



NVT Phybridge enables our customers to transform their existing infrastructure and migrate to IP with confidence. NVT Phybridge products offer technologically advanced features including power over long reach Ethernet over single-pair UTP, multi-pair UTP or Coax, robust power, and power management, PowerWISE power sharing and quick and easy migration to IP end points and IoT. Complete switch solutions include PoLRE LPC, PoLRE24/48, EC10, CLEER24, CLEER24-10G, FLEX8, and FLEX24-10G products. Complete adapter solutions include Phylink, EC-Base, EC-Link, EC-Link+, EC4, FLEX-Base, FLEX-C, FLEX-Link and FLEX4 media converters and cable extenders.

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A. CLEER24-10G

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK SWITCH

DIVISION 27 – COMMUNICATIONS

- 27 20 00 Data Communications
- 27 21 00 Data Communications Network Equipment
- 27 21 29 Switches & Hubs

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK SWITCH

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes a 24-port 10/100Mbps Ethernet-over-Coax switch with power capability on each port.
- B. Product – The CLEER24-10G data switch delivers Ethernet and Power over Coax cable with multiple times the reach of traditional data switches.
- C. Related Requirements
 - (1) 27 10 00 Structured Cabling
 - (2) 27 16 00 Communications Connecting Cords, Device, and Adapters
 - (3) 27 16 16 Communications Media Converters, Adapters, and Transceivers
 - (4) 27 30 00 Voice Communications
 - (5) 27 31 23 IP Voice Switch

1.02 REFERENCES

- A. Abbreviations
 - (1) ACL – Access Control List
 - (2) ARP – Address Resolution Protocol
 - (3) CLI – Command Line Interface
 - (4) DVR – Digital Video Recorder
 - (5) FTP – File Transfer Protocol
 - (6) GbE – Gigabit Ethernet
 - (7) GUI – Graphical User Interface
 - (8) GVRP - GARP VLAN Registration Protocol
 - (9) HTTP(S) – Hypertext Transfer Protocol (Secure)
 - (10)IGMP – Internet Group Management Protocol
 - (11)IoT – Internet of Things
 - (12)IP – Internet Protocol
 - (13)LACP – Link Aggregation Control Protocol
 - (14)LAN – Local Area Network
 - (15)LLDP – Link Layer Discovery Protocol
 - (16)LLDP-MED – Link Layer Discovery Protocol Media Endpoint Discovery
 - (17)LRE – Long Reach Ethernet
 - (18)MAC – Media Access Control
 - (19)Mbps – Megabits per second
 - (20)MDIX – Media Dependent Interface Crossover
 - (21)MLD – Multicast Listener Discovery
 - (22)MSTP – Multiple Spanning Tree Protocol
 - (23)MVRP - Multiple VLAN Registration Protocol

- (24)NTP – Network Time Protocol
 - (25)NVR – Network Video Recorder
 - (26)PoE – Power over Ethernet
 - (27)PoLRE – Power over Long Reach Ethernet
 - (28)RADIUS – Remote Authentication Dial-In User Service
 - (29)RMON – Remote Monitoring
 - (30)RSTP – Rapid Spanning Tree Protocol
 - (31)SFP – Small Form-factor Pluggable transceiver
 - (32)SNMP – Simple Network Management Protocol
 - (33)SSH – Secure Shell
 - (34)SSL – Secure Socket Layer
 - (35)STP – Spanning Tree Protocol
 - (36)TACACS+ - Terminal Access Controller Access Control System Plus
 - (37)TFTP – Trivial File Transfer Protocol
 - (38)UDLD – Unidirectional Link Detection
 - (39)UTP – Unshielded Twisted Pair wiring
 - (40)VLAN – Virtual Local Area Network
- B. Reference Standards
- (1) Network
 - (a) IEEE – 802.3 Ethernet Standards
 - (2) EMC
 - (a) Emissions
 - (i) FCC Part 15 Class A
 - (ii) IECS-003
 - (iii) EN 55032:2012
 - (iv) EN 50121-4:2016
 - (b) Immunity
 - (i) EN 55024:2010
 - (ii) EN 50121-4:2016
 - (3) Safety
 - (a) UL 60950-1 2nd Ed 2014-10-14
 - (b) CAN/CSA C22.2 No. 60950-1-07 2nd Ed 2014-10
 - (c) IEC 62368-1:2014
 - (d) EN 62368-1:2014
 - (e) AS/NZS 62368.1:2018
 - (4) Environment
 - (a) RoHS Directive 2011/65 + 2015/863
 - (5) Mechanical
 - (a) IEC 60297 – Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482.6 mm (19 in.) series

1.03 SUBMITTALS

- A. Product data
 - (1) Datasheets
 - (2) Installation and operation manuals
 - (3) DoC (Declaration of Conformity)
 - (4) Warranty documentation

1.04 QUALIFICATIONS

- A. The manufacturer shall have a minimum of five years experience in producing Ethernet switch equipment.
- B. Installers shall be trained and authorized by the manufacturer to install, integrate, test and commission the system.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver the switch in the manufacturer's original, unopened, undamaged container with identification labels intact.
- B. Store the switch in a temperature environment of -40°C to 85°C (-104°F to 185°F), protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY AND SUPPORT

- A. The manufacturer shall provide a limited 1-year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: NVT Phybridge, Inc.
3457 Superior Court, Unit 3
Oakville, ON, Canada L6L 0C4
Phone: +1 905 901-3633
Web: www.nvtphybridge.com
E-mail: support@nvtphybridge.com
- B. Model: CLEER24-10G
- C. Part number: NV-CLR-024-10G
- D. Alternates: None

2.02 GENERAL DESCRIPTION

- A. The CLEER24-10G switch shall provide Ethernet and PoE over Coax cable with up to eighteen times the reach of traditional data switches.
- B. The CLEER24-10G switch shall possess the following characteristics:
 - (1) capable of delivering up to 50W of PoE to 24 IP endpoints with an aggregate of 983W.

- (2) operates in LRE mode supporting extended Coax cable lengths when paired with an EC-Link, EC-Link+ or EC4 adapter.
- (3) converts conventional Ethernet to a signal that can be carried by various types of 75Ω Coax cable.
- (4) uses previously installed Coax cable to connect IP network endpoints such as IP cameras, IP phones, network switches, DVR/NVRs, PCs, and printers.

2.03 INTERFACES

A. SFP+ (Uplink)

- (1) Two SFP+ connectors (for SFP and SFP+ modules) labelled SFP+ 1 and SFP+ 2. These connections support fiber optic cable (actual cable type depends on the SFP transceiver module installed).
- (2) The 2 SFP+ ports shall support: 1000 Base-T/TX/SX/LX/EX/ZX, 10GBase-CU/SR/LR/ER/ZR (determined by SFP or SFP+ transceiver module installed), Ethernet IEEE 802.3z.
- (3) The CLEER24-10G software shall allow the user to enable the SFP+ interfaces in the user interface (GUI or CLI).
- (4) The CLEER24-10G software shall allow for the ability to bond the uplink ports, providing a total of 20Gb of uplink bandwidth.

B. Ethernet (Downlink)

- (1) The CLEER24-10G shall have a female BNC connector for each of the 24 downlink ports. It shall support any coax cable with a nominal characteristic impedance of 75Ω.
- (2) Maximum cable distances are specified as (based on a 75Ω impedance coax cable):
 - (a) RG59 – 100Mbps to 457m (1500ft) [when paired with any EC adapter]
 - (b) RG59 – 10Mbps from 457m to 1220m (4000ft) [when paired with EC-Link or EC-Link+]
 - (c) RG6 – 100Mbps to 610m (2000ft) [when paired with any EC adapter]
 - (d) RG6 – 10Mbps from 610m to 1220m (4000ft) [when paired with EC-Link]
 - (e) RG6 – 10Mbps from 610m to 1830m (6000ft) [when paired with EC-Link+]
 - (f) RG11 – 100Mbps to 915m (3000ft) [when paired with any EC adapter]
 - (g) RG11 – 10Mbps from 915m to 1220m (4000ft) [when paired with EC-Link]
 - (h) RG11 – 10Mbps from 915m to 1830m (6000ft) [when paired with EC-Link+]
- (3) The maximum data through-put shall be 200Mbps (total up plus down). This will support 100Mbps communication in both directions.
- (4) Each Ethernet Downlink port shall support either 10Mbps or 100Mbps (cable & distance dependant) with no bandwidth sharing between ports.
- (5) There shall be no signal degradation from 0m to the maximum supported distances.

C. Management Port

- (1) The CLEER24-10G shall have one Ethernet RJ45 connector labelled MGMT. This is a dedicated port for out-of-band management of the switch.
- (2) This port shall support 10/100/1000 Base-T full or half duplex.
- (3) This port shall support auto-negotiation of the transmission rate.

D. Console Port

- (1) The CLEER24-10G shall have one serial RJ45 connector labelled Console. This is a dedicated port for management of the switch via a console terminal or PC.
- (2) This port shall support a data rate of 115200 baud, 8 data bits, no parity and 1 stop bit.
- (3) This port shall support a 3-wire interface (transmit, receive, ground). No control lines for handshaking are required.

2.04 INDICATORS

A. Power

- (1) The CLEER24-10G shall have three LED power indicators: Run (green), Alarm (amber) and Fault (red).
- (2) The Run LED indicates the following status: Off – power is off. On – power is on.
- (3) The Alarm LED indicates the following status: Off – no alarm condition. On – there is an issue with the power supply.
- (4) The Fault LED indicates the following status: Off – no fault. Flashing – switch fault.

B. SFP+ Uplink

- (1) Each SFP+ port shall have two LEDs to indicate network link status: Upstream network link (UP ARROW - green) and downstream network link (DOWN ARROW - green)

C. Coax Downlink

- (1) Each of the 24 downlink ports shall have an LED to indicate connection status (green).
- (2) The LED indicates the following status: Off – no link. Flashing – link good with network activity. On – link good.

2.05 POE

- A. The CLEER24-10G shall provide up to 50 watts of power over the UTP connection to each endpoint device.
- B. The CLEER24-10G shall provide passive PoE to the adapter. Non-PoE endpoints are supported.
- C. The endpoint device must be IEEE 802.3af or 802.3at compliant in order to be powered using PoE.

2.06 POWER SHARING

- A. The CLEER24-10G shall allow for a power share setup for sharing power among multiple switches.
- B. The CLEER24-10G shall allow for up to 4 units to be stacked in a power sharing configuration.
- C. The CLEER24-10G shall have 2 rear male connectors, DC IN/OUT, for power sharing.
- D. The CLEER24-10G shall allow for the replacement of a failed AC power supply without disconnecting power or powering down any of the switches.

2.07 ADDITIONAL FEATURES

- A. System Information
 - (1) The system settings of the CLEER24-10G switch shall be exportable as a separate file.
 - (2) The CLEER24-10G switch shall maintain an accessible log of system and network-triggered events.
 - (a) The log shall be searchable.
 - (b) The log shall be exportable to a standard text file.

2.08 SWITCH SOFTWARE

- A. The CLEER24-10G shall have a built-in web server which supports browser-based configuration using Google Chrome, Mozilla Firefox, Apple Safari.
- B. The CLEER24-10G shall have a CLI, supporting advanced configuration not possible via the web GUI. The manufacturer shall allow configuration of the following networking properties and protocols:
 - (1) Layer 2 Protocols
 - (a) VLANs
 - (i) 802.1Q tagged VLANs
 - (ii) MAC-Based VLANs
 - (iii) VLAN Translation
 - (b) STP, RSTP, and MSTP
 - (c) Loop Protection
 - (d) UDLD
 - (e) Link Aggregation (Static or LACP)
 - (f) Auto-MDIX
 - (g) Jumbo frames, maximum 4K
 - (h) MLD Snooping
 - (i) ACLs (Layer 2 and Layer 3)
 - (j) ARP Inspection
 - (k) 802.1x Port Based Authentication
 - (l) MVRP/GVRP
 - (m) QoS (Layer 2 and Layer 3)
 - (2) Layer 3 Features
 - (a) Layer 3 Routing
 - (b) DHCP Server Functionality
 - (c) IP-Based VLANs
 - (3) Layer 4 Features
 - (a) Protocol-Based VLANs
 - (4) Multicast
 - (a) IGMP snooping v1, v2, and v3
 - (5) Security
 - (a) Authentication, Authorization and Accounting
 - (i) Built in RADIUS client to co-operate with RADIUS servers.
 - (ii) RADIUS/TACACS+ login user access authentication.
 - (b) RMON

- (c) Port Security
 - (i) Static MAC locking per port.
 - (ii) Maximum amount of MAC addresses per port.
- (d) SSH/SSL
- (6) Management
 - (a) Management interface
 - (i) Web GUI switch management (HTTPS is supported)
 - (ii) CLI via SSH
 - (iii) CLI via TELNET
 - (iv) CLI via serial console interface
 - (v) SNMP v1, v2c, and v3
 - (b) Multi-switch management software is available.
 - (c) User privilege level control.
 - (d) Built in TFTP client to backup configuration files.
 - (e) System maintenance
 - (i) Firmware upload via FTP, HTTP, SFTP, TFTP, SCP or web GUI.
 - (ii) Configuration upload/download via web GUI or CLI.
 - (iii) Hardware reset button for system reboot or reset to factory defaults.
 - (iv) NTP
 - (v) LLDP/LLDP-MED
 - (vi) SNMP trap for interface link-up and link-down notifications.
 - (vii) Event message logging to a remote syslog server.

2.09 ELECTRICAL

- A. Power
 - (1) Sources
 - (a) Single field replaceable AC-DC PSU with a rated input voltage of 100 to 240VAC, 1000W @ 100-240VAC.
 - (b) Power share setup among up to 4 units – 56VDC nominal (48 to 58VDC).
 - (2) Power consumption
 - (a) 38W (not including PoE endpoints)
 - (3) Power injection (PoE)
 - (a) 48VDC to 58VDC, 50W – endpoint devices must be IEEE 802.3af/at compliant to use power injection.
- B. Immunity
 - (1) Electrostatic Discharge
 - (a) IEC 61000-4-2
EN 61000-4-2
 - (i) +- 6kV Contact Discharge (Direct and indirect)
 - (ii) +- 8kV Air Discharge
 - (2) Electrical Fast Transient
 - (a) IEC 61000-4-4
 - (b) EN 61000-4-4
 - (i) +- 2kV on AC ports

(ii) +/- 2kV on I/O ports

C. Connectors

(1) Ethernet

- (a) SFP+ cage (2) - SFP+ port
- (b) RJ45 (1) - Management port

(2) Coax

- (a) Female BNC (24) - Long reach Ethernet over Coax + power connection

(3) Serial

- (a) RJ45 (1) - Serial console port

(4) External power

- (a) AC power: 1 male IEC 60320/C-14 connector at rear of unit
- (b) Power sharing: 2 male DC connectors (In/Out) at rear of the unit

2.10 MECHANICAL AND ENVIRONMENTAL

- A. Housing material: Powder coated aluminum
- B. Configuration: 1U rack (19 in.)
- C. Mounting: vertical surface or in a rack
- D. Dimensions (H x W x D): 1.73in. x 17.13in. x 10.45in. (4.39cm x 43.5cm x 26.5cm)
- E. Weight: 7.34lbs (3.33kg)
- F. Thermal: Fan cooled
- G. Temperature
 - (1) Operating: 1000W Load: 14°F to 122°F (-10°C to 50°C)
500W Load: 14°F to 140°F (-10°C to 60°C)
 - (2) Storage: -40°C to 85°C (-104°F to 185°F)
- H. Humidity: 10 – 95%, non-condensing @ 35°C
- I. MTBF (Mean Time Between Failure): 20+ Years (175,200+ Hours)

END OF SECTION

PART 3 EXECUTION

3.01 INSTALLERS

- A. Contractor personnel.

3.02 PREPARATION

- A. The network design and configuration shall be verified for compatibility and performance with the IP endpoint(s).
- B. Network configuration shall be tested and qualified by the contractor prior to endpoint installation.

3.03 INSTALLATION

- A. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment.

(1) A report indicating successful test results shall be produced.

3.04 STORAGE

A. The product shall be stored in an environment where temperature and humidity are in the range specified by the manufacturer.

END OF SECTION

B. EC-LINK

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK ADAPTER

DIVISION 27 – COMMUNICATIONS

- 27 20 00 Data Communications
- 27 21 00 Data Communications Network Equipment
- 27 21 29 Switches & Hubs

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK ADAPTER

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes a Single port 10/100Mbps Ethernet over Coax adapter with power capability.
- B. Product – The EC-Link Ethernet over Coax Network Adapter delivers Ethernet and Power over Coax cable with multiple times the reach of traditional data switches.
- C. Related Requirements
 - (1) 27 10 00 Structured Cabling
 - (2) 27 16 00 Communications Connecting Cords, Device, and Adapters
 - (3) 27 16 16 Communications Media Converters, Adapters, and Transceivers
 - (4) 27 30 00 Voice Communications
 - (5) 27 31 23 IP Voice Switch

1.02 REFERENCES

- A. Abbreviations
 - (1) DVR – Digital Video Recorder
 - (2) GbE – Gigabit Ethernet
 - (3) GBIC – Gigabit Interface Converter
 - (4) GUI – Graphical User Interface
 - (5) IoT – Internet of Things
 - (6) IP – Internet Protocol
 - (7) LAN – Local Area Network
 - (8) LLDP – Link Layer Discovery Protocol
 - (9) LLDP-MED – Link Layer Discovery Protocol Media Endpoint Discovery
 - (10) Mbps – Megabits per second
 - (11) NTP – Network Time Protocol
 - (12) NVR – Network Video Recorder
 - (13) PoE – Power over Ethernet
 - (14) PoLRE – Power over Long Reach Ethernet
 - (15) SFP – Small Form-factor Pluggable Transceiver

- (16) SNMP – Simple Network Management Protocol
- (17) STP – Spanning Tree Protocol
- (18) UTP – Unshielded Twisted Pair wiring
- (19) VLAN – Virtual Local Area Network

B. Reference Standards

- (1) Network
 - (a) IEEE – 802.3 Ethernet Standards
- (2) EMC
 - (a) Emissions
 - (i) FCC Part 15, Class B
 - (ii) IEC61000-3-2
 - (iii) EN 55032:2012
 - (iv) EN 50121-4:2015
 - (b) Immunity
 - (i) EN 55024:2010
 - (ii) EN 50121-4:2015
- (3) Safety
 - (a) UL 60950-1 2nd Ed 2014-10-14
 - (b) CAN/CSA C22.2 No. 60950-1-07 2nd Ed 2014-10
 - (c) IEC 62368-1:2014
 - (d) EN 62368-1:2014
 - (e) AS/NZS 62368.1:2018
- (4) Environment
 - (a) RoHS Directives 2011/65 and 2015/863

1.03 SUBMITTALS

- A. Product data**
- (1) Datasheets
 - (2) Installation and operation manuals
 - (3) DoC (Declaration of Conformity)
 - (4) Warranty documentation

1.04 QUALIFICATIONS

- A.** The manufacturer shall have a minimum of five years experience in producing Ethernet switch equipment.
- B.** Installers shall be trained and authorized by the manufacturer to install, integrate, test and commission the system.

1.05 DELIVERY, STORAGE AND HANDLING

- A.** Deliver the device in the manufacturer's original, unopened, undamaged container with identification labels intact.
- B.** Store the device in a temperature environment of -40°C to 85°C (-104°F to 185°F), protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY AND SUPPORT

- A. The manufacturer shall provide a limited 5-year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: NVT Phybridge, Inc.
3457 Superior Court, Unit 3
Oakville, ON, Canada L6L 0C4
Phone: +1 905 901-3633
Web: www.nvtphybridge.com
E-mail: support@nvtphybridge.com
- B. Model: EC-Link
- C. Part Number: NV-ECLK
- D. Alternates: None

2.02 GENERAL DESCRIPTION

- A. The EC-Link shall provide Ethernet and PoE over Coax cable with up to twelve times the reach of traditional data switches.
- B. The EC-Link shall possess the following characteristics:
- (1) capable of delivering up to 30W of PoE to the IP endpoint
 - (2) pairs with a CLEER24 switch, EC10 switch or EC-Base unit to operate in long-reach mode as an Ethernet over Coax Extender.
 - (3) converts conventional Ethernet to a signal that can be carried by various types of 75Ω Coax cable.
 - (4) uses previously installed Coax cable to connect IP network endpoints such as IP cameras, IP phones, network switches, DVR/NVRs, PCs, and printers.
 - (5) capable of being powered via the CLEER24 switch, EC10 switch or EC-Base.

2.03 INTERFACES

- A. Ethernet (Downlink)
- (1) One Ethernet RJ45 connector. This connection supports a standard Ethernet cable: patch or crossover Cat5e/Cat6.
 - (2) The RJ45 shall support 10/100 BaseT full or half duplex and auto-negotiation of the transmission rate.
- B. Coax (Long Reach)
- (1) The EC-Link shall have a single female BNC connector for the long reach Ethernet over Coax port. It will support any 75Ω impedance coax cable.
 - (2) Maximum cable distances are specified as (based on a 75Ω impedance coax cable):
 - (a) RG59 – 100Mbps to 457m (1500ft)

- (b) RG59 – 10Mbps from 457m to 1220m (4000ft)
- (c) RG6 – 100Mbps to 610m (2000ft)
- (d) RG6 – 10Mbps from 610m to 1220m (4000ft)
- (e) RG11 – 100Mbps to 915m (3000ft)
- (f) RG11 – 10Mbps from 915m to 1220m (4000ft)
- (3) The maximum data through-put shall be 200Mbps (total up plus down) and shall auto adapt to the cable conditions. This will support 100Mbps communication in both directions.
- (4) There shall be no signal degradation from 0m to the maximum supported distances.

2.04 INDICATORS

A. Ethernet Downlink

- (1) The Ethernet downlink RJ45 port shall have two LEDs to indicate network connection status: Link status (LEFT - green) and activity status (RIGHT - amber).
- (2) The link status LED indicates the following: Off – no connection. On – link good.
- (3) The activity status LED indicates the following: Off – no activity. Flashing – network activity.

2.05 POE

- A. The EC-Link shall be capable of providing up to 30 watts of power over the UTP connection to the end-point device.
- B. The EC-Link shall be capable of being powered via PoE from the CLEER24 switch, EC10 switch, EC-Base or local power supply.
- C. The EC-Link Ethernet port shall provide PoE on 2-pairs of the Ethernet patch cable 'always-on'.
- D. The endpoint device must be IEEE 802.3af or 802.3at compliant in order to be powered using PoE.

2.06 ELECTRICAL

A. Power

- (1) Sources
 - (a) CLEE24 Switch
 - (b) EC-10 Switch
 - (c) EC-Base
 - (d) Local External DC PSU, Class II, Efficiency VI, Input voltage 100-240VAC, 50-60Hz, Output voltage 55VDC / 1A or 2A, Output connector: 2-pin phoenix connector.
- (2) Power consumption
 - (a) 0.9W (not including PoE endpoints)
- (3) Power injection (PoE)
 - (a) -54VDC, 30W – end-point devices must be IEEE 802.3af/at compliant to use the power injection.

B. Immunity

- (1) Electrostatic Discharge
 - (a) IEC 61000-4-2

EN 61000-4-2

(i) +- 6kV Contact Discharge (Direct and indirect)

(ii) +- 8kV Air Discharge

(2) Electrical Fast Transient

(a) IEC 61000-4-4

(b) EN 61000-4-4

(i) +- 2kV on AC ports

(ii) +- 2kV on I/O ports

C. Connectors

(1) Ethernet

(a) RJ45 (1) - Ethernet uplink port

(b) Female BNC (1) - Long reach Ethernet over Coax + power connection

2.07 MECHANICAL AND ENVIRONMENTAL

A. Housing material: Plastic

B. Mounting Not Mountable

C. Dimensions (H x W x D): 0.83in. x 1.23in. x 3.46in. (21mm x 32mm x 88mm)

D. Weight: 42g

E. Thermal: Air cooled

F. Temperature

(1) Operating: -50°C to 70°C (40°F to 158°F)

(2) Storage: -50°C to 85°C (-104°F to 185°F)

G. Humidity: 10 – 95%, non-condensing @ 35°C

H. MTBF (Mean Time Between Failure): 81 Years (709,560 Hours)

END OF SECTION

PART 3 EXECUTION

3.01 INSTALLERS

A. Contractor personnel.

3.02 PREPARATION

A. The network design and configuration shall be verified for compatibility and performance with the camera(s).

B. Network configuration shall be tested and qualified by the contractor prior to camera installation.

3.03 INSTALLATION

- A. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment.
 - (1) A report indicating successful test results shall be produced.

3.04 STORAGE

- A. The product shall be stored in an environment where temperature and humidity are in the range specified by the manufacturer.

END OF SECTION

C. EC-LINK+

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DIVISION 27 – COMMUNICATIONS

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COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK ADAPTER

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1.02 REFERENCES

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- (15) SFP – Small Form-factor Pluggable Transceiver
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 - (ii) ICES-003
 - (iii) EN 55032:2012
 - (iv) EN 50121-4:2015
 - (b) Immunity
 - (i) EN 55024:2010
 - (ii) EN 50121-4:2015
- (3) Safety
 - (a) UL 60950-1 2nd Ed 2014-10-14
 - (b) CAN/CSA C22.2 No. 60950-1-07 2nd Ed 2014-10
 - (c) IEC 62368-1:2014
 - (d) EN 62368-1:2014
 - (e) AS/NZS 62368.1:2018
- (4) Environment
 - (a) RoHS Directives 2011/65 and 2015/863

1.03 SUBMITTALS

- A. Product data
 - (1) Datasheets
 - (2) Installation and operation manuals
 - (3) DoC (Declaration of Conformity)
 - (4) Warranty documentation

1.04 QUALIFICATIONS

- A. The manufacturer shall have a minimum of five years experience in producing Ethernet switch equipment.
- B. Installers shall be trained and authorized by the manufacturer to install, integrate, test and commission the system.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver the device in the manufacturer’s original, unopened, undamaged container with identification labels intact.

- B. Store the device in a temperature environment of -40°C to 85°C (-104°F to 185°F), protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY AND SUPPORT

- A. The manufacturer shall provide a limited 5-year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: NVT Phybridge, Inc.
3457 Superior Court, Unit 3
Oakville, ON, Canada L6L 0C4
Phone: +1 905 901-3633
Web: www.nvtphybridge.com
E-mail: support@nvtphybridge.com
- B. Model: EC-Link+
- C. Part Code: NV-ECLK-PLS
- D. Alternates: None

2.02 GENERAL DESCRIPTION

- A. The EC-Link+ shall provide Ethernet and PoE over Coax cable with up to eighteen times the reach of traditional data switches.
- B. The EC-Link+ shall possess the following characteristics:
 - (1) capable of delivering up to 50W of PoE to the IP endpoint
 - (2) pairs with a CLEER24 switch, EC10 switch or EC-Base unit to operate in long-reach mode as an Ethernet over Coax Extender.
 - (3) converts conventional Ethernet to a signal that can be carried by various types of Coax cable.
 - (4) uses previously installed Coax cable to connect IP network endpoints such as IP cameras, IP phones, network switches, DVR/NVRs, PCs, and printers.
 - (5) capable of being powered via the CLEER24 switch, EC10 switch, EC- Base unit or local external power supply

2.03 INTERFACES

- A. Ethernet (Downlink)
 - (1) One Ethernet RJ45 connector. This connection supports a standard Ethernet cable: patch or crossover Cat5e/Cat6.
 - (2) The RJ45 shall support 10/100 BaseT full or half duplex and auto-negotiation of the transmission rate.

- B. Coax (Long Reach)
 - (1) The EC-Link+ shall have a single female BNC connector for the long reach ethernet over coax port. It will support and coax cable with a nominal characteristic impedance of 75Ω.
 - (2) Maximum cable distances are specified as (based on a 75Ω impedance coax cable):
 - (a) RG59 – 100Mbps to 457m (1500ft)
 - (b) RG59 – 10Mbps from 457m to 1220m (4000ft)
 - (c) RG6 – 100Mbps to 610m (2000ft)
 - (d) RG6 – 10Mbps from 610m to 1830m (6000ft)
 - (e) RG11 – 100Mbps to 915m (3000ft)
 - (f) RG11 – 10Mbps from 95m to 1830m (6000ft)
 - (3) The maximum data through-put shall be 200Mbps (total up plus down) and shall auto adapt to the cable conditions. This will support 100Mbps communication in both directions.
 - (4) There shall be no signal degradation from 0m to the maximum supported distances.
- C. Power Input
 - (1) The EC-Link+ shall have a single DC in barrel connector capable of supporting a power barrel plug with the dimensions 2.1mm ID and 5.5mm OD.

2.04 INDICATORS

- A. Ethernet Downlink
 - (1) The Ethernet downlink RJ45 port shall have two LEDs to indicate network connection status: Link status (LEFT - green) and activity status (RIGHT - amber).
 - (2) The link status LED indicates the following: Off – no connection. On – link good.
 - (3) The activity status LED indicates the following: Off – no activity. Flashing – network activity.
- B. Long Reach BNC
 - (1) The long reach Ethernet over Coax BNC port shall have one LED to indicate connection status: Link/speed status (green or amber).
 - (2) The link/speed LED indicates the following status: Off – no link. Green – link good with network speed of 100Mbps. Amber – link good with network speed of 10Mbps.

2.05 POE

- A. The EC-Link+ shall be capable of providing up to 50 watts of power over the UTP connection to the endpoint device when powered via a local power supply or the EC-Base (with local power supply) and 30W PoE when powered via the CLEER24 switch, EC10 switch or EC-Base (powered from a standard PoE switch).
- B. The EC-Link+ shall be capable of being powered via PoE from the CLEER24 switch, EC10 switch or EC-Base unit.
- C. The EC-Link+ Ethernet port shall follow standard PoE power negotiation.
- D. The end-point device must be IEEE 802.3af or 802.3at compliant in order to be powered using PoE.

2.06 ELECTRICAL

A. Power

(1) Sources

- (a) CLEER24 Switch
- (b) EC10 Switch
- (c) EC-Base unit
- (d) Local External DC PSU, Class II, Efficiency VI, Input voltage 100-240VAC, 50-60Hz, Output voltage 55VDC / 1A or 2A, Output connector: power barrel plug, (2.1mm ID and 5.5mm OD)

(2) Power consumption

- (a) 1.1W (not including PoE endpoints)

(3) Power injection (PoE)

- (a) -54VDC, 50W – end-point devices must be IEEE 802.3af/at compliant to use the power injection

B. Immunity

(1) Electrostatic Discharge

- (a) IEC 61000-4-2
EN 61000-4-2
 - (i) +- 6kV Contact Discharge (Direct and indirect)
 - (ii) +- 8kV Air Discharge

(2) Electrical Fast Transient

- (a) IEC 61000-4-4
- (b) EN 61000-4-4
 - (i) +- 2kV on AC ports
 - (ii) +- 2kV on I/O ports

C. Connectors

(1) Ethernet

- (a) RJ45 (1) - Ethernet downlink port
- (b) Female BNC (1) - Long reach Ethernet over Coax + power connection

(2) External power

- (a) DC power: 1 DC barrel connector

2.07 MECHANICAL AND ENVIRONMENTAL

- A. Housing material: Powder coated steel
- B. Mounting Desk or Wall Mountable
- C. Dimensions (L x W x H): 3.97in x 1.98in x 1.01in (100.9mm x 50.3mm x 25.7mm)
- D. Weight: 108g
- E. Thermal: Air cooled
- F. Temperature
 - (1) Operating: -50°C to 70°C (-58°F to 158°F)
 - (2) Storage: -40°C to 85°C (-104°F to 185°F)
- G. Humidity: 10 – 95%, non-condensing @ 35°C
- H. MTBF (Mean Time Between Failure): 20+ Years (175,200+ Hours)

END OF SECTION

PART 3 EXECUTION

3.01 INSTALLERS

- A. Contractor personnel

3.02 PREPARATION

- A. The network design and configuration shall be verified for compatibility and performance with the camera(s)
- B. Network configuration shall be tested and qualified by the contractor prior to camera installation.

3.03 INSTALLATION

- A. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment
 - (1) A report indicating successful test results shall be produced.

3.04 STORAGE

- A. The product shall be stored in an environment where temperature and humidity are in the range specified by the manufacturer.

END OF SECTION

D. EC4

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK ADAPTER

DIVISION 27 – COMMUNICATIONS

- 27 20 00 Data Communications
- 27 21 00 Data Communications Network Equipment
- 27 21 29 Switches & Hubs

COAX LEVERAGED ETHERNET EXTENDED REACH NETWORK ADAPTER

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes a 4-port 10/100Mbps Ethernet over Coax adapter with power capability.
- B. Product – The EC4 Ethernet over Coax Network Adapter delivers Ethernet and Power over Coax cable with multiple times the reach of traditional data switches.
- C. Related Requirements
 - (1) 27 10 00 Structured Cabling
 - (2) 27 16 00 Communications Connecting Cords, Device, and Adapters
 - (3) 27 16 16 Communications Media Converters, Adapters, and Transceivers
 - (4) 27 30 00 Voice Communications
 - (5) 27 31 23 IP Voice Switch

1.02 REFERENCES

- A. Abbreviations
 - (1) DVR – Digital Video Recorder
 - (2) GbE – Gigabit Ethernet
 - (3) GBIC – Gigabit Interface Converter
 - (4) GUI – Graphical User Interface
 - (5) IoT – Internet of Things
 - (6) IP – Internet Protocol
 - (7) LAN – Local Area Network
 - (8) LLDP – Link Layer Discovery Protocol
 - (9) LLDP-MED – Link Layer Discovery Protocol Media Endpoint Discovery
 - (10) Mbps – Megabits per second
 - (11) NTP – Network Time Protocol
 - (12) NVR – Network Video Recorder

- (13) PoE – Power over Ethernet
 - (14) PoLRE – Power over Long Reach Ethernet
 - (15) SFP – Small Form-factor Pluggable Transceiver
 - (16) SNMP – Simple Network Management Protocol
 - (17) STP – Spanning Tree Protocol
 - (18) UTP – Unshielded Twisted Pair wiring
 - (19) VLAN – Virtual Local Area Network
- B. Reference Standards
- (1) Network
 - (a) IEEE – 802.3 Ethernet Standards
 - (2) EMC
 - (a) Emissions
 - (i) FCC Part 15, Class A
 - (ii) IECS-003
 - (iii) EN 55032:2012
 - (iv) EN 50121-4:2015
 - (b) Immunity
 - (i) EN 55024:2010
 - (ii) EN 50121-4:2015
 - (3) Safety
 - (a) UL 60950-1 2nd Ed 2014-10-14
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 - (4) Environment
 - (a) RoHS Directives 2011/65 and 2015/863

1.03 SUBMITTALS

- A. Product data
- (1) Datasheets
 - (2) Installation and operation manuals
 - (3) DoC (Declaration of Conformity)
 - (4) Warranty documentation

1.04 QUALIFICATIONS

- A. The manufacturer shall have a minimum of five years experience in producing Ethernet switch equipment.
- B. Installers shall be trained and authorized by the manufacturer to install, integrate, test and commission the system.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver the device in the manufacturer's original, unopened, undamaged container with identification labels intact.
- B. Store the device in a temperature environment of -40°C to 85°C (-104°F to 185°F), protected from mechanical and environmental conditions as designated by the manufacturer.

1.06 WARRANTY AND SUPPORT

- A. The manufacturer shall provide a limited 5-year warranty for the product to be free of defects in material and workmanship.

END OF SECTION

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Manufacturer: NVT Phybridge, Inc.
3457 Superior Court, Unit 3
Oakville, ON, Canada L6L 0C4
Phone: +1 905 901-3633
Web: www.nvtphybridge.com
E-mail: support@nvtphybridge.com
- B. Model: EC4
- C. Part Code: NV-EC-04
- D. Alternates: None

2.02 GENERAL DESCRIPTION

- A. The EC4 shall provide Ethernet and PoE over Coax cable with up to six times the reach of traditional data switches.
- B. The EC4 shall possess the following characteristics:
 - (1) capable of supporting 4 IP endpoints.
 - (2) capable of delivering up to 30W of PoE to be shared across all connected IP endpoints.
 - (3) capable of operating in CLEER mode supporting extended Coax cable lengths when paired with a CLEER24 switch, EC10 switch or EC-Base.
 - (4) converts conventional Ethernet to a signal that can be carried by various types of 75Ω Coax cable.
 - (5) uses previously installed Coax cable to connect IP network endpoints such as IP cameras, IP phones, network switches, DVR/NVRs, PCs, and printers.
 - (6) capable of being powered via the CLEER24 switch, EC10 switch or EC- Base.

2.03 INTERFACES

A. Ethernet (Downlink)

- (1) Four Ethernet RJ45 connectors. These connections support a standard Ethernet cable: patch or crossover Cat5e/Cat6.
- (2) The RJ45 shall support 10/100 BaseT full or half duplex and auto-negotiation of the transmission rate.

B. Coax (Long Reach)

- (1) The EC4 shall have a single female BNC connector for the long reach Ethernet over Coax port. It will support any 75Ω impedance coax cable.
- (2) Maximum cable distances are specified as (based on a 75Ω impedance coax cable):
 - (a) RG59 – 100Mbps to 457m (1500ft)
 - (b) RG6 – 100Mbps to 610m (2000ft)
 - (c) RG11 – 100Mbps to 915m (3000ft)
- (3) The maximum data through-put shall be 200Mbps (total up plus down) and shall auto adapt to the cable conditions. This will support 100Mbps communication in both directions.
- (4) There shall be no signal degradation from 0m to the maximum supported distances.

2.04 INDICATORS

A. Ethernet Downlink

- (1) The Ethernet downlink RJ45 ports shall have two LEDs to indicate network connection status: Link status (LEFT - green) and activity status (RIGHT - amber).
- (2) The link status LED indicates the following: Off – no connection. On – link good.
- (3) The activity status LED indicates the following: Off – no activity. Flashing – network activity.

2.05 POE

- A. The EC4 shall be capable of providing up to 30 watts of power over the UTP connection to be shared between the four endpoint devices.
- B. The EC4 shall be capable of being powered via PoE from the CLEER24 switch, EC10 switch or EC-Base or an external local power supply.
- C. The EC4 Ethernet ports shall provide PoE on 4-pairs of the Ethernet patch cable 'always-on'.
- D. The endpoint device must be IEEE 802.3af or 802.3at compliant in order to be powered using PoE.

2.06 ELECTRICAL

- A. Power
 - (1) Sources
 - (a) CLEER24 Switch
 - (b) EC10 Switch
 - (c) EC-Base
 - (d) Local External DC PSU, Class II, Efficiency VI, Input voltage 100-240VAC, 50-60Hz, Output voltage 55VDC / 1A or 2A, Output connector: power barrel plug, (2.1mm ID and 5.5mm OD)
 - (2) Power consumption
 - (a) 1W (not including PoE endpoints)
 - (3) Power injection (PoE)
 - (a) -54VDC, 30W – endpoint devices must be IEEE 802.3af/at compliant to use the power injection
- B. Immunity
 - (1) Electrostatic Discharge
 - (a) IEC 61000-4-2
EN 61000-4-2
 - (i) +- 6kV Contact Discharge (Direct and indirect)
 - (ii) +- 8kV Air Discharge
 - (2) Electrical Fast Transient
 - (a) IEC 61000-4-4
 - (b) EN 61000-4-4
 - (i) +- 2kV on AC ports
 - (ii) +- 2kV on I/O ports
- C. Connectors
 - (1) Ethernet
 - (a) RJ45 (4) - Ethernet uplink ports
 - (b) Female BNC (1) - long reach Ethernet over Coax + power connection

2.07 MECHANICAL AND ENVIRONMENTAL

- A. Housing material: Plastic
- B. Mounting: Not Mountable
- C. Dimensions (H x W x D): 0.98in. x 2.75in. x 4.3in. (25mm x 70mm x 110mm)
- D. Weight: 96g
- E. Thermal: Air cooled
- F. Temperature
 - (1) Operating: 0°C to 70°C (32°F to 158°F)
 - (2) Storage: -50°C to 85°C (-104°F to 185°F)
- G. Humidity: 10 – 95%, non-condensing @ 35°C
- H. MTBF (Mean Time Between Failure): 20+ Years (175,200+ Hours)

END OF SECTION

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- A. The network design and configuration shall be verified for compatibility and performance with the camera(s).
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- A. Before permanent installation of the system, the system shall be factory tested in conditions simulating the final installed environment.
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- A. The product shall be stored in an environment where temperature and humidity are in the range specified by the manufacturer.

END OF SECTION