

# Campus/Metro Area 8+1 Channel CWDM module



## Rainbow C9 by Obsidian

### Synopsis

Rainbow C9 is a passive Coarse Wavelength Division Multiplex (CWDM) module, capable of bi-directionally interfacing up to 8 CWDM wavelengths (plus a standard 1310nm channel) with a single fiber pair, suitable for driving up to 90Gbits/second of full-duplex InfiniBand traffic over tens of kilometers.

Four Rainbow C9 devices fill a 1RU shelf, delivering a high-density wavelength management capability – 36GBytes per second over 4 fiber pairs using 10Gbits/second LAN port modulation rates.

Rainbow C9 is an un-managed, passive and bit-rate/ protocol agnostic optical device, consuming no power and providing highly reliable operation with minimal insertion loss.

### Background

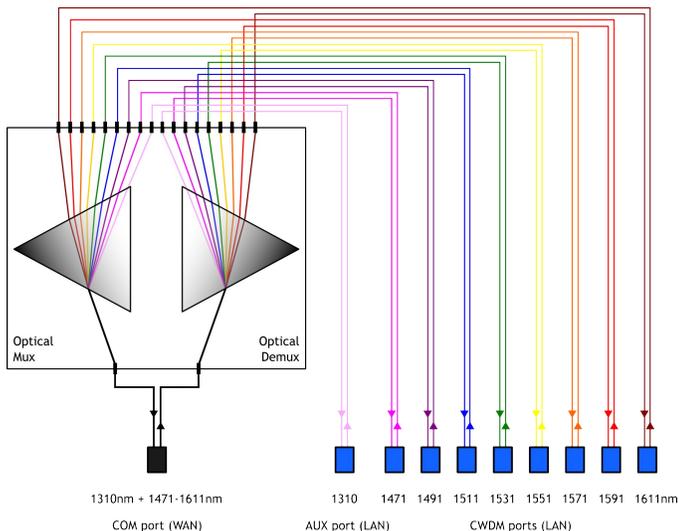
Obsidian's Longbow C100 devices allow parallel 4X InfiniBand channels to be transparently range extended up to 80km (50 miles), through buffer credit extension and bit-stream serialization over 10Gbits/second optical light paths.

Due to the maturity and cost-effectiveness of 10Gbit/second optical components, it is preferable to achieve high link bandwidths by deploying multiple 10Gbits/second channels rather than, say, 40Gbits/second optics. InfiniBand distributes traffic across multiple parallel links - and this approach also provides some level of protection against certain link or component failures.

In environments where fibers are abundantly provisioned, each Longbow pair can drive its own fiber pair. However for many links this is not possible, and this is where the Rainbow C9 plays a role:

### Function

Each Rainbow C9 module has ten front-facing duplex-LC optical ports:



The eight local CWDM ports are each associated with a different wavelength (color), and must be connected to optical transceivers that are matched to that wavelength. Each local port is labelled with the channel number associated with the wavelength it is tuned to – channels from 47, 49, 51 .. 61 corresponding to 1471nm to 1611nm wavelengths in 20nm increments.

The AUX port is suitable for direct connection to a standard 1310nm transceiver. It is treated as a ninth CWDM LAN channel, but conveniently supports non-CWDM transceivers.

The WAN port, labelled 'COM', aggregates all 9 wavelengths of independently modulated LAN data.

The Rainbow C9 is a full duplex device, performing both the combination of nine local wavelengths onto the single outgoing WAN fiber, and the splitting of the single incoming WAN fiber's light into its nine local wavelengths.

### Specifications

#### Chassis

Mounting (Desktop)	Fitted with rubber feet
Mounting (Quad Pack)	19" rack-mount shelf, front mounting no-rail system
Physical	1.5"x4.25"x13"
System power	Passive; 0W, no airflow

#### Optical

Connector	Duplex-LC (ceramic couplers)
LAN WDM wavelengths (nm)	1471, 1491, 1511, 1531, 1551, 1571, 1591 & 1611
LAN AUX wavelength (nm)	1310
WAN port wavelengths (nm)	1310 + (1471-1611)
Insertion loss (dB)	1.9 (typ.) 2.4 (max)
Pass band width (nm)	15
Adjacent isolation (dB)	30 (min) 40 (typ.)
Non-adjacent isolation (dB)	40 (min), 50 (typ.)
Maximum power (mW)	300
Insertion latency (ns)	2 (max)

(A pair of interconnected Rainbow C9s create an insertion loss of 4.8dB (max), which must be accommodated by the link budget)

#### Signal

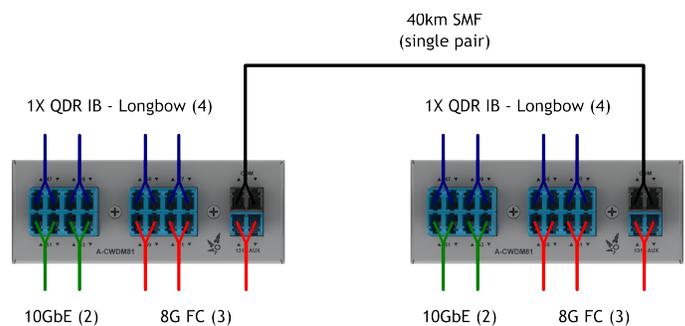
Protocol	Agnostic
Bit-rate	Agnostic

#### Management

Rainbow C9 itself is passive and un-managed, however, important set up and diagnostic measurements such as optical power levels, bit error rates and traffic volumes can be determined through the management mechanisms of the Longbow C100 devices driving the 1X QDR InfiniBand channels.

### Applications

Rainbow C9 can be used to combine up to nine optical signals of arbitrary protocol and bit-rate - providing the center wavelengths and pass bandwidths are respected. Thus, the device would combine parallel Longbow InfiniBand links with other traffic, such as 10Gbit Ethernet or Fibrechannel - for example:



### Rainbow C9 models (Longbow accessory)

**Rainbow C9** (8+1) Channel passive CWDM accessory, type 1

### Contacts

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