ACCEED 1416
Multi Wire Pairs SHDSL – Carrier Ethernet Access and Demarcation Unit and Line Card for ULAF+ platform

Reliable
Legacy network termination units for broadband over copper and fibre

Flexible
Comprehensive set of network demarcation devices for almost all network applications

Strong
MEF-certified systems and solutions to enable fast network integration

Product Overview
ACCEED 1416 supports bonded high speed symmetrical Carrier Ethernet services up to 102.4 Mbit/s on bonded copper pairs.

Comprehensive traffic management at the user network interface (UNI) and integrated E1 CES interworking functions enable the implementation of a broad variety of crucial applications where fiber is not available.

Applications
ACCEED 1416 focuses on the following applications:
- High Speed Business Access
- Network Demarcation for Wholesale Solutions
- Reliable Mobile Backhaul
- Business Access for Rural Areas
- Utility Solutions

Copper Based Ethernet Services with Fiber Like Quality
EFMC-LR is based on well known ITU/ETSI SHDSL technology, supporting reliable, spectral compatible and symmetrical services of 192 kbit/s to 15.3 Mbit/s per wire pair.

Using standard based EFM-bonding, ACCEED 1416 can aggregate up to 16 wire pairs providing up to 100 Mbit/s.

EFM bonding offers the great flexibility to aggregate wire pairs each with a distinct bit rate with very low overhead and minimal latency added. Moreover wire pairs can be added or removed with no impact on the transmission quality, i.e. without bit errors. EFMC bonding delivers fiber like bandwidth to provide profitable services where fiber is not available.

High Flexible and Scalable Architecture
The ACCEED 1416 system architecture allows the mapping of any SHDSL port to any Ethernet port:
- Any Port / Any Card

This architecture supports:
- Flexible bonding of 2 up to 16 wire pairs to match bandwidth requirements
- Optimal utilization of system resources
- Resiliency and line card protection

Key Features
- Ethernet over up to 16 bonded copper wire pairs
- Standard compliant IEEE 802.3ah EFM
- Supports SFF 8472 compliant SFP with DDM
- Sub 50ms Ethernet linear and ring protection switching
- Rate adaptive SHDSL
- Network demarcation allowing SLA enforcement
- Ethernet services with guaranteed bandwidth per flow
- Non-blocking line rate switching
- Integrated CES interworking function
- E1 interface to support legacy customer equipment
- Synchronization with SyncE, 2048 kbit/s, 2048 kHz and SHDSL symbol clock
- Standard Ethernet Link and Service OAM
- 3.3ms CCM intervals
- Built-in remote power supply
- Up to 8 repeater stages supported
- Built-in Y. 1564 Service Activation Test
- Intuitive graphical configuration tool
- Zero Touch Provisioning
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Application

Compatibility
ACCEED 1416 LT is interoperable with any standards compliant 3rd party EFM CPE as well as the ULAF+ ACCEED 1102, 1104, 1416 and BSRU / BSRU+.

Carrier Grade Ethernet Services
Traffic aware switching with extended flow management allows providers to address the emerging market of premium voice and data services over Ethernet.

ACCEED 1416 supports the complete set of CE 2.0 services defined by the MEF: E-Line, E-LAN, E-Tree and E-Access.

Support of E1 Legacy Services
ACCEED 1416 features an E1 port giving the possibility to connect legacy TDM customer equipment. This allows a successful migration to full Carrier Ethernet.

The integrated pseudo wire interworking function supports Structure Agnostic (SAToP) and Structure Aware (CESoPSN) payload encapsulated in Ethernet or MPLS PWE3 protocols.

Ethernet Service Assurance
ACCEED 1416 offers a set of standard based protocols and tools to support providers managing Ethernet services over their entire Life-Cycle. From provisioning to SLA performance monitoring and fault localizing ACCEED allows operation staffs to ease their work and increase their efficiency thus considerably contributing to reducing operating costs.

Provisioning & Turn-up
- Use of configuration files, CLI scripts and Zero Touch Provisioning minimizes the installation effort by automating the configuration process.
- Built-in Y.1564 compliant Service Activation Test (SAT) allows to cut operational costs to verify the SLA at turn-up. A comprehensive test report with all relevant parameters of multiple simultaneously tested services can be generated by a simple keystroke. No need to dispatch personal and costly test equipment to the customer premises.
Performance Management
- Y.1731 based performance management continuously monitors SLA parameters such as Frame Loss, Availability, Frame Delay and Frame Delay Variation with microsecond accuracy and generates alarms if Objective Thresholds are violated, giving providers the possibility to proactively take actions before the service is seriously degraded.
- Collection of statistics on physical, packet and service level as well as real time graphs monitoring service utilization allows to track the service performance, to analyze network traffic and to certify SLA conformity.

Fault Management
- EFM multi pair bonding as well as Ethernet ring and linear protection allow the implementation of resilient architectures minimizing the impact of faults on the service.
- Fault propagation (e.g. AIS/RDI, Dying Gasp...), link, port and service level alarms together with extensive localization tools such as continuity check, linktrace and loopback allow to quickly locate faults and re-establish the service in case of failure.

Extended Line Reach
ACCEED 1416 utilizes the most advanced SHDSL technology which offers the best performance in the market. Moreover ACCEED 1416 supports up to 8 repeater stages per wire pair. BSRU and BSRU+ the ULAF+ two wire pair SHDSL repeaters, fit into EFM and TDM applications. With the built-in Remote Power Supply (RPS) up to 4 BSRU stages can be fed from Central Office and Customer Premises each.

Synchronization Options
For clock sensitive applications like mobile base station backhaul, synchronization is very important. ACCEED 1416 offers several methods to provide an accurate clock over packed based networks to every customer locations:
- Symbol clock delivers a reference clock to customer premises over SHDSL
- Synchronous Ethernet deliver accurate timing over packet based networks
- 2048 kHz/2048 kbit/s clock in and output allow to connect to legacy BITS (Building Integrated Timing Supply)
- Automatic selection of the best available clock source, based on SSM (Synchronization Status Message)
- 2048 kHz/2048 kbit/s to SyncE conversion and vise versa

Mechanic
The ACCEED 1416 is available as plug-in unit for the ULAF+ 19” and ETSI Subrack and Compact Shelf or as desktop unit. ACCEED 1416 fits in any locations: central offices, customer premises, street cabinets etc.

Management
ACCEED 1416 offers a rich variety of management implementations to fulfill the needs of each customer:
- Intuitive and easy to operate graphical management applications
- Standard compliant protocols
- Easy to integrate into 3rd party solutions
- Fully automated Zero Touch Provisioning

The access can be local and from remote via in band or dedicated DCN connection.

ACCEED plug-in cards can be managed via ULAF+ MCU / MCU-S / MCU-CES subrack control card or using a dedicated management access.

Using EFM Link OAM, up to 4 LT to NT links can be managed as single network element providing quick supervision and control of the entire link.
- CLI console, Telnet and SSH
- Local Craft Terminal LCT+ (GUI)
- Syslog and SNMP traps
- DHCP, TFTP, SCP
- RADIUS client authentication
- Standard MIBs
- AccessIntegrator Management System
- MetroIntegrator Management System
## Ethernet Features

### Port control
- Flow Control, Auto MDI/MDI-X, Mode, Advertised Mode
- Link Failure Propagation (LFP)
- Multicast storm protection
- Broadcast storm protection
- Port Mirroring (ingress and egress)
- L2CP list with possibility to tunnel/discard/peer
- L2PT layer2 protocol tunneling for 3rd party compatibility
- Synchronous Ethernet
- Power over Ethernet

### Switch control
- MAC table 16k, self-learning
- Number of MAC-Addresses learned configurable
- MAC table readout
- Port isolation
- Aging enable/disable
- Aging time configurable

### VLAN
- 802.1Q (VLAN)
  - 4095 C-VLANs/CE-VLANs
  - Port VID explicit settable
- 802.1ad (Provider Bridge)
  - Provider/Service VID (S-VID)
  - Provider/Service Ethertype (S-TPID)
  - Multiple customer services (different C-VLANs to S-VLANs) on same customer port
- TR-101 VLAN manipulations
  - Inner/outer swap
  - 1:1 translation
  - N:1 service multiplexing
  - Port-based stacking
  - VLAN-based stacking/multiplexing

### Classification
- Predefined criteria:
  - Ingress Port
  - Destination MAC-Address
  - Source MAC-Address
  - Ethertype (TPID)
  - VLAN-ID
  - VLAN Priority
  - Destination IP-Address
  - Source IP-Address
  - IP Priority (DSCP)
  - IP Datagram Protocol
  - TCP/UDP Destination Port
  - TCP/UDP Source Port

## QoS/Policing
- Prioritization based on:
  - ingress port
  - 802.1p (L2)
  - DSCP (L3)
  - any other criteria (flow)
- MEF10.2 Ethernet Services Attributes (ingress and egress profiles):
  - Committed Information Rate (CIR)
  - Excess Information Rate (PIR)
  - Committed Burst Size (CBS)
  - Excess Burst Size (EBS)
  - Peak Burst Size (PBS)
  - Color mode (CM)
- Metering according to RFC2697, 2698 and 3290 with single or two rate three color marking
- 8 priority queues per egress port
- Per color queue size
- Hard QoS (guaranteed traffic profile)
- Strict priority (SP)
- Weighted fairness algorithms (WFQ, WRR, SDWRR)
- Per port shaping (rate and burst size)
- Per VLAN shaping (rate and burst size)
- Per queue shaping (rate and burst size)
- Random early detection (RED)
- Flexible L2/L3 remarking
- Flexible traffic class assignment

### Counters
- Per port packet and byte counters (RMON Etherstats)
- Per ingress and egress service counters (packet or byte / per color)
- Transmit queue counters (packet or byte)
- Per service/CoS counters (EVC)
- History for all packet counters

### Power
- Green Ethernet (signal power adapted to cable length)
- Power over Ethernet (PoE) option available
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Supported Standards
- MEF 9 Ethernet Services at the UNI (MEF 11, 13, 20)
- MEF 14 Traffic Management (MEF 6.1 / 6.1.1, 10.2 / 10.2.1, 23.1, 29)
- MEF 18 Circuit Emulation Services (MEF 3, 8)
- MEF 25 Service OAM (MEF 17, 30, 31, 35, 36)
- IEEE 802.3ah Ethernet in the First Mile (EFM)
- IEEE 802.3ah Ethernet Link OAM (LOAM)
- IEEE 802.1aq Connectivity Fault Management (CFM)
- ITU-T Y.1731 Service Layer OAM (SOAM)
- ITU-T Y.1564 Ethernet Service Activation Test
- IEEE 802.1D MAC Bridging
- IEEE 802.1Q VLAN Bridging
- IEEE 802.1v VLAN Classification by Protocol and Port
- IEEE 802.1ad Provider Bridging
- DSL Forum TR-101 Flexible VLAN handling
- IEEE 802.3i 10BASE-T
- IEEE 802.3u 100BASE-FX (with SFP)
- IEEE 802.3u 100BASE-TX
- IEEE 802.3ab 1000BASE-T
- IEEE 802.3az 1000BASE-X (with SFP)
- IEEE 802.3x Flow Control
- SFF 8472 Diagnostic Monitoring Interface
- ITU-T G.991.2 SHDSL
- ITU-T G.994.1 Handshake
- ITU-T G.998.2 Ethernet bonding
- ETSI TS 101 524 SDSL
- ITU-T Y.1413 TDM-MPLS networking interworking
- RFC 4553 Structure-Agnostic Time Division Multiplexing
- RFC 5086 Structure-Aware Time Division Multiplexing (TDM) Circuit Emulation Service over Packet Switched Network (CESoPSN)
- ITU-T G.703 Physical signal characteristics
- ITU-T G.704 Synchronization in Packet Networks
- ITU-T G.8261 Synchronous Ethernet (SyncE)
- ITU-T G.8264 SSM transport over ESMC
- ITU-T G.8031 Ethernet linear protection switching
- ITU-T G.8032 Ethernet ring protection switching
- RFC 2865 RADIUS
- IEEE 802.3af Power over Ethernet (PoE)

Technical Data
Power Supply
Input Voltage
- Plug-in version: -40 V to -72 V DC
- Desktop version (without RPS): -40 V to -72 V DC
- Desktop version (with RPS): 95 V to 260 V AC
- Desktop unit (without PoE): ≤16 W
- Desktop unit (with RPS 120 V): ≤45 W
- Desktop unit (with RPS 180 V): ≤65 W
- Plug-in card (without PoE): ≤18 W
- Plug-in card with RPS 120 V: ≤45 W
- Plug-in card with RPS 180 V: ≤58 W
- Voltage: 120 V DC or 180 V DC
- Current (configurable limitation): 50 mA/60 mA

Interfaces
User Network Interface (UNI)
- 3x RJ45 10/100/1000BASE-T
- 1 x SFP slot for FE/GbE
- optional 1 x RJ45 G.703 120/75 Ohm for E1 or reference clock in and output

Management
- 1x RJ45 serial
- 1x RJ45 10/100BASE-T

System Cross Connect (SCC)
- 2x SCC ports (eSATA)

EFM
- 1x RJ45 / 4 copper wire pairs SHDSL.bis
- Line code TC-PAM 4/8/16/32/64/128

Payload Bitrates
- 192 kbit/s to 15.3 Mbit/s per wire pair
- up to 61.2 Mbit/s with 4 wire pairs
- up to 102.4 Mbit/s with 16 wire pairs
- using 4 ACCEED 1416 units

Repeater Support
- up to 8 stages BSRU/BSRU+
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Physical and Environment
- Plug-in version: Double Eurocard size
- Desktop version (W x H x D): 271 x 43.5 x 175 mm
- Operating Temperature: -5° C to +55° C at 5 to 95 % rel. humidity
- Extended Operating Temperature Range (optional): -20° C to +70° C

Safety
- EN 60950-1 (2011)

EMC/EMF
- EN 300 386 V1.5.1 (2010)
- ES 201 468 V1.3.1 (2005)
- ITU-T K.45 (2011)
- EN 62479 (2010)

Related Products
- ACCEED 1102
- ACCEED 1104
- ACCEED 1404
- ACCEED 2102
- ACCEED 2104
- ACCEED 2202
- BSRU
- BSRU+
- AccessIntegrator (AcI)
- MetroIntegrator (MI) NMS

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Purchase Order Information

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Accessories

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Several SFP modules available. Please check the ULAF+ SFP overview data sheet.