LXI IPv6 Test Procedures

Revision 1.0

Feb 20, 2012

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Revision history

Revision	***Description***
Feb 20, 2012	Initial release.

21 LXI IPv6 Extended Function Test Procedure

21.1 Introduction (or Overview)

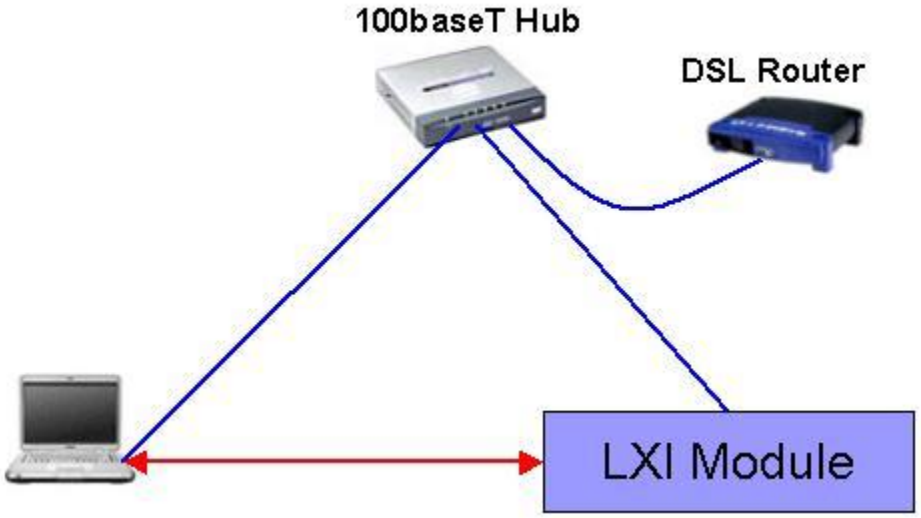
The LXI IPv6 Extended Function Test Procedures define the set of tests that an LXI device implementing LXI IPv6 must pass to claim compliance with the LXI IPv6 Extended Function rules and recommendations.

21.2 Required Hardware

The testing for the LXI IPv6 Extended Function requires an IPv6-compatible router which supports configuration to disable automatic configuration of global IPv6 addresses, configuration to enable router advertisements for SLAAC stateless global addresses, and configuration to enable DHCPv6-assigned global addresses.

Conformance testing will be done using a Dlink DIR-825 router, which supports all the above modes.

The test network will resemble the current test network, with the Dlink DIR-825 replacing the Linksys WRT54G router.



- The DSL router above is a Dlink DIR-825 for IPv6 testing (it can be used for IPv4 testing as well).
    - IPv4 starting configuration:
        - IP address 192.168.1.1
        - DHCP address range 100…110. This will change during testing.
        - Set the DNS server to 192.168.1.1
    - IPv6 starting configuration:
        - Static WAN IP Address: 2000:1::218:e7ff:fefe:3720 (suffix is the mac address, will be different for other DIR 825's)
        - Prefix length 64
        - Default Gateway: 2000:1::1
        - IPv6 DNS Server: 2000:1::1
        - LAN address 2000:2::123
        - Enable Auto IPv6
        - Autoconfig type SLAAC + RDNSS (this will change as testing is done)
        - Router Advertisement lifetime: 5 minutes

- Typically, the 100baseT hub has been a Netgear DS104. It must be a true hub, not a switch, so all traffic goes to all nodes.
- Monitoring computer: typically this has been a laptop with Windows 7 x64 as the OS with the LXI Conformance Test Suite installed. It's LAN configuration is:
    - IPv4
        - Static IP address 192.168.1.99
        - Subnet mask 255.255.255.0
        - Gateway 192.168.1.1
    - IPv6
        - Static IPv6 address 2000:2::500
        - Prefix length 64
        - Gateway 2000:2::123
        - IPv6 DNS Server 2000:2::123

Note: for LXI Precision Time Extended Function testing, there is also an IEEE 488 hardware clock attached to the 100baseT hub. The LXI IXAAT clock is used for this purpose.

21.3 Test Procedure

Note: while a number of the rules could be part of an automated test, initially they will be done manually as described in the Test Methodology.

Rule Number	Rule Name (Title)	Test Type (pick one)	Test Methodology (procedure and expected results for a pass condition)	Notes
21.1.1	Rule – IPv6 Network Stack Compliance	Vendor Certification (manual test)	Vendor certifies the device OS has an IPv6 compliant LAN stack.	
21.1.2	Rule – Interoperate with IPv4 networks	Automated test	Computed. Enable IPv4 and IPv6 on the test network. Pass if all IPv6 tests below pass.	
21.1.3	Rule – IPv6 Instrument Control Connections	Automated test	Make a connection via the vendor declared IPv6 control protocol (HiSLIP or SCPI Raw) . Pass if connection is established successfully.	
21.1.6	Rule – IPv6 HTTP Web Access	Operator Observation (manual test)	Using Internet Explorer, enter the device IPv6 address in square brackets. If the device welcome page appears, pass the test.	
21.2.1	Rule – Create a Link-local address	Automated test	Observe whether the device obtains a link-local address by seeing if a link local address is displays on the Welcome page. Pass if this link local address can be used to access the device (via ping).	

21.2.2	Rule – Support Stateless Address Autoconfiguration (SLAAC)	Automated test	Set IPv6 router to do SLAAC autoconfiguration. Observe whether the device obtains a stateless global IPv6 address. Pass if this global address can be used to access the device (via ping).	Might use Identification XML for automated test.
21.2.3	Rule – Stop using the router assigned IP Address if the valid lifetime lease not renewed	Automated test	Set IPv6 router SLAAC lifetime to 5 minutes. Disconnect and reconnect the device so it gets a new stateless global address. Disable autoconfiguration in the IPv6 router. Wait 5 minutes (this causes the global address to enter the deprecated state). Pass if the device welcome page stops displaying the deprecated stateless global address.	Might verify using Identification XML for automated test. (Might want to do this test after DHCPv6 tests…SLAAC addresses seem to stick around a long time)
21.2.7	Rule – Stop using the DHCP assigned IP Address if the valid lifetime lease not renewed	Automated test	If the device supports DHCPv6, set the IPv6 router to use DHCPv6 for autoconfiguration, with a lifetime of 5 minutes. Cause the device to obtain a stateful DHCPv6-supplied global address (ex: disconnect and reconnect the device). Disable autoconfiguration in the IPv6 router. Wait 5 minutes. Pass if the device welcome page stops displaying the deprecated stateful global address.	Might verify using Identification XML for automated test.
21.2.8	Rule – Honor New DHCP Options at Lease Renewal	Automated test	If the device supports DHCPv6, set the IPv6 router to use DHCPv6 for autoconfiguration. Cause the device to obtain a stateful global address via DHCPv6. Change the address range the IPv6 router will assign. Wait 5 minutes. Pass if the device welcome page displays a stateful global address in the new range.	Might verify using Identification XML for automated test.
21.2.9	Rule – Selection of IP Configuration Modes	Operator Observation (manual test)	If the device supports static IPv6 addresses, bring up the Lan Configuration web page for IPv6 and pass if there are either ‘Automatic/Manual’ or a ‘SLAAC/DHCP/Static’ configuration options. Note: devices can support just ‘SLAAC/DHCP’ configuration options as well.	

21.2.11	Rule – Privacy Setting Disabled by Default	Automated test	If the device supports enabling the IPv6 privacy setting, enable it. Perform a LAN reset (LCI). Pass if the privacy setting reverts to disabled.	Might verify using Identification XML for automated test by checking the global address has the MAC address.
21.3.1	Rule – Display Link-local Address	Operator Observation (manual test)	Pass if it displays the link-local address on the Welcome Web page and on the front panel, if present.	
21.3.2	Rule – Display a minimum of one other Preferred Address	Operator Observation (manual test)	Enable SLAAC in the IPv6 router so a stateless global IPv6 address is generated by the device. Pass if the device displays a global, perferred IPv6 address on the Welcome page and the front panel, if present.	
21.4.1	Rule - Support Multicast DNS	Operator Observation (manual test)	Disconnect the device from the LAN. Start Wireshark capturing mDNS packets (port 5353) on the monitoring PC (see LAN test setup).. Connect the device to the LAN, and Pass if it broadcasts mDNS packets including a AAAA record with the IPv6 address of the device.	
21.4.2	Rule – Support mDNS on IPv6 only networks	Operator Observation (manual test)	Start Wireshark capturing mDNS packets (port 5353) on the monitoring PC. Connect the device to the LAN, and Pass if it broadcasts IPv6 mDNS packets including AAAA record, SRV, and TXT records for LXI Services. (alternately, filter for udp.dstport == 5353 in the display filter)	Apple mDNS responder implementation only broadcasts on IPv4 by default.
21.5.1	Rule – ICMPv6 Ping Reply	Automated test	From the monitoring PC, ping the device using its link-local IPv6 address and its global IPv6 address. Pass if both ping probes get responses from the device.	
21.5.4	Rule – ICMPv6 Echo Reply Enabled by Default	Operator Observation (manual test)	If the device supports disabling ICMPv6 Ping Reply, disable it. Do a LAN Reset (LCI) on the device. Pass if ICMPv6 Ping Reply is now enabled.	

21.6	Rule – Duplicate IP Address Detection	Automated test	If the device allows setting a static IPv6 address, set it to the some IPv6 address.Disconnect the device from the LAN and set the monitoring PC to use that same address. Connect the device. Pass if it stops using the duplicate static address immediately.	
21.8	Rule – Provide an Error Indicator for LAN Configuration Faults	Automated test	1. Disable autoconfiguration on the IPv6 router. 2. Power up the device with no LAN connection. 3. LAN status must be Fault. 4. Connect it to that router. 5. LAN status must be Nofault (normal). 6. Enable SLAAC autoconfiguration on the IPv6 router with a 5 minute lifetime. 7. Observe the device gets a global IPv6 address. 8. LAN status must be Nofault. 9. Disable autoconfiguration on the IPv6 router. 10. Wait 5 minutes until the global IPv6 address is deprecated and disappears from the Welcome page (via IPv4…). 11. LAN Status must be Fault. 12. Do a LAN Reset (LCI) on the device. 13. LAN Status must be Nofault. 14. Activate Identify on the device. 15. LAN Status must be Identify. 16. Deactivate Identify on the device. 17. LAN Status must be Nofault. 18. Enable SLAAC autoconfiguration on the IPv6 router with a 5 minute lifetime.	This assumes IPv4 address configuration is okay (Nofault) throughout the test after connection. It may work if the device has a separate IPv6 LAN status too, but only testing will confirm that.

			19. After a global IPv6 address is displayed by the device, LAN Status must be Nofault. 20. Disable autoconfiguration on the IPv6 router. 21. Wait 5 minutes until the global IPv6 address disappears from the device Welcome page. 22. Lan Status must be Fault. 23. Disconnect the device from the LAN. 24. Lan Status must be Fault. 25. Connect the device to the LAN. 26. LAN status must be Nofault. 27. Pass if all LAN Status checks match the above.	
21.8.1	Rule – Combined IPv4 and IPv6 LAN Status Indicator	Automated test	See 21.8	
21.8.2	Rule – IPv6 Link-Local address is not an error condition	Automated test	Tested by 21.8 test.	
21.8.5	Rule – LAN Status Indicator enabled by default for both IPv4 and IPv6	Automated test	If the device allows disabling the IPv6 LAN Status indicator, disable Ipv6 LAN Status indicator, cause a lost-lease IPv6 address fault, and observe the LAN Status still says Nofault. Do a LAN Reset (LCI). Cause a lost-lease IPv6 address fault. Pass if the LAN status is now Fault.	
21.9	Rule – LAN Configuration Initialize (LCI)	Operator Observation (manual test)	On the LAN Configuration page, set each parameter to the opposite of the LCI state, then request LCI and verify that the LCI state is displayed. Pass if all LCI states are verified.	
21.11.1	Rule – Implement all Rules in the Web Interface Section	Operator Observation (manual test)	Defer to LXI 1.4 Section 9 tests.	

21.11.2	Rule – Include ‘LXI IPv6’ in Welcome Web Page “LXI Extended Functions”	Operator Observation (manual test)	Pass if ‘LXI IPv6’ appears in the LXI Extended Functions field.	
21.11.3	Rule – Show LinkLocal and Preferred IPv6 Addresses on Welcome Web Page	Operator Observation (manual test)	Pass if the Welcome page displays the IPv6 Link-local address and at least one preferred IPv6 global address. (latter with SLAAC autoconfiguration enabled on the IPv6 router)	
21.11.6	Rule – Show Static IPv6 Settings on LAN Configuration Web Page	Operator Observation (manual test)	If the device supports static IPv6 mode, Pass if the LAN Configuration page shows IPv6 configuration fields for IPv6 Configuration Mode, IPv6 Address, Subnet Prefix Length, Default Gateway, and DNS Server(s).	
21.11.8	Rule – Show Mode as 'Disabled' and Blank or '-' fields for disabled IP Protocol	Operator Observation (manual test)	If IPv4 is disabled, verify IPv4 address field is present but blank or ‘-‘ on Welcome and LAN Configuration pages. Verify the LAN configuration page says ‘Disabled’ as the state of IPv4. If IPv6 is disabled, verify IPv6 address field is blank or ‘-‘ on Welcome and LAN Configuration pages. Verify the LAN configuration page says ‘Disabled’ as the state of IPv6. Pass if all verifications pass.	
21.12.2	Rule – Support IEEE-1588 via UDP over IPv6 for the Link-Local Scope	Operator Observation (manual test)	If the device supports IEEE 1588 over IPv6, enable that support on the LXI Sync web page. Use Wireshark to observe the device sends 1588 messages via IPv6 UDP for the link-local scope of FF02/16. Pass if these messages result.	
21.12.3	Rule- Support selecting IPv4 or IPv6 for IEEE-1588	Operator Observation (manual test)	If the device implements LXI Clock Synchronization and LXI IPv6 and supports using UDP over IPv6 for the IEEE-1588 protocol, pass if the LXI Sync page permits selecting IPv4 or IPv6 for IEEE-1588 use.	
21.12.4	Rule - Show IPv6 Addresses on Sync Web Page if using IPv6	Operator Observation (manual	If the device supports IEEE-1588 over IPv6 and IPv6 is selected, pass if all addresses	

		test)	appearing on the Sync Web page are IPv6 addresses.	
21.13.2	Rule – Use IPv6 Multicast Address and Port Number	Operator Observation (manual test)	If the device supports IPv6 LXI Event messages, configure the device to receive a multicast IPv6 LXI event using FF02::138 and port 5044. Send this event to the device and verify it sees it. Configure the device to send a multicast IPv6 LXI event using the same address and port. Cause the device to send the event, and verify it uses address FF02::138 and port 5044. Pass if all verifications pass.	We'll need a tool to send and receive IPv6 LXI events.
21.13.3	Rule – Support IPv6 Address in Square Brackets in IviLxiSync Interface.	Vendor Certification (manual test)	Pass if vendor-supplied IviLxiSync interface accepts IPv6 addresses inside square brackets anywhere host numbers can appear in that interface.	IVI-3 15_LxiSync standard really needs to define what a 'host number' can look like. It doesn't specify either IPv4 or IPv6 formats or any format, actually. The surrounding syntax precludes use of ',', '/', and ':', however. Using square bracketed IPv6 addresses disambiguates use of ':' in IPv6 addresses.
21.14.1	Rule – Support IPv6 access to Identification XML Document	Automated test	Pass if the LXI identification xml can be retrieved using the IPv6 address of the device in square brackets in the URI <hostaddress>\lxi\identification.	
21.14.2	Rule - Include LXI IPv6 Address in <Interface>	Automated test	1. Configure the IPv6 router to autoconfigure a SLAAC global address. 2. Verify there is an <interface> element in the LXI Identification XML with IPType="IPv6" and an <IPAddress> subelement with a global IPv6 address. 3. Configure the IPv6 router	

			to disable autoconfiguration and wait for the device to stop showing a global IPv6 address. 4. Verify there is an <interface> element in the LXI Identification XML with IPType="IPv6" and an <IPAddress> subelement with a link-local IPv6 address. 5. Pass if all verifications pass.	
21.14.3	Rule – IP Type is "IPv6"	Automated test	Verified by 21.14.2	
21.14.5	Rule – Include LXI IPv6 Address in <Gateway>	Automated test	Pass if the <Gateway> element in the IPv6 <Interface> element has an IPv6 address.	
21.14.6	Rule - Show LXI Prefix length in <SubnetMask>	Automated test	Pass if the <SubnetMask> element in the IPv6 <Interface> element shows the prefix length.	
21.14.7	Rule – Include the LXI IPv6 Function in the <LxiExtendedFunctions> element	Automated test	Pass if the <LxiExtendedFunctions> element includes a <Function> element with the value "LXI IPv6" (without quotes).	

21.4 Automated Test

TBD

21.5 Issues

No worries