

# Light up the base station

*Cost efficient transport of native TDM and Ethernet traffic with support for multiple individually synchronized domains*

## Short facts about Transmode:

Transmode is a leading provider of optical networking solutions for transport of data, voice and video traffic, based on CWDM and DWDM technology (Coarse/Dense Wavelength Division Multiplexing).

Our customer base consists of more than 250 network operators, service providers, large enterprises and public institutions across Europe, the Americas and Asia.

Transmode has recently gained recognition from existing customers and independent analysts for its knowledge in optical networking and reliability as well as good product quality.



Mobile data traffic is soaring. “Donglemania”, the use of wireless broadband devices, has been a prime driver of the increase. The rollout of 4th generation infrastructure with even higher bandwidth is just around the corner and will raise the need to fix this even more. For many mobile operators the focus is on how to solve the challenges that this ever increasing explosion of mobile data traffic causes to their backhaul network. Adding more E1/T1s will not solve it in an affordable manner, nor provide the requested bandwidth. Ethernet is a far a better alternative here, providing high capacities at low cost.

In mobile backhaul networks, network synchronization is key to be able to handle handover between base stations. Often one base station shares a cell site with several others. And with 2G, 3G and 4G base stations – perhaps managed by different operators – all sharing one site, one can easily understand that the ability to handle synchronization becomes a complex and vital challenge for a mobile or a wholesale operator.

When TDM traffic is carried over SDH/SONET/ATM networks this is not a problem. However, when Ethernet is the chosen transport medium, which is by far a more affordable alternative, there are a number of issues affecting Quality of Service that need to be addressed – and solved.

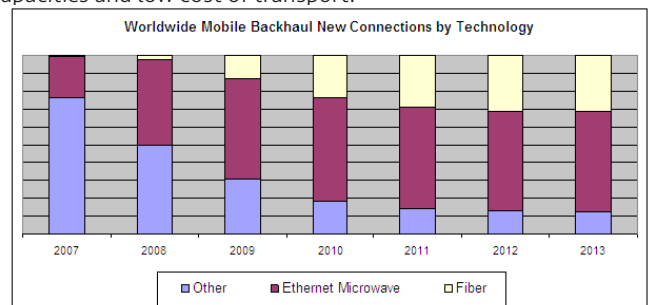
To summarize, the major challenges for mobile backhaul are:

- How can transport networks cost efficiently handle increasing mobile data traffic?
- How can a transport network simultaneously handle legacy TDM and Ethernet transport without redesigning the network?
- How can synchronization be ensured in a mobile network that supports TDM and Ethernet transport, different mobile technologies and several operators – without adding complexity?

## Fiber to the base station – a trend!

Studies show that optical fiber used in Mobile backhaul networks will be a more common infrastructure to connect base stations in the years to come, (see graph to the right). This opens up for fiber-

based Ethernet, bringing advantages such as virtually unlimited capacities and low cost of transport.



Source: Infonetics July 2009

*Fiber connections are increasing in Mobile Backhaul, why Transmode’s WDM expertise successfully can be applied all the way to the base station.*

## Transmode’s Multi-Service Mobile Backhaul Solution

Transmode’s Multi-Service Mobile Backhaul Solution is a WDM based transparent transport solution that removes the bottlenecks from the mobile access. The traffic is transparently delivered using cost efficient Ethernet technology without compromising on native TDM quality.

Solution highlights:

- Cost-efficient increase of mobile backhaul capacity through pushing Intelligent WDM (iWDM™) all the way to the base station
- Multi-service mobile access capabilities optimized for Mobile networks
- Delivery of native TDM and Ethernet traffic simultaneously, with support for multiple individually synchronized domains – using one wavelength only

### Increasing capacity by pushing iWDM all the way to the base station

In light of the ongoing expansion of fiber, Transmode is developing and pushing its proven iWDM concept all the way to the base station. Transmode's iWDM technology is a successful way to utilize standard WDM technology and offers mobile operators the ability to choose between alternative line-rates – 1Gb, 2.5Gb, 4Gb or 10Gb – for the most optimal and cost efficient transport of both TDM and Ethernet traffic. Enabling alternative line-rates minimizes the need to “over-size” networks, keeping total cost of ownership (TCO) at the lowest possible level.

Stretching these capabilities all the way to the base station offers a shared infrastructure that brings the capacity needed to an affordable cost point.

### Optimizing multi-service capabilities for mobile access

Transmode's Multi-Service Muxponder is specially developed to fit the various traffic formats available in mobile access. E1/T1, SDH/SONET, ATM and Ethernet are supported in one single node and are transported over the same shared WDM infrastructure.

In addition, the node can also successfully be used to connect DSLAMs or enterprises, creating a solution that is ideal for integrated fixed and mobile networks as well.

### Delivering native TDM and Ethernet simultaneously with multiple individually synchronized domains

Why carry TDM traffic in a packet format? And why carry Ethernet in a TDM format, or TDM over Ethernet, as some other transport technologies promote? By simply transporting these types of traffic natively it is possible to retain all of the native TDM and Ethernet attributes, while at the same time achieving the capacity and economics enabled by Ethernet. Jitter and bit-error multiplication are eliminated and TDM or Synchronous Ethernet can both be used to maintain network synchronization.

This way of carrying traffic in its native format resembles the approach used in Hybrid microwave access. To use similar approaches for both fiber and microwave access is naturally beneficial for operators of such access networks.

Furthermore, the existing network structure and performance monitoring systems can be kept as they are while the network evolves to meet the higher bitrates, and ultimately to an all-IP network. This avoids the investment in new management systems and eliminates the cumbersome and costly task of integration. It also means that base stations can be connected with optical fiber in a pace that makes sense from a business case perspective as well as it protects already made investments.

The Multi-Service Mobile Backhaul Solution with its iWDM capabilities offers transparent synchronization support for native TDM and Ethernet traffic. This means that traffic is transported supporting multiple individually synchronized domains, a highly important feature for infrastructure sharing solutions, especially in wholesale networks. And finally – both the synchronization *and* the native TDM and Ethernet traffic are transported using a single wavelength only.

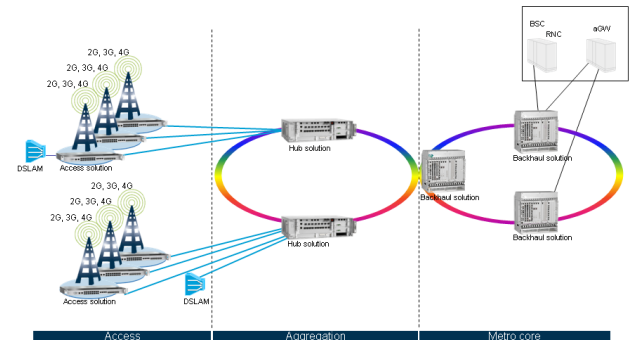
### The solution in a bit more detail

Transmode's Multi-Service Mobile Backhaul Solution is divided into three parts:

- An Access solution – collecting E1/T1 and Ethernet signals from

base stations (and co-located DSLAMs).

- A Hub solution – aggregating E1/T1s traffic from Access nodes into STM-1/OC-3 signals.
- A Backhaul solution – transporting SDH/SONET and Ethernet signals to switch centers via Layer 1 and/or Layer 2 solutions.



Transmode's Multi-Service Mobile Backhaul Solution

### Access solution

The Access solution comprises nodes for high and low capacity demands as well as one for plain Ethernet (GbE) applications. All three nodes are 1 rack unit high.

The line side of the Access units interface towards the next step in the solution, the Hub solution. Each interface supports multiple independent E1/T1s synchronization groups as well as multiple synchronized independent Ethernet connections, all transported using only one wavelength.

Supporting a number of E1/T1s and GbEs on a single wavelength makes this solution beneficial both in mobile as well as broadband backhaul networks, and also business Ethernet and wholesale environments.

### Hub solution

Collecting traffic from up to eight access nodes, the Hub solution is a plug-in unit to Transmode's TM-3000/TM-301 chassis. E1/T1 signals are mapped into STM-1/OC-3 signals for further transport to switching centers. Ethernet signals are provided synchronized and data transparent and transported over a Layer 1 or synchronous Ethernet network.

### Backhaul solution

The Backhaul solution entails both Layer-1 and Layer-2 technologies. Transmode's Layer-1 Multi-Service Muxponder provides synchronized transparent transport of multiple STM-1/OC-3 signals and GbE signals over a single line signal. The ability to carry signals that have independent synchronization sources make this unit, together with Transmode's other Multi-Service units, particularly well suited for mobile networks.

Transmode's combined Layer-1 and Layer-2 solution, using for example the Ethernet Muxponder (EMXP) offers cost-efficient and simplified transport of mobile traffic through its Ethernet and Ethernet-aware capabilities. The integrated Ethernet switching functionality, combined with Ethernet transport abilities, allows mobile data and voice traffic to be delivered over the packet optical network at the lowest possible cost.

Please contact us today for more information regarding this solution! See webpage [www.transmode.com/contact](http://www.transmode.com/contact) for contact details per region.

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