

The Road to 3G

a report by

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Introduction

Popular wisdom says that one cannot have everything, and one must instead make choices and trade-offs. An operators' ideal list of requirements for a 3G solution is one such example of where compromise is essential. The 'wish list' may include:

- cost-effective solutions that build on infrastructure already in place, preserving investments;
- increased voice capacity and significant data speed that can be flexible and easily deployed without major spectrum-planning efforts;
- standard systems, backward and forward, compatible with the wireless network and easily integrated with other networks and data platforms;
- flexibility to upgrade in line with market demand; and
- rapid time-to-market.

From a standards perspective, the International Telecommunication Union (ITU) developed the family of International Mobile Telecommunications Standards (IMT-2000) to meet the 3G needs of operators worldwide. The 3G Code Division Multiple Access (CDMA) standards that are part of that family – CDMA Direct Spread (CDMA-DS), CDMA Multi-Carrier (CDMA-MC) and CDMA Time Division Duplex (CDMA-TDD) – are designed to meet the capabilities that operators will require to provide the advanced services that subscribers will demand in the coming years. Efforts are underway to bring systems based on these standards to the worldwide marketplace.

One challenge facing the players in the wireless industry is how to most effectively move from today's 2G systems to 3G in a cost-effective manner and with minimal disruption to subscribers. All operators must deal with this challenge, and each 2G technology is outlining different migration paths.

Time Divisional Multiple Access (TDMA) will likely migrate to general packet radio service (GPRS), then enhanced data rates for global evolution (EDGE). Global system for mobile communications (GSM) will likely migrate to GPRS, then perhaps to EDGE followed by CDMA-DS, or even perhaps directly to CDMA-DS. In addition, GSM operators have the opportunity to migrate to CDMA-MC, allowing them the benefit of deploying the Multi-Carrier 1X (1.25MHz) mode. cdmaOne operators will migrate to CDMA-MC in the near term, and have the option of deploying the 1X mode or 3X mode. Depending on spectrum availability, some may deploy the CDMA-DS mode as well.

This article outlines the capabilities of the CDMA-MC (cdma2000) mode, and highlights how this technology is offering 3G flexibility, responsiveness and compatibility.

Benefits

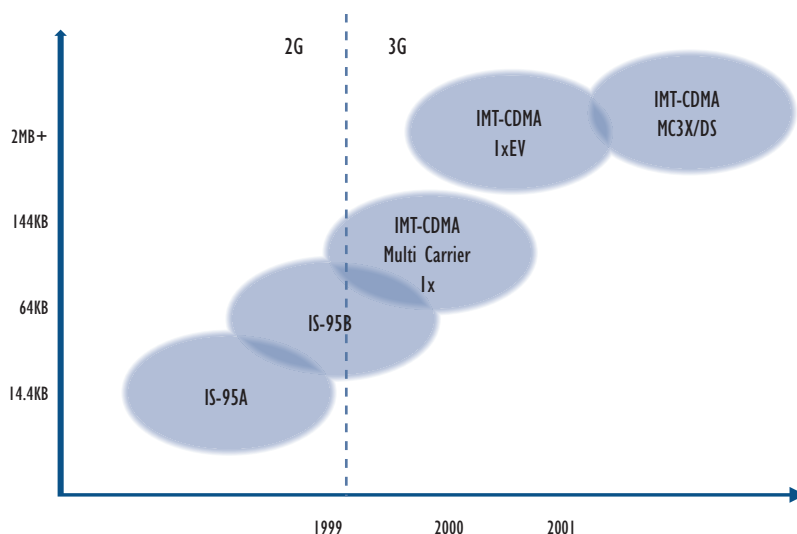
CDMA technology today (cdmaOne) offers operators significant quality, capacity and coverage to enable a digital solution that meets the demands of the marketplace. cdma2000 builds on the capabilities of this technology. The first phase of cdma2000 (1X) offers double capacity and will be ready for commercial deployment in 2000.

In Korea, for example, two of the country's largest wireless operators have announced that they are preparing to launch services this autumn.

A key benefit of cdma2000 1X is the ability to implement the solution in only 1.25MHz in existing personal communications systems and cellular spectrum, while also being available in IMT-2000 bands. There is no need to acquire new spectrum or to have clear spectrum in the existing bands to reap these capacities and other 3G advantages with cdma2000.

This is significant due to the fact that spectrum is a scarce and extremely valuable resource for operators. Whether an operator has new or existing

Figure 1: cdmaOne – Evolution Timeline



spectrum, it is important to utilise that resource as effectively as possible. cdma2000 1X allows an operator flexibility in how and where to apply its 3G service offering.

The 1X capacity enhancements and its time to market have made it attractive to operators and the analyst community alike. High-speed data and the futuristic capabilities that it enables may sound good in industry discussions and promotion, but the bottom line is that financial considerations ultimately drive technology decisions. Migrating to cdma2000 capitalises on a proven technology and existing capabilities. It requires minimal network architecture modifications and incorporates standard Internet Protocol (IP) components. This results in tremendous cost advantages for operators.

Tim Luke, global wireless equipment analyst with Lehman Brothers, recently discussed the 1X advantage in an article regarding migration strategies: “The challenge is the capacity issue,” he said. “The cost perspective and performance is a positive for 1X and CDMA operators. That is why we are so bullish on CDMA.”¹

In the same article, Jon Dorfman, a consultant with The Strategis Group, spoke for CDMA: “I’m a firm believer that CDMA makes a more viable business case going forward than GSM,” he said. “The primary reason is that CDMA gives you huge voice capacity as opposed to GSM EDGE ... When CDMA carriers upgrade, they can do it just for voice reasons. They see it as getting data for free. On the GSM path, it’s much more of a commitment to data.”¹

Voice capacity may not grab headlines as readily as other features of 3G, but the reality of wireless is that

voice capacity is the main driver for early adopters of 3G. Voice will continue to be an important revenue driver for operators for some time.

In Japan, the motivator appears largely to be voice capacity to support a large and growing subscriber base, not necessarily bandwidth for advanced multimedia applications. It is likely that the DDI and IDO Corporations will be the first operators to deploy 3G in Japan, as they are already trialling 1X on existing cdmaOne networks.

Capabilities

Figure 1 illustrates the cdmaOne/cdma2000 migration path, of which there are several important characteristics:

- Handsets and infrastructure use standard IP for enabling seamless Internet and data access, and providing a broader base of applications and solutions. On the network side, this functionality is provided with a standard router called an interworking function. Going beyond platform compatibility to application development, professionals skilled at programming for the Internet can transfer that knowledge to applications for cdmaOne and cdma2000. Incorporating industry standard components result in cost savings from lower capital investment requirements, rapid deployment and interoperability with other networks.
- Migration to 3G does not require significant upgrades to infrastructure, therefore providing a more financially attractive solution. Furthermore, this allows operators to migrate to 3G without the risk of service disruption to customers.
- 2G handsets will operate on the 3G network and vice versa, providing users with transparency and the ability to roam seamlessly. This also reduces the amount of co-ordination and planning required for operators to provide international roaming when operators might be at different stages of 3G deployment.

Conclusion

The path forward for operators worldwide is both an exciting and challenging one. Companies will have to make very significant decisions about how and when to deploy 3G, as the implications of these decisions are significant. Fortunately, operators have solid technology choices in the IMT-2000 CDMA standards family. cdma2000 provides operators with a highly capable, flexible and rational solution. ■

1. Lynette Luna (1999), “AT&T explores 1XRTT technology”, RCR Wireless News, 11 Oct 1999, Vol. 18, No. 41.