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Digital Mobile Communications Measuring Instruments

W-CDMA Protocol Test System (PTS) & W-CDMA Virtual Signaling Tester (VST)

- W-CDMA protocol test capability
- 3GPP Standard compliant development tool
- Runs conformance tests in TS34.123
- Libraries available for UE development, integration and interoperability testing
- Graphical user interfaces for test generation and protocol analysis
- Supports dual mode FDD/GSM testing
- Re-use of test cases on VST and PTS

3G

The MX785201A PTS (Protocol Test System) and MX785101A VST(Virtual Signaling Tester) is a family of test and verification tools from Anritsu for 3rd generation wireless terminals. They have been developed to provide the test support today's research and development engineers need to successfully meet demanding performance and time to market targets. They share a common user interface thus reducing operator learn time as development progresses and migrates over the range of Anritsu's 3G development tools. In addition, test procedures generated for the VST can be run on the PTS and vice versa. This enables test procedures to be developed very early in the development cycle and to evolve as the user equipment evolves. A substantial saving in the investment in development of test procedures can be realised.

Features

- W-CDMA protocol test capability
- 3GPP Standard compliant development tool
- Runs conformance tests in TS34.123
- Libraries available for UE development, integration and interoperability testing
- Graphical user interfaces for test generation and protocol analysis
- Supports dual mode FDD/GSM testing
- Re-use of test cases on VST and PTS

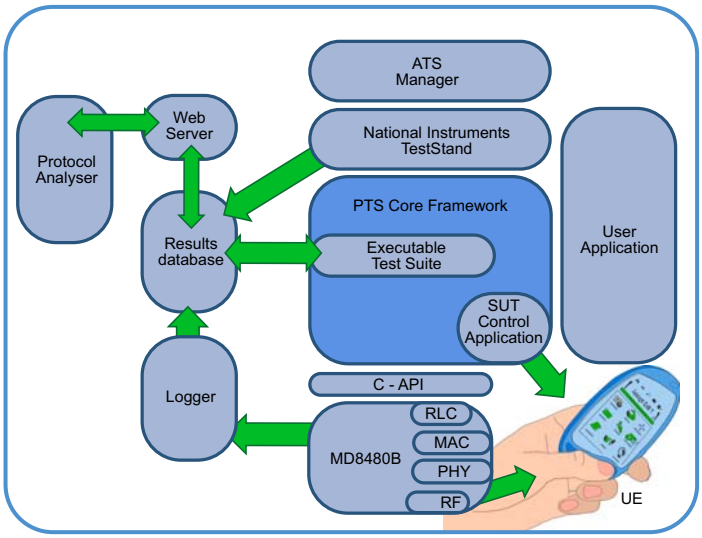
PTS

The MX785201A PTS software is combined with the MD8480B WCDMA Signaling Tester to make a system providing an environment to exercise Layer 3 and Layer 2 signaling protocols defined within the Third Generation Partnership Project (3GPP). The PTS software runs on a Windows 2000/XP™ PC. It executes TestStand™ test sequences made up of calls into a library of TTCN test cases through which can be defined:

- Sequences of layer 3 messages and expected responses
- Layer 3 to layer 2 service primitives to trigger specific layer 2 procedures, or to configure layer 2 operation
- Layer 3 to layer 1 service primitives to configure and initiate layer 1 operation
- Service primitives to and from user provided code modules for UE control

The layer 2 protocol stack and layer 3 test tools are functionally equivalent to those used in the Anritsu VST (Virtual Signaling Tester). An application-programming interface (API) to enable user generated C language test scenarios to be executed is available for the PTS.
The PTS supports multiple 3G cells enabling Soft and Hard handover tests to be carried out. In addition inter-system handover tests from GSM to WCDMA, GPRS to WCDMA, and vice versa are supplied.

System Overview



PTS Core Software

VST

The MX785101A VST software provides an environment to exercise Layer 3 and Layer 2 signaling protocols defined within the Third Generation Partnership Project (3GPP) in a simulated environment. When linked to the customer's signaling protocol development environment, Layer 3 and Layer 2 Test Procedures running on the VST platform enable verification and subsequent validation of the signaling protocol Software Under Test.
The VST runs on a standard Windows PC. The SUT (Software Under Test) may reside on any machine that can be connected via a TCP/IP port to the PC running the VST. In order to interface to the VST, a User Equipment (UE) simulated layer 1 and UE adapter software components are required for the Software Under Test. The VST Network (NW) Abstract Layer 1 and adapter components can be used as a starting point to develop these components. The Abstract Layer 1 has also been developed in such a way that users can easily customise it in order to simulate specific features of the air interface.

Evolution with 3GPP

The capability of the VST & PTS continues to evolve in-line with the 3GPP specifications. The PTS is designed to run the 3GPP Conformance Test Suite as defined in TS34.123. In addition, the Protocol Test System will support the layer 1 and layer 2 parameter sets defined in the 3GPP specifications TS34.108.

ATS manager

The ATS Manager provides a user interface which allows configuration of the PTS and VST, launch of the test sequencer tool to select and execute pre-prepared Layer 3 and Layer 2 Test Procedures and browse the results of the Test Procedures using the Protocol Analyser.

Protocol analyser

All Layer 3, Layer 2 and Layer 1 message exchanges between the PTS/VST and the System Under Test are logged. These messages are decoded to show the name and content of each field and displayed using the Protocol Analyser. Raw captured data is displayed in hexadecimal format.

National Instruments TestStand™

National Instruments TestStand™ provides the high level sequencing tool for loading and executing TTCN test cases. The TestStand™ development system is used to create test sequences.

C-API

As an alternative language to develop Layer 3 and Layer 2 TestProcedures, a 'C' based Application Programmer's Interface (C-API) is included in the form of a DLL.

Executable test suite

Layer 3 and Layer 2 test cases are implemented using TTCN (Tree and Tabular Combined Notation). Created TTCN tests are compiled to an Executable Test Suite (ETS) which interfaces to the PTS or VST via the GCI Management Interface and the GCI Operational Interface. These provide an open, standardised interface to TTCN based executable test suites. The VST & PTS have been developed to work with the Telelogic TAU TTCN Suite for creating and editing TTCN test cases. The GCI framework provided by the PTS provides support for a number of Test Suite Operations (TSOs) and also Protocol Implementation Conformance Statement (PICS/PIXIT).

Codec

The ETS is supported by a codec capable of encoding and decoding Radio Resource Control (RRC), Non Access Stratum (NAS) and lower layer configuration data.

Thin RRC

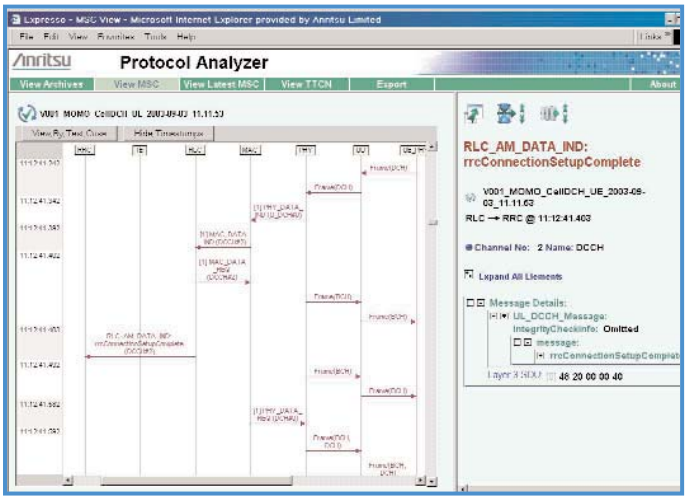
A thin RRC is provided to load NAS messages into RRC direct transfer messages and unload NAS messages from RRC direct transfer messages transparently.

SUT control application

The PTS frame-work supports the AT command set to automatically communicate with the UE to replace keyboard or internal (to UE) signals.

Logger and results database

The logger captures data from the majority of components in the system and stores it in the results database. This data is used by the protocol analyser to create message sequence charts and display decoded messages.



RLC and MAC

RLC and MAC layers conforming to the 3GPP specificationsTS25.322 Radio Link Control Protocol Specification and TS25.321 Medium Access Control Specification are supplied as part of MD8480B.

TE (Terminal Equipment)

The TE software component available as part of the MD8480B in the PTS supports a number of features including voice AMR 12.2K Codec, GSM EFR, ISDN, IP and PPP.

Layer 1

The MX785201A PTS provides a physical layer 1 through the MD8480B that can communicate with a terminal.

Libraries available

Integration library

The Integration library provides a proven set of test scripts that have been tested on real terminals. These test cases take the user through specific milestones (e.g. RRC Connection, location update, voice call, etc.) and provide a straightforward method for testing of terminals during the integration process. They provide a step by step test approach to prove functionality in a UE. The Test Procedures are 3GPP compliant and are designed to be customised to the particular needs of an Integration environment. The PTS Integration Library provides TestStand‘ Sequences in an executable form of the TTCN test cases. National Instruments TestStand™ is required to implement these cases. The Integration Library is available in source code form allowing the more experienced user to make changes to the parameters in order to test more specific details of the terminal design.

Developer Library

The Developer library provides a proven set of TTCN test scripts that have been tested on real terminals and complement the Integration Library. These test cases provide a more flexible test capability and allow experienced designers to exercise their terminals beyond the requirements of 3GPP. This library is supplied in source code form.

Conformance testing

Anritsu offers a range of solutions designed to meet specific customers requirements for UE protocol testing based on the 3GPP standards. These can be summarised as follows:

Standard PTS/VST product

The PTS/VST with the 3GPP adapter option enables users to run the 3GPP conformance tests. 3GPP T1 approved test cases in ETS form are supplied as standard. Quarterly updates to support new test cases are supplied through the support and maintenance contract.

Subscription service

PTS users can gain earliest access to 3GPP conformance test cases through a monthly update subscription service comprising all working conformance test cases in ETS form, ie: 3GPP T1 approved and 3GPP T1 submitted test cases.
This is appropriate for applications where conformance testing is on a critical development path.

GCF Conformance Test Toolkits

Conformance test case packages containing GCF validated test cases in ETS form. For formal UE conformance and pre-conformance testing.

Options available

MX785201A-14 Multi-MD8480 Support

The multi-MD8480 support option allows more than one MD8480 to be controlled from the PTS. This allows for a richer test environment with more cells presented to the UE, for example for certain TS34.123 conformance tests requiring simulation of more than 3 W-CDMA or 1 GSM cells. The option is also useful for R&D or integration testing applications where the additional tests that can be performed by having more than one GSM/GPRS cells will increase test coverage. Network operators can make use of the multi-MD8480 support as well, for simulating multiple cells to better represent their real network.

MX785X01A-42 IP Driver

The IP Driver software option allows data and application testing to be performed in virtually any signalling environment or scenario using automated tests controlled via TTCN running on the MX785201A Protocol Test System (PTS) or Virtual Signalling Test system (VST).
The IP Driver provides access to User-Plane packet data and to route that data through a PC onto a conventional data network. Key features include Multiple primary and secondary PDP contexts with single UE supported and TFT routing for secondary context support.
All protocols over IPv4 and fully flexible IP address allocation are supported.

MX785201A-43 Rapid Test Designer

The Rapid Test Designer (RTD) option provides a quick and easy method of developing test cases to run on the PTS. It provides a graphical, point and click interface to a broad library of procedural building blocks that can be placed on the screen to assemble more complex tests. The library contains composite functions that move the UE into a desired state to start the test, and elemental functions that allow the testing of detailed behaviour. This allows the test creator to focus on specific problem areas using his knowledge of 3GPP networks rather than test concepts.

The RTD's procedural building blocks are integrated with an expert system that guides the user through the complexity of the 3GPP protocols when setting the parameters for a particular test. Anritsu provides comprehensive catalogues of common network settings that can be used to quickly produce working test scenarios. The tool also provides interactive error checking on the procedures and parameters and will pick up any potential problems and mistakes made during test design. Finally, the RTD provides one click, instant execution with no test case build or compilation phase necessary to enable very effective and efficient development of test case libraries for a wide variety of purposes.

Ordering information

Please specify model/order number, name and quantity when ordering.

Model/Order No.	Name
	Main frame
MX785201A	PTS Core Software Single Cell ETS Framework
	Options
MX785201A-10	Multi-Cell Capability (SHO)
MX785201A-11	Multi-Cell (Inter-frequency) Capability (HHO)
MX785201A-12	Multi-RAT (FDD/GSM) Capability
MX785201A-14	Multi MD8480 Support
MX785201A-15	3GPP Compliant TTCN Adapter
MX785201A-17	Additional Protocol Analyser
MX785201A-41	OCNS
MX785201A-42	IP Driver
MX785201A-43	Rapid Test Designer
MX785201A-44	Monthly Subscription Service
	Libraries
MX785201A-31	TTCN Integration Library Source Code
MX785201A-33	TTCN Developer Library Source code
MX785211A	GCF Conformance Toolkit 1 (UAG#05 – Sept 2003)
MX783212A	GCF Conformance Toolkit 2 (UAG#06 – Jan 2004)
MX785213A	GCF Conformance Toolkit 3 (UAG#07 – Mar 2004)
MX785214A	GCF Conformance Toolkit 4 (UAG#08 – June 2004)
MX785215A	GCF Conformance Toolkit 5 (UAG#09 – Sept 2004)
MX785216A	GCF Conformance Toolkit 6 (UAG#10 – Dec 2004)
MX785217A	GCF Conformance Toolkit 7 (UAG#11 – Mar 2005)
	Support
MX785201A-01	National Instruments TestStand™
MX785201A-20	Software Update and Maintenance Contract
MX785201A-21	Training Course (2 days)
MX785201A-23	Installation & Commissioning (1 day)
	Main frame
MX785101A	VST Core Software Single Cell ETS Framework
	Options
MX785101A-10	Multi-Cell Capability (SHO)
MX785101A-11	Multi-Cell (Inter-frequency) Capability (HHO)
MX785101A-15	3GPP Compliant TTCN Adapter
MX785101A-17	Additional Protocol Analyser
MX785101A-42	IP Driver
	Libraries
MX785101A-31	TTCN Integration Library Source Code
MX785101A-33	TTCN Developer Library Source code
	Support
MX785101A-01	National Instruments TestStand™
MX785101A-20	Software Update and Maintenance Contract
MX785101A-21	Training Course (2 days)
MX785101A-23	Installation & Commissioning (1 day)

Note that libraries and options require the underlying core functionality to be present to function fully.

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