National Information Assurance Partnership

Common Criteria Evaluation and Validation Scheme

Validation Report

for the

Pulse Secure Virtual Appliance 8.2/5.3, Version 1.0

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ACKNOWLEDGEMENTS

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Table of Contents

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 PulseSecure Virtual Appliance 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 April 2018. 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 v1.0 (NDcPP) as amended by any NIAP Technical Decisions relevant to the evaluation.

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), as interpreted by the Assurance Activities contained in the NDcPP. 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 provided guidance on technical issues and evaluation processes and reviewed the individual work units documented in the ETR and the Assurance Activities Report (AAR). 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). Based on these findings, 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.

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 Secure Virtual Appliance 8.2/5.3
Protection Profile	NDcPP v1.0
Security Target	Pulse Secure Virtual Appliance 8.2/5.3 Security Target
Evaluation Technical Report	Pulse Secure Virtual Appliance 8.2/5.3 ETR
CC Version	Version 3.1, Revision 4
Conformance Result	CC Part 2 Extended and CC Part 3 Conformant
Sponsor	PulseSecure
Developer	PulseSecure
Common Criteria Testing Lab (CCTL)	Acumen Security Montgomery Village, MD
CCEVS Validators	Patrick Mallett, PhD., Linda Morrison, Jeffrey Dunn, MITRE Corporation; Kenneth Stutterheim, The Aerospace Corporation

3 Architectural Information

The TOE is classified as a virtualized network device (a Virtual Appliance that can be connected to a network). The Virtual Appliance consists of Pulse Connect Secure (PCS) 8.2 and Pulse Policy Secure (PPS) 5.3. The appliance's software is built on IVE OS 2.0. The TOE consists of the Virtual Appliance, the VM hypervisor VMWare ESXi 6.0, and a hardware platform – a Dell Power Edge R430/530 with the Intel Xeon E5-2620 v4 processor, all of which are delivered with the TOE. Thus, the TOE is considered a network device as defined in NDcPP v1.0 as modified by TDs #0096 and #0023. Note that per the NDcPP, in the evaluated configuration no other guest VMs that provide non-network device functionality are allowed on the physical platform.

4 Security Policy

The logical boundary of the TOE includes those security functions implemented exclusively by the TOE.

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.

Cryptographic Operations

The TOE 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 as well as verifying firmware updates.

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 supports passwords consisting of alphanumeric and special characters and enforces minimum password lengths. The TSF supports and certificates using RSA or ECDSA signature algorithms.

The TOE allows only users to view the login warning banner and send/receive ICMP packets prior to authentication.

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.

The TOE can also receive configuration updates from a Pulse One management server.

Protection of the TSF

The TOE implements a number of 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 as well as polling an NTP server to minimize drift. 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 the digital signature of an update prior to installing it.

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.

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 trusted channel with the Pulse One server utilizes HAWK authentication to perform mutual authentication. The TOE initiates the TLS trusted channel with both types of 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.

Unevaluated Functionality

The TOE includes the following unevaluated functionality that is not covered by this Security Target and the associated evaluation:

- Layer 3 SSL VPN
- Application VPN
- Endpoint Integrity and Assessment
- Layer 7 Web single sign-on (SSO) via SAML
- Mobile Device Management Integration
- Network Security and Application Access Control Integration
- Federation
- Guest Access
- Anti-Malware Protection and Patch Assessment
- Firewall Listening Service

These features may be used in the evaluated configuration; however, no assurance as to the correct operation of these features is provided.

Excluded Functionality

The TOE includes the following functionality that must not be enabled nor should it be used in the CC evaluated configuration:

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

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.

Assumption	Description
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 NDcPP. It is assumed that this protection will be covered by cPPs for particular types of network devices (e.g, firewall).
A.TRUSTED_ADMINISTRATOR	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.
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.

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.

Threat	Description
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., 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 include 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	A component of the network device may fail during start-up or during operations causing a compromise or failure in the security functionality of the network device, leaving the device susceptible to attackers.

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 NDcPP.
- 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 Secure Virtual Appliance 8.2/5.3 Security Target, Version 3.2, April 2018.
- Pulse Secure Virtual Appliance Operational User Guidance and Preparative Procedures, version 0.4, March 2018

To use the product in the evaluated configuration, the product must be configured as specified in those guides. Any additional customer documentation provided with the product, or that which may be available online was not included in the scope of the evaluation and therefore should not be relied upon to configure or operate the device in its evaluated configuration.

7 TOE Evaluated Configuration

7.1 Evaluated Configuration

The TOE is classified as a virtualized network device (a Virtual Appliance that can be connected to a network). The Virtual Appliance consists of Pulse Connect Secure (PCS) 8.2 and Pulse Policy Secure (PPS) 5.3. The appliance's software is built on IVE OS 2.0. The TOE consists of the Virtual Appliance, the VM hypervisor and the hardware platform all of which are delivered with the TOE. The evaluated hardware platform is the Dell PowerEdge R430/R530, with the Intel Xeon E5-2620 V4 processor, running the VMware ESXi 6.0. The TOE is considered to be a network device as defined in NDcPP v1.0 as modified by NIAP TDs #0096 and #0023.

7.2 Excluded Functionality

The TOE includes the following functionality that may not be enabled nor 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 PulseSecure Virtual Appliance, which is not publically available. The Assurance Activities Report provides an overview of testing and the prescribed assurance activities.

8.1 Developer Testing

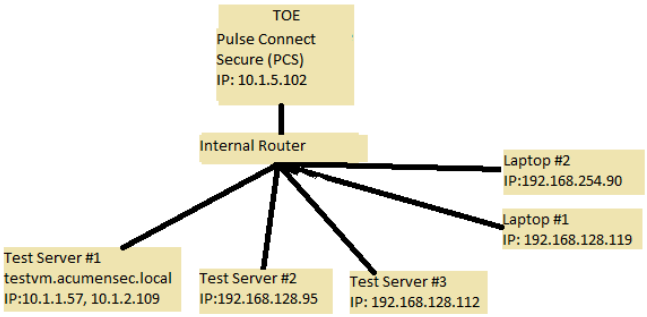
No evidence of developer testing is required in the Assurance Activities for this product.

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 NDcPP. The Independent Testing activity is documented in the Assurance Activities Report, which is publically available, and is not duplicated here.

8.3 Test Bed Diagram

Below is a visual representation of the components included in the test bed:



8.4 Test Tools

The following test tools were used as part of the evaluation testing.

- Acumen-tls version 7
- Oswald tlss_tool version 1.0
- Openssl s_client version 1.1.0g
- Openssl s_server version 1.1.0g
- Wireshark version 2.4.5
- Chrome version 65
- Snipping tool Windows 10

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). Those activities are summarized in the available Assurance Activity Report for the evaluated product. 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 4 and CEM version 3.1 rev 4. The evaluation determined the PulseSecure Virtual Appliance to be Part 2 extended, and meets the SARs contained in the PP. Additionally the evaluator performed the Assurance Activities specified in the NDPP.

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 PulseSecure Virtual Appliance 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 NDcPP.

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.

9.2 Evaluation of Development Documentation

The evaluation team applied each EAL 1 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 NDcPP related to the examination of the information contained in the TOE Summary Specification.

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 Assurance Activities, and that the conclusion reached by the evaluation team was justified.

9.3 Evaluation of Guidance Documents

The evaluation team applied each EAL 1 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 NDcPP related to the examination of the information contained in the operational guidance documents.

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 Assurance Activities, and that the conclusion reached by the evaluation team was justified.

9.4 Evaluation of Life Cycle Support Activities

The evaluation team applied each EAL 1 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.

9.5 Evaluation of Test Documentation and the Test Activity

The evaluation team applied each EAL 1 ATE CEM work unit. The evaluation team ran the set of tests specified by the Assurance Activities in the NDcPP and recorded the results in a Test Report, summarized in the Evaluation Technical Report and Assurance Activities Report.

The validators reviewed the work of the evaluation team, and found that sufficient evidence was provided by the evaluation team to show that the evaluation activities addressed the test activities in the NDcPP, and that the conclusion reached by the evaluation team was justified.

9.6 Vulnerability Assessment Activity

The evaluation team applied each EAL 1 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.

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 addressed the vulnerability analysis Assurance Activities in the NDcPP, and that the conclusion reached by the evaluation team was justified.

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 NDcPP, and correctly verified that the product meets the claims in the ST.

10 Validator Comments & Recommendations

The Pulse Secure products provide additional functionality over and above that which was tested to ensure compliance with the security functionality as described in the Network Device Protection Profile. Administrators are cautioned that any additional functionality the products may provide was not evaluated and no claims or assumptions regarding the proper operation of those features can be drawn from the testing performed.

Note that virtualization of network device products requires the following configuration parameter per the protection profile: in the evaluated configuration, no other guest VMs that provide non-network device functionality are allowed on the physical platform of the evaluated configuration.

Note that the use of NTP across unprotected channels is disallowed.

11 Annexes

Not applicable.

12 Security Target

Pulse Secure Virtual Appliance 8.2/5.3 Security Target. Version 3.2, April 2018

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 4.
2. Common Criteria for Information Technology Security Evaluation - Part 2: Security functional requirements, Version 3.1 Revision 4.
3. Common Criteria for Information Technology Security Evaluation - Part 3: Security assurance requirements, Version 3.1 Revision 4.
4. Common Evaluation Methodology for Information Technology Security Evaluation, Version 3.1 Revision 4.
5. Pulse Secure Security Target Security Target Evaluation Technical Report, Version 2.1, 4/5/2018 <evaluation sensitive document>
6. Pulse Secure Virtual Appliance Evaluation Technical Report, Version 1.1, March 2018 <evaluation sensitive document>
7. Operational User Guidance and Preparative Procedures, Version 0.4, March 2018
8. Common Criteria NDcPP Assurance Activity Report for Pulse Connect Secure 8.2 on Virtual Appliance and Pulse Policy Secure 5.3 on Virtual Appliance, Version 1.1, March 2018
9. Pulse Secure Virtual Appliance 8.2/5.3 Security Target, Version 3.2, April 2018
10. PulseSecure PCS Test Plan, Version 1.1, March 2018 <evaluation sensitive document>
11. PulseSecure PPS Test Plan, Version 1.1, March 2018 <evaluation sensitive document>