National Information Assurance Partnership
Common Criteria Evaluation and Validation Scheme

Validation Report
for
Cisco Network Convergence System 1004 (NCS1004)
Running IOS-XR 24.1

Report Number: CCEVS-VR-VID11508-2025
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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 Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 solution provided by Cisco Systems, Inc. It presents the evaluation results, their justifications, and the conformance results. This Validation Report (VR) is not an endorsement of the Target of Evaluation (TOE) 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 Columbia, MD, United States of America, and was completed in March 2025. The information in this report is largely derived from the Evaluation Technical Report (ETR) and associated test reports, all written by Gossamer Security Solutions. 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 Network Devices*, version 2.2e, 23 March 2020.

The Target of Evaluation (TOE) is the Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1.

The TOE is the Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1. The TOE identified in this VR has been evaluated at a NIAP approved CCTL 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). This VR 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 (CCEVS) and the conclusions of the testing laboratory in the ETR 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 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 ETR are consistent with the evidence produced.

The technical information included in this report was obtained from the *Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 Security Target*, version 1.0, March 4, 2025 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	Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1
Protection Profile	*collaborative Protection Profile for Network Devices*, version 2.2e, 23 March 2020
ST	*Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 Security Target*, version 1.0, March 4, 2025
Evaluation Technical Report	*Evaluation Technical Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, version 0.4, March 4, 2025
CC Version	Common Criteria for Information Technology Security Evaluation, Version 3.1, rev 5
Conformance Result	CC Part 2 extended, CC Part 3 conformant
Sponsor/Developer	Cisco Systems, Inc.
Common Criteria Testing Lab (CCTL)	Gossamer Security Solutions, Inc. Columbia, MD
CCEVS Validators	Jenn Dotson, Linda Morrison, Clare Parran, Lori Sarem

3 Architectural Information

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

The Cisco Network Convergence System 1004 (NCS1004) is comprised of both software and hardware. The hardware is comprised of NCS1004. The software is comprised of the Universal Cisco Internet Operating System (IOS-XR) software image release IOS-XR 24.1.

3.1 TOE Description

The NCS1004 chassis is a 2RU chassis and is the component of the TOE in which all other TOE components are housed. The NCS1004 chassis provides four-line card slots. Each slot can host a 1.2Tbps coherent dense wavelength division multiplexing (DWDM) line card with 12 Quad Small Form-Factor Pluggable (QSFP)-28 based clients and 2 DWDM trunk ports. Each line card can provide up to 12 100Gbe/OTU4 or 3 400GE client ports.

The system supports up to 4.8Tbps of client and 4.8Tbps of trunk traffic. The NCS1004 has two redundant and field replaceable AC & DC power supply units and three redundant and field replaceable fans. It also provides a field replaceable controller card and Solid-State Drive (SSD) disks both on-board the chassis and on the controller card for resiliency.

For connections to the Syslog audit server, the TOE authenticates those devices with X.509v3 certificates and protects communication channels with the TLS protocol. Secure remote administration is protected with SSH which is implemented with authentication failure handling.

3.2 TOE Evaluated Platforms

The evaluated platform consists of the Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1.

3.3 TOE Architecture

The TOE consists of one physical device as specified in section “Physical Boundaries” below and includes the Cisco IOS-XR software. The TOE has two or more network interfaces and is connected to at least one internal and one external network. The Cisco IOS-XR configuration determines how packets are handled to and from the TOE’s network interfaces. The router configuration will determine how traffic flows received on an interface will be handled. Typically, packet flows are passed through the internetworking device and forwarded to their configured destination.

An external syslog server must be used to store audit records. For remote administration, a secure session using SSHv2 must be established.

3.4 Physical Boundaries

The TOE is a hardware and software solution that makes up the router models as follows: NCS1004. The network, on which the TOE resides, is considered part of the IT environment.

The TOE is comprised of the following physical specifications:

Hardware Platform	Processor	Software	Size	Power	Interfaces
NCS1004	Intel Atom C3758 (Goldmont)	IOS-XR 24.1	2RU 3.5 in. x 17.5 in. x 19 in. (8.9 cm x 44.45 cm x 48.26 cm)	1+1 FRU AC or DC <30W per 100G 1300 W (typical) 1400 W (max)	2 (two) slots for 2.1kW AC redundant Power Supply Units (PSU) 3 (three) redundant and field replaceable fans

4 Security Policy

This section summaries the security functionality of the TOE:

1. Security audit
2. Cryptographic support
3. Identification and authentication
4. Security management
5. Protection of the TSF
6. TOE access
7. Trusted path/channels

4.1 Security audit

Auditing allows Security Administrators to discover intentional and unintentional issues with the TOE's configuration and/or operation. Auditing of administrative activities provides information that may be used to hasten corrective action should the system be configured incorrectly. Security audit data can also provide an indication of failure of critical portions of the TOE (e.g. a communication channel failure or anomalous activity (e.g. establishment of an administrative session at a suspicious time, repeated failures to establish sessions or authenticate to the TOE)) of a suspicious nature.

The TOE provides extensive auditing capabilities. The TOE generates an audit record for each auditable event. Each security relevant audit event has the date, timestamp, event description, and subject identity. The TOE provides a circular audit trail. Audit logs are transmitted to an external audit server over a trusted channel protected by TLS.

4.2 Cryptographic support

The TOE provides cryptography in support of other TOE security functionality. All the algorithms claimed have CAVP certificates (Operational Environment –Intel Atom). The TOE leverages the Cisco FIPS Object Module 7.3a which resides in the IOS-XR software.

The TOE provides cryptography in support of remote administrative management via SSHv2 and secures the session between the NCS1004 and remote syslog server using TLS.

4.3 Identification and authentication

The TOE provides authentication services for administrative users wishing to connect to the TOE's secure CLI administrator interface. The TOE requires Authorized Administrators to authenticate prior to being granted access to any of the management functionality. The TOE can be configured to require a minimum password length of 15 characters as well as mandatory password complexity rules.

After a configurable number of incorrect login attempts, the NCS1004 will lock out the account until a configured amount of time for lockout expires.

The TOE provides administrator authentication against a local user database. Password-based authentication can be performed on the serial console or SSH interfaces. The SSHv2 interface also supports authentication using SSH keys.

The TOE uses X.509v3 certificates as defined by RFC 5280 to support authentication for TLS connections.

4.4 Security management

The TOE provides secure administrative services for management of general TOE configuration and the security functionality provided by the TOE. All TOE administration occurs either through a secure SSHv2 session or via a local console connection. The TOE provides the ability to securely manage all TOE administrative users; all identification and authentication; all audit functionality of the TOE; all TOE cryptographic functionality; the timestamps maintained by the TOE; and updates to the TOE. The TOE supports privileged administrator. Only the privileged administrator can perform the above security relevant management functions.

Administrators can create configurable login banners to be displayed at login and can also define an inactivity timeout for each admin interface to terminate sessions after a set period of inactivity.

4.5 Protection of the TSF

The TOE protects against interference and tampering by untrusted subjects by implementing identification, authentication, and access controls to limit configuration to Authorized Administrators. The TOE prevents reading of cryptographic keys and passwords. Additionally, Cisco IOS-XR is not a general-purpose operating system and access to Cisco IOS-XR memory space is restricted to only Cisco IOS-XR functions.

The TOE internally maintains the date and time. This date and time are used as the timestamp that is applied to audit records generated by the TOE. Administrators can update the TOE's clock manually. Finally, the TOE performs testing to verify the correct operation of the router itself and that of the cryptographic module.

The TOE can verify any software updates prior to the software updates being installed on the TOE to avoid the installation of unauthorized software.

4.6 TOE access

The TOE can terminate inactive sessions after an Authorized Administrator configurable time-period. Once a session has been terminated the TOE requires the user to re-authenticate to establish a new session.

The TOE can also display an Authorized Administrator specified banner on the CLI management interface prior to allowing any administrative access to the TOE.

4.7 Trusted path/channels

The TOE establishes a trusted path between the appliance and the CLI using SSHv2 and the syslog server using TLS.

5 Assumptions & Clarification of Scope

Assumptions

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

- *collaborative Protection Profile for Network Devices*, version 2.2e, 23 March 2020 (NDcPP22e)

That information has not been reproduced here and the NDcPP22e should be consulted if there is interest in that material.

Clarification of scope

The scope of this evaluation was limited to the functionality and assurances covered in the NDcPP22e as described for this TOE in the ST. 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.

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 NDcPP22e and performed by the evaluation team).
- This evaluation covers only the specific device models and software as identified in this document, and not any earlier or later versions released or in process.
- Apart from the Admin Guides specified in Section 6, additional customer documentation was not included in the scope of the evaluation and, therefore, should not be relied upon when configuring or operating the device as evaluated.
- 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 NDcPP22e 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:

- *Cisco Network Convergence System 1004 (NCS 1004) Running IOS-XR 24.1 Common Criteria Operational User Guidance and Preparative Procedures*, Version 1.0, March 4, 2025

The following guide was also referenced in above document and used for TOE updates:

- *System Setup and Software Installation Guide for Cisco NCS 1004*, last modified September 4, 2024.

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 be relied upon when configuring or operating the device as evaluated.

To use the product in the evaluated configuration, the product must be configured as specified in the Guidance Documentation listed above. Consumers are encouraged to download the configuration guides from the NIAP website to ensure the device 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 proprietary *Detailed Test Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, Version 0.4, March 4, 2025 (DTR), as summarized in the evaluation *Assurance Activity Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, Version 0.4, March 4, 2025 (AAR).

7.1 Developer Testing

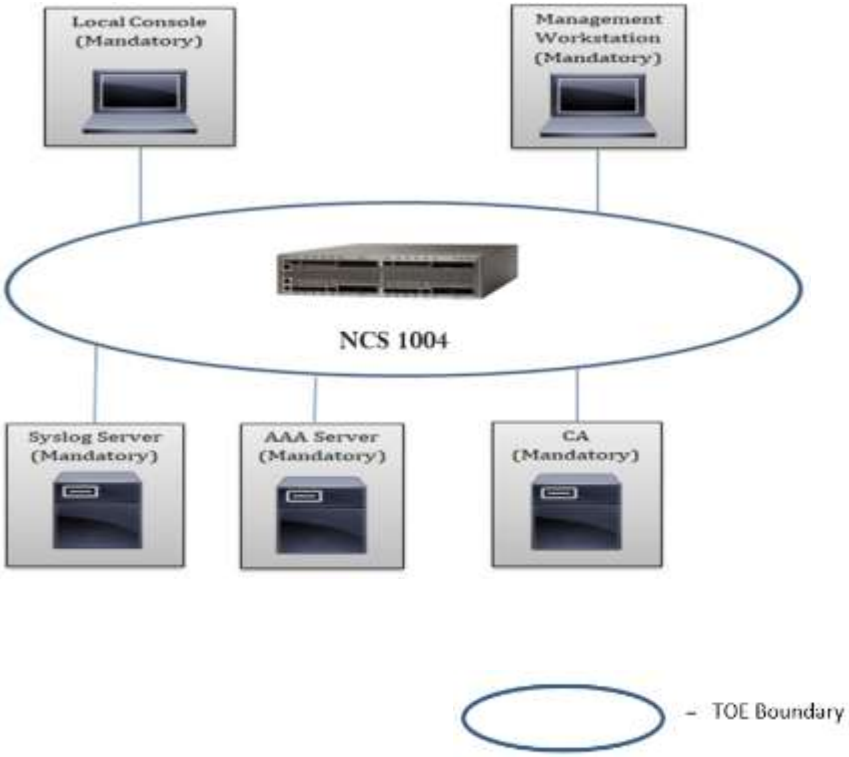
No evidence of developer testing is required in the assurance activities for this product.

7.2 Evaluation Team Independent Testing

The Evaluation team verified the product according to a Common Criteria Certification document and ran the tests specified in the NDcPP22e including the tests associated with optional requirements. The AAR, in Section 3.4, lists the tested devices, provides a list of test tools, and has diagrams of the test environment.

8 Evaluated Configuration

The evaluated configuration consists of the Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1. The following diagram demonstrates the components requried in the environment.


Local Console (Mandatory)
Management Workstation (Mandatory)
NCS 1004
Syslog Server (Mandatory)
AAA Server (Mandatory)
CA (Mandatory)
- TOE Boundary

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 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 5 and CEM version 3.1 rev 5. The evaluation determined the Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 TOE to be Part 2 extended, and to meet the SARs contained in the NDcPP22e.

9.1 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 Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 products that are consistent with the Common Criteria, and product security function descriptions that support the requirements.

The Validation team 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 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 ST and Guidance documents. Additionally, the Evaluation team performed the assurance activities specified in the NDcPP22e related to the examination of the information contained in the TSS.

The Validation team 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.

9.3 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 Validation team 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.

9.4 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 Validation team 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 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 NDcPP22e and recorded the results in a Test Report, summarized in the AAR.

The Validation team 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.

9.6 Vulnerability Assessment Activity (VAN)

The evaluation team applied each AVA CEM work unit. The vulnerability analysis is in the DTR prepared by the Evaluation team. The vulnerability analysis includes a public search for vulnerabilities. The public search for vulnerabilities did not uncover any residual vulnerability.

The evaluator searched the following sites:

- National Vulnerability Database (https://web.nvd.nist.gov/vuln/search)
- Vulnerability Notes Database (http://www.kb.cert.org/vuls/)
- Rapid7 Vulnerability Database (https://www.rapid7.com/db/vulnerabilities)
- Tipping Point Zero Day Initiative (http://www.zerodayinitiative.com/advisories)
- Tenable Network Security (http://nessus.org/plugins/index.php?view=search)
- Offensive Security Exploit Database (https://www.exploit-db.com/)

The search was conducted on February 27, 2025, with the following search terms: “IOS-XR”, “Cisco NCS”, “Network Convergence System”, “SSH”, “TLS”, “Atom C3758”, and “Cisco FIPS Object Module”.

The Validation team 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.

9.7 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

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 *Cisco Network Convergence System 1004 (NCS 1004) Running IOS-XR 24.1 Common Criteria Operational User Guidance and Preparative Procedures* document. As noted in Section 6, consumers should download the configuration guides from the NIAP website to ensure the device is configured as evaluated. No versions of the TOE and software, either earlier or later, were evaluated. Any additional customer documentation, not listed in Section 6, 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 TOE as evaluated.

The Validation team suggests that the consumer pay particular attention to the evaluated configuration of the TOE. As stated in the Clarification of Scope, the evaluated functionality is scoped exclusively to the security functional requirements specified in the ST, and the only evaluated functionality was that which was described by the SFRs claimed in the ST. All other functionality provided by the TOE needs to be assessed separately and no further conclusions can be drawn about its effectiveness.

11 Annexes

Not applicable

12 **Security Target**

The Security Target is identified as: *Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 Security Target, Version 1.0, March 4, 2025*.

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

[1] Common Criteria for Information Technology Security Evaluation: Part 1: Introduction and General Model, Version 3.1, Revision 5, April 2017.

[2] Common Criteria for Information Technology Security Evaluation Part 2: Security functional components, Version 3.1, Revision 5, April 2017.

[3] Common Criteria for Information Technology Security Evaluation Part 3: Security assurance components, Version 3.1 Revision 5, April 2017.

[4] *collaborative Protection Profile for Network Devices*, version 2.2e, 23 March 2020.

[5] *Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1 Security Target*, Version 1.0, March 4, 2025 (ST).

[6] *Assurance Activity Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, Version 0.4, March 4, 2025 (AAR).

[7] *Detailed Test Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, Version 0.4, March 4, 2025 (DTR).

[8] *Evaluation Technical Report for Cisco Network Convergence System 1004 (NCS1004) Running IOS-XR 24.1*, Version 0.4, March 4, 2025 (ETR).