

# Tri-Regional Cross Analysis of Broadband Internet and Structural Separation

by Arata KAMINO\*

## Introduction

Encouragement of fair competition between vertically integrated incumbent carriers and new entrants has been one of the most important regulatory issues in the telecommunications industry after introduction of the competition itself. The structural separation of incumbents has been viewed as one of the ways to promote fair competition, in addition to conduct regulations such as interconnection rules.

Discussions on structural separation in the telecommunications sector originated at the time of traditional POTS (Plain Old Telephone Service), an era based on the sharp distinction between long distance and regional communications. Although this distinction is becoming obsolete with the diffusion of the Internet, structural separation is still on discussion tables in many of the advanced countries except for the US. In the US, with AT&T broken up in 1984, reintegration of divested regional companies (RBOCs) and long distance companies including the former AT&T went ahead and the issue of vertical separation is no longer being raised. On the other hand, in Japan, where NTT was reorganized into several companies –two regional, one long distance, one mobile and others– all under a holding company, ownership separation of NTT subsidiary companies is still under consideration despite the rapid diffusion of broadband. In the EU, meanwhile, functional separation of incumbents became a hot topic during the EC 2007 telecommunications regulatory reform debate.

Focusing on incumbents in the telecommunications sector in Japan, the US and Europe, this paper is organized as follows. First, I will present a survey of differences in recent views of structural separation. Second, I will show the broadband market structure and vertical separation discussions prevailing in these regions. Third, I will put forward an evaluation of the history and background of the treatment of structural separation in Japan. Fourth, based on the points above, I will explain the differences between structural separation policies in Japan, the US and

\* Arata Kamino is an Executive Director of InfoCom Research, Inc.

Author's Note: This paper is rewritten from a paper which was submit to the International Telecommunications Society (ITS) 17th Biennial Conference Montreal, June 24-27, 2008. The original ITS paper was co-authored by Professor Hidenori Fuke at the Faculty of Global Media Studies, Komazawa University.

Europe in terms of the broadband Internet market structure. Finally, I will consider lessons for future progress on the structural separation issue.

## Telecommunications market and structural separation

One of the important issues for policy attempting to govern competition is to constrain the market power of the upstream market from abusing it to its downstream cousin, whenever a dominant company in the upstream market is also active in the downstream market. The measures to secure fair competition in these circumstances are generally classified into 'structural separation' and 'conduct regulation'. As incumbents in the telecommunications industry historically dominated local facilities, securing fair competition between incumbents and new entrants became a big issue. Consequently, topics such as separating an incumbent's local businesses from his long distance businesses (i.e. 'structural separation') and introducing 'conduct regulation' mainly by way of interconnection policies have been widely discussed. In the telecommunications sector, in addition to this type of narrowly defined structural separation, functional separation that doesn't include ownership separation is also a matter of debate. Various interpretations of vertical separation also coexist, with OECD making a distinction between 'structural separation' and 'operational separation' (OECD [2006]), while Martin Cave defines 8 types of separations ranging from 'accounting separation' to 'ownership separation' (CAVE [2006]). The EC, in its 2007 telecommunications regulatory reform program, defines separation with ownership unbundling as 'structural separation' and separation without it as 'functional separation'<sup>1</sup>. I will follow this EC definition hereafter in this paper. In addition, I will use 'vertical separation'<sup>2</sup> as including the notions of both 'structural separation' and 'functional separation'.

Vertical separation in that sense is based on the assumption that the merits of promoting competition through regulatory measures outweigh losses in the economy of scale and scope resulting from the subdivision of an incumbent's organization and/or businesses. On the other hand, conduct regulation imposes interconnection and other rules on incumbents prohibiting the abuse of their market power while maintaining their efficiency in an integrated organization. However, under conduct regulation, it is impossible to impose ex ante regulation on all anticipated future enterprise business operations. Therefore, there remain irremovable claims from new entrants and it becomes impossible to prohibit incumbent anti-competitive behavior simply by imposing conduct regulation.

Vertical separation, however, raises the fundamental issue that certain forms of conduct regulation are required as long as a discretely operating company holds market power in the upstream market. Furthermore, vertical separation is accompanied with the risk of preventing flexible responses to market changes such

as the shift from traditional POTS to IP services. Numerous studies of theoretical industrial organization exist but since there are various problems in applying conclusions derived from them, policies instituted differ significantly between countries. The US divested AT&T in 1984, and Japan reorganized NTT in 1999 by establishing a holding company overseeing one long distance and two regional companies, a mobile operating company, and others. As such, direct or virtual type of structural separation was adopted only by few nations in the 20<sup>th</sup> Century<sup>3</sup>. Its purpose was to assure fair interconnection of long distance networks of new entrants with the local networks of incumbents that were used for legacy fixed voice services. In Europe, since the market liberalization in the 1980-90s, there have been no cases of this kind of 'long distance and regional business structural separation' being introduced by regulators.

It is widely recognized that the separation of long distance and regional businesses is not possible in the recent broadband Internet architecture. As a result, no one discusses reintroduction or continuance of AT&T type divestiture. However, European and Oceania countries find it desirable to functionally separate the access business of incumbents in order to remove problems with competition resulting from the bottleneck nature of access networks sustaining broadband services. Functional separation has already been introduced in the UK (BT), New Zealand (TCNZ)<sup>4</sup> and some other nations. In the US, on the other hand, there are currently no active views on the vertical separation of incumbents, including functional separation of access units. In Japan, it has been decided to resume the review of the organizational structure of NTT in 2010. The need for resumption is based on the common recognition among the related parties that current distinctions between local and long distance businesses of NTT are inappropriate in the broadband era.

Generally speaking, there is a widespread tendency in the US, based on post Chicago School assertions, to conduct analysis by balancing merits and demerits of vertical integration while taking into account any particular situation<sup>5</sup>. This trend is clearly found in recent reviews of the US M&A cases (RIORDAN [2008]). It is also a prevailing notion in Europe that the application of functional separation is justified only when its benefits exceed its costs. Functional separation in Europe, however, was invented as a remedy to promote service- based competition. Its starting point is different from the US where facilities-based competition has developed greatly.

Why do debates on the separation of dominant incumbents in the telecommunications industry differ in Japan, the US and Europe? I suggest that differences between countries derive from variations in stages and phases of recent broadband diffusion and competition. This is shown in Table 1.

Table 1: Status of broadband penetration and competition in Japan, the US and Europe (EU)

<b>Japan</b>	
<b>Penetration</b>	DSL services are the fastest and cheapest in the world (ITU [2006]) and the number of subscribers of FTTx is the largest with 13.08M as of the end of June 2008. Broadband market share for cable companies slightly decreased from 15.4% at the end of 2004 to 13.5% at the end of 2007.
<b>Competition</b>	NTT's share in the retail DSL services was 37.4% as of the end of September 2007 due to intense service-based competition. NTT's share of retail FTTx services was 70.5%. FTTx market is characterized by the mixture of service-based and facilities-based competition. KDDI, potentially the largest facilities-based competitor to NTT, is utilizing assets acquired from an electric power company and its own subsidiary cable TV companies.
<b>Regulation</b>	Unbundling obligation has been imposed on both DSL and FTTx loops of NTT.
<b>The US</b>	
<b>Penetration</b>	Until several years ago, the transmission speed of DSL services was rather slow and their rate was expensive compared to Japan and Korea (ITU [2003]) <sup>6</sup> . Verizon and AT&T are recently accelerating FTTx deployment and cable companies are upgrading the transmission speed of their cable modem services.
<b>Competition</b>	Incumbent telecommunications carriers and cable companies are competing intensely on facilities base. Triple play competition is intense.
<b>Regulation</b>	FCC abolished line sharing obligation for copper loops and unbundling for fibers excluding voice 64 Kbps path in 2005.
<b>Europe (EU)</b>	
<b>Penetration</b>	Many of the EU member states show penetration rate almost the same as in Japan (23.0%) and in the US (25.0%). It is 27.6% in the UK, 26.4% in France and 26.2% in Germany (OECD [2008]). Except for a few nations where cable modems are dominant and Sweden where FTTx is widely deployed, the dominant broadband technology is DSL. However, commercial FTTx services are starting to be launched in Germany and France.
<b>Competition</b>	Competition is limited to the intra-modal service-based competition in DSL market in many of the member states. To promote service-based competition, LLU and bit stream access (BSA: a kind of wholesale product) are being implemented. Incumbents' share in retail markets and the usage rate of LLU and BSA varies significantly among member states.
<b>Regulation</b>	The EU had shifted from the unified application of 'The LLU Regulation' to the introduction of LLU and BSA obligations based on market analysis in each country under a 2003 regulatory framework. Most member states impose LLU and BSA obligations on incumbents. As for FTTx, many countries are conducting a regulatory review to decide how to treat FTTx. Remedies such as 'open access to duct as the first step, with dark fiber provision as the second step' and 'sharing of intra building wire' being under discussion.

## Current status of broadband competition and vertical separation in major countries

### *Status of broadband competition*

Several official broadband statistics are used in this paper, including *Internet Report* (ITU [2006]) and *Broadband statistics* (OECD [2008]), providing figures on a global basis. To begin with, I will briefly examine OECD *Broadband statistics* and summarize world broadband status. Table 2 reveals the characteristics of broadband diffusion in the countries covered by this paper.

#### 1) Penetration

- Penetration rates per 100 inhabitants are almost the same for Japan, the US, the UK, Germany and France (around 25%).
- In terms of penetration rate, though the top 4 countries (Denmark, Netherlands, Norway and Switzerland) deploy broadband technologies other than DSL (mostly cable), DSL is very popular in the UK, Germany and France.

#### 2) Broadband market subscriber shares by technology

- DSL is the most popular technology except in the US. The percentage of DSL in all of the broadband services is 95% in Germany and France, 79% in the UK and 42% in Japan.
- Cable has the majority share in the US with 53%.
- Japan shows the highest FTTx share with 44%.

Table 2: Broadband penetration rates per 100 inhabitants by technology in major countries.

Penetration	DSL	Cable	FTTx/LAN	Others	Total
<b>Japan</b>	9.6%	3.1%	10.2%	0.0%	23.0%
<b>The US</b>	10.1	13.2	0.9	0.8	25.0
<b>The UK</b>	21.7	5.9	0.0	0.1	27.6
<b>Germany</b>	24.6	1.6	0.0	0.1	26.2
<b>France</b>	25.1	1.3	0.0	0.0	26.4

Source: OECD [2008]

*Status of progress on vertical separation in the US and Europe*

As pointed out above, there is little debate on vertical separation in the US as of late 2008. In contrast, pros and cons of functional separation have been widely discussed in Europe (see WAVERMAN [2006] as a typically opposing opinion). One of the official recent reviews that picked up vertical separation in utility industries including telecommunications is the OECD Recommendation Report of 2001 (OECD [2001]). In the recommendation, OECD proposed that “[w]hen faced with a situation [in] which a regulated firm is or may in the future be operating simultaneously in a non-competitive activity and a potentially competitive complementary activity, [m]ember countries should carefully balance the benefits and costs of structural measures against the benefits and costs of behavioral measures”. OECD then issued another report in 2006 to assess the result of the 2001 recommendation and stated that “the potential benefits of ownership separation, such as reduced regulation and stimulation of innovation, may not apply in the case of the local loop”. It, however, added that “[e]ffective operational separation has the potential to allay pervasive, longstanding and potentially unavoidable problems that have affected access regulation” (OECD [2006]). The EC quoted this OECD 2006 assessment and pointed out that “[t]he general view, as confirmed by two OECD reports, is that complete structural separation is rarely justified in the communications sector” (EC [2006]).

I have already indicated that there are many demerits deriving from structural separation in the current telecommunications sector, which is characterized by more rapid and intense technological innovation than other utility industries such as energy and gas<sup>7</sup>. Consequently, the view is widely held that it is not appropriate to adopt structural separation in the telecommunications industry. For example, key related parties opposed structural separation in EC consultations preceding EC 2007 telecom regulatory reform. The EC itself revealed an opinion recommending functional separation in an explanatory note of the proposed EU Directives adopted in November 2007, concluding that “[g]iven this experience and the high level and non revocable intervention involved, very significant benefits of mandated structural separation in terms of gains from achieving equality would have to be demonstrated for it to be a suitable remedy in the telecommunications sector” (EC [2007]). Furthermore, I/ERG (Independent Regulatory Group and European Regulatory Group) announced unambiguously “I/ERG would also support the (European) Commission’s view that structural separation is not appropriate” (IRG/ERG [2006]). In contrast, there have been few voices among national regulatory authorities (NRAs) outright opposing functional separation as an addition to the existing regulatory remedies proposed in the EU Directives. As such it would constitute an extra regulatory tool for NRAs. ERG –NRAs’ representative group– accepted the revised Directives proposals of EC, although asserting that “ERG takes the opinion that the remedy of functional separation has to be solely within the discretion of NRA to decide upon its applicability” (ERG [2007]).

## Progress on broadband competition and vertical separation in Japan

### *Telecommunications liberalization and competition policy*

In Japan, the liberalization of telecommunications market and the privatization of Nippon Telegraph and Telephone Public Corporation were implemented simultaneously in 1985. However, as Fuke points out, there was no sufficient debate on whether conduct regulation should be imposed on NTT or structural separation should be chosen in order to secure fair competition (FUKE [2007]). Though many European countries arranged interconnection rules and rate rebalancing at the time of market liberalization around 1998, interconnection rules were not well provided for in Japan until 1997 when the Ministry of Internal Affairs and Communications (MIC) implemented new rules by revising the Telecommunications Business Law. One of the reasons for the difference between Japan and the EU is the fact that market liberalization occurred 13 years earlier in Japan than in the EU, with very few international benchmark rules applicable at that time. Since the initial arrangement of conduct regulation was insufficient in Japan as already mentioned, views have continued to be canvassed on the structural separation of NTT into long distance business and regional business as a tool to promote fair competition. Thus the structural separation of NTT has been under consideration in parallel with the arrangement of conduct regulations in the 1990s. The persistence of these discussions has been one of the particular characteristics of the Japanese telecommunications market to this day.

As a result, Japan introduced an indirect but practical structural separation of NTT. NTT was reorganized under a holding company structure in 1999, while adopting the same kind of conduct regulations as the EU. However, it became clear that such a 'regional-long distance' type of virtual structural separation couldn't keep up with massive telecommunications changes from POTS to the Internet and to mobile communications. In order to resolve this problem, MIC issued a ministerial report that proposed the removal of line of business control of NTT regional companies. This was to be achieved by instituting additional fair competition rules including the ownership separation of NTT group companies such as by disbanding the NTT Holding company in 2010 (MIC [2006]). However, due to a lack of a concrete vision for NTT after reviewing its organization and the need for further conduct regulations, the Cabinet and ruling parties at the time decided to suspend the MIC panel proposal and agreed to postpone the discussions on NTT reorganization until 2010. The agreement said that "as for NTT organizational structure, we'll resume the review in 2010 by taking into account the status of broadband penetration and NTT's Midterm Business Plan". Conclusions are supposed to be reached as soon as possible following the future review in 2010.

### *Service-based competition and facilities-based competition*

Since the end of the 1990s, Japan has been implementing the most rigid open network policy among major developed countries to promote service-based competition. For example, unbundling obligation has consistently been imposed on both copper and fiber loops until now. There is no bit stream access (BSA) type of broadband wholesale scheme because unbundled-based competition relying on very low LLU charges (especially for line sharing) has flourished from the beginning and there has been no room for Internet service providers (ISPs) to adopt BSA-based competition. How does one explain that the US and European countries, which implemented more or less the same kind of copper LLU as Japan, didn't experience the same degree of DSL competition as Japan? There might be no single answer to this question (IKEDA [2005]). As the LLU charges were set very low, new entries by service-based carriers were encouraged. Furthermore, there have been competitors with a kind of 'animal spirit', continuing to provide alternative DSL services despite long standing fiscal losses.

Softbank, for example, though a leader in broadband competition, recorded a combined group operating loss totaling 195.9 billion yen (\$2 billion) during the four years since it entered the DSL business in 2001. Table 3 shows that line sharing charges were set very low during that period in Japan. Nevertheless, Softbank incurred such a huge loss because the company set a disruptively cheap retail rate for DSL and faced massive marketing costs to capture the majority market share in the short term. It can be said that a strategy like this contributed to the implementation of 'the world fastest and cheapest DSL'.

Table 3: Comparison of LLU charges (as of October, 2004)

	<b>Full unbundling</b>	<b>Shared access (Line Sharing)</b>
<b>Japan</b>	NTT East:1,256 yen NTT West:1,318 yen	NTT East:158 yen NTT West:165 yen
<b>The UK</b>	8.76 pound (1,752 yen)	2.26 pound (452 yen)
<b>Germany</b>	11.80 euro (1,652 yen)	2.43 euro (340 yen)
<b>France</b>	10.50 euro (1,470 yen)	2.90 euro (406 yen)

(Note) Calculated on the basis of the exchange rate at the time (1 pound=200 yen, 1 euro=140 yen)

Source: NTT tariff, BT Price List, Ofcom [2004] and RegTP [2004]

Table 4 summarizes characteristics of DSL competition in Japan. Though these characteristics have both merits and demerits, it is probable that demerits exceed merits in some characteristics. Further analysis will be required to make a full assessment of the balance between them.

Table 4: Characteristics of DSL competition in Japan

Characteristics	Merits	Demerits
1) Very low LLU charges	LLU based intense competition developed.	Neither intra-modal facilities- based competition nor inter-modal competition developed.
2) Destructively cheap DSL retail prices	<ul style="list-style-type: none"> <li>• Only large companies with financial abundance brought sustainable competition.</li> <li>• FTTx retail price was set very low because cheap DSL prices became benchmark for broadband prices.</li> </ul>	<ul style="list-style-type: none"> <li>• Only competitors with large financial base that could bear deficits over several years were able to enter the market.</li> <li>• Application of margin squeeze regulation set on FTTx wholesale charges restricted the development of facilities-based competition (FUKE [2007]).</li> </ul>
3) Strong DSL competition	NTT shifted its broadband strategy from DSL with less market share and profit to FTTx, and, in turn, this strategy accelerated FTTx deployment and penetration.	DSL competitors faced net decrease in the number of DSL subscribers due to customer shift to FTTx at the same time they started to produce profits in DSL businesses. (DSL customer numbers hit the peak in March 2006 and kept on declining after that.)

Eventually, Japanese competitive broadband providers would not have been able to sustain losses in FTTx businesses in the same kind of scenario in which DSL services had initially recorded substantial losses. Consequently, they requested very low wholesale charges for fiber loops in order to avoid FTTx businesses falling into the same money losing trap. This kind of regulatory interference of setting very low wholesale prices is likely to lead to a regulatory preference for a specific technology (i.e. FTTx) and might impair the development of other broadband technologies. Moreover, if the same type of “below cost competition” is repeated for FTTx, it is probable that another specific “successor technology to FTTx” would not easily emerge in the post- FTTx phase.

#### *Current progress on vertical separation*

As shown, progress on structural separation of NTT in Japan has aspects quite unlike that in other countries.

- 1) Current discussions in Japan followed the debates on the ownership separation between long distance and regional businesses of NTT initially started in 1980s.
- 2) Fundamental issues have not yet been resolved even following 1999 when the compromise was made to reorganize NTT under a holding company structure.
- 3) Reviews undertaken during 2005-2006 to resolve these issues were suspended as a result of political compromise.

As was pointed out by the MIC Minister’s panel report, NTT has been constrained by line of business control regulations that do not accommodate current technological and market environments. The problem arose because current laws and regulations during the reorganization of NTT in 1999 didn’t take into account rapid technological innovation (MIC [2006]).

It is questionable, however, whether each of the operating companies of NTT will be able to remain financially sound if a decision is taken to simply disband the NTT holding company and put each operating company under separate ownership. Such a decision will not resolve any issues with respect to competition policy as a whole. The remedy of separating NTT based on political decisions and then leaving choices such as the reunification of separated companies to market principles will not gain public support because shareholders interests are not well protected.

## Conclusions

Given above analysis of the broadband market and regulatory policy affecting it, what implications does vertical separation policy have for the three regions under consideration, Japan, the US and Europe? In the first place, it is appropriate to view Japan and the US as contrasting cases.

In the US, political and regulatory confusion deterred the deployment of DSL from the start and non-regulated cable modem services were able to spread ahead of DSL. To make up for this delay, the integrated incumbent operators put their focus on FTTx deployment alongside DSL, and such activities led to facilities-based competition in the broadband market. As a result, it became unnecessary to implement a vertical separation of the incumbents. In other words, I would like to make the point that the failure of regulatory policy resulted in an unexpected outcome which rendered the need to impose regulation unnecessary. The fact is interesting that cable companies in the US could survive thanks to unique cable regulations.

Though NTT was reorganized in 1999 to promote competition in traditional POTS, contradictions have been coming up with the rapid growth of broadband Internet following that time. Some related parties still demand ownership separation of current NTT group companies. However, the validity for such a claim should be assessed in the light of market reality. Let me reconsider market trends, which will then provide the basis of my conclusion.

- 1) While broadband is rapidly becoming predominant, the market has shifted drastically from DSL to FTTH. Though service-based competition by leasing LLU from NTT played an important role in the rapid growth of the DSL market, KDDI and other companies have purchased assets of some electric companies and it was therefore possible that facilities-based competition would develop further. However, since charges for dark fiber are set at a low level under regulatory policy<sup>8</sup>, facilities-based competition has developed only in few regions and the retail market share of NTT regional companies has been increasing.
- 2) The voice telephony market has been declining with the wide spread of mobile services as well as the rapid migration to VoIP.
- 3) NTT regional companies launched commercial NGN services in March 2008. The way NTT provides NGN reveals the contradiction inherent in the regulation limiting NTT regional companies' business areas within intra-prefecture communications. As the Internet has developed as a global seamless network, there ought to be no boundary between long distance and regional communications. When NTT regional companies tried to offer NGN, they were required to offer the intra-prefecture parts of the service by themselves while leasing inter-prefecture parts from other carriers.

How should we deal with “vertical separation problems” based on these market trends? While it is true that LLU obligation mandated by MIC contributed to the rapid growth of the DSL market, it is service-based competition that relied on local loops of NTT regional companies. Though it seemed that facilities-based competition would grow in the FTTH market initially, MIC’s policy of setting dark fiber charges at a low level restrains the development of facilities based-competition not only in FTTH itself but also in cable broadband or wireless broadband.

In this situation, competition in the Japanese broadband market might remain service-based and no significant facilities-based competition may materialize. In general, ownership separation of an incumbent carrier or functional separation of its bottleneck management unit would not lead to facilities-based competition even if it promoted service-based competition. Clearly, facilities-based competition has an advantage over service-based competition in the sense that it stimulates incentives for technological innovation while ownership separation on its own will not lead to facilities-based competition.

Finally, how should Europe treat vertical separation policy by learning from Japanese and the US experiences? My paper takes the view that the final goal in this debate is to materialize facilities-based competition. It is effective to impose LLU and lower rate setting for LLU in order to promote competition in the short term. However, as shown above, vertical separation in itself is not effective. It can be anticipated that incumbent operators would show reluctance in accepting a strict unbundling regulation. In this case, it may be effective to show intentions of introducing vertical separation as a kind of ‘whip’, in turn inducing incumbents to accept regulation.

Although this kind of remedy would lead to service-based competition, it might hamper facilities-based competition as shown in the case of Japan. Hence, it should be regarded as a temporary remedy until an adequate degree of competition develops in the broadband market.

## NOTES

1. For example, see EC [2007].
2. Theories on vertical separation in telecommunications industry are analyzed in detail in a working paper by SASAKI. (SASAKI [2007])
3. Though NTT keeps ownership relationships between long distance, regional, mobile and other businesses under a holding company, such an organizational structure is the tentative result of deliberations on the structural separation of NTT that have continued since the privatization of the company. Each operating company is regulated separately to conduct businesses stipulated by NTT Law and by a guideline issued at the time of reorganization in 1999. Therefore, we should regard current NTT group companies as virtually divested companies.
4. TeliaSonera and Telecom Italia voluntarily established functionally separated access divisions in early 2008.
5. See YOO [2002] for discussions on post Chicago School.
6. Prices per 100Kbps were \$0.09(Japan), \$0.25(Korea) and \$3.53(The US) at the time.
7. See FUKU [2007] for details.
8. MIC required NTT regional companies to reduce dark fiber charges further in March 2008.

## REFERENCES

- CAVE Martin [2006]. 'Six Degrees of Separation: Operational Separation as a Remedy in European Telecommunications Regulation', *Communications & Strategies*, no.64, pp.89-103.
- EC [2006]. *COMMISSION STAFF WORKING DOCUMENT COMMUNICATION FROM THE COMMISSION TO THE COUNCIL, THE EUROPEAN PARLIAMENT, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS on the Review of the EU Regulatory Framework for electronic communications networks and services*, {COM(2006) 334 final}, IMPACT ASSESSMENT, 28 June 2006
- EC [2007]. *COMMISSION STAFF WORKING DOCUMENT, IMPACT ASSESSMENT*, Accompanying document to the Commission proposal for a Directive of the European Parliament and the Council, {COM (2007) 697, COM (2007)698, COM (2007)699, SEC (2007)1473}, 13 November 2007.
- ERG [2007]. *ERG Opinion on Functional Separation*, ERG(07)44
- FUKU Hidenori [2007]. *Info-Communications Policy in the broadband era*, NTT Publishing. (in Japanese)

- IKEDA Nobuo [2005]. *The Architecture of Information Technologies and Organizations*, NTT Publishing. (in Japanese)
- IRG/ERG [2006]. *Response to the Review of the EU Regulatory Framework for electronic communications network and services*, 27 October 2006.
- ITU [2003]. *ITU INTERNET REPORT 2003: Birth of Broadband*
- ITU [2006]. *ITU INTERNET REPORT 2006: digital life*
- MIC [2006]. *Report of Panel on Frameworks of Communications and Broadcasting* (in Japanese)
- OECD [2001]. *Recommendation of the Council concerning Structural Separation of Regulated Industries*.
- OECD [2006]. *Report to the council on experiences on the implementation of the recommendation concerning structural separation in regulated industries*, (C(2006)65)
- OECD [2008]. *OECD Broadband Statistics, OECD Broadband Portal*, June 2008
- Ofcom [2004]. *Review of the wholesale local access market Explanatory statement and notification*, 26 August 2004.
- RegTP [2004]. RegTP News letter, *One-off local loop charges*, 25 June 2004.
- RIORDAN Michael H [2008]. 'Competitive Effects of Vertical Integration', *Handbook of Antitrust Economics*, Paolo Buccirossi (ed.), MIT Press, 2008.
- SASAKI Tsutomu [2007]. *Perspective on Structural Separations or Functional Separations*, Working paper No.07-02, August 2007 (in Japanese).
- WAVERMAN Leonard [2006]. 'The challenges of a digital world and the need for a new regulatory paradigm at Ofcom', in Ofcom (edited by Richards, E., R. Foster, & T. Kiedrowski) [2006], *Communications - The next decade, A collection of papers prepared for the UK Office of Communications*.
- YOO Christopher S [2002]. 'Vertical Integration and Media Regulation', *Yale Journal on Regulation* Vol. 19:171, 2002.