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Inside this Issue

From the Editor's Desk

By Mat Ford

Welcome to the IETF Journal from the IETF 82 meeting in Taipei, Taiwan. Our cover article explores background and motivations for a new effort to overhaul the WHOIS protocol, and there's more coverage of the WEIRDS BoF in our IETF Ornithology column on page 20.

Another BoF meeting (multrans) considered the thorny problem of multicast traffic in mixed IPv4/IPv6 environments and IETF 82 attendees had the opportunity to witness a demonstration of IPv6/IPv4 multicast interworking solutions during the meeting. The demo is described on page 12.

The IETF 82 meeting was rich with awards for outstanding achievement. On page 15 you'll find discussion with the prize winners and details of their contributions.

The Internet Society held a fascinating panel event during the meeting entitled, "Beyond PUT, POST and GET: Application data routing carves its own path." In addition to observing the importance of Content Delivery Networks to today's popular Internet applications, the panel discussed work from around the world toward generalising this approach to developing a new networking architecture. Read about it on page 7.

Also in this issue are regular columns from the IETF, IAB, and IRTF chairs, coverage of hot topics discussed during plenary meetings, and an introduction to the ISOC Fellowship Programme.

As always, we are hugely grateful to all our contributors. Please send comments and suggestions for contributions to ietfjournal@isoc.org. And remember, you can subscribe in hardcopy or via email at https://www.internetsociety.org/ietfjournal-subscribe.

Something WEIRDS This Way Comes

By Andrew Newton

The WHOIS protocol has been around for a long, long time. It predates the Domain Name System (DNS), the service it is used most to describe, and even IPv4. While the most recent RFC describing the WHOIS protocol was written in 2004, it has been unchanged since its inception: over TCP, the server accepts input until it sees <CR><LF> and then it sends an answer to the client and closes the connection.

Despite (or maybe because of) this protocol's simplicity, it has survived three previous attempts by the IETF to standardize replacements believed to be better. Two of those efforts focused on making

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Photos: Nana Buxani/Internet Society

Message from the IETF Chair

By Russ Housley


Russ Housley, IETF Chair

The IETF participants remain actively engaged in developing the future of the Internet!

For the first time, an IETF meeting was held in Taipei, Taiwan, and we felt most welcome. Attended by 931 people from 48 countries, IETF 82 was hosted by the Taiwan Network Information Center (TWNIC), which served as a wonderful host. The hotel and the convention center facilities were comfortable, and Tuesday evening's social event was well attended. TWNIC was assisted by 15 sponsors, which helped make the event successful. APNIC sponsored the welcome reception; Chunghwa Telecom sponsored the network connectivity; the Bureau of Foreign Trade was a Platinum sponsor; and DNI was a gold sponsor. Thanks to all for your support.

Many working groups (WGs) made significant progress at IETF 82. It was a genuine pleasure to see so many talented people engaged and collaborating.

Since IETF 81, four working groups have been chartered and eight have closed—our count remains fairly steady at 117 WGs. Between meetings, the WGs and their individual contributors produced 512 new Internet-Drafts and updated 1,112 existing Internet-Drafts, some more than once. The Internet Engineering Steering Group (IESG) approved 107 Internet-Drafts for publication as RFCs. The RFC Editor published 97 new RFCs.

You might not know it, but many of the computer systems you use every day depend on the time zone (TZ) database. Arthur David Olson started the TZ database in the mid-1980s as a public service; he had no expectation of payment or other reward. Today, this database is globally vital. Nearing retirement, Olson sought a new home for the TZ database, and the TZ community selected IANA. To accomplish this task, the IESG approved a policy for the TZ database, and the document is in the RFC Editor queue.

Sadly, the story does not end there. Astrolabe, Inc. filed a copyright infringement lawsuit against Olson and Paul Eggert, another member of the TZ community. As a result, the TZ database was taken offline on 7 October 2011. The Internet community helped arrange pro bono legal assistance for Olson, and although the governing RFC was not yet published, ICANN brought the TZ database online at iana.org on 14 October 2011. Many thanks to those Internet heroes who created the TZ database and to those Internet heroes who acted to keep it available to everyone.

The IETF continues to improve its tools. The Datatracker provides a great deal of visibility into the processing of the documents in the IETF stream, and this visibility was recently extended to cover actions within Working Groups. Not all WGs are using this capability yet, but I strongly encourage them to do so. Over the next few months, the database behind the Datatracker will be significantly updated, making it much easier for community-oriented enhancements to be made in the future.

IETF 83 will take place in Paris, France, on 25–30 March 2012. No host has been identified for the meeting in Paris. Scheduling information for the upcoming IETF meetings can always be found at http://www.ietf.org/meeting/. I look forward to seeing you there.

The mission of the Internet Engineering Task Force is to make the Internet work better by producing high-quality and relevant technical documents that influence the way people design, use, and manage the Internet. See http://www.ietf.org.

Recent IESG Document and Protocol Actions

A full list of recent IESG Document and Protocol Actions can be found at https://datatracker.ietf.org/iesg/ann/new/

Words from the IAB Chair

By Bernard Aboba


Bernard Aboba, IAB Chair

Personnel

With the recent Nominating Commitee (Nomcom) announcement of IAB appointments,[1] the IAB welcomes new members Jari Arkko and Marc Blanchet, as well as returning members Bernard Aboba, Ross Callon, Spencer Dawkins, and Hannes Tschofenig. The IAB also expresses its gratitude to outgoing members Olaf Kolkman and Andrei Robachevsky for their service to the community. New IAB members will take office during IETF 83 in Paris.

The IAB also recently announced the appointment of Mary Barnes as IAB executive director,[2] succeeding Dow Street, who has served as IAB executive director since March 2008. Many thanks to Dow for his service to the community. In addition, the IAB announced the appointment of Joel Halpern as liaison to the IESG, succeeding Hannes Tschofenig.[3]

IAB Statement

Recently, concerns have arisen about potential conflicts between interpretations of RFC 1123 and real-world practice with the provisioning of labels in the root zone of the Domain Name System (DNS). While there is work in progress within the IETF relating to this, additional time and effort will be required before RFCs on the subject can be published. So as not to block progress toward the provisioning additional generic TLDs, the IAB has posted a statement entitled "The interpretation of rules in the ICANN gTLD Applicant Guidebook."[4]

Smart Objects

The IETF 82 technical plenary topic, "Interconnecting Smart Objects with the Internet," was organized and introduced by Hannes Tschofenig with featured presentations by Jari Arkko, Robert Assimiti, Fred Baker, Carsten Bormann, and Zach Shelby.[5] Jari provided an overview of a recent IAB workshop called "Connecting Smart Objects with the Internet," including challenges that lie ahead. Robert Assimiti discussed prospects for Smart Object interoperability; Smart Objects and Internet architecture was the basis of a presentation by Fred Baker; Carsten Bormann discussed the importance of removing "Garrulity and Fluff" from protocols to reduce energy consumption; and Zach Shelby described the challenges facing the web as a result of Smart Objects. In addition to the IETF 82 technical plenary on Smart Objects, the IAB approved publication of the Smart Object Workshop Report[6] as an Informational RFC within the IAB stream.

RFC Series

With respect to the RFC Series, several important milestones were reached. The IAB announced the appointment of Heather Flanagan as RFC series editor (RSE),[7] as well as the reappointment of Nevil Brownlee as the independent submission editor (ISE).[8] In addition, "Independent Submission Editor Model"[9] was published as RFC 6548 within the IAB stream.

Privacy Programme

The IAB Privacy Programme, led by Alissa Cooper, published "Report from the Internet Privacy Workshop"[10] as RFC 6462. In addition, the IAB adopted a draft on privacy terminology,[11] as well as one on privacy considerations.[12]

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The Internet Architecture Board is chartered both as a committee of the IETF and as an advisory body of the Internet Society. Its responsibilities include architectural oversight of IETF activities, Internet Standards Process oversight and appeal, and the appointment of the RFC Editor. See http://www.iab.org.

Words from the IAB Chair, continued from page 3

ICANN Relations

With respect to ICANN relations, the IAB submitted an ICANN performance evaluation.[13] It also appointed Peter Koch as liaison to the Domain Name System (DNS) Root Server System Advisory Committee (RSSAC).[14]

ITU Coordination Programme

The ITU–T Coordination Programme, led by Eliot Lear, has been very active over the past few months, most recently responding to the ITU–T liaison on "Update to the IETF and ITU–T collaboration guidelines."[15]

Emergency Services Initiatives

The IAB recently established an Emergency Services Initiative[16] led by Hannes Tschofenig. The initiative will seek to improve collaboration between the IETF and governments on next-generation emergency services. It is also tasked with developing liaisons among the IETF, Standards Development Organizations (SDOs), and industry forums working in this area.

Other News

In other news, the IAB announced a Call for Comments on the Internet-Draft, Architectural Considerations of IP Anycast,[17] authored by Danny McPherson and Dave Oran. Also, the IAB nominated Olaf Kolkman and Hannes Tschofenig as representatives to the Multi-Stakeholder Platform on ICT Standardization.[18]

References

1. "Nomcom 2011–2012: IAB Appointments," http://www.ietf.org/mail-archive/web/ietf-announce/current/msg09827.html
2. "IAB appoints Mary Barnes as Executive Director," http://www.iab.org/2012/01/16/iab-appoints-mary-barnes-as-executive-director/
3. "IAB appoints Joel Halpern as liaison to the IESG," http://www.iab.org/2011/09/28/iab-appoints-joel-halpern-as-liaison-to-the-iesg/
4. "IAB Statement: 'The interpretation of rules in the ICANN gTLD Applicant Guidebook,'" http://www.iab.org/documents/correspondence-reports-documents/2012-2/iab-statement-the-interpretation-of-rules-in-the-icann-gtld-applicant-guidebook/
5. Technical plenary materials, http://www.ietf.org/proceedings/82/technical-plenary.html
6. Smart Objects Workshop Report, http://tools.ietf.org/html/draft-iab-smart-object-workshop
7. "IAB appoints RFC Series Editor," http://www.iab.org/2011/12/02/rfc-series-editor-appointment/
8. "IAB re-appoints Independent Submission Editor," http://www.iab.org/2012/01/18/iab-re-appoints-independent-submissions-editor/
9. ISE Model, http://tools.ietf.org/html/rfc6548
10. Report from the Internet Privacy Workshop, http://tools.ietf.org/html/rfc6462
11. Hansen, M., Tschofenig, H. and R. Smith, "Privacy Terminology," http://tools.ietf.org/html/draft-iab-privacy-terminology
12. Cooper, A., Tschofenig, H., Aboba, B., Peterson, J. and J. Morris, "Privacy Considerations for Internet Protocols," http://tools.ietf.org/html/draft-iab-privacy-considerations
13. "IAB submits ICANN performance evaluation," http://www.iab.org/2011/12/18/iab-submits-icann-performance-evaluation/
14. "IAB appoints Peter Koch as liaison to the RSSAC," http://www.iab.org/2011/11/02/iab-appoints-peter-koch-as-liaison-to-the-rssac/
15. "IAB responds to ITU-T TSAG liaison", http://www.iab.org/2012/01/25/iab-responds-to-itu-t-tsag-liaison-on-update-of-ietf-and-itu-t-collaboration-guidelines/
16. "IAB establishes Emergency Services Initiative," http://www.iab.org/2012/01/11/iab-establishes-emergency-services-initiative/
17. McPherson, D and D. Oran, "Architectural Considerations of IP Anycast," http://tools.ietf.org/html/draft-iab-anycast-arch-implications
18. "IAB nominates representatives to the Multi-Stakeholder Platform on ICT Standardization," http://www.iab.org/2012/01/16/iab-nominates-representatives-to-the-multi-stakeholder-platform-on-ict-standardisation/

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WHOIS a better, more generalized directory service protocol. RWhois added referrals and WHOIS++ added distributed indexing. The Internet Registry Information Service (IRIS), also an attempt to do better, focused more on the application of providing directory services for the DNS and IP registries, albeit in a highly "extensible" manner. And there have been experiments to replace WHOIS with the Lightweight Directory Access Protocol LDAP.

None of those have taken hold.

So when IETF announcements fly by with the title "WHOIS-based Extensible Internet Registration Data Service" (WEIRDS), it is quite natural for eyebrows to become affixed in an upward cant. Who in their right mind would attempt this once more? WEIRDS, indeed.

All that being said, significant issues exist with the applications that have been built atop TCP port 43. The simple nature of the protocol leaves no room for negotiating features or for up-leveling to a new version. Referrals remain a thorny issue, programmatic parsing of output is hit-or-miss, and internationalized domain names bring in a whole new dimension of complexity.

An example of the referral problem occurred during the summer of 2011. When you look up information regarding an IP network, you may be surprised by how many WHOIS clients direct you to the correct regional Internet registry (RIR) database, despite the fact that WHOIS has no referral mechanism. They do this by looking for the names of the RIRs in specific places in the WHOIS output. This precarious, ad hoc referral parsing was accidentally broken when the American Registry for Internet Numbers (ARIN), attempting to be more consistent with the other

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Something WEIRDS This Way Comes, continued from page 4

RIRs, modified its output slightly to include more information. This simple and seemingly innocuous change had to be reverted so that many of today's spam and intrusion-detection systems could report accurate information.

The WEIRDS approach to this problem is based not on a new protocol but on the reuse of existing application strata, specifically RESTful (representational state transfer) web services. The work of applying RESTful web services (RWS) to Internet registry WHOIS access was pioneered by the RIRs; in 2010, ARIN put into production its WHOIS–RWS system followed shortly thereafter by the fielding of a similar service by the Réseaux IP Européens Network Coordination Centre (RIPE NCC). While differing in schemas (based on the needs of their respective regions), both services use XML (Extensible Markup Language) over HTTP addressed by URLs and accessed with the traditional and standard HTTP methods, a programming paradigm used by Amazon, Google, Yahoo, and others to allow integration of third-party applications into their services. Data storage applications backed by Amazon's popular S3 service use RESTful web services to store and retrieve data. Smartphone applications that send tweets use RESTful web services for integration to Twitter. And tools exist for nearly every language to create RESTful web clients; often services can be demonstrated with stock web browsers or simple Unix shell scripts.

Unlike the previous WHOIS replacement attempts, this adoption has been encouraging. ARIN, using XML schemas specific to ARIN's data model, now sees over 40% of its WHOIS data needs served using the RESTful web service. Once a standard model is agreed upon, it is easy to imagine even greater data access using this method.

Unlike prior attempts to replace WHOIS, this adoption has been encouraging. ARIN, using XML schemas specific to ARIN's data model, now sees more than 40 percent of its WHOIS data needs served using the RESTful web service. Once a standard model is agreed upon, it is easy to imagine even greater data access using this method.

As of this writing, an IETF working group (WG) charter is being drafted and a proposal will be put forward to the Internet Engineering Steering Group (IESG) for the creation of a new IETF WG. A WEIRDS birds-of-a-feather (BoF) meeting was held at IETF 82 in Taipei, Taiwan, and the overwhelming sense of the participants was that valuable work does exist with respect to RESTful web service access to the number registries (such as the RIRs). ARIN, RIPE NCC, and the Latin America and Caribbean Network Information Centre (LACNIC) have already put forward a proposal for unified queries; a draft detailing unified responses in JavaScript Object Notation (JSON format) is under development.

With respect to domain names, however, questions have been raised with regard to the expected adoption of any replacement or complement to traditional WHOIS. The naming community has many more actors, and there are legal implications and international

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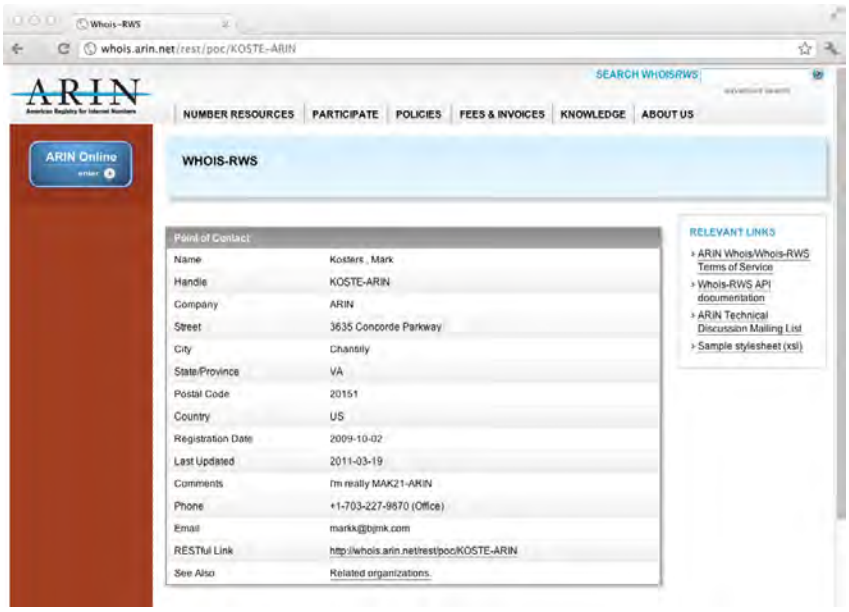

ARIN's implementation of a RESTful web service for WHOIS supports multiple output formats. Using HTTP's content negotiation features, a URL referencing an object in the database can be used by custom client software to retrieve a specific machine-parsable format such as JSON. That same URL also could be used directly in a browser to view the same data either with XHTML or XML formatted with XSTL or CSS. The image below shows a standard web browser retrieving information from ARIN's RESTful web service for WHOIS.

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politics, which has slowed progress and made it less certain. Hence the apprehension regarding a new WHOIS for domain name registries.

For its part, the International Corporation for Assigned Names and Numbers (ICANN) is working on the policy aspects of this issue. ICANN's Security and Stability Advisory Committee (SSAC) published its *SSAC Report on Domain Name WHOIS Terminology and Structure* in September 2011, a document noting the differences between data, access protocols, and services, which is intended to disambiguate policy impasses where data, protocol, and service issues are conflated. The ICANN staff has also published two proposals for RESTful web services aimed at domain name registries and registrars.

Finally, the WEIRDS effort does have an active, participant constituency not seen in the previous efforts: data consumers, specifically from the spam abatement, reputation scoring, and network anti-abuse industries. As network abuses have become more sophisticated over the years, vendors with products to help combat these abuses have increasingly turned to the Internet registries for more and more information. One could consider it combat intelligence. The products and services of those industries need tighter integration and more robust service than is currently offered by the WHOIS protocol.

So WEIRDS is unlike the RWhois, WHOIS++, and IRIS work. Many more constituencies are participating. The nexus with the policy community is being tended to with active support from ICANN, and the technology model is simple and well within the mainstream of most programmers. And, as with all IETF activities, everyone is welcome and voices can be heard by joining the IETF's WEIRDS mailing list.

The model for a RESTful web service for WHOIS is straightforward. For example, assume a client issued an HTTP GET to the URL http://example.com/ip/10.0.0.0/registration. If the client signaled the desire for a JSON response in the Accept header of the GET request, it could receive a response that looks like this:

```
{
  "handle" : "XXXX-RIR",
  "startAddress" : "10.0.0.0",
  "endAddress" : "10.0.0.255",
  "ipVersion" : 4,
  "name": "NET-RTR-1",
  "description" : "A network used for routing",
  "type" : "DIRECT ALLOCATION",
  "parentId" : "YYYY-RIR",
  "remarks" : [
    "she sells seas shells",
    "down by the seashore"
  ],
  "uris" : [
    {
      "type" : "source",
      "uri" : "http://whois-rws.net/network/xxxx"
    },
    {
      "type" : "parent",
      "uri" : "http://whois-rws.net/network/yyyy"
    },
    {
      "type" : "held",
      "uri" : "http://example.net/location/xxxx"
    }
  ],
  "registrationDate" : "20110509",
  "lastChangedDate" : "20110509",
  "lastChangedBy" : "joe@bob.com"
}
```

Using this model, synergies between IP address registries and domain name registries easily can be imagined. A RESTful web service for a domain registry might respond with the following for a request to /name/example.com/registration:

```
{
    "handle": "9690-TEST",
    "name": "example.com",
    "status": [
        "clientHold",
        "clientRenewProhibited",
        "clientUpdateProhibited"
    ],
    "registrationDate": "1992-07-26T09:10:56Z",
    "expirationDate": "2019-01-21T10:11:18Z",
    "remarks": [
        "she sells seas shells",
        "down by the seashore"
    ],
    "uris": [
        {
            "type": "source",
            "uri": "http://whois.registry.example/domain/xxxx"
        },
        …
    ],
    "nameServers": [
        "ns1.example.com",
        "ns2.example.com"
    ],
    "delegationKeys": [{
        "algorithm": 7,
        "digest": "E68C017BD813B9AE2F4DD28E61AD014F859ED44C",
        "digestType": 1,
        "keyTag": 53814
    }]
}
```

How Data-centric Networking Could Change the Internet

By Carolyn Duffy Marsan

Researchers are exploring a fundamentally new approach to networking. Dubbed data-centric networking, information-centric networking, or name-oriented networking, it could transform the Internet infrastructure if it ends up improving the performance and efficiency of content delivery networks (CDNs.)

The Internet Society held a panel discussion concurrent with the IETF meeting in Taipei, Taiwan, in November to discuss the problems that are driving interest in data-centric networking and the implications of this research if it is deployed.

Leslie Daigle, chief Internet technology officer at the Internet Society, served as moderator for the high-level discussion entitled "Beyond PUT, POST, and GET: Application data routing carves its own path."

Daigle pointed out that CDNs, which are typically proprietary, have been involved in some IETF standards work, particularly in the Content Delivery Networks Interconnection working group.

According to Daigle, the new data-centric networking approaches, however, could have "many and varied" implications for the Internet infrastructure. "Unlike today's Internet paradigm, they do recognize data storage as a first-class entity, and they are typically independent of the topology of the network that we understand," she said.

Network operators say that dealing with large volumes of content, particularly streaming video, in a cost-effective manner is one of the toughest challenges they face today.

"We have a lot of data crossing my own company's network," said Rich Woundy, vice president of platform architecture at Comcast Cable. "We want to make sure that we use the network as efficiently as possible and also provide a good customer experience."

Woundy explained that the CDN approach of caching content and distributing it across the Internet has created a good end-user experience and has been cost-effective for content providers. But the uptick in video traffic—which consumes about 60 percent of all bandwidth in the United States—is making the current content distribution approach too expensive for network operators. In addition, the way that CDNs handle failover for busy servers can create inefficient traffic routing.

Network operators say that dealing with large volumes of content, particularly streaming video, in a cost-effective manner is one of the toughest challenges they face today.

Content distribution "is consuming a lot of our network. It's getting our attention, and it's getting our CFO's attention," Woundy said. "The question is: What can I do to balance my need to grow my network while fulfilling the needs of content providers, and making it work efficiently with the other CDN providers out there? … In many cases, the optimisation at the CDN layer and the optimisation at the core and backbone layer is not necessarily in sync."

Aaron Falk, director of business and product management for CDN Solutions at Verivue, agreed that network operators are feeling the pinch of providing network bandwidth for video streaming applications. "Neither Internet service providers (ISPs) nor mobile operators have the upstream capacity to meet the bandwidth demand created by popular video applications," he said.

Leslie Daigle, Internet Society panel discussion moderator and chief Internet technology officer at the Internet Society

Aaron Falk, Internet Society panel speaker and director of business and product management for CDN Solutions at Verivue

"If everybody is at home watching Netflix on a Friday night, this creates a real burden on the operators, and it's a burden that they get no additional revenue for." Falk says. "They see their costs go up, and their subscription fees stay flat. So this is a problem they are interested in seeing solved."

Falk says that the Internet building blocks available to CDNs and network operators to solve this problem—Uni-

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Photos: Nana Buxani/Internet Society

How Data-centric Networking Could Change the Internet, continued

Dave Oran, a Cisco Systems fellow, said CDNs are far down the path of optimising systems to deal with large amounts of content that the Internet architecture wasn't designed to carry and so handles in a suboptimal way.

form Resource Identifiers (URIs), Border Gateway Protocol (BGP), and ping times—are coarse rather than fine-grained tools for connecting a client to a nearby content source.

"Because that's not what these architectural elements were designed to do, there are all sorts of inefficiencies and problems that arise," Falk says. "It's basically trying to build a system to adjust performance issues with mostly found pieces of technology … That motivates a bunch of research."

Dave Oran, a Cisco Systems fellow, said CDNs are far down the path of optimising systems to deal with large amounts of content that the Internet architecture wasn't designed to carry and so handles in a suboptimal way. That's why there is promise in researching new architectures, such as data-centric networking, to solve this problem.

Rich Woundy, Internet Society panel speaker and vice president of platform architecture at Comcast Cable

Audience members lined up to ask questions of Internet Society panel speakers.

"The notion here is that you directly name content … and not worry about what hosts they are coming from and where they are going," Oran says. "You base routing on data … and security on data, and you base optimisation of the network on placing storage at strategic places in the network so data can visit and live on that server."

One requirement for data-centric networking is self-certifying data, in which data items have signatures to assure that they are in the exact format created by the publisher of the data.

Oran identified two primary camps of data-centric networking research: the first is what he calls the dessert-topping approach and the second he refers to as the floor-wax approach. With the dessert-topping approach, researchers are trying to keep the current Internet architecture—including hosts, IP addresses, and HTTP—and build an extra layer on top of this infrastructure to handle data naming, storage, and security. With the floor-wax approach, researchers are considering replacing the entire Internet infrastructure (except IP) with a newly created system that is optimised for data-centric networking.

The floor-wax approach eliminates many middleboxes including DNS (domain name system) load balancers, URI (uniform resource identifiers) redirectors, cooperative cache engines, and transparent proxy caches

"The floor-wax approach says let's go back and reengineer all the way back to IP," Oran explained. "This allows us to look at the fundamentals of naming, the fundamentals of routing, the fundamentals of security, and the fundamentals of robustness and scalability."

Oran said large-scale systems using data-centric networking will be built during the next two or three years. "This is an area worth watching because it's highly disruptive and has the opportunity to dramatically simplify Internet architecture," he added.

Falk pointed out that in order for data-centric networking to work it needs to not only tackle technical problems of video distribution but also support the complex business relationships between content owners, content distributors, network operators, and end users. "We should find a way to build technical solutions that allow these business relationships to work," he said.

Oran added that it's important for researchers who want to fundamentally change the Internet infrastructure to support data-centric networking to understand that they shouldn't optimise for one application—video—when other applications, such as very large distributed databases, may become important in the future.

"We are looking at these new named data architectures for a broad range of applications … not just the pain point of today," Oran said.

"This is an area worth watching because it's highly disruptive and has the opportunity to dramatically simplify Internet architecture."

—Dave Oran
Cisco Systems Fellow

Photos: Nana Buxani/Internet Society

Smart Objects Demand a New Approach to Internet Engineering

By Carolyn Duffy Marsan

As more smart objects, such as sensors and actuators, are connected to the Internet, the devices—which have less energy, memory, and bandwidth capacity than typical hosts—will require a new approach to protocol development and Internet architecture design.

Jari Arkko, IAB plenary speaker and IETF Internet area director and network engineer, Ericsson

This was the topic of the Internet Architecture Board's (IAB's) technical plenary session, entitled "Interconnecting Smart Objects with the Internet," held in Taipei, Taiwan, on 14 November 2011.

Smart objects are very small devices being deployed in very large numbers on the Internet, explained Hannes Tschofenig, a standards specialist with Nokia Seimens Networks, who kicked off the discussion.

"From a network aspect, these devices typically have constraints in terms of energy consumption, a small amount of bandwidth, and a limited amount of memory," Tschofenig said.

Jari Arkko, an IETF Internet area director and a network engineer with Ericsson, gave an overview of the IAB's Smart Objects Workshop, which was held in Prague in March 2011. The workshop, which attracted around 100 participants, covered a variety of applications of smart objects, such as networks in buildings, fountains, and theaters.

One key difference in these applications is that smart objects are sleeping nodes, rather than always-on devices. Smart objects also require deployable security and benefit from routed-over instead of mesh-under networking, Arkko said.

Several IETF working groups (WGs)—Routing Over Low Power and Lossy Networks (ROLL), IPv6 over Low Power WPAN (6LoWPAN), and Constrained Restful Environments (CORE)—are addressing the networking needs of smart objects. In addition, the IETF has formed the Light-Weight Implementation Guidance (LWIG) WG and is tackling related problems in Home Networking (HOMENET). According to Arkko, additional work is needed in such areas as architectural guidelines, cryptography, and data models for smart objects.

"It's clear there are many challenges here," Arkko said. "One that we care quite a bit about is using IP to begin with versus legacy protocols. The answer for everyone in this room is a no-brainer and should be for others on the planet."

Arkko said that despite the goal of "One Internet For All," smart objects create many complications such as the need for dedicated networks, special link layers, protocol stack profiles, and security concerns. He said it is unclear whether smart objects can use IP as it is, or if IP will need to be modified.

"Workshop participants came to the conclusion that we should build for the case where everything is on one network, and allow people to deploy differently than we do today," Arkko said. "The IETF also should build middleware and work to create application standards."

Arkko said the biggest challenge of smart objects is that they are sleeping nodes, and many IETF protocols were not designed for this scenario. One IETF protocol that might work for smart objects is Constrained Application Protocol (CoAP), which is a light-weight version of HTTP. However, Arkko said even CoAP needs

"It's clear there are many challenges here. One that we care quite a bit about is using IP to begin with versus legacy protocols. The answer for everyone in this room is a no-brainer and should be for others on the planet."

—Jari Arkko
IETF Internet Area Director and Network Enginner, Ericsson

Audience members at the IAB technical plenary session

Photos: Nana Buxani/Internet Society

Continued on next page

some adjustments for smart objects, as do crypto protocols.

"We don't need to wait for the future Internet to do the Internet of Things because the Internet of Things is already here," Arkko said. "A lot of technology—IP itself, IPv6—is usable today."

Carsten Bormann, cochair of 6LoWPAN and CORE, said today's Internet protocols use too much energy, spectrum, and memory to be applicable to smart objects. He pointed out that energy-constrained nodes are not only in sleeping mode but also have little ROM (read-only memory) space for code and little RAM (random access memory) space for memory. Additionally, smart objects are typically linked via power-constrained networks with higher loss rates and less reliability than Ethernet.

"This is a set of problems that requires new engineering," Bormann said, warning that Moore's law of how chip performance doubles every two years will not fix these problems. "Moore's law doesn't give you much benefit in constrained nodes and networks."

Bormann identified two issues with today's Internet protocols that make it difficult for them to be used with smart objects. The first he dubbed *garrulity*, which refers to the talkative nature of these protocols. The other he called *fluff*, which refers to the inclusion of unnecessary features. He urged IETF participants to create less complex protocols that would be more suitable to energy-constrained devices.

"Please recalibrate your complexity meters," Bormann urged, pointing out that constrained devices have as little as 100 kilobytes for all of their code, including security, networking configuration, and application code. He said smart objects have so little power that they can't send excess packets, nor can they be turned on for listening mode.

"Please recalibrate your complexity meters."

—Carsten Bormann
Cochair
6LoWPAN and CORE

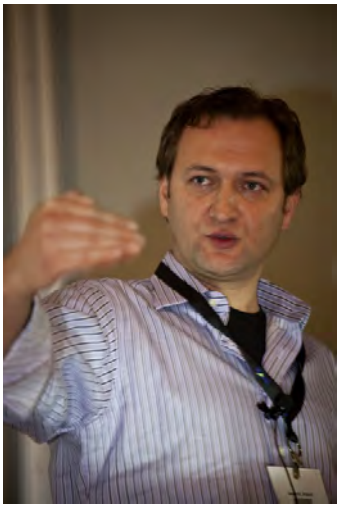
Bormann said some IETF protocols can be streamlined for use with smart objects, which is the goal of 6LoWPAN. Another possibility is for the IETF to streamline Multicast and the Datagram Transport Layer Security (DTLS) protocol while continuing to develop CoAP.

"The protocols you design today, you may want to think about using those protocols in more constrained environments," Bormann said. "They may not just run on big iron, laptops or phones. Think about what you can do to make the protocol talk less and require listening less and get rid of fluff that you don't really need."

Fred Baker, a former IETF chair and Cisco fellow, gave an overview of RFC 6272, which he wrote to identify Internet protocols that can be used in smart grid applications for the electricity industry. Baker said the automotive industry has similar requirements for vehicle-based communications systems and the health care industry for biological sensors. The smart objects in these applications will run on private IP-based networks rather than the public Internet, he explained.

IAB Plenary Speakers (left) Carsten Bormann, cochair, 6LoWPAN and CORE; and (right) Hannes Tschofenig, standards specialist, Nokia Seimens Networks

"They do not intend to use the Internet as we understand it," Baker said. "But they do plan to use IP and some of the related protocols."



Robert Assimiti, IAB plenary speaker and director of technology and standards, Nivis

"The biggest threat is us ending up with completely disparate networks that do not interoperate at any level. … What is the holy grail is that we require no translation gateways and no middleboxes, and that networking and security are interoperable and independent of the application and link layer."

—Robert Assimiti
Director of Technology and Standards
Nivis

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Photos: Nana Buxani/Internet Society

IAB plenary speaker Zach Shelby, engineer, Sensinode

> "We need to work on identity, discovery, directories, and search. I think Web Linking is a good start, but there is a lot more work that needs to be done."
>
> —Zach Shelby
> Active Participant in 6LoWPAN and CORE
> Engineer, Sensinode

Smart Objects Demand a New Approach to Internet Engineering, continued

Robert Assimiti, director of technology and standards at Nivis, said the process-automation industry needs interoperable and secure connectivity among smart objects in a manner that is agnostic to the application and link layer. He said that industrial users are interested in IPv6 because of its vast address space and standards compliance.

Assimiti pointed out that there are many challenges in industrial process-automation networks, including the need for centralised design, connectivity to hundreds of devices, and extremely high reliability. Those networks also have strict guaranteed latencies, use the push-model for data collection, and have devices with long battery life.

Assimiti said three competing standards have emerged for smart objects in process automation, but only one—the International Society of Automation (ISA) 100.11a—uses IETF protocols, including IPv6, UDP, and 6LoWPAN.

"All of the other standards have tailored technology to meet their particular requirements," Assimiti said. "The biggest threat is us ending up with completely disparate networks that do not interoperate at any level … What is the holy grail is that we require no translation gateways and no middleboxes, and that networking and security are interoperable and independent of the application and link layer."

The final speaker at the IAB technical plenary was Zach Shelby, an active participant in 6LoWPAN and CORE and an engineer with Sensinode, who discussed the challenges of integrating smart objects with Web services. This integration would allow machine-to-machine applications such as security monitoring, energy management, facility management, and asset management.

Shelby said the IETF should enable the "Web of Things" by creating protocols that serve as building blocks for application developers. In particular, he mentioned Sensor Markup Language (SenML) as a generic data format and the Web Linking framework. He said the IETF needs to do a better job of creating an optimised security toolbox.

"We need to work on identity, discovery, directories, and search," Shelby said. "I think Web Linking is a good start, but there is a lot more work that needs to be done."

Other remaining challenges to creating the "Web of Things" include the use of DNS (domain name system) versus search for resource lookup as well as the issue of whether those systems should be centralized or distributed. "The IETF needs to give better advice and sound building blocks to software developers," Shelby concluded.

Photo: Nana Buxani/Internet Society

Demonstrating IPv4 Multicast Service Continuity During IPv6 Migration

By X. Deng, S. Hares, X. Huang, C. Jacquenet, Y. Ma, and T. Tsou
Edited by X. Deng

The forthcoming transition period when both IPv4 and IPv6 will have to coexist raises new challenges for service providers. In particular, they need to ensure that their customers will still be able to access the IPv4 Internet from any IPv4-only terminal while they will be provisioned with an IPv6-only prefix. There is widespread need for continuing this so-called IPv4 Internet service.

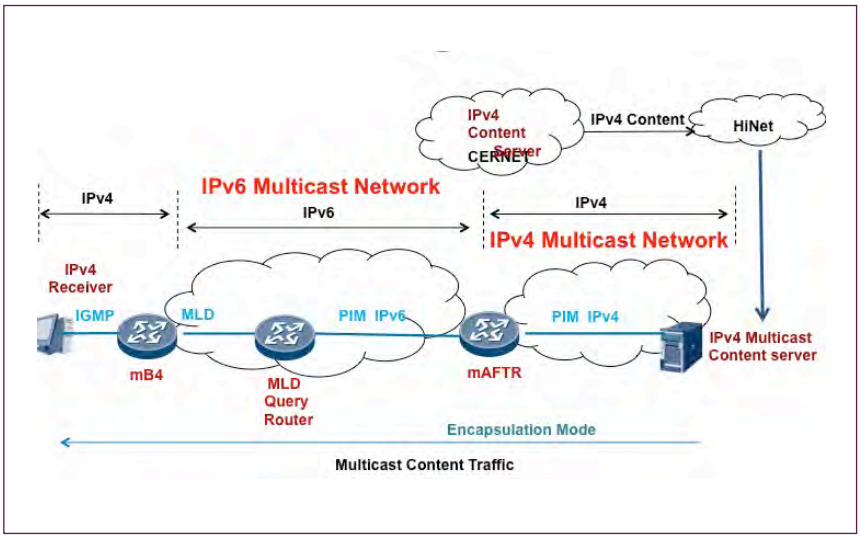

Figure 1: Demonstrating multicast extensions to DS-Lite based on a stateless encapsulation mode.

The IETF 82 meeting last November in Taipei, Taiwan, provided an opportunity for academics, service providers, and vendors to demonstrate techniques that address the need for IPv4 multicast service continuity.

IPv4 multicast services are part of the IPv4 Internet service that needs to be continued. These services need to be delivered to IPv4-only receivers through various access networking environments, including IPv6 access environments (denoted as the 4-6-4 use case).

The IETF 82 meeting last November in Taipei, Taiwan, provided an opportunity for academics, service providers, and vendors to demonstrate techniques that address the need for IPv4 multicast service continuity. Two demonstrations were arranged for that purpose, thanks to a close collaboration among Beijing University of Posts and Telecommunications (BUPT), China Telecom, Comcast, France Telecom/Orange, Huawei, and ZTE Corporation.

Demo 1

The IETF Softwires working group's (WG's) document draft-ietf-softwire-dslite-multicast (http://datatracker.ietf.org/doc/draft-ietf-softwire-dslite-multicast/) documents multicast extensions to the DS-Lite technique for delivering IPv4 multicast services to IPv4 receivers connected to an IPv6 multicast-enabled network.

The demonstration of draft-ietf-softwire-dslite-multicast (Figure 1) was composed of an IPv4 receiver, a multicast B4 capability embedded in a CPE device, an MLD querier, and a multicast Address Family Transition Router (mAFTR) capability colocated with a DS-Lite CGN device.

France Telecom/Orange has developed the "mB4 function" that conveys the contents of the Internet Group Management Protocol (IGMP) report messages sent by the IPv4 multicast receiver into the equivalent Multicast Listener Discovery (MLD) report messages that are forwarded by the CPE towards the MLD querier located upstream in the IPv6 multicast network for further processing.

The mB4 capability is embedded in an OpenWRT-based CPE (see https://openwrt.org/), while ZTE Corporation has developed the mAFTR function, which is used to extend the Protocol Independent Multicast (PIM) v4-computed multicast distribution tree into an equivalent PIMv6-computed multicast distribution tree that is established and maintained in the IPv6 multicast-enabled access infrastructure.

From the perspective of a control plane, the mB4 is responsible for conveying the contents of the IGMP Report messages into the equivalent MLD Report messages by means of a specific IGMP/MLD interworking function and the use of the IPv6 prefixes that are derived from the IPv4 multicast addressing used by the original IPv4 source, as documented in http://tools.ietf.org/html/draft-boucadair-behave-64-multicast-address-format-03.

The mAFTR capability is then used to extend the PIMv4-computed multi-

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Demonstrating IPv4 Multicast Service Continuity During IPv6 Migration, continued

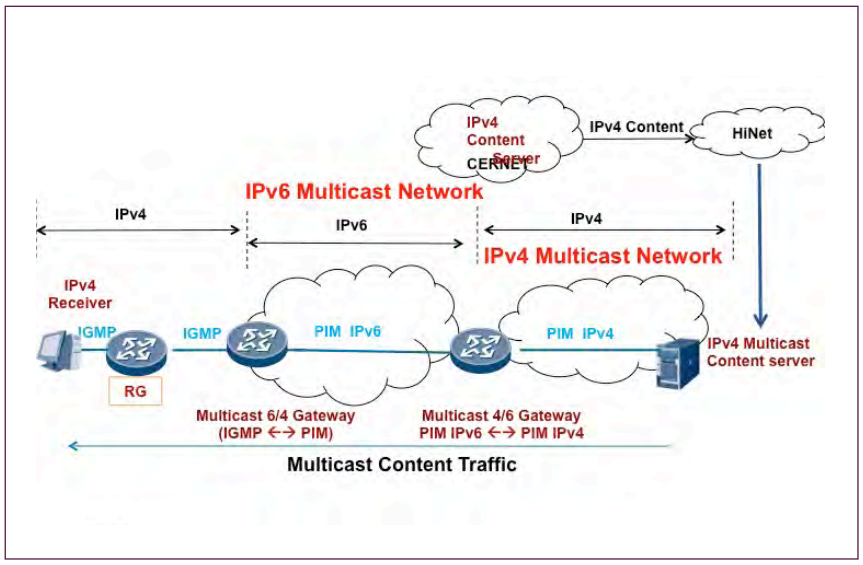

Figure 2: Demonstrating multicast extensions to 4-6-4 [DS-Lite] based on translation capabilities in the forwarding plane.

cast distribution tree with the equivalent PIMv6-computed multicast distribution tree, by means of a PIMv4/PIMv6 inter-working function that allows the triggering of PIMv4 Join messages towards the original IPv4 source based upon the processing of PIMv6 Join messages sent by the PIMv6 DR router colocated with the MLD querier.

Once the IPv6 multicast tree has been established to convey the IPv6 multicast packets that embed the original IPv4 multicast content, the latter is delivered via a stateless IPv4-in-IPv6 encapsulation/decapsulation scheme implemented in both the mB4 and the mAFTR.

Demo 2

Huawei has developed code for multicast IPv4-to-IPv6 translation that runs in the forwarding plane (Figure 2) in Huawei's router product NE40E with wire-speed forwarding for multicast flows. In order to demonstrate interoperability, the France Telecom/Orange CPE was used to connect to a multicast receiver.

This code demonstrates two of the use cases documented in:

- http://tools.ietf.org/html/draft-jaclee-behave-v4v6-mcast-ps-03
- https://datatracker.ietf.org/doc/draft-venaas-behave-v4v6mc-framework/, and
- http://www.ietf.org/internet-drafts/draft-tsou-multrans-use-cases-00.txt

Huawei's 4-6-4 implementation uses translation capabilities that assume the support of so-called adaptation functions that associate the contents of IGMPv2/v3 Report messages with the triggering of PIMv6 Join messages. The

Huawei has developed code for multicast IPv4-to-IPv6 translation that runs in the forwarding plane in Huawei's router product NE40E with wire-speed forwarding for multicast flows. In order to demonstrate interoperability, the France Telecom/Orange CPE was used to connect to a multicast receiver.

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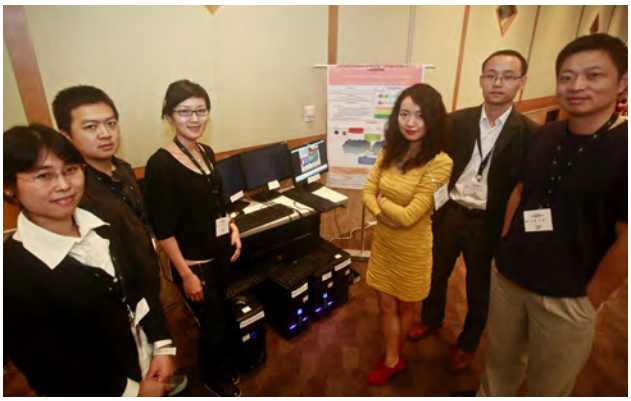
IPv6 Multicast Demo staff (left to right) Charlie Zha, Thomas Zhang, Cathy Zhou, Tina Tsou, James Huang, and Xiaohong Deng.



IPv6 Multicast Demo staff (left to right) Bo Wu, Qilei Wang, Tian Tian, Xiaohong Deng, Fei Zhang, and Yuan Wei.

Photos: Nana Buxani/Internet Society

Currently, the average number of unique IP addresses that are used to visit the IPTV portal each day is around 20,000. According to the statistics, around 90 percent of the traffic comes from universities other than BUPT that are connected to the CERNET2 network.

specific devices used for the demo are shown in Figure 2, where translation is activated in edge routers.

Huawei also addressed the IPv6-IPv6-IPv4 (6-6-4) use case by providing the relevant adaptation functions in the forwarding plane. This allows IPv4 multicast content traffic to be sent via an IPv6 multicast network to an IPv6 receiver (Figure 3). The multicast distribution tree is set-up by the IPv6 signaling (MLDv2 and PIMv6). The IPv4 multicast distribution tree is set up using IPv4 multicast. The 6-6-4 context allows IPv6-only receivers that are connected to an IPv6 multicast network to access IPv4 multicast content.

The IPv4 multicast content was provided by BUPT and delivered through the China Education and Research Network (CERNET) and the Chunghua Telecom (HiNet) network infrastructure for both demos.

BUPT, serving as an IPTV content provider in CERNET and CERNET2, has acquired significant experience in serving IPv6 multicast content. BUPT started to provide IPTV service in 2006, and supports both IPv4 and IPv6 access. In order to promote IPv6 technology, BUPT delivers IPv6-only IPTV content to receivers connected to the CERNET2 network.

Today, the average number of unique IP addresses that are used to visit the IPTV portal each day is around 20,000. According to the statistics, around 90 percent of the traffic comes from universities other than BUPT that are connected to the CERNET2 network.

IPTV service has become one of the most popular services of CERNET2. Sometimes, the 10G router port in the BUPT-managed CERNET2 POP is fully occupied by IPTV traffic.

BUPT has already conducted several other IPv4-to-IPv6 transition technology experiments that have been successful.

IETF 82 was another opportunity to demonstrate the progress that is being accomplished to solve some of the issues raised by the forthcoming transition period. From that perspective, we can expect to look forward to more demos at future IETF meetings that further strengthen the key role played by IETF standardization in promoting IPv6 deployment and usage.

Demonstration team personnel included:

- **France Telecom Orange:** Christian Jacquenet, Xiaohong Deng, Mohamed Boucadair, Gu Daqing, Wang Lan
- **Huawei Technologies:** Susan Hares, Tina Tsou, Thomas Zhang, Cathy Zhou, Charlie Zha, James Huang, Leaf Yeh
- **Beijing University of Posts and Telecommunications:** Yan Ma, Xiaohong Huang, Qin Zhao, Zhenhua Wang, Xiaodong Zhang
- **ZTE Corporation:** Jacni Qin, Fei Zhang, Huaikuo Yang, Jun Wang
- **China Telecom:** Qian Wang
- **Comcast:** Yiu Lee

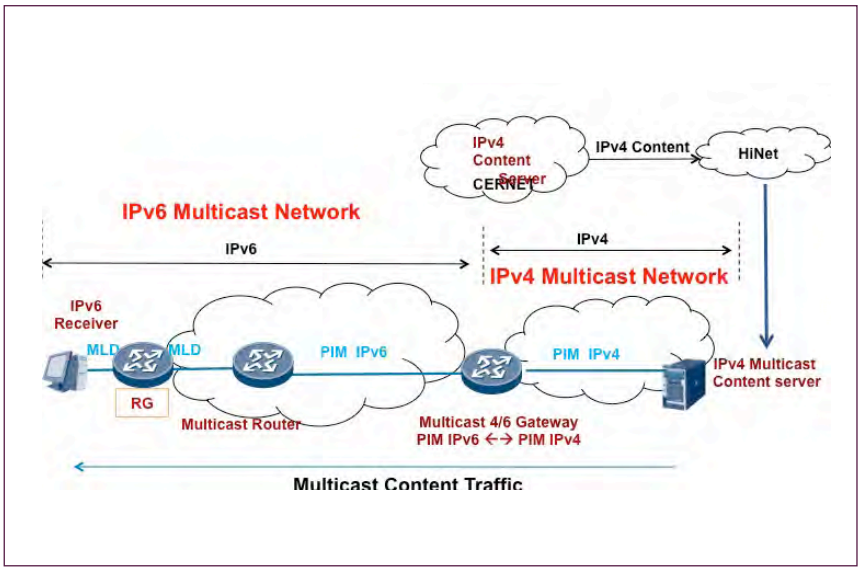


Figure 3: Accessing IPv4 multicast content from an IPv6-only receiver through an IPv6 multicast access infrastructure (6-6-4 Use Case).

Internet Society Announces Winners of Postel, Itojun Awards and Applied Networking Research Prize

By Carolyn Duffy Marsan

The Internet Society announced its annual award winners at the November 2011 IETF meeting in Taipei, Taiwan, recognizing several members of the Internet engineering community for their outstanding technical and leadership contributions.

The 2011 Jonathan B. Postel Service Award was given to Prof. Kilnam Chon of Keio University in Japan for his efforts to advance the Internet in Asia.

Now in its 13th year, the Postel award consists of a presentation crystal and a USD 20,000 prize that goes to an individual who has made outstanding contributions in service to the data communications community. The award recognizes sustained and substantial technical contributions, service to the community, and leadership. The Postel award is named for the original RFC editor and Internet numbering authority.

> "With respect to the IETF, Asia needs to work much harder to share the Internet standards development as Asia's Internet population is reaching 50 percent of the global Internet population. When we look at the IAB, IESG, and other groups of the IETF, Asian representation is far less than what we would expect."
>
> —Prof. Kilnam Chon
> 2011 Jonathan B. Postel
> Service Award Winner

Chon was honored for being a pioneer in Internet research, development, and commercialization in Asia. He was active in connecting Asia to the Internet in the early 1980s and he continues to promote its development in the region. Chon was a professor in the computer science department at the Korean Advanced Institute of Science and Technology from 1982 to 2008 and remains a professor emeritus there.

Chon said winning the Postel award was significant from a professional standpoint because it acknowledges the importance of the Internet's growth in developing countries. He added that winning the award was touching on a personal level because he was in the Ph.D. program at University of California, Los Angeles with Jon Postel.

Prof. Kilnam Chon, 2011 Jonathan B. Postel Service Award winner

Chon, who has been active in the IETF since 1991, said he would like to see more Asian engineers participate in the IETF, publish RFCs, and take on leadership roles in working groups, the IESG and the IAB.

"The Internet in Asia is in pretty good shape now, leading globally in some areas such as broadband, the mobile Internet, IPv6 and IDNs," Chon said. "With respect to the IETF, Asia needs to work much harder to share the Internet standards development as Asia's Internet population is reaching 50 percent of the global Internet population. When we look at the IAB, IESG, and other groups of the IETF, Asian representation is far less than what we would expect."

Chon pointed out that Asia will continue to drive growth in Internet users over the next 10 years.

"We need to prepare for the increase of two billion Internet users in Asia," Chon said. "Many of them are expected to access the Internet through smart phones. This is the paradigm shift on Internet access. We need to lead this paradigm shift to accommodate the new two billion Internet users as well as the current users through education, infrastructure development, and service development."

The Internet Society also recognized two network engineers at the IETF 82 meeting—Alexandre Cassen of France's Free Telecom and Rémi Després, an independent consultant—for their outstanding contributions in furthering the deployment of IPv6 by granting them the 2011 Itojun Service Award.

In its third year, the Itojun Service Award recognizes individuals for their extraordinary dedication to IPv6 deployment. The award is named for Dr. Jun-ichiro "itojun" Hagino, a senior researcher at Internet Initiative Japan and IPv6 proponent who passed away in 2007 at the age of 37. Established by the friends of "itojun" and administered by the Internet Society, the Itojun Service Award participants receive a presentation crystal, a USD 3,000 honorarium, and a travel grant.

Cassen and Després were recognized for their design and implementation of 6rd, a protocol used to rapidly deploy IPv6. The 6rd protocol has been

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Photos: Nana Buxani/Internet Society

Based on his experience with 6rd, [Alexandre Cassen's] message to other IETF participants is: "Do not be afraid of IPv6. It will make things simpler for the future."

Rémi Després, 2011 Itojun Service Award winner (Alexandre Cassen not pictured)

deployed by several Internet service providers (ISPs), including Free, France's second-largest ISP. Free used 6rd to deploy IPv6 to its residential customers in only five weeks in 2007, and now the service provider has more than 1.5 million subscribers using IPv6 every day.

Després, a consultant with RD-IPtech, said Free was several years ahead of most service providers in deploying IPv6. "Free has remained the provider of more than half the native IPv6 traffic seen by Google from 2008 to 2010," he added.

Després encouraged IETF participants to deploy IPv6 as an added feature—not a replacement—for IPv4.

"IPv6 can only bring added value because absolutely everything that still depends on IPv4 to work remains operational," Després said. "As this ubiquitous IPv6 availability progresses, more and more of the traffic makes no use of IPv4 functions, and, eventually, dismounting IPv4 gears will be possible without negative effect on users."

Després said automatic tunneling mechanisms such as 6rd are "advantageous where IPv4-specialized devices cannot be quickly replaced by IPv6-capable ones. … From outside a 6rd provider network, no one can notice that part of your IPv6 routes across the network have traversed some tunnel."

Cassen, who is a research and development team leader at Free, said based on his experience with 6rd, his message to other IETF participants is: "Do not be afraid of IPv6. It will make things simpler for the future."

The Internet Society also announced the most recent winners of its Applied Networking Research Prize (ANRP), which is aimed at recognizing the best new ideas in networking research and encouraging those researchers to interact with the IETF community.

"This experience will aid me in deciding what problems to look at next ... I met lots of industry people in my research domain and got their feedback regarding the research I conduct."

—Nasif Ekiz
2011 Applied Network Research Prize Winner

The ANRP prize recognizes recently published networking research results that are relevant for Internet products and related standardization efforts. Recipients of this award receive USD 500, are invited to talk at an Internet Research Task Force meeting, and get a travel grant. ANRP grants are given three times per year in conjunction with the IETF's three annual meetings.

The November 2011 recipients were Nasif Ekiz and Michio Honda. Ekiz, a Ph.D. candidate in computer and information sciences at the University of Delaware, was honored for his analysis of misbehaving TCP receivers, which was published in the April 2011 issue of ACM SIGCOMM's *Computer Communication Review*. Honda, of Keio University, was recognized for his research into determining the future extensibility of TCP, which was published in the proceedings of the ACM Internet Measurement Conference, held in November 2011.

Attending the Taipei meeting "was a great experience," Ekiz said, adding that he particularly enjoyed the technical discussions in the IETF's transport group. "This experience will aid me in deciding what problems to look at next … I met lots of industry people in my research domain and got their feedback regarding the research I conduct."

Honda said attending the IETF meeting was "quite helpful" for his research, which involves recruiting volunteers, including IETF participants, to run a middlebox measurement tool. His attendance was "a good opportunity to present a snapshot of our measurement work to the volunteers and to ask them to join our experiment for improved measurements," he said.

Photos: Nana Buxani/Internet Society

IRTF Update

By Lars Eggert

During IETF 82 in Taipei, Taiwan, two Internet Research Task Force research groups (RGs) held meetings:

- Host Identity Protocol RG
- Scalable Adaptive Multicast RG.

On the IRTF RFC Stream, no new RFCs have been published since IETF 81.

For the second time an IRTF open meeting was held at the IETF. The purpose of the open meetings is to allow interested IETF attendees to get a quick overview of all current IRTF activities and to discuss topics relevant to the IRTF community, such as proposals to form new research groups. It is expected that IRTF open meetings will be held regularly during IETF meeting weeks.

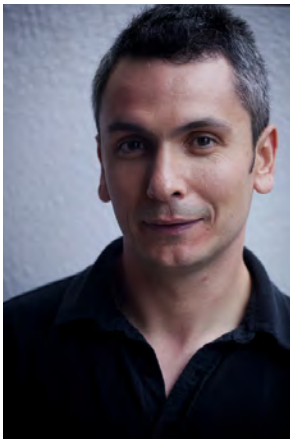
In addition, IRTF open meetings serve as the venue where Applied Networking Research Prize (ANRP) grantees deliver their invited talks. The ANRP recognizes recent published results in applied networking research that will transition into shipping Internet products as well as related standardization efforts. It is supported by the Internet Society in coordination with the IRTF. At IETF 82, two ANRPs were awarded: one to Michio Honda for his research into determining the future extensibility of TCP and another to Nasif Ekiz for his analysis of misbehaving TCP receivers. See the article on page 15 or http://irtf.org/anrp for details.

Applied Network Research Prize Winner Michio Honda

Going forward, the ANRP selection committee has decided to move from one nomination/selection cycle per IETF meeting to a yearly nomination/selection cycle covering all of the year's IETF meetings. This change will not affect the number of ANRPs awarded (roughly one per IETF meeting) and awardees can state a preference as to which IETF meeting they would like to present at during the given year.

The ANRP nomination/selection cycle for a given year will occur during the fall of the previous year. This means that for 2013, the nomination/selection cycle will occur during the fall of 2012. Consequently, the nomination/award schedule for 2012 will be adjusted as follows:

- No ANRPs will be awarded at IETF 83 in Paris in March due to the 2011 holiday season and the short amount of time since the last IETF meeting.
- A nomination/selection cycle to pick awardees for the two remaining IETF meetings in 2012 (IETF 84 in Vancouver, British Columbia, and IETF 85 in Atlanta, Georgia) will be held before IETF 84.



Applied Network Research Prize Winner Nasif Ekiz

Please join the IRTF discussion list to stay informed! http://www.irtf.org/mailman/listinfo/irtf-discuss.

Photos: Nana Buxani/Internet Society

ISOC Fellows to IETF Programme Benefits Both Fellows and Mentors

By Carolyn Duffy Marsan

For six years, the Internet Society (ISOC) has been sponsoring network engineers from emerging and developing economies to attend IETF meetings through its Fellowship to the IETF programme. While the programme provides obvious assistance to the chosen ISOC fellows, the long-time IETF participants who serve as mentors to newcomers experience benefits as well.

Former IETF chair Fred Baker has been mentoring the programme's fellows at least once a year since the programme began. Baker, who is currently co-chair of the IPv6 Operations Working Group (v6ops), says mentoring new members of the IETF community is an important role for leaders like him.

"You come to the point in your career where, frankly, the best thing you can do for other engineers, for your company, for the IETF, is to help other people come along because you're not going to be there forever," Baker says. "Reaching out to new people—not necessarily young people, but new people—and helping them become successful in the endeavor and on their own is actually an important role for any senior person in any profession or any organization."

ISOC fellows are engineers from emerging and developing economies who could not attend an IETF meeting without support. They receive a round-trip airline ticket to attend an IETF meeting, along with hotel accommodations, meeting registration fees, and a stipend to cover meals, transportation and other incidental expenses. ISOC typically supports a dozen fellows at each IETF meeting, with half being first-time attendees and the other half being returning participants.

Each first-time fellow is paired with a mentor, who is an experienced IETF participant with expertise in the technical area that interests the newcomer. The mentor has a telephone or e-mail exchange with the fellow prior to the meeting and suggests materials such as working group documents and discussion threads that should be read prior to the meeting.

The mentor and the fellow meet on the Sunday afternoon of the meeting at the IETF's Newcomers' Meet and Greet. Throughout the weeklong meeting, the mentor serves as a general point-of-contact for the fellow to answer questions or make introductions.

Steve Conte, a senior manager with ISOC, said mentors play an important role in the programme. "The IETF culture can be quite overwhelming, especially when English is not your first language. You can feel shut out of the process," Conte said. "Having a mentor help guide and prepare the fellows helps them get the most out of the meeting."

Baker says the time commitment for being a mentor is minimal, but the rewards are significant.

"Every ISOC fellow who I've mentored hasn't needed a whole lot of support on the ground," Baker says. "What I've done is talk to them in advance in e-mail, find out what they're interested in, and introduced them to the working group chairs over email. I've also talked to them a little bit about process and what we do."

Baker meets with his fellows on Sunday afternoons before the IETF meeting begins, and he is available throughout

"What do I get out of it? Personal satisfaction. I enjoy meeting a new person who might give me an insight into a problem in some area of the world."

—Fred Baker
Mentor, Former IETF Chair

Fred Baker, mentor and former IETF chair

Baasansuren Burmaa, IETF 73 fellow and director of the MN domain registry

> "[Mentors are] vital for building bridges between the IETF community and newcomers. ... It was easier to actively join the IETF community with Fred's introduction."
>
> —Baasansuren Burmaa
> IETF 73 Fellow, Director of the MN Domain Registry

the week to answer their questions via email or in person. He finds that ISOC fellows need little assistance from him later in the week.

"As a mentor, what I'm really doing is getting that person quickly plugged in so they can be productive and find the IETF meeting to be a good use of their time," Baker said. "It's really just a couple hours worth of work."

But Baker finds the hours he spends as mentor to an IETF newcomer to be rewarding.

"What do I get out of it? Personal satisfaction," Baker says. "I enjoy meeting a new person who might give me an insight into a problem in some area of the world. There can be concrete learnings from looking at things through a different set of eyeglasses."

Once, Baker mentored a woman from Tuvalu who worked on Internet resource allocation. "She was focused on how to efficiently deliver Internet services to the outlying islands," Baker said. "Now we're Facebook friends, and I talk to her from time to time about random things. It was interesting to hear about this little tiny island country and what the issues were through her."

Another time, Baker mentored a network engineer from Uganda who detailed the operational difficulties that his employer, a mobile carrier, was having due to the deployment of layer-upon-layer of network address translation (NAT). "It validated some of the things I thought about living with layers and layers of NATs," Baker said.

Sometimes being a mentor turns into a professional opportunity. At the recent IETF meeting in Taipei, Taiwan, Baker spoke to a group of fellows about the history and philosophy of the Internet. Subsequently, he was invited to give a similar talk at the May 2012 meeting of the Latin American and Caribbean Internet Address Registry (LACNIC).

Being a mentor "is an interesting experience. You get to meet somebody from a different part of the world and talk about different approaches to things. Why not avail yourself of that opportunity?" Baker asks.

Baasansuren Burmaa, director of the MN Domain Registry in Mongolia, attended the IETF 73 meeting in Minneapolis as an ISOC fellow with Baker as her mentor. She found Baker's advice helpful in navigating the meeting and understanding WG documents.

"It was easier to actively join the IETF community with Fred's introduction," Burmaa said. "We had the same area of interest, and I had experience on the RFCs, especially related to IPv6, because of Fred's help with IETF meeting preparation."

Burmaa said she has had sporadic email conversations with Baker since then as well as visiting with him in person at the IETF 74 meeting in San Francisco. "Being a mentor to the ISOC fellowship programme is vital for building bridges between the IETF community and newcomers," she added.

While Burmaa continues to participate in IETF WGs electronically, she says there's no substitute for attending the meetings in person—an opportunity that was only available to her because of the Internet Society's Fellowship to the IETF programme.

"Attending the physical meetings and having direct communications are helpful for non-English speakers to have a clear picture of what has worked and what has not worked in terms of Internet drafts development," she said. "It was a precious chance for me to exchange information, share best practices, network among the IETF participants and find ways for the .MN Registry to improve on the security levels for .MN domain registrants and other emerging issues faced by the Mongolian technical community."

The Internet Society is seeking additional mentors for the July 2012 IETF meeting in Vancouver, British Columbia, as well as the November 2012 meeting in Atlanta, Georgia. If you're interested in being a mentor this year, please contact Steve Conte at conte@isoc.org.

If you know a great candidate for the IETF Fellowship programme, let us know! Visit https://www.isoc.org/leaders or email leaders@internetsociety.org for more information and an application.

To learn more about the IETF and its work on Internet standards, visit the IETF website at http://www.ietf.org.

IETF Ornithology: Recent Sightings

Compiled by Mat Ford

Getting new work started in the IETF usually requires a birds-of-a-feather (BoF) meeting to discuss goals for the work and to help assess the level of interest in and support for the work. In this article, we review the BoFs that took place during the last IETF meeting, their intentions, and the outcomes. If you are inspired to arrange a BoF meeting, please read RFC 5434, Considerations for Having a Successful Birds-of-a-Feather (BOF) Session. Full descriptions of the BoFs that were proposed in the run-up to the IETF 82 meeting can be found on the wiki at http://trac.tools.ietf.org/bof/trac/wiki/WikiStart.

WEIRDS—WHOIS-based Extensible Internet Registration Data Service

Description: The work aims at a replacement for WHOIS to be delivered as a RESTful (representational state transfer) service, with an eye to avoiding a number of the issues that have prevented IRIS (the Internet registry information service) deployment as a WHOIS replacement. The impetus for this work is the existence of three already-deployed experimental services similar to the approach being proposed for IETF work, and the burgeoning number of IDN TLDs in the domain name system root zone.

Proceedings: http://www.ietf.org/proceedings/82/minutes/weirds.txt

Outcome: After presentations of the existing implementations, the resulting discussion centred around separating the number registry issues from the domain name registry issues. There was scepticism that the domain name registry issues could be addressed in a way that would lead to widespread adoption of the solution. There was more support for focussing initially on the number registry issues. A working group (WG) charter is being drafted, and this work is discussed in more detail in our feature article on page 1.

Steere's Liocichla (Liocichla steerii)

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MULTRANS—Multicast Transition

Description: This meeting was a follow-up to the BoF held during the IETF 81 meeting in Quebec City. At this meeting, the discussion focused on the operational issues that IPTV providers will face during the IPv4/IPv6 transition period and application layer gateway solutions to those problems.

Proceedings: http://www.ietf.org/proceedings/82/multrans.html

Outcome: The MULTRANS BoF participants wrestled at some length with the discovery problem (how the receiver learns which group address to join since it is not in the same address family as the sender). It was clear that a majority of the people attending the meeting was in favor of trying to better understand the problem. It was agreed to do that work as part of an interim meeting of the mboned WG (see draft-eubanks-mboned-transition-overview at http://datatracker.ietf.org/doc/draft-eubanks-mboned-transition-overview/ for a useful overview of the problem space).

DCON—Distributed Conferencing

Description: The DCON BoF was concerned with proposals to develop a standard solution for scalable conferencing over the Internet. Drawing inspiration from the work of the XCON (Centralized Conferencing) WG it would define a standard suite of protocols for distributed conferencing. This was a WG-forming BoF that related to the work that was done by the recently concluded XCON WG.

Proceedings: http://www.ietf.org/proceedings/82/minutes/dcon.txt

Outcomes: This was a good meeting that provided lots of constructive feedback to the proponents of the work. It was unclear whether there was enough interest within the community to provide sufficient thrust for a WG at this time. Discussions are ongoing and will explore whether or not there is potential for greater community interest in the future, at which time this work will be reconsidered.

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SDN—Software Driven Networks

Description: SDN is an approach to networks that enables applications to converse with and manipulate the control software of network devices and resources. SDNs are composed of applications, control software, and interfaces to services that are hosted in an overlay or logical/virtual network, as well as those possibly same components that compose the underlying physical network (excerpted from draft-nadeau-sdn-problem-statement http://tools.ietf.org/html/draft-nadeau-sdn-problem-statement/).

Proceedings: http://www.ietf.org/proceedings/82/minutes/sdn.html

Outcome: There was quite a bit of confusion and disagreement about what problem this work is intended to solve and how it is going about solving it. The scope of the discussions was very broad. If there is work here for the IETF, it was unclear what that work might be. More work is needed from the proponents of this activity to more clearly articulate a very specific problem that makes sense to address within the IETF.

Mikado pheasant (Calophasis Mikado)

IETF 82 At–A–Glance

Registered attendees: 931

Newcomers: 148

Number of countries: 48

IETF Activity since IETF 81 (July–October 2011)

New WGs: 4

WGs closed: 8

WG currently chartered: 117

New Internet-Drafts: 512

- 167 updated
- 32 updated more than once

Updated Internet-Drafts: 1112

IETF Last Calls: 99

Internet-Drafts approved for publication: 107

RFCs published: 97

- 51 Standards Track and 7 BCP
- 35 Informational and 2 Experimental

IANA Activity since IETF 81 (July–October 2011)

Processed 1320 IETF-related requests, including:

- 616 private enterprise number requests
- 62 port number requests
- 54 TRIP ITAD number requests
- 64 media-type requests

Reviewed 118 I-Ds in Last Call and reviewed 123 I-Ds in IESG Evaluation

Reviewed 105 I-Ds prior to becoming RFCs and 57 of them contained actions for IANA

Processing goal average for IETF-related requests: 95%

Protocal registries conversation to XML: 80% complete

Time Zone database now published by ICANN

- Robert Elz selected as TZ coordinator

RFC Editor Activity since IETF 81 (July–October 2011)

Discussed on rfc-Interest@rfc-editor.org

- RFC Editor and Independent Editor models: draft-iab-rfc-editor model-v2, draft-iab-rfc-independent
- Authors, editors, and contributors proposed policy

Thanks for the Code

Code sprint was very successful

- Incremental imporovements to datatracker deployed
- Beta version of new xml2rfc tool now available on xml.resource.org

Photos: Nana Buxani/Internet Society

IETF Meeting Calendar

IETF 83
25–30 March 2012
Host: TBD
Location: Paris, FR

IETF 84
29 July–3 August 2012
Host: Google
Location: Vancouver, BC, CA

IETF 85
4–9 November 2012
Host: North American Cable Industry
Location: Atlanta, GA, USA

IETF 86
10–15 March 2013
Host: TBD
Location: Orlando, FL, USA

For more information about past and upcoming

IETF Meetings

http://www.ietf.org/meeting/

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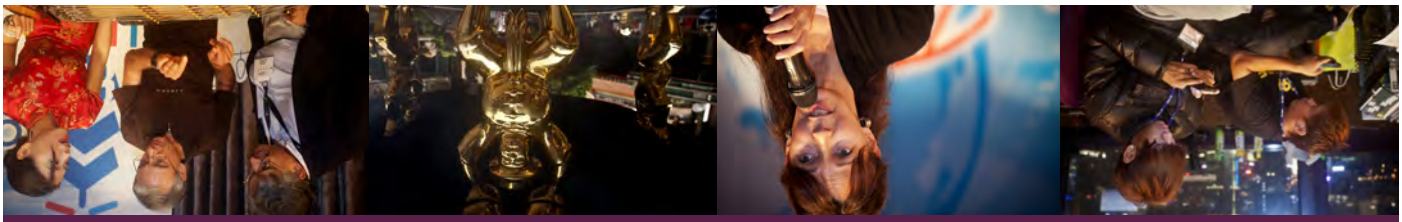

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