



CV-MCU2 Converter/Multiplexer

Multiplexing Protocol Converter Unit for Tactical Networks

- Protocol Conversion and Multiplexing at rates to 20Mbps
- Up to 5 ports of conversion in a single RU
- Wide Range of Module Capabilities
- Over 10 combinations of multiplexing and converting
- Hot-Swappable
- Modular Power Supply
- Extended Environmental Operating Range
- Simple Import/Export of Configuration Settings

Overview

Ultra-DNE's new modular multiplexing protocol converter unit, the CV-MCU2, combines flexibility and versatility into its most space efficient design to date. This sturdy 5-port design expands upon the interoperability suite of DNE's converter products while incorporating the option to function as a next generation Trunk Group Multiplexer.

Today's communication systems are changing almost daily, needing higher speeds, smaller footprints, and more robust features. The CV-MCU2 is a low-cost flexible platform that allows deployed troops to support both new and legacy equipment while making use of higher speed Line of Sight and Beyond Line Of Sight radios that have become the affordable alternative to high cost satellite services.

Users can benefit from the industry-leading density of standalone protocol converters within a single rack unit while also minimizing fiber and cable requirements by multiplexing low speed circuits across a common path. Users can allocate bandwidth on a per-channel basis, allowing many combinations of multiplexing and converting.

The CV-MCU2's Universal Converter Modules allow interoperability with the largest number of legacy converter interfaces available, including the Canoga Perkins 2270 and JTC3A 9109C compliant units such as ITT's GSC-54 and Northrop Grumman's MD-1272. The extensible architecture of the CV-MCU2 will allow for expansion into additional interface types.

Each 1-U high chassis allows for up to five separate option modules equipped with both copper wire and optical fiber

connections. This mix-and-match architecture will allow over 10 combinations of muxing and converting while answering the need for lightweight, space-efficient equipment that is scalable to the data volume requirements.

The CV-MCU2 chassis is installed only once, allowing van cabling and rack-mounted modules to remain permanent. This feature enables the user to expand speeds or alternate protocols and multiplexing / converting function through software set-up at the user interface.

The CV-MCU2 chassis is software upgradable to the CV-MCU2+. This field upgrade provides support for the latest releases and features of modules, including the UCM+ and the Ethernet Bridging Module (EBM).

Overview

The Ultra-DNE CV-MCU2 chassis can mix and match application circuits - for example, a single 1RU chassis can host a CDI-to-NRZ conversion that interfaces to a CV-8448-D, an NRZ-to-Fiber conversion that interfaces to a MD-1272/G, as well as support as 2-port to 1-port multiplexing link which accepts two fiber inputs and converts to a single NRZ radio uplink.

The CV-MCU2 can operate as a replacement to or in conjunction with the existing equipment that will further grow with the customer's demands. The CV-MCU2 can be on one end of a fiber run while the other end can be terminated with the legacy equipment. This flexibility allows the user to upgrade or replace functionality on an as-needed, per-circuit basis.

Each port can operate independently as a converter at rates up to 18.840Mbps, depending on interface type, hosting up to a total of over 90Mbps throughput in a single 1RU chassis.

The CV-MCU2:

Ultra-DNE's versatile CV-MCU2 chassis houses a variety of interchangeable option modules, allowing the user to configure each individual circuit as needed.

The chassis is designed with a rapid field-replaceable modular power supply, so failed supplies can be quickly replaced with the ease of changing a module. A Power-On Self-Test (POST) lets the user know of any potential failures upon power up. These features bring reliability to the communications network, letting the operator know if any circuits are unavailable.

Each chassis comes with a front panel interface with an LCD display and keypad to provide the users with maximum configuration flexibility. The control port can be suited with either a serial interface solution or a telnet interface. Configuration files can easily be imported or exported, allowing for fast, repeatable installations.

Diagnostics:

The CV-MCU2 offers several features to aid in system set-up and troubleshooting. In addition to the self-test performed at power-up, the user can initiate a Built-In Self Test (BIST) to verify the full functionality of all internal data paths for whatever configuration the user has installed.

In addition to full internal testing, the CV-MCU2 can be utilized to establish the link quality on any multiplexer port, multiplexer aggregate, or converter data path. Any interface can be connected to the internal Bit Error Rate Tester (BERT) and link quality statistics can be monitored through the user interface.

Loopback is also provided for the near end and far end terminals for all data interfaces. Near end data will be encoded and then decoded locally, traveling the internal data path before being transmitted back to the near end device. Received data from the far end terminal is looped directly onto the outgoing transmit line back to the far end terminal. This loopback function allows testing of cabling of both the local and far-end terminals.

Multiplexing Functionality

The multiplexing software option makes the CV-MCU2 an ideal low-cost trunk group multiplexer, allowing the user to mux two, three or four ports onto a single aggregate, allowing the user to consolidate field traffic for efficient transport to a remote site, via cable or high-speed radio. The 1-RU size offers a significant reduction in both rack space and weight over legacy group muxes.

The CV-MCU2 allows the aggregate to be either NRZ or Fiber depending on the option cards selected. Multiplexing is done via DNE's proprietary high-efficiency framing aggregate format at rates to 23.552 Mbps.

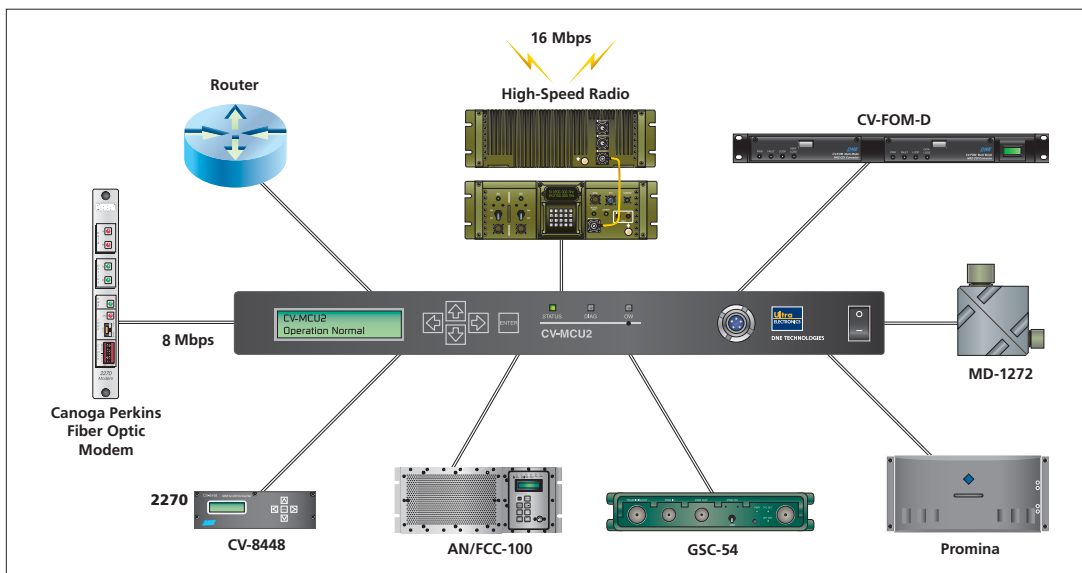
Timing for the CV-MCU2 multiplexing functions can be either external timing via a BNC connector, or recovered aggregate receive timing. Fiber, NRZ and CDI ports are supported.

Environmental

The CV-MCU2 chassis is designed for a tactical environment, with an extended temperature operation range from -20C to +50C. Each option module carries its own environmental operating criteria.

Accessories

DNE also offers a wide variety of accessory cables for customized conversions from the option module interfaces. In addition, tactical interface panels supporting HMA Expanded Beam, TFOCA, or TFOCA-II are available to facilitate cabling.



▲ **The CV-MCU2 extends deployed interoperability** by supporting both legacy equipment and a wide variety of high-speed units, providing valuable space and weight reduction options. In a single RU, the CV-MCU2 can be configured as a flexible multiplexer or as a protocol converter, providing easy interoperation with deployed modems or high-speed radios.

Converter Functionality

Ultra-DNE's CV-MCU2 combines the features of both Fiber Optic Modems (FOMs) and Conditioned Di-Phase Modems (CDIMs) as well as offering a protocol conversion to and from Non-Return to Zero (NRZ) devices.

DNE's CV-MCU2 can host up to five unique 18.840 Mbps converter operations or act as a signal repeater for long fiber runs. This increase in port density and circuit flexibility results in viable space-saving alternatives to previously deployed converter modules. Both CDI and fiber cables are supported, depending on option modules selected.

In addition, a simple front panel LCD interface allows tactical users to reallocate circuits without re-racking and recabling.

Option Modules

The flexibility of the CV-MCU2 is derived from the option cards available for the unit. These modules can be mixed and matched to provide protocol conversion, media conversion, multiplexing, or any combination across the five available option slots.

Combo Fiber-CDI Mux Module:

This module functions as a lower-cost alternative to the CV-MCU2 Universal Converter Module for multiplexing and pass-through applications, providing both a fiber and unbalanced copper CDI interface that can be utilized as a converter port. This module supports both copper and fiber CDI by offering both SMA connectors and ST connectors. NRZ is not supported on this card. Users of DNE's VersaMux 4000 can use this card in the CV-MCU2 for ease in sparing.

NRZ Mux Module:

This module functions as a lower-cost alternative to the CV-MCU2 Universal Converter Module for those users who require basic multiplexing and pass-through applications. This module provides an NRZ interface that can be utilized either as an NRZ port or as an aggregate. CDI is not supported on this card. The NRZ Mux module supports selected rates ranging from 1856 to 16384 kbps through a DB-25F connector. Users of DNE's VersaMux 4000 can use this module in the CV-MCU2 for ease in sparing.

Universal Converter Module (UCM):

Ultra-DNE's Universal Converter Module (UCM) is at the heart of the CV-MCU2's flexibility. This all-in-one card is a fully functional CDI-NRZ-fiber protocol converter card in a 2.5" x 8" footprint. This module supports a wide range of conversion and multiplexing options:

- NRZ to Fiber interface, Canoga Perkins 2270 mode with maximum rates of 8.192Mbps,
- NRZ to Fiber interface, JTC3A 9109 (FOM) mode
- NRZ to Fiber Interface, CV-8448 (CDI) mode
- NRZ to Balanced CDI Copper Interface for EPLRS applications
- NRZ to Unbalanced CDI Copper Interface
- Unbalanced CDI Copper Interface to CDI Fiber Interface for CDI repeater applications
- NRZ, CDI or Fiber port for multiplexing applications
- NRZ, or Fiber aggregate for multiplexing applications.

Each UCM offers one micro-DB-9 connector for balanced and unbalanced interfaces, one micro-DB-25 for NRZ

interfaces, and two optical ST-type fiber connections. These low density cable interfaces allow a flexible cable with a reliable connection for each installation. Each converter module also accepts five timing sources and offers two loopback states, allowing for testing of both the local circuit and the far end terminal.

The UCM preserves interoperability with JTC3A 9109C compliant Fiber Optic Modems, such as the GSC-54 and the MD-1272. In addition, compatibility is extended to Codem's CTM family of products and Canoga Perkins 2270 modems. As always, DNE has preserved interoperability with DNE's complete protocol converter line at rates supported by both units.

With Universal Converter Modules, the CV-MCU2 can support currently deployed programs such as the US Marine Corps' Digital Tech Control (DTC) as well as the US Army's Joint Network Node (JNN), and the US Air Force's Theater Deployable Communications - Integrated Communications Access Packages (TDC - ICAP).

Extended Upgrade Options

Users must field upgrade their existing CV-MCU2 chassis to CV-MCU2+ software to enable the features of the option cards below.

Universal Converter Module Plus (UCM+):

The Universal Converter Module Plus (UCM+) is the second generation of the popular UCM module. It provides all the conversion and connectivity of the original UCM while adding functionality. Feature improvements in the UCM+ include support of loopbacks in the Canoga Perkins mode, as well as extension of Canoga Perkins data rates to 14.336Mbps.

Ethernet Bridging Module:

Ultra-DNE's new Ethernet Bridging Module brings a feature-rich Ethernet Media Converter to tactical applications using the CV-MCU2+ chassis. Each module provides two ports of full-feature 10/100Base-Tx to 100Base-Fx conversion, reliably extending your network distance up to 2 km over tactical or commercial multimode fiber optic cables.

With up to ten ports of media conversion in a one-RU box, a CV-MCU2+ populated with Ethernet Bridging Modules provides industry-leading density for applications where space matters.

Drive Distances		
DNE's CV-MCU2 offers best-in-class drive distances for its option cards.		
	Fiber-CDI Mux Module	Universal Converter Module
Optical:	Up to 16km (10 mi) using 62.5/50µm multimode fiber*; Up to 30km (18.6 mi) using 9µm singlemode fiber	Up to 37km (23 mi) using 62.5/50 µm multimode fiber*; Up to 50 km (31 mi) using 9µm singlemode fiber; Up to 14.2km (8.8 mi) using 62.5/50µm fiber in Canoga Perkins mode*
Unbalanced CDI:	Up to 3.2km (2 mi) at 576kbps; Up to 2.4km (1.5 mi) at 768kbps; Up to 1.6km (1 mi) at 1544kbps; Up to 1.2km (.75 mi) at 2304kbps; Up to .8km (.5 mi) at 4096kbps; Up to .4km (.25 mi) at 4608kbps	Up to 3.2km (2 mi) at 576kbps; Up to 2.4km (1.5 mi) at 768kbps; Up to 2km (1.25 mi) at 1152kbps; Up to 1.6km (1 mi) at 1544kbps; Up to 1.2km (.75 mi) at 3072kbps; Up to .8km (.5 mi) at 4608kbps
Balanced CDI:	n/a on this option card	Up to 6.4km (4 mi) at 64kbps; Up to 3.2km (2 mi) at 224kbps; Up to 1.6km (1 mi) at 768kbps; Up to .64km (.4 mi) at 1544kbps; Up to .32km (.2 mi) at 2048kbps.

* Based on TFOCA cable with 0.75dB/km attenuation

NRZ Mux Module

Fiber-CDI Mux Module

Universal Converter
Module - Plus (UCM+)

(All specifications refer to the individual option module unless otherwise specified. Five modules maximum per chassis)

Tactical Interfaces			
CDI	--	2 Unbalanced SMA connectors per module	One Balanced/Unbalanced Micro B-9 Female
Orderwire	--	Both cards offer software selectable filter to remove Analog CDI Orderwire signaling pass-through	
Optical	--	Both cards are equipped with two 9/50/62.5µm 125µm multimode@1310nm metal, ST per module	
NRZ Interface	EIA-530 pinout, RS-422 (Balanced) signaling using a DB-25F connector	--	EIA 530 pinout, RS-422 (Balanced) signaling using a micro DB-25F connector
NRZ Drive Distances	20.0 ft (6.1m) at 16,384 kbps	-- see page 3 for additional distances	16.4 ft. (5m) at 20,000 kbps see page 3 for additional distances
Data Rates (kbps)			
Unbalanced	--	72, 96, 112, 128, 144, 192, 224, 256, 288, 320, 384, 448, 512, 576, 640, 768, 960, 1024, 1152, 1344, 1536, 1544, 1920, 1952, 2048, 2304, 2560, 2816, 3072, 3088, 3200, 3584, 3968, 4096, 4608 kbps.	
Balanced	--	--	16, 32, 56, 64, 72, 96, 112, 128, 144, 192, 224, 256, 288, 320, 384, 448, 512, 576, 640, 768, 960, 1024, 1152, 1344, 1536, 1920, 1952, 2048 kbps.
Balanced EPLRS	--	--	32, 56, 64, 128, 256, 512 kbps
NRZ	N x 8 kbps increments from 16 to 20,000	--	N x 8 kbps increments from 16 to 20,000
Optical (CV Mode)	--	72, 96, 112, 128, 144, 192, 224, 256, 288, 320, 384, 448, 512, 576, 640, 768, 960, 1024, 1152, 1344, 1536, 1544, 1920, 1952, 2048, 2304, 2560, 2816, 3072, 3088, 3904, 3200, 3584, 3968, 4096, 4608, 4800, 4824, 5120, 5632, 5856, 6144, 6312, 6656, 7168, 7680, 7808, 8064, 8192, 8448 kbps.	
Optical (FOM Mode)	--	N x 8 kbps from 16 to 18,840	N x 8 kbps from 16 to 18,840
Optical (CP Mode)	--	--	N x 8 kbps from 96 to 14,366 (UCM+ only) N x 8 kbps from 96 to 8,192 (UCM only)
Optical Aggregate			2048, 4096, 8192, 10240, 12288, 16384, 18816, 23552 kbps
Compatibility	AN/TSQ-158 EPLRS All option modules are compatible with the following units: DNE CV-2048, CV-CX, CV-8448, CV-FOM, CV-MCU CV-HTU-16M, VersaMux 4000, JTC3A 9109C Devices (including ITT AN/GSC-54 and Moog (Northrop Grumman) MD-1272/G FOM), and Codem CTM-100/C.	--	AN/TSQ-158 EPLRS, Canoga Perkins 2270.
System Timing Interface	One Female BNC Connector per Module; 1 Mhz, 5 Mhz, 10Mhz or Bit Rate External Station Clock In. Additional timing support from NRZ, CDI, Fiber Recovered Timing and Internal Clock* * Standard clock tracking option maintains internal timing at the selected rate with ± 50 ppm and phase is referenced from the selected input clock.		
Additional Modes	KG Resync signaling available		High-margin tracking (± 2000 ppm) for EPLRS KG Resync signaling available
Data Mark Sense	Data Mark Sense is user-selectable to be either positive or negative upon configuration for all modules.		
Environmental	All cards 95% Humidity (non-condensing). Operating altitudes to 15,000 ft (4600m), storage altitudes from -100 ft (-30.5m) to 40,000 ft (12,200m) Shock and Vibration in compliance with MIL STD-810 Loose Cargo and Composite Wheeled Vehicle Vibration Exposure		
Universal Converter Module (UCM/UCM+)	-20° C to 50° C Operating, -40° C to 80° C storage temperature		
NRZ Mux Module:	-10° C to 50° C Operating, -30° C to 70° C storage temperature		
CDI/Fiber Mux Module:	-10° C to 50° C Operating, -30° C to 70° C storage temperature		
Power	90-264 VAC, 47-63 Hz 13 Watts Chassis, 9 Watts per module max for Universal Converter Module.		
Menu Selection	Front panel interface and customer option of ASCII terminal using a DB-9M or telnet using an RJ-45 connector		
Dimensions	19.0" W x 1.75" (1RU) H x 17"D (CV-MCU2 Chassis)	Full chassis weight with five installed modules: approximately 9 pounds	
	<i>Ethernet Bridging Module features and specifications are available on a separate data sheet.</i>		



Ultra Electronics
DNE TECHNOLOGIES
50 Barnes Park North
Wallingford CT USA 06492
Tel: (203) 265-7151 Toll Free: (800) 370-4485
Fax: (203) 265-9101 info@ultra-dne.com
www.ultra-dne.com

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