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Over the past couple of years, India's telecom sector has been witnessing a rapid growth in investments in testing and measurement (T&M). The country's telecom growth has been primarily fuelled by:

- An increasing subscriber base in the GSM and GPRS markets
- Increased penetration of DSL and the internet
- Operators' shift to 3G, Wi-Max, LTE and triple-play services
- Research and development (R&D) investments in emerging technologies such as 3G, Wi-Max and long term evolution (LTE).

Operators are trying to maximise their returns on investments by deploying highly automated provisioning, fault rectifications, workflow management, etc. with a state-of-the-art operational support system. Most operators in India are transitioning from a circuit-switched core to a flexible, scalable and resilient core based on internet protocol. To enable this core, operators are building a lab environment for testing the devices.

The aim is to deploy rigorously tested high-availability (towards 99.99999 per cent) solutions. No wonder most operators are looking to move towards the IP multimedia subsystem access technology in the near future.

The growth of the telecom sector, which was first triggered by the deregulation of the telecom industry and the issue of licences for different circles, has now spiralled into a telecom revolution in the country. The wireless subscriber base has been growing at a very fast rate and the broadband segment – if it grows as projected – will give a further shot in the arm to telecom growth in the country. This, along with the planned 3G and Wi-Max/LTE rollout, will only add to sector growth.

The availability of highly scalable networks to support such a huge subscriber base and meet the quality of service (QoS) and users' quality of experience (QoE) requirements is a big challenge. Setting up a network that meets the QoS and QoE under all loading conditions is a major test. This requirement needs a self-healing optical network with an extremely high quality of service. Besides, maintaining such a transport network in an area where infrastructure like new roads is being developed (with many areas being dug out) is a major roadblock.

Wireline and wireless broadband is a key segment that will help the telecom business grow. In rural India, where the telecom user's access points are serviced by copper cables, DSL instruments and PON deployment costs are high. In such areas, operators are looking to service customers' needs with low-cost wireless services like Wi-Max or LTE. The ability to provide connections without wires reduces the cost of providing these services. Therefore, Wi-Max and LTE are the key technologies. The explosive growth of the infotainment industry and mobile convergence will also aid telecom growth.

Agilent, with its complete set of solutions from R&D to manufacturing, is suitably poised to provide state-of-the-art measurement solutions for the stated technologies. The company offers comprehensive solutions for 2G, 2.5G, 3G as well as base station and antenna testers.

With regard to the challenges in the T&M space, operators across the globe highlight the following points:

- Wireless data services are expensive to deliver and complex to manage, particularly for the scale of operations in a vast country like India.

- Mobile alliances with preferred roaming partners threaten one's valuable international roaming business.

- Managing the content providers' QoS, which is perceived by customers to be the operator's QoS, is difficult.

- The whole customer experience, with regard to the perception of QoS versus the actual experience, is important.

- The threat from non-traditional branded competitors such as Yahoo!, Microsoft, Google, ESPN and Skype is a challenge.

- Mobile number portability, whenever legalised in India, will enable customers to switch operators without changing their numbers. User churn is expected due to QoS issues.

- Wireline operators offering triple-play services have to compete with DTH and cable operators, and will, therefore, need to provide better QoE (especially with users being inclined more towards HDTV than SDTV).

Therefore, the challenge an internet service provider or telecom operator faces while choosing a T&M vendor is the variety of test support in the products and the intensity of technology support in the product.

Considering this, operators are adopting a mixed approach in their measurement solutions build-up. There are groups to manage the basic installation and testing, and others to handle detailed troubleshooting in the network, and testers are procured accordingly. Training engineers to use these testers to their full capability is a challenge for the operators. Operators are looking at ways to reduce operation costs and standardise their vendor partner in a manner where both parties stand to gain.

The best way to choose a T&M solution or partner would be to consider:

- The company’s focus and competence, and its commitment to the market

- The company’s local capability (in India), including its sales, support, repair and calibration

- The company’s product offerings, road map, local support and warranty

- The product’s interoperability and scalability; stretching every rupee invested.

Before the global economic meltdown of 2008 that hit markets worldwide, the key growth driver for telecom T&M came from strong investments in manufacturing, deployment and new technologies (design and R&D).

One of the key growth drivers in 2009-10 has been the wireless boom and digital convergence on mobile. The future of wireless will be riding on 3G and Wi-Max or LTE deployment and on value-added services (VAS). Services such as internet banking, stock trading, web surfing and video-conferencing can now be availed of via mobile networks.

If the QoS of these services is ensured, users will go ahead and use them. The uptake of these services will drive the growth of the telecom market. Therefore, to ensure QoS, measurement solutions need to be put in place (for baselining the technologies for user requirements). The operators’ requirements put tremendous pressure on equipment manufacturers to provide full capabilities and upgrades to VAS in their equipment.

Network equipment manufacturers have to invest significantly in their R&D and manufacturing segments to meet these quality requirements. This gives Agilent, which already has a wide range of testers for the R&D and manufacturing segments, a competitive edge.The technologies prevailing in the Indian market are 2G, 3G and Wi-Max or LTE, and most chipset designers, protocol stack developers and telecom manufacturers are increasing their radio frequency test capabilities in India for these technologies.

We expect major telecom companies as well as the Department of Telecommunications to set up test houses in the near future for catering to the needs of conformance testing on telecom products being developed in India.

There are a number of new technologies to watch out for. For instance, mobile Wi-Max, which supports high bandwidth mobile services at speeds greater than 120 km per hour, is expected to grow substantially over the next few years. However, its ultimate success would be determined by the end-user's experience. As the technology moves quickly from concept to design to volume production, it requires newer and more efficient methods of verifying the integrity and quality of handsets and similar products. Designers developing mobile Wi-Max chipsets, modules and devices require a solution to quickly ensure standard-compliant design performance and improve the time-to-market. With new designs coming up regularly in different places, it is important to have common, industry-standard test tools that enable groups to share information and resolve problems quickly. A quicker rate of technology change implies a faster cycle time for new products entering the verification stage. With cutting-edge technology shipping out quickly, interoperability and conformance testing have become increasingly important to ensure QoS, product quality and customer satisfaction.

3G wireless systems based on WCDMA are now being deployed across the world. To ensure that these systems remain competitive in the high bandwidth future, the 3G Partnership Project (3GPP) is being developed to LTE specifications. The LTE specifications provide a framework for increasing capacity, improving spectrum efficiency and coverage, and reducing latency compared with current high speed packet access deployments. The first company to deliver 3GPP LTE design automation tools and measurement products, Agilent gives design engineers working on LTE chipsets, modules and systems the ability to design, troubleshoot and evaluate performance of early prototype LTE transmitter and receiver designs

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