Overview

Developed by Telcordia Technologies and licensed by Spirent Communications to run on the AX/4000 Frame Relay Test System, the Frame Relay Conformance Test Suites provide a comprehensive series of pre-defined test cases for checking the conformance characteristics of Frame Relay network equipment. Each test case tests a logical unit of functionality and reports a pass, fail, or inconclusive result.

A Windows 98/NT-based graphical user interface for the tests suites is provided by the Test Suite Manager software. The Test Suite Manager allows users to set test parameters and selectively run test cases either individually or in a batch operation. Test results appear in an on-screen window and can be saved to ASCII files for printing and off-line analysis.

Software Description

The Test Suite Manager provides a multi-segmented window to display the following information:

- Selection window—test cases available
- Status window—test case description, test statistics
- Results window—test results, details
- Message window—ladder diagram

From the Test Suite Manager screen, the user can select any number of available test cases to run in batch mode. In addition to selecting the test cases, the user can tailor the test suite to the instrument under test (IUT) by answering the PICS/PIXIT proformas in the Parameter menu. Buttons are provided for running and stopping the tests.

Test Standards

Each test suite provides a series of test cases for specific Frame Relay specifications. In addition to Frame Relay Forum standards, the test suites provide enhanced test coverage based on Telcordia conformance specifications.

Telcordia Certification and Registration Service

Because the test cases in these test suites are identical to those used by Telcordia for its own certification and registration service, passing these test cases helps assure passing Telcordia certification tests. Certifying your application or equipment with Telcordia entitles you to use the Telcordia Mark as proof of third party verification of your product’s technical performance against a defined set of criteria.

Note: Telcordia Technologies (www.telcordia.com) is a leading provider of communications software, engineering, and consulting services based on world-class research.

TTCN Notation

The test suites are written as separate tree and tabular combined notation (TTCN) applications. TTCN (ISO IS-9646) is a high-level, computer-like language that is optimized for protocol test applications. In addition to pass/fail results, the Test Suite Manager software will also display TTCN pseudo-code associated with each test case.
Test Setup

Each test suite includes its own set of PICS/PIXIT profoma for the user to answer before running the tests. The Setup screen lists all of the information required and provides either True/False radio buttons or a simple fill-in field for information entry.

Setup files can be saved to disk and loaded for future tests. The test suites also include default setup files for users to experiment with.

Test Detail

The test suite setup allows the user to select the amount of detail that will appear in the test report. Reporting large amounts of detail takes more time and provides a much higher volume of data than lower amounts of detail. For this reason, testing with minimal detail can be used to quickly identify which test cases pass or fail. Afterwards, a second test, using only test cases that fail, can be set up to report a high level of detail.

The following list indicates the details that can be included or excluded from the report by using True/False radio buttons on the setup screen:
- display TTCN behavior
- display raw PDU data
- display TTCN structured data
- display parameter values in summary
- display protocol decode, match/failed match

Test Selection

After parameters are set up, clicking on the Port Selection option of the system menu brings up an interface setup screen. This screen allows the user to map point-of-control and operation to an AX/4000 port. It is also possible to configure the interface from this screen. The interface screen allows the user to configure operational interface commands and monitor the interface for physical errors.

Running the Tests

After the parameters are set up, clicking on the Run button will start the selected tests in the order shown in the Test Suite Manager screen. If no user input is required during the tests, the tests can run unattended. Testing will stop automatically when finished. Some test cases will require operator intervention. For these cases, the test will pause and wait for the operator to enter the required information. If nothing is entered, the system will time out and move to the next test case.

Test Results

The right side of the Test Suite Manager screen displays the test results in real time. It also displays other information including the parameters used for the test, test script pseudo code, the start and end time for each test case, and cell information. The Test Suite Manager also includes automatic decoding to identify the contents of incoming and outgoing Frame Relay data.

Because some test results can be lengthy, a search function allows users to quickly locate specific strings within the test results. Results for individual test cases can be located by clicking on the test case name in the selection window.
Test Suites
The following is a list of Frame Relay test suites for the AX/4000 Broadband Test System.

Test Suite Manager Software
Part Number 402001—User interface for running test suites
This software provides a Windows 98/NT-based user interface for running the test suites and formatting test results. The Test Suite Manager is required to run any of the test suites listed.

Frame Relay PVC Core Test Suite
Part Number 402200—ANSI T1.618 Conformance Test Suite for PVC Core Aspects
This test suite provides fully automated conformance testing of frame relay equipment. T1.618 defines frame structure, field format, and procedures for transfer of DL-CORE service user data. This test suite verifies IUT operation in the following areas:
- Opening, closing, and shared flags
- Interframe fill
- Frame Check Sequence (FCS)
- Non-integral number of octets in a frame
- Order of bit transmission
- Aborted frames
- Address field
- 10-, 17-, and 23-bit DLCI support
- Information field transparency and size

Frame Relay/ATM Interworking Test Suites
Part Number 402220—FRF.5 Frame Relay/ATM PVC Network Interworking Conformance Test Suite
This test suite provides a fully automated conformance test for testing a frame relay/ATM device that provides network interworking in a PVC environment as defined in the FRF.5 Implementation Agreement (IA). This IA defines a means of transmitting frame relay frames between separate frame relay networks, using an ATM network to link the frame relay networks. The test suite verifies IUT operation in the following areas:
- Frame Relay Service Specific Convergence Sublayer (FR-SSCS) frame/PDU formatting, delimiting, error detection, connection multiplexing, and header field mapping
- AAL5 common part protocol payload mapping between AAL5 payload and frame relay header and information fields
- PVC management for network interworking, which provides PVC status and link integrity verification
- 10-, 17-, and 23-bit DLCI support part number 402230—FRF.8.1 Frame Relay/ATM PVC Service

Part Number 402230—FRF.8.1 Frame Relay/ATM PVC Service Interworking Conformance Test Suite
This test suite provides fully automated conformance testing for a frame relay/ATM service interworking device in a PVC environment as defined in the FRF.8.1 Implementation Agreement (IA). This IA defines a means of transferring data between a frame relay network and an ATM network over a PVC connection. The test suite verifies IUT operation in the following areas:
- Service interworking parameter mapping between Frame Relay header fields and ATM header fields and AAL5 trailer fields
- AAL5 common part protocol mapping between AAL5 payload and frame relay information field, error detection, segmentation, and reassembly of AAL5 PDUs
- PVC management for service interworking
- Upper layer user protocol encapsulation and translation
- 10-, 17-, and 23-bit DLCI support frame relay status signalling test suites
Part Number 402210—Q.933 Annex A Conformance Test Suite for PVC Status Signalling, Network Side

This test suite provides fully automated testing of a frame relay IUT for conformance to the procedures for signalling described in ITU-T Q.933 Annex A. Q.933 Annex A defines procedures for link integrity verification and PVC status signalling. This test suite verifies IUT operation in the following areas:
- Link integrity verification procedures
- PVC status procedures
- Behavior due to reception of invalid frames
- Address field checks
- 10-, 17-, and 23-bit DLCI support
- Message contents
- Timers

Part Number 402211—ANSI T1.617 Annex D Conformance Test Suite for PVC Status Signalling, Network Side

This test suite provides fully automated testing of a frame relay IUT for conformance to the procedures for signalling described in ANSI T1.617 Annex D. T1.617 Annex D defines procedures for link integrity verification and PVC status signalling. This test suite verifies IUT operation in the following areas:
- Link integrity verification procedures
- PVC status procedures
- Behavior due to reception of invalid frames
- Address field checks
- 10-, 17-, and 23-bit DLCI support
- Message contents
- Timers

Part Number 402212—LMI Conformance Test Suite for PVC Status Signalling, Network Side

This test suite provides fully automated testing of a frame relay IUT for conformance to the Local Management Interface, Revision 1.0. This protocol is also referred to as LMI or Consortium Status Signalling. The T1S1 standards define a generic frame relay service, including PVC data transfer, link integrity verification, and PVC management. This test suite verifies IUT operation in the following areas:
- Link integrity verification procedures
- PVC status procedures
- Behavior due to reception of invalid frames
- Address field checks
- 10-, 17-, and 23-bit DLCI support
- Message contents
- Timers

Part Number 402240—FRF.2.1 Frame Relay NNI Bi-Directional PVC Status Signalling Conformance Test Suite

This test suite provides fully automated conformance testing for a frame relay IUT for conformance to the signalling procedures described in the FRF.2.1 Implementation Agreement (IA). This IA defines procedures for notification of the addition or deletion of a PVC segment within a multi-network PVC. This IA also provides a means for notification of the availability of the multi-network PVC. Test cases are based on permutations of FRF.2.1 requirements, port configuration (UNI, NNI), and signalling protocol (Q.933 Annex A, T1.617 Annex D, LMI). This test suite verifies IUT operation in the following areas:
- Link integrity verification procedures
- PVC status procedures
- Behavior due to reception of invalid frames
- 10-, 17-, and 23-bit DLCI support
- Message contents
- Timers

Spirent Global Services

Spirent Global Services provides a variety of professional services, support services and education services – all focused on helping customers meet their complex testing and service assurance requirements. For more information, visit the Global Services website at www.spirentcom.com/gs or contact your Spirent sales representative.