

# UC Irvine

## Globalization of I.T.

### Title

Reconciling Vision and Reality in Japan's NII Policy

### Permalink

<https://escholarship.org/uc/item/83n6r4wc>

### Authors

West, Joel

Dedrick, Jason

Kraemer, Kenneth L.

### Publication Date

1996-02-01

**Reconciling Vision and Reality  
in Japan's NII Policy**

Joel West, Jason Dedrick, and Kenneth L. Kraemer

Center for Research on Information Technology and Organizations  
University of California, Irvine

February 1996

Please address correspondence to:

Prof. Kenneth L. Kraemer  
Director  
CRITO  
University of California  
Irvine, CA 92717-4650  
Phone: (714) 824-5246  
Fax: (714) 824-8091  
Email: [kkraemer@uci.edu](mailto:kkraemer@uci.edu)  
URL: <http://www.crito.uci.edu>

## **Back to the Future: Japan’s NII Plans**

Joel West, Jason Detrick and Kenneth L. Kraemer

### **Abstract**

Japan’s current plans to build an information superhighway are the latest manifestation of 25 years of “joho-ka” (informatization) as a national slogan. The plans are heavily driven by a desire to “catch up” with the U.S., a desire to create new markets for leading electronics producers, and develop weak sectors of Japan’s information industries.

There are a variety of NII plans from rival ministries, and real questions remain about whether these “visions” will become a reality. Actual demand, as well as the feasibility of these plans, however, remain in question. In the past year, some of the NII hype has been toned down and replaced with more pragmatic assessments of the opportunities and challenges inherent in developing Japan's NII. The explosion of internet use has changed the focus somewhat from infrastructure to content and applications.

The key ministries are spending significant sums on NII trial projects and promotion, but the focus is shifting. Also, the debate about NTT's possible breakup has moved to the top of the NII agenda. Continuing conflicts among government ministries and the uncertainty about NTT's future are hobbling Japan's efforts to implement a coherent NII strategy. Japan's top-down, bureaucratic policy approach is also hampering its ability to respond flexibly to the rapid changes taking place in the global information technology environment.

### **Contents**

Motivations: The Origins of Japan’s NII Plans.....	1
Joho-Ka: Creating the Information Society.....	1
Catching up with the U.S.....	2
Producer Motivations: Reviving Japan’s Electronics Industry.....	4
The Vision: An Information/Communications-Based Economy.....	6
Multimedia.....	7
Broadband, Fiber-Optic Communications Infrastructure.....	7
New Hardware Opportunities.....	7
Developing Software and Services Capabilities.....	8
NII as a Productivity Tool for Government and Industry.....	9
NII Plans and Initiatives.....	9
MPT.....	9
MITI.....	10
NTT.....	10
The Reality: NII in the Japanese Context.....	11
Government vs. Private Roles.....	11
Supply-driven versus Demand-driven.....	12
Bureaucratic Rivalry.....	13
NTT’s Central Role and Disputed Future.....	14
An Artificial Schedule Without Financing.....	17
Limited User Experience.....	18
Internet versus Interactive TV: Which model?.....	19

Conclusions .....	19
References.....	20

Japan recently began debating plans for a nationwide digital communications network (often referred to as a national information infrastructure — NII — or “information superhighway”<sup>1</sup>). Because such an infrastructure is potentially the largest public works project since the construction of the *shinkansen* (bullet trains) in the 1960s, the debate has been entered by the leading industrial companies, corporate think tanks, academia and several government ministries.

The initial NII visions developed in 1994 seem to have little to do with the questions of how or why such a network would be used, but instead were driven by technological competitiveness concerns and a desire by electronics manufacturers to find new large and yet-untapped markets.

As with all important issues involving national policy in Japan, bureaucratic rivalry is central to both the process and likely end result of the NII debate. Also involved is the mutual dependence and rivalry between ministries and industry as they seek to gain both support and wrest leadership from each other.

This overview paper summarizes the policy-making processes at work in the contemporary Japanese NII debate. Because much of the debate is an explicit reaction to U.S. NII plans, it also highlights a few of the similarities and differences between those plans, as well as those issues universal to most countries planning to build a NII.

### **MOTIVATIONS: THE ORIGINS OF JAPAN’S NII PLANS**

Plans for a NII are based on the prediction that developed nations will shift from an industrial society, in which tangible objects are manufactured, to an information-based society, in which knowledge is gathered and sold. In Japan, Masuda predicted that a combination of computer and communications technology would bring “the increasing emancipation of man from labor for subsistence” (1980, p. 62). Most recently, the Telecommunications Council (*denshi tsushin shingikai*, an advisory group to the Ministry of Posts and Telecommunications) said the NII could address Japan’s problems of an aging population and over-dependence on Tokyo, and shift Japan to an “intellectually creative society” (Telecommunications Council, 1994a). Not coincidentally, the creation of an information society would create new economic opportunities in software, services, entertainment and information content, all of which are presently areas of weakness in the Japanese economy.

Of course, anywhere NII plans are being discussed — whether the U.S., Japan, Singapore, Korea or Europe — there is an implicit or explicit subtheme of technological competitiveness in computer and communications industries. In Japan, this subtheme is an especially powerful motivator in the 1990s, as Japan’s electronics giants have suffered through a decline in revenues and a collapse in profitability. An additional powerful force behind the recent surge of interest in the NII in Japan has been fear of falling behind the United States in an important economic arena—a concern which became acute with the Clinton administration’s 1993 announcement of its NII strategy. Finally, the emergence of the NII issue in Japan has coincided with the quest for a new mission on the part of key economic ministries, particularly the Ministry of International Trade and Industry (MITI) and the Ministry of Posts and Telecommunications (MPT).

These four issues—creating an information economy, bolstering the electronics industry, reacting to the U.S. challenge, and redefining bureaucratic missions—are the key factors motivating Japan’s drive to develop a NII strategy. The following discussion looks more closely at each of these issues.

---

<sup>1</sup> In English, the term “Information Superhighway” has been most popular, as used by Gore (1991), but often shortened “Info Highway;” its equivalent in Japanese (*joho haiue*) has also been used. The term “National Information Infrastructure” seems to have first been used in Singapore, as in (NCB, 1992); the Japanese equivalent is *joho infura*, which is now preferred. Other variants on the NII theme include “Asian Information Infrastructure,” “Global Information Infrastructure” (GII), etc.

## **Joho-Ka: Creating the Information Society**

The phrase “joho-ka” — usually translated by the quasi-English word “informatization” and denoting change to an information-oriented society (*joho shakai*) — has been a slogan of Japanese government policy for more than two decades, even though the actual effect of the slogan has been minimal. It is generally associated with two threads — the abstract concept of Japan as an information society, and a shift in government industrial policy away from heavy industries in the late 1960s and early 1970s.

In the early 1960s, the phrase “information industry” (*joho sangyo*) was popularized by Tadao Umesao, while *joho-ka* is credited to Yujiro Hayashi of the Economic Planning Agency in 1967.<sup>2</sup> In 1971, a report of the Industrial Structure Council advocated a transformation of the Japanese economy from traditional heavy industries to “knowledge intensive” ones (Morris-Suzuki, 1988, p. 27). The “oil shock” of 1973-74 made salient home the country’s vulnerability as a resource-poor industrial nation, and Johnson places MITI’s first detailed vision of a “knowledge-intensive industrial structure” at November 1974 (1982, p. 301).

Hiromatsu and Ohira (1991) argue that though this first “information society boom” had little impact in Japan, it was exported to Europe, from which it inspired a similar boom in North America and started a second boom in Japan in the late 1970s and early 1980s. Certainly from the 1980s onward, the shift to an information society was repeatedly cited as a national goal, as in Prime Minister Nakasone’s speech opening the Diet in February 1984, and became the subject of various books, articles and television programs (Morris-Suzuki, 1988, p. 28).

Since the initial conception of information technologies, the Japanese government has spawned many research and demonstration projects in software and related technologies, including the Fifth Generation Computing Project, Pattern Information Processing System, Sigma (Anchordoguy, 1989; Fransman, 1990) and the more recent Real World Computing project. But despite the desirability to shift from producing tangible (“hard”) to intangible (“soft”) goods, Japan has not become a major worldwide supplier of software and other intangible information technology products.

Thus far, Japan’s role in the global computer industry has remained primarily in electronic components and peripherals, with a limited role in complete computer systems and a negligible role in software; by one calculation, the size of the information industry increased only from 3.1% to 4.0% of GDP in the period 1975-1985 (Hiromatsu and Ohira, 1991). Public policy debates on information technology are still dominated by considerations of manufacturing and selling hardware — perhaps because the major electronics keiretsu still have far more political influence than smaller software-only firms.

## **Catching up with the U.S.**

Although elements of what is now considered NII have been discussed in Japan for many years, the rhetoric in the period 1993-1995 seems driven by a “catch up” mentality — the view that Japan is behind in both plans for an information infrastructure, and key technologies such as networking and software<sup>3</sup>.

Such a mentality became one of the periodic fads of the Japanese popular press. A visit to a Tokyo bookstore during this period would turn up several magazines and dozens of popular books devoted exclusively to multimedia, NII and the coming revolution in the information industries. Many

---

<sup>2</sup> Ito (1991), referring to Umesao (1963), Hayashi (1969).

<sup>3</sup> This is consistent with Calder’s conception of Japan’s postwar economic policy as that of a “Reactive State”: see (Calder, 1988). For a more detailed discussion of catch up rhetoric in Japan’s NII plans, see West (forthcoming).

examined technological issues, while others examined U.S. policies or explicitly paint an imminent economic rivalry with the U.S. Representative is the book cited Glen Fukushima (1995) entitled *Joho Superhighway no Kyoi: Nihon Joho Sangyo Kaimetsu no Kiki* (“The Threat of the Superhighway: The Crisis of the Annihilation of the Japanese Information Industry”).

In the words of Teruyasu Murakami, a prominent Japanese multimedia expert at the Nomura Research Institute:

Last year [1993], we had a new social infrastructure boom. The argument suddenly erupted around March. The point was [made] that in the Japanese budgeting system, only hardware investments such as construction of bridges or highways or airports are the subject of construction bonds. [It was argued] that bonds should be able to fund software development, including communication development<sup>4</sup>.

This argument was made by [those in] politics and industries from mid-1992. Throughout the year 1992 there wasn't any enthusiasm [for it], but in February-March of 1993, suddenly this argument came to the surface in mass communications, TV, newspapers. A very important reason was the Clinton administration's manifesto of the information superhighway development. That was the starting point of the whole information infrastructure in Japan.

Gore's superhighway idea triggered the whole argument about a national information infrastructure in Japan . . . It's a sort of artificial social phenomenon, not driven by Japanese society's national indigenous needs (Interview, August 29, 1994).

Murakami cited a very concrete reason that Japanese politicians and businessmen were concerned about U.S. NII plans. In May 1993, a report published by the Council on Competitiveness (1993a) stated that U.S. NII plans could boost the competitiveness of U.S. industries. This report was taken very seriously in Japan, according to Murakami, because an earlier commission, headed by then-CEO John Young of Hewlett-Packard, published a report (President's Commission, 1985) that, in Murakami's words, “dramatically changed” U.S. science and technology policy toward Japan.

But here we have one of the curious points of the Japanese examination of U.S. policy discussions: many of the proposals cited are taken far more seriously in Tokyo than New York or Silicon Valley. Except for the *Washington Post*, which did two major articles, the 1985 Young commission report was limited to small stories buried on the business pages of the major newspapers. At least the earlier group — formally the President's Commission on Industrial Competitiveness — got one day of coverage.

Eight years later, its successor, the industry-run Council on Competitiveness issued the 12-page NII report cited by Murakami. Despite the leadership of Young, the presidents of M.I.T. and CalTech, and the CEO of Motorola, the report was ignored by newspapers and only briefly covered by trade magazines.

Similarly, Japanese policy-makers intently studying the U.S. government can recite Vice-President Gore's “Five Points” for any future U.S. NII: 1. encourage private investment; 2. promote competition; 3. quick regulatory response; 4. network access for all information providers; and 5. universal service. These points have gone generally unnoticed in the popular media or in the high-tech community, and

---

<sup>4</sup> It should be noted that construction bonds do not count against the national government's requirement to balance the budget, i.e., they can be used to pay for deficit spending (Lincoln, 1988, p. 74), thus overcoming one potential objection from the powerful Ministry of Finance.

given the complexity of the U.S. policy-making process, were likely to face major revisions even before the 1994 elections brought Republican control of the Congress.

There are three possible explanations for such a Japanese fixation on U.S. policy proposals far beyond their actual importance in U.S. policy:

- *Confusion of the External Perspective.* The United States is unusually diverse in both its social composition and the range of opinions that enter the public discourse. It is difficult for an outsider to distinguish between the president's nominal and actual power, the actual influence of industry, or between legislative proposals that are seminal and those that are "dead on arrival."
- *Greater Perceptivity from an External Perspective.* Japan's industry has been credited with taking a longer view than that in the U.S., while its press is considered more international in focus. The Japanese may be recognizing merit in U.S. ideas that go unremarked here: so when Kumon (1994) cited Gore's five points, he could be anticipating that they would play a role in policy outside the U.S. — as happened when they were later proposed as a global goal for the February 1995 G-7 meeting on the global information infrastructure (NTIA, 1994).
- *External Threat as an Internal Weapon.* It is also possible that the competitive threat of U.S. plans is being used in Japan as a consensus-building tool. It is well understood within Japan that government and industry do better when competing with an external economic rival, because it provides the external pressure necessary to speed up the decision-making process and force things to a conclusion. A crisis of competitiveness — real or imagined — has moved the Japanese closer to an information revolution in the last two years than anything in the preceding twenty.

Examples of this latter view — an explicit competitive threat to Japan from the Clinton-Gore agenda — can be found in Japan's popular press of this time. Fukushima (1995) noted that the dust-jacket of a contemporary Japanese NII book proclaimed, "Who Will Control Multimedia? This Book Reveals the Strategy by Which Japan Can Survive the 21st Century Against the Clinton 'Occupation Policy' Toward the Japanese Information Industry." He characterized the pictures portrayed by such books as "a starkly zero-sum game."

A few (mainly in the U.S.) have suggested that Japan lacks the creativity or other elements necessary for technological leadership, and thus needs to have a model to emulate. According to John Stern, the vice-president for Asian Affairs of the American Electronics Association, "The Japanese catch up better than they lead. . . . This is a nation that got rich following the taillights of America" (Interview, Sept. 1, 1994). But despite the "catch-up" rhetoric, there is little sense among Japan's business and government leaders that the country is irretrievably behind. They face a number of problem areas in their NII plans, but, according to telecommunications executive Teiichi Aruga, "If these issues are resolved, playing rapid catch-up is Japan's forte." One of these issues, Aruga notes (1994), is the emphasis in existing NII tests and discussions on producer rather than, user motivations.

Since that time, voicing of Japanese strengths and American weakness has become more open. For example, a Kobe University professor (Seki, 1995) published a lengthy (if often inaccurate) critique, entitled "Piecemeal nature putting potholes in the U.S. info highway," criticizing U.S. competition between cable TV and regional telephone companies and questioning the value of PC-savvy executives. Such outward criticism may be intended to rebuild Japanese self-confidence after excesses of "catch-up" rhetoric, or it may be intended to focus Japanese energies on building within the country, rather than constantly watching outside.



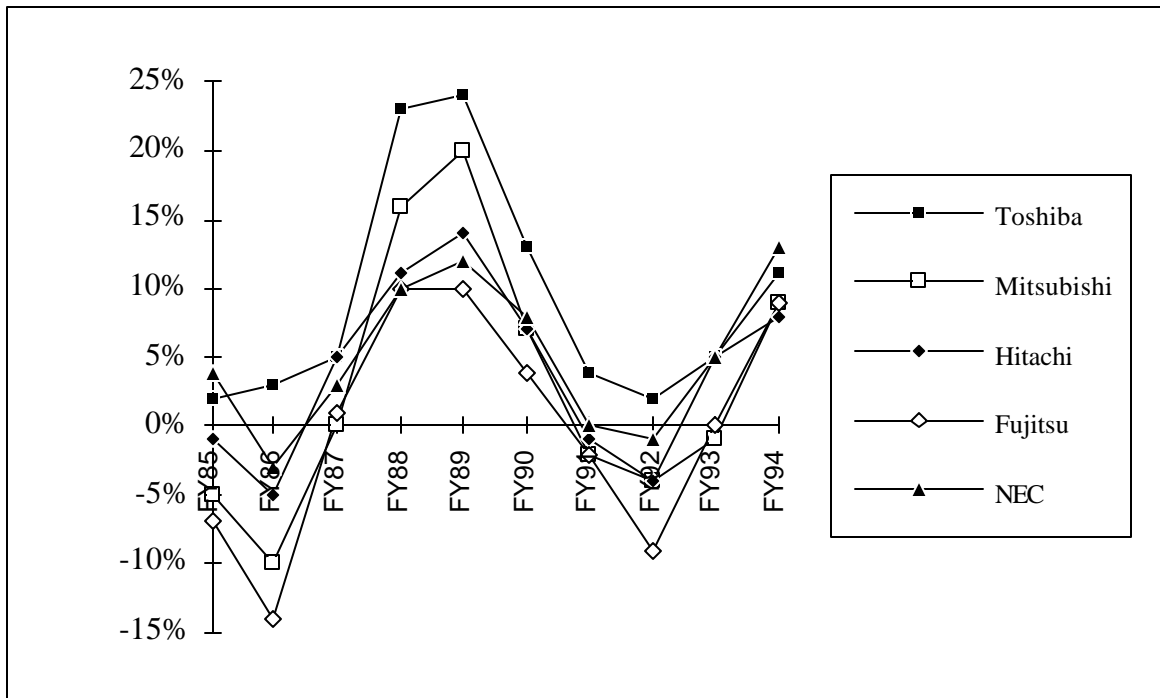
## Producer Motivations: Reviving Japan's Electronics Industry

Much of the debate about the Japanese NII has been framed around the potential revenues and jobs it would generate for many of Japan's electronics industries by incubating a domestic market base for future exports. Such a concept is not new, of course, but instead has been the underlying rationale for Japanese high-tech industrial policy throughout the past 35 years.<sup>5</sup>

What was new during the 1993-1994 period was the unaccustomed difficulties faced by various Japanese industries, which were pinched since the bursting of the "bubble economy" led to recession and an end to four decades of almost uninterrupted economic growth. Adding to weak domestic demand, exports of Japanese-made goods were threatened by continuing *endaka*, or the strong yen. This meant that large Japanese electronics firms were cutting back production in the home islands, moving manufacturing to China and Southeast Asia and searching desperately for new products to manufacture in Japan to sustain both the health of their companies and, by providing jobs, their standing in Japanese political debates.

It is no coincidence that the "catch up" panic came in 1993, in the middle of a 10% two-year decline in Japan's industrial production. (Figure 1.) Advocates of NII investment have used job

**Figure 1. Profits of Japan's top five electronics companies.**



Source: Nomura Research Institute

<sup>5</sup> It is well beyond the scope of this paper to summarize Japan's postwar industrial policy and the central role played by government ministries, even if limited to just high technology industries. The standard discussion of the role of MITI is given by Johnson (1982), while the interpretation of Okimoto (1989) emphasizes the role of private firm; Johnson, et al., (1989) offers views of Japan's developmental policies in several industries. The best account of the incubation of Japan's mainframe computer industry is given by Anchoadoguy (1989), while it, along with Fransman (1990) and Flamm (1987, pp. 125-153), outline Japan's computer industrial policy. Other relevant discussions would include Japanese incubation of the semi-conductor industry (Anchoadoguy 1989, pp. 138-147; Mason, 1992, pp. 174-187; and Okimoto, et al., 1984, pp. 95-115).

creation as a justification: take the oft-cited report by the MPT's Telecommunications Council, which includes a table that explicitly equates NII with jobs [emphasis in the original]:

<b>Multimedia Markets</b>	
(annual revenues in 2010)	
New markets related to the fiber-optic network	¥56 trillion
Existing multimedia markets	¥67 trillion
Total	<b>¥123 trillion</b>

**Jobs created through the construction of the fiber-optic network**  
Approximately **2.43 million**

Source: Telecommunications Council, 1994c, p. 14

As Stern (1994) noted, however, this employment figure would constitute a greater percentage of the labor force than the present-day auto and consumer electronics industries — combined.

Such an emphasis on domestic job creation is consistent with Japan's postwar economic policies, but sustaining this attitude into the 1990s could potentially cause two sources of trade friction. At the high end, Japanese industries are at par with U.S. rivals in several key technologies such as large-scale telecommunications switches. But they have been behind in other network technologies such as hubs and routers, and in software. So the implication that all the jobs created by Japan's NII will be in Japan suggests a continuing policy of favoring Japanese products over imports —which would, in turn, would create new sources of potential trade friction with the United States.

At the low end, both Japan and the U.S. are at an economic disadvantage compared to low-cost producers in the rest of East Asia, so it is natural to assume that (absent explicit governmental policy) many of the jobs involved in manufacturing mass-market consumer electronics products will be created in other East Asian nations, and not in Japan. As the wealthiest country in East Asia, Japan's potential for political leadership in the region lies in using that wealth to promote regional economic growth. Some Asian specialists believe to continue economic growth in the region, Japan must act as a consumer market for manufactured exports from other Asian countries, the way the U.S. has for decades. Such a step would also improve the quality of life of Japanese consumers. But the tone of the NII debate shows that any shift from a producer-driven economy to a consumer-driven economy has yet to begin.

### **THE VISION: AN INFORMATION/COMMUNICATIONS-BASED ECONOMY**

Japan's vision of the NII is still evolving, with different versions coming from various players such as MPT, NTT and MITI. The most influential government document so far has been MPT's 1994 document "Reforms Toward the Intellectually Creative Society of the 21st century." NTT's NII vision is spelled out in the 1994 publication "NTT's Basic Concept and Current Activities for the Coming Multimedia Age." In addition the Management Coordination Agency of the Prime Minister's office has published a plan for government computerization (MCA, 1994), and think tanks such as the Nomura Research Institute have developed their own visions of Japan's NII (see Murakami, 1993).

The term "information/communications" is the focal point of both MPT's and NTT's NII visions. MPT (Telecommunications Council 1994b) speaks of a the transition from the existing socio-economic system to a different system founded on a new paradigm. That new paradigm is defined as an "intellectually creative society based on info-communications." Likewise, NTT (1994) argues that "the information communications industry contributes to the enrichment of people's lives and the activation of industry activities." Each of the visions emphasizes the role of the NII in promoting future economic growth and enriching the lives of citizens.

While the notions of realizing a comfortable lifestyle and promoting mutual understanding are emphasized in MPT's vision, those goals have been reiterated in various government visions for two decades. Why then has NII suddenly taken on such urgency in the past few years? Al Gore might be a proximate cause, but a more fundamental issue is revealed in the MPT report.

The international competitive environment is changing in step with the progress of yen appreciation and the growth of the newly industrializing countries, and Japan is increasingly shifting its production facilities overseas, especially in the manufacturing industries where competitiveness has been declining . . . (T)he shift of production overseas is continuing at a fast pace, giving rise to fears of a hollowing-out of industry. For this reason, too, it is imperative that Japan switch to a new highly productive framework for industry and employment, a framework centered on areas with high intellectual added value (Telecommunications Council 1994b, p. 2).

As this paragraph illustrates, NII in Japan is primarily a response to the declining competitiveness of Japanese industry. Building the NII would respond to the challenges of *endaka* and hollowing-out in two critical ways. First, it would create new economic activities to replace activities that will inevitably continue to move offshore in response to *endaka*. The new activities would include production of intellectual property, such as software, information content, entertainment and information services. They would also include production of new multimedia and telecommunications equipment in which Japan could leverage its existing strengths in hardware technology to create a competitive advantage.

Second, the creation of an advanced national information infrastructure would help make existing industries more productive and competitive through the application of network technologies within and among corporations. A specific concern expressed in Japan is that the U.S. NII will give American companies a competitive advantage, and it is clearly expected that Japanese companies need access to a comparable infrastructure to compete.

The elements of Japan's NII vision focus on creating an information/communications-based economy, and the benefits expected to spring from such an effort. They include: producing new multimedia products and services; installing a nationwide broadband, fiber-optic telecommunications infrastructure; creating hardware products that can be manufactured domestically; developing software capabilities; and improving productivity of the economy through application of information and communications technologies.

## **Multimedia**

Multimedia — the anticipated convergence of audio, video and computing technologies — has been the great anticipated growth market for Japan's electronics companies for many years. They have developed both new products, such as Sony's handheld Data Discman and Fujitsu's home PC series FM Towns, and promoted existing products such as CD-ROMs and even karaoke as part of an anticipated "multimedia revolution."

While touting multimedia as a potentially huge industry, the Telecommunications Council report remains vague on its definition of multimedia. New multimedia markets are defined as those "newly created by program distribution, production of terminal devices, network operations and other related to the development of the fiber-optic network." Existing markets expected to expand by 67 trillion yen include "video equipment, telecommunications equipment, computers and video software." In effect, the report is including the entire electronics and telecommunications industry under the term "multimedia." There is no estimate of the growth of those industries in the absence of a universal fiber-optic network, hence no true estimation of the additional value to be produced by building such a

network, just the assertion that building the network will create 123 trillion yen in economic activity and more than 2 million new jobs.

Regardless of how vaguely the term “multimedia” is defined (and those hyping multimedia in the U.S. and elsewhere are not much more precise), it is clear that the NII vision in Japan is based on the belief that multimedia will be a tremendous driver of economic growth in coming years. Multimedia is expected to revive the stagnant consumer electronics industry by linking it to computing and telecommunications and giving Japan’s electronics companies a new edge over their Asian competitors. It is also expected to enable Japan to make inroads in the entertainment and software industries, where Japanese companies have been unable to challenge the dominance of Hollywood, Silicon Valley and Redmond.

### **Broadband, Fiber-Optic Communications Infrastructure**

The link from multimedia to an information infrastructure is straightforward. Only multimedia content — home movies (video on demand), interactive video games, interactive education, business videoconferencing, and so on — requires the bandwidth to justify a nationwide digital telecommunications network supplanting the existing telephone network. Such a network is the cornerstone of the plans of Japan (and other nations) for an “information society” in which information is conveyed digitally between citizens, business and government, rather than via mail, fax, telephone or television.

Japan's NII plans state that this multimedia system will be delivered via a fiber optic network. In the U.S., current plans call for a hybrid of fiber optics, coaxial cable, enhanced copper wire and wireless. Coaxial cable TV lines serve the vast majority of U.S. homes and have the capacity to provide high-bandwidth transmission. In Japan, expensive, tightly-regulated cable TV has not caught on, available to only 22% of all TV households and subscribed to by a mere 5% (Yamazaki, 1994). So Japan's NII visions call for building a pure fiber optic network.

In 1994, NTT announced plans to wire every Japanese household with fiber-optics by 2015. But then MPT announced a target date of 2010, so NTT changed its projections to 2010 as well. Today, many officials and observers privately say fiber-to-the-home will not happen by 2010, both because of cost and because there is no clear demand on the part of users for such high-speed service to the home. However, there is still a clear emphasis on building the infrastructure as a means of stimulating demand, rather than waiting for demand to drive investment in the infrastructure.

### **New Hardware Opportunities**

The NII is seen as a means to stimulate domestic demand for computer hardware, consumer electronics, and communications equipment. Some of the major categories of hardware include PCs and peripherals, set-top boxes, semiconductors, HDTV, PDAs, video servers, fiber-optic cable, and digital switching equipment. Some of this demand, particularly for telecommunications equipment, will come from the actual construction of the NII. Demand for products such as computers, HDTV, video servers, PDAs and various consumer devices will be driven by the availability of multimedia content over the NII.

In addition, the creation of domestic markets for such products is expected to support exports. Japan’s large, sophisticated domestic market for consumer electronics is credited with supporting exports of TVs, VCRs, video games, Walkman radios, and numerous other devices. By contrast, Japan’s slow adoption of PCs is one reason for the lack of export success in that industry. By stimulating domestic demand for multimedia hardware, it is hoped that new products will be developed for export, and profits from the domestic market will support an export drive. Such a strategy is based on the earlier successes of Japan’s automobile and consumer electronics industries, but also reflects the

pattern followed by the U.S. PC industry. This aspect of the NII is not discussed as directly in the various NII visions, but given the strong concern over *endaka* and hollowing-out, there is no doubt as to the perceived need to develop new export opportunities for Japan's manufacturers.

### **Developing Software and Services Capabilities**

Software and services are the fastest growing segments of the information technology industry worldwide, and still offer better profit opportunities than most of the brutally competitive hardware industry. Japan has tried for decades to catch up in software, through a number of government R&D programs as well as corporate efforts, but if anything has continued to fall further behind the U.S. industry.

Japan's software industry lags far behind that of the U.S. in almost every key dimension. In applications software, eight of the ten largest firms are American, while only one is Japanese. For systems software, seven are U.S. firms and none are Japanese (Office of Industries, U.S. International Trade Commission, 1995). Japanese software companies have almost no presence outside their domestic market. They continue to focus on custom programming, while the global market is shifting rapidly to packaged applications. Most importantly, virtually every key software architecture is controlled by U.S. companies.<sup>6</sup> The only important exception is video game software, which runs on architectures controlled by Nintendo and Sega. Even the Japanese domestic market for packaged software is dominated by U.S. applications, and IBM's DOS-V and Microsoft Windows are unifying the formerly fragmented PC applications market.<sup>7</sup> The Japanese market is still relatively small for information services, such as systems integration, outsourcing, online services and network services. Japanese companies have failed to compete outside the domestic market for such services, and are beginning to face foreign competition in their home market.

The other essential "soft" component of a multimedia future is content. Such an imperative motivated the purchase of Hollywood properties (MCA, Columbia Pictures, Columbia Records) by Japanese electronics companies, since Japanese-produced entertainment exports are largely confined to video games, karaoke and animation. The anticipated synergies between "hard" and "soft" goods have not been realized, and one of the major acquisitions, MCA, has since been sold by Matsushita to a Canadian owner. Meanwhile, Japanese firms such as Sony have experimented with U.S.-based new media subsidiaries and joint ventures, but, in the end, the predominant share of the world's entertainment content still comes from the U.S.

The NII offers new opportunities for Japan in software and services. Multimedia and interactive markets are still in their infancy, and new kinds of content and entertainment are sure to be developed. As new markets develop, it is believed that opportunities will be created for Japanese companies to develop their capabilities in software, services and content and challenge the present U.S. dominance in those areas. Even if U.S. firms set the standards, such standards provide a well-defined target that will play to Japan's forte: manufacturing high-quality complex products that conform to those standards (West, 1995).

### **NII as a Productivity Tool for Government and Industry**

One possible role for the NII is as a tool for increasing productivity in government and industry. For the post-"bubble" industries, economists and other analysts have pointed to poor productivity of

---

<sup>6</sup> This includes DOS-Windows (Microsoft), Macintosh (Apple), UNIX (various versions from IBM, Hewlett-Packard, Sun and DEC), Netware (Novell) and IBM's mainframe operating system.

<sup>7</sup> For more detailed analysis of the troubles of the Japanese software industry, see Cottrell (1993), Baba, et al. (1995), Nakahara (1993), and Dedrick and Kraemer (1995).

Japan's white collar work force (compared to other industrialized nations) as one of the problems that needs to be addressed to aid in economic recovery (Yamakoshi, 1995). Greater use of information technologies, such as PCs, E-mail and groupware are among the technological fixes that have been proposed to increase such productivity.

Government information systems have also lagged those of other leading industrial powers. Murakami (1993) argues that the Japanese bureaucrats have computerized each ministry separately, rather than coordinating and integrating work between ministries. He proposed an inter-ministerial network based on a system of common document interchange formats that would also be connected to local governments and private users. Such a system could be expected to reduce and rationalize administrative tasks, reduce the use of paper (and thus office space), improve information sharing between various levels of government, and improve decision-making. Also, by computerizing this information, the government's information could be more readily accessible as an information asset for all of Japanese society.

### **NII PLANS AND INITIATIVES**

Japan's bureaucratic elites, particularly at MITI, have been credited with engineering the post-war economic miracle that turned Japan into a manufacturing powerhouse and the world's second largest economy. However, the 1990s found MITI a victim of its own success: Japan's manufacturers no longer needed MITI's protection and increasingly ignored its guidance, while few of the later technology development projects (e.g., Sigma, Fifth Generation Computing Systems Project) had produced any commercially successful technologies.

So it is not surprising that MITI was ready to jump at an opportunity such as the NII, which promises to remake Japan's industrial structure. But NII is largely a telecommunications issue, and as such falls within the purview of the previously second-tier MPT. MPT sees the NII as an opportunity to further expand its influence and achieve the status of an economic pilot agency, comparable to the Ministry of Finance (MOF) and MITI.

The jockeying for influence was not limited to MITI and MPT. The NII is seen by many in the bureaucracy as an opportunity to expand their influence and create a new, attractive mission for their ministry or agency. This creates bureaucratic rivalries that have slowed the development of a coherent NII strategy, manifested by various competing ministerial plans. Participants in NII conferences are treated to a parade of representatives from Japanese ministries, always including MITI and MPT but often featuring the Science and Technology Agency and other groups. Each speaker presents a "Vision of a Multimedia Society" that differs more in who is presenting it in than in the details of how the vision would be implemented.

#### **MPT**

Like other national ministries, MPT develops its policies with the help of various permanent and *ad hoc* advisory groups known as *shingikai*, which consist largely of business and academic leaders. Such groups examine ministerial proposals and develop plans that reflect the desires of the constituencies represented on the panel, and also that will be supported by those constituencies once their report is released (Fukunga, 1995).

So the influential Telecommunications Council (1994a) report in May 1994 came from a 21-member panel that included the chairman of both Hitachi and Nikkei (Japan's leading financial publisher), as well as four professors and a vice president of Rengo, the leading labor union; its communications policy committee was headed by the chairman of Daiwa Bank's affiliated research

institute. The origins of the report, its distribution<sup>8</sup>, and its content all contributed to it being the most often quoted of the competing “visions” developed at this time.

The report emphasizes Japan’s economic challenges for the 21st century, and argues that information communications (*joho tsushin*) can both facilitate the nation’s decentralization and help develop Japan’s creativity. The later goal would be obtained through the informatization of education, medical care and government services, achieved through development of application databases and applications.

The two-most often quoted figures from the report are the aforementioned estimated annual size of multimedia-related markets (¥123 trillion) and the new jobs created (2.43 million). Less often quoted are the estimated implementation cost, which ranges from ¥33 to ¥53 trillion, plus ¥42 trillion for underground wiring.

The fiber-optic network would be rolled out in three five year phases culminating in 2010. The first phase would emphasize the center city of prefectural capitals, the second including all cities with a population of at least 100,000, and the final phase extending to cover 100% of the nation. The first phase would also connect schools, hospital libraries and other public institutions, with the development of public applications. Since such application development is essential to take advantage of the hardware infrastructure, the MPT vision argues that the public sector must lead the development and trial deployment of such applications so that they can be put to practical use by the year 2000.

The report recommends interest-free loans and tax incentives to fund private development of the fiber optic network. Local governments should also encourage the undergrounding of the cables, as well as facilitate right-of-way for both underground and above-ground lines<sup>9</sup>. To implement the necessary services, regulatory reforms should encourage the expected convergence of broadcasting and telecommunications, while considering a fiber optic version of universal service.

Finally, the report anticipates the development of systems and standards as the basis for the Japanese NII, arguing for new standards from Japanese trade associations as well as cooperation on international networks with the International Telecommunications Union (ITU).

## MITI

MITI’s (1994) proposal for an “advanced information infrastructure” has similar goals to the MPT report. Noting the limited use of information technologies by public agencies, it emphasizes five priority areas: education, research, medical/social services, government administration and libraries. It outlines specific plans in each of these areas for linking government agencies, private homes and creating online databases to support these goals.

As with the MPT report, it notes the need for new standards for the information infrastructure, and also measures to facilitate the use of copyrighted material in new multimedia software. Such software is a major priority of the MITI report, which advocates the creation of various multimedia information centers (for creating content) and various programs and reforms to improve the software development capabilities of Japanese industries.

MITI is focusing on applications for the NII, not on creating the communications infrastructure itself, which is clearly MPT’s turf. MITI sought the support of other ministries for its NII plan by including them as partners who would receive funding for their own NII applications. MITI’s role was

---

<sup>8</sup> The report was printed in both Japanese and English, as well as a widely-distributed ten page summary. The rapid availability of the English summary contributed to its heavy use outside Japan, as did its publication (in both languages) on the World Wide Web once MPT established a web site later in 1994.

<sup>9</sup> The net effect of such right-of-way policies would assist the development of rivals to NTT’s network, since NTT already has a national right-of-way network.

to be catalyst, coordinator and project manager. This was an attempt to carve out its own niche and enlist other parts of the government bureaucracy in support of its plan (Interviews with MITI officials, October 1995).

## **NTT**

The quasi-private Nippon Telephone and Telegraph is active in the NII debate in Japan, and its views are taken very seriously for two reasons. First, even if it should lose its national monopoly on local service, NTT will be the central player in the implementation of a Japanese NII. Secondly, NTT has a large telecom R&D budget: for fiscal 1993, this amounted to ¥288 billion as compared to ¥35 billion for MPT (MPT data). NTT's R&D and procurement have historically played major roles in the competitiveness of Japanese industry, not only in telecommunications, but also in computers and semiconductors (Anchordoguy, 1989, pp. 39-42, 138-140).

Continuing such research is a major part of NTT's own vision, which would include digital packet-switching, high-speed transmission, low-priced optics, image encoding and voice/character recognition and translation technologies (NTT, 1994).

The NTT plan outlines the various services the firm intends to offer, but at the same time advocates government assistance as essential for the development of the information infrastructure. As with the other reports, it lists software and content as areas where Japan lags the U.S., using comparisons between the two countries such as the number of on-line databases and even dubious comparisons such as the number of universities offering degrees in TV/motion picture production.

## **THE REALITY: NII IN THE JAPANESE CONTEXT**

### **Government vs. Private Roles**

Despite the perceived importance of such networks, the up-front costs are such that few consumer-oriented systems will be self-supporting in the foreseeable future. As Egan (1991) explains:

Broadband telecommunication poses a very difficult “chicken and egg” problem for society...First there are the “high-tech” supply-side economists, who claim that we should immediately adopt and deploy new digital fiber optic and radio technologies, based on the assumption that consumers will find new applications for them. Then there are demand-side economists, who claim that until there is a demand driver, we should not spend money on new technology for fear that we may create an expensive solution for which there is no corresponding problem (p. ix).

But under Egan's bifurcation, few examples of pure demand-side approaches can be found among early adopters of NII technology: the current approach in many technologically advanced nations (including Japan, Singapore and the U.S.) is supply-side. For our purposes, a more useful distinction may be drawn over the center of policy leadership, corresponding to Zysman's (1983) distinction between government (state) and business leadership of industrial development.

How much of a government role is appropriate (or necessary) in developing a NII? As the “info highway” metaphor suggests, a NII fits the classical definition of a public good—something whose benefit is spread throughout society. This would imply a government-dominant model of encouraging telecommunications development. Dutton, et al., note that such an assumption that “telecommunications are a public utility rather than a private commodity” (1987, p. 22) is common to “wired cities” plans dating back to the 1960s. To emphasize the importance of the public nature of telecommunications, U.S. Vice President Gore (1993) cited the Titanic disaster as an example where the profit-making



nature of radio communications caused messages to go unreceived that would have prevented the collision or speeded up rescue operations.

On the other hand, every developed or developing nation has one or more telecommunications companies, with heavy investment in wiring, right-of-way, switching facilities and staff. These companies must either play a key role in a digital communications network or eventually go out of business, obviously an option few telecom executives are considering. Similarly, many countries have cable television companies delivering broadcast (one-to-many) video service that would also be supplanted by interactive (two-way) video carried on an NII.

Such communications service companies see both an opportunity and a threat in plans for a NII. Most are working hard to earn a role in the government's plans. At the same time, in many companies they are also working to preempt government leadership, by launching pilot projects to demonstrate a NII can be built without state intervention.

One key issue is the risk (for either government or industry) in building a national system before the technology and its uses are well-defined. As a U.S. industry group noted, "it is impossible to predict accurately the future path of the market or technology" (Council on Competitiveness, 1993b, p. iv).

Even government-led systems assume a role for private funding, since few governments have the billions of dollars required to wire geographically remote locations door-to-door. In these cases, government funding may be limited to seed projects, with regulatory powers used to direct private funding through incentives (increased rate of return) or coercion (mandated universal service). Of course, where the telecom or cable companies are completely or partially nationalized, the distinction between government and industry leadership becomes one of national budgeting and intra-governmental power struggles, as can be seen in Japan.

At this point, it seems that the Japanese government has decided to concentrate on the twin roles of regulator and promoter, while allowing the private sector to build the infrastructure and develop commercial products. This division of labor is not so different from that in the U.S., although the form it takes is different. The Japanese ministries play a larger role as both regulator (MPT) and promoter (MPT, MITI and others), while the U.S. system is more diffuse, with important roles played by Congress, the bureaucracy, the courts, and state and local governments.

### **Supply-driven versus Demand-driven**

The consumer has been noticeably absent from the NII debate in Japan. The assumption seems to be "if we build it, they (the consumers) will come," and the talk is almost exclusively of the economic benefits accruing to the producers, the influence gained by Japanese ministries, and so on, rather than of any demonstrable consumer demand. This is far from the standard view of the "marketing concept" which focuses on customer needs (for a comprehensive review, see Kohli and Jaworski, 1990).

Of course, nominal consumer desires are postulated, with video-on-demand and long-distance medical imaging being the ubiquitous examples. But these are prototypical needs, placeholders used to advance the discussion of the technology until a real reason can be found. Market tests — both in the 1980s and more recently — have been failures (Kageki, 1994), but plans are proceeding ahead anyway, despite a notable lack of consumer enthusiasm (Sato, 1994).

This problem is not unique to the Japanese debate. In the U.S., Iacono and Kling (1995) argue that "technological utopianism" has been used to sell the NII concept, and Kling adds that the same Information Infrastructure Task Force reports closely studied by the Japanese were seriously flawed:

They were superficial in particular points, particularly in failing to examine why some of these experiments had not expanded and why some of them were not widely adopted.

It was simply assumed that new information technologies would be the catalyst for expansion. (Interview, May 24, 1995)

Instead of consumer uses, King and Kraemer (1995) predict near-term market demand will center on businesses even though public rhetoric has centered on servicing individual consumers. Moreover, they argue that firms will be merely taking away each others markets rather than creating new markets.

Such an approach is symptomatic of technology-driven rather than market-driven thinking. The sharing of chest X-rays with specialists 200 kilometers away could be done by extending existing high-speed trunk lines to a few hundred hospitals, without the expense of building the information superhighway to the front door of each of 60 million households. And postulating an interest in video-on-demand ignores the ready availability of an established, much lower-tech alternative: the corner video store. (The presumed advantages of video-on-demand over the corner video store include availability but not price: forecasts all assume consumers will pay significantly more for the marginal convenience.) Such an absence of market-driven thinking does not bode well for the huge unanswered question of the NII: the cost of wiring each of those 60 million households by the target date of 2010.

Beyond the technological impacts, a few Japanese have also considered the potential social impact of a NII. Kumon, the executive director of the Tokyo-based Center for Global Communications, predicted that in addition to spawning a “third industrial revolution” (a phrase he attributes to George Gilder), the developing information infrastructure will also spawn a social revolution, creating a new class of network-aware citizens, or “netizen”:

Just as during the 17th, 18th, and 19th centuries bourgeois citizens wanted to take part in their societies, [netizens] will demand something different from mass democracy in the 20th century. They will demand a freedom of informational activities — just as the original bourgeoisie demanded freedom of business activities as against the chartered monopolies of their time. . . .

The netizens want to have much greater freedom in terms of sending out information and having access to information. . . . Today, broadcasting is monopolized, chartered to a chosen few of society. Netizens are demanding that anyone should have access (Interview, August 30, 1994).

Meanwhile, Sawa (1994) of Kyoto University argues that “the multimedia-oriented information society will succeed only when individualism is respected” and predicted failure for MPT plans unless education and other social reforms are made.

While precursors to today’s NII have been discussed since *joho-ka* came into fashion in the early 1970s, such social revolutions do not appear to be among the stated goals of big business and the bureaucracy, which have been leading the NII debate. And few in the NII debate (including Kumon) expect the outcome of NII will be the transformation of Japan into a “consumer economy,” as is so often postulated by American economists.

## **Bureaucratic Rivalry**

Given the central role of the Japanese bureaucracy in the nation’s economic miracle over the past 50 years, it is not surprising that business and the media eagerly await each new glimpse into the plans of the unelected officialdom. But despite its spectacular successes with Japan’s auto and electronics industries, and efforts to assert leadership (see MITI, 1994), MITI seems consigned to play a consultative — if not subordinate — role in developing Japan’s digital communications industries.

MITI’s problem is, in fact, summed up by the two words, “digital” and “communications.” Regulation of industries in digital technology (i.e., computers) is under MITI’s authority — except when

they involve communications, which are governed by MPT. As Murakami put it: “In the past, industrial policy was masterminded by MITI. Now you have to think about the Ministry of Post and Telecommunications” (Interview, August 29, 1994). MITI’s emphasis on developing “multimedia software” (software being a traditional MITI purview) is one way to assure a continuing role in the debate.

In addition to MITI and MPT, other ministries and agencies have offered their “visions” of an information society, each competing for support from public and private opinion leaders<sup>10</sup>. Similarly, various ministries have demonstration projects for the city of the future: MITI calls them “new media communities,” whereas MPT sponsors “teletopias,” and the Ministry of Agriculture has its own “greentopias”<sup>11</sup>.

Various ministries are also sponsoring competing private or quasi-private nationwide fiber optic communications networks. MPT, of course, has strong ties to Nihon Telephone and Telegraph (NTT). Among the three new common carriers (NCC’s) that are NTT’s long-distance competitors, MPT favors DDI (Daini Denden Inc., or “2nd phone company”), co-founded by a former NTT executive<sup>12</sup>, the Ministry of Construction favors Teleway, whose lines are buried alongside of the ministry’s national highways, and the Ministry of Transportation has backed Japan Telecom, a spin-off of Japan Railways, which built its fiber optic lines along JR tracks — much as Sprint used the track of the Southern Pacific Railroad in the U.S. Meanwhile, MITI favors various regional carriers tied to MITI-regulated electric power companies, such as Tokyo Electric Power (TEPCO) affiliate TTNet. Even the Ministry of Health is getting into the picture with a 3-year pilot project to lay fiber optic cables through water pipes (“Optical-Fiber Study” 1995).

Such diffusion of interests has its price. As several authors (see for example Watanabe, 1994; Yamanashi, 1995) have noted, many Japanese feel that these turf wars jeopardize the nation’s multimedia future. Nonetheless, the jockeying for influence — primarily the rivalry between MITI and MPT — permeates the NII debate. The recent clash between these two ministries has reopened the “VAN wars” of the early 1980s, in which they fought for jurisdiction over Value-Added-Networks that provide on-line information and digital communication services, the fore-runner of today’s commercial Internet providers.

In 1981, MPT proposed tough regulations for the new VAN providers, which, Johnson (1989) argues was successfully opposed by MITI on grounds that it regulated both computer-based communications and also international trade. In 1982, regulation of many small and medium-sized VANs were liberalized, but MPT’s revised 1983 proposal sought to tightly regulate large service providers, banning foreign ownership of both telecommunications systems owners (such as long distance carriers) and those VAN companies that provided international service. Aided by the Keidanren, MPT won Diet approval in 1984 for digital telecom regulation — but with less control over foreign entrants — and the net result was a liberalization of the VANs to permit competition for NTT (Yamada, 1992). But, several scholars (Johnson, 1989; Vogel, 1996) argue that it also led to a net increase in regulatory power for MPT.

As in the earlier turf battle, MPT is again holding the high cards. In the final analysis, it is hard to see how a national information infrastructure that replaces analog voice circuits to each home with digital

---

<sup>10</sup> For a generalized typology of bureaucratic rivalry in the Japanese government, see Campbell (1984).

<sup>11</sup> So, for example, the MPT vision makes a priority of wiring “teletopia cities” by 2000, but no mention is made of MITI’s “new media communities”. (Telecommunications Council, 1994a, p. 49).

<sup>12</sup> Unlike Teleway and Japan Telecom, DDI lacked a development partner to provide a ready-made right-of-way for fiber optic cables, so DDI is more dependent than NTT and the other NCC’s on microwave relay transmissions — which proved to be an advantage in the Jan. 17 Hanshin earthquake (Kageki, 1995a).

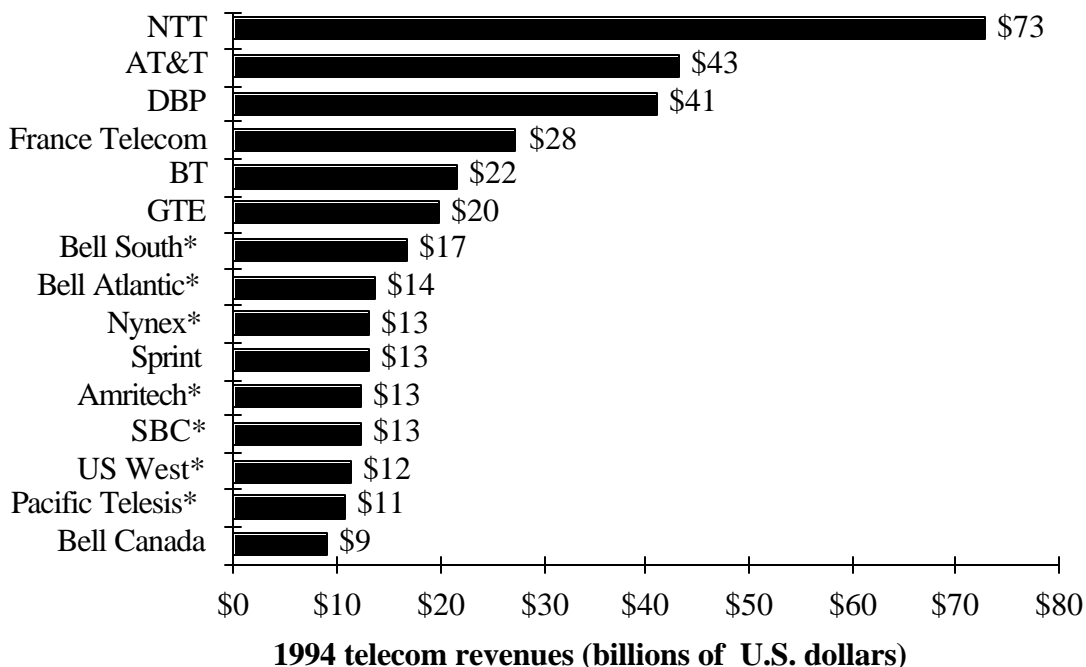
data circuits could be considered anything but a telecommunications, and thus MPT, affair. If it wins major control, MPT will guide both the nature of the network itself, as well as the specifications for the equipment to be manufactured for use in homes, offices and switching stations throughout the nation. For this reason, reports from MPT and its allies, such as the Telecommunications Council, offer the clearest glimpse into the future of Japan's NII.

Despite liberalization, MPT's continuing bias toward regulation will continue to impede the diffusion of network services. For example, as a legacy of the 1981-1984 VAN wars, MPT requires a Special Type II license for those VAN resellers who provide international service, but an easier Type II license for domestic-only VANs. This meant that, according to NTT figures, only about 70% of the Internet sites in Japan in May 1994 were licensed for international E-mail (Goto, 1994): since one E-mail addressing system is used worldwide, the distinction is primarily a regulatory one rather than a technical one. A VAN provider can apply for a domestic license and provide international service (as happened in 1993), but that firm risks losing access to all circuits from a MPT-regulated carrier if MPT discovers the subterfuge. By contrast, no state or federal permits are required to provide worldwide E-mail services in the U.S., and by mid-1993, service providers began to sprout up weekly.

### **NTT's Central Role and Disputed Future**

NTT is the world's largest telecommunications company (Figure 2) and is central to any Japanese plans for a NII: as noted earlier, all existing NII plans assume that NTT will be building the information infrastructure to the consumer's door. NTT was a government agency until 1985, when it was officially spun off as a "private" company and MPT acquired responsibility for regulating NTT. Even after stock sales from 1986 to 1988, the Ministry of Finance still holds about 65% of the shares of NTT; with ongoing MPT influence, NTT has become at best a quasi-private corporation.

**Figure 2: Telecommunications carriers in Japan, U.S., Germany, France, U.K. and Canada**



\* Regional Bell Operating Company, i.e., U.S. “Baby Bell”

Source: MPT (1995)

After the 1985 privatization, the question of breaking up NTT further — a la AT&T — was postponed. Further privatization also has been on hold since the collapse of the stock market, because MOF has not wanted to offer additional shares in a soft market. However, with the prospect of an expanded information infrastructure, and ongoing market power of NTT to crowd out smaller rivals, MPT and the new common carriers (NCCs) have renewed their push to break up NTT; the first salvo came with an MPT (1995) report documenting NTT’s market concentration (Table 1). A special committee of the MPT Telecommunications Council is scheduled to recommend a future structure for NTT to ensure a healthy Japanese telecommunications industry, with a report due in March, 1996. It is expected that the committee will recommend the breakup of NTT, but that will be just the first step in a long process before a final decision is made.

**Table 1: NTT’s share of domestic telecommunications segments**

<u>Market</u>	<u>Share</u>	<u>Revenues</u>
Telephone service	93.3%	¥ 4,865 billion
Leased circuits	82.8%	574
Cellular phone†	60.7	873
Paging†	61.8	273

† Service by NTT DoCoMo affiliate

All revenues for fiscal year ending March 31, 1994

Source: MPT (1995)

In fact, the battle over NTT has been waged in the court of public opinion throughout 1995. MPT argues that breaking up NTT would create a dynamic telecommunications market, with competition leading to lower prices and new services. NTT responds that competition is now international, and that it should be allowed to stay intact to compete in international markets. NTT also argues that a breakup would damage network coherence. Finally, NTT argues that its R&D labs are a national resource that should be preserved.

NTT took two pre-emptive strikes against divestiture in late 1995. First it announced that it would provide local network to other carriers in order to create a competitive environment. It also announced that it would cut its workforce by 50,000 from the present 200,000 to reduce its operating costs, in return for the company being kept intact. NTT President said, "We present this restructuring on the assumption that the breakup will not go forward." (Timmermans, 1995). One industry analyst argued that NTT's pricing structure for interconnection made the offer to open local connections "a fake," intended to win political points rather than create true competition. Potential local competitors are mostly small carriers, cable TV companies and other utility companies that have their own fiber optic networks between cities. None have the capital or technology to compete seriously with NTT.

NTT's plan to cut labor costs will be difficult to implement, given the political clout of NTT's union. The average salary at NTT is estimated at between 8 million and 10 million yen (US\$80,000-100,000) per year, and NTT has a higher worker/customer ratio than its international competitors. NTT's union has not agreed to job or salary cuts, and past efforts to spin off units such as NTT's Software Center were successfully thwarted by the union.

A former NTT executive argued that the real purpose of NTT's announcements was to "move the playground from the NTT Law to the Telecommunications Business Law." Under the NTT Law, the issue of breaking up NTT is within MPT's regulatory jurisdiction. However, by broadening the agenda to encompass the Telecommunications Business Law, NTT is trying to shift the debate to the Diet, where it can line up its allies to oppose breakup. Shifting the debate to the Diet, and/or to some kind of interministerial negotiations, means probably delaying the issue for years. If the Telecommunications Basic Law is to be rewritten, a host of issues will have to be resolved, including the demarcations between local and long-distance service, domestic and international service, Type I and Type II service, and broadcast and cable TV.

One of NTT's goals is to be allowed to expand into international markets. Since its privatization, NTT has been prevented by MPT from providing international service, which remains the domain of international carriers KDD, IDC and ITJ.<sup>13</sup> MPT is unlikely to allow an intact NTT to provide international services, as it would lose one of its most important sources of leverage over NTT. NTT would also like to end the separation of Type I (common carrier) and II (value-added) services. By opening its local lines to competitors, NTT is positioning itself to be allowed to compete in value-added services free of MPT's regulation. This strategy puts NTT's monopoly profits in local service at risk in order to pursue new growth markets in the future. Again, however, MPT is not likely to agree to such a change, as it would prefer to increase, rather than decrease its regulatory reach.

By putting such a broad agenda on the table, NTT hopes to attract allies in its battle with MPT. So far the battle lines seem to be as follows:

Pro-breakup:	MPT, NCCs, cable television companies, other potential competitors
Anti-breakup:	NTT, MITI, NTT's family of equipment suppliers, NTT union

---

<sup>13</sup> *Kokusai Denshin Denwa*, International Digital Communications and International Telecom Japan, but universally referred to by their initials.

Uncertain: Ministry of Finance, political leaders

A key player is likely to be MOF, which is very concerned about maximizing the value of its shares in NTT. In the past it was assumed that MOF would oppose a breakup because NTT's share value would be hurt. However, in 1995, Nomura Research Institute produced a report stating that NTT would actually be worth more in parts than as a whole, as the smaller units could pursue profitable alliances to enter new markets and cut costs. Morgan Stanley came to a similar conclusion (Interview with Tadao Saito, Oct. 23, 1995). Another possible factor will be the outcome of the next national election, expected in 1996. If an LDP majority is restored, the party and its Prime Minister will have more influence over the NTT issue than the present coalition government can muster.

It is difficult to forecast the final outcome of the breakup issue. No one is happy with the present regulatory regime, which maintains artificial market barriers between different categories of service and hamstrings NTT and its competitors alike. However, the present political climate seems more conducive to continued standoff than a decisive resolution of the issues. For the near future, NTT is likely to remain intact under the present regulatory structure, but uncertainty surrounding NTT's future will be an obstacle to rapid development of Japan's NII.

### **An Artificial Schedule Without Financing**

The minimum cost for extending fiber optic lines to every business and individual neighborhood is put at ¥33 trillion; with associated switching systems, extending a line to every home and undergrounding the entire system, the total could be as high as ¥95 trillion (Telecommunications Council, 1994c, p. 5). Most of this cost will have to be advanced ahead of actual revenues, because the development model is not based on pay-as-you-go market-driven development, and because of an ambitious deadline of 2010; not coincidentally, 2010 is five years ahead of the Clinton Administration's target date for the U.S.

To prime the pump, MPT in January announced a FY 1995 ¥32.3 billion loan program for building fiber optic networks, with the money offered to NTT, other Type I carriers, and cable TV operators. Of that, ¥30 billion will be loaned through the Japan Development Bank, and ¥2.3 billion will come from the MPT general account; an unspecified additional amount will be provided by local governments from existing regional development loan programs. Further financing proposal will be made by MPT, the Ministry of Finance and the Ministry of Home Affairs by March 1995 ("MPT Establishes," 1995).

MPT and MITI are now both launching spending sprees to develop NII projects. Each has budgeted close to US\$1 billion for the present fiscal year for a variety of projects, including video-on-demand, education, telemedicine and local government networks. MPT's projects focus more on communications infrastructure, while MITI concentrates on applications development. The two ministries are operating independently rather than cooperating, as each competes to encompass NII and multimedia under its jurisdiction. In addition, NTT is running its own test-bed projects as it implements its own NII vision.

But where will the other trillions come from? One possibility is raising rates for existing NTT subscribers, another is government financing: both face potentially crippling political and practical obstacles. NTT customers already pay more for their services than consumers in many industrialized countries, so the impracticality of raising rates is clearly recognized by NTT president Masashi Kojima:

Financing is the real challenge. Here, the "if we build it they will come" model may no longer work. Most customers are satisfied with conventional telephony; they don't want advanced services to be funded by their telephone bill (Aizu 1994, p. 164).

Much of the pressure for financing stems from the artificial schedule. Given that the financing mechanism (and basic consumer demand) is completely unresolved, the dates announced for completion of the NII reflect more the pride, power ambitions, and national competitiveness of the sponsors than realistic projections of Japan's information future. As an example, at a June 1994 conference in Tokyo, the NTT representative anticipated completion of the national network by 2015, but the MPT representative used the deadline of 2010 contained in its report (Telecommunications Council 1994a); thus, subsequent NTT presentations used the 2010 date. While Japan's "catching up" mentality is second to none, until the details become more concrete, such announced dates must be considered goals rather than predictions.

Also unknown is the impact of the January 17 Hanshin Earthquake. All government budgets prior to that date are called into question by the unanticipated ¥10 trillion or more to be spent rebuilding the Kansai region. The painful vulnerability of Japan's urban areas to inevitable quakes has rekindled talk of decentralization, which would be greatly aided by a NII — as will temporary telecommuting during the Kobe's reconstruction. At the same time, the Internet showed a small fraction of its potential, with real-time eyewitness reports, photographs and casualty lists posted online at Kobe University and elsewhere for readers throughout Japan and the world.

### Limited User Experience

Japan faces even more serious problems than the U.S. in gaining end-user acceptance for the NII: Japanese homes and businesses have relatively limited experience with public networks in particular (e.g., the Internet) and computers in general. Japan ranks only 17th worldwide in per capita computer installations (Stern, 1994), although the recent boom in PC sales is changing that situation. Even though visionaries in Japanese industry, government and academia may be able to look beyond their immediate experience, such limited experience will make both accurate market research and demonstration projects far more difficult to implement.

According to MPT (Telecommunications Council, 1994b, p. 31), Japan has a third the rate of PC penetration and one-sixth the rate of Local Area Network connectivity of the U.S.; similar measures of Japan's perceived disadvantage were circulated by a MITI-affiliated non-governmental organization (See Table 2). A major reason for this was the long delay in developing usable computer representations of the complex Japanese language, in terms of both the input and display of more than 6,000 characters in common use (Choy 1989; Snellen 1991; Cottrell 1994).

Mechanical or electro-mechanical solutions of such made typewriters prohibitively expensive, so the lack of a solution prior to the refinement of personal word processors in the 1980s means that relatively few men over the age of 30 have the keyboard skills necessary to type Japanese for E-mail messages, while the huge popularity of faxes has made the adoption of E-mail more difficult (Negroponte, 1994). Many Japanese are concerned because electronic mail has been rarely used ("Industry leaders," 1994), even in the most beneficial applications such as submitting documents for typesetting (Noguchi, 1994). In the long run, the availability of graphical user interfaces and the development of voice and character recognition software are likely to minimize the difficulties imposed by the Japanese language.

**Table 2: Japanese comparison to U.S. on PC and telecommunications measures**

<u>Description</u>	<u>U.S.</u>	<u>Japan</u>
PC's shipped (1994)	18.6 million	3.0 million
PC's per 100 employees (1994)	55.1	14.7



Computer use by managers (1994)	64%	8%
Systems on Internet (Jan. 1995)	3.2 million	97 thousand
Charge for leased lines (1994))	¥0.4 million	¥2.7 million
CATV households (1993)	61.5%	4.7%

Source: JIPDEC (1995), p. 10

While the U.S. may have an advantage in starting its infrastructure, early in this century Veblen (1915) pointed out that such advantages may not only be temporary, but that first-moving countries may actually have a disadvantage by going first and letting others learn from their mistakes. Though Veblen was talking about English railroads rather than U.S. information highways, Florida and Keeney (1990) specifically argue that the U.S. has a habit of breakthrough innovation while failing to commercialize those inventions, and that Japan in particular benefits from more consistent follow-through in product development.

In the meantime, one approach is for Japanese firms to place significant marketing and R&D resources in a market which has the more experienced user base — i.e., the United States. Such an approach has already begun, with the three largest “Den-den” (New Common Carrier) firms selling Asynchronous Transfer Mode (ATM) telecommunications switches to U.S. NII demonstration projects and telephone companies, and plans to establish ATM manufacturing plants in the U.S. because they “want to get closer to their large customers” (Valigra, 1994).

### **Internet versus Interactive TV: Which model?**

The Japanese visions of NII are based on the notion of a single unified network serving as a pipeline for providing information and entertainment in a mostly one-way direction. The technology of choice is broadband ISDN linking content providers to households, who will choose from a menu of content choices determined by the providers. This notion is now being challenged by the rapid expansion of the Internet in Japan. The Internet was slow to catch on in Japan, partly because of the high cost of telecommunications, MPT's licensing power over Internet access providers, and government efforts to enforce Open Systems Interconnection (OSI) standards while the world was embracing TCP/IP. However, Internet is replacing multimedia as the catchword in Japan, as businesses are able to use the Internet immediately to advertise and put information online, rather than waiting for new infrastructure to be developed. Major newspapers such as the Asahi Shimbun are now online, and online providers such as Niftyserve will offer Internet services in 1996. It is estimated that there are 2 million Internet users in Japan now, and large companies are using Internet for PC networking.

Kumon distinguishes between the Internet model of NII, which is user controlled and allows users to send as well as receive information, and the interactive TV model which is controlled by industry and allows limited interactivity (Interview, October 24, 1995). He argues that most major players in Japan's NII debate, including MPT and the NCCs have paid almost no attention to the Internet and have no understanding of its significance. They are more interested in how to weaken NTT rather than consider the more fundamental issues of what the nature of NII should be. He argues that NTT's announcement of an Open Computer Network in July, 1995, was generally ignored by the media, but is a significant decision, as it means that B-ISDN will be almost discarded and replaced by separate networks for telephony and computers.<sup>14</sup> The notion is that the computer network will be based economically self-supporting demand, rather than universal service, meaning that businesses in particular will have access

---

<sup>14</sup> NTT's decision is probably influenced by the fact that its existing narrow-band ISDN network is underused and is a big money loser.

to the high-speed digital communications that they need without having to wait for, or subsidize, universal service. According to Glocom's Izumi Aizu (Interview, October 23, 1995), there is something like a religious war within NTT's ranks between rival camps favoring the interactive TV and Internet models.

The rivalry between interactive TV and open computer networks parallels the debate in the U.S. between the Digital Audio Visual Council (DAVIC) proposal for information highways and the open data network (ODN) model. The question is whether the key applications will be primarily one-way services, such as video-on-demand, or network services such as the Internet. The rapid development of technologies such as web browsers (e.g., Netscape) and Sun's Java technology suggests the Internet model is winning in the U.S. If Japan makes the wrong choice, it could invest billions in a NII model that actually reinforces its position as an information backwater rather than tapping into the global information revolution.

## CONCLUSIONS

Japanese government leaders have prepared plans for the Japanese NII based on a vision of the future and a demand that does not yet exist. The desire to "catch up" is headed towards an investment of great technological prowess but of great cost and unknown consumer utility.

What role will the government play? As in any telecommunications venture, the government necessarily has a role in standards and regulation, forcing it to balance the need to encourage and incubate a new technology against the requirement to develop something in the long-term interests of society at large.

To meet its incubation role, funding of various demonstration projects that establish realistic goals and needs for NII users will probably do more to advance Japan's NII than all the "visions" in Kasumageki<sup>15</sup>. These efforts will be motivated by very real concerns about the future of post-*endaka* Japanese industry. Thus encouraged, Japanese industries will build yet another generation of advanced electronics products, such as the ATM digital switches that will be required in every community that the NII visits. These products will be marketed for information infrastructures both in Japan and throughout the world.

However, Japan's ministries will not be able to aggressively support export promotion in the way they did in the 1960s and 1970s, before the major trade friction began with the U.S. Efforts to build the Japanese information highway with only Japanese products would certainly exacerbate that friction. At the same time, Japanese producers must remain attuned to international developments and standards, so they avoid the problems of prematurely committing to one standard (as with analog HDTV) or of crafting their own unique standard which cannot be sold outside Japan (as with NEC's PC-98 and other Japanese personal computers).

More broadly, it is questionable whether those in government with the money and power to make things happen have the vision to understand where the information revolution is heading, or whether they will make decisions based on their own institutional imperatives to protect and expand their influence. Depending on the private sector alone is risky as well, since Japan's electronics and communications giants tend to have a herd mentality and will try to promote technologies in which they have existing strengths (a trait they share with their counterparts in the U.S. and elsewhere). Unlike the U.S., however, Japan has not nurtured the entrepreneurial start-ups that have driven the information industries in new directions. The catch-up mentality can be very dangerous in a rapidly changing environment, when new technologies and standards seem to appear almost daily.

---

<sup>15</sup> The district of Tokyo where all Japanese ministries can be found.

The end result is given — some form of digital communications infrastructure will exist in Japan (and other industrialized nations) — even if the technology, use, financing, ownership and schedule are not. The construction of such an infrastructure is seen as an important area of economic benefit and national pride, but its social ramifications are not yet fully appreciated. Despite three decades of discussing a shift to an information society, it appears that Japan will build its information highway without really understanding where it will lead in the end. The country is not unique in this regard, but, given the historic importance of the central government, the importance of distinguishing “vision” from reality is probably more important here than anywhere else.

## REFERENCES

- Aizu Izumi. (1994, December) Not Problems, Opportunities. *Wired*, pp. 163-165, 209-212.
- Anchordoguy, Marie. (1989). *Computers Inc.: Japan's challenge to IBM*. Cambridge, MA: Harvard University Press.
- Aruga Teiichi. (1994, October). Japan's Current Status: The Formation of a Next-Generation Social System. *The Future of Japan's National Information Infrastructure* (symposium), Stanford, CA: Oct. 5, 1994.
- Baba, Yasunori; Takai, Shinji; Mizuta, Yuji. (1995, May). The Japanese software industry: The "hub structure" approach. *Research Policy*, pp. 473-486.
- Calder, Kent. (1988, July). Japanese Foreign Economic Policy Formation: Explaining the Reactive State. *World Politics*, pp. 517-541.
- Campbell, John Creighton. (1984). Policy Conflict and Its Resolution within the Governmental System. In Ellis Krauss Thomas Rohlen, Patricia Steinhoff, (Eds.), *Conflict in Japan*. Honolulu: University of Hawaii Press.
- Choy, Jon. (1989, July 28). The Changing U.S.-Japan Microcomputer Market. *JEI Report*, 29A: 1-11.
- Cottrell, Tom. (1994, March). Fragmented standards and the development of Japan's microcomputer software industry. *Research Policy*, pp. 143-174.
- Council on Competitiveness. (1993a). *Vision for a 21st Century Information Infrastructure*. Washington, DC: Council on Competitiveness. May 1993.
- Council on Competitiveness. (1993b). *Competition Policy: Unlocking the National Information Infrastructure*. Washington, DC: Council on Competitiveness. December 1993.
- Dedrick, Jason and Kenneth L. Kraemer (1995). Behind the curve: Japan's PC industry. *Global Business*. December. (in Japanese).
- Dutton, William H., Jay G. Blumler and Kenneth L. Kraemer (1987). Continuity and Change in the Conception of the Wired City. In Dutton, Blumler and Kraemer (Eds.), *Wired Cities: Shaping the Future of Communications*. Boston: G.K. Hall.
- Egan, Bruce L. (1991). *Information superhighways: The economics of advanced public communication networks*. Boston: Artech House.
- Flamm, Kenneth. (1987). *Targeting the computer: Government support and international competition*. Washington, DC: Brookings Institution, 1987.
- Florida, Richard and Martin Kenney. (1990). *The breakthrough illusion: Corporate America's failure to move from innovation to mass production*. New York: Basic Books.
- Fransman, Martin. (1990). *The market and beyond: Cooperation and competition in information technology development in the Japanese System*. Cambridge: Cambridge University Press.
- Fukunga Hiroshi. (1995, October) . Policy Puppet Show: How Councils of Inquiry "Debate" Key Issues. *Tokyo Business Today*, pp. 18-21.

- Fukushima, Glen. (1995, January). Multimedia Wars? *Tokyo Business Today*, p. 52.
- Gilder, George. (1989). *Microcosm*. New York: Simon and Schuster.
- Gore, Albert, Jr. (1991, January-February). Information superhighways: The next information revolution. *Futurist*, Vol. 25, No. 1, pp. 21-23.
- Gore, Albert, Jr. (1993, December 21). Remarks at the National Press Club (speech).
- Goto Shigeki. (1994, October). The future of Japan's National Information Infrastructure. *The Future of Japan's National Information Infrastructure*. Symposium conducted by Stanford University US-Japan Technology Management Center.
- Hayashi Yujiro. (1969). *Johoka shakai: Hado na shakai kara sofuto na shakai e [Informatizing society: From a hard society to a soft society]*. Tokyo: Kodansha.
- Hiromatsu Takeshi and Ohira Gosei . (1991). *Information Technology and Japanese Economy: An Empirical Analysis on the Size of Information Economy*, Tokyo: University of Tokyo, Komaba Department of Social and International Relations, Working Paper No. 19.
- Iacono, Suzanne and Rob Kling. (1995). Computerization Movements and Tales of Technological Utopianism. In Rob Kling (Ed.), *Computerization and Controversy: Value Conflicts and Social Choices*. New York: Academic Press.
- Industry leaders getting E-mail message. (1994, Sept. 26). *Nikkei Weekly*, p. 13.
- Ito Youichi. (1991). Birth of Joho Shakai and Johka Concepts in Japan and Their Diffusion Outside Japan. *Keio Communication Review*, 13: 3-12.
- JIPDEC (1995). *Informatization White Paper*. Tokyo: Japan Information Processing Development Center.
- Johnson, Chalmers. (1982). *MITI and the Japanese Miracle*. Stanford: Stanford University Press.
- Johnson, Chalmers. (1989). MITI, MPT and the Telecom Wars. In Chalmers Johnson, Laura D'Andrea Tyson and John Zysman (Eds.), *Politics and Productivity: the Real Story of Why Japan Works*. Cambridge, MA: Ballinger.
- Johnson, Chalmers, Laura D'Andrea Tyson and John Zysman (Eds.). (1989). *Politics and Productivity: the Real Story of Why Japan Works*. Cambridge, MA: Ballinger.
- Kageki, Norri. (1994, October 3). Market test shows multimedia not ready for prime time. *Nikkei Weekly*, p. 1, 8.
- King, John L. and Kenneth L. Kraemer. (1995). Information Infrastructure, National Policy, and Global Competitiveness. *Informatization and the Public Sector*.
- Kohli, Ajay and Bernard Jaworski. (1990, April). Market Orientation: The Construct, Research Propositions, and Managerial Implications. *Journal of Marketing* 54, pp. 1-18.
- Kumon Shumpei. (1994). The GII Initiative: Its Significance and the Challenges for Japan. *Symposium on Multimedia Communications and the High-Speed, Intelligent, Distributed, Cooperative Computing Environment of the Year 2010*, Tokyo, Sept. 13, 1994.
- Lincoln, Edward J. (1988). *Japan Facing Economic Maturity*. Washington, DC: Brookings.
- Mason, Mark. (1992). *American Multinationals and Japan: The Political Economy of Japanese Capital Controls, 1899-1980*. Cambridge, MA: Harvard University Press.
- Masuda Yoneji. (1980). *The Information Society as Post-Industrial Society*. Tokyo: Institute for the Information Society.
- MCA. (1994, Oct.). *Denshi seifu no jitsugen wo mokushi shite* [Aiming at the implementation of electronic government]. Tokyo: Management Coordination Agency, Office of the Prime Minister.
- MITI. (1994). *Program for Advanced Information Infrastructure*. Summary Report. Tokyo: Ministry of International Trade and Industry, May 1994.

- Morris-Suzuki, Tessa. (1988). *Beyond Computopia: Information, Automation and Democracy in Japan*. London: Kegan Paul.
- MPT Establishes Special Loans for the Development of the Subscriber Optical Fiber Network. (1995, January 23). *MPT News*. Tokyo: Ministry of Posts and Telecommunications.
- Murakami Teruyasu. (1993). Proposal for Japan: A New Deal in Information Technology Infrastructure. *NRI Quarterly*, Autumn, pp. 68-87.
- Nakahara Tetsushi. (1993). The Industrial Organization and Information Structure of the Software Industry: A U.S.-Japan Comparison. Stanford University, Center for Economic Policy Research, policy paper no. 346.
- Negroponte, Nicholas. (1994, April). The Fax of Life: Playing a Bit Part. *Wired*.
- Noguchi Yukio. (1994, November). Multimedia? We Don't Even Have E-mail Yet! *Tokyo Business Today*, p. 9.
- NTIA. (1994). U.S. goals and objectives for the G7 GII conference. Washington, DC: National Telecommunications and Information Administration, Sept. 14, 1994.
- NTT. 1994. How is Information Communications Changing? NTT's Basic Concept for the Coming Multimedia Age. Conference presentation, Japan-U.S. Information Infrastructure Symposium, Tokyo, June 13.
- Okimoto, Daniel (1989), *Between MITI and the Market: Japanese industrial policy for high technology*. Stanford, CA: Stanford University Press.
- Okimoto, Daniel, Takuo Sugano, and Franklin B. Weinstein, eds. (1984). *Competitive edge: the semiconductor industry in the U.S. and Japan*. Stanford, CA: Stanford University Press.
- Optical-Fiber Study Looks at Water Pipes. (1995, Feb. 27). *Nikkei Weekly*, p. 2.
- President's Commission on Industrial Competitiveness. (1985). *Global Competition: The New Reality* (Vols. I-II). Washington, DC: U.S. Government Printing Office.
- Sato Kyoko. (1994, August 22-28). Multimedia future still a pipe dream to many. *Japan Times Weekly International Edition*, p.13.
- Sawa Takamitsu. (1994, August 29). Japan may nix multimedia. *Japan Times*, p. 18.
- Seki Hideo. (1995, January 2). Piecemeal nature putting potholes into U.S. info highway. *Nikkei Weekly*, p. 7.
- Snellen, Ignace Th.M. (1991). Informatization in Japanese public administration. *Informatization and the Public Sector*, p. 247-267.
- Stern, John. (1994, October). Government and Regulatory Perspectives. *The Future of Japan's National Information Infrastructure*. Symposium conducted by Stanford University US-Japan Technology Management Center.
- Telecommunications Council. (1994a) *21 seiki no chiteki shakai e no kaikaku ni mukete [Reforms toward the intellectual society of the 21st century]*. Tokyo: Ministry of Posts and Telecommunications, May 1994.
- Telecommunications Council. (1994b) *Reforms toward the Intellectually Creative Society of the 21st Century*. English translation. Tokyo: Ministry of Posts and Telecommunications, May 1994.
- Telecommunications Council. (1994c) *Reforms toward the Intellectually Creative Society of the 21st Century*. English translation of Report Summary. Tokyo: Ministry of Posts and Telecommunications, May 1994.
- Timmermans, Jeffrey (1995, Nov. 9). NTT plans to reduce its staff in move to thwart Japan's push for breakup. *Wall Street Journal*, p. A17.
- Umesao Tadao. (1963, January). Joho sangyo ron [Theory of information industries]. *Hoso Asahi*.

- USITC (1995, June). Global Competitiveness of the U.S. Computer Software and Services Industries. Washington, D.C.: U.S. International Trade Commission.
- Valigra, Lori. (1994, Sept. 26). Helping to Pave U.S. Information Superhighway. *Wall Street Journal*, p. B8.
- Veblen, Thorstein. (1915). *Imperial German and the industrial revolution*. New York: Macmillan.
- Vogel, Steven. (1996). *Freer Markets, More Rules: The Paradoxical Politics of Regulatory Reform in the Advanced Industrial Countries*, Ithaca, NY: Cornell University Press.
- Watanabe, Teresa. (1994, December 25). Tide Turns on Mighty Tokyo Elite. *Los Angeles Times*, pp. A1, A13.
- West, Joel. (forthcoming) Utopianism and National Competitiveness in Technology Rhetoric: The Case of Japan's Information Infrastructure. *The Information Society*.
- West, Joel. 1995. Where's the On Ramp? Puzzling over Japan's Information Future. *Tokyo Business Today*, 63(8): 42-44.
- Yamada Takahiro with Michael Borrus. (1992). *Change and Continuity in Japan's Telecommunications Policy*. Berkeley: Berkeley Roundtable on the International Economy. (Working Paper 57).
- Yamakoshi Atsushi. (1995, July 21). White-Collar Work Performance in Japan: Implications for Restructuring. *JEI Report*, No. 27A, pp. 1-9.
- Yamanishi Ken. (1995, February). Petty Infighting at MPT and MITI Put Japan in Slow Lane. *Tokyo Business Today*, p. 9.
- Yamazaki Taketoshi. (1994, November). Cable TV Madness, *Tokyo Business Today*, pp. 6-9.
- Zysman, John. (1983). *Governments, Markets, and Growth*. Ithaca, NY: Cornell University Press.