IPv6 Application Test Service

Generic IPv6 Application Functional Test Plan

Technical Document

Version 0.2

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IPv6 Test Service
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Acknowledgements

The University of New Hampshire would like to acknowledge the efforts of the following individuals in the development of this test suite:

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Marion Dillon	University of New Hampshire
Timothy Winters	University of New Hampshire

References

The following documents are referenced in this text:

[RFC 5952] A Recommendation for IPv6 Address Text Representation. S. Kawamura, M. Kawashima. August 2010.

[NIST IPv6 Profile] "NIST IPv6 Profile", NIST Special Publication (NIST SP) - 500-267Ar1, November 2020. https://doi.org/10.6028/NIST.SP.500-267Ar1

[USGv6-R1] "USGv6 Profile", NIST Special Publication (NIST SP) - 500-267Br1, November 2020. https://doi.org/10.6028/NIST.SP.500-267Br1

Introduction

The University of New Hampshire's InterOperability Laboratory (UNH-IOL) is an institution designed to improve the interoperability of standards based products by providing an environment where a product can be tested against other implementations of a standard. This suite of tests validates that an Application properly functions on an IPv6-only network.

Scope:

The following tests verify the general operation of an Application in an IPv6-only network or Cloud infrastructure.

Definitions

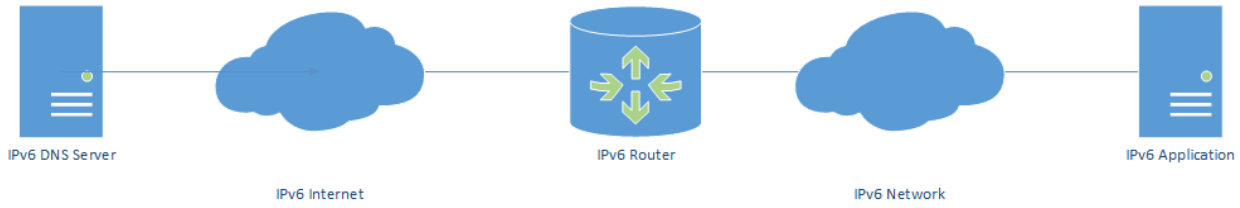
Application	IPv6 Application Testing running on a USGv6 Host/Router
Router	A USGv6 Router
Network	IPv6-only network
DNS Server	A DNS server that has both IPv4 and IPv6

Test Organization

This document organizes tests by group based on related test methodology or goals. Each group begins with a brief set of comments pertaining to all tests within that group. This is followed by a series of description blocks; each block describes a single test. The format of the description block is as follows:

Test Label	The **Test Label** is the first line of the test page. It will have the following form: App.A.B Where each component indicates the following: App – Test Suite Identifier A – Group Number B – Test Number Scripts implementing this test suite should follow this convention, and may also append a character in the set [a-z] indicating a particular test part.
Purpose	The **Purpose** is a short statement describing what the test attempts to achieve. It is usually phrased as a simple assertion of the feature or capability to be tested.
Test Setup	The **Test Setup** section describes the configuration of all devices prior to the start of the test. Different parts of the procedure may involve configuration steps that deviate from what is given in the test setup. If a value is not provided for a protocol parameter, then the protocol's default is used for that parameter.
Procedure and Expected Behavior	The **Procedure and Expected Behavior** table contains the step-by-step instructions for carrying out the test. These steps include such things as enabling interfaces, unplugging devices from the network, or sending packets from a test station. The test procedure also cues the tester to make observations of expected behavior, as needed, as not all steps require observation of results. If any behavior is expected for a procedure, it is to be observed prior to continuing to the next step. Failure to observe any behavior prior to continuing constitutes a failed test. Note, that while test numbers continue between test parts, each test part is to be executed independently (Following Common Test Setup and Cleanup as indicated), and are not cascaded from the previous part.
Possible Problems	The **Possible Problems** section contains a description of known issues with the test procedure, which may affect test results in certain situations.

Common Topology



Test Specification Execution

When executing the test cases in this document, use the following steps:

1) No IPv4 Capabilities are enabled on any devices used for testing, meaning it's not enabled or administratively disabled.
2) DNS Records used for testing have both IPv4 and IPv6 records.

Section 1: IPv6 Addresses

Overview: The tests in this group verify that the Application is capable of parsing and storing IPv6 addresses.

Test APP.1.1: IPv6 Addresses

Purpose: Verify that the Application properly displays and parses IPv6 addresses.

Test Setup: None.

Procedure:

Part A: Displaying IPv6 Addresses

Step	Action	Expected Behavior
1.	Locate areas of the application that display addresses.	
2.	Display link-local IPv6 address.	The observed address is displayed in a text format per RFC 5952, section 4.
3.	Display global IPv6 address.	The observed address is displayed in a text format per RFC 5952, section 4.

Part B: Parsing IPv6 Addresses

Step	Action	Expected Behavior
4.	Locate areas of the application where IPv6 addresses are entered into the system.	
5.	Enter a valid link-local IPv6 address.	Observe that the application displays the value entered.
6.	Enter a valid global IPv6 address.	Observe that the application displays the value entered.

Part C: Invalid IPv6 Addresses

Step	Action	Expected Behavior
7.	Locate areas of the application where IPv6 addresses are entered into the system.	
8.	Enter an invalid IPv6 address that is too long for the field.	Observe that the address is not accepted.
9.	Enter a invalid IPv6 address that contains characters that are invalid.	Observe that the address is not accepted.
10.	Enter an invalid IPv6 address with more ":" than are allowed in RFC 5952.	Observe that the address is not accepted.

Possible Problems: None.

Test APP.1.2: Storing IPv6 Addresses

Purpose: Verify that the Application properly stores IPv6 addresses.

Test Setup: None.

Procedure:

Step	Action	Expected Behavior
1.	Locate areas of the application that that require IPv6 Addresses are stored.	
2.	Verify that the application properly stores the valid IPv6 address including those used for cache.	Observe that IPv6 addresses are stored correctly.

Possible Problems: None.

Section 2: IPv6 Network

Overview: The tests in this group verify that the Application properly functions over an IPv6 network.

Test APP.2.1: Installation and Maintenance Updates

Purpose: Verify the Application properly supports installation and maintenance updates on an IPv6-only network.

Test Setup: The devices are setup according to Common Topology.

Procedure:

Part A: Install Application

Step	Action	Expected Behavior
1.	Install the Application on an operating system that only has IPv6 enabled.	Observe the application is properly installed per the application installation instructions.

Part B: Application Maintenance

Step	Action	Expected Behavior
2.	Ensure the application is running.	
3.	Perform a maintenance update on the Application.	Observe the application is able to perform an update.

Possible Problems: None

Test APP.2.2: Accessing Application Information over IPv6

Purpose: Verify the Application properly supports accessing information over IPv6.

Test Setup: The devices are setup according to Common Topology.

Procedure:

Part A: Access Cloud Service from Application

Step	Action	Expected Behavior
1.	Locate Application functions that need network access to work (eg. Access Cloud Service).	
2.	Utilize the Application functions that require network access to work.	Verify that the Application functions work properly.

Part B: Access Application Cloud Service from Remote IPv6-Only Network

Step	Action	Expected Behavior
3.	Navigate to the landing page of the application.	Verify that the Application loads successfully.
4.	Login, or otherwise initialize the application.	Verify that the Application is initialized successfully.
5.	Locate Application functions that need network access to work (eg. Access Cloud Service).	
6.	Utilize the Application functions that require network access to work.	Verify that the Application functions work properly.

Possible Problems:

- Part B: If the Application does not provide network services, and is only accessed as part of a local (console) interface, this test case may be omitted. This test case is still applicable to Applications that are not native to cloud, but do provide a network enabled interface.

Test APP.2.3: DNS

Purpose: Verify the Application properly uses Domain Name Service (DNS) for retrieving IPv6 addresses.

Test Setup: The devices are setup according to Common Topology.

Procedure:

Part A: DNS has IPv6-only Records

Step	Action	Expected Behavior
1.	Setup the DNS server to have only IPv6 Records.	
2.	Locate an area of the Application that allows for the use of DNS.	
3.	Perform an action that requires the Application to use DNS.	Observe that Application properly performs the action using DNS.

Part B: DNS have both IPv4 and IPv6 Records

Step	Action	Expected Behavior
4.	Setup the DNS server to have both IPv4 and IPv6 Records.	
5.	Locate an area of the Application that allows for the use of DNS.	
6.	Perform an action that requires the Application to use DNS.	Observe that Application properly performs the action using DNS.

Possible Problems: None.

Modification Record

Version	Date	Editor	Modification
0.2	2021-09-09	Timothy Carlin	• Added Test Case APP.2.2 Part B Remote Cloud Access • Fixed Typos
0.1	2017-5-05	Timothy Winters	• Initial Release of Application Test.