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WIRELESS WATCH

In-depth analysis of Wlan, cellular and broadband wireless markets

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Vodafone trials Flarion but Nextel pivotal in mobile broadband race

- **Vodafone turns to OFDM at last to fill 3G gaps**
- **Non-WiMAX suppliers taking a very high risk path**
- **NextNet-Flarion-Nextel triangle could be a template for 4G**

Today, Vodafone announced that it is trialling Flarion's Flash-OFDM technology for mobile broadband wireless services. The news was a shock for two reasons – that it was coming from Vodafone, so far the most lukewarm of the major mobile operators about non-cellular networks; and that, as the world seems to be going 802.16, that it had picked a non-WiMAX technology for its first trials.

The project will take place in Japan under the auspices of Vodafone KK, but is being conducted on behalf of the global group. Professor Michael Walker, director of R&D at the operator, distanced himself from any commitment to roll-outs or commercial trials, saying that “Vodafone undertakes technical trials of emerging technologies to ensure we are well positioned to drive future research into mobile systems”. Like Nextel, the company stressed that it was trialling various technologies and had made no decisions on what to adopt. The trial will take place over seven or eight metro base station areas of Tokyo.

There are also rumors that Flarion will also announce trials shortly with Telstra of Australia and with its own investor, T-Mobile.

Vodafone's motives:

Vodafone has shown very little interest in alternatives to 3G, even pulling back from creating a Wi-Fi network, unlike its rival T-Mobile, which is an investor in Flarion and widely expected to trial its technology soon. However, the world's largest cellco softened its stance somewhat last month, saying that it would “stitch WiMAX” into its offerings as equipment and customer demand developed. And now it is taking a clear interest in the Flarion technology, which is more closely aligned to the 802.20 would-be IEEE standard for highly mobile OFDM-based wireless than to WiMAX.

Given the investment and risk that Vodafone has put into its 3G network, it is understandable that it would throw its efforts behind maintaining a cellular-only wireless world. But the time for that has passed, as its Flarion trial indicates. Growth in wireless

revenues will be increasingly dependent on being able to offer high speed data services, especially to businesses and to heavy users of multimedia. To deliver this 100% through 3G is a very expensive option and very demanding on the spectrum. OFDM-based technologies can provide up to three times greater spectral efficiency and can be deployed cost effectively in areas where there is little cellular penetration, such as rural regions.

Complementing 3G with OFDM is logical then. Before, operators have been deterred by the need to invest in a parallel equipment system together with additional skills, but the broadband wireless companies, and the chipmakers, are working hard to allow their technologies to coexist with UMTS and CDMA.

Flarion, for instance, is developing a 'blade' that will slot into an existing cellular base station to provide Flash-OFDM services from the same infrastructure, while there are similar moves for WiMAX, including work on software defined base stations, by companies like PicoChip, that will enable one set of hardware to support multiple wireless networks.

Why has Vodafone not opted for WiMAX for its first trial, having pledged support for the standard's place in its roadmap? The obvious answer is that the mobile version of WiMAX, unlike the fixed wireless variant, is currently too undeveloped for real pilots – the standard is not finalized and even pre-standard kit that will migrate to 802.16e is mainly on the drawing board.

The closest would probably be NextNet, which has mobile, plug and play technology as Flarion does, but its migration to WiMAX will come gradually and it says there is a significant waiting period before it can start to move its product range to the standard.

The dilemma for 802.20 companies:

In that situation lies the dilemma for the companies that have backed the IEEE 802.20 effort to date. Despite some advantages, notably greater true mobility than 802.16e, this standard will almost certainly be stillborn, with timing and heavyweight industry figures being on the side of WiMAX. So its supporters and contributors can either shift their R&D roadmaps to focus on 802.16e, as Navini has done, or take advantage of the time-lag of a couple of years before the mobile version of WiMAX is commercialized, to try to establish a de facto standard of their

own through major licensees. This seems to be the route that Flarion is currently taking, although in the medium term, we believe the interests of the company and of the broadband wireless industry would be best served by a convergence of its technology with WiMAX.

That decision would rob Flarion of its uniqueness and force it to compete head-on with companies like NextNet and with bigger names like Alcatel as they move into WiMAX. Flarion's solution is to take the Qualcomm approach and seek to sign up the Alcatels of the world as licensees, rather than take them on as rivals, thus also offering operators the reassurance of multiple sources of equipment, price competition, and suppliers with sufficient scale to cope with major roll-outs.

Can Flarion go it alone?

But the company will have to amass a major head of steam, in terms of carrier interest, to attract the interest of large OEMs, which will see WiMAX as a safer and more logical choice. From that point of view, in terms of credibility and profile, the Vodafone announcement is a huge boost.

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Flarion's success is not based on 802.20. Operators do want standards but whether that will be 802.20 or another is another issue.
Flarion

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Flarion may have fewer real world deployments as yet than some other mobile broadband wireless players such as NextNet or IPWireless, but its most recent triallists could not be more bluechip – the Vodafone agreement was announced just weeks after a technology pilot with Nextel in North Carolina was promoted in record time to full commercial trial status.

The temptation, then, to plough its own furrow must be huge (it is no coincidence that Qualcomm pioneer Andrew Viterbi is on Flarion's board). Although officially tightlipped, it certainly seems less bullish about 802.20 than it was a year ago, when it talked about the IEEE work and its own Flash-OFDM almost in one breath.

Now, Joe Barrett, head of marketing in Europe, while insisting that there is still support for the work of the 802.20 group, stresses: “Flarion's success is not based on 802.20. Operators do want standards but whether that will be 802.20 or another is another issue.”

With 802.20 and possibly WiMAX as back-up options, Flarion looks set to take the brave option, initially, of trying to establish a standard itself, a tack similar to that of IPWireless. Along

with NextNet, these are the major players in the plug and play, highly mobile, non-line of sight market (as compared to companies like Alvarion and Aperto that major in the fixed wireless sector).

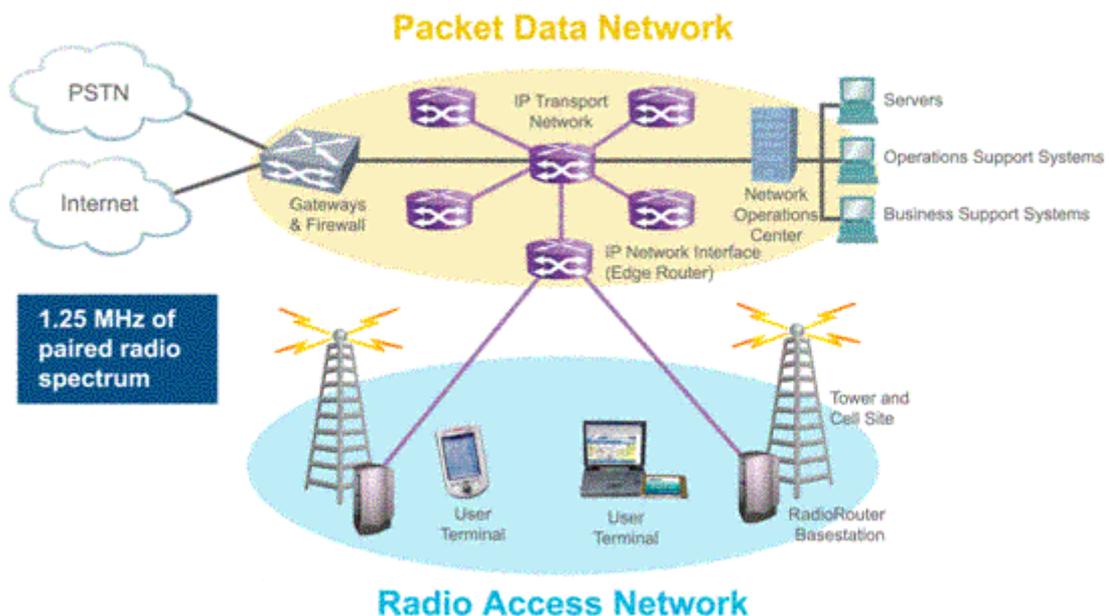
While both Flarion and IPWireless support standards bodies – the latter backing the data optimized version of 3G, UMTS TDD - this seems almost an insurance policy as they strive for their real goal, a strong and permanent position for their own technologies.

The drive for standards:

But we believe that 802.16e has achieved too much momentum, and is too close at hand, to give other technologies the breathing space they need to establish themselves without a standards roadmap, especially as operators such as Nextel are adamant that they want industry standards support in their chosen networks. We cannot believe that two such large operators as Vodafone and Nextel, both with the muscle to dictate terms to small equipment suppliers, have not made a clear standards migration part of the terms of taking any technology trial into the commercial mainstream.

Operators know the consequences, in terms of overpriced kit and difficult migrations, of relying on a technology that is available from only one vendor – Nextel perhaps more than anyone else, with a history built on the unique Motorola network, iDen. Of

Flarion’s architecture



course, unique technology is great if it brings real competitive edge, but iDen ceased to do that years ago – and lost its final claim when Push to Talk ceased to be iDen-specific last year. Nowadays, cost efficiency at the network level, and differentiation through the applications, user interface and marketing, are the goals of the cellcos.

Therefore, it would surely be a sound policy for Flarion to develop a migration route to WiMAX, and ensure that, by the time 802.16e is mainstream, it has a major headstart on other players through its technological excellence and the real world experience of its operator trials. This is clearly the approach of NextNet, which currently says it is well ahead of the WiMAX standard and so aims to establish a strong market presence on the basis of its current advantages, in the hope of a leading position once 802.16 catches up.

NextNet and the case for convergence:

The powerful interests behind WiMAX are undoubtedly interested in snaring some of the more mobile-oriented broadband wireless companies into their camp. Navini was a good coup, and all eyes are now on Flarion and IPWireless. Chuck Riggle, vice president of business development at NextNet, was candid about Flarion being ahead of WiMAX on high speed mobility, though he feels this may “a little ahead of the market”.

In his ideal world, such functionality will be merged into the NextNet WiMAX-oriented product set over time. From the point of view of 802.16e, it would be enormously beneficial to have the input of companies whose technologies were designed from the outset to be highly mobile, unlike ‘e’, whose original remit was merely to support handoff between base stations in a metro area.

NextNet and Flarion may be taking different courses, but there is, of course, one important link between them, and that is Nextel. The US’ fifth largest and most profitable cellco is trialling Flash-OFDM but has made it clear that it will insist on a standards roadmap, and that it is actively considering various broadband options, possibly including both IPWireless and WiMAX.

The link with NextNet? The equipment maker has been acquired by Craig McCaw, serial wireless entrepreneur and major shareholder in Nextel, which he rescued and turned around in the mid-1990s.

This brings NextNet clearly into Nextel's orbit. The acquisition is one of a string of recent moves by McCaw (*see Wireless Watch issue 59*) that seem designed to assemble manufacturers, spectrum and old associates to create a 'new Nextel', poised for an assault on the mobile broadband wireless market in the Americas. McCaw has also acquired Clearwire, a broadband wireless operator and holder of significant WiMAX-suitable spectrum, and will merge both companies, and his existing unit Fixed Wireless Holdings, into a business called Flux Fixed Wireless that he set up last year to house a collection of spectrum.

He is also gathering old friends around him. Clearwire executives include Nicolas Kauser, former right hand man at McCaw Cellular, CTO at AT&T Wireless and now head of telecoms investment house NR Communications. Clearwire's president is Gerard Saleme, former McCaw lobbyist, and other execs include Robert Mechaley, formerly at AT&T Wireless, and Clark Peterson, who was at another McCaw company, Nextlink. Some of these people have replaced former senior executive, including president Leo Cyr, who left last year while the McCaw deal was being worked out.

Steve Wood, CEO of Wireless Services in Bellevue and a former member of the McCaw Cellular executive team, told The Seattle Times that McCaw, Mechaley and Kauser had been acquiring spectrum for over a year and he believes they aim to create a national entity with a patchwork of holdings, as McCaw has done twice before.

"He's done it several times," Wood said. "This is his new gobble-up-the-wireless-spectrum venture. It's the new Nextel." The big difference from Nextel is that McCaw aims, this time, to control the equipment supplier as well as the spectrum.

In some ways the Flux/NextNet combination could be seen as a challenger to Nextel and the other cellcos, since it will not only make equipment but own its own spectrum, but it is far more likely that McCaw envisages the two companies working together. As Nextel's iDen network starts to creak, it is the most likely of the US carriers to consider an IP-only strategy rather than a cellular upgrade, and it would surely welcome a network sharing partner to ease the pressure on its own build-out. It is hardly beyond credibility that Flux/NextNet would provide the WiMAX system for Nextel's roll-out as well as its own, and then converge or merge its technology with that of Flarion within a single Nextel system.

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This is (McCaw's) new gobble-up-the-wireless-spectrum venture. It's the new Nextel

Steve Wood, Wireless Services

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Nokia leaves WiMAX Forum

- **Is Nokia trying to shake confidence to strengthen its 3G hand?**
- **Defection undermines axis with Intel and leaves market for Alcatel et al**
- **Nokia may have abdicated mobile WiMAX crown to Samsung**

In a shock move, Nokia has left the WiMAX Forum, indicating a U-turn on the technology it once promoted enthusiastically.

Nokia was a founding member of the Forum, before Intel joined and raised 802.16's profile beyond recognition, and during 2003 was bullish about the technology, with development projects surrounding base stations for rural regions and 802.16e handsets.

Now, the company has decided not to renew its membership, claiming that its short term priorities are to concentrate on 3G and Wi-Fi. It says it will continue to monitor WiMAX closely and so is likely to take a role again if the technology goes mainstream, but does not see a short term business case.

The surprise lies not so much in taking a more cautious approach to WiMAX – Nokia's primary interest always seemed to lie in handsets, which are some years off – but in the drastic step of breaking ties with the Forum. Even if 802.16 no longer forms a central part of the short to medium term product strategy, companies of Nokia's size and R&D clout tend to remain involved in any industry bodies, even if they do not take a highly active role.

Therefore, it seems that the defection is meant to convey a statement to the market, although if the intention was to undermine confidence in WiMAX, the Finnish company needed to make rather more noise about its decision than simply removing its name from the membership list.



The most likely explanation seems to be that Nokia perceives a real threat from WiMAX equipment to its much vaunted strategy of creating low cost cellular base stations for developing nations. Its efforts in this direction have progressed rapidly, so perhaps it no longer needs fixed WiMAX as a back-up option – it launched 'budget' cellular systems last year and, with its market share in developed regions slipping, is placing growth in China, India and Russia at the center of its plans.

Although WiMAX could be the basis of such an expansion too, the rapid emergence of commodity silicon will depress prices and make the margins available to Nokia less attractive than on a proprietary cellular system, especially with rivals such as Alcatel and Siemens opting to build kit based on off the shelf Intel chips.

The decision of those two giants to deliver WiMAX base stations at an early stage – and in Siemens' case, handsets later on – will have destroyed any hopes Nokia had of gaining a significant head-start in the market. A year ago when Intel first joined the Forum that Nokia had founded, putting massive marketing weight behind the standard, there was very little indication that the big names would get involved, and Nokia could have expected to have the sector to itself for at least a year after the standard was ratified and to build on its closeness to Intel to create a product that was hard to leapfrog.



Now that picture has changed, and the attractiveness of the market must have fallen considerably with the looming prospect of a price battle with some major infrastructure competitors. Better to focus on an area where Nokia has taken a strong lead, in cut-price cellular networks and terminals for developing markets.

Depression in base station market:

Nokia will certainly have come to have a certain fear of WiMAX as a technology that could deepen the already serious depression in infrastructure prices. Once it might have dreamed of charging premiums for the speed and spectral efficiency of 802.16 equipment – now it is more likely that WiMAX will increase the pressure on 3G prices, especially as software defined radio and blade technology allow for the simultaneous support of multiple networks within one base station.

Even without the WiMAX factor, and despite a cautious revival in telecoms investment, life remains hard for infrastructure suppliers – although Nokia is less exposed to this than other competitors since it derives less than 15% of its revenues from equipment, unlike a highly dependent player like Ericsson. At a UK base station conference this week, vendors complained that they face a triple challenge – increasingly aggressive demands for price cuts from operators; higher R&D expenditure; and

new levels of competition, especially with the emergence of low cost Chinese players.

These factors are raising the prospect of the sector's average operating margin falling below 10% for the first time, according to Eiii Aono, director of telecom equity research at Credit Suisse First Boston – and all three of them can be exacerbated by WiMAX. In 2000, the GSM base station market was at its peak and worth \$30bn, but when W-CDMA peaks around 2007, it is likely to be worth only two-thirds of that, even though more units will have been shipped than in GSM.

The pressure is on for base station makers to use as many standardized modules as possible – as the auto industry does – in order to pool development and reap economies of scale in manufacturing. Currently, R&D spend stands at 17% of sales for major vendors, compared to 13% in 1999, which Nokia calls “unsustainable”.

Targeting developing nations:

The pressure to cut costs will be even higher in the developing countries, on which Nokia has pinned a large chunk of its growth plan, picking out India, China, Russia and South America as its main areas of focus. Although major operators in all these countries have shown interest in WiMAX, Nokia has clearly decided to attack with a unique offering and try to mop up market share with its cellular systems, which are widely reported to be ground breaking in price/performance, before WiMAX is sufficiently mobile to be a real competitor.

It can live happily alongside fixed wireless WiMAX, which is an alternative mainly to DSL and cable, not to cellular, but it does seem to be leaving the market for mobile 802.16 infrastructure and terminals wide open for a competitor to snatch. Siemens has put itself in a good position with its early move into fixed WiMAX, and the other Nokia rival to watch will be Samsung, which virtually invented HPI, the South Korean mobile broadband wireless technology that is likely to be merged with 802.16e. That will give the Korean vendor a huge headstart when WiMAX itself goes mobile.

Even if Nokia believes the WiMAX opportunity will not justify the R&D spend required to be at its forefront, the decision to abandon the Forum still seems extreme - especially as it was not done with sufficient sound and fury to be an effective way delib-

erately to undermine confidence in 802.16 and turn the floodlight back on to 3G. The genie is out of the bottle now. After many years when OFDM-based broadband wireless specialists complained that the MEN triumvirate (Motorola, Ericsson and Nokia) used their influence over operators to pressurize them not to toy with non-cellular technologies, now the boot is on the other foot.

After years of slump in the equipment sector, and with the slow growth of 3G, vendors are in a less strong position to dictate, and operators are desperate for networks that will enable them to offer premium services at low cost and risk. Nokia may turn its back on WiMAX but it is no longer in a position significantly to impede its progress with that decision.

Cisco offers WLAN switching at last, pressurizing start-ups

After a year of talk, Cisco has finally released long awaited wired/wireless switch capabilities and taken a major step towards an integrated enterprise network.

A key part of the Structured Wireless Aware Network (Swan) roadmap, the new modules – previously codenamed Screaming Eagle and now called WLAN Services Module (WLSM) – add wireless capabilities to the Cisco Ethernet switch. Layer 3 mobility will be added to the Catalyst 6500 Series and will allow users to roam between access points without losing connection.

Screaming Eagle works with the CiscoWorks Wireless Lan Solution Engine (WLSE), a management appliance introduced last year as part of Swan, and the Supervisor 720 module, which includes new Layer 3 mobility management software. Up to 300 access points are supported with up to 16 routing tunnels per AP, and a total of about 6,000 users.

This is the first time that Cisco has produced a wireless switch with centralized intelligence, taking on products from a host of start-ups such as Trapeze and Airespace.

The integrated system is critical if Cisco is to keep its leadership in corporate voice over IP as these systems increasingly move to a mixture of wired and wireless networks, making fast hand-off and quality of service features essential.

Screaming Eagle works by setting up a multipoint GRE (general routing encapsulation) tunnel from the Catalyst 6500 to each AP

on the network. However, critics question the efficiency of GRE tunneling, as it forces packets along a roundabout path known as ‘tromboning’ that passes through the AP and to multiple switches, before getting to the destination.

But Cisco is presenting its new addition as the first enterprise quality wireless switch, keen to portray the start-ups as providing products most suitable for small and medium-sized organizations, but lacking the functionality, support and financial stability to be trusted in the large corporate network. And of course, it has its massive wired installed base to rely on, looking to milk more revenue from it with wireless extensions.

The product “allows seamless management of what otherwise would be two separate domains, said Larry Birenbaum, senior vice president of Cisco's Ethernet access group. "It is the capstone of our Swan announcement a year ago."

However, Cisco has not turned its back on its support for ‘fat’ access points, which house most of the intelligence and security function in the AP rather than the central switch. This contrasts with the highly centralized approach of the switch start-ups, which rely on dumb APs. Screaming Eagle will work with the Cisco 1100 and 1200 fat APs, though not the older 340s and 350s.

Support for third party APs is not on the agenda, unsurprisingly, given that Cisco has a dominant position in enterprise WLANs and has no desire to let other players in through interoperability.

The switch will cost \$18,000 in a basic version supporting up to 150 Aironet access points, or \$26,000 for the full 300.

The start-ups will now have an even harder job chipping away at Cisco’s market share, since their arguments have relied heavily on the giant’s lack of centralized management and wired/wireless integration. Their chief remaining argument – apart from technical quibbles over GRE and the possible degradation to hand-off rates – is the lock-in factor resulting from Cisco’s refusal to support third party APs.

This will put the spotlight back on the IETF standards body’s work on a common specification for dumb APs, which would allow all supporting vendors’ switches and clients to intercommunicate, thus reducing customers’ risk in choosing equipment from a small vendor.

However, progress towards this standard slowed earlier this year when the proposed Light Weight Access Point Protocol (LWAPP) was renamed and diverted into a seemingly cumbersome process within the IETF.

The LWAPP work was subsumed into a new IETF working group called CAPWAP (Control and Provisioning of Wireless Access Points) and the likely date for completion of a formal document was put back from late this year to mid-2005, giving Cisco more time to solidify its market lead.

The delay is because the mandate for the new working group is initially to study WLAN architecture and topology only – where devices sit and what they are called - without touching the protocols, or how they communicate. This architecture work should take about six months and only then will the group focus on the issues that LWAPP had begun to address.

A few companies say they will continue to support LWAPP in the hope of making it a de facto standard. Prominent among these is Aruba, though it says it will back any final IETF protocol too. Ironically, Cisco also plans to support LWAPP – though not CAPWAP – for any functionality that it builds into its upcoming Swan architecture, which will include some measure of switching.

Cisco was one of the original creators of LWAPP, though it backed away from the technology in 2002 as it increasingly set its cap against the thin AP approach. There must be a suspicion that Cisco will seek to hijack LWAPP for its own purposes in order to drive and control standards in this area itself, pre-empting industry body efforts.

US neighbors and Australia provide template for future wireless

We tend to look for the patterns that will shape the wireless industry to the largest mobile markets – western Europe, Japan, Korea and the US, with China as the emerging giant. But regulatory webs and entrenched cellular operators with almost saturated bases can stifle development of new networks and services in these regions, and in the current climate, other markets are often providing the template for what will happen later in the major territories.

These are areas such as Australia, Canada and parts of Latin America, which are highly developed economies but have greater

room for development of new services than their more saturated neighbors. Many of the most ambitious early deployments of broadband wireless are taking place in these countries, aiming to target affluent populations in metro areas while filling in gaps left – for economic or terrain reasons – in the wireline and cellular network.

We have already seen how the high profile venture of Allstream, Microcell and NR Communications in Canada (*see Wireless Watch issue 52*) is acting as a proving ground for the NextNet mobile broadband technology on which it is basing its roll-out, as well as for a wireless delivery of partner AOL's latest service. Both NextNet and AOL will look to emulate their Canadian venture in the US.

Australia:

Australia is becoming very competitive in terms of wireless services, bringing huge pricing pressure on incumbent telco Telstra and making its nationwide wired network a millstone round its neck. Telstra has plans to upgrade its mobile phone network to CDMA 1xRTT and to offer a nationwide Wi-Fi hotspot service, mainly through partners, but it faces many upstart challengers.

CEO Doug Campbell acknowledges that "wireless and broadband are the future of the internet" but it is certainly far from certain that Telstra will be able to remain dominant through this wireless future.

Sydney is the site of a battle of broadband wireless pioneers. Unwired Australia is rolling out a WiMAX-ready network in the city, based on Airspan equipment operating in the 3.4GHz band, in which the operator has spectrum that can reach 95% of Australians. Unwired, a start-up led by former senior Telstra executive Peter Shore, was founded by media entrepreneur Steve Cosser, and paid \$100m for its spectrum.

Meanwhile, Personal Broadband is to build a similar wireless service in Sydney using the iBurst smart antenna technology from its parent company ArrayComm. Both companies will undercut ADSL prices and believe they need 500,000 subscribers each to survive.

In Melbourne, Access Providers, set up by former Uecomm CEO Keith Ondarchie, has set up a citywide network based on six pre-standard WiMAX base stations operating in the 5.8GHz fre-

quency. The network will have cost Aus\$3m to build by the time it is completed next year, with the addition of three more stations covering the suburbs. Ondarchie has already beaten Telstra and second carrier Optus to become ‘preferred tenderer’ for a \$3m contract to provide network services to a regional health authority and now plans expansion to the Gold Coast.

More bizarrely, US company Sanswire has sold rights to its stratellite system – based on airships floating 25 kilometers above earth – to a group of Australians led by Bob Johnson, former CEO of Telstra subsidiary Sensis. One stratellite covers a radius of 200 kilometers and is said to be far cheaper than towers. The company will float stratellites in many areas of Australia and New Zealand to deliver mobile, high definition television, fixed wireless and paging services.

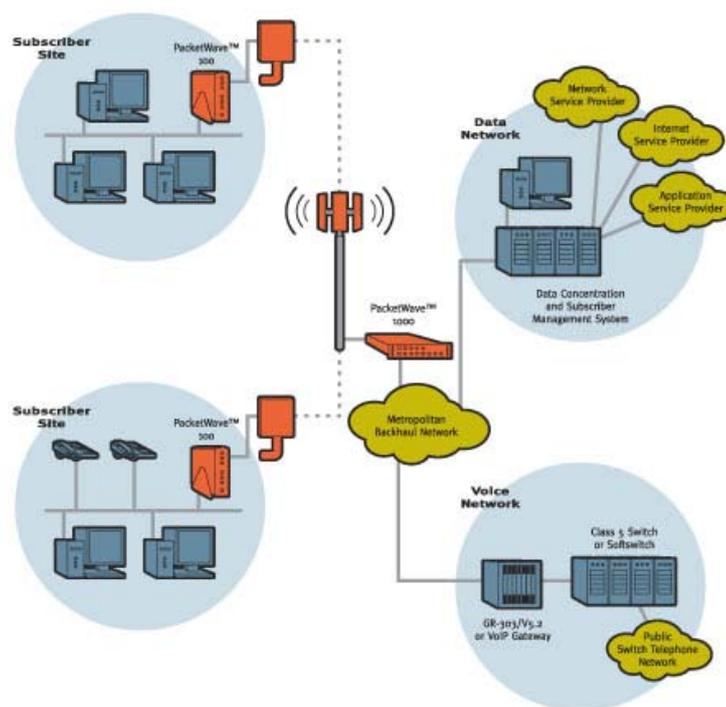
Mexico:

Mexico provides a good example of how MMDS spectrum, generally licensed for television services, can be a good medium for WiMAX. Two of the country’s largest television service providers, MVS and Ultravision, are both using their frequencies to add broadband wireless access for television and internet access, enabling them to reach areas where DSL and cable are unavailable or overpriced.

The Aperto Packet-Wave system in use in Mexico

MVS is deploying a network in Mexico City, the second largest city in the world, based on NextNet equipment and Aperto pre-WiMAX base stations located in cell towers. The mobile, plug and play system is branded i-Go and will be extended to 13 more cities this year as an alternative to DSL or cable. MVS has MMDS spectrum that can reach 70% of Mexico’s population of 97m.

Also in Mexico, MVS rival Ultravision is deploying Navini’s broadband



wireless system on cell towers in the licensed 2.5-2.7GHz spectrum, and it has another WiMAX-ready network in Puebla sourced from Aperto. Ultravision is a wireless cable television operator and has MMDS spectrum in 44 cities.

Combined, the MVSNet and Ultravision projects will bring broadband wireless coverage nationwide over a few years, bringing significant economic benefits to a country where copper wire installation has been limited.

AT&T to re-enter wireless sector with its old brand

AT&T plans to get back into the wireless business, and take back the AT&T Wireless brand as soon as that company completes its merger with Cingular Wireless later this year. "We'll be back in wireless, probably the next day," said David Dorman, CEO of the long distance wireline telco.

AT&T spun off its cellular unit in 2001 and has been shut out of the mobile market since, although a provision in the spin-off agreement allowed for it to take back the brand, in the event of takeover by a third party.

The strategy of the new AT&T Wireless will rest on two foundations – an MVNO (mobile virtual network operator) service based on leasing capacity on a partner's network; and a WiMAX offering providing wireless last mile facilities.

It will be able to package its new VoIP service with cellular offerings, and over time will offer dual-mode handsets. Its most likely leasing partners are T-Mobile USA, Nextel, Sprint PCS and the more regional Alltel.

The move will be highly confusing to the US consumer public, especially a Cingular can still use the AT&T Wireless name in transitional marketing activities for six months. AT&T is likely to benefit from the confusion, and will make attractive offers to try to keep AT&T Wireless subscribers loyal to the brand – especially enterprise users, which have been a particular strength of AT&T Wireless.

However, the downside is that AT&T Wireless has been the least impressive of the cellco brands recently, losing 367,000 customers last quarter and leading its rivals in levels of user complaints – problems that got so bad that there were rumors it

would affect the final price that Cingular would pay, which is currently \$41bn.

Despite previous disasters in this area, MCI – recently emerged from bankruptcy – plans to offer MVNO services again this year, while Qwest has kicked off a service based on capacity leased from Sprint PCS, with mixed results.

More successful has been the UK's Virgin Mobile, which also leases from Sprint, and which added more customers in the first quarter than Sprint itself, using the power of its brand among young adult consumers. In such a brand-driven sector, AT&T may have the broad recognition, but whether this has the power of Virgin for the most enthusiastic sector of the cellphone user base remains to be seen.

Intel and DARPA show off next generation wireless ideas

There has been sharp focus this week on the more blue sky aspects of wireless technology, with Intel holding one of its periodic advanced technology showcases and the US Department of Defense's DARPA unit showing off some new projects.

Even Microsoft chairman Bill Gates was thinking ahead, having returned from his annual retreat or 'Think Week', when he takes time out to ponder on emerging technologies, full of wireless. Gates claimed in an interview that the main theme that emerged from this year's Think Week was "this idea that we're going to unify on the network voice, video and data".

Gates hardly had any major insights to offer the wireless world, but claimed he had got up to speed on "ultra wideband and the so-called WiMax 802.16, to try to get a sense of who the key players are, what the new capabilities will be and how we should factor that into our software design. There's a thing called mesh networking, which is software making all this stuff work together in a way that lets you do video and audio in a pretty neat way."

Over at Intel, the company is extending its keen interest in wireless sensor networks with a project that aims to "do for live data what Google does for content".

IrisNet is a joint initiative with Carnegie Mellon University to develop a sensor network that provides information about the world around to remote PCs or other devices. Possible applica-

tions would be to monitor car parks and inform users of cell-phones or internet-enabled cars where a free space is available.

This is all part of the concept of ‘proactive computing’, where machines obtain, sort and relay information according to certain rules, learning as they go, and all with minimal human intervention. In technology terms, short range, low powered wireless networks – such as the future UltraWideBand version of the ZigBee standard - combined with minute radios and processors will be key.

Intel also showed off its prototype personal server, which fits into a PDA-sized box and stores many gigabytes of personal data on flash cards, as well as including several radios for different wireless links. This will be trialled later this summer.

Another innovation was the GrooveBox, being developed in Intel’s Cambridge, UK labs. It allows a cameraphone to interact with PCs or public kiosks via optical symbols embedded in certain web pages, which behave like more accurate barcodes.

The focus on ubiquitous, proactive networks based on very low power, low cost, ad hoc networks was echoed at DARPA (Defense Advanced Research Projects Agency). It is investigating military applications for mesh networking, RFID and sensor nets, some of which are sure to filter through into the commercial mainstream.



This is five orders of magnitude from what we can do. This is like selling cars that get 10 inches per gallon

*Preston Marshall,
DARPA*

At last week’s Wireless Venture conference, DARPA program manager Preston Marshall said that Wi-Fi was inadequate for the type of applications he is investigating. He said that 802.11b can take up to 12,480 bits and 57 acknowledgments to send an 80-bit data packet, a 0.65% efficiency rating.

"This is five orders of magnitude from what we can do. This is like selling cars that get 10 inches per gallon," he said and he sees self-configuring, ad hoc meshes as the way to overcome the limitations of current wireless.

DARPA has four mesh programs underway, including one cognitive radio that automatically scans the airwaves in real time for available spectrum in which it can set up and tear down ad hoc networks in hundreds or even tens of milliseconds. The project includes development of a machine-readable policy language as the basis for its software.

Another project, called Networking in Extreme Environments, would create a wireless network based on UltraWideBand devices that are optimized for robust connectivity in harsh environments.

Worth Noting:

Africa is the next big market for wireless, says ITU

There is always much talk about the potential of China, India and South America for new wireless roll-outs, but Africa takes the headlines less frequently.

However, the continent has seen a 1,000% increase in mobile subscribers since 1998 and has twice as many mobile as wireline telephone users, according to the International Telecommunications Union (ITU). This only translates to about 52m people, only slightly more than the UK's mobile population, and penetration is just 6.2%, but the lack of any form of fixed infrastructure in many regions makes the potential enormous – penetration of fixed lines is only 2.8%, the lowest in the world.

The lack of wireline means that most cutting edge applications will be developed first on mobile platforms – SMS is gaining ground rapidly because so many people have no access to email, for instance, and demand for internet access is the biggest driver for wireless platforms, whether these are cellular or based on alternatives such as WiMAX. A few GPRS networks have gone into operation and Angola looks set to be the first sub-Saharan African nation with 3G.

The main obstacles to growth, according to the ITU, are unsophisticated regulatory systems that merely award licenses, rather than creating competition or encouraging interoperability of networks; and, of course, low average incomes. This is putting pressure on equipment makers – with Nokia the trailblazer – to create networks that can be profitable on ARPU below \$5. As well as new approaches to equipment design, other tactics will include subsidizing local costs through incoming roaming revenues, and recycling handsets.

Siemens forms Chinese handset venture

A week after Alcatel placed its handset operation in a joint venture with TCL of China, Siemens has allied with its own partner in the country, Ningbo Bird.

The partners will develop handsets for the world's largest mobile phone user base that will be sold through Bird's 30,000-shop dealer network under the Bird brand. The Chinese company already makes some Siemens phones under contract.

The deal will expand Siemens' sales reach, which has until now focused on the main eastern cities, throughout the country.

Like Alcatel, Siemens also looks to market the products of the joint venture internationally – such moves will potentially bring new price/performance benchmarks even to mature phone markets.

FCC sets up wireless broadband taskforce

The US Federal Communications Commission has set up a Wireless Broadband Access Taskforce to examine how future rules on the subject should be created.

Lauren Van Wazer, special counsel and associate chief of the FCC's office of engineering, along with John Branscome, legal advisor, were appointed co-directors of the taskforce, which includes several other FCC attorneys and policy experts.

The new group will "study existing wireless broadband policies and make recommendations for possible improvements to promote the growth of both licensed and unlicensed wireless broadband services. The overarching goal of this initiative is to take a hard look at what we can do to extend the reach of broadband services to underserved areas and to provide increased competition in areas that already have access to broadband," Powell said in a statement.

He also asked for public comment on wireless broadband policies, specifically in 12 areas including the extensiveness of the use of licensed and unlicensed wireless broadband networks in providing broadband services, including cable and DSL; and the use of wireless broadband in serving rural and underserved areas. The FCC is asking that comments be filed by June 3.

Both UWB camps make progress

Alereon is demonstrating its wireless USB chips this week at the Connections Digital Home Conference, with silicon based on the Multiband OFDM Alliance (MBOA) standard for UltraWideBand, supported by Intel and Texas Instruments.

The company said it is the first to show a complete end-to-end solution with MAC, PHY and antenna technologies, all developed by Alereon. The company worked with Philips and Sony on the draft of a new MAC specification for the MBOA, which provides the foundation for wireless USB. This move has distanced the Alliance, possibly irreparably, from the IEEE 802.15.3a group, which is seeking a UWB-based standard for personal area networks, but insists on the use of its own MAC.

Alereon will make its wireless USB developer's platform available later this year.

On the other side of the UWB debate, the UWB Forum, which backs Motorola's Direct Sequence approach, has signed up 30 members and claims it is about to sign several corporate supporters.

The group is trading heavily on the fact that some of its members have commercial silicon now, ahead of the MBOA, and that it supports the Common Signalling Mode, a technology proposed by Pulse~Link that allows different UWB variants to coexist on the same network (though not to interoperate).

The Forum expects to release a UWB specification compatible with the IEEE 802.15.3 MAC in June and several silicon providers are preparing to release additional application specific implementations of this specification later in 2004 and in 2005.

Investments:

THQ Wireless has acquired a controlling interest in European mobile applications and billing company **Minick**.

The acquisition will give THQ Wireless access to Minick's proprietary software, application platform and premium billing infrastructure, which is expected to enable the division to expand its current product line-up with additional mobile offerings such as SMS voting, information and alert services, and wireless marketing campaigns that should bring in a new revenue stream.

As part of the deal, Minick will retain its current management team and will move forward with plans to expand into the US and Asia. Terms of the deal were not revealed.

On-site wireless data start-up **WideRay** closed \$4m in second round financing. The round was led by Sequoia Capital with participation from previous investors. WideRay develops hardware for mobile proximity data services, delivering on-demand, on-location mobile content that users can download over Wi-Fi, Bluetooth, and infrared. The company's customers include TeliaSonera, GM, and Microsoft.

Cellular network management company **Optasite** raised \$10m in first round financing. The round was co-led by Columbia Capital Partners, Highland Capital Partners, and Centennial Ventures with participation from Point Judith Capital, Village Ventures, Point Judith Capital, Worcester Capital Partners, Long River Ventures, TSG Equities, Mass Ventures, and Berkshire Capital. The company said it plans to use the money to develop and acquire wireless tower assets in the northeast and mid-Atlantic regions. Optasite provides wireless network acquisition, cell site construction, testing, and maintenance services.

Mobile content provider **Airborne Entertainment** has closed \$2.2m in second round financing from Wellington Financial. Airborne Entertainment brings content from media companies such as HBO, and Maxim Magazine to wireless carriers.

Operator Watch:

Vote looms as parties put in last bids on Consensus Plan

The saga of the US Consensus Plan – under which Nextel would swap spectrum that conflicts with that of emergency services for alternative bands – may soon come to a head, with a vote expected soon. Various parties are playing their last ditch cards, with Nextel now pushing a plan to move broadcasters to new airwaves in return for 1.9GHz spectrum.

This would be an additional part of the Consensus Plan, which seeks to rationalize the confused 800MHz band, in order to enhance public safety and, Nextel hopes, give it more contiguous swathes of spectrum in its patchwork holdings. Together with the National Broadcasters Association and the Association for Maximum Service Television, it has proposed moving broadcast auxiliary services to the 2025-2110MHz band from the 1.9 GHz band, with Nextel footing the bill of around \$512m. This would expedite Nextel's overall goal of acquiring 1.9GHz spectrum for a relatively low price.

Last week, the CTIA, the body representing the cellular industry, put forward a compromise on the 800MHz swap, which sought to find a middle ground between Nextel's proposals and objections from Verizon Wireless but in fact was generally hostile to the smaller operator. It suggested that Nextel pay \$3bn for a trust fund for public safety licensees and in return get spectrum at 2.1GHz instead of 1.9GHz. Nextel has already said it will not accept bands at 2.1GHz.

Nextel has been campaigning to swap the bands that affect public safety (16MHz of spectrum in the 700MHz, 800MHz and 900MHz bands) for an equivalent amount of new space in the 800MHz and 1.9GHz spectrum for cellphones, for a charge of around \$850m. The advantage for its future plans would be to consolidate many of its frequencies and enable it to implement CDMA or W-CDMA as an upgrade to its current iDen network, which is running out of steam but which is the only platform capable of running effectively on Nextel's currently scattered spectrum.

It would end up with 16MHz of contiguous spectrum in the 800MHz band, in which to continue to offer iDen-based voice services, and 10MHz in the 1.9GHz band, where it could build next generation voice/data services, complementing the WiMAX and Mobile-Fi trials it is running in its MMDS spectrum.

Opponents, notably the largest cellco, Verizon Wireless – backed by the CTIA - have argued that this scheme would amount to a giveaway to Nextel. Verizon has pushed for the new bands to be auctioned and has promised to bid around \$5bn, although some observers believe it has thereby shot itself in the foot on another potential auction, for some spectrum previously tied up by NextWave, by marking its price so high.

Nextel said it would take too long and would not survive a legal challenge for the FCC to try to give it 2.1GHz spectrum. "The FCC lacks a sufficient record regarding the valuation of the 2.1GHz spectrum, the cost of clearing incumbents and deploying a commercial mobile

radio services network from this spectrum, and the risk of interference from operations in this band,” said Robert Foosaner, Nextel chief regulatory officer. “There is consequently a significant risk that the commission’s 800MHz realignment plan would be overturned on appeal if it assigned the 2.1GHz spectrum as replacement spectrum for Nextel. This would only frustrate the FCC’s goal of expeditiously remedying CMRS/public-safety interference in the 800MHz band.”

Vodafone launches 3G in Germany and Portugal

Vodafone is finally launching phone-based 3G services in Europe, with this week seeing the first offerings in Germany and Portugal.

The carrier, which had previously launched 3G in selected territories only as a laptop data card offering, will initially offer a handset from Samsung, which it says has overcome the problems that plagued early 3G phones such as poor battery life. Vodafone adamantly refused to offer 3G until these issues were addressed, laying the blame squarely on the handset makers for delayed 3G roll-out.

Vodafone will soon add a Sony Ericsson handset and is in discussions with LG, Sanyo and Nokia. Hutchison 3, the UK 3G-only operator, is in talks with LG too, to try to fill gaps in its own phone line.

The German and Portuguese services will be concentrated on large urban areas, with users roaming on to GSM networks in rural areas.

In France, Orange launched France's first commercial 3G service in Toulouse with Nokia handsets. Orange will extend 3G to the north, east, and southwest regions of France, as well as in the UK, in the next few weeks.

By the end of this year, 5m western Europeans will use a 3G device but significant growth will not happen until mid-2005. By 2009, 70% of mobile subscribers will have a 3G device, according to research by Analysys.

Nextel takes Push to Talk beyond US

Nextel has launched its first Push to Talk (P2T) services outside the US, with a version of its Direct Connect service to be offered in partnership with Telus Mobility and NII Holdings in Brazil, Argentina, Peru and Canada.

The new Direct Connect covers Nextel customers and Telus Mobility subscribers in Canada and NII Holdings users in Brazil, Argentina, and Peru. Nextel's new service also expands its BlackBerry mobile email service to these markets.

Calypso signs up Vodafone unit

Calypso Wireless has signed up Romania's MobiFon, which is partly owned by Vodafone, to trial its cellular-WLAN roaming technology.

The company claims that the trial is a precursor to evaluation for the whole Vodafone network and would enable Calypso-enabled handsets to operate on the Cingular Wireless network in the US, which has a roaming agreement with MobiFon.

MobiFon is testing the ASNAP technology, which supports roaming between Wi-Fi, GSM/GPRS and Bluetooth, on its two-way wireless conferencing phones.

This is Calypso's first customer win since it announced that it had gained a new patent to technology included in ASNAP and would rigorously enforce it – though so far, it has not followed up with licensee agreements, nor with lawsuits.

Calypso is best known for its cellular/Wi-Fi videophone, the C1250i, and also plans a handset that uses television cable as backhaul for voice over Wi-Fi services, giving cable TV operators a new source of revenue. The C1250i, and its accompanying video-optimized access points, use its ASNAP technology, which supports real time video at 20Mbps.

The company believes it has achieved the holy grail of the patent holder – the ability to go after the biggest names, with a strong enough case to encourage them to dig into their deep pockets for licensing fees not lawyers. It has named Ericsson, Motorola and Nokia as vendors infringing on its patent and aims to start chasing such companies soon.

PCCW to start UK broadband roll-out in August

Hong Kong telco PCCW will start national roll-out of its UK broadband wireless service in August following a trial in six areas.

Mike Butcher, CEO of the new PCCW unit, called UK Broadband, said the 515Kbps service would be priced at £18 a month and the 1Mbps version at £28, lower than most rivals.

The company bought 13 of 15 licenses auctioned in the UK last year and later acquired the companies that held the other two, for a total cost of about \$14m.

Telefonica Moviles and TIM see growth

Telefonica Moviles of Spain has increased first quarter profits by 18% to €423m on sales up 20% to €2.56bn. In the Spanish market, Moviles gained 278,000 new customers to bring the total to almost 20m, with ARPU up by 7%. For the full-year, Moviles expects revenue growth of 9% from Spain.

The group had a worldwide total of 54.4m managed customers at the end of the quarter, or year-on-year growth of 30%, after acquiring 2.3m new clients, 2.1m in Latin America.

Meanwhile, Telecom Italia Mobile saw first quarter net profit rise slightly, limited by higher taxes and losses at some international operations. Net profit was up to €481m from €480m a year earlier. Revenue rose 13% to €2.94bn. TIM's net cash at the end of the quarter doubled to €1.9bn.

WiMAX Watch:

London could become WiMAX zone as UK leaps ahead in broadband

The latest broadband wireless project in UK capital London paves the way for the central district to become a WiMAX hotzone in future.

The local authority in charge of the central Westminster area has launched its long awaited 'Westminster 4G Wireless City' project, which seeks to blanket the area with wireless connections, initially using Wi-Fi and later WiMAX.

The initial use will be to run a network of CCTV cameras for security, and of noise monitors, and for various applications used by local authority workers but commercial services will be added over time through partnership with private operators.

The project is a joint effort between Intel, Cisco and Westminster Council. The first stage will be to extend a current small trial in the Soho area to cover the whole borough using 802.11b technology. This will provide limited public hotspot coverage as well as linking security cameras for more effective safety and crime monitoring. Other applications will include wireless access to council IT systems for field workers such as traffic wardens and street cleaners.

Martin Curley, director of IT Innovation at Intel - never far from any of these increasingly popular public/private hotzone initiatives - said: "It is our plan to cover large metro areas with WiMax technology. We want to unlock the last mile without the need for fiber."

The cost of the project is expected to be about £15m and the network will cover the entire borough within six to nine months. It may be extended to other London districts over time and WiMAX is expected to be phased in, mainly for backhaul, from next year.

The Council is keen to offer paid-for services but is not permitted by regulators to operate as a commercial provider, so would need to seek private partners as well as government permission. This could pose a threat to hotspot operators already in the neighbourhood such as T-Mobile/Starbucks and Broadreach, which is creating a hotzone around Leicester Square.

The UK, having lagged behind some other European countries such as Austria in uptake of public Wi-Fi, has been moving rapidly in the last six months. As well as the Westminster project, there is a plan for a national network of roadside access points offering services to drivers, while BT and some smaller operators are testing broadband wireless in rural regions. BT, which is trialling pre-standard WiMAX in four areas, says it will consider an urban service too, eventually. 38 fixed wireless broadband licenses have been awarded in the 3.5GHz band.

Among the smaller providers of broadband wireless, there are several community oriented Wi-Fi outfits such as Shere Broadband, while start-up Telabria is currently trialling its own system based on Wi-Fi mesh technology from WaveWireless, which it claims will eventually be available to 25% of the UK population, mainly in rural regions. It claims it will operate in 100 communities within a year and is currently converting triallists in its first three centers in south east England to paying customers.

Telabria works with local authorities to identify communities that lack wired broadband access but have significant demand for internet services and is about to launch a marketing campaign to end users. It has also partnered with brewer Shepherd Neame to build hotspots in its pubs and hotels, and is in talks with other pub-owning breweries, potentially bringing it into conflict with The Cloud, which also offers hotspots in bars.

Telabria is backhaul agnostic and may use WiMAX in future, although its first three roll-outs have used satellite.

Fujitsu and Wi-Lan race to be first with certified WiMAX gear

Fujitsu looks set to pip Intel to the post to be the first shipper of certified WiMAX silicon. The company is working with broadband wireless specialist Wi-Lan to get to market first with standards-approved operator equipment, to ship in the first half of 2005.

Conformance specifications and tests should be finalized by November and a wave of products is then expected to be submitted for approval ready for roll-out early next year.

Engineering samples of the Fujitsu WiMAX System on a Chip will be ready in October and Wi-Lan will be its first OEM. The two companies have been collaborating on the chipset since September 2002, before WiMAX hit the headlines and before Intel began work on its own product. Other chipmakers that have promised first generation 802.16 devices include Wavesat, which has signed China Electronics System Engineering as an OEM. Intel has named Airspan, Alcatel, Alvarion, Aperto and Siemens as customers, while one or more Taiwanese wireless chipmakers are also expected to produce early silicon.

The Fujitsu tie-up is a powerful boost for Wi-Lan, which contributed aspects of its Wideband-OFDM technology to the WiMAX specifications. In January, it announced its Continuity Program, guaranteeing a route to the standard for customers of its Libra proprietary broadband wireless gear.

The company pledges that any current Libra customer premise equipment will operate “in the same network, the same cell and even the same sector with future WiMAX compliant CPEs”.

The company aims to maintain interest in its proprietary technology by offering investment protection in order to avoid the selling gap that some broadband equipment makers may suffer as the market waits for WiMAX. Customers can “gain both the technical and market experience that they need now; without having to wait until WiMAX compliant products become available,” said Wi-Lan.

Wi-Lan's current Libra products have a physical layer that is substantially the same as the WiMAX physical layer, and a proprietary MAC layer.

Among its high profile Libra projects have been broadband wireless networks in Portland, Oregon; Paris, France and Tianjin, China, and it recently teamed with Korean integrator Wellink to target intelligent transportation systems using Libra and, in future, 802.16e.

Sequans joins WiMAX Forum

Sequans Communications, a French fabless semiconductor company created in 2003, has joined the WiMAX Forum as a principal member.

The company delivers system on a chip solutions and software, for base station and subscriber station products incorporating the 802.16 standards.

Georges Karam, CEO of Sequans, said: “We believe that our previous experience in cable access and the DOCSIS certification process will offer potential benefits to the WiMAX Forum. As a principal member, we will be fully engaged supporting the Forum’s activities.”

WISPs keen on WiMAX but have two-year wait

Many WISPs are keen to deploy WiMAX equipment for low cost backhaul of hotspots, or for hotzones, but most believe it will be 2006 before they can offer services based on the technology, according to a new survey by ABI Research.

ABI says that more than half of those who responded said they plan to deploy WiMAX wireless broadband services. However, only about a quarter believed they could deploy WiMAX equipment within the next two years. About two-thirds said they will deploy WiMAX whether or not local incumbent carriers do.

Aperto supplies Lebanon network

WiMAX supporter Aperto has deployed its standards-ready equipment in Greater Beirut, in the Lebanon, with local service provider Cedarcom planning roll-out across the area in the 2.6GHz and 3.5GHz licensed bands.

Cedarcom provides wireless data connectivity and last mile access to Lebanese ISPs, ASPs, banks, universities and SMEs. It now plans to deepen its coverage nationwide to offer broadband wireless access to all major cities and business centers in Lebanon. Within 45 days broadband coverage will reach 15 major centers in the country, covering 95% of the business community.

Imad Tarabay, CEO of Cedarcom, said: "We are particularly pleased that Aperto Packet-Wave is able to interface seamlessly with our MPLS based backbone. We are the first carrier to implement MPLS in Lebanon and the first in the Middle East to deploy broadband wireless MPLS based services."

Altitude extending WiMAX in France

Altitude Telecom, the only independent French operator with a license suitable for WiMAX, is extending its pre-standard network rapidly and is offering its expertise on a consultancy basis to operators elsewhere looking to deploy broadband wireless.

Altitude has built networks in several large towns and in two departments, Vendée and Orne. In Vendée, in the west of France, the network will cover 96% of the population in a 7,000 square kilometer area from 20 base stations, and will be fully operational in June 2005.

The operator is working with Wi-Lan as its equipment provider. The partners have already built a test network based on Wi-Lan's Libra 3000 technology in Paris as a precursor to offering an 802.16a network in the city.

Incumbent telco France Telecom is also evaluating WiMAX for a network in the Pyrenees mountain area.

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