Draft Standard

MEF 163 Draft (R3)

Zero Trust Certification Test Cases and Requirements

May 2024

This draft represents MEF work in progress and is subject to change.

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1 List of Contributing Members

The following members of the MEF participated in developing this document and have requested to be included in this list.

Editor Note 1: This list will be finalized before Letter Ballot. Any member that comments in at least one CfC is eligible to be included by opting in before the Letter Ballot is initiated. Note it is the MEF member listed here (typically a company or organization), not their representatives.

- ABC Networks
- XYZ Communications

2 Abstract

A Zero Trust Framework (ZTF), defined in MEF 118 [5], is a cybersecurity architecture where users or clients (end users, applications, and other nonhuman Users, Devices, and Applications that request information from resources) are authenticated, authorized, and continuously validated before being granted access to, maintaining access to, or performing operations on applications.

The focus of this document is on the test cases and requirements for certification of Zero Trust (ZT) implementations. The certification of ZT implementation seen as key for enterprise customers to know about different offerings and solutions so that they can make informed decisions when implementing ZT.

3 Release Notes

This document is currently out for Call for Comments Ballot number 4 and the contents of this document are subject to change based on comments received. All comments from Call for Comments Ballot 3 have been discussed and resolved.

4 Terminology and Abbreviations

This section defines the terms used in this document. In many cases, the normative definitions of terms are found in other documents. In these cases, the third column provides references controlled in other MEF or external documents.

In addition, terms defined in MEF 118 [5] and MEF 162 [6] are included in this document by reference and are not repeated in the table below.

Term	Definition	Reference
Management Capabilities	The set of functions that allow management of a Zero Trust implementation.	This document
Reporting Capabilities	The set of functions that support reporting from a Zero Trust implementation.	This document

Table 1 – Terminology

Abbreviation	Definition	Reference
DUT	Device Under Test	This document
FTP	File Transfer Protocol	This document
PKI	Public Key Infrastructure	This document

Table 2 – Abbreviations

Editor Note 2: The Terminology and Abbreviations will be updated in a future revision of the document.

5 Compliance Levels

The key words "**MUST**," "**MUST NOT**," "**REQUIRED**," "**SHALL**", "**SHALL NOT**", "**SHOULD**", "**SHOULD NOT**", "**RECOMMENDED**", "**NOT RECOMMENDED**", "**MAY**", and "**OPTIONAL**" in this document are to be interpreted as described in BCP 14 (RFC 2119 [1], RFC 8174 [3]) when, and only when, they appear in all capitals, as shown here. All keywords must be in bold text.

Items that are **REQUIRED** (contain the words **MUST** or **MUST NOT**) are labeled as **[Rx]** for required. Items that are **RECOMMENDED** (contain the words **SHOULD** or **SHOULD NOT**) are labeled as **[Dx]** for desirable. OPTIONAL items (containing the words **MAY** or **OPTIONAL**) are labeled as **[Ox]** for optional**.**

Editor Note 3: The following paragraph will be deleted if no conditional requirements are used in the document.

A paragraph preceded by **[CRa]<** specifies a conditional mandatory requirement that **MUST** be followed if the condition(s) following the "<" have been met. For example, "**[CR1]<**[D38]" indicates that Conditional Mandatory Requirement 1 must be followed if Desirable Requirement 38 has been met. A paragraph preceded by **[CDb]<** specifies a Conditional Desirable Requirement that **SHOULD** be followed if the condition(s) following the "<" have been met. A paragraph preceded by **[COc]<** specifies a Conditional Optional Requirement that **MAY** be followed if the condition(s) following the "<" have been met.

6 Numerical Prefix Conventions

Editor Note 4: This section will be deleted if no numerical prefixes are used in the document.

This document uses the prefix notation to indicate multiplier values, as shown in Table 3.

Decimal		**Binary**	
Symbol	**Value**	**Symbol**	**Value**
k	10^3	Ki	2^{10}
M	10^6	Mi	2^{20}
G	10^9	Gi	2^{30}
T	10^{12}	Ti	2^{40}
P	10^{15}	Pi	2^{50}
E	10^{18}	Ei	2^{60}
Z	10^{21}	Zi	2^{70}
Y	10^{24}	Yi	2^{80}

Table 3 – Numerical Prefix Conventions

7 Introduction

A Zero Trust Framework (ZTF), defined in MEF 118 [5], is a cybersecurity architecture where users or clients are authenticated, authorized, and continuously validated before being granted access to, maintaining access to, or performing operations on applications.

The focus of this document is on the test cases and requirements for certification of Zero Trust (ZT) implementations. The certification of ZT implementation seen as key for enterprise customers to know about different offerings and solutions so that they can make informed decisions when implementing ZT.

The testing defined within this document is intended to provide a rating, from D (lowest) to AAA (highest). Ratings are determined based on the results of the test cases defined in this document. For example, a ZT implementation that supports more Policies will be rated higher than a ZT implementation that only supports a limited number of Policies. Ratings are based on weighting applied to each section of the test requirements in this document. See section 12 for more details on the rating methodology for ZT implementation.

After the completion of testing, an overall rating is provided. This overall rating of a ZT implementation can be used to compare different ZT Vendor's ability to meet the test requirements and, therefore, the requirements of Service Providers and enterprise customers. In the same manner, Service Provider's offerings can be compared to determine how different offerings address the end customer's requirements.

In addition to providing an overall rating, a MEF Certification is provided. This MEF Certification is based on compliance with MEF standards tested using the test methodologies defined in section 11.

The testing defined within this document is intended to be repeatable to cover new software releases, service configurations, or updates to how a ZT implementation is managed. Continuous Integration/Continuous Deployment (CI/CD) strategies are used for MEF certification allowing updates as requirements change or as new releases, etc. become available. Repeating the process allows ratings to increase or decrease based on the performance of an implementation or service during continued testing. One release may be certified, while another release may fail certification testing, if a new software release breaks a critical function. In that case, this can be identified during repeated certification testing, and the rating adjusted accordingly. In the same way, if a new software release provides fixes for shortfalls identified in previous certification testing, the rating can be increased accordingly.

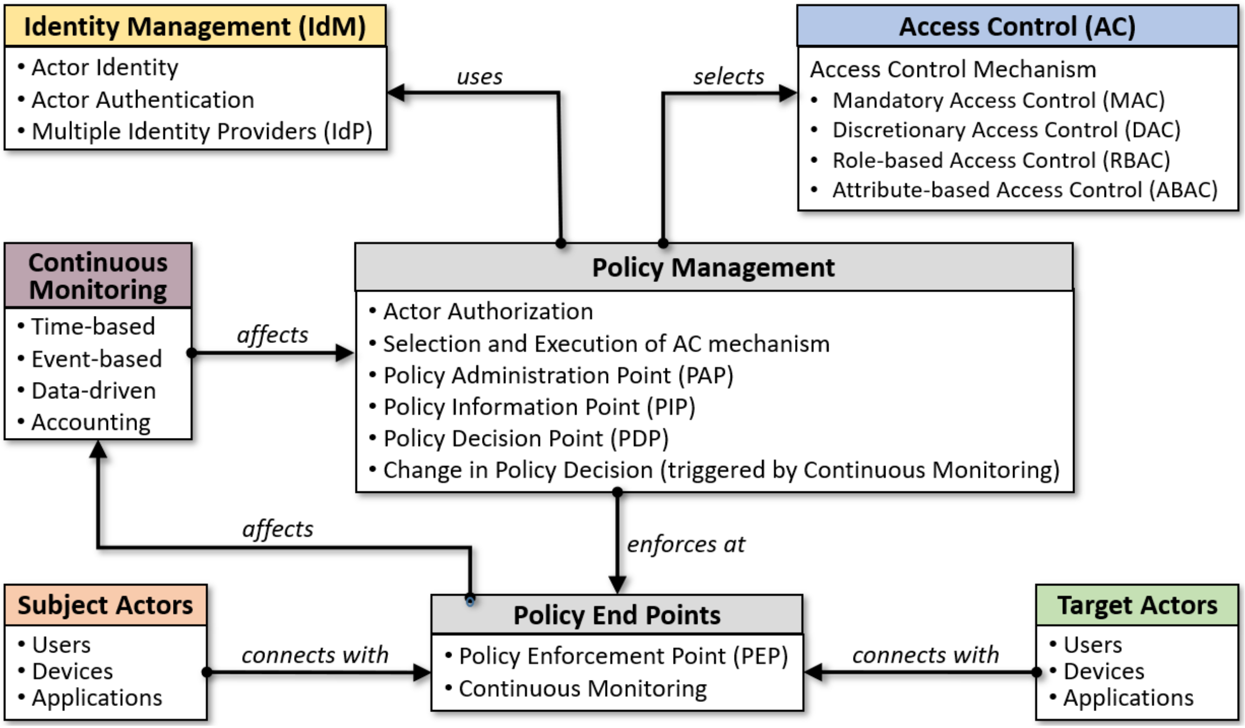
7.1 Zero Trust

The increased usage of cloud services, mobile devices, work-from-home employees, shadow IT, and the Internet of Things (IoT) has dissolved traditional network perimeters. Services must evolve to provide secure User, Device, and Application access to the Subscriber's networked resources (referred to as Target Actors in this document) from any location, including interactions with third-party organizations, e.g., business partners, contractors, etc.

A Zero Trust cybersecurity approach removes the assumption of trust from these Users, Applications, and Devices (referred to as Actors in this document). It focuses on accessing Target Actors in a secure and authorized manner, enforcing rigorous access controls, and continually inspecting, monitoring, and logging network activity from the different Subject Actors. This requires data-level protections, a robust ID for Users, Devices, and Applications architecture, and strategic micro-segmentation to create granular trust zones around a Subscriber's digital resources.

Zero Trust evaluates access requests and network traffic behaviors in real time over the length of active Sessions while continually and consistently recalibrating Subject Actor access to Target Actors and associated Policy Actions.

The above paragraphs are taken from MEF 118 [5].



Identity Management (IdM)
• Actor Identity
• Actor Authentication
• Multiple Identity Providers (IdP)
uses
selects
Access Control (AC)
Access Control Mechanism
• Mandatory Access Control (MAC)
• Discretionary Access Control (DAC)
• Role-based Access Control (RBAC)
• Attribute-based Access Control (ABAC)
Continuous Monitoring
• Time-based
• Event-based
• Data-driven
• Accounting
affects
Policy Management
• Actor Authorization
• Selection and Execution of AC mechanism
• Policy Administration Point (PAP)
• Policy Information Point (PIP)
• Policy Decision Point (PDP)
• Change in Policy Decision (triggered by Continuous Monitoring)
affects
enforces at
Subject Actors
• Users
• Devices
• Applications
connects with
Policy End Points
• Policy Enforcement Point (PEP)
• Continuous Monitoring
connects with
Target Actors
• Users
• Devices
• Applications

Figure 1 – ZT Framework

Figure 1, taken from MEF 118 [5], reflects how Policy is used to manage the ZTF. Policy Management includes Users, Devices, and Applications Authorization, the Policy Administration Point functionality, the Policy Information Point functionality, and the Policy Decision Point functionality. Policy End Points are responsible for Policy Enforcement Point functionality and use information from Continuous Monitoring to make Policy decisions. For more detail on the ZT Framework, see MEF 118 [5].

7.2 What will be tested?

The certification described in this document is designed to address the challenges faced by security and IT professionals in selecting and managing security products. The scope of the test methodologies in this document includes the following capabilities, which are considered essential in any ZT offering:

- Access Control Policy Enforcement
- Authentication via integration with Id Users, Devices, and Applications Providers (IdP)
- Reporting Capabilities
- Management Capabilities

7.2.1 Test Configuration

The test configuration used to perform testing of ZT vendor implementation is shown in Figure 2.

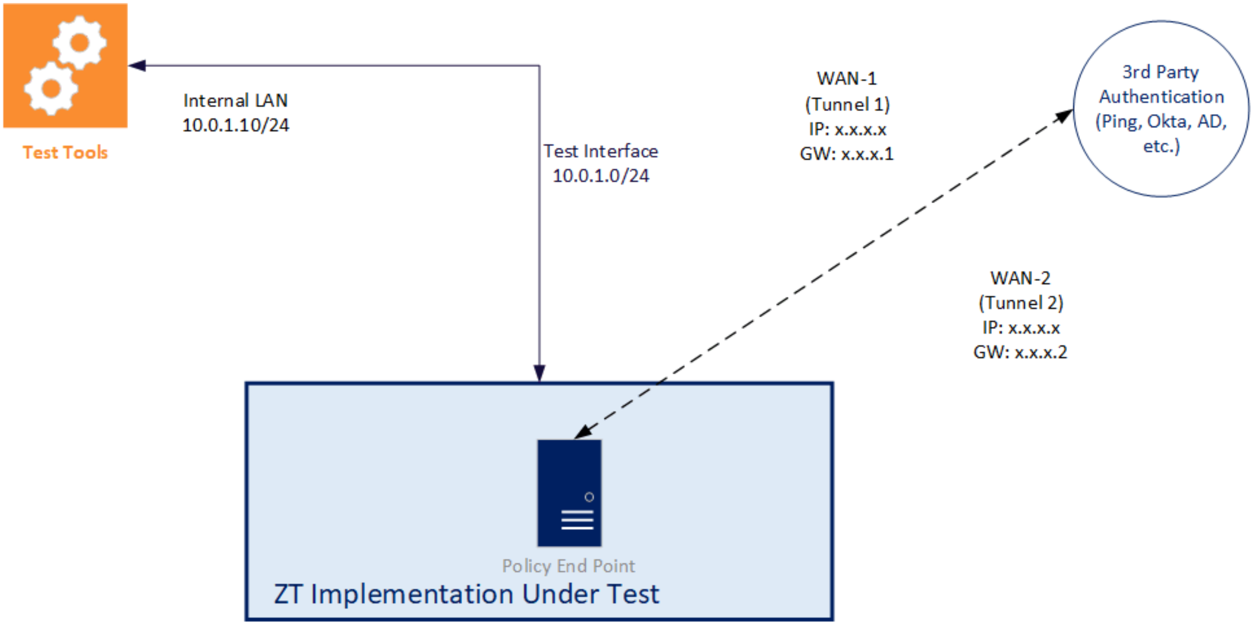


Figure 2 – Test Configuration for ZT

Figure 2 reflects the ZT functions within a single implementation that provides Authentication and Authorization. The ZT Implementation is provided by the vendor being certified. The tests outlined in the remainder of this document use this basic configuration.

Note: There may be slight modifications to this test configuration for specific tests.

Editor Note 5: We agreed to add private applications to this configuration after the Beta is completed.

8 Policy Enforcement

The ZT implementation should be able to securely route or forward traffic through the access service via policy either on-prem or cloud-based policy enforcement, via commonly accepted tunnel methods supported by routers and firewalls, and/or via an agent deployed on a desktop, laptop, or mobile device. Test traffic includes a typical enterprise campus environment and data center content.

A Policy defines the type of rules, conditions, and constraints for a Service. A system that implements Policies utilizes the following Policy functions:

Policy Administration Point (PAP): an entity that is responsible for configuration and maintenance of all other functional entities that make up a Policy

Policy Information Point (PIP): a repository that contains generic information used by Policies. Examples include Session, geolocation, reputation, and risk calculation data, and associated metadata.

Policy Decision Point (PDP): an entity that evaluates an access request using a set of Evaluation Policies, along with applicable information from the PIP. The term "Evaluation Policies" may include Authorization Policies, as well as more robust mechanisms (e.g., RBAC or ABAC) that provide a binary response (i.e., permit or deny access) to send to the PEP. Put another way, the PDP decides whether to Authorize the Actor based on applicable information.

Policy Enforcement Point (PEP): An entity that implements Policy decisions that were made by the PDP. The PEP receives an access request and forwards this request to the PDP. When the PEP receives the response from the PDP, the PEP implements that Policy decision.

8.1 Policy Actions

Policy Actions apply to a Subject Actor wanting to access a specific Target Actor. The Policy Actions may change triggered by the passage of a predetermined amount of time, or an Event-based on the continuous monitoring of the Actors and the corresponding Session. Refer to MEF 118 [5] for Events created during continuous monitoring that can trigger a change in Policy Actions.

[R1] The test **MUST** validate when a Policy Criterion is matched on the Allow List the Policy Action is Allow.

[R2] The test **MUST** validate when a Policy Criterion is matched on the Block List the Policy Action is Block.

The "Allow" Policy Action means that for a given Session between a specific Subject Actor and Target Actor, the Policy End Point permits the Subject Actor to send all IP Packets to the Target Actor and the receive IP Packets from the Target Actor for which Policies are applied. These policies can be applied to a bi-directional session that allows all packets in both directions or a policy for each direction, Subject UDA to Target UDA and Target UDA to Subject UDA.

The "Block" Policy Action means that for a given Session, between a specific Subject Actor and Target Actor, the Policy End Point denies the Subject Actor from sending any IP Packets to the Target Actor and denies the receipt of IP Packets from the Target Actor for which Policies are applied. These policies can be applied to a bi-directional session that blocks all packets in both directions or a policy for each direction, Subject UDA to Target UDA and Target UDA to Subject UDA.

8.2 Policy End Points

A Policy End Point is a location where one or more Policy-related functions are placed. Policies are executed (via PEP) and monitored at a Policy End Point. A Policy End Point is placed at locations where practical when implementing a Zero Trust Framework. Policy End Points are optimally placed in a Device or Application Actor. However, this may not be practical, e.g., inside an IoT Device with minimal processing capability, in which case the Policy End Point would be placed as close as possible to the Actor. Furthermore, a Subject Actor may be able to reach different Target Actors via different networks. Therefore, a Policy End Point must be placed at each access point where the Subject Actor can reach the Target Actor to ensure that Policies can be effectively applied. Example use cases for the placement of Policy End Points is illustrated in MEF 118 [5].

[R3] The test **MUST** validate that a Zero Trust Framework provides a Policy End Point.

8.3 Access Control

As described in MEF 118 [5] policies are rules configured to permit or deny access from a user to an application using criteria such as source, destination, user/group, and service. Policies are typically written to permit, deny, or restrict network traffic to or from one or more of the following:

- **Unknown External Users, Devices, and Applications**— an external User, Device, or Application with unknown security (e.g., Internet web server).
- **Known 3rd Party Users, Devices, and Applications Services** — a service or application (e.g., Office 365, Google Docs, or Salesforce) the enterprise uses, and authorized users are permitted access.
- **Known Internal Users, Devices, and Applications**– an internal User, Device, or Application, i.e., a User, Device, or Application that is being secured and protected.

Editor Note 6: Private applications which include customer applications will be added after the Beta is completed.

This test section verifies that the Device Under Test (DUT) enforces Zero Trust policies over a range of policy environments, from simple to complex. The tests incrementally build on a baseline consisting of a simple configuration with no policy restrictions – to a complex multiple-zone configuration that supports many users, networks, policies, and applications. Traffic will be tested at each level of complexity, ensuring specified policies are enforced. For the three use cases (User on site, Remote user, Third-party user), testing will confirm that authorized traffic from a Subject

Users, Devices, and Applications to a Target Users, Devices, and Applications is allowed while unauthorized traffic between them is blocked.

Note: The protocols and applications shown are examples. The protocols and applications that are included in testing will be provided by the test house as a part of the test agreement.

Access control policies are created to allow a subject Users, Devices, or Applications access to the following services.

8.4 Basic Internet Services

Access Policies are created that allow for certain Users, devices or Applications to utilize the following list of applications.

- An outbound rule allowing access to at least three of these basic Internet services
  - HTTP
  - HTTPS
  - DNS
  - SMTP
  - IMAP
  - POP3
  - Exchange/MAPI
  - FTP

8.5 Trusted Third Party

Policies are created as described for these trusted third-party applications.

- Allow and Deny (Deny all, Allow all, Deny individual applications)Subject User, Device, or Application (internal and remote) connectivity to at least three of these trusted third-party Target User, Device, or Application
  - Office 365
  - Salesforce
  - NetSuite
  - Google Workspace

  - Dropbox

8.6 Location Access

Policies are created as described for these locations.

- Allow and Deny (Deny all, Allow all, Deny individual locations) Subject User, Device, or Application at one location access to the Target User, Device, or Application at another location
  - Enterprise Site secure connectivity
  - Enterprise Site to Cloud resources

Editor Note 7: Cloud-to-cloud will be added here after the Beta is completed.

8.7 Connectivity

Policies are created as described for connectivity.

- Allow/Deny remote/mobile Subject Users, Devices, and Applications secure connectivity to the Target Users, Devices, and Applications
  - Enterprise Site
  - Cloud resources

8.8 Social Media

Policies are created as described for social media for the purpose of certification. It is understood that these policies may not apply to all implementations.

- Allow/Deny Subject Users, Devices, and Applications (Deny all, Allow all, Deny individual social media applications and websites) access to Target Users, Devices, and Applications supporting popular social networking applications and websites
  - Top 10 social media applications, including Facebook, Twitter, LinkedIn, Glassdoor, or other Web applications

Note: The top 10 social media applications will be updated every six months.

8.9 Video and Voice Teleconferencing

Policies are created as described for Video and Voice teleconferencing for the purpose of certification. It is understood that these policies may not apply to all implementations.

- Allow/Deny (Deny all, Allow all, Deny individual teleconferencing applications) Subject Users, Devices, and Applications access to at least two Target Users, Devices, and Applications supporting Video and Voice teleconferencing
  - Microsoft Teams
  - Zoom
  - Cisco WebEx
  - Google Meet

8.10 Streaming Media

Policies are created as described for streaming media applications and web sites for the purpose of certification. It is understood that these policies may not apply to all implementations.

- Allow/Deny (Deny all, Allow all, Deny individual applications and websites) Subject Users, Devices, and Applications access to at least three Target Users, Devices, and Applications supporting streaming media applications and websites
  - Netflix
  - Prime Video
  - Hulu
  - YouTube
  - TikTok
  - HBO Max
  - Disney+
  - AppleTV

8.11 Deny by Default

Policies are created as described to block traffic that has not be allowed.

- A deny-by-default action that blocks all traffic from Subject Users, Devices, and Applications to Target Users, Devices, and Applications that has not been explicitly allowed.

8.12 Policy Enforcement Test Cases

The test cases that use the policies created above are in the following sections.

8.12.1 Enable Authorized Access / Applications

Test Objective: The ZT implementation's PEP should correctly identify and allow authorized Subject User, Device, or Application to access permitted Target User, Device, or Application.

Test Process: Testing the PEP for each of the policy areas above determines whether all transmitted traffic that adhered to policies reached its intended destinations and whether all transmitted traffic that violated policies was blocked.

[R4] When Subject Users, Devices, or Applications have been permitted access to Target Users, Devices, or Applications, the test **MUST** determine if access is provided to the Subject Users, Devices, and Applications to the Target Users, Devices, and Applications.

Note: The ZT Solution Vendor needs to be able to support all of the above while it is understood that an enterprise customer may not use all the functionality.

8.12.1.1 Scoring Penalty

The scoring penalty for section 8.12.1 is 100%.

8.12.2 Block Unauthorized Access to Target Users, Devices, and Applications

Test Objective: The ZT implementation's PEP should correctly identify and block an unauthorized Subject Users, Devices, and Applications from accessing specific Target Users, Devices, or Applications.

Test Process: Testing of the PEP for each policy area above determines whether all transmitted traffic that adhered to policies reached their intended destinations and whether all transmitted traffic that violated policies was blocked.

[R5] When Subject Users, Devices, or Applications have been permitted access to Target Users, Devices, or Applications, the test **MUST** determine if access is provided to the Subject Users, Devices, and Applications to the Target Users, Devices, and Applications.

[R6] When Subject Users, Devices, or Applications are not permitted access to Target Users, Devices, or Applications, the test **MUST** determine if access from the Subject Users, Devices, and Applications is blocked.

8.12.2.1 Scoring Penalty

The scoring penalty for section 8.12.2 is 100%.

8.12.3 Security Assertion Markup Language Authentication for Subject Users, Devices, and Applications

Test Objective: Testing verifies that Security Assertion Markup Language (SAML) interoperability across popular identity providers.

Test Process: The test process is to configure SAML authentication to one or more of the following Identity providers:

- Okta
- Ping
- Azure Active Directory
- Local Active Directory

Verify that Subject Users, Devices, and Applications groups can be used to applied policies.

[R7] The test **MUST** verify if a new Subject Users, Devices, and Applications are added to a group and automatically gain the same access as others.

[R8] The test **MUST** verify that if an existing Subject Users, Devices, and Applications are removed from a group, they automatically lose access to Target Users, Devices, and Applications provided by the group.

Editor Note 8: MEF W118.1 is discussing other authentication methods. This section will be updated once MEF W118.1 goes to RfD.

8.12.3.1 Scoring Penalty

The scoring penalty for section 8.12.3 is 50%.

8.12.4 SAML Authentication for Administrators

Test Objective: Testing will verify if the implementation supports SAML authentication for administrator accounts logging in to the administrative portal.

Test Process: A Subject User, Device, or Application with an administrator Role accesses the administrative portal and is provided access.

[R9] The test **MUST** verify that a Subject Users, Devices, and Applications with an administrator Role can be authenticated via SAML when logging into the administrative portal.

Editor Note 9: MEF W118.1 is discussing other authentication methods. This section will be updated once MEF W118.1 goes to RfD.

8.12.4.1 Scoring Penalty

The scoring penalty for section 8.12.4 is 50%.

8.12.5 Identity Aware Policies

Test Objective: It is important that the identity of a Subject User, Device, or Application can be used to assign/associate policies to a subject User, Device, or Application. Testing will verify that the implementation's PEP enforces policies based on the identity of a Subject Users, Devices, and Applications.

Test Process: A Subject User, Device, or Application access a Target User, Device, or Application with authorization based on their identity by the PEP.

[R10] The test **MUST** verify that policies can be assigned/associated based on the Identify of a Subject Users, Devices, and Applications.

Editor Note 10: MEF W118.1 is discussing other authentication methods. This section will be updated once MEF W118.1 goes to RfD.

8.12.5.1 Scoring Penalty

The scoring penalty for section 8.12.5 is 100%.

9 Management Capabilities

A ZT implementation must provide comprehensive management control to accomplish the expected functionality. Further best practices in user experience should be fundamental to the associated interface. The ZT implementation will be assessed to determine if it meets the following requirements.

9.1 Authentication

9.1.1 Role-Based Access Control

Role-Based Access Control (RBAC) is defined in MEF 118 [5] as "A collection of access Authorizations a Subject or Target Users, Devices, and Applications receives based on a given set of Roles."

Test Objective: This test verifies that RBAC is supported by creating Roles for Subject and Target Users, Devices, and Applications and ensuring that authentication is done correctly.

The System Administrator Role exists as a default Role per MEF 118 [5].

The set of Roles that are created by the System Administrator for the purpose of this testing are:

- Maintenance User
- Administrative User
- User
- Super User
- Custom (a combination of two or more roles)

Test Process: The above Roles are created and then it is verified that the Role was created correctly.

[R11] The test **MUST** verify that the ZT implementation supports RBAC.

Editor Note 11: Should we have two sets of tests, one for a User and one for an Administrative User? This section will be updated once MEF W118.1 goes to RfD.

9.1.1.1 Scoring Penalty

The scoring penalty for section 9.1.1 is 100%.

9.1.2 Policy-Based Access Control Policies using MAC

Policy-based Access Control (PBAC) is defined in MEF 118 [5] as "an Access Control method that uses Policies to determine the appropriate type of Access Control based, e.g., MAC, DAC, RBAC, or

ABAC, on the Subject and Target Actors' Service Attributes and behavior, the current Situation, and applicable business requirements". The focus of this section is on PBAC using Mandatory Access Control (MAC).

Test Objective: The test verifies that PBAC policies using MAC provide the appropriate access by Subject Users, Devices, and Applications to Target Users, Devices, and Applications that are authorized.

Test Process: A Subject User, Device, or Application is authorized access to a specific Target User, Device, or Application. It is verified that the PBAC policy using MAC allows access to the authorized Target User, Device, or Application and cannot access an unauthorized Target User, Device, or Application.

[R12] The testing **MUST** verify that when PBAC policies using MAC are used, that the Security Label, if present, is used as an input to the Authorization process.

An unauthorized Target Users, Devices, and Applications is created on the solution under test.

[R13] The testing **MUST** verify that when PBAC policies using MAC are used, that a Subject User, Device, or Application cannot reach an unauthorized Target User, Device, or Application.

9.1.2.1 Scoring Penalty

If PBAC using MAC policies with security label testing fails, the scoring penalty for section 9.1.2 is 100% .

9.1.3 PBAC Policies using Attribute-Based Access Control

The focus of this section is on PBAC using Attribute-based Access Control (ABAC).

Roles	Target Users, Devices, and Applications	Attributes
Administrative User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace	USER Attributes: Employee Environmental Attributes: Office, WAH, any-time, any-region
Maintenance User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet	USER Attributes: Employee, contractor, Environmental Attributes: Office, anytime, Texas
User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet	USER Attributes: Employee, contractor, partner, auditor, customer Environmental Attributes: Office, WAH, office hours, approved-regions
Super User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, FTP, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet, Netflix, Prime Video, Hulu, YouTube, TikTok	Employee, Environmental Attributes: Office, WAH, anytime, Texas
Custom	As defined	

Table 4 -- Roles and Attributes for Users, Devices and Applications

ABAC policies could restrict actions for certain depending on attributes assigned. Example is that the User with the auditor attribute only has read access to information when that User is in the office.

ABAC has User attributes, Target attributes, and Environmental attributes.

User is shown above as well as some environmental

The example is a corporation in Texas…. Where maintenance users are employees or contractors and is only expected at locations within Texas and can do work at any time. Maintenance workers are not allowed to work remotely. Users, who can be contractors, employees, partners, auditors, or customers, can have access from approved regions but only have access during office hours. Users may work remotely. Administrative User is only an employee who has access anytime from any region and can work remotely.

Super User is an employee who has access at any time but only from the region of Texas. Super User can work remotely.

Auditors are to be restricted to read access, only for a specified time, to specified data, and only when in the office.

Using the Roles and Attributes above we can restrict the Auditor by policy.

What is not shown is the Target Attributes (this would be something applied to the specific application/data that allows the auditor to have access without the need to specify that in policy).

Test Objective: The test verifies that PBAC policies using ABAC provide the appropriate access by Subject Users, Devices, and Applications to Target Users, Devices, and Applications that are authorized.

Test Process: A Subject User, Device, or Application is authorized access to a specific Target User, Device, or Application by:

- Assigning one or more Subject attributes to the Subject User, Device, or Application
- Assigning one or more Target attributes to the Target User, Device, or Application.

It is verified that the PBAC policy using ABAC allows:

- Allow access to the authorized Target User, Device, or Application
- Block access an unauthorized Target User, Device, or Application.

In addition, as described in MEF 118 [5], Environmental Conditions, referred to as Context within this document are included in PBAC using ABAC. Context examples are:

- Mobile
- Working from Home (WFH)
- In the office

Context is assigned to both Subject and Target Users, Devices, and Applications.

[R14] When configuring a test, all of the above ABAC attributes **MUST** be included in the test.

[R15] The testing **MUST** verify that when PBAC policies using ABAC are used, that a Subject User, Device, or Application can reach an authorized Target User, Device, or Application.

An unauthorized Target Users, Devices, and Applications is created on the solution under test.

[R16] The testing **MUST** verify that when PBAC policies using ABAC are used, that a Subject User, Device, or Application cannot reach an unauthorized Target User, Device, or Application.

9.1.3.1 Scoring Penalty

The scoring penalty for section 9.1.3 is 100%.

9.2 Policy

9.2.1 Policy Definition

The ZT implementation should allow the creation of policies used to control access, functionality, and behavior of a ZT implementation. See the list of policies to be created in section 8.

[R17] The test **MUST** verify that policies that describe the behavior of ZT implementations can be created.

9.2.1.1 Scoring Penalty

The scoring penalty for section 9.2.1 is 100%.

9.2.2 View Policy

The ZT implementation should provide the ability to identify what policy has been violated when an alert is generated.

[R18] The test **MUST** verify that when an alert is generated, the policy that has been violated is identified.

9.2.2.1 Scoring Penalty

The scoring penalty for section 9.2.2 is 100%.

9.2.3 Policy Association

The ZT implementation allows associating one or more policies with a Subject Users, Devices, and Applications or a Target Users, Devices, and Applications. Policies are created, as shown in section 8. Subject Users, Devices, and Applications are given access to different Target Users, Devices, and Applications based on their defined roles.

Roles	Target Users, Devices, and Applications
Administrative User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace
Maintenance User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet
User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet
Super User	HTTP, HTTPS, DNS, SMTP, IMAP, POP3, Exchange, FTP, Office 365, Salesforce, Google Workspace, Social Media, Microsoft Teams, Zoom, Cisco WebEx, Google Meet, Netflix, Prime Video, Hulu, YouTube, TikTok
Custom	As defined

Table 4 – Role and Target Users, Devices, and Applications Access Control Policy

[R19] The test **MUST** verify that the ZT implementation allows associating one or more policies with a Subject or Target Users, Devices, and Applications.

9.2.3.1 Scoring Penalty

The scoring penalty for section 9.2.3 is 25%.

9.2.4 Role and Capability Delegation

Test Objective: The ability of a ZT implementation to Inherit, Delegate or Indirectly Delegate Roles and capabilities to other Subject Users, Devices, and Applications is to be verified.

Test Process: A Subject User is defined with a Role and capabilities. The Role and capabilities of the Subject User are then Inherited by another Subject User, Delegated to another Subject User, and Indirectly Delegated to a Subject User. See section 8 for the list of defined policies that can be delegated.

[R20] The test **MUST** verify that the ZT implementation allows Policies to be inherited through Delegation or Indirect Delegation.

9.2.4.1 Scoring Penalty

The scoring penalty for section 9.2.4 is 15%.

9.3 Change Control

9.3.1 Changes to Policies and Rules

Test Objective: The system needs to track, retain, and report changes to policies and rules. Subject and Target Users, Devices, and Applications should also be monitored, and, if possible, change management controls should be implemented. These items fall under compliance process controls for change management, onboard and off-board, segregation of duties, and access control.

Change Control functionality and capabilities include support for each of the following:

- Roll-Back
- Revision History

Test Process: To test this, a policy is changed, and the test verifies that there is a log entry when the policy is changed. In addition, the test verifies that the policy version is automatically updated. The test also verifies that a policy can be rolled back to a previous version.

[R21] The test **MUST** verify that the ZT implementation supports change control.

Editor Note 12: *The requirements for change control will be provided in a later revision of this document. Recommendations on what should be included as change control are requested.*

9.3.1.1 Scoring Penalty

The scoring penalty for section 9.3.1 is 75%.

9.3.2 Policy Versioning

Test Objective: The ZT implementation should provide the ability to secure Policies through versioning and other methods.

Test Process: To test this, a policy is changed, and the test verifies that there is a log entry when the policy is changed. In addition, the test verifies that the policy version is automatically updated. The test also verifies that a policy can be rolled back to a previous version.

[R22] The test **MUST** verify that the ZT implementation secures Policies to eliminate the capability of tampering with them.

Editor Note 13: *Can this section be deleted from the document or combined with previous section?*

9.3.2.1 Scoring Penalty

The scoring penalty for section 9.3.2 is 25%.

10 Reporting Capabilities

Logging, alerting, and reporting are critical functions that inform the security posture and facilitate incident response actions. Reporting capabilities will be assessed to determine the ability of the ZT implementation to support these requirements.

Editor Note 14: The ability to export a report in a file format like .pdf, .csv, etc. will be added after the Beta is completed. This ability may be impacted by the role of the solution, network based may be focused on syslog while cloud based may be focused on .pdf or .csv.

10.1 Logs – Incident Response

Test Objective: All ZT implementations will be tested to determine if they retain log and event data to support the incident response process.

Test Process: Actions that cause the below events are performed and the results are captured.

Standardized logging and reporting formats, which facilitate the fast and accurate consumption of presented data, are imperative for administrators to validate conviction accuracy. The ZT implementation should allow easy generation and exportation of reports, logs, and alerts into industry-standard formats to support incident response. (Aspects like log time normalization, log file maintenance options, and forensic traffic capture will also be factored in the assessment.)

Editor Note 15: Comments on what information must be included in logs are requested.

[R23] The following attributes **MUST** be included in the log:

- Time Stamp
- UDA ID
- Policy applied
- Resulting action

[O1] The following attributes **MAY** be included in the log:

- Ingress interface
- VRF
- Device posture information
- Severity

[R24] The log Event **MUST** be tamper-proof

Tamper-proof in the context of this document is defined as per MEF 118 [5] to be a process which makes alterations to the data difficult (hard to perform), costly (expensive to perform), or both.

[D1] An audit Event **SHOULD** be encrypted with a security strength of at least 256 bits.

Security strength in the context of this document is defined per MEF 118 [5] as a number associated with the amount of work, i.e., the number of operations, that is required to break a cryptographic algorithm or system. Note, the security strength is typically specified in bits.

Each Session is typically continuously monitored because either Subject or Target User, Device, or Application may have Risk calculation data from the Policy Information Point, or the Risk level determined by Risk-Awareness to be sufficiently high to Allow but not sufficiently high to Block the Session. Note that this monitoring is specific to this Session using the Continuous Monitoring techniques defined in MEF 118 [5].

The ZT implementation is expected to collect and store information about events, including the following:

- Administrator Login/Logout
- Successful Authentication
- Unsuccessful Authentication
- Successful Identify
- Unsuccessful Identify
- The Policy which was applied
- Who/What triggered the Policy Action
- Policy Changes
- Policy Deployment
- Policy Violations

[R25] The test **MUST** verify that a ZT implementation collects and stores information about the events in section 10.1.

10.1.1 Scoring Penalty

The scoring penalty for section 10.1 is 100%.

10.2 Reports

Reporting functionality is critical to ascertaining the system's state and investigating incidents. The ZT implementation will be assessed to determine the reporting capabilities that the implementation supports.

10.2.1 Report Automation

Test Objective: Verify that as a part of an implementation for reporting, ZT implementations are expected to provide the capability to schedule and deliver automated reports.

Test Process: Automated reports are configured and it is verified that they are generated with the appropriate information in them at the scheduled time.

[R26] The test **MUST** verify that a ZT implementation supports the capability to schedule and deliver automated reports.

10.2.1.1 Scoring Penalty

The scoring penalty for section 10.2.1 is 5%.

11 Testing of MEF 118 Requirements

The focus of this section is to identify which requirements from MEF 118 [5] are tested using the test methodologies defined in sections 8, 9, and 10.

Requirements are either Mandatory, meaning that they must be tested as a part of the certification, Optional, meaning that they may be tested as a part of the certification, or Deferred, meaning that they will not be tested at this time. Requirements marked with an N are not testable and are excluded from certification testing. The requirements shown in the Comments column have been modified from requirements in MEF 118 [5] so that they apply to solution vendors and not Service Providers.

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R1	T	D	Needs Test Methodology	[R1] To comply with this ZTF, the ZT solution **MUST** encrypt all Service Attribute parameters and their respective values defined in this standard, both at rest and in transit, using common cryptographic suites.
D1	T	D	Needs Test Methodology	[D1] The cryptographic suites in [R1] **SHOULD** use NIST cryptographic algorithms defined in NIST SP 800-175B
R2	N			
R3	T	M	8.1.7, 9.2	[R3] If the IdP is provided by the Subscriber, the IdPID **MUST** be reachable via its IP address
D2	T	M	8.1.7, 9.2	[D2] If the IdP is provided by the Subscriber, the IdPID **SHOULD** be reachable via its domain name
R4	T	M	8.1.7, 9.2	[R4] If the IdP is external to the Subscriber, the IdPID **MUST** be reachable and publicly resolvable
R5	N			

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R6	T	D	Needs Test Methodology	[R6] The ZT solution supporting this ZTF **MUST** support OAuth 2.0 as defined in RFC 6749
D3	T	O		[D3] The ZT solution supporting this ZTF **SHOULD** support SAML 2.0 as defined by OASIS
TO1	T	D		[O1] The ZT solution supporting this ZTF **MAY** support other identity management protocols in addition to OAuth 2.0 and SAML 2.0
R7	N			
R8	T	D	Needs Test Methodology	[R8] The IdP Subscriber Common Name value **MUST** be either of the following: o Null (meaning that no IdP Subscriber Common Name value is provided) o String of the name of the IdP Subscriber
R9	T	D		SP Requirement
CR1	T	D	Needs Test Methodology	[CR1]>[R9] When OAuth 2.0 is used, the minimum version of TLS **MUST** be TLS 1.2 as defined in RFC 5246
R10	T	D	Needs Test Methodology	[R10] When OpenID Connect is used, it **MUST** be used with OAuth 2.0

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R11	T	M	7.12.5	[R11] When the ZT solution is providing the IdP and SAML is used, SAML 2.0 **MUST** be used as the protocol for Authentication and Authorization
R12	T	M	7.12.6	[R12] A Subject user, device or application authenticated by the IdP, **MUST** have at least one Role agreed for it as defined in the User Roles Service Attribute (refer to section 9.1.2), Device Roles Service Attribute (refer to section 9.2.2), and Application Roles Service Attribute (refer to section 9.3.2)
R13	N			
R14	T	D	Need PKI Methodology	PKI requirement
D4	T	D	Need PKI Methodology	PKI requirement
R15	T	D	Need PKI Methodology	PKI requirement
R16	T	D	Need PKI Methodology	PKI requirement
R17	T	D	Need PKI Methodology	PKI requirement
R18	T	D	Need PKI Methodology	PKI requirement
R19	T	D	Need PKI Methodology	PKI requirement
R20	T	D	Need PKI Methodology	PKI requirement

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
D5	T	D	Need PKI Methodology	PKI requirement
R21	N			
R22	T	D	Need PKI Methodology	PKI requirement
D6	T	D	Need PKI Methodology	PKI requirement
R23	T	D	Need PKI Methodology	PKI requirement
R24	N			
R25	N			
R26	N			
R27	T	M	8.1.1	[R27] The User Common Name **MUST** be assigned one of the following values: o Null (meaning that no User Common Name value is provided) o String of the name of the User
R28	N			
R29	N			
R30	T	M	8.1.1	[R30] The ZT solution **MUST** ensure that each User is assigned at least one Role
R31	N			
R32	N	M	8.1.1	[R32] The User Role Common Name **MUST** use one of the following values: o Null (meaning that no User Role Common Name value is provided) o String of the name of the User Role

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R33	T	D	8.1, 8.2 Config Methodology	[R33] Users, Devices, and Applications that do not have the Role of System Administrator **MUST NOT** be authorized to create, modify, or delete Policies
R34	T	D	8.1, 8.2 Config Methodology	[R34] A ZT solution **MUST** ensure that at least one User has the Role of System Administrator
R35	N			
R36	N			
R37	T	D	8.1, 8.2 Config Methodology	[R37] The ZT solution **MUST** allow the assignment of a User Readable Name using one of the following values: o Null (meaning that no Dev Common Name value is provided) o String of the name of the Device Unique IDs are hidden
TR38	T	D	8.1, 8.2 Config Methodology	[R38] The ZT solution **MUST** allow the assignment of at least one Role to each Device
R39	N			

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R40	T	D	8.1, 8.2 Config Methodology	[R40] The Human Readable Name **MUST** use one of the following values: o Null (meaning that no Human Readable Name value is provided) o String of the name of the Device Role
R41	T	D	8.1, 8.2 Config Methodology	[R41] A Device **MUST** be assigned only one Human Readable Name that describes the type of device
R42	T	D	8.1, 8.2 Config Methodology	[R42] The list that identifies the device Interface type value **MUST** be a non-empty list
R43	T	D	8.1, 8.2 Config Methodology	[R43] DevOS **MUST** use one of the following values: o Null (meaning the operating system is not recognized or no DevOS value is provided) o String of the name of the recognized operating system
R44	T	D	8.1, 8.2 Config Methodology	[R44] When the value of Device OS is not Null, the possible value of Device OS **MUST** include: o Windows o macOS o Linux o Android o iOS

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
D7	T	D	8.1, 8.2 Config Methodology	[D7] The device OS value **SHOULD** allow for an operating system specified by the Subscriber that is not listed in [R44]
R45	N			
R46	T	D	8.1, 8.2 Config Methodology	[R46] The Application Common Name **MUST** use one of the following values: o Null (meaning that no Application Common Name value is provided) o String of the name of the Application While ZT Vendors uniquely identify apps While, these are verified using different methods as described in section 8
R47	T	D	8.1, 8.2 Config Methodology	[R47] An Application Version **MUST** use one of the following values: o Null (meaning that no Application Version value is provided or can be queried) o String of the version number of the Application While ZT Vendors uniquely identify apps While, these are verified using different methods as described in section 8

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R48	T	D	8.1, 8.2 Config Methodology	[R48] An Application Type **MUST** use one of the following values: o String of the type of Application While ZT Vendors uniquely identify apps While, these are verified using different methods as described in section 8
R49	T	D	8.1, 8.2 Config Methodology	[R49] The ZT solution **MUST** ensure that each Application Actor is assigned at least one Role
R50	N			
R51	T	D	8.1, 8.2 Config Methodology	[R51] The Application Role Common Name **MUST** use one of the following values: o Null (meaning that no Application Role Common Name value is provided) o String of the name of the Application Role This is based on Figure 7 in MEF 118. Different ZT Vendor implementations will work differently and not align with that figure.
R52	T	D	8.1, 8.2 Config Methodology	[R52] An Application **MUST** have at least one Role assigned in the Application Roles Service Attribute

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R53	N			This is based on Figure 7 in MEF 118. Different ZT Vendor implementations will work differently and not align with that figure.
D8	N			This is based on Figure 7 in MEF 118. Different ZT Vendor implementations will work differently and not align with that figure.
R54	N			This is based on Figure 7 in MEF 118. Different ZT Vendor implementations will work differently and not align with that figure.
R55	N			This is based on Figure 7 in MEF 118. Different ZT Vendor implementations will work differently and not align with that figure.
R56	T	M	7.12	[R56] Only one of the following ZT solution rules **MUST** be applied when a rule criterion is matched: o Allow o Block

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R57	T	D	Management methodology	[R57] Each applied ZT rule **MUST** create an audit Event capturing the parameters agreed to from the following list: o The rule which was applied o How the rule was applied o Where the rule was applied o Who/What triggered the rule action o What Event triggered the rule action o What was the rule action o Why the rule action was applied o When the rule was applied
R58	N			
D9	T	D	Management methodology	[D9] An audit Event **SHOULD** be encrypted with a security strength of at least 256 bit
R59	N			
R60	N			
R61	T	M	8.1, 8.2	[R61] All rule-based access control decisions **MUST** use one or more rules to decide if access is granted

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R62	T	D	8.1, 8.2 Need test case	[R62] When PBAC rules (policies) , used by a ZT solution, use Mandatory Access Control, the MAC criteria, set by the User, Device, or Application with the System Administrator Role, **MUST NOT** be altered by any other User, Device, or Application without the Role of System Administrator
R63	T	D		[R63] When PBAC Policies, used by a Service that uses this ZTF, use Mandatory Access Control, the Security Label, if present, MUST be used as input into the Authorization process

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R64	T	D	Need methodology	[R64] When PBAC rules (policies), used by a ZT solution, uses Mandatory Access Control, a Subject User, Device, or Application that is not the System Admin and that has been granted access to a Target User, Device, or Application **MUST NOT** be able to perform any of the following actions: o Change security attributes of the Subject User, Device or Application, Target User, Device, or Application, or system components of the ZT solution o Choose security attributes to be created with newly created or modified Target Users, Devices, or Applications o Grant privileges to other Subject User, Device, or Application as they would a Delegate o Change the rules governing Access Control

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
D10	T	D	Need Test Case	[D10] When PBAC rules (policies), by this ZT solution, use Mandatory Access Control, a Subject User, Device, or Application that has been granted access **SHOULD** be prevented, whenever possible, from sending information to unauthorized Target User, Device, or Application

R65	T	D	Need Test Methodology	[R65] When PBAC policies, used by a ZT solution, use Discretionary Access Control, a Subject User, Device, or Application that has been granted access to a Target User, Device, or Application **MUST NOT** perform any of the following: o Send the accessed information to other authorized Subject Users, Devices, or Applications or Target Users, Devices, or Applications o Change security attributes on authorized Subject Users, Devices, or Applications, Target User, Devices, or Applications, and system components of the ZT solution o Choose the security attributes to be associated with the Target Users, Devices, or Applications o Grant its privileges to other authorized Subject Users, Devices, or Applications via Delegation o Change the rules governing Access Control
R66	T	D	Configure Methodology	[R66] When PBAC Policies, used by a ZT solution, use Attribute-Based Access Control,

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
				the rules (policy) **MUST** assign one or more Subject attributes to a Subject User, Device, or Application

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R67	T	D	Configure Methodology	[R67] When PBAC Policies, used by a ZT solution, use Attribute-Based Access Control, rules (policy) **MUST** assign one or more Target attributes to a Target User, Device, or Application
R68	T	D	Configure Methodology	[R68] When PBAC Policies, used by a ZT solution, use Attribute-Based Access Control, a set of rules (policies) **MUST** be used to assign access privileges to a Subject User, Device, or Application in order for a Subject User, Device, or Application to access any Target User, Device, or Application
R69	T	D	Configure Methodology	[R69] When PBAC Policies, used by a ZT solution, use Attribute-Based Access Control, the Environmental Conditions **MUST** be represented by one or more objects whose attributes represent at least the current conditions of a User, Device, or Application

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R70	T	D	8.2 Needs test case	[R70] When PBAC Policies, used by a ZT solution, use Attribute-Based Access Control, the Policy **MUST** assess the Subject User, Device, or Application attributes, Target User, Device, or Applications attributes, Environmental Conditions, and applicable Policy Rules to determine if access is authorized or not.
R71	T	D	Config Methodology	[R71] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), the Policy **MUST** be able to assign to a Subject Unser, Device, or Application one or more Roles
R72	T	D	Config Methodology	[R72] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), a Role **MUST** support the capability to have one or more permission

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R73	T	D	Config Methodology	[R73] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), an operation **MUST** support the capability to be assigned to one or more permissions
R74	T	D	Config Methodology	[R74] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), a Permission **MUST** support the capability to be assigned to one or more operations
R75	T	D	Config Methodology	[R75] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), each Session **MUST** be associated with a single Subject User, Device, or Solution
R76	T	D	Config Methodology	[R76] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), each Session **MUST** authorize one or more Roles

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R77	T	D	Config Methodology	[R77] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), all Roles **MUST** be authorized before any access for a given Role is permitted This test applies to end points and not the network.
R78	T	D	8.1.1 Need test case	[R78] When a PBAC Policy, used by a ZT solution, uses Role-Based Access Control (RBAC), a User, Device, or Application with the Role of System Administrator **MUST** be able to change the Authorization of one or more Roles within a Session
R79	T	D	Config Methodology	[R79] When a PBAC Policy, used by a Service that uses this ZTF, uses Flat RBAC (RBAC level 0), the Policy **MUST** Allow an operation only if the Subject User, Device, or Application has been assigned an appropriate Role

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R80	T	D	Config Methodology	[R80] When a PBAC Policy, used by a ZT solution, uses Hierarchical RBAC (RBAC level 1), PBAC implementations **MUST** include all requirements of RBAC level 0
R81	T	D	Config Methodology	[R81] When a PBAC Policy, used by a ZT solution, uses Hierarchical RBAC (RBAC level 1), all Roles **MUST** support Role inheritance for arbitrary structures
R82	T	D	Config Methodology	[R82] When a PBAC Policy, used by ZT solution, uses Constrained RBAC (RBAC level 2), PBAC implementations **MUST** include all requirements of RBAC level 0
R83	T	D	Config Methodology	[R83] When a PBAC Policy, used by a ZT solution, uses Constrained RBAC (RBAC level 2), constraints on Roles assigned to a Subject User, Device, or Application **MUST** be enforced

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R84	T	D	Config Methodology	[R84] When a PBAC Policy, used by a ZT solution, uses Constrained RBAC (RBAC level 2), constraints on Permissions assigned to a Subject User, Device, or Application **MUST** be enforced
R85	T	D	Config Methodology	[R85] When a PBAC Policy, used by a ZT solution, uses Constrained RBAC (RBAC level 2), constraints on the number of Sessions that a Subject User, Device, or Application can have **MUST** be enforced
R86	T	M	9.1.1	[R86] When a PBAC Policy, used by a ZT solution, uses Constrained RBAC (RBAC level 2), SoD **MUST** be enforced
R87	T	D	Config Methodology	[R87] When a PBAC Policy, used by a ZT solution, uses Symmetric RBAC (RBAC level 3), PBAC implementations **MUST** include all requirements of RBAC level 0

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R88	T	D	Config Methodology	[R88] When a PBAC Policy, used by a ZT solution, uses Symmetric RBAC (RBAC level 3), PBAC implementations **MUST** include all requirements of RBAC level 1
R89	T	D	Config Methodology	[R89] When a PBAC Policy, used by a ZT solution, uses Symmetric RBAC (RBAC level 3), PBAC implementations **MUST** include all requirements of RBAC level 2
R90	T	D	Config Methodology	[R90] When a PBAC Policy, used by a ZT solution, uses Symmetric RBAC (RBAC level 3), Dynamic SOD constraints on the system state **MUST** be enforced in RBAC level 3 policies
D11	T	D	Need Test Case	[D11] A ZT solution **SHOULD** support Delegation and Revocation of Actor privileges
[CR2]<[D11]	T	D	Need Test Case	Delegation operations **MUST** be defined for a specific time period if [D11] is met

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
[CR3]<[D11]	N			The Originating and Recipient User, Device, or Application **MUST** be distinguishable from one another in a cryptographically verifiable manner if [D11] is met
[CD1]<[D11]	T	D	Need methodology	[CD1]<[D11] PBAC **SHOULD** use Indirect Delegation if [D11] is met
[CR4]<[D11]	T	D	Need methodology	[CR4]<[D11] A PBAC implementation **MUST** use a dedicated capability or mechanism to signify that a User, Device, or Application can Delegate permissions if [D11] is met
[CR 5]<[D11]	T	D	Need methodology	[CR 5]<[D11] PBAC **MUST** use a set of Policy rules to define delegated permissions and privileges if [D11] is met
[CO1]<[D11]	T	D	Need methodology	[CO1]<[D11] An Originating User, Device, or Application **MAY** enable a Recipient User, Device, or Application to Delegate some or all of the permissions that it has delegated to the Recipient User, Device, or Application if [D11] is met

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
[CD2]<[D11]	T	D	Need methodology	[CD2]<[D11] PBAC **SHOULD** use an indirect mechanism to define permissions that are delegated if [D11] is met
[D12]	T	O		[D12}A ZT solution adopting this ZTF (MEF 118) **SHOULD** support Risk Awareness
[R91]	N			
R92	N			
R93	T	D	Need Monitoring methodology	[R93] For Continuous Monitoring, at least one of the values of {time, event, data} **MUST NOT** be None
R94	T	D	Need Monitoring methodology	[R94] The ZT solution using this Zero Trust Framework **MUST** support the time-based monitoring method
R95	T	D	Need Monitoring methodology	[R95] The ZT solution using the time-based monitoring method **MUST** allow the use of different t values for each User, Device, or Application Session being monitored
R96	T	D	Need Monitoring methodology	[R96] The ZT solution **MUST** support the event-based monitoring method

MEF 118 Requirement	Testable (T), Non-Testable (N)	Mandatory (M), Deferred (D), or Optional (O)	Test Methodology from this Document	Comments
R97	T	D	Need Monitoring methodology	[R97] When the value of the Continuous Monitoring is for Event monitoring , the ZT solution **MUST** provide the {list of events} that can be used with this monitoring method
R98	T	D	Need Monitoring methodology	[R98] For each User, Device, or Application Session being monitored using the event-based monitoring method, the ZT solution **MUST** allow the Subscriber to select one or more events from the Continuous Monitoring Method Service Attribute parameter {list of events} specified in [R97] to be able to apply a Policy Action
D13	T	D	Need Monitoring methodology	[D13] The ZT solution **SHOULD** support the data-driven monitoring method
CR6<D13	T	D	Need Monitoring methodology	[CR6]<[D13] When the value of the Continuous Monitoring Method Service Attribute parameter Data is not None, the ZT solution **MUST** provide the {list of decisions} that can be produced by this monitoring method

Table 5 – MEF 118 Requirements

Editor Note 16: The test methodology is still being discussed for rows with a Test Methodology Required methodology. Once finalized, the test methodology will be updated.

Editor Note 17: Support for OAUTH is under discussion within MEF W118.1. These requirements will be updated when MEF 118.1 goes to RfD.

12 Rating Methodology

The method used to determine the rating for an SD-WAN Edge ZT Vendor solution or an SP SWVC solution under test use objective methods to provide a rating. Ratings use a 0-to-800 point scale. The point values for each rating are shown in Table 6.

Rating	Minimum Points	Maximum Points
AAA	775	800
AA	720	774
A	660	719
BBB	590	659
BB	540	589
B	480	539
CCC	420	479
CC	360	419
C	300	359
D	0	299

Table 6 – Rating Point Values

Each session of testing begins with the allocation of 800 points per section. Points are deducted from the 800 points when a test does not perform as specified.

Section Number	Total Points	Penalty	Comments
8.12.1		100%	
8.12.2		100%	
8.12.3		50%	
8.12.4		50%	
8.12.5		100%	
	800		
9.1.1		100%	
9.1.2		100%	
9.1.3		100%	
9.2.1		100%	
9.2.2		100%	
9.2.3		25%	
9.2.4		15%	
9.3		75%	
9.3.2		25%	
	800		
10.1		100%	
10.2.1		5%	
	800		
Total Points			

Table 7 – Point Penalty Allocation per Section

As seen in Table 7, some areas of testing are considered "table stakes" for ZT implementation, and test results that indicate that the expected capabilities are not provided result in a significant penalty.

Other testing areas are considered "nice to have" functions, and a lower penalty is deducted if the test results are not as expected.

The penalty percentage is calculated and deducted from the total points for each section, and the total points associated with the section are determined. The overall rating is determined based on the total points shown in Table 6. A rating is provided for each section of the document and the overall rating is an average of the per section rating.

12.1 MEF Certification Pass/Fail Criteria

To allow for a MEF Certification a Pass/Fail criteria has been defined within this section. Scores are calculated as describe below.

It is proposed that a minimum of 90% of the requirements from MEF 118 [5] shown in section 11 of this document as testable are required to pass in order for an ZT solution to be eligible for MEF Certification. A rating is not provided unless Certification is obtained.

13 References

[1] IETF RFC 1918, *Address Allocation for Private Internets*, by Y. Rekhter, B. Moskowitz, D. Karrenberg, G. J. de Groot, E. Lear, February 1996

[2] IETF RFC 2119, *Key words for use in RFCs to Indicate Requirement Levels*, by Scott Bradner, March 1997

[3] IETF RFC 8174, *Ambiguity of Uppercase vs. Lowercase in RFC 2119 Key Words*, by B Leiba, May 2017, Copyright © 2017 IETF Trust and the persons identified as the document authors. All rights reserved.

[4] MEF W90.2, *SD-WAN Certification Phase 2*, August 2023

[5] MEF 118, *Zero Trust Framework for MEF Services*, October 2022

[6] MEF W162, *Security Service Edge Certification Test Cases and Requirements*, August 2023