Global Competition and Strategies in the Information and Communications Technology Industry: A Liberal-Strategic Approach

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ABSTRACT This article examines the roles of multinational corporations and the European Union (EU) in structuring global competition around wireless standardization. It analyzes the realities of global competition in information and communications technology (ICT) markets from a more liberal-strategic viewpoint than the subsidy-based industry support promulgated by strategic trade theorists in the 1980s and 1990s. According to a liberal-strategic trade perspective, public actors try to tweak the rules of the world economy to structure global competition in ways that enhance job creation, overall competitiveness in high-technology sectors, and domestic welfare, rather than being primarily concerned about import competition. The story of the European approach to global standardization and competition—and the strategic use of international standards bodies by multinational corporations—primarily represents an aggressive outward-oriented strategy. European actors pursued a globally oriented strategy in the European Telecommunications Standards Institute (ETSI) with the objective of aligning Europe with market and policy developments in the rapidly growing markets of the Asia-Pacific region. By downplaying the importance of import competition, often stressed by strategic trade theorists a liberal-strategic approach to the ICT industry focuses on the prospect of cutting-edge innovations based on a coherent industry strategy that looks at the creation of internationally competitive technologies in the longer-term rather than at incremental change and current import competition pressure.

1. Introduction

This article focuses on the strategic use of international standardization bodies by multinational corporations and the distinctive role of European Union (EU) institutions in structuring the global competition in the information and communications technology (ICT) industry. The main argument is that European public support for multinational firms’ preferred institutional strategies for international

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standardization represents a new form of critical industry support in the age of the network economy. Industry support for the wireless sector illustrates the need to reassess theoretical accounts of global competition and the corporate strategic demands of multinational corporations in high-technology industries. The examination of corporate and EU strategies represents an exercise in theory adaptation. It analyzes the realities of global competition in ICT markets from a more liberal-strategic viewpoint than the subsidy-based industry support promulgated by strategic trade theorists in the 1980s and 1990s; that is, industry support of the wireless sector is viewed as different from analogous stories, such as support in fields of semiconductor trade or competition in consumer electronics. From a liberal-strategic trade perspective, public actors try to tweak the rules of the world economy to structure the global competition in ways that enhance job creation, overall competitiveness in cutting-edge high-technology sectors, and domestic welfare.

In particular, this article is concerned with the standards-setting process around the European version of the third-generation mobile cellular infrastructure, referred to as the Universal Mobile Telecommunications System (UMTS), which in turn is based on the so-called wideband code division multiple access (W-CDMA) technology. Internationally oriented manufacturers and mobile operators supported an outward-oriented approach and strong alignment with standards bodies, leading industry actors and regulatory policy in the Asia-Pacific, and Japan in particular. This collective approach was an offensive effort to ensure that European industry would have a strong future position in the rapidly growing Asia-Pacific markets. In addition, leading European actors in the wireless sector wanted to ensure that the high-growth Asian markets would adopt technology infrastructures and standards that would be backward compatible with the current technology infrastructure in Europe and worldwide—the Global System for Mobile Communications (GSM)—to benefit from scale economies in equipment markets and network economies in services. Future wireless technology infrastructure, and the network effects and services it will result in, is expected to offer higher-speed data transmission, allowing for mobile Internet, full-motion video applications, and CD-quality music on mobile phones. It represents the convergence between two fast-growing markets: the Internet and mobile telephony.

While the wireless industry in Western Europe enjoyed world leadership in mobile cellular communications in the 1990s, the importance of the East Asian markets played a major role for the globally oriented institutional strategy Europe adopted late in the decade. In October 2001, NTT DoCoMo Inc.—Japan’s dominant wireless powerhouse—launched its third generation (3G) mobile phone services (dubbed FOMA) for commercial operation in the Tokyo area, which incorporates the wireless Internet service I-mode. It subsequently announced that it would expand to the southern part of the Kanto region surrounding Tokyo and Yokohama, and to Nagoya, Kyoto, Osaka, and Kobe through regional operators. In late 2001, there were more than 46 million subscribers in Japan with Internet-enabled mobile phones.

China, for its part, is the world’s second-largest cellular-phone market by subscribers. It has been estimated that 26 percent of the Chinese population, or
about 340 million people, will use a mobile phone by 2005. The GSM family of standards currently dominates Chinese wireless infrastructure, but three competing standards (W-CDMA, TD-SCDMA, and CDMA2000) have been considered for rollout. This case is not unlike the United States, which went from one dominant analog standard in the 1980s to a multi-standard environment in the 1990s. China is a major target for foreign direct investment and trade in advanced manufactured goods such as computers, semiconductors, and scientific equipment. Even before China negotiated entry to the World Trade Organization (WTO), wireless manufacturers in Europe and North America jockeyed for favorable positions. In November 2001, for example, Motorola announced that it would increase its investment in the wireless sector in China from $3.4 to $10 billion over the next five years and double production through its Chinese subsidiary and joint alliances. Among the European manufacturers, Ericsson AB (the world leader in mobile infrastructure) and Nokia (the world leader in mobile phones) have long-standing operations in both China and Japan and have been stepping up investment as well as joint-production and marketing ventures with the East Asian private sector. In November 2001, Ericsson stated that it would double investment in China to $5 billion, citing its status as the company’s fastest growing market.

The North American market, which has lagged behind Western Europe and East Asia in terms of advanced digital infrastructure, subscribers, and customer sophistication, is also a major growth region. The GSM technology infrastructure has been slower to penetrate the North American market, but is making progress. In late 2001, for example, the second-largest U.S. cellular carrier, Cingular, with around 23 million customers, announced that it would base its future infrastructure on the GSM technology, thus giving a significant further boost to European producers and the GSM industry.

In the EU, a relatively coherent regulatory policy and coordinated development of basic standards have led to broad deployment and use of wireless technologies. This industrial achievement has resulted in a strong European presence in wireless manufacturing and technology markets. The GSM technology infrastructure is today the leading de facto global second-generation (2G) cellular technology. Throughout the world, new mobile services (2.5G and 3G) will gradually replace current technologies (Figure 1).

2. The political economy of technology infrastructure policy

The importance of technology in international affairs and for economic development has without doubt increased following the globalization of technology

4. The position of EU countries in the high-technology trade structure has lagged behind Japan and the United States in some areas, notably in electronics and software, while the chemicals and pharmaceuticals, nuclear energy, automobiles, and scientific and professional instruments industries have fared better. Guerrieri and Milana (1998, p. 204). More recently, European industry has become stronger, for example, in aerospace (see Thornton 1995), and information technology and telecommunications (see Dalum et al. 1999).
infrastructures. The pursuit of technological leadership through investments and trade in high-technology goods and services is key to high value-added production, employment in highly skilled jobs, economic-industrial competitiveness, and domestic welfare. The wireless sector is clearly associated with such features.\(^5\) It invites governments to formulate technology infrastructure policy, which here refers to micro-level, active, and purposive market intervention by public institutions to shape large-scale technology-intensive infrastructures in the pre-implementation and policy formulation stages to maximize economic, political, and other gains.\(^6\) Public actors engage in strategic intervention to facilitate first-mover advantages in industries characterized by steep learning curves and long development cycles with an aim to generate critical mass, economies of scale in equipment markets, and network economies in services.\(^7\)

The liberal-strategic perspective adopted in this article is different from the realist approach to international political economy (IPE). The realist framework stresses the trend toward mercantilism, regional blocs, and global head-to-head competition, which in turn is assumed to significantly reduce the interest in cooperation between strategic competitors in an anarchic international system.\(^8\) In times of import competition pressure, it is argued, we should expect protectionist government intervention to continue in cutting-edge industries. The strategic trade policy framework states that governments support high-technology industries with the objective of influencing the distribution of gains across regions and countries, fostering civilian technology as input to military

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5. The importance of the wireless sector for economic growth has been stressed both by European policymakers and government advisors in the United States. See DaSilva (1997, 1998); CEA (2000).
6. This definition of technology infrastructure policy (TIP) is used in comparative study of major large-scale technology-intensive European projects. Lembke (forthcoming).
7. Hart and Prakash (1999). A current example of significant public-private collaboration is the European Galileo project, an independent worldwide multi-modal satellite navigation system, which is being managed by the European Commission and the European Space Agency (ESA), building on private and public investments. It is expected to enter service by 2008 and represents the most ambitious EU technology infrastructure project ever undertaken. See Lembke (2001b).
development, and securing independence in, and strategic ownership of, critical infrastructures. However, it pays relatively scarce attention to public–private interaction and the role of collective institutions such as standardization bodies in influencing global competition at the early phases of major industrial-technology adjustments. In addition, the realist strategic trade approach argues, as does the domestic structure perspective, that the core strategies and operations of multinational corporations are deeply influenced and constrained by domestic structures and economic ideologies, or “national systems of political economy.”

Core functions of multinational enterprises are assumed to be less prone to move across borders; domestic (European) structures (e.g., established rules, norms, procedures, and economic ideologies) will constrain the behavior of internationally oriented firms.

Findings in the literature on the political economy of trade and corporate demands have suggested that internationalized, export-dependent firms—which rely on foreign markets and intrafirm trade flows, and thus are sensitive to overseas trends and retaliation—will be more interested in trade liberalization. Import-competing firms with no foreign operations, on the other hand, will be more inclined to demand protection in the face of significant import competition.

Helen Milner and David Yoffie qualify the dominant approaches to the political economy of trade and set forth the conditions under which internationally oriented manufacturers committed to free trade develop strategic demands for government protection. Through their theory of corporate trade demands, they stress the importance of variation in industry economics, industry structure and the behavior of foreign firms and governments for differences in corporate trade preferences. Regarding changes in industry economics, the world mobile wireless industry is characterized by economies of scale, steep learning effects, and an ever-accelerating speed of innovation and investment in R&D, which strengthen the need for internationally oriented manufacturers to gain access to foreign markets. If foreign governments engage in strategic intervention to support domestic firms, and such intervention is or is expected to be successful in creating first-mover advantages, it is likely that manufacturers will demand strategic support at home in attempts to open foreign markets.

Furthermore, Milner and Yoffie argue that the structure of competition within an industry—that is, the similarity or difference in competitive positions—will influence the degree to which firms recognize foreign competitive threats early on and respond with common strategic trade demands. Prior investments in certain technologies and business strategies (capital entrenchment) and the desire to protect and promote those investments and to gain competitive advantages, as well as expected differential impacts of regulatory and standards policy, lead to the formation of strategic groups of vested interests and variation in demands.

In terms of telecommunications equipment sales, the four leading wireless manufacturers—Alcatel, Ericsson, Nokia, and Siemens—all have relatively high international exposure. In mobile communications, however, Ericsson and Nokia have clearly been the leading firms in the late 1990s (Table 1). In early 2001, Nokia enjoyed around 35.2 percent of the global phone market, followed by Motorola at around 13.2 percent, Siemens 6.9 percent and Ericsson 6.8 percent.\footnote{Reuters, 31 May 2001; Financial Times, 6 April 2001.} Ericsson, which had a stronger presence than Siemens in handsets until 2001, dominated the global market for wireless infrastructure (around 35 percent). Ericsson and Nokia have been the European-headquartered manufacturers with strongest presence and success in Asia, North America, and elsewhere. They have also been the most aggressive industrial players in wireless wideband technology through significant R&D investments and proactive adoption of global corporate strategies geared toward East Asian and other world markets.

Though the theory of strategic trade demands outlined by Milner and Yoffie helps us to understand parts of the underlying rationale of corporate preferences, it focuses on demands for protectionist-oriented managed trade policy. That is, it largely views industry support as a defensive exercise and the emergence of strategic trade demands as a result of perceived or real import competition. Indeed, industry support for areas such as semiconductor trade and competition in consumer electronics in the 1980s and 1990s was closely associated with threats of growing technology gaps and what was perceived as unfair and asymmetrical trading practices (though East Asian producers benefited as much from superior design and production technology as from competitive domestic markets that were difficult to penetrate for overseas corporations). The pressure from East Asia resulted in demands for import restrictions and trade restraint agreements on the part of European and U.S. manufacturers. The result was

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Table 1. Top mobile equipment manufacturers, 1998

<table>
<thead>
<tr>
<th>Manufacturer ranking</th>
<th>US$ billion 1998</th>
<th>Change (%) (1997–98)</th>
<th>% of total sales</th>
<th>% of telecom sales</th>
<th>% of foreign sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Motorola (US)</td>
<td>17.9</td>
<td>0</td>
<td>61</td>
<td>61</td>
<td>59</td>
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<tr>
<td>2. Nokia (Finland)</td>
<td>14.7</td>
<td>59</td>
<td>94</td>
<td>94</td>
<td>94</td>
</tr>
<tr>
<td>3. Ericsson (Sweden)</td>
<td>14.5</td>
<td>5</td>
<td>64</td>
<td>64</td>
<td>95</td>
</tr>
<tr>
<td>4. Lucent (USA)</td>
<td>4.3</td>
<td>−6</td>
<td>14</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>5. Nortel (Canada)</td>
<td>3.7</td>
<td>8</td>
<td>21</td>
<td>22</td>
<td>36</td>
</tr>
<tr>
<td>6. NEC (Japan)</td>
<td>3.7</td>
<td>−3</td>
<td>9</td>
<td>29</td>
<td>5</td>
</tr>
<tr>
<td>7. Qualcomm (US)</td>
<td>3.3</td>
<td>60</td>
<td>100</td>
<td>100</td>
<td>34</td>
</tr>
<tr>
<td>8. Matsushita (Japan)</td>
<td>3.1</td>
<td>16</td>
<td>5</td>
<td>17</td>
<td>51</td>
</tr>
<tr>
<td>9. Siemens (Germany)</td>
<td>3.0</td>
<td>10</td>
<td>4</td>
<td>18</td>
<td>69</td>
</tr>
<tr>
<td>10. Alcatel (France)</td>
<td>2.7</td>
<td>30</td>
<td>11</td>
<td>13</td>
<td>83</td>
</tr>
</tbody>
</table>

often protectionist government intervention through traditional subsidy-based policy instruments, specific inducements, and support for homegrown technologies such as independent color television transmission systems in efforts to counter the East Asian challenge.\textsuperscript{15}

A liberal-strategic approach to technology infrastructure policy and trade offers a different interpretation than the subsidy-based industry support examined by the first wave of strategic trade theorists in the 1980s and 1990s. It provides an account of global competition in high-technology industries that is based on new forms of critical industry support in the network economy. The analysis of the wireless industry differs from analogous stories in the 1980s such as competition in consumer electronics and semiconductor trade. In the late 1970s and 1980s, European and U.S. manufacturers—which had developed in cushioned home markets—demanded protection following the capture of increasing market shares by East Asian producers, import competition, and trade deficits in areas such as color television sets, videocassette recorders, and other consumer electronics products.

It is more plausible to argue that industry support for the wireless sector was promoted with the objective of maximizing welfare and avoiding market fragmentation due to incompatible technology infrastructure systems.\textsuperscript{16} The story of wireless industry support should be viewed as primarily an offensive liberal strategy aimed at gaining access to Asian and other overseas markets. This globally oriented approach was complemented with a number of strategic goals. It was an effort to prevent independent technology development in Japan and to ensure compatibility with East Asian markets and policy developments. European-headquartered manufacturers (with the support from Motorola, which had significant interests in GSM markets) demanded a swift European introduction strategy and regulatory implementation favorable to prior investments to ensure backward compatibility to the GSM family of standards and the substantial installed base of GSM networks and customers worldwide.\textsuperscript{17}

Standardization has become a core function of corporate strategy and public policymaking and is of vital importance for the subsequent commercialization of technology infrastructure, not least when it comes to “compatibility” standards.\textsuperscript{18} Multinational corporations set up a global cooperative framework in the wireless industry to develop technical specifications with its major competitors, despite domestic opposition from incumbents in the fixed network industry as well as from a number of national regulatory agencies and the European standards bureaucracy that were concerned about established European regulatory practices. This development was swift and suggests a more liberal-strategic variant of the realist and domestic structure approach. Multinational enterprises play a double-level game. They follow domestic rules and practices, and provide information and political support functions to policymakers to gain preferential treatment, while they may simultaneously align with those foreign private and

\textsuperscript{15} Flamm (1988, 1996); Lawton (1997); Kaitatzi-Whitlock (1998).

\textsuperscript{16} CEC (1998); Council (1999).

\textsuperscript{17} Ericsson, Nokia and Siemens (1996).

\textsuperscript{18} Besen and Johnson (1986).
public actors who are expected to be the most relevant for meeting their own corporate objectives—the “Janus face of the multinational enterprise.”

Those manufacturers that believed they had opportunities to gain market shares in the Asia–Pacific region strongly supported close cooperation with Asian standards bodies and industries with similar business interests. They promoted, and succeeded in creating, a global institutional structure to handle specification and standard processes for wireless technology, which led to a coordinated and offensive European–Japanese alliance.

By stressing the importance of protectionist industry support and head-to-head competition in international affairs, the realist-oriented strategic approach down-plays the role of public institutions in structuring global competition along liberal-strategic lines of action in order to foster highly skilled jobs, enhance domestic welfare, and strengthen the overall competitiveness of promising high-technology industries and innovations. The relationship between technology policy, corporate strategy, and industrial competitiveness—and the focus on incremental versus breakthrough innovation—can be illustrated by two major adjustment processes in the ICT industry: the development of high-definition television (HDTV) in Europe and of flat panel display (FPD) in the United States. The European policy for HDTV and associated standards was initiated in the mid-1980s. The European Commission exerted pressure on major industrial actors in order to develop a preferred technology proposal. It played on the Japanese dominance in consumer electronics and the risk of the adoption of a Japanese standard for HDTV worldwide. This collective effort ran into major hurdles because the technology remained relatively rudimentary and public support was based on insufficient insights in the (weak) commercial prospects for HDTV. In addition, there were different opinions among the major manufacturers due to the variety in business strategies and competitive positions.

Also, the major actors in the adoption chain did not support the European project. The example of corporate strategies and public policy for HDTV illustrates the difficulty of reconciling the multitude of economic interests.

The FPD industry in the United States illustrates a variation of the difficulty of developing an internationally competitive technology in that public policy has not been aimed at supporting a coherent industry strategy. Though the market competition and pluralist U.S. model may lead to breakthrough technology innovation, industry has supported incremental solutions even though it lacks the long-term perspective and institutional support commonly associated with social market models.

U.S. manufacturers encountered increasing competition from Asian producers in the late 1970s and 1980s, and strategic trade policy stressed the need to respond to this import pressure. However, the result has not been satisfactory. Many companies that developed cathode ray tubes (CRT), light crystal displays (LCD) and, more recently, Field Emission

21. Murtha, Spencer, and Lenway (1996) have stressed the capacity of corporatist systems of interest intermediation and political economy in facilitating coordination and communication between different types of actors leading to coherent long-term strategies for the creation of new industries and technologies.
Display (FED) technology received government support to counter the mounting Asian pressure, for example, through multi-million dollar development contracts awarded by the Department of Commerce and the Defense Advanced Research Projects Agency (DARPA). Despite the public support for developing alternative technologies to stimulate competition and avoid politicization of the industry funding process, the result was incremental solutions that have led to the current difficulties in the U.S. FDP industry.

Large U.S. manufacturers, with a focus on the advantages of size (access to resources, name recognition, economies of scale, etc.) downplayed radical innovations promoted by smaller players in the FPD industry. Many of the alternate display technologies that have received favorable attention are nearly as expensive as CRT technology. The alternate “big player” strategy is the LCD technology: lighter weight, somewhat lower power, but not cheaper. It does not represent a paradigm shift that would offer U.S. industry an opportunity to catch up with Asian players in global markets, but instead merely an incremental improvement. The so-called Spindt-tube version of the FED is also a classic example of an incremental solution: the cost of fabricating the emitters is unlikely to ever (or at least soon) permit significant reductions in the cost of the display. Motorola led the development of this technology. However, its perspective on this development was the Spindt-tube emitter—tending to dismiss data suggesting that CNT-FED were more reliable than CRT and LCD displays—and therefore presented no significant cost advantages over the entrenched technologies.

While the big players own the established display markets, the “small player” strategy has been to make those display technologies irrelevant by offering a different display technology that is cheaper and more reliable. The more entrepreneurial companies have tried to promote a paradigm shift rather than to beat the large industry players at the incremental improvement game. Challengers with new, exciting solutions—such as carbon nanotube field emission displays (CNT-FED), developed by Samsung (Korea), Sony (Japan) and Cetek Technologies, Poughkeepsie, NY (U.S.)—work to bring alternative technologies to the forefront and to overcome the entrenched positions of incumbents. Nanotube emitters represent what could be referred to as a “shifting the paradigm” approach aimed not at protecting the U.S. market from import

22. For example, there is controversy about whether the OLED (Organic Light Emitting Diodes) industry—and FED joint alliances such as that between Candescent Technologies and Sony Corporation—will be able to launch competitive products before 2004–2005 and whether their technology proposals are more than “vapor-ware” (a term popular in the late 1990s to describe glowing extrapolations of laboratory curiosities to commercial juggernauts). Leading proponents of the OLED technology benefit from their incumbent positions and industrial—financial clout in the struggle for technological leadership.

23. U.S. corporations in the FED industry, such as PixTech and Candescent, were successful at raising money, but they committed their technology resources to fabricating emitter tips using variations of the so-called Spindt-tip approach. This strategy had appeal because it utilized the familiar tools of the semiconductor industry. However, it proved to be a fatal mistake because the resulting displays were simply too expensive and (probably) not sufficiently reliable. The problem that innovative companies in the CNT-FED industry face, especially as it relates to raising money, is that this situation has discouraged investors. Investors appear to generalize from prior experience to conclude that all FED approaches are doomed instead of recognizing that the CNT-FED technology that is not based on the Spindt-tip approach and could be globally competitive.
competition, but at creating a forward-looking and globally competitive (i.e., cheaper and more reliable) FPD technology. Nanotubes can be grown in situ on the back-plane with excellent yield provided the processing temperatures are high enough (not possible with glass substrates), which results in a significant reduction of the total cost of the display. The CNT-FED offers an alternate FPD technology that carries the promise of an internationally competitive solution.

However, the market does not necessarily obey logic. A plethora of parameters from politics, public perception, financial clout, and market position may overwhelm a technology that is superior by most measures. Vested industry interests preserve their entrenched positions to capitalize on already-made investments and to allow the amortization of capital. “Winning” is often for nontechnical or only faintly technical reasons; it is defined and developed long before there is any demand. The CNT-FED technology may be one of the great technological innovations of 2002–2003. For companies that have developed this technology, the challenge is to convince customers and analysts that CNT-FED is a superior “paradigm shift” solution to the current FPD problem. U.S. industry and parts of the government want to see U.S. manufacturers counter the East Asian dominance in the FPD industry, but they may need to adopt a more radical and liberal-strategic approach, as opposed to a gradual and defensive approach, to successfully respond to the Asian excellence in this critical field. In light of changing markets, technologies, and global competitive dynamics, the CNT-FED technology could be the key factor in the effort to boost industrial leadership and domestic welfare through an internationally oriented approach.

This article suggests that the current approaches to technology infrastructure policy and trade should be sensitive to multinational corporations’ outward-oriented attempts to foster institutional cooperation and to these corporations’ and public actors’ pursuit of liberal-oriented strategies. In addition, it suggests that policymakers and industry leaders should pay close attention to alternate technologies that may carry new opportunities for industrial leadership. Though large industrial conglomerates sometimes develop internationally competitive solutions, the experience of the U.S. FDP industry indicates that large organizations—often associated with risk-averse strategies and short-term decision-making—may not be the source of innovative technology that is viable on globally competitive markets. A more liberal-strategic perspective provides a qualification to the realist literature, which assumes that the race for commercial and technological leadership is characterized primarily by international head-to-head competition and its corollary assumption that global competition results in weak international cooperation. The case of institutional strategies for wireless standardization shows that strong global cooperation can emerge even in a high-stakes area such as the ICT industry, and more specifically wireless

24. The classic example of “winning by changing the paradigm” is that of a number of individuals out in California who believed that semiconductors could be made to do anything that vacuum tubes (supported by RCA) could do. However, this textbook example does not place enough weight on the fact that semiconductors were instantly cheaper and almost instantly more reliable than the competition; that they were somewhat less impressive in performance (audio fidelity, bandwidth) gave solace to RCA, even as it ceased to be an economic force in the market. It is coincidental that the world of display technology is also a world of “vacuum tubes” versus alternative technology.
communications and standards. It is a story of an offensive and liberal-oriented industry strategy aimed at accessing the rapidly growing Asian markets, rather than a story of defensive industrial support and standardization to keep Asian competitors out of the European market. Analysts should also pay closer attention to the distinctive role of political institutions in structuring global competition (such as the EU as a highly organized supranational political actor). The U.S. government and industry could learn from the liberal-strategic approach toward the wireless sector and could apply it to a more globally oriented approach for important fields such as the FPD markets.

3. European standardization policy, network economies, and Intellectual Property Rights (IPR)

High-technology standardization has become a fundamental strategic operation for multinational corporations, due not only to the prospect of royalties and strategic ownership of critical technology but also to possible economies of scale in terminal equipment markets and network economies in services. The support of coherent standard portfolios represents an important policy instrument for EU institutions to ensure market integration and compatibility of technology infrastructures. In the 1990s, the recognition of technical standards as a corporate strategic tool increased and moved up to senior management levels in the European wireless industry. In 1994, for example, ECTEL (European Telecommunications and Professional Electronics Industry) established a task force on standardization strategy (Standards Policy Specialists Group, SPSG). This group advocated a more business-led and strategically coordinated standards process to maintain Europe’s competitive position and to benefit from new opportunities arising from the convergence of several industries. Scholars have likewise recognized the long-term political and economic significance of standardization at corporate, industry, and national or regional levels in that it can have “potentially profound and lasting effects in defining national and global markets, structuring international and interregional competition and patterns of trade, and influencing the rate and direction of technological change.”

The internationalization of production and corporate strategies put pressure on established rules and practices in Western Europe in the field of standardization. The European Commission and industry were working actively with Japanese interests to achieve consensus on new products and concepts with the objective of promoting common technology infrastructure platforms. The Commission

26. ECTEL had strongly resisted attempts by the European Commission to use the High Level Strategy Group for ICT Standardization (HLSG)—created in September 1995 to bring together industrialists representing the four major European ICT trade associations (ECTEL, EACEM, ETNO, and EUROBIT, and later EBU)—as a formal centralized body and voice for European ICT industry because it was not a representative voice for the whole industry. In the late 1990s, ECTEL and EUROBIT (European Association of Manufacturers of Business Machines and Information Technology) merged into the European ICT Association. This merger also undercut the rationale of the European Information Technology Industry Round Table (EITIRT), which subsequently closed down.
argued that common platforms supported competition and reduced the risk of being dictated by proprietary industrial solutions that conflicted with the European policy for competition, market integration, and interoperability: “The aim is to achieve interoperability between regions, capability in systems, and to stimulate common solutions within the framework of technological competition within industry and in the field of standardization.” Changing markets and technologies triggered a need to reconcile policies for the internal European market (a coordinated technology and regulatory framework) and globalization (international acceptance of technology to achieve critical mass, economies of scale, network economies in services, and export market shares).

The EU standardization policy for ICT sectors was built on the experience of fragmented markets with incompatible systems that hampered interworking of different technology platforms. This historical starting position colored European standardization philosophy and procedures, which remained largely intact until the mid-1990s. Since then, European policymakers and industry decisionmakers have increasingly stressed the benefits of common standards if accepted and used worldwide. According to Bangemann, “Globalization is creating new challenges, both for the commercial and the regulatory systems. Solutions that previously were valid within a given context are not necessarily adequate for the global level.” In order to reap scale economies in equipment markets and network economies in services, EU policy demanded an open standardization process so that all interested parties could use the basic standards. The joint development of basic standards through the European Telecommunications Standards Institute (ETSI) requires that standards are open, that all essential intellectual property rights (IPR) necessary for the standard are licensed in a nondiscriminatory and open manner, and that the license fees are reasonable. EU standards policy stated that even if standards decreased the number of variants, there would be no reduction of competition.

The idea of the European model was to redirect competition from technical variants to services, price, and performance. The reduction of diversity with regard to basic standards and technology platforms made it possible to combine products from several manufacturers and make longer production series possible, thus increasing options and decreasing prices for consumers (while maintaining profit margins for manufacturers). In recent years, European policymaking has increasingly focused on activities with a stronger international dimension and shifted toward a new regulatory regime under which formal standards bodies should preserve a “coherent set of standards” in their portfolio for EU policy to be successful. The new EU approach to standardization, which emerged in the late 1990s, stated that standardization could cover competing products, but conflicting standards would not be tolerated and accepted in Europe. A formally recognized standardization body in Europe (for example, ETSI) would have to preserve coherence and interoperability—and exclude standards that

31. For a more in-depth examination of the recent modification in EU policy for standards in ICT markets, see Lembke (2001a).
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were regarded as conflicting—to ensure the necessary harmonization required by EU policy and legislation. The European model of competition was to have a single technology per domain (to ensure multivendor interoperability) and then have competition at the operator and product level to encourage competition (ex ante or anticipatory standardization), which contrasts to the American model, which allowed competition at the standards level leading to a multiple standards environment.

The changing global environment and industry structure posed new challenges to the ETSI’s identity, procedures, and organization. This shift was reflected in (1) the stronger relationship between international activities and trade policy rules, (2) the increasingly global character of ETSI’s membership, and (3) the success of many European/ETSI standards at global level. The European Commission, and in particular the Commission’s Directorate-General (DG) Enterprise, was concerned about the regionally oriented standardization structures and the growing number of standards covered in part by IPR:

In a situation where companies increasingly act on a global basis and make their decisions based on a global strategic perspective, the pursuit of technological leadership by increasing the value of IPR portfolios could hamper efforts to ensure backwards compatibility and global harmonization. The ongoing transformation of formal standards organizations worldwide from groupings of experts seeking consensus on technical matters into battlegrounds for the assertion of competing commercial interests do not facilitate the smooth introduction of new technologies, for example, future mobile communications.  

The importance of IPR in the development of the next-generation wireless technology infrastructure far exceeds its role in the development of GSM technology, and it has played a significant role in structuring international and intra-industry cooperation and competition. One the one hand, IPR’s importance has also stimulated new international links between corporations in Asia, Europe, and North America. On the other hand, the internationalization of production (and corporate strategies) has led to fierce pre-market competition in the IPR domain. For instance, the U.S. manufacturer Qualcomm, whose strategic asset was its CDMA patents, tried to convince and force the European and Asian markets to adopt its own technology (CDMA2000). It engaged in an aggressive political campaign in Europe, Japan, and in the United States, and succeeded in rallying support from a number of U.S. legislators—such as Senator Ernest Hollings—and parts of the government. Europe was accused of engaging in “asymmetrical trading practices;” that is, denying GSM’s competitors entry into the European market and enabling European manufacturers to market GSM around the world from a protected home market, while enjoying free access to the American marketplace with W-CDMA. Europe, Qualcomm and its political supporters argued, used an exclusionary industrial policy in technical standard-setting activities that created an unnecessary barrier to trade in violation of the

WTO Technical Barriers of Trade (TBT). Moreover, by mandating a “discriminatory technical regulation” for wireless communications services, the European regulatory approach would prejudge the outcome of international standardization as well as consolidate the dominance of Ericsson, Nokia, and other European manufacturers in the European market for wireless telecommunications equipment. Faced with what Qualcomm argued was a protectionist European industrial policy and ETSI’s “non-objective” standard setting process, it claimed that it was forced to fall back on its IPR to protect its current customers and its position in the next generation of wireless technology. In other words, without “satisfactory” convergence between W-CDMA and its own technology, Qualcomm officially stated that it would not agree to grant licenses under its essential IPR for the W-CDMA standard according to ETSI IPR policy.

The leading European-headquartered manufacturers responded that if Qualcomm and its political supporters on Capitol Hill succeeded in forcing harmonization (“a compromise standard”) on to Japan, it would reduce the integrity and performance of the European/ETSI technology proposal and jeopardize the development of a truly mobile multimedia infrastructure. Furthermore, it would disrupt the close strategic cooperation between European and Japanese industry and standards bodies, threaten the opportunity for UMTS/W-CDMA to gain a stronghold in Asian markets, impede global economies of scale in equipment markets and network economies in services, and challenge the overall European objective of strengthening its ICT industry internationally.

The world’s operator community, for its part, had taken a backseat position with regard to the international standardization process. In October 1998, however, more than ten operators decided to play a more active global role and launched the Operators’ Harmonization Group (OHG). Its main objective, supported particularly by pure-play wireless operators with investments in various technologies and markets, was to achieve maximum commonality between the competing CDMA technology proposals. This group put significant pressure on wireless manufacturers, and by mid-1999 it had grown to comprise thirty-five operators and twelve manufacturers. This activity was triggered by the IPR disputes between Ericsson and Qualcomm regarding different proposals, which threatened to stall global standards activities.

The OHG operators called on wireless manufacturers to solve the IPR situation expeditiously and to comply with certain IPR principles: IPR should be freely exchanged between manufacturers based upon license and/or cross-license agreements as appropriate; the total cost of IPR should be kept to a minimum and create maximum global demand and acceptance of third-generation services and products; and manufacturers should seek out other IPR holders and establish license and/or cross-license agreements. The overall argument was that IPR should not be used by any company or group of companies to delay the introduction of next-generation services, to withhold the use of the technology to forestall achieving a harmonized international standard, to restrict the import or export of equipment to or from any country, to increase the cost of equipment or services beyond customary levels, or to stifle innovation and the free flow of

33. OHG (1999a, 1999b).
ideas. The OHG concluded that continued public IPR disputes were damaging to the global wireless industry.

In the United States, wireless operators also voiced concerns. The Universal Wireless Communications Consortium (UWCC), an industry group supporting TDMA technology, complained about signals that the U.S. government had sent to China, which, it argued, had resulted in perceptions worldwide that the government was favoring CDMA technology. The implications were potentially serious for the TDMA industry, which had over 70,000 employees and over $30 billion invested in TDMA technology infrastructure.

4. Globalization and institutional strategies in Europe

The European Commission wanted to repeat the GSM success and worked to unite industry behind a common basic technology platform for future wireless products and services. The wireless manufacturing community was largely divided in two rival camps: Ericsson and Nokia promoted W-CDMA through the Nordic Alliance, whereas Siemens spearheaded a group of producers (the UMTS Alliance), including North American manufacturers (Alcatel, Bosch, Motorola, and Nortel), which supported the alternative TD-CDMA radio technology. Both groups suggested the risks involved if their technology proposal for the UMTS radio technology (UTRA, or UMTS Terrestrial Radio Access standard) were not be selected.

Ericsson and Nokia stressed the importance of the Asian market and gained the support of Japanese industry (NTT DoCoMo, NEC, Fujitsu, Matsushita/Panasonic, and Mitsubishi Electric) and wireless operators in the broader Asia–Pacific region. The European corporations in the UMTS Alliance partners were concerned about the globally oriented approach promoted by the Nordic Alliance. The leading wireless industry actors in Europe questioned whether the integrity of the GSM platform could be ensured on a global basis. However, the story of the European approach to global standardization—and the strategic use of international standards bodies by multinational corporations in the context of global competition—is primarily an aggressive outward-oriented strategy with the objective of aligning Europe with industrial and market developments in the Asia–Pacific region and elsewhere in order to benefit from rapidly growing and lucrative markets overseas. It represents a new liberal-strategic form of critical industry support:

International standards for products, processes, and networks are increasingly important to industry due to the quickening pace of technological innovation and the globalization of trade. Japan is key to capturing Asia, a market that by the year 2005 is expected to be larger than Europe and North America combined. Therefore, the support of Japan for a future mobile communication standard is of critical importance.

35. Author interview with European Commission official, April 1999.
Ericsson and Nokia (who rallied behind Ericsson from late 1997) argued that their technology (W-CDMA) had to be selected to ensure global technological leadership and to prevent the European market’s and European firms’ isolation from global markets. Japanese industry had announced that W-CDMA technology would be available outside of Europe and in the Asia–Pacific region regardless of the outcome of high-level decisions in Europe. Ericsson and Nokia remained relatively positive about their chances in world markets, and strongly resisted attempts to establish artificial barriers and defensive postures in Europe and in ETSI.

The GSM operator community—through the GSM Association—argued that ETSI should select technology on political and global commercial objectives rather than on purely technical merits, since it was difficult to provide any definite assessments of the competing technology proposals. The main objective was to maintain interoperability throughout the world and to avoid the regionalization of markets and divisions in the global GSM community, which would jeopardize economies of scale in equipment markets and network economies in services deriving from the leading global technology infrastructure, GSM (Figure 2). The GSM Association decided to support politically the Nordic Alliance and W-CDMA, which it perceived to carry a more promising response to this overall objective. The strategic preferences of the GSM Association consisted of (1) selecting the technology with the greatest potential on the world market and as a global standard, (2) ensuring a continued strong global role for the GSM industry, and (3) aligning with Japan as the best response for European industry to benefit from the lucrative Asian markets.

In 1997, the chairman of the ETSI Special Mobile Group (ETSI SMG), Fred Hillebrand, acting on a mandate given by the ETSI wireless community, engaged
in diplomatic activities to foster stronger cooperation with counterparts in China, Japan, and North America. These so-called “exploratory missions” consisted of joint delegations from a number of industry groupings (ETSI SMG, UMTS Forum, GSM Association 3G Interest Group and ECTEL). Those European manufacturers with significant commercial interests in Japan and Asia pushed for the exploratory missions and benefited from the flanking support of the European Commission. The objectives of this globally oriented activity were to (1) identify an institutional strategy for closer and more structured interregional collaboration on GSM and UTMS specifications, and (2) construct one global working structure among all interested bodies to avoid parallel work and overhead coordination. This institutional and technical form of collaboration would take the form of an ETSI Partnership Project, defined as an activity established when there is a need to cooperate with an external body and where such cooperation cannot be accommodated within the ETSI organization. Hillebrand, with wide support from wireless manufacturers and operators, wanted to create a world specifications body to ensure a successful transition from GSM to UMTS, to capitalize on GSM’s worldwide footprint, and to promote W-CDMA as the leading worldwide standard in Asia, Europe, and North America. Likewise, European wireless manufacturers wanted to create a harmonized platform by spreading the GSM core network and W-CDMA standard overseas and by including the major actors in the Asian markets (China, Japan, and South Korea).

In late January 1998, the ETSI wireless community met in Paris to decide on a radio technology standard for UMTS. European industry and officials in the EU institutions hoped that a proactive decision would enable European-based industry to maintain a commanding position worldwide. At the same time, diplomatic activities accelerated between ETSI, European trade associations, individual firms and the European Commission on the one hand, and Japanese and other Asian standards bodies on the other, with the objective of achieving a maximum of commonalities between European and Asian markets and technology infrastructures. Representatives of the wireless industry expressed the need for exchanging of ideas and knowledge and for finding practical ways to continue technical exchange in advance of political decisions to achieve coordination and stability between Asian and European markets. The chairman (Akio Sasaki) of the Japanese standards body for radio technology (Association of Radio Industries and Businesses, ARIB), who had a good relationship with European industry and the Commission through cooperation within EU R&D projects on wireless technology, proposed that Japan and Europe support the same radio technology to the International Telecommunications Union (ITU), the United Nations-based agency that supported the IMT-2000 concept. Like the UMTS in Europe, however, IMT-2000 was “a hollow shell” that had to be “filled with life.”

Leading European and Japanese actors agreed that if it were not possible to reach a fully agreed position at global level, then at least any differences between Japan and Europe would not be interpreted as an unwillingness to cooperate. Those actors in Europe who favored a global working structure argued that it was unimaginable that Japanese and other companies would come to the court of ETSI on purely European terms. In their view it was important
to avoid accusations of European “neocolonialism” and economic and technological regionalism. A regional body like ETSI, they argued, could not own a world standard. Rather, a truly global standard had to build on already installed equipment. That is, an independent European greenfield approach would not be feasible as a means to foster economies of scale in equipment markets and network economies in services. A liberal institutional and political alignment was necessary across regions, and every partner had to be treated equally through equal rights and obligations. “With a big and proud nation like Japan and the Japanese institutions, you cannot make them second class citizens in Europe. You can obtain a global leadership not through privileges but through performance—if you perform and contribute then you have global leadership. Power cannot be executed by formal control mechanisms.”

The adoption of globally oriented strategies would provide European industry and ETSI with a stronger insurance policy that Japan and other Asian countries would not develop independent technology infrastructures.

While the leading multinationals’ corporate strategies and the EU’s role in structuring global competition around wireless standards were both based on a liberal-strategic approach, this globally oriented exercise also triggered concerns within Europe. While current theoretical perspectives on strategic trade demands and high-technology policy do not adequately account for such global forms of cooperation, they are helpful in explaining such controversies by stressing the role of different competitive positions, business strategies, and the desire to protect established individual privileges or broader regulatory frameworks. Entrenched positions, invested time and money, status, and power were clearly at stake.

Less internationally oriented economic actors that had relatively low investments in and preparedness for W-CDMA argued that a global institutional and trade strategy would create an autonomous entity outside ETSI’s political control. Such an approach constituted a threat to their business models and prior investments. A number of actors—such as fixed telecom operators, some national regulatory bodies (for example, in France and Italy), and Alcatel, which understood the strategic importance of standards but had a disadvantageous competitive position—were concerned about the dominant globally oriented approach in Europe. They viewed it as an attempt to move critical standards activities into an organizational entity with separate powers, which could jeopardize not only their own positions but also ETSI’s identity and privileged role within the EU regulatory-legislative framework. Rather than creating a new global institutional framework, they supported an alternative strategy whereby the ETSI wireless community could be granted more political and strategic autonomy and could work through bilateral cooperation agreements with other regional standards entities. Non-European organizations, they argued, could become ETSI associate members and thereby contribute and participate (whereas the leading wireless manufacturers and operators demanded that non-European actors had to be granted full membership status). In that way, ETSI and its more European-oriented members—in particular fixed network operators—could exer-

cise more influence over the wireless community. They lagged behind the wireless industry and were significantly more embedded in national markets and in national systems of political economy.

Fixed telecom operators, lobbying within ETSI on a platform called the fixed-mobile convergence (FMC) group, voiced concerns about the globalization of the “European” wireless standards process and attempted to weaken the resolve of those supporting the global institutional and trade strategy in Europe. Delegates from fixed network operators in ETSI—such as Telefonica and Tele Denmark—claimed that the ETSI SMG Chairman was in liaison with Japan at the expense of the interests of the greater ETSI community, including the standing ETSI bureaucracy from which they received political support. Moreover, they argued that the chairman’s activities jeopardized the international competitiveness of the European telecommunications industry and “the well-being of European citizens.” The emerging European–Japanese alliance, they claimed, threatened the successful worldwide deployment and market position of the GSM technology infrastructure. Furthermore, they argued that the leading supporters of a globally oriented strategy in the European wireless community, including the chairman and the vice chairman from Ericsson (Gunnar Sandegren), neglected established rules and working procedures and that their activities undermined the authority of ETSI’s General Assembly. Finally, the chairman was accused of having accumulated a secret database to which the rest of the ETSI membership did not have access. At a specially convened ETSI Board meeting in February 1998, the ETSI director-general, Karl-Heinz Rosenbrock, called on the SMG chairman to cede personal initiatives concerning the globalization of wireless standards and stressed that the organization of such standards activities should be negotiated according to established rules of procedure.

These attacks, in turn, raised criticism from those who were accused by the fixed network delegates and from those who recognized the central role that the ETSI SMG chairman had played throughout the history of GSM and UMTS/W-CDMA. The ETSI leadership for wireless standards stressed that a clear mandate had been given, approved by more than two hundred delegates in the ETSI wireless community, including several board members, the GSM Association, and the UMTS Forum. In March 1998, the ETSI board announced that it had launched the UMTS Globalization Group (UGG), with leading representatives from the European wireless community and the European Commission, to provide a mechanism for discussing partnerships with relevant organizations in Europe and around the world. It was established to enable specifications to be prepared and promoted in a manner that would make them attractive to global partners and implemented worldwide. The UGG, which was chaired by the ETSI director-general, was expected to provide strategic management, investigate relations with external partners, and propose an organizational structure that would meet the expectations of ETSI and its partners.

The controversy over alternative institutional approaches continued within the UGG framework, spearheaded by those representatives of the fixed network operators who had attacked the ETSI SMG chairman. The ETSI standing organization (the ETSI secretariat and the director-general) strongly opposed
a globally oriented institutional structure by which Asian and other overseas actors would have the same rights and obligations as full ETSI members. In addition, they opposed the Asian orientation of the Nordic manufacturers because of their strength in international markets and their ability to push their policy preferences within ETSI.

Three political “communities” can be identified in the battle between those who perceived risks to their entrenched individual positions, or more broadly to established regulatory traditions and ETSI’s privileged position in Europe, on the one hand, and those in the wireless community who promoted a liberal and globally oriented institutional approach (see Figure 3). In the ETSI Board, the delegates from Ericsson, Nokia, and Siemens pushed for the globally oriented strategy, with support from the UMTS Forum (chaired by a representative from Telia Mobile of Sweden, Thomas Beijer). The GSM Association, which had strongly criticized ETSI for not granting Asian economic actors full membership rights in the organization, also supported this strategy.

There were thus two rivaling institutional strategies within ETSI: the modular European-oriented approach and the integrated, globally oriented approach. The supporters of the modular approach wanted to move only generic work related to the IMT-2000 family of standards to the planned global working structure to protect technical know-how and to retain political control. An integrated global working structure, they argued, could jeopardize European high-technology standards policy because European standards would be specified and approved by an independent non-recognized standardization forum. The European wireless community, on the other hand, criticized the modular approach because it ignored market requirements and jeopardized the objective of constructing a globally oriented wireless technology infrastructure based on the GSM infrastructure. The European-oriented alternative, it argued, threatened to undermine a proactive alignment with Asian and North American actors and thus the
potential of European technology to achieve global leadership. According to the wireless community, ETSI should therefore transfer all of the work to the new global institutional framework—to be called the Third Generation Partnership Project (3GPP)—that was necessary to define a complete international standard with Asian support and strong European content. Ericsson, Nokia, and the ETSI SMG chairman, in particular, argued that an independent European-oriented approach would separate GSM and UMTS/W-CDMA activities. An inward-oriented European approach would cause regional standards bodies to maintain significant parallel structures, which in turn would impede the penetration of non-European markets and the objective of achieving economies of scale in equipment markets and network economies in services. European wireless operators argued that ETSI had to recognize that a globally oriented approach was a prerequisite for a strong position in the international division of labor.

In May 1998, the Japanese standards bodies for wireless technology (ARIB/TTC) and ETSI agreed on a framework document as a sound basis for further elaboration. The European mobile community wanted to continue without disruption to complete the work in a timely manner to meet the window of opportunity. The deliberations in the UGG resulted in the decision to convene an extraordinary ETSI general assembly to enable the ETSI membership to vote on remaining questions and controversies. In late 1998, 94.5 percent voted in favor of the creation of the 3GPP (1394 weighted votes in favor and eighty-one against) that would develop specifications for the initial phase of a complete third-generation wireless technology infrastructure.37 Subsequently, Asian, European, and U.S. standards organizations agreed to develop specifications for the W-CDMA technology, in compliance with the GSM infrastructure, for future wireless products and services. The membership consisted of three categories: organizational partners (standards bodies), market representation partners (trade associations), and individual members.38 ETSI hosted the 3GPP activity.

The European Commission—which had a continuous dialogue with ETSI on the future structure, scope, direction, and expected implications of wireless standardization—argued that the globalization of European wireless standards would improve trading relationships with other regions in the world. It favored an outward-oriented approach. At the same time, however, it stressed that such activities had to comply with the EU regulatory-legislative framework. It cautioned against the creation of a new legal entity and structure for the development of wireless specifications, which could give rise to regulatory problems in Europe. In addition, it expressed the need to take account of the interests of the EU member states in the discussions on the globalization of wireless specifications and standards.

The Commission’s DG Enterprise, which was responsible for institutional matters related to standardization, was concerned that the 3GPP was not a formally recognized standards body and that its links with the ITU were underdeveloped. It preferred to see the 3GPP subsumed into, or at least annexed

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38. In late 2001, three market representation partners had been accepted into the 3GPP: the GSM Association; the Global mobile Suppliers Association, GSA (initiated by the marketing units of Ericsson, Nokia and Motorola); and the Multimedia Wireless Forum (an international industrial consortium).
onto, the ITU structures. This, it argued, would provide a veneer of respectability and neutrality in the effort to achieve harmonization through a clear consensus process at international level. Moreover, it would better respond to the Commission’s objective of facilitating interoperability between regional systems (globalization via regionalism) and thus global economies of scale in equipment markets and network economies in services.

The European Commission primarily supported the globalization of wireless standardization as a means to enhance European technology and know-how and to assure access to lucrative Asian and other markets. “[The European Commission] supported us in our efforts and liked the concept of us working closer with the United States because there were already then some strong discussions and trade conflicts between the EU and the United States. The European Commission saw this as another way to demonstrate our openness to work with other regions of the world and to prove to them that we are not anti-competitive.”

It closely followed the battle over the globalization of wireless standardization in ETSI and around the world and wanted to ensure that it was successful.

5. Technology promotion and global consolidation

European industry—both manufacturers and operators—wanted to ensure that developments in Asian markets would be compatible with the GSM core network and future wireless technologies to further consolidate the GSM stronghold across the world and the position of European companies in the international division of labor in the ICT industry. The leading wireless actors in Europe, with support of proactive standards officials for the wireless sector within ETSI, recognized that they could not guarantee that GSM and the European proposals for future wireless technology infrastructure would be adopted in the Asia–Pacific region and elsewhere. Therefore, they strongly promoted a global institutional and trade strategy. They succeeded in gradually shifting the European approach from a focus on the European market integration to a significantly more outward-oriented approach characterized by close cooperation with Asian actors and markets. The ETSI wireless community primarily targeted those countries that had to make critical decisions on infrastructure and that shared the same overall business interest as ETSI members—that is, building on the GSM technology infrastructure on a global basis.

Global cooperation and competition was significantly restructured under the guidance of the ETSI wireless community. In the mid-1990s, a strategy emerged

40. A senior Ericsson official, vice president Per-Olof Åkerberg, headed one of the central mechanisms at ETSI’s disposal was the European Telecommunications Standards Awareness Group (ETSAG), chaired by Siemens and with participation from the European Commission. Ericsson and Nokia, however, boycotted such exercises since they did want other entities to disturb or piggyback on their corporate operations in global markets. They had likewise warded off attempts by the ETSI bureaucracy to participate in the Transatlantic Business Dialogue (TABD) where wireless standardization and regulatory policy was discussed in 1998 and 1999. A senior Ericsson official headed the European industrial delegation and strived to reduce the ongoing transatlantic trade dispute and did not welcome “external” interference.
based on the recognition that global acceptance of GSM and future European technology solutions required a globally oriented approach in order to maintain the compatibility and integrity of GSM beyond Europe. This strategic reorientation process, and the establishment of a global institutional arrangement—the 3GPP—can be divided in a number of phases (Figure 4). First, the European–North American cooperation phase in 1996–1997 represented the first step from separate bilateral and regional institutional structures to a more international order. In 1997, a transatlantic joint agreement was agreed and implemented in gradual steps, which improved the integrity of GSM between Europe and North America and the rest of the world. Around the same time, the European wireless standards community targeted the Chinese GSM community in order to integrate all of Chinese requirements into the GSM specifications. In this European–Chinese cooperation phase, thus, the ETSI wireless community embarked on diplomatic activities toward the Chinese authorities and industry and persuaded them to align its specific requirements with the European specifications, and opened up for Chinese participation in ETSI.

In the European–Japanese–North-American cooperation phase, starting around 1997–1998, the European wireless community developed stronger trilateral ties with Japan and North America. It pursued political activities with Japanese and U.S. standards bodies and concluded that there was an opportunity for strategic-institutional cooperation. The European objective was to base international cooperation on an integrated approach to UMTS/W-CDMA to ensure evolution from the worldwide installed base and footprint of GSM. The political and institutional barrier to overcome was how to gain the full support of the other regions and how to coordinate the activity to avoid parallel development processes. “We were going from national to European and now we are going from European to global as the next phase, and it is very much linked
with trade issues. The Americans seem to be far more insular than ever the Fortress Europe has been viewed.”

Finally, the European wireless community was concerned that a globally decentralized cooperative structure would not provide any overall decision-making body for conflict resolution and integrated coordination. They concluded that a global agreement on the GSM/UMTS/W-CDMA cornerstones required a coherent and an innovative global organizational solution. This agreement represented the heart of the global consolidation phase. In early 1999, the ETSI wireless community transferred all its work related to UMTS/W-CDMA and all common work in the third quarter of 1999. ETSI formally decided to extend the scope of the global institutional structure (3GPP) to cover GSM activities in line with the recommendation of the ETSI wireless community. Standards development bodies from China, Japan, South Korea, and the United States accepted this initiative and the European wireless actors viewed it as a means to ensure cohesion between GSM and the next-generation wireless specifications. In June 2001, the ETSI SMG had its last meeting, putting an end to the group that had actively worked to ensure the GSM world hegemony. “The new arrangements concentrate all GSM and 3GPP specification work into one body, which is open on equal terms to interested companies worldwide. It will ensure the integrity of the GSM/3GPP platform, eliminating the risk of incompatibility and inefficiency that might have arisen had the work remained distributed among independently-acting groups.” In 2000, ETSI established a Mobile Standards Group, which would be responsible for the production of harmonized European standards as needed for regulatory purposes related to GSM and UMTS/W-CDMA wireless systems. The European Commission has delegated authority to ETSI to formulate standards, but it monitors whether the ETSI membership respond to the ambitions of the Commission and the requirements of the EU regulatory-legislative framework. The support of the Commission and the EU in structuring European and global competition around wireless standards illustrates the role of the EU as a more organized political actor and indicates the importance of a new form of critical industry support along a liberal-strategic approach.

6. Conclusion

The European wireless industry and policymakers supported a coordinated and outward-oriented approach to avoid fragmentation of the European and world markets, to promote the opportunity for lucrative market shares in the Asia-Pacific region, and to boost the European economy, employment, and the overall competitiveness in advanced ICT industries. The European UMTS/W-CDMA initiative represented a global ambition to capitalize on the success of GSM, which had become the international standard for second-generation mobile

41. Author interview with ETSI official, May 1999.
42. Hillebrand (2000); ETSI (2000a).
43. ETSI (2000c).
44. ETSI (2000b).
cellular systems. This joint European effort contrasts with earlier subsidy-based industry support in semiconductor trade and consumer electronics informed by the perceived or real threat from Asian industries. It represents a new form of critical industry support and illustrates the distinctive role of the EU as an organized political actor in structuring the context of global competition. The European wireless community, in particular those manufacturers with strong positions in Asian and U.S. markets and heavy investments in wideband wireless technology, supported a global institutional structure as a way to foster a European-Japanese alliance and to attract other non-European standards bodies and industry actors. Regarding the ICT industry in the United States, this article suggests that a more globally oriented and forward-looking strategy could be pursued, for example, in the Flat Panel Display market by supporting Field Emitter Display technology based on carbon nanotube emitters (CNT-FED) as a true “shifting-the-paradigm” approach.

In the European wireless standards domain, the supporters of globalization—both wireless manufacturers and operators—argued that the fragmentation and standardization work into several national or regional standards bodies and complex bilateral arrangements resulted in inconsistencies and risks to the idea of global roaming, to scale economies in equipment markets, and to network economies in services. The European and international landscape was different from when the GSM wireless infrastructure was introduced in Europe in the 1990s. Though there was political resistance among fixed telecom operators and the ETSI bureaucracy to an integrated global institutional arrangement and a strong European–Asian alliance with equal rights of the participating actors, the leading European approach was characterized by an internationally oriented strategy aimed at ensuring the support of Asian industry and standards bodies. On the one hand, there was the principle of globalization and the need for cooperation with other national and regional organizations to promote European solutions to the global marketplace. To globalize from the start was a good insurance policy for internationally oriented wireless manufacturers and operators to gain a first-mover advantage and access to Asian and other markets, to seek to have other regions adopt their preferred infrastructure and technology, and to support economies of scale in equipment markets and network economies in services. On the other hand, there was the need to preserve the long-established model of European integration and standardization with the objective of further consolidating the European market. There is a looming tension between retaining the regional anchoring of ETSI in Europe (and its role with respect to EU policymaking) and the challenges to its identity and role in an increasingly liberalized and competitive environment. The battle over globalization in Europe and ETSI was thus based on political–economic philosophies about the appropriate balance between globalization (the partial relinquishing of control that it entails) and regionalism (the protection of established identities and control functions). The “winning” strategy in this process was a liberal, globally oriented approach that put particular emphasis on access to overseas markets.

The theory of corporate trade demands assumes that internationally oriented manufacturers will demand strategic intervention in the face of aggressive foreign support for domestic industry and import competition pressure. How-
ever, this article has shown that the leading internationally oriented corporations in Western Europe, which enjoyed world leadership in the wireless sector, pushed for an outward-oriented, global institutional and trade strategy, and successfully managed to have it adopted. This approach, which aligned Europe with developments and strategies in the Asia–Pacific region, was supported because of the prospect of lucrative Asian markets, and not because of import competition pressure. The efforts and willingness of Ericsson and Nokia in particular to overcome resistance in Europe to increasing Japanese (and Chinese and South Korean) influence over wireless standardization suggests that head-to-head competition does not necessarily exclude strong international cooperation in a globally competitive environment. The behavior of leading multinational corporations suggests that domestic structures and established practices (national or regional systems of political economy) do not necessarily impede the creation and support of globally oriented strategies in critical corporate areas in a field of core strategic importance such as wireless standards. Public institutions such as the EU can play a distinctive role in structuring global competition along a liberal strategic approach to enhance job creation and the overall competitiveness in high-technology industries.

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