IMA Test Solution

Agilent Technologies Broadband Series Test System

Introduction

- IMA test plan document provides guidance on testing the functions and performance of your IMA implementation. Available free of charge.
- You can develop your own test scripts for the BSTS or purchase Agilent consulting services to implement the IMA test plan.
- Agilent consulting services are available to develop test capability that is customized to your needs, based on a flexible IMA test framework for the BSTS.

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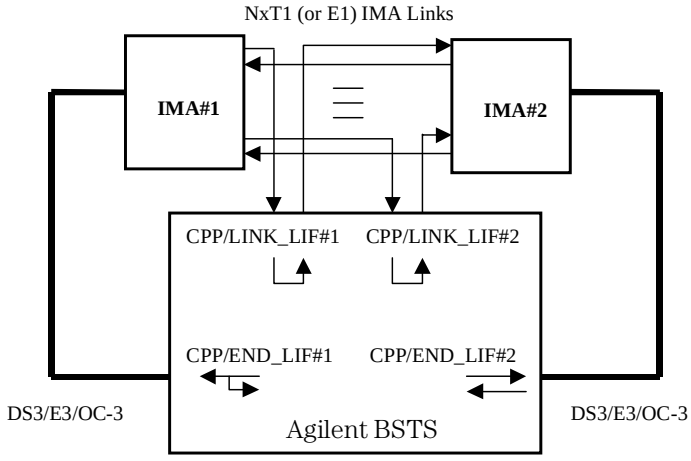
IMA (Inverse Multiplexing for ATM) provides a cost-effective way of deploying ATM across multiple T1/E1 links. The IMA specification treats a group of links as a single ATM connection by distributing cells over the links in a "round-robin" fashion. This results in efficient bandwidth utilization, and the ability to provide higher bandwidth ATM services without the need to use expensive T3/E3 links.

Agilent now offers its expertise to verify the functions and performance of your IMA implementation, using the industry-standard E4210B Broadband Series Test System (BSTS).

An IMA test plan document will be provided free of charge to customers who are planning to purchase, or already own, a BSTS. You may need to purchase additional hardware and software modules for the 4-port IMA test configuration shown above. Minimum BSTS system configuration requirements are described later in this document.

Many of the tests described in the plan can be run manually from the BSTS user interface. You can also automate test execution and report generation by developing test scripts in C, Tcl, or TTCN.

Agilent has developed an IMA test framework that enables rapid customization of automated test scripts. Agilent consulting services are available to help you with all aspects of IMA testing, including development of customized test scripts for the Agilent Broadband Series Test System.



The IMA test solution uses an E4210B Broadband Series Test System configured with four ports.

Key Solution Features

IMA Test Plan

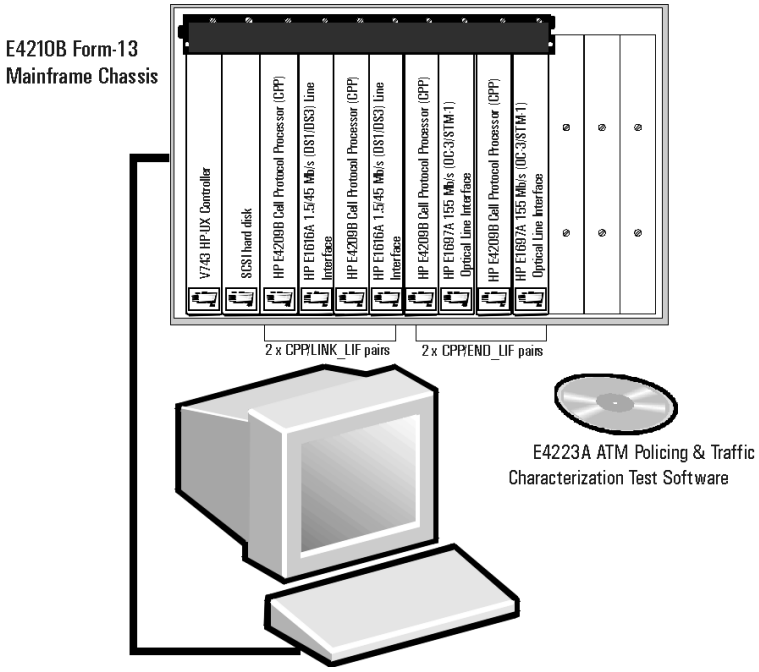
The IMA test plan is divided into six parts covering various functional and performance aspects of IMA. The test configurations enable measurements to be performed both end-to-end and on individual IMA links.

Part 1: IMA Cell Function Verification

IMA Cell Function Verification tests the Inverse Multiplexing and Link Management functions. End-to-end traffic is generated by the BSTS. The IMA links are monitored to verify ICP cell and filler cell format, and IMA frame format. The far-end traffic is monitored to verify cell stream reconstruction and end-to-end transparency.

Part 2: Interface Operation Verification

Interface Operation Verification provides suggestions for test scripts that can be developed for the BSTS. These can be used to verify correct operation of link and group state machines within the Inverse Multiplexing and Link Management functions.



Part 3: Transmit Clock Modes Verification

Transmit Clock Modes Verification tests the implementation of ITC (Independent Transmit Clock) and CTC (Common Transmit Clock) modes of link synchronization.

Part 4: Quality of Service (QoS) Verification

QoS Verification tests end-to-end performance in terms of bit error rate, throughput, and delay.

Part 5: Traffic Management

Traffic Management tests end-to-end performance in terms of traffic policing and prioritization.

Part 6: Other Requirements

Other Requirements provides suggestions for tests that can be performed using the BSTS to verify Unit Management functions such as OAM flows and MIB operation.

Automated Testing

The BSTS software includes C and Tcl libraries as a standard feature. These enable you to develop automated test scripts to control functions such as traffic generation, measurements, data capture, and protocol decoding.

Additional productivity tools for the Agilent Broadband Series Test System enable you to develop customized protocol conformance tests in TTCN or C code. Conformance test scripts can be run under the BSTS Protocol Test Manager environment. This is a graphical user interface that makes it simple to select test cases to run and automatically creates reports of the test results.

Agilent Consulting Services and Product Training

Agilent consulting services are available to provide product training and develop test capability that is customized to your needs. For example:

- The test cases described in Parts 1, 3, 4, and 5 can be automated.
- Conformance tests can be developed to verify the state machines described in Part 2.
- Product training, technical advice, and test automation can be provided for the IMA management functions described in Part 6.


Broadband Series Test System

Configuration and Use With Other BSTS Modules and Applications

In order to implement the IMA test plan, you must have the following minimum system configuration:

- E4210B BSTS Form-13 Mainframe Base
- Two CPP/LINK_LIF pairs for uni-directional monitoring of two IMA links within the IMA group. Each CPP/LINK_LIF pair consists of:

  - E4209A/B Cell Protocol Processor (CPP) module

  - E1616A DS1/DS3 Line Interface module for IMA with T1 links

  - E4201A E1 Line Interface module for IMA with E1 links
- Two CPP/END_LIF pairs for the simulation of end-to-end user traffic (CBR, VBR, UBR. Each CPP/END_LIF pair consists of:

  - E4209A or E4209B Cell Protocol Processor (CPP) module

  - E1616A DS1/DS3 Line Interface module for DS3 connections

  - E1610A E3 Line Interface module for E3 connections

  - E1697A OC-3/STM-1 Line Interface module for OC-3/STM-1 connections
- E4223A Software for testing end-to-end Quality of Service (QoS) using ATM Usage Parameter Control (UPC) test cells as the traffic source.

In order to develop additional IMA test capability, you may require the following items:

- Two additional CPP/LINK_LIF pairs for bi-directional monitoring of the two IMA links.
- E6273B ILMI test software for reading IMA device Management Information Bases (MIBs).
- Two E6270A OAM Protocol Test modules for testing real time end-to-end QoS using OAM Performance Monitoring (PM) cells, while simulating up to 124 independent user traffic streams, and for verifying OAM cell interaction.
- E7310A TTCN Productivity Tools and E7313A ITEX TTCN Editor can be used to develop conformance tests that run under the BSTS Protocol Test Manager environment. You can also use the E5576A Test Manager Integration Kit to compile C programs so that they can run under the Protocol Test Manager environment.
- 3rd-party IMA MUX/de-MUX for interoperability testing.

Product Numbers

E4210B BSTS Form-13 Mainframe Chassis

E4209B Cell Protocol Processor (CPP)

E1610A 34 Mb/s (E3) Line Interface

E1616A 1.5/45 Mb/s (DS1/DS3) Line Interface

E1697A 155 Mb/s (OC-3/STM-1) Optical Line Interface

E4201A 2.048 Mb/s (E1) Line Interface

E4223A ATM Policing & Traffic Characterization software

E6270A OAM Protocol Tester

E6273B ILMI Emulation Test Software

E5576A Test Manager Integration Kit for Agilent BSTS

E7310A TTCN Productivity Tool for the Agilent BSTS

E7313A ITEX TTCN Editor

Applicable Standards

- ATM Forum Inverse Multiplexing for ATM (IMA) Specification 1.0, AF-PHY-0086.000, July 1997.

E4200/E4210 Broadband Series Test System (BSTS)

- The E4200/E4210 Broadband Series Test System (BSTS) is the industry- standard ATM/BISDN test system for R&D engineering, product development, field trials, and QA testing. It offers:
- the widest variety of standard interfaces
- the broadest, most powerful range of signalling capabilities
- complete, automated conformance testing
- time-saving features for monitoring, emulation, simulation, load generation, performance, and automated testing

The BSTS is modular to grow with your testing needs.

Because we build all the BSTS products without shortcuts according to full specifications, you'll catch problems other test equipment may not detect.

Broadband Series Test System

Acronyms

ATM	Asynchronous Trnasfer Mode
BSTS	Broadband Series Test System
CBR	Continuous Bit Rate Services
CPP	E4209 Cell Protocol Processor
CTC	Common Transmit Clock
IMA	Inverse Multiplexing for ATM
ITC	Independent Transmit Clock
MIB	Management Information Bases
MUX	Multiplexer (SONET/SDH)
OAM	Operations, Administration and Manitenance
PM	Performance Monitoring
QoS	Quality of Service
SDH	Synchronous Digital Hierarchy
SONET	Synchronous Optical Network (transmisson protocol)
UBR	Unspecified Bit Rate
UPC	Usage Parameter Control
VBR	Variable Bit Rate

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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.

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Specifications subject to change.

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