attacks.

A second typical usage is to securely move information from an untrusted network into a secured or trusted network. For example, classified Intelligence Community or DoD networks that must receive information from a lower classified network such as the internet, while maintaining network isolation from the lower classified network. In this scenario, the TOE is configured such that the Destination Server connects to the higher security network.

1.3.4 Non-TOE Software/Firmware/Hardware

Bundled with the TOE is a Web Application which allows a user to configure the TOE to connect to systems in the source and destination networks and configure the data type that is being transferred by the TOE. In addition to the Web Application, there is a Command Line Interface (CLI) that can also be used to configure the system. The configuration Web Application and CLI are not included in the TOE boundary.

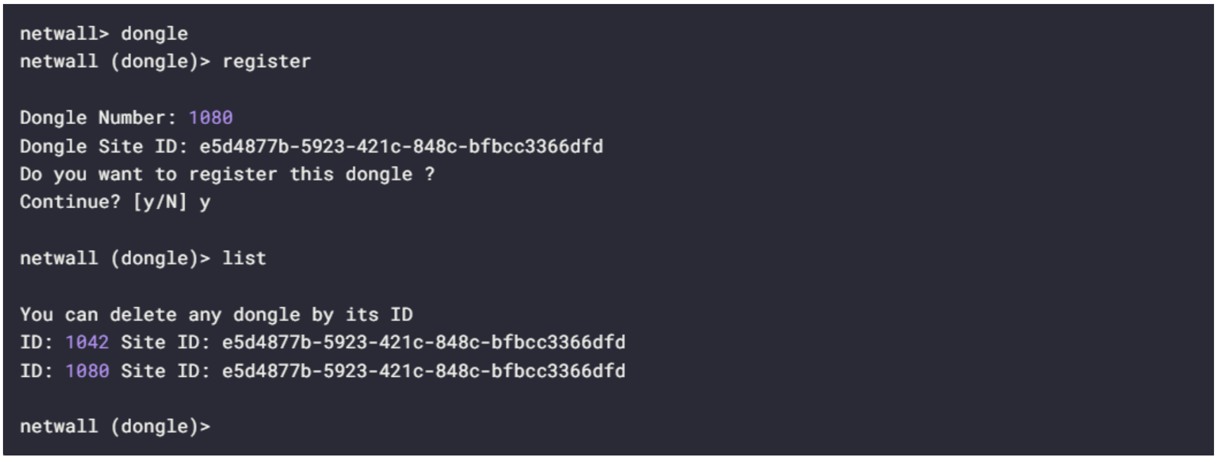
The Web App allows the configuration of Industry Control protocol connector software such as Modbus, OPC DA & UA connectors that are typically provided with the TOE but reside outside the TOE boundary.

Two USB devices (security dongles) are provided. OPSWAT encrypts each dongle with information unique to customer's site. The dongles are encrypted and configured so they cannot be accessed from a computer by normal means. Each dongle contains the following information that is unique for each customer:

- A Site Key identifies the organization's site. This Key is the same on all dongles in the organization.
- A security key unique to each dongle.

These two dongles are preregistered. If the organization needs extra dongles these need to be registered via the CLI to work properly. The user needs admin credentials to access the CLI. So, these dongles act as a second factor for authentication. To register the dongles the user needs to plug in the dongles in the corresponding NetWall appliance and follow the steps indicated in the picture below.

Figure 4 – Dongle registration



```
netwall> dongle
netwall (dongle)> register

Dongle Number: 1080
Dongle Site ID: e5d4877b-5923-421c-848c-bfbcc3366dfd
Do you want to register this dongle ?
Continue? [y/N] y

netwall (dongle)> list

You can delete any dongle by its ID
ID: 1042 Site ID: e5d4877b-5923-421c-848c-bfbcc3366dfd
ID: 1080 Site ID: e5d4877b-5923-421c-848c-bfbcc3366dfd

netwall (dongle)>
```

- OPSWAT TX Connector (outside of the TOE) is a software that can run on the same appliance as the OPSWAT TX Module or on a server in the sending domain. The OPSWAT TX Connector forwards protocol specific data between the sending network servers and forwards this information to the OPSWAT TX Module for delivery to the other domain. The currently supported protocols are:
  - Modbus
  - OPC UA
  - SMTP
  - IEC 104
  - DNP3
  - MQTT

  - OSI-PI

- OPSWAT RX Connector (outside of the TOE) is software that can run on the same appliance as the OPSWAT RX Module or on a server in the receiving domain. The OPSWAT RX Connector forwards protocol specific data between the OPSWAT RX Module and forwards to a server on the same appliance or to a server on the receiving domain.

- Fiber Cards (outside of the TOE):

  - Standard fiber cards are packaged with the appliance. The cards are standard COTS hardware that meet the criteria below.

  - The cards are used by DiodeSend and DiodeReceive to prepare data for physical transmission via the corresponding SFPs.

  - The fiber cards do not contribute to the TOE claims.

  - PCIe gen 2 or above

  - Must have SFP cages compatible with the SFP.

  - 10 gig option requires 8 or more PCIe lanes.

  - 1 gig option requires 1 or more PCIe lane(s).

- Configuration Database
  - Standard SQLITE3 database – single file.
  - The configuration database is used by DiodeSend and DiodeReceive to read configuration via Read Config Interface (SQLITE3 C++ API, libsqlite3 3.34.1-3)
  - DiodeSend and DiodeReceive only read configuration from streams file table.

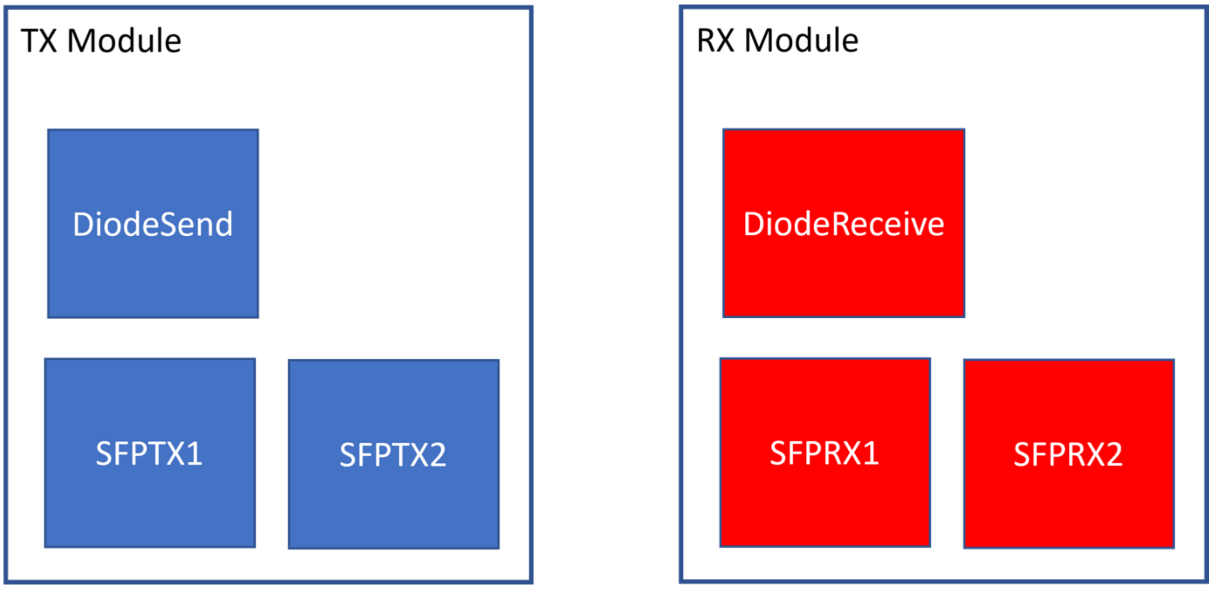
1.4 TOE Description

This section primarily addresses the physical and logical components of the TOE that are included in the evaluation.

1.4.1 Physical Scope of the TOE

The different components conforming TX and RX Modules are indicated in the figure below. In this section a description of the components will be provided together with a detail of the different configurations to be evaluated.

Figure 5 – TOE physical scope



- DiodeSend Description: DiodeSend module is a software module that reads network frames from the sending network, transforms them into internal data representation and sends that to the DiodeReceive module over a single optical fiber cable. For increased reliability the internal data may be optionally sent over two optical fiber cables.
- DiodeReceive Description: DiodeReceive module is a software module that receives the internal data sent by DiodeSend module over pair of single optical fiber cable (SFPRX1 and SFPRX2), extracts the network frames from the data, ensuring data integrity over both pairs is intact and recreates the network payload into the receiving network by injecting that data into the newly created network connections.
- SFPTX1 and SFPTX2 Description: The SFPTX1 and SFPTX2 are identical SFP modules that contain laser LED that convert electronic signals to light. The SFPTX1/SFPTX2 are identical in order to ensure redundancy (where applicable). These SFP modules are modified to utilize single fiber optic cable, in addition these only allow data transmission (data receiving is disabled).
- SFPRX1 and SFPRX2 Description: The SFPRX1 and SFPRX2 are identical SFP (Small Factor Pluggable) modules that contain photoelectric cell that can sense light and convert it into electronic signals. The SFPRX1/SFPRX2 are identical in order to ensure redundancy (where applicable). These SFP modules are modified to operate on single fiber optic cable, in addition these only allow data to be received (data transmission is disabled). Each SFPTX is paired with corresponding SFPRX module – to guarantee hardware enforced one way data transmission.

- Expected SFPs
    - 1 Gigabit TX SFP
    - 1 Gigabit RX SFP
    - 10 Gigabit TX SFP+
    - 10 Gigabit RX SFP+
    - 25 Gigabit TX SFP28
    - 25 Gigabit RX SFP28

The TOE is delivered with all the necessary software components already installed, but the customer can download the evaluated version of the TOE from the https://my.opswat.com/portal/products page and the integrity of the downloaded files can be validated using the HASH values available for every versions. The downloaded package can be installed using the Software Update product function.

Table 3 – OPSWAT NetWall evaluated version identification

Name	Serial number	Software version	Installation package	HASH
NetWall BLUE 1U	NW2023000 19	OD-101: 1.0.1 Config: 1.5.0	NetWall_OD-101_1.0.1_Config_1.5.0.1 963_BLUE	SHA256: d2d2d225832486f85358e3fef e84b97b05401321a9bc08968 79448f4055fc28c
NetWall RED 1U	NW2023000 20	OD-101: 1.0.1 Config: 1.5.0	NetWall_OD-101_1.0.1_Config_1.5.0.1 965_RED	SHA256: e1be95643a2c6c8548ce4096c 1bacfd3aa43d8ec6621b1ac96 b49b2e826b826a
NetWall BLUE DIN rail	LR20220701 5043	OD-101: 1.0.1 Config: 1.5.0	NetWall_OD-101_1.0.1_Config_1.5.0.1 963_BLUE	SHA256: d2d2d225832486f85358e3fef e84b97b05401321a9bc08968 79448f4055fc28c
NetWall RED DIN rail	LR20220701 5044	OD-101: 1.0.1 Config: 1.5.0	NetWall_OD-101_1.0.1_Config_1.5.0.1 965_RED	SHA256: e1be95643a2c6c8548ce4096c 1bacfd3aa43d8ec6621b1ac96 b49b2e826b826a

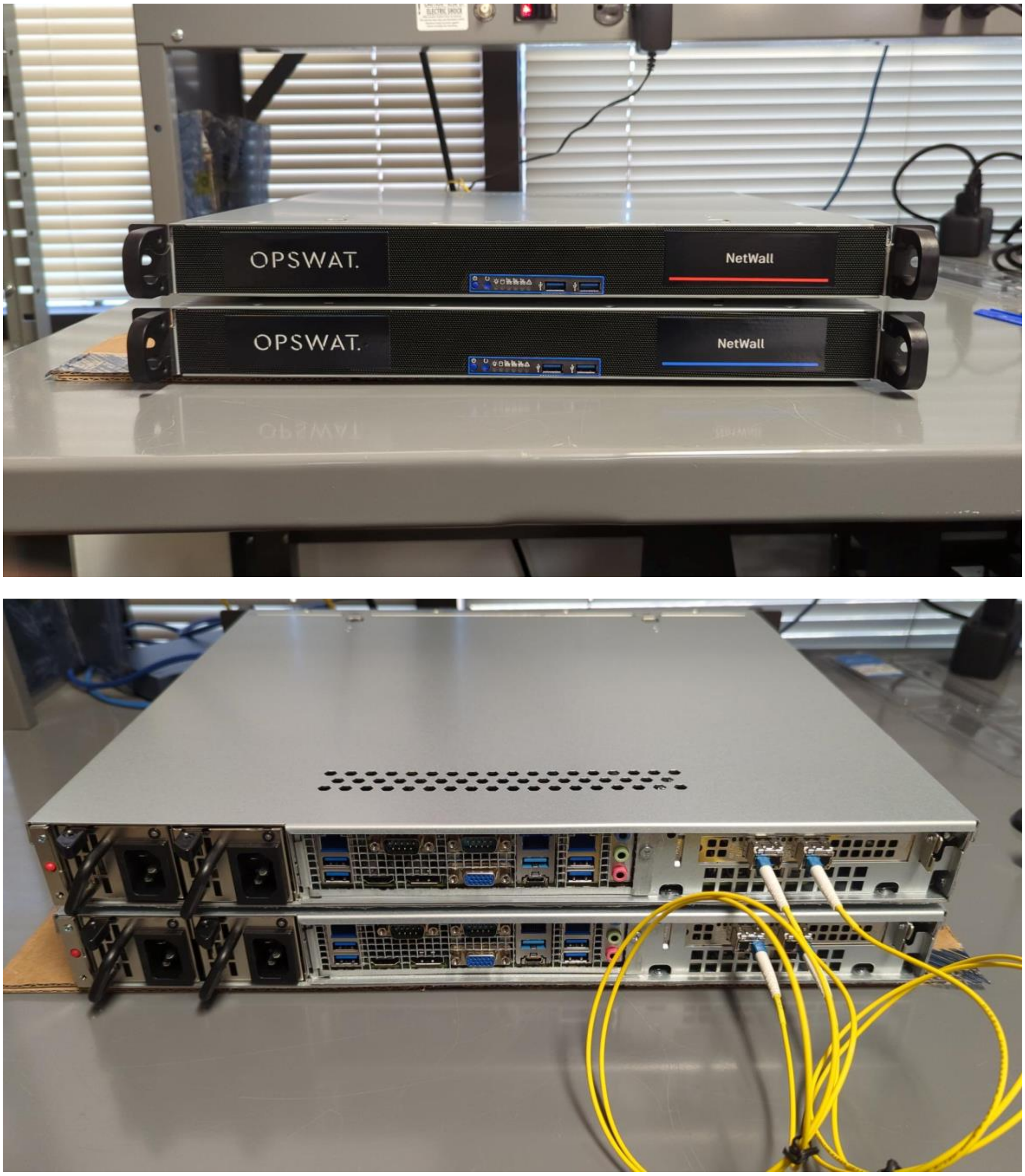
Once the development work has finished for a given version, the candidate version is built using Jenkins and sent to the QA team who will perform regression and new features testing. Once the software is accepted by both QA Team and the Engineering leader the software is officially released together with the documentation corresponding to the new version. The installation packages are uploaded and stored in Amazon S3 Bucket to make them available for the users via my.opswat.com where they can download it.

The TOE can operate in the following evaluated configurations. These different configurations don't affect the functionality and the security of TOE:

- 1U configuration: Two 1U half-depth appliances (NetWall BLUE and NetWall RED) running respectively:

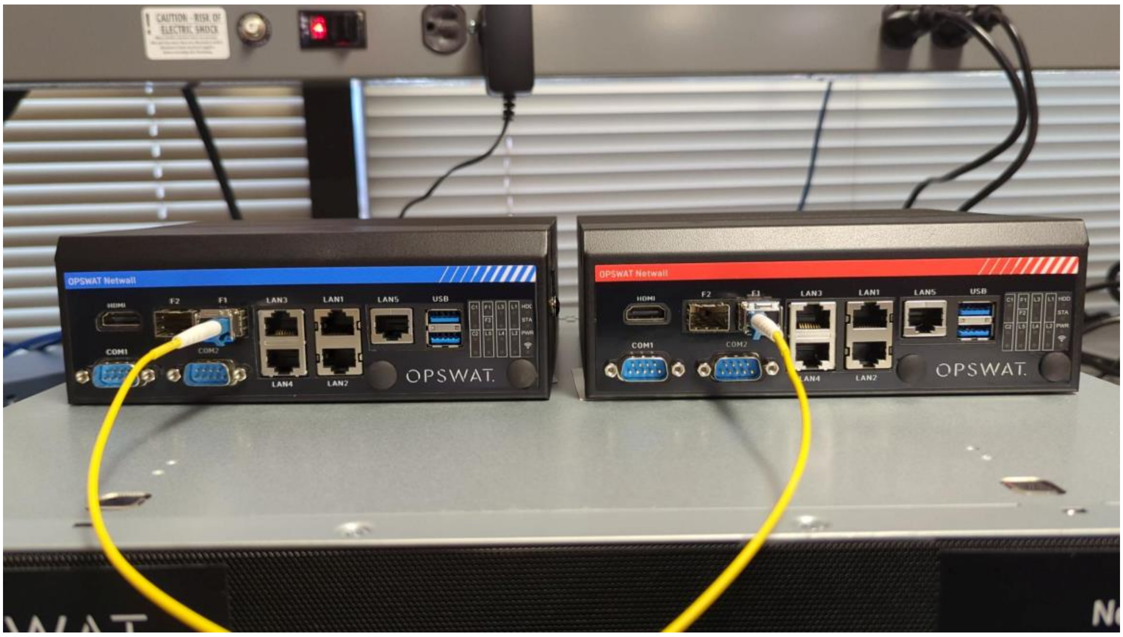
- OPSWAT TX Module and OPSWAT TX Connector in NetWall BLUE.
- OPSWAT RX Module and OPSWAT RX Connector in NetWall RED.

Figure 6 –OPSWAT NetWall Optical Diode 1U version



- DIN Rail configuration: Two DIN Rail appliances (NetWall BLUE and NetWall RED) running respectively:
  - OPSWAT TX Module and OPSWAT TX Connector in NetWall BLUE.
  - OPSWAT RX Module and OPSWAT RX Connector in NetWall RED.

Figure 7 - OPSWAT NetWall Optical Diode Din Rail version



1.4.2 TOE Guidance

The following guidance is considered part of the TOE:

- OPSWAT NetWall Data Diode OD-101 Common Criteria Evaluated Configuration Guide, version 1.2 [OD-UM]
- OPSWAT NetWall Optical Diode AGD documentation [AGD]
- NetWall Diode v1.5 [P-UM]

OPSWAT customers can request a copy of the guidance by contacting OPSWAT support.

1.4.3 Logical Scope of the TOE

The following sequence describes the information flow through the TOE:

1. OPSWAT TX Connector (outside the TOE) on TX side receives a protocol-specific data stream from the industrial network servers or stations.

2. OPSWAT TX Connector sends the information to OPSWAT TX Module.

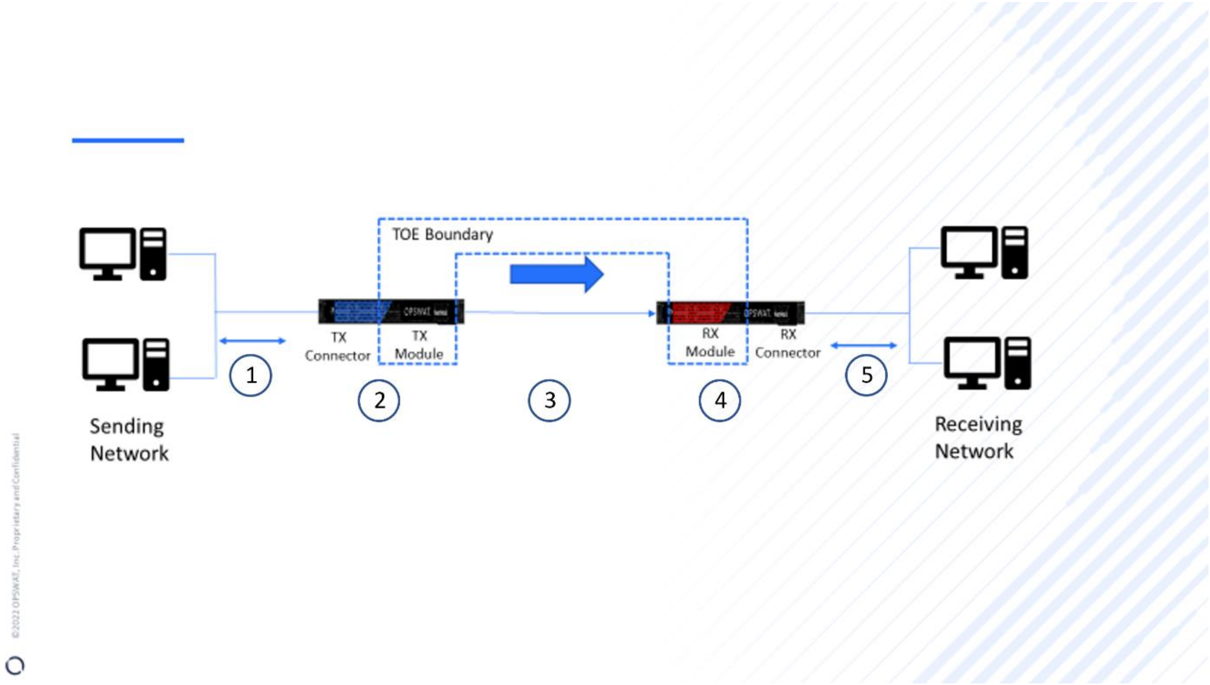
3. OPSWAT TX Module reads the information modify the packages by removing any routable information like protocol-specific headers, performing a protocol break and transmits the information to OPSWAT RX Module over a redundant fiber-optic cable (the cable is outside the TOE but maintained within a physically secure environment).

4. OPSWAT RX Module receives the information, reconstruct the headers, and sends it to OPSWAT RX Connector on the RX server (outside the TOE).

5. OPSWAT RX Connector communicates the data stream to the corporate network servers or stations.

When a change of configuration is done, SIGUSR1 is sent to the TOE using Notify of Config Update function and the Notify Interface which triggers an asynchronous event that is delivered to the TOE (DiodeSend/DiodeReceive). The event is queued up and Read Config function is used to query the modified configuration from the Configuration database. After a successful restart the new configuration will be used by the TOE, otherwise it will load the last working configuration.

Figure 8 – TOE information flow sequence



2 Conformance Claims

Table 4 - Conformance Claims

Common Criteria Conformance	Common Criteria for Information Technology Security Evaluation, CC Part 2 conformant, CC Part 3 conformant
Common Criteria version	Version 3.1 Revision 5, April 2017
PP Conformance	The TOE does not claim conformance with any Protection Profile.
Evaluation Assurance Level	EAL4, augmented with ALC_FLR.2, ALC_DVS.2 and AVA_VAN.5

3 Security Problem Definition

This section defines the security problem to be addressed by the TOE and its operational environment and includes the following:

- Organizational Security Policies (OSPs),
- Assets,
- Secure Usage Assumptions, and
- Threats.

3.1 Organizational Security Policies

This Security Target does not identify any rules or guidelines that must be followed by the TOE and/or its operational environment, phrased as Organizational Security Policies.

All defined security objectives are derived from assumptions and threats only.

3.2 Assets

The IT assets requiring protection are the following:

- Transferred data: All the information transferred from sending to receiving network, including files and streams from different protocols.
- Configuration of the TOE: RX and TX Modules and Connectors require to be configured. This configuration is performed in the Web UI and stored in independent Data Bases for RX and TX.

3.3 Assumptions

Table 5 - Assumptions

Assumption	Description
A.ADMIN	Personnel with authorized physical access to the appliances where the TOE is placed, will not attempt to circumvent the TOE's security functionality or perform any malicious action.
A.PHYSICAL	Appliances (including TOE, Fiber cable and Web App GUI console) will be located within secure and controlled access facilities, preventing unauthorized access.
A.NETWORK	TOE will be the only communications channel between sending and receiving networks.

3.4 Threats

Table 6 - Threats

Threat	Threat agent	Asset	Adverse action
T.LEAKAGE	Attacker	Transferred data	Information residing in the receiving network is accidentally or maliciously transmitted to the sending network.
T.BLUECOMP	Attacker	Configuration of the TOE	A host or process integrity in the sending network is accidentally or maliciously compromised by the action of an actor in the receiving network.

T.TOPOLEAK	Attacker	Transferred data	OSI Layer 3 data from the sending network is passively detected on the receiving network.
T.REDCOMP	Attacker	Configuration of the TOE	A host or process integrity in the receiving network is accidentally or maliciously compromised by the action of an actor in the sending network.

4 Security Objectives

The statement of security objectives shall describe the security objectives for the TOE and the security objectives for the operational environment.

Table 7a - Security Objectives for the TOE

Objective	Description
O.ONEWAY	TOE will only allow information to flow only from sending network to receiving network.
O.PROTOBREAK	TOE will filter OSI Layer 3 information transmitted from the sending to the receiving network such that the receiving network cannot infer Network layer (OSI Layer 3) information of the sending network.
O.SECUREINIT	The TOE will only use the new configuration read from the Config Database if the initialization was successful, otherwise the TOE restarts and loads the previous configuration.

Table 7b - Security Objectives for the Operational Environment

Objective	Description
OE.PHYSICAL	Appliances where the TOE is placed and the fiber optic cable connecting sending and receiving sides will be physically protected, within secure and controlled access facilities.
OE.ADMIN	Administrators with physical access to the appliances where the TOE is placed, will properly follow the TOE guidance and will not try to perform any malicious action or circumvent the TOE's security functionality.
OE.NETWORK	TOE is the only interconnection between sending and receiving networks

4.1 Security Objectives Rationale

This section demonstrates that the stated security objectives counter all identified threats, enforce policies, and uphold assumptions.

The following tables provide a mapping of security objectives for the TOE and security objectives for the operational environment of the TOE to the defined threats, policies, and assumptions, illustrating that each security objective covers at least one threat, enforces a policy or upholds an assumption and that each threat, policy or assumption is covered by at least one security objective.

The tables below provide information regarding:

- the identified security objectives providing effective countermeasures for the threats;
- the identified security objectives providing complete coverage of each organizational security policy;
- the identified security objectives upholding each assumption.

4.1.1 Security Objectives Rationale related to Threats

The security objectives rationale shall trace each security objective for the TOE back to threats countered by that security objective and OSPs enforced by that security objective.

Table 8 – Threats rational

Threats	Objectives	Rationale
T.LEAKAGE	O.ONEWAY	O.ONEWAY ensures that data flowing through the TOE will only be allowed from sending network to receiving network.
T.BLUECOMP	O.ONEWAY O.SECUREINIT	O.ONEWAY ensures that data flowing through the TOE will only be allowed from sending network to receiving network. A user with access to receiving network cannot transmit any information to any host or process on sending network. O.SECUREINIT ensures that the TOE will not get compromised during initialization.
T.REDCOMP	O.ONEWAY O.SECUREINIT	O.ONEWAY ensures that data flowing through the TOE will only be allowed from sending network to receiving network. This mitigates the majority of attacks as most of them requires feedback from the attacked host or process. O.SECUREINIT ensures that the TOE will not get compromised during initialization.
T. TOPOLEAK	O.PROTOBREAK	O.PROTOBREAK ensures that data flowing through the TOE does not disclose sending network topology.

4.1.2 Security Objectives Rationale relating to Assumptions

The security objectives rationale shall trace each security objective for the operational environment back to threats countered by that security objective, OSPs enforced by that security objective, and assumptions upheld by that security objective.

Table 9 – Assumptions rational

Assumptions	Objectives	Rationale
A.ADMIN	OE.ADMIN	OE.ADMIN directly upholds A.ADMIN
A.PHYSICAL	OE.PHYSICAL	OE.PHYSICAL directly upholds A.PHYSICAL
A.NETWORK	OE.NETWORK	OE.NETWORK directly upholds A.NETWORK

5 Security Requirements

This section defines the SFRs, and SARs met by the TOE.

This section defines whether the SFRs and SARs are clear, unambiguous, and well-defined, whether they are internally consistent, and whether the SFRs meet the security objectives of the TOE.

5.1 Conventions

- Completed assignment statements are identified using [*italicized text within brackets*].
- Completed selection statements are identified using [<u>underlined text within brackets</u>].
- Refinements are identified using bold text. (Example: **TSF Data**) Any text removed is stricken (Example: ~~TSF Data~~) and should be considered as a refinement.
- Completed assignment statements inside a selection statement is identified using [<u>*italicized and underlined text within brackets*</u>].
- Iterations are identified by appending a letter in parentheses following the component title. For example, FAU_GEN.1(a) Audit Data Generation would be the first iteration and FAU_GEN.1(b) Audit Data Generation would be the second iteration.

5.2 TOE Security Functional Requirements

List of the SFRs along with their description and the operations performed on them.

Table 10 – SFR operations

Name	Description	S	A	R	I
FDP_IFC.2	Complete Information Flow Control		X		
FDP_IFF.1	Simple Security Attributes		X		
FMT_MSA.3	Static attribute initialisation	X	X		

Note: S = Selection, A = Assignment, R = Refinement, I = Iteration

5.2.1 Complete Information Flow Control (FDP_IFC.2)

FDP_IFC.2	*Complete information flow control*

Hierarchical to: FDP_IFC.1 Subset information flow control

Dependencies: FDP_IFF.1 Simple security attributes

FDP_IFC.2.1 The TSF shall enforce the [*Unidirectional SFP*][1] on [*the TX, the RX, and all information flowing through the TOE*][2] and all operations that cause that information to flow to and from subjects covered by the SFP.

[1] [assignment: *information flow control SFP*]

[2] [assignment: *list of subjects and information*]

FDP_IFC.2.2 The TSF shall ensure that all operations that cause any information in the TOE to flow to and from any subject in the TOE are covered by an information flow control SFP.

5.2.2 Simple security attributes (FDP_IFF.1)

FDP_IFF.1	*Simple Security Attributes*

Hierarchical to: No other components.

Dependencies: FDP_IFC.1 Subset information flow control
FMT_MSA.3 Static attribute initialization

FDP_IFF.1.1 The TSF shall enforce the [*Unidirectional SFP*][3] based on the following types of subject and information security attributes: [*None*][4].

FDP_IFF.1.2 The TSF shall permit an information flow between a controlled subject and controlled information via a controlled operation if the following rules hold: [*no security attribute-based rules*][5].

FDP_IFF.1.3 The TSF shall enforce the [*following additional information flow control SFP rules:*

(1) the TSF shall permit the TX to read information from the sending network,

(2) the TSF shall permit the TX to transmit information to the RX,

(3) the TSF shall permit the RX to receive information from the TX,

(4) the TSF shall permit the RX to write information to the receiving network][6].

FDP_IFF.1.4 The TSF shall explicitly authorize an information flow based on the following rules: [*no rules that explicitly authorize information flows*][7].

FDP_IFF.1.5 The TSF shall explicitly deny an information flow based on the following rules: [

(1) the TSF shall deny the RX to transmit information to the TX; and

(2) the TSF shall deny the TX to receive information from the RX][8].

Application Note 1: The Unidirectional SFP permits information flow from the sending network to the receiving network via TOE TX and RX Modules and denies information flow in

[3] [assignment: *information flow control SFP*]
[4] [assignment: *list of subjects and information controlled under the indicated SFP, and for each, the security attributes*]
[5] [assignment: *for each operation, the security attribute-based relationship that must hold between subject and information security attributes*]
[6] [assignment: *additional information flow control SFP rules*]
[7] [assignment: *rules, based on security attributes, that explicitly authorise information flows*]
[8] [assignment: *rules, based on security attributes, that explicitly deny information flows*]

the inverse direction. Enforcement of this SFR does not involve any guarantees for delivery of information between sending and receiving networks. Such guarantees, if required must be allocated outside the TOE. For example, OPSWAT TX Connector queues information received for transmission from the sending network, and sequentially labels the information as transmitted to the receiving network through the TOE such that OPSWAT RX Connector can automatically identify and report any information loss. The TX Connector Module also provides the capability for retransmitting data, minimizing information lost.

5.2.3 Static attribute initialisation (FMT_MSA.3)

FMT_MSA.3	*Static attribute initialisation*

Hierarchical to: No other components.

Dependency: FMT_MSA.1 Management of security attributes
FMT_SMR.1 Security roles

FMT_MSA.3.1 The TSF shall enforce the [*Unidirectional SFP*][9] to provide [*configurational*][10] default values for security attributes that are used to enforce the SFP.

FMT_MSA.3.2 The TSF shall allow the [*None*][11] to specify alternative initial values to override the default values when an object or information is created.

Application Note 2: The TOE configuration data and security attributes cannot be modified on the TOE, so the FMT_MSA.1 Management of security attributes SFR is not applicable.

Application Note 3: The security roles, the identification, and the authentication are done by a non-TOE component, by the Web App GUI or by the CLI. Since the TOE itself does not manage roles the FMT_SMR.1 Security roles SFR is not applicable.

Application Note 4 (FMT_MSA.3.2): The TOE itself does not manage users or roles. The identification and authentication, and the access control is covered by its operational environment.

5.3 TOE Security Assurance Requirements

This section defines the assurance requirements for the TOE. Assurance requirements are taken from the CC Part 3 and are EAL 4, augmented with the CC part 3 components ALC_FLR.2, ALC_DVS.2 and AVA_VAN.5.

Table 11 - Assurance Requirements

Assurance Requirements		
Class ASE: Security Target evaluation	ASE_CCL.1	Conformance claims
	ASE_ECD.1	Extended components definition
	ASE_INT.1	ST introduction
	ASE_OBJ.2	Security objectives

[9] [assignment: *access control SFP, information flow control SFP*]

[10] [selection, choose one of: restrictive, permissive, [assignment: *other property*]]

[11] [assignment: *the authorised identified roles*]

	ASE_REQ.2	Derived security requirements
	ASE_SPD.1	Security problem definition
	ASE_TSS.1	TOE summary specification
Class ALC: Life Cycle Support	ALC_CMC.4	Production support, acceptance procedures and automation
	ALC_FLR.2	Flaw reporting procedures
	ALC_CMS.4	Parts of the TOE CM coverage
	ALC_DEL.1	Delivery procedures
	ALC_DVS.2	Sufficiency of security measures
	ALC_LCD.1	Developer defined life-cycle model
	ALC_TAT.1	Well-defined development tools
Class ADV: Development	ADV_ARC.1	Security architecture description
	ADV_FSP.4	Complete functional specification
	ADV_TDS.3	Basic modular design
	ADV_IMP.1	Implementation representation of the TSF
Class AGD: Guidance documents	AGD_OPE.1	Operational user guidance
	AGD_PRE.1	Preparative procedures
Class ATE: Tests	ATE_COV.2	Analysis of coverage
	ATE_DPT.1	Testing: basic design
	ATE_FUN.1	Functional testing
	ATE_IND.2	Independent testing – sample
Class AVA: Vulnerability assessment	AVA_VAN.5	Advanced methodical vulnerability analysis

5.4 Security Requirements Rationale

This section provides the rationale for necessity and sufficiency of security requirements, demonstrating that each of the security objectives is addressed by at least one security requirement, and that every security functional requirement is directed toward solving at least one objective.

5.4.1 Security Requirements Coverage

The Table in section 6.5.1.1 provides a mapping between the Security Functional Requirements and the Security Objectives, illustrating that each Security Functional Requirement covers at least one Objective and that each Objective is covered by at least one Security Functional Requirement.

5.4.2 Security Functional Requirements Related to Security Objectives

The following table should give a rationale that all Security Objectives are covered by at least one SFR and to show that there is no Security Objective not covered and no SFR used that is not required.

Table 12 - Security Functional Requirements Related to Security Objectives

Functional Requirement	Rationale	Objective
FDP_IFC.2	The TSF must enforce a unidirectional information flow SFP on all requests to move data	O.ONEWAY

	through the TOE.	
FDP_IFF.1	The TSF ensures that interfaces designed to receive information can only receive information (and never send it) and interfaces designed to send information can only send information (and not receive it).	O.ONEWAY
FMT_MSA.3	The configuration data and secure attributes of the TOE cannot be modified from the TOE, only admins with physical access, appropriate credentials (username, password), and a security dongle can modify those data through the Web App GUI or through the CLI.	O.SECUREINIT OE.PHYSICAL OE.ADMIN

5.4.3 Security Assurance Requirements Rationale

The level of assurance for this ST is Evaluation Assurance Level (EAL) 4, as defined in CC Part 3, augmented with the CC Part 3 components AVA_VAN.5, ALC_DVS.2, and ALC_FLR.2.

EAL 4 ensures that the product has been designed, tested, and reviewed with maximum assurance from positive security engineering based on good development practices. It is applicable in those circumstances where developers or users require a moderate to high level of independently assured security.

AVA_VAN.5, Advanced Methodical Vulnerability Analysis augments EAL4 by ensuring that the TOE has undergone advanced methodical vulnerability analysis to confirm that the product is resilient to attacks with High attack potential. EAL 4 augmented by AVA_VAN.5 is appropriate for a TOE designed to protect industrial networks from cyber-attacks and to prevent leakage of information from classified networks.

ALC_DVS.2, Sufficiency of Security Measures augmentation provides justification that the security measures assure the necessary level of protection to keep confidentiality and integrity of the TOE in its development environment.

ALC_FLR.2, Flaw reporting procedures provides assurance that the TOE will be maintained and supported in the future, requiring the TOE developer to track and correct flaws in the TOE, and providing guidance to TOE users for how to submit security flaw reports to the developer.

5.5 Requirements Dependency Rationale

5.5.1 Rationale Showing that Dependencies are Satisfied

The SFRs in this ST satisfy all the required dependencies listed in the Common Criteria. The table in this section lists each requirement to which the TOE claims conformance and indicates whether the dependent requirements are included. As it is indicated by the table, all dependencies are fulfilled.

5.5.2 Security Functional Requirements Dependencies

The following table provides a summary of the SFRs and their dependencies

Table 13 - Summary of Security Functional Requirements Dependencies

Component	Dependency	Which is:
FDP_IFC.2	FDP_IFF.1	Included
FDP_IFF.1	FDP_IFC.1, FMT_MSA.3	FDP_IFC.1 is included as it is covered by FDP_IFC.2. FMT_MSA.3 included
FMT_MSA.3	FMT_MSA.1 FMT_SMR.1	FMT_MSA.1 not applicable as the security attributes cannot be managed on the TOE. FMT_SMR.1 not applicable as there are no roles managed on the TOE.

5.5.3 Security Assurance Requirements Dependencies

The following table provides a summary of the SARs and their dependencies.

Table 14 - SAR Dependencies

Component	Depends On:	Which is:
ADV_ARC.1	ADV_FSP.1	hierarchically higher component ADV_FSP.4 is included.
	ADV_TDS.1	hierarchically higher component ADV_TDS.3 is included
ADV_FSP.4	ADV_TDS.1	hierarchically higher component ADV_TDS.3 is included.
ADV_IMP.1	ADV_TDS.3	included
	ALC_TAT.1	included
ADV_TDS.3	ADV_FSP.4	included
AGD_OPE.1	ADV_FSP.1	hierarchically higher component ADV_FSP.4 is included.
AGD_PRE.1	no dependencies	not applicable
ALC_CMC.4	ALC_CMS.1	hierarchically higher component ALC_CMS.4 is included.
	ALC_DVS.1	Hierarchically higher component ALC_DVS.2 is included
	ALC_LCD.1	included
ALC_CMS.4	no dependencies	not applicable
ALC_DEL.1	no dependencies	not applicable
ALC_DVS.2	no dependencies	not applicable
ALC_LCD.1	no dependencies	not applicable
ALC_TAT.1	ADV_IMP.1	included
ASE_INT.1	no dependencies	not applicable
ASE_CCL.1	ASE_INT.1	included
	ASE_ECD.1	included

	ASE_REQ.1	hierarchically higher component ASE_REQ.2 is included
ASE_SPD.1	no dependencies	not applicable
ASE_OBJ.2	ASE_SPD.1	included
ASE_ECD.1	no dependencies	not applicable
ASE_REQ.2	ASE_OBJ.2	included
	ASE_ECD.1	included
ASE_TSS.1	ASE_INT.1	included
	ASE_REQ.1	hierarchically higher component ASE_REQ.2 is included
	ADV_FSP.1	hierarchically higher component ADV_FSP.4 is included
ATE_COV.2	ADV_FSP.2	hierarchically higher component ADV_FSP.4 is included
	ATE_FUN.1	included
ATE_FUN.1	ATE_COV.1	hierarchically higher component ATE_COV.2 is included
ATE_IND.2	ADV_FSP.2	hierarchically higher component ADV_FSP.4 is included
	AGD_OPE.1	included
	AGD_PRE.1	included
	ATE_COV.1	hierarchically higher component ATE_COV.2 is included
	ATE_FUN.1	included
ATE_DPT.1	ADV_ARC.1	included
	ADV_TDS.2	hierarchically higher component ADV_TDS.3 is included
	ATE_FUN.1	included
AVA_VAN.5	ADV_ARC.1	included
	ADV_FSP.4	included
	ADV_IMP.1	included
	ADV_TDS.3	included
	AGD_OPE.1	included
	AGD_PRE.1	included
	ATE_DPT.1	included

6 TOE Summary Specification

The following table provides a description of the mechanisms that the TOE implements to cover each SFR defined in section 5, providing description of security functionality given in each of the SFRs and a high-level perspective of their implementation in the TOE.

Table 15 – SFR implementation and coverage

Component	Description
User Data Protection (FDP)	
FDP_IFC.2	TOE is implemented in two independent modules (they have independent power sources and independent optic interfaces) OPSWAT TX Module and OPSWAT RX Module. The Hardware doesn't permit more ways to transmit electronic or optic signals other than the described interfaces. OPSWAT TX Module is connected only to the sending network through OPSWAT TX Connector (outside the TOE as indicated) and the TX Module is not connected to the receiving network. OPSWAT RX Module is only connected to the receiving network through OPSWAT RX Connector (outside the TOE as indicated). **TCP/UDP Stream** The OPSWAT TX Connector interfaces to protocol specific data between the sending network servers and forwards this information to the OPSWAT TX Module. OPSWAT TX Module will remove all routable information from the data received from OPSWAT TX Connector before sending it to the OPSWAT RX Module, performing an effective protocol break. A fiber-optic cable connects TX and RX Modules. The fiber optic cable can be made redundant, providing a higher level of data delivery assurance. The transceivers within the TOE (SFPTX1, SFPTX2, SFPRX1 and SFPRX2) have been physically modified to support only the communication in one single direction, from TX Module to RX Module. SFPTX1 and SFPTX2 lack optics and circuitry required to receive data. SFPRX1 and SFPRX2 lack optics and circuity required to send data. This guarantees that all the information flowing through the TOE is transferred over a physically enforced one-way connection between the TX and RX Modules and therefore covered by the Unidirectional SFP.
FDP_IFF.1	TX Module is connected with the sending network through OPSWAT TX Connector using standard RJ45 interfaces. The TX Module cannot read information from the receiving network because its network interfaces are connected only to the sending network. The TX Module converts the incoming communication into an optic-based data transmission using a fiber-optic transceiver. This transceiver has been physically modified to support only data transmission, implementing galvanic isolation. A fiber-optic cable connects the BLUE module to the RED module and constitutes the only connection between these two components. The

	fiber optic cable can be made redundant, providing a higher level of data delivery assurance. This fiber-optic cable connects to the RX Module’s optic port. OPSWAT RX Module converts the incoming optical data into electronic signals using a fiber-optic transceiver. This transceiver has been physically modified to support only data reception, implementing galvanic isolation. RX module is connected with the receiving network through OPSWAT RX Connector using standard RJ45 interfaces. OPSWAT RX Module transmits the data received from the TX Module to the OPSWAT RX Connector and, from there to the stations and servers in the receiving network. The RX Module cannot transmit information back to the sending network because its network interfaces are connected only to the receiving network and, as commented the optical transceiver in the RX Module has been physically modified to support only data reception.
Security Management (FMT)	
FMT_MSA.3	Only an admin with valid credentials and a security dongle can change the configuration data and the secure attributes within the database in both sides, Sending and Receiving. The configuration data and secure attributes of the TOE cannot be modified from the TOE. **Read Config** Once the admin performs changes on the configuration data and/or secure attributes within the database using the Web App GUI and/or the CLI, the TOE will be notified about the change using the Notify of Config Update function. Once notified, the TOE will read the new configuration data using Read Config function.

7 Acronyms

Table 16 - Acronyms

Acronym	Meaning
CC	Common Criteria
CLI	Command Line Interface
COTS	Commercial-Off-The-Shelf
DoD	Department of Defense
IT	Information Technology
OSI	Open System Interconnection
OSP	Organizational Security Policy
PCIe	Peripheral Component Interconnect Express
PP	Protection Profile
RX	Reception
SA	Security Association
SAR	Security Assurance Requirement
SFP	Small Factor Pluggable
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Functionality
TX	Transmission

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