



Bhumika International Inc.

VCL100ME

STM-1 / STM-4 SDH Add-Drop Multiplexer

Product Brochure & Data Sheet

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Introduction

Traditionally SDH was being used for providing high speed traffic due to its robust architecture and rapid protection schemes. As the traffic pattern changed, there was a need to support multiple services from the same equipment like integrated data transport, better network management etc. This necessitated evolution to Next-Generation SDH.

Next generation SDH/SONET has emerged as one of the most economical and technologically viable solution for transmitting both voice and data over carrier networks. This technology offers savings on investments, power and space to service providers. The latest Multi Service Switching Platforms (MSSPs) and Multi Service Provisioning Platforms (MSPPs) speed up provisioning of new services and optimize network efficiency through better utilization of its network.

Bhumika provides efficient solutions in this field using the VCL100 series products. VCL100ME provides a full range of solutions in this evolving field of NG SDH/SONET. VCL100 family provides the unique advantage of carrying both data and voice over SDH/SONET. In addition to the expensive solution provided by this family, these products have built in modularity, which allow easy upgradeability. This upgradeability feature allows the customer to evolve in "build-as-you-grow" concept, the VCL100 family provides the following features:

- Easy network manageability
- Lower cost per line
- Easy upgradeability
- Carrying both data and voice over SDH/SONET
- Higher reliability



VCL100ME
STM-1 / STM-4 SDH Multiplexer

Architectural Details

VCL100ME, an STM-1/4 platform has been envisaged to address the growing demand for an ultra-compact STM-1/4 ADM platform that can be a low-end entry box for facilitating / interfacing to transport equipment in the core network. STM-1/4 version will be primarily used in the access rings to provide limited E1/DS1 drops and provide Ethernet-over-SDH mapping functions, including LCAS with Virtual Concatenation (VCAT).

VCL100ME supports the following interfaces:

- STM-1 (155.52 Mbps)
- STM-4 (622 Mbps) interfaces
- E1 / DS1
- E3 / DS3 Electrical
- E1 / T1 Interface cards
- E3/DS3
- 8 port 10/100Base
- It can be configured in various topologies such as linear, ring or mesh.

Key Features

Multi-service platform:

VCL100ME supports data and voice traffic.

Ethernet over SDH (EoS):

Ethernet card complies with GFP standards. Supports port-based and 802.1Q based VLAN, 802.1p priority, traffic filtering based on MAC Address/ network layer protocols. It supports LCAS, Lower and Higher Order Virtual Concatenation, Full/half duplex and auto-negotiation.

Flexibility:

It can be configured in various topologies supporting both electric and optical interface. It can take modular cards, which would enable the customers to start small and grow as traffic demands scale. All interfaces are in front for easy access.

Protection:

VCL100ME provides protection features using sub-network connection protection (SNCP) and MSP with switching time less than 50 ms. The base card which contains cross-connect, control plane, timing circuitry can be configured redundant by duplicating the base card.

Supports 1:N protection for E1/E3/DS3 (Available in 2Q06)

Configuration:

VCL100ME can be configured as add-drop multiplexer (ADM) and terminal multiplexer (TMUX). It can support diverse topologies like point-to-point, Bus and Ring topologies.

Cross-connect capability:

STM-1/4 Base card will support completely non-blocking 16x16 STM-1 cross-connect at VC-12 granularity.

STM-4 Base card will support completely non- blocking 64x64 STM-1 cross-connect at VC-12 granularity.

Automatic Topology discovery:

VCL100ME has the ability to automatically discover nodes and trunks within the optical domain, and then intelligently provision the circuit accordingly. This eliminates cumbersome operator intervention and substantially reduces costs.

Miniature size:

VCL100ME is one of the most compact STM-1/4 products available in the market, and provides an optimal solution for installation in 19 inch rack. VCL100ME is only 4.5U high and has a dense port configuration.

Synchronization

Stratum-3/G.813 option 1 compliant timing and synchronization functions.

Laser protection:

VCL100ME comes with SFP-based optical line interfaces with digital diagnostics capability for SFPs.

System Overview

The VCL100ME Multi-Service Provisioning Platform (MSPP) is an STM-1/4 SDH/SONET multiplexer equipment designed to manage bandwidth and derive services from the optical core to access. The product supports end-to-end provisioning and management of services across all the segments of the optical network.

It will have two options of base cards,

1. STM-1/4 Base card: It will support integrated 2.5G cross-connect, control and timing module.
 - SFP Based optics allows power and voltage monitoring
 - Supports 1/2x STM-1(S1.1, L1.1, L1.2) SFPs
 - Supports 1/2x STM-4(S4.1, L4.1, L4.2) SFPs

2. STM-4/16 Base card supports integrated 10G cross-connect, control and timing module. **(Available in 2Q06)**
 - SFP Based optics allows power and voltage monitoring
 - Supports 1/2x STM-4(S4.1, L4.1, L4.2) SFPs
 - Supports 1x STM-16(S16.1, L16.1, L16.2) SFPs

VCL100 Chassis

VCL100ME can be installed in 19". The dimensions are 199mm(H)x445mm(W)x231mm(D). It supports 4 tributary-slots. It has the provision to configure redundant cross-connect and control card

Protection		Protection	
PSU # 1 (Slot)	Tributary Card 1		
	Tributary Card 2		F a n s
OAM (Slot)	System Card #1		
	System Card #2 (Slot for redundancy)		
PSU # 1 (Slot)	Tributary Card 3		
	Tributary Card 4		

Aggregate Interface

Base card will support SFPs for STM-1/4.

- Supports 1/2x STM-1(S1.1, L1.1, L1.2) SFPs
- Supports 1/2x STM-4(S4.1, L4.1, L4.2) SFPs

Craft, Modem and Ethernet Management Interface

It provides craft port, V.24/V.28 modem and 10/100 BaseT Ethernet interface. The Ethernet port is used for NMS purpose. Engineering order-wire (EOW) support is provided optionally using E1/E2 bytes on RJ11 interface.

Diagnostic, Clock and Alarm

VCL100ME allows external 2MHz or 2 Mbps timing signal inputs for synchronizing the input. Detailed synchronization procedure can found later in this system guide.

Potential free contacts are supported for extending the alarms. There are 7 alarms input and 4 alarms output.

Tributary Cards

VCL100ME has four tributary slots, which can provide E1/DS1, E3/DS3, Ethernet or STM-1 o/e interfaces. A maximum bandwidth of 8xSTM-1 can be dropped.

21/28 x E1/DS1 tributary card:

Depending on the requirements VCL100ME can be provided with 21/28 port E1/DS1 card.

1/3 x E3/DS3 tributary card:

VCL100ME can provide 1 or 3 port E3/DS3 support. VCL100ME carries the E3 traffic in an AU4 mode.

1/2xSTM-1 o Tributary card:

The lasers supported are S1.1, S1.2, L1.1 or L1.2 depending upon required reach of the link. All STM-1 interfaces are software configure into the same mapping mode viz., AU3 or AU4, as the case maybe.

1xSTM-1e Tributary card:

STM-1e interfaces can be supported

8- port 10/100 Base-T Ethernet tributary card:

The Ethernet data is carried on multiple VC-12's in granularities of 2 Mbps. Depending on the customer requirement each of the 8 ports in Ethernet card can be configured to carry data in increments of 2 Mbps, such that the aggregate traffic bandwidth from Ethernet card is 155 Mbps. It supports LCAS, GFP, Lower and Higher Order Virtual Concatenation, Full/half duplex and auto-negotiation. It allows robustness of SDH protection mechanism and allows geographically separated LAN or VLANs to be interconnected (Transparent LAN service).

Synchronization and timing

VCL100ME can derive its clock from the following source

- **Line-timed mode:** In this mode VCL100ME derives its clock from any one of the E1 tributaries or STM-1/4 signals.
- **Externally timed mode:** In this mode an external 2048 KHz or 2 Mbps signal could be used as the clock source
- **Holdover mode:** In this mode, VCL100ME uses the stored timing data to control the output frequency for a short duration (of around 24 hrs). Beyond this it uses its own internal oscillator in a free-running mode.

VCL100ME supports Synchronization Status Messaging (SSM) as per ITU-T standards. This is a messaging technique, which enables a SDH equipment to determine the derivation of a timing source. It uses overhead bytes contained within the SDH overhead (S1) for transmitting these messages. Thus when a failure occurs, elements communicate timing reconfiguration information across the network. This is used by VCL100ME for the purpose of synchronization.

VCL100ME provides a 2.048 M BITS clock output, which can be set to either a 2.048 MHz clock or a framed E1 data at 2.048 Mbps.

Power Supply

VCL100ME is powered by a 48V dc power supply or 230V AC, which drives the various subsystems in it.

Protection Features

VCL100ME provides the following protection features:

- VC-12 and VC-3 Path Protection Switching (LO/HO SNC as per G.841 §8)
- 1+1 linear APS (as per G.841)
- On card level, E1 card protection can be provided.

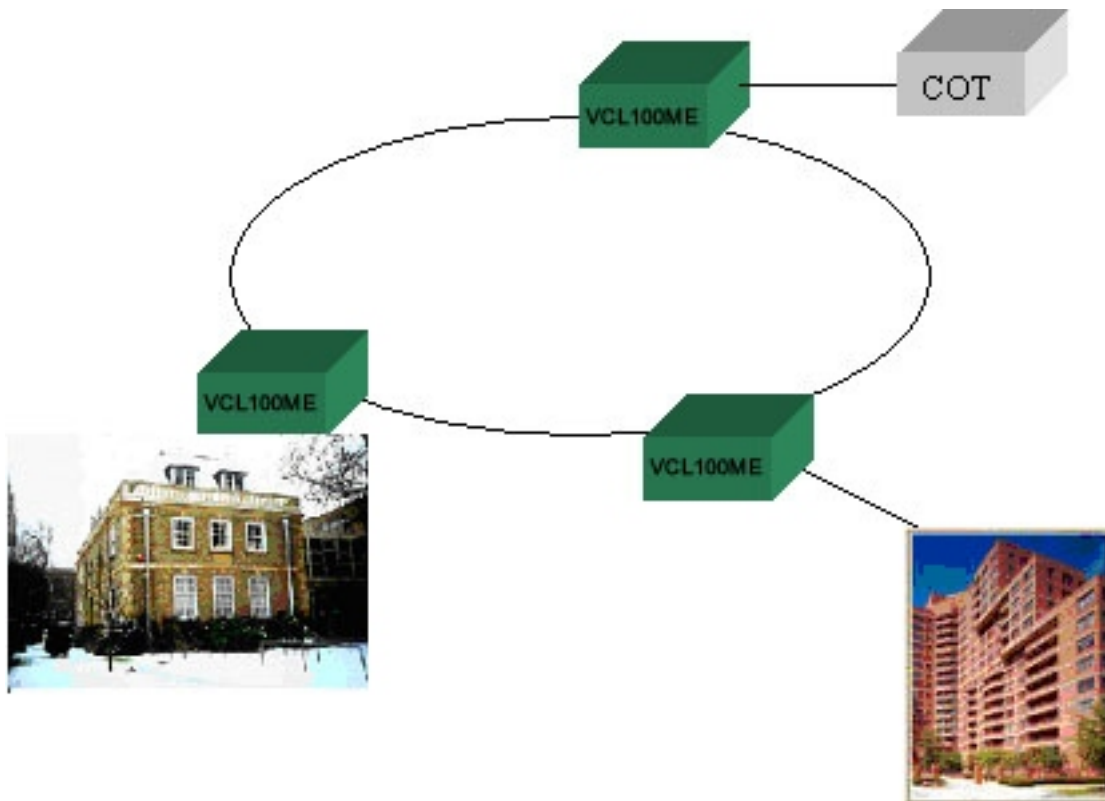
Applications

VCL100ME in various configurations like TMUX, ADM and DXC, can be used in the access network to provide Fiber to the Curb/Fiber to the Building (FTTC/FTTB). This product is a highly reliable, easily manageable system, which comes at real cheap price.

FTTC / FTTB

VCL100ME is an ideal platform to provide high-end data and voice requirement of clients. It can be installed in customer's premise and can provide voice traffic requirement from E1 cards from base chassis, by using the termination slots on the chassis. In addition ME can provide Ethernet connectivity. We can provide Ethernet connection with bandwidth ranging from 2 Mbps to 100Mbps with a granularity of 2 Mbps. As the customer bandwidth requirement increases ME can be configured remotely to provide the requisite bandwidth. This allows a really scalable approach, providing bandwidth-on-demand feature.

FTTC / FTTB Applications

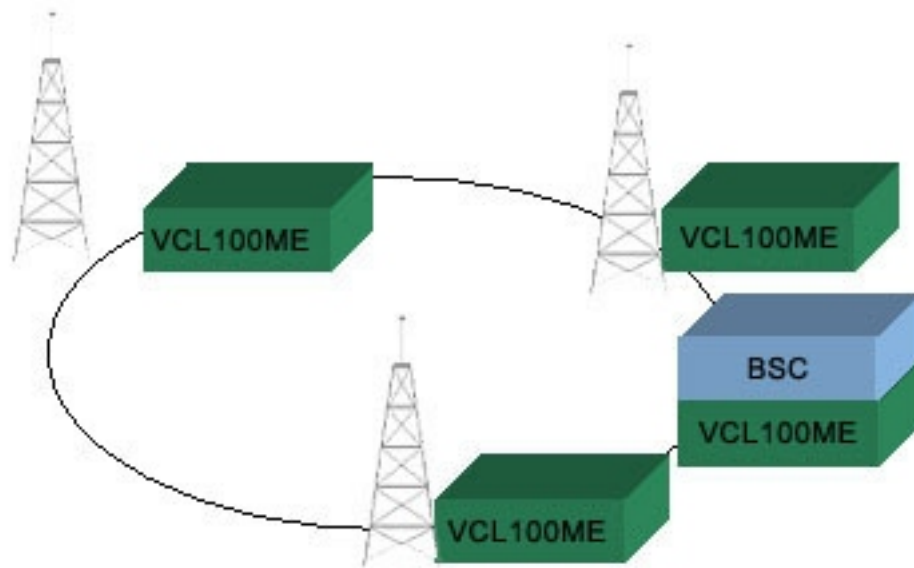


The cellular mobile network is evolving at a very fast pace. To keep up with the rapid pace at which the cellular network is evolving, the underlying SDH network, which provide E1 connectivity to the base stations (BTS) should be able to upgrade at a very fast pace. VCL100ME provides the ideal platform for this evolution. VCL100ME transports the E1 signal reliably from BTS to base station controller (BSC).

One critical feature for cellular networks is the need for precise timing and synchronization. VCL100ME allows the user to access timing information from the line, external clock or internal stratum-3 source. In a line-timed mode, it derives its clock from any one of the E1 tributaries or STM-1/4 signals. In an externally timed mode, an external 2048 KHz or 2 Mbps signal could be used as the clock source. If none of these sources are available, VCL100ME goes into a holdover mode when it uses the stored timing data to control the output frequency for a short duration (of around 24 hrs). Beyond this it uses its own internal oscillator in a free-running mode. ME supports synchronization status messaging (SSM) for timing reconfiguration information.

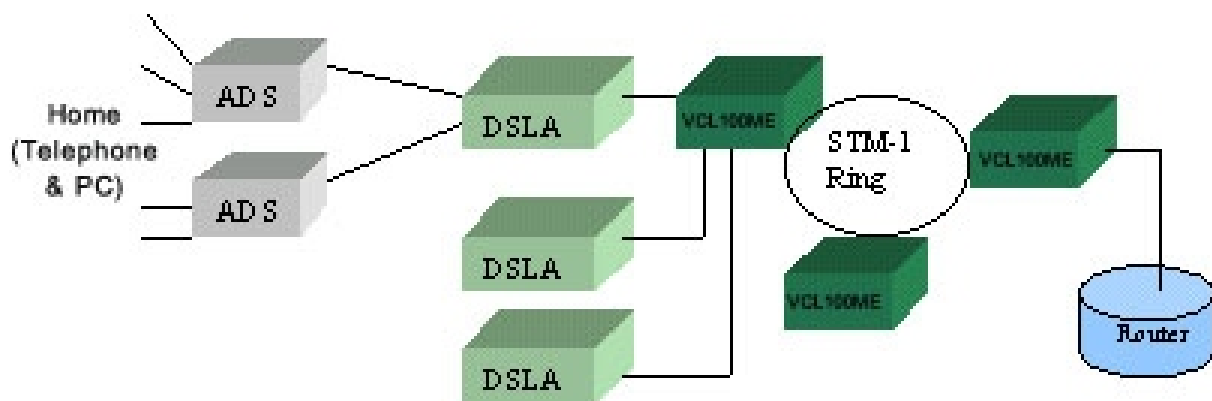
The miniature size and low power consumption makes VCL100ME an ideal choice for remote integration to the base station. In addition, the redundancy provided in ME makes it a reliable unit for installation.

Cellular Mobile Applications



Baseband Internet Access

With the evolution of digital subscribers line (DSL), it is possible to support 1.5 Mbps of integrated voice and data traffic using the ubiquitous copper line infrastructure. In this technology traffic from many ADSL modem terminates at DSLAM placed at the central office (CO). An example application is mentioned below. In this application, the ADSL modems connected to the CPE are connected to the DSLAM on the other side. DSLAM equipments connect to VCL100ME through Ethernet interfaces. The VCL100ME aggregates all the traffic and transports it to the router through the SDH links.



Software

VCL100ME can be managed locally using Network Element Software. Also we can centrally maintain large number of VCL100ME using Network Management Software (NMS).

NES

NES provide the following key features:

- Node-wise Operations & Maintenance
- User programmable severity levels for Alarms
- Node-wise Alarming & Remote Login.
- Performance monitoring as per the standard specifications (G.826).
- In-service monitoring of E1 tributaries.
- Supports full FCAPS functionality via web browser interface.

NES allows user to configure all the above mentioned features using a standard Hyper Text Transfer Protocol (HTTP) based web browser. NES makes the physical data connection using the Ethernet interface in the management interface module in VCL100ME. NES also allows users to control remote nodes using the web browser interface. For this purpose, NES uses DCC bytes in the STM-1/4 frame for carrying the management information to the remote node.

NES allows open software interface using the NES-SNMP software module.

VCL100ME comes with a point-and-click provisioning (PNCP) tool. This module enables customers to provision end-to-end circuits in a network that comprises all VCL family of SDH products. For this users can enable node-resident software module NES-NODE-PNCP, and the server-resident software module NES-HOST-PNCP.

NMS

VCL100ME provides support for a centralized network management through NMS. For this VCL100ME provides the following operation interfaces:

- 10/100 Mbps half-duplex LAN interface for NMS data connection to VCL100CP node (RJ45 connector)
- RS232C Craft interface for local Command Line Interface data connection
- 2 wire analog telephone interface for Engineering Order Wire (E1 or E2 bytes access) with omnibus calling (optional)

Technical Specifications

Network Topology	<ul style="list-style-type: none"> Linear Ring Mesh
Network Element Configurations	<ul style="list-style-type: none"> Single / Dual Terminal Multiplexer (Dual TMUX) Add Drop Multiplexer (ADM) Regenerator In-Line Amplifier Cross Connect
Line Side (Aggregate) Optics	<ul style="list-style-type: none"> 2 X STM-1/4 1310 or 1550 nm (ITU-T G.957 Compliant) S/L 1.1, S/L 1.2, S/L 4.1, S/L/V/U 4.2 L 1.2JE, L 4.2JE (Joint Engineering)
Tributary Interfaces	<ul style="list-style-type: none"> E1 / E3 / E4 Electrical STM-1o / STM-1e 10/100 Ethernet
Modularity	<ul style="list-style-type: none"> Modular in design, capable of upgradation to STM-4 Separate aggregate and tributary cards Mix and match tributaries – E1, E3, DS3, E4, STM-1o/e, 10/100 Ethernet
Cross Connect	<ul style="list-style-type: none"> 252 X 252 VC-12 / 1008 X 1008 VC-12 Fully non blocking Line to Line, Line to Tributary, Tributary to Line, Tributary to Tributary
Protection	<ul style="list-style-type: none"> SNCP / 1+1 MSP (as per G.841) VC-12, VC-3, VC-4 level path protection
Optional Hardware Redundancy	<ul style="list-style-type: none"> Power Supply Card Processor Card Cross-connect Card Aggregate Card
Maintenance	<ul style="list-style-type: none"> Higher-order and Lower-order POH, SDH level alarms and performance monitoring (as per G.826 and G.784) Local & remote loop back Software Downloads
Management	<ul style="list-style-type: none"> Element Management System: NES (Network Element Software), supports full FCAPS functionality. RS-232 port for craft interface V.24 / V.28 Modem interface for remote management In-band control supported using SDH Overhead 10/100Base-T / RJ45 management interface Alarm Signaling Indicators and External Contacts

Technical Specifications

Power Supply	Power Input: -48V DC nominal, -36V to 60V DC Power consumption: less than 100W
Timing & Synchronization	Timing & Synchronization of System (as per G. 813) Internal and External Timing interfaces: Two E1 BITS interfaces (G.703) Internal oscillator capable of supplying a G.813 compliant Stratum-3 SEC Support of SSM byte
Order wire support and user data Channel	E1 / E2 bytes used for Express order wire (Omnibus/ Selective calling facilities) F1 byte for user data channel
Physical Dimensions	Dimensions (H X W X D): 267 mm x 462 mm x 280 mm (10.5 in x 18.2 in x 11 in); Can be mounted on a 19" or 23" or 600mm rack Weight: 2.5 Kg (6 Kg fully loaded)
Environmental	Operating Temperature 0° to 50° C Relative Humidity 10% to 90%, non-condensing

Technical specification are subject to change without notice.

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