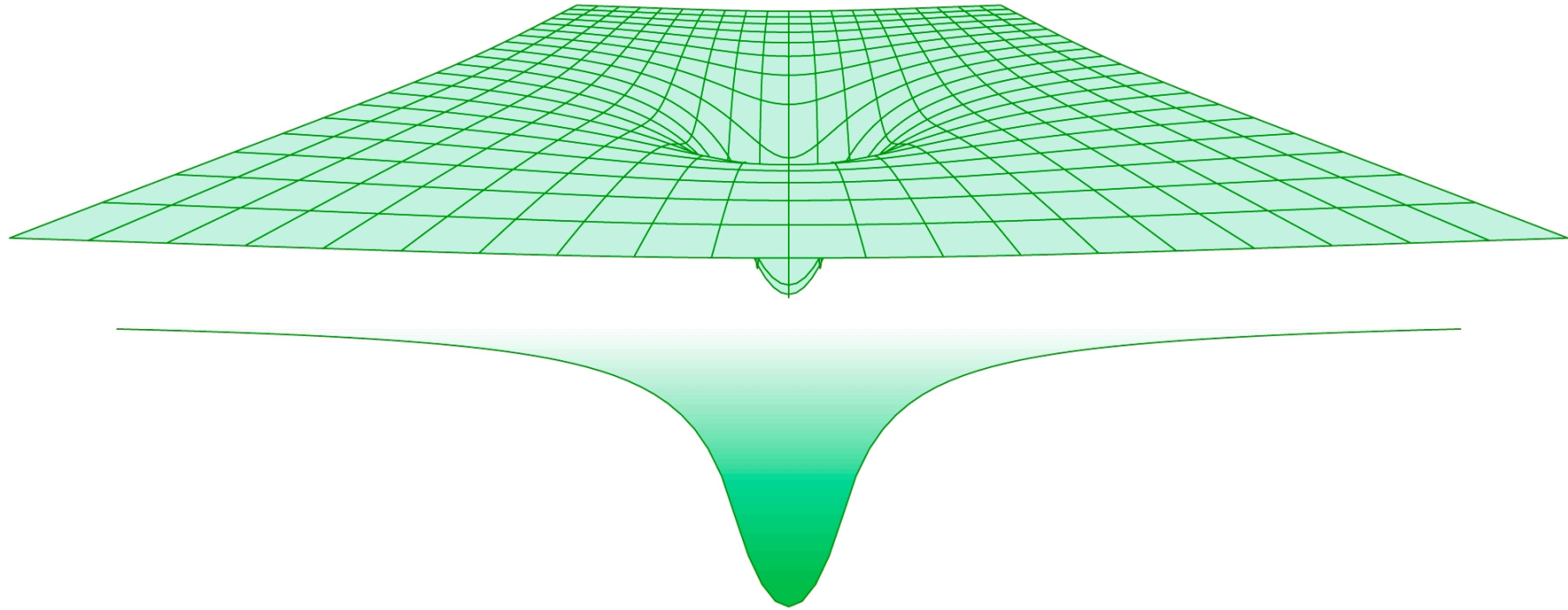


**ARCHITECTURAL CONCERN IN FOCUS**  
**CENTRALIZATION**  
**PERSONAL VIEWPOINT AND POINTERS**



**IAB OPEN SESSION, IETF-110, MARCH 2021**  
**JARI ARKKO, ERICSSON RESEARCH**

# WHAT IS THIS ABOUT?

- › **Centralized service deployment** – Providing services by a single entity rather in a collaborative fashion; the service can be at a single location or distributed, but all under the control of a single administrative domain
  - Some services are naturally under single control (web sites, authoritative DNS)
  - Other services can be provided in either collaborative or centralized manner (also a matter of degrees)
- › **Internet consolidation** – increasing control over internet infrastructure and services by a small set of organizations
- › The IAB has heard a clear message from the community that these topics are important
  - We also understand it is a complex topic, large parts of it is non-technical, and that difficult tradeoffs are involved, and has various viewpoint (doesn't mean that we should ignore it)

# DOES IT MATTER?

- › Market consolidation and centralization can be good

  - Technology adoption

    - Can be as easy as a flick of a switch if you control large number of parties on both sides of a communications channel

  - Hiding in a crowd

- › But there are also some serious drawbacks

  - Overall Internet resilience, interoperability, ability of new entrants to enter, ...

  - Unwelcome interest to user data

    - Even well-meaning services with, say, access to everyone's browsing history, will hear from governments & shareholders

- › Often a reinforcing cycle of economics is involved

  - A service gets improved, attracting more users, being able to improve the service further, at some point collaborative models or competing services start to suffer, at which point users do not have a lot of choice, which allows the winning service to evolve the service to a direction that suits it

# PAST AND CURRENT WORK ON THE TOPIC

## **RFC 1958:**

This allows for uniform and relatively seamless operations in a competitive, multi-vendor, multi-provider public network.

...

Heterogeneity is inevitable and must be supported by design.

## **RFC 3935:**

We embrace technical concepts such as decentralized control, edge-user empowerment and sharing of resources, because those concepts resonate with the core values of the IETF community.

# PAST AND CURRENT WORK ON THE TOPIC

- › Internet Society Global Report “Consolidation in the Internet economy”, (<https://future.internetsociety.org/2019/>)
- › Journal of Cyber Policy special issue on consolidation (<https://www.tandfonline.com/toc/rcyb20/5/1>)
- › IAB DEDR workshop ([iab-dedr-report](#)) + a bit in Covid-19 workshop
- › Some unfinished works: “choke points” work by Nottingham et al
- › Various older and newer I-Ds: [lazanski-consolidation](#), [arkko-arch-infrastructure-centralization](#), [arkko-iab-internet-consolidation](#), etc.
- › Ongoing effort at the IAB to consolidate what we’ve learned 😊

# JOURNAL OF CYBER POLICY SPECIAL ISSUE

Sponsored and initiated by Internet Society (thanks!)

- › [On market concentration and cybersecurity risk](#) (Geer, Jardine & Leverett)
- › [The influence of internet architecture on centralised versus distributed internet services](#) (Arkko)
- › [Consolidation in the DNS resolver market – how much, how fast, how dangerous?](#) (Radu, Hausding)
- › [What lies beneath: transparency in online service supply chains](#) (Cobbe, Norval & Singh)
- › [Unpacking interoperability in competition](#) (Riley)
- › [Evaluating competition in the Internet's infrastructure: a view of GAFAM from the Internet exchanges](#) (Sowell)
- › [Reshaping the internet – the impact of the securitisation of internet infrastructure on approaches to internet governance: the case of Russia and the EU](#) (Claessen)

# SOME THOUGHTS FOR GOING FORWARD

- › Taking to heart that this is important but also a complex topic
- › Avoiding the desire to make this a debate of the extremes
  - Unlikely that we'd move to entirely-p2p or everything-centralized
- › Understanding is the step before doing something useful
  - Awareness of the issues, tradeoffs, and impacts
  - Measurements and data
  - Information is helpful for engineers and non-engineers like
- › There are potentially helpful technical things
  - E.g., if the problem is only one <BLAA> gets used, can we get client-side software discover the available <BLAA>s and use them?
  - Don't hold your breath for revolutionary, all-changing solutions

