WIFI AND 3G – A BRIDGE OR A BARRIER?

Extended Version

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Wireless LAN, or WiFi technologies have received much hype in the past twelve months, as hotspots roll out across the maturing wireless marketplace. Concurrently, arguments have sprung up on the question of interoperability with existing and planned networks, and whether or not public access WiFi as a business proposition challenges or complements existing and planned networks. As the dialogue has developed, it has become clear that whatever the answer, both will co-exist; that they may do so co-operatively or competitively remains to be seen.

First, some basics. WiFi is a local area high-speed broadband wireless technology that allows users within the range, or hotspot, network access at up to 11 Megabits per second. The range of the hotspot, depending on issues such as line of sight, is anywhere between 100-600 feet, or 30-180 meters. It is proliferating in what Starbucks' Chairman Howard Schultz refers to as 'the third place', where people are not at home and not at the office. This means coffee shops, airports, hotels, railway stations, convention centres, and so forth. It is based on the 802.11 standard, which has various versions identified by the trailing letter. The most commonly referenced are:

- 802.11b is the current predominant standard, operating in the 2.4GHz range, and offering up to 11MbpS access speeds
- 802.11a is the next version, which operates in the 5GHz spectrum, and offers up to 54MbpS
- 802.11g will ultimately deliver up to 54MbpS in the 2.4GHz band, and will deliver other as yet undefined benefits

In order to access the service, the user requires an 802.11-enabled laptop, using either a WiFi card, like a network card with an antenna, or on-board 802.11 that is beginning to proliferate (see Intel's Centrino product, and Dell's recent announcement that all latitude laptops will come with 802.11 as standard, as examples – all other major manufacturers have similar programmes).

Usually, access will be on a subscription basis, or via a prepaid scratch card or credit card account. Authentication is most often based on the RADIUS (Remote Authentication Dial-In User Service) standard, using a username and password. SIM based mobile networks are trialling SIM based authentication solutions, examining ways in which tighter integration with the core network can be achieved. There are at present thousands of hotspots around the world, and these are increasing at a rate of knots. Aside from the often referenced hotels, cafes and convention centres, 802.11 is facilitating broadband access in many other locations, such as around phone booths in the UK, and even an outdoor public plaza in Australia.

Integrating wide area and local networks

Wide area data networks offer many advantages as a business proposition, most notably the existence of a support base for huge customer numbers, and the existence in most cases of a core corporate and voice customer base. The challenge in terms of integrating the two networks lies substantially in two key areas – authentication (and implicitly roaming) and billing. The integration of the physical network infrastructure is straightforward – the backhaul of the mobile network, or the fibre capacity of the wireline network, serve as the data highways for the WiFi network. So how are authentication systems and processes, and billing systems and processes, integrated in this way?

Authentication and Roaming

RADIUS based authentication is most prevalent in existing WiFi networks today. At a minimum, this legacy infrastructure will need to be integrated into the wide area network operations. Roaming on RADIUS based networks is complicated, and most operators are looking at delegated authentication based on bilateral roaming agreements for 80% coverage of the

revenue base. Therefore Western European operators for example are looking at the EU, Scandinavia and the US for partners. Mobile operators are looking at SIM based authentication as a tool for leveraging existing data (primarily GPRS) roaming agreements and the accompanying infrastructure. There are several vendors and solution providers offering such solutions, and specialised clearing houses are beginning to offer both SIM and RADIUS based clearing for this purpose (please contact the author for a list).

Billing

In order to integrate the existing billing systems, the key is convergence, the capacity to deliver a single bill to each user for their voice and data traffic, irrespective of the network used. There are three challenges here – the first is marrying the business models, where data access on one network will be priced differently to that of another network despite similar billing metrics. For example, the average GPRS user in Europe who uses WAP over GPRS will consume roughly 1MB per month. For this service, the charge is generally in the region of € 10. The same user on WiFi is more likely to consume a multiple of that per session, given the alternate behavioural patterns when using a laptop to access the Internet. Therefore pricing this service on a per megabyte basis will cause significant problems. While one easy answer is to charge on a per session basis, the problem reoccurs when the subject of roaming is brought up, where roaming partners will be anxious to settle based on consumed network capacity. The second issue is identifying the user based on the WiFi authentication mechanism. Many operators are looking to solve this problem through the deployment of rating and settlement engines, which is a niche sector of the billing industry that is growing apace. The flexibility in these solutions is such that record mapping can be performed, mapping radius authentication information to customer account information, such as an MSISDN number in a GPRS network. In addition, these solutions tend to serve the third problem, which is that of settlement. While it is acknowledged that content providers present a settlement challenge for wide area mobile networks, the WiFi model introduces another layer of complexity, that of site settlement. Most hotspot sites in the US run on revenue share models, and this needs to be addressed. The authentication server, and the rating/settlement servers sit between the WiFi network and the Wide Area network, completing the required infrastructure.

Service Delivery and Speed

The bandwidth deliverable is indeed impressive – with wired LAN speeds at 100MbpS, even 10% of that is impressive on a wireless network. There are a number of limitations, however, that isolate and differentiate the technology from, particularly, its wide area network competitors like UMTS.

First of all, the theoretical speeds are compromised by volume of users, and therefore do not represent a true picture of the product. It is likely however that WiFi will in general be significantly faster than UMTS. Second, it is static. Most wide area mobile network standards are designed to function adequately on bullet trains, and therefore allow for in-motion operation. Third, it is a non-phone experience, and there is a requirement for significant user hardware that exceeds the requirements associated with UMTS. It is also, significantly, a very *different* experience. Fourth, WiFi operates in a noisy space that is less secure than the 'conventional' networks. Amongst other things, garage door controls and baby monitors in the US use the same frequencies. Fifth, the operational area of WiFi is very small, and does not represent a realistic proposition for wide area coverage.

It is important to note that WiFi is a widely available technology, with access points at this point well under the $100 mark. Many householders now have personal live hotspots in their homes, leading to widespread adoption and acceptance of the technology. This helps to promulgate the public access network.

WiFi has the advantage of being first to market in terms of wireless broadband public access. In addition, its potential as a driver for the coming PC (or more specifically laptop) upgrade cycle has seen the aggressive entry of industry giants such as Intel and Dell in driving the technology forward. This impetus guarantees that WiFi will have a momentum that will not go quietly into the night. The innovators have come, and the early adopters are already on board. WiFi is, in Moore parlance, crossing the chasm in early 2003, and will succeed or fail this year. So will it be successful?

Telecommunications Carriers and WiFi

Every major telecommunications company in the world has a WiFi strategy. At the extremes, some are monitoring its progress carefully, and some (like T-Mobile in the US) are rolling out so fast that they're barely pausing for breath. In every major economy, hotspots are rolling out, site rights are being negotiated well in advance, and entrepreneurs are taking advantage of this early stage opportunity (before you start thinking about it, the secret's out, guys!). In many cases, it's a hedging of bets rather than a core long-term strategy. Whatever the motivation, the involvement of the carriers, both wireline and wireless, is hugely significant.

Almost every new laptop in 2003 will have 802.11 on board. Nokia and other switch vendors are preparing integrated solutions where WiFi can collaborate with and augment data networks. The infrastructure is getting cheaper and cheaper, driven to the lowest possible price point by larger companies (such as Intel and Cisco) with broader agendas. Hotspots will be concentrated in high volume, easy access locations, without the regulatory percentage coverage requirement. Every major airport in the world has negotiated, or is negotiating its access rights with service providers. All of these factors will contribute to an availability and core user base that pre-equip WiFi for success as new wide area mobile networks battle for the hearts and minds of consumers.

Integrated Networks

Having said that, integrated WiFi networks offer the best of both worlds. Users can access WiFi at the hotspot, UMTS (or another wide area 3G technology) outside the hotspot, have an always-available data connection, with the benefits of hotspot access *and* the wide area network in one. Indeed, the early adoption of WiFi bodes well for the potential success of 3G, as these users will be presented with that technology as an upgrade rather than as a replacement. Similarly, efforts are underway throughout the world to upgrade GPRS offerings, using emerging technologies like SIM based authentication, presenting an upgrade on GPRS, as opposed to the projection of 3G as an upgrade on WiFi. The interoperability of these two *businesses* as opposed to *technologies* presents an interesting challenge, one that will inevitably be shaped by consumers.

In terms of the adoption timeline, WiFi offers real and immediate access for wireless data consumers. That it is cheap and easily available reduces the barriers to adoption. The prevalence of prepaid access, combined with 'free' 802.11 laptop pre-integration means that anyone with a laptop can try it out at a low cost, without obligation. Removing for a moment the acronyms and network badges, this means that broadband wireless data access is now available and is being adopted by growing numbers of consumers, that will form the core user group for the networks as they evolve into wide-area, more secure, more pervasive products. Therefore the combination of WiFi with wide area networks as part of an adoption strategy is hugely significant.

One of the most significant threats to the WiFi market is the stability of the entrepreneur group. With international markets suffering what can best be described as volatile fortunes, the availability of venture funding is limited, and the palatability for risk is low. Investors burned by in particular the ISP sector are looking at the same problems again, and with potential exits limited,

growth in the independent sector is restricted. That appears to have been circumvented as a potential barrier by the involvement of the wide area network operators, although larger companies, being more risk conscious and implicitly, therefore, less innovative. The widespread adoption of technology, while not yet inevitable, will drive this forward.

A significant point to make is that 3G networks are about much more than high-speed broadband access on the laptop, which is, essentially, where WiFi takes a bow. 3G networks allow for significantly more voice traffic than existing networks, and in their mobility deliver opportunities for in-motion services with which WiFi cannot compete. This means that there will always be a massive market for wide area networks that WiFi does not compete with – voice is still king, and won't be going anywhere soon. The adjunct capacity to offer data services, such as push alerts and secure transactions, is a bonus that will need to be developed over time.

Services across broadband networks are limited in their capacity to deliver new revenue at the beginning of the life of a new product. We define a service as something that is delivered across a network against which a premium charge can be attached. At the beginning of 3G and WiFi, Internet access will be the service for which consumers will pay. Traditional communications service providers need to understand that if they wish to offer voice over WiFi, for example, they will compete with every other VoIP provider that currently offers such services. Premium web sites like FT.com provide content, and consumers will pay the Financial Times for access here, and not the operator. A concentration therefore on providing access, which after all remains the cornerstone of the operator's model, will be most profitable in the longer term.

Ultimately, however, users want services, not technologies, or networks. Users want to be able to access the Internet seamlessly, transparently, wirelessly, and fast, anywhere at any time. Users want services that make their lives better or easier. Users want to be able to communicate with home, with the office, and with other people. Users, therefore, do not care about WiFi, or 3G, or GPRS, or CDMA. Users don't care about bits or bytes, but about movies and conversations. All of the technologies and networks that are developed have their advantages and disadvantages. Each will contribute to the deployment and availability of these products and services, and telecommunications companies will sell and profit from these products and services. Simple is best – consumers understand that. As professionals in this market there is all too often a tendency to get lost in the jargon, and lose perspective on what it is we are trying to do. People will pay companies who make their lives better, and who make their jobs better. In this context, we should examine the development of next generation networks, products and services, and ensure the delivery of stuff people want!