ANDA Networks
EtherTone™ Product Family

ANDA Networks' EtherTone™ product line was designed to bring the concept of dial tone to the data world. By using an Ethernet interface, a carrier can deliver a high-speed network connection to a subscriber, from which it can up sell additional data services; in much the same way as a carrier does with the traditional dial tone service. In addition to data services, the EtherTone product family can also be used to deliver voice services by taking advantage of the latest advances in Ethernet, MPLS and Pseudowire networking.

The EtherTone product line includes:

EtherDAX™ 6000 Series

The EtherDAX™ 6000 is a central office Ethernet aggregation and cross connect product designed to support large scale Ethernet service delivery requirements for leading carriers. The EtherDAX™ 6000 supports high density of channelized STM1, clear channel E3, OC12/STM4 and GigE interfaces with 48G non-blocking capacity initially. It will scale up to OC-192/STM-64, 10GigE, CWDM, and DWDM interfaces with 120G non-blocking capacity. It supports thousands of EtherReach 2000 products and many EtherEdge 4000 products.

EtherEdge™ 4000 Series
The EtherEdge 4000 series is a modular system that enables cost-effective delivery of Ethernet services over copper and fiber facilities. The series has two possible deployment scenarios. It can be located in the basement of multi-tenant buildings, serving as an edge device that supports multiple end users, providing 10/100BaseTX, 100BaseFX, clear channel E3, and channelized STM1 ports on the subscriber side, which can be mapped to multiple E3, STM1, STM4, and GigE ports on the trunk side. The EtherEdge 4000 can also be located at the Service Provider's POP or CO in order to aggregate traffic from tens to hundreds of remote EtherReach 2000 devices or a number of remote EtherEdge 4000.

EtherReach™ 3000 Series
The EtherReach 3000 series provides Ethernet and TDM interfaces in a fixed configuration, compact form factor for deployments at building sites as well as CO or POP locations. Network interface options include STM1, STM4, and Gigabit Ethernet, while subscriber interfaces include 10/100BaseTX, E1, and Gigabit Ethernet. The EtherReach 3000 series offers attractive price points and an easy way to add Ethernet services onto a legacy network.

EtherReach™ 2000 Series
Located at the customer premises, the EtherReach 2000 series devices are single user versions of ANDA Networks' EtherEdge 4000. The EtherReach 2000 series includes units that support E1, E3 and STM1 on the trunk side, and 10/100BaseTX towards the subscriber. As a collection of small fixed-configuration devices, the EtherReach 2000 series can be utilized to meet a variety of deployment scenarios at very attractive prices.

EtherView™ Element Management System
The EtherView EMS is a GUI-driven application that provides the traditional FCAPS management functions for the EtherTone family, and also allows for integration into carriers' higher-level OSS applications.

ANDA Networks EtherTone™ Family Applications

ANDA's EtherTone product line can be used by carriers to offer EtherTone services. What are EtherTone services? Below is a sample of the services that ANDA Networks' customers are offering or planning to offer by using the EtherTone product family:

- High Speed Internet Access
- Ethernet Private Lines
- Transparent LAN Services
- Bundled Voice and Data
- Video Transport

This list should not be viewed as exhaustive as the flexibility of EtherTone product family, as well as Ethernet technology allows carriers to develop specific solutions for particular customer requirements.

In addition to supporting multiple applications, ANDA Networks' EtherTone product family can be deployed in a variety of scenarios. The diagram below illustrates the possible scenarios.
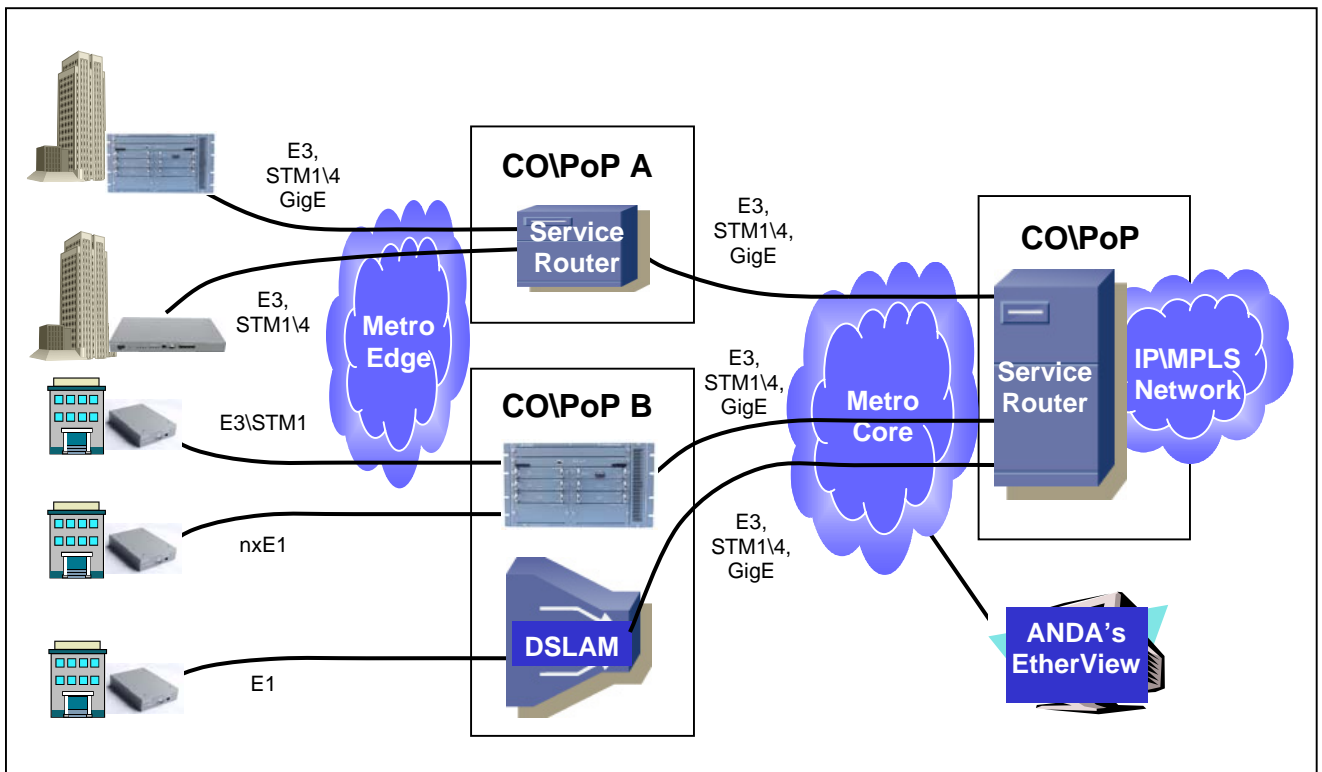
How You Will Benefit from ANDA Networks EtherTone™ Solutions

By deploying EtherTone solutions, carriers can realize benefits in three distinct areas: better bandwidth utilization, increased revenues, and lower operating and support costs. Examples of each of these benefits are discussed below.

Better Bandwidth Utilization:

Existing SDH infrastructure will not be replaced anytime soon. Instead, Service Providers are focusing on using this technology more efficiently – in ways that let them offer more profitable next generation services. ANDA Networks' EtherTone supports X.86 and GFP to map Ethernet directly into SDH payloads far more efficiently via fiber based or copper based network.

Today's SDH infrastructure requires connections for data based services to be provisioned on a *dedicated* TDM time slot on an end-to-end path. This has resulted in SDH networks being over built to accommodate bursty traffic.

X.86 and/or GFP, however, allow the service provider to statistically multiplex the subscribers' Ethernet traffic in the SDH payload. Mapping Ethernet frames into a single SDH virtual connection results in higher bandwidth utilization, the ability to serve more customers with the existing fiber plant, and faster service delivery. All of these benefits translate directly into CAPEX and OPEX savings.

Increased Revenue

Traditional business customer service tariffs force customers to upgrade service rates in *large blocks*.

Connection	E1	to	E3	to	STM1	to	STM4
Speed	2.048 Mbps		34.36 Mbps		155.5 Mbps		622 Mbps

Typical service rate upgrade levels. Costs per service level vary by Service Provider.

Combined with a tight economy and small customer budgets, these service upgrades are frequently delayed until the business customer can justify the large jump in cost to the next service level.

Yet, from the Service Provider's perspective, delayed revenue is lost revenue. Since ANDA Networks' EtherTone utilizes the Ethernet protocol, services can be upgraded in increments of as little as 1 Mbps. By allowing the business customer to upgrade their service level in smaller and easier to justify increments, customers will be more willing to upgrade services sooner. And, Service Providers will recognize revenue sooner without having to further upgrade their existing infrastructure.

Decreased Costs

Currently, to upgrade service levels using a traditional point-to-point infrastructure, a Service Provider truck roll to the customer site is required to install additional E1 or E3 equipment. Truck rolls are labor intensive, expensive, and generally must be scheduled far in advance.

These service level upgrades also generally require the end customer to upgrade their equipment with WAN routers, DSUs, CSUs, or Frame Relay access devices. This equipment is expensive to purchase and maintain and has added tangible and hidden costs resulting from high network complexity.

ANDA Networks' Ethernet based EtherTone product family eliminates truck rolls since bandwidth is provisionable in 1Mbps increments. Thus, customer bandwidth is easily increased, via remote configuration, and expensive WAN equipment is replaced with simple Ethernet switches.

Summary

ANDA Networks' EtherTone product family gives service providers the ability to offer a variety of data and voice services while using a common network infrastructure. By using an Ethernet-based approach, service providers enjoy a solution with significantly lower capital expense. And, the ANDA Networks EtherTone solution is easier to provision and maintain than TDM- and other packet-based approaches.

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EtherDAX™ 6000

Hardware Features

EtherDAX™ 6000 Chassis
➢ 12 interface module slots
➢ 2 system controller and switch modules slots: 1+1 redundant
➢ 2 power module slots with -48VDC
➢ Dimensions: 17" (43.2 cm) W x 11" (27.9 cm) D x 10.5" (26.7 cm) H
➢ 48G non-blocking capacity, 120G non-blocking capacity*

Interface Modules
➢ OC12\STM4 – 4 port, SC connectors, IR or SR
➢ GigE (IEEE802.3z) – 4 full rate GBIC or SFP port
➢ DS3 (ANSI T1.102)– 16 ports
➢ Channelized DS3 (ANSI T.102) – 6 port
➢ Channelized OC3/STM1 (VT1.5/VC12) – 2 port
➢ OC48\STM16* – 1 port, SC connectors, IR or SR
➢ OC3\STM1* – 8 port, SC connectors, IR or SR
➢ 10/100BaseTX* (IEEE 802.3u) – 20 ports
➢ 100BaseFX* (IEEE802.3u) – 20 ports, MM & SM
➢ Modules support ITU G.7041 GFP, G.8040 GFP, X.86, G.707 VCAT, G.7043 VCAT, G.7042 LCAS, 1+1 APS and redundancy for SONET/SDH optical modules
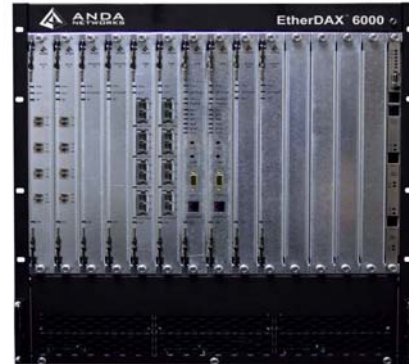➢ 802.3ad Link Aggregation support for Ethernet modules

System Features

Class of Service Support
➢ 8 link layer traffic priority levels per IEEE 802.1p
➢ CoS signaling prioritization: IEEE 802.1p
➢ Optional: MAC Bridging with priority queuing: IEEE 802.1D – 1998
➢ CoS queuing based on IP TOS\DSCP bits

*Available in Future Releases
** To be certified

VLAN Support
➢ VLAN Tagging: IEEE 802.1q
➢ VLAN Bridging with priority queuing: IEEE 802.1p&q
➢ VLAN Swapping (VLAN translation to allow more flexibility in VLAN allocation)
➢ VLAN Stacking (Also known as Q-in-Q)
➢ Policing bandwidth from 1M to 1G in 1M increment on GigE link

Monitoring and Alarms
➢ Performance Monitoring: RFC 2819 RMON, ANSI T1.231.
➢ Alarms: DS3 per RFC2496; SONET per RFC 1595, ANSI T1.231, Telcordia GR-253-CORE

Management
➢ Local DB9 serial port with VT100 terminal emulation
➢ Inband management for remote telnet or HTTPS login
➢ Support for Secure Shell and RADIUS authentication
➢ SNMP v1/v2/v3 support
➢ Ethernet OAM
➢ EtherView Element Management System

Additional Features

Safety & Regulatory Approvals**
➢ UL 60950 / CSA 22.2 / FCC Part 68
➢ NEBS 3 Certification
➢ Telcordia GR-63 & GR-1089
➢ CE Mark

Environmental
➢ Operating temp: 0 to 50 degrees C
➢ Storage temp: -10 to 85 degrees C
➢ Operating humidity: 10% to 85% non-condensing

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EtherEdge 4000

Hardware Features

EtherEdge 4000 Chassis
- 6 interface module slots. 4 subscriber, 2 trunk
- 2 switch modules slots: 1+1 redundant
- 2 power module slots with -48VDC or 120 -220 VAC option
- Dimensions: 17" (43.2 cm) W x 11" (27.9 cm) D x 10.5" (26.7 cm) H

EtherEdge 4000 LP Chassis
- 4 interface module slots. 2 subscriber, 2 trunk
- 1 switch module slot
- 2 power module slots with -48VDC or 120 VAC (96V-136V tolerance) option
- Dimensions: 17" (43.2 cm) W x 16.5" D (41.9 cm) x 5.25" (13.3 cm) H

Subscriber Interfaces
- 10/100BaseTX (IEEE 802.3u) – 8 ports
- 100BaseFX(IEEE802.3u) – 8 ports, MM & SM
- DS3(ANSI T.102)– 8 ports, logical bonding per ITU-T G.7043
- GigE(IEEE802.3z) – 1 full rate GBIC port
- Channelized DS3(ANSI T.102) – 1 port
- STM1 – 4 ports*
- VDSL – 8 ports*
- E1 – 8 ports*

Network Modules
- DS3 – 4 ports
- OC3\STM1 – 1 port, SC connectors, IR and SR
- OC3\STM1– 2 ports, SC connectors, IR or SR
- OC12\STM4 – 1 port, SC connectors, IR or SR
- OC12\STM4 – 2 ports, SFP connectors
- GigE (IEEE802.3z) – 1 full rate GBIC port
- Modules support ITU G.7041 GFP, G.8040* GFP, X.86, G.707 VCAT, G.7043* VCAT, and 1+1 APS and redundancy.
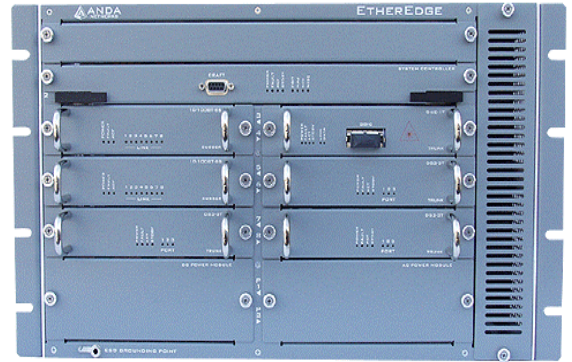
*Available in Future Releases

System Features

Class of Service Support
- 4 link layer traffic priority levels per IEEE 802.1p
- CoS signaling prioritization: IEEE 802.1p

- Optional: MAC Bridging with priority queuing: IEEE 802.1D – 1998
- CoS queuing based on IP TOS\DSCP bits

VLAN Support
- VLAN Tagging: IEEE 802.1q
- VLAN Bridging with priority queuing: IEEE 802.1p&q
- VLAN Swapping (VLAN translation to allow more flexibility in VLAN allocation)
- VLAN Stacking (Also known as Q-in-Q)
- Policing bandwidth from 1M to 1G in 1M increment on GigE uplink

Monitoring and Alarms
- Performance Monitoring: RFC 2819 RMON, ITU G.774
- DS3 alarms via RFC2496
- SDH alarms via RFC 1595 and ITU G.774

Management Access
- Local DB9 serial port with VT100 terminal emulation support
- Inband management for remote telnet or HTTPS login
- SNMP v1/v2/v3 support
- Ethernet OAM

Additional Features

Safety & Regulatory Approvals
- EN 60950 / CSA 22.2 / FCC Part 68
- Telcordia NEBS 3 Certification
- Telcordia GR-63 & GR-1089
- APAC in-country approval

Environmental
- Operating temp: 0 to 50 degrees C
- Storage temp: -10 to 85 degrees C
- Operating humidity: 10% to 85% non-condensing
- Max Power Consumption: 300 watts

Please contact your ANDA sales representative for more information

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EtherReach 3300m

Hardware Features

Subscriber Interfaces
- 4 10/100 Ethernet interfaces per IEEE 802.1u using RJ-45 connectors
- Ethernet interfaces support IEEE 802.3x full duplex operation as well as auto negotiation.
- 16 E1 interfaces per ITU G.703 using a DB37 connector
- E1 interfaces support both 75 and 120 Ohm operation

Network Interface
- 1 STM-1 optical interface per ITU G.704 using SC connectors at 1310nm
- Support for Ethernet over LAPS per ITU-T X.86.
- Support for Virtual Concatenation per ITU-T G.707

System Features

Traffic Forwarding Modes
- VLAN forwarding
- MAC Bridging with priority queuing: IEEE 802.1d – 1998

Bridging Features
- Ability to learn up to 64K MAC addresses
- Spanning tree support per IEEE 802.1d

VLAN Features
- VLAN tagging per IEEE 802.1q
- Support for up to 4095 VLANs
- VLAN bridging with priority queuing per IEEE 802.1q
- Per VLAN policing in increments as little as 1 Mbps.

Class of Service
- 4 traffic priority levels per IEEE 802.1d
- Class of Service prioritization per IEEE 802.1p
- CoS queuing based on IP TOS\DSCP bits

Link Aggregation
- Subscriber Interface Link Aggregation per IEEE 802.3ad – 2000

Management Features
- One 10/100 Ethernet interfaces and one serial RS232 interface for external connectivity
- Management interfaces provide access to CLI or HTTP GUI
- In-band management support
- SNMP V2 compliant
- Ethernet performance monitoring per RFC 2819 RMON
- NTP support per RFC 1305

Additional Features

Environmental
- Operating temperature: 0 to 50 degrees Celsius
- Operating humidity: 10 to 85% condensing
- Storage temperature: -10 to 85 degrees Celsius

Mechanical
- Height: 1RU (1RU = 4.45cm)
- Width: 44 cm
- Depth: 28.5 cm

Power and Heat Dissipation
- Operates on –48V DC power
- Maximum power consumption: ~25W

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EtherReach 3300o

Hardware Features

Subscriber Interfaces
- 4 10/100 Ethernet interfaces per IEEE 802.1u using RJ-45 connector
- Ethernet interfaces support IEEE 802.3x full duplex operation.

Network Interface
- 1 STM-1 optical interface per ITU G.704 using SC connectors at 1310nm
- Support for Ethernet over LAPS per ITU-T X.86
- Support for Virtual Concatenation per ITU-T G.707

System Features

Traffic Forwarding Modes
- VLAN forwarding
- MAC Bridging with priority queuing: IEEE 802.1d – 1998

Bridging Features
- Ability to learn up to 64K MAC addresses
- Spanning tree support per IEEE 802.1d

VLAN Features
- VLAN tagging per IEEE 802.1q
- Support for up to 4095 VLANs
- VLAN bridging with priority queuing per IEEE 802.1q
- Per VLAN policing in increments as little as 1 Mbps

Class of Service
- 4 traffic priority levels per IEEE 802.1d
- Class of Service prioritization: IEEE 802.1p
- CoS queuing based on IP TOS\DSCP bits

Link Aggregation
- Subscriber Interface Link Aggregation per IEEE 802.3ad – 2000

Management Features
- One 10/100 Ethernet interfaces and one serial RS232 interface for external connectivity
- Management interfaces provide access to CLI or HTTP GUI
- In-band management interface available in 2H03
- SNMP V2 compliant
- Ethernet performance monitoring per RFC 2819 RMON
- NTP support per RFC 1305

Additional Features

Environmental
- Operating temperature: 0 to 50 degrees Celsius
- Operating humidity: 10 to 85% condensing
- Storage temperature: -10 to 85 degrees Celsius

Mechanical
- Height: 1RU (1RU = 4.45cm)
- Width: 44 cm
- Depth: 28.5 cm

Power and Heat Dissipation
- Operates on –48V DC power
- Maximum power consumption: ~25W

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EtherReach 3300e

Hardware Features

Subscriber Interfaces
- 4 10/100 Ethernet interfaces per IEEE 802.1u using RJ-45 connectors
- Ethernet interfaces support IEEE 802.3x full duplex operation.

Network Interface
- 1 STM-1 electrical interface per ITU G.704 using BNC connector
- Support for Ethernet over LAPS per ITU-T X.86
- Support for Virtual Concatenation per ITU-T G.707

System Features

Traffic Forwarding Modes
- VLAN forwarding
- MAC Bridging with priority queuing: IEEE 802.1d – 1998

Bridging Features
- Ability to learn up to 64K MAC addresses
- Spanning tree support per IEEE 802.1d

VLAN Features
- VLAN tagging per IEEE 802.1q
- Support for up to 4095 VLANs
- VLAN bridging with priority queuing per IEEE 802.1q
- Per VLAN policing in increments as little as 1 Mbps

Class of Service
- 4 traffic priority levels per IEEE 802.1d
- Class of Service prioritization: IEEE 802.1p
- CoS queuing based on IP TOS\DSCP bits

Link Aggregation
- Subscriber Interface Link Aggregation per IEEE 802.3ad – 2000

Management Features

- One 10/100 Ethernet interfaces and one serial RS232 interface for external connectivity

- Management interfaces provide access to CLI or HTTP GUI
  - In-band management interface available in 2H03
  - SNMP V2 compliant
  - Ethernet performance monitoring per RFC 2819 RMON
  - NTP support per RFC 1305

Additional Features

Environmental
- Operating temperature: 0 to 50 degrees Celsius
- Operating humidity: 10 to 85% condensing
- Storage temperature: -10 to 85 degrees Celsius

Mechanical
- Height: 1RU (1RU = 4.45cm)
- Width: 44 cm
- Depth: 28.5 cm

Power and Heat Dissipation
- Operates on –48V DC power
- Maximum power consumption: ~25W

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EtherReach 2300e

Hardware Features

- 2 10/100BaseTX subscriber interfaces per IEEE 802.3u-1998
- Flow Control with PAUSE frames per IEEE 802.3x
- 1 STM1(ITU-T G.707), SFP network interface. ITU-T G.7041 GFP or ITU-T X.86
- Local craft access via: 10/100BaseTX or DB9 serial interface

System Features

Traffic Forwarding Modes
- VLAN forwarding
- Transparent mapping
- MAC Bridging with priority queuing: IEEE 802.1d – 1998 (Future)

VLAN Support
- VLAN Tagging per IEEE 802.1q
- VLAN Bridging with priority queuing per IEEE 802.1p&q
- Tag Stacking (also known as Q-in-Q) support
- Per VLAN policing with 1 Mbps granularity

Class of Service
- 4 link layer traffic priority levels per IEEE 802.1d
- CoS signaling prioritization: IEEE 802.1d
- WRR and strict priority queue processing
- CoS based on user IP Precedence\TOS\DSCP bits

Link Aggregation
- Subscriber Interface Link Aggregation per IEEE 802.3ad – 2000

Management
- Performance Monitoring: RFC 2819 RMON, ANSI T1.231.
- Queue statistics for Layer 3 SLAs
- SONET alarms per RFC 1595, ANSI T1.231, Telcordia GR-253CORE
- Inband management for remote telnet or HTTP login
- Ethernet OAM

Additional Specifications

Mechanicals
- Width: 6 inches / 15.2 cm
- Height: 1.75 inches / 4.45cm
- Depth: 8 inches / 20.3 cm
- Weight: ~5 lbs / ~2.3 Kg

Safety Approvals
- UL 60950 / CSA 22.2
- FCC Part 15 A

Environmental
- Operating temp: 0 to 50 degrees C
- Storage temp: -10 to 85 degrees C
- Operating humidity: 10% to 85% non-condensing

Power & Heat Dissipation
- 110 VAC (90-240V tolerance)
- 15 VDC (12-24V tolerance)
- Consumes 15 Watts

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EtherReach 2200e

Hardware Features
- 2 10/100BaseTX subscriber interfaces per IEEE 802.3u-1998
- Flow Control with PAUSE frames per IEEE 802.3x
- 1 E3 (ITU-T G.704) network interface: 75 Ohm BNC, X.86 Ethernet over LAPS
- Local craft access via: 10/100BaseTX or DB9 serial interface
- 1+1 equipment protection option
- 100BaseFX converter option

System Features

Traffic Forwarding Modes
- VLAN forwarding
- Transparent mapping
- MAC Bridging with priority queuing: IEEE 802.1d – 1998 (Future)

VLAN Support
- VLAN Tagging per IEEE 802.1q
- VLAN Bridging with priority queuing per IEEE 802.1p&q
- Tag Stacking (also known as Q-in-Q) support
- Per VLAN policing with 1 Mbps granularity

Class of Service
- 4 link layer traffic priority levels per IEEE 802.1d
- CoS signaling prioritization: IEEE 802.1d
- WRR and strict priority queue processing
- CoS based on user IP Precedence\TOS\DSCP bits

Link Aggregation
- Subscriber Interface Link Aggregation per IEEE 802.3ad – 2000

Management
- Performance Monitoring: RFC 2819 RMON, ITU-T G.821.
- Queue statistics for Layer 3 SLAs
- E3 alarms
- Inband management for remote telnet or HTTPS login
- Egress based rate shaping
- Ethernet OAM

Additional Specifications

Mechanicals
- Width: 6 inches / 15.2 cm
- Height: 1.75 inches / 4.45cm
- Depth: 8 inches / 20.3 cm
- Weight: ~5 lbs / ~2.3 Kg

Safety Approvals
- UL 60950 / CSA 22.2
- FCC Part 15 A

Environmental
- Operating temp: 0 to 50 degrees C
- Storage temp: -10 to 85 degrees C
- Operating humidity: 10% to 85% non-condensing

Power & Heat Dissipation
- 220 VAC (90-240V tolerance)
- 15 VDC (12-24V tolerance)
- Consumes 15 Watts

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EtherReach 2108e

Hardware Features
- 2 10/100BaseTX subscriber interfaces per IEEE 802.3u-1998
- Flow Control with PAUSE frames per IEEE 802.3x
- 8 E1(ITU-T G.704) network interfaces via a 50-pin amphenol-type connector.
- HDB3 Line coding
- ITU G.704 framing
- Support for 128 msec differential delay on E1 interfaces
- Local craft access via: 10/100BaseTX or DB9 serial interface

System Features

Inverse Multiplexing
- Logical bonding via VCAT based on ITU G.7043/G.8040
- Configurable automatic removal / restoration of E1s from link group

Traffic Forwarding Modes
- VLAN forwarding
- Transparent mapping
- MAC Bridging with priority queuing: IEEE 802.1d – 1998 (Future)

VLAN Support
- VLAN Tagging per IEEE 802.1q
- VLAN Forwarding
- VLAN Bridging with priority queuing per IEEE 802.1p&q
- Tag Stacking (also known as Q-in-Q) support
- Per VLAN policing with 1 Mbps granularity

Class of Service
- 4 link layer traffic priority levels per IEEE 802.1d
- CoS signaling prioritization: IEEE 802.1d
- WRR and strict priority queue processing
- CoS based on user IP Precedence\TOS\DSCP bits

Management
- Local and remote loop back support
- Ethernet LOS translation to E1 AIS
- Performance Monitoring: RFC 2819 RMON, ITU G.821
- Inband management for remote telnet or HTTPS login
- Ethernet OAM

Additional Specifications

Mechanicals
- Width: 8 inches / 20.3 cm
- Height: 1.75 inches / 4.45cm
- Depth: 10 inches / 25.4 cm
- Weight: ~5 lbs / ~2.3 Kg

Safety Approvals
- EN 60950
- CE Mark
- Call for other country approvals

Environmental
- Operating temp: 0 to 50 degrees C
- Storage temp: -10 to 85 degrees C
- Operating humidity: 10% to 85% non-condensing

Power & Heat Dissipation
- 2200 VAC (90-240V tolerance)
- 15 VDC (12-24V tolerance)
- Consumes 15 Watts

Please contact your ANDA sales representative for more information