

IETF IPv6 standardization status

IPv6 standardization status in the IETF IPv6 standardoinnin tilanne IETF:ssä

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What is the IETF?

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- The (an?) Internet standardization body

- Has produced a lot of standards about Internet Protocol
 - ▷ IP, UDP, TCP, BGP, OSPF, etc.etc. -- almost all the core protocols
- Basically an SDO, but there's much more to it as well..

- From an unofficial (yet) mission statement

- Goal

- ▷ Make the Internet work

- Mission

- ▷ Produce high quality, relevant technical and engineering documents that influence the way people design, use and manage the Internet in such a way as to make the Internet work better.
- ▷ These documents include protocol standards, best current practices and informational documents of various kinds.

- Principles in pursuing the mission

- ▷ Open process -- anyone can participate
- ▷ Technical competence
- ▷ Volunteer core
- ▷ Rough consensus and running code

IPv6 standardization status

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- Context: IETF started defining IPv6 about 10 years ago
 - Serious work during the last 5-6 years
 - Extremely serious work during the last 2-3 years

- Specifications could be divided in four
 - IPv4 features supported in IPv6
 - ▷ Status very good
 - Inherent IPv6 features
 - ▷ I.e., features only in IPv6
 - ▷ Excellent status
 - Features in IPv4 we don't want to support in IPv6
 - ▷ .. but may require some work to replace them, e.g., NATs, "private addressing"
 - ▷ Work underway, but not complete yet
 - Transition/co-existence mechanisms between IPv4 and IPv6
 - ▷ I.e., "how to make deploying IPv6 easy?"
 - ▷ Work still needed, but good basic support exists already

IPv6 standardization status (1)

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- IPv4 features to be supported in IPv6
 - IETF has required IPv6 functionality in all specs in the last 5 years
 - ▷ Very strongly in the last 2-3 years
 - New protocols always support IPv6; old protocols have been revised to handle IPv6
 - Recently, work was finished going through IPv4 dependencies
 - ▷ draft-ietf-v6ops-ipv4survey-*
 - ▷ No substantial items were identified

IPv6 standardization status (1.5)

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□ Non-substantial items identified

○ Network Time Protocol (NTP)

- ▷ Draft is out there, implementations exist, so not a practical problem
- ▷ SNTP already there

○ Use of address literals in URLs/URIs

- ▷ I.e. `http://[2001:db8::1]/index.html`
- ▷ Affects a few applications like RTSP and SDP (fixes in the works)
- ▷ Use square brackets

○ Some obsolete media, no longer needed

- ▷ IP over HyperChannel, NetBIOS, SMDS, HIPPI..

○ MIB work for management almost complete

- ▷ New versions of IPv6, TCP and UDP MIBs

○ IS-IS IPv6 support

- ▷ Approved and implemented; no practical problem

○ VRRP IPv6 support

- ▷ Nearing completion..

○ GRE tunneling

- ▷ Implementations OK, but no formal spec

IPv6 standardization status (2)

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- Inherent IPv6 features i.e. no direct IPv4 counterparts
 - IPv6, ICMPv6, IPv6 Neighbor Discovery ("ARP"), etc.
 - ▷ Mature; Draft Standard
 - Mobile IPv6
 - ▷ Approved and interoperable
 - IPv6 Flow Label
 - ▷ Basics to "how to make QoS (slightly) easier than IPv4"
 - ▷ Published
 - Secure Neighbor Discovery
 - ▷ Almost done
 - A simplification to IPv6 Multicast with PIM-SM ("Embedded-RP")
 - ▷ Almost final, implementations already out there
 - .. all in all, "core IPv6" specifications also in good shape

IPv6 standardization status (3)

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- Undesirable IPv4 features, need other methods
 - Network Address Translators (NATs)
 - ▷ But users use them anyway
 - ▷ We need to figure out how to give the functionality they want without the drawbacks
 - ▷ E.g., boxes which disallow incoming connectivity by default
 - ▷ Primarily a deployment/implementation, not standardization issue
 - Site Multihoming
 - ▷ E.g., an enterprise with PI address space, connecting to two operators
 - ▷ Unscalable form of multihoming: global routing table churn
 - ▷ Work has been progress to find other means
 - Private Addressing (10.0.0.0/8, etc.)
 - ▷ Used for stable internal connectivity, and intermittent connectivity
 - ▷ Unique local addressing in the works
 - ▷ Not necessarily all that attractive if no NAT?

IPv6 standardization status (4)

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- Transition/co-existence with IPv4 and IPv6
 - Goal is to make deploying IPv6 easy
 - "Implement IPv6 on every router and host; when done, use it" is not enough
 - Note: we're not moving from IPv4-only to IPv6-only
 - (At least in the short term..)
 - But adding IPv6 on the side of IPv4, to be used as appropriate
 - Already specified or in the works
 - Configured tunneling of IPv6 over IPv4
 - NAT-PT (but use is discouraged!); a few others not applicable in mainstream
 - 6to4 -- automatic tunneling between public IPv4 addresses
 - IPv6 over an IPv4 MPLS network ("6PE")
 - Still needed and in the works (more or less)
 - Teredo (automatic tunneling between private IPv4 addresses)
 - Tunnel server/broker (to be used by ISPs offering tunneled IPv6 service to customers)
 - Note: automatic tunneling is important
 - More on the next slide

IPv6 standardization status (4.5)

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□ Transition/co-existence with IPv4 and IPv6

○ Support requirements from the ISPs

▷ ISP may not support (native) IPv6, user must be able to use tunneling to get it

○ We must create an environment that every user has IPv6 capability

▷ .. Whether supported by his/her ISP or not

▷ To break the chicken-and-egg problem: we need IPv6(-only) applications

▷ Otherwise, there will never be incentive to **really** go for IPv6

○ To achieve that, hosts need to be IPv6-capable by default

▷ Globally, IPv6 deployment is still very early, so tunneling is required

▷ Tunnel brokers not scalable enough

▷ Direct tunneling between IPv6 nodes is required if tunnel/native access not available

▷ E.g. 6to4 (public IPv4 addresses) or Teredo (NATted IPv4 addresses)

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□ Conclusions

- IPv6 standardization has been quite mature for long time
 - (Implementations are also far long.)
- The status is very good
 - Starting to use IPv6 (alonside of IPv4) has been possible for long time now
 - Just waiting for YOU to deploy it :-)
- The point of IPv6 is to use it alongside of IPv4
 - .. Not to replace IPv4 (in the short time at least)
 - To enable new kinds of applications and deployments
- Some deployment issues for special cases need fine-tuning
 - But this is not blocking serious deployment

□ Comments, questions, etc.

- Shoot!