Chapter 6

The 2G (Second Generation) Mobile Communications Technology Standards

EXECUTIVE SUMMARY

Based on the experience of the NMT standardization, some actors that had been involved in the NMT standardization (e.g., Ericsson) heavily participated in the standardization of a 2G mobile communications technology. They were successfully able to standardize the technology they pursued as the European mobile telecommunications technology standard. Considering all these European actors’ early efforts, it was not a surprise that the GSM standard (the European 2G mobile communications technology standard) expanded its territory. The surprise came from the evolution of CDMA. How could the late entrant, Qualcomm, be able to create and expand the CDMA market? This chapter reveals not only fiery competitions among actors to standardize GSM and CDMA but also conflicts between GSM and CDMA camps as a group.

1. BACKGROUND OF THE 2G TECHNOLOGY STANDARDS

Mobile communications systems are much more complex than computing systems. The development and implementation of mobile communications systems require great resources. All systems need to be compatible and interoperable with each other to deliver signals seamlessly. For these reasons, the more the mobile communications market grows, the more technology standardization is necessary.

Many actors work towards potential market development. The nature of the projected market is influenced by currently available and future technologies. Thus, the actors also project specific usage and scope of a technology. Due to the co-dependent relationship between mobile communications technology and the market, they co-evolve. In this context, actors try to define the future market, choose a technology, and propose a competitive value network accordingly.
Moving to 2G from 1G mobile communications technology implied great changes in at least two ways. First, from the perspective of market evolution, the 1G mobile communications technologies were about creating a mobile communications market for niche users (e.g., high profile business people). Migration to the 2G market indicated that the mobile communications market was expanding for mass customers. Second, from the perspective of technology evolution, technological innovation was required in order to support the mass market. This chapter will discuss these two perspectives in depth, after which the general background of 2G technology standards will be presented.

1.1. Migration of Market from 1G to 2G

The demand for 1G mobile communications services exceeded the rate that anyone predicted. 1G technology was designed and developed for a small number of specific customers, for example, wealthy business people, celebrities, sailors, truck drivers, etc. Because of the large demand, this early market could have grown to include mass customers, but the problem was the technologies that the market was based on. The 1G technologies were limited in their capabilities and capacities to handle a large number of customers and therefore the limitations of the technology limited the growth of the market. Mobile service providers had to turn away potential new customers until there were other innovative technologies available to serve the mass market.

1.2. Migration of Technology from 1G to 2G

While the 1G market was becoming saturated, the digital revolution was happening and permeating into many industries. The rapid development in digital technology was astonishing. For example, the digital compact laser disk (the CD) was replacing tape cassettes and LP records in the entertainment industry. As digital technology evolved, prices of digital-related products (such as processors and memory devices) fell quickly. Although digital cellular and digital radio were not well understood in the mobile communications industry, digital technology was recognized as a key to solving the problems that the 1G market confronted (Calhoun, 1988).

The main technological problem was the limited capacity in 1G mobile communications systems. To solve this problem, actors needed to find a way to allow multiple users to share a frequency channel at the same time. There were various technologies such as Time Division Multiple Access (TDMA), Frequency Division Multiple Access (FDMA) and Code Division Multiple Access (CDMA) that multiplied access within a frequency band. These technologies required digital technology in order to be implemented and commercialized. For example, to burst signals into time, frequency, or code division channels, the systems had to be supported by digital technology.

One thing we should remember is that the timing between market and technology does not always match. Sometimes, as in this case, market development is delayed due to slow technology development or the unavailability of technology.

1.3. General Background of the 2G Technology Standards

On the top of these changes in technology and market development, there was another change in the socio-economic and political environments affecting mobile communications technology standardizations. Many countries started to liberalize their communications industries right before or during the period of 2G mobile communications technology standardization, which ruptured traditional business relationships and practices in the industry (Garrard, 1998).

As the European Union (EU) took shape, there was a general aspiration to strengthen EU as a whole. EU politicians recognized that it would