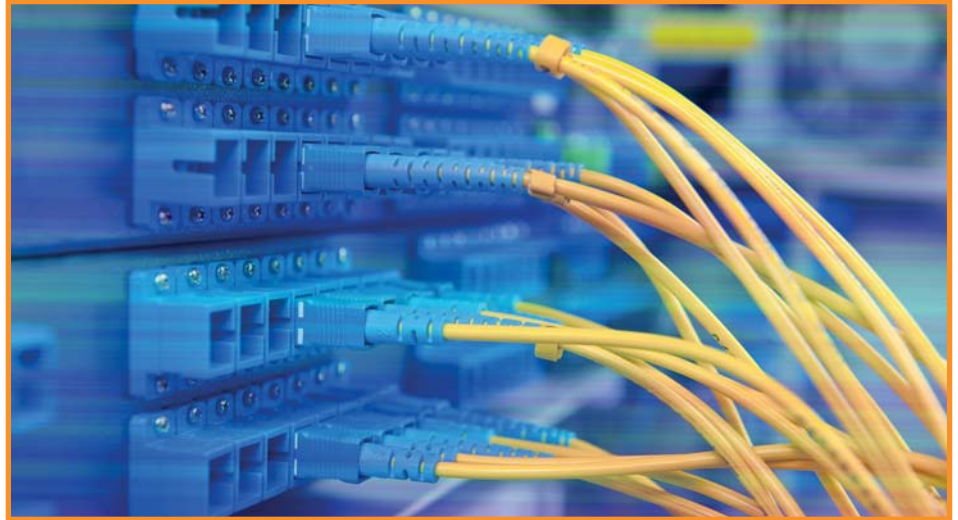




## Multi Service Provisioning Platform

Optical startup builds a new SONET/SDH Multi Service Provisioning Platform (MSPP) with sub 6ms fail-over on fiber lines, and fulfills acquisition exit strategy as a result.



### CASE STUDY

An optical networking startup targeting the growing Metro Ethernet market, set out to develop a new high-availability multi-slot Multi Service Provisioning Platform (MSPP). It was built around a new architecture designed to integrate Internet Protocol (IP), Synchronous Optical Network (SONET) and WDM layers into one platform. This would make it possible to simplify provisioning and enable service providers to connect users to services rapidly and cost-effectively across metropolitan optical networks. This case study describes a project carried out by a team of engineers that are now at embedUR.

#### *Carrier-grade converged services*

This MSPP incorporated the traditional functions of an optical Add Drop Mux (ADM), plus cross-connects to manage multiple fiber rings in a single chassis. It combined IP and TDM technologies to share wavelengths amongst different users and enable connections directly from Ethernet LANs to a service provider's optical backbone.

When deployed in a metropolitan point-of-presence (POP), or Central-Office facility (CO), the MSPP would provide a converged multi-service transport platform to carry IP, Ethernet and TDM traffic over DWDM based SONET/SDH metro networks.

Given the strategic nature of this switch, high availability and fast failover performance was a key design requirement. It needed to recover from line faults within 6-8ms, and from line-card faults within 30ms, in order to prevent service disruption.

#### *From prototype to production*

The team of engineers who built this platform started out at the optical startup, and are now at embedUR. They brought with them broad expertise in wire-line and optical switching, combined with a deep understanding of real-time operating systems, multi-processor systems and distributed systems architectures.

In building the platform the first mission was to develop the system software and make it stable enough for demonstrations at an upcoming optical networking tradeshow. After that major milestone, they then took the system software all the way through the development cycle to product FCS.

Overall the project involved three engineering teams working on

*Kudos to the team, they were instrumental in helping us wow prospects at a key optical show, and get to market six months ahead of competitors.*

*D. B. Founder, Vice President, Software*

## OBJECTIVE:

Bring to market a new high availability Multi Service Provisioning Platform (MSPP) to target converged services Metro carriers.

## SOLUTION:

- Develop stable system-software in time for big splash at tradeshow.
- Scale system software for larger platforms in product line.
- Build Telcordia compliant high-availability resiliency features.

## RESULTS:

- Completed on time, on budget.
- Telcordia GR-253, GR-1400
- Line-card failover sub 25ms.
- Automatic line protection sub 6ms.
- Field trials with major carriers.
- Acquisition exit strategy fulfilled.

different software subsystems and ran for near 10 months. The first phase of the project involved developing software for a six slot switch, but later on, a twelve slot version was introduced to support additional line cards and this required additional scaling of the system software.

There were two main areas of system development: Developing the SONET/SDH system software, packet forwarding software and framer drivers; and the design and development of all the software for fault detection and recovery, at the system level, line card level and individual line level.

### *Distributed system software*

The architecture of the system software was designed for maximum resiliency, and rapid response to any network related state changes. The software consisted of a manager resident on the systems control module, and an agent resident on each line card. The system needed an efficient control protocol and the messaging schema, between manager and its agents to ensure immediate response under the various possible error conditions.

Each agent was responsible for monitoring performance and the state of each line card. The team developed all the alarm surveillance, performance monitoring, equipment and facility protection switching features, and managed to get system-level failover down to sub 50 ms.

To ensure multi-vendor interoperability, line protection needed to be Telcordia standards-compliant, conforming to the alarm surveillance standard GR-253-CORE and uni-directional path switched ring (UPSR) standard GR-1400-CORE. A great result was achieved here as well. In the event of a protected line outage, all the paths of a UPSR provisioned system, could switch over to the standby fiber line in just 6 ms!

### *Dream exit strategy fulfilled*

The company was able to successfully demonstrate its six-slot prototype at a major trade show, and generated significant interest from service providers. They were able to take the system to FCS and field trials just 5 months later. Within 18 months the company was subsequently acquired by a major manufacturer of Telecom equipment targeting Metro service providers.