Research Brief

3G in South Korea: W-CDMA Is in a Maze

Abstract: South Korean carriers are struggling to develop cohesive third-generation strategies amid a labyrinth of incompatible technologies, government regulations and uncertain demand for services.

By Sauk-Hun Song

Recommendations

- SK Telecom and KTF need to merge their established operations with their W-CDMA affiliates, (a merger that they've already decided to do) as soon as possible, remove market uncertainty and map out a definitive business strategy for the evolution of their service portfolios.

- South Korean vendors need to secure reference sites for their 3G products as an immediate priority and begin to aggressively tap overseas market opportunities.

- The troika of related telecommunications parties in South Korea — operators, vendors and the regulator — urgently need to review their 3G plans and policies in the face of the changes in the market and technology environments to prevent replication of network investment and inefficiency in the provision of next-generation services.
3G in South Korea: The Hangover Maze After the Hype

The hype that enveloped the assignment of 3G spectrum in South Korea in December 2000 has evaporated. The hard-fought, technology-driven contest to secure 3G licenses has come full circle: The delays in global W-CDMA rollouts, coupled with the evolution and maturity of cdma2000 1x services and terminals in South Korea, has eroded early market demand for W-CDMA. The resulting uncertainty among the two leading carriers about how best to deploy W-CDMA services in the context of their own stable and attractive cdma2000 services has created confusion in the market over the likely timing and evolution of cellular services. Under the terms of their licenses, all three carriers are obliged to roll out 3G services before the end of 2003, but given the market uncertainty, the government is unlikely to rigorously enforce their obligations. So what strategies are the carriers pursuing in the interim, what do the parties involved need to do next and what are the likely outcomes given the domestic and external pressures on their businesses?

The Road to 3G in South Korea

South Korean carriers are subject to the same technical and commercial issues facing 3G operators worldwide, but their strategies are also shaped by unique domestic considerations, especially the regulatory environment and national information technology policy. From a definitional standpoint, cdma2000 has long been recognized in South Korea as 3G, pre-empting the move by the International Telecommunication Union (ITU) to adopt a similar classification. The government has driven a longstanding national effort to build South Korea's position as a developer and producer of leading-edge wireless technologies. This has evolved through the implementation of cdmaOne, the early deployment of IS-95B and subsequently, cdma2000 1x RTT and 1x EV-DO services.

Following the launch of cdma2000 1x services by SK Telecom in October 2000, however, the evolution of wireless services took some confusing turns. The natural migration path from GSM or personal digital cellular (PDC) to W-CDMA does not apply to South Korea and the carriers had already begun to offer so-called 3G services using established cdma2000 platforms. See Table 1.

There was keen competition for so-called 3G licenses, but in effect, the licenses being contested were to operate wireless businesses in the 2GHz spectrum. In effect this left SK Telecom, KTF and their 3G affiliates with the prospect of developing services on three or four different 3G networks, cdma2000 1x RTT, EV-DO, EV-DV and W-CDMA.
### Carrier Strategy So Far

#### Market Positioning

After 3G licenses were awarded, the winners KT ICOM and SK IMT promoted the prospect of 3G services extensively. However, their message about next-generation wireless was confused by the activities of their cellular associates among the incumbent operators. SK Telecom, for example, billed its cdma2000 1x RTT network as a 3G service and this was supported by the Ministry of Information and Communications (MIC). This created some confusion because 3G services were not generally expected to be offered in 2002 or 2003 by KT ICOM and SK IMT. The confusion over 3G was compounded when SK Telecom and KTF rolled out cdma2000 1x EV-DO services this year in time for the soccer World Cup finals. The operators billed this development as “True 3G” and "My first IMT-2000."

The message from the carriers was that to succeed in the 3G business, the priority is to convey to end users that they are recipients of a new and innovative service. While use of 1x EV-DO has been somewhat disappointing, it would be premature to write it off as a failure at this stage.

Meanwhile, the aggressive development of cdma2000 services has left the W-CDMA licensees without an apparent market niche. Once the W-CDMA operations are absorbed into KTF and SK Telecom, as they inevitably will, the question remains how to efficiently deploy network resources which basically deliver the same services to end users.
Differentiating 3G Services: A New Strategic Requirement
The problem of differentiating 3G services is particularly acute, because
South Korean 3G carriers are not only competing against each other, but
potentially against themselves, as their cdma2000 and W-CDMA platforms
were essentially destined to do the same job.

For example, real time video call can be supported by both technologies.

There are some technical differences: W-CDMA uses the 2GHz frequencies
(2GHz) and wider channel bandwidth (5MHz rather than the 1.25MHz
cdma2000 carrier). This can provide greater trucking efficiencies, however,
operators would still have to limit access to premium services because of
capacity constraints, terminals and the demands of other users.

These technical differences would be largely transparent to the end user,
except in the ultimate pricing of the service. Clearly though, the
deployment of 1x EV-DO and W-CDMA to provide similar services is not
an efficient use of capital and it is conceivable that by 2004 or 2005, there
will be a requirement to upgrade the cdma2000 platform to 1x EV-DV.

Rationalizing the 3G Shareholder Structure
The government awarded 3G licenses to consortia backed by the main
cellular carriers, SK Telecom, LG Telecom and KTF. This licensing
approach is generally construed as ensuring a more equitable distribution
of scarce public resources such as radio spectrum.

Until mergers and acquisitions are completed, the 3G licensees are in
limbo and companies are unable to proceed with full scale network
rollouts. SK Telecom and KTF are also preoccupied with the success of
their established networks and have yet to focus on how the new W-
CDMA businesses will be subsumed into their established activities. While
this situation continues, the 3G licensees are unable to commit to longterm
business strategies, since their future is dependent on the decisions of their
lead shareholders SK Telecom and KTF.

Initial Network Coverage
The 3G licensees have nevertheless made some initial commitments to
their network rollouts. KT ICOM signed an approximately US$100 million
W-CDMA supply contract with LG Electronics, but the deal is a much-
scaled-down version of the original plan. KT ICOM is building out its W-
CDMA network around the Seoul area only, pending a decision on future
rollouts to the merged entity. The net effect has been to postpone
nationwide W-CDMA coverage by at least one year compared with the
original plan. Once the acquisition is completed—probably within the
coming six to nine months—KTF will then have to decide on the phasing
and strategy of the ensuing rollout.
For new mobile services, coverage is a critical success factor, especially in South Korea, which has a relatively small area and intense level of competition. If W-CDMA services do not differ significantly from cdma2000 products, customers will have little incentive to switch to W-CDMA in terms of cost and service coverage.

**Terminal Availability and Pricing**

3G operators face a common challenge globally to secure enough multimode terminals. The situation is compounded in South Korea because of the regulatory requirement for backward compatibility with the established cdma2000 services. Qualcomm and Samsung are intending to produce dual-band dual-mode chipsets for the South Korean market by the middle of 2003, however, this will inflate the price of the terminals.

If this dual-band dual-mode chipset fails to materialize by next year, operators have the option of a dual-chip terminal, however the downside would be increased weight and size.

The increased cost of terminals is problematic in the South Korean market particularly where the government has taken a strong interventionist stance against handset subsidies. The carriers have approached the government requesting 3G terminal subsidies. Such subsidies would create a significant financial burden on the operators, although this might ultimately be necessary to stimulate the market. Recently, MIC prepared the law that prohibits any kind of subsidy for next three years.

This combination of circumstances has prompted SKT and KTF to adopt a "wait and see" approach to W-CDMA. SKT and KTF have indicated their intention to begin W-CDMA services starting in the second half of 2003 with limited coverage.

One possibility is they will attempt to migrate high-use data customers to the new W-CDMA service, but the limited coverage area, high terminal price and lack of new features may be a significant disincentive to users.

**Deployment Schedule**

Figure 1 illustrates the tentative deployment schedules of the two W-CDMA networks. It is clear however, that the incumbent carriers want to defer commercial service until the general market situation improves. The MIC has shown a sympathetic attitude and adopted a flexible stance.

Meanwhile cdma2000 1x EV-DV deployment is planned in South Korea starting in the second half of 2004. It is not at all apparent whether KTF and SK Telecom will abandon the cdma2000 evolution in favor of W-CDMA.

It is clear that the South Korean carriers are now much more focused on amortizing their established investments and underpinning the rollout of new networks with higher expectations in terms of return on investment.
Business Development and Product Strategies

The availability of new services is contingent on improved network performance and the availability of suitable handsets. On the cdma2000 1x RTT networks, operators are experimenting with various types of multimedia services including video-on-demand (VOD) and picture messaging. Although the service quality may be lower than that available on cdma2000 1x EV-DO or W-CDMA, the difference is not significant at this stage.

Most of the initial 3G applications will be tested on the cdma2000 1x and cdma2000 1x EV-DO network before they become available on W-CDMA. This at least provides carriers with an understanding of what applications will be successful. Operators are frequently introducing new services such as location-based services (LBS), broadcast services multimedia streaming, multi-download and upload services as they test the market for innovative new mobile data applications. Figure 2 shows mobile services currently available in South Korea.

Continuity of services will be a key issue in determining when operators introduce W-CDMA. Carriers must support roaming with their established 2G networks and whatever service is introduced, its success will depend on how it is marketed in relation to the established product portfolio.
Table 2 shows SK IMT and KT ICOM’s announced 3G business strategies. There is no significant difference between the two approaches. SKT IMT’s "Multi Access," for example, mirrors the wireline/wireless strategy outlined by KT ICOM.

From the available data it appears there is little unique or innovative application that W-CDMA will be providing, in contrast with the cdma2000 platform, with the exception of global roaming capabilities to other W-CDMA networks.
### Table 2
Comparison of W-CDMA Business Strategies

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<thead>
<tr>
<th>SK IMT's 3G Business Strategy</th>
<th>KT ICOM's 3G Business Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multi Access</strong></td>
<td><strong>Develop dedicated 3G service that is distinct from competitors:</strong></td>
</tr>
<tr>
<td>Keep up with the trend of compounding wired access with wireless and provide multiaccess solutions through construction or network outsourcing.</td>
<td>❑ Wired and wireless convergence service, Voice on Demand (VoD) and global roaming</td>
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<tr>
<td></td>
<td>❑ Develop reasonable and differentiated packet tariff plans</td>
</tr>
<tr>
<td></td>
<td>❑ Location based services</td>
</tr>
<tr>
<td></td>
<td>❑ Mobile office/application service provider (ASP)</td>
</tr>
<tr>
<td><strong>Develop Killer Application</strong></td>
<td><strong>Establish effective distribution channels:</strong></td>
</tr>
<tr>
<td>Maximize service use and competitive power and continually develop differentiated killer applications/content.</td>
<td>❑ Use both KT and KTF’s distribution channelsBuild dedicated 3G-distribution channel</td>
</tr>
<tr>
<td></td>
<td>❑ Support from strategic partners and stockholding company</td>
</tr>
<tr>
<td><strong>Maximize transfer of established customers to W-CDMA</strong></td>
<td><strong>Establish m-business service platform:</strong></td>
</tr>
<tr>
<td>Promote rapid switchover of established customers to W-CDMA with differentiated services such as global roaming and rich multimedia service.</td>
<td>❑ Establish IMT-2000 portal related to m-commerce</td>
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</table>

Source: Operators (October 2002)

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**Gartner Dataquest Perspective**

South Korea’s 3G spectrum auction saw the MIC come under strong pressure from the incumbent operators for W-CDMA licenses. Only reluctantly, after the first two W-CDMA licenses were awarded, did LG Telecom agree to take up the government’s offer of 2GHz spectrum for cdma2000 services.

Since then, however, carriers globally have slowed down their W-CDMA rollouts and the technology has yet to resolve some key commercialization challenges before mass market adoption, starting in 2004. On the other hand, the cdma2000 3x platform which looked so unpromising 18 months ago has been abandoned by the industry. CDMA carriers are now focused on a much more promising 3G roadmap, which will see them enhancing the already mature 1x platform for high bandwidth services through 1x EV DO/DV. Vendors have also committed to cdma2000 products operating in the 2GHz band, with backward compatibility.

The timelines for product availability are not entirely clear, but the technology road map for cdma2000 has crystallized significantly in the past year.
Given the surprising turn of events, SK Telecom and KTF have (unsurprisingly) been sounding out the government over the possibility of using 2GHz spectrum assignments for cdma2000 services. So far the government has resisted this. LG Telecom is taking a much more cautious approach and does not plan to roll out 1x EV-DO services. This decision not to upgrade to 1x EV-DO may ultimately prove a good one, given the lackluster demand for DO services encountered by SK Telecom and KTF, due in part to a lack of DO terminals and compelling applications.

LG Telecom, like its two competitors, is committed to rollout 3G services during 2003 under the terms of its license. But it has yet to make any definitive moves to exploit its access to 2GHz spectrum for cdma2000 services.

LG Telecom originally fought a bitter, ultimately futile battle for one of two W-CDMA licenses on offer in 2000. Eight months later, in August 2001, it accepted a cdma2000 3G license after long negotiations with the government over concessions. The government was clearly keen to protect the interests of domestic manufacturers by ensuring that there is a home market for cdma2000 2GHz products. Ironically, LG Telecom would be highly unlikely to swap its cdma2000 3G franchise for W-CDMA.

It is too early to conclude that South Korean operators will walk away from their W-CDMA commitments. However, the migration from cdma2000 1x to W-CDMA involves some real marketing challenges such as:

- Unclear benefits to consumers
- Similar network performance
- Limited W-CDMA network coverage at the initial stages
- Roaming between W-CDMA and cdma2000 1x unlikely
- Higher initial price points for W-CDMA services
- Need to redevelop wireless applications for the W-CDMA platform
- Handset range will remain limited and expensive until markets in Japan and Europe accelerate

It can be understandable because it is natural to follow the most profitable way. However, the 3G market was not led by operators only. 3G was prepared based on operator, supplier and government cooperation. It is not a simple issue that one player seeks as their own concern only.

Despite the challenges, it would be dangerous to assume that the decision over the future of W-CDMA will be taken by the operators in isolation. South Korea’s wireless market revolves around a close interaction between carriers, equipment vendors and the government.

The first milestone in resolving uncertainties over the future of W-CDMA services in South Korea will be the rationalization of the shareholder structure of KT ICOM and SK IMT and their merger with the established cellular operators.
If W-CDMA continues to experience global delays, SK IMT and KT ICOM may need to accelerate discussions with the MIC over alternative uses of their 2GHz spectrum allocation, not the least reason being because of capacity constraints facing the established SK Telecom and KTF services. In the short term, it is not surprising that the strategy of the incumbent carriers appears to be to buy time, and this involves moves to:

- Lobby the government to remove or delay the launch date of W-CDMA services
- Minimize W-CDMA investment and promote cdma2000 1x services to accelerate market maturity
- Explore possibilities of utilizing other technologies (for example, cdma2000 1x EV-DO) in the 2GHz frequency range

System vendors as well as content and applications developers rely heavily on investment from the carriers and any delay is likely to impact their businesses. Third-party developers may therefore need to review any business plans that are contingent on a W-CDMA rollout.

While W-CDMA carriers continue to delay service launches and minimize investments, suppliers need to find ways to secure alternative reference sites that demonstrate their capabilities. At the same time, they need to study and develop more systematically new business opportunities abroad.

Over time, W-CDMA will inevitably become a mainstream mobile technology. In the interim however, it has become critically important for South Korean carriers to manage carefully their next generation wireless investments and to maintain a sensible commercial balance between cdma2000 and W-CDMA deployment.

Given the prevailing market environment, a duplicate investment in both cdma2000 1x and W-CDMA national networks cannot be justified.

For the time being, operators, vendors and the regulator appear hesitant to make a clear commitment to any technology choice, because of the knock-on impact in the market. It is clearly time however, to reassess the new market and technology environments and bring the parties together to develop a more explicit understanding of where the market is heading and how best to respond to those changes. This is necessary not just to avoid wasteful duplication of investment, but to allow the manufacturing base to pursue product development plans confident in the direction of their own domestic market.

**Key Issue**

How do carriers transition from 2G to 3G?
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