



## ***Telstra Scales Up***

Australia's largest operator beefs up its aggregation network with the Tellabs SmartCore® 9200 Series

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- > Mobile Backhaul Sync Options
- > Ensuring a Great User Experience
- > The Next-Generation Central Office
- > Upload: Mobile Video Revenue Set to Soar



***“We’ll put the latest generation of the Tellabs platform into our network and use it to drive the most flexibility and lowest cost moving forward.”***

— Mike Wright, Telstra executive director for networks and access technologies

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# leading edge

## *Can you afford to be blind to the apps in your network?*

***Thanks to the mobile Internet revolution, change is zipping through our industry faster than a bullet train. We all want to boost network performance, ensure a good user experience and improve business results. The catch is: trying to do all that with blinders on.***

We see blind spots around critical questions: Which applications are networks carrying? What are users really experiencing? Are we ready for future requirements?

Mike Wright, Telstra's executive director for networks and access technologies, sums up the situation: "We need to understand how the network is used." By adding the new Tellabs SmartCore® 9200 Series to its next-gen network, Telstra is gaining applications awareness, OA&M beyond Layer 3, the lowest cost-per-bit and maximum flexibility for the future (page 8).

Our new Tellabs SmartCore 9200 series is all about making networks—including converged and mobile networks—smarter and simpler. It gives you visibility to apps, ways to make money on over-the-top traffic, and built-in flexibility to meet emerging requirements (page 11).

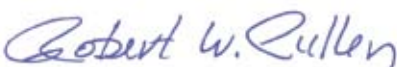
Customers want a deep understanding of the user experience, and the means to correlate it with network performance. Our new Tellabs Insight Analytics<sup>SM</sup> services provide end-to-end analytics, integrate data from many sources across the network, and help you see clearly what's going on in networks and with users (page 6).

As mobile carriers migrate to packet networks, synchronization can be a stumbling block. Rather than keep legacy equipment just for synchronization, Tellabs® 8600 Managed Edge System customers are simplifying their networks and synching up with the new IEEE 1588v2 standard (page 13).

As our industry hurtles forward to realize the full potential of the mobile Internet, smarter and simpler networks are the key. That's why we're investing 25% of Tellabs' revenue to design the best next-gen product portfolio for the smart mobile Internet. We're backing up this portfolio with some of the industry's best sales, service and tech support people, so we can take good care of you.

We're ready to help you answer the critical questions, and help you succeed with users, networks and your business.

Sincerely,



Rob Pullen  
President and CEO



***“Our new Tellabs SmartCore 9200 series is all about making networks—including converged and mobile networks—smarter and simpler.”***

— Robert Pullen, President and CEO, Tellabs

### Tellabs on Track to Reduce Carbon Footprint 20% by 2013

Throughout 2011, *Insight* profiled service providers that are reducing energy consumption to benefit the environment, their customers and their bottom lines. That's not the only reason it's a familiar story at Tellabs. Since 2008, the company has reduced its carbon footprint 13%, the equivalent of taking 1,000 cars off the road.

Three years ago, Tellabs began participating in the Carbon Disclosure Project (CDP), the world's largest database of corporate greenhouse gas emissions. The CDP provides methodology to ensure that all participants measure their emissions the same way.

Tellabs' CDP reports include the company's major international offices in countries such as China and Finland. In early 2010, the Finland offices switched to electricity produced by hydropower, which Tellabs predicted would reduce carbon emissions by almost 2,100 metric tons in the first year.

The switch to hydropower is a major reason why Tellabs' global carbon footprint shrank 5% over the past year. By 2013, Tellabs expects to reduce emissions 20% per employee compared with 2008. Those kinds of goals and results are among the reasons why the Maplecroft Climate Change Innovation Index, FTSE4Good and 8 FTSE KLD indexes consider Tellabs a responsible investment.

To see Tellabs' CDP reports for 2008 through 2011, visit [www.tellabs.com/about/reports.shtml](http://www.tellabs.com/about/reports.shtml). And to learn how operators such as Bharti-Infratel, Comcast, Verizon Wireless and Vodafone save energy, check out the 2011 editions of *Insight* at [www.tellabs.com/news/insight](http://www.tellabs.com/news/insight). ■

*The earthquake and tsunami that struck Japan in March disrupted telecom services throughout the country.* To

help its longtime customer NTT Communications recover quickly, Tellabs provided replacements for 11 Tellabs® 8800 Multiservice Router 10GE modules damaged in the disaster.

In June, NTT Communications' Network Business Division hand-delivered a letter expressing the company's thanks for the quick response. "Tellabs has made a significant contribution to NTTCom and our network service by promptly sending replacements," wrote Yukio Ito, vice president and executive manager of NTT Communications' Network Business Division. "NTTCom would like to show deep appreciation to Tellabs for giving the highest priority and quick action to this issue."

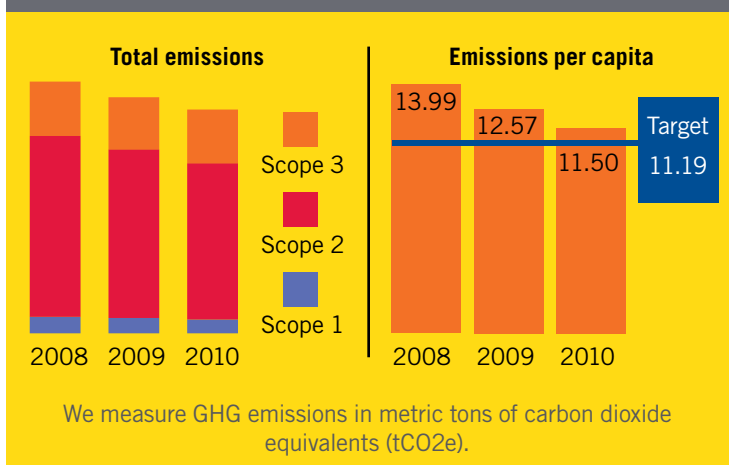
NTT Communications has been a Tellabs customer since 2003, when it began using the Tellabs 8800 Multiservice Router 10GE modules to support its IP/MPLS network with Ethernet service delivery. (For an in-depth look at NTT Communications' IP/MPLS strategy, visit [www.tellabs.com/insight](http://www.tellabs.com/insight) and check out "NTT Com Looks to Blaze New Trails" in the March 2009 issue.)

"We are glad that we could help our Japanese customers," said Michael Stephens, Tellabs director for customer service in the Asia-Pacific region. "The earthquake and tsunami have taken many lives and destroyed a substantial amount of infrastructure there. We wanted to help them restore services and help get the business back on its feet." ■



### TELLABS GREENHOUSE GAS EMISSIONS

Additional details are available in Tellabs' responses to Carbon Disclosure Project



VISIT TELLABS  
AT THESE  
UPCOMING  
EVENTS

**4G WORLD**

October 24-27, 2011  
Tellabs Meeting Room  
McCormick Place  
Chicago

**AFRICACOM 2011**

November 9-10  
Stand C20  
Cape Town Convention Centre  
Cape Town, South Africa

**CARRIER ETHERNET WORLD APAC**

November 30-December 2, 2011  
Stand T  
Resorts World Sentosa  
Singapore

## Mobile Video Call Revenue to Top \$1 Billion and 9 Petabytes by 2015

**Germany's Reichspost launched the world's first public videophone service in 1936.** It took another 70 or so years for videoconferencing and Skype to become mainstream services.

By comparison, mobile video calling looks like an overnight phenomenon. Nearly 1 in 10 mobile users worldwide—roughly 130 million people—will make video calls by 2016, according to a recent Juniper Research report.

Other analyst firms have a similar outlook. In-Stat, for example, expects mobile video calling to generate \$1 billion in revenue by 2015. In-Stat also predicts that:

- Between 2010 and 2015, the number of mobile video callers will increase at a compound annual growth rate of 115%.
- People in Asia-Pacific will use more than half of the world's mobile video calling minutes.
- In North America, mobile video calls will add up to 9 petabytes of traffic by 2015.

For mobile operators, video calling is both an opportunity and a challenge. It's a new revenue stream that can help offset flat or declining voice revenue. But video calling also is among the reasons why operators are migrating to Ethernet backhaul both to accommodate the additional traffic and reduce transport costs.

Operators also are dealing with the challenge by deploying platforms that provide more control over bandwidth-intensive, delay-sensitive traffic such as video calls. For some examples, visit [www.tellabs.com/news/insight](http://www.tellabs.com/news/insight) and check out "Mobile Operators Take Charge" in the Q3 2011 *Insight*. ■



## Personalized Plans Key to Mobile Data Profitability, Gartner Says

**Mobile data revenue will total nearly \$315 billion this year, a 22.5% increase from 2010, according to a recent Gartner report.** By 2015, annual revenue will hit \$552 billion. The catch? To profit from that trend, mobile operators must create rate plans that are flexible, personalized and user-friendly.

"Carriers should focus on increasing the level of clarity and the transparency of their mobile data contracts in order to make the majority of customers feel more at ease in using data services," said Jessica Ekholm, Gartner principal research analyst.

For example, Gartner recommends that operators consider tiered pricing, à la carte and use-based plans. The firm also suggests add-on pricing models, such as allowing users to sign up for data service when they need it or buy higher speeds when they require bandwidth-intensive services.

New pricing strategies are key for accommodating another trend: Data volumes and users will continue to increase over the next several years, but data revenue will grow at a much slower rate, Gartner says.

"This is causing a decoupling between revenue and data traffic, and it is also creating an increase in network costs for carriers as they try to sustain growing data traffic," Ekholm said.

For more insights into the profitability challenge and solutions, visit [www.tellabs.com/news/insight](http://www.tellabs.com/news/insight) and check out "Financial Security" and "The End of Profitability," both in the Q2 2011 *Insight*. ■



**CLOUD COMPUTING CAN  
POWER 5.7 MILLION CARS**

**Enterprises are flocking to cloud computing because it reduces capital expenses while providing access to the latest and greatest technologies.** A recent study quantifies some other benefits. Large U.S. enterprises could reduce their carbon footprint by the equivalent of 200 million barrels of oil annually. That's enough to run 5.7 million cars for 1 year.

Sponsored by AT&T, the Carbon Disclosure Project study found that enterprises plan to increase their cloud computing spending from 10% of their current IT budgets to 69% by 2020. In the process, they would reduce their collective energy spending by \$12.3 billion annually by the end of that period. Their carbon dioxide output also would drop by 85.7 million metric tons.

The full study is available at <https://www.cdproject.net/en-US/WhatWeDo/Pages/Cloud-Computing.aspx>.

# What Are Your Customers Really Experiencing?

*If you think monitoring network performance provides an accurate picture of the mobile user experience, think again.*

By M.J. Richter



***Mobile operators know that enough poor experiences will drive their customers into their competitors' arms. That exodus negatively impacts churn and ARPU—2 metrics that analysts and investors watch like hawks—while the sullied brand increases user-acquisition costs.***

But when it comes to managing the user experience, the traditional bottom-up approach of monitoring network performance rarely reaches the customer-experience level. In this traditional environment “the operations guys would analyze the network, the billing people would analyze billing and the customer-service people would analyze performance metrics,” said Becky Watson, principal analyst with Stratecast, a division of Frost & Sullivan.

“I do not believe that operators can actually determine quality of experience unless they have a very robust analytics strategy. What has to happen for quality of experience to be truly realized is bringing all of that together.”

## **Start with the User Experience**

Effectively managing the user experience requires a top-down view. That process starts with the user's actual experience and then drills across and down into every aspect of the network that affects that experience at a user level.

To carry out such a comprehensive inspection of every network aspect, an analytics solution must be based on enterprise analytics rather than integrated real-time analytics.

An operator's engineering and operations groups typically use integrated real-time analytics tools in the areas of policy enforcement, PCRF and security. Because there's little data-storage capacity within that single network element, integrated real-time analytics tools cannot make historical comparisons or perform any trending analyses.

Enterprise analytics, on the other hand, involves the collection of data from multiple elements and backoffice systems across the network. It also includes the correlation of those information sets and their analysis to gain key insights.

### **The ideal end-to-end analytics solution should:**

- Collect information from network elements, probes and back-office systems, feeding the information into a highly scalable analytics platform.
- Correlate those different information sets into unique, repeatable algorithms.
- Apply analytic logic, modeling and mathematics in the form of advanced statistics and business calculus.
- Produce configurable and distributable dashboards, views and reports, all tailored to meet the unique requirements of each business staff group, such as engineering, operations, marketing, customer care and product management, with the intent of providing actionable insights for each audience.

“End-to-end analytics enables you to look at the customer experience, isolate performance anomalies, do root-cause analysis and make the necessary changes to the network,” said Scott Forbes, Tellabs director of professional services. “You know those changes improve the user experience because you can actually measure the improvements.”

“By contrast, the best an operator can do with the traditional network monitoring approach is to focus on the availability and performance of the network, make changes to the network and hope they improve the user experience as a result.”

### Analyze, Then Act

Using new analytics platforms, in conjunction with correlating multiple data sources in a single, centralized system, operators now can capture, monitor and measure every user session leveraging all of the pertinent data points. Although they don't look at the content of what the user is doing, they can see exactly how the session is performing, all the way from the device through the network and out to the Internet. This design balances user concerns about privacy with the operator's need for deep insights.

As a result, operators can take action before users have negative experiences on the network and then call in to complain. Users typically don't complain after 1 bad experience but rather after 4, 5 or 6 bad experiences. By then, they're so frustrated that they often decide they've had enough and switch to another operator.

An advanced analytics solution enables engineers to proactively get ahead of problems instead of reacting to a

***“I do not believe that operators can actually determine quality of experience unless they have a very robust analytics strategy. What has to happen for quality of experience to be truly realized is bringing all of that together.”***

— Becky Watson, principal analyst with *Stratecast*, a division of *Frost & Sullivan*

complaint by adding more capacity or applying some kind of bandage to fix it. By constantly monitoring and measuring the user experience, this solution enables the operator to do a targeted root-cause analysis when the user experience degrades. The operator then can correlate that analysis with the user experience to determine what's affecting that experience and resolve the issue quickly—and before customers call to complain.

For example, if something in the network goes down, legacy analytics tools cannot help the operator determine how many users are affected or whom the affected users are. However, an advanced analytics solution can use its analytical capabilities to answer both questions. It can pull up the MSIDs, which are unique to each mobile customer, correlate

**To help operators isolate any issue affecting the user experience, the analytics solution can identify and correlate:**

- The specific application being used during a good/bad/poor experience.
- The time of day the customers are using it.
- The components of the network that their sessions traversed.
- The websites that customers' applications used and whether they did so directly or via browser-based searches. Likewise, whether the customers were playing games through connections to gaming servers.
- The IP addresses of the websites or gaming servers and, depending on the operator's specified level of granularity, the associated URLs.



them with CRM data and supply relevant demographic data about each affected user.

When the analytics solution determines that some user experiences are degrading, the operator can examine possible reasons and focus on the areas of the network where anomalies are occurring: Is it a network-configuration issue? Is it some type of problem with those users' mobile devices? Or is it something else altogether?

The user experience can be rated numerically and then ranked as good, bad or poor. If a user has multiple sessions per day, scores are correlated, providing a mean score for the overall experience. Operators also can store these scores in a

database for tasks such as historical and trending analysis. Based on the user experience data, operators can isolate which part(s) of the network may have degraded the experience and do a targeted root-cause analysis to identify the actual problem.

“Then expert teams can say:

‘You have issue X, and we think this sub-set of users is most likely to churn as a result. You might want to resolve it by doing Y, and here's the business justification for considering the various options available,’ Forbes said. “Through precise root-cause analyses, operators can actually solve underlying network problems to proactively manage the user experience and ultimately reduce churn. This is a direct correlation between user experience and network performance.” ■

**ARPU:** Average Revenue Per User

**CRM:** Customer Relationship Management

**MSID:** Mobile Subscriber Identification

**IP:** Internet Protocol

**PCRF:** Policy, Charging and Rules Function

**URL:** Uniform Resource Locator

# Telstra's Transformation

*Australia's largest operator leverages the new Tellabs SmartCore® 9200 Series for its Multi-Service Edge Next Phase project.*

*By Joan Engebretson*



*Mike Wright, Telstra executive director for networks and access technologies*

***Mike Wright has his hands full. As Telstra's executive director for networks and access technologies, he's in charge of the Australian operator's latest ambitious project: double network capacity, introduce a next-generation content routing platform and reduce network costs through upgrades to its aggregation network.***

"The network is largely about maintaining network scale and managing growth, as well as taking evolutionary steps to improve reliability, enhance efficiency and expand services," Wright said.

A critical element of this plan is a new edge router, the Tellabs SmartCore® 9200 Series, which Telstra plans to deploy in 2012. Telstra also will deploy a new universal line card, a new Ethernet and IP line card and a new switch and controller card for the Tellabs® 8800 Multiservice Router Series (MSR), which Telstra has used since 2005.

Currently under development, the Tellabs SmartCore 9200 series is a high-performance IP and Ethernet platform capable of scaling to 1 Tbps per slot and 11 Tbps per chassis, offering ample support for future network expansion.

"The Tellabs SmartCore 9200 series really builds on the success of the Tellabs 8800 MSR series as a carrier-class edge routing platform, supporting IP/MPLS and Ethernet in a highly scalable solution with industry-leading capacity and application-oriented routing," said Tim Doiron, director of product management for the Tellabs IP and Mobile Internet group.

## **New Year, Twice the Traffic**

Over the past several years, Telstra has consolidated more and more traffic onto an MPLS and IP core. To support that evolution, Telstra deployed the Tellabs 8800 MSR series in a large portion of its network. Telstra has deployed nearly 300 Tellabs 8800 MSR series nodes and plans to add more over the next 18 months.

Telstra initially moved Frame Relay and ATM traffic onto its Tellabs 8800 MSR-based MPLS network, leveraging the Tellabs 8800 MSR's unique ATM PNNI-to-Ethernet interworking functions. Later the operator moved traffic from residential broadband customers onto the MPLS network, as well. This

network also supports Ethernet services and mobile backhaul.

Traffic on Telstra's aggregation network has been growing dramatically. For example, the residential broadband portion doubles every 12 months.

"We want to make sure we can continue to support strong traffic growth," said Arturo Cacace, technology manager for Telstra's Ethernet infrastructure and services. "We would like to expand our service offerings, enhance network reliability and efficiency and minimize costs."

Those requirements are driving Telstra's newest upgrade, known internally as Multi-Service Edge (MSE) Next Phase, which aims to further enhance the carrier's aggregation network according to a 2-phase plan.

The first phase, known as MSE Gen 2, is already underway and scheduled for completion in early 2012. In MSE Gen 2, Telstra is introducing 3 new cards to the Tellabs 8800 MSR series that will double network capacity, improve reliability, significantly reduce cost per bit and add new capabilities for Ethernet service delivery.

In the second phase, scheduled to begin in mid-2012, Telstra will deploy the Tellabs SmartCore 9200 series, which expands on the capabilities of the Tellabs 8800 MSR series.

"We plan to use the Tellabs SmartCore 9200 series to provide additional scalability, reliability and network efficiencies, ultimately reducing network costs," said David Robertson, Telstra director for transport and routing engineering. "In addition, the Tellabs SmartCore 9200 series can provide a platform for next-generation services."

### Change is in the Cards

The Tellabs 8800 MSR series nodes, which are part of Telstra's MPLS-based aggregation network, are today equipped with the Tellabs universal line card (ULC-2).

Telstra now plans to upgrade trunks and spares to the ULC-3, a next-generation universal line card that has a revised ASIC, a faster CPU and more RAM. Telstra expects the ULC-3 to improve performance and increase network reliability.

"By using the latest platform, we get better scale and reliability and lower unit cost," Wright said.

Telstra also plans to upgrade the switch and controller card (SCC-1) that is currently deployed in the Tellabs 8800 MSR series to a next-generation version of the card, the SCC-2. That upgrade will more than double chassis capacity, from 120 GB to 288 GB. Slot capacity and Ethernet port density will double, as well.

"Instead of the traditional hard disk drive, the SCC-2 uses solid-state storage," said Andrew Roberts, a sales support engineer for Tellabs who has been closely involved in Telstra's network upgrade plans. "That is one of the several design updates on SCC-2 that enhance network reliability."

The third new line card that Telstra will deploy is the Ethernet line card (ELC), which the carrier will use to support business Ethernet services. The new ELC is a more optimized way to deliver Ethernet with a higher density and lower price per port.

The move to the ELC at this time makes sense for Telstra because of the strong growth the carrier is seeing in Ethernet services. "If you look at our growth statistics, the real explosion is in Ethernet, DSL and wireless," Wright said. Using the ELC is a good move because the product

represents "the latest generation technology with lower power consumption and lower unit cost."

### Better Awareness, Enhanced Reliability

Besides providing ample room for growth, the Tellabs SmartCore 9200 series also gives Telstra some powerful new tools.

"The Tellabs SmartCore 9200 series incorporates application awareness and OA&M capabilities beyond Layer 3 to help service providers understand what user applications drive their network,"

Doiron said. "Those insights enable them to both design accordingly and offer new revenue-generating opportunities."

Another capability of the Tellabs SmartCore 9200 series is built-in support for a 3G and LTE packet core. Although Telstra has no plans to adopt a packet core architecture immediately, the carrier likes the fact that the Tellabs SmartCore 9200 series will enable it to easily add that capability in the future.

The Tellabs SmartCore 9200 series also has several features aimed at enhancing reliability, including solid-state storage, the new Tellabs GeniOSTM carrier-grade operating system and a redesigned software architecture.

"We're always looking for the right time and opportunity to move to the next greater scale solution," Wright said. A key driver of the planned deployment, Wright said, is "to put the latest generation of the Tellabs platform into our network and use it to drive the most flexibility and lowest cost moving forward."

The Tellabs SmartCore 9200 series "has a lot of optional features to build future products on," Wright said. A content and security engine can provide the ability to "better understand how different customers are using the network

***"We plan to use the Tellabs SmartCore 9200 series to provide additional scalability, reliability and network efficiencies, ultimately reducing network costs. In addition, the Tellabs SmartCore 9200 series can provide a platform for next-generation services."***

— David Robertson, Telstra director for transport and routing engineering



The Telstra team: David Robertson, director for transport and routing; Mark Latham, senior technology specialist; Arturo Cacace, technology manager.

and over time, offer different service levels for different applications.” This functionality is built directly into the Tellabs SmartCore 9200 series’ line cards, enabling content inspection directly on line cards interfacing the network and making efficient use of precious chassis ports.

To develop those services, “we want to understand how the network is used,” Wright said. By enabling operators to maintain and analyze aggregate data about the types of applications that customers are using, application awareness can help gain that understanding.

Initially Telstra plans to deploy the Tellabs SmartCore 9200 series in “high-density parts of the network, where scale is needed or where we are looking to drive new services, such as DPI-based services,” Wright said. “We will continue to use the Tellabs 8800 MSR series in areas where Ethernet growth requirements are not as explosive.”

### Familiarity Breeds Content

Despite all of these upgrades, managing the new equipment should require minimal new training or procedures. That’s because Telstra will be able to manage its Tellabs network with a single, unified network manager for both the Tellabs SmartCore 9200 series and the Tellabs 8800 MSR series.

“We look at a lot of equipment from a lot of vendors,” Wright said. “One of the biggest factors we take into account as an operator is to maintain continuity in IT systems. Tellabs’

***“We want to make sure we can continue to support strong traffic growth. We also want to expand our service offerings, enhance network reliability and efficiency and minimize costs.”***

— Arturo Cacace, Telstra technology manager, Ethernet infrastructure and services

manager makes integration easier and the decision to upgrade easier as well.”

That continuity includes some familiar faces. The Tellabs Global Services team has supported several other major Telstra projects, including its Next IPTM network. (For more information about Next IP, visit [www.tellabs.com/insight](http://www.tellabs.com/insight) and check out “Another Step for Telstra’s Next IP Rollout” in the Q3 2011 *Insight*.) That relationship continues with the MSE Gen

2 program and the Tellabs SmartCore 9200 series rollout.

“By working closely with Tellabs Global Services, we can get the most out of the platform,” Wright said. “We benefit from having their experts working with us.”

A team of Tellabs Global Services personnel is focused 100% on Telstra and even have desks located in Telstra offices. This close collaboration helps Tellabs in mapping out the direction of future products, Wright said. By working closely with Tellabs Global Services on an ongoing basis, Wright said Telstra has “direct input into where the partnership is going and a direct feed into the product area at Tellabs.” ■

**3G:** Third Generation

**ASIC:** Application-Specific Integrated Circuit

**ATM:** Asynchronous Transfer Mode

**CPU:** Central Processing Unit

**DSL:** Digital Subscriber Line

**IP:** Internet Protocol

**LTE:** Long-Term Evolution

**MPLS:** Multiprotocol Label Switching

**OA&M:** Operations, Administration and Maintenance

**RAM:** Random Access Memory

**TDM:** Time Division Multiplexing

# Ready for Anything

## ***The new Tellabs SmartCore® 9200 Series enables smarter, simpler networks.***

By M.J. Richter

***When it comes to predicting the future of the mobile Internet and converged Ethernet networks, the only sure bet is that they will keep growing and changing at an ever-faster clip. That constant change means operators must prepare their networks to handle just about anything.***

Operators have stayed on top of the most recent mobile Internet and user trends by deploying solutions for IP/Ethernet and backhaul, the mobile packet core and flatter packet networks. Now they seek products and strategies that will position them to catch the next wave of changes, which likely will include:

- The dominance of multimedia in the traffic mix.
- The rapid expansion of cloud/hosted services and virtualization.
- The movement of billions of users and smart devices onto networks.
- Common services across multiple screens and networks.
- Domination of the marketplace by over-the-top providers.
- The need for massive network scalability—and in multiple dimensions, not just raw capacity.
- New monetization models to bolster operators' long-term success.

To accommodate these coming changes, operators need a new class of network. Those networks must be smart, simple, scalable and adaptable enough to improve both users' quality of experience and operators' profitability.

### **An Evolutionary Path to the Future**

The foundation of that new class of network is the Tellabs SmartCore® 9200 Series, a massively scalable, content-aware routing platform designed to:

- Give operators visibility into their networks.
- Provide secure services.
- Equip the network to predictably deliver any and all kinds of content.
- Enable operators to generate revenues from that content.

The Tellabs SmartCore 9200 series is the most recent addition to the Tellabs portfolio of mobile and metro Ethernet solutions. Featuring the new Tellabs GeniOS™ operating system, the Tellabs SmartCore 9200 series functions initially as an intelligent IP edge router.

Just as important, the Tellabs SmartCore 9200 series' architecture enables networks to keep pace with coming mobile Internet and user developments. For example, by



*Featuring the new Tellabs GeniOS™ operating system, the Tellabs SmartCore 9200 series functions initially as an intelligent IP edge router.*

adding software application modules to the Tellabs SmartCore 9200 series, operators over time can expand their capabilities. These capabilities include content and security engines integrated onto line cards for application awareness, analytics, IPSec security termination and eventually packet core functionality.

“An operator may deploy the Tellabs SmartCore 9200 series as an aggregation Ethernet router today, but what that operator really is deploying is a large toolkit,” said Tim Doiron, Tellabs director of product management. “With it, the operator can infuse the network with so much flexibility that it can adapt to just about anything the mobile Internet throws at it in the years to come.”

### Intelligence for the Future

The Tellabs SmartCore 9200 series features high-density intelligence in the form of SmartCards, as well as distributed routing. Together, these features provide the network visibility and service-optimization capabilities operators need to stay ahead of the fast-changing mobile Internet.

SmartCards are fully swappable among all Tellabs SmartCore 9200 series chassis and include multiple interface options, such as Nx10 Gbps, NxGbE, and Nx100 Gbps. SmartCards eliminate the need for function-specific server blades, spare blades and cards that have no Ethernet interface functionality. They are available in 3 versions:

- SC-1: designed for high-density Ethernet applications.
- SC-2: identical to SC-1 density plus on-board content and security engines for added intelligence capabilities
- SC-3: increased content and security engine processing for applications requiring full-rate or higher density packet inspection.

“By combining traffic management, compute processing and security encryption all on a single card, the SmartCard gives you logical scalability and resource virtualization,” Doiron said. “So if a card has maxed out some dimension of its capacity, it can use another card’s available capacity or intelligence, giving you even greater scalability.”

### 5 Dimensions of Scalability

The SmartCards, together with the new, fully distributed Tellabs GeniOS operating system, enable the Tellabs SmartCore 9200 series to deliver scalability across 5 dimensions: data throughput, control plane, encryption, packet inspection and traffic management. Each of these factors are critical as operators adapt their networks to user



*The Tellabs SmartCore 9200 series is interoperable with existing Tellabs products. It fits neatly into the network to pave an evolutionary path to higher Ethernet density, improved cost-per-bit economics and overall scalability.*

and traffic trends, and maximize user quality of experience and operator profitability.

In terms of bandwidth scalability, the Tellabs SmartCore® 9280 platform is a 10 Tbps-plus chassis in a 16 Rack Unit form factor, while the Tellabs SmartCore® 9240 platform is a more dense 4-slot, 4-Tbps-plus 6 RU chassis.

The platform’s first iteration will deliver 100 Gbps per slot and is designed to scale upwards of 500 Gbps per slot, or 1 Tbps half-duplex as operator demands dictate. Thus, the Tellabs SmartCore 9200 series will provide a 5-fold capacity improvement over time.

A new kind of operating system built for next-generation networks,

Tellabs GeniOS supports multidimensional scalability. It also enables node and network virtualization and features APIs for third-party applications.

The Tellabs SmartCore 9200 series’ ability to ensure optimal network performance stems from its distributed routing, processing and forwarding design. Fully distributed routing “will become more and more valuable to mobile operators as they start targeting the embedded devices space, which will become increasingly dependent on IPv6,” said Patrick Donegan, Heavy Reading senior analyst.

The Tellabs SmartCore 9200 series is also interoperable with existing Tellabs products and is managed by the Tellabs® 8000 Intelligent Network Manager. This interoperability enables the Tellabs SmartCore 9200 series to fit neatly into the network to pave an evolutionary path to higher Ethernet density, improved cost-per-bit economics and overall scalability.

For example, the Tellabs SmartCore 9200 series pairs well with the Tellabs® 7300 Metro Ethernet Switching Series for Layer-2 services and applications. Combined with the newly released Tellabs® 8609 Access Switch, it can serve as a Layer 2/Layer 3 Ethernet- and TDM-based cell-site and access solution.

With that line-up, Tellabs provides not only a full suite of mobile solutions, from the cell site all the way to the core, but also a new class of network that enables operators to support the smart mobile Internet. ■

**API:** Application Programming Interface  
**IP:** Internet Protocol

**IPSec:** Internet Protocol Security  
**TDM:** Time Division Multiplexing

# Time is Money

***As they migrate to packet transport, mobile operators explore synchronization options such as IEEE 1588v2.***

*By Tim Kridel*



***Like the meter in a taxi, the clock signal in a wireless network ultimately is about money. If the base stations lose timing, handovers will fail and calls will drop, costing the operator revenue.***

There's now a new way that timing is money. As mobile operators migrate to packet transport, many of them are leaving TDM infrastructure at each base station simply to provide timing.

"A lot of carriers are keeping an E1 or a DS-1 at the cell site purely for synchronization," said Patrick Donegan, Heavy Reading senior analyst. "That's inefficient. There's a cost associated with that that you need to get out of the network."

And it's a big cost.

"One E1 can cost several hundred Euros per month," said Tuuli Sarvilinna, group product manager for the Tellabs® 8600 Managed Edge System. "If you multiply that by 5,000 or 10,000 base stations, that's a huge amount of money."

## **Why Not GPS?**

At other operators, the E1s/T1s still carry voice and data, but from both a capacity and financial perspective, their

days are numbered. Although those operators know they'll eventually have to switch to packet transport, many are unaware of the sync considerations that come with that migration.

Some operators are considering GPS, which is a mature technology. Its drawbacks include the cost of adding GPS equipment to every base station and the lack of GPS coverage in certain areas, such as inside buildings.

"Reliance on GPS is also a concern for some operators that point to reports of jamming and the U.S. government ownership of GPS," Sarvilinna said.

Fortunately other technologies exist that provide the network-wide clock synchronization necessary for tasks such as handovers. One option is SyncE, which has the Ethernet features of IEEE 802.3 and, thanks to the ITU-T, the synchronization features of SDH/SONET.

The second major option is 1588v2. The IEEE specified 1588v2's protocol suite, including the boundary and transparent clocks. The ITU-T specifies the services available both with and without boundary clocks.

Vodacom is among the operators that currently use GPS but plan to curb further deployment as part of their Ethernet migration.

"Once the access network and core network are based on IP, the 2 options for access are 1588v2 and/or SyncE," said Sean Moss, Vodacom principle specialist. "The main advantage of 1588v2 is it can supply phase and frequency over a packet network and is more cost-effective than GPS at every site."

## **"Any 2 Will Do"**

The number of base stations worldwide using 1588v2 will grow from 48,000 today to 1.3 million by the end of 2015, Heavy Reading predicts. That's an increase from 20% of all Ethernet-fed sites today to 43% by 2015.

"My assumption is that 1588 will go on to be the most widely deployed [solution] over the next few years," Donegan said.

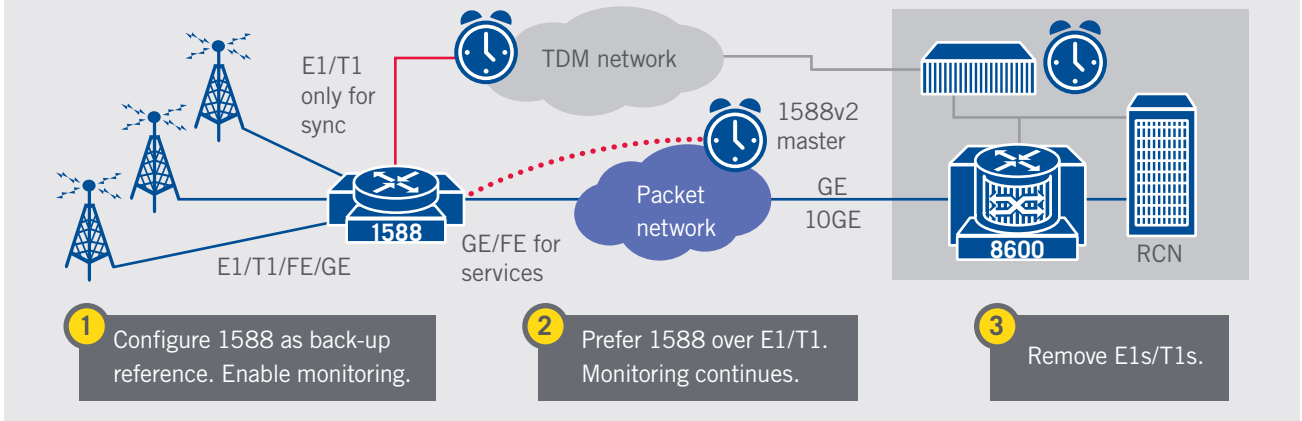
But that's not the same as saying that 1588 eventually will be the only solution.

"A lot of operators will deploy more than one standard," Donegan said. "There is a view amongst many operators that the right philosophy for this transition is 'any 2 will do.' There are circumstances where GPS will work perfectly well, but not deep in buildings. I see pretty strong demand for SyncE, as well."

France Télécom Orange is one example.

"France Télécom Orange is actively investigating SyncE as a first priority and PTPv2/1588 as a second priority," said Sébastien Jobert, Orange expert on network synchronization. "GPS and Galileo may also be considered for specific cases. With a longer term perspective, it is expected that

## FROM E1/T1 TO 1588 IN 3 EASY STEPS.



PTPv2 would also be able to provide accurate phase/time synchronization, possibly combined with SyncE.”

Many operators are waiting for standards work to be finalized before committing.

“Important work is on-going at ITU-T with regards to the definition of PTPv2 telecom profiles,” Jobert said. “This work needs to be finalized to make PTPv2 a mature solution for telecoms applications.”

### No New Hardware Needed

Some mobile operators can implement 1588 immediately and with no new infrastructure. They’re the ones that currently have the Tellabs 8600 system, which has been upgradeable to support 1588 since 2007.

That upgradeability is why Tellabs currently is one of the few vendors with customers running 1588.

“They have live, commercial deployments, and not everybody does,” Donegan said.

To enable 1588, operators simply load the necessary software into their Tellabs 8600 system.

“The operator doesn’t have to purchase any extra boxes to do packet synchronization in the network,” Sarvilinna said. “Everything is integrated, manageable and easily rolled out. We’ve focused on making that migration as painless as possible.”

An operator taking sync from the TDM infrastructure can now use the Tellabs 8600 system’s monitoring features to trial 1588 on the live network without site visits or risk of disturbance. The operator can use the Tellabs® 8000 Intelligent Network Manager to configure, measure and

visualize 1588 performance network-wide and drill down into the detailed TIE plots. Once the 1588 migration is complete, the Tellabs® 8000 Intelligent Network Manager continues to monitor 1588 health using packet metrics and TIE/MTIE measurement on sites with a reference.

“They can monitor it on a large scale for performance issues before actually throwing the switch and having the base stations take the clock from the 1588 client,” said Kenneth Hann, Tellabs principal engineer. “It’s like having built-in measurement equipment on every site.”

### The Right Place at the Right Time

Tellabs started planning 1588 support for products such as the Tellabs® 8605 Access Switch in 2007 while continuing to work with standards bodies such as IEEE and operators to refine the technology.

“In 2002, we discovered that we could use Ethernet to carry timing,” Hann said. “We built that into our products way in advance of any activities in the ITU-T. From about 2006, when the ITU-T adopted SyncE, we’ve been a regular contributor to synchronization topics.”

Today, Tellabs is prepared for LTE Advanced, which most operators likely won’t deploy until late this decade.

“Even though it might be 3 to 5 years before they have to accommodate it in their networks, it will be influencing their purchasing decisions today,” Hann said. “They want to have at least an understanding that the equipment they buy today can be software upgraded to support 1588 phase synchronization, which gives them the accuracy they need for LTE Advanced.” ■

**GPS:** Global Positioning System

**IEEE:** Institute of Electrical and Electronics Engineers

**IP:** Internet Protocol

**ITU-T:** International

Telecommunication Union  
Telecommunication  
Standardization Sector

**LTE:** Long-Term Evolution

**MTIE:** Maximum Time

Interval Error

**PTPv2:** Precision Time Protocol

**SDH:** Synchronous  
Digital Hierarchy

**SONET:** Synchronous

Optical Networking

**SyncE:** Synchronous Ethernet

**TDM:** Time Division Multiplexing

**TIE:** Time Interval Error

# The Next-Generation Central Office



**Service providers worldwide are migrating toward a single network for all services, paired with a new breed of CO.**

By Michael Howard

**Service providers worldwide face big network changes and big challenges. With their massive data centers, Internet content providers such as Google, MSN and Amazon have permanently changed the basic patterns of Internet traffic.**

For example, video traffic growth alone is enough of a challenge. Now add the challenge of unpredictable traffic flows because users access video not just from fixed networks, but from mobile devices anywhere. If operators continue down today's path of just buying more capacity without adding intelligence and making architectural changes, their business models are doomed to unprofitability, their networks will underperform and their customers will churn to rivals with smarter networks.

That's why many service providers are optimizing their networks in 2 major ways:

- Moving toward a single network to support all services: fixed and mobile, private and Internet.
- Developing next-generation central offices, which Infonetics Research calls NG-COs.

Our discussions and surveys with service providers worldwide show that they're considering several architectural options to handle fixed and mobile access, particularly for video. The NG-CO is a location where traffic from both fixed and mobile can be in edge routers. It's a natural point of fixed-mobile convergence. But what's an NG-CO?

Currently, most metro networks have 10s to 100s of COs. Outbound traffic is funneled to a single, large Internet POP—the "super-POP"—that connects to the service provider's

**BRAS:** Broadband Remote Access Server  
**CapEx:** Capital Expenses  
**CDN:** Content Delivery Network  
**FTTN:** Fiber to the Node  
**laaS:** Infrastructure as a Service  
**IP:** Internet Protocol

**OLT:** Optical Line Terminal  
**PaaS:** Platform as a Service  
**PON:** Passive Optical Network  
**POP:** Point of Presence  
**SaaS:** Software as a Service  
**WDM:** Wave Division Multiplexing

inter-city, inter-country network and the Internet. Many functions, such as BRAS, are located in the super-POP.

Operators such as BT have identified a few large COs in a metro—clustered around the super-POP—that will house distributed BRAS and other next-gen network functions, creating NG-COs. In a large metro, there might be 5 to 10 NG-COs that aggregate traffic from the smaller COs and FTTN nodes.

Many operators plan to deploy a variety of infrastructure and services in NG-COs:

- Caching/CDNs to significantly reduce metro, regional and backbone traffic, especially video.
- Adaptive video streaming to ensure an optimal viewing experience on any screen with whatever bandwidth is available.
- Mini data centers to offer cloud services such as IaaS and locate latency-sensitive applications.
- Distributed BRAS and mobile user management at the best point to capture user behavior data to enable intelligent ad.
- Converging fixed and mobile access onto a single aggregation backbone.
- In the future, OLT aggregation points for next-gen access networks such as WDM-PON.

**The NG-CO is a location where traffic from both fixed and mobile can be in edge routers. It's a natural point of fixed-mobile convergence.**

## Cloud-Aware Capabilities

With these functions, NG-COs become part of a distributed, intelligent cloud resource. In their search for new revenue, many service providers—such as Interoute, COLT and GTS in Europe—are expanding their data centers to offer cloud services.

Many operators are considering creating mini data centers in NG-COs to offer PaaS, SaaS and IaaS. This architecture introduces more intelligence into the network in a distributed fashion because content and applications are replicated from originating data centers out to NG-COs. The computing resources can be used for running applications such as rich media and rendering, or latency-sensitive applications such as gaming.

Operators increasingly believe it makes sense to have "cloud-aware" capabilities—that is, mini data centers—in their networks. In this way, carriers believe that NG-COs can become part of a distributed, intelligent cloud resource.

These trends are well under way. One example is Deutsche Telekom's project to reduce the number of COs in Germany from 8,000 to 900. Another example is how most operators are moving toward fewer or a single IP/Ethernet/WDM network. The bottom line: Most operators are planning NG-COs. ■

*Michael Howard is co-founder of Infonetics Research and principal analyst for carrier networks. For more information, visit [www.infonetics.com](http://www.infonetics.com).*

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