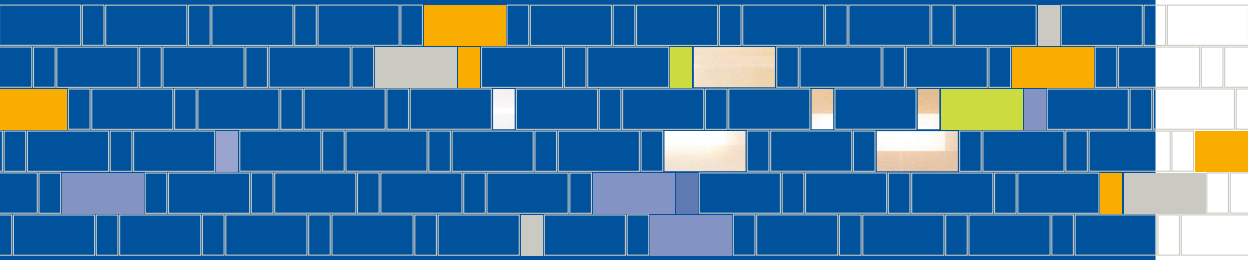


# Carrier-Class Metro Solutions for the Packet Age



The Next Wave in Metro Optical

Luminous Networks™ offers carriers a comprehensive product family to address the entire metro access, from the premises to the POP (Point-of-Presence). Luminous' PacketWave™ optical access switches scale from central office locations to the customer premises, with the flexibility to address both legacy and greenfield network applications.

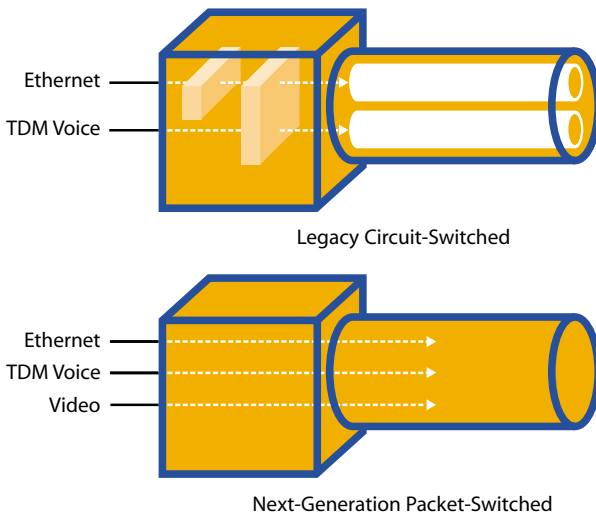
Today's dynamic telecommunications environment requires carriers to adapt to an increasing volume of data-centric traffic while streamlining their networks to reduce costs. The innovative Luminous PacketWave platforms, based on Resilient Packet Rings (RPR), provide a clear path for successful migration to an IP-optimized network supporting voice, data and video services over a cost-effective, converged platform.

## Data Growth in Metro Networks

The explosion of data traffic is rapidly transforming carrier networks. These networks, built to carry voice traffic, are sagging under the growing demands for new services such as Internet access, streaming video and Ethernet services. Analysts expect data to soon exceed over 80% of all network traffic.

## The Efficiency of Packets

To address this explosion in data traffic, carriers can significantly improve network efficiency with a packet-based approach to network design. Statistical multiplexing enables over-subscription of the network, thus maximizing the carrier's return on investment. Packet-based networks allow carriers to closely monitor traffic for critical Service Level Agreements (SLAs) and to proactively provide customers with bandwidth on demand. Luminous' PacketWave is a viable packet-based solution, now deployed in carrier networks.



Luminous' packet-switched architecture efficiently multiplexes voice, data and video for full use of the available bandwidth.

### Resilient Packet Ring Standard

The Resilient Packet Ring (RPR) protocol, now being standardized in the IEEE 802.17 RPR working group, provides carrier-class survivability and a cost-effective means to deliver toll-quality TDM voice on the same efficient packet-based platform as IP data services. The RPR standard is expected to be complete in 2003.

Luminous Networks' RPR implementation provides synchronization for voice and video traffic. RPR demonstrates significant savings over traditional SONET circuit technologies, particularly for mixed voice and data services. As data traffic grows, the price-per-megabit of traffic dramatically decreases for RPR-based solutions compared to aging voice-centric approaches.

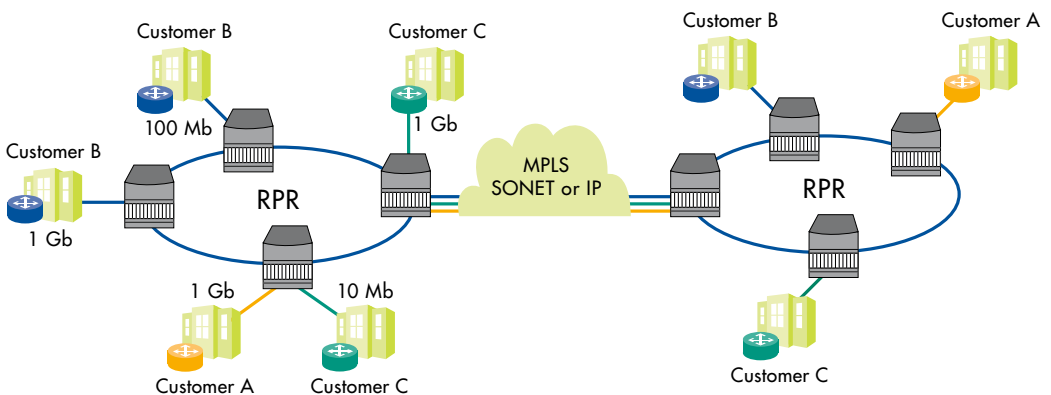
### RPR over Legacy Carrier Networks

Luminous' PacketWave RPR-based platform allows carriers to seamlessly evolve their networks from a circuit-switched to a packet-switched architecture. This ensures continuous support for legacy voice, new packet-based Virtual Private Networks (VPNs), and digital video services.

With its integrated flexible Dense Wavelength Division Multiplexing (DWDM) technology, Luminous' PacketWave metro optical access switches enable carriers to operate both SONET and RPR networks over common fiber facilities. RPR can be transported over existing SONET/SDH systems via the standard optical interfaces OC-12 or OC-48.

### RPR for Greenfield Deployments

For carriers with greenfield networks, RPR enables deployment of a packet-based technology that accommodates data, TDM voice and circuit services. Examples of greenfield networks include new campus fiber networks for universities or business campus backbones. Luminous' PacketWave solution supports all the standard TDM and IP interfaces—T1/E1 and DS3 for private lines, 10/100/1000 Mb Ethernet for data, and OC-N for ATM or SONET. The packet-based architecture enables service providers to offer innovative revenue-generating services such as Transparent LAN Services (TLS) and VPNs.



Luminous' PacketWave enables innovative transparent LAN services to connect remote business sites.

# 99.999% availability

and recovery from network outages in less than **50 milliseconds**



## Services and Benefits

Luminous' PacketWave supports multiple services in both legacy and greenfield applications:

### Ethernet and IP Data Services

The PacketWave family enables carriers to rapidly build new revenue streams from IP data services. VPNs are offered via a comprehensive set of data interfaces and powerful Layer 2/3 capabilities.

### TDM Voice and Circuit Services

PacketWave offers complete support for delay-sensitive services such as voice and video. This includes guaranteed Quality of Service (QoS) metrics such as latency and jitter for private lines services. A key advantage is PacketWave's ability to support full synchronization of TDM circuits over a packet-based network. Now carriers can seamlessly evolve their networks from circuit-based to packet-switched architectures, while continuing to support revenue-generating legacy services.

### Video Services

PacketWave provides support for digital and analog video services. These include digital MPEG Asynchronous Serial Interface (ASI) video cards and Intermediate Frequency (IF) video cards for use in cable television networks. Key applications such as Video-On-Demand (VOD) and Pay-Per-View (PPV) can now be supported over a common packet transport solution to help service providers generate additional revenues.

### Integrated DWDM

The PacketWave platform helps carriers manage their networks by integrating DWDM capabilities. DWDM accommodates SONET and RPR networks simultaneously by assigning each to a unique wavelength.

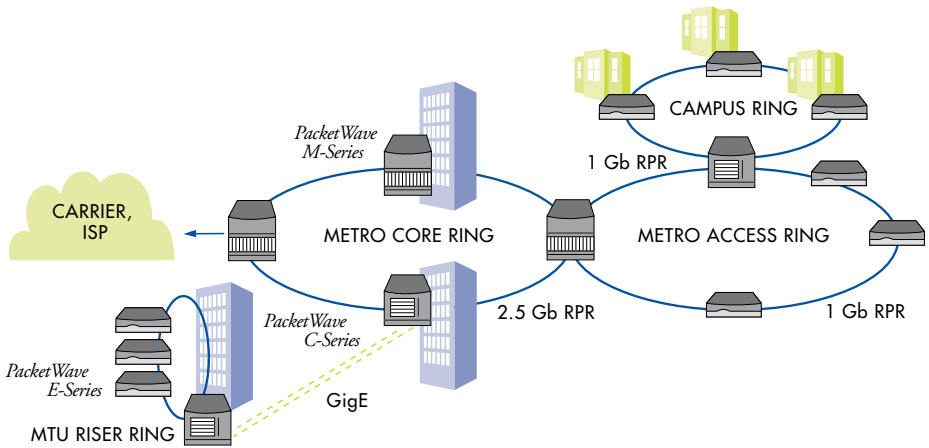
### Service Velocity

PacketWave's simplified, packet-switched architecture enables carriers to quickly and cost-effectively allocate bandwidth and establish Class of Service (CoS) with simple point-and-click provisioning. This significantly improves the time-to-market for new carrier services.

### Service Resiliency

PacketWave's carrier-class capabilities support stringent quality levels, including 99.999% availability and the ability to recover from network outages in less than 50 milliseconds. PacketWave—the industry's first carrier-class packet solution for Metropolitan Area Networks (MANs)—is shipping today.

# Broad Metro Product Line



Luminous' PacketWave provides a carrier-class and

## PacketWave M-Series for Metro Access



The PacketWave M-Series is the flagship solution designed for metro access applications. This rugged, NEBS Level 3 certified metro platform provides complete redundancy and the 99.999% availability demanded by today's metro carriers. Key capabilities include digital video, Gigabit Ethernet and traditional private line services such as voice.

## PacketWave C-Series for Metro Edge



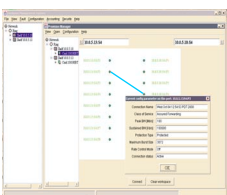
The PacketWave C-Series is a smaller, more compact solution designed for both access and edge applications. This reliable solution—based on the same technology and user cards as the larger M-Series—extends RPR rings into large buildings and campus networks.

## PacketWave E-Series for Customer Premises



The PacketWave E-Series is designed for customer premises deployment. This compact system is only 2 rack units in height and provides a reliable, AC-powered option for extending RPR up the riser or to small- to medium-size enterprises. These Ethernet access devices support both TDM and Ethernet interfaces.

## Luminous Management System



The Luminous Management System™ (LMS) is a comprehensive tool for provisioning and managing the PacketWave network. It provides simple point-and-click provisioning for all services, with up to 8 Classes of Service. The LMS ensures carriers real-time performance monitoring at the system and port levels, with detailed statistics and full FCAPS support for Fault management, as well as Configuration, Accounting, Performance, and Security management.

***cost-effective*** means to deliver **toll-quality TDM voice**  
on the same **efficient** platform as Ethernet data

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