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Telecom Market Research & Analysis

**India Broadband Wireless and WiMAX
Market Analysis & Forecasts 2007-2014
2nd Edition**

October 2007

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and
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About the Team

This report is the result of a special collaboration between two leaders in market research: Maravedis Inc and Tonse Telecom. Tonse Telecom provided an invaluable contribution as a consultancy based in India, its home -base market.

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Tonse Telecom Pvt. Ltd. (www.tonsetelecom.com) delivers research, analysis and consulting services exclusively for the Indian telecom sector, particularly vertical services. Tonse believes that delivering significant value to clients requires bringing unprecedented depth to research and unique insights that can only come from personal relationships, feet-on-the-street presence and local partnership with every segment of the value chain: device makers, software developers, value-added service companies, service providers, infrastructure vendors and regulatory and policy builders.

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About Maravedis

Maravedis is a leading objective, third party research and analysis firm focusing on Broadband Wireless technologies including WiMAX, 802.20, TD-CDMA and Wireless Local Loop Systems. Maravedis' mission is to be the most trusted bridge between the world of fixed-mobile convergence and the world of real deployments and sound business models.

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Methodology & Assumptions

The research was conducted through two main channels:

Secondary Sources

Maravedis always strives to provide its clients with a new and unique perspective of the industry based on its own research. To ensure that we add value to the information already available to stakeholders in the industry, we reviewed most of the market research available on broadband wireless access in India, including

- ITU Statistical Yearbook, 2006
- The World Bank Development Indicators, 2006
- Numerous articles
- Indian ISP Association

Primary Sources

Primary research is a lengthy but indispensable process for market research because it yields data neither biased nor distorted by intermediaries. As part of this research,

Maravedis and Tonse conducted interviews with the following:

- All service providers listed in the report
- The regulatory authorities
- National account managers and other key representatives of equipment vendors active in the Indian market

The survey took place from June to October 2007 and involved discussions with product managers, marketing executives, regulators, technologists and sales people at all organizational levels. We would like to thank all the participants in our survey for their time and contributions.

Executive Summary

The broadband-hungry nation of India might just be waking up to realities. For starters, 2007 could well become the Preparatory Year of Wireless Broadband. Although the former Minister of Telecommunications in India proclaimed 2007 as the Year of Broadband for India, 2008 will instead become the Year of Wireless Broadband for India. Despite the unmet requirement to free bandwidth from various stakeholders, the key engines for broadband growth – the operators – are not willing to wait. Genuine Indian innovation is at work as vendors, operators, and system integrators are coming together like never before to work with whatever is available to trigger a bandwidth revolution.

Leading Indian private operators, as well as incumbents, are working together in narrow 12 MHz channels of 3.3-3.4 GHz to deploy WiMAX services where possible. Notable among these are Reliance, the master operator who currently operates the nation's largest CDMA network of over 29 million subscribers (as of July 2007) and has already started commercial WiMAX services in Bangalore, and Aircel, the Maxis Communication Bernhard (Malaysia) owned ISP that has been providing WiMAX-based backhaul services and leased bandwidth for corporations for over a year.

The Big Carriers: Rearing to Go

A major trend is evident in that in September, two large carriers have brought out RFP/RFIs for Mobile WiMAX. BSNL will require upwards of 100,000 CPEs (with all options taken over two phases, this count can go up to 200,000) and 1000 base stations across the country. This is apart from a separate BWA/WiMAX requirement for commercial urban broadband that is in the works. VSNL, a Tata company, has also released an RFI for a large 802.16e-2005 based system for over 500,000 CPEs in a phased manner. (Note: An RFI does not mean a firm commitment to place purchase orders.)

Bharti Airtel is looking to spread BWA/WiMAX to 300 towns targeting 50,000 SME customers in 2007 using a combination of 3.3-3.4 GHz and 5.8 GHz frequencies. BSNL, which launched the mother of all telco tenders for 60 million GSM lines in 2006, is in the early stages of drafting the RFP for what could become the largest ever BWA/WiMAX purchase requirement from a public-sector operator. The requirement is for 1000 base stations and 100,000 CPEs for a single project.

Judging by some of the plans of Reliance, we believe that the company's extended plans include a massive requirement for 1 million CPEs over the next 12 months. Parts of the plan are already frozen, and vendor evaluations are undergoing completion. Of course, the realization of the entire plan may be subject to political and technology issues such as rapid resolution of spectrum issues. However, we believe that in a worst case scenario, these projects will still move forward with at least 15% real deployment in the next 8 months.

One of the impediments identified in our India BWA/WiMAX Report 2006 was that the WiMAX CPE pricing may become a strong barrier in early penetration of WiMAX services. Leading-edge Indian vendors, such as Telsima, breaking the price barrier by over 50% as early as Q2 2007, has broadened the possibilities. Reliance, unsurprisingly, has brought WiMAX closer to reality by adopting a market-friendly tariff plan that allows a subscriber to sign up at a minimal cost of about Rs 700 per month (\$17) in Bangalore, where the service has first been launched. Reliance has always been a mass-market leader, and it is not surprising that the company is leading the way in taking broadband to the masses at the best prices possible.

BWA/WiMAX: It is Brewing Hot in Here

Tonse believes that the Indian BWA/WiMAX market will continue growing despite the roadblocks. We conservatively estimate that in the next 12 months, about 250,000 CPEs and about 5000

base stations will be sold in India. If some of the larger plans are realized, as many as 10,000 - 12,000 base stations and about 500,000 CPEs might be consumed by this bandwidth-starved nation. At current equipment costs and bulk discounts expected by Indian operators, the total CPE / BS equipment market for the year may be between \$50 million and \$120 million. This is a substantial jump over the last year and could signify the eventual emergence of one of the world's top 3 WiMAX markets.

WiMAX CPE prices have declined from \$300 to about \$140 without a full -feature set. Plain vanilla WiMAX CPE prices will drop below \$100 by Q 1 2008 for large quantities. Medium-size deployments (50,000 CPEs) will start materializing by December 2007, and large -scale deployments (100,000 CPEs) will have begun by March 2008. The rollouts of these networks will be in a phased manner, as there will be a fair amount of time spent in radio-tuning, repositioning of towers, and addressing customer complaints.

The Land Grab for Access will Begin

1. The opportunity for the greenfield BWA/WiMAX operator is interesting. While spectrum will be the biggest challenge, these aggressive players could create interesting niches through geography, targeting specific verticals such as SME, or offering a mix of broadband VAS (Value Added Services) as well as voice and bundled data to shake the competition. The ongoing economic expansion has already created several such niches: retail chains, medical tourism, and tele-education, which are prime candidates for long-haul wireless IP applications.
2. At least one of these innovators is bound to chart a new path and shake up the restricted VoIP space in India. The large integrated service providers have not initiated the service because there is an adequate number of low-cost voice services today, starting with mobile service.
3. We expect that the new crop of Wireless ISPs may invest or co-invest in an international gateway and usher in more transparent pricing to the retail user. This could throw open the flood gates to competitive domestic bandwidth rates, which will bring down international calling and data service price points in general.
4. The incumbent ISPs will continue to adopt a heterogeneous mix of wired and wireless technologies where possible, to mix and match their legacy copper/fiber and air waves to deliver bits to the home with one objective: kill outbound churn and build market share. The wireless solution will again be a mix of licensed and unlicensed where possible, to provide an end-to-end solution.

The explosive VAS application revenue from the mobile world has demonstrated how important it is to begin service introduction early, above and beyond the transport fabric. The promising IPTV and interactive television are one step away once the pipes are laid. In some cases, such as IPTV, the content management platforms are ready and massive investments have been made in convergent billing solutions, including BSNL's recent order of \$300 million dollars for a convergent billing platform. The challenge seems to have shifted to the place they least expected: the access, which has been their traditional strength.

The incumbency position is strong yet vulnerable because artificial roadblocks such as not opening copper to unbundling are not significantly hindering competitors.

Indian BWA/WiMAX Operations and Challenges

- India probably will see the world's lowest end-to-end cost for WiMAX service and will drive costs down further than any other market. Integrated operators such as Reliance will erect WiMAX towers along with CDMA towers and derive further cost advantages.
- Third-party radio-tower companies have emerged within the last year in India. They offer managed tower services for cellular operators. An extension of this would be to provide nationwide WiMAX tower services in managed-service mode. Bringing together thousands of

towers is bound to create additional cost benefits to the WiMAX operator. Currently, cellular operators are deriving a 15-18% cost advantage from shared tower services. (A shared tower service is a managed service provided by a third party to multiple operators. The individual operators will not own the tower infrastructure but will pay a rental for bandwidth used on a monthly basis.)

- One of the challenges the industry will continue to face is availability of trained RF wireless transmission engineers and technicians. The industry apparently is already reeling under a severe shortage of technicians for field support and a lack of specialists.

Policy and Licensing: Confusion Abounds as Spectrum Aberration Explodes

It is well known that the government is already working on various fronts to release spectrum and make the bands available for commercial telecommunication. However it appears as if the proverbial "Pandora's box" may have been opened. Here is a summary of the various issues that have emerged.

As of September 11, 2007, the Department of Telecommunications (DoT) of India and the Indian Defence Ministry have finalized a memorandum of understanding (MoU) that discusses a roadmap for vacating 25 MHz of spectrum for current and third-generation telecom services.

The spectrum conflict appears to be snowballing into a heavy business and political battle in the power corridors of New Delhi – India's capital. Since the middle of July 2007, a series of unhealthy conflicts has created confusion and uncertainty about the future of the Indian mobile industry.

The bitter war of words between GSM and CDMA players took an ugly turn August 2007, as the two industry bodies representing them accused each other of using more spectrum than was allowed during the early days of telecom in India, thus prompting the Ministry to consider a study into how this situation came about.

An Urgent Breakthrough in the Spectrum Issue is Critical

To illustrate why the overall spectrum debate has been difficult to resolve, some of the key areas of contention are listed below.

- AUSPI (Association of Unified Service Providers of India), the body that represents CDMA operators, does not agree with the COAI's (Cellular Operators Association of India, the GSM body) position on additional spectrum for GSM operators.
- Operators disagree regarding spectrum ownership following M&A activity, whether it involves GSM entities or a mixture of GSM and CDMA entities.
- DoT disagrees with some of TRAI's recommendations.
- TRAI disapproves of the current administration and management of spectrum, the agency handling it, and its persistent inefficiencies that have contributed largely to the spectrum mess. But DoT does not acknowledge these problems.
- The Ministry of Defence demands additional time and a full-fledged alternative fiber optic network before giving up the spectrum in its ownership.
- BSNL does not accept the charges proposed by Defence for building its alternative fiber network.
- DoT is willing to pay BSNL for only part of the costs charged by Defence.
- Other areas of disagreement include fee structure for additional spectrum requests from existing 2G operators, green-field license applicants, ISPs, and new Wireless ISPs who could be looking at WiMAX.

Market Forecasts

In 2006, the BWA equipment market opportunity in India was a mere US\$2.5 million, up from US\$6 million in 2005, and was dominated by small deployments for backhaul applications to enterprises with outdoor equipment.

However, Maravedis and Tonse believe that with the upcoming spectrum opening, the certification of new equipment, and lower-cost CPEs, the annual 3.3 and 3.5 GHz equipment opportunity will increase from US\$4 million in 2005 to a peak of US\$280 million in 2014.

Maravedis and Tonse estimate that the Internet subscriber population will grow from the current 10 million to above 48 million by 2011. The Internet user population in India will have exceeded 200 million. This will be made possible by lower-cost PCs and notebooks, CPEs below US\$40, and cheaper broadband service. Maravedis projects an accumulated 21 million BWA subscribers by 2014, counting both residential and business segments. WiMAX subscribers should represent the majority of this figure. Approximately 66% of the WiMAX subscribers will be mobile 802.16-2005, predominately residential, while fixed WiMAX will continue to be driven by large corporations and, to a lesser extent, by SME customers.

Conclusions and Recommendations

The Indian market for BWA/WiMAX will continue to be one of the most sought after markets for global equipment vendors. The nation promises to offer huge, consistently high growth for the next several years, judging by its extremely low broadband penetration rates (under 3 million for a population of over 1 billion).

The government has initiated significant progress in resolving a chaotic spectrum scenario with too many interested parties (GSM lobby, CDMA interests, ISPs, incumbents, military, and other users) and a growing list of new applicants struggling to gain entry into the potentially lucrative telecom service business. However, much more needs to be done, and fast, if a semblance of a fair settlement is to be achieved. The 3G policy is already off by a year, and delays are spawning gaps in an extremely under-penetrated broadband market.

Several government agencies such as WPC, TRAI, and DoT are in disagreement on vital issues such as spectrum administration and management. WPC needs to move to a modern, automated, open operation and adopt a more consultative approach involving industry experts and ecosystem vendors to develop market-friendly policies. The entire spectrum-allocation and administration mechanism has to become holistic, more transparent, open, accessible, and market-friendly.

The government's approach to ISPs, cellular operators, and potential new license applicants needs to be fair. The ISP community appears to be reeling under a counterproductive license regime that requires special permits to provide most services.

There is an urgent need from the Indian equipment vendor market for policy makers (DoT and the Ministry) to introduce methods to encourage small technology start-ups to survive and grow in the domestic telecom markets. Eventually such initiatives could allow telecom companies from India to become global.

India can become one of the largest BWA/WiMAX markets. To take advantage of the opportunity, the authorities have to introduce a plan to bring small tech start-ups into the local market instead of them having to compete against large global vendors. This would foster a rich native vendor ecosystem in this space. If done appropriately, this could enable wireless technology exports from India to become a fine complement to the success of the software industry.