

Vanu Inc's MultiRAN Virtual Base Station Has Wider Implications Than Simply Aiding Active RAN Share

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Cambridge, MA-based Vanu Inc recently announced the availability of its MultiRAN base station solution. The company terms it vBTS or Virtual Base Transceiver Station and the solution allows up to four operators to share the same hardware base station platform. With complete baseband processing being implemented in software, each operator has individual operational control over its own base station. In other words, operators have a virtual base station that exists in software.

The virtualization of the base station is a concept strategically aimed at operators in India who have been given the nod by their regulator TRAI to share active components in their infrastructure. This includes antennas, feeder cables, BTS, and other transmission equipment.

Active RAN share is an extension of Passive Infrastructure Sharing in which the passive components like tower, site, masts, and so on, are shared. However, unlike passive sharing that is prevalent across the world and has been permitted by 70% of operators globally, active sharing is still very niche. India is one of the few countries where active sharing of infrastructure has been encouraged. Europe is the only other region where there has been some infrastructure-sharing activity.

Although MultiRAN might be seen as a key enabler for active RAN sharing, this has wider implications for wireless infrastructure and wireless business models in general. With base stations becoming virtual, and with operators being able to control and manage their base stations remotely through software, hardware has been reduced to a commodity.

The inherent value in the network has strategically shifted from hardware to software. Although this trend has been taking shape over a period of time, the introduction of MultiRAN could trigger bigger bolder changes for the wireless infrastructure business as a whole. We could be at the cusp of what might be termed the software era in wireless infrastructure. In addition, major questions will be raised, mainly related to the roles of both the network vendor and the mobile operator.

In order to understand the motivation and the dynamics behind this transition, it is useful to look at the journey taken by Vanu Inc and how SDR (Software-Defined Radio) as a technology has played a role in wireless networks until now.

Vanu: A Software Vendor in a Hardware World

Vanu Inc. has been the frontrunner in the commercial SDR space. The company was the first vendor to win FCC certification for its software-defined base station in 2004. Vanu was founded in 1998 by Vanu Bose, the son of Amar Bose, creator of the Bose Corporation, the innovative audio systems company. The company emerged from the PhD research that Vanu Bose was pursuing at MIT. Vanu Inc introduced the concept of a SDR base station that could run on COTS (Commercial Off-the-Shelf) servers and the company termed the SDR base station as Anywave. With the baseband processing of the base station handled in software that runs on COTS hardware, Vanu revolutionized the way that mobile base stations were developed and manufactured.

Vanu's SDR Anywave base station lowers the base station CAPEX and OPEX costs as it is able to run a GSM and CDMA base station over a common hardware platform, partitioning the two diverse systems in software. With Vanu's Anywave system, many rural operators have increased their roaming revenues without incurring additional CAPEX and ensuring that their OPEX remains relatively low over the longer term.

The key differentiating factor for Vanu has been the company's perception of itself as a software firm rather than a hardware OEM. Vanu develops software code, which can run on any commercial off-the-shelf hardware. Sounds familiar? Microsoft entered the PC market in the 1980s when IBM was the dominant hardware-centric PC manufacturer. Microsoft was written off at that time, as it wanted to make a business out of software, in a market that that was largely hardware-driven. We know how that story turned out. However, the point is not that Vanu may be the next Microsoft but — similar to Microsoft's business model — that Vanu can run its software on any commercial off-the-shelf server.

Just as Microsoft did in the PC business, Vanu wants to create a wireless equipment business in which the company sees the value shifting from hardware to software. That can only be achieved if the software is decoupled from the hardware, allowing it to run over multiple hardware platforms. This helps Vanu to take advantage of Moore's Law, have an open architecture, and allows hardware-based price-performance improvements to drive what their customers are looking for in terms of a scalable, cost-effective, and best-performing solution.

Paradigm Shift in RAN Value from Hardware to Software

Most top-tier vendors have not been able to grasp the significance of the inherent value in the RAN network moving from hardware into software. Although most have been pushed towards software-upgradeable base stations, there is always a

caveat to software upgradeability. The software is locked onto dedicated hardware. This is what keeps operator customers locked onto their hardware and this is where they see the source of most of their revenues.

Although Vanu is gunning for a revolution in the wireless infrastructure space, the company has found it difficult to convince any of the large commercial mobile operators in the United States or Europe to adopt its products. There could be several reasons for this.

First and foremost, most US and European operators are investing in 3G and beyond and are not particularly interested in the Anywave GSM/CDMA mix at the moment. Another reason could be the fact that the existing relationships and contracts with the larger Tier One OEMs like Ericsson, Nokia Siemens, Alcatel Lucent, and others provides a convenient route for operators to source equipment. It is quite difficult for a lower-tier vendor like Vanu to enter the equipment supplier "food chain." Until now, Vanu has had to make do with a handful of North American rural operator contracts.

Active RAN Sharing and the Indian Connection

Nevertheless, Vanu has somehow continued to innovate and over the last year or so has shifted its focus eastward to the burgeoning Indian wireless market. While opening an R&D office in India, Vanu has found many Indian operators eager to take advantage of its combined GSM/CDMA solution that can run over COTS hardware.

The goal in India is low cost, easy-to-manage, cheap-to-maintain solutions that can help operators keep up with the rapidly growing mobile subscriber base that is expanding at an average of around 6 to 10 million subscribers per month. India's subscriber base reportedly crossed 300 million in August 2008 and is creeping close to North America's population as a whole. With India's population at 1 billion, there is still a long way to go in terms of its growth, which will mainly occur in the rural areas and the small-to-medium towns and villages of India.

The MultiRAN solution is a result of the innovation and research efforts of Vanu over the past few years and this essentially offers Indian operators a viable alternative when deploying fresh GSM networks. With the Indian government mandating rural coverage as a priority, there is a real need for Indian operators to find cost-effective ways of expanding basic 2G GSM coverage. MultiRAN with its virtual base station solution is a step in the right direction and is a unique way of implementing active RAN sharing.

Why MultiRAN Is Different

Vanu is not the first vendor to offer a RAN share solution to the market. Nokia and most top-tier vendors have been offering 3G RAN share solutions for many years. Apart from the fact that Vanu provides a 2G solution, the difference between Nokia Siemens RAN share solution and Vanu's MultiRAN is the way that the sharing is implemented. Nokia's RAN share is built out of the RNC or the controller, where the controller is shared and there is an option for shared or dedicated Node Bs. In addition, unlike Vanu's MultiRAN, parts of the shared Node B are not completely implemented in software.

The PC Analogy

On the other hand, the MultiRAN is equivalent to Linux and Windows being present on the same PC, with compartmentalization of the two operating systems. Vanu has segregated different operator BTS in software, offering more flexibility and treating them as individual base stations. There is a proper logical divide between the two systems. Even the radio heads and power amplifiers are shared in Vanu's MultiRAN system.

The MultiRAN system allows operators to connect their own controllers or BSCs to the vBTS. Vanu's system is much simpler in architecture and existing core and aggregation networks can be connected onto the shared MultiRAN system. In addition, each network operator controls the operations and maintenance portion of the network as the virtual BTS connect into their own back ends.

Although virtual RNCs have been introduced, this is the first time a virtual BTS has been implemented. Adding a virtualization layer to the software base station enhances the capabilities of the software system, making it more flexible, allowing it to make use the processing power of the hardware more efficiently.

This might be a small step for Vanu in terms of technology development and innovation, but it has enabled a completely new way of looking at base stations. Over time, virtualization could be extended to support multiple standards over the same platform, extending GSM/CDMA functionality to support UMTS, WiMAX, even LTE.

The Wider Implications of BTS Virtualization

With base station virtualization, Vanu has opened a Pandora's Box of questions for many operators and vendors not just in India but across the world:

For vendors, who are likely going to see a decline in their equipment shipments, especially with hardware being replaced with software replacements, does it make sense to move towards a software-based business model, where hardware is simply a commodity and each vendor differentiates itself with the software and services that it provides on the hardware?

With each country and region having at least three to four operators running the same technology — be it GSM, UMTS, HSDPA, LTE or WiMAX — is there any sense in maintaining, and more important, investing in such multiple networks?

Is it time to start thinking seriously of a Mobile Netco model where a third party deploys, perhaps even operates and manages the radio access network while operators differentiate themselves on the core network?

If there is a move to such a model, who will take the role of a Mobile Netco? Is it the mobile operators, the OEM vendors, or the tower operators?

Is there now a stronger case for a model with base stations hosted in centralized data centers, which are then connected to radio front ends or antennas in the respective cell locations? Are we going to see the rise of the base station data center model?

All of these questions seem valid in the light of the introduction of the vBTS. Although the initial target market for the vBTS is going to be rural India, it is likely that repercussions will be felt worldwide in the not too distant future.

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