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Conference Paper

Recent Development of Net Neutrality Conditions in Japan: Impact of Fiber Wholesale and Long-term Evolution (LTE)

26th European Regional Conference of the International Telecommunications Society (ITS):
"What Next for European Telecommunications?", Madrid, Spain, 24th-27th June, 2015

Provided in Cooperation with:

International Telecommunications Society (ITS)

Suggested Citation: Jitsuzumi, Toshiya (2015) : Recent Development of Net Neutrality Conditions in Japan: Impact of Fiber Wholesale and Long-term Evolution (LTE), 26th European Regional Conference of the International Telecommunications Society (ITS): "What Next for European Telecommunications?", Madrid, Spain, 24th-27th June, 2015, International Telecommunications Society (ITS), Calgary

This Version is available at:

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Recent Development of Net Neutrality Conditions in Japan

Impact of Fiber Wholesale and Long-term Evolution (LTE)

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Abstract

The Japanese broadband market was very competitive until recently owing to the interconnection rules and the significant market power (SMP) regulations on the incumbent fixed telecom giant, NTT East/West. Japan's regulator, the Ministry of Internal Affairs and Communications (MIC), could let the market dynamism deal with the net neutrality issue without introducing any "special" rules. However, technological developments in mobile broadband have turned mobile operators into leading players in the broadband ecosystem, which is making the broadband access market increasingly oligopolistic. The fiber wholesale recently introduced by NTT East/West may accelerate this trend by realizing the virtual integration of NTT Docomo and NTT East/West. Since mobile network operators are less disciplined in Japan's telecom framework than fixed ones are, the MIC cannot sit back and do nothing. This paper compares two of the tools the MIC may use—increasing competitive pressure in the market and controlling the behavior of dominant mobile operators—and concludes that the latter is more promising. The author recommends that the MIC begin examining the re-regulation of mobile operators and the introduction of new rules for net neutrality.

1. Introduction

Acknowledging that there are several definitions of "net neutrality," Krämer et al. (2013) stated that the existence of effective competition and a constitutional safeguard for freedom of speech are critical factors when discussing whether we need net neutrality regulations. Sharing this perspective but focusing more on the economic aspect, the author has stressed in Jitsuzumi (2010, 2011a) that the net neutrality issue is nothing but a combination of a congestion problem produced by limited network capacity and the threat of anti-competitive behaviors posed by dominant Internet service providers (ISPs).

When the net neutrality issue was first officially discussed in Japan in 2007, the industrial structure of the Japanese broadband ecosystem was (and has been) heavily affected by the significant market power (SMP) regulations on incumbent carriers controlled by Nippon Telegraph and Telephone Corporation (NTT).¹ Thus, broadband users have enjoyed the benefit of competition² among many independent ISPs. The author therefore concluded in Jitsuzumi (2011b) that, from an economic point of view, the special net neutrality rules aimed at constraining the discretion of dominant ISPs repeatedly proposed by the Federal Communications Commission (FCC) were not required in Japan. In fact, the Ministry of Internal Affairs and Communications (MIC) has not introduced any special arrangements for net neutrality; this approach is similar to that of the

¹ NTT is a share-holding company of its subsidiaries in the NTT group. NTT East and NTT West belong to the NTT group and are subject to the NTT Law. NTT East offers regional telecommunications services, including xDSL and FTTH, in eastern Japan, while NTT West offers the same in western Japan.

² However, the level of competition is not as high as it looks. According to Jitsuzumi (2014), the Japanese ISP market is not very competitive considering the size of its switching costs.

European regulators. Leal (2014) indicated that the EU framework treated the net neutrality problem as one that “mainly concerned barriers for competition (in broadband access services) which should be effectively addressed in Europe under the existing rules” (p. 507). Following a similar logic, Jitsuzumi (2014) stressed the importance of a quality of service (QoS) competition among ISPs, calling for improved transparency regarding best-effort quality and network management methods of dealing with this “traffic congestion” problem.

However, recent developments in mobile broadband and the introduction of fiber wholesale by NTT East and NTT West (NTT East/West) may greatly impact the assumptions upon which the author’s conclusion in Jitsuzumi (2011b) was based. As the capability of mobile broadband approaches that of fixed broadband, many consumers are starting to rely only on the former. This process will diminish the level of competition in the broadband ISP market because Japan’s mobile ecosystem is dominated by vertically integrated network/ISP operators, who are less regulated by the current SMP rules. Additionally, in May 2014, NTT announced that it would start a “Hikari collaboration model,” whereby a variety of market players would provide their own integrated services to end-users by combining their strengths with the wholesale fiber access service of NTT East/ West.³ Competing operators have objected strongly, fearing NTT’s unleashed market power. For example, competitors insist that the introduction of wholesale fiber will change the preconditions for the current facility-based competition, leading to infrastructure monopoly. ISPs and telecom operators are afraid of the possible favoritism among the NTT group. If these concerns become a reality, the Japanese broadband ecosystem will change drastically, making a second round of discussions on net neutrality a necessity.

After Section 2 describes the essence of the net neutrality issue from an economic perspective, Section 3 summarizes the rationale of the Japanese approach, focusing on NTT’s indisputable market dominance and Japan’s vertically separated industrial structure. Then, Section 4 evaluates the impact of fiber wholesale introduction and the popularization of Long-term Evolution (LTE). The author suggests in Section 5 that special remedies similar to those used in the US are required in Japan. Finally, Section 6 concludes the paper.

2. Net neutrality “problems” from an economic perspective

According to Cisco (2014), a huge increase in global IP traffic is expected: “Global IP traffic has increased more than fivefold in the past 5 years, and will increase threefold over the next 5 years. Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 21 percent from 2013 to 2018” (p. 1). It is also predicted that the share of video applications, which tend to be more live and thus more concentrated in primetime, will be the major part of global IP usage: “Globally, IP video traffic will be 79 percent of all consumer Internet traffic in 2018, up from 66 percent in 2013...The sum of all forms of video (TV, video on demand [VoD], Internet, and P2P) will be in the range of 80 to 90 percent of global consumer traffic by 2018” (p. 2). To maintain the quality of the end users’ Internet experience, a corresponding expansion of Internet backbone capacity will be required; however, this will cost money and thus requires increased user expenditures. This seems to be a simple congestion problem, which transportation economists have long been dealing with. However, three factors make traditional remedies unworkable and the market-based

³ http://www.ntt.co.jp/news2014/1405eznv/ndyb140513d_01.html.

equilibrium suboptimal:

1. The Internet backbone is a collective commons supported by many individual operators.
2. The prevalence of best-effort quality may inhibit network investment.
3. A serious information asymmetry concerning network QoS exists between ISPs and end users.

Moreover, since facility-based network operators are assumed to enjoy a natural monopoly, if they leverage their market power (for example, by vertically integrating with ISPs) into the neighboring market, the market outcome may include an additional efficiency loss.

Considering all the above, from an economic viewpoint, net neutrality can be interpreted as nothing but a combination of “twin problems,” as discussed in Jitsuzumi (2010, 2011b): traffic congestion with a limited network capacity at the Internet backbone and the potential for anti-competitive behaviors posed by dominant network operators (see Fig. 1).

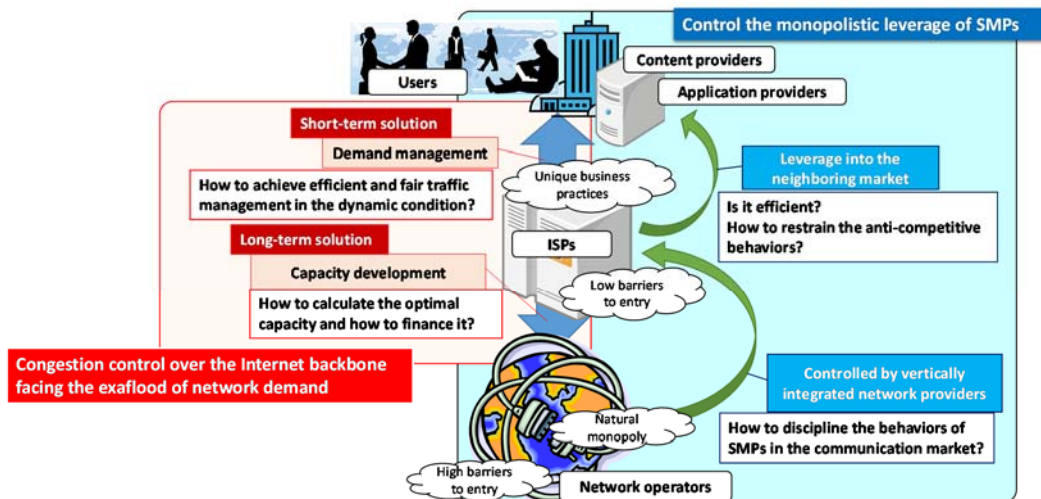
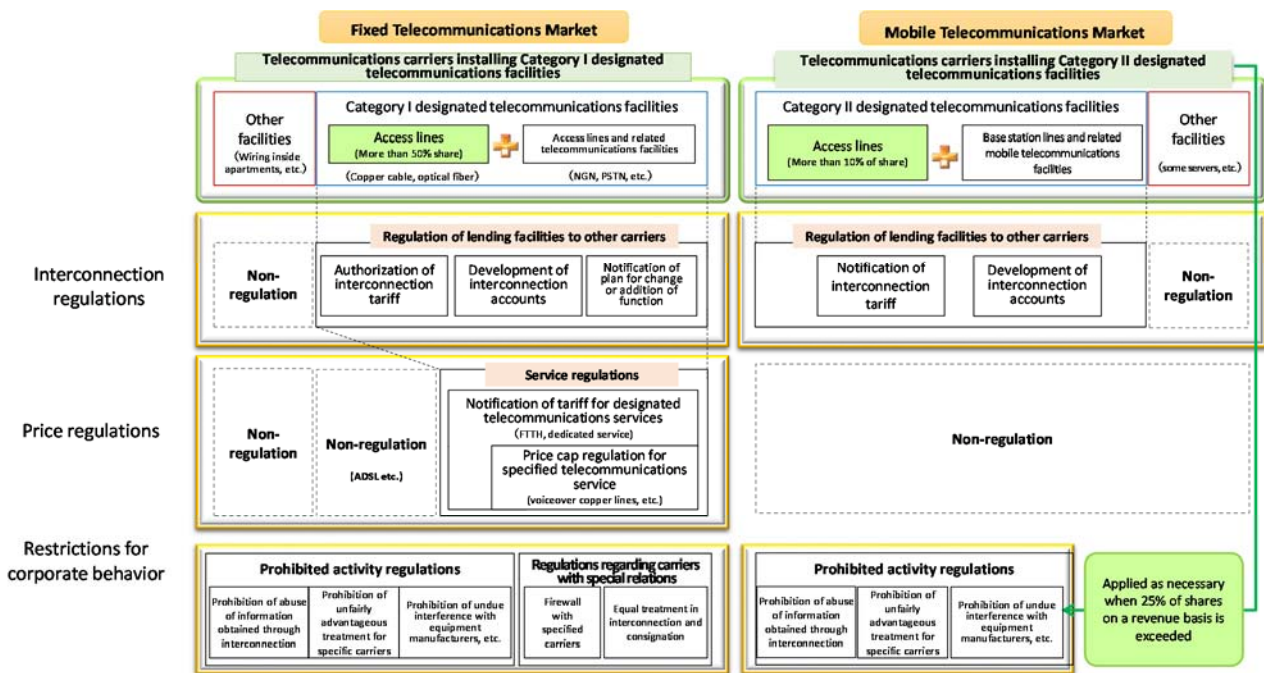


Fig. 1 The economic essence of the net neutrality problem

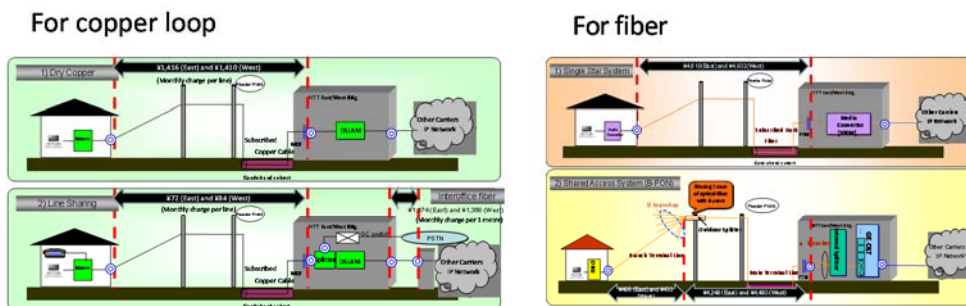
3. Japan's approach thus far

The MIC has been using the following approach to deal with these twin problems. First, to deal with the possible anti-competitive behavior of incumbent network operators, the MIC relies on interconnection requirement and SMP regulations. Article 32 of the Telecommunications Business Act (TBA) stipulates that “Any telecommunications carrier shall accept a request from another telecommunications carrier to interconnect the telecommunications facilities,” and, as shown in Fig. 2, the “Category I designated telecommunications facilities” framework disciplines the behavior of dominant network operators in the fixed telecommunications market (i.e., NTT East/West). These regulations, accompanied with the unbundling obligations (see Fig. 3), limit the discretion of NTT East/West, which can potentially enjoy a natural monopoly, thus helping maintain competitiveness in the fixed broadband ISP market.



Source: Created using material provided by the MIC.

Fig. 2 “Category I and II designated telecommunications facilities” framework



Source: Created using material provided by the MIC.

Fig. 3 Unbundling obligations for NTT East/West

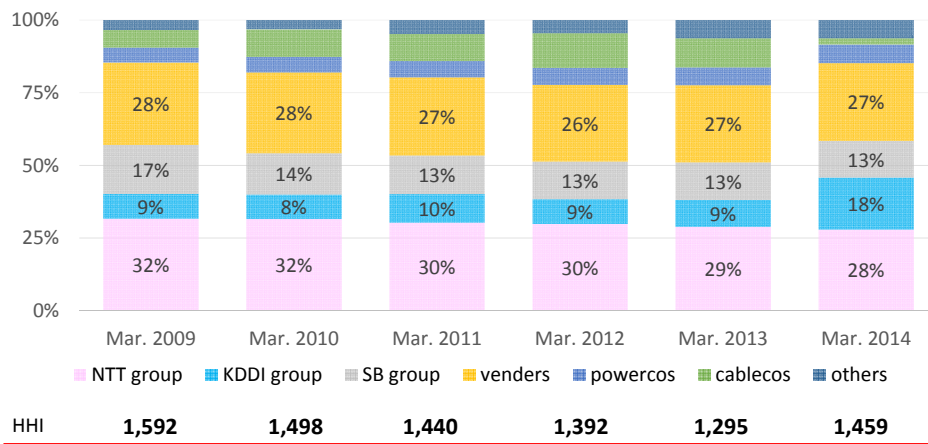
The NTT Law also controls the strategic discretion of NTT East/West (see Table 1). In particular, the scope of business is exhaustively listed in the law: the scope can be expanded only to help accomplish the original scope, provide out-of-bounds service, or foster the productive use of its resources as long as it does not impair fair competition; any expansion requires a pre-notification to the minister. As a result, NTT East/West is not allowed to offer ISP services by itself. Moreover, the SMP rules do not allow NTT East/West to treat its ISP subsidiaries more favorably than it does other ISPs.

Table 1 Restrictions of the NTT Law

	NTT	NTT East/West
Objectives of operation	Control NTT East/West to properly secure the telecom service and related R&D	Provide regional telecom services
Scope of business	Exhaustively listed in the law.	Exhaustively listed in the law.
Expansion of the business domain	Must be for the accomplishment of the original scope and needs pre-notification to the minister (until 2011, the approval of the minister was required instead)	Must be for the accomplishment of the original scope, the provision of out-of-bounds service, and the productive use of its resources as long as it does not impair fair competition; it needs pre-notification to the minister (until 2011, the approval of the minister was required instead)
Obligation	Universal Service Obligation (USO) and promotion of public welfare	USO, and promotion of public welfare
Obligatory shareholding by the government	At least one-third must be owned by the government, and foreign control must be less than one-third.	NTT must own 100%
Appointment of directors and auditors	Foreigners cannot be appointed and must be approved by the minister.	Foreigners cannot be appointed and must be approved by the minister.
Business operating plan	Must be pre-approved by the minister, subject to consultation with the Minister of Finance	Must be pre-approved by the minister, subject to consultation with the Minister of Finance
Financial report	Must be submitted to the minister	Must be submitted to the minister

Source: Adapted and translated by the author.

Since these mechanisms were working as expected as of 2007, it was not necessary for the MIC to introduce any measures to deal with the anti-competitive aspect of the net neutrality issue. In fact, according to MIC (2014a, p. 336), the fixed ISP market is still considered sufficiently competitive (see Fig. 4).



Source: Created based on MIC data (2014a).

Fig. 4 Shares of the fixed ISP market in Japan

Therefore, when dealing with traffic congestion, the MIC could rely on the dynamism of the broadband ISP market with its limitations in mind, and did not introduce any special rules for net neutrality while maintaining the ongoing SMP regulations. To satisfy the transparency requirement of Article 26 of the TBA,⁴

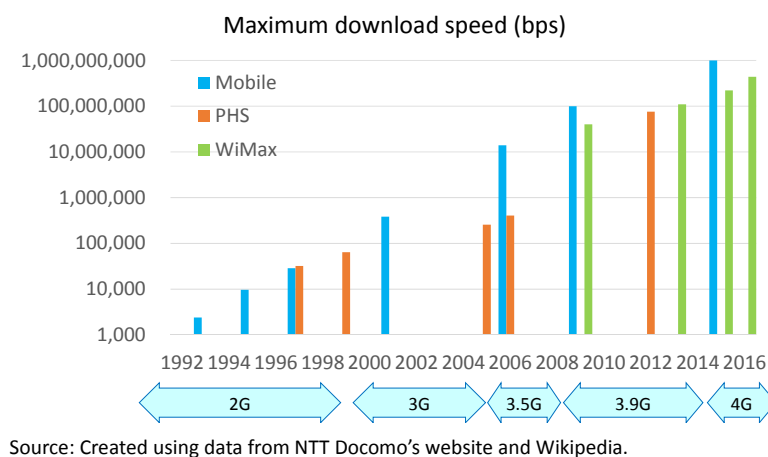
⁴ Article 26 (Accountability of Terms and Conditions for the Service Provision) states the following: “When any telecommunications carrier or any person who engages in acting as an intermediary, agency or agent for concluding a contract for the provision of telecommunications services of a telecommunications carrier (hereinafter referred to as

the MIC revised the Guidelines for Consumer Protection Rules to mandate ISPs to notify subscribers of the details of their packet-shaping practices, such as when and where traffic-shaping occurs and what its target is.⁵ It even included a model contract for disclosing such information. Furthermore, in 2013, it initiated a mobile QoS measurement project to provide sufficient information to end users.⁶ Concerning traffic management, the MIC allowed the market players to self-regulate; it allowed operators to establish the Packet Shaping Guideline in 2008⁷ and the Anti-DoS/DDoS Guideline in 2011,⁸ both of which provide a standard method for traffic management.

So far, this framework has been working well. Indeed, we have not experienced any major incidents that violate net neutrality principles in general, except in some isolated cases.⁹

4. Impact of the fiber wholesale and LTE

The situation that has justified the MIC's passive approach has started to change recently for two reasons. One is technological developments in mobile broadband. When the net neutrality issue was first discussed in Japan in 2007, mobile broadband was mostly seen as complementary to its fixed counterpart. However, as the transmission capability of mobile broadband improves (see Fig. 5), it becomes increasingly substitutable, and users are increasingly relying on it. In fact, according to MIC (2014b), not only has the user share of mobile broadband become larger than that of fixed broadband, but its usage time is now longer (see Fig. 6).



Source: Created using data from NTT Docomo's website and Wikipedia.

Fig. 5 Technological developments in mobile broadband capability

'telecommunications carrier, etc.')

intends to conclude a contract, or to act as an intermediary, agency or agent for concluding a contract, with a person (except a telecommunications carrier) who intends to receive telecommunications services on the provision of telecommunications services specified by an Ordinance of the Ministry of Internal Affairs and Communications as those relevant to the daily lives of citizens, they shall, as specified by an Ordinance of the Ministry of Internal Affairs and Communication, explain to the person an outline of the charges and other terms and conditions for the provision of the telecommunications services."

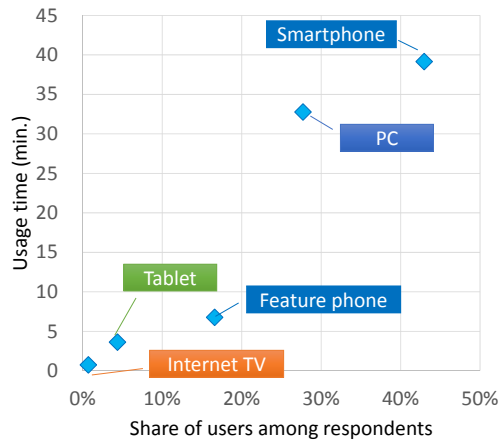
⁵ http://www.soumu.go.jp/menu_news/s-news/16063.html.

⁶ http://www.soumu.go.jp/menu_news/s-news/01kiban04_02000066.html.

⁷ http://www.jaipa.or.jp/other/bandwidth/info_080523.html.

⁸ http://www.jaipa.or.jp/other/mtcs/info_110325.html.

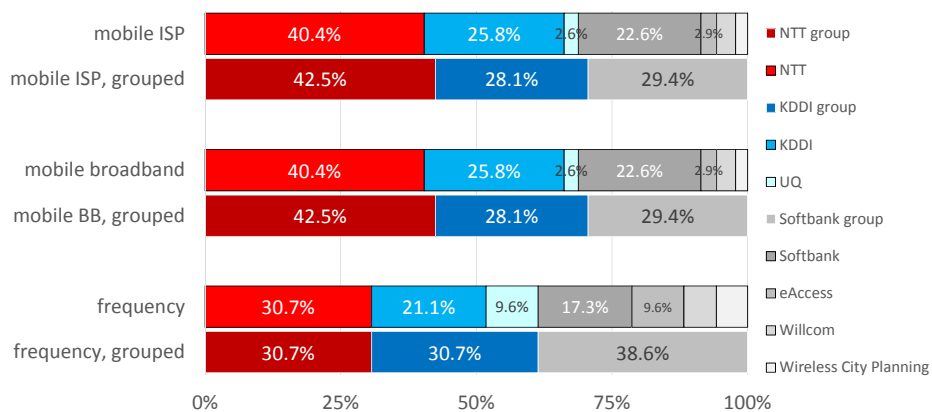
⁹ http://www.soumu.go.jp/menu_news/s-news/01kiban08_02000072.html.



Source: Created based on MIC data (2014b).

Fig. 6 Usage of various terminals for Internet connection

The industrial structure of mobile broadband in Japan is quite different from that of its fixed counterpart. Broadband Internet access is mostly provided by mobile phone operators, which are all vertically integrated with ISPs,¹⁰ and the TBA's rules for mobile SMP operators, as all three major operators (i.e., NTT Docomo, KDDI, SoftBank) are designated as, are less strict than for fixed operators, as shown in Fig. 2. As a result, the market is heavily dominated by three incumbent operators (see Fig. 7). When considering possible collaborations among an operator's group companies, the degree of the oligopoly becomes even greater; in fact, the Herfindahl–Hirschman Index (HHI) of the mobile ISP market had increased from 2,841 to 3,461 by the end of March 2014.



Source: Created based on MIC data (2014a).

Fig. 7 Shares of the mobile market in Japan, at various levels

The other reason for the changed situation is the introduction of fiber wholesale by NTT East/West. On May 13, 2014, NTT announced that NTT East/West would start wholesaling fiber access services. According

¹⁰ NTT Docomo, one of the major members of the NTT group (59.27% of its shares is owned by NTT), is free to expand its business domain. As do its competitors, KDDI and Softbank, NTT Docomo provides Internet access services on its own.

5. Options for the Japanese government and required approach

The emerging situation is expected to be similar to that in the US, where telcos and cablecos, both of which are vertically integrated, can leverage their network market dominance over the ISP market (see Fig. 9). The author believes that the FCC's strategy provides useful guidance for the MIC.

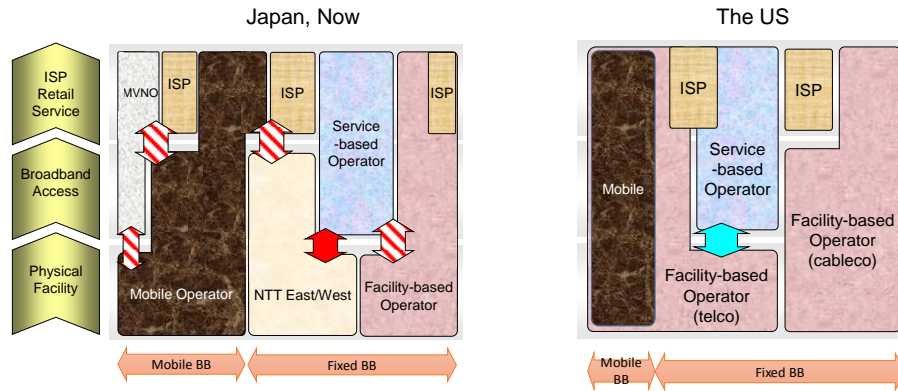


Fig. 9 Comparison of the broadband ecosystem between Japan and the US

In the US, ever since the 2002 Cable Modem Declaratory Ruling, the FCC has been steadily losing its power over broadband network operators.¹⁵ Consequently, although the US broadband access market is largely duopolistic or worse,¹⁶ the FCC has lost almost all controlling power over the dominant players' behaviors. Thus, to attain "net neutrality" or the "Open Internet," the FCC has had to deal with both of the twin problems simultaneously. Since revitalizing market competition through network unbundling or business domain regulation is not feasible in the US, the US introduced new behavioral controls, such as the 2010 Open Internet Order¹⁷ and the 2015 New Open Internet Order¹⁸ (see Fig. 10).¹⁹

¹⁵ In addition to the Cable Modem Declaratory Ruling (17 FCC Rcd 4798, 67 FR 18848 [2002]), the Wireline Broadband Classification Order (20 FCC Rcd 14853, 70 FR 60222 [2005]), Broadband over Power Line Classification Order (21 FCC Rcd 13281 [2006]), and Wireless Broadband Classification Order (22 FCC Rcd 5901 [2007]), accompanied with the Brand X decision (National Cable & Telecommunications Ass'n v. Brand X Internet Services, 125 S.Ct. 2688 [2005]) ended the FCC's authority over the broadband access market.

¹⁶ "2015 BROADBAND PROGRESS REPORT AND NOTICE OF INQUIRY ON IMMEDIATE ACTION TO ACCELERATE DEPLOYMENT" <https://www.fcc.gov/document/fcc-finds-us-broadband-deployment-not-keeping-pace-0>

¹⁷ 25 FCC Rcd 17905, 76 FR 60754, 76 FR 59192 (2010).

¹⁸ 80 FR 19737 (2015).

¹⁹ Compared to these FCC rules, the EU rules, as shown below, are much less specific and leave national regulatory authorities (NRAs) enough room to adjust principles to domestic needs; thus, they are not appropriate as guideline for the MIC.

<p>2010 Open Internet Order</p> <ul style="list-style-type: none"> ◦ Broadband Internet access service (BIAS) is an information service. ◦ Three rules <ol style="list-style-type: none"> 1. Transparency <ul style="list-style-type: none"> ◦ BIAS operators shall publicly disclose accurate information. 2. No blocking <ul style="list-style-type: none"> ◦ Fixed BIAS operators shall not block lawful content, applications, services, or non-harmful devices, subject to reasonable network management. ◦ Fewer requirements for mobile. 3. No unreasonable discrimination <ul style="list-style-type: none"> ◦ Fixed BIAS operators shall not unreasonably discriminate in transmitting lawful network traffic. 	<p>2015 New Open Internet Order</p> <ul style="list-style-type: none"> ◦ Reclassifies BIAS as a telecommunications service. ◦ New authority to address ISP interconnection ◦ Bright-line rules <ol style="list-style-type: none"> 1. No blocking <ul style="list-style-type: none"> ◦ BIAS operators shall not block lawful content, applications, services, or non-harmful devices, subject to reasonable network management. 2. No throttling <ul style="list-style-type: none"> ◦ BIAS operators shall not impair or degrade lawful Internet traffic, subject to reasonable network management. 3. No paid prioritization <ul style="list-style-type: none"> ◦ BIAS operators shall not engage in paid prioritization. ◦ Rules for future conduct <ul style="list-style-type: none"> ◦ BIAS operators shall not unreasonably interfere with or unreasonably disadvantage lawful internet experience of end users and edge providers, subject to reasonable network management. ◦ Higher transparency requirement ◦ General pleading requirements and formal complaint procedures
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Source: Created based on the FCC's Open Internet orders.

Fig. 10 Net neutrality rules of the FCC

Taking the FCC's practices and failures into consideration, the author proposes two groups of policies (see Fig. 11), each of which merits thoughtful perusal. First, to deal with the twin problems, the MIC should increase competition in the mobile market by introducing more competitors, lowering switching costs for existing users, and regulating marketing hype. In introducing more competitors, increasing the number of mobile network operators (MNOs) who depend on Wi-Fi spectrum or of mobile virtual network operators (MVNOs) who do not need spectrum licenses is a possible target. Concerning lowering switching costs, the

<p>Current framework</p> <p>Framework Directive (amended by DIRECTIVE 2009/140/EC)</p> <ul style="list-style-type: none"> ◦ Article 8(4)(g) <p style="margin-left: 20px;">NRAs shall promote "the ability of end-users to access and distribute information or run applications and services of their choice."</p> <p>Universal Service Directive (amended by DIRECTIVE 2009/136/EC)</p> <ul style="list-style-type: none"> ◦ Articles 20(1)(b) <p style="margin-left: 20px;">Member States shall ensure that broadband contracts clearly show the details of traffic control.</p> ◦ Article 21(3)(c), (d) <p style="margin-left: 20px;">NRAs are able to introduce transparency rules on traffic management practices.</p> ◦ Article 22 (3) <p style="margin-left: 20px;">NRAs are able to impose minimum QoS requirements.</p> 	<p>"Connected Continent" Proposal as of Sep. 11, 2013</p> <p>Article 23 - Freedom to provide and avail of open internet access, and reasonable traffic management</p> <ol style="list-style-type: none"> 1. End-users shall be free to access and distribute information and content, run applications and use services of their choice via their internet access service. ... 2. End-users shall also be free to agree with either providers of electronic communications to the public or with providers of content, applications and services on the provision of specialized services with an enhanced quality of service. ... 5. Within the limits of any contractually agreed data volumes or speeds for internet access services, providers of internet access services shall not restrict the freedoms provided for in paragraph 1 by blocking, slowing down, degrading or discriminating against specific content, applications or services, or specific classes thereof, except in cases where it is necessary to apply reasonable traffic management measures. ...
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Source: Created based on the Directives and adapted from the Connected Continent Proposal.

Fig. A Net neutrality rules of the EU

MIC has already implemented mobile number portability (MNP) and the unlocking of SIMs; e-mail address portability²⁰ and personal data portability²¹ may be future possibilities. The costs consumers incur to use a different supplier are called “switching costs.” In general, where a switching cost exists but no product differentiation, firms compete aggressively to attract new users by lowering prices²² but aim to maximize their profits by charging monopolistically high prices to existing users who are “locked in,”²³ possibly impairing market efficiency.²⁴ A high switching cost makes competition for new users too intense at the expense of the existing customer base, giving the operator with the larger customer base a better chance to win. Therefore, it may also be important to contain marketing hype in order to prevent oligopoly.

<p>Structural remedy: Increasing competitiveness</p> <ol style="list-style-type: none"> 1. Introduce more competitors <ol style="list-style-type: none"> A) Mobile network operators B) Mobile virtual network operators 2. Lower switching costs <ol style="list-style-type: none"> A) Mobile number portability B) Unlock SIMs C) E-mail address portability D) Personal data portability 3. Regulate marketing hype 	<p>Behavioral remedy: Restricting SMP players</p> <ol style="list-style-type: none"> 1. Self-regulation <ol style="list-style-type: none"> A) Guideline for packet shaping B) Guidelines for QoS measurement 2. Re-regulation <ol style="list-style-type: none"> A) Tightening of regulations on category II facilities B) Introduce tariff regulations 3. New network neutrality rules <ol style="list-style-type: none"> A) Set the minimum QoS B) Introduce higher transparency C) Set the bright-line rules while leaving much room for case-by-case discretion
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Fig. 11 Policy list for the MIC

Some of these measures have already been introduced in the Japanese broadband market. For example, adding more MVNOs has been one of the policy focuses of the MIC,²⁵ but the share of independent MVNOs is still 5.8% of the mobile market, and only half of them are in the same sector and are thus able to put competitive pressure on incumbent MNOs. On October 24, 2006, the MNP was introduced in Japan in the hope of lowering switching costs and bringing more competition to the mobile market. Since then, according to the data collected by the Telecommunications Carriers Association (TCA),²⁶ Softbank has become a big winner, and NTT Docomo is a constant loser. However, the MNP’s impact on overall competition is limited. The ranges of market share changes have remained almost the same (see Fig. 12). Unlocking SIMs and regulating marketing hype have not yet worked very well, either. Therefore, the author tentatively concludes that it is unwise to rely completely on a structural remedy to address the net neutrality issue. Since increasing

²⁰ Jitsuzumi (2014) proved that an e-mail address linked to a certain provider can serve as a switching cost.

²¹ Jitsuzumi and Koguchi (2013) empirically showed that, in an e-commerce site, personal usage history can serve as a switching cost.

²² Competing service providers need to quote a price lower than that of the existing players to at least compensate the user for the switching costs involved.

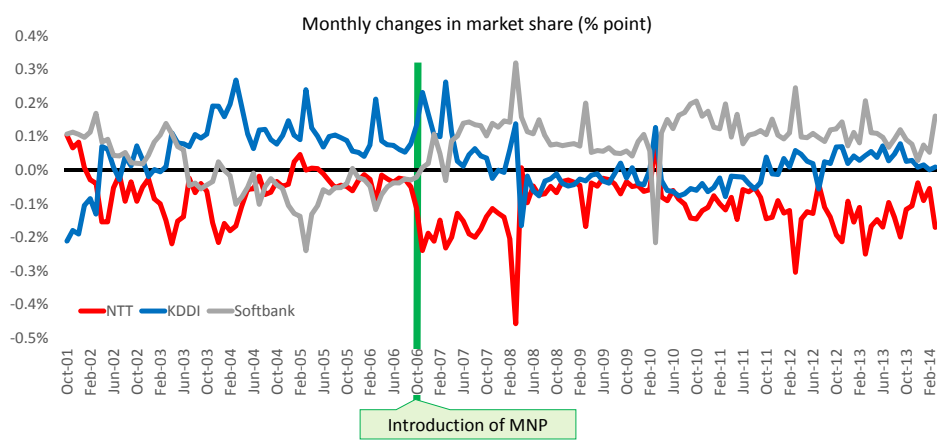
²³ This practice is called “hold-up” or “bargain-then-rip-off” pricing.

²⁴ Many models have been proposed to evaluate its impact on market efficiency (e.g., von Weitzsaecker; 1984; Klemperer, 1987a, 1987b, 1989, 1995). According to Farrell and Klemperer (2007), all models but the simplest ones suggest that switching costs harm optimal resource allocation.

²⁵ See the Mobile Re-creation Plan (http://www.soumu.go.jp/main_content/000320320.pdf).

²⁶ http://www.tca.or.jp/english/database/index_archive.html.

competitive pressure through market dynamism takes time, the MIC must focus more on disciplining the behaviors of the existing mobile operators through regulatory power—at least for now.



Source: Created based on data from TCA's website.

Fig. 12 Impact of MNP on the market share change

On the other hand, the behavioral remedy assumes the existence of market power and attempts to deal with the issue more directly. Allowing stakeholders to create behavioral guidelines is one such attempt; this would be easy to implement and would yield the least harmful traffic management practices with the smallest cost; however, it lacks formal authority and legal certainty and cannot drastically challenge the status quo. The Packet Shaping Guideline and the Anti-DoS/DDoS Guideline are good examples, but they may be toothless due to their lack of an auditing or enforcement mechanism. Re-regulation, such as strengthening the rules for category II designated telecommunications facilities, can be effective in establishing a fixed broadband-like ecosystem in the mobile arena. If it works as planned, the MIC can continue its wait-and-see strategy in dealing with mobile net neutrality problems. However, as was apparent in the FCC's reclassification of broadband Internet, the government may need to face serious political pressure before putting them into practice. This is also true concerning the introduction of "special" rules for net neutrality. Among the three items listed as new net neutrality rules in Fig. 10, the MIC is currently considering improvements in transparency requirements. Specifically, it is studying the advertising principles of the mobile QoS.²⁷ When put into practice, the new transparency rule will improve end users' QoS literacy and discipline broadband operators' practically unregulated traffic management practices. Finally, it is important to repeat that, though apparently useful and promising, these behavioral remedies are designed by policymakers, not by the market, which may distort market equilibrium and harm overall efficiency. Therefore, they must be implemented extremely carefully. Moreover, even if these behavioral remedies work perfectly, the existence of network effects and the scarcity of spectrum resources may give incumbent mobile operators SMPs and make the resulting equilibrium suboptimal, requiring additional intervention.

²⁷ http://www.soumu.go.jp/main_content/000287147.pdf.

6. Conclusion

Since the traffic explosion over the Internet backbone is occurring everywhere, all governments, especially in developed nations, must address the net neutrality issue. Thanks to the competition among broadband ISPs, the MIC has been able to rely on market dynamism to deal with most of the issues, resulting in a regulatory path different from that followed in the US. However, as this paper shows, this unique condition may not hold, as the Japanese broadband ecosystem will become increasingly oligopolistic due to the technological evolution in mobile broadband and the market development led by NTT East/West. As it is apparent that the current Japanese regulatory framework will not be effective in addressing the emerging net neutrality concerns, the MIC must start examining its policy options immediately.

In the preceding section, the author evaluated several policy alternatives and concluded that the behavioral remedies are more effective than the structural ones. Of course, as the behavioral remedies can distort market effectiveness and cannot solve all the issues on their own in the long term, it may be optimal for the MIC to seek the best balance of these two types of remedies. However, it must also be stressed that this conclusion is tentative, as the policies this paper evaluated do not represent an exhaustive list. Empirical studies that assess potential market reactions and weigh the pros and cons of each policy alternative are needed to obtain a more robust conclusion; this is the author's future research agenda. Shuett (2010) states that the discussion on net neutrality "took place in a theoretical vacuum, at least as far as rigorous economic analysis was concerned" (p. 1). The author hopes that this study will help fill this vacuum.

Acknowledgement

This work was supported by JSPS KAKENHI Grant Number 25380304.

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