Knowledge@Wharton – Wipro Future of Industry Series: Telecom Equipment Innovation

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The huge demand for telecom services worldwide has galvanized innovators, while also raising the bar on several fronts. As innovation in wireless and broadband technologies aims to increase capacity and service efficiencies, telecom equipment vendors — like makers of network infrastructure equipment and mobile devices — must also deliver higher-end smartphones and spectral efficiency. They must also address the frugal but high growth markets in emerging economies. Innovate or perish, says Gerald R. Faulhaber, Wharton emeritus professor of business economics and public policy. Boost co-creation and distributed partnership models to share risks and cut time to market, says Jeffrey Heenan-Jalil, vice president and global head for advanced technologies at Wipro Technologies. The two explore the telecom innovation road map in this "Future of Industry" series white paper produced by Knowledge@Wharton and sponsored by Wipro Technologies

As with any other industry, telecom equipment makers today find their innovation landscape dramatically different from a decade ago, says Jeffrey Heenan-Jalil, vice president and global head of advanced technologies at Wipro Technologies. "Ten years ago, innovation was very much a closed shop and there was little understanding of how it would enable changes in people's lives." Over time, telecom equipment vendors (TEVs) formed workshops and other forums among themselves and invited their customers to stimulate ideas. This in turn led to profitable products. "Now, an idea floated on the web could go viral and you are no longer dictating where the responses would come from," he adds.

According to Heenan-Jalil, TEVs today have to be "open to very off-the-bat suggestions." They have to "embrace the ideas and the feedback," assimilate and analyze the data they generate, and respond effectively, he adds. They must also involve telecom service providers who compete on features that devices support. TEVs must ensure their equipment supports the features service providers want to offer their customers, he says.

INNOVATION BEYOND TECHNOLOGY

Innovation must go beyond technology, says Heenan-Jalil. TEVs must expand their focus to business innovation, which would then extend to exploring new markets, processes and business models. Innovating to find new markets could help identify under-penetrated opportunities such as rural markets, mobile commerce or remote health care. New processes, such as outsourcing

non-core activities, could help TEVs better understand ways to optimize their operations. Technology innovation would occur at the same time, such as focusing on small cells that reduce costs and increase capacity and coverage, or remote infrastructure management for mobile networks. Innovation around business models might entail "leveraging partner ecosystems to share uncertainty risks and innovation costs, create relevant talent pools, and reduce time to market," Heenan-Jalil adds.

As the telecom equipment market evolves, the sources of innovation are also changing. While many top-ranking TEVs have suffered revenue drops and a consequent fall in their R&D budgets (typically 8% - 15% of revenues), the industry is growing overall. Heenan-Jalil notes that several new entrants are driving that growth. These new and smaller firms are producing a fair amount of innovation around telecom equipment.

TARGET AREAS FOR TEV INNOVATION

Wharton emeritus professor Gerald R. Faulhaber, whose research specialties include telecommunications and spectrum policy, was formerly chief economist at the U.S. Federal Communications Commission and head of economics research at Bell Labs. Setting out the broader innovation challenges facing the industry, he focuses on wireless and broadband as the context for TEVs to calibrate their efforts. In wireless, Faulhaber identifies three areas of innovation.

The first is innovation in handsets, including smartphones and tablets. "We have seen a dizzying array of innovation in this area and the introduction of [Apple's] iPhone was a game changer," Faulhaber says. In "a period of very rapid evolution for handsets," TEVs have focused mostly on basic issues; such as the size of keyboards and screens, he notes.

Faulhaber does not see much room for innovation in increasing screen sizes on smartphones significantly beyond five inches. Yet, he notes, that under pressure from falling PC sales, Microsoft is attempting an offering where a tablet would act as a PC. "Are we going to have handhelds or tablets or small PCs? How are we going to merge all that?" he asks. "That is a real area for innovation."

The second area is the number of applications that handheld devices can support, says Faulhaber, again crediting the iPhone coupled with Apple's iStore as a game changer that "opened up the markets for innovation." The third area is the operating system market, where the competition is far more intense "than what happened in the PC world, where essentially Microsoft took over," he adds.

Given the limitations of handheld devices, "it falls to the app developers to come up with great ways to do all this stuff, such as new ways to input to the screen so that you are not limited by the absence of a keyboard," says Faulhaber. "I see a lot of opportunity there."

NEED FOR SPECTRAL EFFICIENCY

According to Faulhaber, as telecom networks attempt to push more traffic down their infrastructure faster and cheaper, they face hurdles, which in turn will provide fodder for innovation. He notes that spectrum is a finite resource, and telecom industry participants have to find ways to get the most from it... Spectral efficiency, or the volume of traffic that a given amount of spectrum can handle, "is getting close to the theoretical limits." He also foresees advancements in the capacity of antennas and saving spectrum by using Wi-Fi networks. However, Wi-Fi networks face constraints around the distance signals can travel. Faulhaber expects this to push innovation towards extracting

more capacity from cell towers along with the development of expanded Wi-Fi networks.

Once these challenges are resolved, "we are going to start to move in a world where broadband is going to be wireless," Faulhaber predicts. Telecom carriers will also have to enable switching between cell phone spectrum and Wi-Fi frequencies, and implement advanced technologies like 4G networks. The challenge is for TEVs like makers of telecom towers and antennas, to increase spectral efficiency, he says.

Another hotbed of innovation for TEVs is around small cells, or base stations that provide small footprints of between 10 meters and two kilometers, compared to macro base stations with coverage of up to 10 miles. Mobile operators see these as being crucial to provide coverage for small communities at low costs, like rural markets. Heenan-Jalil cites the scenario of 20,000 football fans at a stadium using their smartphones at the same time when a team wins. Small cells could potentially handle that traffic while macro base stations would find that challenging, he explains. By deploying clusters of small cells in indoor areas like stadiums, convention centers, train stations and airports, mobile operators can handle larger traffic volumes than by distant macro cell towers. Two-thirds of voice traffic and 85% of data traffic on mobile networks occurs indoors, according to market estimates.

Big-data analytics of customer behavior to create suitable offerings would be another area for innovators, says Heenan-Jalil. He sees equipment innovation as a way to help mobile operators ensure real time responses to the insights data analytics produce. TEV innovation must also help extend the life cycles of existing products and features mobile operators offer, to help wring more profit out of investments.

TEVs also have to serve emerging markets like India and Africa, which have rapidly growing mobile user populations, say Faulhaber and Heenan-Jalil. Worldwide, an estimated six billion cell phones are currently in use, and that is set to cross 7.4 billion by 2014, according to the International Telecommunications Union. A big need will be for low cost phones that allow for mobile banking, especially in places like Africa with low banking penetration, says Faulhaber. In five years, those users will upgrade to smartphones, he predicts. Heenan-Jalil also sees logistical and cultural challenges as TEVs innovate to serve emerging economies, such as enabling carriers to maintain services in remote areas or in augmenting responses to health, safety and emergency needs.

The innovation challenges TEVs confront call for collaborations within and outside the industry. Heenan-Jalil says the "co-creation model" is thriving, with large and small firms joining hands, even if they are rivals, to increase innovation budgets, lower costs and reach markets sooner. He expects more collaboration between operators, equipment vendors and user communities. An extension of co-creation is the distributed partnership model, where TEVs could look at a "wider ecosystem." Here, he points to TEVs buying video and content companies to augment their communications business, or buying technology from R&D labs to hasten speed-to-market.

INNOVATE OR PERISH

Faulhaber describes the telecommunications industry as a "hyper competitive market," where the mantra is "innovate fast or die." His advice for participants: "It's a cruel world out there. If you don't have the resources to stay in this game, you better get out." Heenan-Jalil agrees. "If you stop

innovating you become the laggard. Laggards tend not to exist," he says, adding, however, that firms must also know when to stop investing. Until recently, Heenan-Jalil headed Wipro's telecom equipment & media vertical. "The big thing around innovation and measuring it is to recognize when to invest more and also how to stop the investment when you know it is not going to yield results."

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