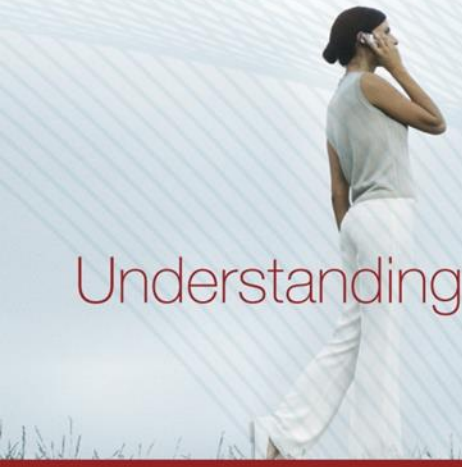

IDATE Research

Wireless

TD-LTE

Adoption and challenges around TD-LTE

M14305IN1 – March 2014

This document is a part of our "Wireless" category which in 2014 includes:
- One dataset in Excel, updated twice yearly
- One state-of-the-art report in PowerPoint, updated twice yearly
- Four market reports in Word, each with its synopsis in PowerPoint
- Privileged access to our lead telecom strategy analysts

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DIGIWORLD by IDATE

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Basile Carle has been an IDATE consultant since April 2008.

After completing his thesis on the potential of WiMAX technology for broadband access on the French consumer market, he specialised in the mobile industry. There, his analyses took him along the entire value chain, from semiconductors to end-user devices and services. Now, as our lead analyst on mobile devices and platforms, he also keeps a close watch on the evolution of mobile networks. His current focus is on LTE-A features – notably interference mitigation, heterogeneous networks and carrier aggregation – and operator strategies.

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Contributor

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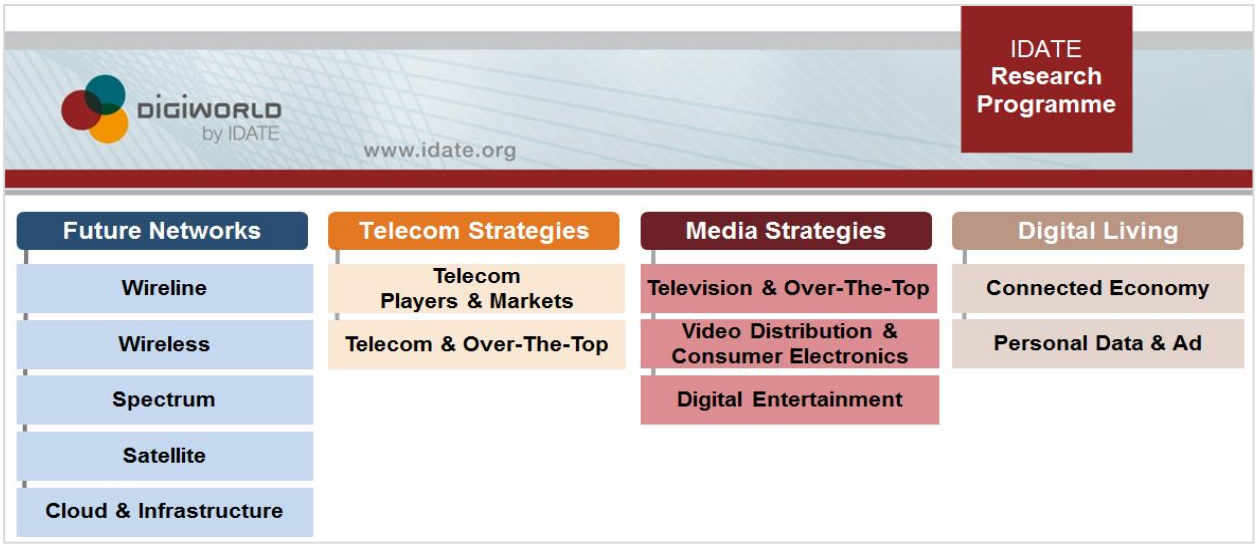
About IDATE and DigiWorld Institute

Founded in 1977, IDATE has gained a reputation as a leader in tracking telecom, Internet and media markets, thanks to the skills of its teams of specialized analysts. Now, with the support of more than 40 member companies – which include many of the digital economy's most influential players – the newly rebranded DigiWorld Institute has entered into a new stage of its development, structured around three main areas of activity:

- **IDATE Research**, an offer of market intelligence publications
- **IDATE Consulting**, time-tested analysis
- **DigiWorld Institute**, a think tank on the digital economy



Contact us for further information on our publications

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Tables & Figures

2. Methodology

The methods employed by IDATE's teams of analysts and consultants are based on an approach that combines:

- research and validation of data collected in the field;
- the application of classic industry and market analysis tools: segmentation, competition analysis, strategic strengths, modelling, assessment and forecasts…;
- the expertise of specialists who contribute their own analytical capabilities and those of their network of market analysts.

More specifically, the tools employed by IDATE's teams are as follows:

1/ A multi-disciplinary team of full-time consultants, specialised by sector of activity

IDATE's analyses are performed primarily by our in-house consultants, and very occasionally by freelance market analysts. This approach allows us to capitalise on our pool of expertise through teamwork, sharing knowledge, ideas, contacts, viewpoints and key data. Each report is drafted by a team of specialists, overseen by senior consultants with a proven track record in their field.

2/ Primary and secondary research

IDATE reports and databases are compiled based on primary data obtained from one-on-one interviews with the sector's decision-makers, and on secondary data which is established by cross-referencing public sources and external databases.

3/ An integrated information centre sustained by a number of tools and proprietary databases

Over the past 30 years, IDATE has established working and data organization methods and proprietary databases that trace the central chapters in the history of our sectors of expertise.

- Companies: IDATE's in-house data service tracks the latest news and events to come out of the top telecom, Internet and media industry companies around the globe. Innovative firms and start-ups are monitored by the market experts in the different "Practices".
- Markets: IDATE's databases are derived from rigorous processing of fundamental economic variables (GDP, investments, exchange rates, demographics, etc.) and their relation to decisive sector-specific and national elements (capex, national market dynamics, etc.).
- Technologies: IDATE's organization by Practice provides us with an efficient means of tracking innovation. IDATE's engineers ensure in-depth understanding of the changing shape of products and services and of the latest innovations in the marketplace.

4/ Contents of the published reports

Each IDATE market report details the structures and issues at play in the market being examined, the decisive forces (technologies, regulation, consumption) and the players involved. Particular emphasis is given to market assessments and forecasts, as part of the central premise. All market reports are laid out in a clear and concise manner, and illustrated with tables and graphs of key market data and trends.

The process of drafting of a market report includes the following stages:

- analysis of the information available in the in-house databases, and review of analyses performed in the recent past;
- based on a preliminary segmentation and assessment of the market, and as part of an validated interview guide, analysts conduct interviews that enable them to validate working hypotheses;
- a market model is then established, making it possible to test the hypotheses that have an impact on the market's development, and validated by a new round of interviews;

- and, finally, the report's conclusions are debated with the team responsible for the project and with expert consultants from the various fields involved;
- a final proofreading and editing/revision process, prior to the production of the final version of the report which is delivered to the client.

5/ Market assessment and forecasts

- Primary data gathering worldwide.
- Market models which isolate key service consumption parameters and service pricing assumption.

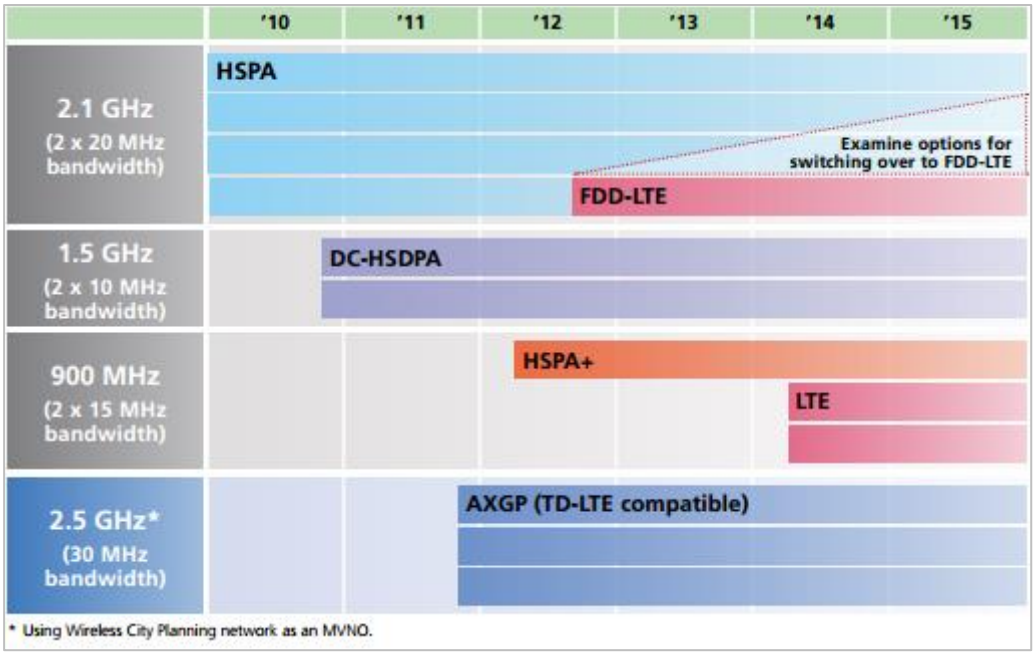
Given that it will be very difficult to provide extended coverage in the 2.3 GHz band, the main issue regarding LTE spectrum in India refers to the availability of the Digital Dividend (700 MHz) for FDD LTE deployment. According to the most optimistic observers, this might have been set to happen in 2013 but a rapid analogue TV switch-off was unlikely in such a short time frame.

Until recently, Airtel only provided data-only devices from Huawei but it announced in December 2013 that it was about to launch smartphone offering in the city of Bangalore. A deal with Apple for its iPhone 5s and 5c, which support the band 40 used by the operator, is still to be announced

3.4.4. Japan (SoftBank)

SoftBank was the first operator to launch a commercial TD-LTE network back in February 2012, planning to further complement it with FDD services, which it did a few months later in July 2012, thus operating an hybrid network where FDD would serve wide area coverage and TDD the densely-populated areas. For that matter, SoftBank used 30 MHz of spectrum in the 2.6 GHz band 41, inherited from the Willcom PHS network acquired in 2010. The technology retained was AXGP, a variant of TD-LTE with extra interference management capabilities and a very dense topology. Wireless City Planning is the name of the entity in charge of the TD-LTE network for SoftBank.

Figure 12: SoftBank spectrum resources



Source: SoftBank

At its launch, the carrier covered Tokyo, Osaka and Fukuoka based on 10,000 of the pre-existing 160,000 microcells being redesigned by SoftBank to support AXGP technology. This pre-existing network was fully upgraded to AXGP and extended by new microcells. Indeed, prior to its commercial launch, the Japanese operator announced in September 2011 its intention to invest 100 billion JPY in TD-LTE infrastructure provided by Huawei and ZTE, that was meant to be ready for 100% LTE-Advanced.

At the end of March 2012, SoftBank had more than 30,000 TD-LTE subscribers and planned to reach 1,000,000 subscribers by the end of that year, able to benefit from a downlink speed up to 110 Mbps. The target fixed by the carrier was to provide TD-LTE connection to 90% of the population by the end of 2013. By the end of September 2013, it had already deployed 42,000 base stations covering 92% of the population in Japan (as compared to 29,000 base stations for FDD-LTE in the same period). In December 2013, SoftBank boasted some two million TD-LTE subscribers, planning to have 54,000 base stations by the end of 2014

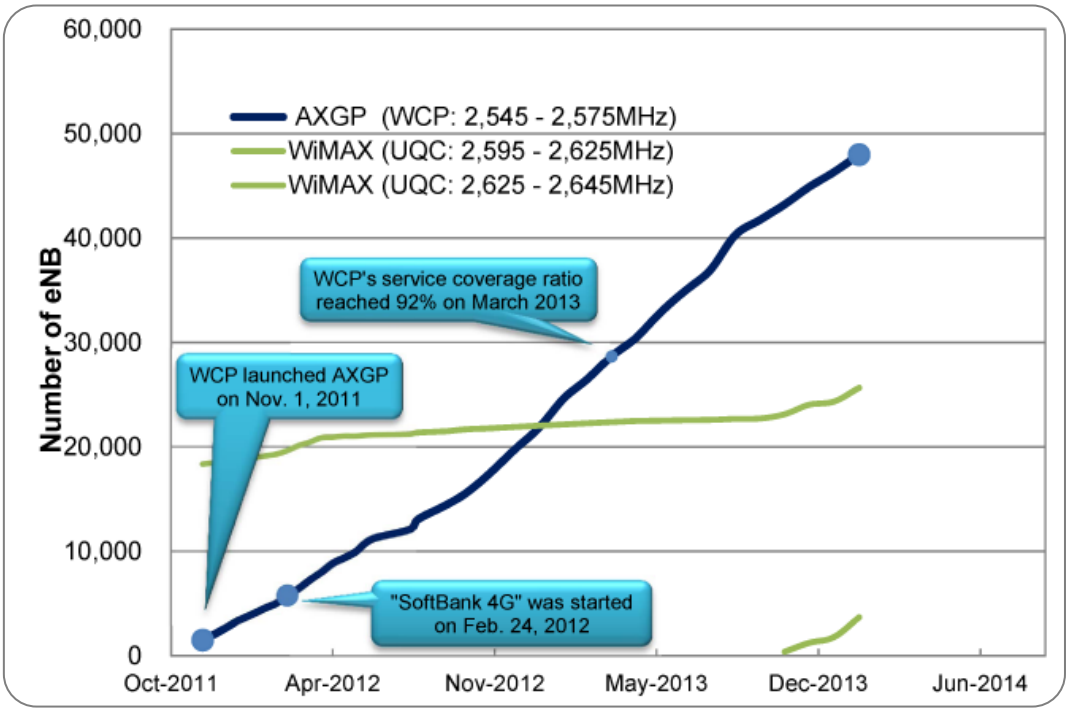
Within the SoftBank strategy, the TD-LTE network is conceived to be primarily rolled out in high-density areas to meet mobile traffic challenges, since the very nature of TD-LTE is more suited to asymmetrical data usages. The network is thus rolled out alongside the LTE FDD network to be used as an offloading solution next to WiFi networks.

Figure 13: SoftBank TD-LTE and LTE FDD coverage areas

Source: SoftBank

National coverage will be reached with its LTE FDD network. The FDD network will provide coverage of the country and the TDD network will bring additional capacity in the main cities. SoftBank indicates that 160,000 microcell sites are available for 4G (PHS) and that there are 150 sites per square kilometre in downtown Tokyo.

Figure 14: TD-LTE cell sites operated by SoftBank



Source: Wireless City Planning

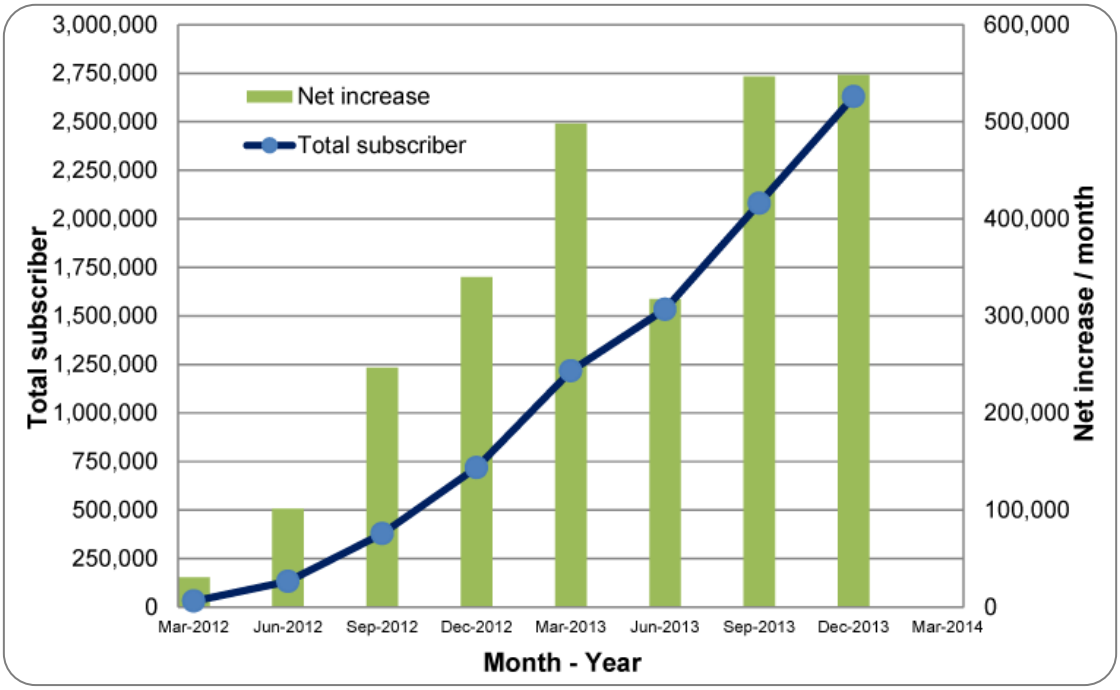
SoftBank is operating a single core network for both the TDD and FDD radio access systems. Load balancing between frequencies will be possible. Data rates offered to subscribers were 110 Mbps in April 2013 using 20 MHz of bandwidth.

Figure 15: SoftBank TD-LTE coverage in Tokyo

Source: SoftBank

At the end of 2013, the operator was offering four different smartphones supporting both FDD and TDD modes and one mobile hotspot.

Figure 16: Subscribers to SoftBank Wireless City Planning TD-LTE



Source: Wireless City Planning