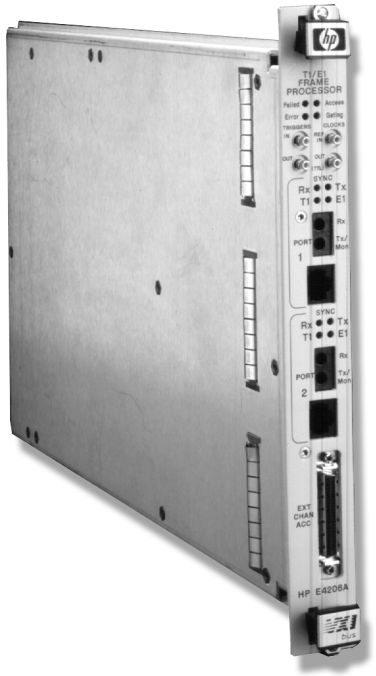
T1/E1 Frame Processor

Agilent Technologies Broadband Series Test System

E4206A



Product Features

- Dual Ports (two interfaces, two application processors)
- Frame-based operation with 20+ real-time measurements
- Switchable between T1 and E1
- Channelized/unchannelized/fractional operation
- Bit mask provides for flexible bit stream selection (56/64 kbps, n X 56/64 kbps, etc.)
- Two timeslots (actually bit streams) can be routed to two Application Processors
- Sophisticated, high performance Traffic Generation capability.

The Agilent Technologies E4206 T1/E1 Frame Processor is a high-performance hardware module that tests frame-based protocols at speeds up to 2 Mb/s. Two integrated T1/E1 interfaces and internal RISC-based protocol test engines can each monitor, capture traffic, and generate statistics -- even with heavily loaded links and short frame lengths. The E4206 can also generate alarms and framing errors, and provide sophisticated traffic generation functionality when used with optional test software applications.

The two physical ports and internal protocol test engines can be combined in different configurations to achieve several different test configurations. Each protocol test engine works with one channel of user-selectable timeslots. In dual- port mode, each physical port is connected to a protocol test engine for independent testing. In pass-through mode, one channel from one port is tested while other timeslots can be passed through to the other port. In dual-channel mode, two separate channels from one physical port can be tested; the second physical port is not used in this configuration.

E4206A supports unchannelized, channelized, and fractional T1/E1 operation. This is accomplished by providing a flexible hyperchannel selection scheme where n timeslots can be merged into one stream (n is 1 to 24 for T1, or 1 to 30 for E1), and a flexible subrate selection scheme where m 8Kb/s multiples can be selected (m is 1 to 8 for 8Kb/s to 64Kb/s selection).

A companion product, the E4207A V Interface Frame Processor, is functionally similar to the E4206 but has integrated interfaces which support V.11, V.28, V.35, V.36 and EIA 530 physical connections.

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Key Features

Real-Time Dual-Port Monitoring and Analysis

Powerful dual-port testing monitors both sides of even heavily- loaded links in real-time. You can view frames in real-time, or capture them for further analysis. The BSTS captures and decodes communications traffic into an English-language display using the same terminology found in standards documents. Errors are automatically detected and highlighted on-screen, complete with explanatory messages. Timestamps correlate events between ports. Sophisticated filters and triggers let you view only traffic of interest, and catch intermittent events. The E4206 has everything you need to see exactly what happened, and when.

High-Performance Traffic Generation

Generates up to eight streams with individually-selectable distributions. For load generation purposes, the E4206 is scalable in two-port increments by adding extra modules up to a maximum of five modules (10 ports) per BSTS E4200 chassis, or a maximum of seven modules (14 ports) per BSTS E4210 chassis.

Extensive Real-Time Measurements

Makes over 20 different real-time measurements including frame rate, minimum and maximum frame size, and framing errors at the physical layer.

Test Both Sides of Frame based/ATM Interworking Devices

Combine the E4206 with other modules from the BSTS's extensive range of Line Interfaces and Test Software applications, to test both sides of a frame based device / ATM interworking device or function -- on one tester!

Friendly User-Interface Makes Complex Testing Easy

The state-of-the-art graphical user interface makes it easy to set up, run, save and restore tests. Includes a C-language user programming environment to automate testing or create extremely complex test scenarios.

Typical Applications

Equipment manufacturers and network operators who provide frame based equipment or frame based/ATM internetworking devices need to verify that:

- Protocol implementations are functionally verified as meeting design specifications and interoperating standards
- Equipment and services are stress-tested to verify that they perform well under heavy loads, especially those which result from conditions such as very short frame lengths

The combination of an E4206 Frame Processor and E4216 Frame Relay Test Software, E4213 SMDS DXI Test Software, or E6275 FUNI Test Software facilitates testing these aspects through error isolation and traffic-generation functions.

User Programming Environment

You can automate repetitive testing or create complex test scenarios by developing your own programs with the UNIX®-based C-language programming environment included with the BSTS.

Simply link your programs to the supplied library of test routines. The user programming library provides programmatic support of all functions available through the graphical user interface. In-depth user and programmers' manuals document test software features and the test routine libraries.

Configuration & Use With Other BSTS Line Interfaces, Hardware Modules & Test Software

The E4206 T1/E1 Frame Processor requires a BSTS chassis with UNIX® controller and optional Frame Based Test Software (Frame Relay, FUNI, SMDS DXI) to perform the tests described in this datasheet.

The E4206 includes two integrated T1/E1 physical interfaces, so line interface modules are not required. The front panel has RJ-48 and mini-bantam connectors; unless noted otherwise, these cables are in a Y configuration with a male RJ-48 connector at one end, and both male and female versions of the adapted connector at the other end.

A companion product, the E4207A V Interface Frame Processor, is functionally similar to the E4206 but has integrated interfaces which support V.11, V.28, V.35, and EIA 530 physical connections.

Warranty & Support Options

Hardware

All BSTS hardware components are warranted for a period of 3 years. Products must be returned to an authorized Agilent service center for service. At the time of purchase, you may select warranty option W01, a no-charge option which converts the standard 3-year return to Agilent warranty to a 1-year on-site warranty.

Software

Agilent Broadband Series Test System software and firmware products are supplied on transportable media such as disk, CD-ROM or integrated circuits. The warranty covers physical defects in the media, and defective media is replaced at no charge during the warranty period. When installed in an Agilent Broadband Series Test System, the software/firmware media has the same warranty period as the product.

Product Numbers

- E4206A T1/E1 Frame Processor
- E4207A V-Interface Frame Processor
- E4216A B-ISDN Frame Relay Test Software
- E4209B 0-155 Mb/s Cell Protocol Processor (CPP)
- E4200B BSTS Form-7 Transportable Chassis
- E4210B BSTS Form-13 Mainframe Chassis
- E4118A #008 RJ-48 M/M/F T Monitor Cable
- E4118A #010 Bantam M/M/F T Monitor Cable
- E4118A #015 DB-15/RJ-48/DB-15 M/M/F T Monitor Cable Jpn
- E4118A #101 RJ-48/DB-9/DB-9 M/F/M T Monitor Cable
- E4118A #102 Mini Bantam/BNC T Monitor Cable
- E4118A #104 RJ-48 to RJ-48 (Japan) M/F Adaptor Cable (Japanese pinout, female RJ-48 connector only)
- E4213B B-ISDN DXI Test software
- E6275A B-ISDN FUNI Test Software

Technical Specifications

Real-Time Dual-Port Monitoring

Multiport Monitoring	• Dual-port mode • Dual-channel / single-port mode • Pass-through mode • Synchronized timestamps correlate events from two physical ports • Protocol viewer works with live traffic or plays back captured data • 4 MB capture buffer per port
Modes	• Passive monitor • Network termination (emulate network) • Terminal equipment (emulate user)
Clock Sources	• Loop (line) • Local • External clock reference
Decode Errors	• Aborted frames • Frame does not have an integral number of octets • Frame is too large • Invalid frame check sequence (FCS)or cyclical redundancy check (CRC-16)
T1 Alarm Detection	• Loss of signal (LSL) • Loss of synchronization (LOS) • Remote alarm indication (RAI) • Alarm indication signal (AIS)
E1 Alarm Detection	• Loss of signal (LSL) • Loss of synchronization (LOS) • Signalling all zeroes (SA0) • Signalling all ones (SA1) • Unframed all ones (UA1) • Remote alarm indication (RAI) • Distant multiframe alarm (DMF)
Pattern Matching	• Passes or blocks frames which match a 64-byte user-defined pattern
T1/E1 Triggers	• Loss of signal level (LSL) • Loss of synchronization (LOS) • Remote alarm indication (RAI) • Alarm indication signal (AIS) • Distant multiframe alarm (DMF)
Trigger Actions	• Start/stop collecting statistics • Start/stop capture • Generate a trace statement • Display a message • Notify user program • Pulse external trigger output
Trigger Controls	• Delayed trigger activation • Specify delay in frames of 0 to 100 milliseconds
Channel Selection	• Channelized/unchannelized/fractional operation • Flexible hyperchannel selection scheme (n timeslots and m subchannels) i.e. n is 24 or 30, and m is 1 to 8 e.g. for 112kps, n=2, m=7 (X 8kbps)

High-Performance Traffic Generation

Traffic Streams and Controls	• Generate up to eight simultaneous streams • Selectable throughput in kb/s and percent load parameters for each stream • Constant, burst or random traffic distributions with distribution parameters individually selectable for each stream
Traffic Options (Stream 1 only)	• Embed 48-bit timestamps • Embed 32-bit sequence numbers • Truncate frame length to specified number of octets • Increment frame length over a specified range • Randomly select frame length from within a specified range
Error Insertion	• Send aborted frames • Send non-octet aligned frames • Invalid frame check sequence (FCS)
Alarm Generation	• Remote alarm indication (RAI) • Alarm indication signal (AIS) • Distant multiframe alarm (DMF)

Real-Time Measurements

T1 D4 12 MF Framing Errors	• Bipolar • Ft bit • Fs bit
T1 D4 4MF Framing Errors	• Bipolar • Ft bit
T1 ESF Framing Errors	• Bipolar • Cyclical redundancy check (CRC) • Frame pattern sequence framing error (FPS)
E1 PCM30 CAS Framing Errors	• Bipolar • Frame alignment signal (FAS)
E1 PCM30 CCS Framing Errors	• Bipolar • Frame alignment signal (FAS)
E1 CRC4 CAS Framing Errors	• Bipolar • Cyclical redundancy check (CRC) • Frame alignment signal (FAS) • Multiframe alignment signal (MFAS)
E1 CRC4 CCS Framing Errors	• Bipolar • Cyclical redundancy check (CRC) • Frame alignment signal (FAS) • Multiframe alignment signal (MFAS)
BOP Measurements	• Bits per second • Number of frames • Frames per second • Minimum, average and maximum frame length • Number of aborted frames • Number of non-octet-aligned frames • Number of frames matching a user-defined 64-byte pattern • Number of frame check sequence FCS) errors

User Programming

Sample Programs	• T1/E1 port setup • Delay measurement • LMI emulation • Lost frame, delay measurements, and payload integrity check for Frame Relay / ATM interworking

Applicable Standards

Physical Layer Standards	• ANSI T1.403 Network-to-Customer Installation DS1 Metallic Interface • Bellcore TR-NWT-000170 Digital Cross-Connect System Requirements and Objectives, January 1993 • AT&T Publication 62411 • ITU Recommendation G.703 (04/91) - Physical/electrical characteristics of hierarchical digital interfaces • ITU Recommendation G.704 (07/95) - Synchronous frame structures used at 1544, 6312, 2048, 8488 and 44 726 Kbit/s hierarchical levels • ITU Recommendation G.742 (1988) - Second order digital multiplexing equipment operating at 8448 Kbit/s and using positive justification • ITU Recommendation G.823 (03/93) - The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy

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Agilent Technologies Broadband Series Test System

The Agilent Technologies BSTS is the industry-standard ATM/BISDN test system for R&D engineering, product development, field trials and QA testing. The latest leading edge, innovative solutions help you lead the fast-packet revolution and reshape tomorrow's networks. It offers a wide range of applications:

- ATM traffic management and signalling
- Packet over SONET/SDH (POS)
- switch/router interworking and performance
- third generation wireless tesing
- complete, automated conformance testing

The BSTS is modular to grow with your testing needs. Because we build all BSTS products without shortcuts according to full specifications, you'll catch problems other test equipment may not detect.

www.Agilent.com/comms/BSTS

United States:
Agilent Technologies
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1-800-452-4844

Canada:
Agilent Technologies Canada Inc.
5150 Spectrum Way
Mississauga, Ontario
L4W 5G1
1-877-894-4414

Europe:
Agilent Technologies
European Marketing Organisation
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547-9999

Japan:
Agilent Technologies Japan Ltd.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
Tokyo 192-8510, Japan
Tel: (81) 426-56-7832
Fax: (81) 426-56-7840

Latin America:
Agilent Technologies
Latin American Region Headquarters
5200 Blue Lagoon Drive, Suite #950
Miami, Florida 33126
U.S.A.
Tel: (305) 267-4245
Fax: (305) 267-4286

Asia Pacific:
Agilent Technologies
19/F, Cityplaza One, 1111 King's Road,
Taikoo Shing, Hong Kong, SAR
Tel: (852) 2599-7889
Fax: (852) 2506-9233

Australia/New Zealand:
Agilent Technologies Australia Pty Ltd
347 Burwood Highway
Forest Hill, Victoria 3131
Tel: 1-800-629-485 (Australia)
Fax: (61-3) 9272-0749
Tel: 0-800-738-378 (New Zealand)
Fax: (64-4) 802-6881

Specifications subject to change.

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