



# IETF Structure and Internet Standards Process

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*93rd IETF*  
Prague, Czech Republic





# 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 than 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

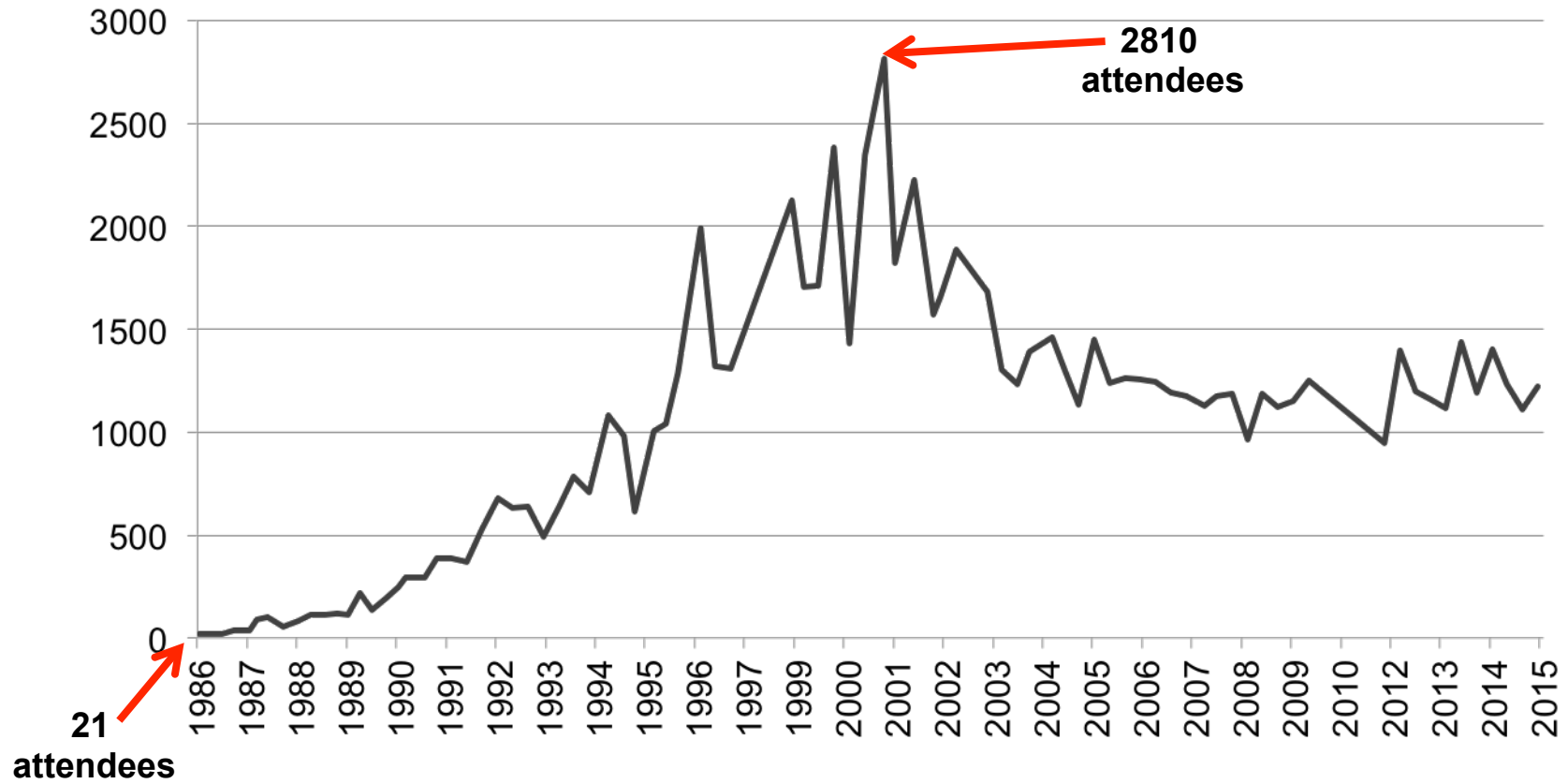
The IETF is “*an organized activity of the Internet Society*”

1K to 1.5K people at 3/year meetings

many, many more on mail lists



# IETF Meeting Attendance





# 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





# 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

128ish “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: 37 WGs

APS & RAI areas were recently merged to create the ART area

GEN General: 1 WG

INT Internet: 20 WGs

O&M Operations and Management: 16 WGs

RTG Routing: 23 WGs

SEC Security: 14 WGs

TSV Transport: 15 WGs







# Area Directors

Areas have 1, 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

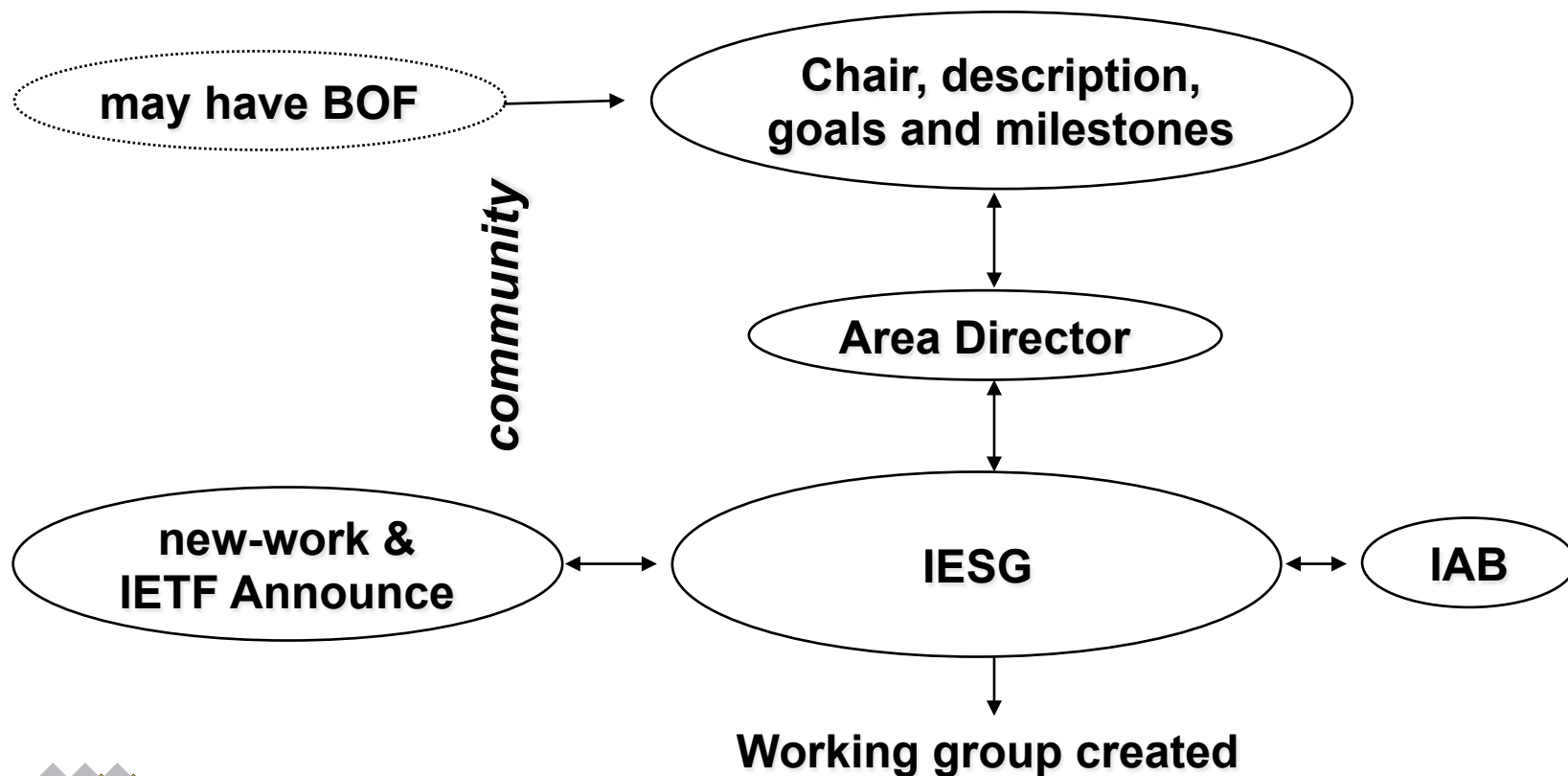
IESG has final say on charter

working groups are closed when their work is done

at least in theory



# Working Group Creation







# 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



I E T F®

scanned & posted - original not retained



# This Week

135 sessions

119 unique sessions

5 BOFs

13 IRTF sessions

Technical Plenary – Tu 900-1130

Operations and Administration Plenary – Th 900-1130

Bits-n-Bites – Th 1900-2100

Technology on display - lubricated by nibbles & drinks





# This Week, BOFs

detnet

Deterministic Networking

edunext

Education and Mentoring Next Generation

i2nsf

Interface to Network Security Functions

capport

CAPTive PORTal interaction

supa

Simplified Use of Policy Abstractions





# This Week, Area Meetings

opsarea	Operations and Management Area Open Meeting
rtgarea	Routing Area Open Meeting
saag	Security Area Open Meeting
tsvarea	Transport 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<sup>th</sup> revision of the BGPv4 specification

a product of the Interdomain Routing Working Group

draft-bradner-rfc3979bis-06.txt

6<sup>th</sup> revision of my proposed update to RFC 3979

not a working group document

draft-iab-rfcformatreq-03.txt

3<sup>rd</sup> 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

Netblt

process documents

IETF Standards Process



I E T F®



# Standards Track RFCs:

## Best Current Practices (**BCP**)

policies and procedures (best way we know how)

3-stage standards track (not all the way followed)

## Proposed Standard (**PS**)

good idea, no known problems

## Draft Standard (**DS**)

PS + stable

multiple implementations, improve document clarity

not **interoperability** not conformance

## Internet Standard (**STD**)

DS + wide use

T F\*



# 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

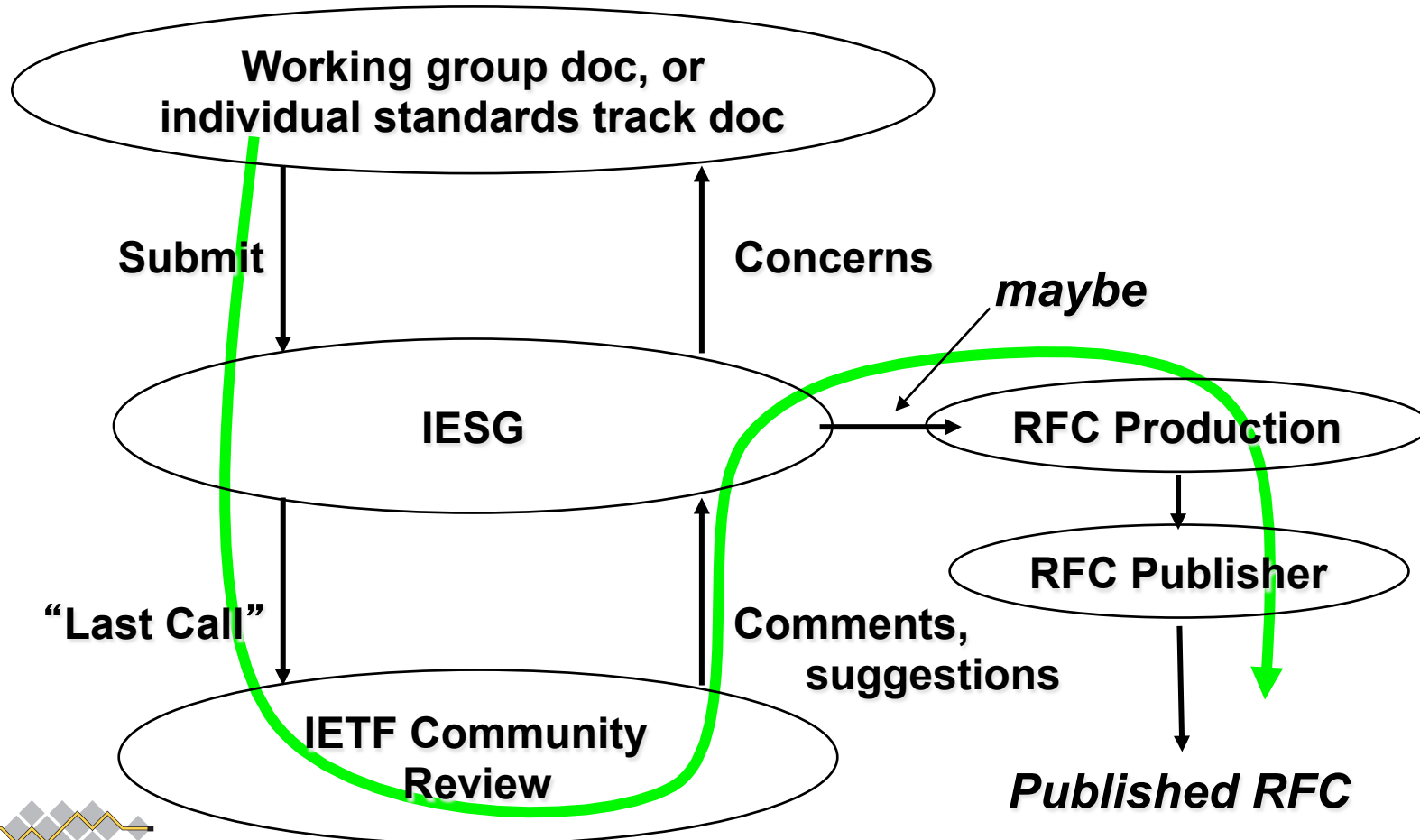
asks IESG for advice

but can exercise own discretion to publish or not

presumption is to publish technically competent and useful IDs

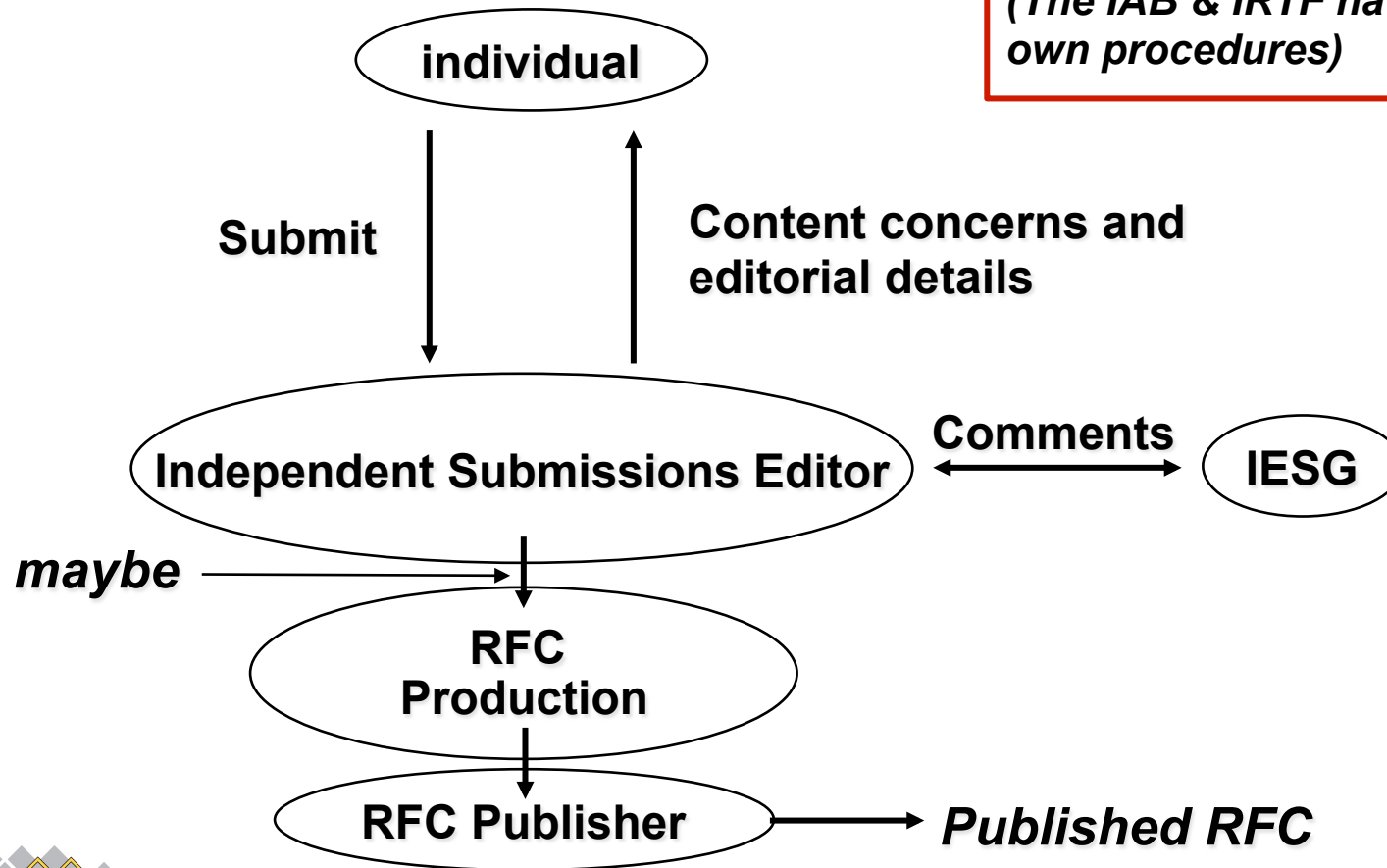
which sometimes is a conflict with IESG

# IETF Submissions



# 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

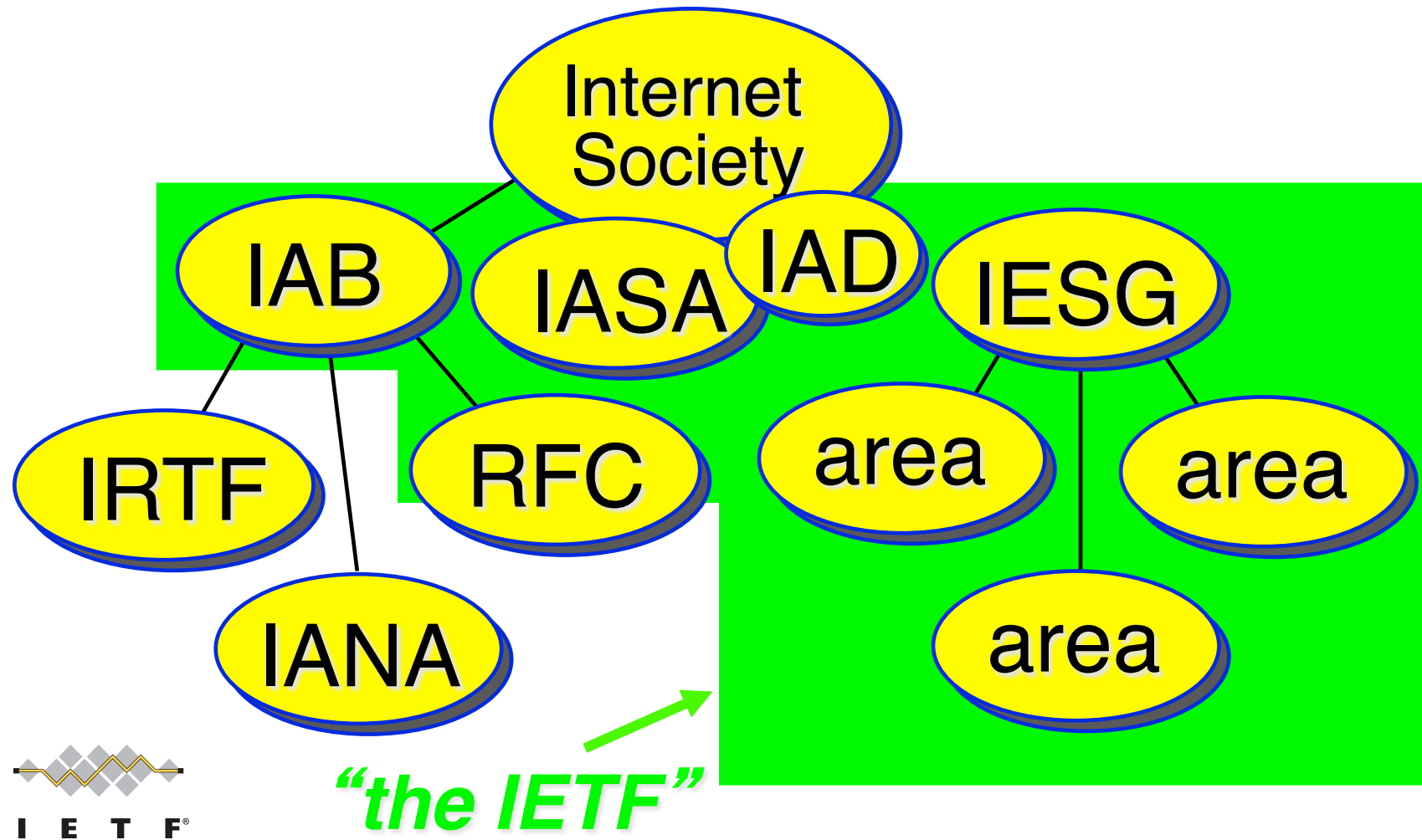
problem: what happens when these extensions break underlying protocol assumptions or make non-interoperable versions?

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



# 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](http://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 (ICNRG)\*

Network Function Virtualization Research Group (NFVRG)\*

Network Management Research Group (NMRG)\*

Network Coding Research Group (NWCRCG)\*

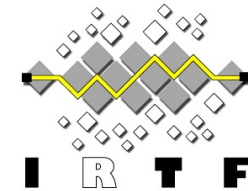
Software-Defined Network Research Group (SDNRG)\*

proposed Thing-to-Thing Research Group (t2trg)\*

proposed Human Rights Protocol Considerations 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





# 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



# 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

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**



# 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





# 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 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>





# 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

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



# 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 ← you are here

1300 – 1450 Document Editing and Shepherding

1400 – 1700 YANG Advice and Editing Session

1500 – 1650 Introduction to Performance Measurements  
and Monitoring

1500 – 1650 Routing Area Overview

1500 – 1700 SDN OpenFlow and ForCES

1600 – 1700 Newcomer's Meet and Greet

1700 – 1900 Welcome Reception



I E T F®

*(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 Maddy Conner ([mconner@amsl.com](mailto:mconner@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?



**I E T F**<sup>®</sup>