Network operators face many challenges driven by the rapid growth in customer demands. Growth in optical networks, the migration to Ethernet, and eventually to LTE Advanced networks brings new opportunities to address the needs. Packet optical networks have become the transport network of choice to address the capacity boom that most network operators see from increased Ethernet traffic. The capacity, cost efficiency and Quality of Services capabilities that a packet optical network can present are superior to other alternatives.

Planning, deploying and operating these transport networks can be complex, time consuming and costly. Increased complexity is driven by the higher volumes of interfaces required by business services, along with Quality of Service (QOS) requirements.

Organizations often use different management platforms to manage different network layers. And the personnel that administrate these platforms are often from different organizational entities, which for many operators is, and will continue to be, the preferred setup.

Transmode’s Enlighten is a multi-layer management suite with a set of capabilities for managing Transmode’s transport networks. It provides capabilities that are vital to managing a network throughout its total lifecycle. Enlighten streamlines departmental tasks associated with operating and growing today’s complex networks into a single management suite, thus significantly reducing time to market and OPEX. With Enlighten’s features for management of packet optical transport networks, it further enhances the advantages with this architecture.

**Key Benefits in short:**

- Provides easy Service Management throughout the service life cycle with Plan, Deploy and Operate functionality
- Reduces provisioning time from days to hours enabling cost efficient network operations
- Provides integrated management of multi-layer transport networks, reducing fault resolution time from hours to minutes
**Enlighten - a multi-layer management suite for Transmode’s transport networks**

Enlighten helps you get the most out of your Transmode network, through intelligence, automation and simplicity and as these networks continue to evolve, both as self-contained entities or as an integrated part of future businesses, Enlighten will guide you seamlessly towards the future.

Transmode’s Enlighten is a management suite that provides network operators with full control of their Transmode network from planning and design, to deployment; implementation and commissioning, through to full network operation.

**Service Management throughout the entire service and network life cycle**

The Enlighten applications support a number of different tasks throughout the various phases in the service and network life cycle. These phases are plan, deploy and operate as shown below.

Each phase represents a set of activities that needs to be performed in a typical optical and packet optical network, but may vary depending on size of the network.

**Planning of services and networks becomes easy with full overview of the available resources**

The plan phase gives a proactive approach to what, where and how new network elements are deployed and configured. In this phase you can plan new networks as well as make add-ons to exiting networks. These are all based on pre-configured templates.

The foundation is a solid resource inventory containing everything that is already installed in the network. The resource inventory also provides information of how existing chassis as well as logical resources, such as optical channels, are utilized. This gives you valuable topology information that is needed for the deployment phase.

**Deploy the network and prepare the services securely and according to plan**

Based on the work order information from the planning phase, deployment of the network can now be performed securely and according to the plan. In the deployment phase the network is commissioned and made ready for service. This phase also involves service provisioning, fulfillment of service requests and activation of new services in an easy and smooth manner. This phase will also let you know which path through the network the new service is taking.

**Operate the services through the multi-layered network**

The operation phase deals with the services once they are in operation. In this phase the services need to be monitored and easy to understand, which leads to faster restoration in case of a failure.

The Enlighten software suite provides visibility of the multiple layers in today’s optical and Ethernet transport networks. This gives network operators one common starting point for efficient troubleshooting throughout the different network layers, which increases service uptime and enables more efficient network provisioning and operation.

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**Fig. 1** Enlighten supports the processes of planning, deploying and operating a Transmode transport network.

**Fig. 2** A screen shot from the planning view where new networks or add-ons to existing networks can be planned.

**Fig. 3** A screen shot showing an MPLS-TP service topology.
Additionally, with centralized handling of important and tasks such as provisioning and software upgrades repetitive tasks can be performed much faster, improving efficiency and reducing OPEX.

**Reduced fault resolution time from hours to minutes**

In order to deliver high service availability it is important that a potential failure is quickly identified and quickly restored to normal operation. In today’s multi-layer networks a single problem in one layer can easily result in multiple alarms at a higher layer, i.e. one could end up with one or more alarms at each of the layers involved.

It is then essential to identify the root cause of the problem in order to reduce the MTTR (Mean Time To Repair).

A multi-layer platform allows for automatic correlation of alarms from different layers leading to quickly identification of the root cause of the failure. A faster diagnosis of what the root cause is will enable easier troubleshooting and eventually enable operators to deliver on their transport Service Level Agreements (SLAs).

However, some operators may prefer a separate set up of their optical and Ethernet network management systems. They can then use access rights to separate the two systems and may regard the single manager approach as a long term evolution.

**Reduced time for provisioning transport networks**

With improved network management tools the time that technical engineers need to spend on site can be reduced. Consequently, this will reduce the number of truck rolls and save OPEX.

Enlighten provides accurate information of what is installed on site enabling technical staff to better prepare and plan on site visits.

**Open and future proof architecture**

The architecture of Enlighten is an open and future proof architecture to be able to support the evolution of OSS systems. The future OSS implementations will have to cope not only with Plan, Deploy and Operate functions but also with changes in network topologies imposed from new business models like Cloud Computing and On Demand Network Services.

Developed in cooperation with leading operators, Enlighten helps you support an expanding network and services portfolio.

**OAM capabilities - service flexibility**

As operators move to packet-optical networks, supporting similar OAM techniques as the widely deployed SONET/SDH networks becomes critical. Enlighten provides MPLS-TP management, enabling operators to configure MPLS-TP tunnels and services in a similar way to the paths and services that are used in ROADM-based optical networks.
SLA management - generating revenue
Visibility and control of the services delivered is key both for the operator delivering the services as well as the customer consuming them. Enlighten provides tools for assuring service availability through quick diagnosis and restoration. It also provides visibility of the service levels through the Transmode Portal or the Ecosystem partners.

Meeting key needs of applications
To ensure delivery of a best in class management offering, Transmode focuses on the needs of particular applications. Enlighten offers unique capabilities for business Ethernet, mobile backhaul and cable-TV/MSO backhaul networks.

Business Ethernet providers offer wholesale transport services to a number of enterprises, and need to manage SLAs of various kinds in an efficient and easy manner. Enlighten provides the tools needed for faster provisioning of services and better delivery of SLAs for business Ethernet providers.

Mobile Backhaul providers that offer synchronization as a service can use the core SLA management capabilities, augmented with additional synchronization monitoring features.

CableTV/MSO backhaul providers gain a simpler and more cost efficient infrastructure from the integration of optical and Ethernet networks, with management tools designed for use by more available, less expensive engineers.

An Ecosystem of best of breed technologies
The Enlighten Ecosystem of best of breed technology partners provides a broader and richer solution that can address each operator’s unique needs. With the Enlighten Ecosystem network operators can get assistance with integration, integration tools/API access, development support, product training and product certification.

The Enlighten Ecosystem typically provides values in multi-vendor applications such as inventory management and SLA management.

Transmode will help Ecosystem partners to integrate their products with Enlighten and other Transmode products. A growing Ecosystem of third party software partners are supported to ensure freedom of choice and flexibility when it comes to choice of model.

The Enlighten Ecosystem enables solutions that are customized to customer needs. The integration of third party Ecosystem products will provide certified solutions that can bring revenue faster and minimize cumbersome integration projects.

A suite of software tools
Enlighten provides a growing set of applications, including:

- Transmode Planning Tool (TPT)
  - TPT offers planning of Transmode resources and services
- Transmode Network Design Tool (TNDT)
  - TNDT offers a tool for easy design of Transmode networks
- Transmode Network Manager (TNM)
  - TNM offers element and network operations management of Transmode networks
- Embedded Node Manager (ENM)
  - ENM offers web based device configuration
- Transmode Enlighten Ecosystem
  - The Transmode Ecosystem offers best of breed technologies for integration with selected applications

Summary
Transmode’s Enlighten software suite addresses the needs posed in today’s transport networks, both optical and packet optical networks. Challenges such as the higher volume of interface requirements, rapid changes requiring more complex management and verification tools, are efficiently met with Enlighten’s single manager for multi-layer networks. This allows easier troubleshooting, faster network restoration, and successful SLA delivery.

The Enlighten suite of service and network management tools helps operators throughout the whole service and network life cycle with tools optimized for planning, deploying and operating the Transmode network. This ensures a service management capability that is needed in today and tomorrow’s transport networks.

Enlighten provides efficient network operation functionality reducing the time spent on site significantly resulting in reduced OPEX.

For further reading:
For more information regarding each of the tools that are part of Enlighten, please see their respective datasheets on www.transmode.com.