Almost three years back TeliaSonera became the world's first operator to deploy an operational LTE network. To date, the world has seen these numbers swell to about 50, and it is expected, these early birds will be joined by another 300 or so (as per current plans) functional 4G networks by say 2015. The growth, to say the least, is more exponential than linear. It is predicted that in this timeframe, almost half the world's Telcos would be operating LTE networks.

It is only to be expected, that those who follow, would like to learn from the journey of the ones who deployed early. Various facets are involved in this learning process – issues involved in technical implementation, the challenges connected to take services associated with this high-end technology to the customers, what have been the returns, what have been the lessons-learned etc. Wireless Watch has made a study of the leading LTE service providers comprising the two years gone by and have highlighted some key points connected with the direction LTE services have taken.

To begin with, as far as penetration of LTE is concerned, it seems to be taking the same route as 3G in its early days, with a customer reach of about 1 – 4% achieved in the first couple of years. The mark-up on the existing premier technology, viz. 3G is about 40% on the highest priced 3G plans. The aim is to appeal to quality subscribers. However, some service providers in America are pricing offerings on both the technologies equally, based on volume. 4G LTE services can be accessed based on availability of coverage and of course the end-user device.

Quite a few Telcos are exploiting 4G LTE to create new business models – a case in point, instead of offering unlimited data packages come up with plans based on tiered quantum of data consumed. Some have been offering attractive over-the-top applications like VoIP, IP TV, and so on. Another model being tried out is to tempt users to give up the fixed wire-line broadband services and to adopt 4G LTE as an alternative. This last objective has not really been achieved, as, on date the LTE customer numbers don’t stack up to much. Regards devices, most are offering similar terminals, namely, tablets, smartphones or dongles. The earlier two should really
aid in the adoption of this technology, as price drops are expected to be much sharper than in the early days of 3G.

Mobile customers are increasing and so are the demands on the networks, both, the air interface and the backhaul. Video and mobile TV will fuel the need for increased bandwidth and the ultimate IPfication of networks. Infrastructure has to be systematically augmented to help the Telcos meet the rising expectations of the consumer. This can be met by transforming to Next Generation Networks (NGNs) and facilitating convergence. As the number of Smartphone and Tablets multiply, the infrastructure should be robust enough to handle the traffic, both, in terms of capacity and quality, enabling simultaneous high quality transmission of voice, data and video.

The increasing number of Smartphone and Tablets has lead to increasing demands on the infrastructure to handle traffic, both, in terms of capacity and quality, enabling simultaneous high quality transmission of voice, data and real-time video. This is in stark contrast to earlier mobile handsets.

However, with voice revenues stagnating, the operators are shifting focus to generating revenues from data, and thus attractive data based services and package plans are being offered to the consumer. This in turn is leading to rapidly increasing uptake of mobile data. Triple play and Quadruple play are the buzzwords and there are umpteen number of smart devices to support these new generation services.

Considering that there were an estimated 5.63 billion 3GPP subscriptions worldwide by June 2012, including, roughly, one billion subscribers for HSPA, the potential for a galloping demand for mobile based value added services and applications is evident. The increasing uptake of mobile data can be supported by examining Telco ARPU figures from mobile data, the rapidly increasing adoption of mVAS, both by individuals as well as corporates and results of papers that augur well for the growth of this segment. This is especially so due to the increasing number of Smartphone and Tablets operating on higher and higher speeds as well as machine–to-machine (M2M) wireless connected devices.
Research on BWA Technology Roadmaps & Ecosystem Development, and its Operator Business Case and Adoption Forecast exist, and will have to be rationally evaluated /further research/studies undertaken. It is not only the Radio Access Network (RAN) to be considered but also the backhaul. Telcos all over the world are investing heavily to deploy 4G mobile broadband all-IP networks. This rapid deployment of 4G can be attributed to operator competition to capture market share among the most advanced subscribers with new smartphone devices and applications that drive mobile data traffic growth. Operators are now deploying 4G mobile broadband networks and services to handle this traffic growth, although the first release of mobile WiMax, HSPA+ and, LTE are all considered by the ITU to be pre-4G technologies. Mobile telecommunications systems are evolving at a rapid rate to enable the broadband services to reach out to the customer. To help achieve this objective, a new technology - Long-term Evolution (LTE) is being developed. It is not just high performance and data rate improvements that characterise this evolution but also the important factors of simplicity, cost and efficiency. These additional factors are of most importance to developing nations, where the future growth in mobile penetration will be at its highest. LTE will provide a cost-effective solution, founded on the principles of robust standardisation and rigorous testing, all of which are derived from a clear understanding of the industry's requirements. The financials for network access provided by fixed wireless operators and wireline operators can be compared. As on date, technology has helped reduce both capital and operating expenditure of fixed wireless over wireline, and as chips become more versatile as well as cheaper this reduction will become even more pronounced in the years to come.

Different innovative and inventive business cases/models would have to be considered, especially if rural/remote penetration is to be achieved, like LTE and 3G+: Next Generation Bundles. Bundles are one of the main ways that Communication Service Providers (CPSs) can package, market, and sell their products and services. Bundles are where one, or a number of services, such as voice, messaging, data, and application usage are combined together with a specific price point. In many cases, a user device comes with bundles of usage. How CSPs bundle their services is dramatically changing. High speed mobile data services, such as LTE, and 3G+, will be the foundation of next generation bundles. This is because the role they play in driving
CPSs revenues and determining customer usage behaviour is increasing in importance, while voice and text has reached a plateau in many markets. The ability to creatively package products and services, led by high speed mobile data, is becoming increasingly important to CSPs. The market leading CSPs who are at the forefront in providing next generation bundles will be the ones who are best positioned to increase market share, reduce churn, grow ARPU, and open new revenue streams from new business models.

CSPs know that if they get a customer on a bundled offer, then their likelihood to churn is reduced. The marketing departments in CSPs promote bundles as a way to save money, and most consumers go for bundles as they provide better value, and control over spending, rather than buying all services separately. The traditional premise for bundles is that they tie customers in with a CSP by providing better value for money and, in the case of multi-play bundles, provide a single CSP to deal with (and also new contractual commitments for post-paid customers). However, customer and market changes are driving next generation bundles to become more sophisticated and offer increased choice for customers, regardless of how they pay for a service, or whether they want the CSP to supply a smartphone or not. As well as changes in customer behaviour, next generation bundles are driven by increasing data and application usage, the squeezing of bandwidth, decreasing voice and text revenue, and increased competition/partnerships with OTT (over the top)/content providers. CSPs are evolving bundles to cater for the requirements of data savvy customers and take account of the wide range of services that can be delivered to any internet enabled device. As mobile data becomes the main element in next generation bundles, any new bundle needs to be supported by a real-time charging foundation, a flexible rating architecture, real-time balance management, and advanced customer hierarchies to identify the relationship of different subscribers and devices in a bundle. As many bundles are composed of buckets of usage shared across concurrent users, the data usage needs to be rated and decremented in real-time to provide an accurate balance and avoid unforeseen overage charges, as well as giving the customer real-time information on balances, and relevant offers and promotions.
Another option is MVNOs. Mobile virtual network operators (MVNOs) are the service providers who offer mobile services without an allotted spectrum by hosting services through commercial agreements with licensed mobile network operators (MNOs). They may have little or no network infrastructure of their own. Usually their services are augmented by product differentiation, brand appeal and existing distribution channels with focused customer segments. This study analyses the need, timing, implementation and possible impact of MVNOs in the Indian mobile communications market through a strategic approach. The Indian cellular market is unique because there are new MNOs still entering the market, mobile services offered are among the lowest-priced in the world, there are many untapped niche segments due to immense cultural diversities, urban areas and rural areas with contrasting teledensity of 95.05 per cent and 16.61 per cent (as at June 2009), and an increasing subscriber base every month (nearly 15 million subscribers are added per month) etc. MVNO policy is under consideration in India. Therefore, an attempt has been made to assay the debate among all stakeholders with regard to MVNO entry in India and present it in synthesis with a comprehensive study of the global MVNO phenomenon. The analysis indicates that, although regulators and customers may benefit, certain barriers (creating a wholesale environment and competition, limited numbering resources etc) have to be worked upon before easing MVNO entry in India in the current scenario, in order to protect the interests of MNOs and MVNOs. A different approach is proposed for the regulation of MVNOs and MNOs in metros and rural areas. MVNO strategy will play a key role in bringing about the agreements with MNOs. It also determines the sustainability of MVNOs in the market and the impact on the stakeholders. By careful consideration and adjustment of these parameters, a possible business case can exist for MVNOs in India in a way that benefits all the stakeholders despite the unique situation of the current Indian cellular market.

Network sharing is another aspect which will have to be explored. Network sharing has long occupied the minds of operators and, while most mobile operators already engage in various forms of sharing, much of this has focused on passive infrastructure sharing as operators remain cautious over the perceived risks associated with active infrastructure sharing. Despite the recent decision by Telstra to end its active network sharing arrangements with Vodafone Hutchison in Australia, the significant capital and operating expenditure (CAPEX and OPEX) savings and the
benefits of a better network in terms of coverage and capacity continue to appeal to many operators. But there are a number of risks and challenges which operators need to manage and control in order to successfully implement a sharing project. Thus by considering different mobile infrastructure sharing models and the issues presented by each, together with how these issues can be managed operators can hope to secure substantial CAPEX and OPEX savings.

This is the picture till now. What will unfold is anybody’s guess. But what can’t be gainsaid is that the next lot of Telcos rolling-out 4G LTE networks and services will scrutinize the early movers experiences closely so as to deduce a further course of action. However each project is a new venture and has issues which are unique, thus one can’t adopt the approach of dittoing what has been undertaken by the early adopters.

As far as the number of LTE customers is concerned, Verizon Wireless is in a league of its own (Table 6.1). The other undisputed fact is that the USA is the largest area of interest, as far as this advanced technology is concerned. Verizon Wireless’s march over its competitors can be attributed to a plethora of devices (about a score smartphones and half that number of tablets) on offer coupled with a vast network and aggressive sales with no mark-up on its 4G LTE pricing.

**Successful Implementations**

Canada is also emerging as a stronghold of 4G LTE, based mainly on the performance of Rogers, which over a period of just six months has increased its LTE customers from a mere 0.2% to a good 6.4%.

However, it’s South Korea where the real action is. On the world stage, SK Telecom has replaced Japan’s NTT Docomo from the second place. Korea’s subscriber base spread ranges from a low of 5% to a high of 20%. Koreans really seem to be ones with an appetite for high speed data (adoption of PON is another example). Though KT Corp entered the field relatively late, it still has 0.86 million customers in just 6 months. This rosy picture can perhaps be attributed to three reasons – all the three service providers have a nation-wide foot-print, a reasonably good suite of devices and finally a negligible mark-up on 3G package rates.
Yota the WiMax giant, has become, in the twinkling of an eye, a LTE behemoth. The majority of its customers were based in Moscow (0.3 million of them), and to comply with governmental regulations, they were all converted to the LTE domain, as brought out, in the twinkling of an eye. This can also be attributed to the perception of LTE Advanced stealing a march over WiMax 2 as far as the ecosystem is compared.

In neighbouring Germany and the Scandinavian nations the numbers are not very encouraging in spite of early deployment of infrastructure and its subsequent upgrading. One can only guess that this may be due to the price differential vis-à-vis the existing 3G package plans. Though, recently, with the competition heating-up, the prices are expected to align with other markets leading to an increase in the number of subscriptions.

### Innovative Packages
It has been noticed that early adopters of LTE priced services based on this technology as a higher-end service as compared to their existing 3G or GPRS plans. Thus the packages may appear pricey, but it appears that they are in keeping with the perceptions of a large number of customers, especially given the much faster downloads.

In the USA the model is different, the service providers are offering both LTE and 3G services purely based on data consumption. Where good LTE infrastructure exists and the customer possesses a good LTE enabled device, the much higher speeds are a bonus.

One of the recent surprise packages has been an innovative marketing plan of Verizon’s (no wonder they are the world-leaders). It is called – “Share Everything”. It is an unlimited voice and SMS offering with a limit on the data (depending on the package), which is shared amongst the different devices of that subscriber, the rates varying depending upon the number of devices. This is, presumably, with an eye on the future, when data would reign supreme and the networks would provide high-speed service to connected devices, this scenario being the major source of Telco earnings.

As far as the network foot-print and the frequencies used are concerned, a couple of deductions can be adduced. Firstly, rapid country-wide roll-outs are possible, South Korea is a case in point (though it is a small nation) – all the three vendors managed this. Secondly, majority of the leading world service providers use the 1700/2100 MHz or 1800 MHz bands (and not the 2600 MHz band).

**Lessons**

In Sweden, both the service providers, Tele2 and TeliaSonera, set off using the 2600 MHz band, but subsequently Tele2 spread to 800/1800 MHz and TeliaSonera added the 800 MHz band. Their country-wide footprint now encompasses about 60%.

Though LTE is a new technology, and its adoption at a nascent stage, one can say that the USA and South Korea and to some extent Japan, are reasonably ahead in the maturity of the
infrastructure coupled with their service offerings and number of LTE clients. To conclude, analysis of their LTE ecosystems leads to the following deductions: service providers have a nation-wide foot-print, a reasonably good suite of devices and finally a negligible mark-up on 3G package rates. The lack of the last attribute has impeded growth in Europe.

As far as the number of LTE customers is concerned, the USA is the largest area of interest in terms of maturity, as far as this advanced technology is concerned. Verizon’s unlimited voice and SMS offering with a focus on the data is, presumably, the future, when data would reign supreme and the networks would provide high-speed service to connected devices – the so called “Internet of Things”, this scenario being the major source of their earnings. However, its efficacy can’t be gauged as yet, as other service providers are yet to follow suit.

The next lot of Telcos rolling-out 4G LTE networks and services will scrutinize the early movers experiences closely so as to deduce a further course of action. Analysis of their LTE ecosystems leads to the following deductions: service providers have a nation-wide foot-print, a reasonably good suite of devices and finally a negligible mark-up on 3G package rates. However, what approach the followers adopt, only time will take.

Regards devices, most service providers are offering similar terminals, namely, tablets, smartphones or dongles. The earlier two should really aid in the adoption of this technology, as price drops are expected to be much sharper than in the early days of 3G. Hence ready availability of suitable devices will not impede adoption, while on the other hand attractive Telco packages can accelerate its adoption.

BWA offers a rare opportunity to the service providers to try out new business models. Some early adopters of LTE priced services based on this technology as a higher-end service as compared to their existing 3G or GPRS plans. Thus the packages may appear pricey. The other different model has service providers offering both LTE and 3G services purely based on data consumption. Where good LTE infrastructure exists and the customer possesses a good LTE enabled device, the much higher speeds are a bonus. Another facet is putting a limit to the data on the 4G LTE plans and making 3G packages without a cap. So ultimately the decisions are with the operators.
Another important aspect is the choice of frequency band (there are at least eight available for LTE - from 700 MHz up to 2.6 GHz), to adopt TDD LTE or FDD LTE etc. Whether to follow the majority (ie. enter into a mature ecosystem), or be a king in one’s own backyard. Anticipate and weigh in competitor strategies or work to ones strengths. Indeed, difficult choices to be made, difficult decisions to be taken and the resultant seemingly insurmountable business challenges. And to win, one would have to take on these challenges and overcome them.

Future

As far as LTE is concerned, change is the only constant with a rapidly transforming scenario. Adoption is exponential, and service providers are putting adequate icing on the cake, to accelerate it further. Recent noteworthy events include the launch of VoLTE in South Korea. SK telecom introduced what it called “HD Voice” packaged with VoLTE enabled Samsung Galaxy S3 phones and extended the service to those already in possession of these handsets by providing upgrades to the software.

As far as India is concerned, besides Airtel’s 4G LTE offerings in four cities, it announced plans to add the metros of Delhi and Mumbai to its coverage. Reliance Jio Infotel, with its country-wide licence, has also been making aggressive moves. It picked Samsung for the roll-out of its network in Mumbai. Telstra has chosen the 1800 MHz band in Australia and has made an initial outlay of 1.35 billion dollars for speedy ecosystem development. Singapore has seen commitments from all three of its operators of an impending start of 4G LTE services.

They would constitute the second wave, and one waits to make analysis of their actions vis-à-vis the first wave, and how the experiences of these combined lot of Telcos would in turn affect operator strategies of those to follow.

Wi-Fi Offload

To reduce the load on the Radio Access Network, Wi-Fi small cell offload constitutes an essential and integral infrastructure element in practically all 4G LTE service provider strategies.
This is especially so as all smartphones and tablets are Wi-Fi enabled and also there is unlicensed spectrum to be had for free. However, the drawback is, as per a study by Ovum, the solutions may be carrier grade, but they fall short of Telco expectations.

One key shortcoming in the eyes of the Telcos, the study finds, is the lack off a smooth hand-off between the mobile 4G network and the small cell Wi-Fi networks. Another requirement is a decision to be made based depending on the device, to choose the best from the available cellular (4G LTE or 3G) or Wi-Fi network. This decision to be made based not only on performance, but also cost, etc.

Not really related to the above, but important nonetheless, is to meet the subscribers’ Quality of Experience expectations. Though the service providers provide Wi-Fi services as an add-on to their 4G LTE plans, the quality of experience, especially when mobility is involved, becomes an issue with Wi-Fi.

Though, the future would see this technological hurdle surmounted with the introduction of PassPoint. This specification of the Wi-Fi Alliance was earlier called Hotspot 2.0. This facilitates Wi-Fi enabled cellphones to automatically find Wi-Fi hotspots, authenticate themselves and connect to the hotspot. Encryption is provided videWPA2. Specification compliant devices have been introduced in the market, duly certified by the Alliance. But the majority of the Telcos are dragging their feet, awaiting the formal Standard.

**Pricing based on Data-rates**

Europe is seeing terrific turf wars amongst the LTE service providers. Prices are low when one arrives at the cost based on per GB basis. Tariffs are based on the data-rates subscribed (as followed by some vendors in the case of DSL). These could be adopted by Telcos in other parts of the world. Wireless Intelligence, in a recent paper has gone on record saying that the average cost of LTE data in Europe is about 2.50 dollars/GB as compared to the average worldwide price of about 5 dollars.
The study has also singled out Sweden as being the nation where the LTE competition is the fiercest as all its four Telcos have also entered the 4G LTE space. It says that the cost of a GB of LTE data can be less than a dollar, while Verizon’s best plan could cost almost 8 dollars for a GB.

An analyst at Wireless Intelligence said that a majority of European Telcos offering LTE services are suffering from an overloaded infrastructure. The reaction has been to do away with unlimited mobile broadband data packages replacing them with pricing plans based on Data-rates coupled with a varied range of data caps.

"This new mobile broadband tariff model, which operators have developed in line with the rationalization of their device portfolios, allows data to be priced on a Quality of Service basis for the first time, with operators offering mobile broadband packages at a range of differently-priced download speeds - as many as six in the case of Vodafone and TMN in Portugal," said their analyst. “This approach allows operators to manage their network capacity in a more revenue efficient way, and further enhance profitability by charging a premium for the highest speeds. We expect this pricing model to spread from Europe to the rest of the world, as more operators deploy LTE and 4G competition ramps up across the globe," he also added. (Value Partners 2012)

LTE – Not a Panacea

In an environment of business uncertainty, markets in doldrums, cut-throat competition amongst the Telcos and a transition from voice to data focused plans, the prevalent mood seems to be that LTE would be a panaceas for all that ails the industry.

China Mobile suffers a poor quarter but reassures investors with promises of accelerated investment in TD-LTE. France Telecom/Orange, deeply challenged by the price war sparked by Free Mobile, promises that its 4G roll-out will put everything right.
And so it goes on – and operators are in danger of falling back into their old habits, of relying on faster networks, per se, for redemption, rather than on delivering innovative services on top of those networks.

**LTE Pioneers**

Strong services, personalization and flexible pricing are the hallmarks of carrier competitiveness, as seen at a small handful of operators. These may be significantly easier to deliver on LTE – because of its capacity and, more importantly, its data-driven, IP-based nature – but they are not reliant on 4G. And many 4G carriers are very far from implementing this important set of changes.

The usual Asian powerhouses are a long way down the road, and some, notably SK Telecom, are starting to reap the rewards with higher ARPU – though only where they deliver innovative services. In such a data-hungry market as South Korea, the largest cellco has seen slides in its ARPU and profits despite huge investment in networks and services, but has begun to see a rebound partly down to 4G, but equally importantly to its SK Planet web services. And of course the LTE roll-out continues to weigh on profits, which were down 54% year-on-year in its most recently reported quarter, to December.

Similarly, Verizon is seeing steady LTE adoption, but how far is this helping its top line results? It certainly moves users to a more efficient network with a lower cost of data delivery, and whose superior customer experience may boost retention. It will also encourage far higher data usage, as already seen among the early adopters – 28% of the carrier’s postpaid base were on LTE as of the end of Q1, but they accounted for 54% of data traffic.

It is not yet clear exactly how Verizon will convert that into revenue and profit. With AT&T snapping at its heels, it does not dare charge an obvious premium for 4G, and has to rely, instead, on using the move to LTE to introduce new approaches to pricing. Its Share Everything plans, initially criticized for being too complicated, have proved popular because they allow several
devices to tap into one pool of megabytes and minutes. But they appear to be the key positive top line driver in Q1, and they are not confined to LTE.

So while LTE is clearly vital to cellcos' ability to deliver new services at lower costs and to differentiate themselves, it is far from an instant panacea for the woes of the mobile sector. 4G-based upticks can be slow to materialize, as the UK's only LTE operator, EE, revealed in its own first quarter figures.

**China and India**

Round the world, China Mobile also needs action from its regulator, particularly to enable it to convert its massive “trial” TD-LTE networks to full commercial status, which will help it accelerate expansion and add new services. Its key weapon to fight against stagnating financial results is to invest more heavily in 4G, to improve its competitive position against rivals China Unicom and China Telecom, and reduce reliance on its unsatisfactory TD-SCDMA 3G infrastructure.

The company recently said it would boost its investment in LTE networks by nearly 50% this year, helping to drive total capex up to over $7 billion for 2013. It reiterated this promise as it posted its smallest profit increase for the past three quarters, for Q113. Net profit was almost flat at 27.9 billion yuan ($4.5 billion), compared to 27.8 billion a year ago, though revenues were up 5.7% to 134.7 billion yuan and the operator added 26.4 million 3G users, talking its 3G base to 114.4 million (this includes the “trial” TD-LTE users). However, high value subscribers remain a small part of Mobile's total base, despite its heavy investments – just 16% of a total of over 700m.

The cellco is expected to mount a tender for 20 billion yuan ($3.2 billion) worth of TD-LTE equipment in May, in preparation for expanding its 4G trials. Overall, it plans to invest 41.7
billion yuan ($7 billion) in 4G this year, part of a far larger $30 billion capex budget for 2013, up sharply from $19.7 billion in 2012.

For 4G, it will install 200,000 LTE-enabled macro base stations, mainly in the 1.9-GHz band, and extending coverage to more than 100 cities. In some cities, it will have to use 2.3-GHz or 2.6-GHz. It will implement a mixture of macrocells and small cells. The former total will rise to 390,000 by the end of 2014 (it has 350,000 3G base stations and 600,000 GSM sites, though many will be overlaid for 4G).

It is working with Alcatel-Lucent on Cloud-RAN and metrocell developments, though other vendors are also participating in these trials, and the actual contracts will certainly be distributed among several vendors, usually with a slant towards local favorites Huawei and ZTE. ALU announced the TD-LTE flavour of its lightRadio metrocell unit (called Metro Radio) at this year's Mobile World Congress.

Mobile will be somewhat limited in its 4G potential until it can get official licences, and its chairman, Xi Guohua, this week urged China's government to issue those before year end. Until this happens, the huge trial networks are not officially sanctioned for commercial use.

Another Chinese Telco, China Telecom has asserted that its BWA roll-outs would adopt the LTE-FDD variety. Its Chairman didn’t mention as to when the licenses for commercial 4G services would be issued by the Chinese government, but said China Telecom would prefer to choose wider deployed FDD-LTE technology over TD-LTE for 4G. “The investment cost on TD-LTE is much higher than that on FDD-LTE,” he said. Wang said China Telecom intends to rent the TD-LTE network from China Mobile if the company were asked to deploy the Beijing-backed 4G technology. “We’ve been discussing with the regulator about this (renting TD-LTE from China Mobile) but it’s still in early stage,” he noted. His comment threw cold water on market expectations that China’s three major carriers will all deploy the LTE-TDD version and to expedite the commercial roll-outs, the Ministry of Industry and Information announced earlier this year that it has set aside a bulk of 190MHz spectrum on the 2500MHz-2690MHz frequency
band for TD-LTE deployment. This led to wide speculations that both China Unicom and China Telecom will also operate 4G service on TD-LTE technology.

China Mobile announced earlier that it would pour 41.5 billion yuan on building “commercial-ready” TD-LTE networks, as the company prepares for the rollout of the 4G services. Wang said China Telecom plans to focus on deploying LTE to major cities first once it starts rolling out its network.

China Unicom has asserted that it will choose FDD technology over TDD for its future LTE network, and plans an initial investment of up to 10 billion yuan ($1.6 billion) to roll out its 4G network. Chairman and CEO Chang Xiaobing said the company will “actively prepare” for the pending issuance of 4G licenses and prefers to adopt a technology roadmap that best fit its business strategy and current network, ie. migrating from W-CDMA to FDD LTE. “The future 4G network must allow us to have a very smooth migration from (our) current 3G network, and we will be standing very firm with this direction,” Chang said at a media briefing on Thursday. An official from the Ministry of Industry and Information has indicated earlier that China will give out 4G licenses by year-end. While there are speculations that the government may issue Unicom a license for TD-LTE, Chang said “there has been no message or pressures from the regulator (requiring Unicom) to adopt the TD-LTE technology.” Chang’s comment comes a day after China Telecom stated it prefers FDD standard for its future 4G network.

As far as India is concerned, Telecom major Bharti Airtel launched the 4G mobile broadband services in Chandigarh, Mohali and Panchkula in March 2013. "This launch is another first by Airtel that further enhances the footprint of mobile broadband in India. Airtel was the first to launch 4G services in India on the TD-LTE platform, with earlier launches in Kolkata, Bengaluru and Pune. Bharti Airtel is also expected to hand-over the onus of BWA roll-outs in the data hungry metros of Delhi and Mumbai to China's Huawei. These licences were bought from Qualcomm.

In contrast with Bharti Airtel Ltd., which has already launched 4G services in the country, GSM service provider, Aircel Ltd. is taking a precautionary approach and is in no hurry to roll out its
Aircel’s Chief Marketing Officer Anupam Vasudev says that the company’s 4G roll-outs may take longer time than what they had anticipated, since the ecosystem is not yet ready. Anupam Vasudev said, “3G services were rolled-out two years back and still the 3G penetration is only 6 percent. On the other hand, the 4G ecosystem too has not evolved yet completely and Aircel’s 4G roll-outs may take much longer time than what we had earlier anticipated.” Aircel has BWA spectrum in eight circles and 3G spectrum in 13 circles. Aircel possesses 4G spectrum in Andhra Pradesh, Tamil Nadu (including Chennai), West Bengal, Bihar, Odisha, Assam, North-East, and Jammu & Kashmir. “It is also about consumer habits... if a consumer is only interested in emailing and social networking, then he/she would not need 4G for that, whereas for watching HD videos the consumer would require 4G service. There is also a need for the consumer to move in that direction, in which demand kind of coming in and consumers start feeling comfortable using high-speed services on their phones. We will have to see, how the ecosystem will evolve, since it is difficult to predict in the world of technology,” says Vasudev. Aircel is expected to roll out 4G services in the current year, however, there is no confirmation over the exact launch date. According to Vasudev, device ecosystem is one of the issues hampering 4G growth. He says that availability and pricing of devices will be crucial for the 4G growth in the country. The company has invested $9 billion for services in the country. Vasudev believes that unavailability of content in different Indian languages is also a barrier for mobile data growth. “Most of the content available over the internet is in English, and that cuts of telcos from nearly 80 percent of the market. So, the ecosystem has to come in the picture now.” He believes that video will be the main growth driver for data services in the country.

The Indian 4G ecosystem is still in it nascent stages and is set to flourish with a number of network roll-outs from the license holders. However, a key challenge in developing the 4G ecosystem has been the devices. Especially so in developing TDD LTE devices because the global 4G ecosystem is tilted in favor of FDD so the device manufacturers tend to focus on FDD devices. This is a key reason why TDD LTE ecosystem is taking much longer to develop. Presently, only fixed data services are being offered by the only 4G service provider, Bharti Airtel Ltd. However, the telecom department has recently allowed BWA spectrum holders to provide voice services over their 4G networks, which means that the market has also opened up
for the device manufacturers. With 4G gaining momentum by each passing month in the country, it seems Reliance Industries Ltd. (RIL) —now Reliance Jio Infocomm—is readying to further catalyse the price sensitive telecom market with some of the biggest disruptions till now. Even before the launch of its first 4G network in the country, Mukesh Ambani led RIL seems to be running ahead of competition with its reported partnership with global smartphone leader Samsung Electronics Co. Ltd. to offer entry-level 4G smartphones for around $100 (about INR 5,500). It is not clear whether the deal is for TDD-LTE or FDD-LTE devices. While Reliance has spectrum in 2.3 Ghz band, which is suitable for TDD-LTE only, recently DoT has started exploring the spectrum swap option wherein the BWA spectrum holders can swap their spectrum with 700 Mhz spectrum. If Reliance goes for swapping its existing 2.3 Ghz with 700 Mhz then it would be able to offer 4G services using FDD-LTE technology. According to a media report, the entry-level Samsung Electronics Co. Ltd. smartphones will be sold with RIL’s data packages starting at as low as Rs 100, while high-end smartphones will be made available at minimum down-payments and the equated monthly installments (EMIs) will be incorporated in subsequent bills at a zero percent interest rate.

Sistema Shyam Networks (MTS India) intends to go in for BWA in a big way hoping for adequate returns on its investments. But is, as of now, adopting a wait-and-watch approach. The plan is to invest about $200 million (approximately Rs 1,093 crore) to roll-out BWA services with effect from next year. The company expects the complete BWA infrastructure to cost about $300 million, and thinks that its existing network will augment the remaining $100 million.

As part of its commitment to roll-out 4G services, Videocon has prepared a roadmap and commenced network planning to provide the next level of mobile communications. The company plans commercial roll-out of 4G services by March 2014.

**Distractions**

Ongoing trends such as disruptive new entrants and MVNOs with low cost bases, and consumer reluctance to pay more for data, will continue, LTE or no LTE. Smart operators need to add value, cut subsidy bills and divert competitive attention away from simple headline pricing and
ARPU. Better quality of service, personalized (not necessarily cheaper) tariff plans, new applications like mobile wallets – all these may help.

Most European cellcos are not yet moving quickly. Only TeliaSonera has announced a shared data plan on LTE, for instance, despite the visible and rapid impact such tactics have made over the water on Verizon. Carriers must beware of repeating 3G mistakes by expecting a faster network to solve all their problems, without tying that to creative, customer-focused thinking on services and pricing (Gabriel, C., 2013).