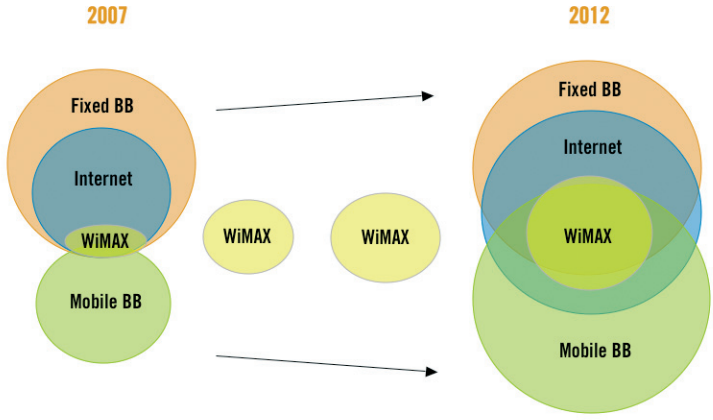
Figure 2.1: The role of WiMAX in fixed-wireless-mobile broadband convergence



Note: BB = broadband.

Source: Informa Telecoms & Media

The illustration in fig. 2.1 also highlights that the majority of growth in the broadband market will come via wireless and mobile technologies. In fact Informa Telecoms & Media forecasts that 48% of the total worldwide broadband subscriber base in 2012 will be using wireless/mobile technologies, compared with 17% in 2007.

WiMAX divergence – new devices and business models

WiMAX is at the heart of broadband convergence but also diverges from existing broadband systems in several respects, which is only natural given that WiMAX is a new broadband platform and will have to differentiate as strongly as possible relative to the incumbent systems such as DSL, cable, EV-DO and HSDPA.

One way WiMAX aims to do this is by bringing broadband connectivity to a host of new devices, starting with new computing devices such as UMPCs and Mobile Internet Devices (MIDs), and then branching out into consumer electronics devices such as digital cameras, as WiMAX chipsets become small and cheap enough to be integrated into relatively small mass-market devices. WiMAX will continue to support its traditional device classes – namely outdoor and indoor CPE – while also expanding to new segments such as notebook computers and handsets, but in those it will compete head-to-head against systems such as HSDPA, which has a reasonably strong position in notebooks and a very strong position in handsets.

This helps to explain why Intel is integrating WiMAX with Wi-Fi, which will build on the scale economics of Wi-Fi to reduce the cost of adding WiMAX to devices. This in turn could give WiMAX a chance of overtaking the penetration rates of EV-DO and HSDPA in notebooks, despite the fact that notebooks with either EV-DO or HSDPA launched in 2006, up to two years ahead of the launch of notebooks in multiple regions with Mobile WiMAX.

does not support Advanced Antenna Systems. 802.16e-2005 in contrast supports multiple channel bandwidths and AAS techniques such as MIMO and beamforming.

The WiMAX Forum and TTA have agreed that WiBro should become part of Mobile WiMAX and have taken several steps to make this happen. In November 2005, first Samsung and then KT joined the board of the WiMAX Forum, and in February 2006 the Forum appointed the TTA as the first WiMAX Forum Certification Lab in Asia Pacific. WiBro is also on track to effectively become the first Mobile WiMAX certification profile, as outlined in the following section.

South Korea's Ministry of Information & Communications issued three 2.3GHz WiBro licences in January 2005 to KT, SK Telecom and Hanaro. However, Hanaro subsequently handed back its licence to MIC. KT ran a public trial of WiBro in late 2005 using handsets from Samsung, and both KT and SK Telecom launched commercial services in mid-2006, although both coverage and device availability were very limited, as detailed in the case studies on KT and SK Telecom in Chapter 5.

Certification

Given that IEEE standards are effectively a huge menu of technology options, it is the job of the WiMAX Forum to select the options that will be the basis of WiMAX-certified commercial products. It does this by defining two types of profiles.

The first, system profiles, takes the relevant IEEE standard and narrows it down to the key features that will have to be included in commercial products based on that system. The key system profiles are 802.16-2004 Fixed WiMAX, which is based on OFDM-256, and 802.16e-2005 Mobile WiMAX, which is based on SOFDMA using either 512 or 1024 carriers.

For each system profile the WiMAX Forum also develops certification profiles, which specify another level of key features – namely spectrum band, duplexing method and channel size. Certification profiles are generally driven by market demand, in that operators and vendors in the forum vote for the profiles that they feel have the best commercial prospects.

The WiMAX Forum has created five certification profiles for 802.16-2004 Fixed WiMAX (see fig. 2.7).

Figure 2.7: 802.16-2004 Fixed WiMAX certification profiles

Profile name	Spectrum (GHz)	Duplexing	Channel size (MHz)
3.5T2	3.5	TDD	3.5
3.5F1	3.5	FDD	3.5
3.5T1	3.5	TDD	7
3.5F2	3.5	FDD	7
5.8T	5.8	TDD	10

Source: WiMAX Forum

auctioned in the UK in 4Q07. There is also the potential for integrating backhaul and WiMAX access equipment. In fact, NEC says that it is developing products that integrate WiMAX microcells with its Pasolink point-to-point outdoor backhaul unit.

In addition, NEC says that it is working on a trial WiMAX system for an operator in Japan.

Opportunities and threats

As one of the smaller diversified telecoms vendors, NEC sees the arrival of WiMAX as a chance to gain new customers and market share, particularly outside Japan. However, its lack of scale relative to the market-leading telecoms equipment vendors means that it may struggle to match the depth and breadth of their competing WiMAX portfolios.

Nokia Siemens Networks

Company overview and strategy

Nokia Siemens Networks, a 50-50 joint venture between Nokia and Siemens, was announced in June 2006 and launched on 1 April 2007. Nokia and Siemens originally planned to launch their infrastructure venture by 1 January 2007 but were delayed by a corruption and money laundering investigation at Siemens. They say that, based on 2005 results, the combined company will have €15.8 billion (US$21.1 billion) in pro forma annual revenues. The group says it is the second-largest company in mobile infrastructure, second in services, third in fixed infrastructure and third in the overall telecoms infrastructure market.

Nokia Siemens Networks (NSN) plans to cut costs by €1.5 billion annually partly by improving R&D efficiency and eliminating overlapping functions. The group, which has its headquarters in Helsinki and a regional headquarters in Munich, says it will reduce its combined head count of 60,000 by 10-15% within four years.

Figure 4.13: Nokia Siemens Networks profile

Company	Details
Announced	June 19, 2006
Launch	April 1, 2007
Structure	50-50 venture between Nokia and Siemens
Asset contribution	Siemens contributing €2.4 billion in assets, Nokia €1.7 billion
Headquarters	Helsinki
Pro-forma revenues (2005)	€15.8 billion
Employees	60,000
Cost-reduction target	€1.5 billion in annual savings, including 10-15% cut in number of employees
WiMAX activities	
Announcement of major WiMAX product	Oct-06
Main products	Flexi WiMAX base station (Nokia); WayMAX (Siemens)
Contracts	Sprint Nextel, US; Orbitel, Colombia; Fastweb, Raiway, Italy

Source: Informa Telecoms & Media

Market opportunities and challenges

Russia is in many ways the ideal market for Fixed WiMAX services – it has a huge under-served population and access to broadband via standard channels, such as DSL and cable infrastructure, is limited outside the major cities. In addition, there is spectrum available at 2.5GHz, 3.5GHz and 5GHz bands.

Operating in the country is challenging, however; every vendor needs special Russian certification for equipment, and low income dictates the need for low-cost customer premises equipment (CPE). In addition, acquiring spectrum from the regulator or existing licence holders can be problematic.

Pakistan: Wateen Telecom

Wateen Telecom is deploying a pre-Mobile WiMAX network across Pakistan in a bid to meet huge untapped demand for broadband in a country that has 157 million people and only 150,000 broadband subscribers. The operator has a 3.5GHz licence that permits fixed but not mobile services and is targeting both companies and consumers.

Wateen has worked with Motorola to deploy the vendor's pre-Mobile WiMAX equipment in 17 cities and said it was on track to launch commercial services in 22 cities in April 2007. Wateen is investing US$250 million in the network, with an undisclosed but reportedly significant amount coming from Motorola via vendor financing, and plans to provide coverage to half the country's population. The group's target is to have one million voice and broadband customers several years after launch.

If the Pakistan project is a success then Wateen affiliates plan to launch services in up to 10 other developing markets. It is unclear when and where other Pakistani-style national WiMAX networks might appear, although sites in Africa and the Middle East are being considered. Wateen is owned by Warid Telecom, a private entity, and many of its plans are under wraps. Warid is owned by the Abu Dhabi Group, a private consortium of businesses, whose shareholders include members of Abu Dhabi's royal family.

In 2006, Warid announced a joint venture with Congo-Brazzaville's incumbent operator, Sotelco, which reportedly plans to operate mobile, fixed-line, WLL, WiMAX and fibre-optic services. It was also awarded a unified licence by the Ugandan government in 2006 and plans to invest about US$200 million in hopes of attracting four million subscribers over three to five years; it is unclear whether the service would be limited to GSM. Warid owns the sixth-largest GSM operator in Bangladesh and has a sister company in Uganda, which was awarded the unified licence (see above); the CFO of Wateen recently moved to become the CEO of its affiliate in Uganda.