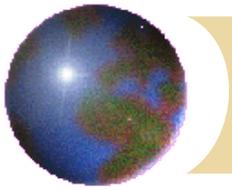


# *IETF Activities Update*

**Cathy Aronson**  
**[cja@daydream.com](mailto:cja@daydream.com)**

**ARIN 32**  
**Phoenix, AZ**

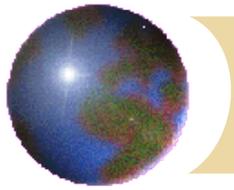




## *Note*

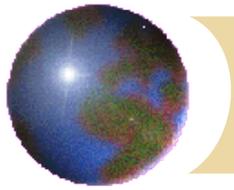
This presentation is not an official IETF report

- ❑ There is no official IETF Liaison to ARIN or any RIR
- ❑ This is all my opinion and my view and I am not covering everything just highlights
- ❑ You should know I like funny quotes
- ❑ I hope you enjoy it
- ❑ Your feedback is greatly appreciated
- ❑ If you were there and have an interesting item I missed please speak up



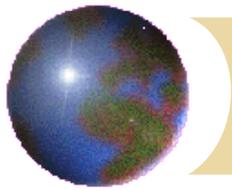
# *Highlights*

- ✦ It seems to me there has been a bit of a shift with respect to IPv6. It is being deployed and using it.
- ✦ More pathologies are being found
- ✦ “Digital Exhaust”



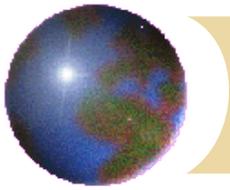
# *Internet Designers?*

- ✦ So these folks write the standards that are used on the Internet. These are questions from the IETF attendee list
  - ❑ What is the best way to exchange money?
  - ❑ Where is the closest coin operated Laundromat?
  - ❑ Where can you eat (insert type here vegan, gluten free, etc) in Berlin?
  - ❑ How much is a cab from the airport to the hotel?

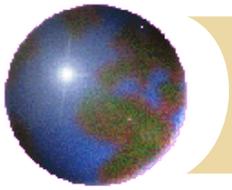


# *Diversity in IETF?*

- ✦ IETF systems is a group founded about 20 years or so ago by some of my favorite women network pioneers.
- ✦ Every IETF in the past couple of years there has been a call to attendees who are women to join IETF systems.
- ✦ This generates quite a stir among some IETF men. Ends up in discussions of groups for Martians and little green men. (seriously).
- ✦ What can you do? What is happening with respect to diversity at IETF?



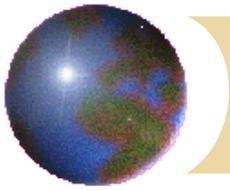
- ✪ ULA (RFC4193) Usage in the Wild
  - ❏ Not intended to be globally routed
  - ❏ There is some leakage but less than RFC1918
  - ❏ 350,000,000 reverse lookups with email per day
  - ❏ 10% of the Internet has a reason to do a reverse lookup of a ULA
  - ❏ 10% of ULAs are assigned from “centrally managed” space (which doesn’t exist)
  - ❏ Widespread use, some leakage.



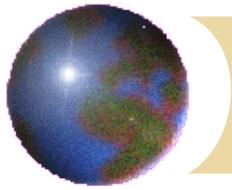
# IEPG

## ✚ DNSSEC deployment and DNSSEC side effect

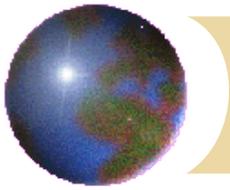
- ✚ The good, the bad, the control (not signed)
- ✚ 8.3% of clients did DNSSEC validation
- ✚ 4.3% got the bad mix of resolvers
- ✚ 87.4% not doing it. A AAAAs only
- ✚ serialized queries for DNSSEC so it takes longer.
- ✚ "if you bugger up your signature you're stuffed"
- ✚ you will see 6x as much traffic when you turn this on and a badly signed zone generates 31 times the traffic



- ✪ Results from IPv6 only testing. Wes George
  - ❏ Looking at turning off v4 for a subset of users.
  - ❏ Various things don't work over v6 like software update.
  - ❏ "if you don't have adblock installed the other answer is v6 only"
  - ❏ IPv4 is for customers. Trying not to waste v4 on internal infrastructure.
  - ❏ [wiki.test-ipv6.com](http://wiki.test-ipv6.com)
  - ❏ <http://www.iepg.org/2013-07-ietf87/3-%20IEPG%20IPv6-only-weg-7-28-13.pdf>

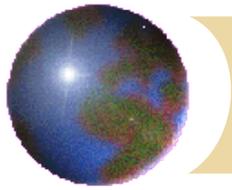


- ⊕ Homenet presentation
  - ⊕ Mark Townsley's intern
  - ⊕ Interconnect home networks and enable service discovery using the .. Wait for it... google plus enabled router.
  - ⊕ Creates a page where you can set up circles to add your friends to your home network.
- ⊕ "having googleplus reconfigure my network layer just feels wrong"
- ⊕ "social network networking" - arturo



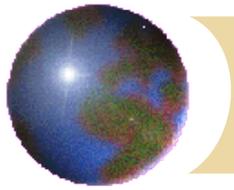
## *Stacked Tunnels for Source Routing BOF*

- ✦ (my thoughts at the time) It occurs to me that all these folks want the Internet to look like circuits. They want to be able to control the path for each service and also reroute based on service.
- ✦ This BOF was all about circuits. Basically putting the state into the packets. With MPLS TE the state is in the network and set up ahead of time.
- ✦ Someone said, "with enough thrust even MPLS will fly"



# *IPv6 Maintenance*

- ✦ Privacy Considerations for IPv6 Address Generation Mechanisms
  - ✦ Folks are starting to see that address spaces are large and how you generate addresses has various security implications. This outlines several mechanisms and their risks
- ✦ Related drafts
  - ✦ A method for Generating Stable Privacy-Enhanced Addresses with IPv6
  - ✦ Router Advertisement based privacy extension in IPv6 auto configuration
- ✦ IPv6 Fragment Header Deprecated
  - ✦ Don't rely on fragments.



# *IPv6 Maintenance*

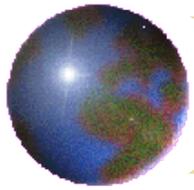
## ✚ **Operational Issues Associated With Long IPv6 Extension Header Chains**

✚ An ISP should not discard IPv6 packets based solely on header chain length if the header chain contains 128 bytes or fewer. Need to find a sane length. “maximum sane”

✚ A couple multicast drafts regarding IPv6 multicast.

✚ **Efficiency aware IPv6 Neighbor Discovery Optimizations**

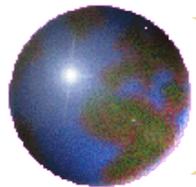
✚ Part of ongoing work on low energy and efficient devices. How to make the network work but less chatty.



# *Technical Plenary*

## ✦ OPUS CODEC

- ✦ A CODEC is a computer program that shrinks large movie files and makes them playable on your computer.
- ✦ OPUS CODEC is an audio codec designed for interactive Internet application
- ✦ Published as RFC 6716 in 2012
- ✦ Works for most audio applications



# Technical Plenary

## Why a New Audio Codec?

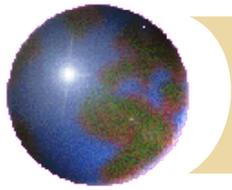
I E T F

HOW STANDARDS PROLIFERATE:  
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



<http://xkcd.com/927/>

<http://imgs.xkcd.com/comics/standards.png>



# *ISOC Briefing Panel*

## ✦ Panellists

- ✦ Pat McManus, Mozilla

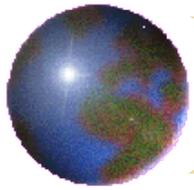
- ✦ Scot Livinggood – Comcast

- ✦ Stuart Cheshire - Apple - responsible or bonjour, PCP to wake up sleeping devices.

- ✦ About improved Internet performance. Some technologies bundle packets and send them out in one frame. This causes TCP to behave as it does.

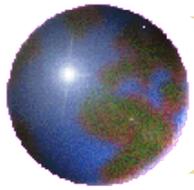
- ✦ Sends out a burst in response. Fills buffers and drops packets. Nice.

- ✦ "Confused, Timid and Unstable" A paper recommended. <http://www.stanford.edu/~huangty/imc012-huang.pdf>



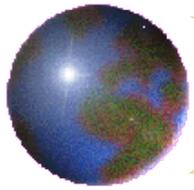
# *Softwire*

- ✦ 22 presentations on the agenda.
- ✦ I can't possibly cover all of them.
- ✦ This group is all about tunneling. V4 in v6 – v6 in v4 etc.
- ✦ If that interests you then check on the drafts.
- ✦ Personally I am not sure if any of this stuff will actually be used in the real world. It may be easier in the end just to use IPv6



# *V6 Operations*

- ✦ Discussion of Unique Local Address (ULAs) announcement in routing
  - ▣ ULAs are massively widely distributed. Announced a covering announcement and drew traffic
  - ▣ 4000 ASNs ask questions in DNS about a ULA.
  - ▣ 10% are in the globally unique space that doesn't exist. Most are using all 0's
  - ▣ Folks need to start filtering these out of global routing



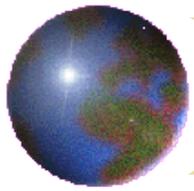
# V6 Operations

- ✦ Enterprise IPv6 Deployment Guidelines.
  - ▣ Document moving along
  - ▣ WGLC added some changes
  - ▣ Geoff H says that the document shouldn't be like v4 so we should remove the NAT statement in this document. Make addresses more available instead.
- ✦ draft-taylor-v6ops-fragdrop
  - ▣ Why operators filter fragments and what that implies



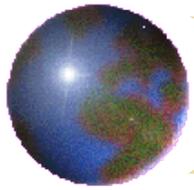
# *V6 Operations*

- ❖ Monitoring Dual Stack/IPv6-only Networks and Services
  - ❑ Guideline document. How to monitor networks.
  - ❑ Started with v4 SNMP, then v6 SNMP then unified SNMP.
  - ❑ Explains transition of MIBs, SNMP, Flow Tools, CLI etc.
- ❖ IPv6 Guidelines for Datacenters
  - ❑ Got a lot of comments on the document.
  - ❑ Added /64 VLANs, remote access



# *V6 Operations*

- ✚ Balanced Security for IPv6 CPE.
- ✚ Measuring the Effects of Happy Eyeballs
  - ▣ Grad student testing of happy eyeballs.  
higher connection times over v6
  - ▣ IPv6 Happy eyeballed winner is rarely faster than the IPv4 route
  - ▣ Other drafts
    - IPv6 IPID Needed
    - End-to-End Response Time Needed for IPv6 Diagnostics
    - IPv6 Packet Sequence Number Needed
    - Recommended Usage of IPv6 PDM Option



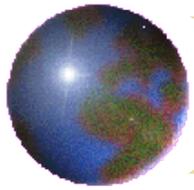
# *V6 Operations*

## ✦ Teredo Sunset Experiment

▣ Teredo is a transition technology that gives IPv6 connectivity for IPv6-capable nodes which are on an IPv4 only network. (no native IPv6)

▣ Switched off `teredo.ipv6.microsoft.com` from July9-July15th

- Went from 9.4 million datagrams per second to a lot less (DNS traffic)
- Then went to zero
- Negligible effect on overall IPv6 traffic
- Next step is to set a real date to turn off for good.



# *V6 Operations*

## ✚ Analysis of Semantic Embedded IPv6 Address Schemas

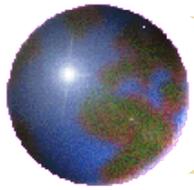
### ▣ Assigning address with different semantics

- Interface ID, extension header, diffServ field, etc.

### ▣ Fundamentally changes how addresses are used.

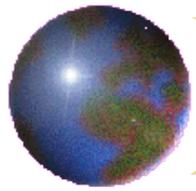
### ▣ May change how RIRs do business and how blocks are divided up.

### ▣ Fred and Ole to write an overview of address architecture.



# *V6 Operations*

- ⊕ IPv4 Address Literal in URL
  - ⊞ General mechanism for translating IPv6 address with NAT64 prefix from “literal IPv4 address”
  - ⊞ Use a special TLD. 192.0.2.10.TLD
  - ⊞ Not sure if this is a good idea.
- ⊕ NAT64 Operational Experiences
- ⊕ IPv6 Roaming Behavior Analysis
  - ⊞ Document has experiences with mobile IPv6



# *V6 Operations*

- ✦ A Near Term Solution for Home IP Networking (HIPnet)
  - ✦ If you have questions talk to Chris G.
  - ✦ Self-organizing: Directionless routers
  - ✦ Addressing: Recursive prefix delegation
  - ✦ Routing: Hierarchical

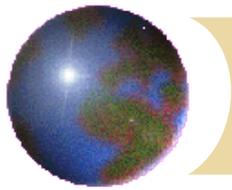


# BOF

## ❖ Deterministic IPv6 Over IEEE802.154e Time slotted Channel Hopping BoF

- ❖ SO there are ways that IEEE802.15.4e can be sending data directly without using the upper layers.
- ❖ This is low power with devices that sleep and need to not be chatty.
- ❖ Like devices on a factory floor
- ❖ 6top layer just above IEEE 802.15.4e TSCH layer



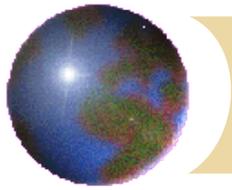


# *V4 Sunsetting*

## ✦ Joint Sunset4-DHC summary/What's next

### ☒ Sunset4 Gap Analysis

- ARP for everything problem.
  - host only has routable IPv6 but IPv4 is turned on the host
  - arp requests come from link local address to all sorts of destinations
  - So you get IPv4 breakage with working IPv6
- Solutions
  - Disable Ipv4 (not all stacks allow this)
  - Get DHCPv6 to say “no IPv4”



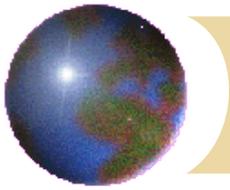
# *V4 Sunsetting*

## ✦ DNS A record filter

- ✦ Work comes from WIDE Project
- ✦ Solution to long timeouts on v6 only networks
- ✦ Filtering A records prevents these long timeouts.

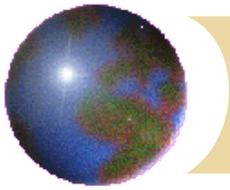
## ✦ SIP over IPv6 Task Group

- ✦ Evaluating current state of SIP over IPv6
- ✦ Sort of a Gap analysis
- ✦ When network was v6 only caused network devices to “crash and burn”



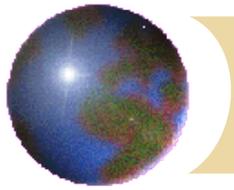
## *V4 Sunsetting*

- ✦ Other interesting drafts. From these we can see what problems are currently being solved.
  - ✦ Interoperability Impacts of IPv6 Interworking with Existing IPv4 SIP Implementations
  - ✦ Turning off IPv4 Using DHCPv6
  - ✦ DHCPv4 over DHCPv6 Transport
  - ✦ Provisioning IPv4 Configuration Over IPv6 Only Networks
  - ✦ DHCPv6 Dynamic DNS Reconfiguration



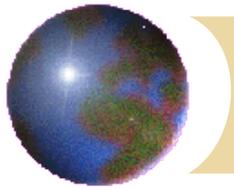
# MPLS

- ✦ Gap Analysis for operating IPv6 only mpls networks
  - ✦ what happens when you connect MPLS to an IPv6 only network?
  - ✦ Wes George made some good comments. "IPv4 is for customers" He is looking at making most of the rest of the network v6 only
  - ✦ Quote of the meeting
    - "why are you going to bother with all that fancy set up stuff when it's all going to go into a big fog"



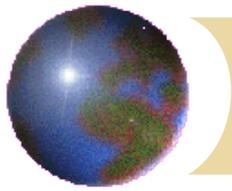
# *Dynamic Host Configuration*

- ✦ “we're arguing about angels dancing on the head of a pin here” Ted Lemon
- ✦ There are 15 drafts in this group a lot of them dealing with tweaks to DHCP.
- ✦ Talked about the important issues with DHC in v4 Sunsetting slides.



# *Security Open Meeting*

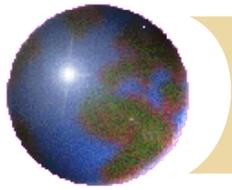
- ✚ Interesting presentation about DNS security issues. The work was all done in a lab so far, but will be done in the wild as well
- ✚ A few items of note
  - ▣ 15 years since IPSEC but < 6% of traffic is encrypted. Why?
    - Challenge and response is enough?
    - False hope that attackers are off path?
    - DNS, TCP immune to off-path attacks?
  - ▣ “Using cookies to protect against the cookie monster is bad”



# *Security Open Meeting*

## *✦ DNS Cache-Poisoning: New Vulnerabilities and Implications*

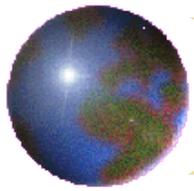
*✦ A number of standardized mechanisms were proposed to enhance security of DNS against cache poisoning attacks. However, we recently found vulnerabilities, allowing attackers to circumvent those defenses and poison resolvers' caches. We present techniques to foil widely deployed defenses, standardized in RFC5452,6056,4697. We then discuss potential countermeasures, some of which may require changes to devices and protocols*



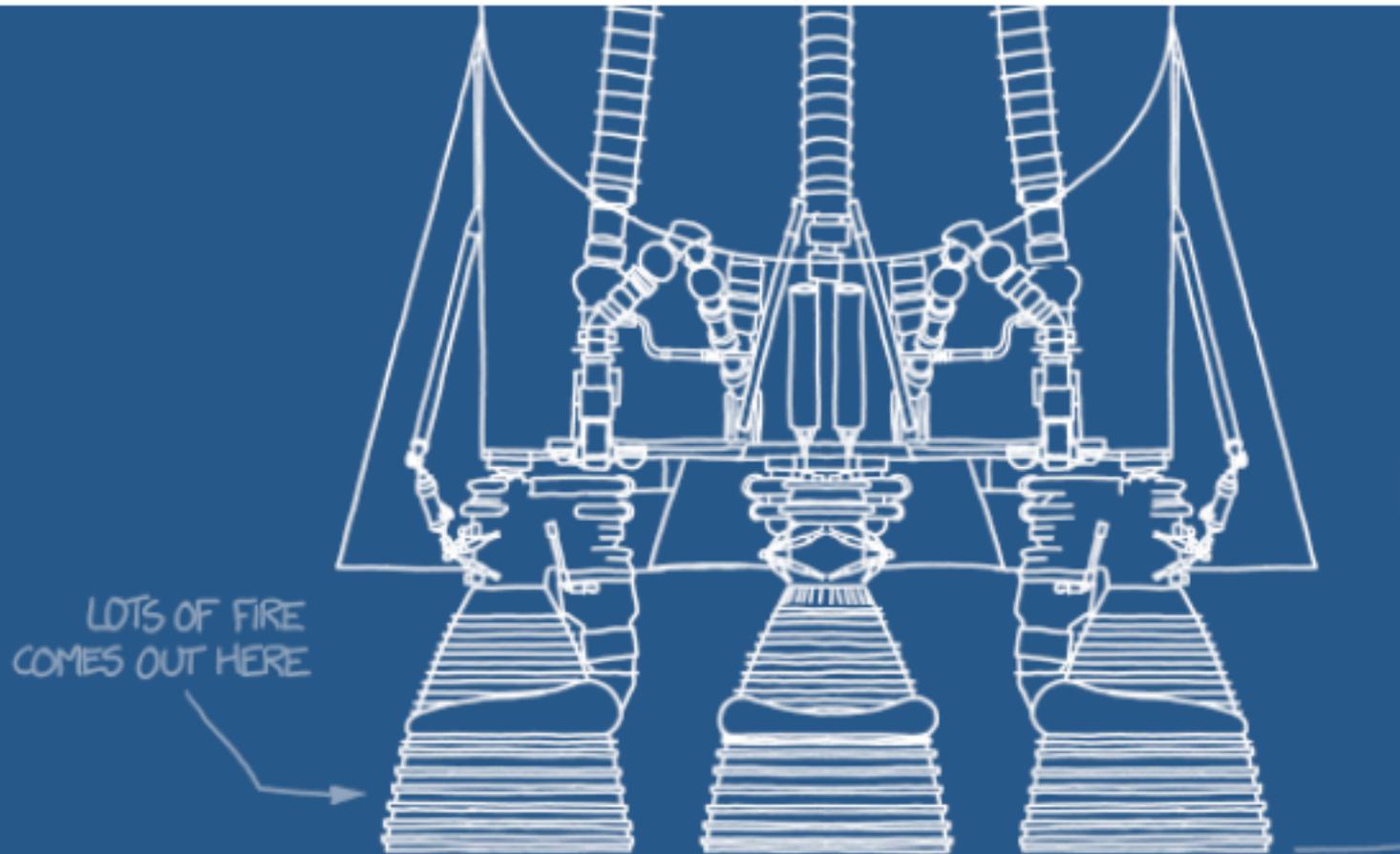
# *Security Open Meeting*

## ✚ The TOR Project

- ✚ Very cool project
- ✚ Loosely associated network of relays to set up an encrypted and anonymous way to send traffic
- ✚ Used to get around censorship
- ✚ [www. Torproject.org](http://www.torproject.org)

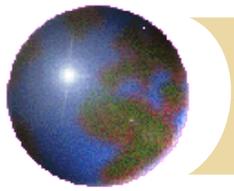


# *DNS Operations (DNSOP)*



THIS END SHOULD POINT TOWARD THE GROUND IF YOU WANT TO GO TO SPACE.

IF IT STARTS POINTING TOWARD SPACE YOU ARE HAVING A BAD PROBLEM AND YOU WILL NOT GO TO SPACE TODAY.



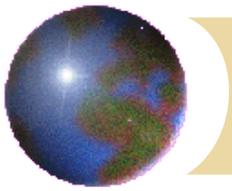
# *DNS Operations (DNSOP)*

## ✦ DNS Flush

- ✦ State of the art is to flush the cache and restart over and over again.
- ✦ In theory this is 27 person-years per domain
- ✦ Build arrangements to do this in some automated way.
- ✦ Potential hack is to use NOTIFY
- ✦ Joe Abley looking for feedback

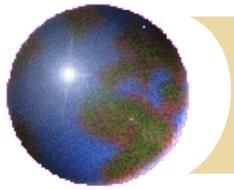
## ✦ DNS Hammer

- ✦ draft-wkumari-dnsop-hammer-00
- ✦ Automated method for managing expiring records.
- ✦ Sporadic spike in resolution time



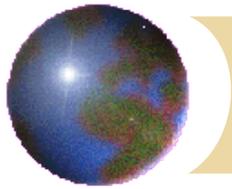
# *6LO BOF*

- ✦ IPv6 over networks of resource constrained nodes
- ✦ IPv6 over Low power Wireless Personal Area Networks (6lowpan) wg closed
- ✦ There are drafts that need a home.
- ✦ The BOF is to determine if a new 6LO working group should be formed.



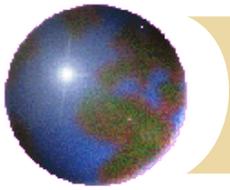
# *V6 RENUM*

"One man's rogue is another man's renumbering event" how to prepare a renumbering event - timers etc. RFC4192



# *HOMENET*

- ✦ draft-jvkjmb-home-networking-incremental-00
  - ✦ Good draft. Breaks down the different phases of evolution of home networks. John says that Comcast sees millions of devices in RFC6204 and RFC6204bis but in the near term single router only.
- ✦ <http://tools.ietf.org/html/draft-stenberg-homenet-dnssdext-hybrid-proxy-ospf-0>
  - ✦ This draft describes what configuration participating DNS servers require as well as how to do it with using auto-configured OSPFv3



# *HOMENET*

## ✦ Other Drafts of note

### ✦ draft-ietf-homenet-arch-09

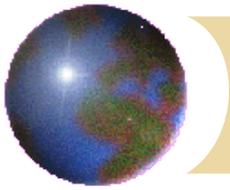
- Moving forward looking for feedback

### ✦ draft-boutier-homenet-source-specific-routing-00

- Maybe someday this will solve multihoming

### ✦ draft-mgmt-homenet-front-end-naming-delegation-02

- Home network name delegation



# SIDR

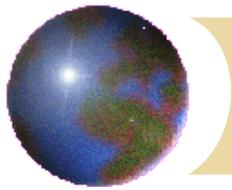
## ✦ RPKI tools

### ✦ Origin Validation Looking Glass

- check validity of prefixes in routing table
- [www.labs.lacnic.net/rpkitools/looking\\_glass](http://www.labs.lacnic.net/rpkitools/looking_glass)
- Easily parsable output, alarm that will alert NOC

### ✦ The RPKI Dashboard

- SURFNET
  - 495838 Prefixes in routing table
  - 2.46% is valid
  - .52% invalid



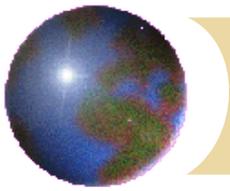
## ✦ RPKI tools continued

### ✦ ROA Wizard

- pulls your registration resources from the DB and suggests ROA to be created
- Available right now for LACNIC members

## ✦ ROA to BGP Prefix Converter

- ✦ Use ASN and it offers prefix lists
- ✦ See next slide for per RIR stats



# SIDR

rpki.surfnet.nl/perrir.html

Global Top 10 IPv4/6 Per AS RIR Stats RPKI routes World map Trends Alexa Top500

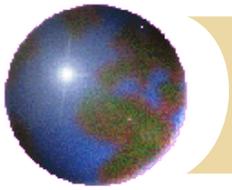
10 records per page Search:

RIR	Total	Valid	Invalid	Unknown	Accuracy	RPKI Adoption Rate
AFRINIC	11256 (100%)	16 (0.14%)	39 (0.35%)	11201 (99.51%)	29.09%	0.49%
APNIC	117349 (100%)	85 (0.07%)	214 (0.18%)	117050 (99.75%)	28.43%	0.25%
ARIN	183166 (100%)	224 (0.12%)	31 (0.02%)	182911 (99.86%)	87.84%	0.14%
LACNIC	58913 (100%)	5517 (9.69%)	1148 (2.02%)	50248 (88.29%)	82.78%	11.71%
RIPE NCC	129120 (100%)	6503 (5.04%)	1151 (0.89%)	121466 (94.07%)	84.96%	5.93%

Much Better Than IPv6

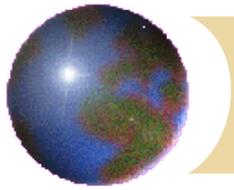
Half are Two LIRs

Embarrassing



# *SIDR*

- ✦ Performance testing of the RPKI
  - ✦ Interesting work about amount of CPU/network etc for RPKI
  - ✦ Slides are here
    - <http://www.ietf.org/proceedings/87/slides/slides-87-sidr-11.pdf>
    - he is also willing to give out scripts if folks want them



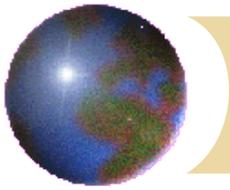
# *Not Presented but of Note*

## ✦ Named Data Networking

✦ Named-data.net

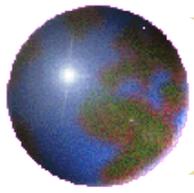
✦ Work by Van Jacobsen and Lixia Zhang

“The Named Data Networking (NDN) project aims to develop a new Internet architecture that can capitalize on strengths – and address weaknesses – of the Internet’s current host-based, point-to-point communication architecture in order to naturally accommodate emerging patterns of communication. The project studies the technical challenges that must be addressed to validate NDN as a future Internet architecture: routing scalability, fast forwarding, trust models, network security, content protection and privacy, and fundamentals communication theory. ”



# References

- ✦ General WG Info:
  - ✦ <http://datatracker.ietf.org/wg/> (**Easiest to use**)
- ✦ Internet Drafts:
  - ✦ <http://tools.ietf.org/html>
- ✦ IETF Daily Dose (**quick tool to get an update**):
  - ✦ <http://tools.ietf.org/dailydose/>
- ✦ Upcoming meeting agenda:
  - ✦ <http://tools.ietf.org/agenda>
- ✦ Upcoming BOFs Wiki:
  - ✦ <http://tools.ietf.org/bof/trac/wiki>
- ✦ Also IETF drafts now available as ebooks
  - ✦ <http://www.fenron.net/~fenner/ietf/ietf-ebooks>



# Questions?

