

# DS1 (T1)/E1 ATM

Thunder Series (Bantam/RJ-45 or DB15 Interfaces)

## SOLUTION HIGHLIGHTS

Two independently operational full duplex ports per module (Rx, Tx)

DS1/E1 framing standards supported

Real time 7 layer protocol analysis

Physical layer error insertion including APS

Generation and analysis of up to 1024 channels on a single port for quality of service (QoS) 0.191 and generic cell rate algorithm (GCRA)

40ns time stamp resolution & correlation across all ports with 1.2ns GCRA measurement resolution

Full line rate capture with up to 128 MB per port

ATM network impairment and emulation

MPEG video & LAN distribution models

Simultaneous monitoring, traffic generation and UNI signaling test applications running on a single port



## Overview

The versatile ATM Thunder Series interface modules are designed to provide wire rate data capture, playback and transmission, while performing real time simultaneous analysis of the seven OSI layers.

This DS1/E1 module provides dual port RJ-45 and dual port bantam physical connectors or DB15 connectors for the InterWatch platform operating at software selectable DS1/1.544 or E1/2.048 Mbps rates.

Up to 14 DS1/E1 modules (28 ports) can be added on the InterWatch 96000 unit, 7 modules (14 ports) on the InterWatch 95000, allowing comprehensive system load testing across multiple ports simultaneously.

The DS1/E1 interface provides application testing support for leading technologies including Voice over IP (VoIP), Quality of Service (QoS), ATM Signaling (UNI, PNNI), IP Performance/QoS Testing, Multi-Protocol Label Switching (MPLS) and UMTS.

Combined with the powerful capabilities of the InterWatch Performance & Verification System, the modular architecture of the Thunder Series interface provides equipment manufacturers and network operators a world-class testing solution during the network development and verification process.

# DS1 (T1)/E1 ATM

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## Specifications

### PORT DENSITY

InterWatch 96000

- Up to 14 modules (28 ports)

InterWatch 95000

- Up to 7 modules (14 ports)

### RAM (PER RECEIVER)

64 MB

Upgradable to 128 MB

### DATA PATHS

- 2 Transmit
- 2 Receive

### CONNECTORS

#### Dual RJ-45 & Dual Bantam

- 1.544 Mbps (DS1-RJ45)
- 2.048 Mbps (E1-RJ45)
- 1.544 Mbps (DS1-Bantam)

#### DUAL DB15

- 2.048 Mbps (DB15)
- SMB AC-Coupled External Link Clock Input
- [BNC TTL input and output](#)

### STANDARD

- PLCP & G.804

### LINE CODES

- DS1; AMI & B8ZS Encoding
- E1; AMI & HDB3 Encoding

### TEST APPLICATIONS

- LAN & Frame over ATM
- xDSL
- ATM Physical & Cell Layer
- ATM Signaling (UNI, PNNI)
- ATM Network Impairment
- IP Performance/QoS (non-real-time)

### MONITORING

- Up to 128 MB full line rate capture and simultaneous analysis on 2 ports.
- 40ns timestamp resolution and correlation across all ports.
- QoS 0.191 cell analysis on 1024 channels per port simultaneously.
- Simultaneous GCRA cell analysis on 1024 channels per port with 1.2ns resolution.
- Combined simultaneous QoS 0.191 and GCRA cell analysis on 1024 channels per port.
- Wire rate cell layer statistics on 1024 virtual channel connections (VCC) simultaneously.
- Physical layer monitoring and analysis based on G.826 specifications
- Auto-recognition of encapsulated protocols on 1024 channels simultaneously
- Multiple cell header pre-filters with statistics
- ATM UNI and NNI

### TRAFFIC GENERATION

- Wire rate traffic generation, capture and playback across all channels
- QoS traffic generation across 1024 channels with user definable traffic profiles, based on I.356 specifications
- GCRA testing on 1024 channels
- Dynamic on-the-fly modification of parameters
- User definable cell layer generation
- OAM, AALO, AAL3/4, AAL5 traffic generation
- Runtime statistic per channel generated
- GUI editor for IPv4 & IPv6, MPLS and Frame Relay packet definition
- Physical layer error and alarm insertion based on G.826 spec.

Traffic Distribution Parameters:

- ABR
- CBR
- VBR (simulated LAN and MPEG)
- GCRA (single & dual Leaky bucket)
- 2-state & 3-state Markov
- Poisson
- Normal

### PHYSICAL CHARACTERISTICS

Single slot module

Width: 20.3mm (0.8")

Length: 311.2mm (12.25")

Weight: 885g (1.95 lbs.)

### PART NUMBERS

#### Complete Modules (Including LIM)

#### 01-104901B

**Thunder DS1/E1 Bantam/RJ45 ATM Module**  
occupies 1 VME-64 slot

#### 01-104891B

**Thunder DS1/E1 DB15 ATM Module**  
Occupies 1 VME-64 slot  
128 MB RAM per receiver

#### 01-105069B

**ATM Thunder 512MB RAM Upgrade**  
256 MB RAM per receiver

#### Thunder Line Interface Modules (LIM only)

#### 01-104900B

**Thunder DS1/E1 Bantam/RJ45 Line Interface Module (LIM)**

#### 01-105090B

**Thunder DS3/E3 Line Interface Module**

#### REQUIRES:

#### 01-104730A

**Thunder ATM Base Module**  
occupies 1 VME-64 slot  
2x 64MB RAM buffers

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