draft-mcfadden-consolidation-taxonomy-03

A Taxonomy of Internet Consolidation

Much Excellent Discussion on Consolidation

- And, the impact by/on the IETF
  - See the 2019 IAB Workshop
  - ISOC White Paper from 2019
  - Full Issue of the Cyber Policy Journal, 2020
  - "Internet Centralization: What Can Standards Do?“
    - https://datatracker.ietf.org/doc/draft-nottingham-avoiding-internet-centralization/
  - Much peer-reviewed academic work (too numerous to mention specifics)
  - On the Effects of Internet Consolidation
    - https://datatracker.ietf.org/doc/draft-mcfadden-cnsldtn-effects/
  - And, much more . . .

Is There a Definition of Consolidation?

- Yes. In fact, several – from our own community.
- Arrko:
  - "the process of increasing control over internet infrastructure and services by a small set of organizations.“
- Nottingham:
  - “the state of affairs where a single entity or a small group of them can observe, capture, control, or extract rent from the operation or use of an Internet function exclusively.“
- ISOC:
  - “growing forces of concentration, vertical and horizontal integration, and shrinking opportunities for market entry and competition”

Why a Taxonomy?

- Because people are talking about consolidation . . .
  - . . . But, often, are talking about different things
- It's evidence that that consolidation is not just real, but it has effects in different ways
- And, consolidation is viewed from different perspectives by different stakeholders

A Taxonomy and the IRTF (IETF)

- Others have discussed the relationship between standards and consolidation
  - That's not the topic here, but that conversation continues . . .
- Instead, this is intended as research into the kinds of consolidation that other researchers, protocol designers and others identify
- The rechartered DINRG seems a perfect place to do this work

Taxonomy

- The current draft breaks consolidation into four main categories
  - Economic consolidation
  - Traffic and Infrastructure consolidation
  - Architectural consolidation
  - Service and Application consolidation
- A few words about each category . . .

Economic Consolidation on the Internet

- Many authors and researchers point to the dominance of a small number of market players
- The ISOC 2019 White Paper is notable for its particular emphasis on this category
  - ". . .a handful of actors play a significant role in our increasingly-connected societies. In this context it's important to consider what the implications of those trends are. . ."
- Other authors suggest that economies of scale are the primary cause of consolidation (this is a very common theme)
- This economic reality is the source of some gloom in certain quarters (for instance, is regulation even possible?)

Traffic and Infrastructure Consolidation

- Others note how traffic flows and infrastructure provision has changed (and, identify that as separate from economics)
- In certain markets, access is dominated by a small group
- Services like CDNs and other modern infrastructure has high costs of provision and thus, a limited number of players
- In the mobile space, dominant, incumbent operators had first mover advantage (and dominate many markets) because of the infrastructure that was in place

Architectural Consolidation

- The end-to-end principle is a historic footnote
- The rise of intermediaries
  - Intermediaries dictated by protocol design
    - We've always had http proxies, but consider . . .
    - Privacy Pass, OHAI, and other protocols that depend on intermediaries to provide solutions to use cases
    - Some protocols require a small number of intermediaries for the protocol to work successfully
- An older argument was – "consolidation is not an issue for the IETF"
  - Protocol design in the last five years has demonstrably changed that

Service and Application Consolidation

- One-stop shops
  - Few run their own SMTP/IMAP/POP3 server anymore
  - Google alone holds 90% of the global search market, over 60% of web browsers, the number 1 (by far) mobile operating system (Android), the top user-generated video platform (YouTube), and has more than 1.5 billion active users of its email service (Gmail).
  - Tencent owns WeChat, China's biggest social media platform, with more than 1 billion monthly active users. Tencent's stable of platforms, including QQ, WeChat, and various Tencent branded social media and content offerings, demand almost 4 times as much user attention as any other service.
- The size of these dominant companies (and, those like them) is due to network effects and their presence beyond simply the application layer

Goal of this Draft

- Many viewpoints on consolidation
- Organize our thinking and discussion be having some clarity on what we are talking about
- Contribute to further research by providing a framework for thinking about consolidation (in its many forms)
- Looking for:
  - Comments on whether the taxonomy is granular enough?
  - Are there things missing?
  - Are there things that would be useful to see in a subsequent draft?

Questions?
Comments?