Patterns of internet traffic growth

It is well known that internet traffic is growing rapidly. However, it is less well understood that growth differs significantly between countries. It also often assumed that traffic growth either requires higher bandwidths, or conversely that higher bandwidths stimulate traffic growth. The evidence for either of these assumptions is weak.

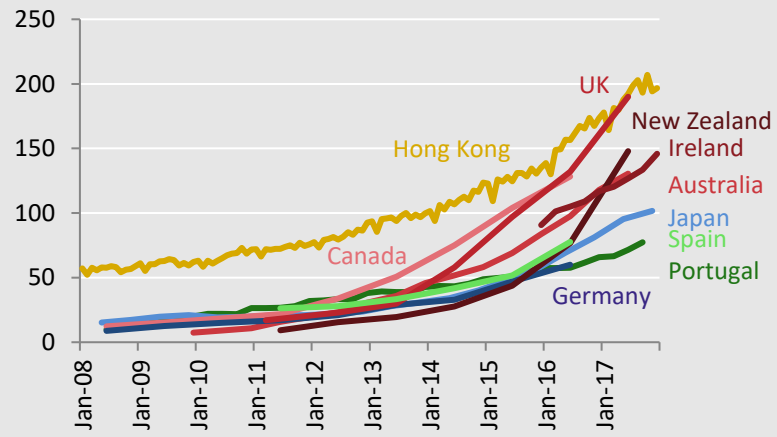
These issues matter, since they feed into a range of policy and strategy decisions, such as core network design; the rationale for upgrades to the access network; the potential for mobile to compete with fixed; the specification of the USO; and so on.

This note examines the latest evidence regarding traffic growth around the world.

Fixed broadband traffic

Fixed internet traffic is growing globally. But it is growing very differently in different markets. Figure 1 shows monthly GB per line for countries where this data is available[1]:

Figure 1: Traffic per fixed broadband line, GB/month[2]



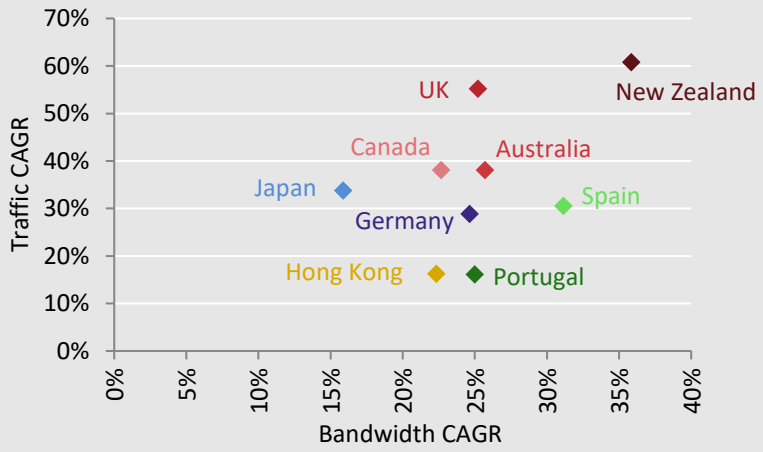
Traffic volumes vary significantly, but so do growth rates. Hong Kong, once a significant outlier, is being caught up by several markets.

Traffic and bandwidth

Volumes of traffic are not particularly correlated with available bandwidth. According to Akamai, average delivered bit rates in the UK are 16.9 Mbps for its streams.[3] This compares to 20.2 Mbps for Japan, which has roughly half the traffic of the UK. To take another example, Ireland and Australia very similar traffic, though the former has speeds more than 40% higher.

Nor is *growth* in traffic correlated with *growth* in bandwidth.

Figure 2: Traffic growth vs bandwidth growth, CAGR 2013-17[4]



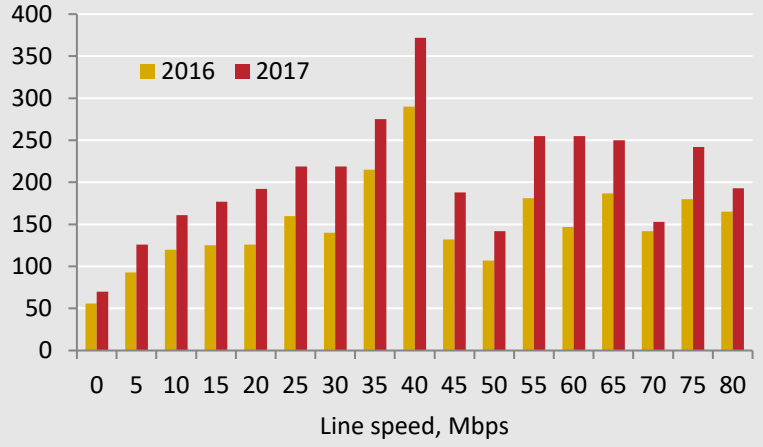
As Figure 2 shows, countries such as Portugal, Germany, Australia, Canada and the UK have had similar bandwidth growth rates, but substantially different traffic growth. Indeed, if we remove New Zealand as an outlier, there is literally zero correlation between traffic and bandwidth CAGR.[5] (New Zealand has been deploying fibre, but so too have several other countries in our sample. A likely explanation for its rapid growth is a shift to unlimited data allowances. In June 2013, 95% of NZ lines had a data cap. By June 2017, just 38% did so).[6]

That traffic growth is unrelated to bandwidth growth suggests that bandwidth is not a material constraint to usage, at least in the countries in our sample (where the great majority of consumers have adequate connections) – if it were, we might expect there to be a correlation between improved speeds and greater traffic.

Traffic growth and line speed

Further evidence of the weak linkage between bandwidth and traffic growth comes from Ofcom data for usage volumes by line speed.

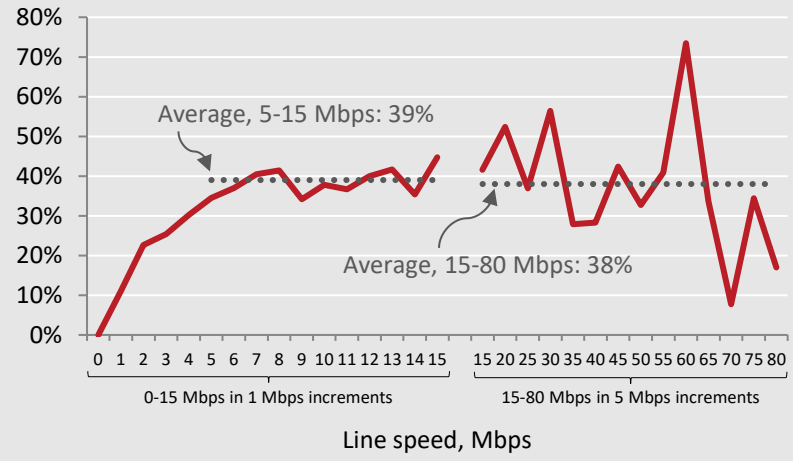
Figure 3: UK fixed broadband traffic by line speed, GB/month[7]



As Figure 3 shows, while very low line speeds (below 10 Mbps) do appear to have lower traffic, increasing speeds above 10 Mbps brings diminishing increases in traffic.[8] For example, the 2017 average traffic of lines with speed 25-30 Mbps was 219GB – the average[9] of traffic of faster lines was only slightly higher at 230 GB.

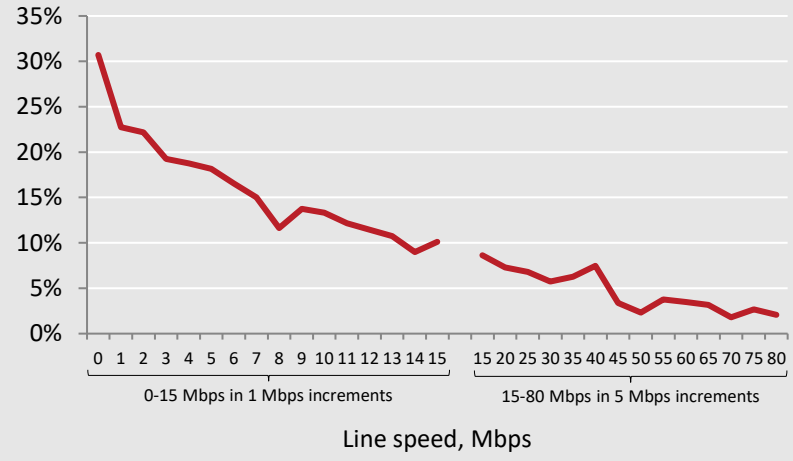
If we turn to traffic growth by line speed, the story is even starker. Figure 4 shows that average growth for lines with speeds 5-15 Mbps is virtually identical for that of lines with speeds of over 15 Mbps.

Figure 4: UK fixed broadband traffic growth (2016-17) by line speed[10]



One reason that even lines with lower speeds can enjoy robust traffic growth is that they are relatively unutilised, even in busy hours. Figure 5 shows estimated utilisation in busy hours, based on the traffic volume of each different line speed. The average 7 Mbps line (for example) uses just 15% of its capacity during busy hours, suggesting that theoretically it could carry over six times more traffic without any increase in capacity.

Figure 5: UK fixed BB line busy hours utilisation by line speed[11]



Certainly higher speed lines have even lower utilisation – but this just underlines the fact that much of the extra capacity of higher speed lines simply lies fallow, rather than enabling additional traffic.

Language blocks as a driver of growth?

All the above evidence suggests that different broadband infrastructure in different countries is unlikely to be a primary driver of different rates of traffic growth. What then *is* driving these different rates of growth? We can only speculate, but it is intriguing that the countries with both the highest growth and the highest traffic are generally English-speaking, with Hong Kong as a partial exception.[12] (Countries with English as their primary language are shown in shades of red and brown in the figures above). Being an English-speaking country means that more own-language content is available, and that US-originated services may be offered more quickly in that country.

Netflix – a key driver of internet traffic – is a case in point. Of our sample countries, it launched first in Canada (2010) and then in the UK and Ireland (2012). Germany was the first non-English speaking member of the sample counties to receive Netflix, in 2014.

Netflix's inventory is also larger in English speaking markets. We estimate approximately 8,500 hours of content on average across the sample English speaking markets, versus 4,100 for the others.[13]

Thus uptake and usage of Netflix and similar services such as Amazon Prime are likely to be higher in English speaking markets (though of course most markets will have domestic streaming services also, such as iPlayer in the UK and maxdome in Germany).

Video is a key driver of traffic growth. Cisco estimate it was 67% of the 2016 total, and will rise to 80% in 2021.[14] Thus the earlier and wider availability of VOD services in English-speaking markets may have been a significant contributor to higher growth in those countries. As VOD offers mature in other markets, they too may see a surge in traffic growth.

Conclusion

Internet traffic is driven by many factors. Available bandwidth is just one factor – and the evidence suggests that it not a particularly important one.

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Endnotes

[1] The Cisco VNI figures are more comprehensive, but we have chosen not to use them. These appear to be based (in part) on modelling rather than actual usage data, and can differ materially from official figures. For instance, Cisco reports 39.7GB per internet household in 2016, compared to BNetzA's 60GB per broadband line. (BNetzA's figure includes business lines, which will pull down the average – thus a BNetzA figure for households would be even higher)

[2] Sourced from relevant national regulatory authorities or government statistical services. Figures are average for both business and residential lines, except for the UK which is residential only. Australia traffic is for download only – upload also included for other countries

[3] Akamai, *State of the Internet Q1 2017*, 31 May 2017 [latest available]

[4] Sources per Footnotes 2 and 3. Note that for traffic growth, CAGRs have been based on latest available figures, and thus in some cases will not exactly match the period for the bandwidth CAGR calculation. 2013 figures for Ireland not available.

[5] R^2=0.00. Even with New Zealand, the R^2 is just 0.21

[6] Stats NZ, *Internet service provider survey: 2017*, 9 October 2017

[7] Ofcom, *Connected Nations 2017*, 15 December 2017

[8] Though the picture is complicated by selection effects. Heavy users may choose higher speeds because they believe they need them, even if in fact they do not. In this case, higher traffic 'causes' higher speeds, not vice-versa

[9] Simple average

[10] Communications Chambers analysis of data from Ofcom, *Connected Nations 2017*, 15 December 2017. Simple averages

[11] Communications Chambers analysis of data from Ofcom, *Connected Nations 2017*, 15 December 2017. 50% of a line's traffic assumed to be carried in four 'busy hours' per day. Downstream traffic only, with overall ratio of downstream to upstream traffic (11.7:1) used for all line speeds

[12] English is an official language in Hong Kong, but for most residents Cantonese is their native language

[13] Communications Chambers estimate, based on data from finder.com. 90 mins per movie, 30 mins per TV episode, and 20 episodes per TV title assumed

[14] Cisco, *VNI Forecast Highlights Tool* [accessed 29 March 2018]