

# IPv6 Interoperability Testing and the IPv6 Ready Logo Program

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# Overview

- Understanding the Interoperability Problem
- Solving the Interoperability Problem
- The role of the UNH InterOperability Lab
- The IPv6 Ready Logo Program
- The Application



# Interoperability Failures

- Pushes out market acceptance of new technologies
- Increases support cost
- Opens windows of opportunity for alternative solutions
- Does not enhance the reputation of a product

# The meaning of Interoperability

- Plug and play operation independent of who provided the product
- Works in the users environment
- Works with the users applications

# Foundational Issues

- How is interoperability achieved?
- How is interoperability demonstrated to the marketplace?

# Key #1 The Standard

- The standard is the foundation of interoperability. Interoperability problems will exist unless:
  - The standard clearly and fully specifies external behavior
  - The standard limits options
  - The standard addresses market needs
  - The standard achieves sufficient developer support and is considered authoritative



# Key #2 Technical Testing

- New technologies, like new products, have bugs. Test procedures must be available which show that the :
  - External behavior of the product is consistent with the standard
  - Product works with other products in different configurations
  - Product works with common applications



# Key #3 Reference Environment

- Practical concerns make it necessary to maintain a common center in which interoperability testing and feedback can occur
  - Group interoperability test events, or “plug-fests” are necessary to expose issues.
  - A common site (or sites) is needed where multiple implementations of the standard are available for testing
  - Developers must be able to have testing done without exposure of unannounced products or test results



# Key #4 An interoperability metric

- An accepted definition must exist that shows when a product is interoperable
  - A test report that may be distributed by the owner of the product within the development community
  - testing must cover both conformance and interoperability items

# The Marketing Issues

- Cooperation must be achieved between developers
- Interoperability intent and achievement must be demonstrated to the public
- Testing needs can not significantly delay product introductions
- The interoperability metric must be effective to be accepted

# The Process

- Creating structure to focus industry effort and obtain support
- Develop testing tools and technology
- Establish reference center
- Coordinate demonstrations that show interoperability
- Establish a visible interoperability metric



# What is the UNH-IOL

- Interoperability “facilitation” organization
  - Part of the University of New Hampshire
  - Develops customized solutions and provides testing and consulting services
  - Helps coordinate interoperability efforts within the industry
  - Provides technical experience for university students



# Technological Applications

- IPv6 Protocols
- Ethernet
  - 10Base-T
  - Fast Ethernet
  - Gigabit Ethernet
  - 10Gigabit Ethernet
  - Power over Ethernet
- ADSL and SHDSL
- Ethernet Bridging
  - Spanning Tree and VLANs
- IPv4 Routing
  - OSPF, BGP and IS-IS
  - RIP and VRRP
  - Multicast Routing
- Storage Area Networks
  - Fibre Channel and iSCSI
  - Serial Attached SCSI
  - Serial Attached ATA
- 802.11 Wireless
- Voice over X



# The IPv6 Forum

- A world-wide consortium of leading Internet vendors, Research & Education Networks
- A clear mission to promote IPv6 by
  - Dramatically improving the market and user awareness of IPv6
  - Creating a quality and secure Next Generation Internet and allowing world-wide equitable access to knowledge and technology
  - Embracing a moral responsibility to the world.



# The IPv6 Logo Program

- Equipment that meets a certain set of requirements may qualify for an IPv6 Ready logo that is sponsored by the IPv6 Forum
- A formal application process is in place. The equipment vendor applies for a logo with their regional officer (which is NICI).

# The IPv6 Logo Program: Phase I

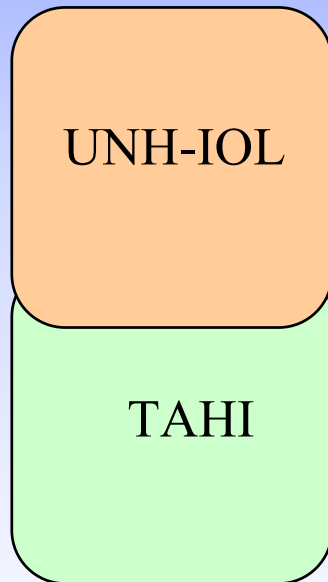
- In the first stage, the Logo will indicate that the product includes IPv6 mandatory core protocols and can interoperate with other IPv6 equipment
- Based on the TAHI test suite or participation in Moonv6 Phase I
- Light set of tests to ensure a device can pass an overview of tests



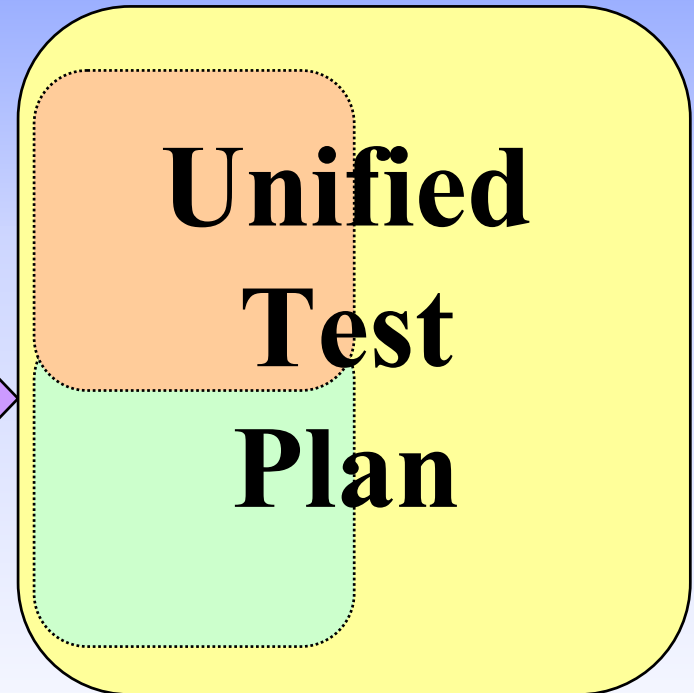
# The IPv6 Logo Program: Phase II

A “Unified” test suite for the IPv6 Base Specifications both UNH and TAHI are the primary authors of the first draft of this document.

Phase I Test Content



Phase II Test Content



# The IPv6 Logo Program: Phase II

- Phase II is working on a base specification test plan to include:
  - Technical consensus and clear technical references. The IPv6 ready logo will indicate that a product has successfully satisfied the strong detailed requirements stated by the IPv6 Logo Committee.
  - To avoid confusion, the logo "IPv6 Ready" will be generic. The IPv6 Logo Committee will define the test profiles with associated requirements for specific functionalities.



# What is the Project plan for Phase II?

- The test plan will go into public review next week (April 9<sup>th</sup>).
- Following 4 weeks of public review, the comments will be merged with the base document.
- The objective is to have a finalized IPv6 Ready Phase II test plan completed in August.

# Additional IPv6 Logo Committee Projects

- SNMP testing is being developed by the NICI labs
- TAHI is working with equipment vendors on IPSec
- TAHI is working on Mobile IPv6 Tests

# The Application of the IPv6 Ready Logo Test Plan



# Generic Application Fundamentals

- The work begins with a single standard or a set of standards (IPv6 RFCs, such as 2460, 2461, 2462, 2463)
- Collaborate with industry to write a basic set of conformance tests and interoperability scenarios. In the case of IPv6 this started in 1995. The focus at that time was the ND interaction between hosts and routers.



# Take Theory to Reality

- Acquire a set of products that implement the standard or set of standards
- Connect them in interoperability scenarios, ensure that the behavior is consistent with the standard and the theoretical expectations documented in the draft test plans
- Update draft test plans with new observations

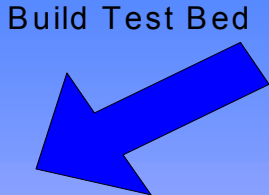
# Establish Test Center

- Acquire test equipment and build software or hardware test tools
- Implement conformance test plans and test against real products
- Continuously update theoretical test documents and update test implementations
  - This is resource intensive, but results in the best test scenarios

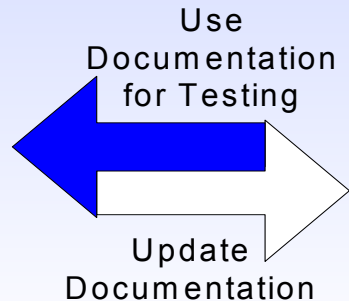
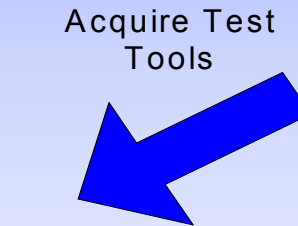
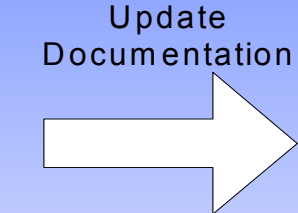
Industry Standard



Study Real Interoperability Scenarios with primitive analyzer devices



Offer Testing



Theoretical Test Documentation



# Summary

- Addressing the interoperability problem requires
  - A good standard
  - Detailed test documents for technically focused testing
  - An interoperability reference center and interoperability test procedures
  - A meaningful interoperability metric

# Resource Requirements

- To implement this in your lab, you will need:
  - The appropriate standards
  - Clear test documentation
  - Engineers that collaborate with industry
  - Real implementations
  - Test tools

