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TVM Capital Technology

Portfolio Spotlight on

March 2008

ubidyne™

The Global Mobile Communications Industry

The industry continues to mature and gain subscribers, but it is not without challenges. Companies such as Ubidyne have an opportunity to deliver breakthrough products to streamline current mobile network infra-structure — thereby reducing operator costs and offering consumers higher quality service.

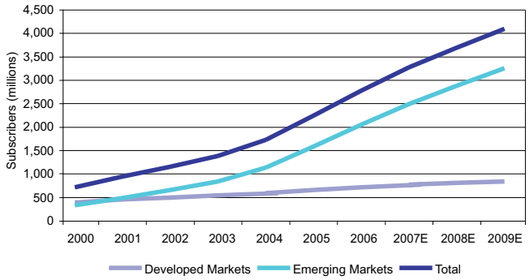
Catalyze Your Vision

Industry Snapshot: Rapid Subscriber Growth, Lower Profitability

From the beginning of the mobile communications industry in 1991 with the first GSM network, subscriber growth has consistently beaten analysts' expectations. Total worldwide subscriptions exceeded 3 billion (50% global penetration) before the end of 2007, driven by the large emerging markets of India, China and Russia. In addition, the market for new handsets remains robust, driven not just by new subscribers, but also by the integration of greater functionality such as e-mail, touch-sensitive screens, Wi-Fi access and mapping software.

Global Mobile Subscribers

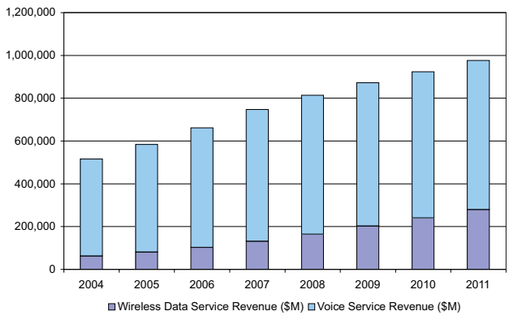
Source: Lehman Brothers



The strong growth, however, does not reflect the underlying difficulties facing mobile operators. Revenue from voice services is severely challenged by competitive pricing and reductions in international roaming rates, which have historically provided a large share of profits in the industry. With subscriber penetration close to saturation in many Western markets, mobile operators must look beyond subscriber growth to new data applications in order to increase revenues and stem the decline in profitability.

Global Wireless Service Revenue

Source: Gartner



Operators also are struggling with increasingly uncompetitive cost structures and must find ways to squeeze higher performance from fewer resources. This situation is especially acute in developing markets, where average revenues per user are 3 to 4 times lower than their developed market counterparts.

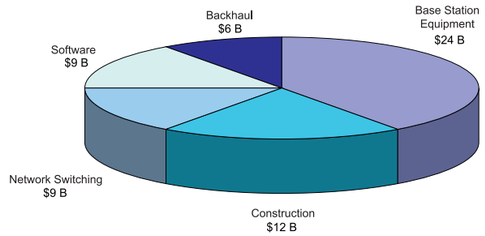
Network Infrastructure

With thousands of base stations required to provide coverage and capacity, efforts to lower the price of equipment will have a serious impact on network capital expenditures (capex), which reached approximately $60 billion in 2007. In Germany, for example, mobile operators use approximately 20,000 sites ranging from building rooftop installations to expensive customized towers. The preparation of these sites to accommodate equipment and backhaul transport, as well as backup battery power and air-conditioning for reliable operation can add 50 percent to the original equipment price. New generations of technology have introduced an additional challenge: faster data rates and more complex signals (as well as higher frequencies) means reduced coverage from antennas and, therefore, more base stations to meet coverage requirements.

Vendors realize that they can not merely increase performance incrementally or cost-reduce existing designs to meet operator demands. As a result, there is enormous pressure to develop fundamentally new network architectures.

Mobile Network Capex

Source: Lehman Brothers



Total Wireless Capex 2007E $60 B

Reduced capex, while important on its own, should be delivered to operators with lower costs of running the network, including:

- power consumption of base stations and cooling systems
- real estate leasing for network equipment and antennas
- maintenance of base stations and antenna sub-systems

With the addition of 3G technology to existing GSM sites, operators are quickly running out of space in equipment rooms and on building rooftops, heightening the urgency to reduce both the size and the weight of any newly installed gear. Equipment vendors are already pitching their roadmaps to 4G standards, with new products expected in 2010. Since GSM networks will likely stay in operation until at least 2015, many operators face the prospect of managing three different access technologies for many years.

For profitable growth in the future, operators need a low-cost, simpler, and more flexible radio access infrastructure that delivers high bandwidth applications to customers with improved quality of service at the lowest cost-per-bit.

The Greening of Mobile Networks

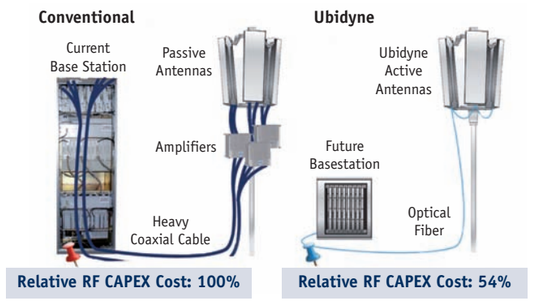
As operators increase the number of base stations in their networks to support advanced services, power consumption continues to rise. Operators are therefore demanding that equipment suppliers deliver significant improvements in power efficiency. Vodafone, for example, wants to see a 33% improvement in the energy efficiency of new network equipment by March 2008, compared to a 2006 baseline. Recent studies indicate that mobile networks account for about 80% of operators' electricity usage. A major source of power loss in base stations results from the inherent inefficiency of their signal-boosting amplifiers. More advanced wireless technologies with higher-speed data rates place demanding requirements on amplifiers. As a consequence, power efficiency is 15-20% - the remainder needs to be removed from the system as excess heat with air-conditioning, which itself consumes additional power. With lighter and more power efficient equipment, operators can save not only on their power bills, but also on site installation costs, including backup batteries and generators, fewer of which will be needed to keep base stations running in the case of a power failure.

Disruptive Innovation

Headquartered in Ulm, Germany, with additional development in Arizona, Ubidyne is helping operators to meet the challenges of provisioning high-performance wireless networks with a disruptive approach to base station and antenna design. Virtually unchanged since the beginning of the mobile communications industry, the analog electronics chain of conventional architectures is completely transformed in Ubidyne's digital design. Today, this part of the base station market, directly addressed by Ubidyne, totals $3.5 billion per year worldwide.

Taking advantage of the latest high-performance semiconductor technologies, the "active antenna array" allows for the transmission of a digitized radio signal over an optical fiber directly into an antenna, avoiding signal losses which affect both performance and power consumption. The combination of open base station specifications and proprietary, patented design delivers mobile communications at the lowest overall cost level for operators, and dramatically lowers the equipment size and power consumption.

Base Station Architecture

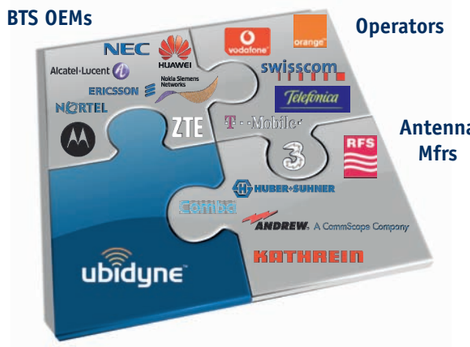


Instead of delivering incremental performance improvements or focusing on cost-reduction, Ubidyne has overturned the conventional approach to base station development. By moving from a collection of discrete, inefficient analog components to a fully digital, power-efficient and integrated product based on proprietary semiconductors, Ubidyne is enabling the industry to deliver on the promise of significantly lower up-front network costs and reduced on-going operational costs. The design facilitates the implementation of advanced antenna concepts that give leading operators the capability to deliver higher capacity and quality-of-service to end users.

Operator Challenge	*Ubidyne's Active Antenna Array*
High Capex	45% lower costs for base station RF chain. 35% fewer sites required.
Power Consumption	Amplifier design and no cable losses deliver 50% power reduction.
Site Acquisition, Construction and Leasing	Reduced space and reinforcement for equipment, cabling, cooling and backup power. Flexible antenna placement.
Maintenance	Remote configuration capability. Built-in system redundancy.
Quality of Service	Improved spectral efficiency and capacity from advanced smart antenna capabilities.

Industry Ecosystem

As a critical provider of sub-system technology, Ubidyne works with major equipment suppliers to the industry. Joint product developments with two of the largest antenna vendors, Kathrein and Andrew, are already underway to bring Ubidyne's digital radio concept to market. Concurrently, base station OEM (original equipment manufacturers) are engaging with Ubidyne to integrate their own base station equipment and network management systems with the jointly developed antenna products. The interest from both sets of companies is complemented by a very strong market "pull" from leading mobile operators who need little convincing of the benefits for themselves and have encouraged their suppliers to partner with Ubidyne. Momentum within the ecosystem will result in Ubidyne products first delivered for trial operator deployments in the latter half of 2008.



Q&A with Ken Hawk, CEO of Ubidyne, Inc.


Ken Hawk

Ubidyne was formed in late 2005 by a veteran base station design team from Siemens Communications. TVM Capital led the spin-out effort, and added London-based Accel Partners to complete a €10 million Series A financing. The TVM Capital Technology Team assisted in negotiations with Siemens and coordinated all aspects of technical and market due diligence, including an intellectual property study, which formed the basis for the company's patent strategy. The TVM Capital Corporate Finance team in Munich and Boston was instrumental in forming the US corporate structure and German operating subsidiary.

Ubidyne's core founding team was immediately complemented with senior hardware and software designers, many of whom have been hired from the rich engineering talent pool around Ulm, Germany. These individuals have collectively worked on 285 production semiconductor designs and have collaborated on over 140 granted patents.

In 2006, Ken Hawk, an American-born entrepreneur (founder, CEO of iGo, NASDAQ IPO) with significant start-up experience in Europe (CEO of Nemerix), moved to Germany to take on the role of CEO. Under his leadership, Ubidyne expanded the management team, opened a design center in Tempe, Arizona, and set the company on track for commercial launch nine months ahead of schedule.

Q. You left the United States to take on the role of CEO. What drew you to the challenge?

A. Ubidyne's embedded digital radio technology has the opportunity to change the wireless infrastructure industry. The move from analog to fully digital is a disruptive development. I felt that the founders, Werner Korte and Clemens Rheinfelder, were not only passionate about their ideas, but also had strong track records of bringing technology breakthroughs out of the lab and into production, including the world's first GSM system.

Q. . How can Ubidyne help solve the big issues faced by mobile operators today?

A. Operators face a fundamental challenge – to drastically reduce capex and opex in their networks, while delivering a better customer experience. Products being developed at Ubidyne will be cheaper to deploy and operate, but also provide better coverage and quality of service – consumers will also notice improved handset battery life as a result.

Q. Is the timing right for Ubidyne's technology?

A. Operators are facing even greater downward pressure on their pricing plans and roaming tariffs – this is forcing them to re-visit the costs of running networks. Aggravating this trend is the prospect of deploying and managing a third network technology. Our breakthrough architecture, combined with recent advances in semiconductor technology and open specifications make the product concept and go-to-market strategy for this revolutionary approach achievable today.

Q. What are the important near-term goals for the company?

A. The team is currently very focused on delivering, in cooperation with our antenna partners, a pre-release of the first product to operators who will test it on a select number of base stations. Throughout the trials, we will continue to work with our manufacturing partner to move into volume production the latter half of 2008.

Q. How has TVM Capital supported Ubidyne's development?

A. During my career I have had the opportunity to work with many global VCs. Most VCs promise to deliver more than just the money, TVM Capital is one of the few that actually delivers on that promise! Over the past year the TVM Capital team has been instrumental in recruiting a key mobile industry veteran from one of the leading operators, driving our recent fundraising, and actively participating in our patent committee meetings. I couldn't ask for a better partner in building our business.

TVM Capital

TVM Capital is a global venture firm with a 25 year operating track record. The investment focus of TVM Capital on financing technology and life sciences companies has led to specialized, focused teams and dedicated funds to serve the target markets best. TVM Capital's Technology Team invests in promising businesses with a focus in information technology, internet, communications and clean technology. The TVM Capital Technology Practice has successfully invested in these emerging markets consistently, developing a deep understanding of the rapidly evolving markets and combining that knowledge with the right business expertise to help portfolio companies navigate the proper course. The TVM Capital Technology Team invests in all stages of the product life cycle from its earliest stages like material and design innovation through late stage opportunities brought about by innovative business models and strategies for execution.

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