

Implications of OTT Services for the Regulation of Telecommunication Services

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ACCC/AER Regulatory Conference 2016

August 4, 2016



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Overview

- 1 Introduce OTT services and relevant details of provision
- 2 Overview of two sided platforms
 - ISPs are two sided platforms
 - So too are many OTT services
- 3 OTT implications for telecom operators
- 4 OTT telecom service implications for regulation of telecom services
 - Individual services (text messaging and local telephony)
 - Retail versus wholesale regulation
 - Bundling
- 5 Foreclosure issues related to vertically integrated ISPs
 - Input foreclosure
 - Customer foreclosure



Internet Technology

- Think of the internet as four mutually independent layers:
 - Physical layer is the network
 - Logical layer is the protocol governing data transmission on the network
 - Application layer is the application that interprets, sends, and receives the data
 - Content layer is what the application creates from the data received
- Independence of the layers means that the internet is modular
 - Compatibility between different layers means a service provider does not have to be vertically integrated across all four layers
- Internet is open
 - Logical layer—the Internet Protocol (IP)—is non-proprietary. This means that anyone can develop a compatible physical or application layer
- Over the Top (OTT) Services are examples of applications that take advantage of this modularity



Over the top (OTT) services

- Accessible with broadband access
 - Complementarities between OTT service and ISP
- OTT service are access independent services
 - OTT services are provided on the “open internet”
 - Not strongly linked with the network, in particular independent of the network of subscribers’ ISP (last mile)
- Telecommunication Services
 - Instant messaging and Voice over Internet Protocol (VoIP)
- Video or Broadcasting Services
 - Stream video to the premise
- Distinguish between OTT services and managed services
 - Managed services are not provided on the “open internet”
 - Interaction with the network to ensure quality of service, e.g., VoIP on cable network and IPTV on telco network



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Internet service providers are a two sided platform

- ISP attracts subscribers
 - Provides network access to end users
 - Access itself is not valued per se, only of value if it results in a connection with content and service providers (CSPs)
- ISP network also connects, directly or indirectly, with CSPs
 - Subscriber ISP connects with internet backbone providers
 - Internet backbone providers are connected with the ISPs of the CSPs
 - OTT service are examples of CSPs



Types of OTT services

- OTT services can be one sided platforms
 - Charges price to users in return for a service (e.g. cloud storage)
- OTT services can be two sided platforms
 - Market makers
 - facilitate matching and a transaction, e.g., online markets, dating services
 - Audience makers
 - No explicit price charged to subscribers, but provides information/entertainment to users who in return are subject to advertising

Cross platform externalities and two sided platforms

- Usage externality:
 - Participation on the platform creates value for both sides. This means that one side, by its choice, creates costs or benefits for the other side. ISP allows users to utilize an OTT service, it creates value for the OTT service and the user
- Membership externalities:
 - More participants on one side increase the value of participation on the other side. More CSPs that an ISP is connected to, the more valuable accessing the ISP is for subscribers. The more subscribers to an ISP, the more valuable it is for CSPs to be connected with that ISP
 - Audience/Advertising supported OTT service: advertisers benefit from more subscribers, subscribers, in large part are unlikely to benefit from more advertisers. Positive cross platform externality is only on one side. OTT service buys content and sells advertising. More content purchased, more users, and the greater the demand by advertisers to connect with the platform
- Cross group externalities are examples of indirect network effects



Pricing and two sided platforms

- Platform sets a price for each side to maximize profits
- Objective is to attract users in the right proportions
- Right proportions depends on nature of the cross platform externalities:
 - [Usage] A lower price increases the number of transactions, i.e. likelihood of a match. Balancing proportions requires that the side that is scarce receives a relatively low price
 - [Membership] A lower price for the side that has the most impact on the value to the other side
- Skewed prices can be the result
 - Negative or zero prices to one side
 - High prices to the side that benefits from a large installed base on the other side, attracted by the low price



Competition between platforms (ISPs)

- Single versus Multihoming
 - Subscribers single home
 - CSPs multihome
- Subscribers are a bottleneck to competition
 - ISP has a monopoly on access
 - Low prices to attract subscribers
 - High prices to CSPs

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Impact of OTT telecommunication services on telcos

- Relevant OTT services are substitutes for telecom and video services
- OTT services are also complements with broadband access
- OTT telecom and video services have made the revenue model for some telecom services by some providers unsustainable
 - Price based on usage, e.g. price per minute or per text (Voice and SMS)
 - Regulated termination fees
- Some telcos have lost significant market share and revenues
 - Voice and text messaging
 - 90% of all messaging forecast to be OTT messaging in Europe by 2020
- Response has been move to flat rate voice and text messaging by some telcos
 - Parallels to the regulated, and artificial distinction, between local and long distance



Telco pricing adjustments from OTT service presence: the good

- OTT service provides additional value for subscribers on the telco network
 - Value of access depends on services they can access, including OTT services
 - OTT services are valued by subscribers hence the Telco can increase the price for access charged to subscribers
- Telco might benefit and be able to charge higher prices, extracting benefit to subscribers of new OTT services
 - Impact on telco direct if the telco is an ISP
 - Impact on telco is indirect if they provide wholesale access to the ISP



Telco pricing adjustments from OTT services: the not so good

- Rate rebalancing and raising access prices might not be possible or effective
- Market power by the OTT service means that there are pricing externalities between complements
 - Market power in supply of complement, firms do not internalize the benefit on the supplier of the other complement of lowering their price or cost of usage. Hence prices are too high [Cournot effect]
- Telcos can no longer engage in second degree price discrimination. Extract more surplus from high value users by having a mark up on usage. OTT service undercuts the mark up on usage when it is supported by advertising
- The extent of competition in telecom services might be less than the extent of competition for broadband access



Rate rebalancing from cross group externalities

- Two sided pricing suggests the following hypothesis (Peitz and Valletti (2015)):
 - Initially, with advertising supported OTT services, OTT services provide lots of value to subscribers, consistent with high pricing by an ISP for access
 - Through time, as OTT services are able to extract more value from subscribers, then in the absence of net neutrality regulations, the expectation is that prices for CSPs will rise and prices for subscribers will fall. This is a “waterbed” effect
 - Telco extracts rents from CSPs and hence lowers prices to subscribers, increasing demand for, and rents extracted from, CSPs
- Competition among ISPs
 - Low prices for subscribers to acquire the bottleneck and charge high prices for CSP



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OTT service implications for regulation: market power

- When would OTT services mean it is possible to relax regulation of telecom services intended to control market power?
- What are the implications of OTT services for regulatory sanctioned exercises of market power?
 - Recovery of network costs requires raising prices for some or all services above marginal cost
- Do OTT services have market power?
 - Some OTT services may have a bottleneck: their installed base that is incompatible with other services may be a source of market power. Incompatibilities and lack of mandatory interconnection creates switching costs and possibly market power



Market Power

- Ability to profitably raise price above competitive levels
 - Profitably alter characteristics of its products or other aspects of its behaviour away from competitive levels
 - Reduce: (i) quality of its products; (ii) product variety; (iii) level of customer service; and/or (iv) expenditure on research and development below competitive levels
- Raises its price or reduces its supply, market price increases and so does its profits
- Competitive level
 - Economies of scale mean average cost
 - Multiproduct firms means the number of firms adjust such that margins and variable profits across all products result in the marginal firm breaking even



Determinants of Market Power

- What are the substitution alternatives of a firm's customers?
 - Willingness and ability to substitute or switch or divert their demand to:
 - Other suppliers of the same product [ability determined by competition in the market]
 - Other products [willingness determines market definition]
- Willingness and ability to substitute impacts the ability of a firm to exercise market power
- Costs of exercising market power depend on the service's margin
 - Winner takes all, then aggregate margin across all services lost, losing a premise is more costly than losing a single service
 - Benefits of exercise depend on extent of inframarginal units
 - Larger remaining base of subscribers, more profitable to raise price



Telecom services

- Telecom service by telco
 - Bundle of complements = network + service
- OTT application
 - Bundle put together by subscriber from separate suppliers
 - Broadband access plus Application
- Telecom service and substitute OTT applications are system goods. A system good is composed of a set of compatible components that produce consumption services
- Telecom attempts to exercise market power in the telecom service
- Marginal impact of OTT services
 - Additional avenue for substitution
 - Existing avenues might include Interplatform (Cable, Wireless) and Intraplatform (Resale, Bitstream, ULL) avenues



Extent of substitution to OTT service

- Consumers' ability to switch
 - Subscribers already have broadband access
 - Wireline or wireless
 - Subscribers do not have broadband access
- Those with broadband access much less costly to switch
 - Comparison at margin
- Those without broadband access may also find it optimal to switch
 - OTT service plus broadband
- Consumer willingness to switch depend on
 - Price of alternatives
 - Product characteristics of alternatives including: (i) location specific services (e.g., emergency); (ii) interconnection and (iii) quality. Key consideration will be any cost or quality advantages to the Telco service from being able to offer a managed service
 - Switching costs: e.g., number portability or lost network benefits



Text messaging I

- Broadband availability and adoption is critical
- Limited bandwidth required
 - Wireless access and competition in wireless
 - Smartphone penetration
 - Wifi access
- Substitute to lower marginal cost service
 - Avoid per message pricing
 - OTT text messaging funded by advertising



Text messaging II

- Coordination problem if OTT messaging is not compatible
- Incentive to solve is much lower prices for subscribers
 - OTT service is financed by advertising
 - Ability enhanced by coordination strategies of others
 - Device manufacturers
 - Social media bundle (add onto an existing platform, e.g., Facebook and Facebook Messenger)
 - Multihoming by subscribers
 - Aggregation service facilitate multihoming
- Prima facie case that OTT text messaging services are an additional significant competitive constraint



OTT text messaging

- Global phenomena (and this ignores Apple's iMessaging)

OTT	Number of Users
WhatsApp	1 billion
Facebook Messenger	1 billion
WeChat	762 million
Viber	249 million
Line	218 million
Kik	200 million

Source: C. Cockburn, "Off the Chart," *Globe and Mail*, 15 July 2016 B1 and J. McConnell, "Facebook Messenger now has one billion users, and its VP says service is 'just getting started'," *National Post*, 20 July 2016.



Local telephony I

- Broadband penetration and conditions of supply
 - Penetration of wired broadband
 - Competition in broadband
 - Access regulation in broadband
 - Penetration of wireless broadband
 - Competition in wireless and extent of smartphome adoption
- Limited bandwidth of voice
- Pricing of local telephony
 - Flat rate versus usage charges
 - OTT platform supported by advertising



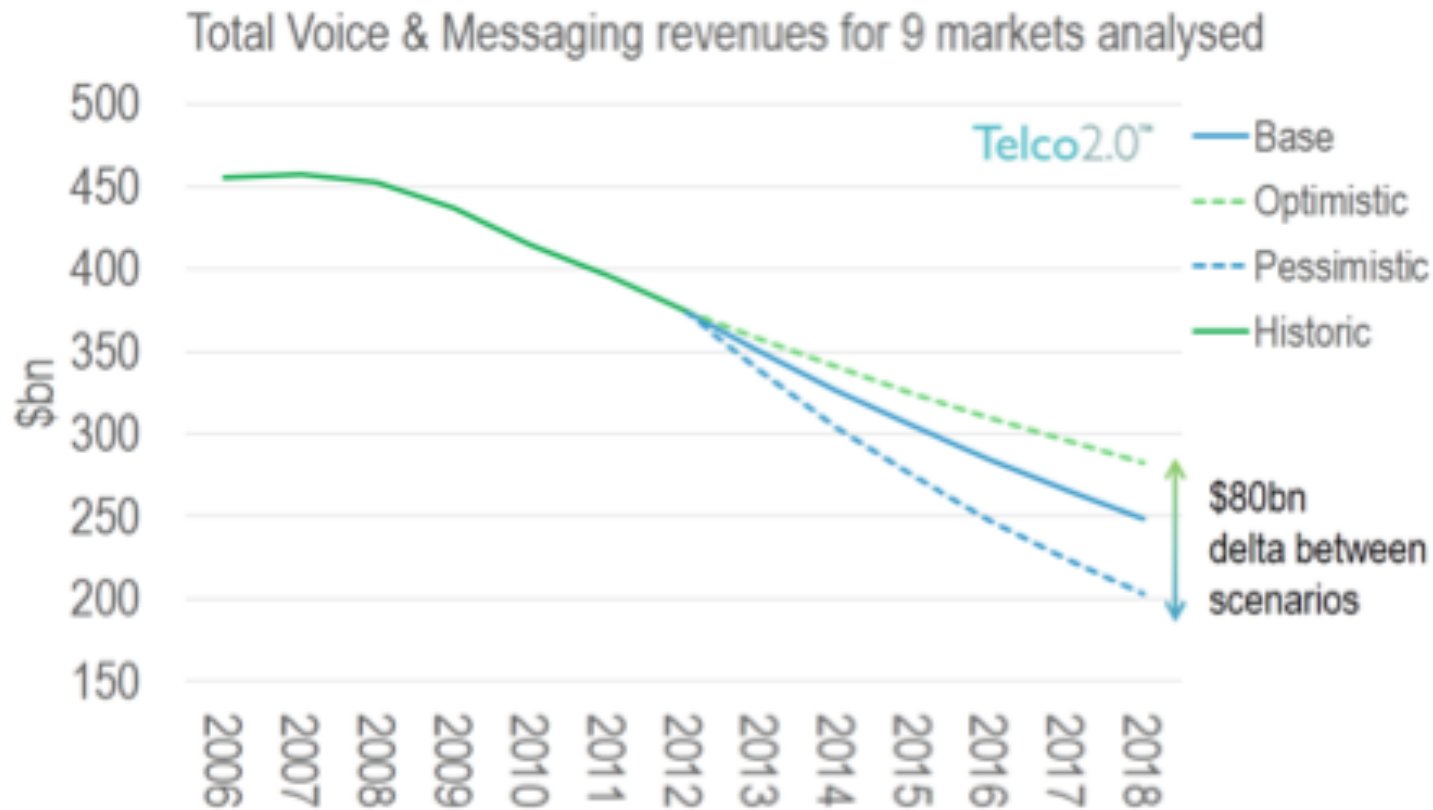
Local telephony II

- OTT applications have similar functionality, quality, and reliability?
 - PSTN access
 - Quality of service
 - Can access independent VoIP providers pay for priority?
 - What is the frequency and extent of usage of subscribers?
- Number portability and other switching costs
- VoIP less certain the significance of competitive constraint
 - Appear to be a function of quality of the open internet. With increased investment in bandwidth, the difference in quality between a managed service and an OTT service will likely diminish



Impact on telco revenues from OTT text and VoIP

Scenarios vary from a \$92bn to \$172bn decline on a base of \$375bn



Markets: US, Canada, Germany, France, Spain, Italy, UK, Singapore, Taiwan

Sources: Ofcom, CMT, BNETZA, TIA, KCC, Telco accounts, STL Partners



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STL Partners, *The Future of Voice and Messaging*, 2015. Available online at [www.telco2.net/blog/2013/11/telcos could lose up to 172bn.html](http://www.telco2.net/blog/2013/11/telcos%20could%20lose%20up%20to%20172bn.html)



OTT services and effect on system competition

- Competition for a telecom service is between systems of complements: network access and the application
- Telco ability to charge separate tolls for telecom service, may be increasingly constrained by OTT telecom services
 - Usage based pricing replaced by flat rate pricing
 - Telecom service bundled with broadband access
- The analysis above assumes competition in network access for subscribers sufficient that the telco cannot simply rate rebalance to neutralize or even benefit from the OTT. The analysis held constant the terms and price of broadband access when considering the effect of the OTT on the market power of the telco. If the telco has the ability to raise the price of broadband access, then the benefits of the OTT service may not be captured by consumers, but by the telco
- The market power of the telco may be not in just the final service, but stem from limited alternatives for broadband access. If so competition at the service level might be restricted, but it could be exercised in the broadband access market, raising the cost of the OTT service alternative/system
- This might not be as effective an exercise of market power and the extent of market power in access may be less than in the service
 - Lost the ability to price discriminate based on usage
 - Depends on competition to provide access and surplus captured by OTT services



OTT services and the changing role of the telco

- Further might expect that if OTT telecom services replace telco services, telcos gradually realign becoming only ISPs, competing for subscribers and CSPs by setting prices appropriately on both sides of their platform
 - Assumes absence of constraints on pricing CSP content (net neutrality)
 - Assumes quality and innovation of services occurs independent of the network
 - Only unique non-replicable asset of the telco is its network
 - Telco not able to innovate and introduce services that cannot be matched and bettered by OTT services
- The relevant market power issue with respect to telcos will be an assessment of whether as ISPs they have market power as a platform: the number of platforms will be determined, in part, by the number of networks and the regulation of those networks



OTT services may limit regulation

- Regulation will have a focus on terms of access for ISPs to network facilities
 - How many networks before market power in access for subscribers and CSPs is sufficiently disciplined?
- The conjecture is that the more competitive the ISP platform market, the less likely pricing for CSPs is a concern
 - Competition between ISPs for subscribers lowers overall rate levels (Bourreau, Kourandi, and Valletti (2015) and Greenstein, Peitz, and Valletti (2016))
 - Minimum quality standards to mitigate incentives to sabotage CSP traffic
 - ISPs have incentives to make sure CSPs are available to attract subscribers
 - Competition between ISPs limits ability to exclude CSPs



Regulation of telecom services

- No longer have retail regulation in many jurisdictions
 - Replaced by wholesale access regime
 - Premise is that mandated access enables competition at retail sufficient to discipline the exercise of market power in the provision of retail services
 - Services or elements providing competitors access to the last mile
 - Unbundled local loops, resale, bitstream access
 - Interconnection
 - Termination rates for telephony and text messaging
- How does increase an increase in competition at retail from OTT telecom services affect market power at wholesale?



Wholesale market power in telecom

- Extent of substitution
 - Direct substitution to a different input in the provision of retail services
 - Presumably limited or service, element, or facility would not be essential with mandated access
 - Indirect substitution by consumers downstream disciplines the exercise of market power upstream
 - Raise wholesale price, raises costs downstream, higher costs results in higher retail prices, consumers substitute to other services that do not use that supplier's input and in doing so discipline the exercise of market power for the input
- Question: Can OTT services result in a sufficient increase in indirect substitution that market power upstream is disciplined and some wholesale services can be deregulated?



Deregulation of a wholesale service?

- The impact on wholesale market power will depend on whether OTT services do not use the regulated wholesale service
- If that is the case, then the OTT service creates an avenue of indirect substitution
- For instance, consider text messaging. Suppose there is regulated termination of text messages because of market power, presumed to arise from the termination monopoly of the wireless provider
 - What is the potential response by consumers to an increase in the wholesale price of terminating text messages? Is that response changed by the introduction of OTT text messaging?
 - Response might be considerably larger if at the margin consumers can, and will, substitute to an OTT application that utilizes broadband and Wifi access on their phones
 - Competition at wholesale increased: there is not just a single way to reach a subscriber with a text message through their wireless service, instead now the relevant competition is in broadband access
 - Competition in broadband access, depends on the effectiveness of regulation mandating access to networks, as well as the number of competing broadband service providers with networks capable of supporting the OTT telecom service
 - Text messaging's low bandwidth clearly means wireless networks are in the relevant wholesale market
- Not so clear that need to continue regulation of text termination rates



Market power and bundling

- Market power in bundles depends on
 - The presence of other suppliers of comparable bundles
 - Voice, internet, and video
 - The willingness of consumers to opt for “best of breed”
 - Increase in the price of the bundle above competitive levels, do enough consumers at the margin respond by creating their own equivalent bundles?
- Competition from less complete and single service options might not be sufficient:
 - Transaction cost savings
 - Customer specific economies of scope
 - Billing and network costs
 - Higher quality of joint provision



Triple play, OTT services, and regulation

- Suppose market power in triple play (telephony, broadband, and video) and the source of that market power is video
 - Video cannot be matched by competitors
- Under these circumstances expect demand on regulators to enable competitors to provide video
 - Video/Broadcasting an essential facility
- OTT video stream may be sufficient to preclude market power in the triple play. Availability of the OTT service increases customer willingness to substitute if it reduces quality concerns, transaction costs, and reduces the cost advantage of the telco



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Vertically integrated ISPs and OTT services

- ISP typically is vertically integrated, provides both broadband access and services that compete with some OTT services
- Control of broadband access means that the ISP may be able to monitor, meter, and control the traffic delivered to a subscriber
 - Header information in packets
 - Deep packet inspection (DPI)
 - Discriminate on the basis of data



OTT services and ISPs: Input foreclosure

- Input foreclosure: hypothesis is that the vertically integrated ISP will
 - Raise the cost or reduce the quality of OTT data delivered to ISP customers
 - Net neutrality requirements intended to prevent discrimination against OTT data
 - Foreclose OTT (app) access by denying subscribers access to the application
 - Madison River denied OTT VoIP access (Vonage) and KPN blocked VoIP on its Wifi hotspot network
 - Foreclose video
 - Exclusive programming rights
- All of which reduces the quality or raises the costs of the OTT service
 - Reduces ability or willingness of the ISP's customers to substitute
- Leading to a reduction in the constraint of the OTT service on the market power of the vertically integrated ISP's telecom services



OTTs and ISPs: Customer foreclosure

- Customer foreclosure: hypothesis is that the ISP favours certain OTT services, creating market power for the OTT service
- Zero rating
 - Instituted by the ISP, involves excluding data for OTT applications from data caps
 - There is no opportunity cost to subscribers, either monetary or forgone data, for data use for the included apps
- Sponsored data plans
 - The OTT service compensates the ISP in return for the ISP lowering the cost to its subscribers of downloading that data of that OTT service
 - OTT data excluded from data caps



Foreclosure: framework for analysis

- Incentive for Foreclosure
 - Partial foreclosure: typically the incentives to supply differ if a firm is integrated. Withholding supply upstream may increase upstream price, marginal cost of downstream competitors, and hence downstream price and profits
 - Complete foreclosure: not adjustment at the margin, but gains versus costs of transacting with a rival
- Ability to foreclose determines the effect on the ability of rivals' to compete
 - **ISP must have market power in access: without market power in access, foreclosure will not be possible**
- Effect on ISP's incentives to compete
- Effect on competition and consumer welfare
 - foreclosure may be pro-competitive because it changes pricing incentives
 - efficiencies and foreclosure is just ancillary
 - exclusivity and vertical integration typically justified by the enhanced benefits of coordination (pricing and investment)



Incentive for complete foreclosure

- Typically a trade-off
 - Lost revenue and profits in the supply of the foreclosed good
 - Increased market power, revenue, and profits in another product
- When the conditions of the single profit theorem hold, the loss is larger than the gain. No incentive to leverage market power in access by an ISP into telco services or OTT markets
 - Modern version is internalizing complementary externalities (ICE) (Farrell and Weiser (2003))
- For foreclosure to be profitable, based on its effect on market power, the single profit theorem must not hold



Input foreclosure ISPs and OTTs

- Access to subscribers is a one way essential complement (Chen and Nalebuff (2006))
 - Essential for competitor to provide service, but access to the competitor's product is not essential for the ISP
 - ISP competes in a telco service against an app that subscribers can use for free (Broos and Gautier (2015))
 - ISP competes against a CSP in provision of advertising supported content (Dewinter and Rosch (2016), Kourandi, Kramer, and Valletti (2015))
- Exclusivity in programming rights
 - Copyright lock out of OTT video services through integration or exclusive contracting (Church and Gandal (2000))



Input foreclosure by ISPs against OTT telecom service (Broos and Gautier (2015))

- Trade off: increase in competition and loss of volume in telephony versus added value of broadband access, leading to higher prices for subscribers
- Monopoly ISP never excludes the app. Instead it rebalances its rates between internet access and telco service, raising its internet rate by the price of telephony. Moreover, it introduces a premium for internet with app access such that internet plus app access is priced exactly the same as internet plus telephony. It engages in price discrimination by offering two versions of the internet
 - Total surplus, consumer surplus, and ISP profits are all higher when it offers a low price/low quality and high price/high quality option. There is a better match between consumers and choice of telco option and greater internet access
- In the case of a vertically integrated ISP in competition with a non integrated ISPs, the integrated ISP acquires exclusive rights to the app, preempting competition in telco services from the app and again surcharging consumers for internet access with the app
 - Total surplus is higher than if the app is available on both ISPs with no premium, though consumers are harmed. The increase in efficiency arises from better sorting between subscribers and the differentiated telco services
 - Raises concerns under a consumer welfare standard if a vertically integrated ISP signs an exclusive with Netflix to include access to its catalogue on the telco's set-top box



Foreclosure of competing CSPs supported by advertising

- ISP exclusion of CSP supported by advertising (Dewinter and Rosch (2016))
 - Vertically integrated ISP with a monopoly in access trades off increase in market power and profits in content with decrease in willingness to pay by subscribers for access
 - Exclusion always occurs if the independent content is identical. As content becomes more differentiated, competition in content decreases and the value to subscribers of independent content rises. For exclusion to remain profitable, the network effect from content to subscribers must rise: this decreases the value to subscribers at the margin of the independent content (it is less difficult for the ISP to provide the same level of benefits to subscribers on its own).
- Demand for an ISP is increasing in content, but more content increases competition for advertising, more users means more opportunities for advertising by CSP. Competition between ISPs and CSPs (Kourandi, Kramer, and Valletti (2015))
 - Full exclusivity means that a CSP is provided only on one ISP and an ISP only provides access to a single CSP
 - Trade-off: exclusivity between ISP and CSP may increase the market share of the ISP and reduces competition between CSPs, but loss in advertising revenues from subscribers connected by the rival ISP
 - Exclusivity, leading to internet fragmentation, is more likely the:
 - stronger competition in advertising (avoid by exclusivity)
 - smaller advertising revenue (limited ability of a CSP to make revenue)
 - the more complementary CSP content (retaliation by ISP to exclusivity to avoid loss of market share)
 - the higher termination fees for CSP content (cost savings associated with exclusivity)
 - Exclusivity is harmful for consumers, but may be efficient: the policy implication is a no exclusivity rule, but the analysis ignores efficiency rationales for exclusivity



Programming Foreclosure

- OTT video lock out allegations involving:
 - Vertical integration and foreclosure
 - Pressure from existing distributors on programmers to restrict online rights
 - TV Everywhere
 - Online rights bundled with linear distribution rights
 - Price discrimination to stop cord cutting, subsidize cord cutters by extent of margin on BDU rights
- Trade-off profits lost in programming versus profits gained in distribution. Distribution advantage arises if the value of the distribution platform (here the OTT service) depends on the variety and price of programming
- Integration and foreclosure is profitable and inefficient (Church and Gandal (2000))
 - ISP and OTT service are significantly differentiated, but video programming is not
 - ISP and OTT service are not significantly differentiated, but video programming is highly differentiated. This is only profitable if it results in the exclusion of the other distribution platform



Full customer foreclosure of OTTs by ISPs

- Circumstances under which there can be anticompetitive customer foreclosure of an OTT service by an ISP
- Incentive: trade off between lost revenues of the ISP because of a reduction in subscriber demand from excluding OTT services versus increased market power and profits from a reduction in competition in the OTT service market
- Ability: ISP market power downstream, i.e., limited competition in ISP provision, so that OTT service and subscribers cannot avoid ISP. If competition downstream, then subscribers switch to rival ISPs that provide access to the OTT service. Competitive advantage to provide access to all OTT services: demand for an ISP is likely increasing in variety and decreasing in the price of complementary services
- Effect on rival OTT services
 - Importance of economies of scale and network effects. Deny scale or installed base to a rival to induce exit in the OTT service activity and reduction in competitive constraint on the ISP
- ISP market is local, but the market for OTT service is likely global
 - Foreclosure in these cases will have to be multimarket



Extensions

- Desirability and possibility of symmetric social obligations on telcos and OTT service providers
 - Universal Service obligations, privacy protection, emergency services, etc.
 - Levelize regulatory obligations
 - Relax obligations for telecoms
 - Impose obligations on OTT services
- OTT service has market power
 - Network effects
 - Switching costs
 - Absence of interconnection and portability (which typically characterized telecommunications)
- Rent shifting from Telco to OTT service
 - Implications for investment in the network

