IETF Structure and Internet Standards Process

Scott Bradner

94th IETF
Yokohama, Japan
Agenda

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

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

Dave Clark (1992)
People not Companies

IETF attendees are judged for themselves not by the company they work for or the organization they represent. The power of a technical argument is what determines the reception of an idea. Does not help to have many different companies represented on a document or proposal. Representatives from other SDOs are seen as people with specific knowledge of the work of the SDO (at least in an area) but they do not get more consideration that anyone else with a proposal.
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
IETF Meeting Attendance

2810 attendees

21 attendees
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

guarantee 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
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 Work Team

136ish “active” Working Groups
Working Group Chairs: manage working group
Document Editors: edit individual documents
7 Areas, each with Area Directors (ADs)
   ART, GEN, INT, O&M, 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 Areas

ART  Applications and Real-Time: 42 WGs
GEN  General: 1 WG
INT  Internet: 19 WGs
O&M Operations and Management: 16 WGs
RTG  Routing: 24 WGs
SEC  Security: 19 WGs
TSV  Transport: 15 WGs
Area Directors

technical Areas have 2 or 3 ADs
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
IESG

Internet Engineering Steering Group
ADs + IETF Chair
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
How the IETF Work Gets Done

generally, IETF technology development is done in Working Groups
   but can be an individual effort
proposals are published as working documents
   “Internet Draft”
working document revised & republished based on discussion
working document submitted to AD for IESG review
AD performs technical and process review of document
   returns document with comments if AD finds issues
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 is satisfied, the document is sent to RFC Editor for publication as RFC
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
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
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
Working Group Creation

- **may have BOF**
- **Chair, description, goals and milestones**
- **Area Director**
- **IESG**
- **IAB**

- **new-work & IETF Announce**
- **Working group created**

The diagram illustrates the process of working group creation within the IETF community, involving the IESG, IAB, and other key stakeholders.
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
This Week

123 sessions
  108 unique sessions
  1 BOF
  10 IRTF sessions

Operations, Administration, and Technical Plenary – Wed 1530-183

Bits-n-Bites – Th 1900-2100
  Technology on display - lubricated by nibbles & drinks
This Week, BOFs

iss

Internet Storage Sync
This Week, Area Meetings

- opsarea: Operations and Management Area Open Meeting
- rtgarea: Routing Area Open Meeting
- saag: Security Area Open Meeting
- Irtfopen: IRTF Open Meeting
Rough Consensus

no defined IETF membership - just “participants”

“Rough consensus and running code...”

does not require unanimity

chairs 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
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
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 produce pure-text & pdf 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?
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)
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
Internet Draft (ID) Naming, contd.

examples:

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

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

draft-iab-rfcformatreq-03.txt
  3\textsuperscript{rd} revision of an IAB document on requirements for the
  formats of RFCs
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
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
  - NetBIOS
- process documents
  - IETF Standards Process
Standards Track RFCs:

Best Current Practices (BCP)
  policies or procedures (best way we know how)

3-stage standards track (not all that well followed)
  Proposed Standard (PS)
    good idea, no known problems
  Draft Standard (DS)
    PS + stable
    multiple interoperable implementations to prove document clarity
  note: interoperability not conformance

Internet Standard (STD)
  DS + wide use
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
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 can be put into a RFC
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
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
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
IETF Submissions

Working group doc, or
individual standards track doc

Submit

Concerns

"Last Call"

IESG

RFC Production

RFC Publisher

Comments, suggestions

IETF Community Review

Published RFC

maybe
Non-IETF Submissions

(The IAB & IRTF have their own procedures)
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
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
Top Level View of IETF Organization

- IAB
- IASA
- IAD
- IESG
- IANA
- RFC
- IRTF
- Internet Society
- "the IETF"
The Internet Society (ISOC)

non-profit, non-governmental, independent, international organization
more than 133 organizational members, more than 71,000 individual members & 108 chapters in 92 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
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
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 (ICNRC)*
Network Function Virtualization Research Group (NFVRG)*
Network Management Research Group (NMRG)*
Network Coding Research Group (NWCRG)
Software-Defined Network Research Group (SDNRG)*
proposed Thing-to-Thing Research Group (t2trg)*
proposed Human Rights Protocol Considerations Research Group*
proposed Network Machine Learning Research Group*
proposed How Ossified is the Protocol Stack? Research Group*

*Meeting this week
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
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 9 “programs”
    IAB members plus others to ensure continuity
http://www.iab.org/activities/programs/
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
currently preformed by ICANN under a MoU
In flux
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
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
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
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

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
IAASA, 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
  members selected by nomcom (2), IAB (1), IESG (1) & ISOC (1)
IETF Trust

created in Dec 2005 to hold IETF-related IPR
  copyrights (on RFCs etc)
  domain names (e.g., ietf.org, rfc-editor.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
Selecting IETF Management

picked by a nominations committee (nomcom)
  nomcom chair appointed by ISOC president
  process described in RFC 7437
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
Dots

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

👏 IETFer specifically happy to help
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 a further appeal can be made to the ISOC Board

it is OK to appeal decisions – people do (& succeed)
but appeals are not quick
starting “low” is the right thing to do
Intellectual Property Rights

IPR is a very big issue in standards bodies

two areas:

  - copyright in documents
  - patents covering standards technology
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 is required for standards track documents. Author(s) retain all other rights.

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
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.
More Information

See the *Info for Newcomers* section on the IETF website
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
Other IETF Training/Tutorials

1300 – 1450 Newcomer’s Orientation
1300 – 1450 Newcomer’s Orientation in Japanese
1300 – 1450 Tools for Creating IDs and RFCs
1300 – 1700 YANG Tutorial, Advice and Editing Session
1500 – 1600 Internet Area Overview
1500 – 1650 PRECIS and i18n
1600 – 1700 Newcomer's Meet and Greet
1700 – 1900 Welcome Reception

(talking to IETF people is often quite an education!)
Newcomer’s Dinner

informal dinner for newcomer’s to chat about their experience

meet at the IETF registration desk at 8:00 PM Monday

walk to nearby reasonably priced restaurant

please email Naveen Khan (nkhan@amsl.com) if you would like to attend or for more information
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
Questions?