# Storage Area Networks

## FEATURES AND BENEFITS

- GigaEdge 232 TDM multiplexes up to 4xAny or 8xESCON SAN protocols on a single fiber or wavelength pair where Any = GE ESCON, FICON, FC & 2G-FC.
- Standard SFP interfaces supported on all ports (tributary and line).
- GigaEdge 232 conforms to the low latency ITU-T GFP-T Standard for mapping of bytes from tributary SAN ports to OC-48 / STM-16 aggregate (line) ports.
- Remote GigaEdge 232 Muxes are manageable from a central processor site using in-band DCC over OC-48 / STM-16 line interface.
- Low footprint, low power and low cost 232 edge solutions optimised for the edge of the access network.
- GigaEdge 8200 CWDM ROADM is available as a low cost Metro ring interconnecting SAN sites
- The GigaMux 3200 DWDM Metro rings can be deployed by carriers to interconnect SAN sites and can grow to up to 40 wavelengths
- The GigaMux 6400 DWDM Metro rings can be deployed by large enterprises to interconnect SAN sites with up to 80 wavelengths
- The GigaMux products also have TDM multiplexing options for bandwidth efficiency as well as transponders for ISC, ETR, 4G-FC,10G-FC and 10G-Ethernet

**Sorrento's GigaMux 6400 & 3200 DWDM, GigaEdge 820 CWDM and GigaEdge 232 TDM multiplexers provide low cost, low latency, bandwidth efficient Storage Area Networks (SANs) for carriers and enterprises — small, medium and large.**

Enterprises are today highly dependant on high speed private data networks for interconnecting local and remote processing and storage facilities. Additionally, disaster recovery needs require remote storage facilities to be at least 50km to 100km away from central processing facilities. To achieve high speed data transfers between servers and storage devices over these distances requires switching and transport protocols and equipment which are optimized for low latency.

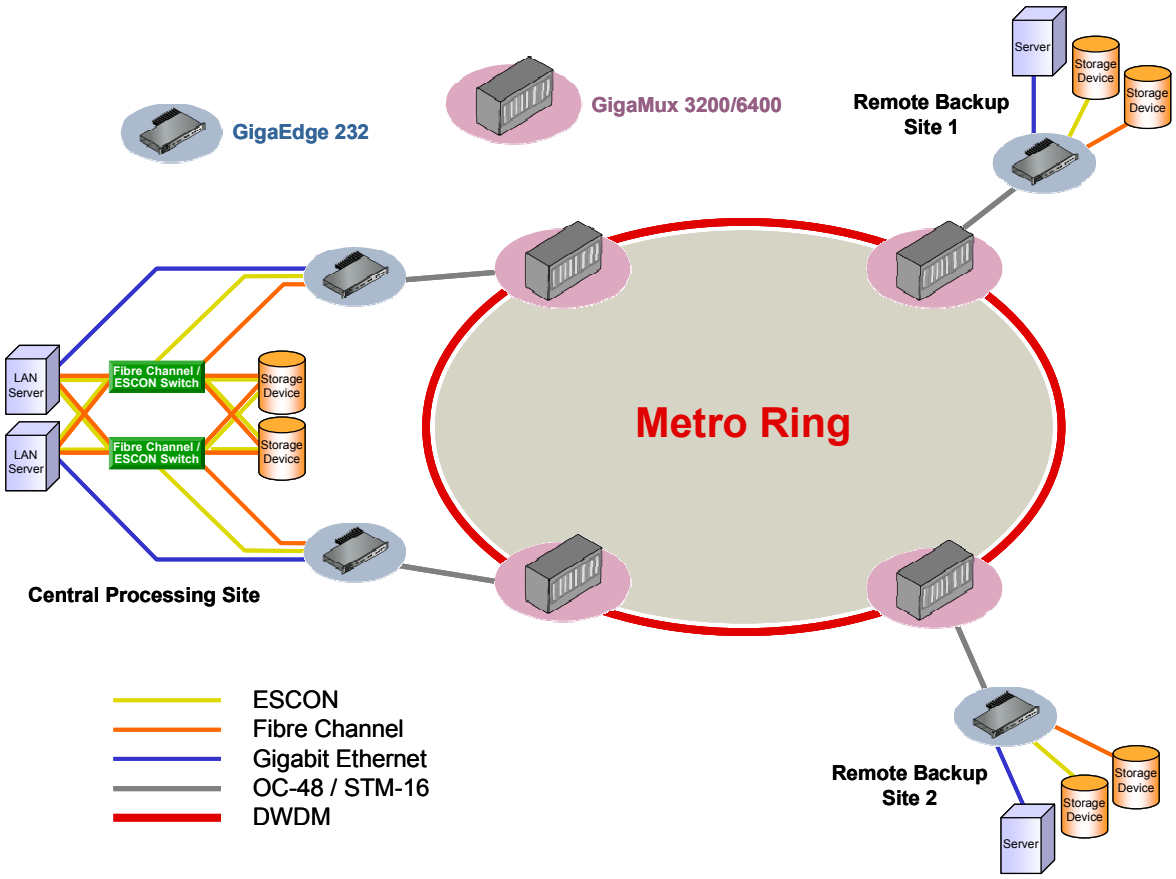
Storage Area Networks (SANs) based on low latency protocols such as ESCON, FICON and Fibre Channel (FC) have been developed for remote backup and disaster recovery applications with Fibre Channel designed to provide low latency transport over distances of up to 100km without the need for buffering. Additionally, the ubiquitous deployment of Gigabit Ethernet (GE) for LAN-LAN and LAN-Server networks has resulted in its use for some SAN applications as an alternative to FC. Being a legacy SAN protocol, 200 Mbps ESCON supports much shorter transmission distances without buffering and is gradually being phased out in favor of FICON, FC and GE. However, there are often many parallel ESCON links that have been stacked-up over time to achieve the same bandwidth as Fibre Channel and enterprises are often reluctant to remove them due to the hidden costs of hardware & software upgrades.

To meet the low latency, high-bandwidth and multi-channel needs of SAN applications, DWDM, CWDM and bit or byte-interleaved TDM technologies and standards have evolved. In the case of TDM, ITU-T G.7041 Generic Framing Procedure with Transparency (GFP-T) is the preferred standard for low latency, with mappings available for ESCON, FICON, FC and GE. Sorrento's products conform to these standards.

GigaMux 6400


GigaEdge 820


GigaEdge 232




## Small Enterprises

Small enterprises will generally need only a few channels for inter-connecting a central processing site and remote backup sites. However, like large enterprises, they will have the need for a mission critical network which has no single point of failure. To service their needs, they may lease from a local carrier, fibers or wavelength-pairs for inter-connecting various sites.

To maximise the bandwidth utilisation of each fiber or pair of wavelengths and thus minimise the lease cost, Sorrento can provide a GigaEdge 232 for installation at the edge of the network that multiplexes up to 4 x Any protocols onto OC-48/STM-16. An example configuration might include a legacy ESCON + new FC + GE. If a total of 8 x ESCON interfaces are required, then a pair of low cost GigaEdge 232s can be added in a stacked configuration. These will multiplex the additional ESCONs onto a 2nd OC-48/STM-16 aggregate transmitted over another fiber or wavelength-pair.

## Medium Enterprises

Medium sized enterprises can deploy the Sorrento GigaEdge 820 product to implement a low cost Metro CWDM ring with fault-tolerant ROADM capabilities. The GigaEdge 232 product is again used to provide low cost multiplexing of 4xAny or 8xESCON SAN protocols into one or two CWDM channels and 1 fiber.

## Carriers & Large Enterprises

Both carriers and large enterprises can deploy the Sorrento GigaMux 3200 or 6400 products to implement a Metro DWDM ring as shown in the above diagram. Dual homing from central processing equipment to two Metro ring nodes and to two remote backup sites meets the no single point of failure requirement. In the case of large enterprises requiring more bandwidth and channels, the GigaMux 6400 is cost-effective for deployment at the customer sites with built-in TDM multiplexing cards for providing bandwidth efficiency.

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**Sorrento Networks**
9137 East Mineral Circle
Suite 340
Centennial, CO 80112
www.sorrentonet.com

About Sorrento Networks Inc.