The IETF

What is it and how does it work?

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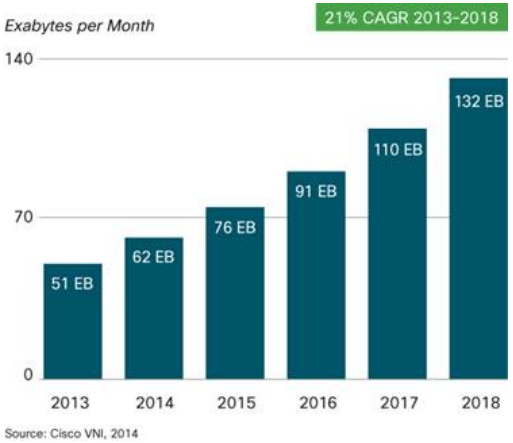
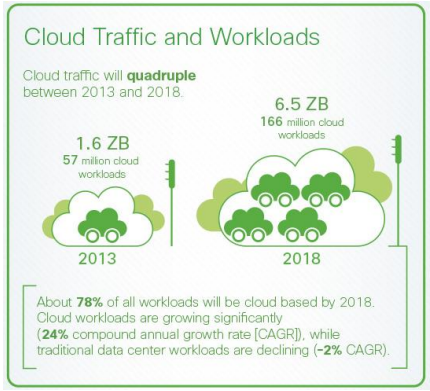
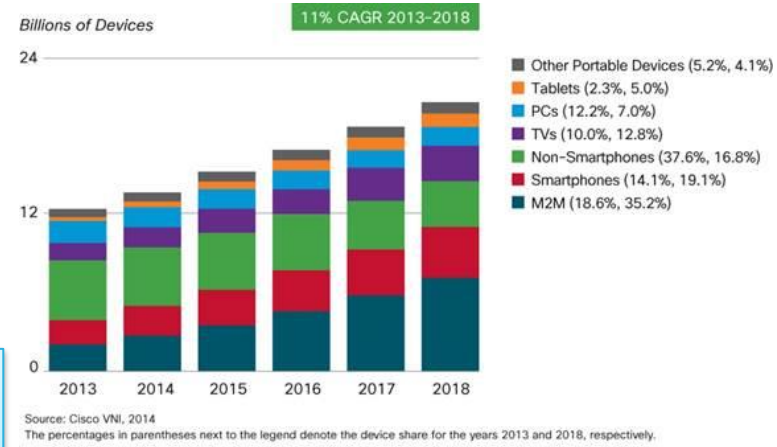


Source: Cisco VNI, 2014



Traffic Growth
Device Proliferation
Cloud
Video



Source: Cisco VNI, 2014
The percentages in parentheses next to the legend denote the device share for the years 2013 and 2018, respectively.

Source: Cisco VNI, 2014
The percentages within parentheses next to the legend denote the relative traffic shares in 2013 and 2018, respectively.

No one is in charge, anyone can contribute and everyone can benefit.

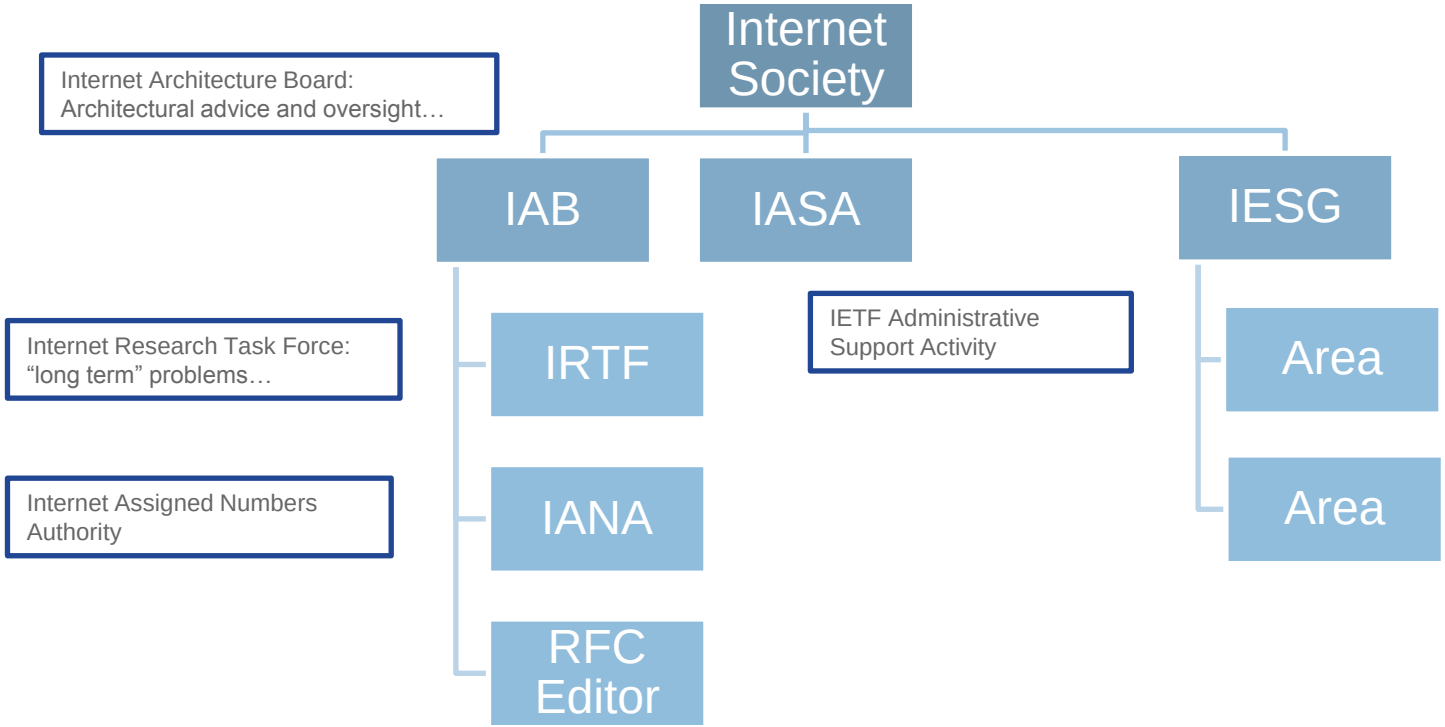
IETF History

- Formed in 1986
  - Evolved out of US ARPANET-related government activities
    - Internet Configuration Control Board (ICCB) (1979) and Internet Activities Board (1983)
- People not companies are participants!
- Has developed or maintains most Internet-related standards.
- Does not exist (in a legal sense), no members, no voting
  - The IETF is “an organized activity of the Internet Society”

Internet Engineering Task Force (IETF)

- Mission: to make the Internet work better.
- Role and Scope
  - '*above the wire and below the application*'
    - IP, TCP, email, routing, IPsec, HTTP, FTP, ssh, LDAP,
    - SIP, mobile IP, ppp, RADIUS, Kerberos, secure email,
    - streaming video & audio, ...

IETF Organization

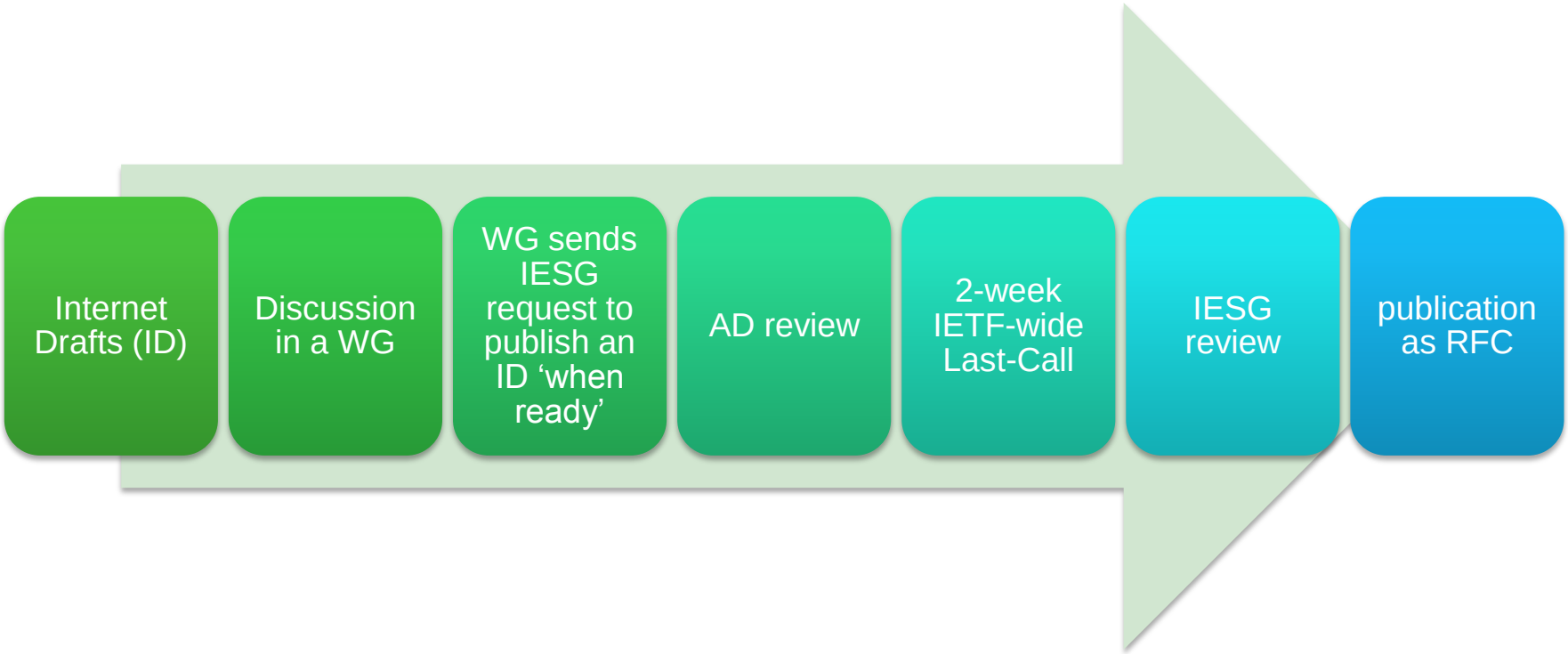


Working Groups

- Working Groups are focused by charters
- no defined membership; just participants

- “***Rough consensus and running code...”***
  - no formal voting (can not define the constituency)
  - does **not require unanimity**
  - chair determines if there is consensus
  - disputes resolved by discussion
  - mailing list and face-to-face meetings
  - final decisions must be verified on mailing list

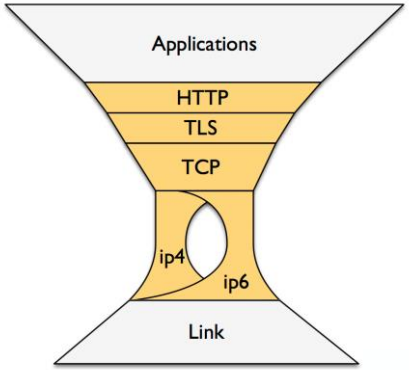
Standards Process



IETF Organization: Areas

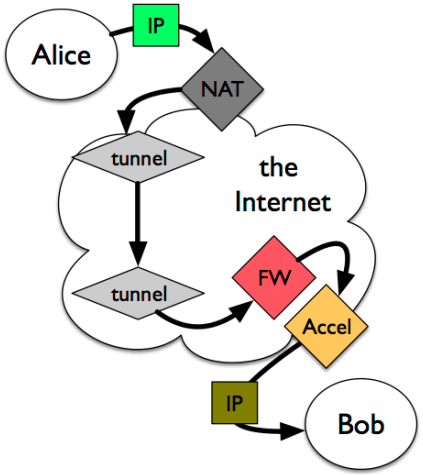
General Area (gen)	• ...activities focused on supporting, updating and maintaining the IETF standards development process.
Security (sec)	• ...focused on security protocols...services: integrity, authentication, non-repudiation, confidentiality, and access control...key management is also vital.
Applications and Real Time (art)	•Protocols for delay-sensitive communications, and building blocks to be used across a wide variety of applications.
Operations & Management (ops)	• Network Management, AAA, and various operational issues facing the Internet such as DNS, IPv6, operational security and Routing operations.
Transport Services (tsv)	• ...works on mechanisms related to end-to-end data transport...
Routing (rtg)	• ...responsible for ensuring continuous operation of the Internet routing system...
Internet (int)	• ...IP layer (both IPv4 and IPv6), DNS, mobility, VPNs and pseudowires..., and various link layer technologies.

IP Stack Evolution



- …evolution of IPv4 and IPv6, the transport protocols running over IP, and the overall protocol stack architecture.
- There is an observed trend of functionality moving “up the stack”: where the “waist” was once IP, now many applications run over HTTP/TCP/IP.

1. **Evolving interfaces to transport and network-layer services**
2. **Improving path transparency in the presence of firewalls and middleboxes**

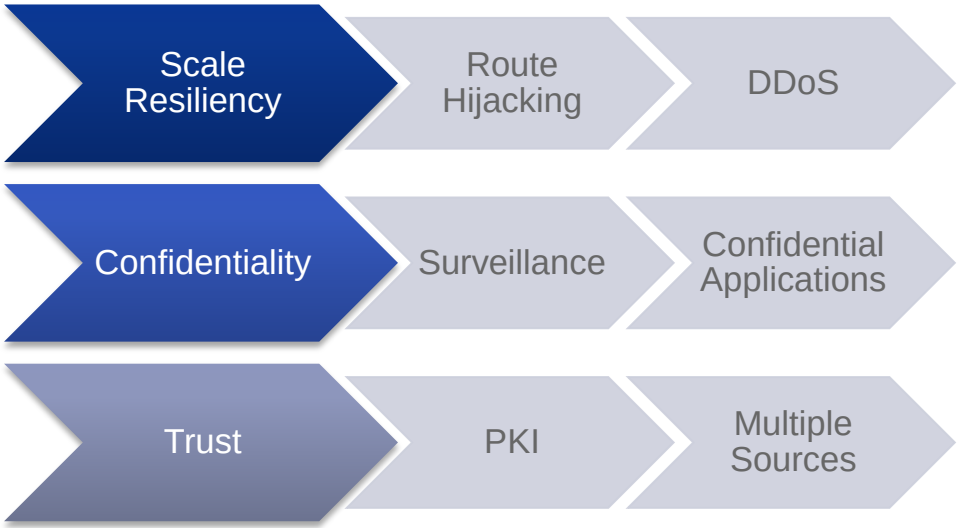


https://www.ietf.org/proceedings/91/slides/slides-91-iab-techplenary-6.pdf

Privacy and Security

Internet Challenges

1. **protocols are developed as building blocks**
2. **security approaches presume that attackers have resources on par with those available to secure the system**
3. **many systems breach confidentiality to simplify the delivery of services**



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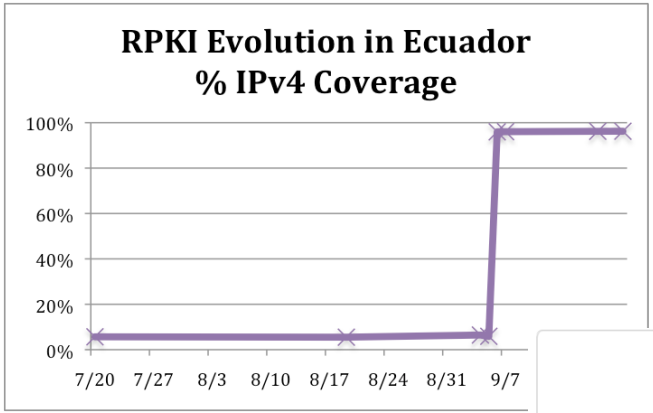
Pervasive Monitoring is An Attack (rfc7258)

Pervasive monitoring is a technical attack on privacy that should be mitigated in the design of IETF protocols.

RPKI-Based Origin Validation Deployment



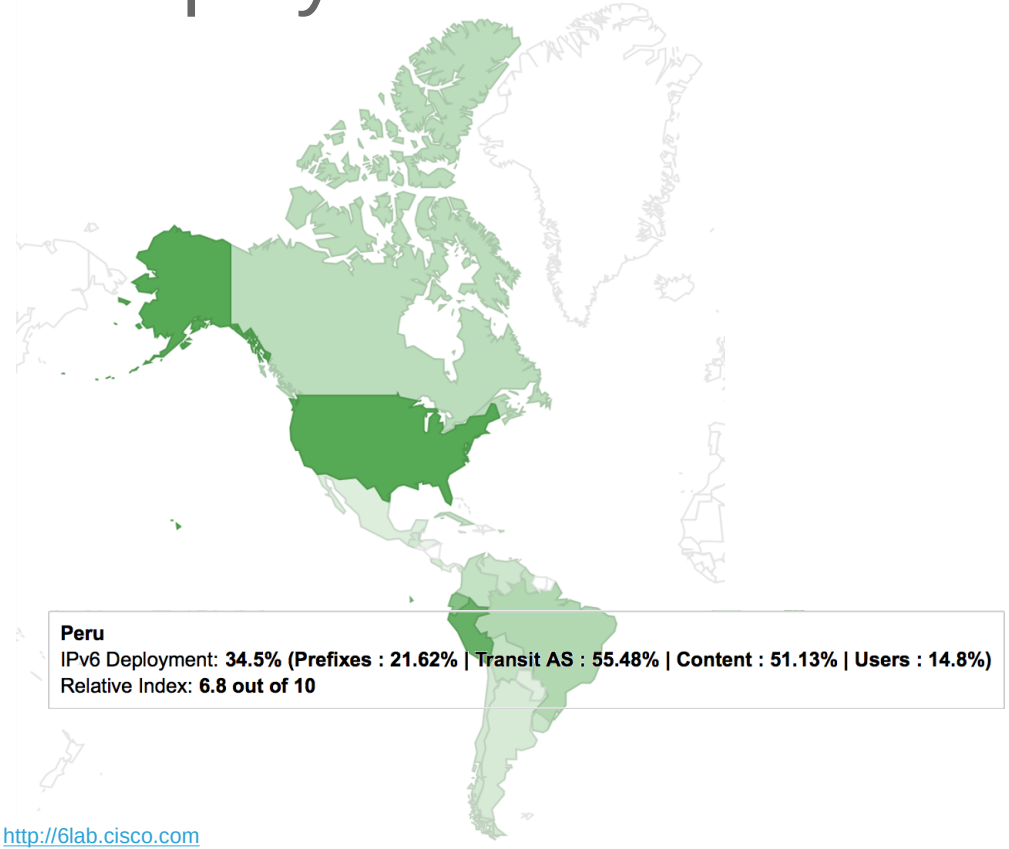
RIR	Total	Valid	Invalid	Unknown	Accuracy	RPKI Adoption Rate
AFRINIC	14130 (100%)	67 (0.47%)	50 (0.35%)	14013 (99.17%)	57.26%	0.83%
APNIC	143856 (100%)	1956 (1.36%)	691 (0.48%)	141209 (98.16%)	73.89%	1.84%
ARIN	209634 (100%)	1473 (0.7%)	347 (0.17%)	207814 (99.13%)	80.93%	0.87%
LACNIC	74925 (100%)	17697 (23.62%)	636 (0.85%)	56592 (75.53%)	96.53%	24.47%
RIPE NCC	149295 (100%)	13968 (9.36%)	1158 (0.78%)	134169 (89.87%)	92.34%	10.13%

http://tools.ietf.org/html/draft-fmejia-opsec-origin-a-country /
http://rpki.surfnet.nl/perrir.html

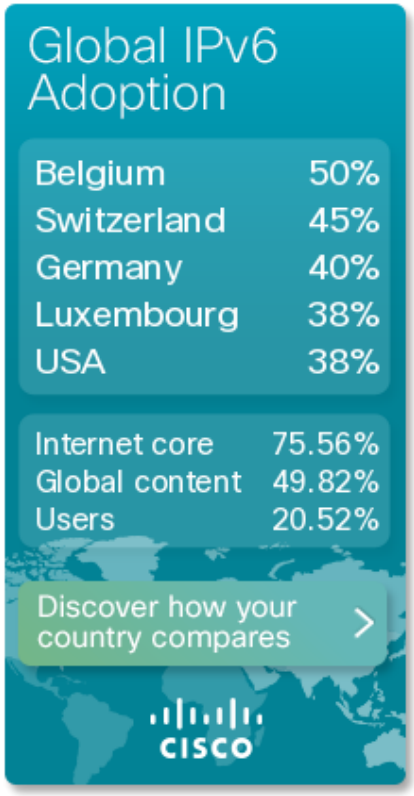
IPv6 Deployment

6lab.cisco.com @cisco6lab · Jun 15

Huge #IPv6 increase lately. Watch out Peru, Equador, Brazil, Bolivia, Malaysia, Portugal, Greece, Norway, Finland, Schweiz, Czech R, Saudi



Peru
IPv6 Deployment: **34.5% (Prefixes : 21.62% | Transit AS : 55.48% | Content : 51.13% | Users : 14.8%)**
Relative Index: **6.8 out of 10**



http://6lab.cisco.com

New Directions: New IETF Work

- Home Networking

  “…focuses on the evolving networking technology within and among relatively small "residential home" networks. For example, an obvious trend in home networking is the proliferation of networking technology in an increasingly broad range and number of devices.”

- Autonomic Networking Integrated Model and Approach (anima)

  “…refers to the self-managing characteristics (configuration, protection, healing, and optimization) of distributed network elements, adapting to unpredictable changes while hiding intrinsic complexity from operators and users.”

- Delay Tolerant Networking (dtn)

  “…specifies mechanisms for data communications in the presence of long delays and/or intermittent connectivity.”

Internet Research Task Force

Mission

The Internet Research Task Force (IRTF) promotes research of importance to the evolution of the Internet by creating focused, long-term Research Groups working on topics related to Internet protocols, applications, architecture and technology.

Overview

The Internet Research Task Force (IRTF) focuses on longer term research issues related to the Internet while the parallel organization, the Internet Engineering Task Force (IETF), focuses on the shorter term issues of engineering and standards making.

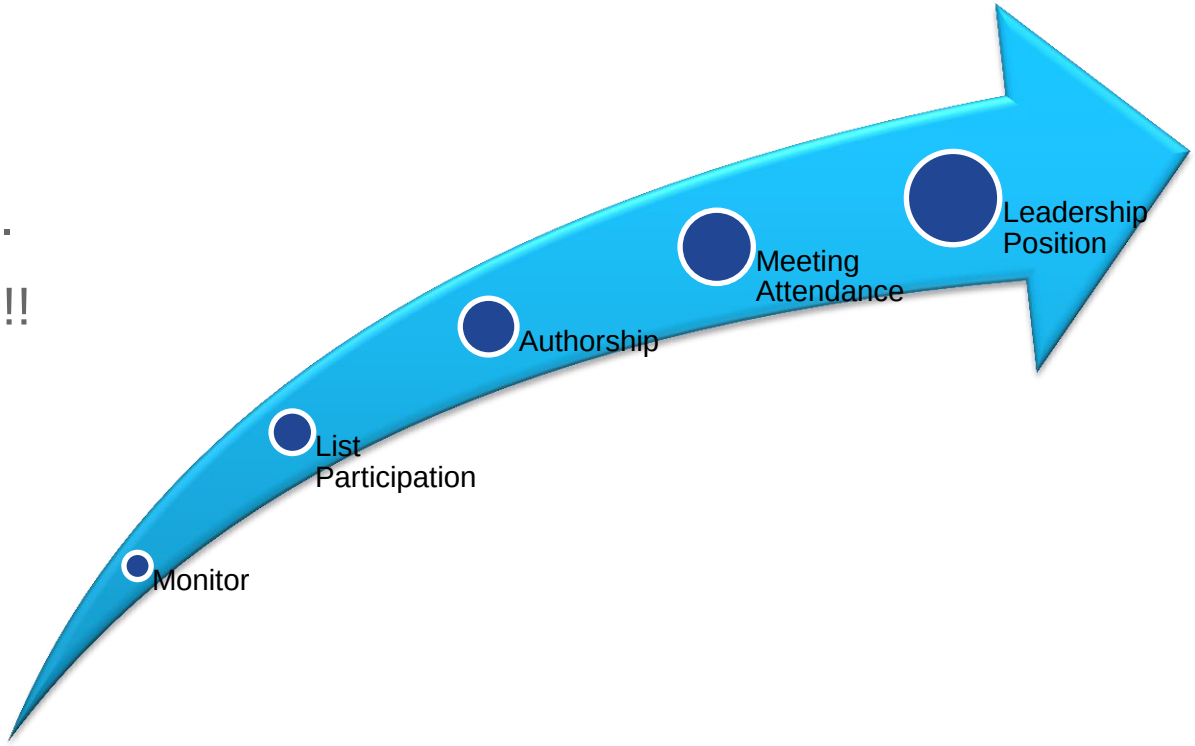
Current Research Groups

These 9 Research Groups are currently chartered:

- **CFRG** *Crypto Forum Research Group*
- **DTNRG** *Delay-Tolerant Networking Research Group*
- **GAIA** *Global Access to the Internet for All Research Group*
- **ICCRG** *Internet Congestion Control Research Group*
- **ICNRG** *Information-Centric Networking Research Group*
- **NFVRG** *Network Function Virtualization Research Group*
- **NMRG** *Network Management Research Group*
- **NWCRG** *Network Coding Research Group*
- **SDNRG** *Software-Defined Networking Research Group*

How to Participate in the IETF?

- Join a mailing list..
- ..start contributing!!



TOMORROW starts here.