Communications Security Establishment | Centre de la sécurité des télécommunications

CANADIAN CENTRE FOR CYBER SECURITY

COMMON CRITERIA CERTIFICATION REPORT

Sphyrna Security Unidirectional Gateway - Data Diode Identifier: 2010-UG100-SSI

7 September 2021

536-LSS

Canada

FOREWORD

This certification report is an UNCLASSIFIED publication, issued under the authority of the Chief, Communications Security Establishment (CSE).

The Information Technology (IT) product identified in this certification report, and its associated certificate, has been evaluated at an approved testing laboratory established under the Canadian Centre for Cyber Security (a branch of CSE). This certification report, and its associated certificate, applies only to the identified version and release of the product in its evaluated configuration. The evaluation has been conducted in accordance with the provisions of the Canadian Common Criteria Program, and the conclusions of the testing laboratory in the evaluation report are consistent with the evidence adduced.

This report, and its associated certificate, are not an endorsement of the IT product by Canadian Centre for Cyber Security, or any other organization that recognizes or gives effect to this report, and its associated certificate, and no warranty for the IT product by the Canadian Centre for Cyber Security, or any other organization that recognizes or gives effect to this report, and its associated certificate, is either expressed or implied.

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OVERVIEW

The Canadian Common Criteria Program provides a third-party evaluation service for determining the trustworthiness of Information Technology (IT) security products. Evaluations are performed by a commercial Common Criteria Testing Laboratory (CCTL) under the oversight of the Certification Body, which is managed by the Canadian Centre for Cyber Security.

A CCTL is a commercial facility that has been approved by the Certification Body to perform Common Criteria evaluations; a significant requirement for such approval is accreditation to the requirements of ISO/IEC 17025, the General Requirements for the Competence of Testing and Calibration Laboratories.

By awarding a Common Criteria certificate, the Certification Body asserts that the product complies with the security requirements specified in the associated security target. A security target is a requirements specification document that defines the scope of the evaluation activities. The consumer of certified IT products should review the security target, in addition to this certification report, in order to gain an understanding of any assumptions made during the evaluation, the IT product's intended environment, the evaluated security functionality, and the testing and analysis conducted by the CCTL.

The certification report, certificate of product evaluation and security target are posted to the Common Criteria portal (the official website of the International Common Criteria Project).

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Sphyrna Security Unidirectional Gateway - Data Diode Identifier: 2010-UG100-SSI (hereafter referred to as the Target of Evaluation, or TOE), from **Sphyrna Security Incorporated** , was the subject of this Common Criteria evaluation. A description of the TOE can be found in Section 1.2. The results of this evaluation demonstrate that the TOE meets the requirements of the conformance claim listed in Section 1.1 for the evaluated security functionality.

Lightship Security is the CCTL that conducted the evaluation. This evaluation was completed on 7 September 2021 and was carried out in accordance with the rules of the Canadian Common Criteria Program.

The scope of the evaluation is defined by the Security Target, which identifies assumptions made during the evaluation, the intended environment for the TOE, and the security functional/assurance requirements. Consumers are advised to verify that their operating environment is consistent with that specified in the security target, and to give due consideration to the comments, observations, and recommendations in this Certification Report.

The Canadian Centre for Cyber Security, as the Certification Body, declares that this evaluation meets all the conditions of the Arrangement on the Recognition of Common Criteria Certificates and that the product is listed on the Certified Products list (CPL) for the Canadian Common Criteria Program and the Common Criteria portal (the official website of the International Common Criteria Program).

1 IDENTIFICATION OF TARGET OF EVALUATION

The Target of Evaluation (TOE) is identified as follows:

Table 1: TOE Identification

TOE Name and Version	Sphyrna Security Unidirectional Gateway - Data Diode Identifier: 2010-UG100-SSI
Developer	Sphyrna Security Incorporated

1.1 COMMON CRITERIA CONFORMANCE

The evaluation was conducted using the Common Methodology for Information Technology Security Evaluation, Version 3.1 Revision 5, for conformance to the Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5.

The TOE claims the following conformance:

EAL4+ (ADV_INT.2, ALC_CMC.5, ALC_CMS.5, ALC_DVS.2, ALC_FLR.3, ATE_DPT.2 and AVA_VAN.4)

1.2 TOE DESCRIPTION

The TOE is used to provide a one-way connection between two networks of different security levels. The TOE is the security enforcing subsystem that ensures that data can only be transmitted in one direction and that no data can be passed, either explicitly or covertly, in the reverse direction.

1.3 TOE ARCHITECTURE

A diagram of the TOE architecture is as follows:

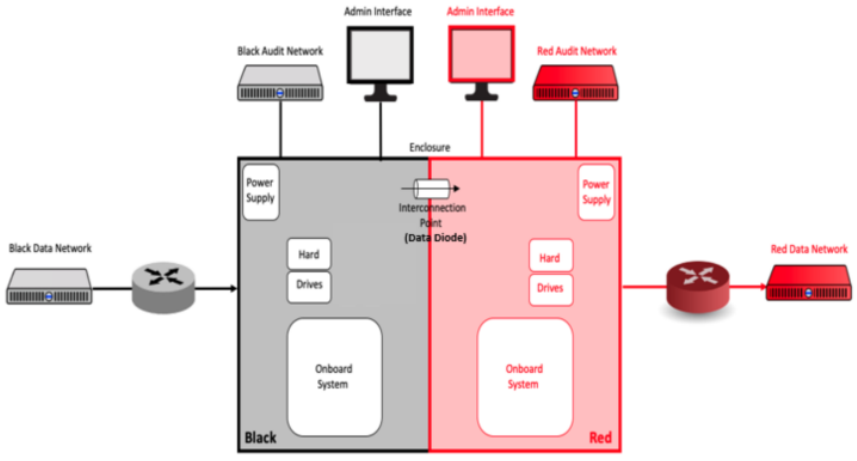

Figure 1: TOE Architecture

2 SECURITY POLICY

The TOE implements and enforces policies pertaining to the following security functionality:

- Unidirectional Data Transfer
- Failure with Preservation of Secure State

Complete details of the security functional requirements (SFRs) can be found in the Security Target (ST) referenced in section 8.2.

3 ASSUMPTIONS AND CLARIFICATION OF SCOPE

Consumers of the TOE should consider assumptions about usage and environmental settings as requirements for the product's installation and its operating environment. This will ensure the proper and secure operation of the TOE.

3.1 USAGE AND ENVIRONMENTAL ASSUMPTIONS

The following assumptions are made regarding the use and deployment of the TOE:

- The TOE will be stored and deployed in accordance with the physical security requirements of the high side
- The TOE is the only method of interconnecting the high-side and low-side networks
- The TOE enclosure is constructed to resist tampering efforts and employs mechanisms to detect and respond to tamper attempts

3.2 CLARIFICATION OF SCOPE

The physical boundary of the TOE is limited to the hardware components that enforce unidirectional data transfer, which consists of two physical data diode components, each housed in a tamper resistant case. Together these components comprise the overall logical data diode (the TOE).

4 EVALUATED CONFIGURATION

The evaluated configuration for the TOE comprises:

TOE Hardware	Sphyrna Security Unidirectional Gateway - Data Diode Identifier: 2010-UG100-SSI
Environmental Support	• Connecting equipment. The low side and high side connected network equipment. • Unidirectional Gateway. The TOE is a subsystem of the Unidirectional Gateway devices, which consists of a custom 1U tamper-resistant enclosure that houses two single board computers, two power supplies, and four hard drives (two per computer in a RAID configuration)

4.1 DOCUMENTATION

The following documents are provided to the consumer to assist in the configuration and installation of the TOE:

a) Sphyrna Security Unidirectional Gateway (Data Diode) User Guide, v1.0.3

5 EVALUATION ANALYSIS ACTIVITIES

The evaluation analysis activities involved a structured evaluation of the TOE. Documentation and process dealing with Development, Guidance Documents, and Life-Cycle Support were evaluated.

5.1 DEVELOPMENT

The evaluators analyzed the documentation provided by the vendor; they determined that the design completely and accurately describes the TOE security functionality (TSF) interfaces and how the TSF implements the security functional requirements. The evaluators determined that the initialization process is secure, that the security functions are protected against tamper and bypass, and that security domains are maintained.

5.2 GUIDANCE DOCUMENTS

The evaluators examined the TOE preparative user guidance and operational user guidance and determined that it sufficiently and unambiguously describes how to securely transform the TOE into its evaluated configuration and how to use and administer the product. The evaluators examined and tested the preparative and operational guidance and determined that they are complete and sufficiently detailed to result in a secure configuration.

Section 4.1 provides details on the guidance documents.

5.3 LIFE-CYCLE SUPPORT

An analysis of the TOE configuration management system and associated documentation was performed. The evaluators found that the TOE configuration items were clearly marked.

The evaluators examined the delivery documentation and determined that it described all the procedures required to maintain the integrity of the TOE during distribution to the consumer.

6 TESTING ACTIVITIES

Testing consists of the following three steps: assessing developer tests, performing independent functional tests, and performing penetration tests.

6.1 ASSESSMENT OF DEVELOPER TESTS

The evaluators verified that the developer has met their testing responsibilities by examining their test evidence, and reviewing their test results, as documented in the Evaluation Test Report (ETR). The correspondence between the tests identified in the developer's test documentation and the functional specification was complete.

6.2 CONDUCT OF TESTING

The TOE was subjected to a comprehensive suite of formally documented, independent functional and penetration tests. The detailed testing activities, including configurations, procedures, test cases, expected results and observed results are documented in a separate Test Results document.

6.3 INDEPENDENT FUNCTIONAL TESTING

During this evaluation, the evaluator developed independent functional tests by examining design and guidance documentation.

All testing was planned and documented to a sufficient level of detail to allow repeatability of the testing procedures and results. The following testing activities were performed:

a. Repeat of Developer's Tests: The evaluator repeated a subset of the developer's tests

b. Use of Epoxy: The evaluator confirmed the use of epoxy on unused ports of the TOE

c. Use of Y Cable: The evaluator verified that a Y cable is used to backfeed the TX signal to the RX side of the SFP on the mainboard

d. Single Cable Interconnect: The evaluator confirmed that only a single cable is used to connect the High & Low sides

e. Independent Power Supplies: The evaluator confirmed that the High & Low sides are powered by independent power supplies

f. Tamper Seals: The evaluator confirmed that the tamper seals used meet the FIPS 140-2 Tamper seal testing requirements.

6.3.1 FUNCTIONAL TEST RESULTS

The developer's tests and the independent functional tests yielded the expected results, providing assurance that the TOE behaves as specified in its ST and functional specification.

6.4 INDEPENDENT PENETRATION TESTING

The penetration testing effort focused on 4 flaw hypotheses.

- Public Vulnerability based (Type 1)
- Technical community sources (Type 2)
- Evaluation team generated (Type 3)
- Tool Generated (Type 4)

The evaluators conducted an independent review of all evaluation evidence, public domain vulnerability databases and technical community sources (Type 1 & 2). Additionally, the evaluators used automated vulnerability scanning tools to discover potential network, platform, and application layer vulnerabilities (Type 4). Based upon this review, the evaluators formulated flaw hypotheses (Type 3), which they used in their penetration testing effort.

6.4.1 PENETRATION TEST RESULTS

Type 1 & 2 searches were conducted on **6/22/2021** and included the following search terms:

Diode	Unintentional EM emanations from CPU/Memory/Data Bus on device	Unintentional sonic emanations from capacitors and mechanical parts. Can also be sub and ultra-sonic.
Intentional/unintentional optical emanations from LEDs	Modulating current in power lines by changing CPU workload.	Reversing the photoelectric effect (causing electron-hole recombination in a photodiode) to emit photons from the “receiver”.

Vulnerability searches were conducted using the following sources:

Common Vulnerabilities and Exposures (CVE) (http://cve.mitre.org/)	National Vulnerability Database (http://nvd.nist.gov/)
CERT (https://www.kb.cert.org/vuls/)	Google (https://www.google.ca/)

The independent penetration testing did not uncover any residual exploitable vulnerabilities in the intended operating environment.

7 RESULTS OF THE EVALUATION

The Information Technology (IT) product identified in this certification report, and its associated certificate, has been evaluated at an approved testing laboratory established under the Canadian Centre for Cyber Security (CCCS). This certification report, and its associated certificate, apply only to the specific version and release of the product in its evaluated configuration.

This evaluation has provided the basis for the conformance claim documented in Table 1. The overall verdict for this evaluation is **PASS**. These results are supported by evidence in the ETR.

7.1 RECOMMENDATIONS/COMMENTS

It is recommended that all guidance outlined in Section 4.1 be followed to configure the TOE in the evaluated configuration.

8 SUPPORTING CONTENT

8.1 LIST OF ABBREVIATIONS

Term	Definition
CAVP	Cryptographic Algorithm Validation Program
CCTL	Common Criteria Testing Laboratory
CM	Configuration Management
CMVP	Cryptographic Module Validation Program
CSE	Communications Security Establishment
CCCS	Canadian Centre for Cyber Security
EAL	Evaluation Assurance Level
ETR	Evaluation Technical Report
GC	Government of Canada
IT	Information Technology
ITS	Information Technology Security
PP	Protection Profile
SFP	Small Form-factor Pluggable
SFR	Security Functional Requirement
ST	Security Target
TOE	Target of Evaluation
TSF	TOE Security Function

8.2 REFERENCES

Reference
Common Criteria for Information Technology Security Evaluation, Version 3.1 Revision 5, April 2017.
Common Methodology for Information Technology Security Evaluation, CEM, Version 3.1 Revision 5, April 2017.
Security Target Sphyrna Security Unidirectional Gateway - Data Diode, 5 AUG 2021, v1.0
Evaluation Technical Report Sphyrna Security Unidirectional Gateway - Data Diode, 7 SEPT 2021, v1.2