

Determining the Impact of Wireless Local-area Network Technology on the Business Case for 3G

a report by

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For the last two to three years, people have been debating the justification of the profit motive for wireless technologies. Whatever optimistic predications are made, it seems likely that there would be one pessimistic certainty. This has left the market totally confused and an extravagant telecoms market has evolved.

Enthusiasm about making money in the wireless industry is becoming paramount. Operators are faced with a new complexity of exciting types of wireless technologies and no single wireless technology stands out as a clear favourite and, hence, there is little or no insight into where the increasing profitability will come from. Currently, there is more bandwidth available than there are customers to use it, users fear having to pay more for something that they have not asked for and the industry is left with heavy investments with more to come in the search for the right products.

In the meantime, business users and students have reverted to a wireless technology that has been around for more than a decade and actually meets their demands. The fastest way of accessing the mobile Internet is currently through systems based on the wireless local area network (WLAN) access 802.11 standard. WLANs have found a particular market niche for households, business and other institutions, notably in older buildings where wiring installation poses a challenge. In practice, there are many versions of the WLAN standard and each of these offers different data rates. Range figures depend on topography and cost figures tend to vary over time. In addition, the 2Mbit links between the access points and the backbone network need to be installed and are major obstacles today to achieving maximum capacity and performance.

This, however, cannot be compared with a mobility service in 3G. Furthermore, insufficient security, lack of guaranteed availability of service or transmission bandwidth and billing are also concerns of professionals using WLAN who cannot fully rely on local device-installed firewalls. These deficiencies, as with other radio technologies, are

short term in nature, while the work continues to improve and harmonise the characteristics. The complexity of a wideband Code Division Multiple Access (WCDMA) radio network and handsets with handover to existing networks are the main cause for 3G service delays.

While today, most customers have plug-in 802.11 WLAN cards, the information technology industry has already begun delivering laptops with integrated 802.11 interfaces. The component industry will, by 2004/2005, have components supporting Bluetooth™, Global Positioning System (GPS) and 802.11x in the same chip. This presents new opportunities for smart phones and personal digital assistants or other new devices. Some vendors have already integrated 802.11 and GPRS in the same Personal Computer Memory Card International Association (PCMCIA) card, allowing roaming to start in 2.5G.

The number of users is small and the expectation is that the GPRS/3G/WLAN card would draw a larger user group. Interference concerns regarding the use of 802.11b and Bluetooth in the same physical space exist. Studies and technology trials indicate that the two standards can co-exist, but with some performance deterioration. Efforts are currently under way to minimise the interference potential.

WLAN and 3G share common capabilities but they are not direct one-to-one replacements. Instead, the inter-networking of WLAN and future 3G systems will allow service providers to leverage the unique and complementary advantages of each.

Seamless hand-offs for wireless fidelity (Wi-Fi) on a UMTS™/3G network, enabling mobile laptop users to browse the Internet while roaming between two network types with no interruption in the session, will be a key feature for mobile workers. This situation becomes more complex when the WLAN is mobile. Currently, mobile Internet Protocol (IP) relies on tunnelling, where all packets are sent via a user's Virtual Packet Network, which forwards them across the Internet to wherever the user is located. It adds extra routing hops, increasing latency and more consuming bandwidth. Internet

Protocol Version 6 (IPv6) is needed for this type of mobility because of the many addresses and the multiple layers of sub-netting. The Japanese government is requiring all of Japan's Internet service providers to support IPv6 by 2006 and the European Commission's Information Society eEurope 2005 plan calls for a general deployment in different industrial sectors by 2005.

The UMTS Forum recently conducted a survey and study and, after considerable debate, the wireless industry has focused on the impact of public WLAN services on the forecast service provider revenues for 3G. One result of this debate is that a number of industry analysts have reduced their forecasts for 3G revenues due to their belief that public WLAN deployment will cannibalise potential 3G revenues. The result concluded that WLAN will be complementary to 3G, not in competition. This opens up room for new business models where one could envisage both the 'mobile' and 'portable' usage scenarios.

When comparing 3G and WLAN, it is important to recognise that 3G is more than just high bit-rates and access to the Internet. There are a number of applications and benefits that remain strictly within the realm of 3G and are likely to guarantee its continued existence. While the WLAN service is currently mainly limited to mobile e-mail and Web access, Voice over IP (VoIP) is also being considered as a service for the future.

The use of VoIP in public networks can be considered questionable for the following reasons:

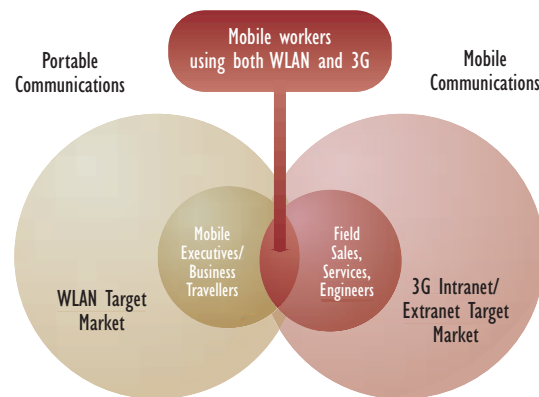
- the deployment of public WLANs for data-only applications is already hampered by the issues (such as security/privacy and data throughput) discussed previously;
- VoIP adds significant network design complexities in terms of bandwidth management and acceptable voice quality;
- VoIP/WLAN handsets are not yet ready for the mass market in terms of cost, design and user interface; and
- the regulatory implications of offering voice services via a public WLAN have not been addressed and are likely to be complex and time-consuming to resolve.

Table 1: Worldwide Public WLAN Market Size in units (millions) and revenue (US\$ billions)

	2002	2003	2004	2005
WLAN business users (millions) ¹	0.7	4.8	11.9	20.5
WLAN users that are also 3G subscribers (millions)	–	0.3	1.7	5.3
WLAN users that are not 3G subscribers (millions)	0.6	4.6	10.2	15.2
Total WLAN market (US\$ billions) ²	0.15	0.9	1.9	2.8
Worldwide 3G mobile intranet extranet revenue (US\$ billions)	0.2	1.9	5.8	9.8
Total market opportunity (US\$ billions)	0.3	2.8	7.8	12.6

Source: UMTS Forum and Telecompetition Inc., May 2002.

Figure 1: Segment Focus Comparison of WLAN and 3G



Source: UMTS Forum and Telecompetition, Inc.

Some mobile operators are already trying to secure the WLAN business, using their existing billing infrastructure and customer relationships to offer combined packages of mobile phones and WLAN. There are also a number of operators today offering free Internet WLAN access in hot spots, airports, hotels, etc.

Public WLAN service may be an important source of competitive differentiation for 3G operators and cannot be ignored, especially since some countries in Europe have allocated up to 450MHz in the 5GHz range for public use of non-licensed spectrum technologies such as WLAN. Nevertheless, optimal speeds are generally not attainable. The characteristics of the physical surroundings, ethernet collision-avoidance schemes, quality of Wi-Fi network design and the number of simultaneous users (among other things) all contribute to actual shared-user data rates below the optimal 11Mbit/s. A similar situation exists for wired-ethernet LAN. The actual total data throughput of a Wi-Fi access point is about 6Mbit/s over a short range and degrades over distance and number of users. A similar situation

1. WLAN targeted countries/territories only, which includes Australia, Brazil, China, Hong Kong, India, Japan, South Korea, Singapore, Taiwan, the 15 EU Member States and the US.
 2. WLAN revenue per subscriber is based on current minimum WLAN subscription prices of US\$25 per month, declining by 15% annually. The average revenue per user also considers that WLAN hot spots will not be available to all users in 2005, that not all users will have WLAN-enabled devices and that many will not subscribe for an entire year of full-time usage.

Table 2: Possible 3G Business Revenues – At-risk Scenarios

Assumption	2002	2003	2004	2005	Cumulative 2002–2010 (% of total 3G revenue)
Business users with WLAN service only (millions)	0.6	4.6	10.2	15.2	
Business users with both 3G/WLAN services (millions)	0.0	0.3	1.7	5.3	
Total 3G business revenue (US\$ billions) ³	–	0.1	0.7	2.2	4%
Possible Scenarios – 3G Operator Revenue at Risk (US\$ billion)					
If 10% of 3G/WLAN users dropped 3G	–	0.02	0.1	0.3	0.4%
If 20% of 3G/WLAN users dropped 3G	–	0.02	0.15	0.45	0.8%

Source: UMTS Forum and Telecompetition Inc., May 2002.

exists for the other WLAN technologies. In short, unlike 3G, 802.11x technologies do not allow guaranteed data throughput and quality of service. Nevertheless, a fourfold increase in hot spot availability is anticipated in 2003. This fact, combined with a fast-growing base of Wi-Fi devices, results in the 4.8 million users (primarily in Western Europe and the US) expected in 2003.

The UMTS Forum has forecast that worldwide operator-retained revenue for mobile intranet/extranet in 2005 to be US\$9.8 billion, and an estimated 20.5 million business users of public

implications of not participating in any way may be greater than any direct revenue impact. WLAN users of hot spots are more likely to be better educated with managerial responsibility and have higher income and professional qualifications than mobile users in general. This is a customer segment that an operator should nurture and protect from competitive inroads.

Wireless data awareness is growing, with many organisations having both optimistic and business plans – nearly 90% of organisations are planning to exploit wireless and provide applications.

There are a number of applications and benefits that remain strictly within the realm of 3G and are likely to guarantee its continued existence.

WLAN, of which 5.3 million are likely to be both WLAN users and 3G subscribers. These 20.5 million users are expected to generate US\$2.8 billion in WLAN service revenue by 2005, for a combined market opportunity of over US\$12 billion.

The 5.3 million 3G/WLAN subscribers would generate about US\$2.2 billion of all forecast 3G revenues for business subscribers in 2005. In a higher illustrative scenario, if 20% of the 3G/WLAN users changed their 3G service provider or discontinued service, this would represent a loss of US\$450 million in 2005, and a cumulative loss of US\$9.3 billion through 2010, or less than 1% of the total cumulative 3G revenue.

The public WLAN market presents a positive market opportunity to 3G operators that should not be ignored. While the direct threat in terms of revenue loss may not be that great, the strategic

- Public WLAN will add US\$2.8 billion to the market for 3G mobile data in 2005.
- Public WLAN introduces new, event-driven services to additional market segments.
- Public WLAN is not a direct substitute for mobile intranet or other 3G services.
- Public WLAN service may be an important source of competitive differentiation for 3G operators.
- The direct impact on forecast 3G mobile intranet revenues is likely to be less than 1% of total 3G revenues in 2005.
- Public WLAN will be used by almost 20% of 3G business users in 2005 – a significant portion of the user base. ■

3. The figures include revenue from business multimedia messaging services, location-based services, mobile intranet/extranet access, simple voice and rich voice. In 2005, the US\$2.7 billion total 3G business revenue includes US\$1.4 billion for mobile intranet/extranet access.