IPv6 Testing Service
Address Architecture
Interoperability Test Plan

Technical Document

Version 3.0

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Table of Contents

Acknowledgements

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Introduction

The University of New Hampshire's InterOperability Laboratory (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 has been developed to help implementers evaluate the functionality of their products that support IPv6 Addresses Architecture. This test suite has been designed to test the interoperability of the device under test with the specification in RFC 4291, 4193, 4007, 3879, 3484, and 2526. Successful completion of all tests contained in this suite does not guarantee that the tested device will operate with other devices that implement IPv6 Address Architecture. However, these tests provide a reasonable level of confidence that the Node Under Test will function well in most multi-vendor environments with this implementation.

Definitions

DAD	Duplicate Address Detection (DAD)
DHCPv6	Dynamic Host Configuration Protocol for IPv6
NS	Neighbor Solicitation
ICMP	Internet Control Messaging Protocol
DUT	Device Under Test
RUT	Router Under Test
TN	Test Node
TR	Test Router

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:
	    IP.IOP.A.B
	
	Where each component indicates the following:
	    IP – Test Suite Identifier
	    IOP – Interoperability Test Suite
	    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.
References	The **References** section lists cross-references to the specifications and documentation that might be helpful in understanding and evaluating the test and results
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.

References

The following documents are referenced in these texts:

[RFC 4193]   R. Hinden, B.Haberman. "Unique Local IPv6 Unicast Addresses". RFC 4193, October 2005.

[RFC 4291]   R.Hinden, S. Deering, "IP Version 6 Addressing Architecture", RFC 4291, February 2006.

[RFC 4007]   S. Deering, B. Haberman, T. Jinmei, E. Nordmark, B. Zill, "IPv6 Scoped Address Architecture", RFC 4007, March 2005.

[RFC 3879]   C. Huitema, B. Carpenter, "Deprecating Site Local Addresses". RFC 3879, September 2004.

[RFC6724] Thaler, D., Ed., Draves, R., Matsumoto, A., and T. Chown, "Default Address Selection for Internet Protocol Version 6 (IPv6)", RFC 6724, DOI 10.17487/RFC6724, September 2012.

[RFC 2526]   D. Johnson, S. Deering, "Reserved IPv6 Subnet Anycast Addresses", RFC 2526, March 1999.

[RFC 4862]   Thomson, S. and T. Narten. "IPv6 Stateless Address Autoconfiguration". RFC 4862, September 2007.

[RFC 4443]   A. Conta, S. Deering, M. Gupta, Ed. "Internet Control Message Protocol for the Internet Protocol Version 6 (IPv6) Specification". RFC 4443, March 2006..

[RFC 3315]   R. Droms, J. Bound, B. Volz, T. Lemon, C. Perkins, M. Carney. "Dynamic Host Configuration Protocol for IPv6 (DHCPv6)". RFC 3315, July 2003.

General Node Requirements

- Host
  - Ability to configure a global address and default router by receipt of Router Advertisement.
- Router
  - Ability to transmit Router Advertisements with a positive AdvValidLifetime.
  - Ability to transmit Router Advertisements with a positive AdvDefaultLifetime.
- Host and Router
  - Ability to use a ping6 application and print out results indicating the receipt of an ICMPv6 Echo Reply.
  - Ability to show multicast ping result indicating the receipt of each ICMPv6 Echo Reply.
  - Must Support all-nodes multicast address (FF02::1), must support transmit of all-routers multicast address (FF02::2) Echo Request.

Group 1: IPv6 Node

Scope

These tests are designed to verify a nodes behavior regarding IPv6 Address Architecture.

Overview

The tests in this group verify interoperability of a node regarding the assignment of IPv6 addresses according to RFC 4291, 4007, 4193, 3879, and 3484.
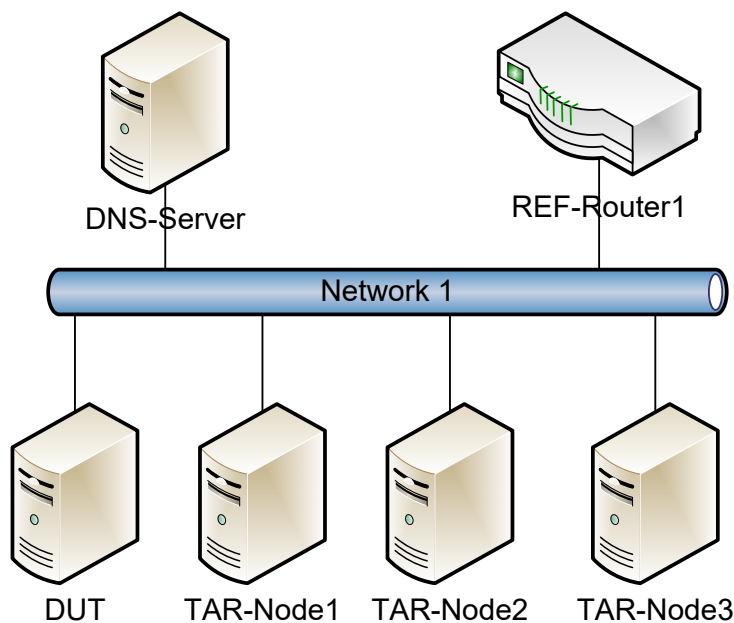
Test AddrInterop.1.1: IPv6 Scoped Address

Purpose: To verify that an IPv6 node can properly scope IPv6 addresses.

Reference:
- [RFC 4007] – Section 7 and 8
- [RFC 4291] – Section 2.5

Test Setup: Configure REF-Router 1 to transmit Router Advertisement with a valid global Prefix. If the DUT or any TAR-Node is a router configure a global address on Network 1.

Procedure:

Part A: Sending link-local scope

Step	Action	Expected Behavior
1.	Transmit ICMPv6 Echo Requests from the DUT to the link-local address of TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests to the link-local address of TAR-Node1 on Network 1. TAR-Node1 must transmit ICMPv6 Echo Replies to the link-local address of the DUT.
2.	Transmit ICMPv6 Echo Request from the DUT to the link-local address of TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests to the link-local address of TAR-Node2 on Network 1. TAR-Node2 must transmit ICMPv6 Echo Replies to the link-local address of the DUT.

Step	Action	Expected Behavior
3.	Transmits ICMPv6 Echo Requests from the DUT to the global address of TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests to the link-local address of TAR-Node3 on Network 1. TAR-Node3 must transmit ICMPv6 Echo Replies to the link-local address of the DUT.

Part B: Sending global scope

Step	Action	Expected Behavior
4.	Transmits ICMPv6 Echo Requests from the DUT to the global address of TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests to the global address of TAR-Node1 on Network 1. TAR-Node1 must transmit ICMPv6 Echo Replies to the global address of the DUT.
5.	Transmits ICMPv6 Echo Requests from the DUT to the global address of TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests to the global address of TAR-Node2 on Network 1. TAR-Node2 must transmit ICMPv6 Echo Replies to the global address of the DUT.
6.	Transmits ICMPv6 Echo Requests from the DUT to the global address of TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests to the global address of TAR-Node3 on Network 1. TAR-Node3 must transmit ICMPv6 Echo Replies to the global address of the DUT.

Part C: Receiving link-local scope

Step	Action	Expected Behavior
7.	Transmit ICMPv6 Echo Request from TAR-Node1 to the link-local address of the DUT.	TAR-Node1 must transmit ICMPv6 Echo Request to the link-local address of the DUT on the Network 1. The DUT must transmit ICMPv6 Echo Replies to the link-local address of TAR-Node1.
8.	Transmit ICMPv6 Echo Request from TAR-Node2 to the link-local address of the DUT.	TAR-Node2 must transmit ICMPv6 Echo Request to the link-local address of the DUT on the Network 1. The DUT must transmit ICMPv6 Echo Replies to the link-local address of TAR-Node2.
9.	Transmit ICMPv6 Echo Request from TAR-Node3 to the link-local address of the DUT.	TAR-Node3 must transmit ICMPv6 Echo Request to the link-local address of the DUT on the Network 1. The DUT must transmit ICMPv6 Echo Replies to the link-local address of TAR-Node3.

Part D: Receiving global scope

Step	Action	Expected Behavior
10.	Transmit ICMPv6 Echo Request from TAR-Node1 to the global address of the DUT.	TAR-Node1 must transmit ICMPv6 Echo Request to the global address of the DUT on the Network 1. The DUT must

		transmit ICMPv6 Echo Replies to the global address of TAR-Node1.
11.	Transmit ICMPv6 Echo Request from TAR-Node2 to the global address of the DUT.	TAR-Node2 must transmit ICMPv6 Echo Request to the global address of the DUT on the Network 1. The DUT must transmit ICMPv6 Echo Replies to the global address of TAR-Node2.
12.	Transmit ICMPv6 Echo Request from TAR-Node3 to the global address of the DUT.	TAR-Node3 must transmit ICMPv6 Echo Request to the global address of the DUT on the Network 1. The DUT must transmit ICMPv6 Echo Replies to the global address of TAR-Node3.

Possible Problems: A passive node does not implement an application for sending Echo Requests. Parts A and B may be omitted if the DUT is a passive node.

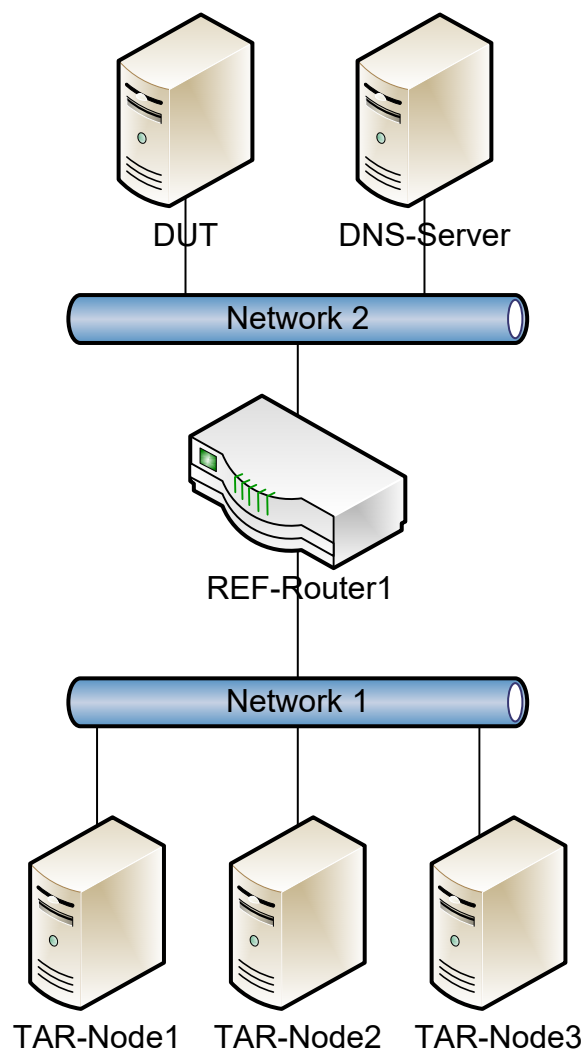## Test AddrInterop.1.2: Default Source Address Selection

Purpose: To verify that a node properly selects the proper default source address.
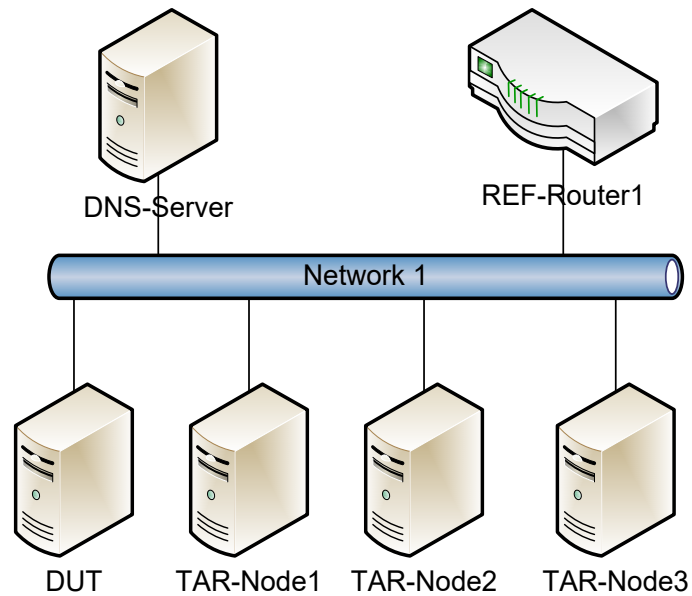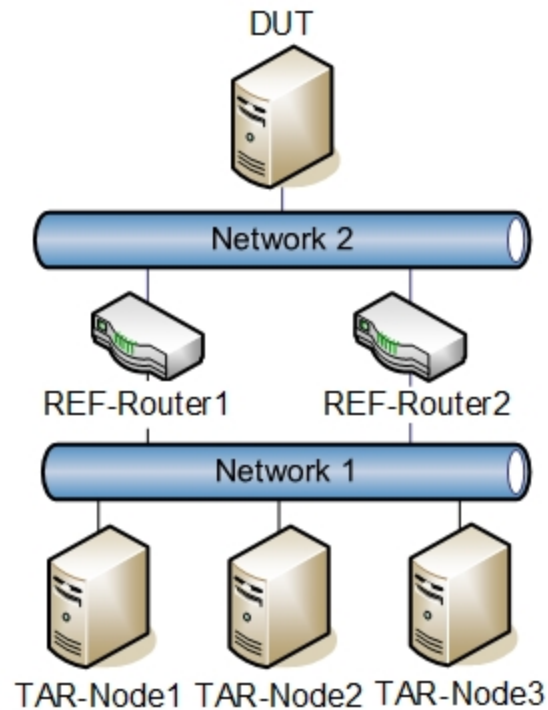
Reference:
- [RFC 6724] – Section 5

Test Setup:
Part A-B:

PART C-D:

PART E:

Procedure:

Part A: Use longest matching prefix

Step	Action	Expected Behavior
1.	Configure REF-Router1 to transmit Router Advertisements with a prefix of 2001:2:0:1000::/64 and 2001:2:0:1100::/64 on Network 2. If the DUT is a router configure global addresses with a prefix of 2001:2:0:1000::/64 and a prefix of 2001:2:0:1100::/64 and configure a default route using REF-Router1.	
2.	Configure REF-Router1 to transmit a Router Advertisements with a prefix of 2001:2:0:1110::/64 on Network 2. If a TAR-Node is a router, configure a prefix of 2001:2:0:1110::/64 and a default route of REF-Router1.	
3.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests using 2001:2:0:1100::/64 as the source address to TAR-Node1. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
4.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests using 2001:2:0:1100::/64 as the source address to TAR-Node2. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
5.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests using 2001:2:0:1100::/64 as the source address to TAR-Node3. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Part B: Avoid deprecated addresses (Host only)

Step	Action	Expected Behavior
6.	Configure REF-Router1 to transmit Router Advertisement with Prefix 2001:2:0:1000::/64 and 2001:2:0:1100::/64 on Network2. Prefix 2001:2:0:1000::/64 is configured with preferred and valid lifetimes that last the entire test. Prefix 2001:2:0:1100::/64 is configured with a preferred lifetime of 15 seconds and a valid lifetime of 120 seconds.	

7.	Configure REF-Router1 to transmit Router Advertisements with a prefix of 2001:2:0:1110::/64 on Network 1. If a TAR-Node is a router configure, a prefix of 2001:2:0:1110::/64 and a default route of REF-Router1.	
8.	Wait between the 15 seconds and 120 seconds.	
9.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node1. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
10.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node2. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
11.	Transmit ICMPv6 Echo Request from the DUT to TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node3. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT

Part C: Prefer appropriate scope

Step	Action	Expected Behavior
12.	Configure REF-Router1 to transmit valid Router Advertisements with Prefix 2001:2:0:1000::/64 on Network 1. If the DUT is a router, a global address with Prefix 2001:2:0:1000::/64 is configured on Network 1.	
13.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests using a global source address with a prefix of 2001:2:0:1000::/64 to TAR-Node1. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
14.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests using a global source address with a prefix of 2001:2:0:1000::/64 to TAR-Node2. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
15.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests using a global source address with a prefix of 2001:2:0:1000::/64 to TAR-Node3. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Part D: Prefer temporary address (Host only)

Step	Action	Expected Behavior
16.	Configure the DUT to use both temporary and global addresses.	
17.	Configure REF-Router1 to transmit valid Router Advertisements with Prefix 2001:2:0:1000::/64 on Network 1.	
18.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests using its temporary address to TAR-Node1. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
19.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests using its temporary address to TAR-Node2. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
20.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests using its temporary address to TAR-Node3. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Part E: Prefer next-hop advertised prefix (Host Only)

Step	Action	Expected Behavior
21.	Configure REF-Router1 to transmit valid Router Advertisements with Prefix 2001:2:0:1000::/64 on Network2. The Router Preference should be set to High (01).	
22.	Configure REF-Router2 to transmit Router Advertisements with Prefix 2001:2:0:1100::/64 on Network2. The Router Preference should be set to Medium (00).	
23.	Configure REF-Router1 and REF-Router2 to transmit valid Router Advertisements with Prefix 2001:2:0:1110::/64 on Network1.	
24.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node1.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node1. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
25.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node2.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node2. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
26.	Transmit ICMPv6 Echo Request from the DUT to the global address of TAR-Node3.	The DUT must transmit ICMPv6 Echo Requests using Prefix 2001:2:0:1000::/64 source address to TAR-Node3. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Possible Problems:
- An IPv6 implementation is not required to remember which next-hops advertised which prefixes. The conceptual models of IPv6 hosts in Section 5 of [RFC4861] and Section 3 of [RFC4191] have no such requirement. Hence, Rule 5.5 is only applicable to implementations that track this information. Therefore implementations that don't track this information may omit Part E.
- A device may not support temporary addresses, if this is the case Part D may be omitted.
- A passive node does not implement an application for sending Echo Requests. This test may be omitted if the DUT is a passive node.
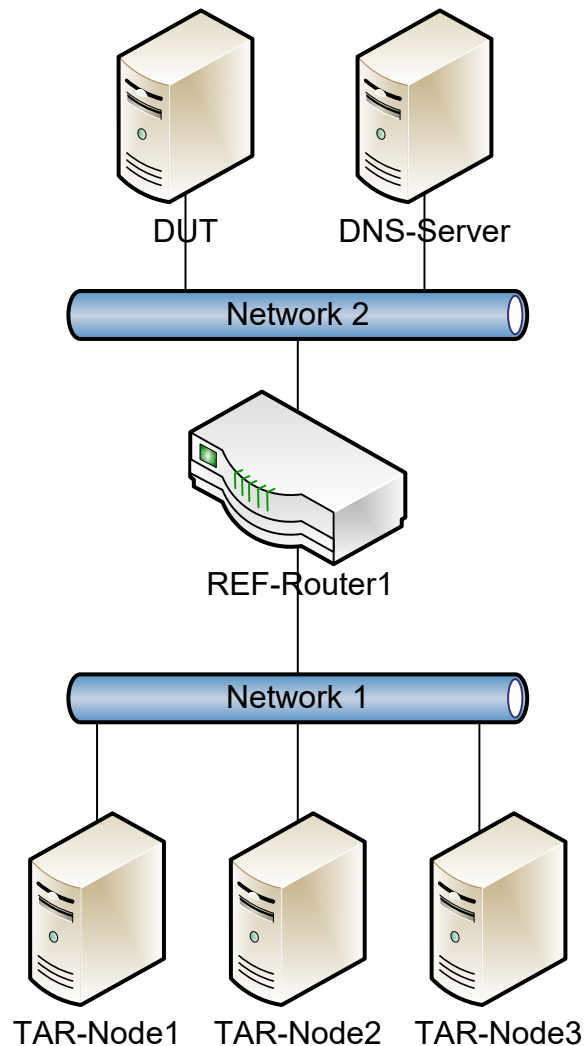
Test AddrInterop.1.3: Default Destination Address Selection

Purpose: To verify that a node properly selects the correct destination address.

Reference:
- [RFC 6724] – Section 6

Test Setup:

Procedure:

Part A: Use longest matching prefix

Step	Action	Expected Behavior
1.	REF-Router1 transmits Router Advertisements with prefixes of 2001:2:0:1000::/64 and 2001:2:0:1100::/64 on Network 2. If the DUT is a router, configure global addresses with a prefix of 2001:2:0:1100::/64 and a prefix of 2001:2:0:1000::/64 on Network 2 with a default route of REF-Router1.	
2.	REF-Router1 transmits Router Advertisements with 2001:2:0:1110::/64 and 2001:2:0:1003::/64 on Network 1. If any of the TAR-Node are routers, configure global addresses with a prefix of 2001:2:0:1110::/64 and a prefix of 2001:2:0:1003::/64 on Network 1.	
3.	Configure DNS-Server with the global addresses of TAR-Node1 for "node1.test.example.com", the global addresses of TAR-Node2 for "node2.test.example.com", and the global addresses of TAR-Node3 for "node3.test.example.com".	
4.	The DUT transmits an ICMPv6 Echo Request for "node1.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with the 2001:2:0:1003::/64 global address of TAR-Node1 as the destination address. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
5.	The DUT transmits an ICMPv6 Echo Request for "node2.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with the 2001:2:0:1003::/64 global address of TAR-Node2 as the destination address. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
6.	The DUT transmits an ICMPv6 Echo Request for "node3.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with the 2001:2:0:1003::/64 global address of TAR-Node3 as the destination address. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Part B: Avoid deprecated addresses (Host only)

Step	Action	Expected Behavior
7.	REF-Router1 transmits Router Advertisements with prefixes of	

	2001:2:0:1000::/64 and 2001:2:0:1100::/64 on Network 2. Prefix 2001:2:0:1000::/64 is configured with a preferred lifetime of 15 seconds and a valid lifetime of 120 seconds. Prefix 2001:2:0:1100::/64 is configured with preferred and valid lifetimes that last the entire test.	
8.	REF-Router1 transmits Router Advertisements with 2001:2:0:1110::/64 and 2001:2:0:1003::/64 on Network 1. If any of the TAR-Nodes are routers, configure a global address with a prefix of 2001:2:0:1110::/64 and 2001:2:0:1003::/64 on Network 1.	
9.	Configure DNS-Server with the global addresses of TAR-Node1 for "node1.test.example.com", the global addresses of TAR-Node2 for "node2.test.example.com", and the global addresses of TAR-Node3 for "node3.test.example.com".	
10.	Wait between the 15 seconds and 120 seconds.	
11.	The DUT transmits an ICMPv6 Echo Request for "node1.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with TAR-Node1's 2001:2:0:1110::/64 address as the destination address. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.
12.	The DUT transmits an ICMPv6 Echo Request for "node2.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with TAR-Node2's 2001:2:0:1110::/64 address as the destination address. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
13.	The DUT transmits an ICMPv6 Echo Request for "node3.test.example.com".	The DUT must transmit an ICMPv6 Echo Request with TAR-Node3's 2001:2:0:1110::/64 address as the destination address. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Possible Problems:

- If the DUT doesn't support DNS or another application that allows a list of destination addresses, then this test case may be omitted.
- A passive node does not implement an application for sending Echo Request. This test may be omitted if the DUT is a passive node.
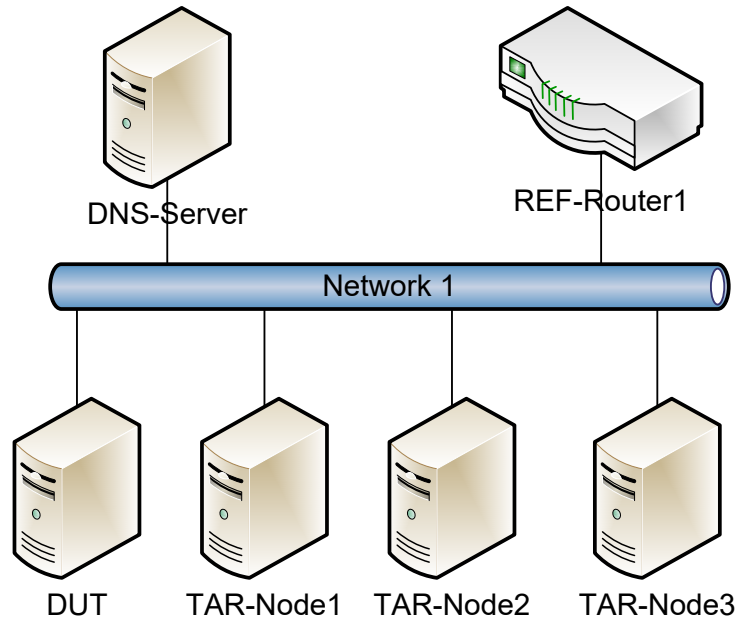
Test AddrInterop.1.4: Unique Local IPv6 Addresses

Purpose: To verify that a node properly uses unique local IPv6 address.

Reference:
- [RFC 4193] – Section 4

Test Setup:

Procedure:

Part A: Transmitting Unique Local IPv6 Addresses

Step	Action	Expected Behavior
1.	REF-Router1 transmits valid Router Advertisement with a unique local prefix of FD01::/64 on Network 1. If the DUT or any TAR-Node is a router, configure a unique local address with a prefix of FD01::/64 on Network 1.	
2.	The DUT transmits an ICMPv6 Echo Request to TAR-Node1's unique local address.	The DUT must transmit an ICMPv6 Echo Request with TAR-Node1's unique local address as the destination address. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.

| 3. | The DUT transmits an ICMPv6 Echo Request to TAR-Node2's unique local address. | The DUT must transmit an ICMPv6 Echo Request with TAR-Node2's unique local address as the destination address. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT. |
| 4. | The DUT transmits an ICMPv6 Echo Request to TAR-Node3's unique local address. | The DUT must transmit an ICMPv6 Echo Request with TAR-Node3's unique local address as the destination address. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT. |

Part B: Receiving Unique Local IPv6 Address

Step	Action	Expected Behavior
5.	REF-Router1 transmits valid Router Advertisement with a unique local prefix of FD01::/64 on Network 1. If the DUT or any TAR-Node is a router, configure a unique local address with a prefix of FD01::/64 on Network 1.	
6.	TAR-Node1 transmits an ICMPv6 Echo Request to the unique local address of the DUT.	TAR-Node1 must transmit an ICMPv6 Echo Request with the DUT unique local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node1.
7.	TAR-Node2 transmits an ICMPv6 Echo Request to the unique local address of the DUT.	TAR-Node2 must transmit an ICMPv6 Echo Request with the DUT unique local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node2.
8.	TAR-Node3 transmits an ICMPv6 Echo Request to the unique local address of the DUT.	TAR-Node3 must transmit an ICMPv6 Echo Request with the DUT unique local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node3.

Possible Problems: A passive node does not implement an application for sending Echo Requests. Part A may be omitted if the DUT is a passive node.
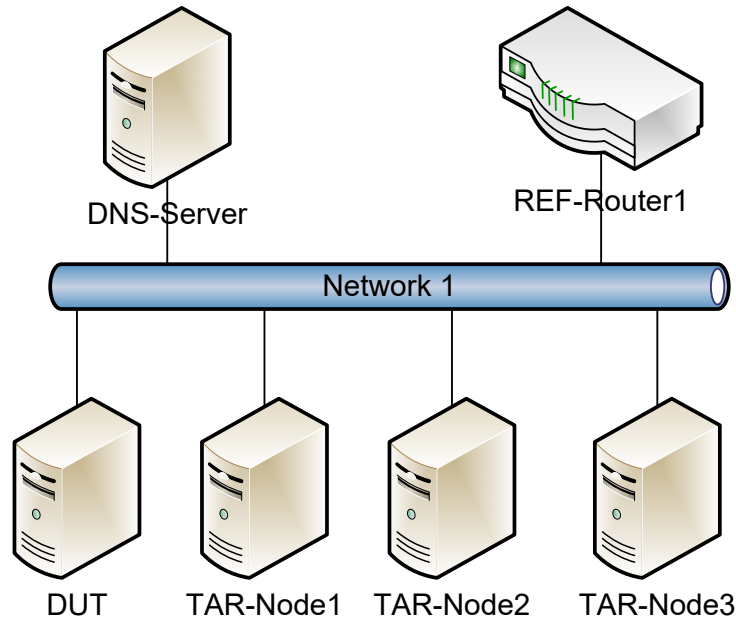
Test AddrInterop.1.5: Deprecating Site Local Addresses

Purpose: To verify that a node properly deprecates IPv6 site local address.

Reference:
- [RFC 3879] – Section 4

Test Setup:

Procedure:

Part A: Transmitting Site Local IPv6 Addresses

Step	Action	Expected Behavior
1.	REF-Router1 transmits valid Router Advertisement with a site local prefix of FEC0::/64 on Network 1. If the DUT or any TAR-Node is a router, configure a site local address with a prefix of FEC0::/64 on Network 1.	
2.	The DUT transmits an ICMPv6 Echo Request to TAR-Node1's site local address.	The DUT must transmit an ICMPv6 Echo Request with TAR-Node1's site local address as the destination address. TAR-Node1 must transmit ICMPv6 Echo Replies to the DUT.

3.	The DUT transmits an ICMPv6 Echo Request to TAR-Node2's site local address.	The DUT must transmit an ICMPv6 Echo Request with TAR-Node2's site local address as the destination address. TAR-Node2 must transmit ICMPv6 Echo Replies to the DUT.
4.	The DUT transmits an ICMPv6 Echo Request to TAR-Node3's site local address.	The DUT must transmit an ICMPv6 Echo Request with TAR-Node3's site local address as the destination address. TAR-Node3 must transmit ICMPv6 Echo Replies to the DUT.

Part B: Receiving Site Local IPv6 Address

Step	Action	Expected Behavior
5.	REF-Router1 transmits valid Router Advertisement with a site local prefix of FEC0::/64 on Network 1. If the DUT or any TAR-Node is a router, configure a site local address with a prefix of FEC0::/64 on Network 1.	
6.	TAR-Node1 transmits an ICMPv6 Echo Request to the site local address of the DUT.	TAR-Node1 must transmit an ICMPv6 Echo Request with the DUT site local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node1.
7.	TAR-Node2 transmits an ICMPv6 Echo Request to the site local address of the DUT.	TAR-Node2 must transmit an ICMPv6 Echo Request with the DUT site local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node2.
8.	TAR-Node3 transmits an ICMPv6 Echo Request to the site local address of the DUT.	TAR-Node3 must transmit an ICMPv6 Echo Request with the DUT site local address as the destination address. The DUT must transmit ICMPv6 Echo Replies to TAR-Node3.

Possible Problems: A passive node does not implement an application for sending Echo Requests. Part A may be omitted if the DUT is a passive node.

Group 2: IPv6 Router

Scope

These tests are designed to verify a router behavior regarding IPv6 Address Architecture.

Overview

The tests in this group verify interoperability of a router regarding the assignment of IPv6 addresses according to RFC 4291, 4007, 4193, 3879, and 3484.
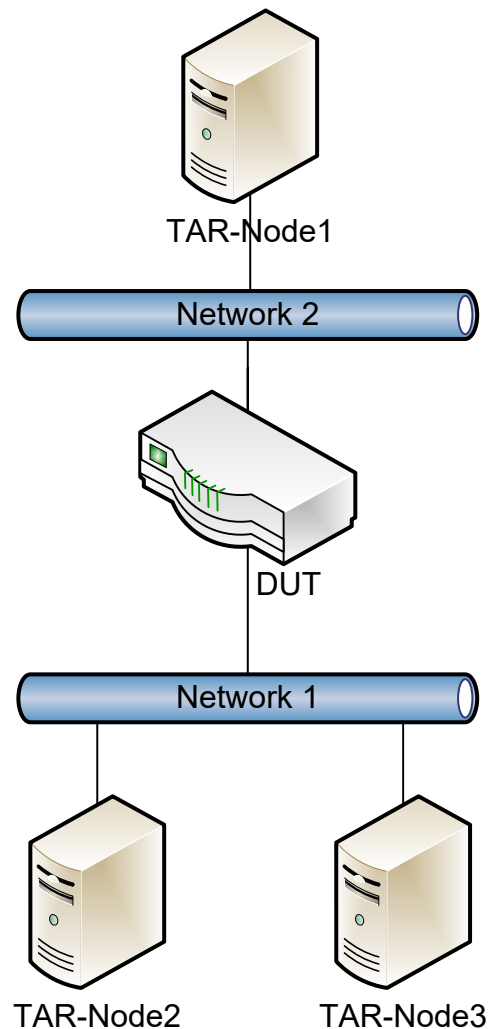
Test AddrInterop.2.1: Routing Unique Local IPv6 Addresses (Router Only)

Purpose: To verify that a router properly routes unique local IPv6 address.

Reference:
- [RFC 4193] – Section 4.1

Test Setup:

Procedure:

Step	Action	Expected Behavior
1.	Configure the DUT with a unique local address with prefix of	

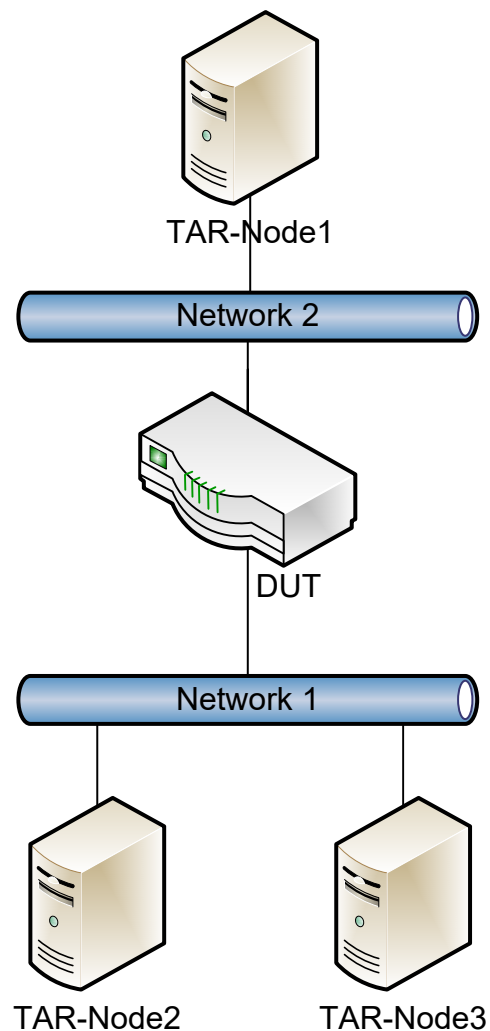|		
	FD01::/64 on Network 1. The DUT must transmit RA's with unique local prefix of FD01::/64 on Network 1. If a TAR-Node is a router, configure a unique local address with a prefix of FD01::/64 and a default route of the DUT.	
2.	Configure the DUT with a unique local address with prefix of FD02::/64 on Network 2. The DUT must transmit RA's with unique local prefix of FD02::/64 on Network 2. If TAR-Node1 is a router, configure a unique local address with a prefix of FD02::/64 and a default route of the DUT.	
3.	The TAR-Node1 transmits an ICMPv6 Echo Request to TAR-Node2 unique local address.	The DUT must forward the Echo Request from TAR-Node1 to TAR-Node2. The DUT must forward the Echo Reply from TAR-Node2 to TAR-Node1.
4.	The TAR-Node1 transmits an ICMPv6 Echo Request to TAR-Node3 unique local address.	The DUT must forward the Echo Request from TAR-Node1 to TAR-Node3. The DUT must forward the Echo Reply from TAR-Node3 to TAR-Node1.

Possible Problems: None.

Test AddrInterop.2.2: Routing Deprecated Site Local IPv6 Addresses (Router Only)

Purpose: To verify that a router properly routes unique local IPv6 address.

Reference:
- [RFC 3879] – Section 4

Test Setup:

Procedure:

Step	Action	Expected Behavior

1.	Configure the DUT with a site local address with prefix of FEC0::/64 on Network 1. The DUT must transmit RA's with site local prefix of FEC0::/64 on Network 1. If a TAR-Node is a router, configure a site local address with a prefix of FEC0::/64 and a default route of the DUT.	
2.	Configure the DUT with a site local address with prefix of FEC1::/64 on Network 2. The DUT must transmit RA's with site local prefix of FEC1::/64 on Network 2. If TAR-Node1 is a router, configure a site local address with a prefix of FEC1::/64 and a default route of the DUT.	
3.	The TAR-Node1 transmits an ICMPv6 Echo Request to TAR-Node2 site local address.	The DUT must forward the Echo Request from TAR-Node1 to TAR-Node2. The DUT must forward the Echo Reply from TAR-Node2 to TAR-Node1.
4.	The TAR-Node1 transmits an ICMPv6 Echo Request to TAR-Node3 site local address.	The DUT must forward the Echo Request from TAR-Node1 to TAR-Node3. The DUT must forward the Echo Reply from TAR-Node3 to TAR-Node1.

Possible Problems: None.

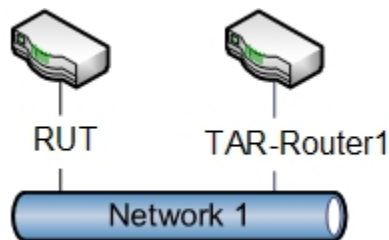## Test AddrInterop.2.3: IPv6 Prefixes greater than 64-bits (Router Only)

Purpose: To verify that a router properly supports the assignment of /127 prefix on point-to-point inter-router links and routing prefixes greater than 64-bits.
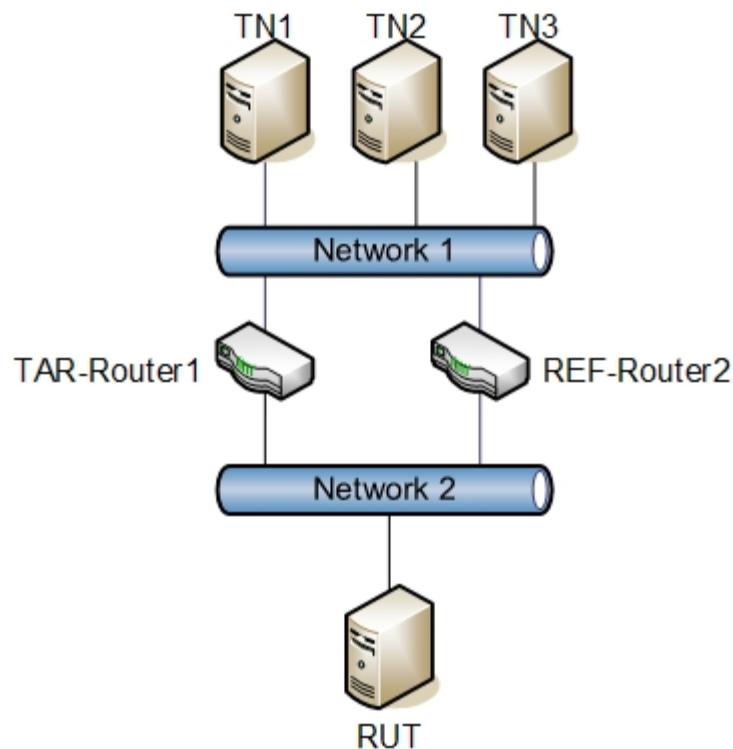
Reference:
- [RFC 6164] – Section 6
- [RFC 7608] – Section 2

Test Setup:
PART A:

PART B:

Procedure:

Part A: Subnet Anycast address

Step	Action	Expected Behavior
1.	Configure the RUT to have a point-to-point link with a /127 prefix by adding the address 2001:2:0:1000::1271/127 to its Network 0 interface.	
2.	Configure TAR-Router1 to have a point-to-point link with a /127 prefix by adding the address 2001:2:0:1000::1270/127 to its Network 0 interface.	The RUT must not send a DAD Neighbor Advertisement when TAR-Router1 sends a DAD Neighbor Solicitation for the Anycast address.
3.	Remove both addresses from the DUT and TAR-Router1.	
4.	Configure the TAR-Router1 to have a point-to-point link with a /127 prefix by adding the address 2001:2:0:1000::1271/127 to its Network 0 interface.	
5.	Configure the RUT to have a point-to-point link with a /127 prefix by adding the address 2001:2:0:1000::1270/127 to its Network 0 interface.	TAR-Router1 must not send a DAD Neighbor Advertisement when the RUT sends a DAD Neighbor Solicitation for the Anycast address.

Part B: Routing /96

Step	Action	Expected Behavior
6.	Configure the DUT to have a route with a prefix length of /96 to TAR-Router1. A default route should be configured to REF-Router1.	
7.	TAR-Node1 is configured to have an address which matches the /96 route except for the last bit.	
8.	TAR-Node2 is configured to have an address in the /96 route.	
9.	TAR-Node3 is configured to have an address in the /96 route, which has the 97th bit set to 1.	
10.	Configure the RUT to transmit an Echo Request to TAR-Node1.	The DUT must transmit the Echo Request using REF-Router2 as its next-hop.
11.	Configure the RUT to transmit an Echo Request to TAR-Node2.	The DUT must transmit the Echo Request using TAR-Router1 as its next-hop.
12.	Configure the RUT to transmit an Echo Request to TAR-Node3.	The DUT must transmit the Echo Request using TAR-Router1 as its next hop.

Possible Problems: A passive node does not implement an application for sending Echo Request. Part B may be omitted if the DUT is a passive node.

Modification Record

Version 3.0   December 11, 2020
- Added temporary address test (1.2d)
- Added prefer next hop test (1.2e)
- Added IPv6 Prefixes greater than 64-bits tests (2.3a-b)

Version 1.4   January 31, 2020
- Updated to use IPv6 Benchmarking Prefix (RFC 5180) for all specified address.
- Removed IPv6 Mobility Test Cases (1.2C, 1.3B).
- Removed test case due to the use of link-local addresses in the DNS (1.3C).
- Moved Modification record to the end of the document.
- Removed DNS Server from Topology 1.
- Updated format.
- Updated pictures per test case.

Version 1.3   July 28, 2010
- Added Test Topology to documents
- Added three interoperability partners to every test case.
- Allow passive nodes.
- Removed multicast scope from 1.1.
- Removed public address test case from 1.2 due to inability to run this test case.
- Allow for devices that only support one global address.
- Added reference to RFC 4291 in test 1.1.

Version 1.2   November 11, 2009
- Organized Test Cases by RFC.
- Broke 1.2 parts into 1.3,1.4,1.5
- Added Router Test Cases

Version 1.1   July 13, 2009
- Corrected Table of Contents
- Corrected Observable Results in test 1.2.

Version 1.0   April 24, 2009
- Initial Version.