

Mobile backhaul – the power behind LTE



The market: mobile broadband for Web 2.0 services

It might be an unfashionable topic in the mobile world – when everyone is talking about next-generation radio access – but service providers are now finding that optimizing mobile backhaul to cope with the vast rise in data traffic is a very pressing concern. While the key to revenue growth undoubtedly lies in 3G/4G mobile broadband services for the Web 2.0 generation, these demanding customers are used to seeing a steady decline in the cost per bit for their bandwidth-heavy applications, and that's focusing attention on expensive and ageing traditional backhaul infrastructure.

The situation will change especially rapidly for service providers as they start to address radio access with LTE (long term evolution), the next-generation mobile standard. It will expose a major bottleneck in mobile backhaul, as much infrastructure around the world is rooted in legacy leased line and TDM architecture that simply will not scale up to provide efficiently the transport requirements of next-generation networks.

As analyst Infonetics Research reports, data traffic is likely to surpass voice traffic on mobile networks by 2010, thanks to the activities of subscribers with iPhones and other bandwidth-hungry devices. "Carriers everywhere are increasing the bandwidth on their backhaul networks to handle this exploding IP data traffic, and the most efficient, cost-effective way to do that is to transition from TDM to packet IP/Ethernet, which is driving the mobile backhaul equipment market," reports Infonetics. It adds that mobile backhaul equipment investments jumped a healthy 19% in 2008 to \$4.6 billion worldwide, and revenue is set to 'explode' over the next 5 years and beyond.

It's a point reinforced by analyst Gartner, which states that service providers should plan for more than 100 Mbit/s backhaul capacity per site via a 'graceful' migration from TDM, factoring in resiliency, end-to-end network management, quality of service and SLA monitoring – and not least, cost per megabit.

As analyst Telecom Strategy Partners stated in 2009:

"Top honors go to Nokia Siemens Networks ... it is gaining recognition for its mobile networks expertise and professional services for cost optimization of solutions, leveraging optical systems, Carrier Ethernet and a variety of access technologies."

The challenges: maximizing performance and coping with complexity

The key aim is to maximize service performance – throughput, latency and transport efficiency – while minimizing total cost of ownership. Backhaul transport is a strategic and critical part of the overall network optimisation equation – it accounts for more than 30 % of technical operation costs as well as 30 % of the overall capital investments for many mobile service providers. These are figures that usually scale linearly as mobile data traffic grows. Many service providers now need to decouple transport costs from capacity growth and increase network efficiency – and so achieve LTE readiness.

But optimizing mobile backhaul can be highly complex, as it can involve multiple network layers and a wide mix of transport technologies and protocols. A deep knowledge is needed of the multi-disciplinary complexity involved. The design of an optimized next-generation mobile backhaul network and migration strategy can test the resources of even the most expert operator. A partner with the right expertise can help operators plan and implement a smooth, cost-effective evolution to next-generation backhaul.

The solution: an evolutionary path towards full packet mobile backhaul

The way forward lies, of course, in migrating all transport to the packet-based world. The key is to choose an evolutionary pathway that is as simple and efficient as possible, and which also fits in with present infrastructure outside of green-field implementations. There are a number of approaches currently in place for backhaul – principally leased lines, and self-built microwave systems sometimes supplemented with leased lines. LTE (with speeds in tens of Mbits/s

per user) will require cost-effective Carrier Ethernet-based backhaul running on microwave, fibre or hybrid networks. Certainly, typical second generation (2G) cell sites have a few T1/E1 lines for cellular backhaul that will need to be overhauled for LTE deployments. And increasingly, the converged fixed/mobile broadband service mix offered by service providers also competing in residential and business fixed broadband are coming into play and can equally be integrated into one simplified Carrier Ethernet Transport backhaul solution.

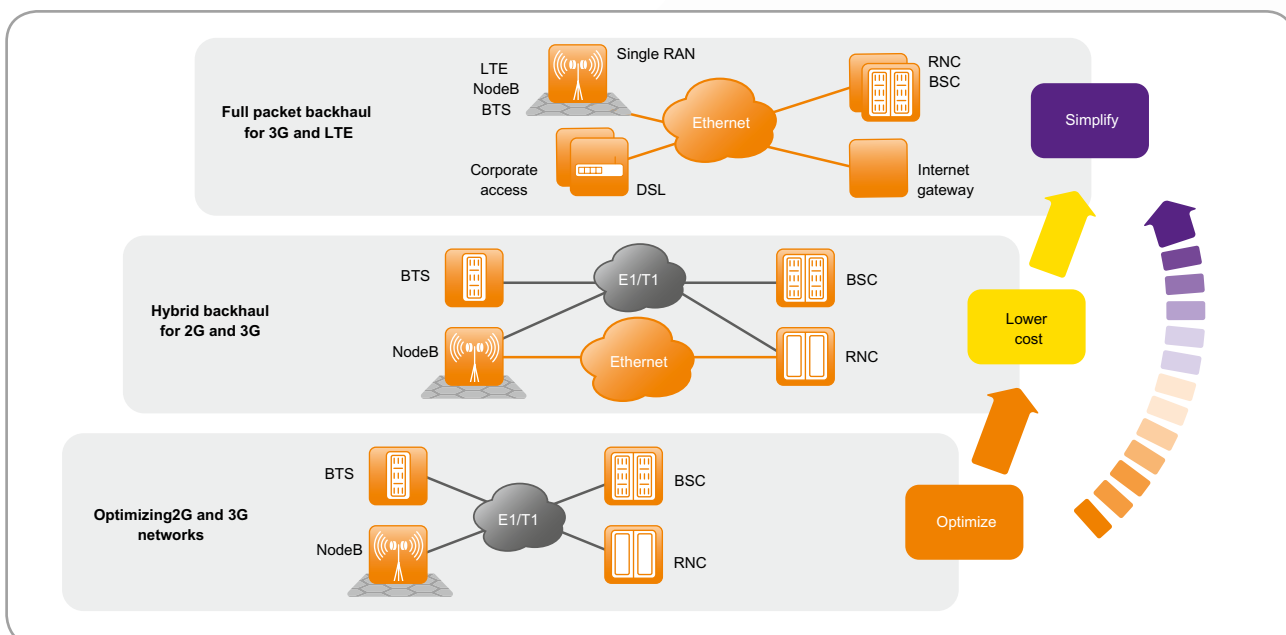
The Nokia Siemens Networks approach: optimizing backhaul is not “one size fits all”

Carrier Ethernet Transport is the best solution for many customers, either to lower costs and simplify backhaul across the entire network, or to migrate data traffic to Ethernet and keep voice on existing transport infrastructure. With migration towards LTE, service providers must ensure that the ratio between revenues generated per cell site and the backhaul cost per site is kept at sustainable and competitive levels.

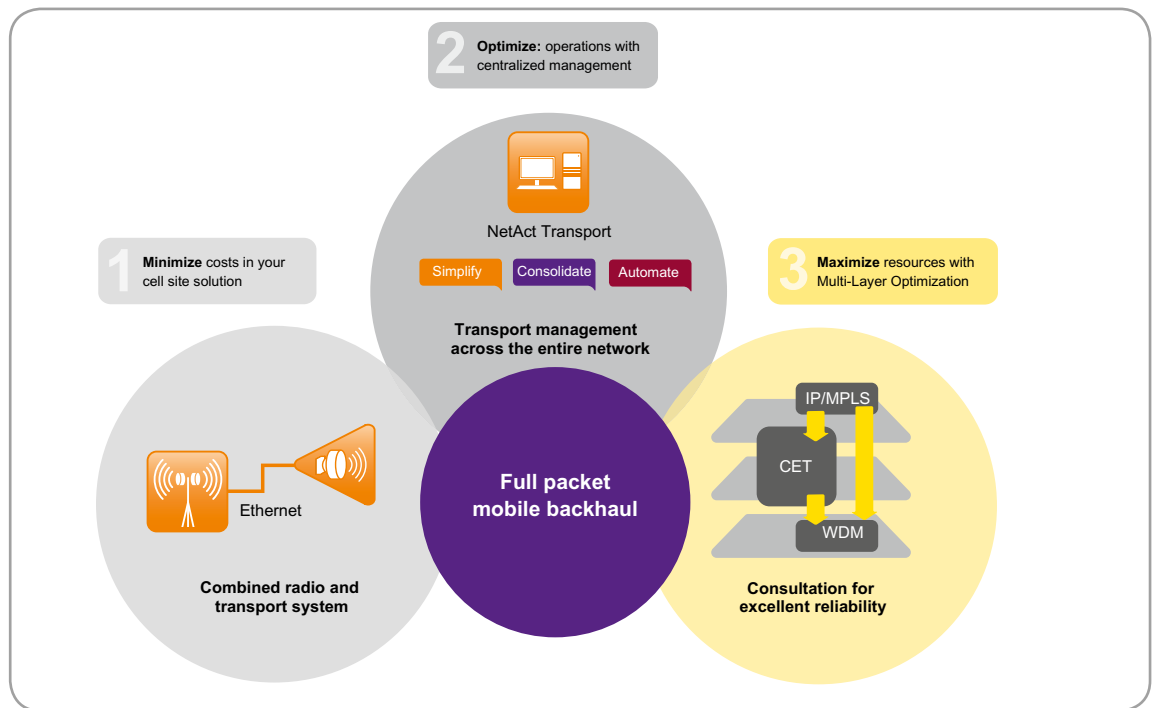
Our aim is to help service providers enhance customer experience with true quality of service and flexible options for bandwidth allocation. Our solutions are tailored to individual transport infrastructure needs and the existing architecture situation.

1) Minimize costs in your cell site solution

A first step is to implement a “zero footprint solution” for sites, where universal transport capabilities are already integrated into Nokia Siemens Networks’ Flexi base station. This can optimize site costs by up to 25% by eliminating additional shelter equipment, space and power consumption – a “greener” way to go.



Picture 1: Evolution path towards a full packet mobile backhaul network



Picture 2: Efficiency – with full packet Mobile Backhaul solution across the entire network

2) Optimize operations with centralized management

A second – and overarching – point is common management for backhaul among other parts of the network. Our end-to-end transport management of IP/MPLS, Carrier Ethernet, microwave, optical and access networks improves operational efficiency by enabling data sharing between different systems and processes across a service provider's whole network. Easy application management can lead to cost savings. For example, a mid-sized service provider can reduce its transport configuration related annual OPEX by up to 80% by harmonizing the transport connectivity management. Optimizing backhaul solutions is not a "one size fits all" exercise.

3) Maximize resources with Multi-Layer Optimization

A consultative approach is needed to provide the best resilience, end-to-end time synchronisation over packets, a hard quality of service and excellent reliability capabilities. For accurate timing over packets our solution provides simplified and cost efficient network synchronisation for today's HSPA (high-speed packet access), HSPA evolution and future LTE networks. Not least, optimal selection of transport technologies such as IP, Ethernet and optical across the backhaul network is a key consideration. Our consultative Multi-layer Optimization (MLO) service is a new way to tune networks that examines every corner of network infrastructure and operations. Transport cost savings of 30% can be realized.

Backhaul in action: customers speak

With more than 600 customers for mobile backhaul solutions in more than 100 countries, we have many successful deployments where greatly improved

efficiency and enriched customer experience have been reported. A service provider in Malaysia with more than 10 million subscribers has moved to a full IP network with our mobile backhaul solution. We helped the provider build future-proof packet backhaul for optimal transport of HSPA and to prepare for LTE services. It is saving a great deal of OPEX not only in transport costs but also in staff effort, which accounts for about 20% of technical operations. Another example is the service operator Chunghwa Telecom in Taiwan, which created new wireless high-speed Internet services with 60% lower transport costs using our mobile backhaul solution. The balance between cost and capacity has enabled the provider to offer mobile broadband data services and an enriched customer experience – and has also made the network more profitable.

Conclusion: the right strategic partner to prepare your mobile backhaul for LTE

For many service providers, moving to a high speed packet access network just does not make business sense where backhaul remains on TDM leased line architecture. The way forward will involve a good deal of modelling to ascertain the relative merits of, for example, a hybrid network, leased Ethernet or a full self-build carrier Ethernet backhaul network – but a simplified, unified packet-based network has to be the ultimate aim. Our mobile backhaul solution overcomes the obstacles to minimising cost and will stand the test of time. A strong consultative approach, integration expertise and portfolio breadth to create optimised backhaul solution makes us the right strategic partner to build up the mobile backhaul power behind LTE.