

# For VMS MobiFone, MPLS is Key

*Vietnam's largest operator turns to Tellabs for a new backhaul strategy as it rolls out 3G.*

*By Joan Engebretson*



**Although nearly 1 out of every 2 Vietnamese mobile users are its customers, Vietnam Mobile Telecom Services Company (VMS) isn't content to rest on its laurels. Instead, the state-owned operator – which sells service under the MobiFone brand – is aggressively upgrading its network to stay on top in a market that some analysts forecast will be as big as Japan's by 2014.**

Backhaul is a prime example. VMS knew it needed to add backhaul capacity to keep up with customer demand for the bandwidth-intensive data and multimedia services that its UMTS upgrade would enable.

But even as it was preparing to deploy 3G, VMS also was looking ahead to 4G, whose all-IP design gives operators new options for reducing OpEx, including on the transport side.

For 3G, VMS opted to use a backhaul network architecture based on the Tellabs® 8600 Managed Edge System. That choice has enabled VMS to minimize both CapEx and OpEx today while also providing the foundation for 4G tomorrow.

### A Clear Choice: MPLS

VMS first learned about Tellabs' approach to mobile backhaul at a workshop that Tellabs conducted for the carrier.

"After attending the workshop, we realized the important considerations and issues involving the transport networks to support 3G and 4G services," said Nguyen Dang Nguyen, vice president of network planning and management for VMS. "We also understood the scalability and potential of a high-speed, packet-based transmission infrastructure. We assimilated important concepts for design, planning and dimensioning the transmission architecture for next-generation networks."



Headquartered in Hanoi, MobiFone is the largest telecommunications provider in Vietnam, with 41% of the mobile market.

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VMS's 2G network relied heavily on leased lines, as well as some SDH and PDH microwave links for backhaul. The operator considered reusing this infrastructure for its 3G backhaul, perhaps enhancing some of it to support Ethernet.

Nguyen and his team also liked the idea of using MPLS, which can be transported over a variety of physical links, including SDH and higher-bandwidth, more economical Ethernet links. MPLS became even more attractive after they learned at the Tellabs workshop that numerous Tier 1 mobile operators use it to support 2G and 3G backhaul, integrating the two networks onto a common packet infrastructure.

VMS decided to deploy its 3G network in 3 phases.

The initial phase would use ATM connectivity for delay-sensitive voice and control plane traffic, with all other traffic running over IP. Next, VMS will move the traffic from its TDM-based, legacy 2G backhaul network onto the same packetized backhaul infrastructure implemented for 3G. In the third phase, all 3G traffic would be handled as IP.

VMS also anticipated eventually deploying 4G service and wanted to plan its 3G network in a way that would simplify the 4G upgrade. In the process, VMS wanted to minimize the cost of leased circuits and optimize its existing investment in SDH and PDH microwave infrastructure.

### Bridging Two Worlds

After carefully considering various options, VMS determined that an MPLS backhaul architecture, centered around the Tellabs 8600 system, would help it achieve all of these goals. Even so, VMS was concerned that its technicians were accustomed to certain maintenance and troubleshooting capabilities inherent in their traditional SDH approach—and that MPLS would not support the same capabilities.

But the Tellabs 8600 system has an important feature that helped address these concerns: It supports packet loop testing so that even when it's using MPLS circuits for transport, VMS technicians still can measure the circuit performance of these packet-oriented circuits.

"If there were a problem, this capability would help us identify the problem conveniently and easily so that it could be solved quickly," Nguyen said.

### Early Efficiency

VMS chose a network architecture that uses Tellabs 8600 systems installed at 2 types of key anchor points in its backhaul network: Hub Site and RNC Site locales.



*Vietnam's aged wireline infrastructure can't keep up with its population of more than 87 million.*

At the Hub Site locales, some Tellabs 8600 network elements aggregate traffic from multiple Node Bs. Typically, the Hub Site-located Tellabs 8600 is connected via a leased Fast Ethernet circuit to a second Tellabs 8600 installed next to an RNC.

In other parts of the network, SDH microwave radios connect Hub Site and RNC Site locales. In both scenarios, the Tellabs 8600s use MPLS to communicate with each other.

In Phase 1 of VMS's 3G network deployment, IP datagrams handle data traffic, while ATM cells carry delay-sensitive voice and control plane traffic over the MPLS links using Pseudowire (PWE3) emulation. The Tellabs 8600 also supports ATM IMA, enabling early termination of ATM IMA links, from the Node Bs, at the Hub Site locales.

The ATM cells are then extracted and encapsulated as MPLS-based Pseudowire circuits and transported over a packet-based transmission. This approach enables early packetization of the backhaul network, thus allows statistical multiplexing to happen closer to the access network.

With this design, network transport efficiency is experienced as early as possible in the traffic's journey. The PWE3 technology will also play an important role when 2G traffic, based on the TDM framing format, is moved onto the new backhaul network in Phase 2.

"The Tellabs 8600 Multiservice Routers at the Hub Site and RNC Site locales work as a pair to enable legacy traffic and interfaces to be transparently transported over a MPLS-based packet network infrastructure," said Richard Jung, Tellabs strategic business development manager for Vietnam.

The platform's ability to support both IP and ATM traffic aggregation was an important reason why VMS chose Tellabs. Edge network devices from some other manufacturers are not able to support both traffic types and instead require two separate pieces of equipment.

But as Nguyen explained, "The Tellabs product is more attractive because it combines both ATM and IP packet processing in one box, which saves CapEx and OpEx."

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#### **Fast Savings**

The Tellabs 8600 also eliminates the need to lease expensive SDH circuits to support high-bandwidth, best-effort, Internet-bound mobile traffic, resulting in additional cost savings. For handling such traffic, the Fast Ethernet circuits are more economical on a cost-per-bit basis than the SDH circuits that VMS is phasing out.

Fast Ethernet also uses bandwidth more efficiently because unlike SDH, it supports statistical multiplexing, eliminating the need to "nail the bandwidth" of the transmission link like PDH/SDH circuits usually do.

"If you lease SDH circuits and groom them using SDH, there is no multiplexing gain to talk about when using this method to transport best effort user traffic," Jung said. "You

will burn a lot of bandwidth, and be forced to use the high QoS that is inherent on these leased lines, to transport the datagram traffic that is based on best-effort QoS classes. This is both wasteful and inefficient.”

Tellabs also maximized the VMS backhaul network’s efficiency with a network architecture that uses a single Tellabs 8600 at the RNC Site locale to connect to multiple co-located RNCs. This design enables a higher speed interface, such as STM-1, between these RNCs and the RNC Site-based Tellabs 8600, while the lower speed E1 connections are terminated early in the Hub Site locale Tellabs 8600 node.

This approach enables VMS to increase the number of Node Bs that can be terminated and controlled per RNC, instead of having each RNC terminated to the Node Bs directly with native E1 interfaces. Those E1 interfaces usually are a limited and expensive resource.

Apart from using more cost-effective, packet-based leased circuits, VMS also wanted to be able to continue to use as much of the company’s existing microwave backhaul infrastructure as possible. The solution was to use groups of microwave radios to create an SDH ring between the Tellabs 8600 anchor points at the Hub Site and RNC Site locations and to run MPLS over this SDH infrastructure.

“It enables VMS to re-use their SDH infrastructure as a packet-based network,” Jung said.

This approach provides the best of both worlds: The packet-based MPLS network has the resiliency and robustness of a SDH network, yet it enables the efficient transport of packet-based datagram traffic.

### Phasing Out ATM

Beginning in 2012 or 2013, VMS plans to make its 3G backhaul network even more efficient by enabling it to carry delay-sensitive voice and control plane traffic in IP format rather than using ATM.

In order to support this traffic, the backhaul network must be able to support packet synchronization technologies. Initially the Tellabs 8600 at the Hub Site location will provide synchronization to each Node B over the E1 connection to the Node B.

Eventually VMS may use packet synchronization techniques such as Synchronous Ethernet or IEEE 1588v2 Precision Timing Protocol over the Ethernet connections between each

Node B and the Hub Site-based Tellabs 8600. There, the RNC performs a phase or frequency time synchronization over the packet based with the Node B base stations.

VMS also considered how 4G would impact the 3G backhaul network. In 4G networks, unlike previous generations, individual BTSs can communicate with one another, rather than communicating only with the RNC. This capability requires the backhaul network to support multipoint IP-VPN, a feature the Tellabs 8600 includes.

### At Least 30% Backhaul Savings

Nokia Siemens Networks was chosen for the VMS 3G contract in 2009 and integrated the Tellabs 8600 system for the mobile backhaul deployment. Several segments of the network have been operational since late that year, with additional segments going live on a regular basis.

The carrier expects to have the deployment completed by 2011.

VMS plans to move traffic from its 2G network onto the new backhaul infrastructure in its 2010 3G expansion.

Nguyen estimated that using the Tellabs 8600 has saved at least 30% in the costs paid to its wholesale network provider for connectivity.

“Instead of using TDM and separate Ethernet circuits, we can aggregate all that traffic onto one transmission link,” Nguyen said.

Overall savings undoubtedly are even greater when the savings created by the multiplexing gain and the ability to control more Node Bs per RNC are factored in.

Nguyen is confident that the Tellabs platform will support a smooth transition when the company moves voice and control plane traffic onto IP and when VMS deploys 4G.

“We are happy with the product and the technology and the support we have received from Tellabs,” Nguyen said. ■



VMS Mobifone is excited about modernizing its network to 3G and implementing an IP backbone to handle the expected growth.

**2G:** Second Generation

**3G:** Third Generation

**4G:** Fourth Generation

**ATM:** Asynchronous Transfer Mode

**BTS:** Base Transceiver Station

**CapEx:** Capital Expenses

**IMA:** Inverse Multiplexing over ATM

**IP:** Internet Protocol

**MPLS:** Multiprotocol Label Switching

**OpEx:** Operating Expenses

**PDH:** Plesiochronous Digital Hierarchy

**QoS:** Quality of Service

**RNC:** Radio Network Controller

**SDH:** Synchronous Digital Hierarchy

**TDM:** Time-Division Multiplexing

**UMTS:** Universal Mobile Telecommunications System

**VPN:** Virtual Private Network