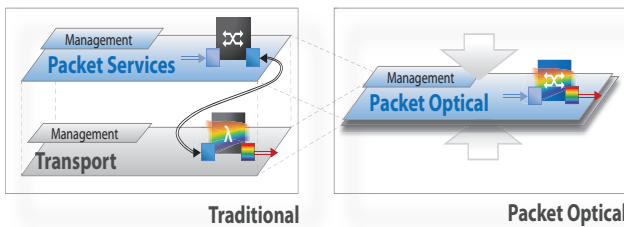


SERVICE DELIVERY WITH A DYNAMIC OPTICAL LAYER



Network Evolution Required

Growing communications demand is being driven by bandwidth-intensive applications, cloud services, and enhanced access to content and information via ubiquitous broadband wireless for business and personal subscribers. To address this growing need, network operators must have a service delivery network that acts as an enabler for a diverse set of offerings and delivers on business objectives.



Packet optical network platforms are the solution of choice to scale the capacity and deliver a comprehensive Ethernet and wavelength service offering. The convergence of Layer 0/1/2+ capabilities simplify the overall complexity of networks and tie network capacity directly to service delivery. The traditionally deployed fixed optical layer underpinning provides scalability but necessitates operationally-intensive procedures—and significant pre-planning—to enable the network to scale and operate effectively. This needs to change.

Deploying a Flexible Service Delivery Foundation

Reconfigurable optical add-drop multiplexing technology in networks today delivers lower-cost-per-bit and improved operational efficiency and customer responsiveness to service adds/moves/changes and the alleviation of significant manual effort along a service path. ROADMs address many of the shortcomings of a fixed optical layer but still necessitate a significant amount of manual effort. In addition, the deployed technologies typically have evolution limitations with respect to wavelength spacing and wavelength capacity.

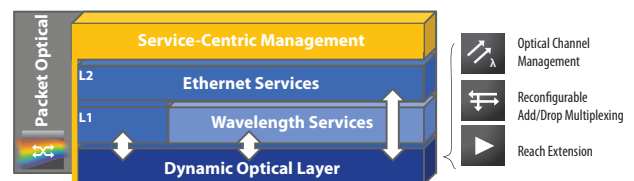
Solutions are now available that combine reconfigurable optical add/drop multiplexing, reach extension, and service-centric management capabilities to provide simplified operations and enhanced automation that comes with a

fully-managed optical layer. The system-oriented nature of the solution—a key differentiator versus previous generation technology implementations—alleviates the complexity of planning, provisioning, and on-going optimization and power management of service delivery networks—the foundation is not made up of a set of independent elements.

Technology Generation	1	2	3
Function	Selective channel add/drop and power equalization	Optical cross-connect between multiple degrees	Optical cross-connect between multiple degrees
Single input to single output port	•		
Multiple inputs to single output port		•	•
Available Degrees	1x1 only	1xN (N=2,4,...)	1xN (N=2,4,...)
Wavelength Spacing support	100 GHz	50 or 100 GHz	50 and 100 GHz

Dynamic Optical Layer: Key Differences

BTI Systems' Dynamic Optical Layer—as part of the BTI 7000 Series packet optical network platform—is focused on combining key functions as part of a cohesive solution that automatically discovers adjacent nodes and shares information between ROADM and reach-extension elements to set power levels, compute span loss and provide autonomous monitoring and channel power-level rebalancing—and offer zero channel network turn-up.



4th Generation ROADMs improve on previous generations with gridless (or flexible grid) technology. Network operators are able to send any wavelength to any port—change these assignments automatically (colourless), enable end-to-end service routing on any degree (directionless), and use any connection independent of all others in use (contentionless); the key difference is that ability to define arbitrary wavelength spacing to address future protocols and line rate availability. Service providers will benefit from this next generation technology and a new service delivery foundation blueprint.

Technology Generation	1	2	3	4
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Single input to single output port	•			
Multiple inputs to single output port		•	•	•
Available Degrees	1x1 only	1xN (N=2,4,...)	1xN (N=2,4,...)	1xN (N=2,4,...)
Wavelength Spacing support	100 GHz	50 or 100 GHz	50 and 100 GHz	50, 100 GHz and arbitrary

Optimized for Metro Aggregation

Benefit from next generation component technology innovation and efficiencies. The elements provide a compact form factor to efficiently fit into precious rack space and allow elements to be combined within modules to simplify wiring and limit configuration errors. Cost-optimization enables deployment closer to the network edge where reconfigurability and access to all channels is extremely important.

Zero Channel Turn-Up

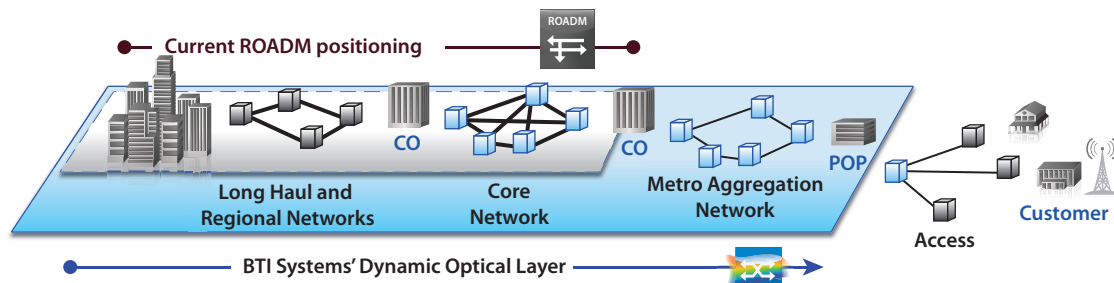
Ensure the network's ready before service deployment. System-oriented capabilities enable the auto-discovery of adjacent elements and sharing of information to set power levels and compute span loss and model span load before a service is provisioned. As services are added, the Dynamic Optical Layer provides autonomous monitoring and channel power level rebalancing as required.

Secure Investment

Guarantee the network will adapt and grow rather than necessitate a forklift upgrade. By implementing a solution with gridless capabilities today, service delivery networks are future-proofed and extremely flexible in terms of bandwidth capacity. Gridless technology enables network operators to accommodate 400 Gbps or 1 Tbps transmissions that require a wider channel width than current ITU standards call for—and can do so alongside 10G, and 40/100G services without wasting spectrum.

A High Value Service Delivery Network

Network operators can now reset how services were previously routed and “de-fragment the network” with an automated, all-optical service delivery foundation. Alleviating pre-planning, and enabling service manipulation to better address current network needs and pressures means that network operators no longer having to live with where and how services were previously provisioned.



BTI Systems' packet optical solutions provide the means to simplify service delivery, ensure maximum service return, and guarantees your network is ready for whatever your customers request.

- **Comprehensive Service Delivery:** As an integrated component of a packet optical platform, the Dynamic Optical Layer provides a flexible underpinning to deliver a full suite of Ethernet and high capacity, low-latency wavelength service offerings.
- **Maximized Revenue Potential:** A Dynamic Optical Layer eliminates stranded capacity and guarantees the most efficient use of the network—and one that can serve a larger geographic footprint—which equates to a larger addressable market for your services.
- **Cost-Effective Service Delivery:** Delivers a network that simplifies operations, eliminating truck rolls which are replaced by mouse clicks at the NOC. This translates to OPEX savings meaning improved margins and the opportunity to extend savings on to customers in competitive markets.
- **Enhanced Responsiveness:** Service-centric management and optical layer automation simplifies provisioning and—through virtually eliminating hands-on effort—expedites service delivery to the customer. The automated capabilities ensure the service is always tuned and performing at its optimum level meaning services are fixed, before they're broken.
- **Secure Investment:** The Dynamic Optical Layer offers a service delivery underpinning that provides a future-proof solution supporting 100GHz, 50GHz and arbitrary channel spacing that's optimized for 10Gbps channels today, and is ready to address the protocols and line rates of tomorrow.

Service Delivery. Simplified.

The savvy nature of today's user means they are driving never-seen-before network bandwidth growth based on increased consumption and utilization. Networks must be easy to operate, responsive to growing customer demand, cost-effective to meet margin pressure, and capable of evolving to address what tomorrow has in store. BTI Systems' Dynamic Optical Layer capabilities provide the flexibility and simplicity to deliver a comprehensive service portfolio with the optimal approach.