Mobile Industry Data Capacity Crisis

Introduction

The mobile broadband industry is heading towards a crisis. The industry is a victim of its own success: the rapid growth in mobile data services, especially those targeting consumers, are rapidly using up network bandwidth.

The humble mobile phone is no longer a piece of technology. Apple, Google and traditional stalwarts of the mobile industry like Nokia are increasingly adding sophistication and functionality that turns our phones into multi-media entertainment devices - capable of watching TV, listening to streamed music, downloading films and even playing high quality interactive games.

The majority of TV broadcasters are making their TV programmes available via the internet and their iPlayers - thus starting the process of enabling people to watch TV using their mobile phones. According to Facebook there are 65 million active users accessing the social network via their mobile phone. We are viewing over 1 billion video clips on YouTube each day with a clear and increasing trend to do so using our mobile phones. There are many more examples that culminate in a massive surge in our collective demand for bandwidth hungry Internet services that are slowly beginning to outstrip the available capacity on traditional mobile networks.

In just a few years' time – unless operators act swiftly to address the problem – smartphone and mobile broadband users will experience severe service degradation, especially in urban areas and around key transport hubs.

Operators can, and are, attempting to address the problem on both the supply and demand side of the curve. MNOs are building out bandwidth across their existing 3G and 3G+ (HSDPA) networks, whilst trying to migrate users from older GPRS platforms to more bandwidth-efficient 3G networks.

Newer 4G networks such as LTE promise a further improvement in bandwidth and bandwidth efficiency, especially for data traffic. However, 4G networks require a significant investment in network equipment on the part of operators. Moreover, research carried out by analysts at Exane BNP Paribas suggests that even with such investment, network capacity growth will be insufficient to keep pace with demand.

At the same time, network operators are unable to reign in the demand for data services, except at the margins. All-inclusive or "all you can eat" data pricing is now an accepted – and expected – feature of mobile broadband services across Europe.

Operators have and continue to attempt to put in place usage caps, "fair usage" policies, and tariff structures designed explicitly to deter heavy data users, such as those using peer-to-peer networks.

These policies are largely unpopular with users. Moreover, as our research shows, mobile broadband network saturation occurs well before the point when most usage caps start to take effect: a problem that will only become more acute, as operators continue to sign up new users for their services.

If operators are to stave off a capacity crisis – and a consequent crisis in their capex, revenue and cash positions, they need to adopt another, radically different approach.

Crunch time for networks

Research carried out by Exane BPN Paribas predicts that by 2011 or early 2012, penetration of mobile Internet services is expected to exceed 70%. At the same time average peak usage levels in central city, high-density areas would be between 50% and 70%.

For operators, this creates a problem. Networks will reach a crossover point where the capacity available to customers falls behind the demand. As a result, the user experience starts to degrade.

This point has already been reached in areas of high demand, notably central city zones, suburban high streets, and those residential areas with transient populations such as students or rented accommodation.

Meeting this increased demand for data-based services is expensive. Industry studies suggest that the total cost of ownership of 1Mb of data traffic could be as much as seven times higher than the cost of one voice minute, so data traffic growth per user makes networks more expensive. In order to meet this additional capacity, networks need to raise their capital investment levels.

Newer cellular technologies, including HSPDA/HSUPA and LTE, do provide increased capacity. But the rate of data growth suggested by the Exane BNP Paribas research outpaces any gains offered by network technologies. Networks will also need to invest more in their back-haul networks, as well as find funds to pay for 4G upgrades.

Nor can networks readily turn to pricing, in order to compensate for their rising costs. Users drawn in to “unlimited” or unmetered mobile broadband services – whether via a smartphone or via a laptop/USB dongle combination – are highly unlikely to accept either a use-time based pricing model or model based on data transferred.

Even where operators do apply data usage caps or ceilings, this cannot be relied on to constrain demand, as the “all you can eat” model is now well established for mobile broadband services. Operators accept that, except perhaps at the margins, traffic-based charging is now largely unmarketable.

This puts operators in a position where their costs are increasing, as they are forced to invest in upgrading their networks, yet average revenues per user are falling, as the market for mobile broadband services expands away from early adopters and business users, towards a mass consumer proposition.

Although operators will be able to offer some added value services on top of basic data access, for the large part any revenues earned from content services will go towards the cost of sourcing the content itself. Operator margins on content are highly unlikely to be sufficiently large to offset rising network costs.

As a result, operators need a readily available, cost effective and quick to deploy alternative to 4G cellular networks, in order to offload their growing volumes of data traffic, whist enabling to maintain both customer growth and customer service levels.

A new model for mobile data services

There is an option that allows operators both to meet growing demand, and to control costs: offloading data traffic onto WiFi networks.

Based on the usage patterns operators are currently seeing for 3G cellular data patterns, there is a close fit between areas where people currently want to use the Internet on a PDA or smart phone, or use mobile broadband with a laptop, and areas that are already well covered by WiFi networks. Many of these areas are served by public WiFi networks, and hotspot providers.

WiFi networks are now also commonplace in homes, and offices. In most Western European markets, over 50% of homes with broadband have WiFi-capable routers. WiFi is already readily available indoors, in public areas including hotels, business facilities and transport hubs, and there have been a number of initiatives in Europe to boost outdoor WiFi coverage too.

From the device perspective, almost all current laptop computers support WiFi connections. WiFi is increasingly built in to PDAs and smart phones, and the technology is filtering down to the "feature phone" category, as consumers demand more economical access to services such as photo sharing, or access to social networks.

Set against the cost of upgrading capacity of 3G networks, or rolling out coverage of 4G, WiFi offers an almost ready made infrastructure, requiring little in the way of new hardware for consumers, and only modest investments from mobile operators to fill in coverage gaps indoors and to boost outdoor services.

WiFi access points also integrate efficiently with existing fixed Internet access technologies, including DSL, cable and fibre, and makes effective use of existing (IP-based) backhaul networks.

Enabling the new service model

As most mobile broadband traffic is already accounted for by smartphone or laptop users – with WiFi-equipped devices – the potential to offload traffic to WiFi networks is significant. Moving such users onto the WiFi network allows operators to devote cellular capacity to devices that are not WiFi capable, to fill in any gaps in the WiFi coverage gap, or for other purposes such as vertical applications or machine to machine (M2M) communications.

In order for 3G to WiFi offload to work, operators will need to take a number of critical steps.

Firstly, it is not practical to move all traffic onto WiFi networks, so operators need to decide where to use WiFi, and where to keep traffic on the cellular network.

The handover between cellular and WiFi networks also needs to be seamless, so that users notice no interruption of service. This is likely to involve developing and testing software for a number of different platforms. The software will need to be sufficiently intelligent not just to detect a wireless network, but to decide whether to use it, and then to join it.

Attention will also need to be paid to the commercial arrangements, and to data security, especially if mobile users are to "roam" on to private business or commercial networks.

However, the ubiquity and scale economies of WiFi, coupled with the pressures building on cellular network data capacity, make the investment not just worthwhile, but essential.

Conclusions

In the next two to three years, mobile operators face a capacity crunch on their data networks. The popularity of mobile broadband, among both smartphone and laptop users, is causing data consumption to outstrip additional capacity. Unless this is addressed, there is a real danger that service quality will decline.

However, there is an opportunity for operators to use WiFi, both from public and private access points, as an alternative carrier technology. This allows networks to offload data traffic from their highest volume users at low cost, releasing expensive cellular capacity for future growth and ensuring that service users' expectations continue to be met.