



LEADING KENYA OPERATOR MIGRATES FROM TDM TO HYBRID MICROWAVE, EYES ALL IP

SAFARICOM

CHALLENGE

Safaricom, the leading mobile operator in Kenya, East Africa, has been in business since 2000. Then owned by the Kenya government, it started as an analog mobile phone network. It's now a fully independent, publicly traded mobile operator. Over time as it transitioned technologies, it accumulated legacy TDM equipment. But with growing 3G HSDPA and WiMAX businesses, Safaricom had to enable more Ethernet capacity for 3G and WiMAX data while leveraging its TDM base for 2G/3G voice. It needed a hybrid microwave backhaul to extend its TDM investment and allow it flexibility for Ethernet data expansion.

SOLUTION

As incumbent vendor in Safaricom's western network, Aviat Networks knew its TDM equipment end to end. Whereas Ethernet-to-E1 converters had been used to accommodate WiMAX data on the network edge to make room for packet traffic and reserve E1s for 2G/3G voice/data traffic, Eclipse Packet Node hybrid radios now carry both forms of traffic natively. Also, 3G data is now carried as Ethernet freeing E1s for voice. The platform scales with data traffic, which had been going up faster than backhaul capacity. Not only is Safaricom ready for migration to 4G/all IP but it also has already partially migrated its 3G to all IP.



"Our strategy is to continually invest in all areas of our network and deliver on our customer needs. Democratizing data and the mobile Internet to bridge the Digital Divide has delivered strong growth. The investment in data services—principally 3G, fiber, WiMAX and microwave—saw the number of mobile data customers increase by over 85 percent to 4.9 million in 2011."

Bob Collymore

CEO
Safaricom

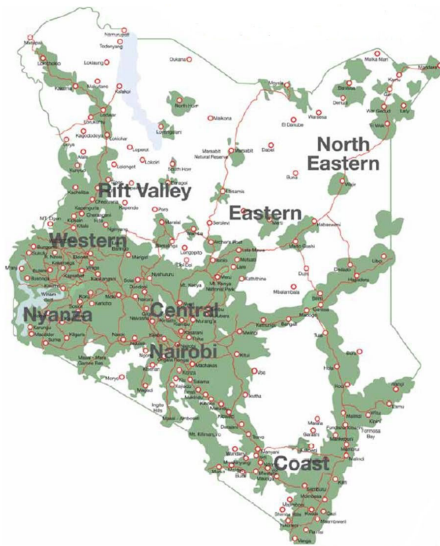
HYBRID RADIO OFFERS ETHERNET FOR DATA, E1S FOR VOICE

Safaricom is the long-time mobile leader in Kenya and still growing. Subscribers were up 9 percent in 2011 to 17.2 million. Moreover, 3G customers increased over 85 percent to 4.9 million. These 3G subscribers are exploding data traffic. Also, WiMAX subscribers are increasing 4G data traffic at an exponential rate. Those caused problems as data traffic was outstripping legacy backhaul capacity. Plus, voice traffic capacity had to be protected. "There was a drastic increase in uptake of 3G/WiMAX data services. This was straining the traditional TDM transmission systems due to inefficiency of the Ethernet-to-E1 converters that enabled Ethernet to be transported over E1s," says Jared Onyimbo, Safaricom's Principal Transmission Planning Engineer. "A hybrid platform that transports Ethernet and TDM traffic natively was the perfect solution to these conversion inefficiencies."

MODULAR ECLIPSE GIVES FLEXIBLE ETHERNET CAPACITY

With Aviat Networks' ProVision network monitoring software, Portal element manager and Eclipse Packet Node Gigabit Ethernet switching, engineers were able to provision sufficient

Ethernet channels while doing overbooking. Ethernet channels were established while policing different QoS levels to support Safaricom's growing and diverse 3G and WiMAX data customers as well as different SLAs for its classified customers and traffic, while setting aside sufficient E1 capacity for voice traffic. Thanks to the end-to-end service auto creation capability, engineers easily provisioned service over many hops. Ethernet channels were created, and the performance of these channels was monitored using the Performance Data tool within Portal. Aviat Networks enabled the elimination of Ethernet-to-E1 converters and other equipment from the radio sites as well as made network management easier because only one element



As can be seen from Safaricom's coverage map of Kenya, its western network is more dense and contiguous than other parts of the network. In this part of the network, the operator is relying fully on Eclipse Packet Node to optimize its Ethernet data traffic and preserve E1 capacity for voice.

T/Rs. They're flexibly modular to ease upgrades to higher capacity Ethernet services as data traffic rises. Eclipse Packet Node provides Safaricom with up to 200Mbps capacity. Software upgrades can raise that to 400 Mbps.

SYNC REQUIREMENTS FOR THE FUTURE

With plans to migrate to all IP on the Eclipse Packet Node platform in its backhaul, Safaricom is committed to Synchronous Ethernet (Sync E) as its primary timing method of the future. Where Sync E is not used, the IEEE 1588v2 timing standard will be employed. The modular nature of Eclipse Packet Node supports both and allows for a uniform spares program in Safaricom's network. This will ease spares stocking and replacement in the field, as necessary for maintenance and upgrades.

Safaricom can enable Sync E and IEEE 1588v2 when it feels ready to make the transition to all IP. A simple software license activation will provide the necessary synchronization capabilities for Safaricom's all IP backhaul without new hardware.

in the form of the modular Eclipse Packet Node platform is used to transport Ethernet.

"Eclipse Packet Node allows us to make progress toward Ethernet migration without future network upgrades," says Thibaud Rerolle, Technical/IT Director of Safaricom. "It assisted us in taking our first network evolutionary step from TDM to hybrid and then eventually to all-IP without requiring external Ethernet switches. All our western mobile network sites that carry 3G or WiMAX data traffic will use Eclipse for transport, easing integration of E1s and Ethernet."

Since 2009, Safaricom has bought over 2000 Eclipse Packet Node



Thibaud Rerolle, Technical/IT Director of Safaricom, is leading the mobile operator's push into 3G and WiMAX data coverage, which Aviat Networks' Eclipse Packet Node platform helps enable.

ECLIPSE PACKET NODE ENABLES SAFARICOM TO EXTEND COVERAGE

Safaricom has experienced firsthand the leap from snail-paced 80Kbps first generation (1G) cellular phone technology to superfast 21Mbps third generation (3G) smartphones.

"In essence, a 3G network is a data network that supports voice," says Thibaud Rerolle, Technical/IT Director of Safaricom. "When browsing the Internet, you download more data than you upload. But 2G networks are symmetrical, striking a balance between downloads and uploads: speeds are not optimal. However, 3G networks are asymmetrical in how they allocate resources and skew in favor of downloading."

Safaricom started with a 3.5G High Speed Downlink Packet Access (HSDPA) data network in 2007 and added 4G WiMAX in 2009. The rollout began in urban areas such as Nairobi and spread to outlying districts, building demand for data.

So Safaricom is now deploying the Eclipse Packet Node platform throughout its network to meet that demand. Eclipse Packet Node will add data capacity in native IP/Ethernet and preserve native TDM/E1 capacity for voice traffic in a hybrid configuration. "Other than fiber, only microwave can sate our mobile network's thirst for backhaul capacity," Rerolle says.

NETWORK ON THE EDGE

Based on its TDM network's history, Safaricom executed a straightforward strategy of adding capacity: new wireless transmission equipment would be deployed to the backhaul backbone and legacy equipment would be moved to the edge of the network. While this worked sufficiently well for a virtually all-voice, low-data traffic wireless backhaul, the strategy does not scale in the era of skyrocketing data rates as uptake of 3G and WiMAX data consumption outstrips backhaul capacity. Ethernet-to-E1 converters could not scale the backhaul capacity to keep up with demand.

But with Eclipse Packet Node, Ethernet capacity is scalable with demand and carried in native format. And E1 capacity is preserved; also carried in native format, providing a seamless step in Safaricom's network evolution from TDM to hybrid backhaul as well as clearing the operator's roadmap for future evolution to all IP backhaul.



Safaricom is migrating its TDM mobile backhaul sites, such as Lewa, Kenya, (above) to the Eclipse Packet Node hybrid microwave radio platform to support 3G and WiMAX data growth on Ethernet while preserving sufficient E1 capacity for 2G and 3G voice.



Aviat Networks' Eclipse Packet Node microwave radio platform enables Safaricom to migrate from TDM to a hybrid backhaul with a roadmap to eventual all IP backhaul.

ECLIPSE MICROWAVE BACKHAUL

Eclipse Packet Node, the leading platform for microwave backhaul, has proven itself in a variety of rollouts the world over. This includes making smooth Safaricom's migration from legacy TDM to hybrid backhaul with a future roadmap to all IP. Also, Eclipse Packet Node delivers high-performance Carrier Ethernet by:

- Enabling consistent Carrier Ethernet services to be extended from the core to the access
- Removing barriers between fiber and microwave interworking
- Supporting efficient end-to-end Carrier Ethernet networks across access, aggregation and core
- Delivering lower total cost of ownership

IP BRIDGE TO THE FUTURE

With Safaricom's transition from TDM networking to a hybrid microwave radio backhaul, its next move is to bridge the gap to an all-Ethernet/IP backhaul of the future. Using ProVision, Aviat Networks' carrier-class element management system, to manage Ethernet capacity, Safaricom will proceed to this stage with an upcoming upgrade and new Maintenance Level Agreement (MLA). "To establish network utilization baselines on Safaricom's backhaul, network designers will use Ethernet performance monitoring/analysis tools in ProVision," says Aggrey Sang, pre-sales network engineer, Aviat Networks. "As Safaricom continues to transition from TDM to hybrid then to all IP backhaul, ProVision monitoring will minimize user disruption, enabling side-by-side management of legacy and next-generation services."

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