

## 3 Spectrum issues will affect MNOs' LTE deployment strategies

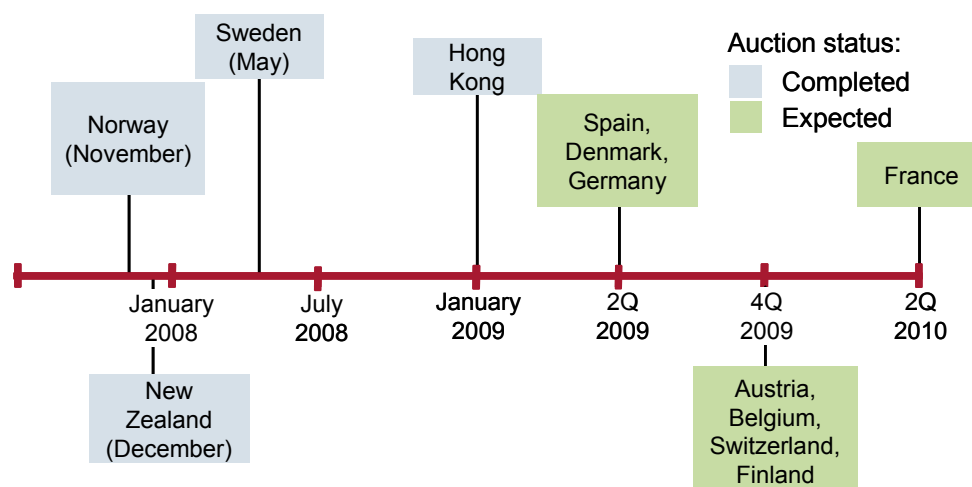
Operators' strategies for LTE will be heavily influenced by their choice of carrier frequency. There was a time when the decision was not so complicated and operators merely decided whether or not to buy what was on offer from the regulator. Now, spectrum is becoming available in many new bands, and offering operators a much wider choice than ever before. The four most important developments in current spectrum matters are:

- the ITU allocation of a 3G expansion band in 2600MHz
- the refarming of GSM 900MHz (and possibly GSM 1800MHz)
- the availability of spectrum in the 700–800MHz range, as a result of the switchover from analogue to digital broadcast TV
- the refarming of wireless cable 1700–2100MHz spectrum in the USA for Advanced Wireless Services.

### 3.1 Operators will deploy LTE in the IMT-2000 expansion band

In 2000, the World Radio Congress identified new spectrum for 3G technologies in the 2500–2690MHz frequency band. This is known as the IMT-2000 or 3G expansion band. Many countries plan to auction 2500–2690MHz spectrum in the next two years, if they have not done so already, as shown in Figure 3.1.

**Figure 3.1:** Timeline for 2500–2690MHz spectrum auctions [Source: Analysys Mason, 2009]



# 5 There are a number of pathways to LTE

For the purposes of analysis and illustration, we consider possible strategies for the four main types of operator: the combined GSM and UMTS operator, the UMTS-only operator, the GSM-only operator and the CDMA operator.

## 5.1 The combined GSM and UMTS operator

Operators with both 2G and 3G spectrum, for example 900/1800MHz and 2100MHz, respectively, are likely to retain GSM voice at 1800MHz, upgrading through GPRS and even GPRS enhanced to support VoIP as it matures. Spectrum in the IMT-2000 expansion band, 2500–2690MHz, will be used as a capacity overlay in urban areas. The challenge is to provide reliable mobile broadband coverage indoors. In this, operators have three realistic choices:

- direct indoor coverage with femtocells and/or Wi-Fi
- macrocell coverage using 900MHz
- macrocell coverage using 2100MHz and/or 2600MHz.

With direct indoor coverage using femtocells/Wi-Fi, the quality of coverage is likely to be far better than macrocell coverage. Wi-Fi has the advantage of being a reliable technology that can be deployed today with a viable business model. Femtocells are a natural progression for the mobile operator from a GSM/UMTS family background, but the business case and technical challenges may yet prevent the widespread deployment of femtocells. Both Wi-Fi and femtocell solutions depend on the ADSL backhaul. This may make the mobile operator unacceptably vulnerable to the fixed operator and may be a serious weakness that fixed operators could exploit, especially as our predictions are that mobile operators may have taken more than 20% of fixed operators' broadband business in developed European markets by 2013. Of course, a converged operator, with both fixed and mobile networks, would not feel threatened by fixed–mobile substitution.

If it transpires that a profitable femtocell business case is not possible, and/or the operator does not wish to rely on ADSL backhaul to provide its mobile broadband offering, then the operator will need to provide indoor coverage with the macrocell network. Whether the operator decides to buy 700MHz spectrum when it becomes available or to replace 900MHz GSM with data-optimised access technology, such as LTE or HSPA+, depends on