GUEST PAPER

The puzzling picture of the issue of 3G licenses in China that would affect several hundred billions of investment becomes clearer. It is possible that the Chinese government will issue 3G licenses in 2006. Therefore, at the beginning of this year, we have the honor of inviting Ms. Cao Shumin, a well-known mobile communications expert in China and Vice President of China Academy of Telecommunication Research, to give a special contribution on the development trends of wireless mobile communications.

This article points out that the hot topics in the wireless mobile communications field in 2005 included HSDPA, 1x EV-DO Release A, WiMAX, E3G and B3G. In addition, the article shows that the trends of mobile broadbandization and broadband mobilization are more obvious with the quickening of commercialization and standardization of these technologies. Moreover, technology development becomes more rapid and technical competition more severe in the wireless communications field. The development of wireless communications shows a tendency of gradual convergence of networks, integrated applications of multiple access technologies, and unceasing launch of new services.

The article thinks that 3G and WiMAX are complementary technologies. As for China, 3G should be first commercialized, and then mobile WiMAX.

Trends of Wireless Mobile Communications —Broadbandization and Mobilization

Cao Shumin

Cao Shumin received her Master's degree from Beijing University of Aeronautics and Astronautics in 1992. Now she is a senior engineer and Vice President of China Academy of Telecommunication Research. She is also a member of Expert Committee of Information Technology for the national "863" program and chairperson of the following organizations: Wireless Communication Technical Committee of China Communications Standards Association; 3G Field Trial Expert Group of MII of China; TD-SCDMA R&D and Industrialization Program Expert Group; Broadband Wireless Communication Technology Expert Group. She won 2 Second Prizes of National Scientific and Technological Progress Awards, 2 First Prizes and 6 Second Prizes of Scientific and Technological Progress Awards of MII of China, and China Youth Science and Technology Innovation Outstanding Prize. She has received the National Excellent Science and Technology Worker, as well as the National Advanced Worker awards.

1 Obvious Trends of Mobile Broadbandization and Broadband Mobilization

The emerging of 802.16/ WiMAX technology at the beginning of 2004 started a new turn of the technology competition in the wireless communications field. This has fastened the evolution of cellular mobile communications technologies. The 3GPP and 3GPP2 initiated their studies on the standardization of E3G respectively at the end of 2004 and the beginning of 2005. On one hand, the Long Term Evolution (LTE) plan initiated by 3GPP proposed that the E3G technology would implement the rates of 100 Mb/s in the downlink and 50 Mb/s in the uplink, have 2–4 times more spectrum efficiency than Version R6 and better support IP transmission services with lower cost. The 3GPP is going to complete the study of major parameters in 2006 and E3G standardization in June 2007. On the other hand, 3GPP2 has launched its Air Interface Evolution (AIE) plan. The plan is divided into two phases.

The multi-carrier CDMA2000 1x EV-DO technology is adopted in the first phase, with a maximum of 15 carriers and supporting data rates of 46.5 Mb/s in the downlink and 27 Mb/s in the uplink. The enhanced radio interface used in the second phase may support data rates of 100 Mb/s-1Gb/s in the downlink and 50 Mb/s-100 Mb/s in the uplink. The first phase will be released at the beginning of 2006, while the second phase will be finished in April 2007.

The emerging and promotion of WiMAX, and the initiation and fastening of E3G have brought obvious trends of broadbandization and mobilization in the wirleless mobile communications. That is, broadband wireless access trends to have more mobility, while mobile communications towards broadbandization. Figure1 illustrates the trends of wireless mobile communications.

The standardization of WiMAX and the promotion of its products made great progress in 2005. First, two interworking tests of fixed WiMAX were made in China respectively in June and November of 2005. The number of equipment vendors participating in the second test was added from 4 in the first test into 10, although the interval between the two tests was only 5 months. ZTE and Huawei, two Chinese vendors, took part in the second test sponsored by China Academy of Telecommunication Research in November. The two tests play an important role in maturing fixed WiMAX products. It is primarily estimated that fixed WiMAX may gradually go in commercial use in China by 2006-2007. Meanwhile, the standardization for mobile WiMAX made great progress in 2005. The IEEE 802.16 working group fulfilled the standardization of physical and MAC layers. In addition, the WiMAX forum has initiated the work for standardization of the upper-layer protocols and wireless access network that had kept unclear. It is expected to implement commercialization of mobile WiMAX around 2008.

In most instances, in 2005, the study on WiMAX made substantial progress and the standardization work of evolution technologies for 3G was accelerated.

2 Complementary Broadband Wireless Access and Broadband Mobile Communications Technologies

The relationship between broadband wireless access and broadband mobile communications technologies can be seen clearer through the comparison of 3G and its evolution technology with WiMAX:

3G and its evolution technology are complementary to WiMAX in network coverage, mobility, services, frequency, market positioning, and more.

(1) Coverage and Mobility

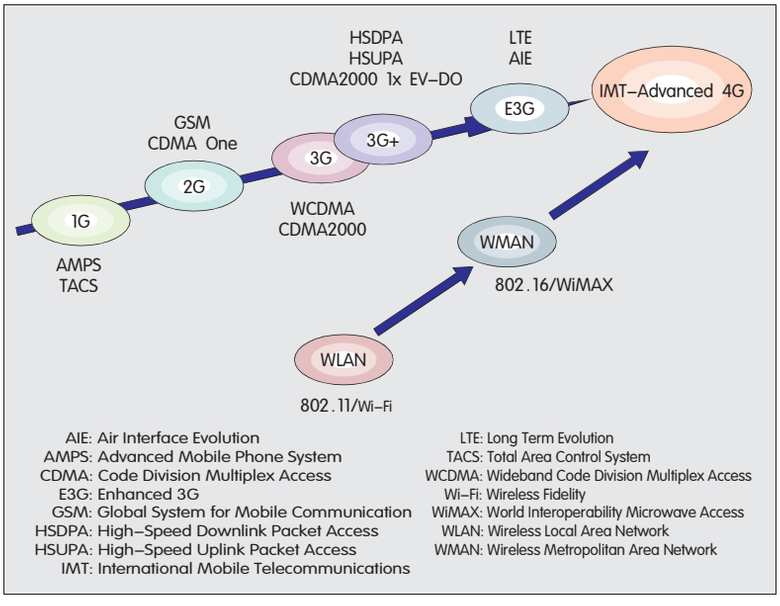
Based on 2G, 3G and its evolution technology will keep ubiquitous coverage and meet requirements of various mobile environments. However, WiMAX provides regional hotpot coverage and roaming mobility in some time.

(2) Services

3G and its evolution technology support voice, as well as diversified data services. The data rates supported will be gradually raised. However, WiMAX mainly offers data services, and gradually implements VoIP services.

(3) Standardization

3G and its evolution technology have strong standardization, but their standards are complicated with complex implementation of technology. Comparatively, the standardization of WiMAX is weak, but the implementation



▲ Figure 1. Development trends of wireless mobile communications.

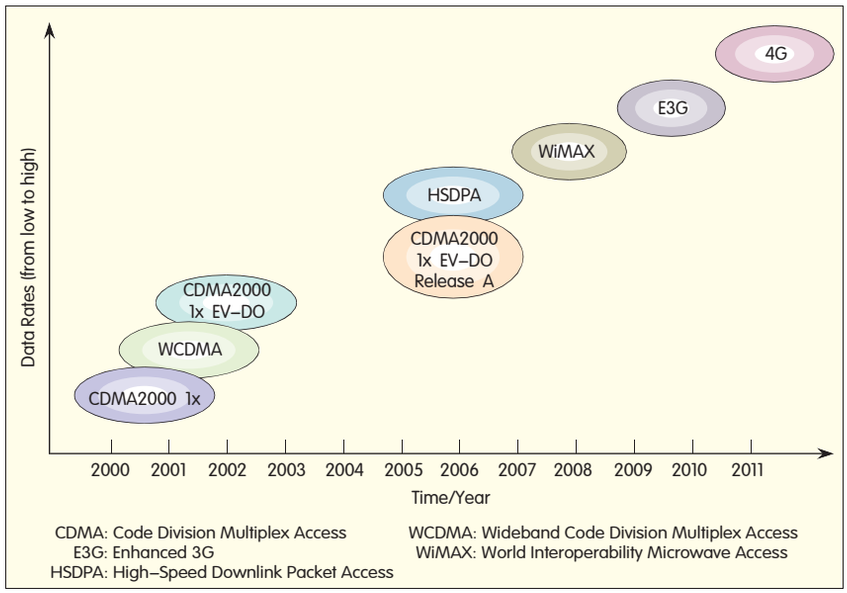
of network is simple.

(4) Terminals

Most terminals that 3G and its evolution technology support are handheld, but more types of 3G terminals that are applicable to computers including the lap-top are emerging. Comparatively, lap-tops are the main terminal WiMAX supports, and handheld terminals for WiMAX system are expected in the future.

(5) Frequency

3G and its evolution technology use the globally coordinated and defined 3G core and extended frequency bands. However, there are no globally coordinated usable frequency bands for WiMAX. Its usable frequency bands are under study and coordination.



▲ Figure 2. An estimated timetable of commercial use of 3G and its evolution technologies as well as mobile WiMAX.

(6) Maturity of Equipment

The covergence of fixed and mobile networks, and the covergence of communications, computer, broadcasting and TV, and sensor networks become great development trends

The implementation of 3G technologies has its large-scale commercial use worldwide, and the enhanced 3G technologies, such as HSDPA and CDMA2000 1x EV-DO, will enter in commercial use by 2006-2007. However, the commercialization of WiMAX needs about 3 more years. Figure 2 shows the timetable of commercial use of 3G and its evolution technology and mobile WiMAX, as well as their data service capabilities. Seen from Figure 2, mobile WiMAX is between HSDPA/1x EV-DO Release A and E3G.

(7) Market Positioning

3G and its evolution technology offer services mainly in the areas covered by mobile communications networks, while WiMAX, as a specific broadband wireless access technology, is flexible for various application places. For example, WiMAX system may access mobile networks, as regional coverage of the mobile networks, to bear the services with large data traffic, lighten the burden of the mobile networks, and decrease cost. It may also work as wireless extension of broadband access services of fixed networks, or provide roaming data access services.

Accordingly, it is obvious that these two technologies are complementary. It is rational for China to commercialize 3G first and then gradually consider mobile WiMAX, no matter from the view of technical development or from the characteristics of these technologies.

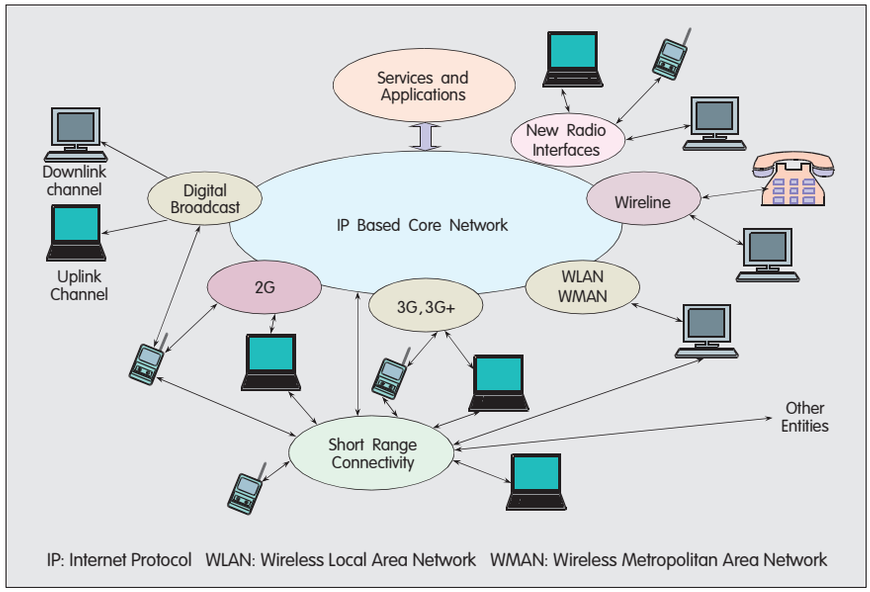
3 Be Ripe for Network Convergence, Service Convergence and Access Integration

With the rapid development of mobile communications and Internet, and according to the trends of fixed and mobile broadbandization, the communications networks and services are experiencing revolutionary changes. On one hand, the mainstream of services will change from the conventional voice services to integrated information service. On the other hand, communications will be extended from between humans to between humans and things, and between things. Communications will penetrate into every aspect of daily life.

Following the development trends of technology, relative industries will gradually merge, using a series of new technologies, new services, and new applications to meet market

demands. Figure 3 shows the future network that has implemented network convergence, service convergence, and access integration. The convergence is all–round and at multiple layers, including convergence of network, services, and terminals. The convergence of fixed and mobile networks and the convergence of communications, computer, broadcasting and TV, and sensor networks especially become great development trends. Moreover, conditions in technology, market demands, and equipment for the convergence are maturing.

The inevitable way to reach the aforementioned objective of convergence is to simultaneously use multiple wireless access technologies and fixed access technologies. These include cellular mobile communications technologies (WAN), broadband wireless access technologies (MAN), and short–distance wireless technologies (such as RFID, UWB and bluetooth). These access networks, together with fixed broadband networks, are connected to the same IP–based core network platform, and ubiquitous best services may be implemented through seamless handover of the networks.



▲ Figure 3. A converged network supporting integrated services and multiple access.

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Roundup

TelePassport to Deploy ZTE's Triple–play Services in Greece

TelePassport Hellas, one of the largest Telecommunication alternative providers in Greece, has announced a collaboration with ZTE Corporation for the deployment and promotion of triple play voice, video and data services in the Greek market.

ZTE will provide TelePassport with equipment which includes DSLAM terminals, video servers and customer set–top boxes to cost–effectively and simultaneously deliver enhanced triple play voice, data and video services to residential subscribers and businesses.

The deal is worth 23 million Euro over the next three years and TelePassport expects the deployment to be delivering services to the Greek market by the second quarter of 2006. TelePassport is planning the expansion of its network with the creation of 36 nodes in order to extend coverage to 70% of the Greek population. Initially an IPTV service will be provided in Athens and Thessalonica which will expand to cover the whole of Greece within the next two years.

The first triple play package will include access to 384–2 048 kb/s internet, at least two telephone lines per connection and access to content.

The new platform will be able to provide a wide range of services including free voice communication between TelePassport subscribers, additional telephone lines, specified speed internet access, on–line gaming, IPTV free channels/satellite channels or terrestrial, subscriptions channels, musical programs on satellite radio, near VoD, TSTV (Time–Shifted Television), PVR (Personal Video Recorder), TV video telephone, on line betting, tele–marketing, tele–medicine, TV mail and info services such as news, cinema, and hospital information.

Mr. Richard J. Guo, Vice President of ZTE International Marketing Department said: "ZTE is present in more than 20 countries in Europe. Greece has been our center in the Balkans since 2002. After our successful development and commercial disposition of triple play in many countries worldwide, this is our first installation in Greece. I would like to thank TP for the excellent cooperation. Our advanced products and services combined with TP's wide experience of the Greek market will benefit the Greek consumers."