INTELLINET TECHNOLOGIES
Accelerating Convergence

The Business Case for Mobile Data Offload

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A Business Case for Mobile Data Offload

Mobile Broadband Data will continue to grow strongly

The last 30 years have seen two major communication revolutions. Firstly, consumers and businesses have discovered the power of mobile telephony to allow people to communicate and enthusiastically adopted it to make it one of the most widely adopted technologies ever in the history of mankind. Secondly, the internet and its adoption by consumers and businesses have transformed the way business and consumers transfer information and communicate. Taken together both have profoundly changed the way people in many countries live their lives in little under 30 years.

Mobile traffic has and will continue to grow rapidly as consumers move from using fixed lines to using mobile devices both for voice and broadband internet access as:

- flat rate voice and data bundles make usage of mobile more cost competitive and costs controllable
- consumers look to build their communication needs around their primary communication devices: their mobile phone or their smartphone and their netbook or laptop.

Mobile networks are likely to see considerable uplift in mobile broadband traffic

At the same time, the nature of internet services will continue evolve as consumers and businesses use the internet not only as a mechanism for web traffic and email but as a way of delivering entertainment. Already, YouTube, Apple's iTunes and BBC's iPlayer have changed the way people consume entertainment media and this is a trend that is likely to continue for the foreseeable future driving up traffic on all broadband networks.

The result is that mobile networks are likely to see the considerable uplift in mobile broadband traffic not only continue but rapidly increase as not only more customers adopt mobile broadband but the usage per customer expands rapidly.

Capacity takes a hit

Network capacity will come under pressure due to the rise in traffic and also due to the fact that a high percentage of mobile broadband is likely to be consumed indoors. Although, for example, HSPA cells can offer peak rates of 7.2Mbps or 14.4Mbps depending upon the generation of HSPA installed, average rates for a cell are significantly lower.

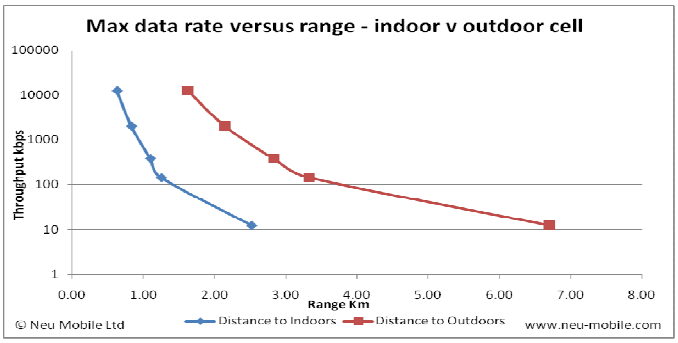

Figure 1: Data rate versus range for indoor and outdoor cells

This occurs as W-CDMA systems are noise limited systems. Customers who are farther away from a cell antenna or indoors require more power and therefore introduce more noise. The more noise there is the less the capacity of an individual site. Figure 1 shows the maximum data rate achievable if all a HSPA cells capacity is dedicated to a user for different ranges and for indoor versus outdoor locations. As is clearly shown the range and rates available for indoor users are considerably lower than for outdoor users. In terms of cell capacity, this can also be viewed as indoor users taking significantly more capacity than equivalent outdoor users as shown in Figure 2.

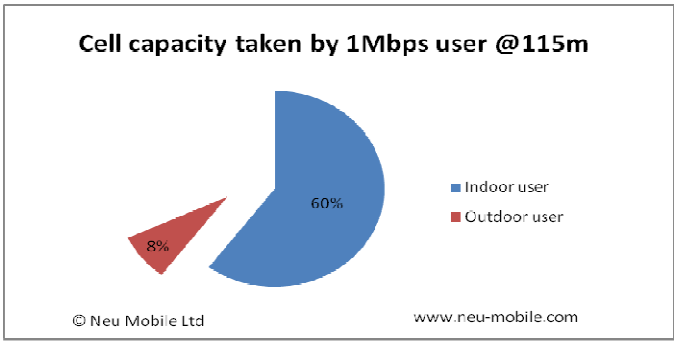

Figure 2: Cell Capacity Taken by Indoor and Outdoor Users

The result of this is that each carrier on a cell is more likely to support 1.7-1.8Mbps than 7.2Mbps or 14.4Mbps. This is because if you assume that everyone is distributed evenly in a cell and that 50% people are inside then the real capacity of each carrier is substantially lower than the theoretical capacity. If a greater proportion of users are inside then the available capacity is even lower.

Costs soar when existing site capacity gets depleted

The easiest way for operators to expand mobile broadband capacity is to add additional carriers at an existing site

The easiest way for operators to expand mobile broadband capacity is to add additional carriers at an existing site. This is a low cost option as for most operators this is a relatively low incremental cost. However for most operators, only a limited number of carriers are available. When these are exhausted, the operator is faced with building new sites. As a result the incremental cost of new capacity becomes substantial. In fact the incremental cost can more than double as is shown in Figure 3.

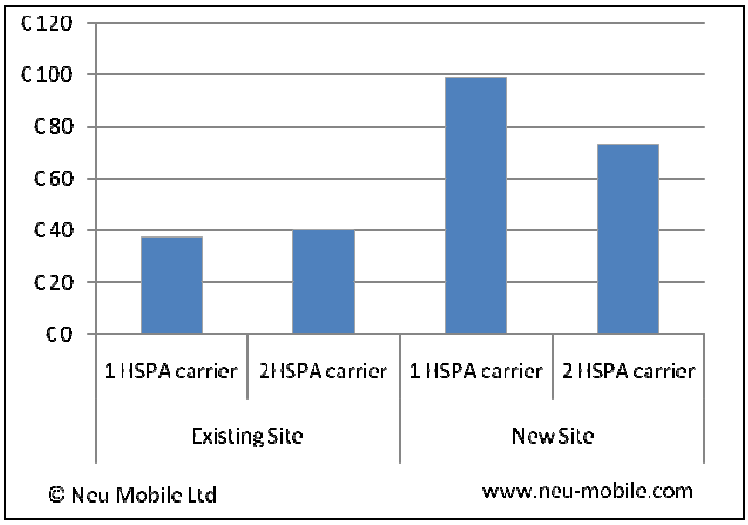

Figure 3: Incremental cost per 1 GB/month subscriber

However this is not the only negative factor that operators need to consider. Traffic growth is driven not only by more subscribers but also by the fact that each subscriber is using more, so in the future a customer could be consuming even more data. Figure 4 show the impact of usage on cost for an existing site.

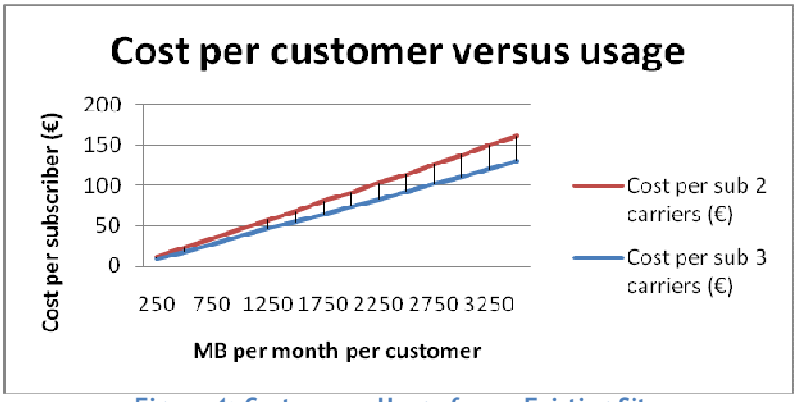

Figure 4: Cost versus Usage for an Existing Site

As can be seen from above increased consumption will have a significant impact on costs and operators need to find ways of reducing the costs of providing high capacity and/or a way of getting more revenue from customers to cover the increased costs.

The option for offloading Mobile Data

Operators who offload data direct to the internet risk lower revenues

One solution to the cost of providing additional capacity at cell sites is to offload traffic to indoor sites or mobile data offload. This not only provides additional capacity to absorb traffic growth but by removing noisy indoor user actually increases the cell capacity by more than the traffic lost. Returning to the example in Figure 2, if we remove the indoor 1Mbps user we could replace them by 7 1Mbps outdoor users which would be a significant increase in capacity. In real life we can't

remove indoor users but by reducing the number of them accessing the outdoor cells we can improve outdoor capacity.

Mobile data can be either offloaded to an alternative access technology can either be delivered directly to the internet or can be delivered back to the operator's network as shown in Figure 5 .

Although direct offload to the internet via for example a Wi-Fi hotspot can appear to be the most convenient and cost effective way of offloading data traffic it does have a potential impact on revenue streams.

The advantage mobile operators have who keep traffic on network is that they can:

- Offer transparent operation of services so that customers get the same look and feel irrespective of access technology. This increases service usability and stops revenue leak.
- Provide a more secure service so that customers' security credential and traffic are protected from hackers. This ensures that customers feel confident to use the offload facility.
- Analyse traffic to get a full picture of usage and interests. This can be useful in better targeting customers with services and propositions. As such the operator can offer partners improved positioning of their proposition and revenue. This is a value added service that the operator can sell to 3rd parties.
- Provide service billing to the mobile account for operator and 3rd party services. This is a value added service that the operator can sell to 3rd parties.

1. As a result, operators who offload data direct to the internet risk lower revenues even though they may have a very cost efficient support of data.

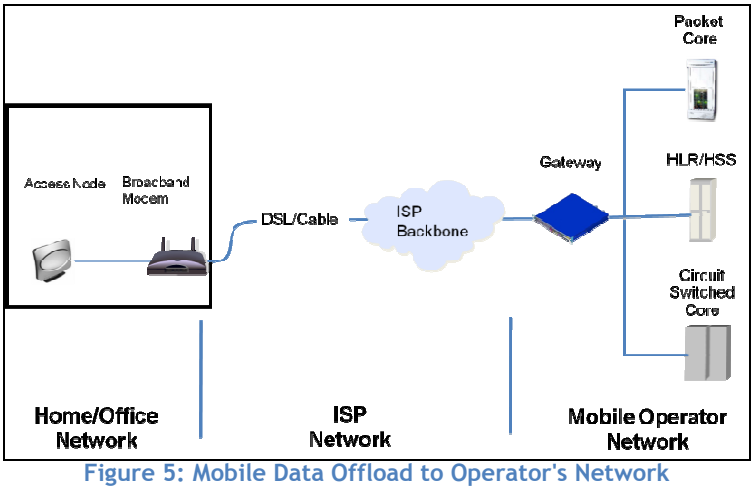

Figure 5: Mobile Data Offload to Operator's Network

There are two main offload approaches that deliver traffic to the operator's network:

1. Intelligent WLAN – the mobile device communicates with a standard Wi-Fi hotspot or router which tunnels the traffic back to a Gateway in the operator's network.
2. Femtocell – the mobile device communicates with a femtocell, a small low power cellular access point, which tunnels traffic back to a Gateway in the operator's network.

The main difference between the solutions are that the femtocell solution requires 3G spectrum along with the SGSN and the GGSN in the packet core while the IWLAN solution requires just public Wi-Fi spectrum and a GGSN in the packet core.

A Simple Business Case for Mobile Data Offload

For the business case to work, the indoor cells and backhaul used must be cheap

As described earlier the main case for mobile data offload is to reduce the load on expensive outside cells. However as they will generally be less loaded than outdoor cells.

In the examples below, it is assumed that the cost of transport for IWLAN, femtocell and the traditional network are all comparable between the solutions so that this simple business case will focus on just the cost of the access point/base station and transport from the site to the radio network. All other costs will be assumed similar and negligible to the overall business case.

Mobile networks are built up to provide coverage and capacity. The first comparison shown in Figure 6 shows the cost of providing coverage and capacity using each technology.

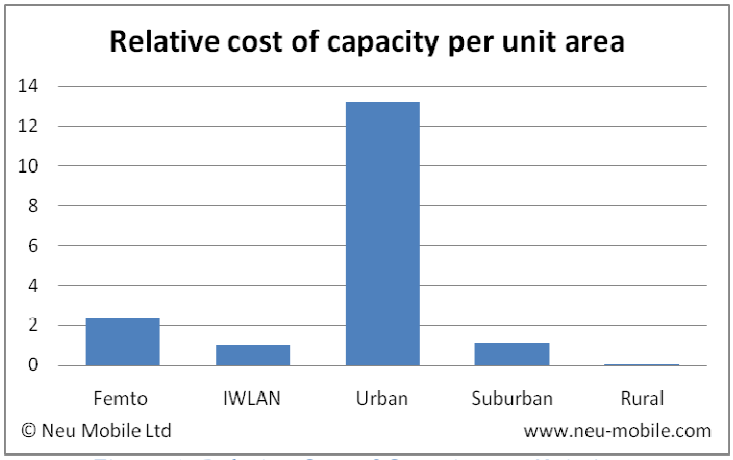

Figure 6: Relative Cost of Capacity per Unit Area

This shows that IWLAN provides the lowest cost of providing contiguous radio coverage for all environments except the rural environment. In reality, femtocells and IWLAN are unlikely to be used to cover other environments than the urban environment because it would be difficult to find and manage the massive number of sites required to provide contiguous coverage. IWLAN is cheaper than femtocells

as it is assumed that existing Wi-Fi can be reused. If existing Wi-Fi is not available then the cost of the IWLAN solution will be broadly comparable with the femtocell solution.

If spot coverage is required, a better way of looking at relative investment cost is by looking at the cost of providing 1 Mbps. Figure 7 shows the relative costs for the different technologies.

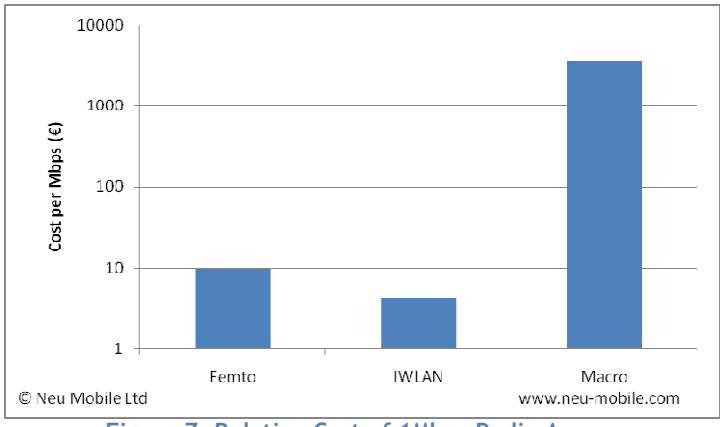

Figure 7: Relative Cost of 1Mbps Radio Access

As can be seen from the diagram above femtocells and IWLAN allow capacity to be added at a considerably lower cost than macrocells. Again IWLAN is cheaper than femtocells when existing Wi-Fi can be reused.

Finally, the indicators given to this point assume that large amounts of capacity are required during the busy hour. Although it is quite feasible with today's Video on Demand technology to be able to consume this amount of bandwidth, conventional internet users today tend to use 10-50kbps (averaged across active and inactive users). If we look at the cost of providing this capacity for the different technologies we get the results shown in Figure 8. A busy hour traffic level of 10kbps equates to around 1GB per month and 50kbps to 5GB per month.

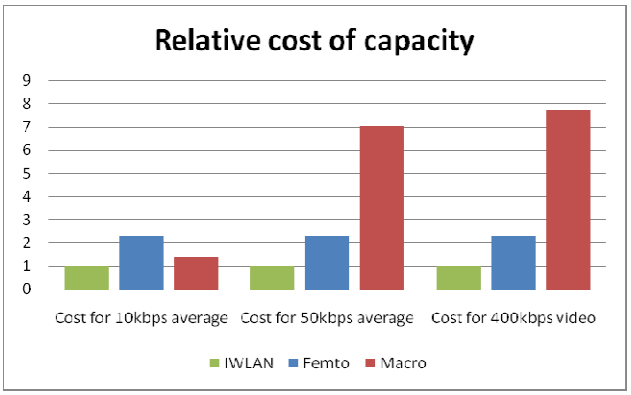

Figure 8: Relative Cost of Services for Different Technologies

Again IWLAN represents the cheapest way of providing busy hour capacity for all services if existing Wi-Fi is reused. However if new Wi-Fi or Femtocell equipment is

required then a load of about 20kbps (2GB per month) is required before the solution becomes more cost effective than competing solutions.

The Business Case strengthens with Multiple Users

IWLAN represents the cheapest way of providing busy hour capacity for all services

The business case example presented is a simple start and demonstrates that relatively small costs can have a profound impact on the business case. For example, if installation costs were $100 per piece of equipment then the breakeven point could occur with double the traffic load. As such the femtocell and IWLAN business case is very sensitive to cost.

As can be seen in Figure 8, higher throughput improves the business case to a level whereby carriage costs are significantly lower than using macrocells. If multiple users are on a femtocell or IWLAN, the cost is split between those users. As a result, the simplest and most compelling use of this technology is in multi-customer offices and multi-customer households as the cost gains are the easiest to quantify.

Finally, IWLAN does offer one significant advantage over femtocells in this multi-user environment. Whereas today femtocells are tied to one operator, IWLAN allows a single Wi-Fi access point to be used for multiple operators. This means that a single access point can serve customers from multiple operators making it a more attractive proposition not just for operators but also customers.

IntelliNet Solutions for Data Offload

IntelliNet Technologies offers a portfolio of interworking WLAN products. These include the IWLAN server which can support the 3GPP modes of a TTG and PDG. IntelliNet provides the interworking elements for supporting authentication with its AAA server. The IWLAN set also includes a Voice Call Continuity Server for supporting voice applications.

IntelliNet also enables offload through femtocells with its Femtocell Gateway. Both solutions are available on an Advanced TCA platform and can also be hosted on an OEM platform.

About IntelliNet Technologies

Headquartered in Melbourne, Florida with offices in Bangalore, India, IntelliNet Technologies is a leading provider of next-generation network convergence and application development solutions for PSTN, cellular, wireless and IP Multimedia Subsystem (IMS) networks. Major equipment vendors, application developers and global operators currently use IntelliNet's products for prepaid, location services, messaging and fixed mobile convergence. Additional solutions include: mobility, fraud management, and network bridging applications including SS7/IN, SIGTRAN, DIAMETER, SUPL, SIP and other emerging signaling protocols. For more information please visit: http://www.intellinet-tech.com