IETF Structure and Internet Standards Process

Scott Bradner

91st IETF
Honolulu, Hawaii, USA

1

Agenda

- IETF history & overview
- IETF Purpose
- how work gets done
- IETF role & scope
- IETF structure & associated groups
- IETF management & selection
- IETF process & procedure
- a working group session
- intellectual property rights (IPR)

2

The IETF

- Internet Engineering Task Force
- formed in 1986
  - expansion of US ARPANET-related government activities
    - Internet Configuration Control Board (ICCB) (1979) and Internet Activities Board (1983)
- was not considered important for a long time - good!!
- not "government approved" (US or other) - great!!
  - although funding support from U.S. Government until 1997
- people not companies

"We reject kings, presidents and voting. We believe in rough consensus and running code"

Dave Clark (1992)

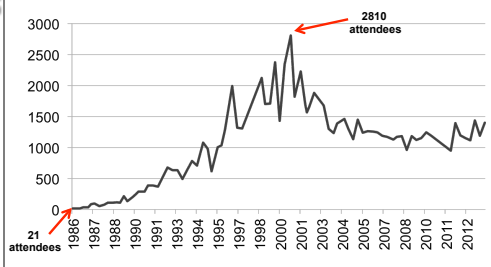
3

IETF Overview

- Internet Standards R Us
  - most Internet-related standards were developed by, or are maintained by, the IETF
    - not including physical network or page display standards
- does not exist (in a legal sense), no members, no voting
  - The IETF is "*an organized activity of the Internet Society*"
- 1K to 1.5K people at 3/year meetings
  - many, many more on mail lists

4

IETF Meeting Attendance



5

IETF Purpose

- develop and maintain standards for technologies used to provide Internet service or to provide services over the Internet
- ensure that the technology can perform needed functions
- ensure that the technology will support the proper scale of deployment and usage
- ensure that the technology itself is secure and can be operated securely
- ensure that the technology is manageable
- IETF produces standards and other documents

6

IETF "Standards"

- IETF standards: not 'because we say so' standards
- they are standards only if people use them
  - formal SDOs can create legally mandated standards
- IETF standards are published in "RFCs"
- no formal recognition for IETF standards
  - by governments or "approved" standards organization
    - but some government standards refer to IETF standards
  - lack of formal government input "a problem"
    - at least to some governments
- no submitting to "traditional" standards bodies

IETF

7

IETF Work Team

- 129ish Working Groups
- Working Group Chairs: manage working group
- Document Editors: edit individual documents
- 8 Areas, each with Area Directors (ADs)
  - APS, GEN, INT, O&M, RAI, RTG, SEC, TSV
  - IETF Chair: AD for General Area, chief spokesperson
- Internet Engineering Steering Group (IESG): technical review, process management (ADs + IETF Chair)
- Internet Architecture Board (IAB): architectural guidance & liaisons

IETF

8

Area Directors

- Areas have 2 ADs
  - except General Area, which has one
- responsible for setting direction in Area
- responsible for managing process in Area
  - approve BOFs & propose working groups
  - ensure working groups follow proper process
  - have authority to change working group management
    - generally with IESG consultation
- review working group documents prior to IESG review

IETF

9

IESG

- Internet Engineering Steering Group
- ADs + IETF Chair (15 members)
- multi-disciplinary technical review group
- provides cross-area pre-publication technical review of IETF RFCs
- approves publication of IETF documents
  - reviews and comments on non-IETF RFC submissions
- manages IETF process
- approves WG creation (with IAB & community advice)
- part of appeal chain

IETF

10

How the IETF Work Gets Done

- generally, IETF technology development is done in Working Groups
  - but can be an individual effort
- proposal published as a working document
  - "Internet Draft"
- working document revised & republished based on discussion
- working document submitted to IESG via AD
- AD performs technical and process review of document
  - returns document with comments if AD finds issues

IETF

11

How the IETF Work Gets Done, contd.

- when AD satisfied, the IESG issues IETF-wide "Last Call" for comments
- IESG performs interdisciplinary technical review of proposal & reviews Last-Call comments
  - returns document to WG with comments if IESG finds issues
- when IESG satisfied, the document sent to RFC Editor for publication as RFC

IETF

12

Birds of a Feather Sessions (BOF)

- often precedes the formation of a Working Group
- group of people interested in a topic convince an AD that they have a good idea - one worth exploring & that there are enough interested people to do the work
- need description and agenda before a BOF can be scheduled
  - and sometimes a draft charter for a working group
- BOFs generally only meet once
- can lead to a WG or can be a one-time thing

13

Working Groups

- this is where the IETF primarily get its work done
  - most discussions on a WG mailing list
  - face-to-face meetings focused on key issues (ideally)
    - note: face-to-face meetings generally quite short
- "bottoms up"
  - i.e., generally proposed by IETF participants, not ADs, IESG or IETF Chair
    - makes it hard for the IETF leadership to commit the IETF to do something
- often preceded by a BOF

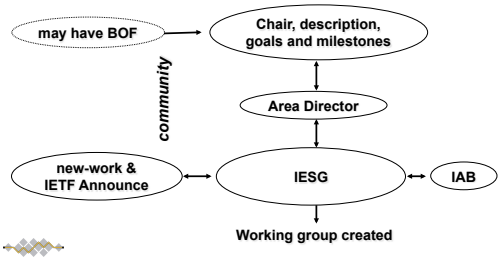
14

Working Groups, contd.

- Working Groups are focused by charters agreed between WG chair(s) and area director
  - restrictive charters with milestones
- charter approved by IESG with IAB advice
  - after public announcement for comments
  - announcement goes to other SDOs to check for overlaps
- IESG has final say on charter
- working groups are closed when their work is done
  - at least in theory

15

Working Group Creation



16

A Working Group Session

- WGs only meet for a few hours at an IETF meeting
  - most working group work is done on the WG mailing list
  - often only specific unresolved issues are discussed at meetings
  - so read the IDs and mailing list before the session
  - advice: listen (and read) before speaking
- sessions are being streamed & recorded
  - so speak directly into the mike (don't look at the questioner)
  - say your name - every time you get to the mike
    - for the people in audio-land & for the scribe(s)
- sign the "blue sheets"
  - record of who is in the room - required for openness
  - scanned & posted - original not retained

17

Rough Consensus

- no defined IETF membership - just "participants"
- "***Rough consensus*** *and running code...*"
- does **not** require unanimity
  - But should ensure that everyone has their say
- no formal voting (can not define the constituency)
  - can do show of hands or hum - but no count
- disputes resolved by discussion
  - on mailing list and in face-to-face meetings
- final decisions must be verified on mailing list
  - to ensure those not present at face-to-face are included
    - but taking into account face-to-face discussion

18

IETF Documents

all IETF documents are open
- i.e., anyone can download and make copies (in full)

Internet Draft
- IETF working documents
- some I-Ds are working group documents

RFC
- archival publications (never changed once published)
  - update or correction gets new RFC number

19

IETF Document Format

English is the official language of the IETF
- but blanket permission is given to translate any IETF document (in total) into any language for any reason

ASCII is the mailing list and general document format

Moving to a XML-based authoritative format for documents
- will still produce pure-text versions

note that the current format is still readable after 44 years (see RFC 20 for an example)
- how many other SDOs can claim that?

20

Internet-Draft

IETF working documents

random or non-random thoughts

input to the process

no admissions control other than boilerplate (see IPR)

removed from the main IETF Internet Drafts directory after 6 months or upon replacement

all RFCs must pre-exist as IDs
- to deal with IPR handoff, etc.
  - (other than some IANA or RFC Editor created ones)

21

Internet Draft (ID) Naming

ID filename used to classify Internet Drafts

all ID filenames start with "draft-"

individual IDs continue with the last name of the lead author/editor and, often, the name of the working group the ID is targeted at

Working Group IDs continue with "ietf-WGNAME"

filename continues with subject

filename continues with version number
- initial version "00"

filename ends with ".txt" extension

22

Internet Draft (ID) Naming, contd.

examples:

draft-ietf-idr-bgp4-26.txt
- 26th revision of the BGPv4 specification
- a product of the Interdomain Routing Working Group

draft-bradner-rfc3979bis-06.txt
- 6th revision of my proposed update to RFC 3979
- not a working group document

draft-iab-rfcformatreq-03.txt
- 3rd revision of an IAB document on requirements for the formats of RFCs

23

What is a RFC?

IETF document publication series

RFC used to stand for "Request for Comments"
- now just a (brand) name
- now tend to be more formal documents than early RFCs

RFC 1 *Host Software* - Apr 7 1969

now over 7000 RFCs

not all RFCs are standards!
- see RFC 1796
- though some vendors sometimes imply otherwise

many types of RFCs

24

RFC Repository Contains:

- standards track
  - OSPF, IPv6, IPsec ...
- obsolete Standards
  - RIPv1
- requirements
  - Host Requirements
- policies
  - Classless InterDomain Routing
- April Fool's Day jokes
  - IP on Avian Carriers
  - ... updated for QoS
- poetry
  - 'Twas the night before startup
- white papers
  - On packet switches with infinite storage
- corporate documentation
  - Ascend multilink protocol
- experimental history
  - NetBlt
- process documents
  - IETF Standards Process

IETF

25

Standards Track RFCs:

Best C… Practices (**BCP**)
policies … edures (best way we k… w)
3-stage standar… k (not all th… ollowed)
Proposed Standar…
good idea, no known p…
Draft Standard (**DS**)
PS + stable
multiple int… ble implementati… ove document clarity
not … **operability** not conformance
… t Standard (**STD**)
… S + wide use

IETF

26

Standards Track RFCs:

Best Current Practices (**BCP**)
policies or procedures (best way we know how)
2-stage standards track (changed 2011 - RFC 6410)
Proposed Standard (**PS**)
good idea, no known problems
Internet Standard (**STD**)
PS + stable + "benefit to Internet community"
multiple interoperable implementations to prove document clarity
note: interoperability, not conformance

IETF

27

Other RFC Types

Informational
Experimental
Historical

always check the current status of an RFC before relying on it. A new RFC may have obsoleted or updated the one you are looking at, or it may have been reclassified as Historical

you can find out by looking at the RFC index

remember that RFCs are not changed after publication - so no status change notice put in RFC

IETF

28

RFC Editor

IETF publication arm
was one person, then one small team
now multiple parts
oversight (RFC Series Editor - RSE)
editing (RFC Production) - done by AMS
publishing (RFC Publisher) - done by AMS
independent submissions (Independent Submissions Editor - ISE)
RSE & ISE selected & appointed by IAB

IETF

29

RFC Production & Publishing

receives requests to publish IDs from multiple streams
IETF (via IESG)
IRTF (via IRSG)
IAB
Independent Submissions (via ISE)
edits IDs for publication
verify edits with authors
publishes RFCs

IETF

30

Independent Submissions Editor

ISE gets requests to publish IDs

- can only publish informational or experimental RFCs

asks IESG for advice

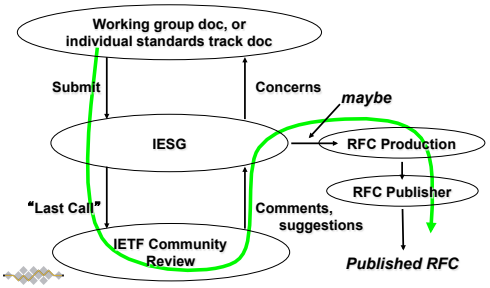
- but can exercise own discretion to publish or not

presumption is to publish technically competent and useful IDs

- which sometimes is a conflict with IESG

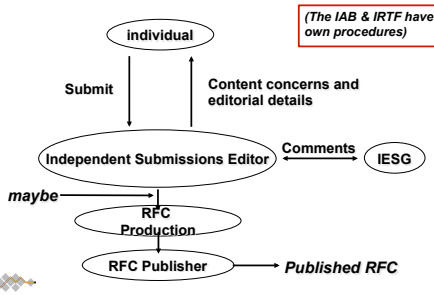
31

IETF Submissions



32

Non-IETF Submissions



33

The Role & Scope of the IETF

'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, ...

but wires are getting fuzzy

- MPLS, GMPLS, pwe3, VPN, ...

generally hard to clearly define IETF scope

- IETF is constantly exploring the edges
  - e.g. (IP) telephony

34

Scope of Other SDOs

the Internet (& the Internet protocols) are very interesting to other standards development organizations (SDO)

- Internet is becoming the underpinnings of the entire world telecommunications business

other SDOs trying "fix" or "extend" IETF protocols

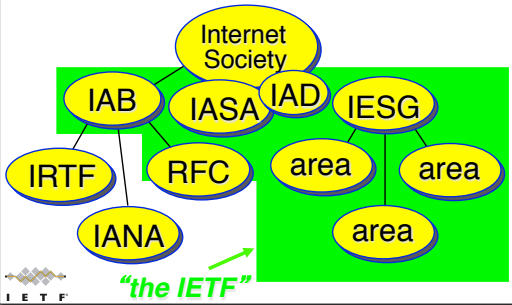
- they may be trying to solve a different problem
  - or are making different assumptions
- problem: what happens when these extensions break underlying protocol assumptions or make non-interoperable versions?

SDO (including IETF) assumption: each SDO modifies its own protocols

- but, see dispute with ITU-T over MPLS for transport

35

Top Level View of IETF Organization



36

The Internet Society (ISOC)

- non-profit, non-governmental, independent, international organization
  - more than 153 organizational members, more than 66,000 individual members & over 107 chapters in 72 countries
- formed 1992 to:
  - provide legal umbrella over IETF
  - continue Landweber developing country workshops
- mission:
  - *"To promote the open development, evolution, and use of the Internet for the benefit of all people throughout the world."*

join at www.isoc.org

37

ISOC, contd.

- IETF agreed to come under ISOC legal umbrella in 1996
  - after a (long) open working-group-based discussion
- ISOC is now the organizational and administrative home for IETF (as of 2005)
  - legal umbrella, insurance, IASA home, IAD employer, etc.
  - ISOC Board of Trustees part of appeal chain
  - ISOC President appoints chair of nomcom
  - IAB chartered by ISOC
  - ISOC President is on the IAB list & calls
- IETF (through IAB) appoints 4 ISOC trustees

38

Internet Research Task Force (IRTF)

- focused on long term problems in Internet
  - Crypto Forum Research Group (CFRG)
  - Delay-Tolerant Networking Research Group (DTNRG)
  - Global Access to the Internet for All Research Group (GAIA)
  - Internet Congestion Control Research Group (ICCRG)*
  - Information Centric Networking Research Group (ICNRG)
  - Network Coding Research Group (NWCRG)*
  - Network Management Research Group (NMRG)
  - Software-Defined Network Research Group (SDNRG)*
  - Plus two proposed research groups

* Meeting this week

39

Internet Architecture Board (IAB)

- provides overall architectural advice & oversight
  - to IESG, IETF, IRTF & ISOC
- deals with IETF external liaisons
- appoints IRTF chair
- selects & oversees IETF-IANA
- appoints & oversees RFC Editor
- chartered by & advises the ISOC Board
- approves IESG slate from nomcom
- step in appeals chain

40

IAB , contd.

- provide input to IESG on WG formation & charters
- sponsor & organize IRTF
- convene topic-specific workshops
  - mostly invitation only
- write IDs/RFCs stating IAB opinion
  - with community & IESG review
- participate in WG discussions
- IAB activities organized in "programs"
  - IAB members plus others to ensure continuity
  - http://www.iab.org/activities/programs/

41

IANA

- Internet Assigned Number Authority
- need to record parameters in IETF protocols
- assigns numbers and keeps them from colliding
  - assigns protocol numbers (ports, MIME types, etc)
  - IP addresses
    - assigns address blocks to 5 regional IP Address registries
      - which assign addresses to ISPs and end sites
  - domain names
    - defines top level domains (TLDs) - e.g., .com, .ca, .us, ...
    - maintains root server database of TLD server addresses
- the IANA predates the IETF

42

IANA, contd.

Internet Drafts need to include a "IANA Considerations" section
- section tells the IANA what assignment actions are needed if ID is to be published as a RFC
- can say "no IANA actions required"
- see RFC 5226 for details

IANA reviews IDs during IESG consideration phase to see if any IANA actions required prior to publication

43

IETF Management

IETF management are all volunteers

AD job: half to 3/4 time

IAB job: 1/3 time

IETF Chair job: full time

IETF does not pay ADs, IAB members, IAOC members, WG chairs or IETF Chair a salary or expenses
- people are company- or self- supported
- secretariat, RFC publication support & IAD are paid

44

IETF Secretariat

Association Management Solutions, LLC - Fremont, CA, USA
- managed by IETF Administrative Support Activity (IASA)

runs
- plenary meetings, mailing lists,
- Internet-Draft & directory, IESG teleconferences, REF editing & publication

coordinates
- day to day work of IESG

AMS

45

IETF Administrative Support Activity (IASA)

provides the administrative structure required to support the IETF standards process: see RFCs 4071 & 4371

has no authority over the standards process

housed within the Internet Society

Internet Society

- creates budget for IETF
  - money from meeting fees, meeting-related sponsors & from ISOC
- responsible for IETF finances
- contracts for IETF support functions
  - Secretariat functions, RFC evaluation and publication & IETF-IANA
- deals with IETF IPR

46

IASA, contd.

includes:

IETF Administrative Director (**IAD**) - Ray Pelletier
- ISOC employee
- day to day operations oversight

IETF Administrative Oversight Committee (**IAOC**)
- 8-member body
- IAB & IETF chairs & ISOC president
- plus
- members selected by nomcom (2), IAB, IESG & ISOC

47

IETF Trust

created in Dec 2005 to hold IETF IPR
- copyrights (on RFCs etc)
- domain names (e.g., ietf.org)
- trademarks
- software paid for by IETF
- databases
- etc

IPR created under the secretariat contract goes to Trust

The IETF Trust is not a patent pool

Legal Provisions Relating to IETF Documents

http://trustee.ietf.org/license-info/IETF-TLP-4.htm

48

Selecting IETF Management

- picked by a nominations committee (nomcom)
  - nomcom chair appointed by ISOC president
  - process described in RFC 3777
- members selected randomly from list of **volunteers**
  - requirement: present at 3 of last 5 IETF meetings
  - *very* random process to select from volunteers: RFC 3797
- gets list of jobs to fill
  - can include IETF Chair, IESG, IAB & IAOC members
- nominate one person for each job
  - IAOC selections approved by IESG, IESG & IETF Chair selections approved by IAB, IAB selections approved by ISOC BoT

49

Dots

- IAB member (red)
- IESG member (yellow)
- Working Group chair (blue)
- nomcom (orange)
- Local host (green)
- IAOC member (purple)
- IRSG member

IETFer specifically happy to help

50

Appeals Process

- IETF decisions can be appealed
  - start level above decision being appealed
- 1st to the WG chair(s)
- only then to the Area Director
- only then to the IESG
- only then to the IAB
- if claim is that **the process** itself is broken, (not that the process was not followed)
  - then an appeal can be made to the ISOC Board (after the above is complete)
- it is OK to appeal decisions – people do (& succeed)
  - but appeals are not quick
  - starting "low" is the right thing to do

51

Intellectual Property Rights

- IPR is a very big issue in standards bodies
- two areas:
  - copyright in documents
  - patents covering standards technology

52

IPR (Copyright)

- ID author(s) need to give non-exclusive publication rights to IETF Trust if to be published at all
- also (normally) the right to make derivative works
  - this right required for standards track documents
- author(s) **retain** all other rights

- Rules described in RFC 5378
- IETF Trust released a FAQ on IETF copyright
  - see http://trustee.ietf.org/faqs.html

53

IPR (Patents)

- IETF IPR (patent) rules (in RFC 3979)
  - require timely **disclosure** of your own IPR in your own submissions & submissions of others
    - disclosures published on IETF web site
  - "**reasonably and personally**" known to the WG participant - i.e., no patent search required
- **WG** may take IPR into account when choosing solution
  - RFC 3669 gives background and guidance
- push from open source people for RF-only process
  - consensus to not change to mandatory RF-only
    - but many WGs **tend** to want RF or IPR-free
    - (or at least assumed to be IPR-free)
      - update in the works

54

Note Well

The "Note Well" statement shows up a lot at the IETF.
Mailing lists, registration, meeting openings, etc.

defines "contribution" and requires obeying IETF rules

In effect, **a "contribution" is anything you say or write with the intent to effect the IETF standards process**

if you make a contribution that includes or relates to your IPR you must disclose that fact

Note Well note is undergoing revision – big discussion on IETF discussion mailing list

55

IETF Mentoring Program

match experienced IETF participants with newcomers

to aid newcomer integration into the IETF community through advice, help, and collected wisdom

for more information or to request a mentor see:

http://www.ietf.org/resources/mentoring-program.html

56

Other IETF Training/Tutorials

1300 – 1450 Newcomer's Orientation ← you are here

1300 – 1450 Introduction to the Security Area

1500 – 1650 YANG Advice and Editing Session

1500 – 1650 Presentation Skills

1600 – 1700 Newcomer's Meet and Greet
newcomers, WG chairs & ADs

1700 – 1900 Welcome Reception
(talking to IETF people is often quite an education!)

57

Newcomer's Dinner

informal dinner for newcomer's to chat about their experience

meet at the IETF registration desk at 8 PM Monday

walk to nearby reasonably priced restaurant

please email Maddy Conner (mconner@amsl.com) if you would like to attend or for more information

58

What next?

join mailing lists
this is where the work happens
but read (and understand) before writing
read the drafts & contribute
don't be shy (but do not come on too strong)
talk with (not just to) people
treat everyone with respect, even if you disagree
look for common ground
don't settle for second-rate discussion or technology

59

Questions?

60