



A report from IETF 71, March 2008, Philadelphia, Pennsylvania. Published by the Internet Society in cooperation with the Internet Engineering Task Force*

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A Week of Firsts in Philadelphia

From the Editor's Desk, by Mirjam Kühne

Like several other organizations (most notably some of the Network Operator Groups), the IETF took the opportunity of having many engineers in one room at one time to switch off the IPv4 network and make only the IPv6 network available, which they did during the IETF 71 plenary in Philadelphia (see below). The IPv4 outage experiment nearly coincided with a power outage, which took place just as Scott Bradner was presenting a report about the recent use of arbitration during the Nomination Committee process. This was the first time in the history of the NomCom that the arbitration process had to be employed (more on this in the plenary report). Another interesting development in Philadelphia was a BoF on IDNA, which could lead to the formation of a new IDNA working group at the IETF 72 meeting in Dublin (see a report on the BoF on page 11).

We thank all of our contributors to this issue, and we wish you fun reading. As always, we welcome both your comments and your contributions for future issues.



Independence Hall in Philadelphia

Photo by Patrik Fällström

The IETF Goes (IPv6) Native at IETF 71

By Leslie Daigle

At IETF 71 in Philadelphia, the IETF put the spotlight on the next generation of Internet addressing by switching off attendees' access to IPv4 during its Wednesday plenary meeting. For an hour, Internet engineers could access the Internet only by using an IPv6 network; their machines had to connect to the network by using IPv6, and they could reach only other IPv6 Internet sites. The experience not only highlighted that IPv6 is a deployed reality; it also underscored the fact that there is a long way to go before there is as much content (and solid connectivity) as we are accustomed to in the predominantly IPv4-based Internet.

To fully appreciate the significance of the one-hour event, it is necessary to take a few steps back in time. IPv6 has been top of mind at IETF meeting plenaries for some time. As noted in Volume 3, Issue 2, of the *IETF Journal*, IPv6 was a predominant theme at IETF 69 in July 2007. At that meeting, the IAB and the IESG had a joint meeting to review the then current understanding of IPv6 deployment, impediments, and predictions. At the time, there were considerable speculation and debate concerning the various statistics being presented, which were intended to emphasize that IPv4 address allocations will change in nature in the upcoming years as the IANA free pool of IPv4 address space to allocate to the Regional Internet Registries runs out. By IETF 70 in November

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* The articles published in the IETF Journal are not intended to reflect the opinions or the position of the IETF or the Internet Society.

Message from the IETF Chair

By Russ Housley

I'm pleased to report that IETF 71, held in Philadelphia in March 2008 was an enormously successful meeting. We had 1,131 people from 49 different countries in attendance. Comcast was the host and certainly made everyone feel welcome. Comcast provided an impressive 80-gigabit-per-second primary fiber link to the Philadelphia Downtown Marriott, where the meeting was held (if the router line cards had been available, the link could have been upgraded to 100 gigabits per second). Unfortunately, the IETF was unable to generate enough traffic to consume half of the available bandwidth despite a challenge to do so. The site network was subcontracted to VeriLAN Networks. And, as in the past, the success of the meeting depended on a number of dedicated volunteers. Thank you all.

The week was filled with the usual mixture of working group (WG) meetings, BoF (birds-of-a-feather) sessions, research group (RG) meetings, and as always, many side meetings.

Since IETF 70, five new WGs were chartered and two WGs were closed. There are now approximately 120 WGs. Between the meetings, the WGs and their individual contributors produced 337 new Internet-Drafts and generated 881 updated Internet-Drafts. The Internet Engineering Steering Group approved 50 Internet-Drafts for publication as RFCs. The RFC Editor published 73 new RFCs.

This was the first meeting supported by the new IETF secretariat vendor: Association Management Solutions (AMS). By all accounts, AMS did an outstanding job. Thanks for all of the hard work and quick study.

One of the hot topics during the several sessions and many hallway discussions at IETF 71 was IPv6 adoption (the discussion in the V6OPS WG meeting about requirements for NAT-PT was especially lively). Throughout the week, an IPv6-only network was available to enable attendees to experience the Internet without IPv4. At the Wednesday evening plenary, the IPv4 wireless network was turned off. As part of the experiment, two hours before the plenary, ipv6.google.com became available. A lot of hard work went into making this site and others available in time. The general consensus was that there was much to be learned from the experiment. An IPv6-only wireless network will be available at future meetings.

I look forward to IETF 72 in Dublin (27 July–1 August) and IETF 73 in Minneapolis (16–21 November 2008). Scheduling information for the next IETF meetings can be found via <http://www.ietf.org/meetings/meetings.html>. I look forward to seeing you there. 



Russ Housley, IETF Chair

New BoF Meetings

Descriptions and agendas for all BoF meetings can be found at <http://www.ietf.org/meetings/past-meetings.html>.

Applications Area

esds: Extensible Supply-chain
Discovery Service
idn: International Domain Names

General Area

Pufi: Procedures Update for IETF

Operations and Management Area

Canmod: Comparing
Approaches to
NETCONF Modeling

Real-time Applications and Infrastructure Area

Rucus: Reducing Unwanted
Communications using SIP
Peppermint: Provisioning
Extensions in Peering
Registries for Multimedia
INTerconnection

Security Area

Kmart: Key Management for
Routing Protocols



Olaf Kolkman, IAB Chair

Words from the IAB Chair

By *Olaf Kolkman*

A proven method for performing architectural work is by publishing architectural documents/RFCs. It is not the only method by which the Internet Architecture Board (IAB) works. There are the technical plenaries—subject of my last column; there is the IAB’s input during BOF and working group creation; there are workshops with workshop reports as their outcomes; and there are the statements we publish on our Web site or on relevant mailing lists.

Architectural documents usually start their lives because of a particular interest in an architectural topic by one or more IAB members. Those architectural topics are usually triggered by ongoing work in the IETF, where one could claim that an architectural principle has been violated or that there are various architectural choices to be made. I hurry to say that there is neither a big book with architectural principles nor a blueprint with all of the design principles available to the IAB—or anybody else. So, what makes an issue an architectural issue is usually in the eye of the observer.

An architectural document is valuable if such document tries to step away from the issue of the day, if it takes a stab at rationalizing the design trade-offs, and if it provides architectural directions. Directions—plural—because often there are multiple ways to approach a problem, and depending on the environment, one may need to make trade-offs between several architectural principles and pragmatism.

IAB members are not, and should not be, the only ones able to identify, analyse, and document architectural issues and directions. It occasionally happens that other IETF participants solicit an architectural Internet Draft for IAB consideration. Also, after considering an issue, the IAB may find it has insufficient in-depth knowledge of the specifics of an issue. In those cases, it reaches out to let specialists help define the various directions and trade-offs.

Architectural documents are published as RFCs after IAB consensus. However, the IAB does not publish its architectural documents without some form of public review. Usually, the intent to publish a document is announced on the IETF announcement list, and feedback is solicited. If you want to know more about the process by which the IAB publishes architectural and other IAB stream documents, I refer you to RFC4548 (“Process for Publication of IAB RFCs”).

At the moment of writing this column two drafts are about to be finalised for publication: “Design Choices When Expanding DNS” and “What Makes For a Successful Protocol?” while “Principles of Internet Host Configuration” is on the nomination for an IETF call for comments. As always, your comments on specific documents or on areas where the IAB might consider publication of architectural consideration documents are welcome. 

IETF 71 Facts and Figures

Registered attendees	1,131
Countries	49
New WGs	5
Closed WGs	2
WGs Chartered	120
New Internet-Drafts	337
Updated Internet-Drafts.....	881
IETF Last Calls.....	60
Approvals	50
<i>(November 2007–February 2008)</i>	
73 RFCs published of which	
• 52 standards tracks	
• 1 BCP	
80 Internet-Drafts submitted for publication	
• 52 submitted by the IETF	
<i>IANA Actions</i>	
<i>(November 2007–February 2008)</i>	
Processed ~1,240 IETF-related requests of which:	
• 761 Private Enterprise Numbers	
• 92 Port Numbers	
• 125 TRIP ITAD Numbers	
• 30 media-type requests	

The IETF Goes (IPv6) Native at IETF 71, continued from page 1

2007, more-pointed questions were being asked at the plenary, such as, What can we do with or for IPv6?

When the room is full of Internet engineers who would like to do something, this is not the sort of question that bears much discussion in the abstract. So, when Rohan Mahy leaned over during the IETF 70 plenary meeting and whispered, “Why don’t we just shut off IPv4 during the next plenary?” I instantly urged him to make that suggestion to the IETF chair. Russ Housley didn’t waste time: Upon confirmation of the technical feasibility of such an activity, Russ put the plan to the community in December. With that, people were given notice: An opportunity for community spirit was upon us; computers and/or home networks and resources should

be readied.

The initial reaction to the plan was mixed, but it helped refine the parameters of the experiment. Wireless IPv6-only connectivity would be available (by choice) through the entire week, so that people could get prepared. The IPv4 outage would be limited to one hour, and it would be implemented only in the plenary room’s wireless coverage itself. The IETF meeting network crew is well versed in providing IPv6 connectivity, so it was clear from the outset that IPv6 networking would not be the challenge—beyond the usual need to plan carefully. Introducing network changes in the middle of an operational meeting requires planning and care. Instead, the biggest question mark was user reluctance. In many ways, this mirrors the state of IPv6 diffusion in the world today.

As planning was under way in the early months of the year, similar IPv6 events were announced and executed in other meetings (NANOG and APRICOT each had IPv6-only hours). The intended experience of the IETF event was different, as reflected in the choice not to provide IPv4/IPv6 protocol translation (NAT-PT). Stepping beyond questions of transition, the intent was to provide engineers with some firsthand experience in working with IPv6 in the wild. As Shane Kerr noted in his article on the IETF and IPv6 in IETF Journal Volume 3, Issue 2, “eating our own dog food” is the only way for Internet engineers to fully grasp and prioritize the range of issues that can and should be addressed in order to continue to support the practical deployment of IPv6.

The early announcement of the event clearly motivated several IETF attendees to prepare. While some IETF attendees use IPv6 on a regular basis, many do not, so the event was largely intended to target those engineers for whom this was going to be new ground. Some made sure their home networks and Internet resources were IPv6 capable in time for the event. Even some of the regular IPv6 users had surprises when they were attached to an IPv6-only network, such as problems associated with missing IPv6 DNS glue records for their domains.

The big news of the day was Google’s announcement—at the IETF meeting—of an IPv6-accessible site for its search engine (<http://ipv6.google.com>). In true IETF fashion, rumours were circulating in advance of the announcement, including detections of Google IPv6 routing announcements and DNS entries indicating that Google was up to something. The reality is that engineers at Google had been working hard to address both technical issues and skepticism, using the IETF event as a target for the delivery of an IPv6-accessible site. Google’s announcement in the ple-

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IETF71 IPv4 Outage

IETF71 IPv4 Outage

During the IETF71 meeting in March 2008, there will be a hands-on experiment for exploring the post-global-IPv4 Internet. The plan is for this to be both:

- a first-hand experience open to all IETF participants, and
- an opportunity to capture informal experience data to inform protocol design work going forward.

One aspect of this experiment will be to provide an “IPv6 only” network throughout the meeting week. This will provide participants with the opportunity to “site see” the current realities of IPv6 network deployment. Participants who so desire can use this as an opportunity to test their software, setup or services for IPv6 accessibility. Computers connected to that network will be assigned an IPv6 address, and packets from that network will be routed (only) via external IPv6 connectivity. That is, there will be no IPv6 to IPv4 translation or Application Layer Gateway support to connect to IPv4-only sites. While the “IPv6 only” network will be available throughout the meeting week, other wireless network access will be turned off in the plenary meeting room during a set time of the Wednesday night plenary meeting. This will provide a focused and communal opportunity for experiencing the IPv6 Internet!

We are also exploring the demonstration of another model of a possible IPv6-supported future, to provide two possible future paths for people to compare and contrast. More information will be provided as that is scale tested and made available.

Participating

As you participate in this effort (through the week, or at the plenary event), please be sure to contribute any findings by updating the experiment information page,

http://wiki.tools.isoc.org/IETF71_IPv4_Outage/IETF71_IPv4_Outage_Experiences

Also, discussion is being logged on the IPv6-accessible Jabber conference:

[ipv6-experiment](#) on the jabber conference server conference.amsl.com

IETF 71 IPv4 outage Wiki page

nary drew a round of appreciative applause from attendees. Lorenzo Colitti showcased the work as an illustration of what is possible with IPv6. According to Lorenzo, it hadn't been difficult, since all of the necessary pieces were available, but it had required persistence. He urged other organisations not to be afraid and to press on with IPv6.

One of the biggest technical hurdles was known in advance of the IETF meeting; that is, that Windows XP does not (natively) support DNS resolution over IPv6. Since the IETF event was not providing NAT-PT, this slowed down a number of attendees: Windows XP users with IPv6 turned on could connect to other sites over the Internet—but only by manually entering the IPv6 address. Elwyn Davies, for one, was determined not to be stumped. Early in the week, he set out to run BIND on his Windows XP notebook to provide IPv6-capable DNS resolution for his notebook's applications, but he soon discovered a bug in BIND. Fortunately, Mark Andrews of ISC was quickly able to provide an interim fix for the code. This is the sort of playful engineering that made the event fun as well as useful.

At its peak, about 190 computers were connected to the IPv6-only network during the IETF 71 IPv6-only hour, reaching out to a combined total of some 750 different global IPv6 addresses. Relatively few glitches were reported, though there were some challenges with global routing. This is not surprising, given that IPv6 deployment is still only as diffused as the very early days of the Internet.

IETF 71 meeting host Comcast was also using the week as an opportunity to run IPv6-related networking experiments. Fully supportive of IPv6 deployment, Comcast's Alain Durand is also focusing on transition issues and supporting large-access networks even as IPv4 addresses become scarcer. To that end, a separate network was available to those IETF attendees who

knew where to find it in the form of a double-NATed IPv4-IPv6-IPv4 network; with that network, attendees could connect to it as an IPv4 network and access the rest of the IPv4 Internet (only). However, the packets were carried across an intervening IPv6 network, transparently to either end. The full model

and motivation are provided in draft-durand-v6ops-natv4v6v4. The NATing from IPv4 to IPv6 and then back to IPv4 (the double NAT) may introduce issues for some types of applications. It could also potentially cause a reduction in network performance. This particular network's availability was announced about 30 minutes into the IPv6 event, by which time folks who had not been able to get onto the IPv6 network for one reason or another were quite willing to test its performance.

In the end, response to the IPv6 event was quite positive. IETF attendees expressed enthusiasm for what they learned about IPv6 as well as interest in repeating the effort. During the Thursday technical plenary, suggestions were made to continue with having IPv6 events during future IETF plenaries or perhaps similarly showcasing other technologies in need of review and airing. As always, the challenge is to find a balance between providing a solid operational network, upon which the meetings and attendees depend, and providing an ex-



IPv6 Wiki page

perimental environment in which engineers can play on real-scale networks.

No single one of these IPv6 events is going to cause an instant uptick in the amount of IPv6 activity on the Internet. However, such events are breaking down the barriers of fear, uncertainty, and doubt and enabling core Internet engineers and operators to discuss how to deploy IPv6 rather than questioning whether IPv6 is deployable. For the IETF, the value of this event will be seen in ongoing working group meetings, as more participants have their own firsthand IPv6 usage experience to draw on. 

Information about the IETF71 IPv6 event, including notes of lessons learned and pointers to related materials, can be found at http://wiki.tools.isoc.org/IETF71_IPv4_Outage

An interesting collection of information about IPv6 and its state of deployment is available at <http://www.getip6.info/>.

Plenary Report

By **Mirjam Kühne**

Note: This is not a complete report of the plenary sessions; rather, it is a summary of the highlights of the discussions. All IETF 71 presentations can be found at <http://www.ietf.org/meetings/past.meetings.html>.

We have made substantial progress in our efforts to develop Internet technology,” announced John Schanz, who spoke about Internet developments from the past 15 years on behalf of Comcast, the host of IETF 71. “And those efforts have not only had a substantial impact on most industries; they have also enhanced global capabilities for all.”

As John described, Internet and communications technologies and their related applications have undergone considerable transformation since the early days of the Internet. In a few short decades, those changes made it possible for electronic communications to become a fact of life for many. In most of the developed regions of the world, the current generation of users is growing up with personal computers, cell phones, broadcast television, and access to digital media. On one hand, that kind of easy and affordable access means it’s possible to work from nearly any location, it’s easier to pursue an education, and it’s simpler to get everything from medical information to movie times. On the other hand, not only are we suffering from information overload, but 24-7 access to e-mail, instant messaging, and text messaging have blurred the line that separates our work and school lives from our personal lives. In fact, for many of us, it has become less about how to manage

our online availability and more about how to manage our unavailability. This enormous capacity to internetwork and

Comcast and Nortel are supporting a production demonstration of the industry’s first 100Gbps DWDM (dense-wavelength-division-multiplexing) IP link. The link was tested at IETF 71 in Philadelphia and provided Internet connectivity for attendees for the final three days of the meeting.

interoperate among devices through IP also has implications for the IETF and its work.

One of those implications is the need to provide higher-speed connectivity. To that, John answered the call by announcing an industry first: Comcast and Nortel are supporting a production demonstration of the industry’s first 100Gbps DWDM (dense-wavelength-division-multiplexing) IP link. The link was tested at IETF 71 in Philadelphia and provided Internet connectivity for attendees for the final three days of the meeting. “The new focus is ensuring that everything going forward interoperates well with IP and the Internet from its very beginning,” said John.

The line meant a bit more preparation than usual, said Morgan Sackett, representing the Network Operations Centre,



Mirjam Kühne

but he thanked the Comcast staff, the VeriLAN NOC staff, and all of the volunteers who had contributed to the success of the meeting’s networking capability.

Updates and Administration

IAOC chair Kurtis Lindqvist reported that the IAOC has opened up discussions with the IAB about future RFC Editor functional components. As a result of those discussions, the IAOC has decided to start negotiations with the University of California’s Information Sciences Institute (ISI) for a continuation of its contract as the RFC Editor. The IAOC is aiming for an RFC’ed request for information followed by a request for proposal in approximately one year. Revenues consist of meeting fees (56 percent), hosting contributions (12 percent), and contributions from the Internet Society through its Organizational Members and the Public Interest Registry (32 percent). Expenses consist of meeting expenses (40 percent), secretariat services (30 percent), RFC Editor services (17 percent), and IASA operations (13 percent). An IAOC Call Tech Committee has been set up to look into reducing the costs associated with conference calls—for example, by us-



Photo by Peter Lofberg

Russ Housley gives John Schanz of Comcast a thank-you plaque for hosting IETF 71

ing videoconferencing tools and VoIP technology. In addition, the IAOC now has a funding model subcommittee and a new revenue design team to look into other sources of income.

The Nominations Committee (NomCom) report was presented by NomCom chair Lakshminath Dondeti, who published a detailed report in the form of an Internet-Draft prior to the meeting. This served as a good precedent for future NomCom chair.

During the recent NomCom process, a conflict arose between the NomCom and the IAB when the IAB requested from the NomCom certain additional information about the candidates, and the NomCom, in an attempt to protect the privacy of the candidates, refused to provide the information. Scott Bradner was brought in as an arbiter, representing the first time the NomCom arbitration process had ever been applied within the IETF. Scott described the process as it is defined in the document titled IAB and IESG Selection, Confirmation, and Recall Process: Operation of the Nominating and Recall Committees (RFC 3777).

Ultimately, it was decided that the NomCom would provide redacted versions of the responses to one section of the questionnaire and that it would include testimony about anything the NomCom learned that would enhance the IAB's understanding of the responses. Scott further suggested that a new NomCom working group (WG) be formed to make recommendations about how best to clarify the role of the confirming body (in this case the IAB) as well as what data it can expect to see and what data will not be made available. He also suggested the questionnaire contain a section meant only for review by the NomCom and another one that can be used to provide additional information for the confirming body in the event that additional information is requested. This distinction, Scott suggested, should be made clear to the applicant on

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the form. In general, he expressed concern that the definition in RFC 3777 is too broad.

Rob Austein, who served on the IAB for six years, agreed that the current standard for nominations raises more questions than it answers. "One is often handed a slate with very little information," he said. "The IAB can either rubber-stamp it or ask for more information. At the moment the rules are very fuzzy. This has to be fixed."

Gregory Lebovitz, a new IAB member, said he appreciated that the IAB is trying to make the right decision and that all parties tried to do the right thing. "This is all healthy behaviour," he said. "I am proud to be part of a community that is behaving like that."

While some attendees expressed dissatisfaction with the outcome of the arbiter process, it was generally agreed that to test that part of the dispute resolution process and to involve an arbiter were good decisions.

There were quite a number of personnel changes again during IETF 71. Sam Hartman, who served as Security Area director for three years, and Kurtis Lindqvist, who served as chair of the IAOC for the past two years, received plaques and thank-yous from the Internet Society and the IETF in honor of their service.

Pasi Eronen will take over as Security Area director, and Ole Jacobsen will join the IAOC as a new member. Jonne Soininen will be the new IAOC chair. Ed Juskevicius will act as chair for the IETF Trust. The NomCom also appointed four new IAB members, including Gonzalo Camarillo, Stuart

Cheshire, Gregory Lebovitz, and Andy Malis plus Dow Street who will act as the Executive Director.

IETF administrative director Ray Pelletier gave an update on the financial status of the IETF Administrative Support Activity (IASA).

IAOC Q&A

A number of questions regarding the secretariat transition from Neustar to AMS were addressed during the IAOC question-and-answer session, with some attendees raising concerns about the IETF Web site as well as security issues

Continued on next page

Comic BoF



Plenary Report, continued from page 7

related to the transition of the IETF secretariat from one organization to the other. “While I’m extremely pleased by the efficiency with which AMS and the support/advisory team recovered from problems,” said John Klensin, “I’d like to be sure that (1) we do enough analysis of what happened so we are much better prepared for any future transition not just in terms of quality of software and operations but also in terms of transitional procedures and (2) we continue to work on being sure that the IETF is setting a proper example for the community by following the kinds of good practices we recommend to others.”

Kurtis agreed that the transition was fairly smooth. However, security-related issues need to be discussed with the IETF administrative director, and the infrastructure needs to be in place to address unforeseen events.

On a separate subject, the issue was raised about how increasingly difficult it has become to enter the United States, especially for those participants who are required to have a visa. One participant expressed concern that visa problems might also affect one’s eligibility for positions such as membership on the NomCom (NomCom members are required to attend at least three out of the previous five meetings) and raised the possibility that the rules be changed to reflect a distinction between becoming eligible and staying eligible. It was also

suggested that meetings be held in locations outside the United States, such as Canada.

Unfortunately, visa issues are common even outside the United States, and there will always be people who will not be able to attend an IETF meeting. To accommodate them, IETF meetings need to be held in a diversity of places. Another solution to this problem would be to make it easier to participate remotely.

Jonne Soininen said the IAOC is

One participant expressed concerned that visa problems might affect one’s eligibility for positions such as membership on the NomCom and raised the possibility that the rules be changed to reflect a distinction between becoming eligible and staying eligible.

aware of the problem but explained that the IETF meeting is often restricted by what the host has to offer. It would be good to have a better idea of how many people are affected by visa problems. Everybody who has visa problems is encouraged to inform Ray Pelletier, who is collecting this data.

During the IESG open mic session, concern was raised that when evaluating individual submissions, the IESG uses a different set of criteria from the set it uses when it reviews documents that come out of a WG, but that those criteria are not explicitly defined. There seem to be certain assumptions: that WG documents undergo a more formal review process by the WG before being submitted to the IESG and that individual submissions must therefore be evaluated more strictly by the IESG.

Ted Hardie raised another issue related to IESG activities by noting that there had been a recent series of decisions in which the IESG appeared to be enforcing its

technical agenda or preferences without fostering community consensus. While he said he understood the history of those decisions, his concern was that this practice could become a pattern. He added that he was afraid “this will frustrate people and move activity out of the IETF.”

Sam Hartman, who was an IESG member until IETF 71, agreed it is important for the IESG to ask the community, “Are you sure about this? Is this consensus? and Did you talk to other

parts of the community?” After that, the area director must be convinced that there is, indeed, informed consensus.

Another participant agreed that the IESG serves a valuable function in making sure that new protocols don’t break the Internet but said that at times the process appears arbitrary. “We fixed the problem that the process was too long, but now we have the problem that people feel it is too risky to bring work to the IETF because things sometimes get held up for unclear reasons,” said Randy Gellens.

It was also suggested that a document be drafted for authors, describing good practices on how to read an IESG review and how to reply. Direct dialogue often helps as well.

IAB/Technical Plenary

After Aaron Falk gave an update of the work of the Internet Research Task Force (see page 21), Olaf Kolkman gave a summary of recent IAB activities.

There are a number of IAB documents in process. Principals of Internet Host Configuration and What Makes for a Successful Protocol are almost fin-



Photo by Peter Löhberg

The cheesesteak capital offers a warm welcome to visitors.

ished. The IAB has also reviewed DNS Choices and is intending to publish it. It is now soliciting such feedback from the community. RFC 4845 describes a method for soliciting feedback from the community. It is not a Last Call, but all community input is taken seriously.

A large part of the IAB's work goes into administrative issues and interorganizational relations. The IAB responded to a request for information by the U.S. Department of Commerce regarding the possibility of private-sector handoff. It restated its relation to and interest in the IETF protocol parameters, as maintained by the Internet Assigned Numbers Authority. During the private-sector handoff, the role of the IETF must be recognized. The IAB also provided feedback to a request for public comments on the stability of the DNS while adding new generic Top Level Domains



Photo by Peter Löhberg
Scott Bradner speaking about the Nom-Com process at IETF 71

(gTLDs). The IAB provided reference to RFC 2620 and suggested review by ICANN on a per gTLD basis.

The IAB also continued to work with the ITU-T on transport multiprotocol label switching (T-MPLS). After IETF 70, an ad hoc group was established to work with ITU-T Study Group 13, and a lot of work has been done since to ensure beneficial outcomes for both orga-

nizations. The coordination was a success, and the ad hoc group has concluded. A joint project team has been established consisting of roughly 20 specialists and an ITU-T and MPLS interoperability design team sponsored

by the routing area. It was set up to assist the ITU in choosing between two options: to move T-MPLS into the IETF (taking into account mutual requirements) or to establish a clean separation of name, EtherType, and other code points. Find more details on page 16. Fred Baker thanked the outgoing IAB members Leslie Daigle, Eric Rescorla, Elwyn Davies and Kevin Fall and gave each of them a plaque.

Technical Presentation on IPTV

By way of introduction, Barry Leiba mentioned a newspaper article that described a partnership between TiVo, a producer of digital video recorders, and YouTube. One aspect of the two presentations is that this technology is using a protocol stack that was developed in the IETF to provide video over a private network.

Barry introduced Marshall Eubanks from AmericaFree.TV as well as Keith Ross, professor of computer science at Polytechnic University in Brooklyn, New York.

In the discussion following the presentations, people have asked why most developments in this area happen in Asia (China in particular) and Europe. One explanation is that there are many more local TV stations and channels in China. The channels are not centralized, which encourages people to distribute more data. Furthermore, the govern-



Photo by Peter Löhberg
Members of the IAOC

ment operates TV stations, and peer-to-peer (P2P) systems are not illegal.

Another topic that interested people was the tit-for-tat algorithm Keith described in his presentation. Originally developed in gaming theory, this algorithm is now used also for P2P systems like BitTorrent. The tit-for-tat algorithm works between two trading parties—for instance, when two parties want the same video and one has pieces the other wants and vice versa. So far, this is the only successfully implemented algorithm. There is some research about incentives in P2P systems, and the incentive “I trade with you only if you trade with me” seems to be the one that is working best. “There is no trust required because it is immediate,” said Keith.

IAB Open Mic Session

A large part of the IAB open mic session was devoted to the IPv4 outage experiment. Most participants were pleased with the experiment and suggested similar exercises at future IETF meetings. Someone suggested it would have been useful to conduct such an experiment six or eight years ago, and in fact it was then being signalled as an important topic by the IAB; however, it was difficult to get attention at that time. Now there is enough critical mass. In addition, the technology has moved on since then. “We could have talked

Continued on next page

IDNA Revisited

By Wendy Rickard

This article is based on an IDNA BoF held at IETF 71 in Philadelphia.

In the five years since the original protocol for Internationalized Domain Names (IDNs) was completed and deployed, a handful of new developments, together with a number of real or perceived defects or inadequacies in the original protocol, has led to a desire to revise and upgrade the standard. Those efforts, which are now being undertaken by the new IDNabis working group (WG), were topics discussed during a BoF (birds of a feather) meeting in March at IETF 71 in Philadelphia.

IDN Controversies

Adopted in 2003, Internationalized Domain Names in Applications, RFC 3490, and associated documents, commonly known as IDNA2003, was the first attempt at creating a truly multi-lingual Domain Name System (DNS) by making it possible to read and write domain names with characters that fall outside the ASCII repertoire. The protocol was based on the then-current version of Unicode, and it was designed to achieve maximum backward compatibility with the existing DNS. While the IDNA2003 initiative was by and

large successful, a newer version of Unicode (version 3.2) has since been released, and a number of concerns about the protocol's potential limitations and defects have been raised. Some of those concerns may have been the results of unrealistic expectations: domain names, for example, don't generally map well into languages, and Unicode presents its own set of constraints. One problem that is fundamentally unsolvable in the general case is that there are characters in several scripts that simply look too much like other characters. That inevitably leads to confusion. Some of that confusion exists even among basic Latin

characters. For example, unless fonts are chosen carefully, the zero and the letter O or the number 1 and the letter I may look too much alike for any user to easily recognize and discern.

In response to growing concerns about the ability of IDNA2003 to lead to a truly international DNS, the Internet Architecture Board issued RFC 4690 in September 2006. That document attempted to summarize the general problems and issues that were being discussed. It was also intended to present a framework for future development work, including the need to migrate to newer versions of Unicode. As IDN expert and IDNA WG participant John Klensin frequently points out, there are numerous issues connected to IDNs—in addition to the one mentioned earlier—that may not be capable of being resolved. Many of those may be more about the culture and traditions of language and writing systems than the results of technical limitations. As John warns, “We shouldn't expect to write literature in domain names.”

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about it in the past only hypothetically; now we can get our hands dirty,” said Leslie Daigle.

Lixia Zhang agreed that there are many differences between then and now. Then the limitations of network address translation were not as obvious; there were not as many P2P applications; and, perhaps more important, there was not as much pressure because the IPv4 address space was not as scarce as it is now.

Most of the open issues now are deployment issues and not related to the protocol as such or to the network architecture.

Another topic raised was a perceived lack of operational experience in the IAB and the IETF as a whole. This has been a concern for quite a while now, and

the IAB continues to actively reach out to the operational community. There will be a survey to find out more about operational requirements. On the other hand, it seems to be the case that operators are well aware of what is going on at the IETF, and they comment when they feel the need.

Dave Oran urged the IAB to look at the problem that peer-to-peer applications will always find new bandwidth and that “they will suck it up as soon as they find it.” The payback for new bandwidth is much less clear today. Dave proposed the IAB should look at



Photo by Peter Lötthberg

In response to concerns expressed at previous meetings about the lack of food during IETF meeting breaks, Fred Baker hands Eric Rescorla an especially large cookie from IETF 71

that from both operational and architectural points of view. “Otherwise, it could happen that providers block applications versus users' trying to work around that,” he said. 🍪

Regardless of the validity of the complaints, dealing with newer versions of Unicode was generally recognized as an imperative, along with a handful of other issues that could contribute to more expanded applicability of IDN. Around the time that RFC 4690 was published, a design team began working on a set of proposed revisions to the protocol. The revision was strongly influenced by discussions being conducted on an open mailing list including thousands of messages containing recommendations for revisions and adjustments. To date, the IDNAbis WG is reviewing the design team's documents and deciding whether to pursue the recommendations offered by the team or to choose another path.

Key Issues

What are some of the key issues with regard to IDNA? At the IDNA BoF session in Philadelphia, John presented three. The first has to do with important characters and scripts that were excluded from the original IDN standard largely because they did not appear in Unicode 3.2. The proposed new model generalizes from the original LDH (letter-digit-hyphen) rule that was established in the first version of the DNS. That rule allows only letters, digits, and embedded hyphens but no punctuation or symbols. So far, the WG remains committed to retaining that rule, even though speakers of a particular language may regard the entire orthography of that language to be critical if effective communications are to be achieved. The DNS, as John points out, is about mnemonics, "not about writing novels," which means that some compromises should be expected.

As part of the first issue, while the IDNA2003 working group made an effort to include as many Unicode characters as possible, doing so may have resulted in a handful of problems. Those problems are real to users of a language, even if the language has only a small number of speakers. Again, compromises are necessary. As John said, it may

be equally important to "avoid the trap of thinking everything can fit into the DNS." In particular, the IETF "does not have a consensus mechanism for solving orthographic or linguistic disputes," he said.

The second set of issues involves scripts or individual characters that may have been inadvertently mishandled in IDNA2003. One example is the fi-

Regardless of the validity of the complaints, dealing with newer versions of Unicode was generally recognized as an imperative, along with a handful of other issues that could contribute to more expanded applicability of IDN.

nal form Sigma in Greek, which is not only a distinct character; it is also one that has significance for those who read and write in Greek. Unfortunately, the final form Sigma is not represented in IDNA2003. There are those who argue passionately that the omission should be corrected. To that John suggests that while the IETF does not have a way to resolve such disputes, "we should listen and try to encourage people to find a way to resolve the complaints."

The third set of issues involves the actual structure of IDNA2003, which is Unicode-version dependent. Unfortunately, applications can't recognize which version of Unicode is being used, and as a result, code points are being looked up that aren't defined. "It isn't easy to understand what is permitted and what isn't, which makes extensibility and forward compatibility poor," said John.

Concern has also been expressed that IDNA2003 is confusing with regard to terminology. For example, the standard is applied to labels, not to fully qualified domain names (FQDNs). Questions also remain concerning right-to-left (bidi) scripts and label separators. "There is a difference between mapping label separators and other parts of the FQDN," said John. "Label separator mappings, if

any, may need to be understood by even non-IDNA applications." Compatibility between the two versions is a matter of perspective, says John, because what goes on the wire doesn't change that much between IDNA2003 and the new IDNA2008, but what is permitted to go into the IDNA system does change. New terms—such as U-labels, A-labels, and LDH labels—get introduced to reduce confusion in other areas.

BoF chair Harald Alvestrand agreed that separators are key issues for IDNA, but he also said that in a more general sense, the problems are related to protocol issues. The most important differences, said John, lie in trying to define rules and mechanisms to which one can conform rather than an algorithm one can implement. "In some ways, the new approach is simpler, because as compared to IDNA2003, the mappings are gone and conversion to and from the

Continued on next page



A glimpse of City Hall in the City of Brotherly Love

Photo by Peter Löhberg

IDNA Revisited, continued from page 11

punycode version is symmetric and information preserving,” he said.

The issue of mappings appears to be critical in a number of respects. As explained in draft-ietf-idnabis-rationale-00.txt, which was posted in May 2008, issues in domain name identification and processing arise because IDNA2003 specified that several characters be treated as equivalent to the ASCII period (dot, full stop) character used as a label separator. As the draft states, “If a domain name appears in an arbitrary context (such as running text), one may be faced with the requirement to know that a string is a domain name in order to adjust for the different forms of dots but also to have traditional dots to recognize that a string is a domain name—an obvious contradiction.”

The IDNA2008 model removes all of these mappings and interpretations—including the equivalence of different forms of dots—from the protocol, leaving such mappings to local processing. “This should not be taken to imply that local processing is optional or can be avoided entirely. Instead, unless the programme context is such that it is known that any IDNs that appear will be either U-labels or A-labels (representation in Unicode or encoded in ASCII using punycode encoding), some local processing of apparent domain name strings will be required both to maintain compatibility with IDNA2003 and to prevent user astonishment.”

Bidi

One of the great challenges of IDNs is the ability to represent domain names in languages that are written from right to left (RTL), such as Arabic and Hebrew, and that have those names behave consistently and make sense in context. In IDNA2003, the rule is that the label can be RTL only if the first and last characters of each one are RTL. The

Proposed Changes to IDNA

In April 2008, the Network working group released an Internet Draft with proposed high-level changes from IDNA2003 to IDNA200x based on the IDNA design team documents. Those changes include:

1. Update base character set from Unicode 3.2 to Unicode version-agnostic
2. Separate the definitions for the “registration” and “lookup” activities
3. Disallow symbol and punctuation characters except where special exceptions are necessary
4. Remove the mapping and normalization steps from the protocol and have them instead done by the applications themselves, possibly in a local fashion, before invoking the protocol
5. Change the way that the protocol specifies which characters are allowed in labels from “humans decide what the table of code points contains” to “decision about code points are based on Unicode properties plus a small exclusion list created by humans”
6. Introduce the new concept of characters that can be used only in specific contexts.
7. Allowing typical words and names in languages such as Dhivehi and Yiddish to be expressed
8. Make bidirectional domain names (delimited strings of labels, not just labels standing on their own) display in a nonsurprising fashion
9. Make bidirectional domain names in a paragraph display in a nonsurprising fashion
10. Remove the dot separator from the mandatory part of the protocol

Changes Proposed by Individuals in the Working Group

In addition to the changes above, individuals in the working group have proposed high-level changes. These include:

- a. Add conversion between traditional and simplified Chinese characters
- b. Add guidelines or requirements for registration of character variants, along the lines of RFC 3743

This work is being discussed on the mailing list at idna-update@alvestrand.no. Also see [draft-hoffman-idna200x-topics-03](#).

problem, according to Harald, arises when confronted with nonspacing (or combining) marks. Some languages, including Yiddish and Dhivehi (the official language of the Maldives), have words that end with a combining mark that has no direction. Under IDNA2003

of registries and zone administrators at all levels of the DNS (as well as the need for registry restrictions), the need to educate registrants in order to minimize confusion, and the need to engage look-up implementers (and the developers of related applications). “The common

One of the great challenges of IDNs is the ability to represent domain names in languages that are written from right to left (RTL), such as Arabic and Hebrew , and that have those names behave consistently and make sense in context.

it is not possible to use such words, and because of that, it is not possible to use those languages. In response, Harald and Cary Karp proposed a new set of rules (in draft-ietf-idnabis-bidi-00.txt), which permits nonspacing marks at the end of a label and makes other changes. It was discovered, however, that some ASCII labels that appear next to some RTL labels could break.

Recommendations

Drawing on RFC 4690 and the WG drafts, John suggested several goals be met in the next version of IDNA, which was referred to as IDNA200x prior to the IETF 71 in Philadelphia and IDNA2008 since then. Those goals include a version of IDNA that is:

- Unicode-version agnostic
- Easier to understand
- More predictable with regard to what happens when languages and scripts are applied
- More adaptable to local conditions (realistic interoperability)

Those who are following IDN—and especially those who are working with it—are encouraged to understand that domain name internationalization is not just about the IDNA protocol and character rules. There are, in fact, many areas of responsibility that are required so as to make the system work well, including the standard protocol, the cooperation

sense that users need to possess to make IDNA a functional reality may require some education in order to develop,” said John. “You can’t solve confusion, but you can provide better tools.”

Summary

The work of the current IDN WG, called the IDNABIS WG, is to ensure the practical stability of the validity of algorithms for IDNs. It is currently organized as four Standards Track documents.

The charter of the WG is meant to untie IDNA from specific versions of Unicode using algorithms that define validity based on Unicode properties. Other goals include separating requirements for valid IDNs at time of registration versus at resolution time, revising bidirectional algorithms to produce a deterministic answer as to whether or not a label is allowed, determining whether bidirectional algorithms should allow additional mnemonics labels, and permitting effective use of some scripts that were inadvertently excluded by the original protocols.

The IDNABIS WG remains committed to preserving and using the current Domain Name System and no substantially new protocols or mechanisms are expected. 

ISOC Fellow Vincent Ngundi: At Home at the IETF

By Wendy Rickard

An engineer from Kenya speaks with the IETF Journal about becoming an Internaut and making his way to the IETF.

“Long live this noble initiative,” declares Vincent Ngundi when speaking about the ISOC Fellowship to the IETF programme. The native Kenyan travelled the long road from Nairobi to Philadelphia in March for IETF 71, and unlike many other fellows, the transition from one culture to another was not too much of a shock for him.

Although my face-to-face meeting with Vincent was brief, his comfort level was obvious; in fact, he was hardly the picture of the awestruck, small-town Internaut trying to fit in with the big guys. “To my utter surprise, I was totally comfortable,” he said.

Vincent’s easygoing manner most likely explains his comfort level, and it

Vincent’s interest in technology began early, back when he was in primary school. Born in Nairobi in 1978, Vincent has lived in Kenya all of his life. His father is a retired army colonel; his mother is a former flight attendant with East African Airways. “At first I wanted to be an astronaut,” he said. “Being very good in sciences, I thought a career in



Photo by Ahmed Ugas

ISOC Fellow Vincent Ngundi in Johannesburg at the AFTLD AGM

intern, immediately following graduation in August 2004. “I was an intern for eight months and later was employed as systems engineer in April 2005,” he said. Moving quickly through the ranks, Vincent was promoted to technical manager of KENIC in April 2007. In September 2008, he was named administrative manager.

“The Internet has always amazed me, and after joining KENIC, I took to learning as much as I could about Internet technologies,” he said. Since joining KENIC, Vincent has been able to gain a wealth of information and knowledge about the Internet, both through his own initiative and with the help of colleagues, workshops, seminars, and meetings like the IETF.

Vincent became interested in the IETF during his search to understand how the Internet works. “I always thought there was some big organization out there that managed the Internet and its technologies,” he said. “Further research brought me to the IETF, a humble entity based more or less on the model for developing open-source software.” Vincent learned about the fellowship programme from the ISOC mailing list and from IETF Journal editor Mirjam Kühne. “I have been a member of the ISOC mailing list as well as other mailing lists, such as AfNOG, AfriNIC, ICANN, and others for a while now,” he said.

“Decide what working groups you want to attend and follow, then familiarize yourself with the discussions on the mailing lists. Gather from your mentor as much information as possible. Plan to be at the meetings in time for the newcomers’ tutorial and the session on writing an RFC.”

— Vincent Ngundi, on making the most of an IETF meeting

should prove an asset to his professional life. As administrative manager of the Kenya Network Information Centre (KENIC), Vincent coordinates and manages the day-to-day operations of the public/private partnership (its board membership is drawn from the public sector, the private sector, and civil society). But it wasn’t always smooth sailing. Vincent confesses that the transition from a position that was purely technical to one that is administrative was not easy. “At first, the challenge had to do with balancing the technical aspect of the job with the business side, but I’ve learned a lot on the job, and all is OK now,” he said.

engineering would be the way to go.” He entered the University of Nairobi’s architecture programme but quickly realized that architecture wasn’t what he wanted to do. After consulting with friends and colleagues, he settled on computer science, even in the face of numerous social and economic challenges in the country, including lack of awareness of the Internet, illiteracy, the cost of access, and poor electricity distribution. “I have never regretted my decision,” he said.

Today, Vincent holds a bachelor of science degree from the university and is currently enrolled in a master of science programme in computer science there as well. He joined KENIC as an

Report from the ISOC Fellowship Programme

ISOC Fellows Come to Philadelphia for IETF 71

As part of its long tradition of helping build technical capacity in less-developed countries, the Internet Society (ISOC) Fellowship to the IETF programme continues to bring technologists from developing regions to IETF meetings.

In March 2008, six Fellows attended IETF 71 in Philadelphia. ISOC covers the cost of attending the meeting and pairs each Fellow with an IETF veteran, who serves as their meeting mentor.

ISOC extends opportunities for organizations to become sponsors of this important programme. Sponsorship demonstrates a commitment to technical capacity building in less-developed regions and shows support for extending participation in the IETF to those in developing countries. It also creates opportunities to build contacts with technologists and potential regional leaders who are highly knowledgeable about conditions in developing countries. Those who are interested in becoming an ISOC Fellowship to the IETF sponsor should contact ISOC at fellow-sponsor@isoc.org.



ISOC Fellows and mentors at IETF 71 in Philadelphia

Photo by Gerard Ross

The Fellows attending IETF 71 came from Bangladesh, Ethiopia, Haiti, India, Kenya, and Pakistan. They included:

- Max Larson Henry (Haiti), Faculty Member, Faculte des Sciences, Universite d'Etat d'Haiti (mentor: Stephane Bortzmeyer, AFNIC)
- Mohibul Hasib Mahmud (Bangladesh), Manager, Network Routing, BRAC BDMail Network Ltd. (bracnet) (mentor: George Michaelson, APNIC)
- Dessalegn Mequanint Yehuala (Ethiopia), Lecturer/Researcher, Computer Science Department, Addis Ababa University (mentor: Dave Meyer, Cisco)
- Vincent Ngundi (Kenya), Technical Manager, Kenya Network Information Center (KeNIC) (mentor: Shane Kerr, AfiliAs)
- Mudivedu Shroff Rajesh (India), Network and Systems Administrator, Indian Institute of Science (mentor: Dave Knight, AfiliAs)
- Asim Zaheer (Pakistan), Mentor Graphics and part-time graduate student, Lahore University of Management Sciences (LUMS) (mentor: Hesham Soliman, Elevate Technologies)

Those interested in applying for Fellowship should review the programme overview at <http://www.isoc.org/educpillar/fellowship/overview.shtml>.

In preparation for the Philadelphia meeting, Vincent familiarized himself with mailing list discussions that interested him and read material that was sent to him by his mentor, Shane Kerr, who is working for AfiliAs. "Further," he said, "I went through the programme agenda, marking out the sessions that interested me and consulted with former fellows, including Michuki Mwangi and Alain Aina."

Clearly, Vincent's proactive nature

made it possible for him to approach his first-time experience at the IETF with confidence. He believes his comfort level may also be attributed to the "remarkable introduction by the ISOC staff" as well as the efforts of his mentor, "but the experience was way better than I expected," he said. "The people were great. And Philadelphia is lovely."

Vincent has several suggestions for folks who are attending an IETF meet-

ing for the first time. "Decide what working groups you want to attend and follow, then familiarize yourself with the discussions on the mailing lists. Gather from your mentor as much information as possible. Plan to be at the meetings in time for the newcomers' tutorial and the session on writing an RFC. And remember that Mirjam and Leni will be important contacts before, during, and after the IETF meeting." 

Working with ITU-T: The MPLS Transport Profile Case

By *Loa Andersson and Stewart Bryant*

The International Telecommunication Union Telecommunication Standardization Sector (ITU-T) and the IETF have agreed that the next-generation transport network will be based on MPLS (multiprotocol-label-switching) technology developed within the IETF. It has been mutually agreed that the IETF and ITU will work together to extend IETF MPLS functionality to address the needs of the transport network. The work will move forward with the recognitions that the sole design authority for MPLS resides within the IETF and that expertise for Transport Network Infrastructure resides within ITU-T Study Group (SG) 15.

The need for a solution to the problem of designing a packet-based transport network solution based on IETF MPLS has led to a level of technical cooperation between the IETF and the ITU-T not previously required. As a result, a new organizational structure was developed, and a design framework that both conforms to the IETF MPLS architecture and satisfies the needs of the service providers that look to the ITU-T to meet their transport network needs was designed.

History

For a number of years, the ITU-T has been designing a label-switched protocol for transport networks, which provide the wide-area connectivity on which other services—such as IP or phone networks—run. The ITU-T chose to adapt the IETF's MPLS to this task and introduced a protocol suite known as T-MPLS.

Late in the ITU-T design and specification cycle there were a number of liaison exchanges between the ITU-T and the IETF concerning the technology. In response, the chairs of the MPLS, PWE3, BFD, and CCAMP working groups (WGs), as well as the Routing and Internet area directors, attended a number of ITU-T meetings. During the process, the IETF became increasingly concerned that incompatibility between IETF MPLS and ITU-T T-MPLS would lead to what Stewart Bryant, PWE3 co-chair, had previously

described as a “train wreck on the Internet.” Those concerns led the chairs of the IESG and the IAB to take the unprecedented step of sending a liaison to the ITU-T, stating that either T-MPLS should become a fully compliant MPLS

“Given the complexity of today’s networks, it is inevitable that we will, from time to time, see conflicts in approaches. This is natural. Quickly agreeing on a common way forward is imperative. And at we have done so is an indication of the great spirit of cooperation between IETF and ITU that has been built over many years of collaboration.”

— Malcolm Johnson, Director,
ITU Telecommunication Standardization Bureau

protocol, standardized under the IETF process (so-called Option 1) or it should become a completely separate protocol with a new name and a new set of code points (so-called Option 2).

Both options were discussed at an ITU-T meeting of Question 12 Study Group 15 in Stuttgart, Germany, where it was proposed that an ITU-T-IETF joint working team (JWT) be formed to evaluate the issues and make a recommendation to ITU-T management on the best way forward.

The first meeting of the JWT occurred during the ITU-T Geneva plenary this past February. An IETF design team and an ITU-T focus group supported the JWT.

As a result of the work of the JWT

and the resulting agreement on how to move forward, the fears that a set of next-generation network transport specifications developed by ITU-T could cause interoperability problems have been allayed.

The JWT Recommendation

Early in the process, members of the JWT realized it was possible to design a solution to the transport network requirements without changes to the MPLS architecture. To prove the feasibility of a solution to the transport network requirements that fully conformed to the IETF MPLS architecture, the JWT constructed a straw man design framework. The design framework demonstrated that it is possible to adapt the IETF MPLS architecture to satisfy the

needs of the transport network with only minimal changes in the IETF MPLS architecture, thereby demonstrating the considerable flexibility of the IETF design.

While the straw man can be used to provide the starting point for development of the solution, the details for the entire solution will be considered during the IETF standardization process. In addition, there will be strict adherence to the MPLS change process. Given that a viable solution to the transport network requirements has been demonstrated, the JWT reached consensus to recommend the first option: that the ITU and the IETF agree to work together and bring transport requirements into the IETF and extend IETF MPLS forwarding, OAM (operation, manage-

ment, and maintenance), protection, control plane protocols, and network management to meet the requirements through the IETF Standards Process. The JWT concluded that this would be the best way to (1) fulfill the mutual goal of improving the functionality of both the transport networks and the Internet and (2) ensure complete interoperability and architectural soundness (see <http://www.itu.int/ITU-T/news-log/CategoryView,category,Study%20Group%2015.aspx>).

Furthermore, it was recommended that the technology should now be known as the Transport Profile for MPLS (MPLS-TP) and that future

work in the IETF on this subject should focus on the definition and design of the MPLS-TP. It was also agreed that the ITU-T would focus on the integration of MPLS-TP into the transport network—which would put the current T-MPLS Recommendations into alignment with MPLS-TP—and that the ITU-T would terminate work on current T-MPLS.

The JWT found no reason to investigate the option of working independently on a solution, now that the teams were working diligently to find solutions that were compatible with IETF MPLS architecture.

MPLS Transport Profile Requirements

As described earlier, in the designing of a solution to the transport network requirement, it is necessary to consider five elements:

1. Forwarding
2. OAM
3. Protection
4. Control plane
5. Network management

The operators of transport networks require that label-switched paths (LSPs) and pseudowires (PWs) be configured statically via the management plane. This

Continued on next page

DHCPv6 Is Getting to Be a Mature Technology

By Alain Durand

About three years ago, when Comcast started to look at production-grade DHCPv6 servers, not much was available. Sure, there were a few proof-of-concept codes here and there, but nothing we would dare use in production. Things have changed quite a bit since then.

Back in early 2007, only a few products, both commercial and open source, were available, each at various stages of maturity. After an initial attempt at interoperating them, it quickly became apparent that there were hiccups. Clearly, more testing and polishing were necessary. In the tradition of early connectathon and interop events, we decided to organize a DHCPv6 bake-off that would bring together implementers of all of the available codes. They would be locked in a room for a couple days and asked to build real networks in which all products would interoperate seamlessly.

The first bake-off was held in March 2007 at the RIPE NCC (the event was reported in the IETF Journal, Volume 3, Issue 1). Participants were eager to repeat the event by the end of the year, so another bake-off was performed in Vancouver, Canada, just after IETF 70. While the implementations were improving, the participants asked for a third bake-off, which was held in Philadelphia right before IETF 71.

Today, more than 20 separate implementations have been proved able to interoperate. The technology is maturing and is beginning to be deployed. Furthermore, both commercial and open-source servers are readily available. For example, the IETF 71 IPv6-only network was for the first time offering stateful DHCPv6 address allocations. Not only did the staff report no problems with it; they also characterized it as a simple upgrade from the server code that had previously been used for DHCPv4.

Many operating systems are able to take advantage of the technology and are now integrating (natively) a DHCPv6 client. The next step is to get DHCPv6 clients and servers integrated into home routers, which is essential for distributing IPv6 addresses, prefixes, and other configuration data to residential broadband customers. So far, this remains the missing link, since very few of those devices currently support IPv6.

To all of the participants of the three bake-offs, we thank you for your decisive contribution to making this technology a reality and for serving as cornerstones of the deployment of IPv6.

Working with ITU-T, continued from page 17

is to allow the equipment to be configured by using a centralized management system that connects to equipment out of band with respect to the data plane. If a control plane is used for the configuration of the LSPs/PWs, then failure and recovery of the control plane are not allowed to impact the forwarding plane, which is akin to a requirement to support nonstop routing and nonstop forwarding in the IP world.

Service providers are also requesting consistent OAM capabilities for multi-layered network and interworking of the different layers and technologies, such as Layer 2, pseudowire, and label-switched path. They want to be able to offer MPLS label-switched paths and pseudowires as a part of their transport service offerings and not to use them just to provide higher-level services, such as virtual private networks. In order to do that, they must be able to seamlessly manage label-switched paths and pseudowires at different nested levels. This is known as tandem connection monitoring (TCM), and it is used, for example, when a label-switched path of pseudowire crosses multiple administrations.

Currently, MPLS and pseudowires provide a generalized protection mechanism that operates in a mesh network topology and provides one-plus-one (data on active and standby path) or one-to-one (data only on active path) protection. Service providers building transport networks have in the past used a hybrid of fast convergence and fast re-route—particularly in specialist topologies, such as rings. To support transport networks, it may therefore be necessary to provide additional protection mechanisms.

Service providers also need the OAM and the data traffic to be congruent. This is provided in pseudowires through the use of a multiplexing mechanism called the associated channel header (ACH), which allows the OAM to be

multiplexed transparently over the same LSP as the pseudowire. MPLS has no equivalent general-purpose OAM multiplexing mechanism. As requirements on forthcoming solutions for the MPLS TP, the IETF inserted that no modification to the MPLS forwarding architecture should be needed and that a solution should be based on existing pseudowire and LSP constructs.

In response, the JWT proposed a new method of carrying an ACH over an MPLS LSP. This small extension to the IETF MPLS architecture was the only additional mechanism that the JWT needed to postulate. It also makes it possible to have a common OAM mechanism between pseudowires and LSPs. Thus, operational complexity and overhead are dramatically reduced, and both IETF technologies are enhanced.

The OAM-data congruency is particularly challenging in the case of link aggregation groups and equal-cost multipath support. However, transport network designers do not normally apply these techniques. In the short term, at least, it is suggested that the LSPs and PWs used in transport network applications avoid these topology constructs.

In general, to avoid losing LSP head-end information, transport networks require that bidirectional point-to-point paths be congruent and that there be no LSP merging—in other words, no use of LDP multipoint-to-point signaling. Multicast services operate only as point-to-multipoint services and not as multipoint-to-multipoint services. The JWT was unable to reach consensus on whether penultimate hop popping needed to be excluded from the design. The straw man design framework assumes that PHP is not used, but this is the subject of ongoing investigation.

When protection switching (fast re-route) is in use, the OAM function is responsible for monitoring the label-switched path or pseudowire and initiates path recovery actions.

It was a requirement that IP forwarding not be required to support OAM or data packets, although an out-of-band management network running IP was considered outside the scope of the feasibility study.

The transport network has to be capable of being used with static provisioning systems or with a control plane. On one hand, when static provisioning was used there had to be no dependency on routing or signalling, such as GMPLS or IGP, RSVP, BGP, and LDP. On the other hand, the mechanisms and capabilities used must be able to interoperate with existing MPLS and pseudowire control and forwarding planes.

With the addition of the MPLS Transport Profile, the spectrum of services that MPLS now supports is illustrated in Figure 1 (page 19), which is taken from the JWT report.

The Straw Man Design Framework

The straw man design framework proposed by the JWT can be found at http://www.ietf.org/MPLS-TP_overview-22.pdf.

In creating the straw man MPLS transport profile architecture the technical feasibility study by the JWT and IETF MPLS Interoperability Design Team introduced two new constructs: the first was the definition of a new MPLS reserved label—the MPLS-TP alert label (TAL)—and the second was the definition of a Generic Associated Channel (GE-ACH).

The GE-ACH is a generalization of the ACH mechanism already defined for pseudowires to allow the mechanism and protocols that run over it to be used in both a pseudowire context and an MPLS LSP context.

The GE-ACH allows OAM packets to be directed to an intermediated node on an LSP/PWE via a suitable combination of label stacking or proper TTL setting. The use of this approach allowed

the OAM channel to be introduced into MPLS without any modification to the existing MPLS forwarding design (a design invariant). There already exists an OAM alert reserved label (label 14), which was considered for use as the TAL, but the JWT believed that reusing this label would detract from the simplicity of the proposed design and that reclaiming it would be difficult in the short term due to existing deployments. The JWT therefore recommended the allocation of a new MPLS reserved label to the TAL. For various reasons, the designers speculated that this would be label 13 (Stewart's lucky number), and the terms TAL and label now seem to be synonymous.

The Generic Associated Channel functionality supports the FCAPS functions that need to be supported by providing the encapsulation needed to carry OAM, APS, and ECC packets across the network. Thus, it is proposed that PWE3 and MPLS use the same mechanism to carry OAM traffic, but necessarily with a different method of indicating to the receiving equipment that the OAM payload is present in the packet. This mechanism (ACH) can be

unified for LSPs and PWE, enabling the same functionality for both as well as ease of implementation. The GE ACH would use code points from PW ACH space but not necessarily for PW purposes. Bringing ACH functionality into LSPs begins to blur the architectural line between an MPLS LSP and an MPLS pseudowire. The functional differences between an MPLS LSP and an MPLS PW must, however, be retained in the architecture. There may be specific differences that are discovered in the design phase. For reasons of security and congestion, ACH functionality for LSP and pseudowires should be limited to only OAM, APS, and ECC management-channel data.

To illustrate how these new mechanisms are applied, Figure 2 (page 20) shows how LSP, multisegment pseudowire, and tandem connection monitoring OAM will be added to the MPLS architecture. Further examples can be found in the full report of the JWT.

As can be seen in Figure 1, there is consistency between the OAM for pseudowires and LSPs.

It was shown that a great deal of IETF protocol, design, and architectural reuse can be employed to solve the transport-network requirements and that no fundamental change to the IETF MPLS architecture was considered necessary.

Future Organization of the Work

It is proposed that the MPLS interop design team, the JWT, and the ad hoc T-MPLS groups continue to operate as described in the ITU-T document that created them (SG 15 TD515/PLEN). As stated in the document, they are expected (1) to facilitate rapid exchange of information between the IETF and ITU-T; (2) to ensure that the work is progressing, with a consistent set of priorities to identify gaps/inconsistencies in the solutions under development; (3) to propose solutions for consideration by the appropriate WG/Question; and (4) to provide guidance when work on a topic is stalled or technical decision must be mediated. It should be noted that none of the groups have the authority to create or modify IETF RFCs or ITU-T Recommendations. Any such work must be handled through the normal processes and channels of the respective standards

bodies. For the new cooperative venture to work, direct participation in the work by experts from the IETF and ITU-T is required. For example, an IETF MPLS Interoperability Design Team needs to be chartered so as to produce an MPLS-TP architectural documentation hierarchy. However, all documents would then progress in the appropriate IETF WGs according to the usual procedures.

It is assumed that ITU-T participants will be active members of the design teams and that drafts will be reviewed by the ITU-T prior to completion of WG last call. ITU-T review will

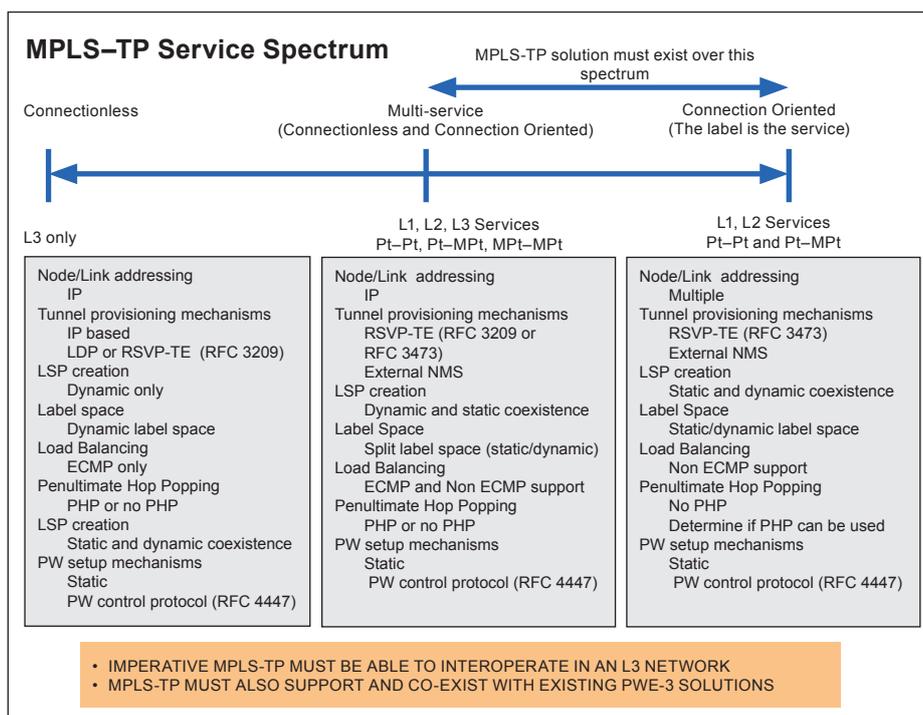


Figure 1

Continued on next page

Working with ITU-T, continued from page 19

be handled by correspondence, and the results of the review will be conveyed via a liaison statement. Review by correspondence will avoid delaying WG last call to align with an ITU-T SG/experts meeting. Early allocation of RFC numbers and IANA code points once a document has completed IESG review are also expected to expedite the joint standards work.

The normative definition of the MPLS-TP that supports the ITU-T transport network requirements will be captured in IETF RFCs. The ITU-T will develop Recommendations for allowing MPLS-TP to be integrated with current transport equipment and networks. It will, with the agreement of the IETF, define any ITU-T specific functionality within the MPLS-TP architecture, using the (G)MPLS change process (RFC 4929), and will revise existing Recommendations to align with MPLS-TP.

The normative definition of the MPLS-TP that supports the ITU-T transport network requirements will be

captured in IETF RFCs. The ITU-T will:

- Develop recommendations that allow MPLS-TP to be integrated with current transport equipment and networks
- Specify any ITU-T-specific functionality within the MPLS-TP architecture—via the MPLS change process (RFC 4929)
- Revise existing Recommendations to align with MPLS-TP via the MPLS change process

ITU-T MPLS-TP Recommendations will rely on normative references to RFCs. Final text for consent will be provided to the IETF for review, and initiation of the AAP process should be timed so that members can base their AAP comments on an appropriate IETF WG consensus review of the consented text. Early communication among liaisons and the JWT should make it possible to avoid major comments on the final documents; for example, the draft Recommendation for consent should be sent to the IETF for review prior to the SG meeting that plans to approve them.

Conclusion

The IETF and ITU have agreed that they will work together to extend IETF MPLS functionality to address the needs of the transport network. The work will move forward in the recognition that the sole design authority for MPLS resides within the IETF and that the domain of expertise for transport network infrastructure resides within ITU-T SG 15. The agreement to work together to design MPLS-TP resolves the issue of the ITU-T design’s being incompatible with widely deployed IETF MPLS technology.

“We do not often encounter concerns that make ITU-T designs noninteroperable with IETF designs, so we had to improvise a structure in which to effectively embed the problem solving in our processes,” said IAB chair Olaf Kolkman. “All in all, it has been somewhat of a rough ride, but the outcome is satisfactory because of hard work and a goal-oriented approach by everybody involved.”

IETF chair Russ Housley agreed, expressing optimism over the outcome. “I see this as a significant milestone in the cooperation between the ITU-T and the IETF.”

It is also, of course, a major milestone in the history of MPLS and the design of transport networks.

Loa Andersson has been active in several standards organizations for more than 15 years. He is now a co-chair of the MPLS WG and a member of the IAB.

Stewart Bryant has been active in the IETF, ITU-T SGs 13 and 15, and IEEE 1588. He is now co-chair of the PWE3 and TICTOC WGs and is IETF liaison representative to the ITU-T for MPLS issues.

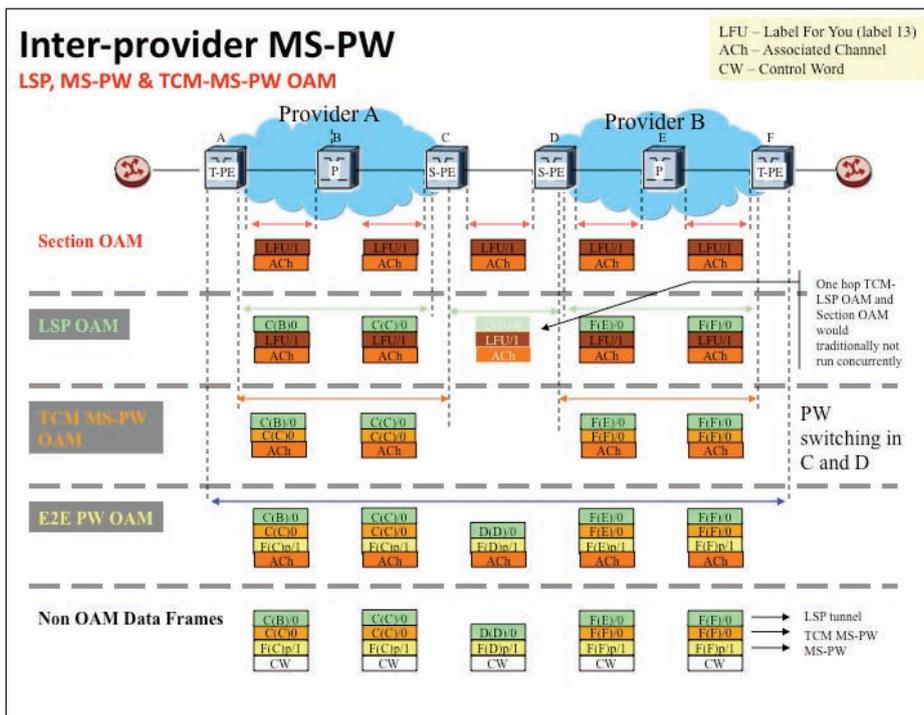


Figure 2



Aaron Falk, IRTF Chair

IRTF Report

By Aaron Falk

What follows are summaries of several updates on the Internet Research Groups (RGs), some of which were reported during the Technical Plenary at IETF 71.

Currently, 14 RGs are working on topics related to Internet protocols, applications, architecture, and technology. Some groups have significant ties to IETF work; others, not so much. Most RGs are open, and all maintain open mailing lists. There is room for overlap in scope between RGs, and the management style within each group is diverse.

Two RGs have been closed since the last meeting: End-Middle-End and Internet Measurement. The future of the Peer-to-Peer RG is currently being discussed. The work of the Network Management RG is being reviewed by the Internet Architecture Board (IAB).

Suggestions for new work for the Internet Research Task Force (IRTF) are being considered. The IAB is seeking an IRTF RG on unwanted traffic mitigations (an e-mail will be going out to the research community). There is also interest in an RG on network visualization. Finally, there is continued interest in an RG on a Quality of Service policy framework.

Three IRTF drafts are in the RFC Editor's queue. Eight drafts are in the process of being published. A draft to establish an IRTF RFC stream is under development and should be published in the near future.

Seven RGs met at IETF 71. Following is a summary of recent developments as well as developments reported by RGs during the IETF 71 technical plenary.

Anti-Spam RG (asrg)

The ASRG could possibly be resurrected following a meeting at IETF 71 in Philadelphia. There is interest in finishing two drafts:

- Description of mechanisms used for DNS blacklists
- A best current practices on blacklist operations

The RG has set up a wiki on spam mitigation techniques that is now being populated and that may evolve into a document analysing why some of those techniques should not be used. The wiki is located at <http://wiki.asrg.sp.am>.

Delay-Tolerant Networking RG (dtnrg)

The DTN implementations have found broad application, including, for instance, among nomadic and arctic users, for commercial use (LEO satellites), and for Defense Advanced Research Projects Agency (DARPA) mobile networks. The RG recently published two RFCs and 16 Internet-Drafts. At IETF 71 the RG organized a BarBoF to discuss establishing a community-based reference DTN implementation.

Host Identity Protocol RG (hip)

The RFC editor has published the document "NAT and Firewall Traversal Issues of Host Identity Protocol (HIP) Communication" as RFC 5207. Several new drafts on extending HIP have been presented:

Continued on next page

IRTF Report, Continued from page 21

- The use of certificates in HIP
- A HIP-based mobile router
- Security Parameter Index-based network address translation

The RG continues the discussion on legacy NAT and HIP-aware middlebox traversal (with possible P2P-SIP applicability).

Internet Congestion Control RG (iccrgr)

The ICCRG has been reviewing congestion control proposals for the Transport Area, such as Compound TCP and CUBIC. Work on the two surveys continues: one addresses current congestion control RFCs, and the other looks at open congestion control research issues. The RG plans to initiate a discussion on TCP slow-start enhancements.

Mobility Optimizations RG (moboptsrgr)

The MOBOPTSRG is finishing two documents: one on location privacy for mobile IPv6 and the other on handover preauthentication. Work on multicast mobility continues, including the development of a problem statement, which is nearly done. Some recommendations were made at IETF 70 in Vancouver.

Network Management RG (nmrg)

The NMRG has begun studying the behaviour of management protocols by using network traces. For this work, the RG is seeking collaborators from enterprise networks.

The group is also in the process of finalizing a document specifying SNMP trace exchange formats and specifying a format for aggregation of SNMP messages.

The IAB has asked the NMRG to seek feedback from the operators community—for instance, at NANOG or RIPE meetings.

Routing RG (rrg)

There has been a lot of activity within the RRG, as evidenced by the nearly 1,000 messages on the mailing list since IETF 70. The RG is now evaluating several routing architecture proposals and is working to build consensus toward a recommendation by March 2009. The goal is to create a recommendation for a specific architecture rather than create a concrete proposal.

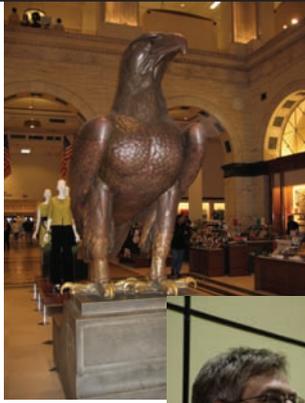
Scalable, Adaptive Multicast RG (samrg)

The SAMRG is currently working on two drafts. First is a protocol for hybrid multicast; the second involves applying P2P-SIP overlays to multicast. The RG is encouraging prototyping. There is a tentative plan to have an interim meeting at MILCOM 2008. The meeting would then be coordinated with a special session on P2P overlays.

For more information about the Internet Research Task Force, visit <http://www.irtf.org/>.

Recent IESG Document and Protocol Actions

A full list of recent IESG Document and Protocol Actions can be found at <http://ietfjournal.isoc.org/DocProtoActions0401.shtml>.



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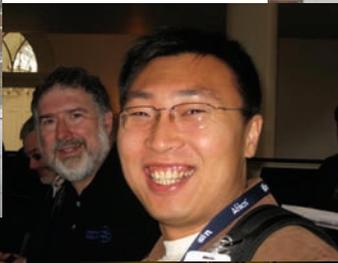
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Photos by Patrik Fältström and Peter Löthberg

IETF Meeting Calendar

IETF 72

27 July–1 August 2008
Host: Alcatel-Lucent
Location: Dublin, Ireland

IETF 74

22–27 March 2009
Host: TBD
Location: San Francisco, CA, USA

IETF 73

16–21 November 2008
Host: Google
Location: Minneapolis, MN, USA

IETF 75

26–31 July 2009
Host: .SE
Location: Stockholm, Sweden

Register now for

IETF 72

27 July–1 August 2008

Dubin, Ireland

<http://ietf.org/meetings/72-IETF.html>

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Regular registration: USD 785

Full-time students: USD 150 with on-site proof of ID

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