



ICT생태계 변화와 망중립성 정책의 모색: OTT (Over-the-Top) 서비스와 제로 레이팅 (Zero-rating)

오픈넷 포럼 2015.8.12

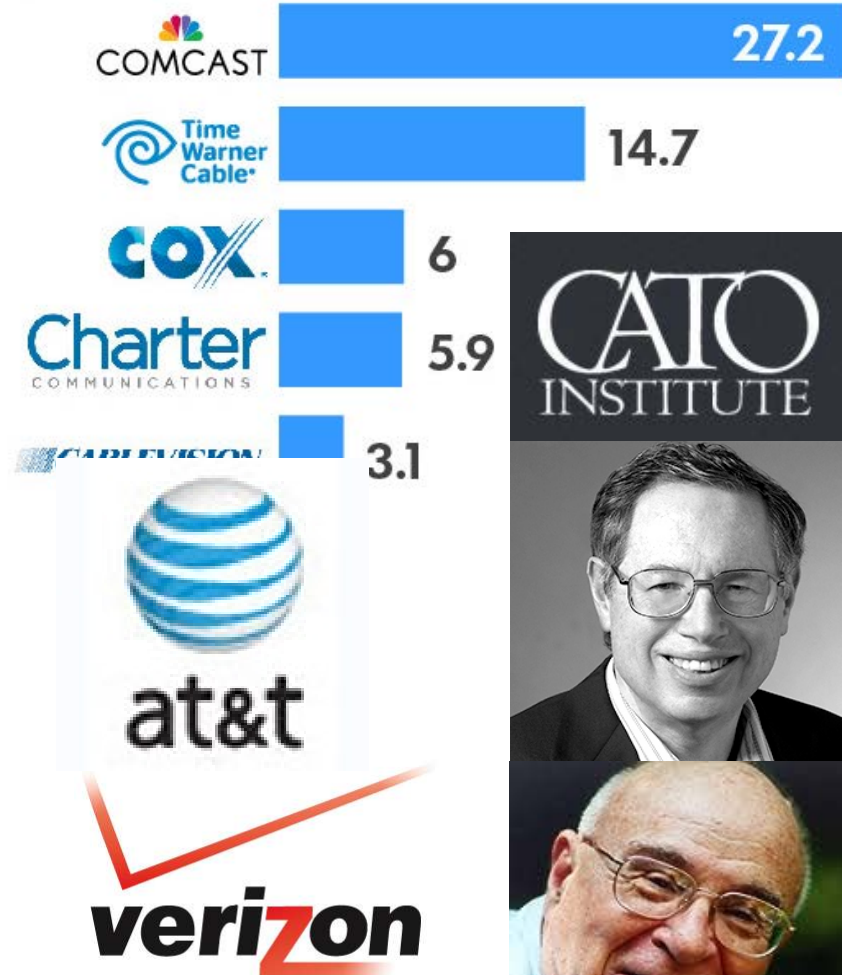
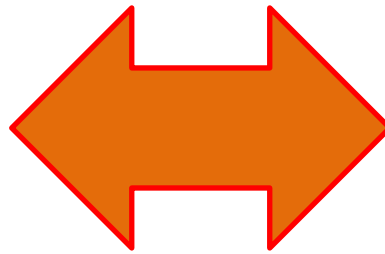
최은창

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Showdown over Net Neutrality (USA)

Content, Applications, Service (OTT)

Network Providers (ISPs)
= Telcos + Cable Companies



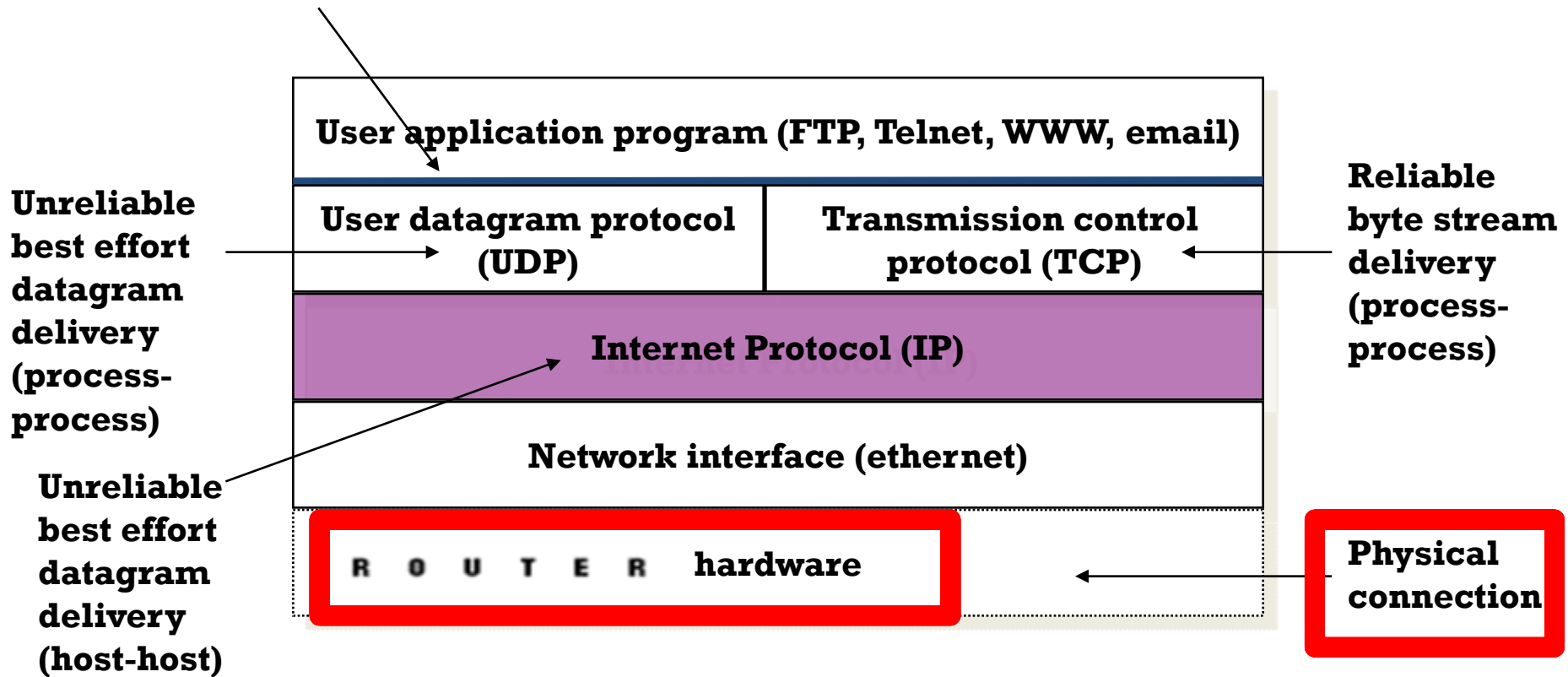
Public Knowledge



TCP/IP Model

Internet Protocol (IP) Stack

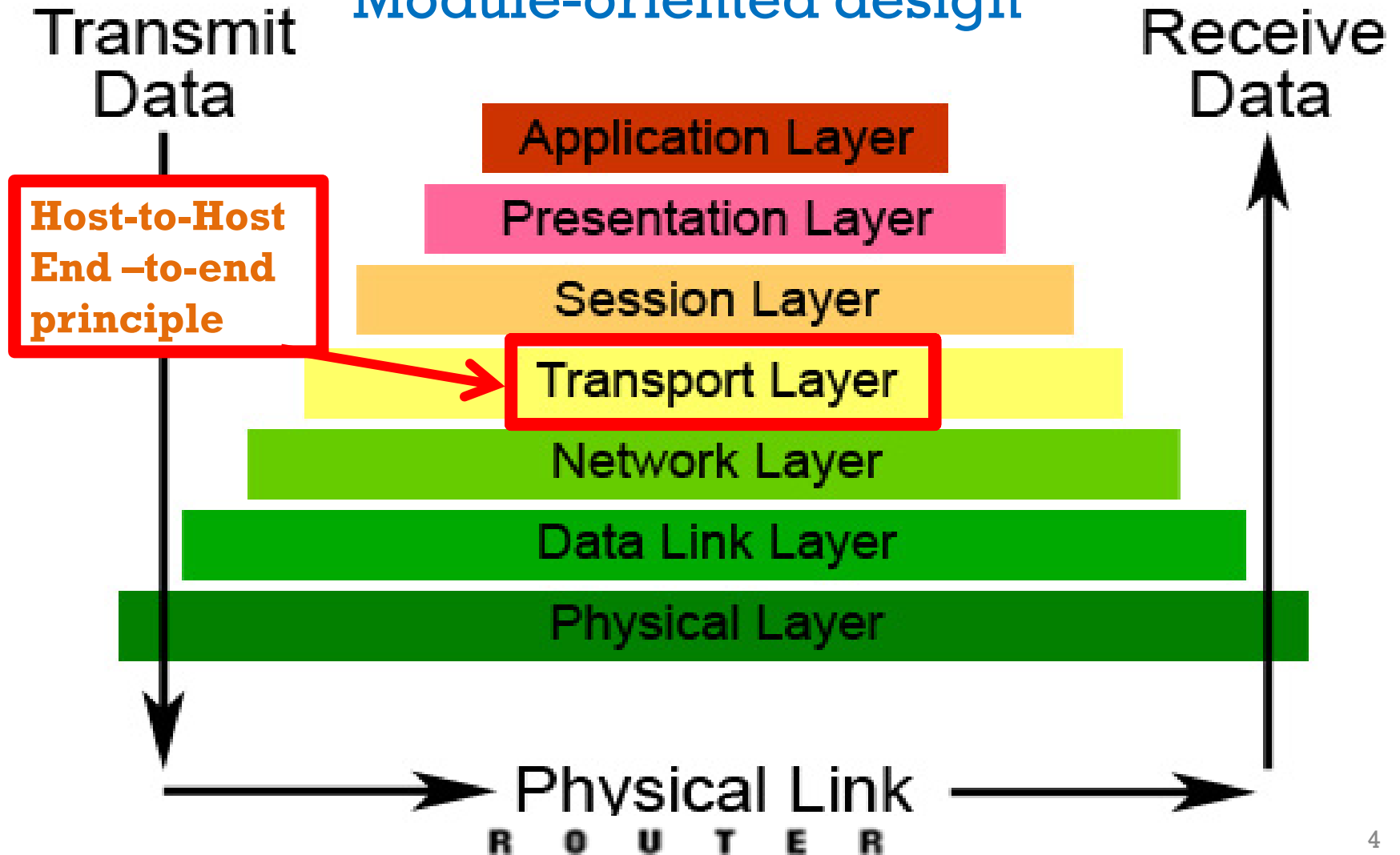
Berkeley sockets interface



The Seven Layers of OSI

개방형 시스템 간 상호 접속 참조 모델

Module-oriented design



OSI Model vs. TCP/IP Layers

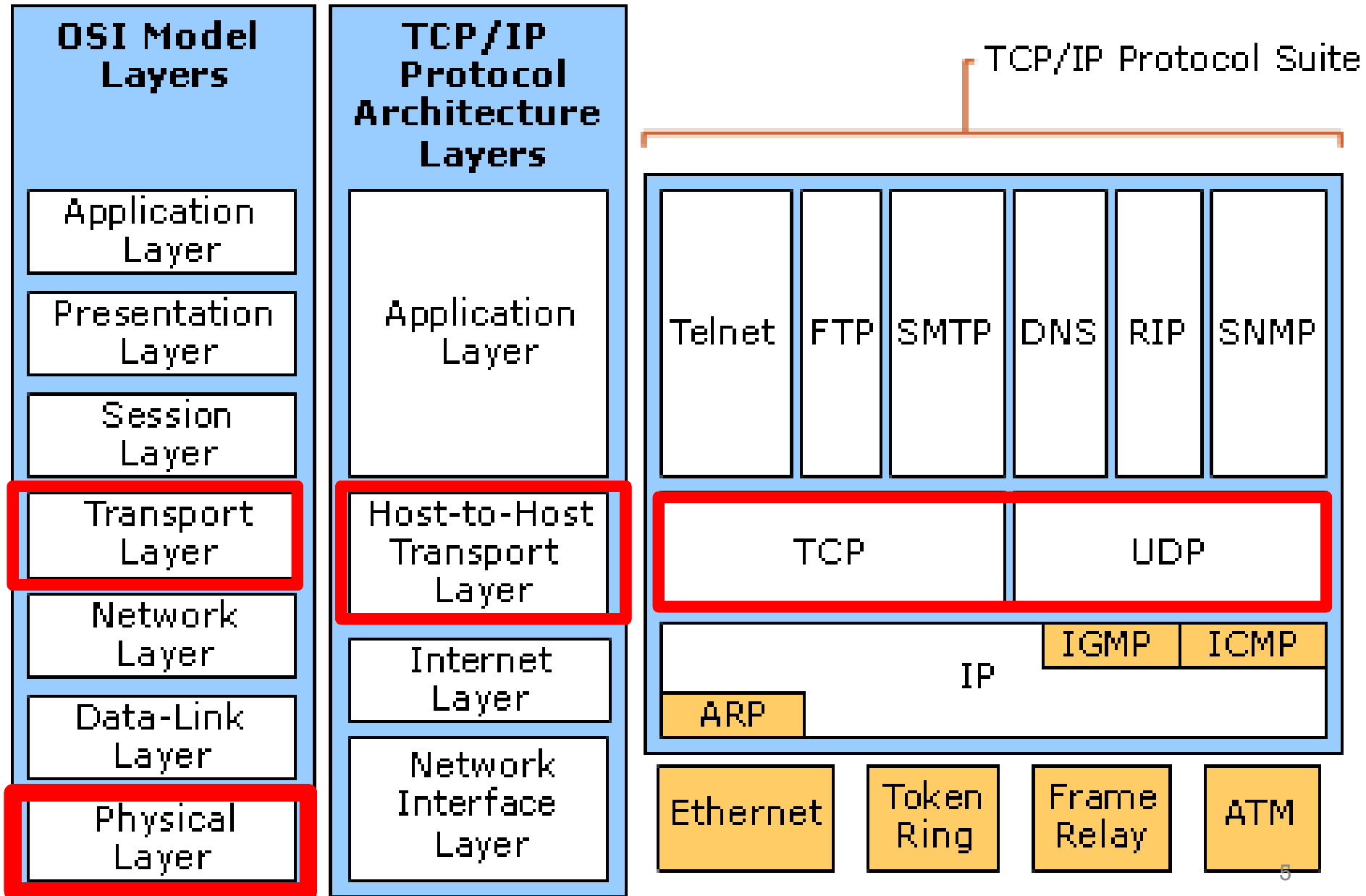
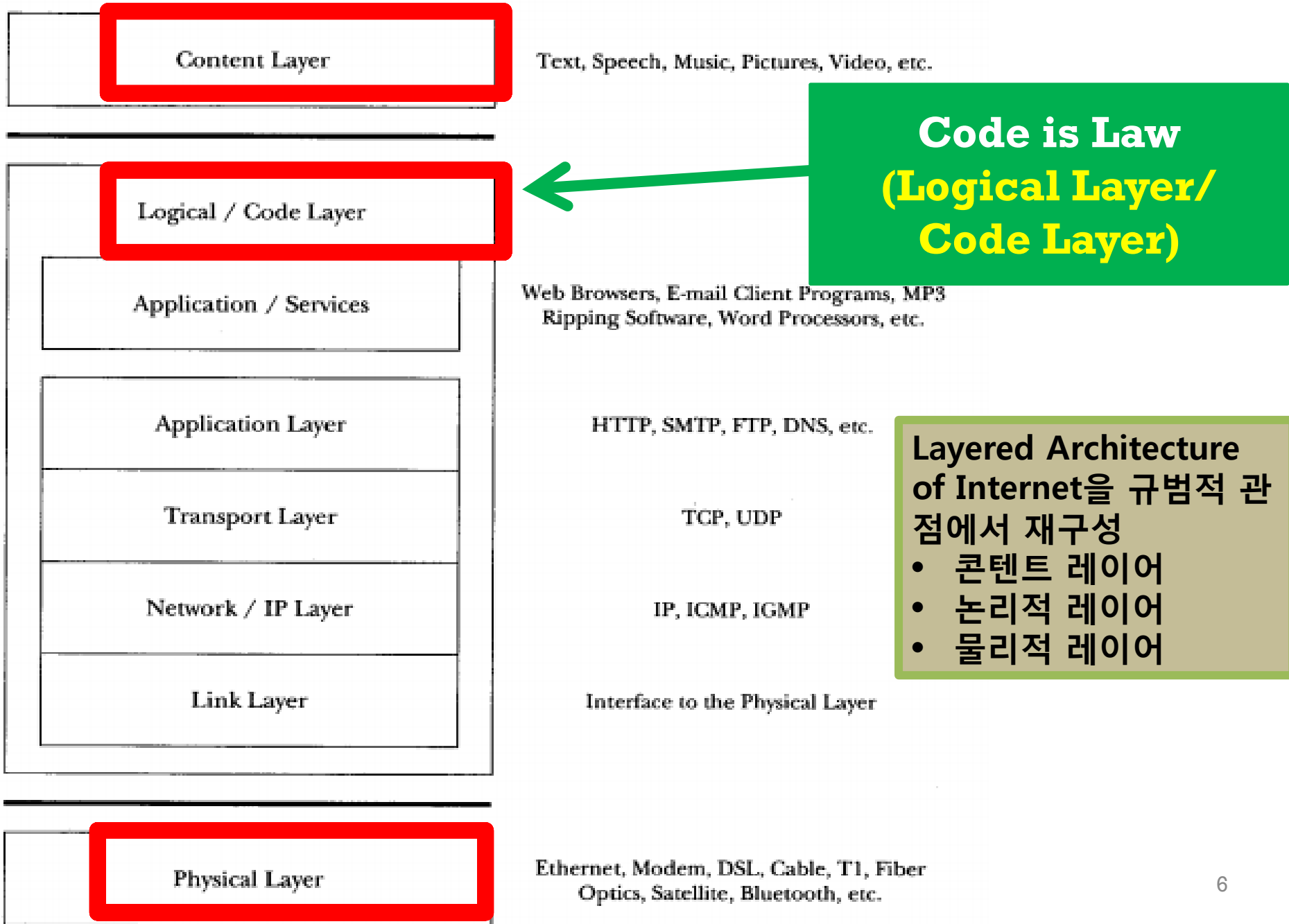


FIGURE 5. TCP/IP LAYERS WITHIN COMMUNICATION SYSTEM LAYERS



Layered Architecture of Internet :Implication to Regulation

OSI 모델		TCP/IP 모델	제공자	규범적 분류와 영역	지배원리
			콘텐츠 제작자	콘텐츠 레이어 (상표권, 저작권, 데이터베이스 보호, 전자상거래 사기)	<ul style="list-style-type: none"> · 저작권법, 상표법, · 공정이용(fair use) · 온라인 서비스 제공자 (OSP)의 법적 책임
레이어 7	응용 레이어	응용 레이어 (FTP, SMTP, HTTP, Telnet, DNS, RIP, SNMP)	애플리케이션 제작자	<div style="border: 2px solid red; padding: 5px;"> 논리적 레이어 (웹 표준, 웹브라우저, HTML5, 운영체제, 프리·오픈 소프트웨어, 소프트웨어 특허, Peer-to-P 네트워크, 저작권 관리기술 DRM, 도메인 네임) </div>	<div style="border: 2px solid red; padding: 5px;"> 웹표준 (W3C, IETF) 레이어 원칙(레이어 분리, 레이어 교차 최소화) 단대단(end-to-end) 원칙 망 중립성(유선, 무선) 플랫폼 중립성 </div>
레이어 6	표현 레이어				
레이어 5	세션 레이어				
레이어 4	전송 레이어	전송 레이어 (UDP, TCP)	인터넷 접속서비스 제공자(ISP)		
레이어 3	네트워크 레이어	인터넷 레이어 (인터넷 프로토콜, IPv6, VoIP, ICMP)			
레이어 2	데이터 링크 레이어	네트워크 액세스 레이어 (주파수, DSL, 광랜, 케이블, FTTH, HFC, DOCSIS, 정액 라우터)	물리적 인프라 소유자	<div style="border: 2px solid green; padding: 5px;"> 물리적 레이어 (트래픽 통제, 미들마일, 라스트마일) </div>	<div style="border: 2px solid green; padding: 5px;"> 재산권 기술표준화, 커먼 캐리어 규제 망 개방, 상호접속 </div>
레이어 1	물리적 레이어				

Before the
Federal Communications Commission
Washington, D.C. 20554



In the Matter of)

Protecting and Promoting the Open Internet)

) GN Docket No. 14-28
)

REPORT AND ORDER ON REMAND, DECLARATORY RULING, AND ORDER

Adopted: February 26, 2015

Released: March 12, 2015

By the Commission: Chairman Wheeler and Commissioners Clyburn and Rosenworcel issuing separate statements; Commissioners Pai and O’Rielly dissenting and issuing separate statements.

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FCC Net Neutrality Rule(2015)

No Blocking : All sites /apps must be **equally accessible**. ISPs and telecom operators should **not block** certain sites or apps just because they don't pay them.

No Slowing down (throttling) of some sites: All sites must be accessible at the **same speed** (at ISPs/telco level). No intended speeding up of certain sites because of additional payment.

No Paid Prioritization.

→ The cost of access must be the same for all sites ?

→ No “Zero Rating”?

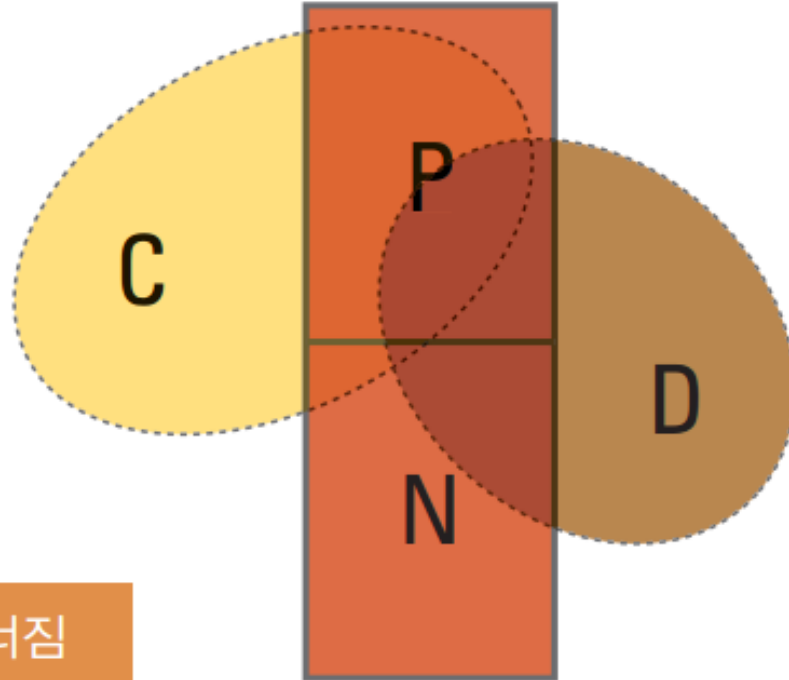
FCC Net Neutrality Rule(2015) 평가

- 적용범위: Wired + **Wireless Internet Traffic !!!!**
- 2015년 현재 본안 소송 진행 중: Court of Appeal Federal Circuit by AT&T, Verizon, Sprint and T-Mobile
- 적용예외: “reasonable network management” 합리적 네트워크 관리의 범주는 어디까지인가?
- 금지대상: “commercially unreasonable practice” 문언적 의미가 모호하여 논란의 소지
- Local Network, Last-mile 문제는 해소. 그러나 Middle-mile의 Tier 2단계의 트래픽 통제에 대해서는 침묵
- **Peering Contract 자체는 FCC 규제 관할이 아니라는 입장**
→ 어떤 **Zero-rating Plan**이 망중립성 규제 위반인가는 Case-by-case로 판단하겠다

OTT(Over-the-Top) 서비스의 확대와 망중립성 규제의 역할은?

ICT 생태계의 변화

인터넷 상의
P플랫폼을 통한
디지털 콘텐츠 제공,
클라우드를 통한
서비스 제공



D의 OS는 특정P와
연계되며 내장 SW는
P, N의 SW와
연계되어 서비스 완결
(ex. 음성 · 사물인식,
LBS 등)

P와 N도 경계가 무너지짐

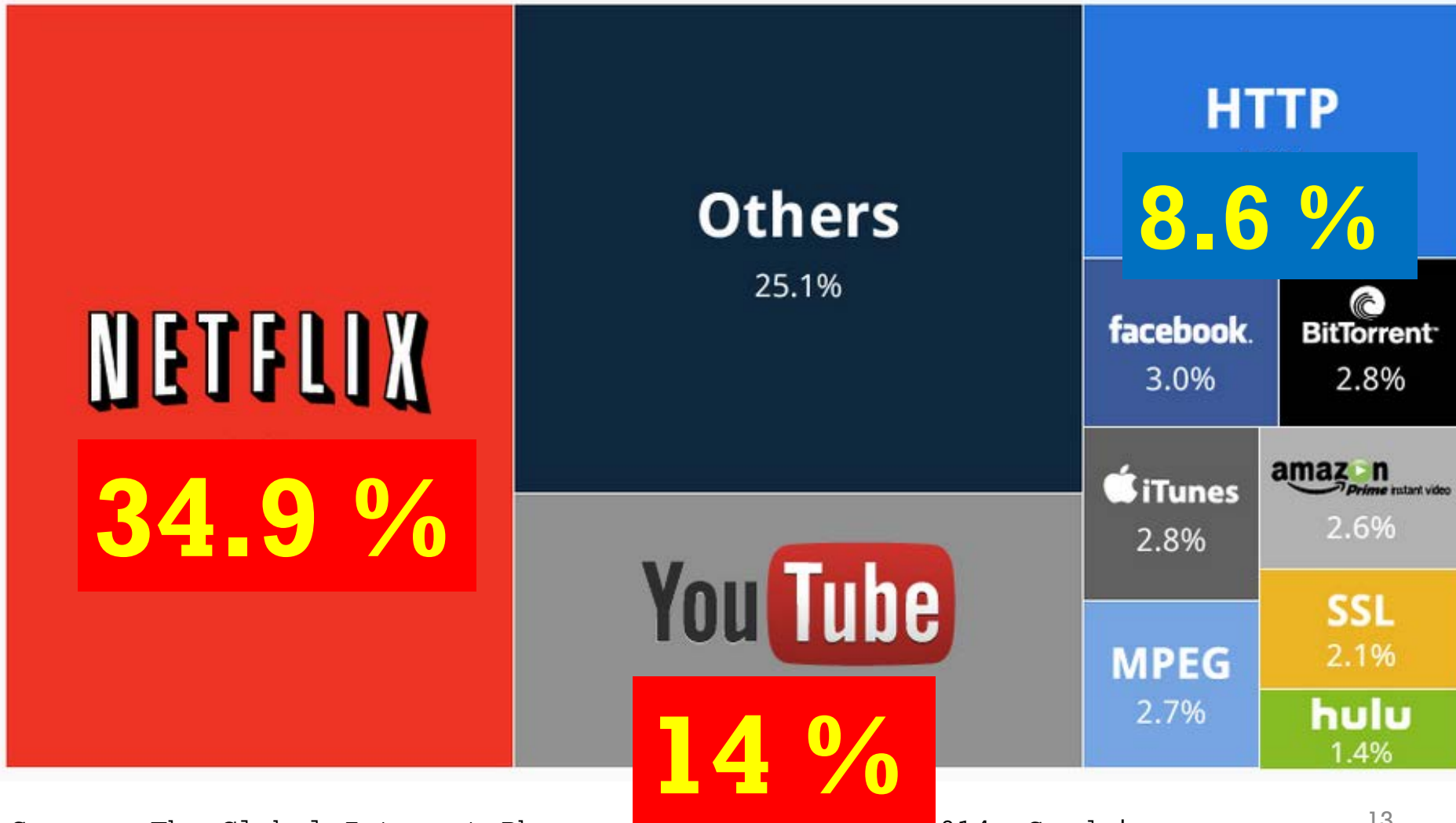
C-P-N-D 등 ICT 비즈니스 환경이 급변
하는 가운데 인터넷 사업자, 콘텐츠 사업
자, 케이블 사업자, 통신 사업자의 혼전양
상 . 비즈니스 모델 합종 연횡 진행

- **Content**
- **Platform(= Software)**
- **Network**
- **Device**











Internet Traffic (Northern America 2014)

Netflix and YouTube Are America's Biggest Traffic Hogs

Percentage of peak period downstream traffic in North America, by application*



War: Cable/Satellite vs. OTT Providers

SERVICE		SUBSCRIBERS	SERVICE		SUBSCRIBERS
1.		36.2 MILLION	6.		6 MILLION
2.		22.6 MILLION	7.		5.7 MILLION
3.		20.3 MILLION	8.		5.3 MILLION
4.		14.1 MILLION	9.		4.4 MILLION
5.		11.4 MILLION	10.		4.3 MILLION

Top 10 video distributors(MVPD)in North America in 2015

Over-the-Top Internet Traffic (North America 2014)

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	BitTorrent	25.49%	Netflix	34.89%	Netflix	32.39%
2	Netflix	9.48%	YouTube	14.04%	YouTube	13.25%
3	HTTP	7.18%	HTTP	8.62%	HTTP	8.47%
4	SSL	7.05%	Facebook	2.98%	BitTorrent	5.03%
5	YouTube	6.14%	BitTorrent	2.80%	Facebook	2.94%
6	iCloud	4.41%	iTunes	2.77%	SSL	2.63%
7	Skype	2.77%	MPEG - OTHER	2.66%	iTunes	2.55%
8	Facebook	2.60%	Amazon Video	2.58%	MPEG - OTHER	2.44%
9	FaceTime	2.38%	SSL	2.14%	Amazon Video	2.37%
10	Dropbox	1.48%	Hulu	1.41%	Hulu	1.20%
		68.98%		74.89%		73.28%

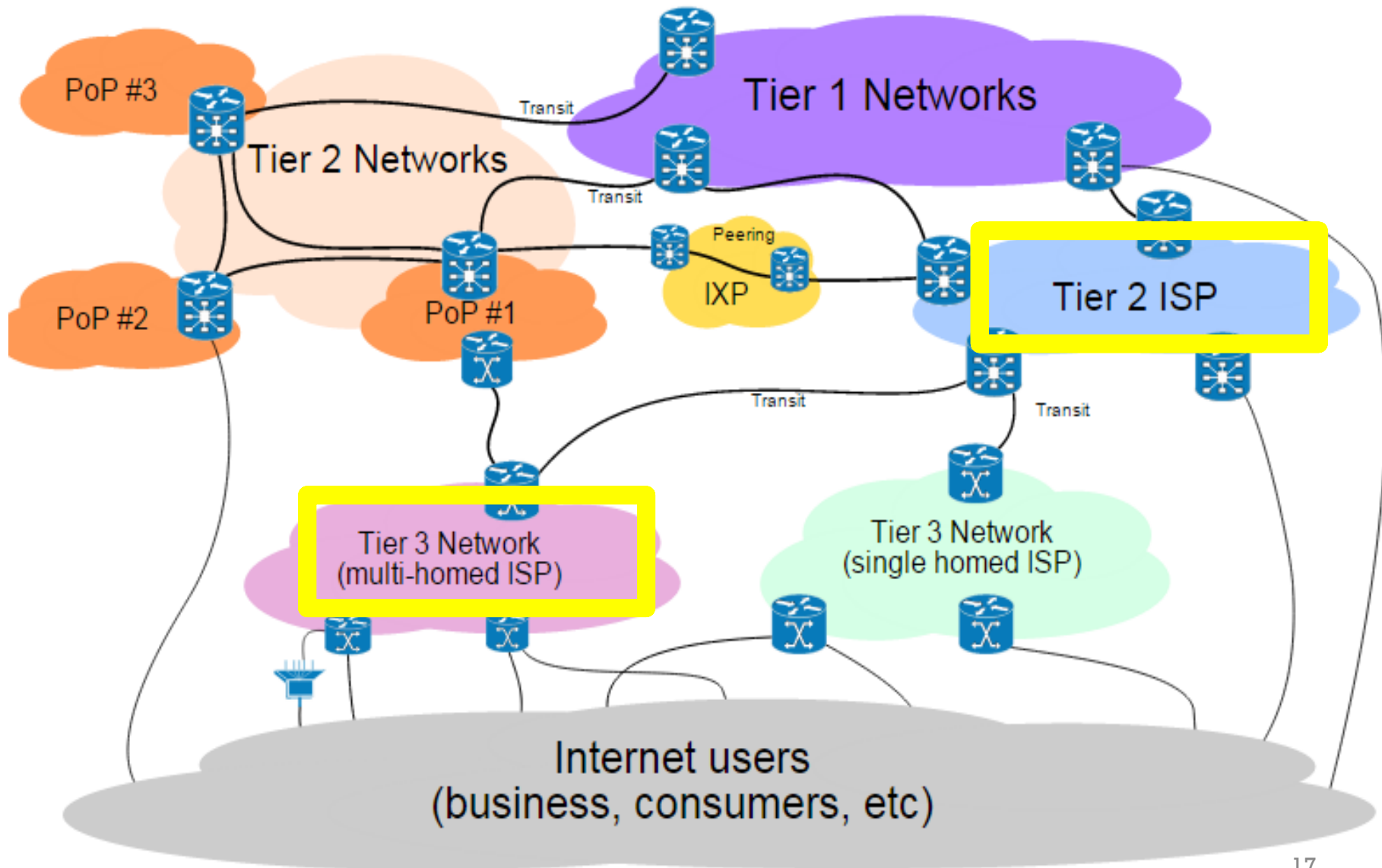


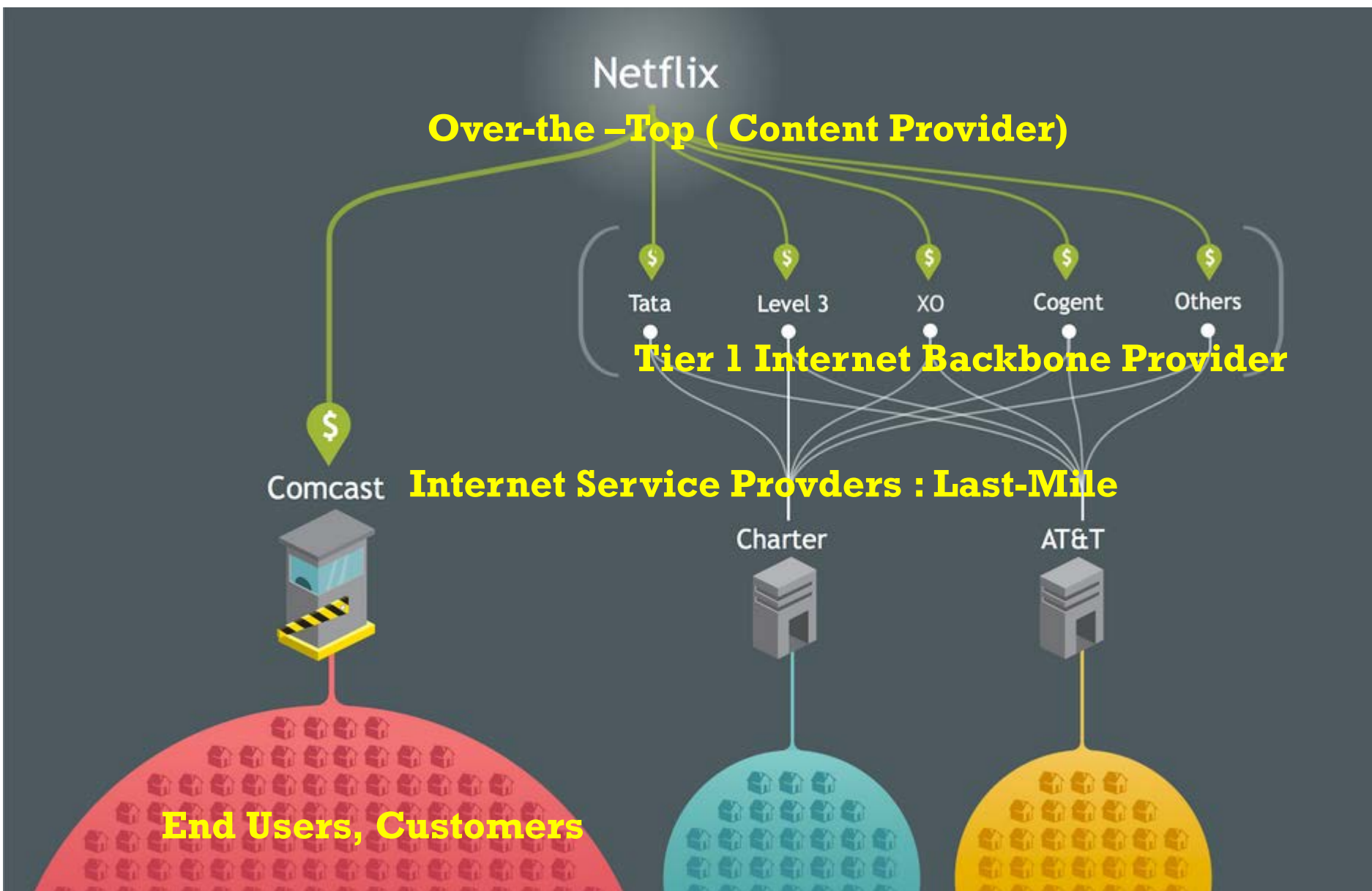
Table 2 - Top 10 Peak Period Applications - North America, Fixed Access

Internet Traffic Application (Europe 2014)

Rank	Upstream		Downstream		Aggregate	
	Application	Share	Application	Share	Application	Share
1	HTTP	15.38%	HTTP	24.60%	HTTP	23.31%
2	Facebook	14.76%	YouTube	20.89%	YouTube	19.04%
3	BitTorrent	8.99%	Facebook	12.16%	Facebook	12.54%
4	Skype	8.33%	MPEG - OTHER	3.77%	BitTorrent	3.82%
5	YouTube	7.41%	SSL	3.06%	MPEG - OTHER	3.44%
6	SSL	5.70%	Flash Video	3.03%	SSL	3.42%
7	Google Cloud	3.39%	BitTorrent	3.01%	Flash Video	2.66%
8	iTunes	1.88%	Google Cloud	1.90%	Skype	2.43%
9	Instagram	1.76%	Google Market	1.67%	Google Cloud	2.10%
10	Apple iMessage	1.47%	iTunes	1.61%	iTunes	1.64%
		69.05%		75.70%		74.43%

Network Architecture



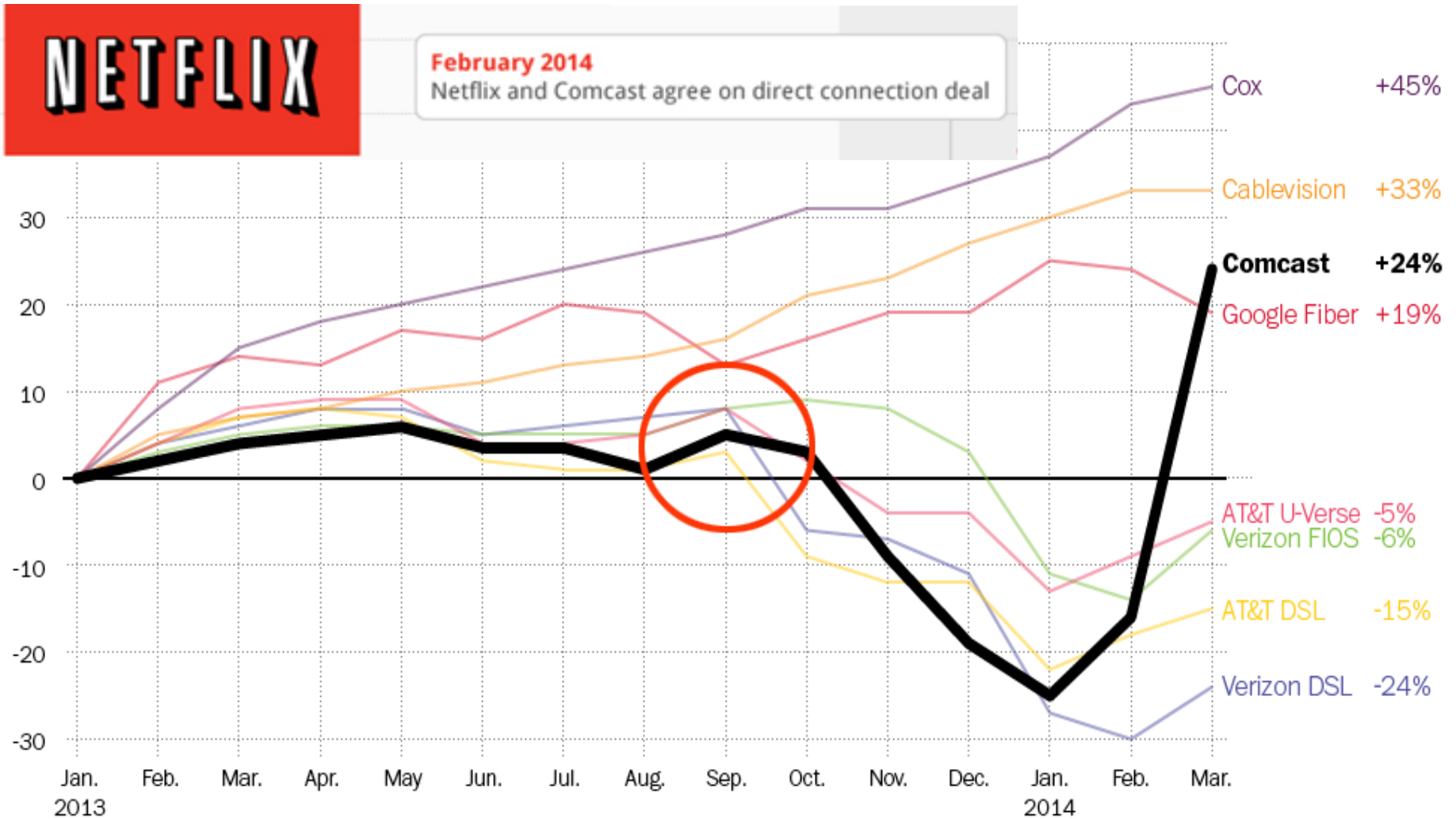


Source: Netflix, The Case Against ISP Tolls

<http://blog.netflix.com/2014/04/the-case-against-isp-tolls.html>

Comcast-Netflix Deal

% change in Netflix download speed



SOURCE: Netflix
GRAPHIC: The Washington Post. Published April 24, 2014

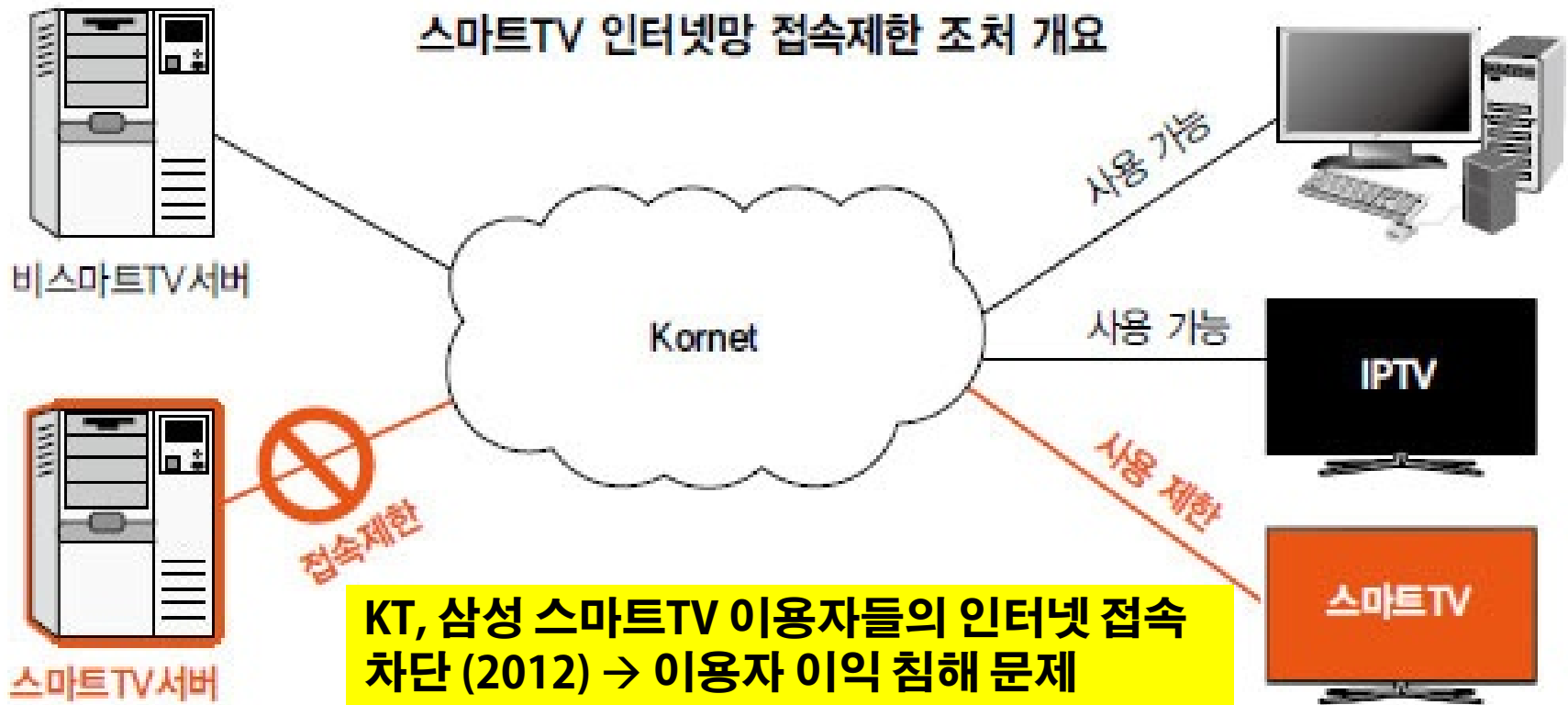
Source: Netflix

Smart TV traffic blocked

국내 초고속 인터넷 3사의 트래픽 차단 현황

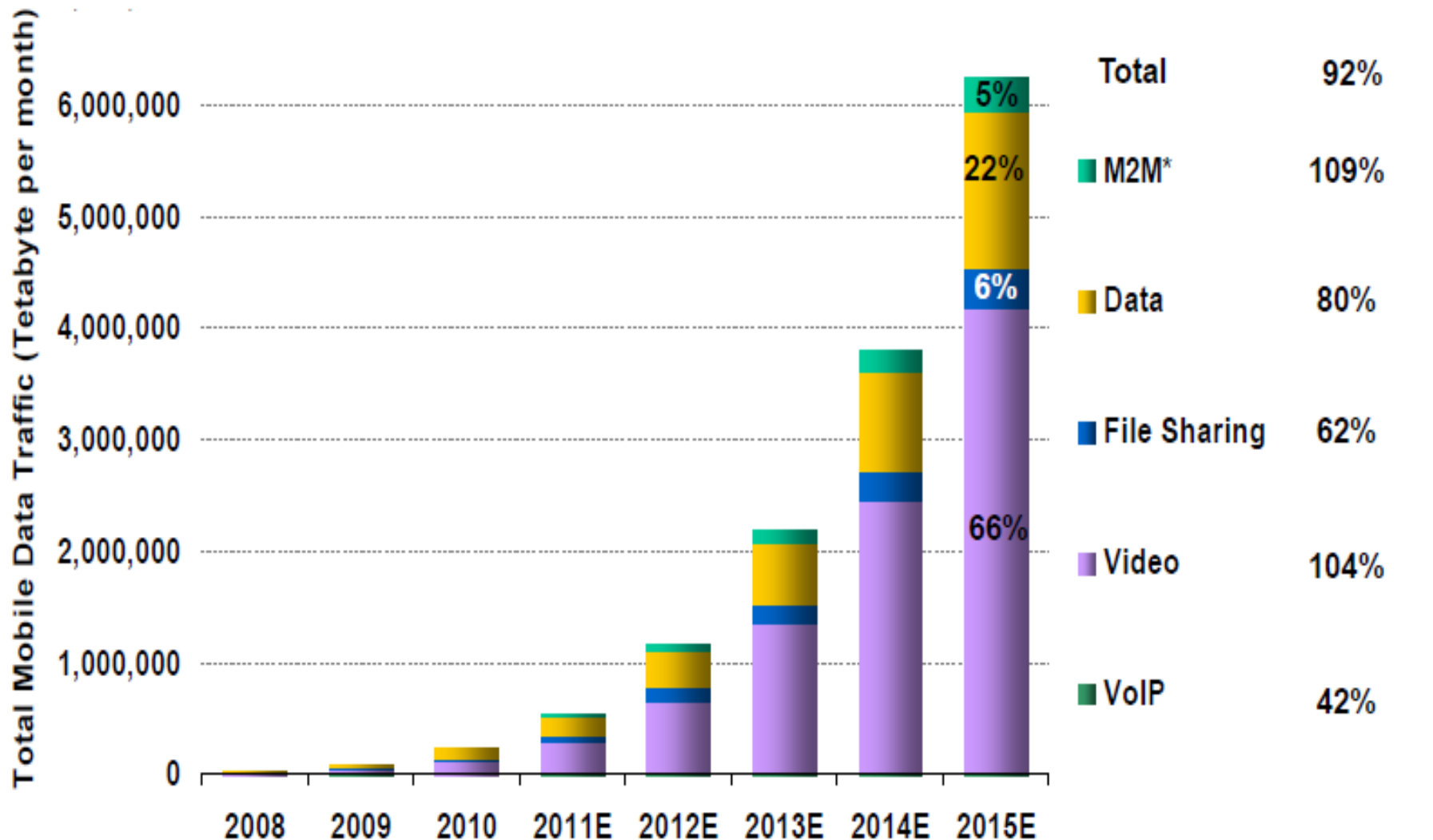
자료: KT

	KT	SK브로드밴드	LGU+
스마트TV	삼성 스마트TV 차단 (LG전자, 소니 등 국내외 나머지 제품은 해당 없음)	없음	없음
가입가구	782만	419만	281만



Zero-rating 서비스는 망중립성을 위협하는가?

Global Mobile Data Traffic, by Type 2008 – 2015E

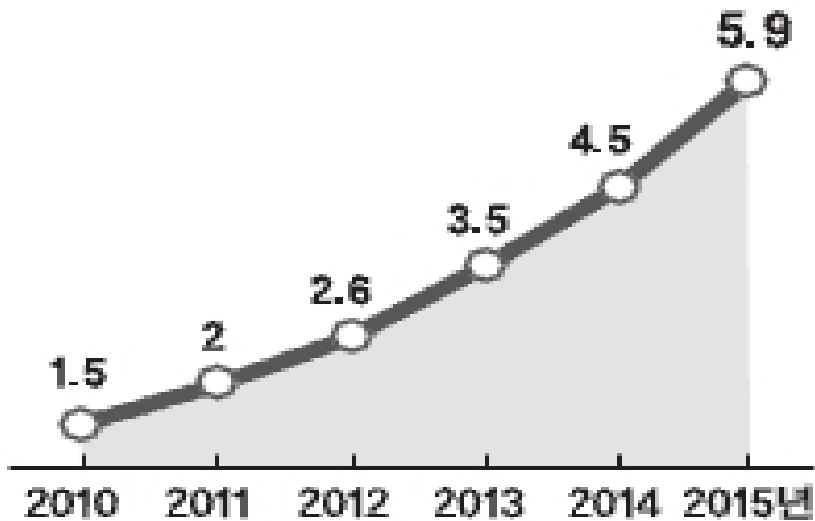


구분	2G·3G 피쳐폰		3G 스마트폰		4G 스마트폰		합계(평균)	
	전체트래픽 (TB)	1가입자당 트래픽 (MB)	전체트래픽 (TB)	1가입자당 트래픽 (MB)	전체트래픽 (TB)	1가입자당 트래픽 (MB)	전체트래픽 (TB)	1가입자당 트래픽 (MB)
'14.12	63	4	6,087	1,064	113,019	3,312	119,169	2,188
'15.1	65	5	5,600	1,044	112,021	3,222	117,686	2,153
'15.2	60	4	4,762	933	109,073	3,095	113,895	2,094
'15.3	65	5	4,815	986	120,035	3,365	124,915	2,302
'15.4	62	4	4,551	968	125,904	3,495	130,516	2,398
'15.5	50	4	4,351	961	132,545	3,637	136,946	2,506

국내 유선 트래픽 전망

※연평균 증가율 31%

(단위:EB/월)

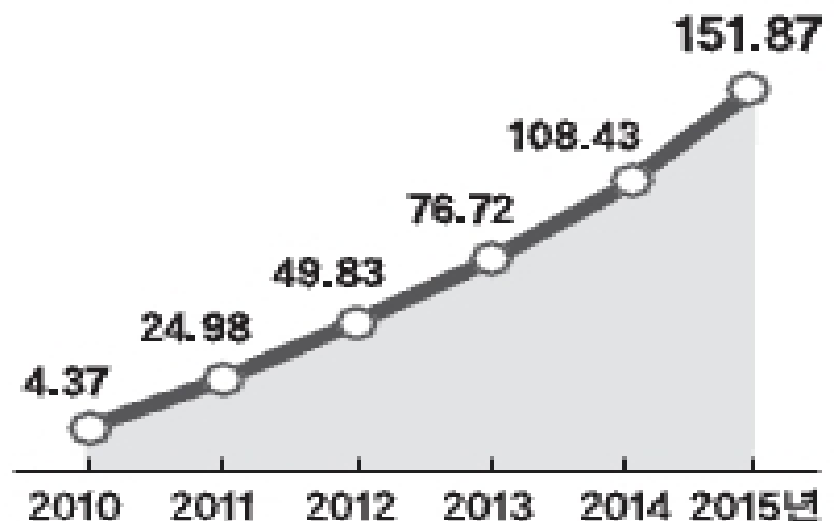


자료:방송통신위원회

국내 무선 트래픽 전망

※연평균 증가율 103%

(단위:PB/월)



자료:방송통신위원회

제로 레이팅 사례: T-Mobile

T-Mobile's Unlimited Music Streaming Is the Worst for Net Neutrality

Jan 14, 2014
TIME At T-Mobile from all of the top music services → data charges do not apply

"Music freedom" looks like a benefit for subscribers, and that's the most dangerous part.

Most things that T-Mobile has done over the last year have made me feel warm and fuzzy inside, but I felt a pit in my stomach on Wednesday when the carrier announced that certain

streaming music services won't count against users' data limits.

Instead of treating all music services equally, T-

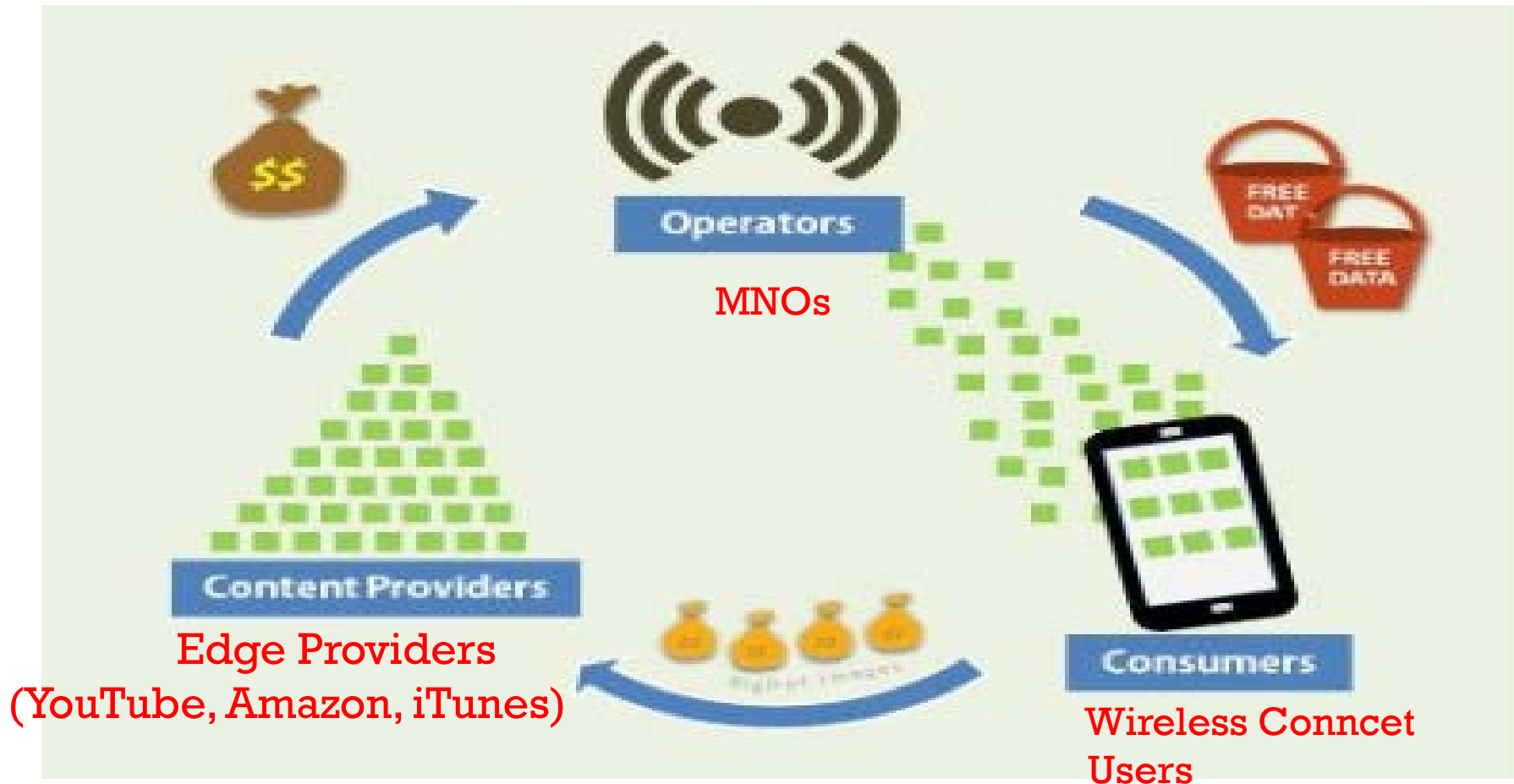


Matthew Williams - Bloomberg / Getty Images

T-Mobile CEO John Legere speaks during an event in Seattle on Wednesday, June 18, 2014

제로 레이팅 (toll-free-data)의 구조

- Mobile Network Operators (MNOs) provided 'free' connection to their selected sites, namely their content stores and service portals
- Zero-rating/ toll-free data / sponsored data : nonneutral



제로 레이팅 (toll-free-data)의 구조

- MNOs collaborated with Edge Providers (Application/Content providers) to facilitate the delivery of the zero rated content
 - a form of paid prioritization
 - violates Net neutrality rule
- MNOs have ability to offer zero-rates to their subscribers (users) → ability to influence the popularity of selected web content and applications in mobile.
- MNOs capture and increase their market share by offering free quota packages.

Zero-Rating: Pros.

무선 인터넷은 유선과 다름 (주파수 비용, 데이터 한도 존재 scare bandwidth resource)

Free data, content를 누가 싫어하는가? : 소비자는 원하는 통신사와 무선 데이터 플랜 선택가능

합법적인 Win & Win 전략

- MNOs (Lock-in효과)
- Customer(데이터를 아낄 수)
- Edge provider(마케팅 가능)

Zero-rated appa는 MNOs의 마케팅 플랫폼이다

무선 인터넷 트래픽 혼잡(wireless congestion) 감소시킬 관리 전략

Zero-Rating: Cons

- 55%에 이르는 무선 인터넷 비중. 하나의 인터넷에는 하나의 룰이 필요(Only One Internet, Same rule)
- **A form of paid prioritization**
→ 망중립성 규칙에 위배. 시장경쟁 저해, 온라인 표현 자유 훼손
- 소비자 서비스와 콘텐츠 선택권을 훼손하게 됨
- 강력한 차별적 효과가 혁신을 저해시키며 스타트업(CAS)에게 특히 부담
- 무선영역(Wireless MNOs)에서 허용된다면 유선 ISP도 마찬가지로 답습할 것이다.



'Facebook Zero' 프로그램

저개발국가들의 피쳐폰 이용자들에게 페이스북 접속 비용 없이 제공하여 가입자 확대 유도. 50여개 Telco 와 제휴



'Google Free Zone' 프로그램

지메일, 구글+, 구글 검색 등 무료 접속
ex) 인도, 나이지리아 등 Telco 와 제휴



'Wikipedia Zero' 프로그램

위키피디아에 무료로 접속하여 정보 이용
ex) 인도, 대만, 사우디아라비아, 파키스탄



Flipkart app in India

Telco major Airtel +
e-commerce major Flipkart

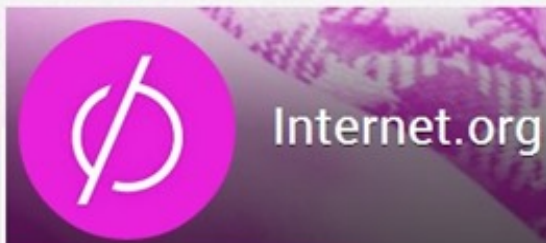


Innovation Challenge

제로 레이팅 사례



Today, the internet isn't accessible for two thirds of the world. Imagine a world where it connects us all.



[참여기업]

Facebook, Ericsson, MediaTek, Nokia, Opera, Qualcomm, Samsung

[목표]

- **Making Access Affordable**
- **Using Data more Efficiently**
- **Helping Business Drive Access**

0.facebook.com – Experience

Today's experience:
(m.facebook.com)

0.facebook.com's experience:
(0.facebook.com or zero.facebook.com)

PAID FOR section
(std data charges)

FREE BROWSING (no data charge)

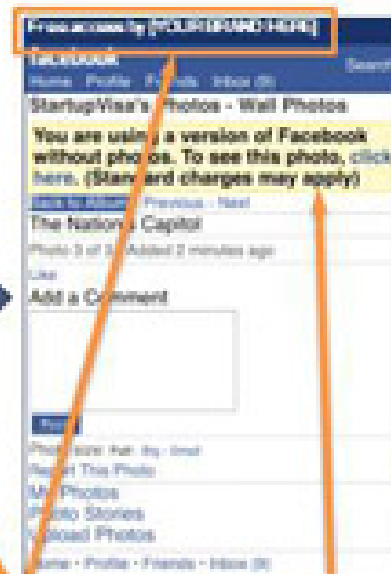
PAID FOR section
(std data charges)



Full facebook
Mobile site
(Lots of data and
photos)



We removed all
the photos



Clear indication
that the mobile
operator is
sponsoring this



Alerts for entering
paid for sections

Photos are
Displayed on
(Pages which are
charged for)

제로 레이팅 사례: 인도

- Telecom major **Bharti Airtel** launched an **open marketing platform “Airtel Zero”** that allows customers to access a variety of mobile applications for free,
- data charges to be paid by the application providers.
- Telecom Regulatory Authority of India (TRAI) → zero-rating plan does not violate Net neutrality

The image shows a screenshot of the Flipkart mobile application interface. On the left, there is a blue sidebar with the Airtel logo at the top, the Flipkart logo in the middle, and the text 'powered by mango techno' at the bottom. The main content area is white and features a search bar at the top with the text 'Home' and 'Enter the keyword here...'. Below the search bar are six yellow category tiles: Books, Mobiles & Accessories, Movies & TV Shows, Music, a game controller, and a camera. On the right, there is a section titled 'Mobiles & accessories' with 'samsung (91 results found)'. Below this, there are two product listings for Samsung Galaxy phones. The first listing is for the Samsung Galaxy Y 55360 (Grey) with a price of Rs. 7830 (6% off from Rs. 4800) and a 'Buy This Item' button. The second listing is for the Samsung Galaxy Ace S5830... with a price of Rs. 17200 (19% off from Rs. 33) and a 'Buy This Item' button. Both listings mention 'Shipping Free' and 'Delivered in 2-4 business days'. At the bottom of the screen, there is a dark blue navigation bar with a WhatsApp icon and a magnifying glass icon.

- Mobile app makers register with **Airtel Zero** to give customers toll-free access to their apps.
- **Airtel Zero** will inform the customers about these Toll-free apps.
- Then customers will download these apps and access them at zero data charges.



Source: NDTV, Apr 10, 2015, Net neutrality supporters downrate Flipkart app after Co-Founder supports Airtel zero

Canadian Radio-television and Telecommunications cracks down on zero-rating in two net neutrality rulings

CRTC backs net neutrality in ruling against apps that favour certain content

Regulator makes key ruling in favour of net neutrality in case involving Bell, Videotron and others

CBC News | Posted: Jan 29, 2015 12:39 PM ET | Last Updated: Jan 29, 2015 3:10 PM ET



Mobile carriers **Bell Mobility** and **Vidéotron** were exempting their own **mobile TV** services from their regular data plans , while **counting traffic for rival services** against those data caps.

제로 레이팅 사례: Comcast's Xfinity App



- ISPs might zero-rate their own applications, while counting all other applications against the cap.
- Comcast's Xfinity App is zero-rated, while other online streaming apps like Netflix or Hulu count towards the cap → 유료 비디오배급시장의 반경쟁야기

제로 레이팅 규제 사례

- Regulators in Chile, the Netherlands, Slovenia and Canada explicitly prohibited zero-rating,
- Regulators in Germany, Austria and Norway publicly stated that zero-rating violates network neutrality.
- Zero-rating has a strong discriminatory effect.

Zero-rating' should not be permitted where

(a) it is **paid-for by edge providers**;

(b) it is offered to selected applications within a class to the **exclusion of others**, even if there is no payment involved”

왜 제로 레이팅은 망중립성에 대한 강력한 위협인가?

Barbara van Schewick



Zero-rating in exchange for edge-provider payment

- Zero-rating harms the start-up innovation ecosystem and free speech
- Zero-rating harms users → Application providers will have to recoup the costs of zero-rating (ex: through higher prices or more advertising on the site.)
- Users will ultimately pay the price.