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HUAWEI

The road from 4G to 5G

According to Ovum's latest analysis, there are 622 LTE contracts awarded until end-Q2 2014 while there is a total of 792 operators globally, writes Dimitris Mavrakis. There is still considerable ground to cover in terms of LTE deployments, especially when considering TD-LTE and emerging markets. Of these 622 declared contracts, Huawei was the leading vendor with 38%, followed by Ericsson with 31% and Nokia with 18%.

Although it may seem LTE network deployments are reaching their zenith, the new network technology is creating something much more important, something that is showing the way towards faster, agile and user-centric networks.

LTE is the first true mobile data network and usage patterns show robust traffic growth and data service adoption in markets where LTE has been launched. If one thinks about it, LTE is not the destination of mobile networks; it is merely the beginning. Although the majority of today's LTE networks may be well under-utilised, smartphone adoption and data awareness is likely to pressure operators to upgrade to faster, newer networks. LTE networks in advanced markets like South Korea or Japan are already illustrating the need for additional measures to satisfy end user demands while operators in these markets are deploying Carrier Aggregation and small cells.

It is clear that networks in five years will be subject to demands that will grow organically from current use models and from other uses cases that we have yet to discover. The Internet of Things (IoT), connected cities, self-driving cars, drones, collaborative economies, Bring Your Own Device (BYOD), 4K video and augmented reality are a few applications that give us a glimpse of the future, one that will have many more requirements on the mobile network. As of end-2014, operators and vendors are starting to outline the next wave of cellular connectivity.

What is 4.5G?

Despite its technical superiority over 3G technologies, LTE is the first iteration towards a high-speed, ubiquitous network. Operators and vendors are discussing enhancements to the LTE specification which are likely to be introduced with 3GPP Release 12 and 13 and include massive MIMO, new spectrum resources (including unlicensed bands), Carrier Aggregation (CA) for wider frequencies, new waveforms (perhaps non-OFDM), tighter integration of heterogeneous networks (hetnets), use of cloud computing and other enhancements to the air interface and radio resource allocation.

These improvements are necessary for two reasons. The first is they must provide a necessary improvement to existing LTE networks that is transparent to end users. By doing so, LTE services will provide additional organic growth opportunities to operators while maintaining a positive user experience.
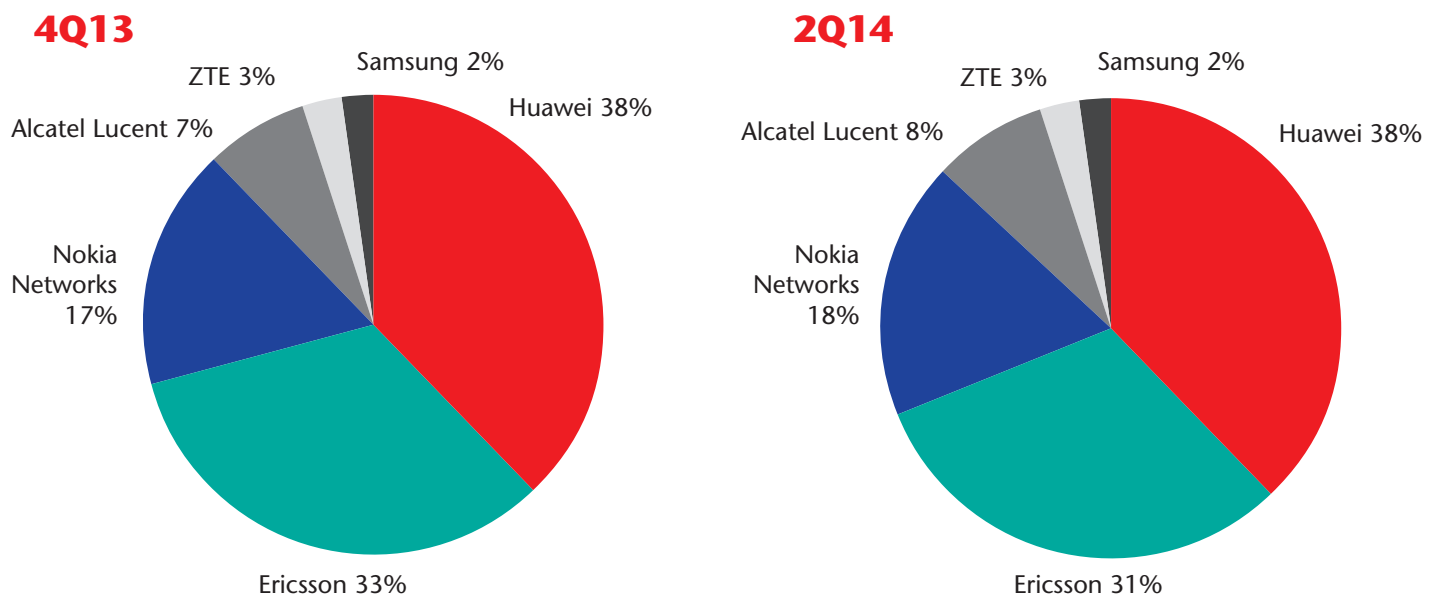
The second reason is that from a technical perspective, 4.5G will create the platform for 5G. Network architectural changes such as hetnets, cloud computing, multiple air interfaces and use of unlicensed spectrum are likely to be the foundation of 5G.

5G: A new technology for a new world

As of Q3 2014, 5G is a collection of service scenarios that require ubiquitous coverage, ultra-broadband networks, support for billions of devices to support connecting living and businesses. 5G isn't just an incremental upgrade to existing LTE networks; it's a technology, business and service revolution. LTE and 4.5G are laying down the foundations for 5G today and providing a glimpse of what's ahead for mobile networks and services. 5G is also not an air interface upgrade alone, but a whole new paradigm for deployment, operations and the internal culture of the service provider.

Dimitris Mavrakis is Principal Analyst at Ovum

LTE contract share by vendor (validated), 4Q13 vs. 2Q14

4Q13

ZTE 3%
Samsung 2%
Alcatel Lucent 7%
Huawei 38%
Nokia Networks 17%
Ericsson 33%

2Q14

ZTE 3%
Samsung 2%
Alcatel Lucent 8%
Huawei 38%
Nokia Networks 18%
Ericsson 31%

Source: Ovum (includes contracts under NDA)

4.5G – the essential technology evolution
Q&A: David Wang, President, Wireless Network Product Line, Huawei

In 2014 Global MBB Forum in Shanghai, Huawei is introducing 4.5G. Can you tell us about the background of the 4.5G?
The short answer is the expectations and demands of our mobile broadband (MBB) world have precipitated LTE user growth, capacity requirements and network performance expectations that simply cannot wait for the homogenized world of 5G to be defined and applied. Our global industry needs to recognise a new evolutionary stage in radio technology to protect LTE investments, allowing business growth to seamlessly continue without any weakening of performance and lessening of end user satisfaction.

Let's look at this in some more detail. In the last five years, we have grown from a voice and SMS dominated era to one which is overwhelmingly dominated by data services to match digital speed-of-life user expectations. Requirements for high definition video experience have increased considerably and the pressure is on carriers to provide a broad spectrum of users with information and entertainment anytime and anywhere.

Huawei has identified nine major wireless applications that can be effectively supported on 4.5G. To name a few: IoT, smart cities, mobile cloud services, mobile video and mobile corporate services. These applications need consistent user experience above the current capabilities of MBB networks.

If we don't introduce a radio technology to accommodate the change MBB adoption has hastened, we are in danger of slowing the very growth MBB seeks to encourage. This is where 4.5G enters the picture.

What are the major network goals for 4.5G?
There are three main drivers being foreseen for 4.5G. These are xGbps peak rate at the user level, end to end network transfer delay (latency) of 10ms, and massive connections up to 100K things per Km2. In a nutshell, 4.5G is the bridge between current 4G network and future 5G that will come around 2020.

What market segments will drive the 4.5G market?
Firstly we see quite a significant potential for 4.5G to extend the scope of mobile office capabilities. There is a strong growth foreseen for mobile cloud and other corporate services that require a more consistent connectivity than today's wireless networks. It addresses multiple network aspects such as short latency and higher throughput. The benchmark here is to get a 4.5G connection as powerful as today any fixed access. In addition there is a clear benefit of 4.5G for providing ubiquitous access to corporate service any place and anytime.

In addition, the corporate market should benefit from the development of narrowband machine to machine which will be fully addressed by a 4.5G network.

Secondly, for the mass market smartphones are getting more powerful and its adoption is faster than was expected. Innovation plays a central role in the smartphone business. Some of those innovations could benefit from the 4.5G; examples of these innovations are the support for 3D and virtual reality capabilities.

Lastly, we estimate new opportunities to develop smart city projects (smart security, smart meter, and smart transportation) by leveraging 4.5G network capabilities.

What is the current status of 4.5G in 2014?
While 4G including LTE-Advanced is covered by 3GPP Releases 10, 11 and 12, for the timeframe of 2010 to 2015. 4.5G should be covered by 3GPP Releases 13 and 14 to cover the 2015 to 2018 timeline. The expectation is that early 4.5G commercial launches will happen by 2016

Huawei see 4.5G as an evolution from 4G, can you elaborate on that?
Huawei recognises that it is important to guarantee a comprehensive evolution from today's 4G.

Firstly, 4.5G network is backward compatible with legacy 4G terminals. Secondly, on the network side, Huawei is working on a smooth migration taking care of today's 4G infrastructure investment when implementing 4.5G. Indeed, 4G networks are viewed as the baseline for the evolution to 4.5G.

Finally, Huawei as an end to end vendor is able to address the complete evolution from 4G to 4.5G and making all necessary research works towards the future vision of 5G.

China Mobile buoyed by iPhone and One LTE's success

The launch of Apple's latest smartphones always leads to fresh records being broken in the mobile industry, writes Graeme Neill. But figures from China Mobile regarding demand for the iPhone 6 and 6 Plus are staggering. Within six hours of the devices being put on presale, two million reservations were made for the 64GB models.

While the new devices are good news for Chinese consumers, they are even better news for the One LTE ecosystem, uniting TD-LTE and FDD-LTE spectrum. According to China Mobile, the iPhone 6 series are global handsets that support TD-LTE/FD-LTE/3G/2G and this indicates that One LTE has become the industry standard for all upcoming devices.

TD-LTE is perfect for handling huge amounts of data traffic; something which will be expected from the larger screens of the iPhone 6 and 6 Plus.

The One LTE ecosystem has been driven by the Global TD-LTE Initiative (GTI), an organisation China Mobile has been one of the key supporters of since 2012. It now boasts more than 100 operators and over 90 manufacturer members globally. China Mobile has ordered 100 million of these devices this year alone.

The strong partnerships and desire to work together across GTI has led to the entry price of One LTE smartphones becoming even more affordable. The cheapest One LTE smartphone now costs only $60. China Mobile's next target is to achieve 70 percent of 4G smartphones priced below 1,000 yuan ($162) this year and extend its partnership distribution footprint to make One LTE devices available for everyone and in every country.

China Mobile has impressed with the biggest and quickest 4G development the industry has seen. It now boasts more than 800 million subscribers, across 2G, 3G and LTE, but is keen to widen its footprint even more. Recently they have sped up their 4G network plan, reaching 700,000 TD-LTE sites by the end of this year and there will be more next year.

As of October 2014, China Mobile has over 40 million TD-LTE users. Given the current 50 percent monthly user growth, it is very confident it will exceed its 2014 year end user target of 50 million, and will hit 150 million and 300 million subscribers in the subsequent two years.

The operator is also reaping the benefits of the changing consumer behaviours of customers using an LTE network. Data usage and ARPU of users has grown six and three times respectively when compared to the 3G and 2G blended average. China Mobile expects its data ARPU will supersede voice ARPU by the end of 2016.

Strength at home and abroad

Of course, China Mobile's rivals are keen to boost their 4G LTE offerings by speeding up their own implementation plans. However, the market leader is confident it will remain ahead of the competition.

China Mobile says: "We are glad to see more 4G developments all over the world as that supports the further growth of the One LTE ecosystem. Domestically, the early 4G commitment of China Mobile enables us to strive deeper in developing the 4G network, devices and services in the future."

So what new services can customers expect? China Mobile highlights innovation with the likes of carrier aggregation, high order MIMO, VoLTE, FDD+TDD convergence, which will bring faster speeds and greater efficiencies to its network. VoLTE and RCS services will be launched next year, with a greater number of LTE-A devices also hitting the market.

The operator could expand its operations further, following its recent investment in Thailand True Corp. Earlier this year, the Chinese government unveiled new rules to allow easier overseas investment by domestic companies. Should the market expect more activity from China Mobile? China Mobile confirms it is looking into some opportunities and are open to exploration with potential partners. It believes data is the general global trend therefore spectrum acquisition is one of the foremost factors to be considered.

Orange sees potential in mobile broadband

There's a strong commercial momentum at Orange, as the pan-European and pan African operator experiences huge growth in demand for mobile broadband. According to Arnaud Vamparys, Orange VP of RAN & Microwaves, demand for its mobile broadband service is almost doubling every year, and the company is making investments in extending its 3G/4G networks to keep pace with demand: "We're seeing new business opportunities throughout the 30 countries in which we operate in Europe, in the Middle East and in Africa. Our customers want to connect more and more devices to the internet. To enhance their experience, we're adding 4G frequencies to be able to offer more speed for our customers and we also have a good densification programme for indoor coverage" Vamparys says.

Orange's 4G networks already cover 71% of the population in France, 66% in Spain, 59% in Poland and 81% in Belgium. It also has 4G services in Romania, Slovakia and Moldova and started 4G+ deployment in France. But Vamparys says the company wants also to diversify its connectivity revenue. Orange sees a major opportunity to grow its financial services business. Orange Money already has over 11 million customers in Africa and grew by 53% year on year to September 2014. The company launched Orange Cash, a NFC prepaid contactless payment solution in conjunction with Visa Europe, in France in early 2014, and has been very pleased with the consumer response to the solution to date.

Orange showcased a number of home technology products and services based on the Internet of Things at its annual innovation Hello show in Paris in October, all engineered to be simple and intuitive to use. Chief among these is Homelive, a home automation and monitoring service that users can control from a smartphone and which Orange boasts brings a "new dimension to smart-home convenience with an unparalleled solution to put your home at your fingertips when you are out", allowing users to remotely adjust the settings on thermostats, light switches, noise, movement and smoke detectors, and other systems.

It also announced a new multimedia hub, Homepoint, aimed at being a central feature between the smartphone and the home, and Datavenue, a platform dedicated to gathering, storing, combining and securing data, for the use of service providers and manufacturers of connected objects. Orange says the IoT platform will make it possible to link data from different sources, such as open data, connected objects and big data from businesses. Datavenue will put large corporations in touch with developers, partners and the manufacturers of connected objects, constructing an IoT ecosystem that promotes the development of innovative services on top of Orange networks.

"We also have Pops," says Vamparys. "This amazing connectivity solution runs on mobile networks using Orange's M2M advanced platforms so our partners can connect easily objects on the move." Pops technology is already available in sportswear. Quiksilver has also chosen it for a connected wristband that will be launched next year. It sends surfers weather forecasts or alerts even when they leave their smartphones on the shore. Vamparys says that it's an exciting environment to be working in currently in France, as there are lots of new start-ups being created to address the internet of objects. Orange networks are perfectly designed to enhance Pops performance.

Vamparys says the company is also looking at low power objects and how it handles these devices on the mobile network. "We want to evolve our public network to connect low power objects and private networks. In that domain, we are working hard on the evolution of our existing cellular networks and in the requirements of a native IoT network, the 5G" he says. As Orange works on developing and rolling out its connectivity products and services based on the latest radio technologies, Vamparys says it will ensure with some leading infrastructure providers it meets a number of fundamental criteria. "We must ensure interoperability," he says. "We have to avoid objects being dependent on each other and their management then becoming a problem for our customers. We also need proper control of the network to assure security, as cloud services become more important to us and we bring the cloud closer to the objects, inside the network through virtualization. We will also need more scalability, as the number of devices and objects on the network grows."

Q&A: LG Uplus, Executive Vice-President Kim SunTae

LG Uplus has been at the forefront of LTE deployment. What are the key elements for LG Uplus to achieve such success?
LTE represents the opportunity for LG Uplus to overcome the evolution and global roaming challenges associated with CDMA. Additionally, it's a chance for the company to take leadership in the market for the first time since its foundation. In Korea, with a rapid introduction of smart phones since 2010, a majority of subscribers are now using wireless Internet services. As a result, data traffic increased at an exponential rate, and since early 2011 the 3G networks could no longer accommodate it.

In 2011, the international standard LTE was adopted by more than 100 common carriers across the world. With LTE, LG Uplus was no longer isolated by technology and has implemented various strategies in stages that have disrupted the competitive landscape in Korea.

The first of these was to change the 3G-oriented market to an LTE-oriented one. LG Uplus elaborately prepared its LTE service at least a half year earlier than rivals and completed its nationwide rollout in just nine months.

LG Uplus has been at the forefront of LTE-A commercialisation, with carrier aggregation (CA) implemented in July 2013. Through a successful demonstration of 3-band CA providing the maximum speed of 300Mbps by binding 2.6GHz broadband LTE with 800MHz and 2.1GHz LTE bands, LG Uplus solidified its position as a next-generation LTE technology leader. LG Uplus was the first in the world to demonstrate 3-band CA in an actual commercial network. With a successful commercial network demonstration, LG Uplus has completed network preparations to commence service to customers immediately upon the release of smart phones supporting 3-band CA function.

What work is the company doing in this area?
Since the commercialisation of 800M 10MHz + 2.1G 10MHz CA in 2013, LG Uplus has been continuously developing LTE-A technology in order to achieve network differentiation. LG Uplus completed a broadband LTE network implementation covering metropolitan areas in only three months since the commencement of broadband LTE services in Seoul and capital area at the end of 2013. In July 2014, LG Uplus started broadband LTE-A service for 84 major cities nationwide. LG Uplus' broadband LTE-A is a next-generation LTE service providing the maximum speed of 225Mbps by integrating the world's top-level 800MHz LTE nationwide network, 2.6 GHz broadband and LTE nationwide network. It enables users to download a 1Gb HD video in just 36 seconds.

What can your experiences as an operator in such an advanced and competitive market as South Korea teach other operators elsewhere in the world?
LG Uplus is a role model for operators trying to evolve their networks from CDMA to LTE. When we started our LTE business, we released dual mode handsets that support CDMA and LTE concurrently and deployed a nationwide network implementation at super speed., While we needed to develop SRVCC (single radio voice call continuity) technology for voice service handover from LTE to CDMA network, SRVCC development required a large amount of CAPEX on core networks and was subject to deterioration of voice quality during the handover.

Since the nationwide deployment, we have been strengthening our network through stabilisation and accumulation technologies, operating a 100% LTE single mode service that can provide voice and data services simultaneously in one LTE network. Moreover, LG Uplus has been leading video communications to deliver new values to customers with differentiated services, such as Uwa, U + HDTV, U + Navigation real and U-flix, by taking advantages of single LTE and the high speeds made possible by our LTE network.

LG Uplus has accumulated experiences that are helpful for the late starters in terms of swift network implementation, LTE network optimization and early stabilisation of VoLTE network. In fact, LG Uplus is already providing consulting services to overseas operator.
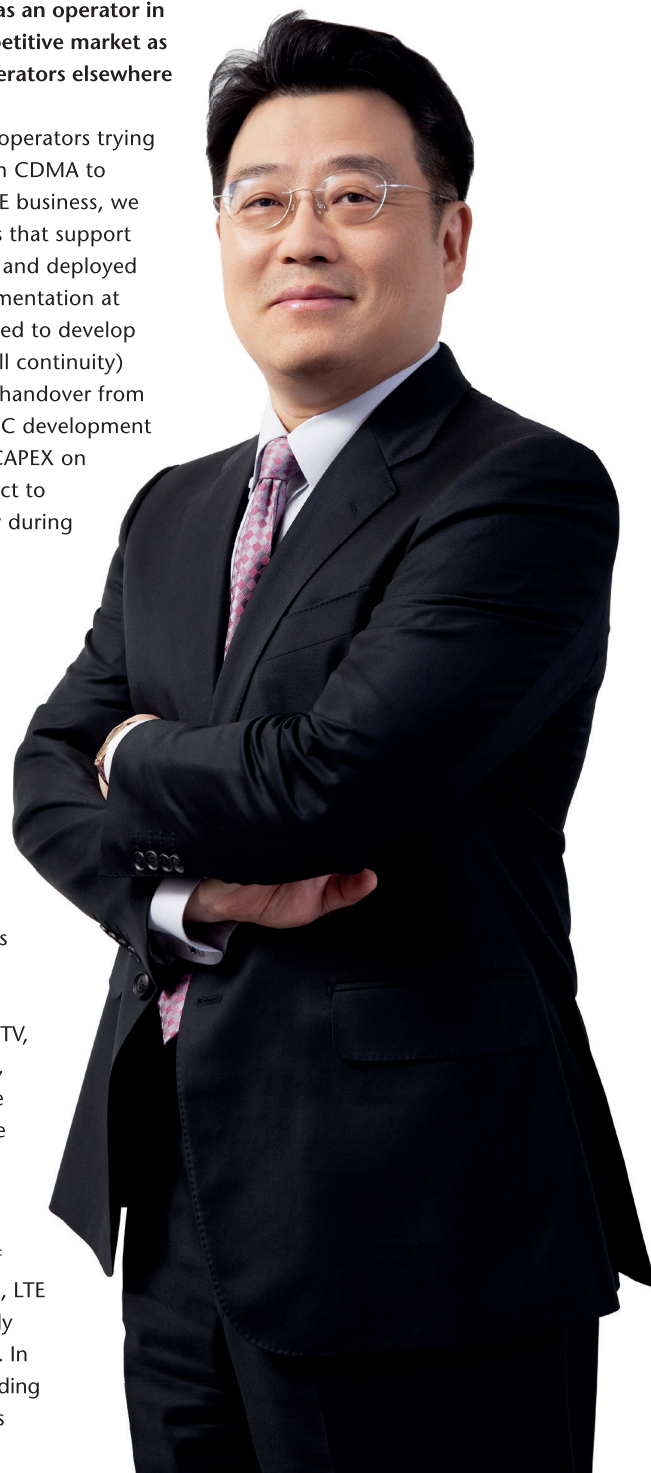
700MHz Sparks excitement about 4G potential

1800MHz spectrum has dominated the deployment of LTE to date, with almost half of the world's 4G networks using the band, writes Eira Hayward. However, there is growing excitement that APT700 spectrum could service more than two billion people, becoming the world's most popular piece of LTE frequency.

APT700 refers to spectrum in the 700MHz band – that is between 698 and 806MHz - which was formerly used for analogue television broadcasting and has been repurposed for mobile broadband services. Its low frequency means it travels well, can carry signal over long distances and also needs fewer base stations to service a much larger area. It can penetrate solid objects better than the higher frequency bands commonly used for 4G mobile networks.

This greater reach and improved in-building penetration makes it particularly cost-effective to deploy and suitable for mobile broadband both indoors and in rural areas. The spectrum has been already adopted for 4G in much of Latin America and Australasia, as well as in Asian markets like Taiwan, Singapore and Japan.

Spark, formerly Telecom New Zealand, owns the largest block of 700MHz spectrum in the country and it has already gained a competitive edge with the roll-out of 4G services on it. The network, which is being built by Huawei, was launched and opened for commercial traffic in the Waikato region in late August with 11 cell sites on the 700MHz spectrum at launch. The roll-out is currently being extended to a number of other areas of high rural demand.

Chief Operating Officer David Havercroft says the company deliberately decided to trial 700MHz spectrum in an agricultural area: "New Zealand is small but diverse nation, across two islands with a topography and landscape that is perfect to reap the benefits of 700. Our rural areas contribute a massive part of New Zealand's economy in terms of tourism and agriculture. They are the two largest single components of the New Zealand economy in terms of GDP contribution and exports and foreign earnings. So connecting them to a fast network is essential. The trial went extremely well, with the services performing above expectation and with very high speeds shown. This has given us the confidence to accelerate our plans."

Spark has been offering 4G services using 1800MHz spectrum for 12 months, and has been trialing the 700MHz spectrum alongside Huawei for some time. Spark has found a 700MHz cell site will cover an area four to six times larger than an equivalent 1800MHz cell site and that a 700MHz signal will propagate through the walls of buildings four to six times better than an 1800MHz signal.

Havercroft says Spark invested NZ$158 million in the 700MHz spectrum auction, more than double that of its competitors. He thinks it will deliver significant benefits. "In New Zealand our rural communities are the real engine rooms of the economy, and 700 MHz spectrum will enable 4G mobile to be delivered as a high quality data service nationwide. Its superior performance and economics will allow for a more extensive and rapid roll-out of 4G mobile broadband services in less densely populated and rural areas than would otherwise be possible. We paid a premium to acquire our spectrum, and it means Spark's devices will be more compatible when customers are roaming in Australia our largest neighbour."

The range of devices compatible with 700MHz spectrum is limited at present. Spark is on track to have 10 compatible devices available to its customers by the end of the year and Havercroft says as more countries free up and repurpose their 700MHz spectrum for 4G networks he expects the current issues over limited handsets and support will disappear. It is already working with a number of manufacturers to broaden the portfolio of compatible mobile devices, he says, and he is confident that it will become the most popular band globally for 4G deployment.

"New Zealand was one of the first countries to clear and reallocate a portion of the 700MHz band to support mobile broadband," Havercroft says. "We're going through a period of huge investments in our network. We had a big 4G roll-out we've added over 1,000 Wi-Fi hotspots (most of them repurposed from public telephone boxes), and at the same time we've built a high speed transport network. The 4G 700MHz strategy to serve New Zealand's rural communities is a critical part of this investment. For us it's about providing the economy - particularly New Zealand's all-important agri-business economy -with a substantial level of service and quality."

Connected car market gets into gear

With connected cars expected to number over 1.3 billion in the next 10 years, the automotive and information technology industries are making the connected car a reality, writes Eira Hayward. The term encompasses a wide range of services and capabilities - from telematics around car maintenance to location-based services and in-car entertainment streaming services - and this means a wide range of service and revenue opportunities for automobile manufacturers, service providers and application providers. Key to the success of the connected car is increasing driver effectiveness, not increasing driver distractions.

Connection options for the car include both embedded modules and tethered options usually focused on the smartphone. Embedded connectivity, a SIM-connected module built into the vehicle, is set grow very quickly. In the next 10 years 89% of new cars sold will have embedded connectivity, meaning 654 million embedded connections worldwide by 2024, according to Chris Nicoll, Practice Head, Networks and Enterprise Research at Analysys Mason.

Add to this mobile tethered connectivity, where technologies like Apple's CarPlay and the Car Connectivity Consortium's MirrorLink enable drivers to access smartphone applications via the vehicle's infotainment system, and that represents 645 million mobile device tethered cars in 10 years, according to Analysys Mason. Today's smartphone-based tethered connectivity options can include automobile stereo access to music playlists, GPS navigation and text-to-speech conversation for incoming text messages to help reduce driver distraction – a key goal of the mobile operators. "There are already more connected cars on the road than you might think," says Nicoll, "but it's very basic connectivity at the moment and most of it is tethered to smartphones."

Increased data speeds and capacity available from mobile networks have made the connected car market a reality. As Nicoll says: "The bigger the mobile pipe, the more you can do with it - streaming audio, video, real time telematics, interactive services - there's a lot you can do if you have a fat 25Mb - 300Mb connection that LTE and LTE-A provides.."

Nicoll also thinks there's an opportunity for operators to provide more than just the fat pipe and move up the M2M value chain by delivering value-added services to vehicle manufacturers. These might include personal cloud solutions based on the profile of different users of the same vehicle, as has been demonstrated by BMW and Deutsche Telekom, or personalised "on-the-go" services to make drivers aware of commercial opportunities along the way (reserved parking spaces perhaps) and greater use of real-time traffic navigation services to help driver re-route around traffic problems, rather than the basic notification services most users see today.

Eastern promise

Asia is leading the way, but there are many factors which can influence the speed the connected car market might grow in the region. In more developed parts of Asia, like Japan, Singapore and Korea, mobile infrastructure is very advanced, commute times tend to be lengthy – the average commute time is South Korea is 40 minutes - income levels tend to be high, and people tend to be early adopters. A connected car provides another platform for mobile services with the added attribute of having greater mobile range.

In less developed parts of the world, in China particularly, there is a burgeoning middle class which aspires to car ownership. China is already the world's biggest country in terms of car production and sales but the government has imposed a number of restrictions on new car licences in order to meet its objectives on reducing air pollution and traffic congestion. "In addition, we think that most vehicles sold in China will be of low to medium cost, but that does not mean that consumers will not be willing or able to pay for connected car services that help people get more value from their vehicle," says Nicoll. "Such solutions will be attractive in places where there is quality 3G and 4G coverage. China Mobile's LTE network should be fully deployed by 2016, for example."

The endgame for the connected car is the self-driving car. Despite the hype and the prototypes, Nicoll thinks this is still years away. "The support system has to be failsafe in every situation, it can't work only 99% of the time. It's got account for every situation, for the child darting in front of the car or an accident. Of course having more and more data coming into a car takes us some of the way towards this but self-driving is still a long way off." In the meantime, drivers are assured of having a smarter car to drive with more data available for information, entertainment, comfort and safety. The connected car isn't just coming. It is already here.