**PINE-4** is a Network Termination Unit connecting Fast Ethernet LANs over four bonded E1 circuits. The device enables Service Providers to supply high capacity Ethernet services to remote locations and transport connection of Corporate WANs over existing E1 or T1. The device can be used in point-to-point or in hub-and-spoke topology operating opposite **PINE-155**. The device uses HDLC/GFP bonding to create a scalable large virtual pipe of upto 4E1.

Typical applications include Ethernet private Line / LAN services, IP DSLAMs, Cellular IP and WiMAX base station back-hauling, Inter-office or Enterprise LAN connectivity.

### Key Features

- **EoPDH**: 4 FE over 4 E1/T1
- **VCG**: 1 VCG with 1 ~ 4/ E1/T1 members
- **EoPDH encapsulation**: HDLC, GFP
- **Fault Pass through**: VCG based
- **E1 Framed mode**: Framed, PCM31
- **E1 loopback**: Single E1 loopback test & loopback detection
- **Forwarding mode**: Store-and-forward mode, Buffer size: 128KB
- **Packet forwarding**: MTU:1,632 Bytes DLF forward control
- **Bandwidth profile**
  - Max rate limit: 100,000Kbps
  - Ingress rate limit per port
  - Increments: 64Kbps (64K-1M), 1Mbps (1-100M), 10Mbps (100-1000M)
  - Supports egress shaping per port
- **Storm control**:
  - Broadcast storm control
  - Multicast storm control
  - Unicast DLF storm control
  - Control mode: Global, bps
- **Link Aggregation**: Upto 4 groups, upto 4 ports in each group
- **Port mirroring for egress and ingress ports**
- **MAC address table**:
  - IEEE 802.1Q 8K MAC address
  - Add/remove MAC address
  - View MAC address statistic
  - Search MAC address
  - Aging time: 15-3,825s
  - MAC table threshold per port
  - MAC table limit: 1-255
- **Flow control**: IEEE 802.3x in full duplex mode
- **VLAN**: IEEE 802.1Q VLAN, 4K active VLANs, Port PVID Overwrite
- **QinQ**: Overwrite, Port QinQ
- **L2TP**: BPDU, DOT1X, LACP
- **Port Loopback Detection**: Individual port will be shutdown if loopback is detected
- **Input power**: 220V AC (nom), -48V DC (nom), (AC+DC) dual input option accepts (100 ~ 240V AC) and (-36V ~ -72V DC)
Management Features

- System Management:
  CLI, ARP, Management address configuration, Telnet Console, SSH RMON Group 1, 2, 3 & 9, SNMP Bridge MIB (RFC1493), **LITEVIEW**, System log, Hierarchical alarms, Link alarm per port, Keep-alive report, Fault pass through, Module information management
- Cluster Management: Neighbour Discovery protocol
- Auto configuration: Supported
- Software upgrade: Xmodem/FTP upgrade in BOOTROM, FTP/TFTP (system & configuration files)
- Scheduling: System task scheduling
- Time Management:
  Timezone, Time modification, DST, System time synchronization by SNTP Client, NTP
- DHCP: DHCP Snooping, DHCP Client, DHCP Option82
- OAM: 802.3ah OAM (Discovery, Link Performance, Remote loopback, Fault detection and Performance Stats as per OAM standards), OAM Master, Extended OAM
- CFM: 802.1ag, Y.1731 protocol, Supports 128 MEP/128 MA
- SLA: Layer-2/Layer-3 SLA (frame delay, jitter & loss)
- Error tolerance & Redundancy:
  System error report, Fast recovery during serious error, Hardware voltage & temperature monitoring
- Filter: Switch access IP packet filter
- ACL: IP-based ACL
- QoS: CoS to queue mapping, DSCP to queue mapping, Port TRUST mode, TRUST port priority, TRUST CoS priority, TRUST DSCP priority, Global queue scheduling 4 queues per port, SP, WRR, WRR weight range: 1-125SP+WRR

Application

![Application Diagram](image-url)
Technical Specifications

- **Compliance to standards**: IEEE 802.1Q VLAN, IEEE 802.3ad Link Aggregation, IEEE 802.1ad QinQ, IEEE 802.1p CoS Prioritization, IEEE 802.3x Flow Control, IEEE 802.3ah QAM, IEEE 802.1ag Connectivity Fault Management, ITU-T Y.1731 Services OAM, Static Routing, RMON I and II standards, SNMPv1/v2c/v3, ITU-T G.703, G.704, G.823, G.824, Bellcore GR-499-CORE, ANSI T1.403

- **Performance**: Switching fabric 0.832~1Gbps

- **Capacity**: 32MB SDRAM, 8MB flash, 128KB Switch Buffer

- **Number of ports**: 4 FE ports, 4 E1/T1 ports, 1 Console port

- **Fast Ethernet port**: 10Base-TX (RJ-45, Cat3/Cat4/Cat5 UTP), 100Base-TX (RJ-45, Cat5 UTP)
  
  MTU: 1632 Bytes
  
  Supports auto-MDI/MDIX

- **E1 port**:
  
  Bit Rate: 2.048Mbps
  
  Line Coding: HDB3
  
  Impedance: 120 Ohms Balanced
  
  Connector: RJ-45
  
  Standards compliance: ITU-T G.703, G.704, G.823

- **Console port**: RJ-45

- **LED Indicators**:
  
  System Indicator, Power Supply Indicator
  
  Indicators for Ethernet ports: LNK/ACT and 100 Mbps
  
  Indicators for E1 ports: LOS (Loss of signal)

- **Power supply**: AC: 220V, DC: -48V
  
  AC+DC dual input option
  
  AC range: 100~240V AC, DC range: -36V ~ -72V DC
  
  Power consumption: ≤10W (at max load)

- **Operating environment**:
  
  Temperature: -5~55 deg centigrade
  
  Relative Humidity: ≤90% non-condensing
  
  Storage Temperature: -25~70 deg centigrade

- **Dimension (WxHxD)**: 300 x 44 x 135 mm

- **Weight**: ≤1.2 Kg

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**Ordering PINE-4**

<table>
<thead>
<tr>
<th>PINE/4E1/4FE/DC</th>
<th>Intelligent Ethernet Demarcation Device, four 10/100Mbps FE ports, four E1 (120 Ohm balanced) RJ-45 uplink, working on -48V DC power supply.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PINE/4E1/4FE/AC</td>
<td>Intelligent Ethernet Demarcation Device, four 10/100Mbps FE ports, four E1 (120 Ohm balanced) RJ-45 uplink, working with AC Adaptor (220V AC to -48V DC) power supply.</td>
</tr>
<tr>
<td>PINE/4E1/4FE/AC/DC</td>
<td>Intelligent Ethernet Demarcation Device, four 10/100Mbps FE ports, four E1 (120 Ohm balanced) RJ-45 uplink, working with (AC+DC) dual power input option. AC range: 100~240V, DC range: -36V ~ -72V DC.</td>
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