What's new at IETF about IPv6?

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November 2024

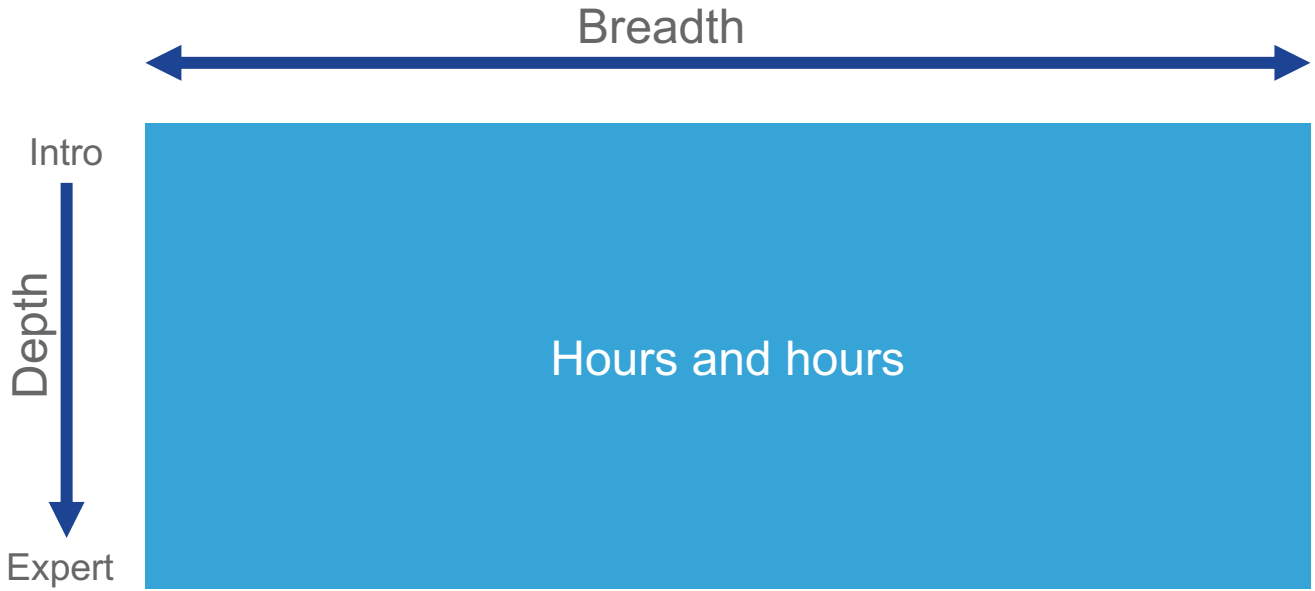
Disclaimers

- The oral / written comments on IETF work represent neither my employer nor the Internet Engineering Steering Group view
- Slides are *work in progress*

Unless specified all pictures and logos are from Microsoft Powerpoint stock images

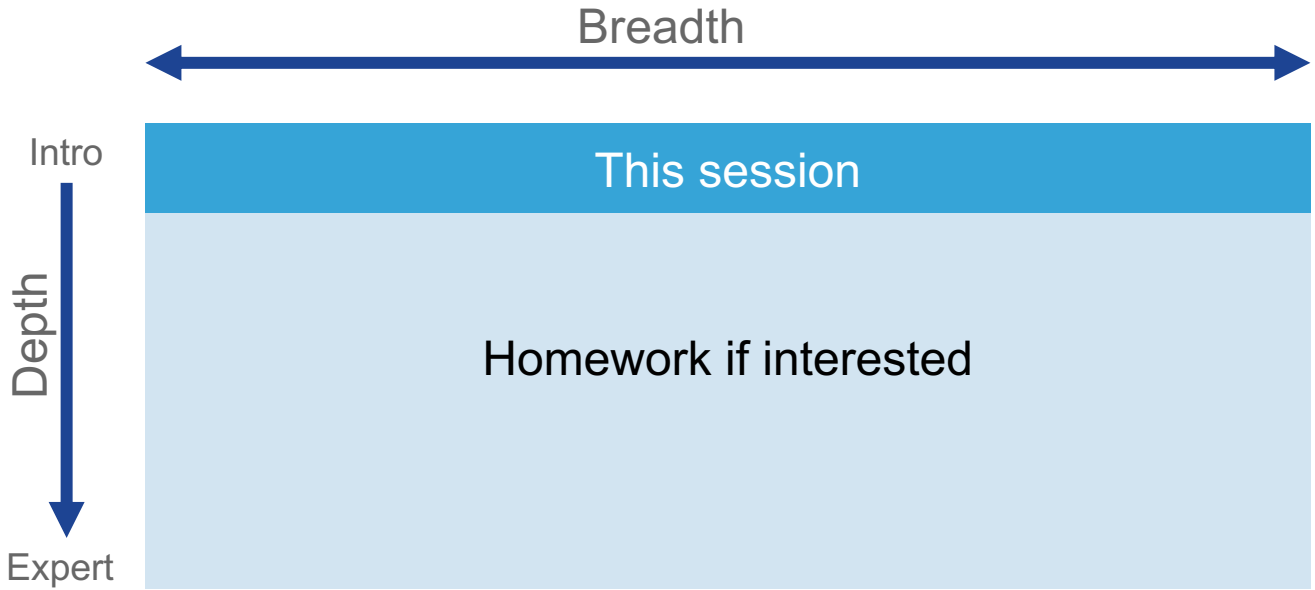
Expectations Setting

- How to cover the IETF news about IPv6 ?



Expectations Setting

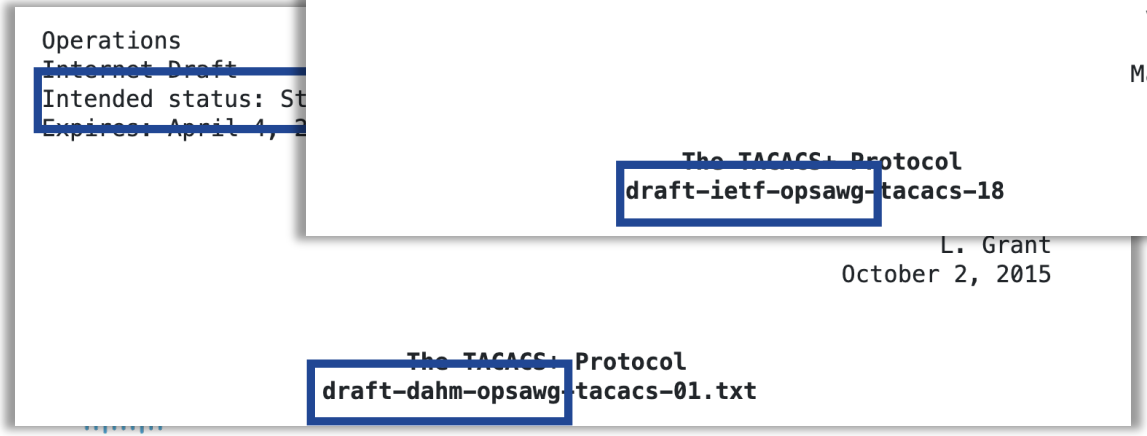
- How to cover the IETF news about IPv6 in 30 minutes ?



IETF Publications

Document Names and Categories

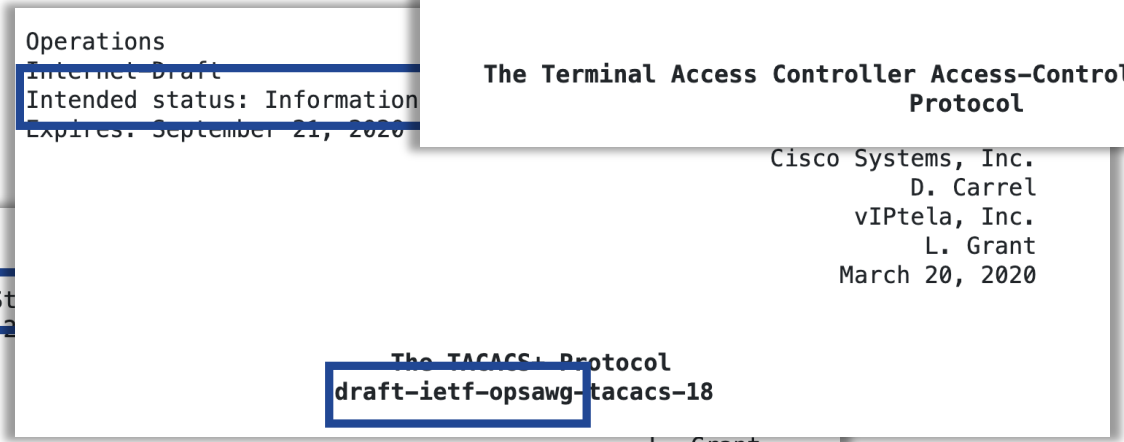
- IETF draft = work in progress = not an IETF standard
  - E.g., draft-grant-tacacs-00 (1996) no WG
  - draft-author-wgname-title: individual draft hoping to be adopted (ex draft-dahm-opsawg-tacacs-01)
  - draft-ietf-wgname-title: draft adopted by a working group, i.e., the WG has control of the content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



Operations
Internet Draft
Intended status: St
Expires: April 4, 2

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

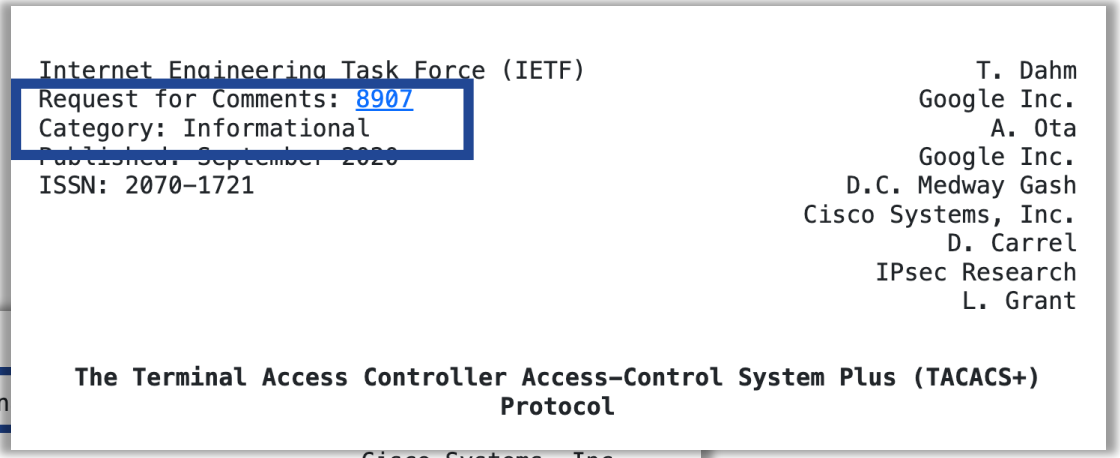
L. Grant
October 2, 2015



Operations
Internet Draft
Intended status: Information
Expires: September 21, 2020

Cisco Systems, Inc.
D. Carrel
vIPtela, Inc.
L. Grant
March 20, 2020

The TACACS+ Protocol
draft-ietf-opsawg-tacacs-18



Internet Engineering Task Force (IETF)
Request for Comments: 8907
Category: Informational
Published: September 2020
ISSN: 2070-1721

T. Dahm
Google Inc.
A. Ota
Google Inc.
D.C. Medway Gash
Cisco Systems, Inc.
D. Carrel
IPsec Research
L. Grant

The Terminal Access Controller Access-Control System Plus (TACACS+) Protocol

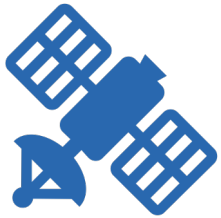
Publication Streams

- 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/

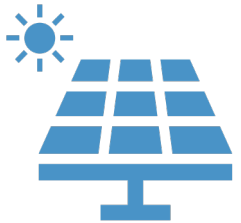
Source: Microsoft Stock Images

Some New Work at the IETF

IETF in the Near / Deep Space



- Last time, Time Variant Routing was started
  - From LEO satellites to predicable link load and solar powered PoP



- November 2024 IETF-121 meeting:
  - IP in Deep Space BoF
    - QUIC profile to the Moon and possibly March
    - https://datatracker.ietf.org/doc/bofreq-blanchet-deepspace/
    - What about a dedicated IPv6 prefix out of 2000::/3 or 4000::/3 ? ;-)
  - Systems and Protocol Adaptations for Circumstellar Environments Research Group (SPACE RG)
    - https://github.com/ekline/ntnrg/blob/main/charter.md

Independent Submission
Request for Comments: 9564
Category: Informational

M. Blanchet
Viagenie

Faster Than Light Speed Protocol (FLIP)

Abstract

The recent advances in artificial intelligence (AI) such as large language models enable the design of the Faster than LIght speed Protocol (FLIP) for Internet. FLIP provides a way to avoid congestion, enhance security, and deliver faster packets on the Internet by using AI to predict future packets at the receiving peer before they arrive. This document describes the protocol, its various encapsulations, and some operational considerations.

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Request for Comments: 9564
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Published: 1 April 2024
ISSN: 2070-1721

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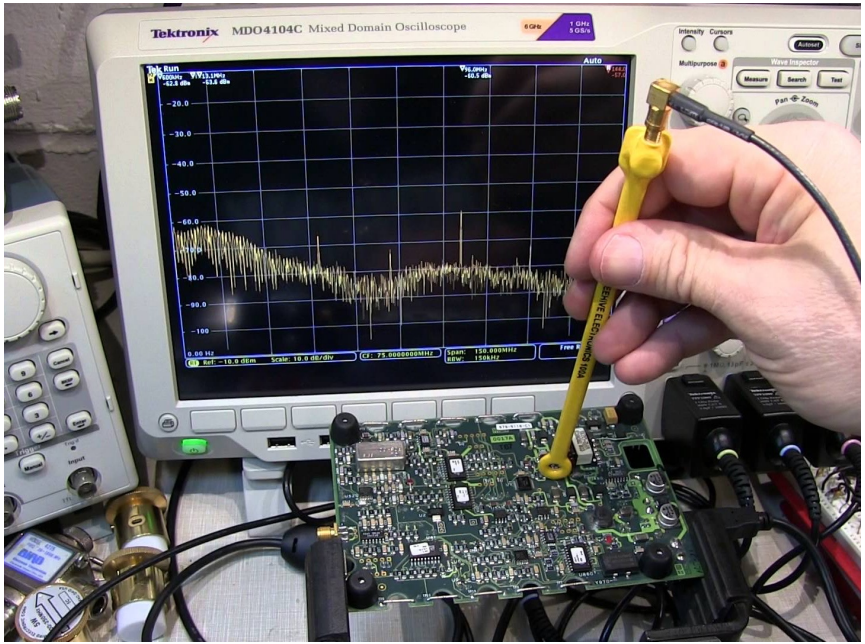
Probing the Internet

RFC 9511 Attribution of Internet Probes

- By Justin Iurman & Eric Vyncke ;-)
- We learned by doing mistakes...
- Sending probes with a URI
  - Mailto:sorcerer@example.org
  - https://example.org/probe.txt



Some Brief News at V6OPS 1/4

- RFC 9637
  - *Expanding the IPv6 Documentation Space*
  - Smaller /20 prefix rather than 2001:db8::/32
  - Can be used for multi-tenants SP network
- draft-ietf-v6ops-rfc7084bis-01
  - *Basic Requirements for IPv6 Customer Edge Routers*
  - Update to transition technologies
  - Must not use EUI-64
- draft-ietf-v6ops-cpe-lan-pd-05
  - *DHCP-PD on the LAN side of residential gateways* (see also SNAC WG later)

More Brief News at V6OPS 2/4

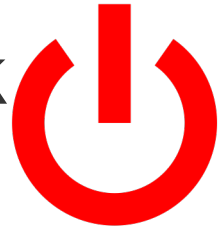
- draft-ietf-v6ops-claton-02
  - *Dedicated IPv6 address for CLAT (stateless differentiation between IPv4 & IPv6 traffic)*
  - Only when IPv4 is not available
  - Prefers RA rather than DNS to discover the NAT64 prefix
- draft-ccc-v6ops-address-accountability-00
  - IPv6 Address Accountability Considerations
  - Some networks require IP address – user attribution
- draft-pauly-v6ops-happy-eyeballs-v3-02
  - Add transport selection QUIC vs. TCP using SVCB DNS Resource Records
  - Will move to its own Working Group

RFC 9663 Using DHCPv6-PD to Allocate Unique IPv6 Prefix per Client in Large Broadcast Networks

- Born as draft-ietf-v6ops-dhcp-pd-per-device-05
- Scalability: aggregation of all IPv6 addresses of a node in a single prefix
  - Delegated prefix is off-link, routing to the client LLA, no NDP ;-)
- Allow for network extension (SNAC, thetering, ...)
  - I.e., the delegated prefix MUST support SLAAC
  - I.e., the longuest prefix length is 64
- Similar to
  - the /64 to mobile 3GPP hand sets
  - RFC 8273 Unique IPv6 Prefix per Host

16

Turning IPv4 Off in an Enterprise Network



draft-ietf-v6ops-6mops-00 “IPv6-Mostly Networks”

- SLAAC (no DHCP-IA),
- DNS64/NAT64 (config via RA and not DNS),
- 464XLAT for IPv4 literals
- RFC8925: IPv6-Only Preferred Option for DHCPv4, option 108 indicate that a host supports an IPv6-only mode and is willing to forgo obtaining an IPv4 address
- DHCP-PD to the host (network extensions, VM, tethered nodes)
- Default Address Selection Rule 5.5 == Critical when clients move between segments

See previous:
IPv6-mostly at Imperial College London - David Stockdale (Imperial College London)

Some Brief News from

Some Brief News from

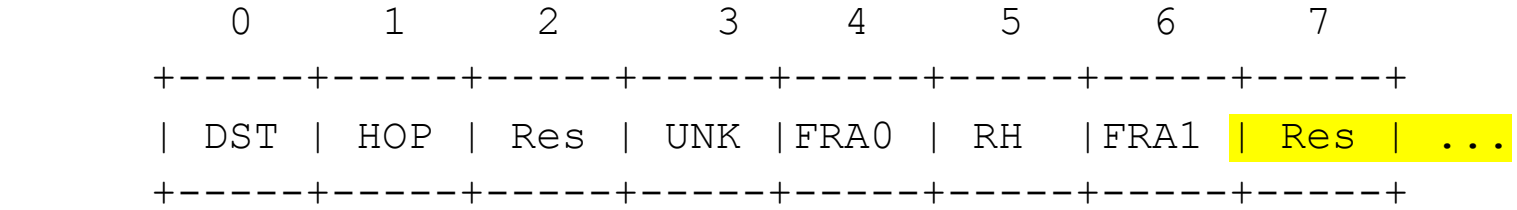
- RFC 9602
  - *Segment Routing over IPv6 (SRv6) Segment Identifiers in the IPv6 Addressing Architecture*
  - Easier to add layer-3 filters for 5f00::/16
- RFC 9673
  - *IPv6 Hop-by-Hop Options Processing Procedures*
  - Practical update to RFC 8200 to help the use of HbH
  - Leading bits of Option Type all become either ”skip” or “MAY discard”
- RFC 9631
  - *The IPv6 Compact Routing Header (CRH)*
  - Experimental, not linked to SPRING / SRv6
  - Use state in CRH-aware router to compress the segment list

More Brief News from 6MAN

- draft-ietf-6man-pio-pflag-12
  - *Signalling DHCPv6 Prefix Delegation Availability to Hosts*
  - See the V6OPS about DHCP-PD to the host
  - A flag in the Prefix Information Option of the RA
- draft-ietf-6man-rfc6724-update-15
  - *Prioritizing known-local IPv6 ULAs through address selection policy*
  - Preference for IPv6 ULAs over IPv4 addresses in RFC6724
  - RFC 6724 preferences: IPv6 GUA, IPv4, IPv6 ULA
  - Some US Federals have deployed ULA-only networks ☹ and cannot meet the US Mandate of being IPv6-only
  - See also https://rfc6724.vyncke.org
- draft-ietf-6man-eh-limits-16
  - *Limits on Sending and Processing IPv6 Extension Headers*
  - A source host SHOULD NOT send a packet with an IPv6 header chain larger than 104 bytes
  - Assumed to set “minimum baseline of support”...
    - Personal concern about race to the bottom: can this become the value for all procurements ?
- draft-clw-6man-rfc8504-bis-01
  - *IPv6 Node Requirements*

OPSAWG: Extended TCP Options and IPv6 Extension Headers IPFIX Information Elements

- draft-ietf-opsawg-ipfix-tcpo-v6eh-18 (the core)
- draft-ietf-opsawg-ipfix-fixes-12 (IANA registry)
- Old RFC 5102 -> IANA IPFIX Entities



- New/updated IPFIX information elements
  - ipv6ExtensionHeadersFull: bit-mask based on a registry
  - ipv6ExtensionHeaderCount: series of <EH, count>
  - ipv6ExtensionHeadersChainLength: octet count *(can have multiple in a flow)*

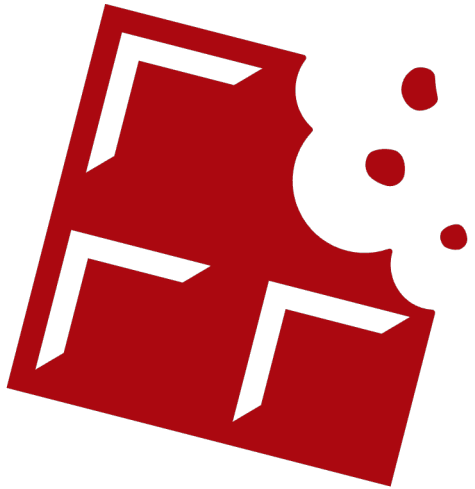
Stub Network Auto Configuration for IPv6 (snac WG)

- How to connect an IEEE 802.15.4 IPv6 network to the residential/home Wi-Fi (and possibly to the Internet) ?
  - Different MAC address lengths 16/64 vs. 48 for Wi-Fi
  - Different speed / CPU (think airpods, light bulbs)
  - 6lo could be used, i.e., header compression
  - 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
  - Avoid homenet pitfalls: do not try to boil the ocean

SNAC WG: only one simple document

- draft-ietf-snac-simple-06
- Mainly re-using *existing* mechanisms
  - RA on Adjacent Infrastructure Link (AIL) to detect IPv6 and adjacent stub routers
  - ULA used
    - on the stub network in the absence of DHCP-PD
    - on IPv6-less AIL
  - NAT64 if required by stub network
  - mDNS (same authors!)



DHC WG

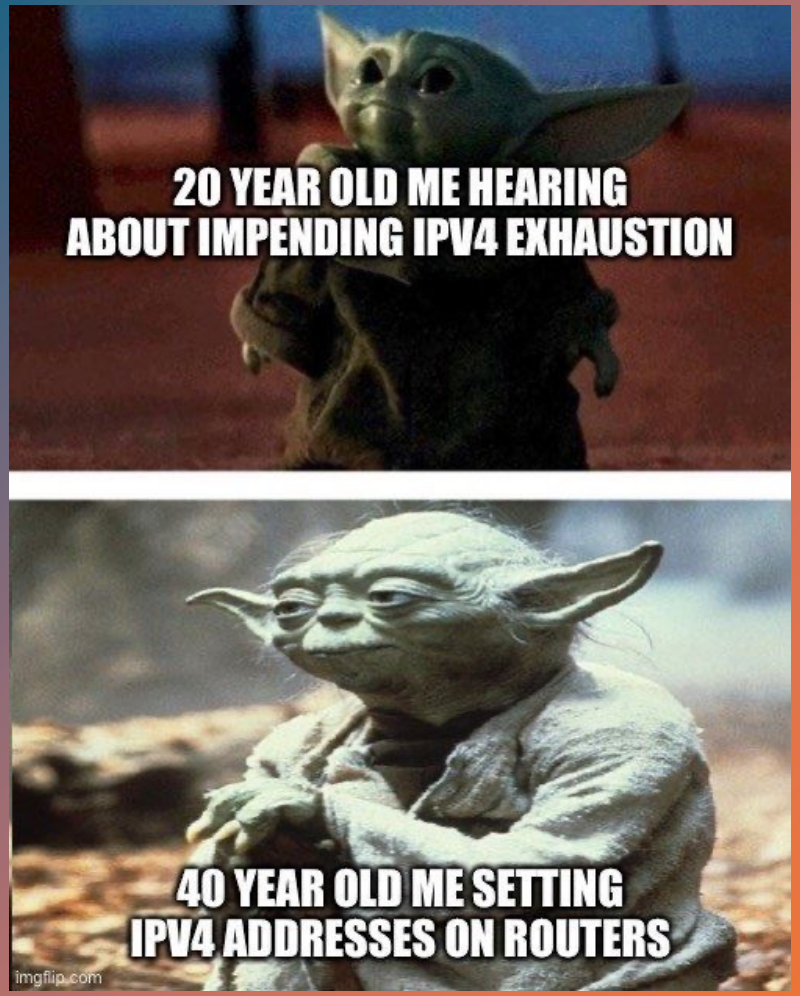
draft-ietf-dhc-rfc8415bis-06

- Status: Internet Standard rather than Proposed Standard
- Remove IA_TA (temporary address) as it was never used
- Remove unicast replies

draft-ietf-dhc-addr-notification-13

- Registering Self-generated IPv6 Addresses using DHCPv6
- I.e., for networks not using stateful DHCP IA_NA, but wanting to collect the addresses
- Should be published as RFC 9686

Last Words



Source: X/Twitter

Conclusion

- IPv6 is not yet done
- A lot of work still in progress
- Operators' views are ~~welcome~~, required
- Join the IETF, at least mailing lists
- Presented work is mostly *in progress* your input is still welcome