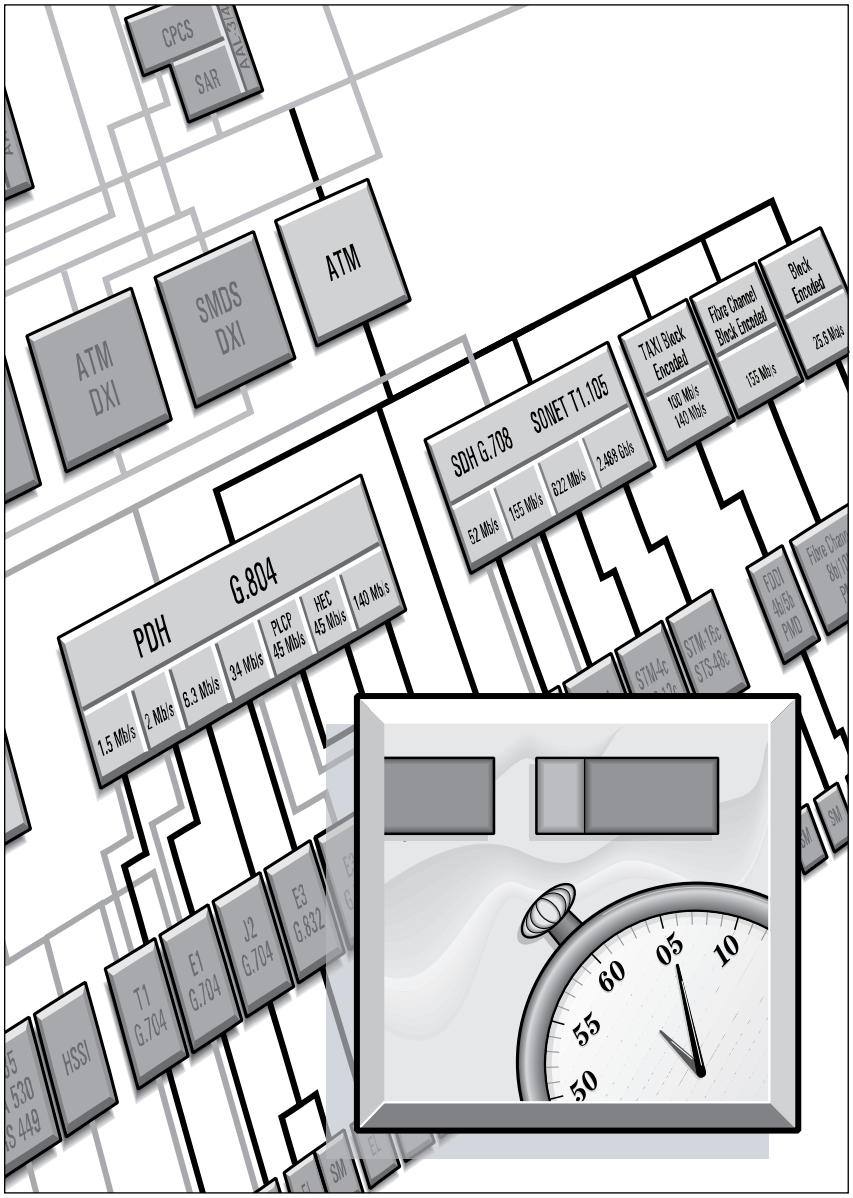
HEWLETT® PACKARD

ATM Policing & Traffic Characterization

E4223A

A Comprehensive Test Application to

– Verify ATM Policing Functions
– Perform Traffic Characterization



For the HP Broadband Series Test System

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1. Product Overview

The E4223A ATM Policing & Traffic Characterization Test Application is software which provides i) traffic generation & analysis to verify policing algorithm implementations, and ii) test features to characterize user traffic. Part of the modular HP Broadband Series Test System, this test solution is ideal for R&D engineering, product development, quality assurance, and active network applications.

◆ Functional Description

Policing Verification

The E4223A is a complete tool for usage parameter control verification. A generation & analysis test methodology is used whereby precisely controlled predefined traffic is generated and transmitted to the network equipment under test. The behavior of the network equipment under test is then analyzed.

The test operator first configures the traffic generator by selecting a traffic distribution type and distribution parameters.
The standard traffic generation capabilities of the Broadband Series Test System are enhanced by the addition of a generic cell rate algorithm (GCRA) traffic distribution.

Traffic is optimized to individually stress the cell rate or the burst size.

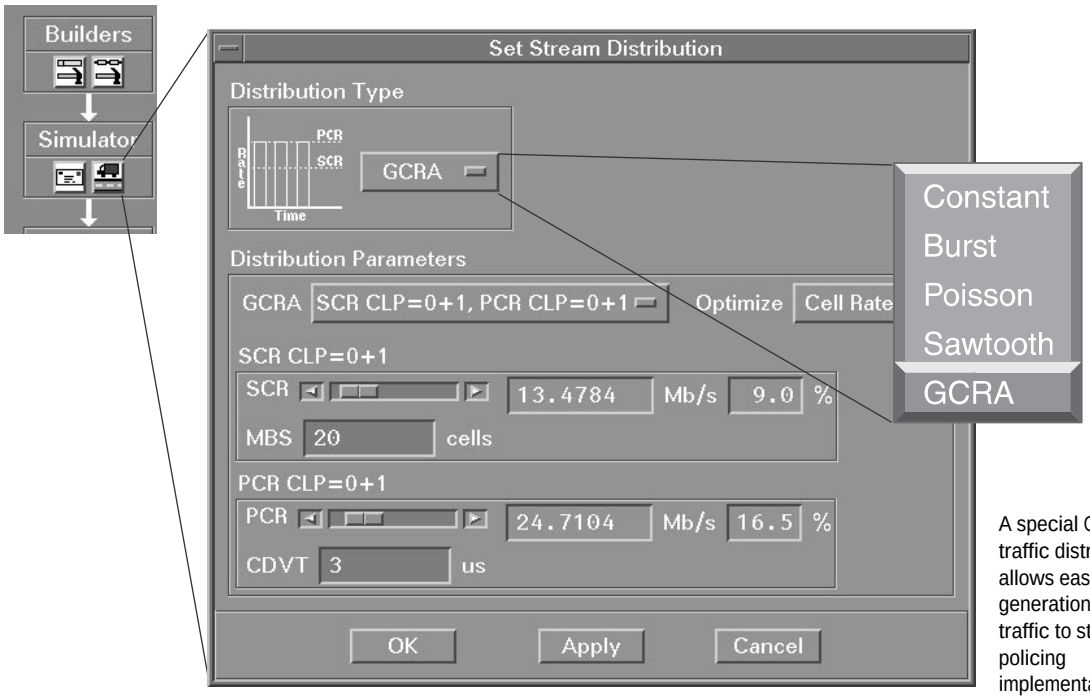
Traffic generated by the GCRA distribution has already been shaped. Traffic generated by other distributions—constant, burst, Poisson, etc.—can be shaped to the GCRA parameters, or can deliberately violate peak cell rate, cell delay variation tolerance, sustainable cell rate, and/or maximum burst size parameters. In addition to user-defined cells and cell sequences, special usage parameter control (UPC) test cells can be used for additional in-depth testing. These test cells contain sequence numbers and the original cell loss priority (CLP) bit in order to detect cell loss and tagging.

The output is captured in memory for post-processing. Results are displayed in both numerical and graphical formats.

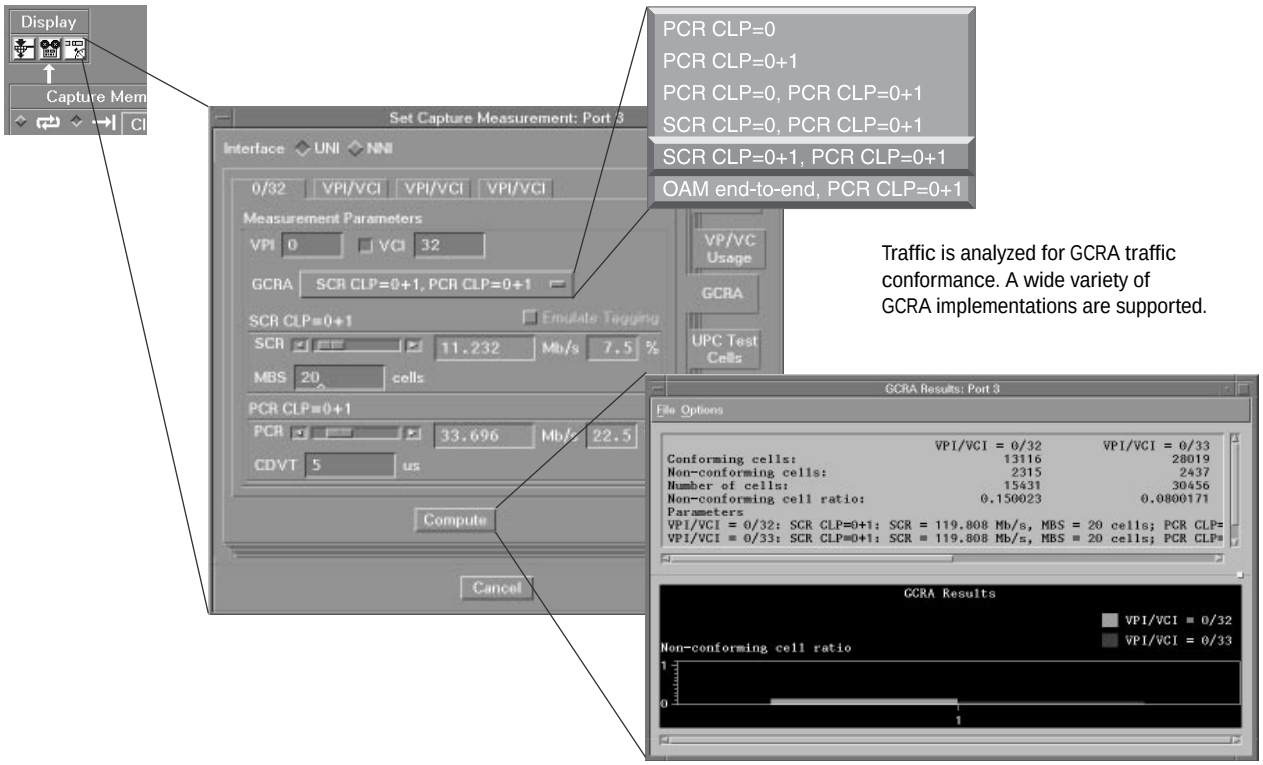
Numerical data can be saved to a text file; graphical results can be saved to a PostScript file.

◆ Typical Applications

Testing of policing algorithms takes place at three key phases of implementation. First, ATM equipment manufacturers need



A special GCRA traffic distribution allows easy generation of precise traffic to stress the policing implementation.



Traffic is analyzed for GCRA traffic conformance. A wide variety of GCRA implementations are supported.

to verify that the policing mechanisms in their switches perform to specification. Second, network operators must ensure that policing mechanisms in the ATM switches that they select and purchase do indeed operate properly before deploying the switches. And third, CPE manufacturers need to verify and validate their ATM network interface cards to ensure that ATM traffic is properly shaped at the user-network interface.

◆ Key Features

Generation & Analysis Policing Verification

Generation & analysis testing generates pre-defined conforming (or non-conforming) traffic and then observes the reaction of the network equipment under test. Generated traffic can use a new GCRA distribution or be shaped. Compare the known non-conforming cell ratio of the generated cell streams with values measured by the test equipment to verify policing conformance. Special UPC test cells enable additional in-depth testing. Measure how many cells are tagged or dropped.

User Traffic GCRA Conformance Analysis

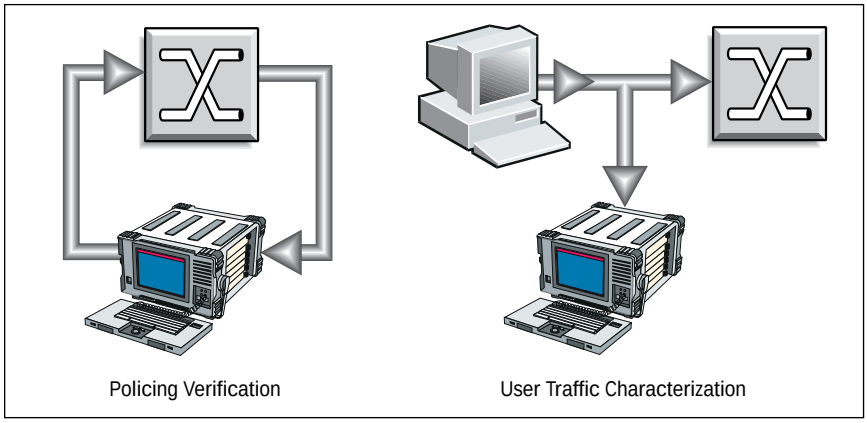
Measures conformance of a user traffic stream to user-defined GCRA parameters. Uses a large sample of up to 131,072 cells to accurately characterize traffic.

ATM Traffic Characterization

Measures cell arrival time, cell interarrival time, cell delay, peak-to-peak cell delay variation, and 1-point cell delay variation, using a large sample size of up to 131,072 cells.

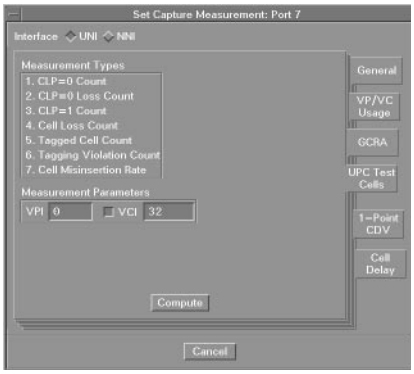
VP/VC Utilization Analysis

Lets you easily see what VCs and VPs were used on a link. Especially helpful for identifying virtual channel misconfigurations.



Policing Verification

User Traffic Characterization



UPC test cell stream provides indepth analysis

2. Technical Specifications

◆ Generation & Analysis Policing Verification

Traffic Generation Distributions

Distribution	Parameters
GCRA	GCRA type (single or dual leaky bucket), peak cell rate (0.5 to 100% of line rate), cell delay variation tolerance (range depends on specific line interface used), sustainable cell rate (0.5 to 100% of line rate), maximum burst size (SCR dependent, 1 to 2047 cells when using an E4209A, 1 to 8183 cells when using an E4209B Cell Protocol Processor)
Constant	Mean load (0.5 to 100% of line rate)
Burst	Burst maximum load (0 to 100% of line rate) and gap (0 to 3894 cells)
Sawtooth	Minimum & maximum loads (0.5 to 100% of line rate), burst gap (0 to 3894 cells)
Poisson	Mean cell interarrival time

Traffic Shaping Parameters

GCRA Variant	Parameters
PCR CLP=0+1	Peak cell rate Cell delay variation tolerance
PCR CLP=0+1, SCR CLP=0+1	Peak cell rate Cell delay variation tolerance Sustainable cell rate Maximum burst size

Measurements Available on UPC Test Cells

- CLP=0 cell count
- CLP=0 cell loss count
- CLP=1 cell count
- Cell loss count
- Tagged cell count

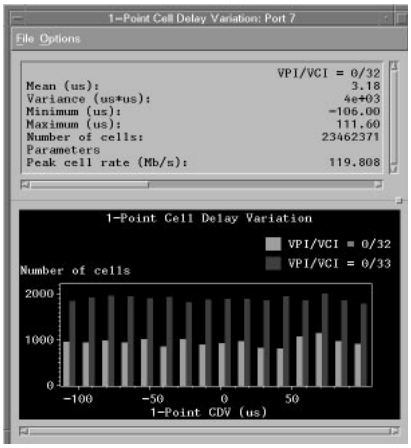
◆ User Traffic GCRA Conformance Analysis

Measurement	Results
GCRA Type PCR CLP=0 PCR CLP=0+1 PCR CLP=0, PCR CLP=0+1 SCR CLP=0, PCR CLP=0+1 SCR CLP=0+1, PCR CLP=0+1 OAM end-to-end, PCR CLP=0+1	Non-conforming cells (count and ratio) Conforming cell count Cell conformance bar graph
GCRA Parameters – PCR and CDVT – SCR and MBS	

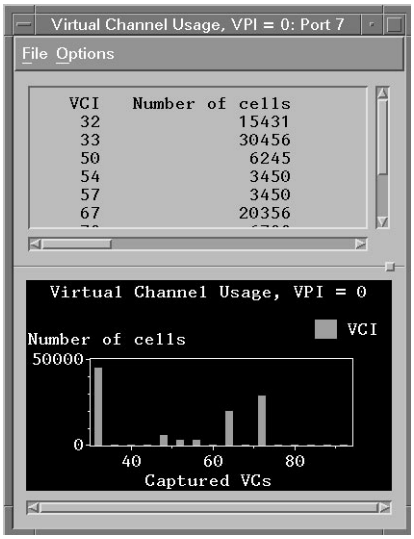
◆ ATM Traffic Characterization

Measurement	Results
Cell arrival time	Minimum & maximum Mean & variance Histogram
Cell interarrival time	Minimum & maximum Mean & variance Histogram
Cell delay*	Minimum & maximum Mean & variance Peak-to-peak CDV Histogram
CLP count	CLP=0 count and ratio CLP=1 count CLP bar graph
1-point CDV	Minimum & maximum Mean & variance Histogram

** These measurements are not available when using the E4203A 155 Mb/s Protocol Line Interface.*



1-point CDV analysis



Virtual channel usage analysis

- **VC/VP Utilization Analysis**

Measurement	Results
VP usage	List of active VPs Histogram
VC usage	List of active VCs Histogram

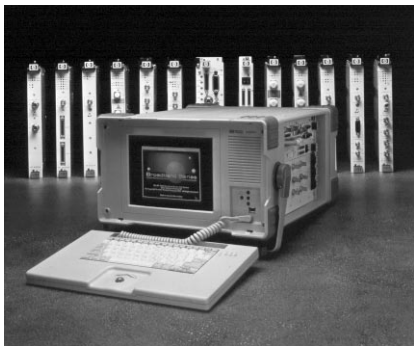
- **User Programming**

You can automate testing or set up complex scenarios by executing your own programs on the BSTS's embedded UNIX® controller. Access the E4223A by simply linking your code with a library of test routines. A standard UNIX workstation environment is provided on the BSTS, including networking tools and utilities.

3. Applicable Standards

Standard	Relevant Functionality
ATM Forum UNI 3.0 & 3.1	GCRA definition and tagging algorithm
Draft Version 4.0 of the ATM Forum Traffic Management Specification (02/96)	Definition of peak-to-peak cell delay variation
ITU-T Recommendation I.371 (07/95)	GCRA definition (including OAM end-to-end variation) and tagging algorithm
ITU-T Draft New Recommendation O.191 (04/95)	Algorithm for computing cell loss and cell misinsertion implemented using proprietary test cells
ITU-T Draft Revised Recommendation I.356 (07/95)	Non-conforming cell algorithm (for transmitted traffic) cell delay, 1-point CDV

4. Configuration, Ordering Information, & Warranty



◆ Configuration & System Requirements

The E4223A ATM Policing & Traffic Characterization Test Application is licensed software for the E4200/E4210 Broadband Series Test System. In operation, a minimal configuration of a chassis with UNIX controller, a line interface, and an E4209A or E4209B Cell Protocol Processor are required. Any of the many ATM-based line interfaces available for the BSTS may be used.

It requires Version 3.02 or later of the BSTS Base System Software. One software license is required per BSTS test system chassis. Since this test software is shipped on CD-ROM, a CD-ROM drive is needed for software installation.

◆ Warranty & Support Options

HP 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 HP Broadband Series Test System, the software/firmware media has the same warranty period as the product.

This test software has no components requiring calibration.

◆ Documentation Included

– User's Guide
– Programmer's Guide

◆ Part Numbers

Part Number	Description
E4223A	Policing & Traffic Characterization; includes documentation
E4223A #QA0	Scheduled software updates

5. For More Information

◆ Related HP Literature

For an introduction to the modular Broadband Series Test System, please see brochure 5962-9751E. An ordering guide, publication 5964-0393E, helps you determine the appropriate system configuration for your testing needs. Solution note 5963-7510E describes traffic policing in detail. Technical specifications detailing other hardware modules and test software packages for the BSTS are also available.

– *The HP Broadband Series Test System*, publication 5963-9488E

– *BSTS Product Ordering Guide*, publication 5964-0393E

– *Traffic Policing*, publication 5963-7510E

◆ How to Find Out About HP Products, Publications & Services

For more information on Hewlett-Packard Test & Measurement products, publications or services, please call your local Hewlett-Packard sales office. A current listing is available via Web through AccessHP at http://www.hp.com. If you do not have access to the internet, please contact one of the HP centers listed below and they will direct you to your nearest HP representative.

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