A quick summary of DINRG Workshop on Centralization in the Internet
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All meeting materials:
https://datatracker.ietf.org/meeting/interim-2021-dinrg-01/session/dinrg

Workshop recording: https://youtu.be/1kbsbvjb1zu
Many Efforts in Identifying & Mitigating Centralization

A rather incomplete list:

- Centralised Architectures in Internet Infrastructure: draft-arkko-arch-infrastructure-centralisation-00
- Protocol and Engineering Effects of Consolidation: draft-lazanski-consolidation-04
- Centralization, Decentralization, and Internet Standards: draft-nottingham-avoiding-internet-centralization-05
- Internet Threat Model Evolution: Background and Principles: draft-arkko-farrell-arch-model-t-redux-01
- Security Considerations for Protocol Designers: https://datatracker.ietf.org/doc/draft-lazanski-protocol-sec-design-model-t/05/
The goal of DIN RG 2021 workshop

• To find effective cure, we want to first identify the root cause
  • What are the driving forces?
  • How did consolidation/centralization happen?
  • What can be learned from what we’ve observed?

• Caveat
  • The discussions were limited in scope
    • Mostly focused around app service centralization
  • One effort into exploring the problem space; more needed
From History to Today: Market Centralization Is Not New

• Observation from the history:
  • Economy of scale drives consolidation, resulted in centralized control over industry sectors
  • Big corporates’ interests ≠ user and society’s interest
  • Regulations necessary: 1890 Sherman Antitrust Act
    • prohibiting companies from colluding or merging to form an effective monopoly

• Internet industries today: followed the footstep of the past giants
  • Past giants exploited labor force to accumulate profits
  • Internet giants accumulated personal data to profit from advertisement
Some specifics (I)

- Internet centralization started with companies investing into providing needed new services
  - Search, email, social networking ...
  - More services added over time

- Positive feedback loop:
  - More users ⇒ more inputs for better services ⇒ attract more users, get higher revenues

- Proliferation of free services ⇒ surveillance economy
  - The more the app providers know about specific users ⇒ the better services
  - AND the more influence they have over users, blurring the line between service and implicit control
Some specifics (II)

- Networking started from dominance of carriage
  - Then moved to dominance of platforms
  - Then the dominance by application services

فائـ: Over time the locus of value and money shifted up the protocol stack
  - Where one can exploit centralization with minimized cost
  - Lower layer services became commodity services
Some specifics (III)

- Application service providers seem taking over the control of everything, creating their own ecosystem
- Decentralized competitors likely face uphill battles against centralized monopolies
  - Decentralized solutions requires standards
  - Standard developments cost efforts and time
  - It is far easier, simpler, and faster for monopoly service providers to develop new apps, add new features
Can Network Protocols Prevent Centralization?

• Protocols simply facilitate the movement of packets from one place to another
  • As carriers, protocols do not dictate where packets go
  • It is application deployments who make that decision.
Why early decentralized apps got consolidated

• In early days of Internet, organizations ran application servers to provide services for their users
  • they were not doing it as revenue generating business

• Once network apps becoming revenue-generating businesses: economy of scale drives towards consolidating all
  • Bigger sizes $\implies$ afford more investment in better services, defense against failures/attacks $\implies$ make outsourcing services more attractive $\implies$ more organizations outsource services

security threats increased over time too
The majority of Web content delivery increasingly concentrated on a few companies that provide Content Delivery Infrastructures (CDIs) such as Content Delivery Networks (CDNs) and cloud hosts.

Contributing Factors to Centralization

- Driven by Economy of Scale, applications Got Centralized

- Security Threats Further Intensified Centralization
What to take away

• Today’s centralization resulted from few regulatory constraints on a market driven by economy of scale
  • Economy of scale motivates corporations to grow big
  • Major concern: their control power & influence over users and society

• Security challenges
  • Today we absorb DDoS attacks as the means of mitigation
    • Only massive systems have capabilities to absorb all forms of DDoS
  • Limitation of the existing web security framework
    • user – user communications are thru cloud apps
  • Difficulties in developing/deploying security solutions
Reflections

• The society thrives on the balance between economy, regulation, and technology
  • Today’s balance tilted to economy
  • Regulations: exactly what to regulate and how?
  • Technologies: falling behind security threats

• Effective regulation and legislation will be a deciding factor in curtailing unconstrained market

• The technical community must act
  • Help the regulatory sectors on what/how to regulate
  • Work with regulations in concert by providing new security solutions
    • Effective solutions to curtail DDoS threats
    • Direct user-to-user communications for new generation of apps
What’s next

• Further discussions needed
  • Consolidation did not happen overnight, a full comprehension also takes some time

• Making DINRG as a focal point to collect all related inputs and to organize discussions?

• Questions to ponder:
  • What do we wish see as the “ideal” outcome? that can take into account/balance out
    • The benefit from big data, the gain from economy of scale
    • Users’ privacy and sovereignty
    
    Can we gain back the control without necessarily dissolving the giants?
  
  • What regulations to suggest?
  • Proposing new regulations requires hard evidence: what to collect?
Next step

• **Discussion**
  • What is missing?
  • Suggested directions?
  • Suggested ways of working?

• Limited time today – let’s try to get as many good ideas as possible
  • Limit contributions to about 3 minutes
  • Defer in-depth discussions to list and next meeting