IETF 112 – Side Meeting

https://datatracker.ietf.org/doc/draft-jia-intarea-scenarios-problems-addressing/

https://datatracker.ietf.org/doc/draft-jia-intarea-internet-addressing-gap-analysis/

Internet Addressing -

PROBLEM Statement and GAP Analysis

IETF 112 – Online

2021.11.08

Actual start time: 18:10

(to accommodate short break for people attending last IETF session of the day)

Note Well

This is a reminder of IETF policies in effect on various topics such as patents or code of conduct. It is only meant to point you in the right direction. Exceptions may apply. The IETF's patent policy and the definition of an IETF "contribution" and "participation" are set forth in BCP 79; please read it carefully.

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- Personal information that you provide to IETF will be handled in accordance with the IETF Privacy Statement.
- As a participant or attendee, you agree to work respectfully with other participants; please contact the ombudsteam (https://www.ietf.org/contact/ombudsteam/) if you have questions or concerns about this.

Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

- BCP 9 (Internet Standards Process)
- BCP 25 (Working Group processes)
- BCP 25 (Anti-Harassment Procedures)
- BCP 54 (Code of Conduct)
- BCP 78 (Copyright)
- BCP 79 (Patents, Participation)
- https://www.ietf.org/privacy-policy/(Privacy Policy)

IETF

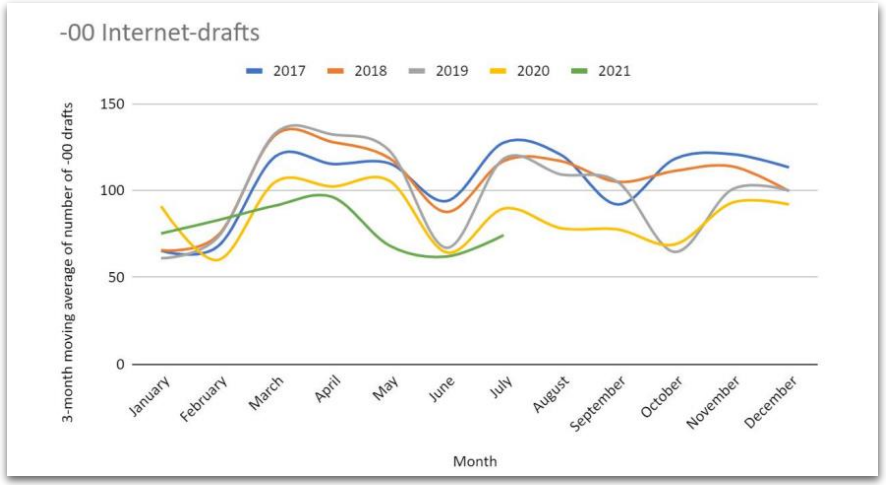
Logistics

This meeting is publicly streamed and recorded

- 60-minute in Total
- Webex
  - https://htf-paris.my.webex.com/htf-paris.my-en/j.php?MTID=me5c3296ffa38c59d4b010c5a81567410
  - Please keep yourselves on mute
- Interaction
  - Questions – Raise your hand in WebEx, moderator will call on you to speak
  - Chat Window: Feel free to chat there and speakers may be able to respond
  - Question and discussion – INTAREA Mailing List
    - https://www.ietf.org/mailman/listinfo/int-area
- Live stream
  - https://youtu.be/vwtoCvluREA
- Materials
  - https://github.com/Iannone-Luigi/Addresing

WHY are we here anyway?

- Technical points will be overviewed in the next slides…



- But in the meantime:
  - New work and discussion is slowing down …
    - (due to online-only events)
  - Can we use side meetings to cope with the situation?
    - Consider this meeting kind of an **experiment**

Some Observations on Available Data

2020

- Email & total drafts seemed to broadly track previous years.
- New work (-00) drafts was slightly down (~ 15-20%).
- Inline with on-line communications and no f2f interaction.

2021

- Emails trending slightly lower
- Drafts, and particularly new drafts are noticeably down.

The IESG will continue to monitor this data

- This meeting **IS NOT ABOUT** setting the stage for a BoF
- This meeting **IS ABOUT** promoting **broader thinking** of a new work in IETF

WHO is here?

You all: thank you for coming ☺

- A group of panelist invited to share their experience and opinion (special thanks to them)
  - Dino Farinacci
  - ~~Vasileios Giotsas~~
  - Dirk Kutscher
  - Robert Moskowitz
  - Michael Richardson
  - Nirmala Shenoy
  - Laurent Toutain
  - But the mic is open to everybody
- Agenda:
  - Introduction (this very presentation)
    - 15 Minutes – Luigi Iannone
  - Open Discussion
    - 45 Minutes – Animator: Dirk Trossen

WHAT is the topic: Internet Addressing Problems and Gaps

- There are many scenarios in which current Internet addressing shows **shortcomings**
- Internet community has recognized those shortcomings to the original properties of Internet addressing, and thus developed **point extensions** to fix them.
- There are a number of **compounding issues** with those extensions, particularly **fragility** when considering point extensions in coexistence
- Doing point extensions to addressing, possibly over any existing or new header field imaginable, may be seen as a powerful tool for extending the Internet
- But developing point solutions may lead to further issues being identified, most importantly it may increase the **complexity** as well as **fragility** of the overall system

PROBLEM STATEMENT Draft

- Provides **example** scenarios that the existing **Internet addressing structure itself** is a potential hindrance for service provisioning

  - Communication in Constrained Environments (IoT)
  - Communication within Dynamically Changing Topologies
  - Communication among Moving Endpoints
  - Communication Across Services
  - Steering Communication Traffic
  - Communication with built-in security
  - Communication in Alternative Forwarding Architectures

- Revolves around following **question**:

  > Should limited domains purely rely on IP addresses and therefore deal with the complexity of translating any semantic mismatch themselves, or should flexibility for supporting those limited domains be a key focus for an evolved Internet addressing?

GAP ANALYSIS Draft: Main Flow of the Document

- Focus on 3 key properties for Internet Addressing
  - **Fixed Address length** through 32/128 bit length
  - **Ambiguous Address Semantic** with explicit locator and implicit identifier
  - **Limited Address Semantic Support** with mainly prefix-based only semantics

Section 2

- Outline extensions to those key properties
  - Position those extensions as attempts to fill **identified gaps** in properties through point solutions to overcome them

Section 3

- Identify issues with those extensions
  - Which may be solved with an evolved addressing

Section 5

OPEN QUESTIONS to the Panelists and the Community

- Have the extensions shown that **gaps to addressing** have been identified by the Internet community?
- Are the identified issues worth thinking of **different approaches** to addressing the identified gaps?
  - Do we think we can avoid the issues or just uncover others?
- Do you agree that an architectural approach is required that makes **extensibility** of addressing a key principle to future Internet addressing?
  - Or can we afford to continue doing what we have done so far?
- Are there **contributors to this discussion** who would want to work with us to push the discussion and associated material further?

DISCUSSION

Internet Addressing - Problem Statement and Gap Analysis

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Structure of a Network Address

Routing & Addressing Side Meeting IETF 112 (Online)
November 2021

Dino Farinacci
lispers.net

In a Nutshell

- For Applications
  - Addresses should be opaque
  - They should be endpoint identifiers
  - They can have structure for mobility but app doesn’t know or care about it
  - Applications should not know if an address is unicast, anycast, or multicast
- For the Network
  - Must be topological locators with structure
  - Must be power-of-2 aggregatable
  - Overlay mapping databases must be aggregatable at EID and Locator level
- The Futures of Addresses
  - Need to be small for packet compressibility
  - Need to be long for various levels of aggregatabiltiy
  - Web3 distributed apps will use public keys for addresses (blockchain wallet addresses)

University of Applied Sciences

HOCHSCHULE EMDEN·LEER Networked Systems

Internet Addressing

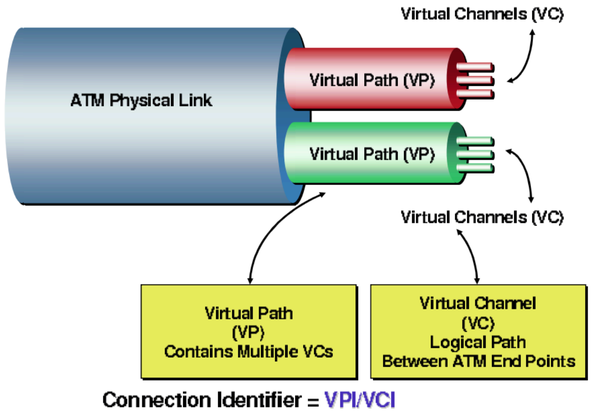
IETF-112 Side Meeting on Problems and Gaps

Dirk Kutscher
2021-11-08

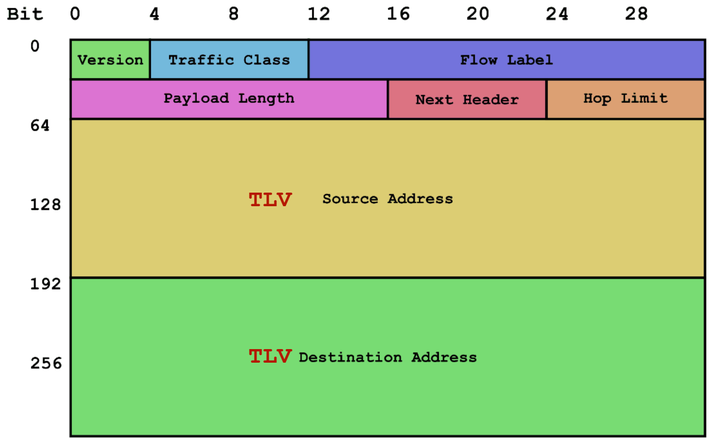
Network Design in the Course of Time

Are We All too Blinded by Our Success?

Bell-head approach to packet networking



IP-head approach to Internet evolution



Addressing is NOT the Problem

Architecture before Packet Formats

- **IP (v4 & v6) designed to do a few things well**
  - Scalable end-to-end communication
  - Enabling the design of resilient, adaptive networks
  - Address format designed to match requirements
  - Additional enablers to match: DNS, BGP
- **Widely deployed Internet protocols and shifted requirements**
  - Host-based e2e not the main use case anymore
  - Instead: connecting eye-balls to content (and compute functions for that)
  - Cf. amount of "subscriber" traffic sourced from peering vs. CDN
- **Problems today**
  - Operational complexities in managing overlays (one per service/CDN provider)
  - Problematic security & privacy and trust infrastructure
  - Surveillance industry dystopia
  - Brittleness of centralized systems (cf. recent events)
- **Some root causes**
  - Myopic, business-driven kludge development (resort to network management...)
  - Network layer limitations wrt supporting new use cases directly (hence overlays)
- **New address formats will not fix this**
  - Addressing is a consequence of architectural decisions
  - Much harder topic – but let's turn the discussion from its head onto its feet...

Internet Addressing Problems and Gaps

Nirmala Shenoy

Rochester Institute of Technology, NY

Internet Addressing Problems

- Variety of communication domains and domain specific addressing needs
- Internet id the forwarding platform for most domains
- Limitations of fixed length addresses
- Semantics issues

Preferred Solution /Issues

- Preferred a single holistic addressing
- Issues
  - Can it satisfy current /future domain specific needs
  - Current /future domain specific security needs

Major challenges to Investigations

- How to interwork with the variability in limited domains (current and future)
- Do we modify/extend/replace IP / displacing slowly with an interim workable option is viable
- Work on addressing only i.e. data plane perspective – can adversely impact control plane operations – already complex and stressed

Some assumptions to start with

- New limited domains will continue. Retrofitting is not efficient
- IP has to be accommodated for in the interim
- Security – domain specific

A good place to start

- A robust (Simple) mechanism to embrace limited domains today/tomorrow and IP
- GOAL – deliver from one end point to another
  - Least impact on domains
  - Structure /locations based addresses can encapsulate limited domain and IP packets for delivery.
    - MORE IMPORTANTLY - can also simplify routing

Drafts can be Reviewed at INTAREA WG:

1) Internet Addressing: Problem statements (https://datatracker.ietf.org/doc/draft-jia-intarea-scenarios-problems-addressing/)
2) Internet Addressing: Gap analysis (https://datatracker.ietf.org/doc/draft-jia-intarea-internet-addressing-gap-analysis/)

THANKS!

Welcome **Feedback** in the **INTAREA WG Mailing-List**

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