IETF 101

Internet Standards and why we should care

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Agenda

Google

IPv6 BGP

Google
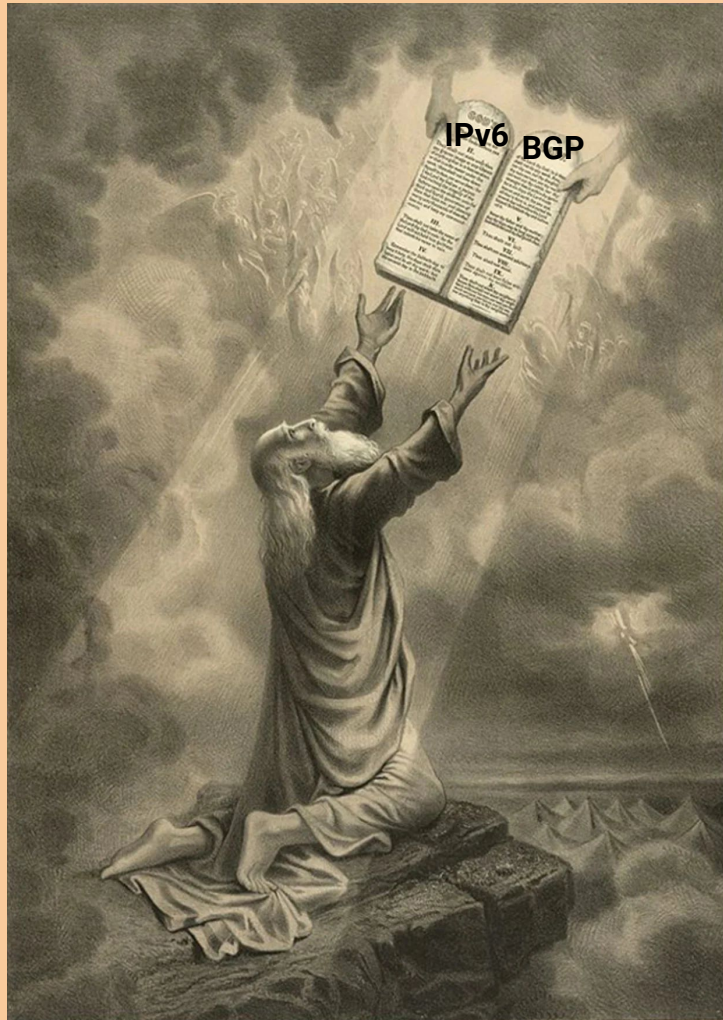
Importance of SDOs

Code Points Allocation

Design Authority

Oversee protocols modification and extension
- Is it safe?
- Would it break anything?
- Would it work across different domains?

Experts with diverse experience

Ensure compatibility

Recommended Reading: RFC5704, "Uncoordinated Protocol Development Considered Harmful"

What the IETF is

"The mission of the Internet Engineering Task Force 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."

Voluntary SDO publishing standards for the Internet protocol stack:
- layer 3 (IPv4 / IPv6, MPLS, associated protocols)
- layer 4 (TCP, UDP, SCTP, QUIC, etc)
- layer 7 (SMTP, SIP, RTP, etc), except W3C

How the IETF Works

~150 working groups with volunteer document authors/editors and chairs in seven areas:

- **ART**: application protocols (HTTP), real-time communication (SIP, RTCWEB)
- **TSV**: transport-layer protocols (TCP, QUIC), congestion control
- **RTG**: Routing and signaling protocols
- **INT**: Layer 3 protocols (IPv4/IPv6), 6LoWPAN/LPWAN, DNS, DHCP
- **OPS**: Network management (YANG), operations venues (DNSOPS, V6OPS)
- **SEC**: TLS, IPsec, IoT security
- **GEN**: IETF Process metagroups

Google

How to Participate in the IETF

No membership

Work done in

- Mailing lists

- Meetings (3 x year + interims)

  - Hybrid (onsite+remote mode)

  - Fee for registering (with waiver options)

Anyone can participate!

7.1 What You Can Do

Read: Review the Internet-Drafts in your area of expertise and comment on them in the Working Groups. Participate in the discussion in a friendly, helpful fashion, with the goal being the best Internet standards possible. Listen much more than you speak. If you disagree, debate the technical issues: never attack the people.

Implement: Write programs that use the current Internet standards. The standards aren't worth much unless they are available to Internet users. Implement even the "minor" standards, since they will become less minor if they appear in more software. Report any problems you find with the standards to the appropriate Working Group so that the standard can be clarified in later revisions. Remember the tenet, "rough consensus and running code," so you can help support the standards you want to become more widespread by creating more running code. You can help the development of protocols before they become standards by implementing I-Ds (but not doing wide-spread deployment) to ensure that the authors have done a good job. If you find errors or omissions, offer improvements based on your implementation experience. A great way to get involved in this is by participating in the Hackathons.

Write: Edit or co-author Internet-Drafts in your area of expertise. Do this for the benefit of the Internet community, not to get your name (or, even worse, your company's name) on a document. Draft authors receive kinds of technical (and, sadly, sometimes personal) criticism. Take the technical comments with equanimity and use it to improve your draft in order to produce the best and most interoperable standard, and ignore the personal ones.
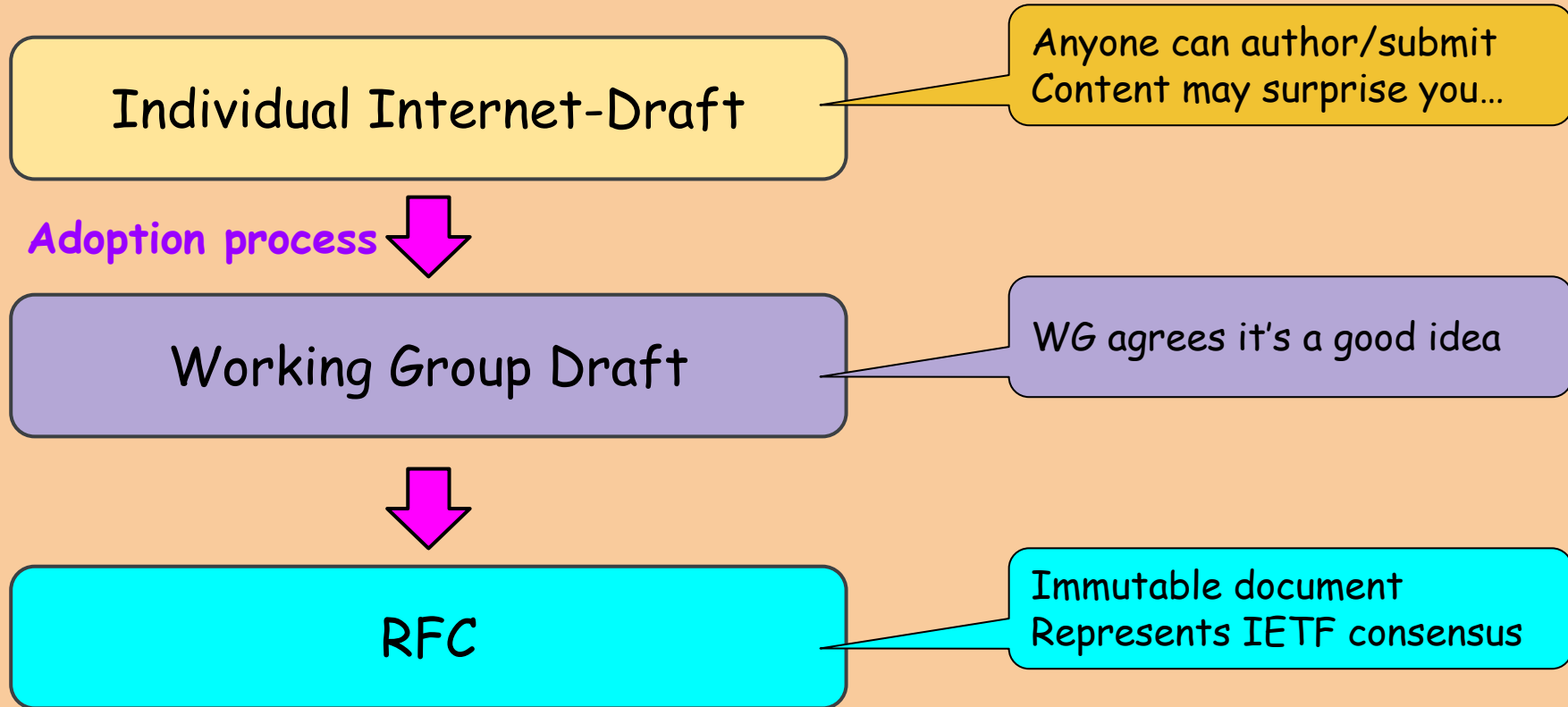
What Is RFC?

Request **F**or **C**omments contains technical specifications and organizational notes for the Internet, such as:

- Protocol specifications
- Technologies and architecture
- Requirements for hosts, routers, systems etc
- Best current operational practices
- Operational considerations and deployment scenarios

Internet-Draft vs RFC (simplified)

Individual Internet-Draft

Anyone can author/submit
Content may surprise you...

Adoption process

Working Group Draft

WG agrees it's a good idea

RFC

Immutable document
Represents IETF consensus

Reasons To Participate

IETF Drafts

Hosts and
networks
behaviour

2023

2025-2028

Reasons To Participate

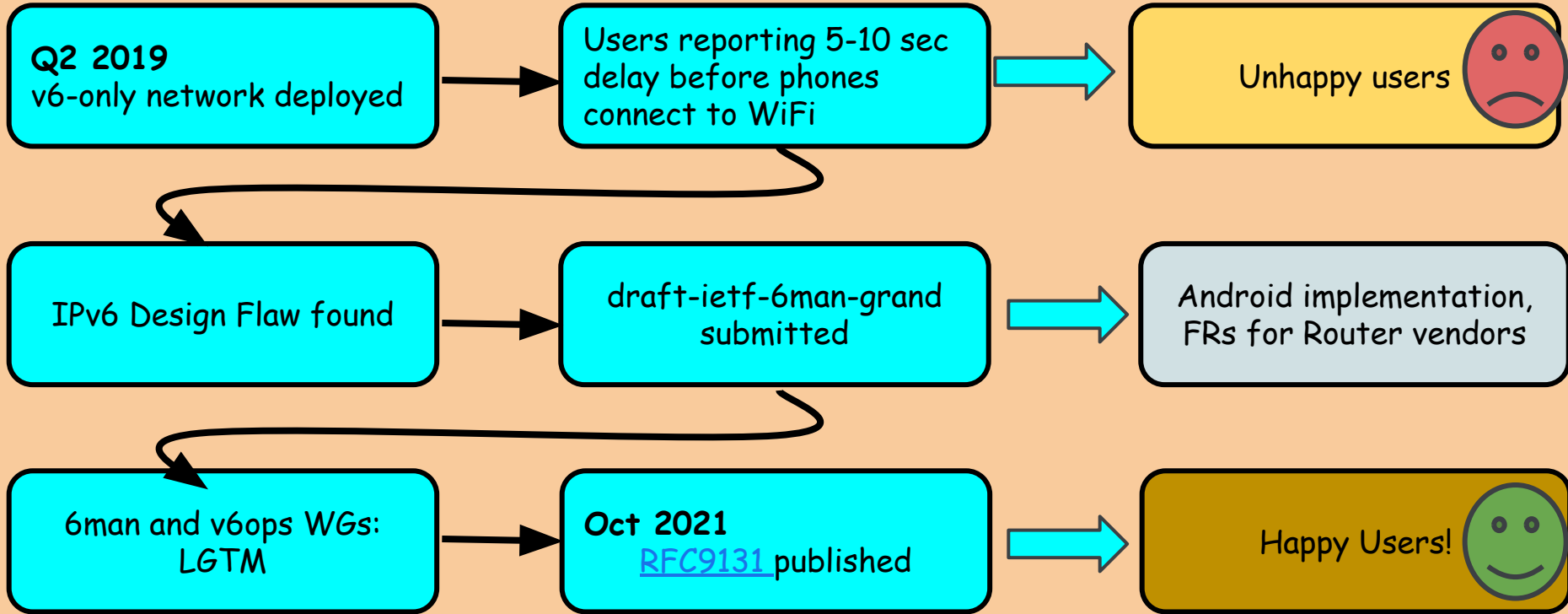Promote ideas improving users' experience

Fighting harmful ideas

Reasons To Participate

Solve issues encountered in your network

Case Study: ~7 secs of "No connectivity" on IPv6-only WiFi

Q2 2019
v6-only network deployed

→ Users reporting 5-10 sec delay before phones connect to WiFi

⇒ Unhappy users 🙁

IPv6 Design Flaw found

→ draft-ietf-6man-grand submitted

⇒ Android implementation, FRs for Router vendors

6man and v6ops WGs: LGTM

→ **Oct 2021**
RFC9131 published

⇒ Happy Users! 🙂

Could We Have Done It Without IETF?

Are the proposed changes safe?

What about other networks?

Reasons To Participate

Driving Innovation

Define Industry Best Practices
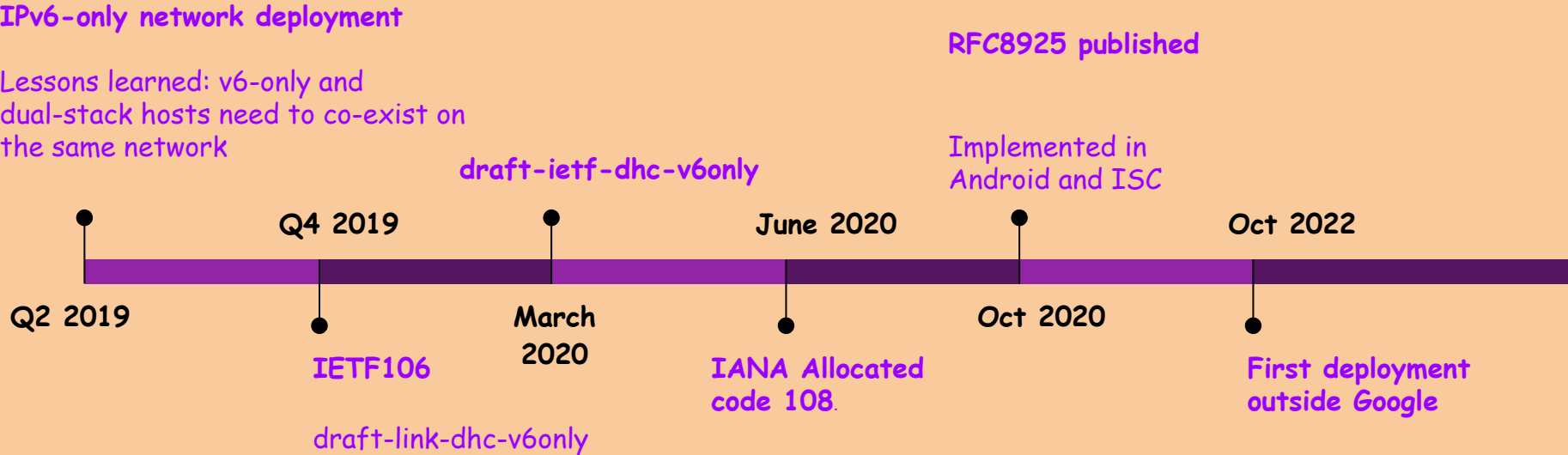
Case Study: IPv6-Only Enterprises

IPv6-only network deployment

Lessons learned: v6-only and
dual-stack hosts need to co-exist on
the same network

draft-ietf-dhc-v6only

RFC8925 published

Implemented in
Android and ISC

Q4 2019

June 2020

Oct 2022

Q2 2019

IETF106

March
2020

**IANA Allocated
code 108**.

Oct 2020

**First deployment
outside Google**

draft-link-dhc-v6only

Could We Have Done It Without IETF?

Expertise

- co-authors from various backgrounds
- Input from the best industry experts

Speed of execution

Industry-wide impact

- Standard solution (IANA allocation option code)
- External deployments even before we did it

Case Study: NAT64 Prefix Detection

Problem:
- hosts need to know NAT64 prefix used by the network.
- Existing mechanism is slow and insecure

Solution:
- RFC8781 (PREF64 in Router Advertisement)

Impact Outside Google
- Improved security for Android users
- 4 open source implementation + MikroTik

IETF and IPv6: What's Going on?

[Using DHCPv6-PD to Allocate Unique IPv6 Prefix per Client](#)

[Improving the Robustness of Stateless Address Autoconfiguration (SLAAC) to Flash Renumbering Events](#)

Interesting Reading: [RFC 9386: IPv6 Deployment Status](#)

Questions?

Ask me: furry13@gmail.com