Mobile Network Neutrality in Smart Phone Era

Joon Young Kim[1], Jin Kyung Park[2] and Bong Gyou Lee[3]

[1]SK Research Institute, Korea, johnjykim@sktelecom.com

[2,3]Yonsei University, Korea, {[2]parkjinkyung, [3]bglee}@yonsei.ac.kr

Abstract

Unlike Network neutrality in traditional wireline Internet, the same concept is not going to be accepted easily by wireless industry players. AT&T and Verizon have accepted the principles outlined by the FCC on network neutrality that keeping their broadband networks open. But the regulation proposed by FCC is not only for wireline but also for wireless services. One must wonder what the difference in attitude from the same companies for the same concept depends on the communications platform.

The FCC is not the only regulatory agency that tries to apply the entire array of Net neutrality requirements to wireless services, but Korean Communications Commission (KCC) is also considering the application of the concept.

Network operators are arguing that wireless networks differ from wireline broadband networks because bandwidth is more limited on a wireless network. This capacity constraint makes it difficult to implement the Net neutrality principle in wireless market. It will be more so when the number of world-wide Smart Phone users are expected to increase 35% per year by 2013.

FCC's recent National Broadband Plan is designed to promote the nation's broadband services, but the FCC hasn't decided how it will move forward with its Net neutrality rules yet. This study will attempt to show that regulating the Internet like the phone network may stifle innovation and investment.

Advocating what seemingly better for the consumers' benefit and public interest may harm the long-term benefit of the society. The delay in innovation and investment can also affect the quality of our everyday lives in the smart phone era.

Keywords: Net Neutrality, wireline, wireless, smart phone, innovation and investment.

1 Introduction

"Network neutrality" is no longer a foreign term even to a layman. It has been discussed and debated a lot for the past few years. The initial concept is started as how to regulate network providers design, manage, and price the use of their network. Network neutrality shares the fundamental concept of the internet's openness: No data traffic should be discriminated for its characteristics, contents, or the size. The main debate has been between large internet contents providers and the internet service providers with network on imposing certain limitation or differentiated price[1].

Net neutrality debate naturally became a policy and regulation issue of importance. The regulatory verdict on the matter is somewhat important because it is likely to have a significant effect on the development and use of future wireline and mobile broadband networks[2]. In particular, broadband operators face capacity problems as the demand for bandwidth consuming contents and applications, like streaming video and on-line game.

Original net neutrality debate as concerning the vertical integration of cable firms with ISPs would be a threat to the end to end design of the internet. When Tim Wu brought up wireless network neutrality, he simply suggested extending Carterfone principle to the mobile internet. He thought that wireless network operators should be treated no differently from wireline network operators when it comes to network neutrality. Also, application platforms have to have a standard so that the end users can enjoy the same contents on any devices.

However, it is difficult to directly apply the same concept of neutrality to mobile broadband internet. The competition structure of mobile network is very different from the previous wireline system where vertically integrated Bell system dominated communications market. So the Caterfone logic lose its ground here. Unlike wireline internet, wireless internet started as a closed walled garden system charging by the packet. Therefore, the traffic discrimination in wireless internet is rather natural compare to the wireline's open internet environment. But the most important difference is perhaps the spectrum bandwidth for the mobile broadband is limited resource for the network operators. This capacity constraint makes it difficult to implement the Net neutrality principle in wireless market. It will be more so when the number of world-wide Smart Phone users are expected to increase 35% per year by 2013.

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[1] Original definition is about a network design principle. The idea is that a maximally useful public information network aspires to treat all content, sites, and platforms equally. So that the network to carry every form of information and support every kind of application.

[2] The decision and practice of the U.S. regulation will have impact on other nations' policy.

The U.S. federal government is ramping up its efforts to regulate the Internet recently, and it could have a major impact on consumers as well as big cable and phone companies. The net neutrality debate is in its second round. During the presidential election campaign, Barack Obama pledged to appoint Net Neutrality supporters to the FCC and he appointed Julius Genachowski to the chair. In Oct. 2009, FCC announced NPRM[3] regarding openness of the internet and announced National Broadband Plan in March 2010 that includes proposals for the network neutrality. Although lost a little bit of its momentum since the US court of Appeals for the DC ruled in favor for Comcast in FCC's net neutrality regulation, the US government's will to pursue network neutrality seems still strong[4].

For the past couple of years, the wave of smartphones is covering all over the world. You may see in news or blogs dealing with iPhone this and Android that pretty much every day. The all talk little action mobile internet is now gearing up and consuming the network capacity. The proponents' argument is end users' rights of the access. The opponents are mostly concern that network neutrality affects negatively in investment incentive.

We have reviewed quite a few literatures on the subject and selected a few to introduce the arguments and to support our points. Then we pointed out the technological and structural differences between wireline and wireless networks and why it is difficult to apply the same standard of network neutrality. Finally we presented the logic why it can have negative impact for the end users especially with high smartphone diffusion rate.

2 Literature Review

Jonathan Zittrain argued in his book, *the future of the internet* that the Internet needs to be treated as a type of commons. More specifically, the Internet should be treated as a "must carry" pipeline that doesn't favor some content at the expense of other. He is so right, but can be misleading though. What he meant was not to discriminate the streaming speed of Youtube to that of Hulu. He clearly didn't mean that all contents are to be treated equally at the expense of the network carriers' cost. Timothy Karr[5], for example, actively argues that how net neutrality is beneficial for the end users and network carriers are against it to protect their legacy business model. He is also right about protecting consumers' choice and the free flow of information online. He also said in a few

[3] Notice of Proposed Rule Making: In the matter of Preserving the Open Internet Broadband Industry Practice, FCC 09-03. GN Docket No. 09-191

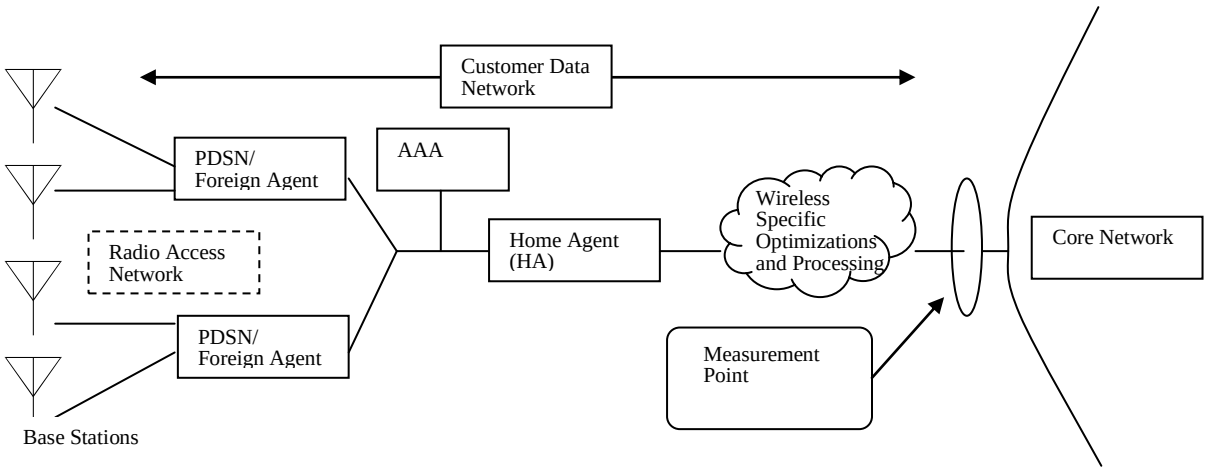
[4] Obama administration has made net neutrality one of its central technology policy issues.

[5] Campaign Director, Free Press and Savetheinternet.com

interviews that network neutrality has to be enforced regardless of the platform and FCC has opportunity to right the wrong. David Farber, Gerald Faulhaber (2010), argued that the internet needs a makeover. Unfortunately, congressional initiatives aimed at preserving the best of the old Internet threaten to stifle the emergence of the new one. They also pointed out that the FCC should not waste its time with pointless, costly regulation; it should facilitate competition so that customers can choose for themselves if and how much network neutrality they want. What they are saying is that the advocates of the network neutrality are using the consumers to win the argument, but only true advocates for the consumers are themselves. Hart(2007) also said in his book prioritization of bandwidth is necessary for future innovation on the Internet. Stephen Pociask(2007)[6] argued in his study that despite proponents' best intentions, net neutrality proposals would be a twofold problem for consumers. Innovations that require a guaranteed level of service won't come to market, and consumers would have to pay more for the services they receive.

3 The technical differences between Wireline and Wireless Internet Environment

The demand for wireless Internet access has increased exponentially. Mobility seems carry the Internet industry momentum from wireline Internet to wireless broadband access. The advent of smartphones started the ubiquitous life that we have talked about for years.



[Fig. 1] Wireless and Measurement Architecture.

Source: Ridoux, Nucci, and Veitch (2006)

[6] Net neutrality regulation would cost consumers $69 billion over ten years.

Now proponents of the net neutrality want to apply the same principles of the net neutrality to the mobile broadband Internet.

Unfortunately, it seems that they don't have a solid understanding how the traffic carried by wireless infrastructures. Without understanding the basic technological differences between the networks, how can anyone argue about neutrality in the first place? So we need to take a look at what a typical wireless network looks like and how the data travels one end to the other.

As we see in [Fig.1], between the Radio Access Network and the core network, the traffic goes through the Customer Data Network (CDN) whose entry points are represented by Packet Data Switch Node (PDSN) which handles Authorization, Authentication and Accounting (AAA) and mobility management through a Mobile IP infrastructure. When a user appears on the RAN, the FA relays its request to the AAA server for authentication then forward it to the HA that replies with an IP address from its pool. Now the new user can access the network resources while being free to move to other cells.[7]

When modeling the wireless traffic, in contrast with wireline Internet traffic, the flow arrival process has a significant structure that must be taken into consideration.[8] What does it mean in layman's term? It means transmitting data traffic must have orders and priorities in order to avoid congestions or delays.

Without further discussion on technical aspect, we can understand why network neutrality cannot be directly applied in the wireless environment.

4 Potential Negative Impact of the Network Neutrality

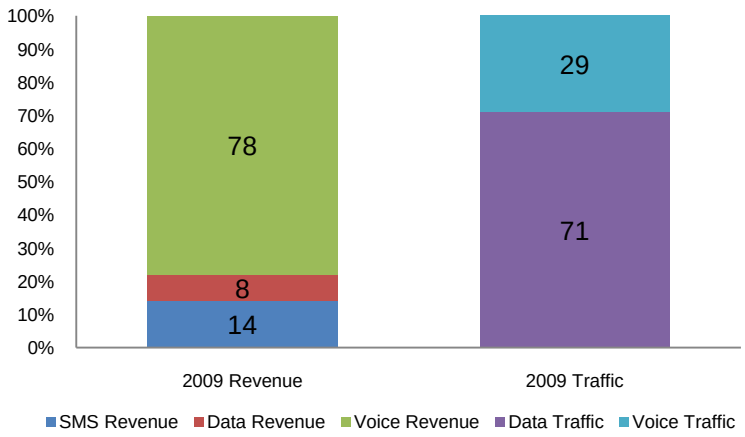
Imagine there is a toll freeway with 6 lanes. All kinds of vehicles are passing up and down of it. There are many ways to charge whoever uses that freeway to recoup the construction cost and some profit on top. You may charge a flat toll for any shapes and sizes of the vehicles or you can differentiate the pricing by the size. Not by the color or the registered county but by the size. If you are a driver of a smaller car or a motorcycle, would you prefer paying the same amount as a dump truck or a bus? Let's assume that the toll is uniformly priced regardless of the vehicles' size, and everyone can drive at the same speed, more and more large vehicles will have incentive to use the freeway. In order to avoid the congestion, they have to expand the freeway into eight or ten lanes. Now the toll will have to be raised to cover the expenditure. You, as a small car driver, suddenly

[7] This is possible by handover among cell towers.

[8] Ridoux, Nucci, and Veitch (2006) showed this by experiment results

become unhappier. Well, it could be a lot worse if there's no potential way to extend the lanes. If that's the case, everybody has to drive slowly and the toll will become more expensive to control the congestion.

Above analogy fits rather nicely to the wireline and wireless broadband if not perfectly. The biggest difference between the wireline and the wireless broadband network is the degree of extendibility of the capacity when it is necessary.



[Fig. 2] Data Traffic v. Revenue (US Market, %)

Now, what seems not fair from the [Fig.2]? Data traffic volume is almost three quarters of the total wireless traffic, but the revenue is mere 8%. Some of the data traffic is paying a lot less toll than it should be even without the net neutrality regulation.

Until recently, network congestion or capacity shortage in wireless network was none issue. Now with bandwidth-hungry smartphones, net books, and iPad, network operators are suddenly worrying about the network capacity. Transmitting packets are no longer simple text, email, or photo. It is streaming videos with high definition quality. Youtube, Hulu, Airvideo, and Slingbox are oversized trucks on the wireless broadband network.

The problem is not just the size of the contents. When Google introduced Google Voice, a VoIP solution that you can talk and text for free, Apple blocked Google Voice from the AppStore. Wait, Apple? not AT&T? So it is something new that handset manufacturer is blocking the content application. FCC is looking into the matter focusing on potential influence of AT&T to push out the Google Voice application[9]. Blocking a specific application violates the rights to use all lawful

[9] There said to be a written condition on the exclusive contract between AT&T and Apple that any and all VoIP functions using AT&T's cellular network may not be included in iPhone.

applications and it also applies to the manufacturer along with network operators. This shows the conflict between wireless network and mobile VoIP service providers as wireless network neutrality becomes policy issue. The core of the conflict is that VoIP service providers wants to tap into the bread and butter of the network operators, voice market. Will consumer be better off talking for free via Google Voice, Skype or Fring? Yes for now, but may be not in the longer time frame. Device manufacturers and carriers establish standards and protocols that application developers must follow. And manufacturers of handsets and carriers must work closely to ensure that the phones and the networks function in the way that they must to keep the highest possible quality in transmitting information and use the spectrum efficiently.

FCC's principles to preserve net neutrality have some ambiguity especially with the term 'lawful'. If we grant the property rights of the network, then the owner or the operator of the network should be able to decide what is and what isn't lawful under its policy as well. If telecommunications operators in general, including major wireless network carriers, are to be considered as common carriers and network properties are considered as public utility, then why would anyone be willing to spend billions of dollars to develop and innovate the network in the first place? When neutrality proponents say that people have a right to 'neutral' provision of information over the Internet, what they are really saying is that the public has some sort of right over the private property of the companies that provide the access to that information.

The proponents of the network neutrality would say that they want to use regulation to engender competition and innovation, but their remedies would have the opposite effect. They tend to underestimate the amount of competition that already exists in the market for high-speed internet services. There are multiple companies providing the services using multiple technology platforms.

Network operators are not saying that they are censoring the contents, but prioritize the packets and control the traffic to maintain QoS and congestion problem of the network.[10] It is especially important for wireless network to control the packets and applications transmitting through handsets. Failure to do so may jam the network and your smartphone can't even make a simple phone call let alone surfing the internet download some contents.

5 Conclusion

At the end of the day, with net neutrality or without, it is all about pricing of the service. It is not contents issue, but it is all about return on investments for the network operators' point of view as

[10] As we showed in the previous chapter.

well as internet portals or contents providers' as well. It will be great if you can pay less than what you are willing always. But if FCC is not going to touch the price of the services, then the best mechanism known today is 'market'.

Under the current authority of FCC, they can't do anything to carry out net neutrality proposal. It requires the congress to change the law and empower FCC. In the mean time, FCC may try to include wireless telecommunications operators into 'Telecommunications Common Carrier' under the Title II of the Act.[11]

Free in the sense of unrestricted is not the same as cost free. If unlimited access and usage of finite resources are allowed, the tragedy of the commons problem will occur.

Prioritization of the traffic is necessary for the network operators to keep the QoS and normality. Smartphone diffusion got much faster when 'all you can eat' plan was introduced. The consumer benefits from better quality and the reassurance of unlimited service, free from huge phone bill.

Both technologically and historically, wireless network is very different from wireline network in terms of transmitting logic and pricing the packets. And there are many evidences that innovations are in every value chain of the wireless industry. There's no dominant monopolist who can control the market at his will. No market failure is to be seen. Regulatory interventions into markets without market failure cannot be justified and only going to raise costs, restrict consumer choice, and reduce incentives for investment and innovation. When there's nothing to fix, the regulators don't have to try fixing things, but make sure the market works properly.

The operators are to be creative and responsive in their services' pricing and traffic management. Otherwise they may have to face the politically appealing restrictions called 'Net Neutrality', which will be neither in their interests nor in those of the customers.

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[11] FCC categorized broadband services under Title I, information service, to de-regulate the services in 2002. Commissioner Michael Copps has been arguing that broadband service has to be under Title II, telecommunications service.

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