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Mobile operators need more cost-efficient backhaul networks to cope with rising data traffic volumes

Russia's largest mobile operator looks to fixed-mobile broadband convergence for competitive edge

Tellabs highlights its expertise in providing cost-efficient solutions for mobile backhaul and optical transport networks

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Today's mobile industry faces an unprecedented set of challenges. Operators face an onslaught of mobile Internet traffic hitting their networks while struggling to keep their costs under control. This is especially evident in Russia where penetration rates of wireless data services are forecast to grow from 24 percent in 2009 to 44 percent by 2015.

Operators must act quickly or risk being overwhelmed by the surging volume of data traffic. The phenomenal popularity of the iPhone offers a stark warning to operators, with recent figures showing that iPhone users on average consume up to seven times more data per month than average wireless subscribers*. This is compounded by the additional problem of managing cost and flattening ARPU rates. By reducing cost structures and managing bandwidth growth effectively, service providers will be better placed to maximize profitability.

Tellabs has commissioned this special edition magazine to support operators as they plan their future network infrastructure strategy during this pivotal phase of the industry.

"Tellabs helps operators accommodate unprecedented traffic growth through innovative backhaul and traffic management solutions whilst also helping control costs and positioning for long-term success. The Tellabs® SmartCore™ platform adds intelligence to mobile networks so that carriers can monetize the mobile Internet. We offer the end-to-end manageability, multi-service capabilities and multiple synchronisation alternatives operators need today" comments Tellabs CEO Robert Pullen. "That's why Tellabs has become a trusted partner to 43 of the world's 50 major service providers. We look forward to supporting the tremendous growth potential existing today in Russia and the CIS region."

Robert W. Pullen,
Tellabs Chief Executive Officer and President

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BACKHAUL TO THE FORE IN RUSSIA

AS 3G IN RUSSIA GETS UNDERWAY, THERE IS GROWING PRESSURE ON MOBILE OPERATORS TO UPGRADE THEIR BACKHAUL NETWORKS

Mobile backhaul has shot up the agenda of operators around the world – and for good reason. As wireless data traffic volumes increase exponentially in many regions around the world, how the mobile backhaul network is provisioned could make or break the mobile data business case.

"Mobile operators don't have any choice but to upgrade their TDM-dominated backhaul networks to more cost-efficient transmission technologies," says Prayerna Raina, a research analyst at Frost & Sullivan, a growth consulting company. "The bigger question is to what technology and at what pace that migration will happen?"

But not all mobile operators are starting from the same point. In Russia, where 3G rollout only started in earnest in 2008, there is an opportunity for mobile operators to leapfrog their western counterparts and transition directly to Ethernet-based backhaul transport. Ethernet is a much more cost-efficient and scalable transmission technology than ATM, which is commonly used for carry 3G data traffic in the access part of the backhaul (between the cell site and the aggregation network).

"Whereas Western European operators have a large installed base of 3G cell sites supporting legacy ATM transport interfaces, Russian operators have an opportunity to deploy Ethernet interfaces at their base stations from day one, and at a much higher proportion of their cell sites," says Patrick Donegan, a senior analyst at Heavy Reading. "They can avoid some of the complexities that the early adopters of 3G are having to wrestle with."

Oleg Larionov, director of the transport network department at MTS Group – the largest mobile operator in Russia and the CIS – says orders have already been placed for 3G base stations equipped with Ethernet interfaces. "We expect to start deployment during Q1 2010," he says. "We're seeing a reduction in capex of between 20-30% with Ethernet and expect around a 40% cut in opex compared with leased line costs."

New strategic thinking required

The attraction of using packet-based transport in the backhaul – which extends from the cell site through to the edge of the network core via the aggregation/metro network – is that it can avoid the congestion problems often seen when using legacy ATM and TDM equipment to handle periods of high data demand. If they are to remain competitive in markets where mobile broadband is taking off, operators will have no choice but to remove these potential bandwidth bottlenecks as cost-efficiently as possible.

"Backhaul needs to be a very strategic investment, because it is absolutely clear that whatever operators do today needs to be scalable," says Raina. "Ethernet is the way to go, because it is scalable; ATM and TDM are not."

Although the demand curve for data traffic is arching upwards in many developed markets, and is set to grow rapidly in big emerging markets like Russia (see sidebar, Backhaul pressure in Russia), revenue is not rising by anyway near the same rate. Mobile operators therefore need to lower as much as possible the incremental cost of delivering more data traffic – in short, to decouple cost and capacity.

"In the early days of mobile internet growth, it looked as if – for a short while – this growth could be managed tactically by adding TDM-based E1/T1 lines," says Ben McCahill, director of mobile strategies at Tellabs, a supplier of mobile backhaul and optical networking solutions. "But mobile internet is a persistent phenomenon. That means a strategic change in the backhaul is required."

ATM and TDM are designed for a service environment where levels of traffic demand are predictable and the cost of provisioning more circuits can be set against a clear idea of how much more revenue the extra booked bandwidth will generate. In the world of 3G data services, there is no such predictability. Surges in demand can come from different cell sites at different times, which can lead to backhaul congestion and deteriorate service performance if using legacy protocols. Legacy equipment can't cater for such a dynamic environment because they reserve bandwidth on the network that can't be shared when needed. That leads to inefficiencies. And aside from the high cost of leased E1/T1 lines, they can also take a long time to provision.

This is why operators from around the world are developing backhaul migration strategies that will lead – eventually – to an all-IP RAN network. By deploying packet-based transmission in the backhaul, operators can take advantage of the capex and opex savings that statistical multiplexing brings. They are also in a better position to provide bandwidth when it is needed, giving them more freedom to launch new services.

Russian migration paths

Any migration path towards Ethernet/IP will, by definition, need to accommodate legacy traffic. In Russia, that migration will necessarily involve the leveraging of existing microwave links. "Microwave radio relay is usually used in distant and difficult to access regions, but fibre-optic is used everywhere else where it is possible, particularly in densely-populated urban areas," says Vitaly Solonin, a senior consultant at J'son & Partners, a Moscow-headquartered research and consulting firm.

"A main issue for us is how to move forward from TDM microwave to packet-level microwave, which requires a massive upgrade," confirms MTS' Larionov. "We will continue to look at using a hybrid type of microwave, which can accommodate both TDM and Ethernet. That will involve upgrading our microwave links to increase capacity so they can support the hybrid approach, along with new packet microwave [technology]."

But what about the optimisation strategy for TDM traffic beyond the access network in the backhaul? Heavy Reading's Patrick Donegan warns that Russian's mobile operators will need to brace themselves. "As 3G starts to be rolled out in volume in Russia, operators will roll out new packet microwave systems," he says, "but that multiservice TDM and Ethernet backhaul environment will still require aggregation and optimisation to ensure that operators' costs don't get out of line with mobile broadband revenues."

MTS' approach is to use psuedowires over IP/MPLS, which can emulate essential TDM and ATM attributes and so enable MTS to achieve statistical multiplexing gains from legacy traffic. "This will create a microwave backhaul solution at the aggregation side of the transport network, which will integrate TDM and Ethernet traffic," says Larionov.

Building out its own extensive fibre-based backhaul network – where it is economically feasible to do so – is the ultimate goal of MTS. Since 2007 MTS has embarked on a programme to cut the ratio of leased lines to self-built lines from 80/20 to 20/80 by 2012. According to Larionov, the operator is on target to achieve that goal. "We need fibre simply because of the higher traffic volumes, particularly as Comstar [a fixed-line operator acquired by MTS] also has WiMAX [a high-speed mobile broadband technology]."

With so many different transmission protocols and mediums to choose from, operators may welcome a flexible approach to backhaul networking – one that allows them to manage upgrades as new transmission technologies come along. Tellabs offers such a possibility. "We offer three so-called managed anchor points in the backhaul," says Tellabs's McCahill. "One located at the cell site, one at the aggregation network and one at the edge of the mobile core. Operators can then change transmission technologies between them when they want, but the managed points remain the same. Using an end-to-end managed Ethernet system, the unit cost for delivering bandwidth can be reduced tenfold."

Frost & Sullivan's Raina says that Tellabs was one of the first major suppliers to offer a managed end-to-end Ethernet system in the backhaul, but she expects more suppliers to come out with their own end-to-end managed Ethernet systems during 2010. "As operators move to upgrade their backhaul, flexibility on the part of their suppliers will be vital," she adds. □

BACKHAUL PRESSURE IN RUSSIA

Russia's mobile operators look like they will need to brace themselves for the perfect storm of higher traffic volumes and lower data tariffs. MTS, Russia's largest mobile operator, expects wireless data traffic volumes in the country to jump from 20,000 terabytes in 2008 to an enormous 384,000 terabytes in 2015 – an 86% CAGR. The wireless data surge, says MTS, will be driven by unlimited internet, pay-as-you-go data services, flat-rate data packages and the proliferation of data usage devices.

Data prices, meanwhile, are already falling sharply. In St Petersburg, where wireless data competition is fiercest in Russia – outdoor 3G services are not expected in Moscow until early 2010 - a price way looks underway. In October 2009, Vimpelcom – Russia's second largest mobile operator – slashed its 3G/HSPA tariff (with a 3GB monthly limit) from RUB675 to RUB195. If Vimpelcom users exceed the 3GB limit, they are cut back from 3.6Mbps maximum download speeds to 64Kbps.

"It's a very tough competitive market, but not just among the big three mobile operators [MTS, Vimpelcom and Megafon]," says Solonin. "In St Petersburg, there is also SkyLink [an EV-DO 3G operator] and Yota [a mobile WiMAX operator]."

Backhaul upgrades will be essential for Russia's mobile operators if they are to remain competitive in this environment.

BACKHAUL CAPEX ON THE RISE WORLDWIDE

According to Frost & Sullivan, the amount of capex allocated on the mobile backhaul segment worldwide was US$7.1 billion during 2008, up from US$6.3 billion during 2007. Frost & Sullivan projects that the mobile backhaul market (access and aggregation) will grow at a 20% CAGR between 2009 and 2015, reaching an annual capex sum of US$24 billion.

Backhaul spending fell in 2009 due to the economic downturn - down to US $6.7 billion from US $7.1 billion in 2008 - but overall the mobile backhaul market remains robust.

"At a 20% CAGR, mobile backhaul gear is growing about as fast as an equipment market can grow," says Prayerna Raina, a research analyst at Frost & Sullivan.

MTS: BROADBAND BUILDING

STRATEGIC NETWORK INVESTMENT IS REQUIRED IF MTS' MOVE INTO FIXED AND MOBILE BROADBAND IS TO BE A LONG-TERM SUCCESS.

By Ken Wieland

MTS is the largest mobile operator in Russia and the CIS with a consolidated subscriber total of nearly 100 million across its footprint. Most of that number – 68.7 million – is based in Russia, its home market, and generates around 80% of group revenues (as of Q2 2009).

With the 2G mobile market now saturated in Russia, MTS is looking to mobile broadband and fixed broadband to drive future growth. Like many other large mobile operators, MTS does not want to limit its operations to the mobile sector only. It wants to become a 'total communications provider', capable of offering fixed, mobile and internet solutions.

MTS made its big push into the fixed-line segment with the purchase of a controlling stake (50.91%) in Comstar – agreed in October 2009 – for the sum of US$1.32 billion. Comstar is a national fixed-line provider with operations in 70 Russian cities and over one million residential broadband subscribers across Russia , 850,000 of which are in Moscow (as of June 2009).

Comstar also owns a 56% stake in MGTS, the Moscow city phone company. MTS aims to have more than a third of MGTS' 3.6 million voice customers connected to broadband by the end of 2011, giving it a 50 per cent share of Moscow's vibrant fixed broadband market. There are no plans to re-brand MGTS as the company is a well established brand name in Russia's capital city.

Comstar – like MTS – is a subsidiary of Sistema, a services conglomerate. By merging the two operations, Sistema shareholders should benefit. MTS estimates that revenue and cost synergies totalling over $200m – at net present value – could be achieved.

Converged concerns

While economics are clearly driving fixed/mobile convergence, MTS cannot afford to jeopardise the performance of its most lucrative service to date – mobile voice – by converging its fixed and mobile businesses onto one packet-based optical platform.

"At the access and aggregation level, we have to combine and integrate different types of traffic, with different requirements, from the respective MTS and Comstar businesses," says Oleg Larionov, director of the transport network department at the MTS Group. "For the mobile voice business, we need reliability and carrier class quality; on the fixed side, a best-effort data service is usually required for broadband access, although there will also be some voice and more IPTV in the future."

Larionov and his team at MTS – with the help of consultants – are planning the architecture design of a converged network. Larionov expects the design work to finish in 2010 (Q1 or Q2).

"As part of our analysis for a network architecture solution, we are looking at which [transmission] standards to use in terms of the first and second level aggregation, the metro level and in the zones [distances between Russia's cities, which can reach up to 2,000km]," adds Larionov. "We are trying to get an idea of the best-case scenario for a next-generation network that can cope with different types of traffic. Ideally, we would like to find universal optical networking equipment that will handle both mobile and fixed services. This will save on capex and opex."

From its optical networking suppliers, Larionov is looking for automatic channel provisioning and optimal management support for multiple nodes with built-in diagnostics features. On the packet (or service) layer, he is weighing up the pros and cons of various connection-orientated packet transmission protocols. The main candidates are IP/MPLS psuedowires (backed by IETF); MPLS-TP, evolved from work within ITU (although not yet standardised) and designed to have greater resiliency than IP/MPLS; and Provider Backbone Bridging-Traffic Engineering (PBB-TE), a version of Carrier Ethernet backed by IEEE.

MTS is already using IP/MPLS psuedowires over microwave in its mobile backhaul, as well as some IP/MPLS in its fibre-optic metro networks. "IP/MPLS technology is mature," says Larionov. "Businesses and operators know how to design, use and troubleshoot this type of network at the metro level."

But Larionov considers, that there is no need to implement IP/MPLS to the access and aggregation part of the network. Rising cost (more Layer 3 routers required) and increased management complexity are the limiting factors, he says. "It is not easy to find people with the necessary skills set for IP/MPLS network management," adds Larionov. "Most of the people in the mobile industry are TDM-orientated. We need to make life easier, not more difficult."

While Carrier Ethernet potentially ticks the boxes of greater management simplicity and lower cost for a converged packet transport network at the access and aggregation levels, Larionov still has some doubts about its readiness and reliability. So far, MTS has restricted Carrier Ethernet deployments to some point-to-point connections in the network core. "From Carrier Ethernet we need 20ms to 50ms resiliency, the same intelligent functions as IP/MPLS in terms of provisioning and troubleshooting, and all without the need for highly-skilled managers," says Larionov. "However, we believe Carrier Ethernet is about 70-80% ready. We're working with analysts, who are working with vendors, to meet our requirements."

3G adds backhaul pressure

Russia is a latecomer to 3G when compared with Western Europe. It wasn't until March 2007 when MTS, along with Russia's two other big mobile operators – Vimpelcom and Megafon – were each allocated 3G spectrum. But 3G network rollout is now beginning to pick up pace after a slow start. MTS had rolled out 3G in 41 Russian cities by October 2009, using HSPA networks with maximum downlink speeds of 3.6Mbps. MTS aims to reach 45 cities with 3G by the end of 2009 and to launch 7.2Mbps HSPA networks across Russia during 2010.

Oleg Larionov

> A main issue for us [in the backhaul] is how to move forward from TDM microwave to packet-level microwave, which requires a massive upgrade

MTS continues to put various measures in place to stimulate revenue from mobile data and content. It has introduced high-end phones into the market, such as the Nokia N97 in June 2009 and HTC Hero (Q3 2009), as well as a range of Blackberry devices. MTS says it has also managed to leverage its partnership with Vodafone – signed in October 2008 – to market phones in Russia exclusive to the world's biggest operator in terms of revenue. And in September 2009, MTS launched Omlet.ru, an online and mobile content portal offering a large selection of licensed videos, music and games.

The expected increase in data traffic, courtesy of 3G, requires MTS to upgrade its mobile backhaul network. Yet Russia's mobile operators, because they have only recently begun to roll out 3G in earnest, may have a cost advantage over their Western counterparts by being able to transition 3G cell sites directly to Ethernet-based backhaul transport – Ethernet is a much more cost-efficient and scalable transmission technology than ATM, which is commonly used for carrying 3G data traffic in the access part of the backhaul.

MTS' Larionov says orders have already been placed for 3G base stations equipped with Ethernet interfaces. "We expect to start deployment during Q1 2010," he says. "We're seeing a reduction in capex of between 20-30% with Ethernet and expect around a 40% cut in opex compared with leased line costs."

But what about the optimisation strategy for existing TDM traffic in the backhaul? Patrick Donegan, a senior analyst with Heavy Reading, warns that this will need careful planning in order to protect operating margins. "As 3G starts to be rolled out in volume in Russia, operators will roll out new packet microwave systems," he says, "but the multiservice TDM and Ethernet backhaul environment will still require aggregation and optimisation to ensure operators' costs don't get out of line with mobile broadband revenues."

Larionov confirms that finding a cost-effective migration path from TDM to packet-based networks is a key requirement for MTS' mobile access networks and aggregation. "A main issue for us is how to move forward from TDM microwave to packet-level microwave, which requires a massive upgrade," he says. "We will continue to look at using hybrid solutions on the network, which can accommodate both TDM and Ethernet. That will involve upgrading our microwave links to increase capacity so they can support the hybrid approach, along with new packet microwave [technology]."

MTS' hybrid backhaul approach is to use psuedowires over IP/MPLS, which can emulate essential TDM and ATM attributes and so enable MTS to achieve statistical multiplexing gains from legacy traffic. "This will create a microwave backhaul solution at the aggregation side of the transport network, which will integrate TDM and Ethernet traffic," says Larionov.

Building out its own extensive fibre-based backhaul network – where it is economically feasible to do so – is the ultimate goal of MTS. Since 2007 MTS has embarked on a programme to cut the ratio of leased lines to self-built fibre lines from 80/20 to 20/80 by 2012. According to Larionov, the operator is on target to achieve that goal. "We need fibre simply because of the higher traffic volumes, particularly as Comstar also has WiMAX."

MTS ON A BRANDING MISSION

MTS is intent on building up a successful brand in Russia and CIS through its '3+2' strategy, which it embarked upon in September 2007. The '3' is for delivering best customer experience, driving data and content services, and expansion in CIS and developing markets; the '2' is for cost efficiency and MTS group development.

Evolving from '3+2', MTS has developed a '3i' strategy: integration, internet, innovation. A key part of 3i is service innovation through the integration of fixed and mobile broadband services.

It is a strategy that has reaped dividends. In 2008, MTS became the first Russian company to enter BRANDZ Top 100 Most Powerful Brands, a ranking published by the Financial Times and Millward Brown, a global market research and consulting company.

In December 2008 the MTS brand extended beyond Russia and CIS borders for the first time when Sistema – the majority shareholder in MTS – branded a mobile company it owns in India with the MTS logo.

Given that the key areas for network capex will be mobile backhaul and optical packet transport as fixed and mobile broadband services are primed to take off in Russia and CIS, this special supplement – sponsored by Tellabs – focuses on both areas. □

MTS: A HISTORY OF EXPANSION

1993	Established by Moscow City Telephone Network (MGTS), T-Mobile, Siemens and several other shareholders
1994	First operator in Moscow to launch GSM services
1996	Sistema acquires a majority stake in MTS
2002	Initiates international expansion through the establishment of Mobile TeleSystems LLC, a joint venture with Beltelecom, the national fixed-line operator in Belarus
2003-07	Makes operator acquisitions in the Ukraine, Uzbekistan, Turkmenistan and Armenia
2008	Launches commercial 3G services in Russia and CIS
2009	Acquires controlling stake in Comstar, a fixed-line telephony and broadband service provider in Russia

THE RIGHT STRATEGY FOR MOBILE BROADBAND SUCCESS

FUTURE NETWORK DEMANDS MEANS THAT EFFECTIVE PLANNING TODAY IS ESSENTIAL.

Mobile operators around the world recognize huge opportunities in high speed mobile broadband services for work, education, entertainment and social interaction. Users want more than service--they expect anytime-anywhere access and ever-faster connections. With the prospect of a 7.2 Mbit/s connection from the smartphone or laptop looming, service providers' ability to satisfy these demands depends in part on how efficiently mobile-backhaul and optical-networking technologies are deployed.

Market researchers predict the penetration rate of wireless data services in Russia alone will grow from 24 percent in 2009 to 44 percent in 2015, driven by rising Internet usage; growth of mobile applications; increasing demand for local and international content; and the proliferation of mobile-data devices.

CIS Gives Mobile Broadband Plenty of Room to Grow

The relative maturity of Russia's mobile-voice market, combined with the pent-up demand for communications connectivity throughout the CIS, clearly presents significant opportunities for service providers to upgrade networks, expand coverage, offer mobile-broadband services and, in the process, increase market share and strengthen profitability.

In an effort to boost data traffic and average revenue per user (ARPU), Russia's three major mobile operators--Mobile TeleSystems (MTS), VimpelCom and MegaFon--recently began to migrate their GSM, GPRS and EDGE networks to 3G technology and to market smartphones, such as the Apple iPhone, within Russia. Further, MTS, VimpelCom and other mobile operators are expanding their services into more CIS nations.

As a report by IHS Global Insight notes, moving beyond Russia's borders into the growing economies of neighboring CIS countries gives operators the chance "to capitalize on subscriber booms, technological developments, regional synergies and roaming opportunities."

Profitable Growth Demands the Right Planning Now

Yet to achieve long-term success in any market, including the CIS, mobile operators must grapple with two conflicting challenges. On the one hand, the current global economic downturn has curtailed subscriber spending--and constrained the operators' own capital expenditure (CAPEX) and operating expenditure (OPEX) budgets.

On the other hand, mobile operators recognize that even in the midst of tough economic times, they must position their networks to accommodate surging data traffic, which is already straining network capacity. In a recent press interview, Dimitris Mavrakis, an analyst with UK-based Informa, predicted the worldwide volume of mobile data traffic will rise 25-fold by 2012, while data-related revenues will only double in that time frame.

The resulting lack of cash will further constrain operators' ability to increase network bandwidth, but, Mavrakis warned, unless operators do something now, mobile-data traffic jams will inevitably occur.

More Backhaul Capacity at Lower Cost

Well aware of the growing congestion threat and the fact that the backhaul network typically accounts for 30 percent-60 percent of radio access network (RAN) OPEX, leading mobile operators around the world are turning to vendors such as Tellabs International for help. "Given the huge market growth, they need solutions right now that not only increase their backhaul capacity but also help them lower their costs," says Petri Markkanen, Tellabs vice president for Russia and the CIS region.

"Tellabs has demonstrated that we can help wireless operators reduce their mobile backhaul costs by 60 percent to 93 percent. For example, a major Russian operator, using our solution in a recent live network trial, achieved a 60-percent savings in capacity."

Markkanen adds that Astelit, Ukraine's third-largest GSM provider, is another CIS operator that relies on the Tellabs mobile backhaul solution to scale its network quickly and easily, introduce data services and increase market share.

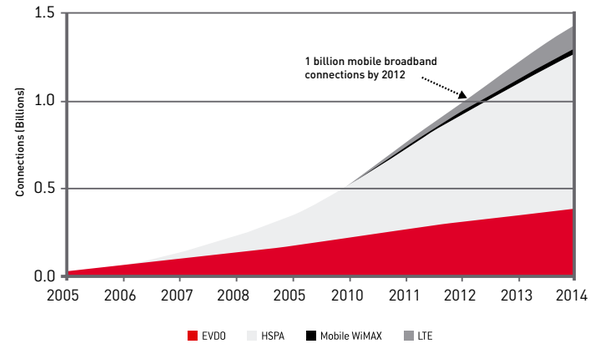
As evidence of Tellabs' commitment to delivering the solutions operators need, Tellabs won the Frost & Sullivan 2009 award for best practices in mobile backhaul solutions.

While in the optical arena, Tellabs recently won a Global Telecoms Business Innovation award for the world's first nationwide Dynamic Optical Network based on Verizon Communications' use of the Tellabs® 7100 Optical Transport System. The Verizon network collapses several network layers into a single platform, enabling Verizon to deploy new services delivering a 95-percent reduction in service-activation times; a 75-percent reduction in installation costs; and a reduction of more than 50 percent in power consumption.

Tellabs CEO Rob Pullen says that Tellabs has designed its solutions portfolio to help operators within the CIS and around the world accommodate unprecedented traffic growth, control costs and position themselves for long-term success.

"Our mobile backhaul solutions enable service providers to prepare their networks for 3G/4G services while lowering their total cost of ownership, while our optical networking solutions make it possible for operators to scale any service quickly and easily--also at a lower total cost of ownership. Because we deliver the innovative solutions our customers need to succeed," he says, "Tellabs today is a trusted partner to 43 of the world's 50 major service providers." □

MOBILEMARKET TRENDS // GROWTH IN MOBILE BROADBAND SUBSCRIBERS



Source: Heavy Reading, August 2009

TELLABS HELPS ASTELIT INNOVATE TO STAY AHEAD OF GROWTH

Just four years since launching service, Ukrainian mobile operator Astelit has acquired 11 million subscribers – roughly one-fifth of the country's wireless customers.

One factor that has helped Astelit network planners stay ahead of growth and capacity issues is the company's decision to use a single supplier,

Tellabs, for its fully managed mobile transport network "We're growing very fast," said Vladimir Lutchenko, manager of the access network planning unit at Astelit."This equipment helps us to define whatever we need: new services or capacity upgrades. Because of the very informative NMS, there is no problem with network management...Six people are managing our whole network."

MOBILE BACKHAUL SUCCESS

"Our customers demand a comprehensive solution, which is both scalable and flexible in delivering their 2G, 3G voice and data services. We chose the Tellabs solution because it brings manageability, flexibility and scalability in meeting these demands."

George Nazi, managing director of BT's 21CN programme

"We saw that Tellabs built a product specifically for a Pseudowire Application. They didn't start with a legacy platform and try to morph it into an IP/MPLS product. They built a platform from scratch dedicated for backhaul. That was unique."

Andy Jones, head of Transport Network Strategy and Architecture, Vodafone Group

OPTICAL NETWORKING FOR THE FUTURE

DRAMATIC GROWTH IN FIXED AND MOBILE BROADBAND TRAFFIC WILL REQUIRE OPERATORS TO RE-ARCHITECT THEIR OPTICAL TRANSPORT NETWORKS.

By Ken Wieland

As operators start offering triple-play and quadruple-play services in order to attract and retain customers, network traffic volumes will increase dramatically. If the experience of 'superfast' broadband take-up in South Korea, Scandinavia and the Netherlands is anything to go by – where downlink speeds are typically in excess of 50Mbps and up to 100Mbps in some cases – the old conservative assumptions of between 25% and 30% take-up of homes passed will not do. Instead, superfast broadband take-up – driven by IPTV and HDTV – is more likely to exceed 80%.

In Russia, where the country's big three mobile operators are seeking to converge cellular traffic and fixed broadband traffic over one network following the acquisition of fixed network assets – and ideally controlled by a single management platform – data volumes are poised to grow exponentially. And not just in the core of the network but much nearer to the customer, at the metro and aggregation levels.

The big question facing operators, as they position themselves as triple- and quadruple-play service providers, is how will they provision the required extra bandwidth in a cost-efficient and timely manner?

In typical legacy SDH network environments, network capacity increases have been traditionally achieved by stacking new ADMs (add/drop multiplexers) in the existing point-to-point DWDM infrastructure that carries TDM and ATM circuits. This process can be slow (manual intervention required) and expensive (more boxes to install and maintain; greater power consumption).

Operators therefore need a much more flexible and cost-efficient optical networking solution – one that can certainly support packet-based transport , which allows operators to take advantage of statistical multiplexing, but also one that can cater for legacy SDH traffic. That is why operators are turning to ROADM technology.

ROADM travels by Metro

At the metro level, the business case for ROADM – or reconfigurable optical add/drop multiplexers – has become much stronger in Russia and in other parts of world where consumer bandwidth demand is on the rise from both mobile and fixed networks.

MTS, the largest mobile operator in Russia, reports that traffic volume over its network has increased 50-60% since the launch of 3G in 2008. Comstar, a fixed-line subsidiary of MTS, says its traffic volume is doubling every year. Metro ROADMs are vital for flexible and fast configuration of bandwidth, extending the unlimited capacity in the core out into the metro area.

Vympelcom's merger with fixed operator Golden Telecom has resulted in duplicate optical networks in some regions of Russia. Moscow, Saint-Petersburg, Krasnoyarsk and some other cities are covered by wide, meshed and complicated optical networks which use the low-speed SDH interfaces. Some cities have Metro Ethernet networks which are used by both fixed and mobile subscribers but bandwidth has become an issue.

Consequently, both MTS and Vimpelcom are understood to be in the planning phase to roll out metro ROADMs in major Russian cities during 2010 and 2011.

The original push for metro (and long-haul) ROADM by suppliers was that it cut down the

opex bill for the operator by reducing the level of manual intervention required in the provisioning of wavelength services. Although the business case for ROADM has been clear for some time in the long-haul and ultra long-haul segments of the network, where manual wavelength provisioning is awkward and expensive, the business case for metro ROADM has not been so clear-cut – until, that is, the explosion of bandwidth demand.

But there is more to ROADMs than reducing opex, argues Paul Momtahan, director of data & transport solution marketing at Tellabs. "The filtering technologies of older DWDM systems struggle to support 40Gbps and 100Gbps wavelengths over a number of hops, which operators need to do if they are to future-proof their networks," he says. "Another strong driver for metro ROADM is mesh restoration whereby wavelengths can be re-routed around a failure. This can be done with an intelligent transport control plane and some enhancements to the ROADM platform."

Using an 8-degree ROADM (eight fibre inputs), the Tellabs 7100 Optical Transport System (OTS) can support mesh networking, as well as add or drop up to 88x8 wavelengths (88 wavelengths per degree). That number of channels, says Momtahan, is in the upper range of what ROADM suppliers can typically support today.

Ian Redpath, a principal analyst at the Ovum consultancy firm, is convinced that metro ROADMs are the way to go for operators on the cusp of a traffic demand surge brought about by the increasing popularity of bandwidth-hungry applications such as video, IPTV, HDTV, pay-TV and online social networking.

"ROADMs are a natural evolution of capability in the metro WDM segment," he says. "There will continue to be CWDM and fixed DWDM in the lower bandwidth, access-distribution portion of the network. But in the metro core, for mid-tier and larger operators, the ROADM has become central. The only disadvantage is a higher day one cost but carriers expect to recoup the higher day- one costs over the life of the network element."

The cost savings of deploying ROADM technology can be significant, however. Tellabs, for example, says that an operator using its Optical Networking Solutions – with ROADM and integrated "ADM-on-a-Blade" technology – can deliver four times more bandwidth than an OC-48/STM-16 based ADM network with a separate DWDM layer for a similar initial investment. Extra capacity is also much easier to add using point-and-click provisioning – and far faster than the 30 days or so required to upgrade capacity on the "ADM plus separate DWDM" solution (involving extensive manual installation and configuration).

But all successful ROADM suppliers will still have to support a traditional SDH environment, as Tellabs does, if they are to have any chance of catching the eye of incumbents that have legacy equipment and services to support. Integration of SDH with the DWDM infrastructure is a key requirement as businesses still require 20-50ms resiliency, which Carrier Ethernet can't yet provide.

All the major operators building optical metro networks face the same situation. Compared to other technologies, ROADM is the most efficient way to optimize use of existing optical networks with a complicated meshed structure.

For operators starting out on the upgrade of their metro networks, the capacity and mesh networking capability offered by the Tellabs 7100 OTS Nano may be sufficient to begin with, particularly if there is no need to connect to multiple rings at the network edge. Like its big brother the Tellabs 7100 OTS, the Nano still has a range of functions over and above the packet optical transport capabilities required by incumbent operators: SDH/SONET interfaces, the speedy allocation of wavelengths, as well supporting ESCON and FISCON, the most popular SAN (Storage Access Network) protocols used by enterprises today.

Interoperability

Moving forward, operators will invariably want to see greater interoperability between different vendors' equipment in the optical space.

At the control plane level, interoperability progress is being made among some suppliers. Working through the OIF (Optical Internetworking Forum), which promotes the development and deployment of interoperable networking solutions and services, Tellabs – along with two other major optical vendors – has successfully interoperated their respective kit (using an ASON-GMPLS control plane) over Verizon's network in the US. The ASON-GMPLS control plane allows operators to manage both the optical layer and MPLS-TP (although not regular IP/MPLS).

With a strong position in mobile backhaul at the access and aggregation level, as well as a strong hand in the metro and core optical transport space, Tellabs is well placed to help operators carve an optimal path towards fixed and mobile convergence in Russia and elsewhere. A single management system that can handle different network elements and traffic protocols, from the packet layers down to the optical layers – which Tellabs offers as part of its optical networking solutions – may well be an attractive value proposition for operators. □

RUSSIA: FIXED AND MOBILE ON THE SAME WAVELENGTH

Russia's telecom landscape is dominated by three mobile operators: MTS, Vimpelcom and Megafon. It is they who consumers generally turn to for voice service, not the fixed-line providers. With the 2G mobile market saturated, however, Russia's mobile operators are looking to mobile broadband and fixed broadband to secure future growth. This has led to the acquisition of fixed-line businesses.

In February 2008 Vimpelcom acquired Golden Telecom, a fixed-line voice and broadband service provider in Russia and the Ukraine. MTS, in October 2009, purchased a controlling stake in Comstar, also a fixed-line telephony and broadband player in Russia. Megafon, through much of 2009, was in discussions to acquire Synterra, a provider of long-haul and local telephony services in Russia (as well as WiMAX for internet access).

By having fixed-line access, Russia's big three mobile operators can offer bundled packages of mobile and fixed services to businesses and consumers, as well as make a play for the fast-growing fixed residential broadband markets in Moscow and St Petersburg. The untapped fixed broadband market in Russia's underserved regions also represents an enormous growth opportunity.

There is an obvious bottom-line appeal in using the same optical network assets to deliver fixed and mobile traffic. It is clearly better to have one network with a higher fill rate than two separate networks with lower fill rates. A packet-based transport network would also 'collapse' the number of network layers associated with TDM- and ATM-dominated legacy equipment and lead to greater cost efficiencies.

The demands of fixed/mobile convergence have led Russia's mobile operator to start upgrading their networks at the metro and aggregation level, although there are concerns that mobile voice – still a lucrative service – should not be jeopardized by converging cellular traffic with best-effort fixed-line data traffic over one network. However, in the core of the network, where there has been traditionally much more capacity than the metro, convergence of fixed and mobile traffic over a packet-based transport network appears relatively straightforward.

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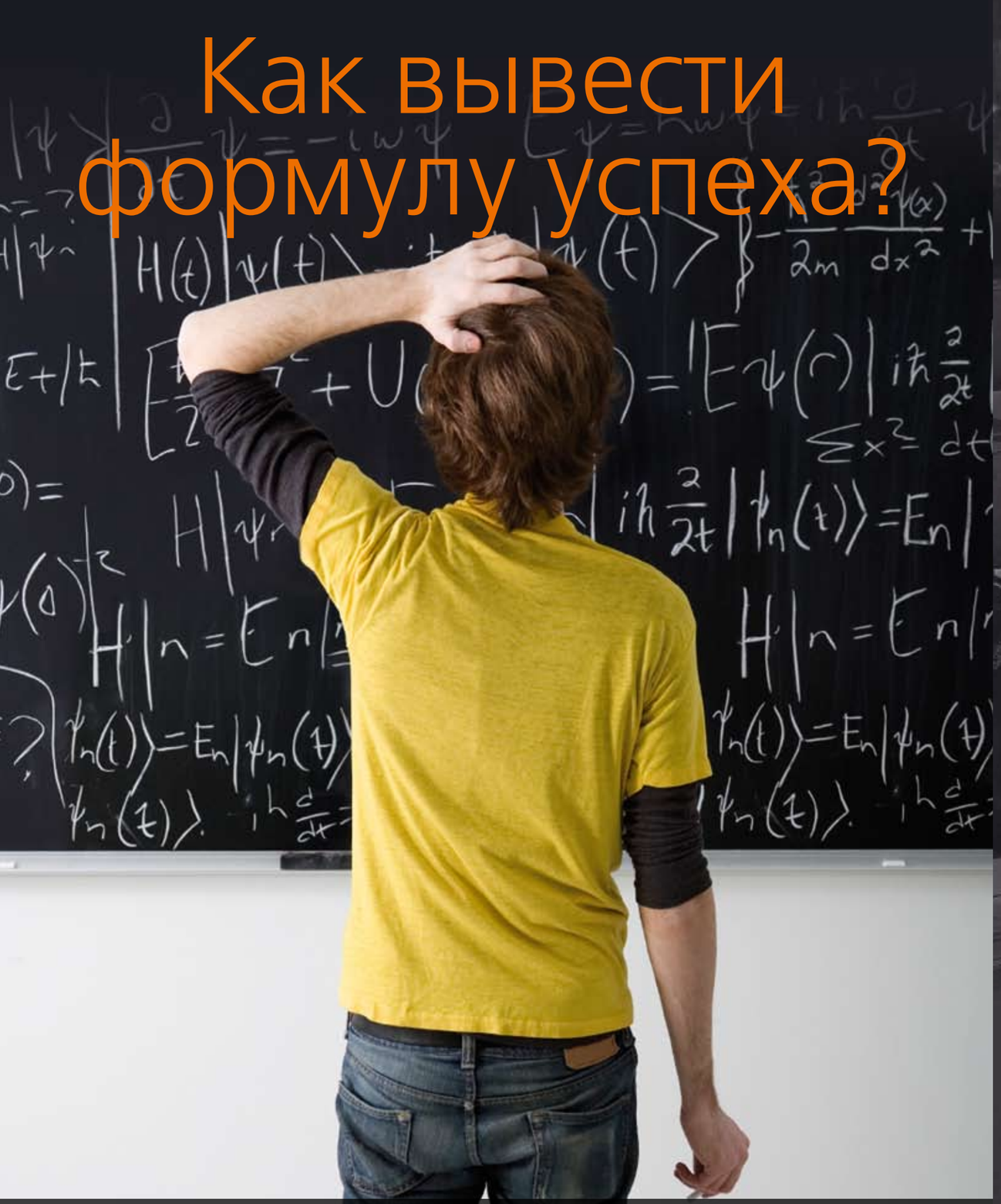

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