

## **Delivering the best mobile broadband experience: the 1800MHz spectrum 'refarming' opportunity**

*As subscribers continue to flock in huge numbers to mobile broadband-enabled smartphones, dongles and other devices, it is vital that operators continue to deliver a good user experience. Ensuring there is sufficient network capacity available to serve this growing demand for anywhere, anytime connectivity is vital. And one way many operators around the world will be able to meet this requirement is by 'refarming' their 1800MHz spectrum – currently used for GSM traffic – for use by mobile broadband radio technologies, including LTE and HSPA.*

Mobile broadband subscriptions and traffic are growing worldwide at an unprecedented rate. There are already 600 million mobile broadband subscriptions worldwide, and this number is expected to grow to five billion by 2016. Some advanced markets have seen a doubling in mobile data traffic volumes every 6–12 months over the past few years.

The main growth driver is the mass-market shift from voice-centric feature phones with mobile broadband-enabled smartphones. In some markets, mobile broadband-enabled smartphones constitute 90 percent of new handset sales.

More and more vendors are launching such smartphones and their average selling price continues to fall. Figures from market research company IDC show that sales of smartphones reached 101 million in the fourth quarter of 2010 – up 87 percent from a year earlier. Total sales for the year were 302 million, up 75 percent on 2009. The market was given a significant boost by the arrival of Android, which has now surpassed Symbian to become the most popular smartphone operating system.

This transition to smartphones represents a great opportunity for operators: evidence shows that smartphone users produce significantly higher ARPU than users of voice-centric phones. But it also represents a challenge: as they become more reliant on mobile broadband access as part of their daily lives, subscribers are starting to cite reception quality as their primary concern – ahead of factors like ease of use, screen size and good battery life.

In short, the network is becoming the differentiator.

### **Ensuring good network quality**

Good mobile broadband service relies on having good network quality, and that means having the right coverage, capacity and latency as mobile data traffic continues to grow.

There are essentially two ways to achieve this within the existing network. The first is to improve network efficiency by introducing new techniques such as higher-order modulation, densification, higher-order sectorization and antenna reconfiguration. The second is to expand the amount of radio spectrum available to mobile broadband through deploying new carriers or new bands.

For most operators around the world, meeting demand for mobile broadband will mean a combination of these activities.

As part of this process, operators are considering the most profitable way they can utilize their total spectrum assets over time. As mobile data traffic continues to outstrip voice-centric traffic, one clear candidate for delivering additional spectrum for mobile broadband is the 1800MHz band used by more than 350 operators in 148 countries around the world.

For many operators who want to deploy LTE for the best mobile broadband experience, lack of suitable radio spectrum is a major obstacle. With introduction of LTE 1800, this limitation can be removed in most markets, turning LTE into a truly global technology.

## **Refarming 1800MHz spectrum**

As GSM traffic starts to diminish – a trend already established in advanced markets as subscribers migrate to other forms of mobile communication – operators with 1800MHz spectrum can begin to reform the freed up bands for use by mobile broadband radio technologies such as LTE and HSPA.

The 1800MHz band has a number of advantages for use by mobile broadband radio technologies. Its broad global deployment means it provides a good complement for LTE in other bands, for example. It also offers typically 2 x 75MHz spectrum bands that are not very fragmented in most markets.

The choice of which technology route to take – LTE 1800 or HSPA 1800 – will depend on a range of factors. These include: the operator's current market situation; the penetration of smartphones and other mobile broadband devices; the availability of other spectrum (especially that offering the capacity, and coverage, to cater for mobile broadband growth); the geography of the operator's service area; and local regulatory conditions.

From a technical perspective, either route is perfectly feasible and spectrum refarming is a well tried and trusted approach – for example, Ericsson has in-depth experience of conducting major refarming projects for GSM operators implementing WCDMA. Roll-out of the first LTE 1800 networks has already started.

Today, the 1800MHz band is almost entirely used for GSM traffic, often as a 'higher' band complement to GSM in the 900MHz band. Typically, the higher band is used for capacity and the lower band for coverage deployments.

## **Shaping the ecosystem**

Operators can accelerate the process of freeing up 1800MHz bands through frequency replanning and the deployment of GSM modernization technologies that enhance voice spectral efficiency – essentially 'squeezing' the spectrum needed by GSM traffic. There are many techniques available to do this, including 1/1 reuse, Adaptive Multi-Rate (AMR) techniques and Voice services over Adaptive Multi-user channels on One Slot (VAMOS), to name a few.

Another way operators can boost load reduction on the GSM network is by actively steering new terminal sales towards 3G-capable devices that do not need GSM. Some operators have already made the decision to sell only 3G-enabled devices. In this way, the vast majority of devices will eventually be using the 3G (WCDMA/HSPA) network, with its higher spectral efficiency for voice and data.

The successful use of 1800MHz spectrum for mobile broadband will require mobile broadband-enabled devices that can use the band, of course. Furthermore, these devices must be able to use multiple standards (multi-mode) and as well as multiple frequencies within each mode (multi-band). Several device manufacturers have already introduced or announced multi-band LTE/HSPA devices to meet this need.



Ultimately, the technology ecosystem will be shaped by the commercial decisions that operators make for their own markets. But one thing is for certain: the 1800MHz band represents a major asset for enabling mobile broadband growth in the coming years.