China Mobile's large-scale bidding for the deployment of 200,000 LTE TDD base stations across 100 cities concluded in August 2013, marking a new era in the commercial utilization of the technology. Pilot deployment commenced in 2010, and has since spread to thirteen cities across China, making for what is already the largest LTE TDD deployment by any operator, but still just a warm-up for the world's largest mobile carrier.
China Mobile is now facing huge challenges with the cost-efficient adoption of advanced technologies that facilitate business expansion and assure QoE in the wake of business transformation. Thus far, it has vigorously promoted the standardization and industrialization of LTE TDD technologies. As of 2012, China Mobile expanded its pilot LTE TDD networks to 13 cities, accounting for some 20,000 base stations.

Hangzhou: LTE TDD on the go

As networks proliferate, new sites are becoming scarce, and network deployment is shifting from an RAT to an area basis to compensate. Based on its legacy GSM and TD-SCDMA infrastructure, China Mobile plans to construct commercial LTE TDD networks on a scale never before seen, with great efficiency in terms of time and cost.

Hangzhou, in eastern China’s Zhejiang province, was one of the six initial cities to host the first wave of pilot deployment, and China Mobile’s local branch there managed to employ legacy 3G network equipment to enable smooth evolution to LTE TDD. Through function verification tests carried out at the site, cluster, and overall level, China Mobile Zhejiang (Zhejiang Mobile) pioneered an evolutionary process through just a single pair of boards, one piece of optical fiber, and one software package for each site. In addition, Zhejiang Mobile proposed an innovative performance improvement program for LTE TDD networks working on Band F that improved system throughput by 17% through the special subframe configuration of 9:3:2. This resolved key technical issues and thus enabled the subsequent large-scale deployment of LTE TDD.

To overcome the lack of LTE TDD terminals, Zhejiang Mobile promoted TD-Fi, where users enjoy LTE TDD access via Wi-Fi on certain transit lines. On March 15, 2012, Hangzhou’s B1 bus line became the first in the city to support LTE TDD, giving its fortunate passengers free online surfing experience through special Wi-Fi access points.

In 2013, Zhejiang Mobile has made great efforts to improve user experience, especially for users at the cell edges. Thanks to the joint efforts of macro and microcells, carrier aggregation of Bands D and F, and implementation of Huawei’s LampSite housings, users at the edges can enjoy a guaranteed data rate of 5Mbps, with a maximum reaching 100Mbps (70Mbps on average).

What’s more, Zhejiang Mobile has explored applications for smart transportation, smart healthcare, smart campus networking, and smart city management, with Hangzhou’s citizens enjoying the benefits in the form of a digital lifestyle as integrated as any in China.
In 2013, China Mobile initiated its program of deploying over 200,000 eNodeBs in 100 cities, serving some one million LTE TDD terminals initially.

Currently, China Mobile serves roughly 20,000 subscribers with LTE TDD CPEs in Hangzhou. As LTE TDD terminals proliferate, more and more people can enjoy the convenience brought by mobile ultra-broadband.

**Shenzhen: Unified 3G/4G**

LTE TDD made its Shenzhen debut during the 2011 Universiade games. Thanks to the stability of the constructed network, a live HD broadcast of the torch relay was available, as were a variety of other HD features. LTE TDD supports video shoot-and-transmit functionality, making those ubiquitous vans with satellite dishes unnecessary. Onsite scenes were transmitted in real time via a terminal installed onto a camera, making the work of journalists much smoother.

China Mobile Shenzhen (Shenzhen Mobile) advanced the notion of 3G and 4G networks being planned, deployed, optimized, and maintained in a unified manner. During the planning stage, legacy TD-SCDMA infrastructure was utilized to facilitate careful planning for LTE TDD, based on the latter's network structure. During construction, TD-SCDMA hardware supported LTE TDD so that dual-mode sites could be put in place. What's more, during optimization, LTE TDD parameter modification did not affect the TD-SCDMA network, while both were maintained through a unified network management system, dramatically reducing the OPEX involved.

Shenzhen Mobile has since rolled out additional LTE TDD infrastructure to cover certain residential areas, facilitating a superior user experience for its upscale users involving applications and services such as multimedia broadcast multicast service (eMBMS), IPTV, and smart TV.

**Chengdu: LTE TDD moves in**

Chengdu is one of the largest cities in the world and China's major industrial hub in the interior. On December 8, 2012, at the sixth China Mobile Migu Music Festival, China Mobile Sichuan (Sichuan Mobile) announced the launch of Chengdu’s first LTE TDD network. At the press conference, Jian Qin, General Manager of Sichuan Mobile, made history with the first VoLTE video call via mobile phone in China.

During the following June, Sichuan Mobile deployed over 600 LTE TDD eNodeBs for the twelfth Fortune Global Forum, covering vital areas of transit such as freeways, subway lines, five-star hotels, and exhibition halls. It also set up 4G network experience zones in 19 service centers in Chengdu, demonstrating innovative LTE TDD technologies and applications to subscribers. For
example, the download rate was demonstrated as achieving 1Gbps thanks to carrier aggregation technology, which meant that a 4GB movie could be downloaded in less than thirty seconds. What’s more, Sichuan Mobile demonstrated a typical Internet of Vehicles (IoV) application involving real-time HD video surveillance, giving users a glimpse of things to come.

**Shanghai: A smarter city**

At the 2010 World Expo, China Mobile’s LTE TDD network dazzled international audiences with the Chinese debuts of such LTE services as mobile HD conferencing, mobile HD video surveillance, shoot-and-transmit functionality, and HD VOD. Its LTE TDD network for the Expo Park covered 5.28 square kilometers of outdoor spaces, as well as important venues, such as the China Pavilion, theme pavilions, the Expo Axis, and the arts centers.

On May 17, 2013, World Telecommunications and Information Society Day, China Mobile Shanghai (Shanghai Mobile) held a conference where a variety of LTE-enabled services were demonstrated. Scenes on buses and ambulances were recorded and transmitted to the monitoring center, with crystal clear HD imagery stunning the crowd on the big screen. This technology could someday facilitate far safer health and transportation systems as experts at headquarters can take in the situation without relying on imprecise onsite descriptions, and give out the proper instructions accordingly. Currently, Shanghai Mobile is in the midst of a large-scale LTE TDD rollout, which will deliver the data rates, applications, and overall intelligence to create a smarter city for tomorrow.

**A bright future**

In 2013, China Mobile initiated its program of deploying over 200,000 eNodeBs in 100 cities, serving some one million LTE TDD terminals initially. Xi Guohua, Chairman of China Mobile, predicted that with the joint efforts of Global TD-LTE Initiative (GTI) operators, there would be over 500,000 LTE TDD eNodeBs serving more than two billion people worldwide by 2014.

To meet future challenges, Li Yue, China Mobile’s CEO, suggested that voice services will continue to be one of the most important services provided by LTE networks and will integrate with other services for better user experience. Meanwhile, China Mobile released its VoLTE commercial deployment plans and a whitepaper during the Mobile Asia Expo 2013, with the former likely to see a commercial launch in Q4 2014.