



# Mobile Broadband in the 1800MHz Band

July 2011



Meeting the rising demand for Mobile Broadband services





## Executive Summary

### 1800MHz today

- Approaching half of the world's mobile operators already have 1800MHz spectrum: 351 mobile operators in 148 countries have licenses to use 1800MHz spectrum, according to the GSMA.
- Today, the vast majority of operators' 1800MHz spectrum is used to provide GSM services.
- Mobile operators typically have wide channels, well-suited to capacity for Mobile Broadband services, in the 1800MHz band: more than 60% of 1800MHz spectrum in France, Germany, Italy, Spain, and the U.K. is available in slots of 10MHz or wider, according to Qualcomm (sourcing the European Communication Office).

### Demand for Mobile Broadband

- Global Mobile Broadband connections are set to grow an average of 50% a year for the next three years, according to the GSMA.
- As a result, data traffic on mobile networks is growing exponentially and many mobile operators need more capacity. CSL in Hong Kong, for example, has seen data traffic grow 100 fold since March 2009.

### Why 1800MHz

- The 1800MHz spectrum band could significantly enhance Mobile Broadband capacity, if it were used to deliver LTE and HSPA/HSPA+ services, as well as GSM.
- In many markets, the 1800MHz band contains the widest bandwidth allocation of spectrum mobile operators have.
- Mobile Broadband services at 1800MHz can be delivered by adapting existing GSM base stations, reducing the need for new site deployment, lowering costs and limiting the environmental impact
- The 1800MHz band offers significantly better geographic and in-building coverage than the 2600GHz band, which is being used for many LTE deployments. LTE at 1800MHz provides twice as much coverage as LTE at 2600MHz, according to tests by Elisa, a mobile operator in Finland
- 1800MHz can be used for LTE services in countries where no other suitable bands are available.

### Deployment plans

- Telstra trialled LTE in June 2010. The plan to offer LTE via refarming of 1800MHz and the upcoming release of 700MHz and 2.6GHz. The launch of commercial services will be following Australia's switch off of analogue channels which are not due until the end of 2013.
- CSL, Deutsche Telekom and Telstra are among the operators that plan to launch LTE services in the 1800MHz band this year, while France Telecom Orange plans to launch HSPA/HSPA+ services at 1800MHz this year.

### Device availability

- LTE 1800MHz devices are becoming available: 10% of the 98 commercial LTE devices announced by March 2011 supported 1800MHz, according to the Global mobile Suppliers Association (GSA).
- Several HSPA 1800MHz and dual-mode HSPA/LTE 1800MHz devices will be launched in 2011, according to Qualcomm.

### Decision criteria

Mobile operators' decision on whether to use 1800MHz for LTE, HSPA+ or just GSM depends on:

- Their existing spectrum allocation
- Legal and regulatory conditions
- Future potential spectrum allocations
- Competition and the market environment
- The availability of equipment



## Introduction

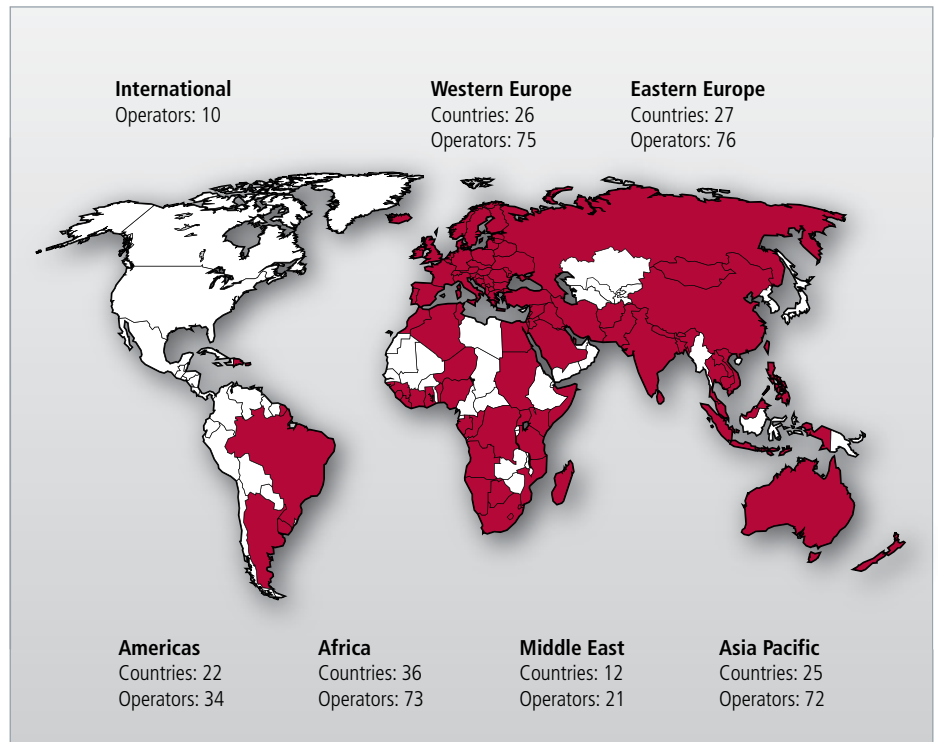
This paper explores the potential to use the 1800MHz spectrum band to help meet rising demand for Mobile Broadband services. It is based on the presentations and subsequent discussion at the 1800MHz HSPA/LTE Workshop hosted by the GSMA and the Global mobile Suppliers Association (GSA) in London during March 2011.

### 1800MHz today

The 1800MHz band is widely-used to provide mobile services. Approaching half of the world's 800 mobile operators (351 mobile operators in 148 countries) already have licenses to use the 1800MHz band, according to the GSMA. Some 151 of the 1800MHz operators are in Europe, 73 in Africa, 72 in Asia-Pacific, 34 in Latin America and 21 in the Middle East (see map opposite).

The vast majority of these operators are using the 1800MHz spectrum to provide GSM services, but in many countries, GSM usage has peaked, or is about to peak, as more and more people buy Mobile Broadband devices that give them fast access to the Internet and other online services. As consumers select devices that support HSPA (as well as GSM), the number of GSM-only devices in use is now in decline in Western Europe and North America, according to Wireless Intelligence. The research firm expects Latin America and Eastern Europe to reach the same tipping point early in 2013, with the rest of the world following suit by the first quarter of 2015.

### 1800MHz – Licences today



**Demand for Mobile Broadband**

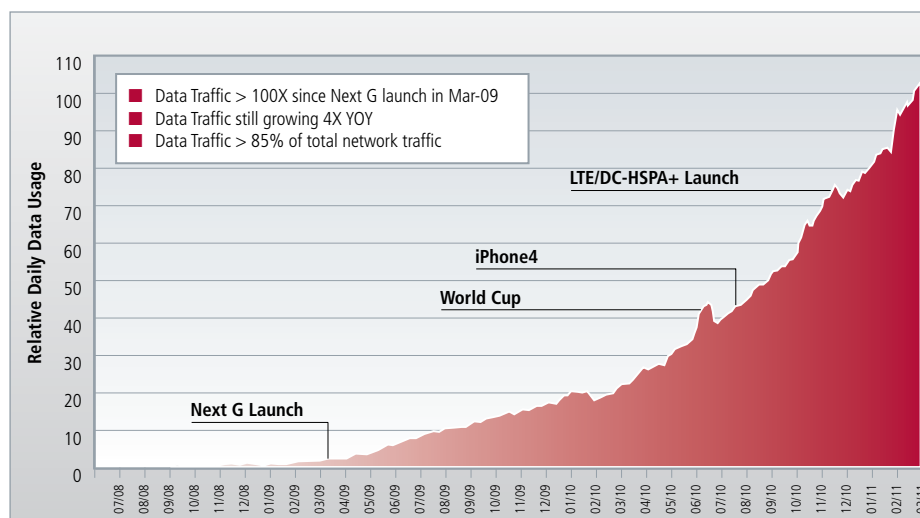
Both consumers and business users now want to access social networks, web sites, corporate applications, email and many other Internet-based services while on the move. To do that, they are buying HSPA-enabled smartphones, tablets, netbooks and dongles (USB modems that can be used to connect a laptop to an HSPA network). In the 19 countries where LTE networks are now live, people are also beginning to purchase LTE dongles and smartphones.

Worldwide, the number of Mobile Broadband connections (HSPA, HSPA+ and LTE) is set to grow an average of 50% a year for the next three years, according to the GSMA. These new connections are driving exponential growth in data traffic on many mobile networks. Some mobile operators now need more capacity in hot spots where large numbers of people go online simultaneously. Telstra subsidiary CSL, for example, has seen data traffic grow 100 fold since the launch of its Next G Mobile Broadband service in Hong Kong in March 2009 (see chart below).

Even after that dramatic surge, the data traffic on CSL’s network is still growing fourfold year-on-year, Paul Wang, Senior Manager for Technology Planning at CSL, told the 1800MHz workshop. “It is starting to concern us, in terms of straining the network. We are really going to hit the 3G wall in two years time, which we would like to avoid.” he said. “Half of our traffic is being generated by smartphones and half by dongles/home broadband. If we can move the dongle/home broadband traffic on to LTE, that is going to open up our capacity for smartphones.”



**The mobile data explosion continues**



Original chart content supplied by CSL



**Why 1800MHz?**

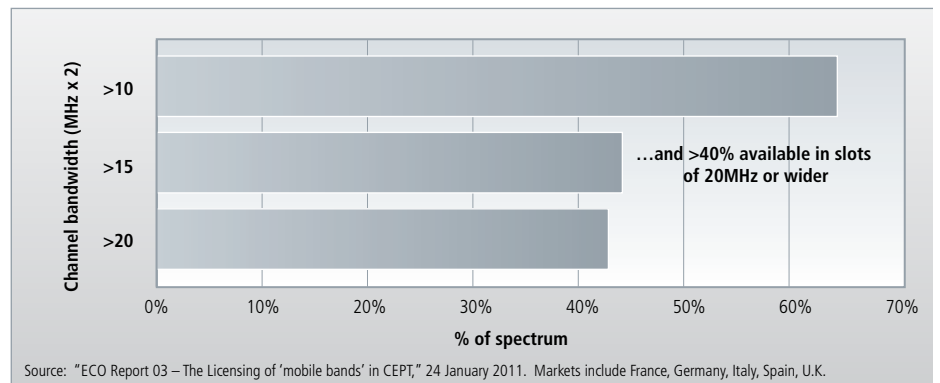
One way to create more capacity for Mobile Broadband services would be to use the 1800MHz band to provide HSPA/HSPA+ or LTE services, as well as GSM. In many markets, the 1800MHz band has been licensed on a technology-neutral basis, making it appropriate to refarm for Mobile Broadband services.

Moreover, the 1800MHz band is made up of 75MHz uplink and 75MHz downlink, according to Ericsson, which means it often accounts for the largest available slice of spectrum available to mobile operators. Deutsche Telekom, for example, says its largest chunk of paired spectrum above 1GHz is in the 1800MHz band in most of the markets where it operates. France Telecom also says the 1800MHz band is the largest band it has in the majority of its markets.

“So, if we want capacity, that is the band,” Glyn Roylance, Head of New Radio Technology at France Telecom Orange, told the workshop. “The capacity issues and requirements are here today and we think HSPA 1800 devices should be quite easy, cheap and fast-to-market...We regard 1800 now as the sweet spot. We could not think of a better band for Mobile Broadband. We are advocates of HSPA in the 1800 band. We see HSPA in the short-term and LTE in the longer-term.”

Moreover, in most countries, the 1800MHz band has been divided up in a way that means that individual mobile operators each have wide channels, well-suited to increasing capacity for Mobile Broadband services: more than 60% of 1800MHz spectrum in France, Germany, Italy, Spain, and the U.K. is available in slots of 10MHz or wider, according to Qualcomm (sourcing the European Communication Office, see chart below). This factor is particularly important for LTE, which needs channels of 20MHz to achieve its full potential performance.

**More than 60% of 1800MHz spectrum in top 5 EU markets available in slots of 10MHz or wider**



Original chart content supplied by Qualcomm

Mobile Broadband services at 1800MHz can be delivered by adapting existing GSM base stations, removing the need for new site deployment, reducing operators' costs and environmental impact. Deutsche Telekom, which plans to launch LTE services at 1800MHz in the summer of 2011, describes 1800MHz as "the most attractive spectrum to bring capacity to urban areas, without new site deployment, meaning minimized OPEX (operating costs) and minimized environmental impact."

Some mobile operators say the 1800MHz band also has the potential to offer significantly better geographic and in-building coverage than the 2.6GHz band, which is being used for many LTE deployments. LTE at 1800MHz provides twice as much coverage as LTE at 2600MHz, according to tests by Elisa, a mobile operator in Finland.

Other mobile operators have come to a similar conclusion. "Our planning calculations support Elisa's results indicating that the 1800 MHz band offers twice the coverage area than 2600 MHz" Peter Stevens, Principal Engineer, RN Strategy, Deutsche Telekom UK, told the workshop. With twice the coverage area you need half as many sites. Deutsche Telekom believes the 1800MHz band is the best option for LTE deployments providing capacity in urban areas as it offers best combination of capacity and coverage performance (see chart below). CSL in Hong Kong also believes the 1800MHz band offers a significant coverage advantage over the 2600MHz band. "For LTE, we don't see how we can offer good coverage with 2600 alone," said Mr. Wang of CSL

**LTE deployment suitability of mainstream European FDD bands**

Spectrum Band	Band Size	Propagation	Utilisation	Antenna system impact	Rural coverage	Urban capacity	Indoor/hotspot
800MHz	↓	↑	↓	↗	✓	✓	
900MHz	↓	↑	↓	↗	✓		
1800MHz	↑	→	→	→	✓	✓	✓
2.1GHz	↗	↓	↑	↓		✓	✓
2.6GHz	↗	↑	↓	↑		✓	✓

1800 MHz band is well suited for Mobile Broadband application when considering a range of criteria

Original chart content supplied by Deutsche Telekom

During trials of Mobile Broadband services in the 1800MHz band in France in 2010, France Telecom "saw coverage improvements and worthwhile improvements in cell throughput at the cell edge," Glyn Roylance told the workshop.

Ericsson says the 1800MHz band also has a key role to play in enabling mobile operators who don't yet have access to 2600MHz or 700/800MHz spectrum to launch LTE services. "1800MHz makes LTE truly global," Martin Ljungberg, Product Manager - Mobile Broadband at Ericsson, told the workshop.



### Deployment plans

Support for LTE in the 1800MHz band is growing. In Hong Kong, CSL began using the 1800MHz band and the 2600MHz band to offer LTE services in November 2010. "We need LTE at 2.6GHz and 1.8GHz for capacity and coverage," said Paul Wang of CSL at the workshop. "We believe we should use the newest technology in new bands."

Deploying LTE at 1800MHz is designed to help CSL improve indoor coverage in densely-populated Hong Kong, where nearly 50% of CSL's base station sites are located indoors or in tunnels, as radio signals travelling at 1800MHz are better at penetrating walls than signals travelling at 2600MHz.

The Global mobile Suppliers Association (GSA) says that Telstra is planning to launch LTE services in the 1800 MHz band in Australia before the end of 2011 and TeliaSonera is also preparing to launch LTE at 1800MHz this year.

Deutsche Telekom also plans to launch LTE services in the 1800MHz band in Germany during 2011. "1800MHz has the potential to become the main band for LTE deployment in the EU," Peter Stevens told the workshop. "DT prefers the newest technology which is LTE. But certainly would not rule out the use of the 1800 band for HSPA."

The GSA says that Vodafone Hutchison Australia, Optus (also in Australia), Elisa in Finland, Bouygues Telecom in France and Cosmote in Greece are either trialling LTE in 1800MHz spectrum or have already conducted trials. In Singapore, StarHub plans to trial LTE 1800 following confirmation by the regulator that the band can be used for LTE, according to the GSA, which also says that Smartone-Vodafone in Hong Kong is committed to LTE 1800 network deployment

Taking a different route, France Telecom Orange plans to launch HSPA/HSPA+ services in the 1800MHz band in the summer of 2011. Glyn Roylance told the workshop that France Telecom Orange is planning to use HSPA, rather than LTE, because it believes there will be more compatible devices available in the near term. "You don't get the capacity benefit until you have a reasonable number of devices using the band," he said. "Our belief today is that HSPA will be quicker at delivering that capacity. Power consumption will be better and we won't have interoperability issues."



**Device availability**

LTE 1800MHz devices and HSPA 1800 devices are already available. In Hong Kong, CSL customers can use a dongle developed by ZTE and Qualcomm to connect to the operator's LTE 1800 and LTE 2600 networks, as well as its HSPA+ and EDGE networks. The ZTE dongle supports a peak downlink speed of 100Mbps and a peak uplink speed of 50Mbps on LTE. The GSA says that Huawei has also developed a dongle that can support LTE at 1800MHz and 2600MHz, together with HSPA at 2100MHz and GSM at 900MHz, while Sierra Wireless has developed a dual-mode dongle for Telstra that will support LTE1800, LTE2600 and HSPA+.

Qualcomm launched chipsets supporting HSPA 1800MHz in 2010 and dual-mode HSPA/LTE 1800MHz devices in early 2011 and radio frequency (RF) components supporting 1800MHz are now in volume production from multiple vendors, according to Ben Timmons, Senior Director, Marketing and Business Development at Qualcomm.

Paul Wang told the workshop that CSL is looking for devices that will support dual-carrier HSPA+ at 850MHz, 900MHz and 2100MHz, together with LTE at 1800MHz and 2600MHz, enabling its customers to connect to high-speed Mobile Broadband services around the world, as well as in Hong Kong. Peter Stevens at Deutsche Telekom also urged device suppliers to support the 1800MHz band in their Mobile Broadband products.





**Conclusions**

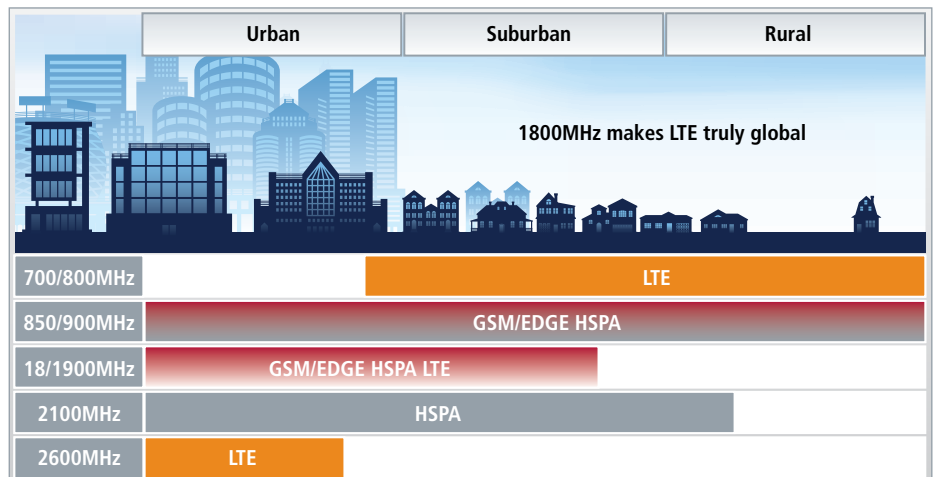
As the number of LTE1800 and HSPA1800 devices grows, many of the 351 mobile operators with 1800MHz spectrum are likely to seek to use this band to meet rising demand for Mobile Broadband services. However, individual mobile operators will adopt different 1800MHz strategies reflecting their own specific circumstances. Sandra Gilligan of the GSMA told the workshop a mobile operator’s decision on whether to use 1800MHz for LTE, HSPA+ or just GSM will depend on the following factors:

- Their existing spectrum allocation
- Legal and regulatory conditions
- Future potential spectrum allocations
- Competition and the market environment
- The availability of equipment

Deployment costs are unlikely to be a major barrier unless mobile operators’ existing infrastructure is old, as it is relatively straightforward to configure modern base stations to support LTE at 1800MHz, according to Ericsson. “Upgrading is more or less a software fix,” Martin Ljungberg of Ericsson told the workshop. “It all comes back to how much spectrum I have.”

In summary, experts regard the 1800MHz as a highly versatile band that can play an integral role in meeting the fast growing demand for Mobile Broadband services. They expect many mobile operators to use the 1800MHz and the 2600MHz bands to provide urban and suburban Mobile Broadband coverage, supplemented by rural and suburban coverage provided through the 700MHz and 800MHz bands. (see Ericsson graphic below)

**Typical spectrum strategy**



Original chart content supplied by Ericsson









For further information,  
Email: [mbb@gsm.org](mailto:mbb@gsm.org)  
Visit: [www.gsmamobilebroadband.com](http://www.gsmamobilebroadband.com)