National Information Assurance Partnership

Common Criteria Evaluation and Validation Scheme

Validation Report

Curtiss-Wright Defense Solutions Data Transport System 1-Slot Hardware Encryption Layer

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ACKNOWLEDGEMENTS

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1 Executive Summary

This report documents the assessment of the National Information Assurance Partnership (NIAP) validation team of the evaluation of Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer solution provided by Curtiss-Wright Defense Solutions. It presents the evaluation results, their justifications, and the conformance results. This Validation Report is not an endorsement of the Target of Evaluation by any agency of the U.S. government, and no warranty is either expressed or implied.

The evaluation was performed by the Gossamer Security Solutions (Gossamer) Common Criteria Testing Laboratory (CCTL) in Catonsville, MD, United States of America, and was completed in October 2018. The information in this report is largely derived from the proprietary Evaluation Technical Report (ETR) and associated test reports, all written by Gossamer Security Solutions, and summarized in the publically available Assurance Activity Report associated with this evaluation. The evaluation determined that the product is both Common Criteria Part 2 Extended and Part 3 Conformant, and meets the assurance requirements of the collaborative Protection Profile for Full Drive Encryption - Encryption Engine, Version 2.0, 09 September 2016 and collaborative Protection Profile for Full Drive Encryption Authorization Acquisition, Version 2.0, 09 September 2016.

The Target of Evaluation (TOE) is the Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer.

The Target of Evaluation (TOE) identified in this Validation Report has been evaluated at a NIAP approved Common Criteria Testing Laboratory using the Common Methodology for IT Security Evaluation (Version 3.1, Rev 4) for conformance to the Common Criteria for IT Security Evaluation (Version 3.1, Rev 4). This Validation Report applies only to the specific version of the TOE as evaluated. The evaluation has been conducted in accordance with the provisions of the NIAP Common Criteria Evaluation and Validation Scheme and the conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence provided.

The validation team monitored the activities of the evaluation team, provided guidance on technical issues and evaluation processes, and reviewed the individual work units and successive versions of the ETR. The validation team found that the evaluation showed that the product satisfies all of the functional requirements and assurance requirements stated in the Security Target (ST). Therefore the validation team concludes that the testing laboratory's findings are accurate, the conclusions justified, and the conformance results are correct. The conclusions of the testing laboratory in the evaluation technical report are consistent with the evidence produced.

The technical information included in this report was obtained from the Curtiss-Wright Defense Solutions Data Transport System 1-Slot Hardware Encryption Layer (FDEEEcPP20/FDEAAcPP20) Security Target, Version 0.6, October 18, 2018 and analysis performed by the Validation Team.

2 Identification

The CCEVS is a joint National Security Agency (NSA) and National Institute of Standards and Technology (NIST) effort to establish commercial facilities to perform trusted product evaluations. Under this program, security evaluations are conducted by commercial testing laboratories called Common Criteria Testing Laboratories (CCTLs) using the Common Evaluation Methodology (CEM) in accordance with National Voluntary Laboratory Assessment Program (NVLAP) accreditation.

The NIAP Validation Body assigns Validators to monitor the CCTLs to ensure quality and consistency across evaluations. Developers of information technology products desiring a security evaluation contract with a CCTL and pay a fee for their product's evaluation. Upon successful completion of the evaluation, the product is added to NIAP's Validated Products List.

Table 1 provides information needed to completely identify the product, including:

- The Target of Evaluation (TOE): the fully qualified identifier of the product as evaluated.
- The Security Target (ST), describing the security features, claims, and assurances of the product.
- The conformance result of the evaluation.
- The Protection Profile to which the product is conformant.
- The organizations and individuals participating in the evaluation.

Table 1: Evaluation Identifiers

Item	Identifier
Evaluation Scheme	United States NIAP Common Criteria Evaluation and Validation Scheme
TOE **Protection Profile**	Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer (Specific models identified in Section 8)
	collaborative Protection Profile for Full Drive Encryption - Encryption Engine, Version 2.0, 09 September 2016 and collaborative Protection Profile for Full Drive Encryption Authorization Acquisition, Version 2.0, 09 September 2016
ST	Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer Security Target, Version 0.6, October 18, 2018
Evaluation Technical Report	Evaluation Technical Report for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer, Version 0.3, October 18, 2018
CC Version	Common Criteria for Information Technology Security Evaluation, Version 3.1, rev 4
Conformance Result	CC Part 2 extended, CC Part 3 conformant
Sponsor	Curtiss-Wright Defense Solutions
Developer	Curtiss-Wright Defense Solutions
Common Criteria Testing Lab (CCTL)	Gossamer Security Solutions, Inc. Catonsville, MD

Item	Identifier
CCEVS Validators	John Butterworth, The MITRE Corporation Joanne Fitzpatrick, The MITRE Corporation Stelios Melachrinoudis, The MITRE Corporation Kenneth Stutterheim, The Aerospace Corporation

3 Architectural Information

Note: The following architectural description is based on the description presented in the Security Target.

The Curtiss-Wright Defense Solutions Data Transport System 1-Slot Hardware Layer (hereafter referred to as the TOE) is a hardware encryption layer that is used for Data-At-Rest (DAR) encryption as part of the underlying rugged Network Attached Storage (NAS) file server, denoted as the Curtiss-Wright DTS1 CSFC/ECC Cryptographic Data Transport System (DTS) (hereafter referred to as the DTS1). The underlying DTS1 is intended for use in Unmanned Aerial Vehicles (UAV), Unmanned Underwater Vehicles (UUV), and Intelligence Surveillance Reconnaissance (ISR) aircraft. Easily integrated into network centric systems, the DTS1 is an easy to use, turnkey, rugged network File Server that houses one Removable Memory Cartridge (RMC) that provides quick off load of data. The RMC can be easily removed from one DTS1 and installed into any other DTS1 providing full, seamless data transfer between one or more networks in separate locations (e.g. ground => vehicle => ground).

3.1 TOE Evaluated Configuration

Detail regarding the evaluated configuration is provided in Section 8 below.

3.2 TOE Architecture

The TOE provides a hardware Full Drive Encryption solution that can accept a Removable Memory Cartridge (RMC) which contains a data drive.

3.3 Physical Boundaries

The TOE's physical boundary is the physical perimeter of its enclosure. The TOE provides a ruggedized solution to secure Data at Rest (DAR).

4 Security Policy

This section summaries the security functionality of the TOE:

1. Cryptographic support
2. User data protection
3. Security management
4. Protection of the TSF

4.1 Cryptographic support

The TOE includes cryptographic functionality for key management, user authentication, and block-based encryption including: symmetric key generation, encryption/decryption, cryptographic hashing, keyed-hash message authentication, and password-based key derivation. These functions are supported with suitable random bit generation, key derivation, salt generation, initialization vector generation, secure key storage, and key destruction. These primitive cryptographic functions are used to encrypt Data-At-Rest (including the generation and protection of keys and key encryption keys) used by the TOE.

4.2 User data protection

The TOE performs Full Drive Encryption on the entire drive (so that no plaintext exists) and does so without user intervention.

4.3 Security management

The TOE provides each of the required management services to manage the full drive encryption using a command line interface.

4.4 Protection of the TSF

The TOE implements a number of features to protect itself to ensure the reliability and integrity of its security features. It protects key and key material, and includes functions to perform self-tests and software/firmware integrity checking so that it might detect when it is failing or may be corrupt. If any of the self-tests fails, the TOE will not go into an operational mode.

5 Assumptions & Clarification of Scope

Assumptions

The Security Problem Definition, including the assumptions, may be found in the following documents:

- collaborative Protection Profile for Full Drive Encryption - Encryption Engine, Version 2.0, 09 September 2016
- collaborative Protection Profile for Full Drive Encryption Authorization Acquisition, Version 2.0, 09 September 2016

That information has not been reproduced here and the FDEEEcPP20/FDEAAcPP20 should be consulted if there is interest in that material.

The scope of this evaluation was limited to the functionality and assurances covered in the FDEEEcPP20/FDEAAcPP20 as described for this TOE in the Security Target. Other functionality included in the product was not assessed as part of this evaluation. All other functionality provided by the devices needs to be assessed separately, and no further conclusions can be drawn about their effectiveness.

Clarification of scope

All evaluations (and all products) have limitations, as well as potential misconceptions that need clarification. This text covers some of the more important limitations and clarifications of this evaluation. Note that:

- As with any evaluation, this evaluation only shows that the evaluated configuration meets the security claims made with a certain level of assurance (the assurance activities specified in the Full Drive Encryption Protection Profiles and performed by the evaluation team).
- This evaluation covers only the specific device model and software as identified in this document, and not any earlier or later versions released or in process. More specifically, this evaluation only covers the hardware encryption layer of the Curtiss-Wright Data Transport Solution, not the software encryption layer, which is covered in a separate evaluation.
- This evaluation did not specifically search for, nor attempt to exploit, vulnerabilities that were not "obvious" or vulnerabilities to objectives not claimed in the ST. The CEM defines an "obvious" vulnerability as one that is easily exploited with a minimum of understanding of the TOE, technical sophistication and resources.
- The functionality evaluated is scoped exclusively to the security functional requirements specified in the FDEEEcPP20/FDEAAcPP20 and applicable Technical Decisions. Any additional security related functional capabilities of the TOE were not covered by this evaluation.

6 Documentation

The following documents were available with the TOE for evaluation:

- Curtiss-Wright DTS1 Data Transport System (Network File System) User Guide, DDOC0099-000-A2

To use the product in the evaluated configuration, the software must be configured as specified in that guide. Any additional customer documentation provided with the product, or that is available online was not included in the scope of the evaluation and therefore should not to be relied upon when configuring or operating the software as evaluated. Consumers are encouraged to download the CC configuration guides directly from the NIAP site to ensure the software is configured as evaluated.

7 IT Product Testing

This section describes the testing efforts of the developer and the Evaluation Team. It is derived from information contained in the following proprietary document:

- *Evaluation Technical Report for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer*, Version 0.3, October 18, 2018

A non-proprietary summary of the test configuration, test tools, and tests performed may be found in:

- *Assurance Activity Report (FDEEEcPP20/FDEAAcPP20) for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer, Version 0.3, October 18, 2018 (AAR).*

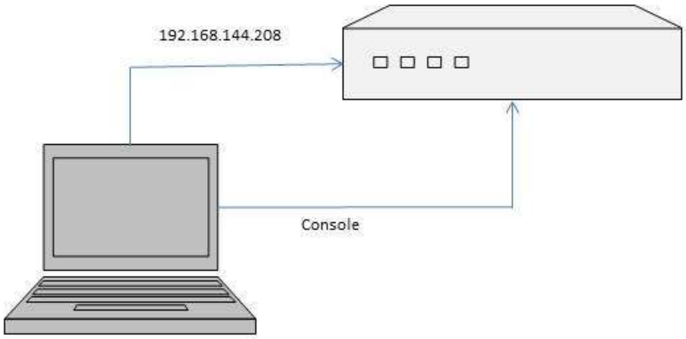
7.1 Developer Testing

No evidence of developer testing is required in the assurance activities for this product.

7.2 Evaluation Team Independent Testing

The evaluation team verified the product according a Common Criteria Certification document and ran the tests specified in the FDEEEcPP20/FDEAAcPP20 including the tests associated with optional requirements.

7.3 Test Environment



TOE Platform: Curtiss-Wright Defense Solutions Data Transport System 1-Slot (build 373)

7.4 Testing Software

- Windows 10, 64-bit edition
- Standard Windows utilities (e.g., notepad, snip tool)
- Putty version 0.67 (used to connect to the device)
- HxD (Hexeditor) version 1.7.7.0 (used to examine dumped memory files)
- Gossamer developed test tools for binary searches
- Curtiss Wright tool for performing cryptographic operation to setup TOE – cm_crypto
- Debugger (used to dump memory) - Keil uVision Version 4

8 Results of the Evaluation

The results of the assurance requirements are generally described in this section and are presented in detail in the proprietary ETR. The reader of this document can assume that all assurance activities and work units received a passing verdict.

A verdict for an assurance component is determined by the resulting verdicts assigned to the corresponding evaluator action elements. The evaluation was conducted based upon CC version 3.1 rev 4 and CEM version 3.1 rev 4. The evaluation determined the Data Transport System 1-Slot Hardware Encryption Layer TOE to be Part 2 extended, and to meet the SARs contained in the FDEEEcPP20/FDEAAcPP20.

8.1 Evaluation of the Security Target (ASE)

The evaluation team applied each ASE CEM work unit. The ST evaluation ensured the ST contains a description of the environment in terms of policies and assumptions, a statement of security requirements claimed to be met by the Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer product that are consistent with the Common Criteria, and product security function descriptions that support the requirements.

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.2 Evaluation of the Development (ADV)

The evaluation team applied each ADV CEM work unit. The evaluation team assessed the design documentation and found it adequate to aid in understanding how the TSF provides the security functions. The design documentation consists of a functional specification contained in the Security target and Guidance documents. Additionally the evaluator performed the assurance activities specified in the FDEEEcPP20/FDEAAcPP20 related to the examination of the information contained in the TSS.

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.3 Evaluation of the Guidance Documents (AGD)

The evaluation team applied each AGD CEM work unit. The evaluation team ensured the adequacy of the user guidance in describing how to use the operational TOE. Additionally, the evaluation team ensured the adequacy of the administrator guidance in describing how to securely administer the TOE. All of the guides were assessed during the design and testing phases of the evaluation to ensure they were complete.

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.4 Evaluation of the Life Cycle Support Activities (ALC)

The evaluation team applied each ALC CEM work unit. The evaluation team found that the TOE was identified.

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.5 Evaluation of the Test Documentation and the Test Activity (ATE)

The evaluation team applied each ATE CEM work unit. The evaluation team ran the set of tests specified by the assurance activities in the FDEEEcPP20/FDEAAcPP20 and recorded the results in a Test Report, summarized in the AAR.

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.6 Vulnerability Assessment Activity (VAN)

The evaluation team applied each AVA CEM work unit. The vulnerability analysis is in the Detailed Test Report (DTR) prepared by the evaluator. The vulnerability analysis includes a public search for vulnerabilities. A public search for vulnerabilities was conducted September 28, 2018 and did not uncover any residual vulnerability.

The evaluator searched the National Vulnerability Database (https://web.nvd.nist.gov/view/vuln/search) and the Vulnerability Notes Database (http://www.kb.cert.org/vuls/) with the following search terms: disk encryption", "drive encryption", "key destruction", "key sanitization", "Opal management software", "SED management software", "Password caching", "Key caching", "Curtiss Wright", "DTS1", "Defense Solutions Data Transport System", "Curtiss Wright Crypto Firmware", "NXP (Phillips) ARM7 Processor P/N LPC2368FBD100", "Maxim Integrated DS3645, Rev A4", "Microchip ATECC508A", "Enova X-Wall MX-256C ".

The validators reviewed the work of the evaluation team, and found that sufficient evidence and justification was provided by the evaluation team to confirm that the evaluation was conducted in accordance with the requirements of the CEM, and that the conclusion reached by the evaluation team was justified.

8.7 Summary of Evaluation Results

The evaluation team's assessment of the evaluation evidence demonstrates that the claims in the ST are met. Additionally, the evaluation team's testing also demonstrated the accuracy of the claims in the ST.

The validation team's assessment of the evidence provided by the evaluation team is that it demonstrates that the evaluation team followed the procedures defined in the CEM, and correctly verified that the product meets the claims in the ST.

9 Validator Comments/Recommendations

The validators suggest that the consumer pay particular attention to the evaluated configuration of the hardware encryption layer. The functionality evaluated is scoped exclusively to the security functional requirements specified in the Security Target, and only the functionality implemented by the SFR's within the Security Target was evaluated. All other functionality provided, to include software, firmware, or hardware that was not part of the evaluated configuration, needs to be assessed separately and no further conclusions can be drawn about their effectiveness.

In addition to the hardware-based FDE layer provided by the DTS1, the DTS1 provides a software/firmware-based Full Drive Encryption (FDE) layer to encrypt the drive within the RMC. The software/firmware-based FDE layer is addressed in a separate evaluation.

Administrators should pay particular attention to the encryptor's ability to setup Automatic Login covered in section 6.3.6 of the Administrative Guide. It is possible to set a command that will allow for saving login credentials, which when saved, allows for login to occur automatically during power up. If default passwords are used, they must be changed.

NIAP established the Full Drive Encryption Technical Rapid Response Team (FDE-TRRT) which, along with the Full Drive Encryption International Technical Community (FDE iTC), addressed questions and concerns related to evaluations claiming conformance to the *Protection Profile for Full Drive Encryption.* A Technical Decision is an issue resolution statement that clarifies or interprets protection profile requirements and assurance activities. The FDE-TRRT, in conjunction with the Full Drive Encryption (FDE) Interpretations Team (FIT), has formally posted eight Technical Decisions related to *collaborative Protection Profile for Full Drive Encryption Encryption Engine* and *collaborative Protection Profile for Full Drive Encryption Authorization Acquisition*: TD0229, TD0233, TD0308, TD0309, TD0310, TD0312, TD0344, TD0345 (see https://www.niap-ccevs.org/Documents_and_Guidance/view_tds.cfm). Of these, the following eight FDE-TRRT Technical Decisions applied to this evaluation: TD0229, TD0233, TD0308, TD0309, TD0310, TD0312, TD0344, TD0345.

9.1 TRRT Decisions

There was one TRRT decision made throughout the course of this evaluation, which has not led to a TD as of this writing but is upcoming:

9.1.1 Hardware FDE Key Dumping

A TRRT request was made to address an issue in the FCS_CKM.4(b) SFR from the Full Drive Encryption: Encryption EE PP:

1. FCS_CKM_EXT.6.1 has FCS_CKM.4(b) only from the EE PP.

2. The SD for the FDEEE PP is confusing with this SFR as it says it has no test and then lists a test for FCS_CKM.4(b). I checked the recently completed NIAP Seagate evaluation (10857) for guidance and they did no tests for the FCS_CKM.4(b) requirement

Question: Does this mean this evaluation does not have to do any key dumping tests?

Upon review, the FDE-TRRT stated that the Test Assurance Activity statement in FCS_CKM.4(b) of the FDE EE PP, “There is no test evaluation activity for this SFR”, was made in error and tests do have to be performed for FCS_CKM.4(b). Because of this TRRT decision, the lab performed tests consistent with the Evaluation Activities for this SFR. As of this writing, the TRRT decision has not led to a TD, but is upcoming.

10 Annexes

Not applicable

11 Security Target

The Security Target is identified as: *Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer (FDEEEcPP20/FDEAAcPP20) Security Target, Version 0.6, October 18, 2018*.

12 Glossary

The following definitions are used throughout this document:

- **Common Criteria Testing Laboratory (CCTL)**. An IT security evaluation facility accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) and approved by the CCEVS Validation Body to conduct Common Criteria-based evaluations.
- **Conformance**. The ability to demonstrate in an unambiguous way that a given implementation is correct with respect to the formal model.
- **Evaluation**. The assessment of an IT product against the Common Criteria using the Common Criteria Evaluation Methodology to determine whether or not the claims made are justified; or the assessment of a protection profile against the Common Criteria using the Common

Evaluation Methodology to determine if the Profile is complete, consistent, technically sound and hence suitable for use as a statement of requirements for one or more TOEs that may be evaluated.

- **Evaluation Evidence**. Any tangible resource (information) required from the sponsor or developer by the evaluator to perform one or more evaluation activities.
- **Feature.** Part of a product that is either included with the product or can be ordered separately.
- **Target of Evaluation (TOE)**. A group of IT products configured as an IT system, or an IT product, and associated documentation that is the subject of a security evaluation under the CC.
- **Validation**. The process carried out by the CCEVS Validation Body leading to the issue of a Common Criteria certificate.
- **Validation Body**. A governmental organization responsible for carrying out validation and for overseeing the day-to-day operation of the NIAP Common Criteria Evaluation and Validation Scheme.

13 Bibliography

The Validation Team used the following documents to produce this Validation Report:

[1] Common Criteria for Information Technology Security Evaluation: Part 1: Introduction and General Model, Version 3.1, Revision 4, September 2012.

[2] Common Criteria for Information Technology Security Evaluation Part 2: Security functional components, Version 3.1, Revision 4, September 2012.

[3] Common Criteria for Information Technology Security Evaluation Part 3: Security assurance components, Version 3.1 Revision 4, September 2102.

[4] collaborative Protection Profile for Full Drive Encryption - Encryption Engine, Version 2.0, 09 September 2016

[5] collaborative Protection Profile for Full Drive Encryption Authorization Acquisition, Version 2.0, 09 September 2016.

[6] Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer (FDEEEcPP20/FDEAAcPP20) Security Target, Version 0.6, October 18, 2018 (ST).

[7] Assurance Activity Report (FDEEEcPP20/FDEAAcPP20) for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer, Version 0.3, October 18, 2018 (AAR).

[8] Detailed Test Report (FDEEEcPP20/FDEAAcPP20) for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer, Version 0.2, October 17, 2018 (DTR). <Evaluation Sensitive>

[9] Evaluation Technical Report for Curtiss-Wright Data Transport System 1-Slot Hardware Encryption Layer, Version 0.3, October 18, 2018 (ETR) <Evaluation Sensitive>

[10] Curtiss-Wright DTS1 CSfc / ECC Cryptographic Data Transport System (Network File System) User Guide, DDOC0099-000-A2, March 23, 2018