Technical Programme
to support IPv6 Interoperability events

Version 2, June 2002

This document provides a starting point for discussion on the definition of a technical programme including a list of conformance and/or interoperability tests on IPv6 and related protocols that should be provided during IPv6 interoperability events such as, amongst others, those scheduled in 2002 and 2003 by the ETSI Interoperability Service.

This document invites for comments and contributions.

All information and downloading of specifications can be found (soon) at www.etsi.org/plugtests/IPv6

Disclaimer: We do not claim that information given in this document is accurate and exhaustive.

History

Document history		
V0.0	28 March 2002	Main inputs from IRISA/ENST –S. Barbin, F. Roudaut, C. Viho, O. Medina, A. Minaburo, D. Ros, F. Dupont and L. Toutain
V1	25 April 2002	Overall design, review of inputs -Philippe COUSIN, ETSI
V2	19 June 2002	Update information . Philippe COUSIn ETSI
V2.1	20 June 2002	Added UNH-IOL sections –Gerard Goubert, UNH-IOL

1. Introduction

The needs in trials for supporting and deploying IPv6 has actively been studied by the IPv6 Task Force [see reports at www.ipv6tf.org] where recommendations have been included in the recent European Commission communication on "Next Generation Internet – priorities for action in migration to the new Internet protocol IPv6" COM(2002)96final which called Industry to "*support and fully participate in Interoperability events organised, including those by ETSI*"

The rationale as drafted by the IPv6Forum in its "Trials Framework Group Report" is the following:

Every new technology must evolve from development to deployment through a trial-and-acceptance stage. The supporters of this trial stage are usually the developers of the new technology (manufacturers), researchers, large corporations interested in the early adoption, or institutions on behalf of the benefiting communities. Technology manufacturers rely upon this stage to move from simulation to final product, from laboratory to the market.

However, the evolution of current Internet infrastructures to the new IPv6 protocol prompts operators to embark on projects with profound implications and transformations on the existing network architectures. Adding these implications to the demand for specialised resources, costly early-adopter risk factors, and a long investment-to-return cycle, makes this migration a very high investment for an operator and/or manufacturer to incur alone.

The combination of the above constraints generates, at the current stage, a cyclic impasse, whereby the developer cannot deploy without a field trial, and the recipient cannot support the field trial alone.
These constraints are understandable in the light of the evolution in large common infrastructures, used by the public community today. As with the railways, bridges, or telephone systems, these infrastructural progresses are very broad in scope, and therefore not wholly containable in the laboratory. Also, having wide communities as potential recipients, these projects need to be born out of partnerships between the scientific community, the manufacturers, the operators, and the governments, on behalf of the common welfare.

[IPv6 Task Force] *Recommendation – As one efficient way to pool expertise and benefit from collective test beds, it is encouraged to support the setting up of interoperability events in particular organized by a neutral organization such as those organized by ETSI and supported by the eEurope initiative. These events are an opportunity for engineers from competing organizations to meet together in a commercially secure environment, to share experiences and improve interoperability between their implementations.*

This document, then, aims to define a technical programme for supporting IPv6 interoperability events.

2. The Technical context and need for coordination

Interoperability events used to be organised in a very simple and pragmatic way where all participants are invited to come to the events and check that their IPv6 implementation interoperate with others.

When the event is gathering limited number of companies (e.g. less than 20) with homogeneous system (i.e. implementing same features), a simple and pragmatic event using a "free style" approach might bring some benefits. But when attendance to events grows with products implementing different and complex features, **test plan and test services must be organised**. This is one of the objectives of this technical programme.

Secondly, while it should be important for companies to come to interoperability events and work with others in a coordinated way, due to business pressure, this should be organised in the most efficient way leading to **cost savings and time-to-market efficiency for companies**. Resources to test and validation are very important within companies and it would be wasting money either not doing tests risking having non interoperable product, getting products back from market or to develop test platforms, test cases when many partners including many independent organisations are freely bringing tools and expertise on the market on the same topic. However those experts are, in some case, working on the same sub-topics and such overlap is counter-effective. The second objective is then on the one hand to identify what the market needs in term of validation and testing and when (as timing is important) and on the other hand to **organise the development of the necessary test services**. This would **avoid redundant works and pool all the voluntary efforts together** leading to save time and money for putting qualified product on the market.

Finally attention should be pay on the right methodological and technical approaches used for improving interoperability and on the enough preparation and deep analysis that the participant should do before coming to the events. Long debates have taken place in committees and still continuing on the methodologies used to ensure interoperability between products We can mention, for instance, the ETSI TC MTS (Technical Committee – Methods for Testing and Specifications). Experience has been proven that deep check of complex implementation using exhaustive conformance test scenarios are very useful and ensure a large extent of interoperability issues. In the past and in some telecommunications this approach was considering the only valuable one. But this approach was long and costly while in some cases , pragmatic tests in interoperability events brought high cost-effective value to participants. Looking at some industrial forum (DSL Forum, GCF, Bluetooth, ..) they are developing a qualification programme combining the benefit of “deep” conformance testing and “pragmatic” interoperability testing organised in Plugfest. The market is now looking for the most **efficient combination of both approaches Conformance and Interoperability testing**, this programme is supporting.

To sum up the objectives of coordinated interoperability are:

- Define the needs and the market-accepted test plans for the interoperability events;
- Organise availability of global, freely accessible tests scenarios and tools identified in the test plan;
- Provide efficiency and then cost and time saving to participating companies in pooling resources together rather having overlapping developments but also in providing the most efficient testing/validation services to ensure high confidence level on IPv6 implementations;
- The ultimate objective is support successful IPv6 deployment and businesses for companies developing IPv6 compliant products or just using it.

3. The 2002-2003 programme of events

Interoperability events brought opportunities for engineers from competing organizations to meet together in a commercially secure environment, to share experiences and improve interoperability between their implementations.

The interoperability events dedicated to IPv6 are the following:

What	Acronym	When	Where
TAHI Interoperability event	T2002	January 2002	Yokohama-Japan
Connecthaton 2002	C2002	March 2002	San Jose -US
3rd ETSI IPv6 Plugtests	P2002	September 2002	Cannes -France
Euro6IX interoperability event	X2002		
Connecthaton 2003	C2003		
4th ETSI Ipv6 Plugtests	P2003	September 2003	Brussels -Belgium

4. Document's editor and partners

This programme invites partners to contribute to the development of freely IPv6 available test cases (called CONTRIButor) or to bring their test expertise with test suites and tools at the event (call EXPERT).

We listed here below partners known as having available expertise such as those which already participated to IPv6 testing events:

The Technical programme coordinator/moderator is Philippe Cousin, the ETSI Interoperability Service Manager, email : Philippe.cousin@etsi.fr

The technical programme's editor is Cesar Viho from G6test – IRISA email: cesar.viho@irisa.fr

Programme Participant	Full Name	Status	website
Plugtests	ETSI Interoperability Service	COORD	www;etsi.org/plugtests
UNH/IOL ((US)	University Of New Hampshire Interoperability Laboratory		www.iol.unh.edu/
TAHI (JP)	TAHI	CONTRIB	www.tahi.org
G6test group (FR)	G6TEST	CONTRIB	www.g6.asso.fr/
Ericsson Research Laboratory (HU)	ERICSSON	EXPERT	
ULB (BE)	ULB	CONTRIB	www.ulb.be
AGILENT		EXPERT	www.agilent.com

All information and downloading of specifications can be found (soon)at www.etsi.org/plugtests/IPv6

See section 10 for more details on participant's organization

5. Commenting and/or contributing to the programme

The development of this IPv6 technical programme is an open process mainly driven by contributors and experts which provide inputs to it. The process is open and any expertise, comments and contribution are welcomed.

Contribution and comments must be sent to Cesar Viho from IRISA, the ETSI's technical programme editor (cesar.viho@irisa.fr) copy to the programme coordinator (Philippe.cousin@etsi.fr)

When appropriate a reflector will be put in place to follow up and contribute to the programme

6. Overview on IPv6 Conformance Testing

The following table is a synthesis on state-of-art IPv6 test suites, trends in IPv6 deployment and related test suites needed by the market. For specialist, they can have a quick overview of technical items together with availability of test suites as known so far by several laboratories/companies.

This table would allow participants to interoperability events to **quickly check what would be available, when and where.** But more important, this would help to **coordinate voluntary developments on (new) IPv6 issues**, avoiding overall between expert groups as well as to pool forces together in order to provide the right services to the IPv6 products manufacturers in a quicker, richer and more efficient way.

More detailed are on each topic is given in section 7 and 8.

The meaning of symbol or acronym in the table is as follows:

X: means available by partners and could be provided in interoperability events
P2002: means will be developed to be available at ETSI "Plugtests 2002", IPv6 Interoperability event.
X2002: as defined by Euro6IX project
T2002: as available at the TAHI 2002 interoperability event

IPv6 CONFORMANCE TESTING ACTIVITIES

	Main independent experts			Other expertise	
	G6TEST	TAHI	UNH	Ericsson (*)	Various
C1. IPv6 Core Protocol					
a)IPv6 Specification *[RFC 2460]*	X	X	X	X	
b)IPv6 Jumbo Payload Option *[RFC 2675)*	X		X	X	
c)ICMPv6 *[RFC 2463]*	X	X	X	X	
d)Neighbor Discovery *[RFC 2461]*	X	X	X	X	
e)Path MTU Discovery *[RFC 1981]*	X	X	X	X	
f)Stateless Address Autoconfiguration *[RFC 2460]*	X	X	X	X	
g)Redirect *[RFC 2461]*	X		X	X	
h)DHCPv6					
g) SIP					TESTINGTECH
C2. Mobile IPv6(v13):					
a)Correspondent Node Part	X			X	
b)Home Agent Part	X			X	
c)Mobile Node Part	X			X	
C3. Mobile IPv6(v14):					
a)Correspondent Node Part			X		
b)Home Agent Part					
c)Mobile Node Part					
C4. Mobile IPv6(v15):					
a)Correspondent Node Part	P2002				
b)Home Agent Part	P2002				
c)Mobile Node Part	P2002				
C5. Mobile IPv6(v16):					
a)Correspondent Node Part					
b)Home Agent Part					
c)Mobile Node Part					
C6. Transition:					
a)IPv6 over IPv4 Tunnel		X			
C7. Routing:					
a)RIPng Operations *[RFC 2080]*			X		
b)OSPFv3 *[RFC 2740]*					
c)EGP *[RFC 904]*					
d)BGP4+ *[RFC 1771]*					AGILENT
e)ISISv6					AGILENT
C8. Security:					
a)IPSec AH *[RFC 2401, RFC 2402]*		X			
b)IPSec ESP *[RFC 2401, RFC 2406)*		X			

(*) Ericsson will not be present at the ETSI Plugtests 2002

7. Overview on IPv6 Interoperability Testing

IPv6 INTEROPERABILITY TESTING ACTIVITIES

	Main independent experts			Other expertise
	G6Test	TAHI	UNH	
I1. *IPv6 Basic Interoperability:*				
a)IPv6 Basic Specifications		X	X	
b)IPv6 over PPP *[RFC 2472]*	X			
c)ICMP echo interoperability			X	
d)TCP interoperability			X	
e)UDP interoperability			X	
f)SIP *[RFC 2543]*				
g)SCTP *[RFC 2960]*				
I2. *Transition Mechanisms:*				
a)6over4				
b)6to4 encapsulation	X			
c)SIIT/NAT-PT *[RFC 2765, 2766]*	X			
d)ISATAP				
e)DSTM				
I3. *Routing:*				
a)RIPng *[RFC 2080]*		X		
b)OSPFv3 *[RFC 2740]*			P2002	ULB –P2002
c)EGP *[RFC 904]*				
d)BGP4+ *[RFC 1771]*		X		
e)IS-ISv3				
I4. *Security:*				
a)Ipsec *[RFC 2401, 2402, 2406]*		X		
b)IKE *[RFC 2409]*		X		
I5. *Compression:*				
*a)*ROHC	X			
b) 3GPP PDCP and ROHC				
I6. *Multicast*				
a) Multicast Listener Discovery(MLD) *[RFC 2710]*				
I7. Diffserv				
Diffserv *[RFC 2475]*				

8. Details on IPv6 testing available specifications

1. Basic protocols

IPv6 Basic protocols include Core IPv6 Support specification [IPv6], Internet Control Message Protocol [ICMPv6], Neighbor Discovery [ND], Stateless Address Auto-configuration [SAA], and Path-MTU Discovery [PMTUD]. Most of the IPv6 implementations already passed these tests in the previous ETSI IPv6 interoperability events or in other events. Even though the overall test results are stable of IPv6 core, re-testing will be required to evaluate non-regression of implementations.

References :

- RFC 1883, Internet Protocol, Version 6 (IPv6) Specification. S. Deering, R. Hinden. December 1995. PROPOSED STANDARD.
- RFC 1885, Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6). A. Conta, S. Deering. December 1995. PROPOSED STANDARD.
- RFC 2460, Neighbor Discovery for IP Version 6 (IPv6). T. Narten, E. Nordmark, W. Simpson. August 1996. PROPOSED STANDARD.
- RFC 2461, IPv6 Stateless Address Autoconfiguration. S. Thomson, T. Narten. August 1996. PROPOSED STANDARD.
- RFC 1981, Path MTU Discovery for IP version 6. J. McCann, S. Deering, J. Mogul. August 1996. PROPOSED STANDARD.

2. Mobility support for IPv6

For the moment, there is no standard about mobility support for IPv6. Mobile IPv6 is only described in one draft called "*draft-ietf-mobileip-ipv6-XX*" where "*XX*" is the version number. Version 16 is available only since 02/03/22, while only version 14 was available during the previous ETSI IPv6 interoperability event. Mobile IPv6 is still a point of strong discussions in the IETF mobileip mailing list in particular since possibly denial-of-service attacks were lightened in the protocol. These versions of the drafts are not interoperable with each other. However there will still be a demand for a testing activity of version 13. This is due to the fact that "version 13" implementations have already been released, and that a dual support for version 13 and others is the only way to insure interoperability with those implementations. As version 16 can be expected to be followed up quickly by a version 17, we should expect test requests for version 13 to 16.

Reference :

draft-ietf-mobileip-ipv6-16.txt, Mobility Support in IPv6, David B. Johnson, Charles Perkins, March 2002, INTERNET DRAFT.

3. Transition Mechanisms

The transition mechanisms are a set of mechanisms for ensuring the integration of IPv6 networks in existing IPv4 infrastructures, and guaranteeing communications between the two IPv4 and IPv6 worlds. Transition mechanisms often need an IPv4 infrastructure to be tested. A lot of these mechanisms are defined, like 6over4, 6to4, SIIT, NAT-PT, ISATAP, but a mechanism is really known to be preferred among the others. We should take a careful look to the evolution in this domain.

References :

http://www.ietf.org/html.charters/ngtrans-charter.html

4. IPv6 over PPP

Despite the age of the standard, there will still be requests for testing interoperability of PPP stacks that support IPv6.

Reference :
RFC 2023, IP Version 6 over PPP. D. Haskin, E. Allen. October 1996. PROPOSED STANDARD.

5. IPsec:

IP layer needs to integrate a support for security services that will flexibly allow combinations of authentication, integrity, access control, and confidentiality. IPsec is not yet completely defined but security support will be crucial in future IPv6 stacks, in particular in mobile IPv6 in which authentication cannot be left aside. As the number of companies that integrate IPsec in their developing environment grows, we can expect requests for security testing during the next ETSI IPv6 interoperability event.

References :

- RFC2401, Security Architecture for the Internet Protocol, S. Kent, R. Atkinson, November 1998, PROPOSED STANDARD.
- RFC2402, IP Authentication Header, S. Kent, R. Atkinson, November 1998, PROPOSED STANDARD.
- RFC2406, IP Encapsulating Security Payload (ESP), Kent, R. Atkinson, November 1998, PROPOSED STANDARD.

6. Routing protocols *:* (RIPng, OSPFv3, IS-IS, BGP4+)

Routing protocols can be divided in two groups. The interior gateway protocols (IGP) are in charge of routing packets within an autonomous IPv6 domain, whereas the exterior gateway protocols (EGP) allow the connectivity between domains.

IGPs :

- RIPng is the Routing Internet Protocol version 2 adapted for IPv6. This protocol is based on distance vectors. It was the first routing protocol to be implemented because of its simplicity. There is still a strong pragmatic requirement for coordinating an interoperability testing activity of RIPng in a multiple implementations context.
- OSPFv3 (as Open Shortest Path First for IPv6) is, as for IPv4, designated to be the reference routing protocol. This protocol is based on the maintenance of link states, and the IPv6 version is younger than RIPng. That is why OSPF was not yet massively implemented, and so we can expect an increasing demand for OSPF testing.

EGPs (IS-IS, BGP4 + multiprotocol extensions) :

- IS-IS and BGP-4 are inter-domain routing protocols that support extensions for routing of traffic from IPv6 domains. Demand for testing these protocols is growing as implementation statuses make steps forwards. Further investigations are needed for these protocols, because the required testing environments are more complex than for intra-domain routing protocols.

References :

- RFC2080, RIPng for IPv6, G. Malkin, R. Minnear, January 1997, PROPOSED STANDARD.
- RFC2740, OSPF for IPv6, R. Coltun, D. Ferguson, J. Moy, 1999, PROPOSED STANDARD.
- draft-ietf-isis-ipv6-02.txt, Routing IPv6 with IS-IS, Christian E. Hopps, April 2001. INTERNET DRAFT.

- RFC1771, A Border Gateway Protocol 4 (BGP-4), Y. Rekhter, T. Li, 1995, DRAFT STANDARD.

7. Header Compression Protocols : (ROHC)

It seems reasonable to believe that in the years to come, IP will become a commonly used way to carry telephony. Some future cellular telephony links might also be based on IP and IP telephony. Cellular phones may have become more general-purpose, and may have IP stacks supporting not only audio and video, but also web browsing, email, gaming, etc. Because cellular communications involve high error rates, long roundtrip times, and very low bandwidth, it is important to use header compression. ROHC (Robust Header Compression) is a highly robust and efficient header compression scheme for RTP/UDP/IP (Real-Time Transport Protocol, User Datagram Protocol, Internet Protocol), UDP/IP, and ESP/IP (Encapsulating Security Payload) headers. This brand new compression header protocol is also defined for IPv6, but the developing state of the implementations is at its early stage. Testing activity is rising in this domain, as proved by recent ROHC interoperability events (ROHC in the desert, Arizona, November 2001, Arctic ROHC, Sweden, April 2002).

Reference :
RFC 3095, RObust Header Compression (ROHC): Framework and four profiles: RTP, UDP, ESP, and uncompressed. C. Bormann, C. Burmeister, M. Degermark, H. Fukushima, H. Hannu, L-E. Jonsson, R. Hakenberg, T. Koren, K. Le, Z. Liu, A. Martensson, A. Miyazaki, K. Svanbro, T. Wiebke, T. Yoshimura, H. Zheng. July 2001. PROPOSED STANDARD.

8. Multicast support for IPv6:

IPv6 defines some basic multicast protocols that have been implemented by many implementers, like the Multicast Listener Discovery Protocol. The implementations and the conformance testing technology exist already, enabling a conformance test activity. However, unlike basic IPv6 support, we do not hear about the existence of test suites for these protocols.

Reference :
RFC 2710, Multicast Listener Discovery (MLD) for IPv6. S. Deering, W. Fenner, B. Haberman. October 1999. PROPOSED STANDARD.

9. DHCPv6:

DHCP (for Dynamic Host Configuration Protocol) reduces the cost of ownership by centralizing the management of network resources. IP addresses, routing information, OS installation information, directory service information, and other such informations are localized on a few DHCP servers, rather than distributed in local configuration files among all network nodes. The IPv6 version of this protocol is a critical step to achieve true automatic network configuration and administration.

Reference :
draft-ietf-dhc-dhcpv6-23.txt, Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", Ralph Droms, C Perkins, Jim Bound, Bernard Volz, M. Carney, Ted Lemon, February 2002, INTERNET DRAFT.

10. Differenciation of Services (DiffServ)

New multimedia applications need real-time performance that guarantees bounded delays and minimum throughput. The current Internet does not support these QoS parameters and it is a real challenge to integrate them in the existing architecture. DiffServ is an architecture that provides a simple scheme to support various types of applications and specific business requirements by differentiating classes of service for internet traffic. There are a lot of developments in this area. Most of the IPv6 stacks provides the toolboxes that enable differentiation of services. There are already a lot of experimentation about service-level agreements relying on DiffServ, and our previous works on this topic have lightened the possibility to have clearly-defined conformance and interoperability testing activity.

References :

- RFC2475, An Architecture for Differentiated Service, S. Blake, D. Black, M. Carlson, E. Davies, Z. Wang, W. Weiss, December 1998, INFORMATIONAL.
- RFC 2597, Assured Forwarding PHB Group. J. Heinanen, F. Baker, W. Weiss, J. Wroclawski. June 1999. PROPOSED STANDARD.
- RFC 2598, An Expedited Forwarding PHB. V. Jacobson, K. Nichols, K. Poduri. June 1999. PROPOSED STANDARD.

9. Overall references (Drafts and RFCs)

RFC 904, Exterior Gateway Protocol formal Specification, D.L. Mills, Apr-01-1984, (Status: HISTORIC)

RFC 1771, A Border Gateway Protocol 4 (BGP-4), Y. Rekhter, T. Li, 1995, (Status: DRAFT STANDARD)

RFC 1981, Path MTU Discovery for IP version 6. J. McCann, S. Deering, J. Mogul. August 1996. (Status: PROPOSED STANDARD)

RFC 2080, RIPng for IPv6. G. Malkin, R. Minnear. January 1997. (Status: PROPOSED STANDARD)

RFC 2401, Security Architecture for the Internet Protocol, S. Kent, R. Atkinson, November 1998. (Status: PROPOSED STANDARD)

RFC 2402, IP Authentication Header, S. Kent, R. Atkinson, November 1998. (Status: PROPOSED STANDARD)

RFC 2406, IP Encapsulating Security Payload (ESP), Kent, R. Atkinson, November 1998. (Status: PROPOSED STANDARD)

RFC 2409, The Internet Key Exchange (IKE), D. Harkins, D. Carrel November 1998. (Status: PROPOSED STANDARD)

RFC 2460, Internet Protocol, Version 6 (IPv6) Specification. S. Deering, R. Hinden. December 1998. (Status: DRAFT STANDARD)

RFC 2461, Neighbor Discovery for IP Version 6 (IPv6). T. Narten, E. Nordmark, W. Simpson. December 1998. (Status: DRAFT STANDARD)

RFC 2462, IPv6 Stateless Address Autoconfiguration. S. Thomson, T. Narten. December 1998. (Status: DRAFT STANDARD)

RFC 2463, Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification. A. Conta, S. Deering. December 1998. (Status: DRAFT STANDARD)

RFC 2472, IP Version 6 over PPP. D.Haskin, E. Allen, December 1998. (Status: PROPOSED STANDARD)

RFC 2475, An Architecture for Differentiated Service, S. Blake, D. Black, M. Carlson, E. Davies, Z. Wang, W. Weiss, December 1998, INFORMATIONAL

RFC 2543, SIP: Session Initiation Protocol, M. Handley, H. Schulzrinne, E. Schooler, J. Rosenberg, March 1999. (Status: PROPOSED STANDARD)

RFC 2675, IPv6 Jumbograms. D. Borman, S. Deering, R. Hinden August 1999 ASCII (Status: PROPOSED STANDARD)

RFC 2710, Multicast Listener Discovery (MLD) for IPv6. S. Deering, W. Fenner, B. Haberman. October 1999. (Status: PROPOSED STANDARD)

RFC 2740, OSPF for IPv6, R. Coltun, D. Ferguson, J. Moy, 1999. (Status: PROPOSED STANDARD)

RFC 2765, Stateless IP/ICMP Translation Algorithm (SIIT). E. Nordmark February 2000 (Status: PROPOSED STANDARD)

RFC 2766, Network Address Translation – Protocol Translation (NAT-PT) G. Tsirtsis, P. Srisuresh February 2000. (Status: PROPOSED STANDARD)

RFC 2960, Stream Control Transmission Protocol R. Stewart, Q. Xie, K. Morneault, C. Sharp, H. Schwarzbauer, T. Taylor, I. Rytina, M. Kalla, L. Zhang, V. Paxson, October 2000 (Status: PROPOSED STANDARD)

draft-ietf-dhc-dhcpv6-23.txt, Dynamic Host Configuration Protocol for IPv6 (DHCPv6)", Ralph Droms, C Perkins, Jim Bound, Bernard Volz, M. Carney, Ted Lemon, 02/06/2002. (196655 bytes)

draft-ietf-idr-bgp4-17, A Border Gateway Protocol 4 (BGP-4), Y. Rekhter, T. Li, (Status: INTERNET DRAFT)

draft-ietf-mobileip-ipv6 v13,14,15, Mobility Support in IPv6, C Perkins, D. Johnson (Status: INTERNET DRAFT)

draft-ietf-ngtrans-dstm-07, Dual Stack Transition Mechanism (DSTM), Laurent Toutain, Octavio Medina, Francis Dupont, Hossam Afifi, Alain Durand

draft-ietf-ngtrans-isatap-03, Intra-Site Automatic Tunnel Addressing Protocol (ISATAP), F. Templin, T. Gleeson, M. Talwar, D. Thaler, 30 January 2002, (Status: INTERNET DRAFT)

draft-ietf-rohc-over-ppp-04, ROHC over PPP, Carsten Bormann, November 2001 (Status: INTERNET DRAFT)

ISO/IEC 10589, "Intermediate System to Intermediate System Intra-Domain Routing Exchange Protocol for use in Conjunction with the Protocol for Providing the Connectionless-mode Network Service (ISO 8473)", June 1992.

10. Presentation of programme's participants

Plugtests, the ETSI Interoperability Service

The ETSI PLUGTESTS^{TM} Service was set up at the end of 1999 as a professional service specializing in the organization of interoperability events. In 2001 it was established on a permanent basis with dedicated support, and adopted the PLUGTESTS^{TM} name.

The PLUGTESTS^{TM} Service is a valuable tool for testing any telecommunication, Internet or Information Technology standard, and customers include ETSI and 3GPP Technical Bodies, working groups of the Internet Engineering Task Force (IETF), International Telecommunication Union Study Groups, fora and interest groups.

The guarantee of interoperability is essential to the standardization process. As well as providing fast feedback into the standards process, enhancing the quality of the final deliverable, a PLUGTESTS^{TM} event is an opportunity for engineers from competing organizations to meet together in a commercially secure environment, to iron out potential problems and improve interoperability between their implementations. Participants invariably say that these events help save considerable time and money in development costs. The results of PLUGTESTS^{TM} events may also provide useful feedback to other organizations such as the IETF, the IPv6 Forum and the Third Generation Partnership Project.

So far , the ETSI Interoperability service has organised 16 Interoperability events gathering more than 500 companies and 1600 participants in a broad range of areas (SIP, IPv6, M3UA, SCTP, BLUETOOTH, SMART CARD;VOIP SPEECH QUALITY, etc). The programme of events is growing for the next years where already around a minimum of 10 to 12 events are scheduled for 2002 and 2003.
Due to the interest on IPv6, the ETSI Interoperability Service is now planning having a minimum of one IPv6 interoperability event a year.

G6TEST

To be provided (TBP) by G6TEST

ULB (University Libre de Bruxelles)

TBP

UNH

In 1988, the University of New Hampshire Research Computing Center started the InterOperability Lab (IOL). The IOL is a unique organization that has two distinct missions:

The IOL's first mission is externally focused and is to provide testing services for vendors of computer communications devices. The IOL is involved in research and development work, but is mainly used by a community of over 200 vendors to verify the interoperability and/or conformance of their computer communications products. This service of the IOL is performed through independent focused interest groups in the lab, which are called consortiums. The IOL currently has 14 consortiums in operation to test the following computer communications technologies: 10-Gigabit Ethernet, ADSL, Bridge Functions, DOCSIS, Fast Ethernet, Fibre Channel, Gigabit Ethernet, IPv6, iSCSI, MPLS, Routing, SHDSL, Voice over Broadband and Wireless 802.11. The IOL also offers contracted testing services in Ethernet (10Base-T).

The second mission of the IOL is internally focused and is to provide educational and employment opportunities for qualified UNH undergraduate and graduate students. The IOL affords a unique opportunity for students to be educated in one of the fastest growing and most challenging fields, computer communications. The IOL has created a rigorous training program in data communications and computer networking which allows students to gain a broad knowledge of several communications technologies through the mastery of industry standards, classwork, hands-on experience with state of the art equipment, and interaction with industry leaders.

The IPv6 Consortium has developed many test suites to include the testing of the Base Specification, Neighbor Discovery, Redirects, Path MTU, RIPng and Mobility support for IPv6.

The IPv6 Consortium was formed in March of 1993. The Consortium was formed through the cooperative agreement of vendors interested in testing IP products. IPv6 Consortium members agree to keep a technical focus, elect leaders from their membership, and cover the costs of developing and performing tests through an annual membership fee. Additionally, Consortium members agree to provide a platform representing their equipment at the IOL for at least 18 months. The requirement to leave a platform at the IOL allows the users of the lab to perform interoperability testing with current equipment throughout the year, and without having to make special legal arrangements with other players in the technology. This, then, becomes one of the major benefits of Consortium membership: "the ability to test against other vendor's products in a neutral setting without having to incur the capital expense of setting up and operating individual vendor test facilities."

Membership in the IPv6 Consortium should be viewed as an extension of a members' own in-house private lab. The intent of most of the testing programs of the IPv6 Consortium, and of the lab itself, is to isolate problems (bugs) in member's equipment before it gets into consumers' hands. It needs to be emphasized that IPv6 Consortium testing is performed from a quality assurance point of view, not from a marketing or promotions point of view. Therefore, the Consortium agreement limits the disclosure of specific product test results to respective members only.

TAHI

TAHI Project has started in 1998. TAHI Project is formed as a joint effort, with the objective of developing and providing the verification technology related to IPv6.

During its growth, IPv4 has encountered and overcome a host of obstacles. Now that the Internet infrastructure has been established, we are no longer allowed to take the same tortuous process for IPv6. The verification technology, therefore, is very important and critical for IPv6 development and for its success.

TAHI’s objectives are as follows:

+ research and develop conformance & interoperability tests for IPv6.
+ bring forward the results and accomplishments of the project to the public for FREE.

Any developer interested in IPv6 can freely utilize the results and accomplishments of TAHI Project. Free software has been playing an important role in the progress of the Internet. TAHI strongly believes that its giveaway approach will contribute immensely to the advance of IPv6.

In the first phase, TAHI has developed conformance test suite for the IPv6 basic specifications and for Mobile IPv6. In the second phase, TAHI has developed conformance test suite for Low Cost Network Appliance (LCNA), in concurrent with defining the LCNA specifications. And TAHI is yet developing Mobile IPv6 test.

Today, there are a lot of TAHI test suite users scattered over the world.

TAHI also held the IPv6 Interoperability test event, and a large number of IPv6 implementers around the world have so far participated in the past 3 test events.
For more information, please visit TAHI’s web site: http://www.tahi.org/

ERICSSON