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# Entrepreneurship in Japan's ICT Sector: Opportunities and Protection from Japan's Telecommunications Regulatory Regime Shift

Kenji E. KUSHIDA\*

Entrepreneurs and entrepreneurship played a critical role in transforming Japan's telecommunications sector. Between the mid-1990s and mid-2000s, in a sector long dominated by a stable set of large actors with well-established patterns of interaction, entrepreneurs introduced new technologies, new business models, and new norms of interaction. The subsequent transformation of Japan's telecommunications sector was dramatic, providing consumers with not only fast and sophisticated services but also low prices and an entire new ecosystem of mobile content—a considerable departure from Japan's long track record of being known as producer- rather than consumer-oriented, with consumers enjoying high-end services and products, but at high prices. Yet, these transformative entrepreneurs were not acting in a vacuum. Regulatory shifts in telecommunications were critical in providing opportunities for entrepreneurs, while simultaneously protecting them from large incumbent firms. These regulatory shifts were driven by the political dynamics of the 1990s as Japan struggled through its post-bubble economic malaise and political changes.

**Keywords:** *Japan; information technology; ICT; political economy; regulation; telecommunications.*

## I. Introduction: Entrepreneurship in Japan's Information and Communications Technology Sector

Japan's telecommunications sector provides a valuable vantage into the ongoing transformation of Japan's political economy. A careful study of the sector's transformation from the mid-1990s reveals a particular dynamic of change. Perhaps unexpectedly, a critical driver of change was entrepreneurship—new firms or new entrants introducing new business models or technologies. This entrepreneurship, however, did not flourish in a vacuum, nor was it simply the result of deregulation. Regulatory structures *created the opportunities* for entrepreneurs while *providing protection* from large incumbents.

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Often masked beneath the broader narrative of Japan's 'lost decade' or 'lost two decades' after the bubble burst in 1990, Japan's political economy did undergo several substantial transformations. Particularly in the late 1990s and early 2000s, a broad range of regulatory shifts reshaped the dynamics of competition across a broad range of sectors as well as in core areas of Japanese capitalism, such as corporate governance, employment, and large firms' strategies (Vogel 2006; Aoki, Jackson and Miyajima 2007; Schaede 2008; Conrad 2010). In sectors ranging from banking and securities to insurance, retail, and pharmaceuticals, regulatory shifts altered the prevailing business models, deregulation enabled the entry of foreign firms, and waves of consolidation reshaped the corporate and product landscapes (Kushida 2010). In Information and Communications Technology (ICT), the transformation was particularly dramatic, unexpected, and driven by entrepreneurship.

### 1.1. The Unexpected Transformation of Japan's Telecommunications Sector

Japan's telecommunications sector underwent a surprising and sudden transformation in the late 1990s. Until then, Japan lagged in major cross-national telecommunications indicators: high landline and cellular prices, low Internet diffusion, and limited service options [International Telecommunication Union (ITU) 2003]. The sector's industrial structure consisted of a limited number of carriers and a stable set of large manufacturers engaged in vigorous but non-price-based competition (Fransman 1995; Anchordoguy 2005). The former state-owned carrier, Nippon Telephone and Telegraph (NTT), dominated the sector with its financial resources, size, and R&D (research and development) capabilities, setting the sector's technological trajectories. The government heavily managed the industry on an *ex ante* basis by limiting new entrants, approving price changes, and restructuring the scope of carriers' business activities (Vogel 1996; Fuke 2000).

By the mid-2000s, however—in the span of just a few years—the sector transformed dramatically. Intense price competition sparked by new entrants propelled Japan to the forefront of fast low-priced broadband services (ITU 2003; Fransman 2006). The sector spawned new service markets, most prominently cellular Internet platforms and a robust mobile Internet content ecosystem (Funk 2001, 2004). Voice-over-IP (VoIP), which sends voice signals over the Internet, diffused rapidly, taking the form of conventional telephone replacement—again, driven by new entrants (Kushida and Ogata 2007). In short, new entrants reshaped the dynamics of competition and increasingly set the technological trajectories. The industry no longer consisted of a predominantly closed group of firms following stable patterns of interaction. The government no longer micromanaged the sector, and some firms even mounted unprecedented lawsuits against the government, challenging its policy processes. This shift in the primary industry actors, principal government actors, the orientation of policymaking (*ex ante* versus *ex post*), the mechanisms of government-business and intra-industry coordination, and source of technological trajectories can be considered a 'regime shift' in telecommunications (Kushida 2006).

Entrepreneurial firms, led by strong entrepreneurs, were the immediate drivers of this transformation.<sup>1</sup> The new entrants introduced new technologies and new business models. They sparked price competition, forcing incumbents to adjust and adapt, driving Japan's rapid broadband diffusion.

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1. Defining 'entrepreneurship' is challenging, particularly since it is not a clearly defined field. See Schaede (2011) for an overview of various concepts and difficulties in conceptualization. In this paper, I use a working definition of entrepreneurs as individuals or small groups who disrupt prevailing dynamics of competition through new entry, new business models, or new technologies.

Japan's mobile Internet content ecosystem, with almost \$3 billion in annual sales by 2002, provided vast new opportunities for start-ups and entrepreneurs.

This transformative role of entrepreneurs and new entrants was unexpected. Until the late 1990s, Japan's telecommunications industry left little room for new entrants or disruptive business models. Large firms dominated the sector, and NTT, partially privatized in 1985, was among the largest firms in Japan as measured by employees, market capitalization, and capital assets. NTT's longtime equipment suppliers, such as NEC, Toshiba, and Hitachi, were Japan's industrial giants. From 1985, the government 'managed' competition by selectively licensing new entrants, carefully preventing price wars, and limiting the scope of carriers' businesses. While this protected the early telecommunications competitors—known as New Common Carriers (NCCs)—from NTT's potential predatory pricing or attrition from cut-throat competition, NCCs were hardly the disruptive firms of the 1990s new entrants. What changed to allow new entrants and entrepreneurs to reshape the industry in the late 1990s?

The puzzle deepens when considering that Japan's overall postwar economic structure was usually deemed anything but conducive to entrepreneurship and new entrants—particularly in domestic-oriented sectors. In general, core characteristics of Japan's variant of capitalism, often argued to be 'complementary' in that they were mutually reinforcing (Aoki 2001), favored large incumbents engaging in incremental product innovation over new entrants introducing disruptive business models (Yamamura 2003). For example, a bank-centered financial system lacked early stage venture capital financing and limited IPO exit opportunities; *keiretsu* inter-firm networks left little room for new suppliers; long-term employment frustrated efforts to recruit high-quality managers and employees; 'convoy' systems of implicit government bailout guarantees, coupled with a general longevity of large corporations limited the supply of highly skilled entrepreneurs; and firms' internally focused R&D practices limited start-ups' attempts to sell technology or get bought out by large firms (Imai 1998). These characteristics were generally stronger in domestic-oriented sectors, with greater government protections and regulations favoring incumbent firms. In telecommunications, NTT's standards and considerable R&D capabilities strongly advantaged firms close to NTT.

So what enabled new entrants and entrepreneurs to reshape Japan's telecommunications sector? Was it the availability of disruptive new technologies? Deregulation opening new opportunities? And if so, what caused the deregulation—external pressure? These questions address an ongoing thrust of scholarship concerning the evolution of Japan's model of capitalism (Pempel 1998; Vogel 2006; Aoki, Jackson and Miyajima 2007; Schaefer 2008) since telecommunications was a core strategic sector in Japan's rapid postwar development.

This paper addresses these questions by analyzing two areas driving the sector's transformation: high-speed broadband and cellular Internet services. It adopts four levels of analysis: politics, policies, industrial dynamics, and firms. This multilevel approach clearly reveals what studies at any one level cannot—how the broader political context shaped policy changes, which in turn shaped dynamics of competition. At the same time, it shows how firms influenced policymakers and regulators by introducing new market realities, informing the next round of policy.

## 1.2. The Argument in Brief

The findings, though simple, can only be derived by understanding the full complexity of interactions among actors at the different levels. Put simply, the entrepreneurship that sparked the transformation of Japan's telecommunications sector was both enabled and supported by government policy and policy-shaped industry dynamics. Specifically, the regulatory framework *provided opportunities* for entrepreneurs while it simultaneously *protected new entrants* from the large incumbent firms.

In the case of broadband, a ‘regulatory regime shift’ provided the opportunities and protection for new entrants. The shift occurred in two phases: sweeping deregulation creating opportunities, and new regulations, responding to new entrants’ efforts, protecting them from incumbents. The impetus for these regulatory shifts lay in political dynamics stemming from Japan’s economic malaise of the 1990s, and a normative shift within the regulatory bureaucracy.

In the case of cellular Internet services, the opportunities and protection for entrepreneurs stemmed from Japan’s ‘Galapagos’-like cellular industry—a popular label describing its relative isolation from global markets resulting in proprietary dynamics of competition (MIC 2007). Japan’s cellular ‘Galapagos’ resulted from government policy, both intentional and unintentional. Political compromises led to R&D resource-rich carriers, which drove the market along a distinctive trajectory through cut-throat competition in an isolated domestic market (Kushida 2011). Cellular Internet platform services grew out of this environment, developing symbiotically with a content ecosystem that provided start-up firms vast new opportunities to experiment and innovate. Japan’s cellular isolation, an unintended consequence, protected these start-ups from global software and content giants.

New potentially disruptive technologies were a critical input but were insufficient in and of themselves for entrepreneurs and start-ups to transform the sector. In broadband, truly disruptive business models appeared only after protective regulations. The cellular Internet platform services relied on innovative business models rather than disruptive technologies, and they developed from Japan’s particularistic cellular dynamics of competition.

The ‘regulatory regime shift’ that provided the impetus for entrepreneurship in broadband was not driven by corporate lobbying. Nor was it sparked solely by regulatory responses to market developments. It was, instead, driven by politics and a normative shift within the Ministry of Posts and Telecommunications (MPT). Political debates, spanning decades, over market liberalization and the breakup of NTT led to compromises that shaped the sector. A generational shift among MPT officials transformed their regulatory preferences from managing competition *ex ante* toward governing markets *ex post*.

## 2. Part I: Japan’s Unexpected Spectacular Development of Broadband

Japan’s broadband growth was spectacular, driven by unexpected dynamics of competition. In early 1999, Japan had no broadband market, with expensive landline Internet access.<sup>2</sup> As a result, Japan’s Internet diffusion lagged behind the US and many other advanced industrial countries.<sup>3</sup> Telecommunications prices were still relatively high despite a decade of decreases (Source: Organization for Economic Co-operation and Development). These decreases, moreover, followed an orderly ‘lock-step’ dance, as shown later, between NTT and NCCs.

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2. International Telecommunications Union. Internet access in Japan required dial-up or ISDN access, incurring per-minute charges, as well as Internet Service Provider (ISP) fees. In the US by contrast, local calls were mostly flat rate.
  3. In 1999, by population percentage, Internet subscriptions were: 8% for Japan, 18% for the US, 13% in the UK, 10% Germany, and 5% France. The Organization for Economic Co-operation and Development (OECD) average was 9%. Other high diffusion countries included Denmark and Sweden (21%), Netherlands (19%), Norway and Switzerland (14%), and Australia (13%) (Source: OECD). This excludes Japan’s fast growing mobile Internet market, however, as shown later.

In the early 2000s, however, Japan's broadband services grew abruptly. Japanese consumers suddenly found themselves enjoying not only the fastest but also the cheapest broadband services worldwide. Digital Subscriber Line (DSL) subscriptions exploded from 211(!) at the end of 1999 to almost 14 million by March 2003 (ITU 2004) (See Table 1). By then, 4 of the world's 10 fastest broadband providers were Japanese (See Table 2). The low prices were particularly astonishing; Japanese consumers often enjoy high-end products and services but rarely the lowest prices, yet three of the cheapest broadband providers among the world's fastest were Japanese (See Table 3). In 2003, the ITU ranked Japan as having the lowest broadband prices (See Table 4), as well as the best price-performance (price per unit of data transmission) (ITU 2003).

Even a cursory glance at Tables 2 and 3 immediately reveals the prominence of start-ups and new entrants—Yahoo!BB, eAccess, and Usen. Japan is no stranger to intense competition, particularly in export-oriented industries, but new firms and new entrants have been far less prominent since the high

**Table 1.** Broadband Subscriptions, Japan 1999–2005 (millions).

	1999	2000	2001	2002	2003	2004	2005
Total broadband	—	0.63	2.83	7.81	13.64	18.66	22.37
Cable Internet	0.15	0.63	1.3	1.95	2.48	2.87	3.23
DSL lines	<0.01	0.01	1.52	5.65	10.27	13.33	14.48
FTTH	—	—	0.07	0.42	1.45	2.43	4.64

Note: For FTTH, 2001–2003 indicate end of fiscal year rather than calendar year.

Source: (Kushida and Oh 2007).

**Table 2.** Fastest Broadband Service Providers Worldwide, 2003.

Country	Company	Access Type	Download Speed (Mbps)	Monthly Charge	
				USD	PPP
Japan	NTT East	FTTH	100	52.45	42.46
Japan	Usen	FTTH	100	35.38	28.84
Japan	eAccess	ADSL	40	38.46	31.35
Japan	Yahoo!BB	ADSL	26	25.19	20.54
Sweden	Bostream	vDSL	26	48.04	41.33
Korea	Hanaro	DSL	20	41.25	66.38
Korea	KT	DSL	13	42.01	67.61
Canada	Gulf Islands <sup>a</sup>	Fixed wireless	11	23.00	27.06
Korea	Thrunet	DSL	10	31.74	51.08
Sweden	Bredbands bolaget	Ethernet LAN	10	38.63	33.23

<sup>a</sup>Price limited to 1000 Megabits per month.

(Source: Adapted from Fransman 2006: 11, 12).

**Table 3.** Fastest Broadband Service Providers Ranked by Price (PPP), 2003\*.

Country	Company	Access Type	Monthly Charge		Download Speed (Mbps)
			PPP**	USD	
Japan	Yahoo!BB	ADSL	20.54	25.19	26
Japan	Usen	FTTH	28.84	35.38	100
Japan	eAccess	ADSL	31.35	38.46	40
Sweden	Bredbands bolaget	Ethernet LAN	33.23	38.63	10
Finland	OulunPuhelin	ADSL	40.36	45.16	10
Sweden	Bostream	vDSL	41.33	48.04	26
Japan	NTT East	FTTH	42.46	52.45	100
Korea	Thrunet	DSL	51.08	31.74	10
Korea	Hanaro	DSL	66.38	41.25	20
Korea	KT	DSL	67.61	42.01	13

\*Excludes all carriers that capped the monthly Mbps amounts of data transferred.

\*\*Purchasing Power Parity

(Source: Adapted from Fransman 2006: 11, 12)

**Table 4.** Average Monthly Prices of Broadband Subscriptions (USD), G8 Countries minus Russia, plus Australia and South Korea, 2003.

Country	Price
Australia	91.8
Italy	73.6
Singapore	53.0
Canada	51.6
France	50.6
South Korea	49.2
UK	44.6
Hong Kong	38.2
Germany	33.9
US	33.2
Japan	24.2

Source: ITU Asia-Pacific Telecommunications Indicators (2004).

growth era of the 1950s to the 1970s.<sup>4</sup> Here, it is noteworthy that new entrants of the 1990s rather than the first wave of NCCs from the 1980s were the leaders in fast low-cost broadband. These new entrants were independent from the major *keiretsu* groups as well as the NCCs.

The 1990s' new entrants forced the reluctant incumbent, NTT,<sup>5</sup> to offer high-speed broadband access earlier than it intended, at lower prices than it wanted, using technology it initially resisted. Tokyo Metallic Communications (TMC) pioneered commercial DSL services in late 1999, joined shortly by eAccess and several other start-ups. NTT responded in spring 2001 with its own DSL service. Softbank, founded in the early 1980s, entered the DSL market by delivering a price shock in 2001 by halving DSL prices. Usen also entered in 2001, offering high-speed Fiber-To-The-Home (FTTH) services to a limited area, at prices comparable to pre-Softbank-shock DSL. As other NCCs also began FTTH, NTT was again forced to offer FTTH at similarly low rates.

To understand the origins of these industry dynamics, we must review the telecommunications regulatory structure from the mid-1980s, which shaped the actors, their resources, patterns of interaction, and dynamics of competition.

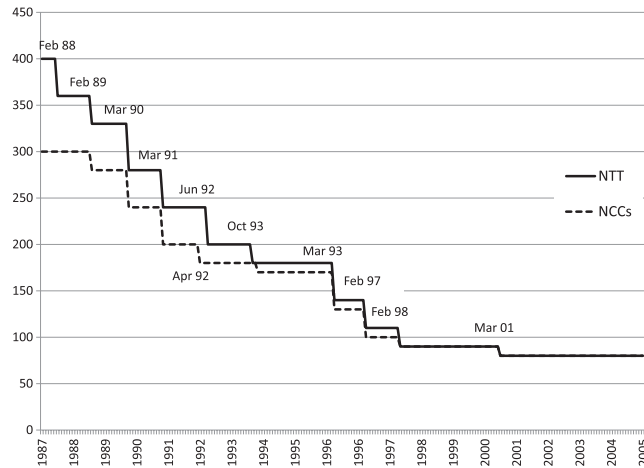
### 3. Japan's Telecommunications Regulatory Structure of 'Controlled Competition'

Japan's telecommunications regulatory structure after 1985 entailed, on the one hand, MPT micro-managing the sector—a regulatory regime observers label 'controlled' or 'managed' competition (Vogel 1996; Kushida and Oh 2007). On the other hand, politically, it pitted MPT against NTT, with MPT attempting to break apart NTT and increase competition, while NTT mobilized its political clout, fighting to retain its organizational structure, resources, and technological capabilities.

MPT managed competition through formal and informal policy tools. It segmented the market through administrative guidance,<sup>6</sup> orchestrated a limited number of new entrants through discretionary licensing authority,<sup>7</sup> and eliminated the possibility of price wars or predatory prices by NTT. The resulting 'lock-step' price reductions entailed NCCs lowering prices in sync, just slightly undercutting NTT, which followed suit shortly thereafter (See Figure 1).

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4. Competition in industries such as automobiles, motorcycles, semiconductors, and consumer electronics was truly fierce (Abegglen and Stalk, 1985, 2006). Only a few large firms survived as final assemblers (Johnstone 1999; Alexander 2008). Even so, domestic manufacturing markets were famously crowded; Toyota, Nissan, Mazda, Mitsubishi Motors, Daihatsu, Suzuki, and Fuji Heavy Industries in autos, for example.
  5. To be precise, NTT was restructuring into a holding company, with NTT East and NTT West, collectively labeled the NTT regional companies, put in charge of local telephony. It was these NTT regional companies that were planning to roll out fiber infrastructure-based services.
  6. MPT segmented the market in two ways. First, it categorized telecom carriers into three types, regulating infrastructure-owning carriers more heavily by limiting entry and regulating prices. Second, MPT restricted firms' scope of business into areas such as long distance, local, and international service. This was informal administrative guidance, with no explicit legal basis (Fuke 2000: 32).
  7. A 'Supply Demand Adjustment Clause' in the Telecommunications Business Law gave MPT wide discretion to limit the market. MPT could cite factors such as 'a mismatch between the business and existing demand . . .' to deny an application, without any specific criteria (Fuke 2000: 16). Likewise, no specific criteria existed for MPT to approve price changes. Although not always in full control, MPT did, on several occasions, deny licenses to prospective entrants (Kawabata 2006).





**Figure 1.** ‘Lock-Step’ Patterns of Price Decreases for Long Distance Calls in Japan NTT and NCC’s Call Rates for Tokyo-Osaka (Daytime, Weekday, yen per Three Minutes).

MPT was also the locus of NTT–NCC relations, mediating contentious annual negotiations over NTT’s interconnection fees, pushing a sometimes reluctant NTT to increase the scope of interconnection. NCCs often hired retired MPT officials in their upper management ranks.<sup>8</sup>

MPT’s power resulted from a protracted and complex political battle in the early 1980s surrounding liberalizing the sector, privatizing NTT, and splitting NTT apart. This political process, much analyzed, involved almost the entire range of prototypical Japanese political dynamics. They included a broad privatization program by Prime Minister Nakasone; bureaucratic turf battles between MPT and the Ministry of International Trade and Industry (MITI); the powerful Ministry of Finance (MOF)’s concerns over budget implications; Liberal Democratic Party (LDP) politicians specializing in telecommunications and postal issues (*yūsei zoku*); and NTT’s public sector union, the largest in Japan, mobilizing the LDP’s longtime opposition, the Japan Socialist Party. MPT emerged from this political battle in 1985 with a vast array of new regulatory powers.

For the next 15 years, MPT and NTT locked heads numerous times over the issue of splitting apart NTT, with the political settlements shaping other telecommunications policies. NTT, though partially privatized, avoided a complete breakup like US former monopoly AT&T, retaining its extensive R&D capabilities and infrastructure. Although reorganized as a holding company, NTT still dwarfed all others in the sector.<sup>9</sup>

MPT’s micro-management during the ‘controlled competition’ regime from the 1980s through the mid-1990s left little room for entrepreneurship in terms of new entrants introducing radical new technologies, disruptive business models, or aggressive pricing strategies. Yet, NTT’s high prices provided

8. For details, see (Kawabata 2004). The Telecommunications Business Law stipulated that when carriers could not reach an agreement, the complainant could appeal, and MPT could issue an order for the carriers to reach an agreement or engage in arbitration.

9. The ongoing political struggle often involving LDP politicians, NTT’s union, opposition parties, and sometimes other ministries such as the Ministry of Finance, frequently led to market liberalization and interconnection policies that were compromises reached in exchange for postponing the issue of breaking up NTT (Vogel 1996, 2000).

opportunities for technologies and services promising lower prices. As MPT began reformulating how it promoted competition and limited NTT's dominance, it started to drive a regulatory 'regime shift'.

#### 4. The Regulatory 'Regime Shift' Reshaping Market Opportunities

In the late 1990s, Japan's telecommunications regulations underwent a 'regime shift', embodying a shift in the primary industry and government actors, their patterns of interaction, and the orientation of policymaking (*ex ante* management versus *ex post* monitoring) (Kushida 2006). The first part of the regime shift consisted of deregulation, providing opportunities for new entrants. This enabled the initial broadband start-ups TMC, eAccess, and others to enter the market and pressure NTT. The second part of the regime shift, consisting of re-regulation—the creation and implementation of new rules and organizations<sup>10</sup>—provided the protection for new entrants to establish viable competitive strategies. This second phase was a necessary condition for new entrants to launch commercially viable disruptive business strategies; Softbank pushed furthest in waging a price war.

##### 4.1. Deregulation—Opportunities for Entrepreneurship

In the mid to late 1990s, MPT relinquished many of its policy tools to micromanage the sector. The deregulation was driven by a normative shift within the ministry, supported by the political environment. It was not simply the result of pressure from business groups, foreign governments, or international organizations.

In several steps beginning in 1998, MPT began dismantling its regulatory apparatus by decompartmentalizing the sector, removing restrictions on firms' scopes of business, and lowering entry barriers to new entrants, including foreign firms.<sup>11</sup> By 2003, little remained of MPT's policy tools for *ex ante* competition management.<sup>12</sup>

A normative shift among elite MPT officials led the ministry to increasingly embrace the notion of freer competition (rather than bureaucratically micromanaged markets). This was driven by Japan's overall economic decline of the 1990s and disillusion among elite in the 'Japanese model' of capitalism, including the government's strong hand in the economy (Vogel 2006). Many officials were irked by the ongoing political compromises behind closed doors in the prolonged battle over breaking up NTT.<sup>13</sup> Younger officials, more influenced by ideas of neoliberal competition, blamed NTT's dominance and insufficient competition for Japan falling behind in important areas such as Internet diffusion.<sup>14</sup> While older generations of MPT officials were generally more comfortable with issues concerning conventional telephony, younger officials were often intimately familiar with the contrasting technological paradigms of the Internet and other emerging technologies. Many had welcomed Japan's burgeoning market for Internet

10. Steven Vogel differentiates between deregulation, a relaxing of rules, and reregulation, an increase of rules, as components of liberalization, an increase in the overall level of competition (Vogel 1996).

11. See (Fuke 2000) for details. Foreign ownership of network infrastructure was allowed following Japan's entry into the 1997 World Trade Organization (WTO) Telecom Agreement. Japan was not forced to accept the WTO measures against its will; MPT was in fact prepared to go further and used its willingness to engage in several liberalizing measures as bargaining chips for greater access to markets such as the US (Suda 2005).

12. MIC removed the classification of Type I, Type II carriers altogether in 2003.

13. Interview, former Telecommunications Deliberation Council Chair, Tokyo, 2005.

14. Interviews, various MIC officials. Tokyo, 2005–2011.

Service Providers (ISPs) in the mid-1990s but were dismayed as many such ISPs were squeezed out of business due to disadvantageous cost structures; ISPs competed against each other on price but were hostage to NTT's monopoly pricing to lease infrastructure. Moreover, limited to NTT-provided backbone infrastructure, ISPs had little access to the underlying networks and were unable to either build up their technical expertise or to explore new technologies promising radical cost reductions (Tojo 2010).

MPT's deregulation was facilitated by the political leadership's broader reform agenda. The Cabinet's 'Three Year Plan for Deregulation', from 1995 encompassed several industries including telecommunications, strengthening MPT's ability to amend the Telecommunications Business Law without parliamentary debates. This was not, however, a case of politicians forcing a reluctant MPT to relinquish power; in fact, MPT sometimes wanted to go further. For example, LDP politicians thwarted MPT's attempts to increase competition between different parts of NTT (Kawabata 2004). This wave of deregulation provided opportunities for the DSL start-ups of the late 1990s, beginning with TMC.

#### 4.2. TMC: The Front-Runner

TMC, Japan's DSL pioneer, had humble origins. Most founders had telecommunications industry backgrounds but were not in major positions of power. TMC's origins are traceable to a group of volunteers conducting Japan's first DSL field tests in early 1998. They used an obscure local agricultural cooperative-owned communications network in rural Nagano prefecture, an interesting story in of itself.<sup>15</sup> The group's leader, Tojo Iwao, had previously founded and sold an ISP, TNet. TMC was founded in July 1999 with only approximately US\$300,000 of initial capital, mostly from the sale of TNet. TMC borrowed office space from another ISP, and its five founders initially took almost no pay, running other businesses simultaneously. After a series of difficult negotiations, largely encouraged and supported by MPT, TMC successfully secured access to NTT's facilities to install its own DSL equipment, commencing services on Christmas Eve, 1999 (Tojo 2010).

Tojo was largely an industry outsider until the 1990s. A Tokyo Institute of Technology graduate from the late 1960s, he founded a small firm, Surigiken, specializing in mathematics-based software solutions to corporate and government clients. In the 1990s, upon seeing the potential of the Internet, he founded TNet aiming to deliver a price shock to the high-priced ISP services; a 64 kbp private line around 1994 cost half a million yen per month, and his goal was one-fifth of that price. He discovered, however, that the entire ISP market was hostage to NTT's high interconnection charges.<sup>16</sup> As Internet users increased, ISPs lost while NTT won since ISPs could enter freely and competed on price, while NTT's de facto monopoly on the underlying network infrastructure protected it from price pressure. TNet fell into financial difficulties and was sold to PSI, a foreign ISP. Shortly thereafter, Tojo

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15. Agricultural cooperatives were major rural telephony providers in the early postwar years, matching NTT's subscriber levels in the late 1950s and early 1960s at several million. Government regulations prohibited interconnection among the agricultural networks, however, and their secondary function of carrying broadcast signals was rendered obsolete by the advent of terrestrial broadcasts. By the late 1990s, local agricultural network subscribers totaled less than half a million, but these were the only non-NTT controlled telephone networks in Japan, enabling Tojo and his partners to conduct DSL field tests without NTT support.

16. NTT charged ¥53,000/month to lease NTT's private line for 64 K, ¥286,000 for a 1 M line, and double that for a 3 M line. TNet wanted to offer its ISP services at ¥100,000 for 64 K, but NTT's interconnection fees made this extremely challenging.

learned about DSL technology, which sends-high frequency signals through conventional copper telephone lines to deliver high-speed Internet—requiring relatively low capital costs. In DSL, Tojo saw an opportunity to revolutionize Japan's telecommunications industry, blaming NTT for Japan falling behind other advanced industrialized countries. He charged that NTT was enthusiastically promoting ISDN, a slower technology for which it charged high metered fees, while deliberately ignoring faster technologies like DSL, until it deployed nationwide fiber networks at its own pace (Tojo 2010).

eAccess, the second major DSL start-up, was founded in November 1999 and differed considerably from TMC. Co-founder Senmoto Sachio was both an industry veteran and a well-established entrepreneur, having left NTT to create Daini Denden (DDI), the first and largest NCC. Senmoto, a Kyoto University engineering graduate, joined NTT in 1966. In the 1970s, sponsored by NTT, he earned a PhD in electrical engineering at the University of Florida. Upon returning to NTT, Senmoto was involved in fiber optics and ISDN-related services. Leaving NTT at age 41, he founded DDI with Inamori Kazuo, founder of major high-tech firm Kyocera. By the late 1990s, DDI's sales topped a trillion yen, and Senmoto left in 1996 to become a professor at Keio University. From there, he founded eAccess and left Keio to become full-time CEO (Eisenmann, Egawa and Ota 2007).

eAccess' other co-founder, Eric Gan, was a UK-educated Hong Kong Chinese analyst at Goldman Sachs covering telecommunications. He and Senmoto reportedly saw greater potential for DSL in Japan than in the US; NTT's per-minute charges had suppressed dial-up Internet usage, and Japanese lived closer to NTT's exchange facilities, enabling higher transmission speeds (Eisenmann, Egawa and Ota 2007).

eAccess had far stronger financial footing than TMC, which operated on a shoe-string budget. Founded with 220 million yen (100 million each from Senmoto and Gan), it raised 4.5 billion yen from Goldman Sachs, Morgan Stanley, and other investors in 2000, followed by another 5 billion from a similar group joined by venture capital firms such as Dell Ventures and Sycamore Ventures (Eisenmann, Egawa and Ota 2007). eAccess started trial services in May 2000, commencing commercial services in October that year, 10 months after TMC.

Also in contrast to TMC, whose business model was vertically integrated to provide both DSL and ISP services directly to consumers, eAccess chose to become a wholesaler to other ISPs; ISPs competed against each other on price and bore the cost of reaching consumers, while eAccess could focus on providing the underlying DSL access to ISPs.

#### 4.3. The Challenge for New Entrants: Start-ups at the Mercy of NTT

Despite being new entrants spearheading new business models using new technologies, the efforts of eAccess and other start-ups alone—enabled by deregulation—were, however, insufficient to dramatically restructure the sector. Only after the second part of the regulatory regime shift, entailing new rules, new organizations, and the strengthening of existing rules to promote competition and protect new entrants, did radical shifts begin.

The reliance of DSL technology on existing copper telephone lines placed DSL start-ups at the mercy of NTT until new rules were enacted. DSL requires equipment installed at both the user's end and within infrastructure-owning carriers' facilities (a process known as *collocation*). Since NTT owned the networks, the DSL start-ups required collocation with NTT.

NTT was, however, (understandably) less than enthusiastic about DSL. DSL threatened NTT's business model of charging by the minute, both for local calls and Internet access.<sup>17</sup> DSL also did not fit NTT's technology map; NTT had invested billions of dollars to deploy nationwide ISDN networks, planning to replace it with fiber to every home. Moreover, to deploy DSL, households with ISDN installations had to reinstall copper lines.

As a front-runner, TMC in particular faced an uphill battle. It carved new territory in negotiating over prices and operational procedures with NTT for collocation and interconnection.<sup>18</sup> Its negotiations and friction with NTT included items such as: NTT initially contending that little copper remained in its network (later proved false); NTT's attempt to reserve the right to give six months' notice to remove copper used by TMC, threatening the viability of TMC offering year-long contracts (later raised to two years); collocation facility availability checks; collocation pricing; and cumbersome fax-heavy manual procedures to connect subscribers. MPT became involved in several of the negotiations, supporting TMC (Tojo 2010).

A myriad of government regulations also unintentionally frustrated DSL start-ups. Initially, only NTT-approved technicians were allowed into NTT's facilities, forcing start-ups to contract an NTT group company to install their equipment.<sup>19</sup> More problematic was the requirement that government-certified technicians (therefore, another NTT group company) install the DSL modems in subscribers' homes—despite the fact that they only needed to plug them into a phone jack. The modems themselves were also restricted to rentals, just as telephones and cellular phones had been historically.

These adverse business conditions strained the initial DSL start-ups—especially the financially weaker ones. TMC, for example, experienced weeks and even months of delays in providing services to subscribers. Moreover, the immediate popularity of DSL forced NTT to delay its ISDN-FTTH migration strategy. NTT introduced its own DSL services in December 2000, further decreasing its incentive to facilitate DSL start-ups' services.

## 5. Re-Regulation: Protecting New Entrants and Facilitating Entrepreneurship

At this juncture, new policy actors and regulations began to support DSL start-ups. In July 2000, the newly strengthened Cabinet Office spearheaded broadband promotion policies. It established an 'IT Strategy Headquarters', which produced a report, the '*e-Japan Strategy*'. The report identified

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17. In 1995, NTT did begin flat rates with its ISDN services aimed at Internet access, but only during the hours of 11 pm–8 am, and only for two numbers stipulated a priori.

18. In 1997, MPT had formalized telephony interconnection rules to favor NCCs, but collocation and DSL were not covered (see Fuke 2000: 20, 35; Suda 2005).

19. This reflected in part legitimate concerns about allowing third parties into NTT's facilities since the government considered the reliable maintenance of emergency lines as one of its mandates.

Japan's lagging IT development as problematic, articulating a goal to create 'ultra high-speed network infrastructure and competition policies'. It set a five-year timeline to establish 'one of the world's most advanced Internet networks', providing low-cost Internet access within a year (Prime Minister's Office 2001). Start-ups including TMC and eAccess were invited to give input, and the Ministry of Internal Affairs and Communications (MIC, which had absorbed MPT's telecommunications divisions) retained several academics sympathetic to DSL start-ups in its deliberation councils.

MIC's autonomous strategic capacity was strengthened by the Cabinet Office passing the 'Basic IT Law on the Formation of an Advanced Information and Telecommunications Network Society' (IT Basic Law), enabling MIC to implement various specific measures through Ministerial Ordinances without amending laws.<sup>20</sup> The political context helped; Prime Minister Mori Yoshiro's administration was suffering exceptionally low approval ratings, and promoting low-cost broadband had broad appeal, with few opponents.<sup>21</sup>

From the mid-2000s, MIC supported DSL providers by strengthening rules governing NTT. It compelled NTT to allow start-ups to install equipment without NTT technicians. It also required NTT to clarify collocation fee calculations, which eventually decreased fees from ¥800 to approximately ¥190 by December 2000.

Critically, MIC used its new strength to provide a dramatically new network environment for start-ups. In December 2000, MIC required NTT to lease out its unused fiber infrastructure known as 'dark fiber', mandating that fees be based on NTT's operational cost rather than the far higher cost of NTT's historical infrastructure investments (Fuke 2003). This fundamentally altered DSL providers' cost structures since they could build backbone infrastructure by installing their own equipment on leased NTT dark fiber rather than paying for NTT-maintained networks. Backbone costs became fixed leasing costs rather than variable costs that increased in proportion to traffic, enabling eAccess, for example, to lower its backbone cost by 90% (Eisenmann, Egawa and Ota 2007: 5).

The Japan Fair Trade Commission (JFTC), a new policy actor in telecommunications, bolstered DSL start-ups' position against NTT in December 2000. Citing antitrust concerns, it issued the first-ever warning to NTT, despite lacking specific rules for punitive action. This signaled the JFTC's tough stance on NTT—good news for competitors.

The newly established Dispute Resolution Commission (DRC) added its weight to protect the DSL start-ups. In early 2001, responding to filings by Tokyo Metallic and eAccess, the DRC ruled against NTT. The DRC, located within MIC, was in principle a neutral third-party organization, publicizing all complaint filings, deliberations, and results.<sup>22</sup> The DRC represented the ministry's commitment to govern competition on an *ex post* basis, addressing conflict after the fact rather than orchestrating competition *ex ante* to minimize potential conflict.

MIC further clamped down on NTT, warning NTT in the spring of 2001 about its marketing practices. eAccess and others had complained that when potential subscribers contacted NTT about switching their ISDN lines back to copper, NTT directed them to its own DSL service.

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20. See *Nikkei Communications* (2002).

21. Rosenbluth and Thies (2010) argue that the electoral shift in 1994 from multi-member districts to a hybrid of single-member districts and proportional representation led to pressure for politicians to move toward broader mass appeal.

22. It was created as part of Prime Minister Hashimoto Ryutaro's reshuffling of government bureaucracies in the late 1990s, and MPT had fought to keep the DRC within the ministry. For details, see Kawabata 2004.



Thus, by the spring of 2001, the new regulatory framework had substantially altered the opportunities facing DSL providers. Many early entrants' challenges were no longer major issues. While de-regulation provided the opportunity to enter, re-regulation provided the protection to sustain commercially viable businesses. (The regulatory protection, however, came too late to save TMC, which faced insolvency and was absorbed into Softbank.)

### 5.1. The 'Softbank Shock(s)'

In the summer of 2001, Softbank's Son Masayoshi took the opportunities offered by the new regulatory environment to their extreme. Son, a third generation ethnic Korean, left a prestigious Japanese high school to study in the US, finishing a degree at the University of California, Berkeley. Using profits from a successful patent he developed while at Berkeley, he returned to Japan, founding Softbank in 1981 as a software wholesaler. By the late 1990s, Softbank had become a holding company with a vast range of investments in online and e-commerce-related businesses. Son was an early investor in Yahoo!, and established Yahoo!Japan as a joint venture with Softbank. Even after the IT bubble burst in 2000–2001, Softbank continued to acquire new companies and enter into new joint ventures (while divesting from others). Son became well known for his strong leadership and willingness to defy conventional Japanese business practices (Miki 2009).

Immediately following its purchase of the debt-mired TMC, in August 2001, Softbank announced its entry into DSL. TMC founder Tojo recalled being impressed by Son, who explained how he had waited until three developments promised a viable DSL business: the opening of NTT's exchanges (still insufficient because NTT would likely obstruct newcomers); the JFTC's warning that weakened NTT's resistance (but backbone leasing costs were still too high); and finally, the unbundling of NTT's dark fiber, which solved the backbone leasing cost problem. Tojo was impressed by how cautious yet confident and risk-averse Son was compared to TMC (Tojo 2010).<sup>23</sup>

By the time Softbank introduced DSL, NTT had already entered the DSL market, which was growing rapidly. Softbank not only halved the prevailing DSL market rate but also offered speeds of up to 8 Mbp compared to NTT's 1.5 Mbp. Softbank's shocking prices were matched by unconventional aggressive sales tactics. It blanketed metropolitan areas with temp staff-operated tables outside train stations, handing out DSL modems worth over \$100 free to new subscribers.

Softbank's pricing strategy astonished government officials and industry participants but was enthusiastically embraced by consumers. (DSL subscribers grew from just under 300,000 in the months preceding Softbank's DSL service to 8.2 million by June 2003.) Many government officials feared that Son's 'reckless' price war threatened carriers' future infrastructure investment capabilities, and the strategy almost certainly would not have been permitted under MPT's previous 'controlled competition' regime.<sup>24</sup> Other DSL providers such as eAccess, as well as NTT, had little choice but to follow Softbank with not only lower prices but faster DSL speeds as well (See Table 5). For consumers, these

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23. Son had been interested in providing broadband to households for some time, such as through entering into an ultimately unsuccessful joint venture with Microsoft in the late 1990s to provide high speed broadband via fixed wireless technology to circumvent NTT's infrastructure.

24. Interviews, various current and former MIC officials, Tokyo 2005–2010.

**Table 5.** Softbank's Price Shock and NTT's Response: DSL Subscription Prices.

	March 2001 \$ (PPP \$)	September 2001 \$ (PPP \$)	September 2002 \$ (PPP \$)	September 2003 \$ (PPP \$)
NTT East (1.5 Mbps)	54 (43)	52 (41)	43 (34)	41 (32)
NTT East (8 Mbps)			44 (35)	41 (32)
NTT East (12 Mbps)				42 (33)
NTT East (24 Mbps)				42 (33)
Softbank BB (8 Mbps)		21 (17)	21 (17)	21 (17)
Softbank BB (12 Mbps)			24 (19)	24 (19)
Softbank BB (26 Mbps)				25 (20)

PPP, Purchasing Power Parity.  
Source: (Ida 2006).

dynamics of competition that suddenly yielded a proliferation of low-priced high-speed broadband were nothing short of breathtaking—but this was only the beginning.

In April 2002, Softbank delivered a second price shock to enhance its DSL offering. By bundling telephone-substitute VoIP subscriptions<sup>25</sup> for free with its DSL, Softbank offered Japanese consumers unlimited flat-rate telephony for the first time. Softbank DSL/VoIP users could plug their existing telephones into the DSL modem and make free calls to each other without using a computer. They could call regular telephones, and Softbank set the prices well below those of NTT. In particular, international calls to the US were a third the prevailing rate. This new service captured headlines and the public's attention, and by December 2003, the number of Softbank's VoIP subscribers catapulted to 3.5 million.

## 5.2. MIC's Fast Support for Telephone-Substitute VoIP Services

Swift regulatory support for VoIP also aided start-ups and new entrants. Softbank's initial VoIP phones could not receive telephone number allocations, making them imperfect telephone substitutes.<sup>26</sup> In 2003, however, MIC began allocating telephone numbers to VoIP lines. It assigned a dedicated '050' prefix to DSL-based VoIP and allowed VoIP services fulfilling certain performance requirements to receive conventional telephone numbers. This enabled FTTH service providers to bundle VoIP subscriptions as fully functional cheaper replacements for NTT's conventional telephone service. Moreover, MIC extended 'number portability' to VoIP, allowing FTTH VoIP subscribers to retain their existing telephone numbers. This swift regulatory embrace of VoIP supported Japan's extremely rapid diffusion of telephone-substitute (as opposed to computer-based) VoIP diffusion, driven by start-ups (Kushida and Ogata 2007).

25. VoIP sends voice signals over the Internet, and most forms require a computer on one or both ends, exemplified by Skype.

26. To receive calls, users still required NTT subscriptions, and Softbank incurred interconnection fees.



### 5.3. Fiber-To-The-Home (FTTH)

Japan's highly developed FTTH market was strongly shaped by its DSL market. FTTH providers were a different set of firms from the DSL start-ups, but the low DSL prices set FTTH price levels. Interestingly, direct government support for fiber network build-outs dating from the 'controlled competition' regulatory regime of the 1990s facilitated the construction of multiple costly fiber backbone networks.

The deployment of nationwide fiber infrastructure had been a cornerstone of MPT and NTT's investment strategies since the early 1990s. Since NTT was not completely broken up, it was financially capable of nationwide FTTH deployment (Ida 2009). MPT, interested in facilitating competition against NTT, used financial subsidies and low-interest loans—classic industrial policy measures—to assist NCCs' fiber deployment.<sup>27</sup> Thus, by the early 2000s, as DSL spread rapidly, NTT and several NCCs had built extensive fiber networks.

The actual FTTH services market, however, was strongly shaped by a new entrant, Usen. Commencing services in 2001, Usen's transmission speed, 100 Mbp, was substantially faster than DSL (16 Mbp at the time). Yet it charged only about 5000 yen—the pre-price shock DSL level. Usen was an unusual company, founded in 1964 in Osaka as a provider of landline music, primarily serving restaurants and drinking establishments. Established by Uno Mototada, a naturalized Japanese citizen of Chinese descent, Usen was infamous for illegally installing lines on telephone poles. In 1998, when Uno fell ill, his son, Yasuhide, an entrepreneur in his own right having founded a temp staffing agency, took over. Uno Yasuhide thoroughly transformed Usen's antiquated internal processes, installing computers for the first time, creating new information flows and embarking on a costly campaign to obtain government permission and pay back dues for the illegal portion of its entire infrastructure. Seeing an opportunity to provide high-speed Internet access, Uno invested heavily to deploy fiber on its extensive network (Wada 2006).

Usen was so early to attempt FTTH that it struggled to find network equipment suppliers at low enough costs; globally, nobody had deployed residential FTTH at this scale. Usen eventually found an obscure Italian supplier, reportedly via the latter's website. Uno gathered investments from about 25 firms, including Sony, manufacturers, IT infrastructure firms, and content providers. He created a Usen subsidiary, Ucom, obtaining a Type I carrier license in 2000 (Wada 2006).

In March 2001, with the strong moral support from MIC officials interested in fostering competition against NTT, Usen became the first firm to offer residential FTTH. It initially served a limited part of Tokyo at half the price of NTT's FTTH trial services. However, only a few months later, Softbank delivered its price shock in DSL. For most consumers, exposed to PC-based Internet for the first time, slower DSL service for 2500 yen sufficed (in the early 2000s, before the advent of Youtube and video streaming). Usen retained its price level but significantly slowed expansion plans (Wada 2006).

Other NCCs, who had deployed fiber networks with government support, were forced to match Usen's FTTH prices. Osaka-based K-Opticom, a subsidiary of Kansai Electric Power Company, was particularly aggressive in pushing FTTH (Ida 2009). NTT, again, had little choice but to follow with comparable FTTH prices, and as the dominant carrier, NTT's focus on FTTH accelerated its overall diffusion (see Table 1).

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27. These measures included low-interest loans through the Development Bank of Japan (DBJ) and subsidized interest payments through a semi-public entity, the Telecommunications Advancement Organization; by 1999, the bank had allocated loans of over 75 billion yen (DBJ).

Thus, the unexpectedly transformative role of start-up firms and new entrants in Japan's spectacular broadband development were enabled by a regulatory regime shift in the late 1990s. Deregulation enabled new entrants to experiment with new services, new technologies, and new business models. Re-regulation, entailing a variety of new rules, new organizations, and new regulatory actors entering telecom policymaking protected the new entrants that transformed market dynamics. (For an overview of the regulatory shifts and industry developments, see Figure 2.)

## 6. Part II. Cellular Internet Services and Content Ecosystem

Japan's other unexpected development in ICT—its pioneering mobile Internet platform services and vibrant content ecosystem—began in the late 1990s. Japanese carriers succeeded in commercializing profitable cellular Internet platforms while their European and American counterparts struggled. Given Japanese firms' traditional strengths, it was unsurprising for Japanese carriers to invest heavily in infrastructure or to enjoy the highest average revenue per user, a result of charging high prices (ITU). However, few would have predicted that the relatively conservative Japanese carriers would innovate new business models, or that they would spawn an ecosystem of mobile Internet content populated by entrepreneurs and start-up firms. By 2002, however, just over two years after the platform services were

	Date	Policy Measure	Industry Milestones
<b>Deregulation*</b>	1998	Relaxation of entry barriers through removal of MPT's supply-demand adjustment clause Relaxation of MPT's price controls Foreign carriers allowed to own infrastructure, higher limits of foreign ownership of NTT equity De-compartmentalization of sub-sectors	
	1999		Tokyo Metallic starts DSL service
	(2001)	User installation of DSL modems allowed	
<b>Reregulation</b>	2000	'IT Strategy Headquarters' established within Cabinet Office, <i>e-Japan</i> strategy promulgated NTT required to clarify terms and price calculations of DSL collocation and interconnection fees NTT required to lease out 'dark fiber' Japan Fair Trade Commission warning against NTT	eAccess begins DSL service
	2001	Dispute Resolution Commission established MIC issues warning to NTT about DSL marketing practices	Usen begins FTTH service Softbank enters DSL, delivers price shock
	2002		Softbank's free bundled VoIP service K-Opticom begins FTTH, VoIP services
	2003	MIC allocates dedicated telephone numbers to DSL VoIP, announced criteria for conventional number allocation and 'number portability'	KDDI begins FTTH, VoIP services

\* the year the deregulation came into effect rather than the year legislation was passed.

**Figure 2.** Timeline of Japan's Telecommunications Regulatory 'Regime Shift' and Market Developments.

introduced, Japan's mobile content market was estimated at 286 billion yen (2.8 billion USD at 1 USD = 100 yen). By 2009, it grew to 1.5 trillion yen (15 billion USD) (DCAJ 2010:203). (See Table 6)

Content categories with the highest revenue are shown in Table 7. Many categories, such as games and social networking, were led by new firms.

A recent survey of the 10 most commonly bookmarked mobile sites reveals the success of independent start-up firms—neither subsidiaries nor affiliates of large companies or *keiretsu* groups (see Table 8). Most start-ups on the list began with traditional Internet offerings and then migrated to cellular platforms. They were founded by a new breed of Japanese entrepreneurs, many of whom became among the wealthiest Japanese.

A brief sketch of the top-ranked firms is as follows. Yahoo!Mobile is the portal site for Yahoo!Japan, controlled by Son Masayoshi's Softbank. It includes functions such as email, search, and news along with links to various other Softbank group companies. Mixi, a social networking site, was founded in 2004 by a young entrepreneur, Kasahara Kenji, age 29 at the time. Kasahara, a Tokyo University

**Table 6.** Growth of Japan's Mobile Content Market.

Year	2002	2003	2004	2005	2006	2007	2008	2009
Size (billions yen)	287	352	520	722	931	1160	1352	1521

Source: MIC.

**Table 7.** Composition of Japan's Mobile Content and Services Markets 2006–2009 (billions yen, ranked by 2009 values).

	2006	2007	2008	2009
Ring tones	150.2	163.3	166.3	160.3
Games	74.8	84.8	86.9	88.4
Electronic books	6.9	22.1	39.5	50.0
Social networking	0.5	6.0	15.7	44.7
Email enhancements	5.5	11.6	17.1	22.8
Celebrity/entertainment	18.7	19.5	20.1	24.1
Transportation	12.5	16.4	20.6	24.1
Waiting tones	24.8	22.7	22.9	22.6
Horoscopes	15.8	18.2	20	19.1
Reference	4.5	5.4	7.7	12.1
Ring back tones	2.9	8.7	11	11.5
Video	2.4	3.6	6.2	11.2
News and weather	6.3	7.3	7.8	9.7
Media	7.4	7.7	6.6	6.6
Others	33.4	29.9	35.1	45.3
	366.6	427.2	483.5	552.5

Source: Mobile Content Forum.

**Table 8.** Top Ten Bookmarked Mobile Websites, 2008.

Rank	Site	
1	Yahoo!Mobile	Search/Email Portal
2	Mixi Mobile	Social Networking Service
3	Rakuten	Online Shopping
4	Mobage-Town	Games
5	Dream Prize	
6	EC Navi Mobile	Maps/Navigation
7	Osaifu.com	Mobile money
8	Google Mobile	Search/Email
9	au	Carrier
10	TSUTAYA Online	Movie/Music Rental

Source: Mobile Content Forum.

graduate, had previously created several Internet content firms. Mixi became Japan's dominant social networking site for the rest of the decade, and mobile phones became its largest access base from 2008. After Mixi's September 2006 IPO, Forbes ranked Kasahara among the 40 wealthiest Japanese from 2008 onwards (Forbes.com). Rakuten, an online marketplace platform founded in 1998, was one of Japan's earliest successful Internet firms. Rakuten provided payment functions and store quality assurances, hosting a wide range of businesses—from retail to auctions and brokerages. Rakuten's purchase of a professional baseball team in 2005 made it a household name. Rakuten's founder, Mikitani Hiroshi, left a major Japanese bank after attending Harvard Business School, ranking among the 15 wealthiest Japanese from 2007 (Forbes.com).

The top gaming firm, Mobage-Town, was a mobile rather than traditional Internet service from its inception. Introduced in 2006 by DeNA, a start-up founded in 1999, it offered aspects of social networking services, but with entertainment features such as games and avatars. Its revenue was largely based on selling avatars and other online items. The company went public in 2006, purchasing a fast growing San Francisco online gaming company in 2010. The founder, Namba Tomoko, joined McKinsey Japan after college in the mid-1980s, obtaining an MBA at Harvard, and reaching partner at McKinsey before founding DeNA.

These new, wildly successful Japanese mobile content firms all grew in Japan's cellular Internet platform ecosystem. The commercial success of these platform services was therefore a necessary condition for these entrepreneurial opportunities. Until the introduction of Apple's iPhone and its App Store platform that took the world by storm in 2007, Japan's mobile Internet services enjoyed the most highly developed mobile content ecosystem worldwide (Funk 2001, 2004).

The question, then, is how these platform services came about and became commercially successful. The commonly told story focuses on entrepreneurship within the dominant carrier, NTT DoCoMo (Matsunaga 2000; Natsuno 2001; Beck and Wade 2002; Ratliff 2002). However, it was in fact the industry structure that created a particular logic of competition within an isolated domestic cellular market that shaped DoCoMo's innovative and successful business model. This industry structure and logic of competition were products of Japan's 'controlled competition' regulatory regime, in which both intended and unintended policy factors shaped the actors, their relative resources, and the dynamics of competition.

### 6.1. Japan's Cellular Internet Platform Services

In early 1999, DoCoMo introduced *i-mode*, the first cellular Internet platform service. Competitors KDDI and J-Phone followed quickly, employing essentially the same business model. All three services became immensely popular; within a year of their introduction, at the end of 2000, 26 million of 58 million Japanese cellular users paid for subscriptions.<sup>28</sup> By the end of 2005, this grew to 78 million of 90 million, reaching 92 of 111 million by early 2010 (TCA).

The business models were as follows. Content was provided by third parties rather than the carrier—hence the label coined here, ‘cellular Internet platform service’. The carrier provided a portal site from which two types of content could be accessed. ‘Official’ content, screened by the carrier, was included in the portal’s easy-to-access menu. ‘Unofficial’ content could be anywhere on the Internet but required the subscriber to enter a URL or find the site through a search engine. ‘Official’ content providers could charge subscription fees to users through carriers’ monthly subscription bills, removing a barrier to entry for start-ups of managing payments—particularly in Japan, with relatively low credit card diffusion. In exchange, ‘official’ content providers paid approximately 9% of their revenue to carriers. Carriers charged subscribers for data packets, enjoying revenue streams whether users visited ‘official’ or ‘unofficial’ sites.<sup>29</sup> For most Japanese, this was their first ‘always on’ Internet experience; Internet-based email was the killer application.

Intense competition between the three nationwide carriers focused on introducing ever more sophisticated capabilities to enhance their platforms. DoCoMo’s R&D resources were far greater, but its competitors were first to market (worldwide) in the early 2000s with features embedded in new handset offerings such as color displays, camera phones, and music downloads. Other features added over the years included downloadable java applet applications, IC-chip embedded handsets for electronic money, digital TV tuners, GPS capabilities, and bionic sensors for security.

### 6.2. The Unlikely Entrepreneur: NTT DoCoMo’s In-House Venture

DoCoMo, originally the mobile division of NTT, was an unlikely business model entrepreneur—former state-owned monopolists rarely are. Although using the word entrepreneur begs the question of boundaries between simply innovative large firms versus entrepreneurial firms, in this instance, DoCoMo should be considered entrepreneurial because it created a largely autonomous business unit comprising mostly outsiders, free to create a new business model that threatened to cannibalize the company’s core revenue model. DoCoMo’s organizational structure and its resources were shaped by a political compromise in the NTT break-up debate. DoCoMo’s relatively small initial size and leadership opened the possibility for its entrepreneurial role, and the R&D resources it received upon spinning out enabled it to strongly shape the sector.

DoCoMo’s initial leadership shaped it into an aggressive company. Since Japan’s cellular market in 1990 was small and regarded as peripheral, DoCoMo was not a high prestige assignment for NTT employees. Its first president, Oboshi Koji, was a capable NTT manager, but having earned the

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28. Subscriptions to cellular Internet platform services were optional and priced at 300 yen (\$3 at \$1 = 100 yen) monthly. In 2000, DoCoMo, KDDI, and J-Phone had approximately 17 million, 5 million, and 4.5 million cellular Internet subscribers, respectively (TCA).

29. The platforms have been characterized as ‘open-but-owned’ since they were open to anybody for content but owned by the carrier, who could monetize its platform (Vogel and Zysman 2002). Apple’s iPhone App store follows a similar principle.

reputation of a maverick, he was passed up for promotion within NTT and assigned to lead the new mobile firm. Oboshi exerted strong leadership, supported by some highly motivated NTT employees for whom the assignment to DoCoMo had not been a promotion, transforming several business practices that had previously hindered cellular adoption (NTT DoCoMo 2001).<sup>30</sup>

From around 1994, Japan's cellular market grew at an explosive rate as prices decreased, coverage areas increased, and handsets gained sophistication and attractiveness.<sup>31</sup> The number of cellular subscribers grew from 1.38 million in 1991 to 4.33 million in 1994, 26.91 million in 1996, and 38.25 million in 1997 (MIC).

In 1996, although cellular growth continued, Oboshi became concerned about market saturation. As mobile carriers worldwide began focusing on mobile Internet connectivity in the mid-1990s, Oboshi appointed DoCoMo engineer Enoki Keiichi as team leader to create a mobile Internet business. Unusual for a large Japanese firm, Oboshi gave Enoki broad discretion to recruit NTT outsiders. Oboshi also provided access to DoCoMo's considerable R&D resources while insulating it from other divisions wary of mobile Internet services cannibalizing DoCoMo's existing voice communications revenue (Matsunaga 2000).

The *i-mode* team, as it was later named, made several business decisions that defied the telecommunications industry's conventional wisdom.<sup>32</sup> These decisions included making *i-mode* a portal to third party content rather than offering in-house content; allowing open access to the Internet; adopting a simplified version of Html as a coding language rather than the emerging Wireless Application Protocol standard favored by European carriers<sup>33</sup>; targeting mass consumers rather than high-margin business users; and setting low subscription prices.<sup>34</sup> Through DoCoMo's R&D labs, the *i-mode* team worked closely with handset manufacturers to introduce *i-mode*-ready handsets simultaneously with the debut of *i-mode* services—a significant chicken and egg problem elsewhere (Matsunaga 2000; Funk 2001; Natsumo 2001; Henten *et al.* 2004). In short, DoCoMo's creation of *i-mode* was an exemplary case of a large incumbent firm overcoming the 'innovator's dilemma' often plaguing large firms, in which fear of cannibalizing existing businesses prevents adoption of new technologies and business models (Christensen 2000).<sup>35</sup>

### 6.3. The Race toward Mobile Internet Services in Industry Context

Often overlooked in this conventional portrayal of DoCoMo's entrepreneurial role, however, are the dynamics of competition among carriers. Two pieces of evidence suggest the critical importance of these dynamics. First, during the race to commercialize cellular Internet services, DoCoMo was often behind. Second, the close release date of similar services by three carriers with very different networks

30. For example, he abolished the large deposit requirement (approximately \$1000) for new subscribers, a legacy of landline practices, and worked with MPT to allow outright sale rather than rental of handsets (NTT DoCoMo 2001).

31. See Funk (2002: 187) on the miniaturization of handsets.

32. According to a core team member, most of these defied McKinsey consultants' recommendations as well (Matsunaga 2000).

33. This lowered the technical bar for entry, especially for 'unofficial' content providers.

34. For *i-mode*, ¥300 (approximately \$3) and ¥100–¥300 for subscription-based 'official' sites.

35. Although Christensen (2000) suggests that packet-switched cellular networks were potentially a disruptive technology, it is increasingly clear that business models rather than the technology itself often determine whether it is disruptive or not (Kushida and Ogata 2007).

and technological underpinnings reveals the intensity of the race; DoCoMo pioneered the business model, but competitors were very close to commercialization.<sup>36</sup>

Despite pioneering the business model, DoCoMo actually lagged behind during much of the race. In late 1997, J-Phone was first to roll out a cellular information service, ‘Sky-walker’, taking DoCoMo by surprise. Oboshi was reportedly furious, ordering his team to accelerate development of similar services. In December 1998, DoCoMo again found itself behind when J-Phone rolled out an early text-only version of its cellular Internet service.<sup>37</sup>

After DoCoMo pioneered the *i-mode* business model, it often found itself scrambling as a follower. J-Phone pioneered camera-embedded handsets in 2001, enabling users to email images. In late 2004, KDDI pioneered a commercially successful song download service, ‘chaku-uta’, reaching 5 million downloads within 16 months after its introduction, approaching the sales of CD singles (Masuno 2006). In both cases, it took DoCoMo approximately a year to offer similar handsets and services.

Thus, DoCoMo’s service entrepreneurship occurred in the context of vigorous competition—competition along a particular technological trajectory almost unique to Japan, with tight carrier-manufacturer ties in a relatively isolated but profitable market (Kushida 2011). These particular competitive dynamics resulted from a combination of intentional government strategies and unintended policy consequences. They created a large number of wireless competitors, a playing field tilted to DoCoMo’s favor, and a de-coupling of Japan’s domestic cellular market from global markets.

#### 6.4. Intense Competition: The Outcome of Successful and Unsuccessful Industrial Policies

MPT’s strategic industrial policy created a highly competitive domestic wireless market. By licensing newly reallocated spectra in 1994, MPT provided consumers four choices of cellular carriers. It also deregulated retail channels, enabling sales at electronics stores and swiftly proliferating cellphone specialty stores, fueling rapid market growth.

In 1995, MPT licensed three additional providers of wireless services competing against cellular services. A product of MPT’s R&D efforts to create a cheaper cellular alternative, technology known as Personal Handyphone System (PHS) was a functional equivalent to cellular services, but with simpler technology (similar to cordless phones).<sup>38</sup> PHS carriers offered better handset performance (smaller size and lower cost), lower service prices (due to far lower base station costs), superior voice quality, and better urban coverage (including indoors and in subways, facilitated by low-cost base

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36. Following DoCoMo’s *i-mode* in February of 1999, KDDI introduced *EZWeb* in April and J-Phone introduced *J-Sky* in December 1999.

37. Tokyo Digital Phone (later J-Phone and then Vodafone) went to a research lab in Keio University known for its work on Internet-related technologies, IDO (later KDDI) joined the WAP forum assembled by the American firm Unwired Planet, and DoCoMo strengthened ties to Access, a Japanese start-up company (Nihon Keizai Shinbun 2003*a,b,c*).

38. In the early 1990s, MPT decided that cellular services would remain too expensive for ordinary consumers. Using its newly acquired R&D resources and discretionary licensing authority, it conducted much basic R&D and orchestrated the creation of PHS carriers, mostly consortia of cellular firms.



stations). PHS services gained immediate popularity, and MPT initially projected PHS surpassing cellular subscriptions by 2000 (Funk 2002). Cellular carriers, including DoCoMo, therefore faced stiff competition to not only lower prices and enhance coverage but also to add new features and search for new business models (Kushida 2008).<sup>39</sup>

### 6.5. The Playing Field Tilted Toward DoCoMo: The Consequences of Politics Driving Policies

MPT's choice of the digital cellular standard tilted the competitive playing field toward DoCoMo's advantage in the mid-1990s, intensifying the pressure for competitors to develop cellular Internet services.

In 1994, MPT adopted a proprietary digital standard developed by DoCoMo, known as PDC (Personal Digital Communications). DoCoMo, the only carrier with sufficient R&D resources to do so, continually upgraded the standard. By privileging the set of equipment suppliers with longstanding historical ties—known as 'NTT Family' firms—with detailed information on the new specifications before they became public, DoCoMo had a head start on its competitors. DoCoMo also imposed several months' delay for 'family' firms to ship their newest handsets to competitors. Since product cycles were around three months, DoCoMo enjoyed a decisive lead in handset miniaturization and features through much of the 1990s (Funk 2002).

PDC also contributed to Japan's cellular isolation by tying up manufacturers' cellular R&D resources. The rapidly changing, competitive, and explosively growing domestic market left few resources for Japanese handset manufacturers to pursue global markets, which required substantial redesigns due to PDC's incompatibility with other standards (Cole 2006).

MPT's adoption of PDC was not primarily aimed at isolating the market. Rather, it was the solution to a separate political and technical issue. In the late 1980s, MPT had been involved in a major bilateral US-Japan trade dispute over the liberalization of Japan's wireless sector. Motorola and the US government had pressured the Japanese government to adopt a standard that enabled Motorola to supply equipment. The LDP political leadership had gotten involved in a complex settlement (Suda 2005; Kushida 2008); from the ministry's vantage, political involvement was something to be avoided if at all possible. So in the early 1990s, when faced with the technical need to switch to a digital standard to use wireless spectrum more efficiently due to rising subscriber numbers, MPT did not want to reopen the debate. However, since only 5 MHz was allocated to DoCoMo's competitors and GSM, the European standard, required 10 MHz, PDC (under development by NTT), which only required 5 MHz, was an obvious choice.<sup>40</sup>

MPT did not anticipate the magnitude of advantage PDC conferred to DoCoMo. Moreover, MPT had its hopes pinned on PHS. Although MPT had excluded foreign firms in PHS standard-setting (Funk 2002), its stance changed upon realizing how the domestic proprietary standards were causing Japanese firms to retreat from global markets (Kushida 2008). For third-generation (3G) wireless,

39. PHS was therefore successful in accelerating the diffusion of wireless telephony and lowering prices, but PHS carriers themselves did not succeed. After hitting a peak in 1997, PHS subscriptions began to wane. The very competition that MPT had orchestrated brought a surge of improvements in cellular services that eroded the advantages of PHS. Cellular carriers rushed to match PHS performance attributes and coverage areas. In addition, since PHS carriers leased NTT's public telephone backbone network, MPT's lack of strong interconnection rules led to heavy financial burdens for PHS carriers. This lesson was not lost on the young MPT officials who were later instrumental in facilitating DSL markets.

40. Interview, former Telecommunications Deliberation Council Chair, Tokyo, 2007.



MPT was determined to adopt global standards, and it allowed DoCoMo's competitors DDI and IDO to deploy the CDMA standard developed by US start-up firm Qualcomm.<sup>41</sup> In fact, the ministry later published a report on the dangers of the industry becoming a 'Galapagos', in which isolated development led to a unique but fragile ecosystem (MIC 2007).

The root cause of NTT's dominance of the PDC-based market was its considerable R&D resources. These resources were conferred to DoCoMo in a political settlement during the ongoing battle over splitting apart NTT. A politician-brokered compromise in 1990 spun out NTT's mobile division, but despite the concerns of numerous MPT officials about the potential advantage this entailed, DoCoMo nonetheless received NTT's wireless labs.<sup>42</sup>

### 6.6. Opportunities for Experimentation and Unintended Protection

Japan's cellular Internet platforms appeared at the end of the 'controlled competition' telecommunications regulatory regime. By early 1999, when *i-mode* was introduced, prices, entry, and compartmentalization had been deregulated. DoCoMo did not have to concern itself with obtaining MPT's approval for the *i-mode* pricing scheme. Nor was there any concern about whether *i-mode* and its competitors constituted the entry of cellular carriers into multiple sectoral compartments (in this case, Internet Service Providers) and whether this was allowed. In short, the deregulation of the late 1990s facilitated carriers' abilities to experiment.

Japan's cellular isolation, though costly in terms of opportunity cost for entry into global markets, actually protected Japanese start-ups as the content ecosystem developed. The likes of Amazon, eBay, Google, and later, MySpace and Facebook did not become the market leaders in Japan's mobile content ecosystem. Instead, the business models of Rakuten, Yahoo!Mobile, Mixi, and others incorporated some aspects similar to those of the global content giants but enjoyed first mover advantages and were more tailored to the local Japanese market. By the time the global firms entered, the Japanese start-ups enjoyed strongly entrenched positions. Only with Apple's introduction of the iPhone, including its App Store content platform, almost a decade after the advent of Japan's cellular Internet platform services, did the domestic ecosystem begin to meld rapidly with global markets.<sup>43</sup>

## 7. Conclusion

This paper analyzed the causes of the unexpected role of entrepreneurship and new entrants in the transformation of Japan's telecommunications sector. Analyzing the two market segments most transformed—broadband and mobile Internet content—it found that regulatory shifts reshaped the opportunities and constraints facing entrepreneurs attempting to enter the sector, deploy new technologies, and introduce disruptive business practices.

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41. DDI and IDO's CDMA services began in 1999, shortly before they merged to become KDDI.

42. Interview, former MPT official, Tokyo, 2008. For more on these political debates, see (Vogel 2000; Kawabata 2004).

43. National barriers still remain at the service level since not all Japanese content can be purchased from abroad, and vice versa, as payment and registration structures are at the national level as of mid-2011.

Specifically, the regulatory shifts provided both new opportunities and protection from incumbents. This effect was most clear in DSL markets, in which deregulation enabled new entry and new business model possibilities, while new rules over collocation and interconnection, and new regulatory interventions on behalf of start-ups enabled commercial viability for new entrants. Swift regulatory support also facilitated the rapid diffusion of VoIP, and low fiber backbone interconnection rates aided the development of FTTH. For the cellular Internet content ecosystem, dynamics of competition shaped by intended and unintended government policy created the particular environment in which carriers raced to commercialize cellular Internet platform services. The commercial success of these services, combined with the unintended isolation of Japan's wireless markets, ended up protecting start-ups from large global content firms.

This study shows several broader implications for understanding how Japan is changing, the mechanisms of change, and the conditions for how entrepreneurship can transform highly regulated or network-based industries. Though limited to one industry, IT is Japan's largest sector, and the study captures the transformation of two very different industry segments.<sup>44</sup>

This analysis reveals a generally underappreciated role of new entrants and start-up firms, shifting the focus away from large firms in analyses of Japan's evolving political economy. It reveals the significant role of new entrants and start-up firms in disrupting the dynamics of competition in hitherto stable industries through price shocks, new technologies, and other new forms of competition. These opportunities, however, only bore fruit after some measure of protection arose as a result of intended or unintended policy.

A distinctive pattern of change occurred in which start-ups compelled large incumbents to adjust, altering their business models and technology strategies, which in turn led to major sector-wide change. This pattern suggests an important mechanism for systemic change in Japan, which is often characterized as resistant to change and reform.

This paper also reveals how regulatory structures at the sectoral level influenced the environment facing start-ups and new entrants. Studies of entrepreneurship in general often focus on national-level institutional and regulatory factors to explain relative rates of entrepreneurship or the vibrancy of entrepreneurial ecosystems—particularly in analyses of Silicon Valley (Kenney 2000; Lee 2000; Rowen and Toyoda 2002). This analysis shows the critical role that sector-level regulations can play in providing opportunities and protection for new entrants, without which they were unlikely to have been as transformative. The availability of new technology or bold new entrants with alternative corporate governance structures, corporate ties, or radical business models were insufficient; only after regulatory protection or support did the start-ups have a viable chance to succeed on their own and escape being crushed by incumbents.

The significance of sector-level regulations in unleashing the potential of entrepreneurship is neither limited to Japan nor to the telecommunications industry. Any industry dominated by large incumbent firms with powerful market advantages, particularly those involving networks or complex systems, such as electric grids or energy systems, is likely to experience similar effects. Heavily regulated markets, such as finance, are strong candidates as well. Prevailing studies of Silicon Valley-style entrepreneurship or conceptions of how newcomers can disrupt status quo market dynamics focus primarily on industries with relatively little government regulation (Christensen 2000). Yet large swaths

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44. The broader IT industry is the largest single sector in the economy, comprising an estimated 10% of the nominal GDP, at 96.5 trillion yen in 2008. The sector also contributed approximately 34% of Japan's GDP growth in the five years of Japan's sustained growth from 2002 to 2007 (MIC 2010).

of the economy, ranging from health care and finance to energy and ICT, are, in fact, heavily regulated and shaped by government policy, as the unprecedented government bailouts in the US and Europe during the 2008 global financial crisis revealed.

Finally, the experience of Japan's mobile content ecosystem reveals a fundamental dilemma regarding platforms, protection for start-ups, and global competition. Japan's unintended cellular isolation ended up protecting its vibrant mobile content ecosystem from global software and content giants, enabling the spectacular success of Japanese start-ups. As long as platform services—*i-mode* and its competitors—remained within the domestic market, this content ecosystem was trapped in Japan. However, with new global content platforms in the form of Apple's iPhone App Store, Google's Android Marketplace,<sup>45</sup> and Cloud Computing platforms such as Salesforce.com,<sup>46</sup> there is real potential for Japanese start-ups to succeed in global markets. Silicon Valley venture capitalists are increasingly turning their attention toward Japanese content firms.<sup>47</sup> Yet, the risks of an isolated domestic market are as old as Darwinian evolution itself; Galapagos may yield a breathtakingly unique array of evolutionary trajectories, but they may be vulnerable to extinction from external species, with limited potential to conquer other parts of the world. Japan's cellular isolation was an unintended outcome that may have turned out advantageously, but strategic attempts may prove dangerous. Yet, without some opportunity for domestic markets to gestate innovations that can then spring onto the global stage, prominence in global competition is difficult to achieve.

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45. For details on these platforms, see (Kenney and Pon 2011).

46. For more on the emerging Cloud Computing ecosystem, see (Kushida *et al.* 2011).

47. Stanford Project on Japanese Entrepreneurship conference, February 2011, Stanford, CA.

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