

4G or not 4G – a progress report

A regular column on the information industries

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Some initial comments are in order. First, the service marketed by the majority of operators as 4G is not all that it seems. 4G is a technical standard, but operators are happy to use the term for services that do not meet this standard. 4G to all intents and purposes is a version of long-term evolution (LTE), but the version that meets the technical specifications for 4G is in fact LTE-Advanced (LTE-A). In most current cases, LTE-A uses carrier aggregation – that is, a combination of spectrum in at least two independent bands – to provide a maximum theoretical downlink of 150 Mbps or thereabouts, although the typical user will receive far less. LTE-A is currently available in parts of most advanced economies but is very patchy elsewhere in the world.

Second, although LTE may indeed be available, it is generally rolled out progressively, commencing in the biggest urban centres and reaching rural areas much later. In some areas, it may never be provided at all, although the increasing use of re-farmed 2G spectrum in the 1,800 MHz band means that 2G and 4G will tend in future to be provided simultaneously, while 3G, rather than 2G, is phased out.

Third, it is necessary to distinguish between licences and launches. In

most countries, it is a requirement that an operator receive an explicit licence for the provision of LTE, although some 2G licences have been issued on a technology-neutral basis. Although new spectrum bands such as the 2.6 GHz band have been opened up for the provision of LTE, operators have so far shown a clear preference for re-farmed spectrum in the 1,800 MHz band or a combination of the two bands to provide LTE-A. In some cases, operators will have made their networks ready for LTE prior to receiving a 4G licence, while in other cases, there may be considerable delays between the receipt of a licence and a launch.

This brings us on to the somewhat thorny issue of what is meant by a launch. This matter is often glossed over, and there is in reality only one alternative source for this information in the public domain which is the Global mobile Suppliers Association (GSA) at www.gsacom.com. However, the GSA uses its own unique method for recording LTE launches, and it has recently shut off access to its LTE database to anyone who is not paying a membership fee.

One clear distinction that does need to be made is between launches by

nationwide networks and those by regional networks. Equally, if the launch is explicitly stated to be “soft”, a “trial”, a “test”, a “pilot” or equivalent, then it should not be listed as a launch. However, launches that involve dongles but not handsets may or may not be countable, perhaps depending on what is being defined as a “commercial” launch. Mobile virtual network operators (MVNOs) also present difficulties. It may be argued that a MVNO roams over an incumbent’s network, and hence it is only necessary to note the launch date of the latter. However, users tend to choose MVNOs rather than incumbents because they prefer their prices and/or services, in which case the issue of whether or not a MVNO provides 4G – it does not necessarily do so even if it roams on a network with 4G capability – is a factor of some importance.

For the purposes of the author’s own databases, the clear preference is to include every case of 4G provision no matter what the specific circumstances, seeking only to distinguish between provision by nationwide networks and everyone else. This naturally tends to bump up the number of launches compared to other sources, such as they are, but it does have the attribute of simplicity. It is worth noting that there are (depending on definition) some 225 countries/

islands in the world, and the most common number of networks per country is either three or four. Hence, once the number of nationwide network launches reaches over 700, it can reasonably be stated that 4G has become the *de facto* standard for worldwide mobile communications even if it takes many more years to become fully available to users.

It is therefore of considerable interest to note that Table I, which covers the period to end-February 2016, reveals that there have so far been only some 360 such launches. In other words, 4G has only reached roughly the half way stage in terms of penetration among nationwide incumbents around the world. To shed further light on the matter, the table divides the data onto a regional basis (according to the author’s own definition). Africa – which is widely agreed to contain around 55 countries and islands – has recently shown good growth in network numbers, but this disguises somewhat that there is a significant clustering in a much more modest number of countries. North America, in contrast, appears to be a laggard, whereas in practice this reflects the pervasiveness of regional operators in the USA as shown in Table II. Not surprisingly, Europe – broadly defined to encroach beyond the boundaries of the European Union’s 28 member

states – is the evident regional leader with 145 launches.

Table II is, as noted previously, somewhat more contentious, as it is based exclusively on the author’s definitions. Because of the numerous launches by regional networks, the North America region is very prominent whereas activity in Africa is muted.

Whether the roughly 160 launches collated in Table II is more or less than might have been expected is impossible to say, especially in the light of the distribution, so it is presented here without further comment.

So where does the mobile sector go from here? In the first place, given that 4G as advertised is only now turning into 4G as technically specified, it is somewhat alarming that there are increasing reports concerning the launch of 4.5G during the period 2018-2020. It has taken roughly 15 years for 3G to permeate throughout the world, but technical progress is constantly speeding up. It may be argued that it is indeed simply a matter of speed – LTE provides a 75 Mbps downlink, LTE-A provides first a 150 Mbps downlink then a 300 Mbps downlink and 4.5G must go on from there. But higher speeds do not simply require carrier aggregation; they require the bandwidth to be

Table I LTE network launches by region: nationwide incumbent terrestrial networks

Year	Total	Western Europe	Eastern Europe/CIS	Middle East	Asia-Pacific	North America	Latin America ^a	Africa
2009	2	2	0	0	0	0	0	0
2010	16	11	2	0	2	1	0	0
2011	25	10	2	5	4	3	1	0
2012	75	28	11	3	16	5	5	7
2013	85	30	3	8	15	4	17	8
2014	76	13 ^b	6	5	18	1	22	11 ^c
2015	81	16	10 ^d	4	14	1	19	17
2016	3	–	1	–	1	–	1	–
Total	363	110	35	25	70	15	65	43

Notes: ^aIncluding the Caribbean; ^bHutchison acquired fellow licensee Telefónica in 2014; ^cin Rwanda, a single wholesaler provides a service to every operator. Two national incumbents signed up as MVNOs in November 2014; ^din Belarus, a single wholesaler beCloud has provided a service to every operator since 2013; one national incumbent signed up as a MVNO in December 2015

Table II LTE network launches by region: Non-nationwide/non-incumbent including MVNOs

Year	Total	Western Europe	Eastern Europe/CIS	Middle East	Asia-Pacific	North America	Latin America	Africa
2009	0	0	0	0	0	0	0	0
2010	1	0	0	0	0	1	0	0
2011	4	2	0	0	0	1 ^a	1	0
2012	27	4	1	0	4	16 ^{b,c}	2	0
2013	52	12	2	3	10	24 ^c	0	1
2014	38	15	3	0	2	10 ^{a,b}	3	5
2015	33	14	0	1	5	7	2	4
2016	6	3	–	–	1	–	–	2
Total	161 ^d	50	6	4	22	59 ^e	8	12

Notes: ^aLeap Wireless was acquired by AT&T in 2014; ^bBendBroadband shut down its network, opened in 2012; ^cShenandoah Telecommunications has agreed to merge with nTelos Holdings in early 2016; ^dSome of these operate as wholesalers, and it is not always possible to identify all of their clients which, in any event, tend to be small localised operations; ^eOf these, 21 are members of the LTE in Rural America programme run by Verizon Wireless; this initially used only the 700 MHz band, but AWS spectrum is being added in a number of cases; others are members of the Rural Roaming Preferred Provider programme run by Sprint—some are members of both programmes but are counted only once

constantly increased and other new technologies to be added.

This in turn means either that all existing spectrum be re-farmed – a process that is already in hand and which effectively spells the demise of 3G – or that new bands be opened up, especially the contentious 700 MHz band which is already occupied for non-mobile services in most countries. However, much of the most recent demand has stemmed from machine-to-machine applications and the Internet of Things which involve the use of unlicensed spectrum in much higher bands, so new rules need to be agreed and implemented governing how the spectrum should be shared between

licensed and unlicensed bodies – and quickly.

For their part, licensed operators must not merely keep up with technology but must find the funds to invest in their upgraded networks. Not surprisingly, they are restructuring by moving out of overseas countries where their market share is modest and buying up anything that can improve their ability to provide multi-play within the remaining national markets. This, in turn, shifts power within the sector towards companies such as Liberty Global which previously were left largely alone to “do their thing”.

In short, operators in the mobile sector are entering a period of turmoil with uncertain outcomes

while simultaneously trying to establish a competitive presence via the introduction of LTE and LTE-A. LTE may have near nationwide coverage in some advanced economies but has yet to be licensed in many emerging economies, so at the end of the decade, we will be left with a varying mixture of 2G, 3G, 4G and 4.5G. All that remains is the issue of how to make money from all of this and who will be making it.

About the author

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