The UAE and 5G Mobile: Evolution or Revolution?

Chris Appleby
c.appleby@tamimi.com

March 2015

Users can look forward to significantly higher standards and speeds for mobile and smart phones as the world moves closer to Fifth Generation (5G) standards. This article looks at the background to the 5G standard, makes some observations about what a 5G service might look like, and finally examines some of the legal and technical challenges ahead.

A recent announcement by the Telecommunications Regulatory Authority (TRA) of the UAE noted that the UAE had achieved the highest increase worldwide in the Global Information, Communications & Technology Development Index (Index). In the latest edition, the UAE had jumped from 46th to 32nd place. The Index is published by the International Telecommunications Union (ITU), a highly respected United Nations agency which coordinates global telecommunication standards and regulations.

The ITU noted further key results:

- The UAE is the highest ranking country in the world in terms of the proportion of rural population covered by at least a Third Generation (3G) Mobile Telephone Network
- It ranked second of all Arab countries[RK1] in terms of having the largest proportion of its population online at 88% (Bahrain is ranked slightly higher)
- Wireless broadband penetration in the UAE has doubled from 45% in 2013 to 90% in 2015
- The UAE has a high level of household internet connectivity
- Mobile telephone penetration is at 193%, one of the highest in the world.

The UAE is therefore in good hands when it comes to the development and management of the Information, Communications and Technology sector generally, and more specifically the mobile sector.

Most readers will be familiar with the family of mobile standards known as 2G, 3G etcetera. These standards track the quantum improvements in speed and capability of mobile and more recently smart phone capability and are developed by the GSM Association based in London. In the early days of mobile phones, in the late 1980's and early 1990's, phones were only used for analogue voice calls. The further development from this original 1G standard can be seen in the following table.

GENERATION	**PRIMARY SERVICE**	**KEY DIFFERENTIATOR**	**WEAKNESS** (addressed by subsequent generation)
1G	Analogue phone calls	Mobility	Poor spectral efficiency, major security issues
2G	Digital phone calls and messaging	Secure, mass adoption	Limited data rates – difficult to support demand for internet/e-mail

3G	Phone calls, messaging, data	Better internet experience	Real performance failed to match hype, failure of WAP for internet access
3.5G	Phone calls, messaging, broadband data	Broadband internet, applications	Tied to legacy, mobile specific architecture and protocols
4G	All-IP services (including voice, messaging)	Faster broadband internet, lower latency	

(Source: © GSMA Intelligence 2015)

There are some warning signs in this table, easily recognised by those who remember the auction of 3G spectrum in the late 1990's and early 2000's. Eager telecommunications operators bid huge sums for new 3G spectrum in the expectation of large increases in demand for mobile internet services. This occurred at a time when profitable online business models on the one hand, and the essential technologies underpinning mobile internet delivery on the other, were severely under-developed. This failure flowed through to the sub-sea cable sector which had also geared up for strong growth in demand, which failed to appear. Things were made worse, fatally for a number of very large sub-sea cable operators, by a sudden surge at the time in the science behind fibre-optic cable technology. This allowed for the transmission of far more data down a single fibre optic cable, leading to massive oversupply and redundancy in sub-sea cables which still exists to an extent some 15 years later.

These earlier failures at the 3G stage are a reminder of how easily capital can be misallocated, even by the most experienced players. It also serves as a warning against the hype that is slowly but surely mounting around 5G.

Right now, mobile enjoy what appears to be a happy medium at the 4G level. Handset technology in the form of new generation smart phones is relatively well matched with mobile broadband speeds and the wide offerings in the form of data downloads and applications. But this moment will not last, so what of the future? Specifically, how will the authorities in the UAE adapt to 5G noting that the first commercial launches of 5G are not expected until 2020.

To answer that let's look at the question of what is meant by 5G and what it might offer. Given the speed at which technology is being developed, the distant horizon for the launch of 5G, and the recent historical failures mentioned above, the final incarnation of 5G will no doubt be different from what is known now.

Despite that, the more obvious improvements over the current 4G standard can be described with a degree of certainty. First, there will be higher coverage, density and availability of mobile services which will allow more devices to operate in a given area while downloading and uploading vastly more data. Secondly, new technologies will allow significant reductions in energy usage and a corresponding increase in the battery life of devices.

However, in a recent analysis[1] published in December 2014 (the GSMA Report) the GSMA Association makes the argument that many of these improvements over 4G standards are merely incremental and not truly reflective of the unique qualities of a 5G standard. So what might distinguish 5G from 4G?

One of the ultimate aims of radio technology as applied to the internet, including the mobile internet, is to reduce delays in transmitting data, known as latency. To understand this more clearly, remember that data transmitted via the internet to your mobile device is first broken up into small packets of data, then sent over a multitude of internet pathways, and finally reassembled at the end destination in its original

form. . Compared to the early days of the internet, when there were very few pathways, latency was very poor and often some packets of data simply dropped out and were lost altogether (packet-loss). New technologies and far greater network density have improved the internet experience, especially for mobile users. So, one distinguishing feature of true 5G is exceptionally low latency.

The second technical element identified in the GSMA Report as being fundamental to a true 5G service is a much faster data rate. The GSMA quotes a figure of 1 Gigabit per second (Gbps) which is many multiples higher than reliable existing services. Moreover, the transmitting devices (antennae and other network equipment) will also need to be upgraded to deal with these speeds, raising the capital allocation argument for network operators.

From a regulatory perspective it will be the revolutionary 5G applications which will present regulators around the world with new challenges. Some examples are:

- Remote surgical operations
- Driverless vehicles
- Connected cars
- Healthcare monitoring
- Advanced virtual reality, including gaming

In almost all cases new sector laws and regulations will need to be developed, at the very least to protect human health and life on the one hand, and on the other hand to promote efficient investment in applications that will benefit society. In each case regulators will need to address the multiple challenges faced by all parties: the potential users of these technologies, the technology providers, as well as the relevant government entities who will oversee the relevant activities (for example Department of Health, Road Transport Authority).

Alongside these revolutionary offerings, 5G will also allow enhanced versions of existing applications such as voice and video calls, gaming and machine-to-machine communication. All if these applications are currently available with existing 4G and related technologies, which make them much less relevant to the 5G discussion.

Aside from these regulatory challenges, there are other issues which 5G technologies will present to regulators around the world. This relates to the use of spectrum, which is essentially the range of radio frequencies over which communications are sent through the air. (Readers may wish to refer to an earlier recent article in Issue 275 of December 2015 of the Al Tamimi Law Update, “Averting a Spectrum Shortage in the GCC”.)

As noted in our earlier article, spectrum is a valuable national resource and has finite limits. There are constant and growing demands for more spectrum from a wide range of stakeholders such as emergency service providers, telecoms companies, the aviation and marine industries, television broadcasters, national defence and security departments, and many others. Thus far operators and equipment vendors who are looking towards 5G are focussing on spectrum which is in a different frequency range than existing 3G and 4G solutions, which may provide some relief to regulators.

Aside from the main regulatory issue for governments of how to allocate this valuable spectrum, one of the flow-on implications is that many more cell sites will need to be built to support a 5G network. This scenario raises questions of land use rights, primarily increasing demand for access to public and private land by mobile operators. It also raises the thorny question of site sharing and other sharing arrangements as between competing telecommunications network operators. As the GSM Report notes, there may be cases where a single network infrastructure should be implemented and made accessible to all licensed operators. We agree that this may be the ideal technical solution in some cases, but given the troubled history (globally) of network and facility sharing in the telecommunications sector, this will present a very significant challenge to telecommunications regulators, not just in the UAE.

In summary, 5G will most likely distinguish itself from earlier 3G and 4G standards by offering truly unique services which will require very high standards of latency and packet-loss and massively higher data speeds. Applications which are merely an enhancement of existing services will not rank as true 5G.

On the other hand, the revolutionary new applications which depend on the enhanced 5G technologies will need to be developed within a suitable regulatory framework in each case, whether it be healthcare, transport or media. Further regulatory challenges will arise in dealing with scarce spectrum resources. However as noted at the start of the article, the UAE is a leader in the Information, Technology and Communication sector, and this should give confidence that it will be able to deal with the challenges that 5G will bring.

---

[1] “Understanding 5G: Perspectives on future technological advancements in mobile.” GSMA Intelligence; London, December 2014. https://gsmaintelligence.com/research/?file=c88a32b3c59a11944a9c4e544fee7770&download

---

[RK1]Would be interesting to state which was No1