On the Road to 3G and Beyond, Alcatel-Lucent Leads the Way

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With the broadest, most comprehensive wireless portfolio in the industry, Alcatel-Lucent helps operators transform their networks to support more advanced wireless services, and expand their service offerings into new areas.

Introduction

In the wireless world, service providers, their customers and the vendors that support them are constantly looking toward the next-generation horizon, the services they will find there, and the technologies that will enable these new services to flourish. In some markets, the next generation is third-generation or 3G, while in other markets operators are already looking toward “4G” and beyond.

Interestingly, for each operator the next-generation future will be distinct from those of their competitors, and will be defined by a variety of characteristics including business models, target customer sets, relationships with parent companies or partners, spectrum holdings, and a vast array of other factors. As importantly, the road to the next-generation future is different for each operator – each has a different starting point and a different ultimate destination, and each road will almost certainly include a variety of stops and detours along the way.

“Combining assets from Alcatel, Lucent and Nortel, Alcatel-Lucent enjoys a strong or strengthening position in many key wireless markets. It is the undisputed number one player in the CDMA2000 space. It claims a significant position with emerging market GSM and a roughly 10% WCDMA market share. A TD-SCDMA tie-up with Datang pairs it with a founder of the Chinese 3G standard… one that has reportedly won initial TD-SCDMA deals. Scale, combined with market share, is important for cost-effective and cutting-edge R&D… Alcatel-Lucent is an undisputed fixed-line heavyweight (important for supporting mobile core builds) and can boast one of the strongest professional services businesses (important for deploying new technologies and supporting multi-vendor network management demands).”

Peter Jarich, Research Director, Telecom Infrastructure, Mobile Networks and Carrier Core at analyst firm Current Analysis. Excerpted from their May 1, 2007 Alcatel-Lucent Company Assessment.

The simple truth is that there is no single path to the future of broadband wireless communications. Instead, what operators face is a continuous journey through an ever-changing landscape. What they need is a guide – or at least a traveling companion – who can help them navigate this landscape, select the best path, and ensure that their journey is a successful one. Alcatel-Lucent, more than any other vendor in the industry, has the expertise and experience needed to guide operators as they transform their networks and their businesses to compete effectively as the market evolves.
Enhancing the mobile broadband experience
While the road to 3G used to be fraught with uncertainty, delays, technical challenges and financial hiccups, today 3G services are increasingly widespread around the world. Two well-established 3G technologies – W-CDMA (UMTS) and CDMA2000 1xEV-DO – are currently serving many millions of customer worldwide, and a third standard – time division-synchronous code division multiple access (TD-SCDMA) – is poised to play a significant role in the delivery of 3G services in China and perhaps other markets. Today, 3G networks are the gold standard for broadband mobile service, and promise to play a critical role in mobile communications for years to come.

With 3G increasingly well-established in the market, operators are seeking ways to further enhance their service offerings and improve the end user experience for their subscribers. Among the key challenges facing operators is increasing data transmission speeds – both uplink and downlink – on existing networks to meet growing demand for advanced multimedia services and distribution of user-generated content. Equally important is an operator’s need to ensure ubiquitous coverage for their customers, whether inside buildings (please see related article in this issue “Preparing and Deploying Advanced Indoor Coverage End-to-End in Japan”), in dense urban hotspots or sparsely populated rural areas.

As the leading supplier of 3G systems worldwide, Alcatel-Lucent has served as a guide on the road to 3G more than any other equipment vendor, and is ideally positioned to partner with operators while they transition their networks from 2G to 3G, as they enhance their 3G offerings, or as they explore more advanced 4G architectures. Why?

Figure 1: Alcatel-Lucent brings together the W-CDMA assets of three leading companies, creating a powerful new competitor in the market.

One + one + one is greater than three
When it comes to wireless, the merger of Alcatel and Lucent Technologies featured an additional element that made it look more like a three-way marriage – the extra party standing at the altar was Nortel Networks’ UMTS Terrestrial Radio Access Network (UTRAN)/W-CDMA business, which was acquired by Alcatel-Lucent on December 31, 2006.
This three-way marriage has already yielded extraordinary benefits, significantly enhancing the company's role as a leader in the wireless market. On the simplest level, this combination has expanded the company's market presence substantially, delivering the scope and scale needed to meet the needs of the most demanding operators. For instance, Alcatel-Lucent is now a supplier to one in four W-CDMA operators worldwide, with more than 50,000 installed Node Bs across the globe and more than 40 customers including Mobilkom, Orange, Partner, O2, Telefónica Moviles, SFR, Vodafone, KTF, SK Telecom and more.

Alcatel-Lucent is also now in a very strong position – as a major GSM player in high-growth markets – to support the substantial number of 2G network operators that are moving rapidly to introduce 3G capabilities. This expanded market presence builds on Alcatel-Lucent's well-established leadership in CDMA technology (48% market share) and strong position in the nascent WiMAX market.

**Best-in-class W-CDMA portfolio**

As a result of recent merger and acquisition activities, Alcatel-Lucent can offer customers around the world solutions to address virtually every possible deployment scenario using the full range of platforms across several leading portfolios – with nearly a dozen options to choose from. Alcatel-Lucent now possesses one of the most diverse and complete W-CDMA portfolio available in the industry.

Customer deployments can be supported in all frequencies and frequency bands – including anticipated opportunities with operators in China, Advanced Wireless Spectrum (AWS) auction winners in the U.S., and potential deployments in the 900 MHz band. As significantly, Alcatel-Lucent
now has the broadest selection of base station solutions available in the market to address the widest array of deployment scenarios, helping operators with the flexibility to deliver in-building and in-home coverage solutions, fill coverage cold spots – where coverage is lacking – and provide enhanced coverage in high-demand hot spots. Our distributed base station solutions – which enable individual base station components to be deployed in different locations – help operators manage site acquisition costs and operational challenges, by giving them the flexibility to deploy their systems in the way that makes the best use of available real estate.

Alcatel-Lucent has the strongest set of W-CDMA offerings in the industry, incorporating best-in-class products and components including Radio Network Controller (RNC) software and Node B assets (including digital Base Stations) from Nortel; Base Band technology and middleware from Lucent; and Telecom Computing Architecture (TCA) and software-defined radio (SDR) assets and expertise from Alcatel.

A new dynamism

The recent merger and acquisition activity has also brought added dynamism, energy and a renewed spirit of innovation to Alcatel-Lucent’s wireless solutions. For instance, some of our wireless researchers – some of the brightest minds in the industry – can now focus on delivering innovative new platforms to address emerging customer requirements. One great example of this cross-fertilization is Alcatel-Lucent’s new “Femto Base Station Router (BSR),” a compact, all-IP platform that combines the key functions of a base station, router and base station controller in a compact unit ideally suited to supporting in-home 3G coverage.

The Femto BSR integrates the pioneering BSR concept and spread-spectrum expertise from Lucent, the W-CDMA strength and Femto base station form-factor from Nortel, and the broadband networking expertise and design and manufacturing strengths of Alcatel to produce a uniquely powerful network element that is already creating new opportunities for customers. In a period of little more than two months, Alcatel-Lucent created the Femto BSR, and is already seeing substantial interest from customers seeking to expand their in-building and in-home W-CDMA and HSPA network coverage.
A wireless R&D powerhouse

The combination of the three companies’ wireless R&D organizations also has concentrated an enormous amount of expertise and hands-on experience in the development, design, deployment and management of advanced wireless networks. This strengthens Alcatel-Lucent’s ability to bring new technologies to market quickly, an attribute with clear value to operators for whom being first-to-market is an important priority. Alcatel-Lucent now has one of the leading R&D capabilities in the industry, with unmatched expertise in a host of critical areas of wireless communications. This expertise is evident in the numerous technical “firsts” the company can claim, including the recent achievement of the first successful High Speed Uplink Packet Access (HSUPA) trial in Europe with Mobilkom Austria, an accomplishment that helped secure a major deal for Alcatel-Lucent as supplier for Mobilkom’s W-CDMA/HSPA and GSM/EDGE networks in several markets in Eastern Europe. These kinds of achievement highlight the increased value we bring to our customers.

An ideal guide on the road to 3G and beyond

Operators that partner with Alcatel-Lucent can count on having access to the most innovative wireless networking solutions the industry has to offer, regardless of the technology path they have chosen. The strength of our new portfolio goes beyond the combination of products to something much greater. For instance, we have shared technologies and techniques to install W-CDMA and WiMAX components into existing 2G base stations, called “Multi-Standard Base Stations”, to support complementary 2G, 3G and WiMAX solutions – part of Alcatel-Lucent’s unique value proposition.

Alcatel-Lucent’s ability to drive the standardization and commercialization of new wireless technologies has grown considerably. We are now in an ideal position to drive the development of emerging wireless technologies – such as LTE, Ultra Mobile Broadband (UMB), and further iterations of WiMAX – that can help customers remain competitive. The combination of R&D organizations resulting from the merger and acquisition has provided deep pools of expertise in the development of common ATCA®-based platforms, advanced antenna technologies such as multiple input/multiple output (MIMO) and “beam forming” (a method used to modify signals in an array of multiple antennas to increase the power and quality of signals being directed at a particular mobile device), orthogonal frequency division multiple access (OFDMA) solutions, flat-IP (where hierarchical “layers” in mobile networks are collapsed to remove network bottlenecks), software-defined radio and, of course, spread-spectrum technologies – the basis for all 3G standards.

In fact, many of the building blocks of tomorrow’s 4G networks are already being implemented in Alcatel-Lucent’s commercial 3G and WiMAX solutions today, such as intelligent antenna and beam forming capabilities in its CDMA portfolio, MIMO on its WiMAX platforms, and flat-IP solutions in its W-CDMA portfolio with the BSR family of products.

4G: The wideband future

The next generation of wireless networking technology, known as “4G,” is intended to offer the capability to deliver truly broadband wireless services. Alcatel-Lucent does not view 4G as a particular technology, rather as a set of capabilities that ultimately will be supported by a variety of technologies.

The requirements for 4G are currently being defined within the International Telecommunications Union (ITU) as “IMT Advanced,” and Alcatel-Lucent is actively engaged in developing those requirements. In anticipation of the requirements, standards development organizations as well as industry groups (3GPP, 3GPP2, WiMAX Forum) are already developing potential standards. Operators and vendors, including Alcatel-Lucent, are working intensively on this effort.

1 Advanced Telecom Computing Architecture, a family of industry standards that define new blade (board) and chassis form factor (shelf) optimized for communications.
IP Key to Mobile Network Evolution

As 3G networks become more widespread and mobile data services become increasingly popular, operators are seeing increasing demand for advanced mobile services such as mobile TV, IMS-based blended services, and a variety of mobile content offerings. These services are driving increases in mobile data traffic which are expected to accelerate over time. To address this demand, mobile networks are evolving rapidly, characterized by increasingly powerful radio access networks and multimedia-centric core network architectures.

One of the key features of these new networks is their reliance on Internet Protocol (IP)-based radio access network (RAN) and core architectures, as well as converged transport networks that can ensure the quality of the end user experience for these advanced mobile services.

One of the great benefits of this approach is the ability to leverage the dramatic cost savings that IP/MPLS multi-service backbone networks offer. Additionally, operators are looking to drive IP capabilities closer and closer to the customer, ultimately leading to IP deployed end-to-end throughout the wireless network.

Leading mobile networking standards bodies including the Third Generation Partnership Project (3GPP), and its sister organization 3GPP2, are developing and refining standards for the introduction of IP into the mobile network environment for both W-CDMA and CDMA2000-based networks. Alcatel-Lucent, which is a key participant in both of these efforts, outlines a recommended approach to these critical network evolution challenges in two articles located in our online magazine:

- The Role of IP in Next-generation CDMA Mobile Networks
  http://www.alcatel-lucent.com/enrich/theroleofip

- The IP Road to Mobile Network Evolution
  http://www.alcatel-lucent.com/enrich/theiproad

What is clear today is that 4G networks will almost certainly have a variety of characteristics in common, most notably that they will be based on OFDM technologies and delivered in wideband carriers of 10 MHz or more. Alcatel-Lucent is leading the development of standards for what will presumably be 4G technologies such as LTE, UMB and various iterations of WiMAX.

Which technology each operator decides to deploy to support 4G capabilities will depend on the kind of network they have in place today, the kinds of service they are seeking to deliver in a particular market, and the radio spectrum they have available to support those services.

With the most comprehensive wireless portfolio in the industry, the most complete overall portfolio of telecommunications products and services in the business, a central role in the establishment of the next generation of wireless standards, and a truly global presence with operations in 130 countries – and the ability to serve virtually every market around the world – Alcatel-Lucent has the scale and expertise to drive the evolution from any technology and spectrum band to 3G, 4G and beyond, making the company an ideal partner for operators as they pursue their competitive transformation initiatives.

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