

# TD-SCDMA – China's chance

**TD-SCDMA (3G) mobile technology has enormous potential in the largest mobile market in the world, with sales of over five million handsets a month. China has no wish to be dependent on Western technology, and this has led to investment in the new standard. TD-SCDMA enables the rapid spread of telecommunications to thinly populated areas, and the broad transmission bandwidth also provides access to the Internet.**

As the mobile world waits for the Chinese authorities to award between two and five 3G licences in the next six months, Klaus Ahlbeck of the Danish company RTX Telecom anticipates that the TD-SCDMA standard will become a key technology for the Chinese. Currently, only four or five companies in the world are familiar with the third generation technology developed by CATT, the China Academy of Telecommunications Technology, along with Datang and Siemens. On the basis of the insight that Klaus Ahlbeck has gained through several visits to China, he thinks that the Chinese standard will open the door to a market of unprecedented proportions.

Up until the new millennium, the West treated China as a developing country as far as telephony was concerned, as even landlines only really existed in the larger cities. In the last couple of years, the mobile telephone has proved to be a cheap way of expanding telephony outside the cities. The use of cellular phones has exploded so fast that at the start of the fourth quarter of 2002, the world's most populous nation had 190 million mobile phone users, or almost as many as those using landlines (207 million). With sales of mobile phones averaging five million a month, the Chinese authorities are keen that the country itself is in control of cellular technology. They are acting on the principle: you can trade with us if you give us access to your technology in return, thus helping your own telecommunications industry.

The millions of phones currently being sold use GSM or CDMA technologies, and China Mobile, the largest mobile operator in the world, still uses foreign-made base stations, networks and terminals. Over the next seven to eight years, the Chinese will achieve an economic level where everyone can own a mobile phone and "It is certainly one of the goals of the Chinese that the growth in value takes place in China," Klaus Ahlbeck says.

However, China joined the WTO in 2001, and in the very near future, foreign manufacturers will thus have access to the enormous Chinese market with their 2G and 3G products based on such standards as UMTS. This means the Chinese have to make the decision to give priority to their own 3G standard TD-SCDMA in order to give their domestic industries a boost. Nonetheless, this means that the Chinese will have to work together with Western development companies, such as RTX Telecom, that have been developing TD-SCDMA technology for handsets since summer 2000.

Klaus Ahlbeck identifies another reason for believing that TD-SCDMA will be the 3G standard of the future in China: that the public authorities have allocated the bandwidth frequencies 2300–2400 MHz without revealing what it will be used for. "We think they will use the technology as a kind of wireless landline – wireless local loop – in villages, as the majority of the Chinese still do not have access to a telephone either at work or at home." As regards the Internet, a landline will always carry higher data speeds than a wireless network, but TD-SCDMA can provide up to 2Mbp/s, which will cover the needs of China for many years to come.

If the Chinese succeed in applying their own 3G standard to both the mobile network and as a substitute for landlines, they will have a technology that they can export to developing countries throughout the world and to their neighbours in the Far East. "If they have a proven technology within three to four years, they really will have export potential." The Danish development director thinks that China wishes to perform the same trick as Japan and Korea and embark on a technological adventure.

Last year, China turned out 465,000 trained engineers and scientists, and so approached the numbers pertaining in the USA. In three to four years, they will also be as highly skilled as the Americans and start to outdo Silicon Valley.

The concept of pervasive computing that is expected to come to the fore in the next decade is yet another reason to think that there is a great future in store for TD-SCDMA. Analysts predict that the demand for M2M communication will exceed that for mobile telephony. Monitoring water levels in rivers and reservoirs and using pumps and alarms can all be performed via the cellular network. Once again, the development director at RTX Telecom considers that the Chinese wish to master a technology themselves to ensure that they are as independent of Western technology as possible. "In ten years' time, the Chinese will be able to roll out TD-SCDMA fully, whereas today they need to ask for development assistance from companies like us."

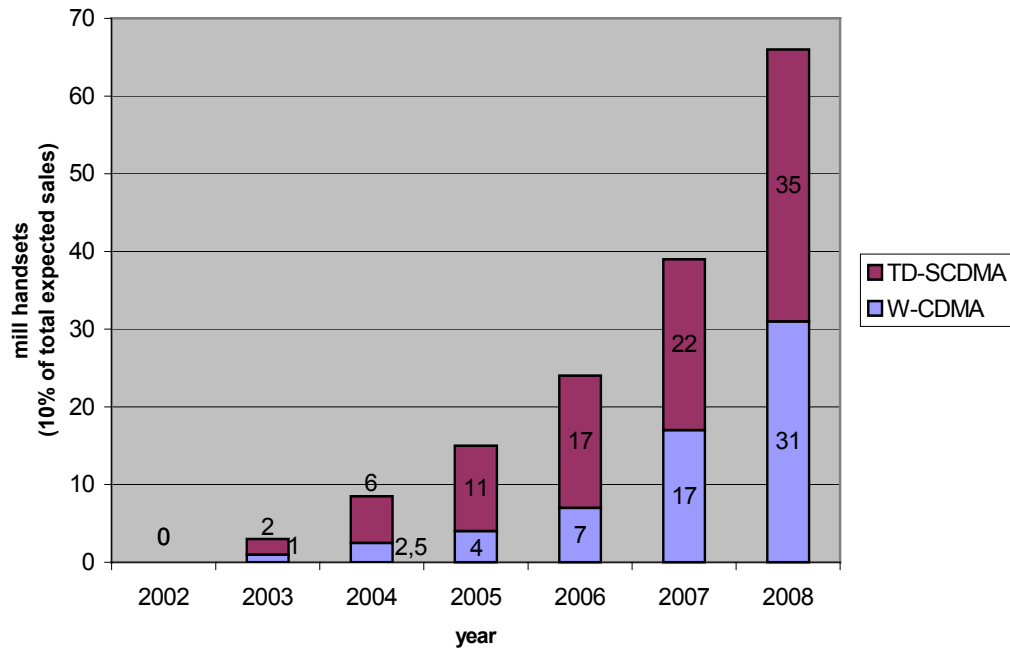
However, the strongest argument of all for predicting that TD-SCDMA will be the 3G future for China is in the technology itself: TD-SCDMA builds directly on a development of GSM, which is a technology that the Chinese are already familiar with. The leap from GSM to TD-SCDMA will thus be less painful than moving to UMTS, an evolution rather than a revolution. The interim fate of UMTS in Europe will also make the Chinese think twice when selecting their 3G solution.

As TD-SCDMA is an evolution of GSM, the products will not cost a great deal more. Putting TD-SCDMA onto a GSM phone will be fairly inexpensive, whereas it costs four times as much to put UMTS on a GSM phone. TD-SCDMA can also build on all the advantages of GSM, and could therefore well become cheaper and cheaper both as regards the network and the handset.

During a TD-SCDMA field trial in Beijing, it was possible to make video calls from a car even at a speed of up to 125 km/h and up to 21 kilometres from the base station – without any noticeable loss in quality. Furthermore, TD-SCDMA has a high spectrum efficiency as it does not require separate bands for uplink and downlink and has a flexible asynchronous data rate ranging from 1.2 Kbp/s to 2Mbp/s in both directions, making it well suited to Internet traffic.

There are two or three groups in the world currently working on the standard for the critical type approval of telephones for a TD-SCDMA network, and RTX Telecom is editing the specifications for type approval of TD-SCDMA terminals. The company is currently testing a prototype with Siemens ICM N, using calls over the Siemens TD-SCDMA network. RTX Telecom also has contacts through Siemens with Agilent, which is developing test equipment for use in laboratories measuring whether individual TD-SCDMA telephones meet the requirements. Klaus Ahlbeck concludes "The basic technology is in place, but the TD-SCDMA standard is still somewhat immature. Many of the specifications requirements are still vague, which is why it is essential to be in contact with those few who have a thorough knowledge of the technology. When we, as a development company, talk about customers, we not only mean the Chinese themselves, but also Nokia and Motorola. We took the risk and went ahead with the development of TD-SCDMA, while the large manufacturers decided to develop UMTS."

## Sales of GSM/TD-SCDMA and GSM/UMTS handsets in China

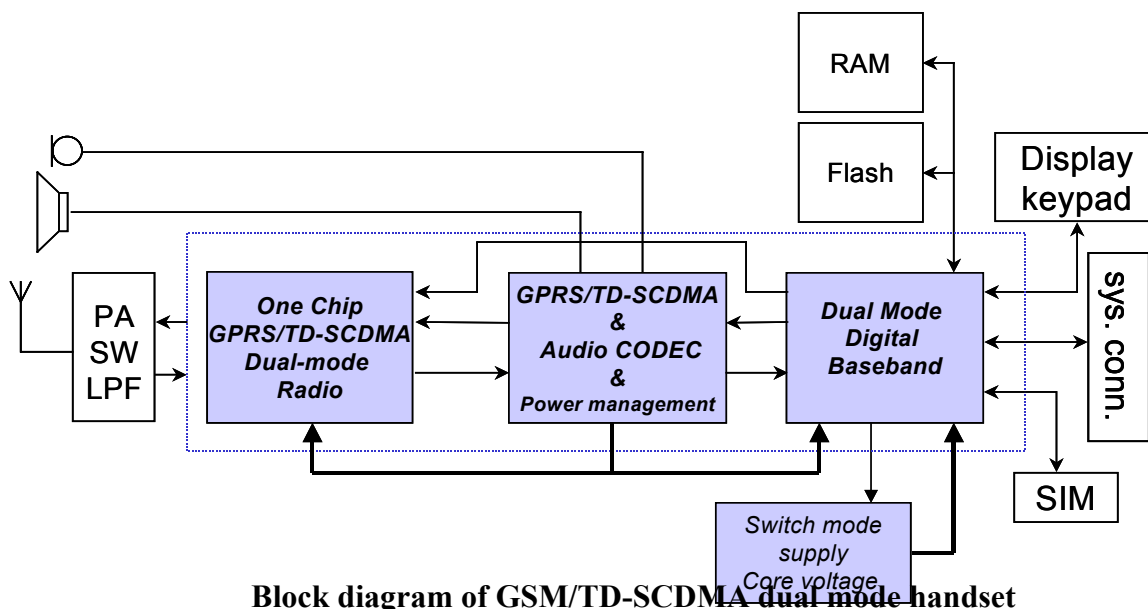


RTX Telecom is currently working on introducing the company's know-how into chips, typically made by manufacturers who also develop and produce GSM chips. TD-SCDMA chips are expected to come onto the market in 2003, when they can be used in a manufacturer's products, possibly in China, which can then launch a TD-SCDMA mobile phone onto the market in the first half of 2004.

### Facts

GSM/TD-SCDMA dual-mode handsets can achieve the same level of integration as the currently existing GSM/GPRS telephones and will be only a little more expensive than the GSM/EDGE handsets that will be standard for GSM in 2004.

This is because, like GSM, TD-SCDMA is in essence a TDMA technology, and therefore does not require a duplex filter to separate a signal transmitted to the base station from the signal received from the base station. A duplex filter is big, expensive and increases the electricity consumption of the handset. With modern direct conversion receiver and transmitter circuits it will be possible to implement virtually the entire handset as integrated circuits, thus taking full advantage of Moore's Law, which means that for decades electronic products have become cheaper and cheaper while offering more and more features.



- The technology was developed by the China Academy of Telecommunications Technology (CATT), Datang and Siemens.
- Asynchronous uplink – downlink, suitable for Internet traffic.
- Large cells, with a diameter of up to 40 km.
- Good mobility: at least 120 km/h
- Accepted by the International Telecommunication Union (ITU) in April 2001 as a 3G standard.
- TD-SCDMA has three principal advantages over other 3G standards, all of which are important in cities:
  1. Most efficient use of the frequency spectrum
  2. Efficient use of smart antennae
  3. Uses the optimal Joint Detection as receiver algorithms
- Enables the reuse of the GSM/GPRS infrastructure
- Large capacity in the network for voice transmissions
- High data transfer speed – up to 2 Mbp/s asynchronous both ways
- Siemens forecasts that there will be around 40 million TD-SCDMA users in 2005.

Critical development areas for TD-SCDMA:

- The combination of TDMA and CDMA radio technology
- TD-SCDMA level 1 software
- Joint Detection receiver algorithms
- Integration of GSM and TD-SCDMA

