

National Information Assurance Partnership
Common Criteria Evaluation and Validation Scheme



Validation Report

for the

Pulse Connect Secure v9.1, Version 1.0

Report Number: CCEVS-VR-11021-2020

Dated: 03/30/2020

Version: 1.0

**National Institute of Standards and Technology
Information Technology Laboratory
100 Bureau Drive
Gaithersburg, MD 20899**

**National Security Agency
Information Assurance Directorate
9800 Savage Road STE 6940
Fort George G. Meade, MD 20755-6940**

ACKNOWLEDGEMENTS

Validation Team

Paul Bicknell

Jenn Dotson

Randy Heimann

Linda Morrison (Lead Validator)

Clare Olin

Jean Petty (Senior Validator)

Common Criteria Testing Laboratory

Anthony Busciglio

Brad Mitchell

Kevin Zhang

Olexandr Kholyavko

Acumen Security, LLC

Table of Contents

1	Executive Summary	4
2	Identification	5
3	Architectural Information	6
4	Security Policy.....	7
4.1	Security Audit.....	7
4.2	Cryptographic Support.....	7
4.3	Identification and Authentication.....	7
4.4	Security Management	7
4.5	Protection of the TSF.....	7
4.6	TOE Access	8
4.7	Trusted Path/Channels	8
5	Assumptions, Threats & Clarification of Scope.....	9
5.1	Assumptions	9
5.2	Threats	10
5.3	Clarification of Scope.....	11
6	Documentation	13
7	TOE Evaluated Configuration	14
7.1	Evaluated Configuration	14
7.2	Excluded Functionality	14
8	IT Product Testing	15
8.1	Developer Testing	15
8.2	Evaluation Team Independent Testing.....	15
9	Results of the Evaluation	16
9.1	Evaluation of Security Target.....	16
9.2	Evaluation of Development Documentation	16
9.3	Evaluation of Guidance Documents	16
9.4	Evaluation of Life Cycle Support Activities	16
9.5	Evaluation of Test Documentation and the Test Activity.....	17
9.6	Vulnerability Assessment Activity	17
9.7	Summary of Evaluation Results	17
10	Validator Comments & Recommendations	18
11	Annexes	19
12	Security Target.....	20
13	Glossary	21
14	Bibliography.....	22

1 Executive Summary

This Validation Report (VR) is intended to assist the end user of this product and any security certification Agent for that end user in determining the suitability of this Information Technology (IT) product for their environment. End users should review the Security Target (ST), which is where specific security claims are made, in conjunction with this VR, which describes how those security claims were tested and evaluated and any restrictions on the evaluated configuration. Prospective users should carefully read the Assumptions and Clarification of Scope in Section 5 and the Validator Comments in Section 10, where any restrictions on the evaluated configuration are highlighted.

This report documents the National Information Assurance Partnership (NIAP) assessment of the evaluation of the Pulse Connect Secure v9.1 Target of Evaluation (TOE). It presents the evaluation results, their justifications, and the conformance results. This VR is not an endorsement of the TOE by any agency of the U.S. Government and no warranty of the TOE is either expressed or implied. This VR applies only to the specific version and configuration of the product as evaluated and documented in the ST.

The evaluation was completed by Acumen Security in March 2020. The information in this report is largely derived from the Evaluation Technical Report (ETR) and associated test report, all written by Acumen Security. The evaluation determined that the product is both Common Criteria Part 2 Extended and Part 3 Conformant and meets the assurance requirements defined in the collaborative Protection Profile for Network Devices, Version 2.1.

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. 5) for conformance to the Common Criteria for IT Security Evaluation (Version 3.1, Rev. 5), as interpreted by the Assurance Activities contained in the collaborative Protection Profile for Network Devices, Version 2.1. 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.

2 Identification

The CCEVS is a joint National Security Agency (NSA) and National Institute of Standards 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). CCTLs evaluate products against Protection Profile containing Assurance Activities, which are interpretation of CEM work units specific to the technology described by the PP.

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 Product Compliance 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(s) 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	Pulse Connect Secure v9.1
Protection Profile	collaborative Protection Profile for Network Devices, Version 2.1
Security Target	Pulse Connect Secure v9.1 Security Target, V1.1, March 17, 2020
Evaluation Technical Report	Pulse Connect Secure ETR, V1.2, March 17, 2020
CC Version	Version 3.1, Revision 5
Conformance Result	CC Part 2 Extended and CC Part 3 Conformant
Sponsor	PulseSecure, LLC.
Developer	PulseSecure, LLC.
Common Criteria Testing Lab (CCTL)	Acumen Security Rockville, MD
CCEVS Validators	Paul Bicknell, Jenn Dotson, Randy Heimann, Clare Olin, Linda Morrison, Jean Petty

3 Architectural Information

Pulse Connect Secure enables secure device access to applications and resources in the data center and in the cloud. This clientless system provides unified management of policies, compliance, and authorizations for cloud and data center access. The single sign-on and Layer 3 SSL VPN functionality of the TOE are outside the scope of this evaluation.

The TOE is classified as a network device (a generic infrastructure device that can be connected to a network) or a virtual network device (a Virtual Appliance that can be connected to a network) depending on the underlying platform. The TOE software consists of Pulse Connect Secure (PCS) 9.1. The appliance's software is built on IVE OS 2.0. The TOE consists of the PCS application, IVE OS, and either the TOE hardware or the VM hypervisor, all of which are delivered with the TOE. The TOE hardware consists of either the PSA Models 300, 3000, 5000, 7000C, or 7000F.

4 Security Policy

The TOE provides the security functionality required by NDcPP v2.1 September 24, 2018.

4.1 Security Audit

The TOE generates audit records for security relevant events. The TOE maintains a local audit log as well as sending the audit records to a remote Syslog server. Audit records sent to the remote server are protected by a TLS connection. Each audit record includes identity (username, IP address, or process), date and time of the event, type of event, and the outcome of the event. The TOE prevents modification to the local audit log.

4.2 Cryptographic Support

The TOE includes the Pulse Secure Cryptographic Module that implements CAVP validated cryptographic algorithms for random bit generation, encryption/decryption, authentication, and integrity protection/verification. These algorithms are used to provide security for the TLS and HTTPs connections for secure management and secure connections to a syslog server. TLS and HTTPs are also used to verify firmware updates.

4.3 Identification and Authentication

The TOE authenticates administrative users using a username/password or username/X.509 certificate combination. The TOE does not allow access to any administrative functions prior to successful authentication. The TOE validates and authenticates X.509 certificates for all certificate uses. The TOE supports passwords consisting of alphanumeric and special characters and enforces minimum password lengths. The TSF supports certificates using RSA or ECDSA signature algorithms. The TOE only allows users to view the login warning banner and send/receive ICMP packets prior to authentication. Remote administrators are locked out after a configurable number of unsuccessful authentication attempts.

4.4 Security Management

The TOE allows users with the Security Administrator role to administer the TOE over a remote web UI or a local CLI. These interfaces do not allow the Security Administrator to execute arbitrary commands or executables on the TOE. Security Administrators can manage connections to an external Syslog server, as well as determine the size of local audit storage.

4.5 Protection of the TSF

The TOE implements several self-protection mechanisms. It does not provide an interface for the reading of secret or private keys. The TOE ensures timestamps, timeouts, and certificate checks are accurate by maintaining a real-time clock. Upon startup, the TOE runs a suite of self-tests to verify that it is operating correctly. The TOE also verifies the integrity and authenticity of firmware updates by verifying a digital signature of the update prior to installing it.

4.6 TOE Access

The TOE can be configured to display a warning and consent banner when an administrator attempts to establish an interactive session over the local CLI or remote web UI. The TOE also enforces a configurable inactivity timeout for remote and local administrative sessions.

4.7 Trusted Path/Channels

The TOE uses TLS to provide a trusted communication channel between itself and remote Syslog servers. The trusted channels utilize X.509 certificates to perform mutual authentication. The TOE initiates the TLS trusted channel with the remote server. The TOE uses HTTPS/TLS to provide a trusted path between itself and remote administrative users. The TOE does not implement any additional methods of remote administration. The remote administrative users are responsible for initiating the trusted path when they wish to communicate with the TOE.

5 Assumptions, Threats & Clarification of Scope

5.1 Assumptions

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

ID	Assumption
A.PHYSICAL_PROTECTION	The network device is assumed to be physically protected in its operational environment and not subject to physical attacks that compromise the security and/or interfere with the device's physical interconnections and correct operation. This protection is assumed to be sufficient to protect the device and the data it contains. As a result, the cPP will not include any requirements on physical tamper protection or other physical attack mitigations. The cPP will not expect the product to defend against physical access to the device that allows unauthorized entities to extract data, bypass other controls, or otherwise manipulate the device.
A.LIMITED_FUNCTIONALITY	The device is assumed to provide networking functionality as its core function and not provide functionality/services that could be deemed as general purpose computing. For example, the device should not provide computing platform for general purpose applications (unrelated to networking functionality).
A.NO_THRU_TRAFFIC_PROTECTION	A standard/generic network device does not provide any assurance regarding the protection of traffic that traverses it. The intent is for the network device to protect data that originates on or is destined to the device itself, to include administrative data and audit data. Traffic that is traversing the network device, destined for another network entity, is not covered by the ND cPP. It is assumed that this protection will be covered by cPPs and PP-Modules for particular types of network devices (e.g. firewall).
A.TRUSTED_ADMINISTRATOR	<p>The Security Administrator(s) for the network device are assumed to be trusted and to act in the best interest of security for the organization. This includes being appropriately trained, following policy, and adhering to guidance documentation. Administrators are trusted to ensure passwords/credentials have sufficient strength and entropy and to lack malicious intent when administering the device. The network device is not expected to be capable of defending against a malicious administrator that actively works to bypass or compromise the security of the device.</p> <p>For TOEs supporting X.509v3 certificate-based authentication, the Security Administrator(s) are expected to fully validate (e.g. offline verification) any CA certificate (root CA certificate or intermediate CA certificate) loaded into the TOE's trusted source (aka 'root store', 'trusted CA Key Store', or similar) as a trust anchor prior to use (e.g. offline verification).</p>
A.REGULAR_UPDATES	The network device firmware and software is assumed to be updated by an administrator on a regular basis in response to the release of product updates due to known vulnerabilities.
A.ADMIN_CREDENTIALS_SECURE	The administrator's credentials (private key) used to access the network device are protected by the platform on which they reside.

A.COMPONENTS_RUNNING (applies to distributed TOEs only)	For distributed TOEs it is assumed that the availability of all TOE components is checked as appropriate to reduce the risk of an undetected attack on (or failure of) one or more TOE components. It is also assumed that in addition to the availability of all components it is also checked as appropriate that the audit functionality is running properly on all TOE components.
A.RESIDUAL_INFORMATION	The Administrator must ensure that there is no unauthorized access possible for sensitive residual information (e.g. cryptographic keys, keying material, PINs, passwords etc.) on networking equipment when the equipment is discarded or removed from its operational environment.

5.2 Threats

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

ID	Threat
T.UNAUTHORIZED_ADMINISTRATOR_ACCESS	Threat agents may attempt to gain administrator access to the network device by nefarious means such as masquerading as an administrator to the device, masquerading as the device to an administrator, replaying an administrative session (in its entirety, or selected portions), or performing man-in-the-middle attacks, which would provide access to the administrative session, or sessions between network devices. Successfully gaining administrator access allows malicious actions that compromise the security functionality of the device and the network on which it resides.
T.WEAK_CRYPTOGRAPHY	Threat agents may exploit weak cryptographic algorithms or perform a cryptographic exhaust against the key space. Poorly chosen encryption algorithms, modes, and key sizes will allow attackers to compromise the algorithms, or brute force exhaust the key space and give them unauthorized access allowing them to read, manipulate and/or control the traffic with minimal effort.
T.UNTRUSTED_COMMUNICATION_CHANNELS	Threat agents may attempt to target network devices that do not use standardized secure tunneling protocols to protect the critical network traffic. Attackers may take advantage of poorly designed protocols or poor key management to successfully perform man-in-the-middle attacks, replay attacks, etc. Successful attacks will result in loss of confidentiality and integrity of the critical network traffic, and potentially could lead to a compromise of the network device itself.
T.WEAK_AUTHENTICATION_ENDPOINTS	Threat agents may take advantage of secure protocols that use weak methods to authenticate the endpoints – e.g. a shared password that is guessable or transported as plaintext. The consequences are the same as a poorly designed protocol, the attacker could masquerade as the Administrator or another device, and the attacker could insert themselves into the network stream and perform a man-in-the-middle attack. The result is the critical

	network traffic is exposed and there could be a loss of confidentiality and integrity, and potentially the network device itself could be compromised.
T.UPDATE_COMPROMISE	Threat agents may attempt to provide a compromised update of the software or firmware which undermines the security functionality of the device. Non-validated updates or updates validated using non-secure or weak cryptography leave the update firmware vulnerable to surreptitious alteration.
T.UNDETECTED_ACTIVITY	Threat agents may attempt to access, change, and/or modify the security functionality of the network device without administrator awareness. This could result in the attacker finding an avenue (e.g., misconfiguration, flaw in the product) to compromise the device and the administrator would have no knowledge that the device has been compromised.
T.SECURITY_FUNCTIONALITY_COMPROMISE	Threat agents may compromise credentials and device data enabling continued access to the network device and its critical data. The compromise of credentials includes replacing existing credentials with an attacker’s credentials, modifying existing credentials, or obtaining the administrator or device credentials for use by the attacker.
T.PASSWORD_CRACKING	Threat agents may be able to take advantage of weak administrative passwords to gain privileged access to the device. Having privileged access to the device provides the attacker unfettered access to the network traffic, and may allow them to take advantage of any trust relationships with other network devices.
T.SECURITY_FUNCTIONALITY_FAILURE	An external, unauthorized entity could make use of failed or compromised security functionality and might therefore subsequently use or abuse security functions without prior authentication to access, change or modify device data, critical network traffic or security functionality of the device.

5.3 Clarification of Scope

All evaluations (and all products) have limitations, as well as potential misconceptions that need clarifying. 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 level of assurance for this evaluation is defined within the collaborative Protection Profile for Network Devices, Version 2.1.
- Consistent with the expectations of the Protection Profile, this evaluation did not specifically search for, nor seriously attempt to counter, 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 evaluation of security functionality of the product was limited to the functionality specified in the claimed PPs. Any additional security related functional capabilities included in the product were not covered by this evaluation.

6 Documentation

The following documents were provided by the vendor with the TOE for evaluation:

- Pulse Connect Secure v9.1 Security Target, V1.2, March 17, 2020
- Pulse Secure Operational User Guidance and Preparative Procedures, V1.2, March 2020

7 TOE Evaluated Configuration

7.1 Evaluated Configuration

The TOE consists of the following hardware:

- • PSA 300
- • PSA 3000
- • PSA 5000
- • PSA 7000C
- • PSA 7000F

Running:

- • Pulse Connect Secure (PCS) v9.1

The PPS software runs on any of the TOE hardware appliance platforms or on a virtual appliance. The TOE is delivered with the PCS v9.1 software installed on one of the PSA appliances. The TOE can also be a virtual appliance on VMware ESXi 6.0, with a Dell PowerEdge R430R530 as the hardware platform. ESXi is a bare-metal hypervisor so there is no underlying operation system. In the evaluated configuration, there are no guest VMs on the physical platform providing non-network device functionality.

7.2 Excluded Functionality

The TOE includes the following functionality that is not covered in this Security Target and may not be enabled or used in in the CC evaluated configuration:

- DMI Agent
- SNMP Traps
- External Authentication Servers for administrator authentication

8 IT Product Testing

This section describes the testing efforts of the developer and the evaluation team. It is derived from information contained in Evaluation Test Report for Pulse Connect Secure v9.1, V1.0, January 7, 2020, which is not publicly available. The Assurance Activities Report provides an overview of testing and the prescribed assurance activities.

8.1 Developer Testing

No evidence of developer testing is required in the Assurance Activities for this product.

8.2 Evaluation Team Independent Testing

The evaluation team verified the product according the vendor-provided guidance documentation and ran the tests specified in the collaborative Protection Profile for Network Devices, Version 2.1. The Independent Testing activity is documented in the Assurance Activities Report, V1.2, March 24, 2020, which is publicly available, and is not duplicated here.

9 Results of the Evaluation

The results of the assurance requirements are generally described in this section and are presented in detail in the proprietary documents: the Detailed Test Report (DTR) and the Evaluation Technical Report (ETR). The reader of this document can assume that 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 5 and CEM version 3.1 rev 5. The evaluation determined the Pulse Connect Secure v9.1 to be Part 2 extended, and meets the SARs contained in the PP. Additionally the evaluator performed the Assurance Activities specified in the NDcPP, V2.1.

9.1 Evaluation of Security Target

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 Pulse Connect Secure v9.1 that are consistent with the Common Criteria, and product security function descriptions that support the requirements. Additionally, the evaluator performed an assessment of the Assurance Activities specified in the collaborative Protection Profile for Network Devices, Version 2.1.

9.2 Evaluation of Development Documentation

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's TOE Summary Specification. Additionally, the evaluator performed the Assurance Activities specified in the collaborative Protection Profile for Network Devices, Version 2.1 related to the examination of the information contained in the TOE Summary Specification.

9.3 Evaluation of Guidance Documents

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. The guides were assessed during the design and testing phases of the evaluation to ensure they were complete. Additionally, the evaluator performed the Assurance Activities specified in the collaborative Protection Profile for Network Devices, Version 2.1 related to the examination of the information contained in the operational guidance documents.

9.4 Evaluation of Life Cycle Support Activities

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

9.5 Evaluation of Test Documentation and the Test Activity

The evaluation team applied each ATE CEM work unit. The evaluation team ran the set of tests specified by the Assurance Activities in the collaborative Protection Profile for Network Devices, Version 2.1 and recorded the results in a Test Report, summarized in the Evaluation Technical Report and Assurance Activities Report.

9.6 Vulnerability Assessment Activity

The evaluation team applied each AVA CEM work unit. The evaluation team performed a public search for vulnerabilities, performed vulnerability testing and did not discover any issues with the TOE.

9.7 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 test activities 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 performed the Assurance Activities in the collaborative Protection Profile for Network Devices, Version 2.1, and correctly verified that the product meets the claims in the ST.

10 Validator Comments & Recommendations

The validation team notes that the evaluated configuration is dependent upon the TOE being configured per the evaluated configuration instructions in the *Pulse Connect Secure Operational User Guidance and Preparative Procedures, Version 1.2, March 2020* document.

Please note that the functionality evaluated is scoped exclusively to the security functional requirements specified in the Security Target. Other functionality included in the product was not assessed as part of this evaluation. All other functionality provided by the product needs to be assessed separately and no further conclusions can be drawn about their effectiveness.

11 Annexes

Not applicable.

12 Security Target

Pulse Connect Secure v9.1 Security Target, V1.2, March 17, 2020

13 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.

14 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 5.
2. Common Criteria for Information Technology Security Evaluation - Part 2: Security functional requirements, Version 3.1 Revision 5.
3. Common Criteria for Information Technology Security Evaluation - Part 3: Security assurance requirements, Version 3.1 Revision 5.
4. Common Evaluation Methodology for Information Technology Security Evaluation, Version 3.1 Revision 5.
5. Collaborative Protection Profile for Network Devices, Version 2.1, 24 September 2018 (NDcPP21).
6. Pulse Connect Secure v9.1 Security Target, Version 1.2, March 17, 2020.
7. Assurance Activity Report for Pulse Connect Secure, Version 2.1, March 24, 2020.
8. Test Plan for PCS (PSA5000), Version 1.1, March 16, 2020.
9. Test Plan for Virtual PCS, Version 1.1, March 16, 2020.
10. Evaluation Technical Report for Pulse Connect Secure v9.1, V.2.1, March 17, 2020.
11. Pulse Secure Operational User Guidance and Preparative Procedures, V1.2, March 2020