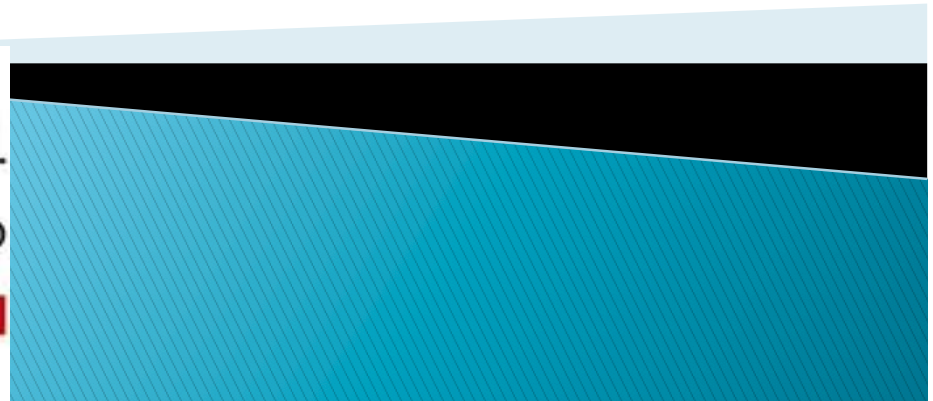


Challenges to European Internet Business Models: Governing a fragmented internet

Jonathan Liebenau & Silvia Elaluf-Calderwood
Department of Management

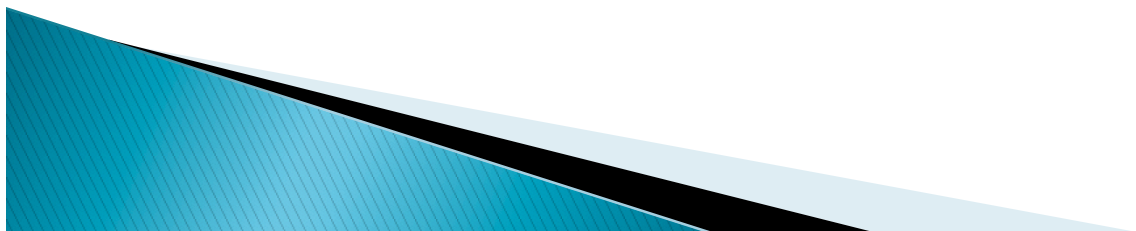


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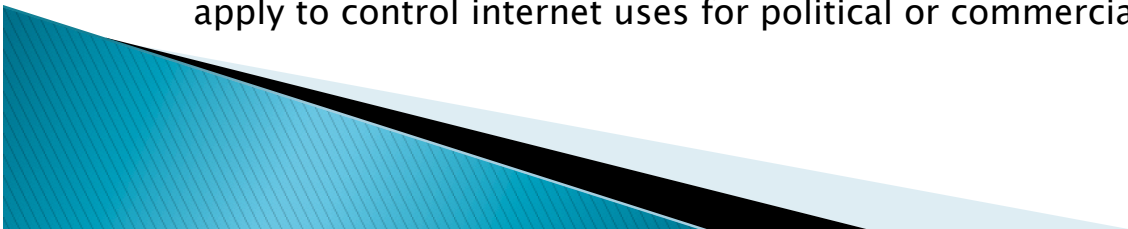


Modular activities in the digital economy are characterised by

- ▶ functional relationships that knit together technical forms of interaction, as for example facilitated by application protocol interfaces [APIs] and social network linkages,
- ▶ commercial functions such as online shops, advertisements and personal data useful for customer relationship management [CRM] uses.
 - Increasingly, those engaged in transport, content delivery and connectivity have explored ways of integrating those increasingly commoditized functions with more value added activities in specialist software, content creation and services.
- ▶ This has opened new areas of competition and challenged longstanding notions of industry structures, strategies and policies.
- ▶ It has also forced regulators to reconsider their roles and the measures they have with regard to market forming.



- ▶ Increasingly, however, leading internet companies such as Amazon, Google and Apple have successfully been able to use the vertical integration of internet functionalities to create value in digital services. While first mover advantage (Fransman, 2010), larger home markets, and competitive superiority can explain some aspects of these companies' market positions, US regulatory practices have also been important in fostering modular-type business strategies. European competitors have felt more constraints to specialize and operate within a layer, furthering opportunities for US companies to dominate. These firms have mastered the use of digital platforms to deliver services in more than one layer of the internet. They are adept at devising new business models that encase lucrative proprietary goods and services that integrate across layers, while designing broadly flexible interfaces that allow them to reach mass markets.
- ▶ European technology companies and in particular the telecommunication industry sector have failed to follow this path and respond to the US dominance in the sector, even when they had the strategic advantages or were innovators in the field (e.g. Nokia in the mobile sector). Some of these failings are attributable to inefficiency, inadequate innovation and in some cases incompetence of European business decision makers versus their US counterparts. There are also structural and governance inhibitors, and regulators in Europe have ignored the modular aspects of the vertical integration in the use of the internet to focus their policies on ensuring access instead of traffic generation when developing regulatory policies.
- ▶ Modularity does not necessarily presuppose fragmentation. However, it does offer design choices that allow simultaneously for integrative digital functions and scalability through easily accessed interfaces. Those same features have two kinds of tradeoffs. One concerns innovation choices and the imposed stability of technologies within modules. The other allows for choices of interfaces that might promote the antithesis of integration. The latter is at the core of some net-neutrality discussions because it describes how proprietary or favoured services can be structured. It is also relevant for choices of governance that nations might apply to control internet uses for political or commercial reasons.



Report	Comments	Economic Analysis
Collectors of traffic counters connected to routers (e.g. CiscoVNI data)	Information based on Cisco's own collection. Considered industry benchmark. Lots of exceptions. No QoS. Traffic is analysed in categories that are not matched by other industry reports	No correlation between traffic and pricing., but regular reports comment on economic context.
Reports from firms generating traffic	Google, YouTube, Facebook http://www.google.com/transparencyreport/traffic/#expand=TJ%20or	No indicators for comparison
Classification of traffic: e.g. Sandvine	Focus sectors e.g. entertainment, home roaming, comm services. Sandvine Global Internet Phenomena Report	Some based primarily on billing, by type of traffic
Academic studies on the internet e.g. Economides	Theoretical and practical academic analysis of current status of the internet	Yes. Some of the pricing is indirectly estimated
Consultancy reports commissioned by interested parties	(incumbents, consumer groups, industry assoc., etc.) e.g. BCG, ATKearney (2013) Report on traffic and demand based on ETNO members data	Yes, based on own commissioned calculations
Regional, national, state regulatory frameworks	FCC http://www.gpo.gov/fdsys/pkg/FR-2011-09-23/html/2011-24259.htm	Yes. Based on specialized studies FCC commissioned

Explanation of Traffic Categories

The table below describes each of the traffic categories used in the Global Internet Phenomena Report: 2H 2013

Traffic Category	Description	Examples
Storage	Large data transfers using the File Transfer Protocol or its derivatives. Services that provide file-hosting, network back-up, and one-click downloads	FTP, Rapidshare, Mozy, zShare, Carbonite, Dropbox
Gaming	Console and PC gaming, console download traffic, game updates	Nintendo Wii, Xbox Live, Playstation 2, Playstation 3, PC games
Marketplaces	Marketplaces where subscribers can purchase and download media including applications, music, movies, books, and software updates	Google Android Marketplace, Apple iTunes, Windows Update
Administration	Applications and services used to administer the network	DNS, ICMP, NTP, SNMP
Filesharing	Filesharing applications that use a peer-to-peer or Newsgroups as a distribution models	BitTorrent, eDonkey, Gnutella, Ares, Newsgroups
Communications	Applications, services and protocols that allow email, chat, voice, and video communications; information sharing (photos, status, etc) between users	Skype, WhatsApp, iMessage, FaceTime
Real-Time Entertainment	Applications and protocols that allow “on-demand” entertainment that is consumed (viewed or heard) as it arrives	Streamed or buffered audio and video (RTSP, RTP, RTMP, Flash, MPEG), peercasting (PPStream, Octoshape), specific streaming sites and services (Netflix, Hulu, YouTube, Spotify,)
Social Networking	Websites and services focused on enabling interaction (chat, communication) and information sharing (photos, status, etc) between users	Facebook, Twitter, LinkedIn, Instagram
Tunneling	Protocols and services that allow remote access to network resources or mask application identity.	Remote Desktop, VNC, PC Anywhere, SSL, SSH,
Web Browsing	Web protocols and specific websites	HTTP, WAP browsing

Figure 2: Sandvine explanation of traffic categories (Sandvine, 2013)

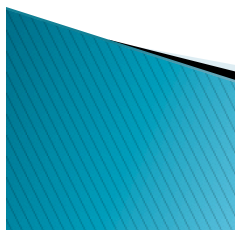


TABLE 1: METRICS AND MEASURES FOR INTERNET INFRASTRUCTURE AND ACCESS

Metric	Data Sources
Penetration	<ul style="list-style-type: none"> • Business surveys: total number of subscriptions • Household and consumer surveys: proportion of houses connected to Internet/broadband
Speed	<ul style="list-style-type: none"> • Business surveys and market research: advertised speeds (e.g., OECD, FCC) • Content delivery networks and web services: download speeds (e.g., Akamai, Netflix) • Distributed client-side hardware: download and upload speeds (e.g., government partnerships with SamKnows) • Crowdsourcing: download and upload speeds (e.g., Ookla's Speedtest, M-Lab)
Price	<ul style="list-style-type: none"> • Market research: comparison of offers across different ISPs and countries (e.g., OECD, FCC) • Crowdsourcing: user-submitted information on prices (e.g., Ookla's Net Index)
Infrastructure: location, size, and routing	<ul style="list-style-type: none"> • IP address distribution • Allocation of domains • Number of Internet hosts • Number, size, and relationships of autonomous systems (AS) • Network bandwidth estimates • Internet exchange (IX) location and traffic • Route identification and analysis • National network status (e.g., Renesys, Arbor Networks) • International pipe location, traffic, and dependencies

Figure 3. Definition of metrics by the Berkman center ((Faris and Heacock, 2013)

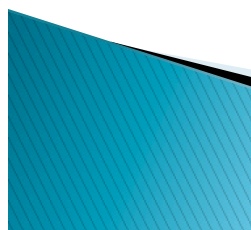


TABLE 2: METRICS FOR INTERNET CONTROL

Metric	Data Source(s)
Take-downs	<ul style="list-style-type: none"> • Business self-reporting (e.g., Chilling Effects, company transparency reports) • Content tracking (e.g., studies on the removal of Weibo posts)
Filtering	<ul style="list-style-type: none"> • Business self-reporting (company transparency reports) • Distributed data collection and analysis (e.g., OpenNet Initiative, OONI) • Crowdsourced reports (e.g., Alkasir, Herdict) • Automated tools: websites, keywords (e.g., GreatFire, Is It Down Right Now) • Social / media reports • Leaked block lists
DDOS	<ul style="list-style-type: none"> • Distributed network data gathering (e.g., Arbor Networks, Akamai, Google) • Surveys of websites and services • Social / media reports
Malware and other attacks	<ul style="list-style-type: none"> • Malware analysis and signatures (anti-virus) • Malware hosting (e.g., StopBadware, Google) • Response coordination (e.g., CERT)
Legal restrictions	<ul style="list-style-type: none"> • Legal analysis • Social / media reports
Non-technical controls	<ul style="list-style-type: none"> • Watchdog group reports • Social / media reports
Self-censorship	<ul style="list-style-type: none"> • Surveys of Internet users and online organizations

Figure 4. Methods for internet control. Source Berkman Center (Faris and Heacock, 2013).

Figure 5: Data sources for online activity. Source
Berkmann Center (Faris and Heacock, 2013).

TABLE 3: DATA SOURCES FOR MEASURING ONLINE ACTIVITY

General Data Type(s)/Origin(s)	Specific Source(s)
Reporting on individual behavior	<ul style="list-style-type: none">• Client-side behavioral monitoring software (e.g., ComScore, Alexa)• Cookies and browsing history• Consumer surveys
Network monitoring: location, type, and quantity of traffic	<ul style="list-style-type: none">• Monitoring by ISPs• Monitoring by network services (e.g., content distribution networks, Internet security companies)
Data collection by websites and services: visitors, contributors, content, links, comments, languages, locations	<ul style="list-style-type: none">• Websites, including social media platforms (e.g., user-generated content sites, social network sites, blogging and micro-blogging sites)• Search data
Social media mapping: link- and/or content-based	<ul style="list-style-type: none">• Landscape mapping: platform/service-based mapping (e.g., Twitter, Facebook, blogosphere)• Topical or issue-based mapping
Qualitative assessments	<ul style="list-style-type: none">• Expert opinion surveys



The key criteria required are:

- ▶ *What the disaggregated characteristics of traffic are by type of traffic.* This would include differences between kinds of data, not only by routing through mobile systems, voice services, etc. but also by kinds of video services, differentiating, for example, streaming videos from surveillance cameras, etc.
- ▶ *How interconnections occur and what their business functions are.* This will need to take into account application protocol interfaces [APIs] as well as other methods to transfer data.
- ▶ *A relationship between descriptions of routing and the trajectory of disaggregated traffic* such that we can understand the extent of double counting. This would take into account the traffic that remains within specific networks as well as those that move between networks through peering and transit arrangements.
- ▶ *A direct link between pricing for traffic carriage and the cost of generating and maintaining networks.*
- ▶ *We also require an open debate on metrics collection and repositories of data,* which includes both open and walled internet data.



- ▶ European regulators cannot remain focused on earlier network forms and models.
- ▶ However, the drive for regulation to satisfy new demands for privacy are emerging, and are threatening US-based companies in their effort to provide data assurances for cloud services. New regulatory practices will be put in place to protect data that is geographically sensitive. New business models may emerge for international customers, perhaps to offer some customers contracts that specify their data is NSA-monitored and some non-monitored.
- ▶ Such trends, and the demand that we understand better the underlying economic indicators, require new internet metrics that can discern the ways in which new business practices will be priced and negotiated.

