The 451 Group

2009 preview – Mobility

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Introduction

The overriding issue facing the technology industry is the economy, and as we look ahead to 2009, there are few markets that will be untouched by reduced spending on IT. Keeping this in mind, the mobile and wireless market will weather this economic malaise better than many others. Particularly in the enterprise, mobile's significant ROI will ensure that it is kept on the shrinking list of IT wants and needs. We are proponents of the continued evolution of the role of the smartphone in the enterprise, and we see this role only growing in 2009 – with the help of some old and new players. Looking ahead, we see consolidation as well as vendors exiting the semiconductor market due to intense competition and multisourcing from device vendors – limiting the power of semiconductor vendors. Despite the economy, carriers are continuing network migrations as they need, and can afford to look beyond the current term in anticipation of renewed growth in the use of wireless broadband networks around the world.

Smartphones lead the way

The smartphone has been a key component in the growth of enterprise mobile for a number of years, and this will not change in 2009. The use of these devices is heavily driven by mobile email – but over the next 12-18 months we see a realization by enterprise users that mobile offers more than this. The hype that was given to mobile in 2008 will translate to adoption in 2009 as IT and companies overall come under pressure to do more with fewer employees. This will be driven by two forces: the 'prosumer' and IT. IT will increasingly provide back-end access for mobile devices to provide employee access 24/7, secured by mobile VPNs from **AppGate Network Security**, **Birdstep Technology** and **NetMotion Wireless**. For companies still behind the mobile-adoption curve, employees will continue to bring their own smartphones to work, looking to compete both externally and – just as important – internally as companies look more closely at employee productivity. The widespread introduction of touch input devices will address some pain points for mobile, particularly the limited real estate that mobile devices have for displaying content and allowing users to interact with applications. New more-accurate and capable touchscreens will give developers greater freedom to provide custom touch-based UIs, thereby increasing the capabilities of the smartphone. In 2009, look for enterprise mobile software developers to build on their support for iPhone by also supporting touchscreen devices from competing device vendors.

While the smartphone market will see more-rapid growth than the mobile phone segment overall, it will not all be roses. We expect to see Palm OS exit the market in 2009 (i.e., no new Palm OS devices) as mobile open source pressures OS vendors' ability to demand royalty premiums. This is further driven by device vendor **Palm Inc's** own interest in mobile Linux – possibly releasing its own version in 2009.

Main changes to the market expected this year:

- Smartphones will take on more of the burden of work in the enterprise in 2009 as employees discover capabilities of mobile beyond email.

- Touch and Qwerty together will provide the flexibility needed for mobile-device vendors to address users' needs.
- Palm OS will reach end of life as its only device vendor customer migrates to mobile Linux.

Companies at the forefront of disruption:

- While **Research in Motion** hung its hat on Qwerty devices, its need to build a broad portfolio of devices for BlackBerry Enterprise Server will ensure a steady introduction of new devices.
- **Nokia** may have ended **Intellisync's** life, but the vendor has not given up on the enterprise, with renewed focus on both Qwerty and touchscreen devices.
- Look for **Apple** to announce the third-generation iPhone in 2009, which will provide more openness for developers to manage and support the device.
- Long in the shadow of carriers, **HTC** will continue to build its brand name and offer cutting-edge devices that support both consumers and enterprise.
- **Samsung** is leveraging its partnership with **Microsoft** to bring new Windows Mobile devices into the enterprise.

Multi-device enterprise environments

Supporting the continued growth in use of smartphones in the enterprise beyond just email are mobile enterprise software vendors that transitioned from ISVs to services players with their own development tools. In order to reach as many enterprise users as possible, these vendors support every smartphone OS. This flexibility will push some enterprises away from depending on just one smartphone OS in their enterprise. This will not drive replacements, especially in a tight market, but will allow support and development for devices already in the enterprise that are not centered on email. Support for multi-device environments meets the needs of companies that want to manage the mobile devices accessing their enterprise network.

As enterprises look to mobilize processes, support for only BlackBerry or Windows Mobile will not do – different types of workers demand different tools. Companies like **Antenna Software**, **Sybase** and **Syclo** are betting that enterprises will understand the need to connect and manage all the devices used by their employees. In 2009, BlackBerry will continue as the enterprise device for a majority of users, but the need for flexibility and vendors willing to provide this flexibility will see RIM's share of the market decrease.

Main changes to the market expected this year:

- Vendors offering application-development environments for all or most mobile OSs will drive multi-device mobile environments in enterprises.
- Enterprises will move to be aware of and to manage all the devices used by their employees.

Companies at the forefront of disruption:

- Antenna Software's acquisition of competitor **Vettro** will provide new markets and customers to develop applications on the Antenna Mobile Platform.
- Sybase will look to support multi-device environments from a device management prospective as well as an application-development role.
- Syclo's prepackaged applications will serve as a basis for custom mobile applications.

Enter the real browser

Advancements in smartphone technology and wireless-network bandwidth in the past few years have set the stage for broad adoption of mobile internet. A key ingredient, powerful mobile browsers are making their way into a larger number of devices. No longer limited to high-end consumer smartphones, aka iPhone, HTML mobile browsers are now a standard feature on new smartphones. Competition from third-party browsers like **Opera Software** has put pressure on mobile OS vendors that bundle browsers to dramatically improve rendering performance.

A major weakness of the mobile browser is the need to remain connected. Due to the inherent mobility of a smartphone, connectivity cannot be guaranteed. Wider 3G network deployments will address this somewhat, but carrier market-share battles will ensure that coverage continues to improve in major markets. The deployment of femtocells will also address the customer-premises coverage issue. Somewhat beyond the scope of this report, Long Term Evolution (LTE) (see elsewhere in this preview for more on this subject) will significantly improve network speeds, providing mobile internet applications the ability to truly perform like a client application. Open source will have a significant impact on the mobile browser in 2009. Android, **Mozilla** and **Symbian** are all leveraging the open source model to draw developer time and attention to their mobile browsers. This will put even more pressure on OS and device vendors like Apple, Microsoft and RIM to keep their mobile browsers competitive.

Main changes to market expected this year:

- Mobile internet will drive adoption of services and help offset the pain of still sky-high pricing for mobile data.
- In 2009, the mobile browser will take hold as a key delivery model for mobile enterprise services.

Companies at the forefront of disruption:

- Nokia's S60 browser will see marked improvement as open source developers dig into the source code of the webkit browser.
- Opera Software will enter new markets with device-vendor partner Samsung.
- Mozilla will enter the mobile market shortly with its Fennec mobile browser.
- Microsoft will add new capabilities to Mobile Internet Explorer with the launch of Windows Mobile 7 in 2009.

Wireless space headed for major consolidation

It looks like the handheld and emerging mobile Internet device market will be impacted by the current downturn in the world economy. **Intel**, Samsung, Nokia and **Qualcomm** have already issued warnings about a slowdown in consumer sales of their products. The moves come at a time when the wireless handset and cellular business appears to be at a major crossroads. **Freescale Semiconductor** has said that it is looking to depart the wireless business and is looking at exit strategies. Rivals **STMicroelectronics** and **NXP Semiconductors** joined their wireless chip efforts into a single joint venture in the spring, but have been relatively quiet since that time. Another change that might occur in the baseband space is the partial departure of **Texas Instruments**, which said that it has been in talks to sell its merchant cellular baseband operations. It would maintain its high-end OMAP technology that is used in smartphones. **Advanced Micro Devices**, which had been seeking to establish a foothold in the cellular space with technology it gained from its purchase of **ATI Technologies**, was forced to put its business unit up for sale.

This could spell out tough times for newcomer **Sandbridge Technologies**, which will be seeking to crash the baseband party next year with a software-based reprogrammable baseband processor, the SB3500, which was recently released. The chip is designed to let customers determine what features will and will not be supported on a baseband processor, allowing them to stock one chip for multiple markets. Software-based reprogrammable chips have been talked about for years, and it looks as if they are starting to try and establish themselves, with Sandbridge taking a lead position. It will go head to head with well-established vendors – such as **Broadcom**, Texas Instruments and Qualcomm – that offer baseband chips that are highly integrated and can support different connectivity needs, including 3G, 4G, Bluetooth and GPS. While Broadcom and Qualcomm have been engaged in a long-running lawsuit about whose technology is in whose chips, they have both been moving to enhance their offerings in this space and to fend off any newcomers.

Intel, which has already entered and departed the mobile space once, is poised to make a big play in the space again with a focus on the smartphone and mobile Internet device segment. It showed a prototype reconfigurable baseband processor in 2007 and a development kit as well. It has successfully pushed its Atom technology into the netbook category of devices, but it is seeking to move into smaller devices as well. However, having sold its last-generation technology to Marvell in 2006 after spending millions, if not billions, on its last venture into the cellular space, the company has to completely reestablish itself in the market. Rivals such as Qualcomm, with its Snapdragon and Gobi families of chips, are already working to become major factors in this space. Qualcomm's Snapdragon is just one of the first of a generation of processors based on **ARM Limited's** Cortex family of IP cores. Qualcomm will not be alone since ARM has said that it expects a range of its licensees to deliver chips in the 2009 timeframe, including **Nvidia**, Samsung, **NEC**, STMicroelectronics, Texas Instruments, Intel and **LSI**.

Main changes to the market expected this year:

- Consolidation in baseband space with several companies such as Freescale Semiconductor and Texas Instruments looking to depart. The question is will they find a buyer.
- The iPhone and BlackBerry platforms have become the base for computing on the go. Now customers will want more, and this will lead to greater functionality demanded by developers to help meet the strain that the additional uses will place on the platforms.
- Intel, which spent years and billions of dollars in the mobile space, is again reentering the space after its previous failure. It will push its Atom-class processors down from netbooks and a new generation of chipsets for smartphones and handhelds upward in the future.

Companies at the forefront of disruption:

- ARM licensees are starting to bring next-generation chipsets that could threaten AMD's and Intel's chokehold on the notebook space. The offerings, expected by midyear, could provide battery and system performance.
- Nvidia is seeking to highlight its graphics capabilities as it continues to push its application processors and other key technologies into the mobile space.
- The promise of software-defined radio so far has been just that – a promise. Now that Sandbridge has a second-generation chip that it claims is ready for prime time, the market will be able to see what all the noise is about.

WiMax becomes mainstream, now really faces Wi-Fi

Commercial deployments of WiMax or WiMax-like infrastructures have been spreading since 2007. **Clearwire** is the leader in terms of number of subscribers, in addition to several regional companies such as **DigitalBridge Communications**; **AT&T's** subsidiary, Alascom; and **Arialink**, which has been deploying smaller fixed and mobile WiMax networks in areas like Idaho, Wyoming, Alaska, Virginia, Indiana, Michigan and others since 2006. The fourth quarter of 2008 really signaled the beginning of a true nationwide WiMax service from a tier one carrier, with **Sprint-Nextel's** launch of its Xohm WiMax network in Baltimore and regulators (and shareholders) approving its merger with Clearwire.

2009 will be a year of continued deployment from the new Clearwire, both expanding Sprint's mobile WiMax deployments into new areas (such as Washington, DC; Chicago; Dallas; Fort Worth, Texas; Boston; Philadelphia and more) and expanding the 'old' Clearwire territories with mobile WiMax deployments in Portland, Oregon; Atlanta; Las Vegas; and Grand Rapids, Michigan. In addition, there is still the need to replace the proprietary wireless broadband deployments (made by the 'old' Clearwire) to certified mobile WiMax in order to enable roaming between these coverage areas. Expansion of coverage areas won't mean much without expanding the device offerings, and 2009 should present subscribers with multiple WiMax options such as embedded WiMax support in many notebooks (and some netbooks) with Intel chipsets, Web-browsing mobile WiMax devices such as the Nokia N810 and PC cards. The **WiMax Forum** has certified close to 20 mobile devices, and most of them should be available in 1H2009.

Will we see new entrants to WiMax in 2009? Looks like it. **Comcast** has been making some strides into WiMax, participating in the $3.2bn investment for the new Clearwire (**Time Warner** also invested) and acquiring spectrum for use in a possible WiMax service. One possible scenario states that Comcast will deploy its own WiMax network, but it really makes no sense to do so when it has a stake in the new Clearwire. A more-logical scenario will see Comcast testing (in 2009) and deploying (later that year or in 2010) WiMax femtocells (femtocells are explained in a separate section later) to offer its subscribers wireless data services indoors as well as outdoors (via the Xohm service).

Meanwhile, other carriers are using Wi-Fi to service their subscribers' mobile data needs: AT&T bought **Wayport** in order to provide more Wi-Fi hotspot coverage for its iPhone users as well as occasional customers (tourists, mobile warriors, et al.). With the iPhone users, AT&T can offload these subscribers' data traffic from its 3G network to the wireline broadband networks via Wi-Fi.

Main changes to the market expected this year:

- More WiMax coverage available in major US cities, both as a DSL/cable alternative (albeit with slower speeds) as well as a nomad/mobile wireless broadband solution.
- Increased interest by nonmobile carriers, such as cable companies, in leveraging WiMax technology for their needs.
- More WiMax-enabled mobile devices reach the market, offering more choices for the subscribers.
- Introduction of new services optimized for WiMax such as video chats, streaming high-definition music, enterprise WAN connectivity and more.

Companies at the forefront of disruption:

- In the beginning of 2009, the 'new' Clearwire (old Clearwire+Xohm) is forecasted to have more than 500,000 subscribers, with about 98% of them using the old proprietary pre-WiMax network (with the other 2% coming from Xohm). Clearwire has slowed down its

subscriber acquisitions in the last few quarters to focus on the merger and deployment of WiMax overlay on top of its existing coverage, which might mean new subscribers will come from Xohm territories and note old Clearwire territories.

- An early leader in WiMax equipment, **Alvarion** now has Nortel as a partner in development and marketing, but it has so far had success at the second- and third-tier communications providers. **Cisco** already made its WiMax play (by acquiring **Navini Networks**), so who will pick up Alvarion?

- **Runcom**, a 10-year-old company, creates a lot of buzz with reports of impressive wins in Asia and a huge $100m deal in China. So how come no one else in noticing? 2009 will be Runcom's year to put its cards on the table and show us why we should not see it just as a really good marketer. Its competitors – **Wavesat**, **picoChip**, **Beceem Communications** and **Sequans** – should also look at 2009 as the first significant year of WiMax-semiconductors revenue.

- The main provider of Sprint's Xohm WiMax infrastructure, Samsung has managed to become a force to be reckoned with in the wireless infrastructure business. Now that the 'old' Clearwire needs to install WiMax on top of its existing proprietary **Motorola** equipment, can Samsung get that deal too? Motorola and **Nokia Siemens Networks** (NSN) are rumored to be close behind.

Long Term Evolution: expect continued buzz, trial results and vendor pressure

With a forecasted deployment beginning in 2010, Long Term Evolution was the talk of the town in 2008, and will reach new heights, buzz-wise, in 2009. With increasingly more incumbent cellular carriers deciding to choose LTE as their next-generation wireless broadband strategy, it is now time for vendors to rush their R&D and integration efforts to be able to keep up with the carriers' timeline. **T-Mobile's** CTO has already hinted that he would be happy to see a faster development cycle with LTE vendors. Expect the buzz to peak around March or April 2009 since the LTE standard should get its final stamp of approval within the 3GPP (the industry body responsible for cellular technologies' standard ratification).

In early 2009, we should begin to hear about the results of LTE trials currently being conducted throughout the world and have an initial set of expectations as to how LTE can be deployed and what level of service subscribers should expect. (Of course, the results come from a limited trial with a tiny fraction of the number of subscribers, so real-life service should be worse, but these trials are usually meant to test if the technology works at all outside the lab and how it handles handoff, roaming, various services, etc.)

Semiconductor vendors also lie in wait since successful trials with LTE should bring orders for base station, customer-premises equipment and handset chipsets. Companies like Freescale, **Infineon Technologies**, NXP Semiconductors and Qualcomm are banking on the success of LTE to reignite the handset chipset market (especially Qualcomm, after canning its wireless broadband alternative, UMB). We are still unclear on how TI will approach this market since the company announced its intention to sell its wireless chipsets unit. Another question mark is Broadcom, which doesn't have any LTE activity but might snap up a small LTE chipset vendor when it feels the market is worth getting into (which should be in early 2009). Another area to watch in 2009 is the introduction of multimode next-generation wireless chipsets, which will support both LTE and WiMax and enable subscribers to roam between coverage areas of both technologies. Considering the fact that most carriers are deploying either WiMax or LTE, and not both, we would need to see a new set of roaming agreements between mobile-service providers not only allowing international roaming, but also domestic roaming (i.e., an AT&T mobility LTE user roaming into a Clearwire WiMax territory using his dual-mode device), but that is more likely to be relevant from 2010 onward.

Main changes to the market expected this year:

- Mobile applications that will convince the average user to be interested in LTE. Current high-speed packet access (HSPA) bandwidth provides a pretty good user experience when watching streaming video (and, of course, music) and using semi-data-intensive one-way applications (i.e., downloading), so the next step would be to demonstrate how LTE can create a two-way high-definition/business-grade/extraordinary performance, which is the task at hand in 2009 for the vendors' marketing teams.
- Most undecided carriers will announce migration plans in 2009, if only to ease the pressure from their investors as they demand a forecast of carrier capex for the next few years.

Companies at the forefront of disruption:

- Nokia Siemens Networks is probably the most vocal of vendors in the LTE realm; it is also probably the fastest one to get (or, at least, announce) some traction at the carriers. 2009 will place the burden of proof on NSN in terms of keeping up with promised delivery dates for LTE equipment.
- New infrastructure buildup allows a somewhat-even playing field for Motorola, **Ericsson**, Nortel and **Alcatel-Lucent**, so expect them to come up with 'secret sauce' claims that will hopefully drive some LTE business their way. For some (such as Motorola, which hadn't made much progress with HSPA), LTE is the way to stay alive in the infrastructure market.
- PicoChip, Icera, Wavesat are some of the private companies getting ready to ship LTE silicon/reference design in 2009. Some (picoChip, Wavesat) also work in WiMax, so they have at least one market to fall back to; others (Icera) are concentrating on HSPA and LTE, so they have a bigger gamble, but probably a bigger reward.
- Intel is probably the world's most active supporter of WiMax (both in marketing dollars and investment dollars); it has finally read the signs and declared it will support LTE in its upcoming Moorsetown chipset family.

The year of femtocells?

2009 will be the year in which femtocells, a small-scale base station installed at subscribers' homes, will take off in the US and Europe. Femtocells are similar to routers, but they include a cellular antenna and an Ethernet port for connection to the wireline broadband (DSL, cable or other access technology). These devices relay voice and data traffic from cellular handsets within their coverage area onto the wireline broadband, thus enabling better indoor reception for cellular voice calls, offloading traffic from the cellular network to the wireline broadband network and setting the stage for future mobile data services within the house. Femtocells are even considered a more cost-effective way of deploying LTE networks by placing LTE femtocells at the subscribers' home rather than placing an LTE macrocell base station in each neighborhood.

After Sprint started deploying femtocells in the summer of 2008, **Verizon** and AT&T Mobility had confirmed their intention to trial and probably deploy femtocells in 2009. We hear AT&T has already pretty much made its choice of vendors (Cisco and **ip.access**) in a huge seven-million-unit deal for a GSM femtocell, but none of the companies are confirming that. Verizon, on the other hand, will trial a Samsung code-division multiple access femtocell similar to Sprint's already deployed femtocell (branded 'Airave').

What is interesting to note is how femtocells are perceived differently in the US and Europe. In the US, which was a latecomer to the 3G era, femtocells are used to solve problems of bad indoor

reception and dropped voice calls. In Europe, with an established 3G and high-speed downlink packet access (HSDPA) coverage, and mostly no significant indoor-coverage issues, femtocells are the indoor-extension of the mobile carriers' plan to be the provider of wireless broadband services. This is why initial femtocell deployment (i.e., Sprint and Verizon) supports a measly 153Kbps data throughput, while European subscribers would get 3G femtocells. However, T-Mobile US, the last tier one carrier to launch a 3G network in the US, might be the first to offer 3G femtocells and leapfrog its competitors. The company already has plans to deploy 3G femtocells from **Ubiquisys** (which it has invested in) in Europe, so it would be logical to assume a similar partnership in the US, maybe even during 2009.

Main changes to the market expected this year:

- If AT&T does commit to femtocell deployment, this could be a huge deal for Cisco and its femtocell partner ip.access. It could also mean that AT&T is the only carrier with both mobile and fixed broadband service, and could be the only mobile carrier to actually promise QoS to its customers (here's another source of revenue!).
- T-Mobile US has remained mum on its femtocell plans. It currently has a cellular-Wi-Fi unlicensed mobile access (UMA) solution, but we believe it is only temporary until it goes ahead with its 3G femtocell deployment.
- Carriers' use of VoIP in offloading voice traffic from handsets to wireline broadband via the femtocells should really move mobile VoIP closer to the carriers' infrastructure plans. Watch this space!

Companies at the forefront of disruption:

- Ip.access, Ubiquisys, **RadioFrame Networks** and **Airvana** are independent femtocell-focused companies that have managed to persuade the mobile carriers that this is the true fixed-mobile-convergence they were looking for, not dual-mode Wi-Fi handsets.
- Regarding picoChip, **Percello**, RadioFrame Networks and **DesignArt Networks**: private femtocell silicon providers enjoyed some needed funding in 2008, and with the financial markets looking rather dim in the near future, for some of them 2009 will need to be a year of a providing revenue paths to their investors.
- The world's largest infrastructure vendors – Cisco, Samsung, **Alcatel**-**Lucent**, Nokia Siemens and Ericsson – have also joined the femtocell trend, mostly by partnering with a femtocell-focused vendor (Cisco - ip.access; NSN - RadioFrame, Airvana, Ubiquisys; Alcatel-Lucent - Airvana) to cut costs on internal development.