HOWARD TECHNOLOGY SOLUTIONS

# BlackDiamond® 12804R

*The BlackDiamond 12804R is purpose-built to deliver new business and residential services on a single platform.*

## Features

- High service density to increase revenue per subscriber
- Carrier-class scalability to scale and manage networks with ease
- Carrier-class availability to offer high-quality services and avoid service disruptions

## Target Applications

- Triple play of Internet access, IP Telephony, IP Television (IPTV), and more to residential subscribers
- Prioritized VPN, Internet access, Voice-over-IP (VoIP) and other applications over point-to-point (E-Line) or multi-point (E-LAN) connections to business customers.
- Aggregating residential triple play and business services on a common platform

The metro Ethernet market continues to grow, but increased competition and customer churn have metro service providers demanding solutions that increase revenue and lower operational costs. Designed from the ground-up for high service density, the BlackDiamond 12804R enables metro service providers to increase revenue with more subscribers, and more services per subscriber.

BlackDiamond 12804R allows a single Ethernet network to deliver both residential and business services. Residential services include triple play where each subscriber can be directed to unique content providers for telephony services, IPTV, Internet access, and more. Business services include standard E-Line and E-LAN to connect multiple sites, plus tiered Internet access and VoIP to each business with hierarchical bandwidth and content redirection controls.

Technology innovations built into the BlackDiamond 12804R makes scaling and managing larger networks easy. The carrier-class BlackDiamond 12804R incorporates hardware, software and network-level resiliency features to prevent service disruptions.

## High Service Density

### Tiered Bandwidth Control

The hierarchical Quality of Service (QoS) engine in the BlackDiamond 12804R allows the setting of bandwidth limits per service, per subscriber and per port. Thousands of subscribers with varying service requirements can share the same gigabit or 10 gigabit port, enabling scalable residential DSL and cable triple play services. Subscribers from each DSLAM or CMTS are aggregated into a shared connection to the BlackDiamond 12804R for service control.

The BlackDiamond 12804R allows bandwidth controls at ingress and egress, so bandwidth can be reserved both to the customer for applications such as video on demand as well as from the customer for Peer-to-Peer applications.

### Granular Content Delivery

The BlackDiamond 12804R supports rich service multiplexing capabilities using Extreme Networks Virtual Metro Area Networks (vMANs) technology. Thousands of DSL or cable subscribers aggregated into a common port can use different Internet Service Providers (ISPs) for Internet Access—each subscriber can be routed on a unique vMAN to the respective ISP. Similarly, the video content from the metro provider can be distributed based on unique services purchased by a subscriber.

vMAN Cross-Connect enables bridging regional VLANs and vMANs to connect business sites. For a business that uses different VLANs or vMANs per site, the metro service provider can translate the customer tags between the sites, so the business can leave its internal infrastructure unchanged. This is useful in mergers and acquisitions and other activities that require convergence of multiple networks.

### CLEAR-Flow Security Engine

The BlackDiamond 12804R is designed to support new revenue-generating services using CLEAR-Flow, a fundamental new approach to detect and block security attacks at 10 gigabit speeds. Using the monitoring and programming scale of Extreme Networks ASICs, ExtremeXOS™ and memory architectures, CLEAR-Flow examines each and every packet, at line-rate, and immediately acts upon rogue traffic, protecting each subscriber and their networks.

## Carrier-Class Scalability

### Network Scaling

By allowing overlapping VLANs in a network, vMANs enable metro providers to scale to large numbers of customers. A customer's Layer 2 domain can be identified by a combination of vMAN and port, allowing metro service providers to accommodate a large number of vMAN customers on the same Ethernet network.

vMAN translation on Network-to-Network Interface (NNI) ports combined with hierarchical QoS allows the BlackDiamond 12804R to peer with other network and application providers and extend network reach. Traffic to and from each peer can be controlled per vMAN and per class of service.

For additional scale, a metro provider can map each vMAN to a unique MPLS tunnel using Hierarchical VPLS (H-VPLS). By taking advantage of the Layer 2 traffic per customer and the hierarchical hub-and-spoke connectivity at the MPLS edge, H-VPLS provides a scaleable approach to build an MPLS core.

The MAC-in-MAC protocol, based on the emerging IEEE 802.1ah standard, allows the metro provider to scale the network with Ethernet technology, maintaining management and operational simplicity and lower costs. MAC-in-MAC encapsulates vMAN traffic into an additional Ethernet header for routing within the core. Therefore, core Ethernet switches only need to learn the MAC addresses of edge switches that are directly connected to the core, and not the MAC addresses inside the customer VLANs. MAC-in-MAC also provides a higher number of vMAN instances for scaling to more subscribers.

### Service Provisioning

In addition to CLI and SNMP, BlackDiamond 12804R allows a metro provider to build a rich service-aware OSS by leveraging XML. The secure XML interface provides easier integration with best-of-breed monitoring and security devices, and provide a higher scale of network operations.

### Service Diagnostics

The BlackDiamond 12804R supports fault-management capabilities being standardized with IEEE 802.1ag. These capabilities allow Layer 2 ping, traceroute, and continuity checks, so that any link or switch failure can be quickly detected and corrected.

## Carrier-Class Availability

### Hardware Redundancy

Resiliency is integral to each component on the BlackDiamond 12804R. ECC memory is used to automatically correct memory errors. Hot standby management and switching modules, passive backplane, redundant power supplies and fan controllers provide high-availability in the rare case of component failures. The system architecture—separate data and control plane, large packet buffers for traffic bursts, large address tables for subscriber scale, hardware-based traffic monitoring, and optimized multicast replication—maintains high-performance with a varying traffic and services mix.

### Software Availability

BlackDiamond 12804R uses the modular ExtremeXOS operating system, which allows software modules to be individually restarted and updated without requiring the shutdown of other modules. The switch is protected against attacks with MD5 authenticated routing protocols, secure SSHv2 and SNMPv3 management access, Longest Prefix Match to avoid CPU thrashing, Denial of Service mitigation with CPU limiters, and large number of flexible ingress and egress ACLs to control access.

### Network Resiliency

BlackDiamond 12804R supports an array of high availability protocols including Ethernet Automatic Protection Switching (EAPS), a technology that provides loop-free Ethernet networks with SONET-like failover under 50 milliseconds.

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