IETF Update

"The magic of watching grass grow"

CATHY ARONSON
ARIN 38, DALLAS, TEXAS

About This Presentation

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 please share it!
- Opinions expressed are solely my own and I include thoughts that I typed while at the meeting.

Highlights

- A draft went all the way to RFC, RFC7788, and .home was never officially defined per RFC 6761 how to define special purpose domain names.
- QUIC BoF - Quick UDP Internet Connection
  - QUIC is a new multiplexed and secure transport atop UDP, designed from the ground up and optimized for HTTP/2 semantics. While built with HTTP/2 as the primary application protocol, QUIC builds on decades of transport and security experience, and implements mechanisms that make it attractive as a modern general-purpose transport. Currently in Chromium Browser
- PLUS BoF - Path Layer UDP Substrate
  - The PLUS working group's goal is to define a common shim layer atop the User Datagram Protocol (UDP) to provide a transport-independent method to signal flow semantics under transport and application control, necessary to enable the deployment of new, encrypted transport protocols within the existing Internet.
- I heard the same talk 3 times. Stay tuned for that!
- The IPv6 RFCs are not officially Internet Standards
- Ross Callon's talk about the cost of too many standards.
- Hackerboards..

Footwear Styles of the IETF

IEPG – What is it?

- The IEPG is an informal gathering that meets on the Sunday prior to IETF meetings. The intended theme of these meetings is essentially one of operational relevance in some form or fashion - although the chair will readily admit that he will run with an agenda of whatever is on offer at the time!
- The IEPG has a web page and a mailing list
  - iepg@iepg.org - the usual subscription protocols apply.

IEPG

- IANA registry update
  - Changes to IANA registry to help IETF
  - Small tweaks
- IPv6 Deployment Survey
  - 900 Responses
  - 300 ISPs say v6 is a commercial service
  - Charts of prefix sizes
  - Questions about static prefixes

IEPG

- Measuring IPv6 ISP performance
  - Is it reliable?
  - Is it slower or faster than v4
  - These days most of the time unicast v6 results are similar than v4
  - 44% v6 is faster
  - Stats.labs.apnic.net
- DNSSEC Encryption algorithm ability
  - Survey of DNSSEC going on out there.

IEPG

- What is an invalid ROA? ROA Misconceptions
  - Only invalid if crypto chain fails. Nothing to do with BGP announcement.
- Yeti DNS
  - Yeti DNS is a test bed so that folks can try new things coming in the root. Yeti tries different things IANA wants to implement, etc.

IEPG

- cryptech.is
  - an effort to create an open hardware crypto engine design and the tools needed to make it trustworthy
    - "Pervasive monitoring is an attack"
- DNS privacy
  - implementation and deployment status
  - Qname minimization just sends the info that is required
- RIPE Atlas Traceroute
  - More work with RIPE atlas probes
  - Real time traceroute stream available to all

The Presentation I saw 3 times

- https://tools.ietf.org/html/draft-bowbakova-rtgwg-enterprise-pa-multihoming-00
- This document struggles with the age old problem of multi-homing with PA address space.
- This draft uses Source Address Dependent Routing (SADR) in the first hop routers.

Presentation I saw 3 times

- Here it is again.. Notes from Routing Area
  - draft-bowbakova-rtgwg-enterprise-pa-multihoming
- holistic view .. not just router or host routing and how hosts choose right source address.
- send to the right ISP and also how to do policy.. using this ISP for A and another for B
- No NAT also failure scenarios how to pick the right source address
- Basically multiple scoped forwarding tables.

IPv6 Maintenance (6MAN) - ?

- The 6man working group is responsible for the maintenance, upkeep, and advancement of the IPv6 protocol specifications and addressing architecture. It is not chartered to develop major changes or additions to the IPv6 specifications. The working group will address protocol limitations/issues discovered during deployment and operation. It will also serve as a venue for discussing the proper location for working on IPv6-related issues within the IETF.

6Man

- IPv6 Specifications to Internet Standard, draft-ietf-6man-rfc2460bis , draft-ietf-6man-rfc4291bis , draft-ietf-6man-rfc1981bis
  - We have been using IPv6 now for how long and the RFCs are not officially Internet Standards.
  - lots of discussion of little bits of things that have been learned that need to be updated in these documents. This would allow us to move to Internet Standard
  - "sitting around for 60 seconds with half a packet is discouraging"
  - "you have a spec therefore you care"
- WG Last Call: Recommendation on Stable IPv6 Interface Identifiers, draft-ietf-6man-default-iids
  - This generated a lot of discussion and impacts a number of drafts. They are asking for feedback
  - Stages in the process to "standard" are here
    - https://tools.ietf.org/html/rfc6410

6Man

- Other active individual drafts
  - IANA IPv6 Special-Purpose Address Registry and unclear use of "global", and Special-Purpose IP Address Registries, draft-carpenter-6man-whats-global , draft-bchv-rfc6890bis
  - Recommendation on Non-Stable IPv6 Interface Identifiers, draft-gont-6man-non-stable-iids

6Man

- Enterprise Multihoming using Provider-Assigned Addresses without Network Prefix Translation: Requirements and Solution, draft-bowbakova-rtgwg-enterprise-pa-multihoming

V6 Operations – What is it?

- The IPv6 Operations Working Group (v6ops) develops guidelines for the operation of a shared IPv4/IPv6 Internet and provides operational guidance on how to deploy IPv6 into existing IPv4-only networks, as well as into new network installations.
- The main focus of the v6ops WG is to look at the immediate deployment issues; more advanced stages of deployment and transition are a lower priority.
- http://datatracker.ietf.org/wg/v6ops/

v6Ops

- draft-ietf-v6ops-unique-ipv6-prefix-per-host
  - A prefix per host instead of an address per host.
  - Benefits of a unique IPv6 prefix compared to a unique IPv6 address from the service provider are going from enhanced subscriber management to improved isolation between subscribers.

v6Ops

- **64::/16: An IPv4/IPv6 translation prefix**
  - 64::/16 for locally significant use with v4/v6 translation
  - so folks doing this use their own address space. Using this isn't good because it's not unique… Burning a /16 for this is "insane" .. so this is controversial to say the least. some folks think it's easier to do this out of different space.

Routing Area Open Meeting

- Highlight of the meeting from someone retiring
- Keep it Simple: The cost of (too many) Standards Ross Callon
  - too much complexity and too many standards
  - VPNs and encapsulations.. (example) IP in IP, IP in UDP, IP in GRE in IP, IP in GRE in UDP, L2TP; IPsec; MPLS in IP; MPLS in UDP ..
  - if you have too many then you have no standards at all. Some vendors implement some and others others and then no one does the same thing.
  - His perspective slide is good.. No one vendor

Routing Area Open Meeting

- CodeMatch
  - Improved linkage between IETF Working Groups and developers (open source or proprietary),
  - Assist with diversity with outreach to students, researchers, with some focus on regional diversity,
  - Track implementations of drafts/RFCs to identify standards track candidates,
  - Increased visibility into the relevance of standards and connections to open source efforts, etc

Routing Area Open Meeting

- draft-francois-rtgwg-segment-routing-ti-lfa & draft-francois-rtgwg-segment-routing-uloop
  - Link failure and segment routing. Loop free rerouting
- draft-agv-rtgwg-spring-segment-routing-mrt
  - User MRT for segment routing. IGP extensions are required to carry MRT. (Maximally Redundant Trees)

Routing Area Open Meeting

- draft-kumar-rtgwg-grpc-protocol
- draft-talwar-rtgwg-grpc-use-cases
  - open source version of google's microservice communication network
  - leverages standard HTTP/2 as its transport layer)
  - use for streaming data and network configuration

Human Rights Considerations

- The Human Rights Protocol Considerations Research Group is chartered to research whether standards and protocols can enable, strengthen or threaten human rights, as defined in the Universal Declaration of Human Rights (UDHR) [1] and the International Covenant on Civil and Political Rights (ICCPR) [2], specifically, but not limited to the right to freedom of expression and the right to freedom of assembly.

Human Rights Considerations

- Laura DeNardis on Protocol Politics
  - interesting talk on her book on governance and human rights on the Internet. Can use the architecture to subvert rights. Data localization, encryption backdoors, redirecting DNS queries, Raise questions about human rights. No longer just a communication network but also a control network (Internet of Things) .. other aspects of real human interactions. Will there be a lot of proprietary standards where we can no longer even look? Look up her books at Ourinternet.org

Human Rights Considerations

- UN Special Rapporteur Human Rights David Kaye on report 'Freedom of expression and the private sector in the digital age'
  - Freedom of expression.. standards.. Article 19. Provide the standards for the rights that all individuals enjoys. Opinion without interference. Right to seek and receive information of all kinds. regardless of media or frontiers. current project maps the was the private sector … telecommunications companies, ISPs and equipment vendors.
  - "garbled by nature"
  - pressures on the tech community not to do the right thing.
- Lessons learned from RFC 6973
  - Privacy Considerations For Internet Protocols
- draft-tenoever-hrpc-research
  - This is terminology and it's being used to look at other HRPC drafts and work.

IPv6 over Networks of Resource-constrained Nodes – 6Lo

- 6lo focuses on the work that facilitates IPv6 connectivity over constrained node networks with the characteristics of:
  - limited power, memory and processing resources
  - hard upper bounds on state, code space and processing cycles
  - optimization of energy and network bandwidth usage
  - lack of some layer 2 services like complete device connectivity and broadcast/multicast

6Lo

- IPv6 over Bluetooth Low Energy Mesh Networks https://tools.ietf.org/html/draft-gomez-6lo-blemesh
- Transmission of IPv6 over MS/TP Networks https://tools.ietf.org/wg/6lo/draft-ietf-6lo-6lobac
  - The building controls industry moving towards IPv6. Most numerous and least costly devices. “if a lifetime is less than 1 second…”
  - MS/TP - Master-Slave/Token-Passing

6LO

- ESC Dispatch Bytes and IANA Registry https://tools.ietf.org/wg/6lo/draft-ietf-6lo-dispatch-iana-registry
  - Document to direct IANA on putting these in the registry
- 6lo ND backbone router
  - https://tools.ietf.org/html/draft-ietf-6lo-backbone-router
- IPv6 over Near Field Communication
  - https://tools.ietf.org/wg/6lo/draft-ietf-6lo-nfc

6Lo

- Designating 6LBR (6Lo Border Router) for IID Assignment
  - https://tools.ietf.org/html/draft-rashid-6lo-iid-assignment
- This draft discusses how to designate 6LBR to assign IIDs for failed DAD. Currently, DAD cycle is repeated until the conceived IID isn't declared unique. To remove the overhead of repeated DAD cycle, this document enables 6LBR to suggest an IID (to 6LN) for failed DAD. It improves the overall network performance by avoiding repeated DAD cycle. To attain higher degree of privacy, IID can be periodical changed and designating 6LBR ensures the uniqueness of IID in a proactive manner.

6Lo

- Other drafts
  - 6lo ETSI Plugfest@IETF96
  - An Update to 6LoWPAN ND
    - https://tools.ietf.org/html/draft-thubert-6lo-rfc6775-update-00
  - Low-Power Wide Area Networks (LPWAN)

Dynamic Host Configuration - ?

- The DHC WG is responsible for defining DHCP protocol extensions. Definitions of new DHCP options that are delivered using standard mechanisms with documented semantics are not considered a protocol extension and thus are outside of scope for the DHC WG. Such options should be defined within their respective WGs and reviewed by DHCP experts in the Internet Area Directorate. However, if such options require protocol extensions or new semantics, the protocol extension work must be done in the DHC WG.
- charter-ietf-dhc-08

DHC

- Secure DHCPv6 and Secure DHCPv6 Deployment, draft-ietf-dhc-sedhcpv6
  - DHCPv6 includes no deployable security mechanism that can protect end-to-end communication between DHCP clients and servers. This memo describes a mechanism for using public key cryptography to provide such security.
- draft-li-dhc-secure-dhcpv6-deployment
  - Secure DHCPv6 provides authentication and encryption mechanisms for DHCPv6. This draft analyses DHCPv6 threat model and provides guideline for secure DHCPv6 deployment.
- TOFU - Trust on First Use - tofu stores the host key and then use it in the future to verify the host

DHC

- Other Drafts
  - draft-volz-dhc-relay-server-security
  - draft-ietf-dhc-dhcpv6-failover-protocol
  - draft-ietf-dhc-dhcpv6-yang
  - draft-shen-dhc-client-port
  - draft-ietf-dhc-rfc3315bis

OPSEC

- The OPSEC WG will document operational issues and best current practices with regard to network security. In particular, the working group will clarify the rationale of supporting current operational practice, addressing gaps in currently understood best practices and clarifying liabilities inherent in security practices where they exist.
- The scope of the OPSEC WG includes the protection and secure operation of the forwarding, control and management planes. Documentation of operational issues, revision of existing operational security practices documents and proposals for new approaches to operational challenges related to network security are in scope.

OPSEC

- The STRIDE towards IPv6: A Threat Model for IPv6 Transition Technologies, draft-georgescu-opsec-ipv6-trans-tech-threat-model-01
  - Created the STRIDE model (Spoofing, Tampering, Repudiation, Information Disclosure, Denial of service and Elevation of Privilege)
  - Then looking at transition technologies with respect to this model.
- Recommendations on Filtering of IPv6 Packets Containing IPv6 Extension Headers
  - Security and operational implications of extension headers. Operational advice on filtering them. How do we fix the widespread filtering?

OPSEC

- Operational Security Considerations for IPv6 Networks, draft-ietf-opsec-v6-09
  - Love this from the doc.
    - IPv6 address allocations and overall architecture are an important part of securing IPv6. Initial designs, even if intended to be temporary, tend to last much longer than expected. Although initially IPv6 was thought to make renumbering easy, in practice, it may be extremely difficult to renumber without a good IP Addresses Management (IPAM) system.
  - Re-addressing a network is hard.. Really? ☺

SDN – What is it?

- Software Defined Networking
  - Early SDN models focused primarily on moving the control plane out of the network elements into "controllers" on the theory that the switching elements could remain simple, general-purpose, and cost-effective while at the same time allowing the control plane to rapidly evolve. A number of recent SDN models, on the other hand, include approaches in which control and data plane programability works in concert with existing and future distributed control planes.
  - SDN aims to benefit all types of networks, including wireless, cellular, home, enterprise, data centers, and wide-area networks. The Software-Defined Networking Research Group (SDNRG) investigates SDN from various perspectives with the goal of identifying the approaches that can be defined, deployed and used in the near term as well identifying future research challenges. In particular, key areas of interest include solution scalability, abstractions, and programming languages and paradigms particularly useful in the context of SDN. In addition, it is an explicit goal of the SDNRG to provide a forum for researchers to investigate key and interesting problems in the Software-Defined Networking field.
  - Finally, the SDNRG provides objective definitions, metrics and background research with the goal of providing this information as input to protocol, network, and service design to SDOs and other standards producing organizations such as the IETF, ETSI, ATIS, ITU-T, IEEE, ONF, MEF, and DMTF.

SDN

- Network operator Challenges for Commercial SDN Environments
  - Speaker is from China mobile.
  - tenant management and administration management
  - information collection -
  - tenants can see their own part of the network. Dynamically. each level monitored.
  - end to end detection and precise fault location

SDN

- Techniques and tools for the management and operation of NFV and SDN networks
  - NFV - Network Functions Visualization - life cycle of resources
  - “discuss a common set of abstraction models”
- SDN Architecture and Use Cases for PCE-based Central Control
  - PCE - Path Computation Element.. computes paths
  - isolate computation from computing paths?

SDN

- Network Scheduling in Software-defined Environments
  - Synchronized clocks on switches and then SDN tell them when to do what.
  - coordinating updates or capturing snapshots
  - update paths at a particular time
  - timing is important so that re-routes don't cause congestion.
  - TIMEFLIP - Time based TCAM look up

SDN

- Authentication and Authorization in Wired OpenFlow-based Networks using 802.1X
  - SDN in campus networks
  - Identity based network control
  - Proof of concept so far in the lab.
- Limitations of Optimization for Multi-site NFV Network Service Delivery
  - looks like moving stuff around using SDN to meet SLAs and optimizing CAPEX and OPEX
  - sort of a survey of what's going on in this space
- SDN Controller Performance Evaluation
  - looking at performance due to number of devices managed as well as the number of controllers.

SDN

- Others
  - VNF Benchmark as a Service
  - VNF vs. NFV –
    - VNF - refers to the implementation of a network function using software that is decoupled from the underlying hardware.
    - NFV - refers to the overarching principle or concept of running software-defined network functions, independent of any specific hardware platform, as well as to a formal network virtualization initiative led by some of the world's biggest telecommunications network operators.
  - The abstract art of composing SDN applications
  - Control as a minimal common denominator for future networking

INTAREA – What is it?

- The Internet Area Working Group (INTAREA WG) acts primarily as a forum for discussing far-ranging topics that affect the entire area. Such topics include, for instance, address space issues, basic IP layer functionality, and architectural questions. The group also serves as a forum to distribute information about ongoing activities in the area, create a shared understanding of the challenges and goals for the area, and to enable coordination.

INTAREA

- IAB Stack Evolution Program
  - stackevo-discuss@iab.org
  - sounds interesting. Plus bof was part of this
- GUE and Extensions
  - Okay so this is yet another encapsulation protocol. In light of Ross Callon's talk this guy was asked simply, "why"?

INTAREA

- Other topics
  - IP Broadcast Considerations
  - IP Encapsulation Congestion Notification Guidelines
  - Extended Ping
    - can't ping if unnumbered or private addresses or link-local
    - Eping allows you to ping these interfaces. changes to ICMP
  - Bandwidth Aggregation for Internet Access
    - how to bond two connections to the same ISP like in the case of homenet..
  - IP over intentionally partially partitioned links
  - Ad Hoc Wireless Networks
  - Multiple Access Management
  - IPIPv4 Tunnel Yang Model

HOMENET – What is it?

- The purpose of this working group is to focus on this evolution, in particular as it addresses the introduction of IPv6, by developing an architecture addressing this full scope of requirements:
  - prefix configuration for routers
  - managing routing
  - name resolution
  - service discovery
  - network security
- charter-ietf-homenet-03

HOMENET

- HNCP Deployment Experiences
  - HNCP is the address configuration protocol of the HOMENET protocol suite.
  - HNCP is designed to configure unmanaged, small, stable, prefix-based networks.
- Architecture Draft
  - draft-lemon-homenet-naming-architecture-01
  - “Users cannot be assumed to be skilled or knowledgeable in name service operation, or even to have any sort of mental model of how these functions work”

HOMENET

- This draft is all about DNCP and HNCP
  - Distributed Node Consensus Protocol
  - Homenet Networking Control Protocol.
  - draft-ietf-homenet-hncp-bis-00
  - This is all about how a homenet figures itself out. Super hard problem to solve
- Discussion of RFC7788. What should be done about ".home"?

HOMENET

- Documents Published since last meeting
  - RFC 7787 - Distributed Node Consensus Protocol
  - RFC 7788 - Home Networking Control Protocol
- New draft Babel for homenet
  - draft-ietf-homenet-babel-profile-00

HOMENET

- Other drafts
  - draft-ietf-homenet-hybrid-proxy-zeroconf-02
  - draft-ietf-homenet-front-end-naming-delegation-04
  - draft-ietf-homenet-naming-architecture-dhc-options-03

BABEL WG

- The Working Group will focus on moving the Babel protocol to IETF Proposed Standard with IETF review. This includes clarifying RFC 6126 and integrating RFC 7557 and feedback provided by independent implementations, and resolving comments. It is not a requirement that the Babel protocol produced is backwards compatible with RFC 6126. It is a requirement that Babel support at least one profile that is auto-configuring. Other documents that are relevant to the above work can also be produced. Particular emphasis will be placed on work needed for a Proposed Standard routing protocol, such as ensuring manageability and strong security. Link metric measurement or link metric calculation procedures significantly more complex that those currently in Babel are out of scope.

BABEL WG

- Proposed changes to the Babel routing protocol
  - these aren't changes to the protocol but a protocol for making changes to the protocol.
- HOMENET for Hackerboards (very Cool)
  - Okay so this guy took a bunch of these very very small computers and hooked them together into a HOMENET using HOMENET protocols.
  - http://www.pcworld.com/article/2911098/computers/mini-pc-invasion-10-radically-tiny-computers-that-fit-in-the-palm-of-your-hand.html

SIDR – What is it?

- The purpose of the SIDR working group is to reduce vulnerabilities in the inter-domain routing system. The two vulnerabilities that will be addressed are:
  - Is an Autonomous System (AS) authorized to originate an IP prefix
  - Is the AS-Path represented in the route the same as the path through which the NLRI traveled
  - The SIDR working group will take practical deployability into consideration.
- charter-ietf-sidr-04

SIDR

- RPKI Repository Delta Protocol
  - https://datatracker.ietf.org/doc/draft-ietf-sidr-delta-protocol/
  - https://tools.ietf.org/html/draft-ietf-sidr-delta-protocol-03
    - provides relying parties with a mechanism to query a repository for incremental updates, thus enabling the RP to keep its state in sync with the repository.
    - two interoperable implementations.
    - verify certificate and if it fails give a warning
- Updates to ROA and BGPSec Router Certificate profiles RPKI Validation Reconsidered
  - https://datatracker.ietf.org/doc/draft-ietf-sidr-rpki-validation-reconsidered/
  - https://tools.ietf.org/html/draft-ietf-sidr-rpki-validation-reconsidered-06
  - Separate ROAs are good because if one route in a ROA is invalid then they all have a problem.
  - Separate BGPsec Router certs for different ASNs.. Same reason.
  - RE OIDs..
    - To ensure all RPs behave the same way. (use the same algorithm) A phased in approach where RPs must support then a phased in approach of what CAs may use and must use

SIDR

- RPKI vs BGP Global Statistics
  - stats on what's going on out there but only for v4 right now
  - this is cool.. percentage of address space in regions covered by ROAs. Also which are valid.
  - This is interesting data.
- Question for CJ to ponder.. In RIPE PI space is gotten from your upstream provider. In ARIN PI is specifically gotten from ARIN not your upstream ISP… Pondering…

SIDR

- Problem Statement and Considerations for ROA Mergence
  - https://datatracker.ietf.org/doc/draft-yan-sidr-roa-mergence/
  - https://tools.ietf.org/html/draft-yan-sidr-roa-mergence-00
  - Mergence - to become combined, united, swallowed up, or absorbed; lose identity by uniting or blending (often followed by *in* or *into*)
  - The ROA mergence is a common case that each ROA contains exactly one AS number but may contain multiple IP address prefixes in the operational process of ROA issuance.
  - Misconfiguration causes routes to be declared invalid. so if you have multiple prefixes if one is wrong they are all revoked. This increases convergence times because of the updating of ROAs. Interesting
  - The recommendation is that one ROA one prefix.
- RPKI Deployment Considerations
  - RP, CA issues
  - data sync and other issues..

SIDR

- Requirements for Resource Public Key Infrastructure (RPKI) Relying Parties
  - consolidating requirements for RAs..
  - not redefine the functions but to point to existing info.
  - Interesting that the specs are so hard to follow we need a doc to understand the docs.
- RPKI Multiple "All Resources" Trust Anchors Applicability Statement
  - All about Trust Anchors and RIRs..
  - What happens if blocks move from one RIR to another?
  - Andy Newton is working on this for ARIN

Meeting Venue Working Group

The selection of meeting venues for our physical meetings is a common area of discussion at the IETF and feedback for the IAOC and its meeting committee.

A specification of the venue selection process and criteria would be useful. With community discussion and agreement such a specification will be very helpful in improving the process and ensuring that the relevant criteria are properly identified.

The discussion itself may also be helpful. For instance, due to recent discussions, potential future destinations are announced to the community to help identify potential issues early.

Meeting Venue Working Group

- The ongoing discussion of changing venues depending on health and safety.. political situations etc.
- It is an interesting exercise that was brought about by IETF 100 being in Singapore. The mailing list discussion is very thought provoking

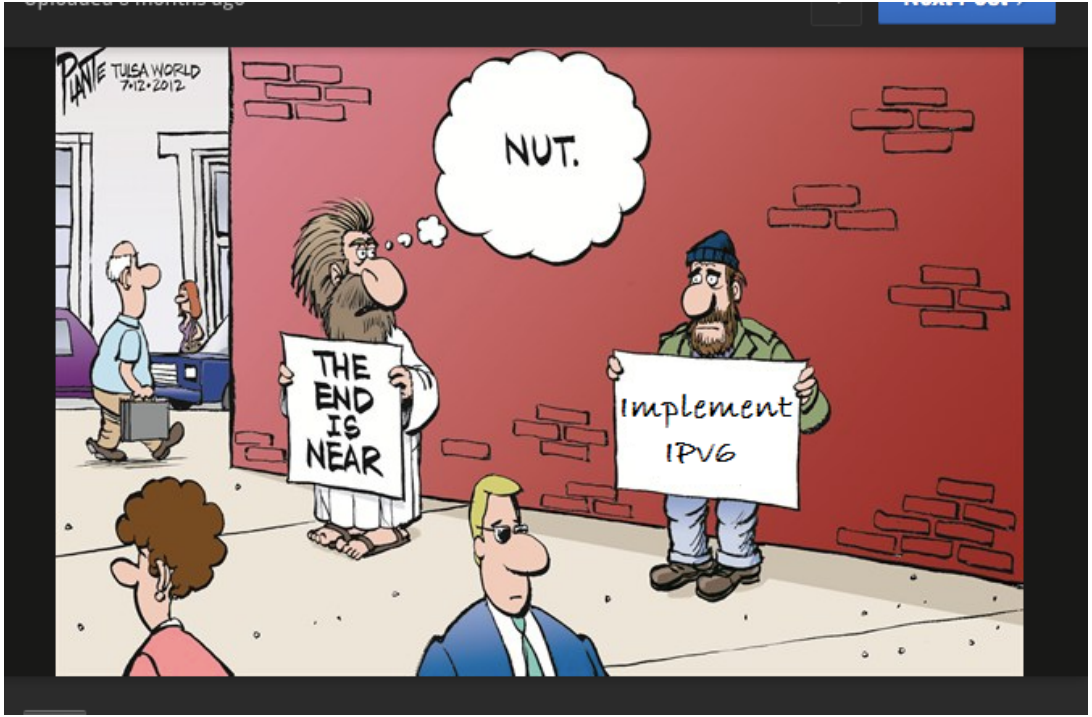
References

- Cool Feed of new documents and what they are
  - http://tools.ietf.org/group/tools/trac/wiki/AtomFeeds
  - It's pretty cool and has info about all new documents, liaisons etc.
- 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

Going to your first IETF?

- Watch the video
  - https://www.ietf.org/newcomers.html
- Are you a woman attending first IETF?
  - IETF Systers
  - https://www.ietf.org/mailman/listinfo/systers
- Woman involved in NOGs?
  - Net-grrls
  - https://www.facebook.com/groups/netgrrls/
- Men there are lists for you too.. All the meeting lists are mostly men. Have at it ☺

Questions?


PLANTE
TULSA WORLD
7-12-2012
NUT.
THE END IS NEAR
Implement IPV6