
cisco Live!
Let's go

The bridge to possible

Making the Internet a Better Place by Participating in the IETF

Beginner's Guide

Éric Vyncke
Distinguished Engineer
@evyncke

Prapanch Ramamoorthy
Principal Engineer

cisco Live!

BRKGEN-1385

Session Objectives

- Ever wondered how innovation for the Internet works? The IETF is the main place where a community of engineers that come together to share ideas and innovate. It can be daunting to think of developing and writing standards at first but know that this is a journey. Everyone is welcome at the IETF, this is free, and there is something for everyone to do and to learn.
- The presentation will be a unique and fun conversation between a veteran and a newcomer at the IETF to provide attendees with varied perspectives.
- Come to this session to learn about the IETF, the kind of work that happens there and how you can get started with your journey at the IETF.

The “Veteran”: Éric Vyncke

- Lives in Belgium
  - IPv6 leading country for many years
- Member of Cisco Global Technology Standards team
- Loves SW engineering
- Motto: Open, secure, and end-to-end Internet

- ~ 1984 first RFC read RFC 791 (IP)
- 1988: first IP packet sent
- 1997: joined Cisco
- 2000: first IETF-49 meeting in San Diego, CA, USA
- 2003: first RFC 3585 published
- 2015: OPSEC WG chair
- 2019: Internet Area Director
- https://datatracker.ietf.org/person/evyncke@cisco.com

The “Junior”: Prapanch Ramamoorthy

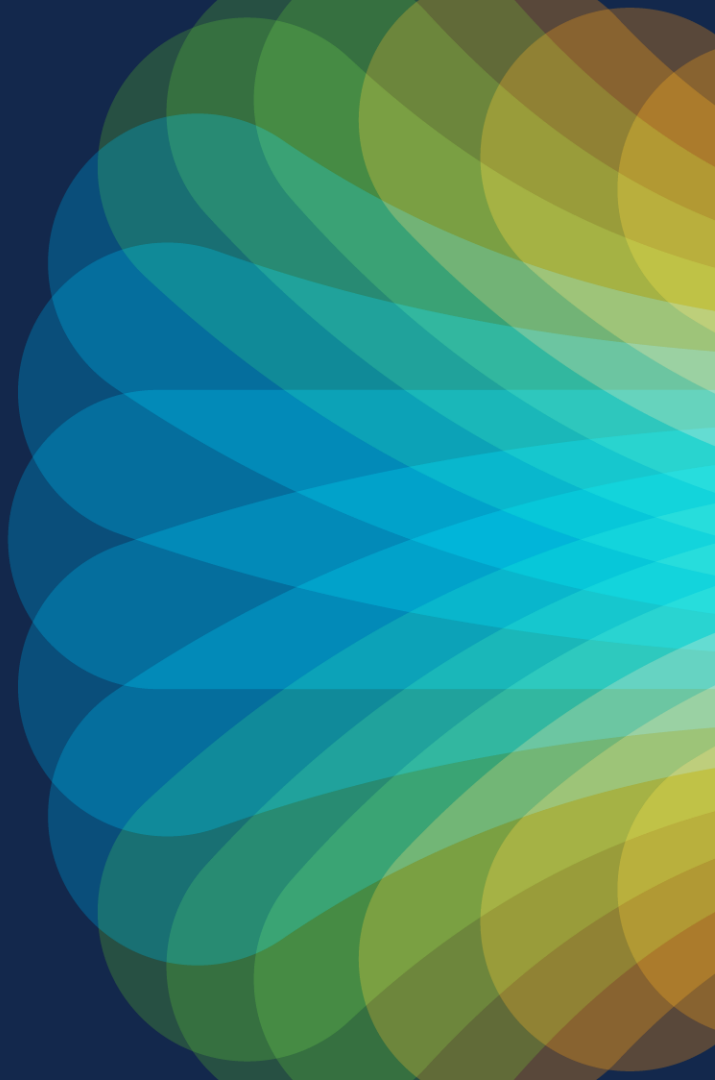
- Principal Engineer in TAC
- 36 years old. 14.5 years experience in Cybersecurity
- Problem Solver, Serviceability architect, Teacher, Innovator
- Husband and father (2 boys)
- Fun fact
  - Love eating and trying out new things
  - Social media phantom

- 2011 – starting reading RFCs
- 2021 – Joined IETF
- 2021 – First IETF Online (112)
- 2022 – Working group participation
- 2023 – Exploring ideas for new work.

Agenda

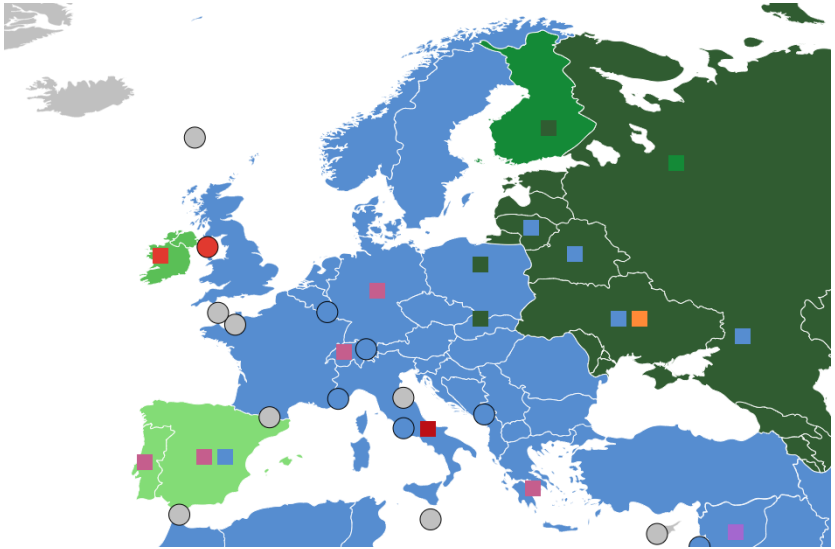
- Where do standards come from ?
- IETF Organizational Structure
- IETF Publication Process
- Some New Work
- Conclusion

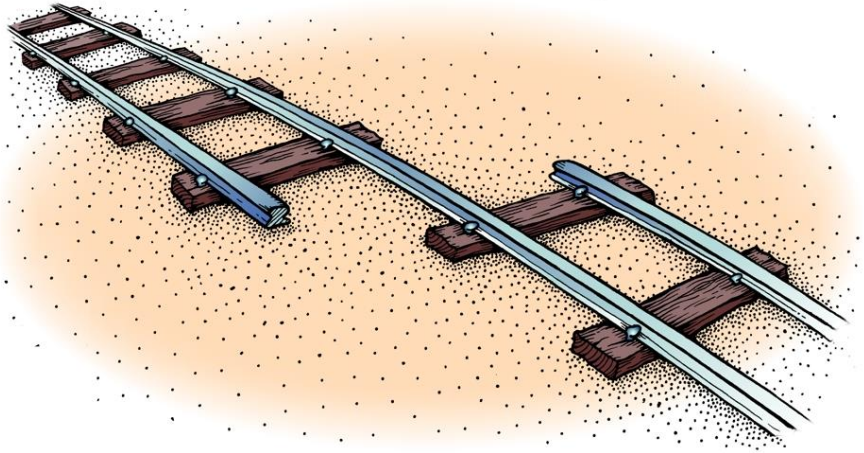
Where do standards come from ?



Without Standards

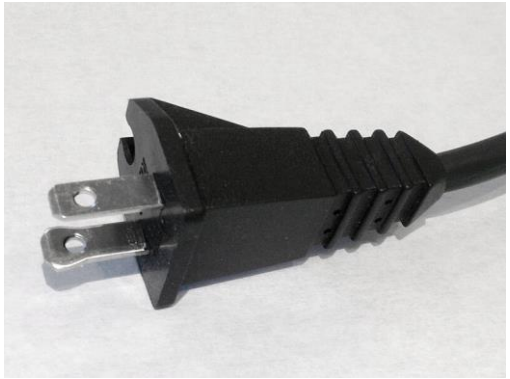
- Different railway track standards





Even for electrical power

Sources: By Ziltro - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=70006773



Sources: Wikimedia https://creativecommons.org/licenses/by-sa/4.0/

20+ Years Ago

Source: John Wright

Different Standard Develoment Organisations (SDOs)

- Open (with enterprise sponsoring)

- Country or region-oriented

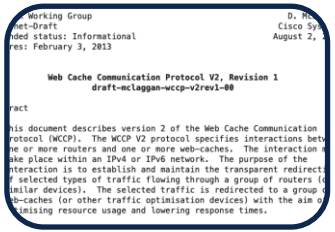
- Vertical Market

IETF vs. Other Standard Development Organizations (SDOs)

- IETF
  - No formal voting
  - Self-selected individual participants;
    No formal government role;
    Market-based adoption
  - Focused on Internet technologies;
  - Bottom-up

- Traditional SDOs
  - Formal voting
  - National members or organizational members – rarely individuals; Sometimes treaty-based; Sometimes legally mandated adoption
  - Wide range of technical, process & physical standards
  - Often top-down

Why did I choose to go after the IETF?



Working Group
Internet-Draft
Intended status: Informational
Expires: February 3, 2013

D. M
Cisco Sy
August 2,

Web Cache Communication Protocol V2, Revision 1
draft-mclaggan-wccp-v2rev1-00

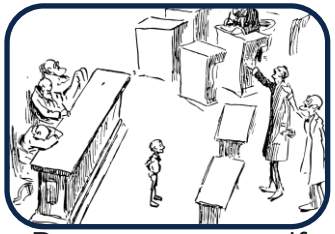
Abstract

This document describes version 2 of the Web Cache Communication Protocol (WCCP). The WCCP V2 protocol specifies interactions betw one or more routers and one or more web-caches. The interaction take place within an IPv4 or IPv6 network. The purpose of the interaction is to establish and maintain the transparent redirect of selected types of traffic flowing through a group of routers (similar devices). The selected traffic is redirected to a group web-caches (or other traffic optimisation devices) with the aim o optimising resource usage and lowering response times.

Exposed to RFCs early on

Personal growth

Learning new things



Represent myself and not employer

Free Membership ☺

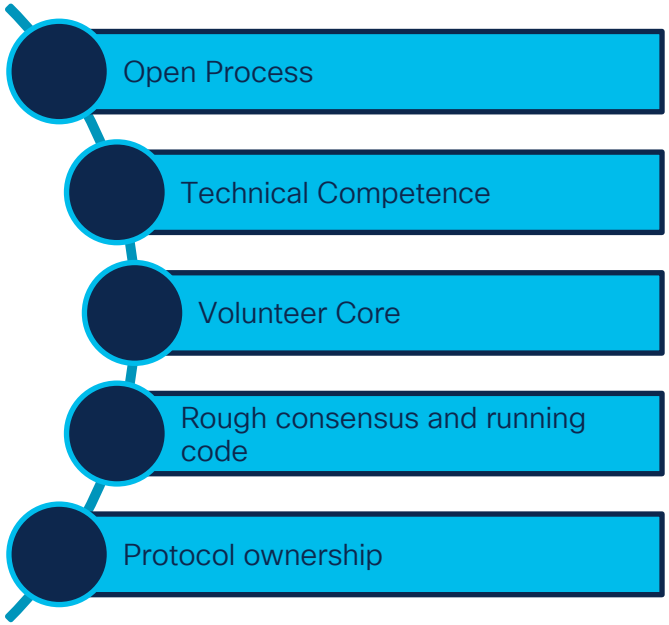
IETF Organizational Structure

IETF Mission

“The mission of the IETF is to make the Internet work better by producing high quality, relevant technical documents that influence the way people design, use, and manage the Internet.”

https://www.ietf.org/about/mission/

Cardinal Principles

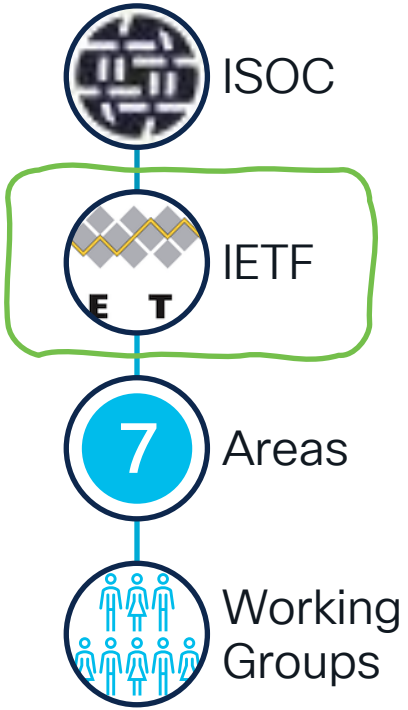


IETF Purpose

- 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

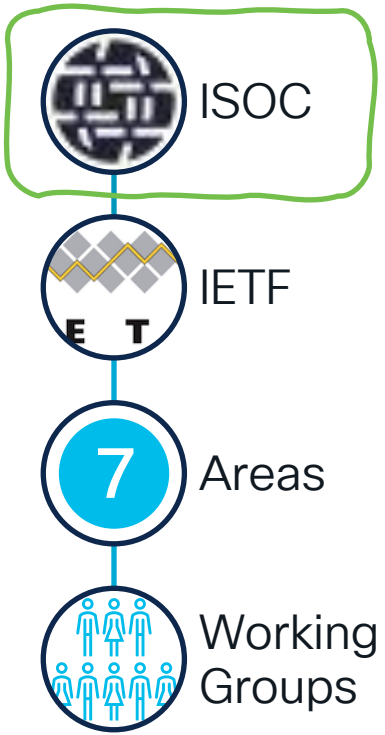
The IETF

- Organized activity of the Internet Society
- A voluntary Standards Development Organization
- Consists of !many! Working Groups (WGs)
  - Organized by Areas of related WG
- Most standards work is done by the Working Groups
- Internet Architecture Board (IAB) is a related organization



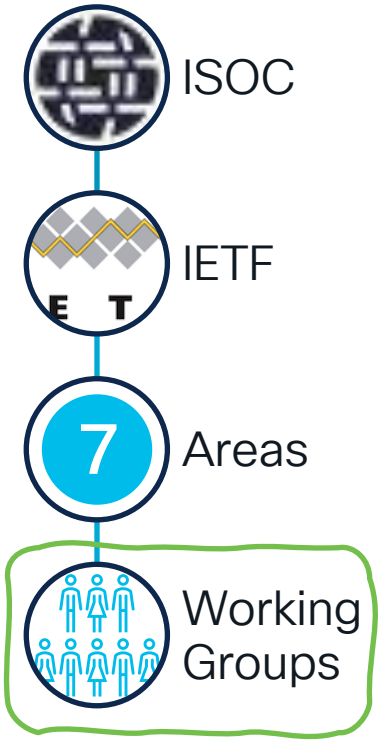
Link between ISOC and IETF

- Home of IETF LLC – administrative entity of IETF
- Financial Contributions
- Appointment of key roles – NomCom chair and IETF IAB candidates
- https://www.rfc-editor.org/rfc/rfc8712.html



Working Group

- Where the main work of the IETF takes place
- Bottom-up formation
  - Generally proposed by IETF participants to meet a perceived need, i.e, bottom-up
  - Often preceded by (usually one) Birds of a Feather session(s)
  - Negotiates a charter with the AD (with advice and consent of IESG and IAB)
- Has an agreed work plan and schedule
- “F2F” or interim meetings ideally focused on key issues
- Lives on between IETF Meetings (ironing details)



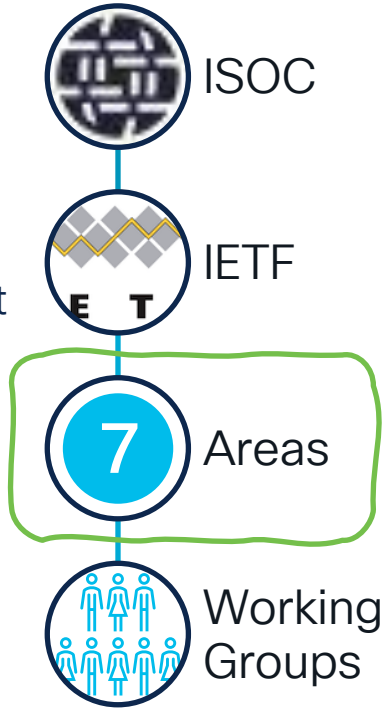
WG Mailing List

- Every WG has one mailing list
  - https://www.ietf.org/mailman/listinfo
  - Archives are always public
  - Subscription is always open and free
- The only ‘official’ media for WG adoption or for ‘last calls’

- GitHub also starts to be used
  - E.g., https://github.com/IETF-OPSAWG-WG
  - “Opening issues in github” vs. “email discussion” ?

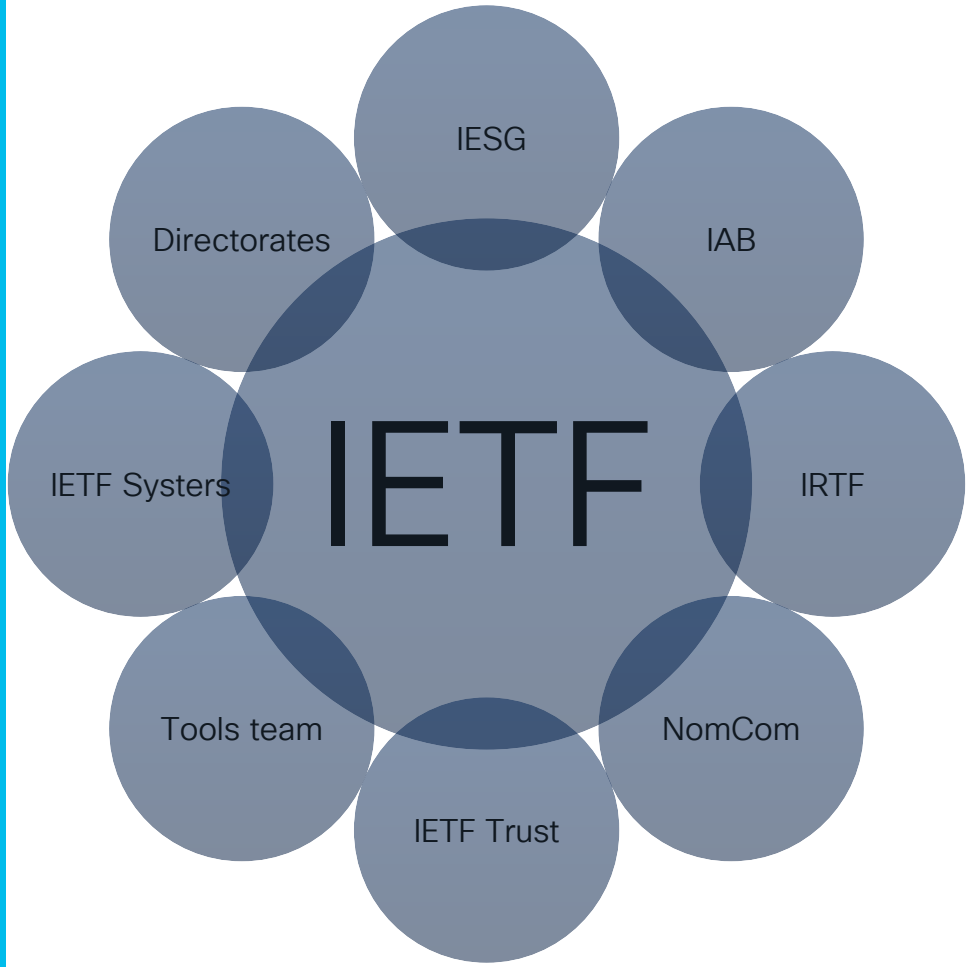
WG are Aggregated into Areas

- 7 areas:
  - GEN: general, AD = IETF chair
  - ART: Application and Real-Time
  - ~~TSV: Transport and services~~ ➔ WIT: Web and Internet Transport
  - INT: Internet
  - RTG: Routing
  - OPS: Operation and Management
  - SEC: Security
- 1, 2 or 3 ‘selected’ Area Directors per area for a 2-year term
- https://www.ietf.org/topics/areas/



Supporting groups

https://www.ietf.org/about/groups/



Acronym Decoder

- Internet Architecture Board (IAB – www.iab.org):
  - long-range technical direction
  - ensuring the Internet continues to grow and evolve
- Internet Engineering Steering Group (IESG):
  - technical management of IETF activities and the Internet standards process.
- IETF Administration LLC: corporate legal home
  - supporting the ongoing operations
  - IETF's finances and budget
- IETF Trust:
  - acquire, hold, and maintain intellectual property and other property

More Acronyms

- Internet Research Task Force (IRTF – www.irtf.org)
  - Focused on long term research topic
  - No Working Groups (WG) but Research Groups (RG)
  - E.g., Information-Centric Networking ICNRG, Quantum Internet QIRG
- Internet Assigned Number Authority (IANA – www.iana.org)
  - Registry for all port numbers, MIME types, ...
- RFC Editor www.rfc-editor.org
  - Last editorial and consistency review of drafts before publication
  - Assign RFC numbers
  - Publish them and maintain errata as RFC are never modified

Feeling a bit dazed and confused?

Imagination vs Reality

- Group of experts who know it all
- Closed group that is not welcoming of newcomers
- I have to do a lot to get up to speed
- Fear of embarrassment – My thoughts and ideas will be laughed at/frowned upon

Imagination vs Reality

- Truly open community – encourages participation from all walks of life
- Something for everyone (Areas, WG, BOFs, individual drafts, etc.)
  - Example of GAIA research group
- Welcoming of ideas from anyone (BOFs, WG presentations)

Global Access to the Internet for All (gaia)

Charter for Research Group

Charter

The Internet Society's Global Internet User Survey 2012 reveals that a large majority of respondents believe that Internet access should be considered a basic human right. However, in the reality of today's Internet, the vision of global access to the Internet faces the challenge of a growing digital divide, i.e., a growing disparity between those with sufficient access to the Internet and those who cannot afford access to the essential services provided by the Internet.

So how did I get started?

Read the getting started @ IETF guide

Research areas and pick 2 of interest (int and sec)

Within the 2, pick WGs of interest – https://datatracker.ietf.org/group/

Pick ones without a lot of history or work already done (scitt)

- Subscribe to mailers, read up on charter, look at timeline and history
- Read any documents/drafts

Attend meetings especially IETF online

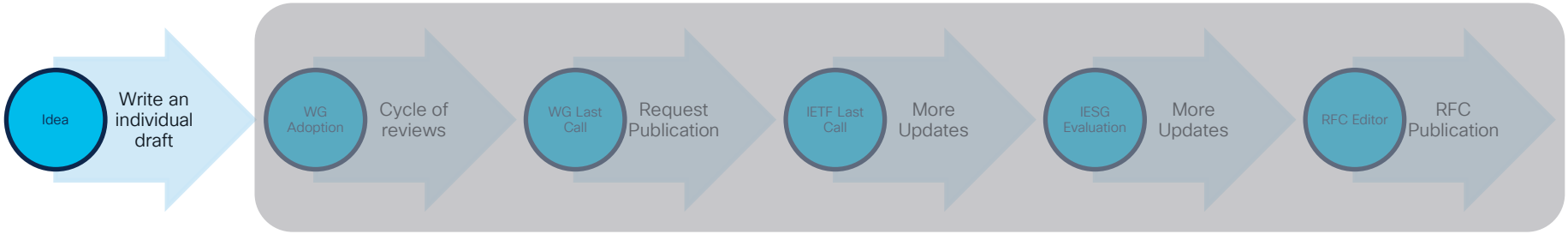
- Participate in any interesting BOFs

IETF Publication Process

Document Names and Categories

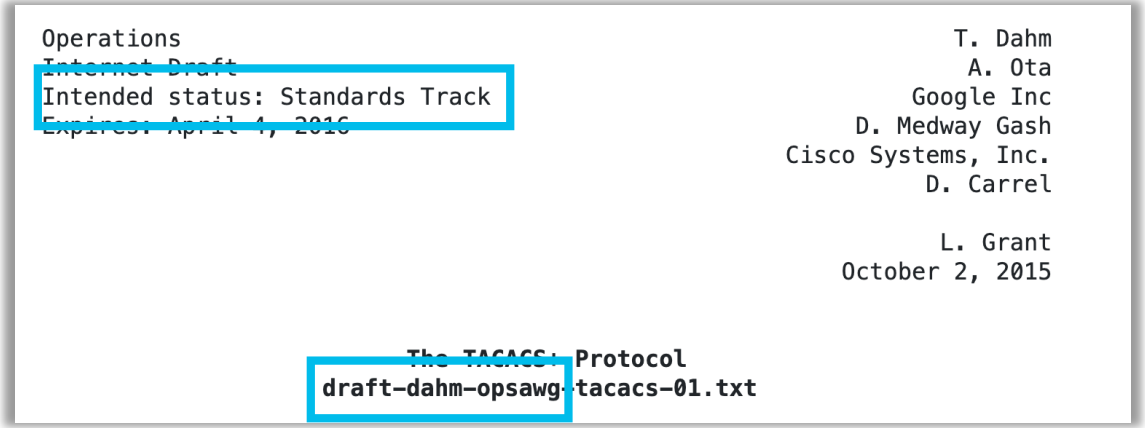
- IETF draft = work in progress = not an IETF standard
  - E.g., draft-grant-tacacs-00 (1996) no WG
  - draft-author-wgname-title: individual draft hoping to be adopted (ex draft-dahm-opsawg-tacacs-01)
  - draft-ietf-wgname-title: draft adopted by a working group, i.e., the WG has control of the content (ex draft-ietf-opsawg-tacacs)
- RFC Categories
  - Standards Track
  - Informational (ex RFC 8907), not a standard
  - Experimental, not a standard
  - Best Current Practice (BCP)

From an Idea to a RFC



- Individual draft
  - Publish the document as an individual Internet Draft (I-D).
  - Receive comments on the draft => edit your draft based on the comments.
  - Repeat... And request WG adoption by consensus

How to Check ?



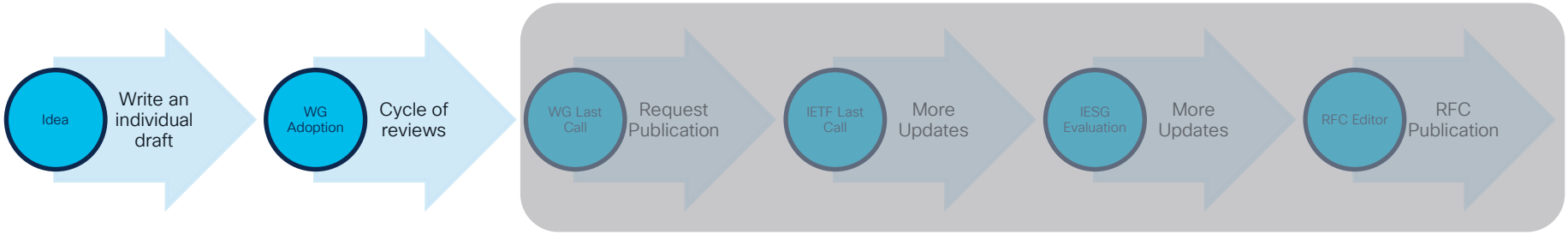
Operations
Internet Draft
Intended status: Standards Track
Expires: April 4, 2016

T. Dahm
A. Ota
Google Inc
D. Medway Gash
Cisco Systems, Inc.
D. Carrel

L. Grant
October 2, 2015

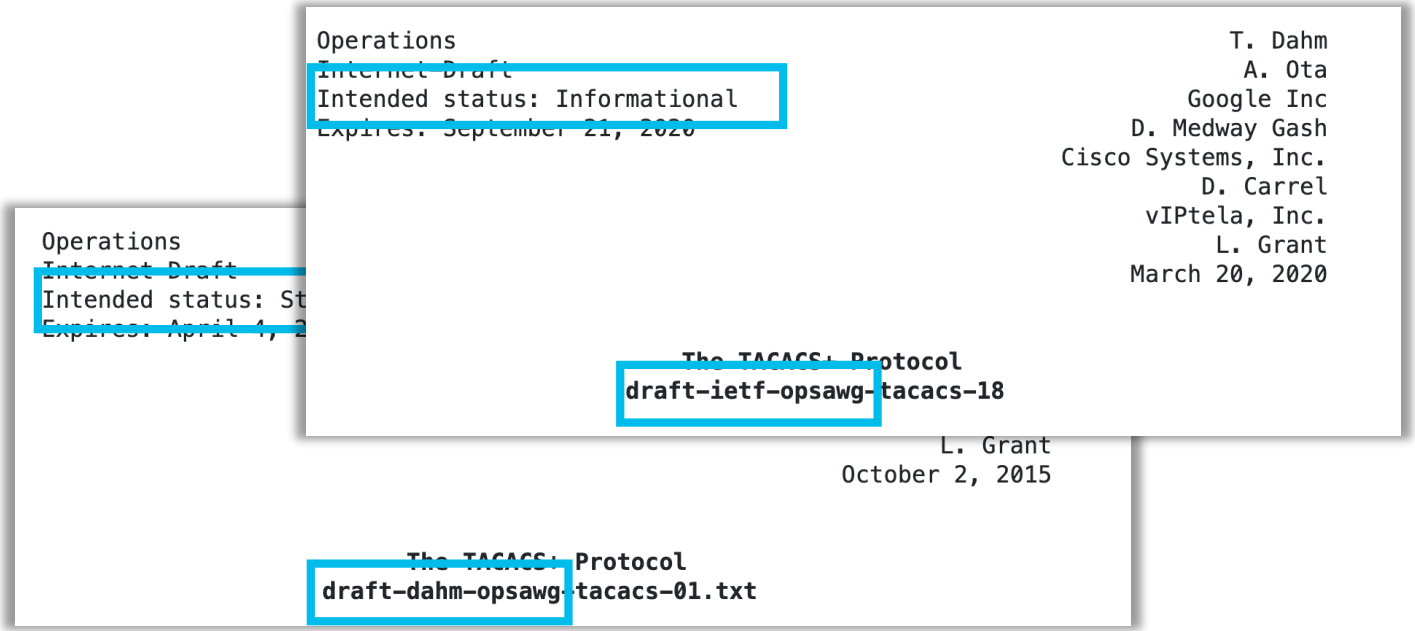
The TACACS+ Protocol
draft-dahm-opsawg-tacacs-01.txt

From an Idea to a RFC

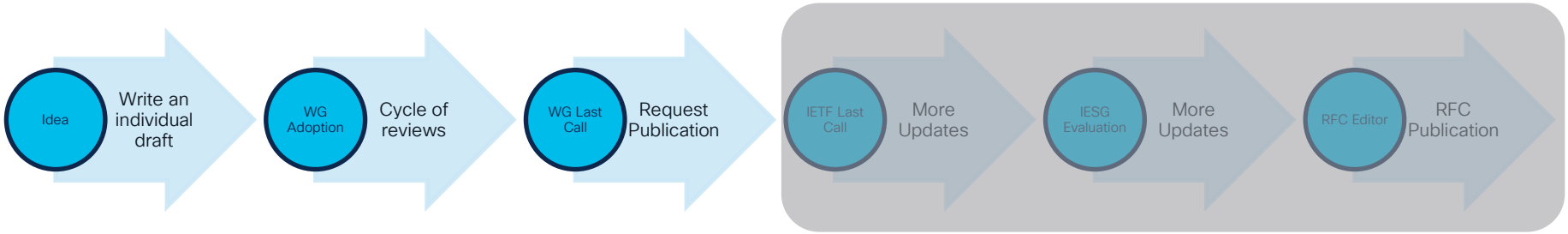


- WG draft
  - Re-publish the document as WG draft
  - WG is now the control change (authors -> editors)
  - Comments, reviews, changes, revised I-D
  - Until WG Last Call consensus

How to Check ?

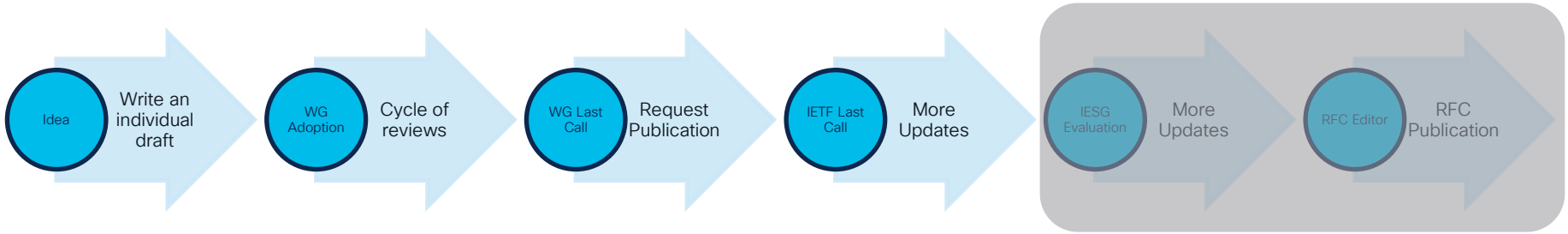


From an Idea to a RFC



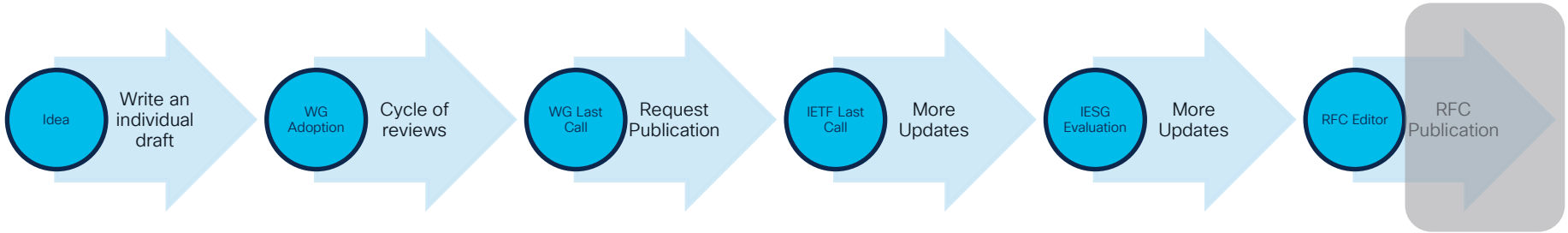
- The WG chair asks the Area Director (AD) to take it to the IESG.
- AD does his/her own initial review, and maybe ask for updates
- Get reviews from the wider IETF membership (IETF *Last Call*)

From an Idea to a RFC



- Discuss concerns with the IESG members
- Could lead to changes as one AD can block a document - https://datatracker.ietf.org/iesg/discusses/

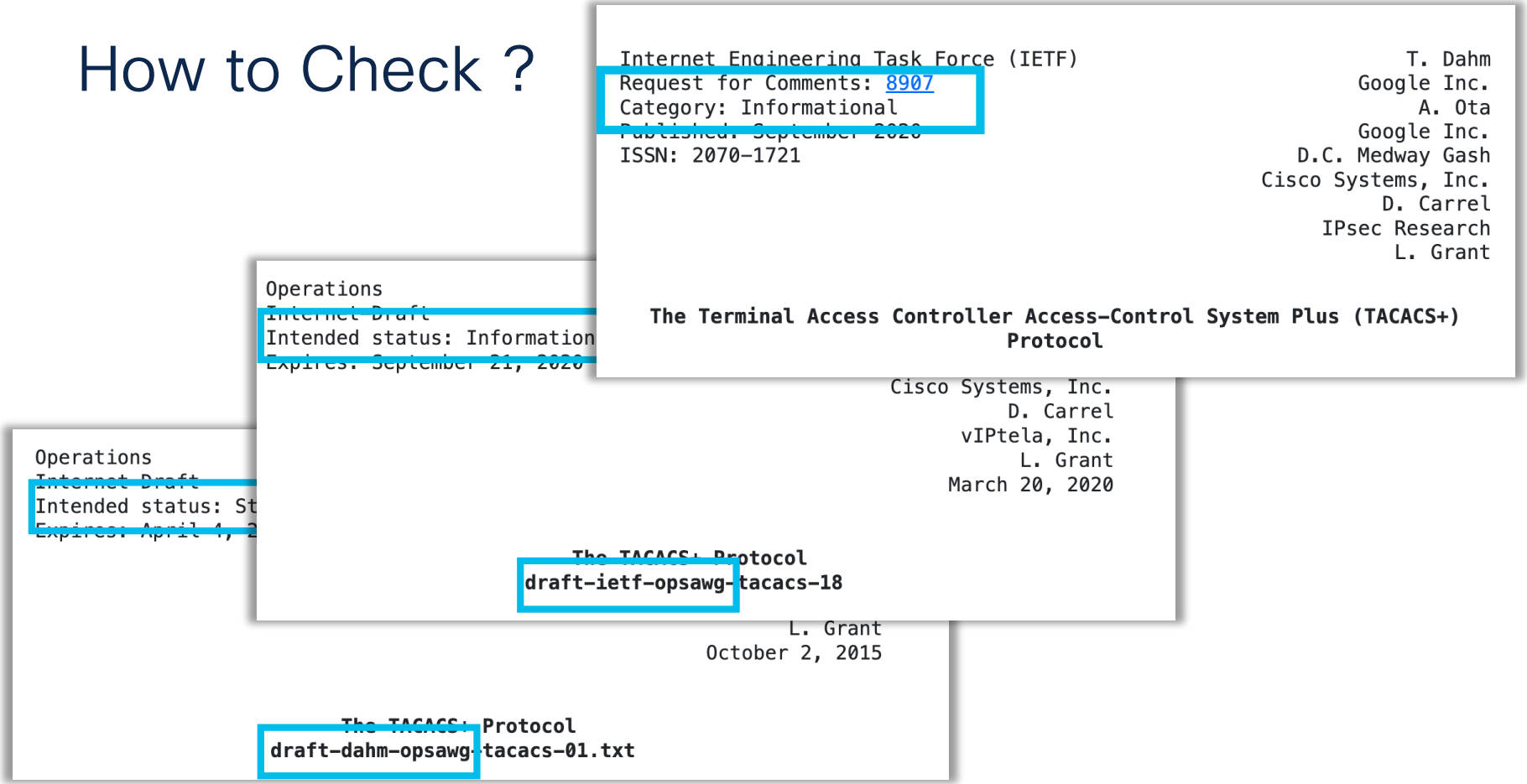
From an Idea to a RFC



- Wait for the document to be reviewed and published by the RFC Editor.
  - IANA has often to review the I-D and allocates some code points

All in all, it is about 2 years minimum...!

How to Check ?



Hum based on your preference...

Pineapple on Pizza.

IETF and Consensus RFC 7282

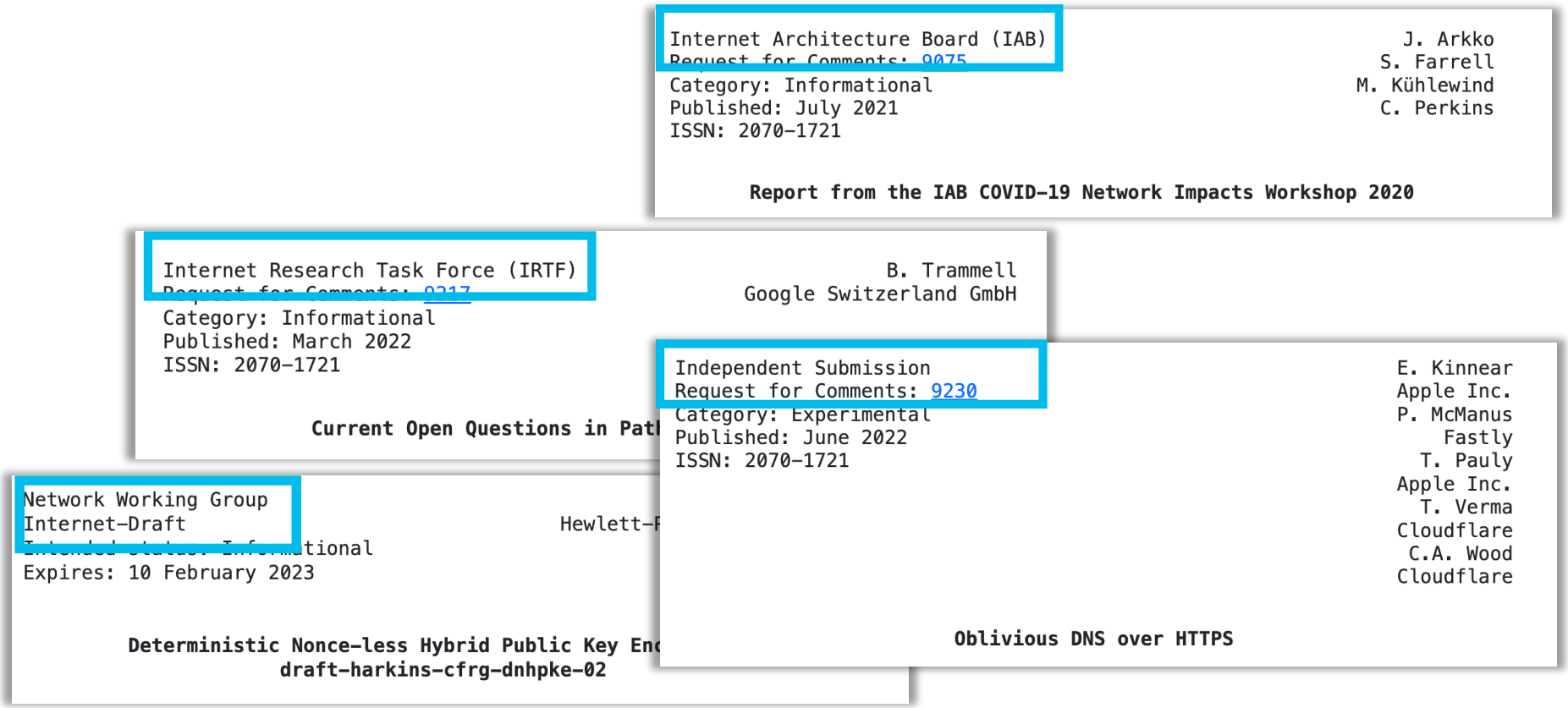
"We reject kings, presidents and voting. We believe in rough consensus and running code." – David Clark

- "Rough Consensus" – **Rough consensus is achieved when all issues are addressed, but not necessarily accommodated**
- Humming – a way of measuring consensus that is not voting
- The session chair is usually the arbiter of consensus, but WG session consensus must yield to WG mailing list consensus
- Dissenting opinions are heard, but are not controlling

Publication Streams

- IETF:
  - WG (or AD sponsorship) then IETF consensus and approved by IESG
  - Only stream with ‘standards track’ category
- IAB
  - informational only
  - https://datatracker.ietf.org/stream/iab/
- IRTF:
  - RG consensus, informational/experimental, IESG to detect potential conflicts, approved by IRSG
  - https://datatracker.ietf.org/stream/irtf/
- Independent Submission Stream:
  - informational/experimental, no IETF consensus, IESG to detect potential conflicts, approved by Independent Stream Editor (ISE)
  - https://datatracker.ietf.org/stream/ise/

How to Check the Streams ?



Internet Architecture Board (IAB)
Request for Comments: 9075
Category: Informational
Published: July 2021
ISSN: 2070-1721

J. Arkko
S. Farrell
M. Kühlewind
C. Perkins

Report from the IAB COVID-19 Network Impacts Workshop 2020

Internet Research Task Force (IRTF)
Request for Comments: 9217
Category: Informational
Published: March 2022
ISSN: 2070-1721

B. Trammell
Google Switzerland GmbH

Current Open Questions in Path

Independent Submission
Request for Comments: 9230
Category: Experimental
Published: June 2022
ISSN: 2070-1721

E. Kinnear
Apple Inc.
P. McManus
Fastly
T. Pauly
Apple Inc.
T. Verma
Cloudflare
C.A. Wood
Cloudflare

Oblivious DNS over HTTPS

Network Working Group
Internet-Draft
Intended Status: Informational
Expires: 10 February 2023

Hewlett-P

Deterministic Nonce-less Hybrid Public Key Enc
draft-harkins-cfrg-dnhpke-02

A Long-Standing Tradition

The high-order bit of the IP fragment offset field is the only unused bit in the IP header. Accordingly, the selection of the bit position is not left to IANA.

Network Working Group
Request for Comments: 3514
Category: Informational

S. Bellovin
AT&T Labs Research
1 April 2003

IPv4 Header

The Security Flag in the IPv4 Header

Status of this Memo

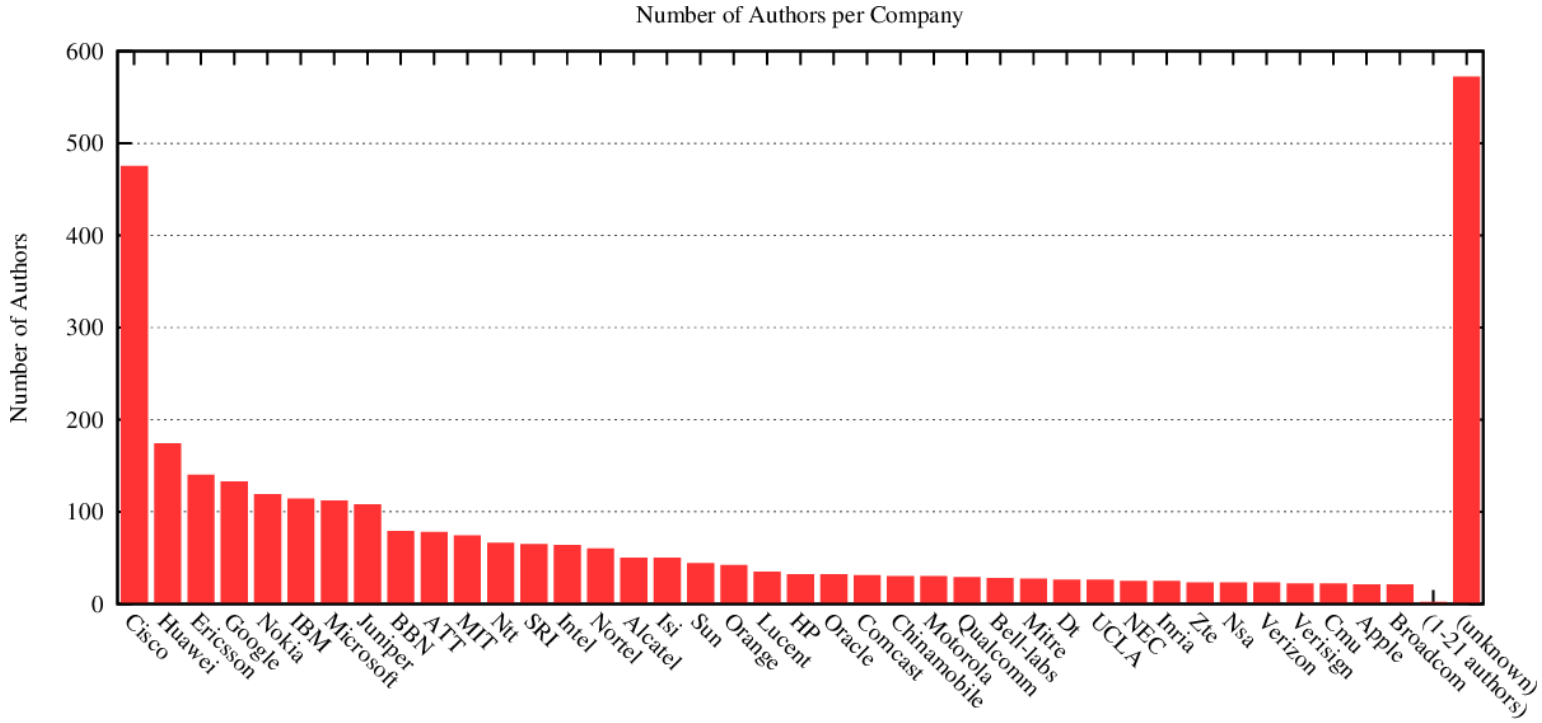
This memo provides information for the Internet community. It does not specify an Internet standard of any kind. Distribution of this memo is unlimited.

s follows:

0x0 If the bit is set to 0, the packet has no evil intent. Hosts, network elements, etc., SHOULD assume that the packet is harmless, and SHOULD NOT take any defensive measures. (We note that this part of the spec is already implemented by many common desktop operating systems.)

0x1 If the bit is set to 1, the packet has evil intent. Secure systems SHOULD try to defend themselves against such packets. Insecure systems MAY chose to crash, be penetrated, etc.

Most Active Organization in 2023



Source: https://www.arkko.com/tools/rfcstats/companydistr.html

Some New Work

Supply Chain Integrity, Transparency, and Trust (scitt)

- Tackling supply chain challenges such as
  - No uniform mechanism to publish supply chain information
  - Lack of standards to verify supply chain data

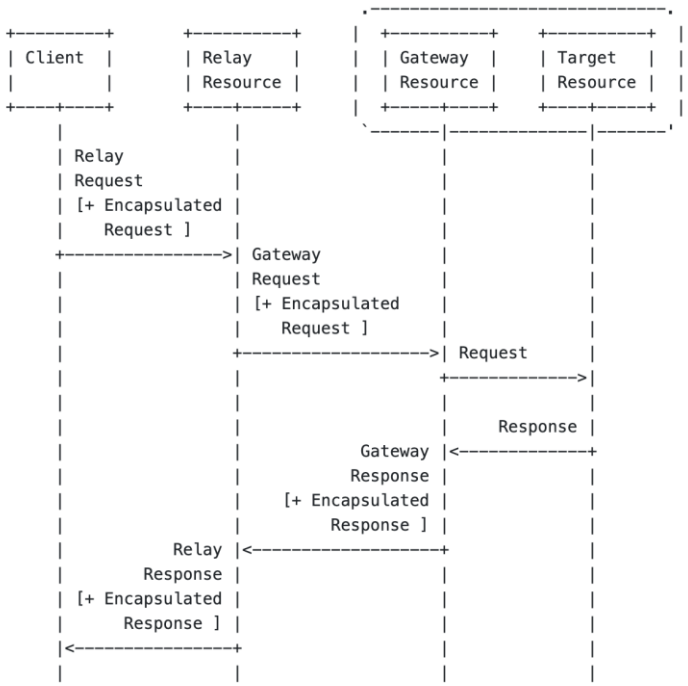
- Goals include
  - Develop models for supply chain registry, notary and auditing
  - Framework for supply chain information that is notarized and verifiable by anyone

Security is Important (Cont.)

- Messaging Layer Security (MLS) WG: for secure E2EE IM, RFC 9420
- Source Address Validation in Intra-domain and Inter-domain Networks (savnet) WG: going beyond uRPF and SAVI [RFC7039]
- Post-Quantum Use In Protocols (pquip) WG + IRTF CFRG QIG
- Key Transparency (keytrans) WG: verifiability for identity-to-public-key bindings in centralized messaging

Security (Privacy) is Important

- Oblivious HTTP Application Intermediation (OHAI) WG
- Pushed by Apple & Mozilla

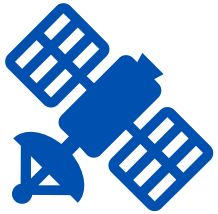


Stub Network Auto Configuration for IPv6 (snac WG)

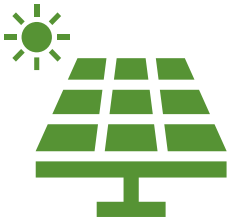
- How to connect IEEE 802.15.4 IPv6 network to the Internet via the residential/home Wi-Fi ?
  - Different MAC address lengths 16/64 vs. 48 for Wi-FI
  - IPv6 is a must as ‘stub’ networks are IoT

- Challenge
  - Not a single change in the existing residential/home Wi-Fi
  - Must work with IPv4-only, dual-stack, IPv6-only Wi-Fi

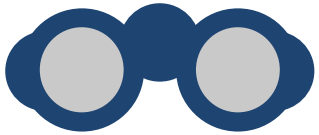
Time-Variant Routing



- Routing protocols are reactive: adjency loss detected, rerouting
- But, some events are scheduled:
  - Maintenance
  - PoP/router power down (e.g., no more solar/wind energy)
  - Satellites have very predictable orbits
- TVR WG will ‘enhance’ existing routing protocols with above info
  - => routing protocols will be proactive

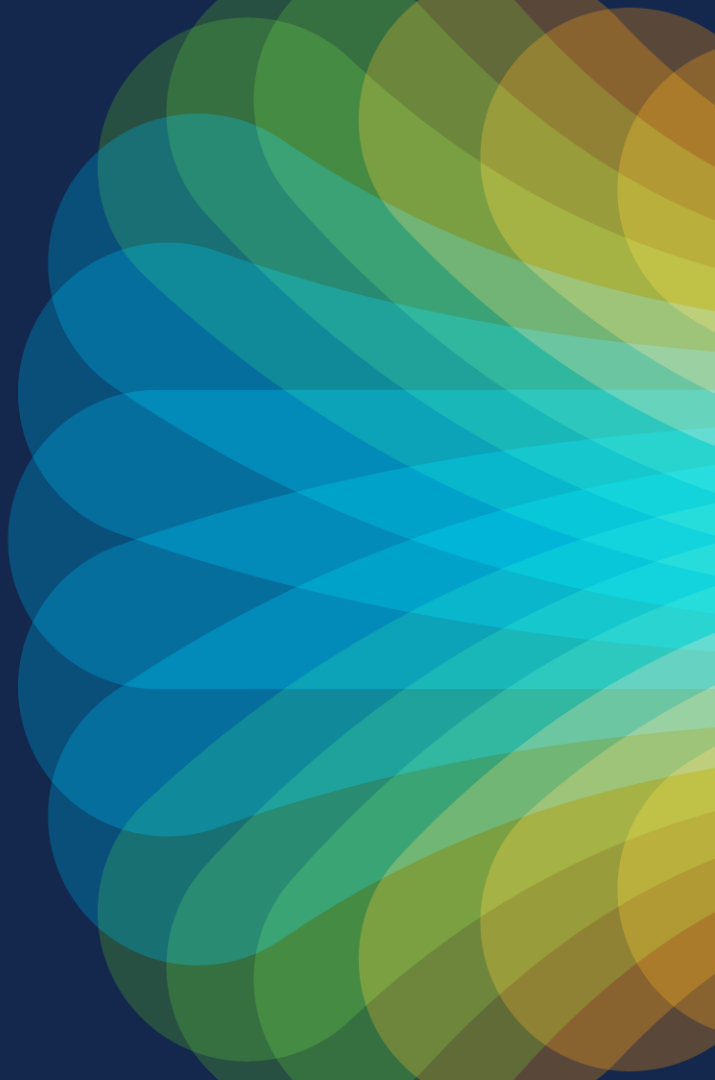


Setting expectations



- Considerable time investment (personal)
- Read, learn, read more..!
- Attend IETF Online
- Identify WGs/BOFs. Start with mailing lists

Conclusion



Thank you

- For listening
- But also, to ACT

- IETF is not about superpower of Gods
- It is about engineering mainly (and vendor politics sometime)
- Decisions are made on MAILING LIST
- Free
- You are an individual and not an employee/student
- No NEED to be in physical meetings

More references

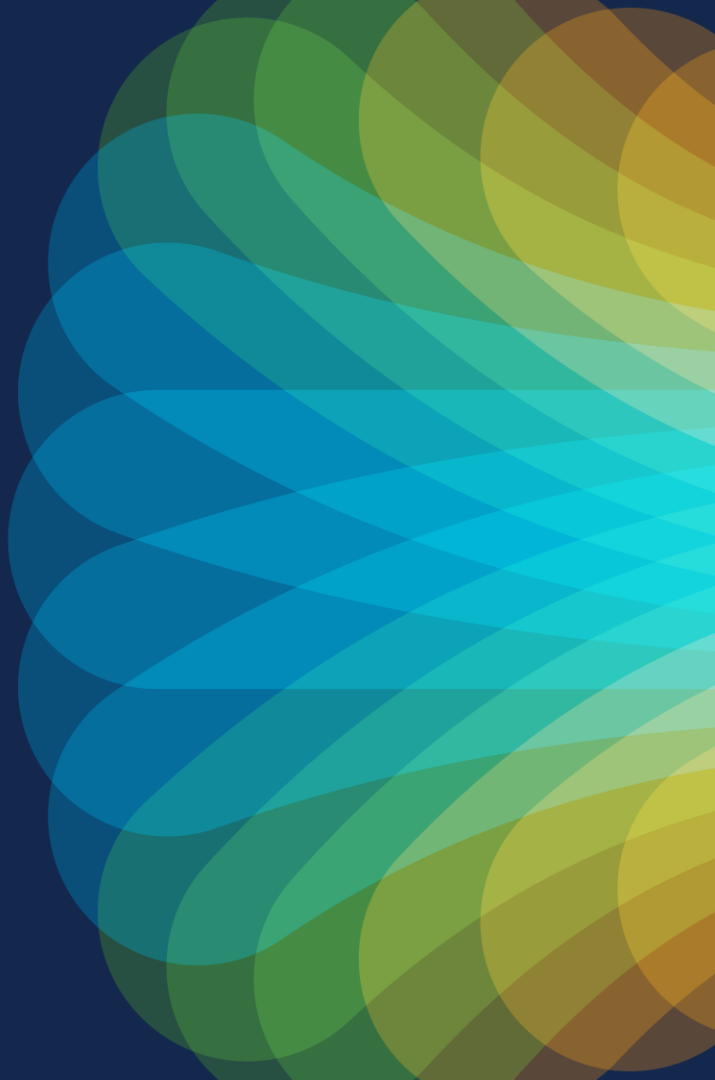
- The Tao of the IETF – “Everything you always wanted to know about the IETF, but were afraid to ask” https://www.ietf.org/tao.html
- See also https://www.ietf.org/about/participate/tutorials/
- The list of mailing lists – https://www.ietf.org/meeting/email-list.html

Resources

- IETF Getting Started document
- IETF 119 Online - https://www.ietf.org/how/meetings/119/
- Current active WGs - https://datatracker.ietf.org/wg/
- BOFs - https://datatracker.ietf.org/wg/bofs/
- To submit:
  - New BOF request - https://datatracker.ietf.org/doc/bof-requests
  - New Internet-draft (I-D) - https://datatracker.ietf.org/submit/

The bridge to possible

Thank you



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Let's go