



Product Introduction

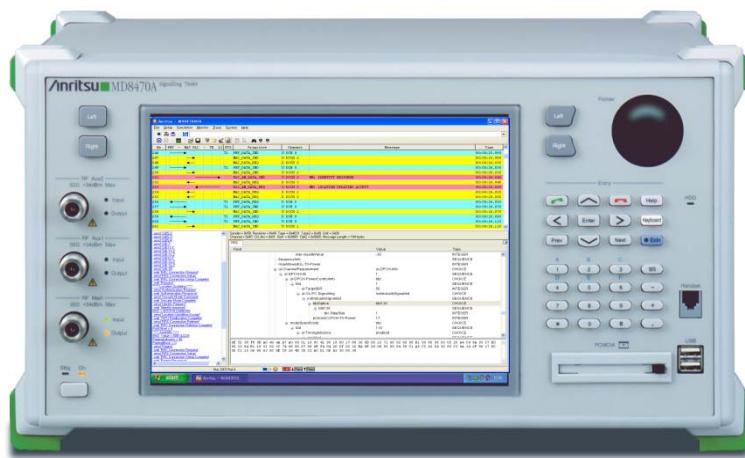
MX847040B

TD-SCDMA/GSM Simulation Kit

MD8470A
Signalling Tester

MD8470A Signalling Tester

MX847040B TD-SCDMA/GSM Simulation Kit - Product Introduction -



Your Benchtop Mobile
Communications Network

December 2009
Anritsu Corporation
Version 3.00

❖ Contents

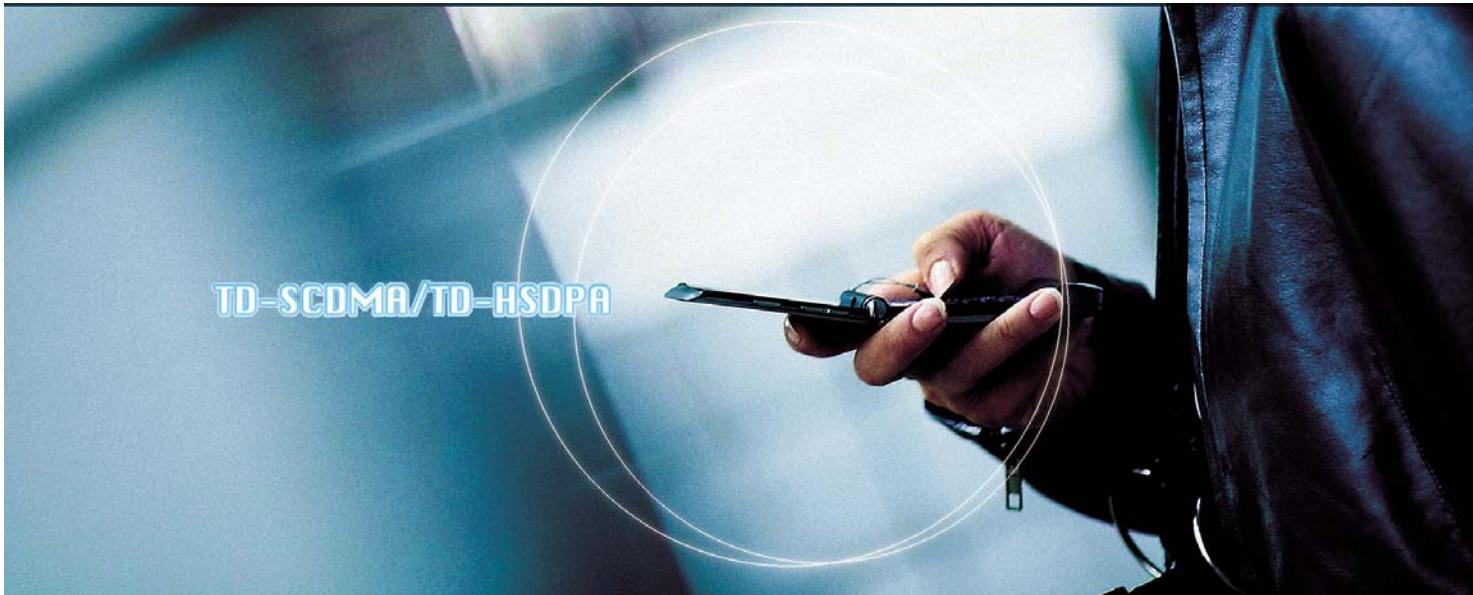
1. Quick Review of Anritsu Test Solution
2. MD8470A Signalling Tester Product Overview
3. Merits of Signalling Tester
4. Required Configuration
5. Support Service Outline



1. Quick Review of Anritsu Test Solution

Market Background

- TD-SCDMA is about to start full-scale deployment in China.
- As TD-SCDMA becomes a new world standard, UE and network quality are a major issue.



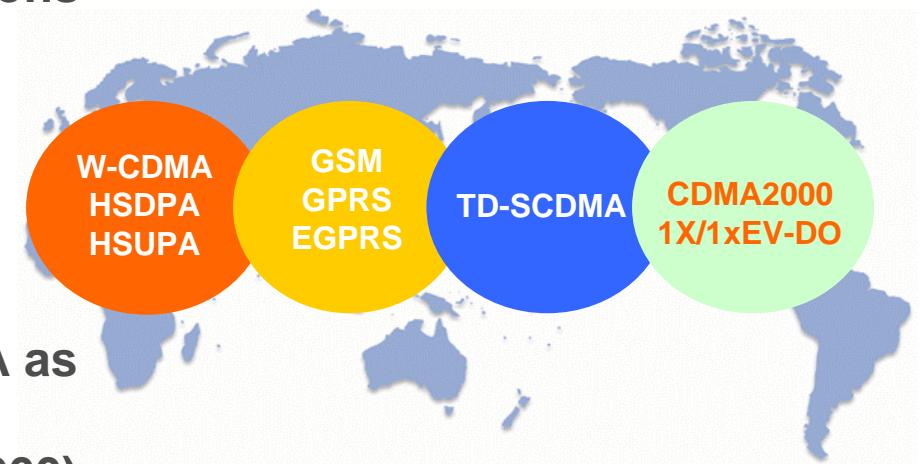
- To improve UE quality, Anritsu provides TD-SCDMA test solutions ranging from RF to protocol, application, and production line tests.
- Anritsu solutions will help grow your TD-SCDMA business.

Anritsu TD-SCDMA Solutions for R&D

- Anritsu supports various test solutions for TD-SCDMA UE R&D.

- Core Technology
- RF
- Protocol
- Application

- These solutions support TD-SCDMA as well as other world communication standards (W-CDMA, GSM, CDMA2000).



Signal Analyzer
MS2690A/91A/92A



Digital Modulation SG
MG3700A



Radio Communication
Analyzer
MT8815B/20B



Signalling Tester
MD8470A

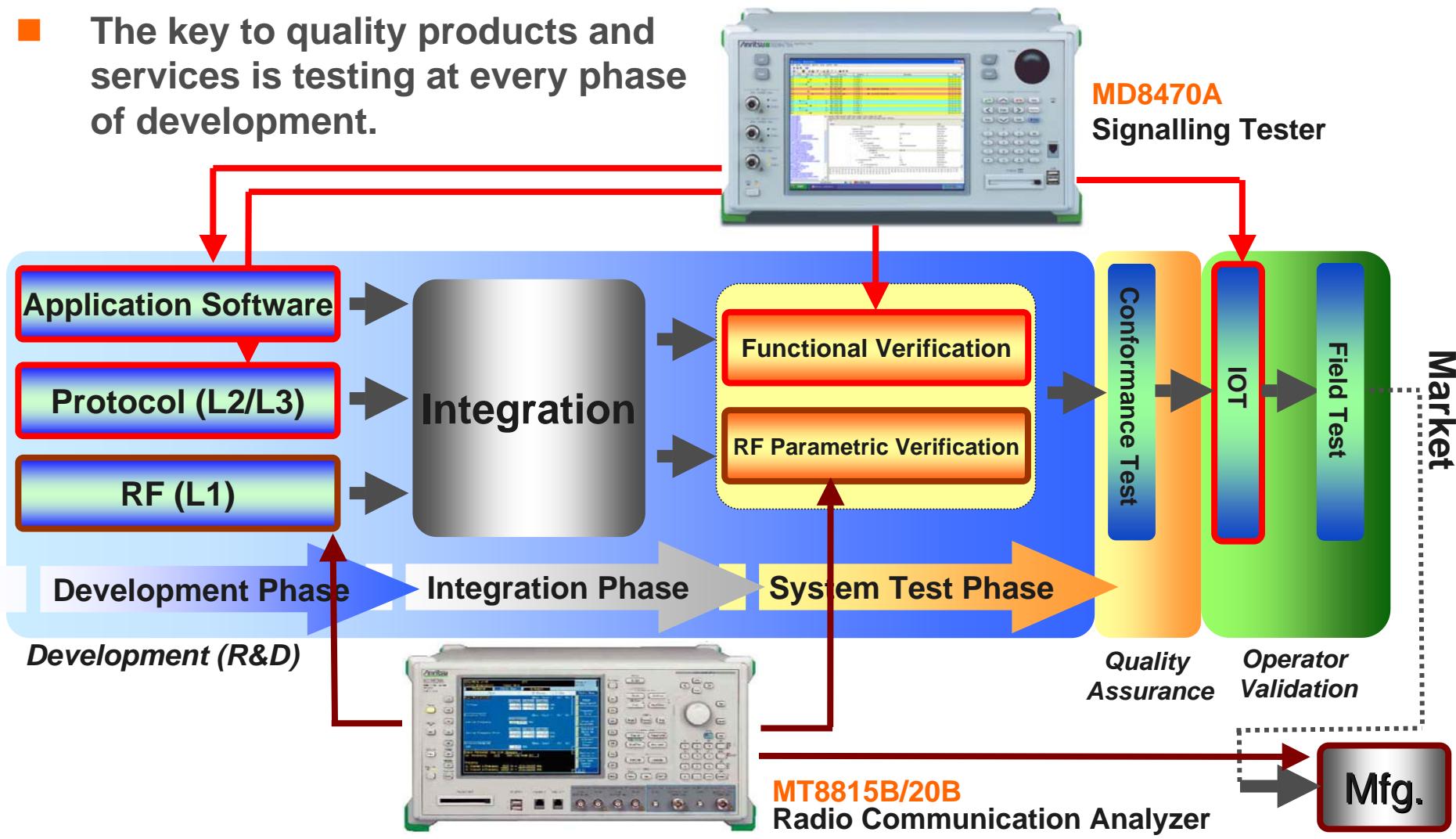
Core Technology

RF

Protocol/Application

Major MD8470A and MT8815B/20B Targets at TD-SCDMA UE Verification

- The key to quality products and services is testing at every phase of development.



MD8470A Signalling Tester for TD-SCDMA

- The MD8470A is a base station simulator that helps mobile UE development and evaluation engineers verify all the UE functions.
- The all-in-one design supports both protocol and application testing for TD-SCDMA HSDPA/HSUPA and GSM/(E)GRPS.

Key Features

Protocol Testing

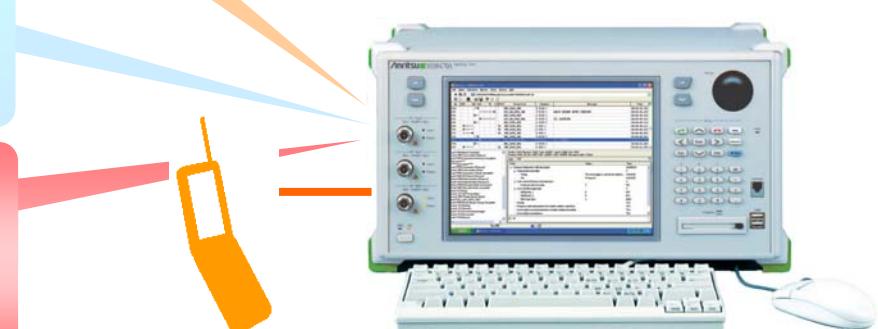
- Simulates TD-SCDMA HSPA and GSM/(E)GPRS network using script mode
- Supports various protocol sequence tests with flexible interface
- Provides protocol logging and decode feature for evaluation and troubleshooting
- Supports InterRAT handover on single platform
(TD-SCDMA HSPA ⇔ GSM/(E)GPRS)

Application Testing

- Supports voice call, video call and SMS tests
- Supports video streaming, web browsing, rich-content downloading (music, games) and MMS with appropriate server
- Supports HSDPA/HSUPA data throughput tests with built-in IP performance monitor

Regression/Stress Testing

- Simulates continuous testing for voice call, video call, handover, cell-reselection etc. using dedicated sample scenarios



TD-SCDMA Mobile Phone Issues

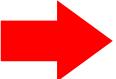
TD-SCDMA UEs may face the following issues:

■ Call Connection Stability

- Unstable basic call connection
 - Voice, Video, Packet (HSDPA/HSUPA), SMS, Multicall
- Unstable UE behavior during handover
 - TD-SCDMA ⇄ GSM
 - TD-SCDMA ⇄ TD-SCDMA, GSM/GPRS ⇄ GSM/GPRS
- UE cannot select best network

■ Performance

- Poor battery performance
 - Standby and talk time
 - Multimedia (MMS, music, streaming...)
- Low data throughput

 Anritsu's MD8470A is the ideal TD-SCDMA UE test solution for these issues.

Anritsu Solution Proposal [1/4]

■ Basic Call Connection Stability

Issues

- Call connection fails sometimes in real networks
- Requires verification of UE behavior with reference network

Anritsu Solution Proposal

- ✓ The MD8470A simulates TD-SCDMA HSPA to perform the following protocol and function tests.

[Protocol Tests]

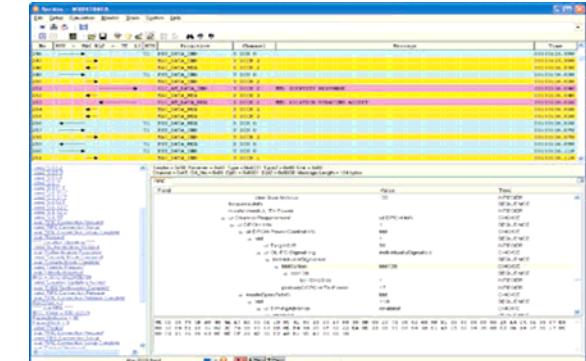
- UE-originated voice call, UE-terminated voice call
- UE-originated packet call, UE-call release
- NW-call release, etc.

[Function Tests]

- Voice/Video/Packet call (Rel. 4, HSPA)
- Messaging (SMS/MMS)

[Regression/Stress Tests]

- Continuous various service testing (e.g. Thousand loop)
- ✓ Sample scenarios can verify UE behavior.
- ✓ The Log viewer analyzes Layer-3 problems in real time.



Anritsu Solution Proposal [2/4]

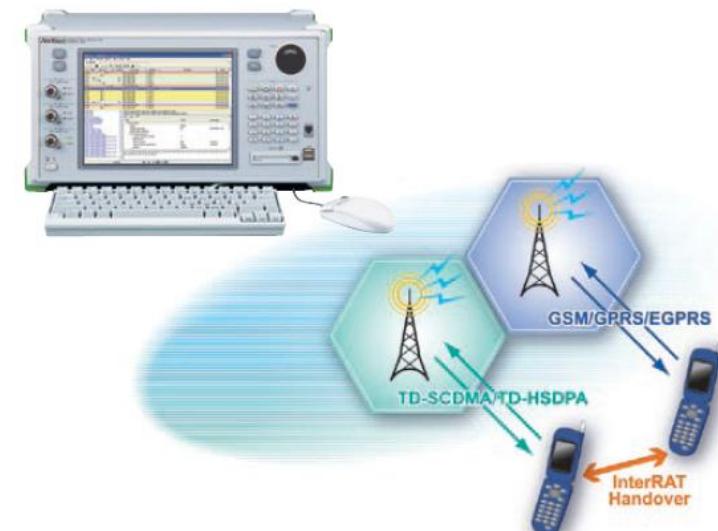
■ Call Connection Stability (Handover)

Issues

- Call connection fails sometimes at handover
- Requires reproduction of status at handover and cell selection/reselection

Anritsu Solution Proposal

- ✓ The MD8470A supports handover and cell selection/reselection between 2G, 2.5G, 3G and 3.5G systems
 - TD-SCDMA HSPA ⇔ GSM/(E)GPRS
 - TD-SCDMA HSPA ⇔ TD-SCDMA HSPA
- ✓ Network parameters for handover, cell selection/reselection can be changed.
- ✓ The Log viewer supports easy analysis of UE behavior at handover and cell selection/reselection.



Anritsu Solution Proposal [3/4]

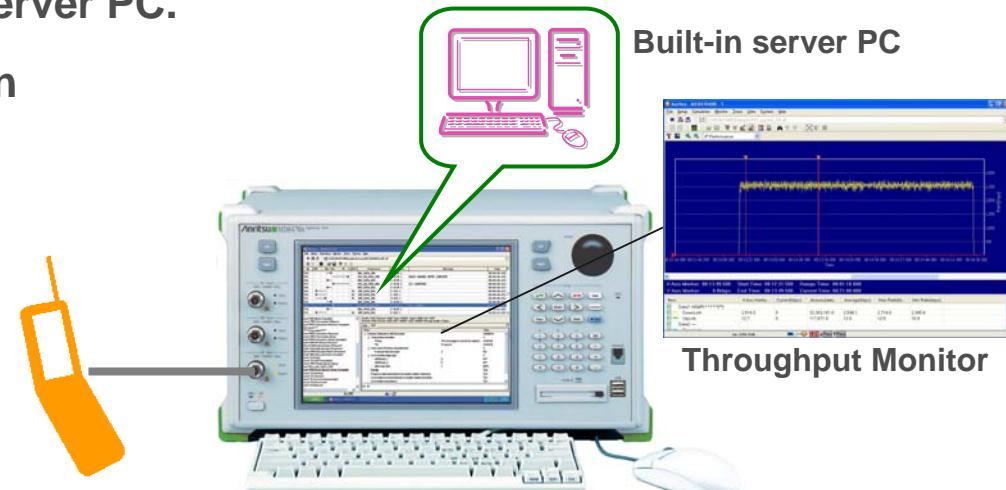
■ Data Throughput Performance

Issues

- Lower data throughput performance than expected
- Requires verification of impact of various application software or under external stress factors

Anritsu Solution Proposal

- ✓ The MD8470A simulates networks for all 3GPP TS25.306 TD-SCDMA HSPA UE categories, allowing users to configure the fastest TD-SCDMA data environment using the built-in server PC.
- ✓ The Throughput Monitor function monitors data throughput in real time.
- ✓ Simultaneous services (voice + packet, SMS + packet, etc.) are supported for stress testing verification.



Anritsu Solution Proposal [4/4]

■ Battery Performance

Assumed Issues

- Simple standby and talk-time measurements are inadequate.
- Battery performance must be verified when using mobile applications.

Anritsu Solution Proposal

- ✓ The MD8470A support for external packets allows users to test battery performance with application servers, such as MMS, e-mail, streaming and music downloads.
- ✓ Network conditions can be configured flexibly by modifying the C-scenario script controlling network Layer-3 behavior.



2. MD8470A Signalling Tester Product Overview

Anritsu Solution for TD-SCDMA HSPA Network Simulation



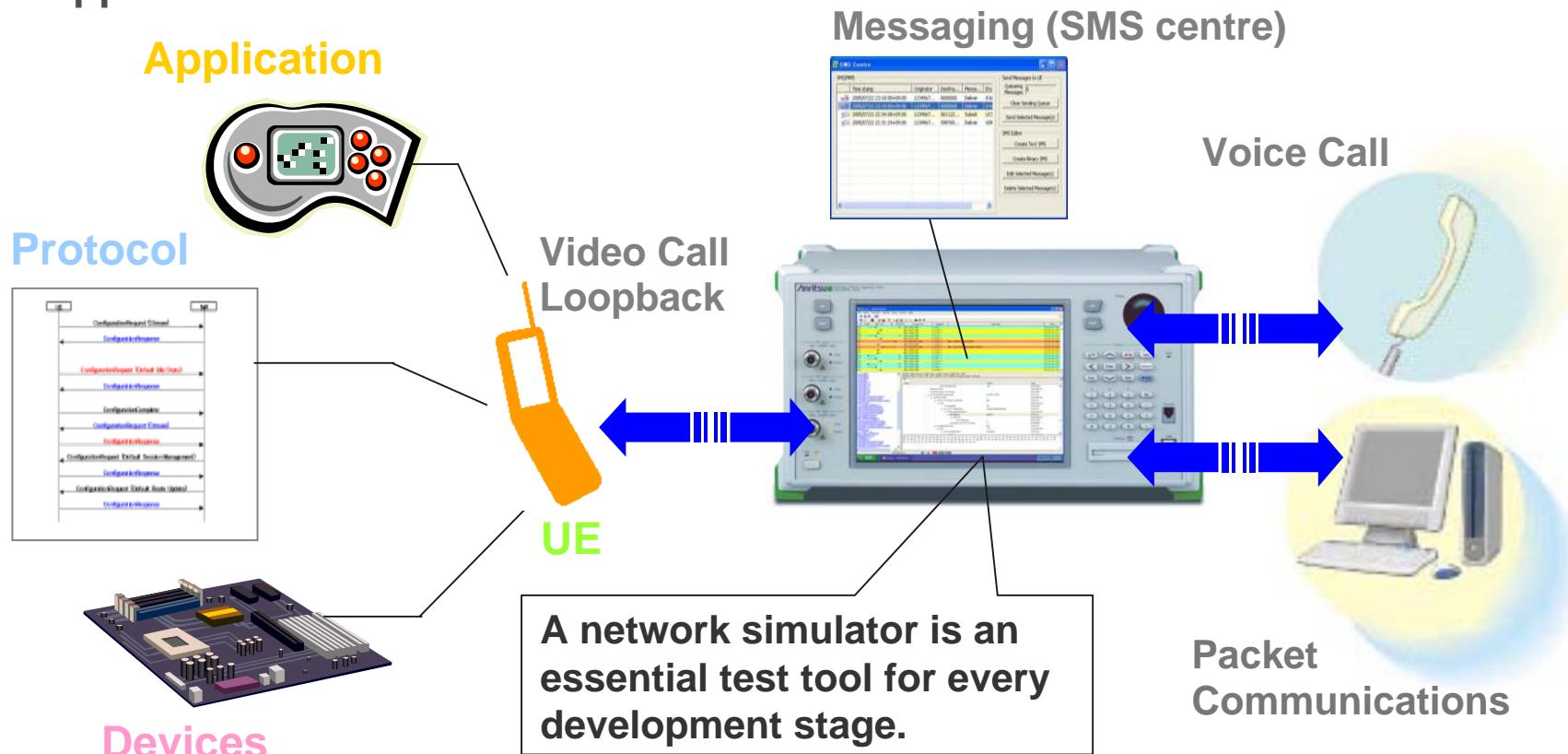
MD8470A Signalling Tester

New TD-SCDMA Options

- MU847040B TD-SCDMA/HSPA Signalling Unit
- MX847040B TD-SCDMA/GSM Simulation Kit
- MX847040B-13 TD-HSPA Software

Test Configuration

- Ethernet and handset interfaces support various data communication services.
- An application server can be installed in the built-in PC.
- The all-in-one platform provides a development environment including an application server.



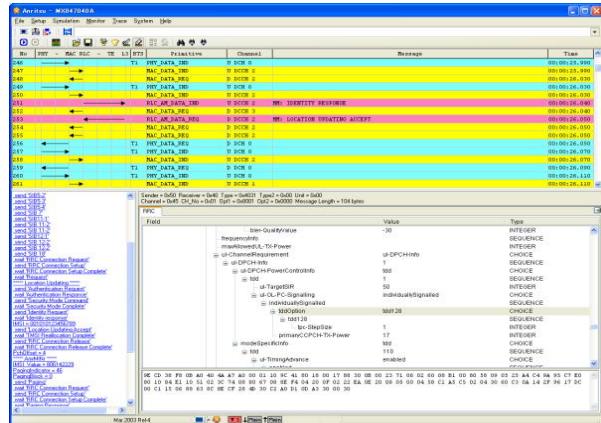
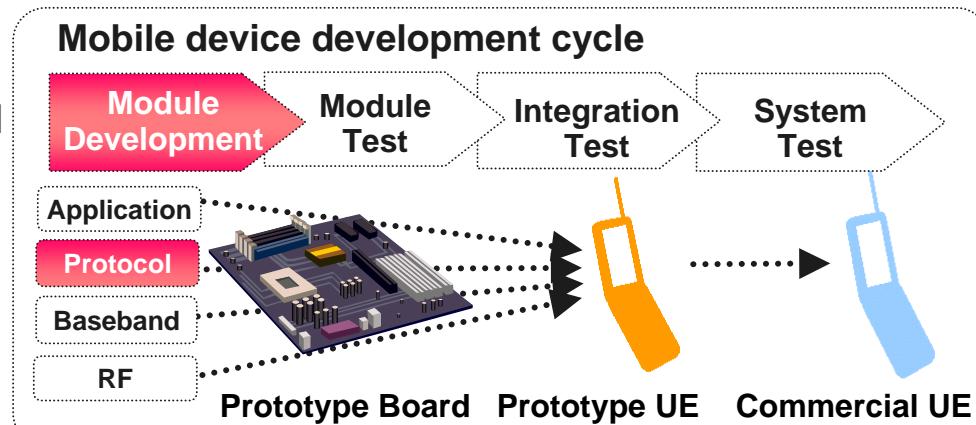
Features of TD-SCDMA Options

- Simulates TD-SCDMA HSDPA/HSUPA network
- Supports simulation using flexible scenarios (in C)
- Supports various TD-SCDMA HSDPA/HSUPA channel combinations
- Supports bearers, including voice, packet, and SMS
- Provides high-performance test platform to support all 3GPP TS25.306 TD-SCDMA HSDPA/HSUPA UE categories
- Provides powerful protocol message logging and decode functions for efficient troubleshooting
- Provides monitoring functions for downlink channel power, uplink power and timing alignment
- Supports installation of two TD-SCDMA units for testing IntraRAT handover and GSM/GPRS/EGPRS options for testing InterRAT handover of dual-mode phones

Protocol Tests

Flexible Protocol Sequence Test

- The C-based scripting interface offers full and flexible control of Layer 3 behavior.
- Freely-defined test parameters and sequences support TD-SCDMA/GSM protocol sequence testing, semi-normal testing and interrupt testing.

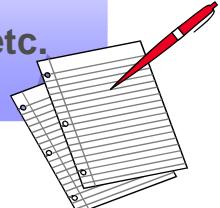


MX847040B Control Software



Protocol Test Item Examples

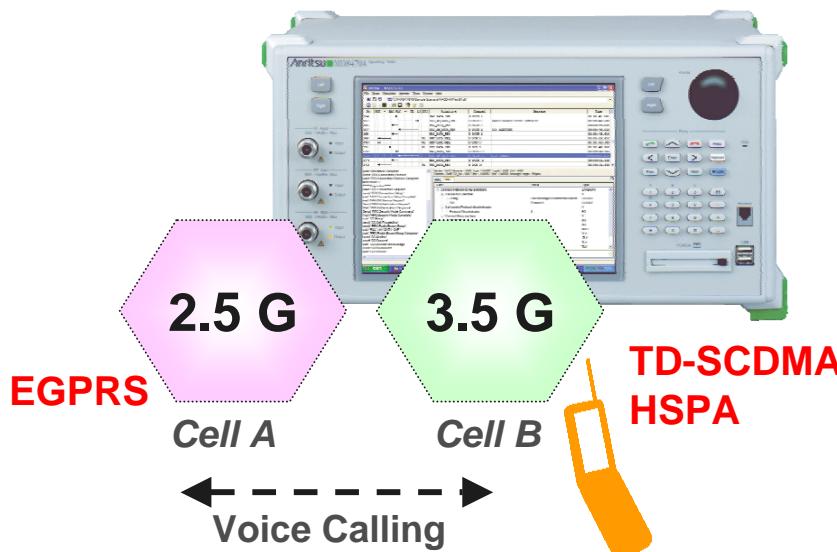
- Registration
- UE-originated voice call
- UE-terminated voice call
- UE-originated packet call
- UE-call release
- NW-call release
- UE-originated SMS
- UE terminatedetc.



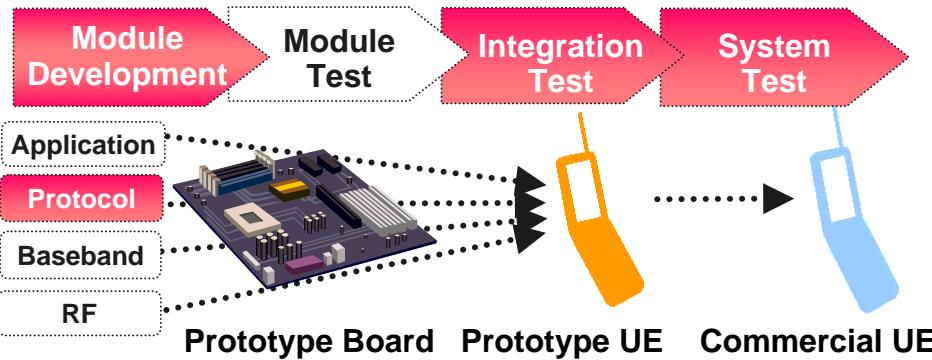
Handover Tests

All-in-One 2-Cell Environment

- The all-in-one MD8470A supports 2-cell InterRAT/IntraRAT tests, including cell selection, reselection and handovers.
- In addition to roaming verification when moving between different carriers, the MD8470A can verify the quality of high-speed packet-based multimedia services at TD-SCDMA HSPA and EGPRS InterRAT.



Mobile device development cycle



TD-SCDMA/TD-HSPA (2-Cell IntraRAT)

- Cell Selection
- Cell Reselection
- Handover (Baton / Hard Handover)
 - Voice Call (AMR: Handset, Loopback)
 - Video Call (Loopback)
 - Packet Call (up to DL2.8M/UL2.0M)
 - Multi-Call (Voice + Packet, Video + Packet)

TD-SCDMA/TD-HSPA, GSM/(E)GPRS (InterRAT)

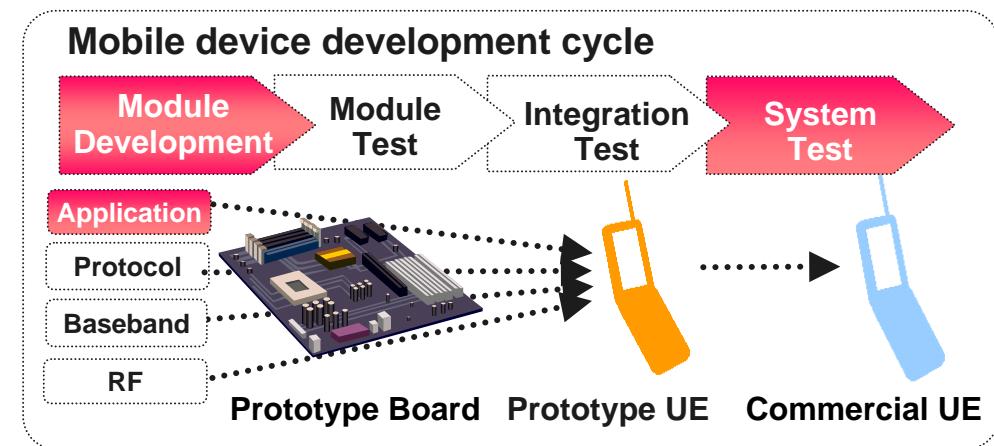
- Cell Selection
- Inter-system Cell Reselection
- Inter-system Handover
 - Voice Call (TDS: AMR \leftrightarrow GSM: EFR)
 - Packet Call (TD-HSPA \leftrightarrow (E)GPRS)

Application/Function Tests

Various Application Tests with One Instrument

- The MD8470A supports a full range of TD-SCDMA application tests. Also, combined use with application servers provides an end-to-end environment simulating various services.
- The following TD-SCDMA sample scenarios are bundled with the MD8470A.

- TD-SCDMA Voice Call (AMR 12.2 kbps)
- TD-SCDMA Voice Call HHO (Baton / HHO)
- TD-SCDMA Video Call (AV 64 kbps)
- SMS
- TD-SCDMA Packet Call (DL 64 kbps/UL 64 kbps)
- TD-SCDMA Packet HHO (Baton / HHO)
- TD-SCDMA HSDPA Packet Call (DL 2.8 Mbps)
- InterRAT Cell Reselection (TD-SCDMA / GSM)
- InterRAT Voice Call (TD-SCDMA / GSM)
- InterRAT Packet Call (TD-SCDMA / GSM)



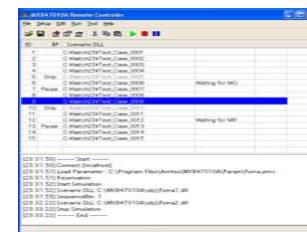
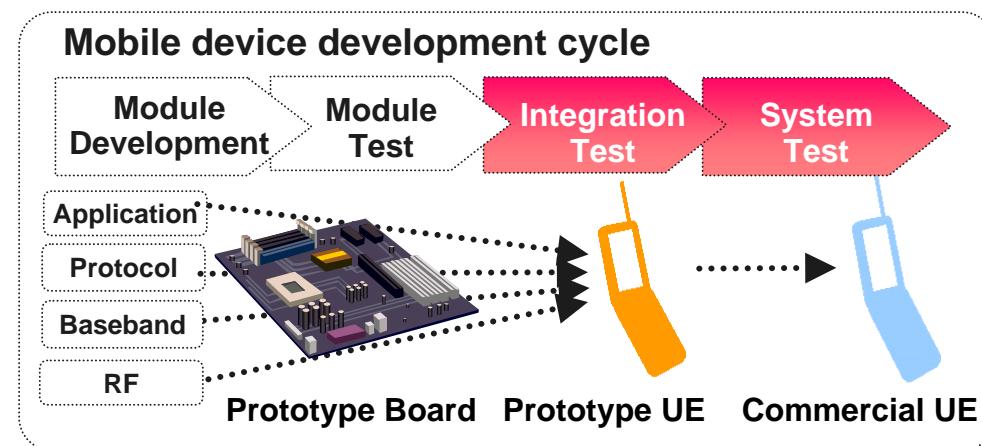
- Application Test Item Examples**
 - Voice/Video calls
 - Web browsing
 - SMS/MMS messaging
 - Content download and execution, including images, video streams, ring tones, and Java etc.

Regression/Stress Tests

Continuous Test Environment

- The following type of continuous loop testing can be supported using Scenario Scheduler with dedicated sample scenarios.
- C-scenario can also generate Pass or Fail result after finishing the continuous testing for checking the UE call quality.

- Regression Test Item Examples
 - Voice Call Continuous Loop
 - Video Call Continuous Loop
 - TD-HSDPA Download
 - Continuous Simultaneous Services (Voice call + Packet)
(Video call + Packet)
 - Continuous Cell reselection
 - Continuous Handover (InterRAT / IntraRAT Handovers)
 - Power Changing During Call etc.



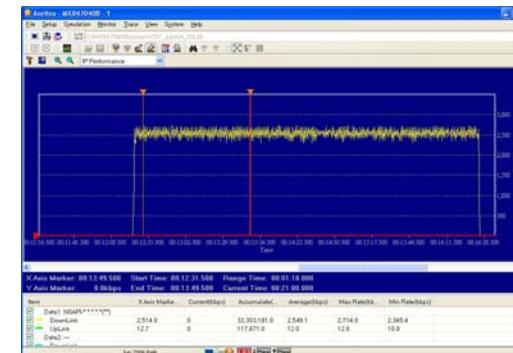
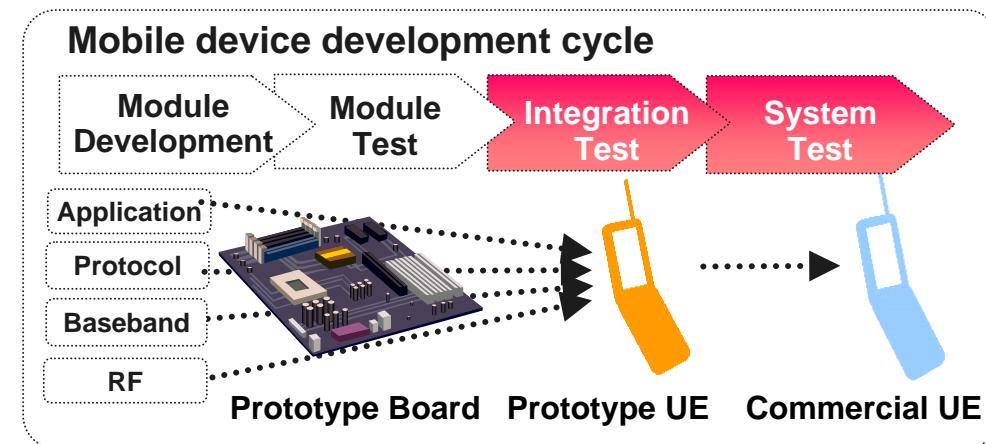
Scenario Scheduler
with dedicated sample scenarios



Data Throughput Tests

Data Throughput Measurement

- The new built-in IP Performance Monitor function supports real-time monitoring of data throughput performance.
- Actual data throughput can be verified at a fixed rate or at a rate determined by the TD-SCDMA HSPA UE category and CQI value.
- An efficient development environment for optimizing terminal throughput is easily configured.



IP Performance Monitor



TD-HSPA Software Specification

Supports All HSPA UE Categories in TS25.306

The MX847040B-13 performance is ideal for feasibility verification of mobile terminals at the highest data rate.

TD-HSDPA

HS-DSCH category	Maximum number of HSDSCH codes per timeslot	Maximum number of HSDSCH timeslots per TTI	Maximum number of HSDSCH transport channel bits that can be received within an HSDSCH TTI	Total number of soft channel bits	Maximum Throughput [bps]
Category 1	16	2	2788	11264	557600
Category 2	16	2	2788	22528	557600
Category 3	16	2	2788	33792	557600
Category 4	16	2	5600	22528	1120000
Category 5	16	2	5600	45056	1120000
Category 6	16	2	5600	67584	1120000
Category 7	16	3	8416	33792	1683200
Category 8	16	3	8416	67584	1683200
Category 9	16	3	8416	101376	1683200
Category 10	16	4	11226	45056	2245200
Category 11	16	4	11226	90112	2245200
Category 12	16	4	11226	135168	2245200
Category 13	16	5	14043	56320	2808600
Category 14	16	5	14043	112640	2808600
Category 15	16	5	14043	168960	2808600

TD-HSUPA

E-DCH category	Maximum number of E – DCH timeslots per TTI	Maximum number of E – DCH transport channel bits that can be received within an E –	Maximum Throughput [bps]
Category 1	2 (Note 1, 3)	2754	550800
Category 2	3 (Note 1, 3)	4162	832400
Category 3	2 (Note 2, 3)	5532	1106400
Category 4	3 (Note 2, 3)	8348	1669600
Category 5	4 (Note 2, 3)	11160	2232000
Category 6	5 (Note 2, 3)	11160	2232000

Protocol Analysis

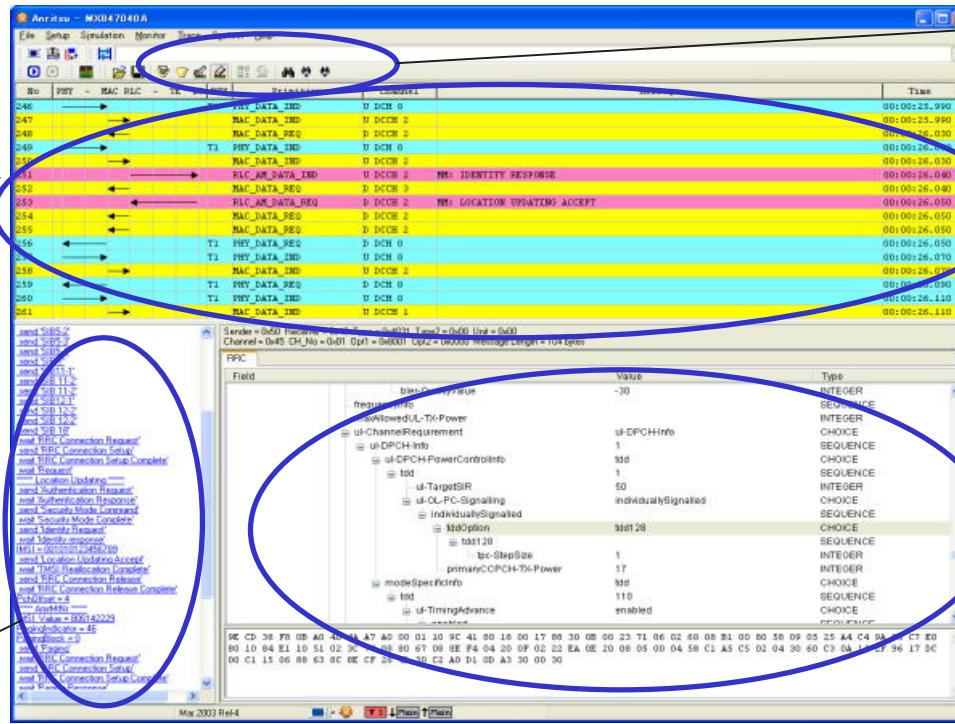
- When edited and compiled scenarios are loaded into the dedicated control software and executed, simulation is performed by controlling the MD8470A.
- After the test, analysis of simulation results is supported by the decode function for protocol messages (RRC, NAS [RR, CC, MM, GMM, SM], SMS, SS [Supplementary Services] Config) and filtering function.

Real-time protocol message monitoring

Powerful message filtering and searching

Used-defined sequence messages

Protocol message decoding

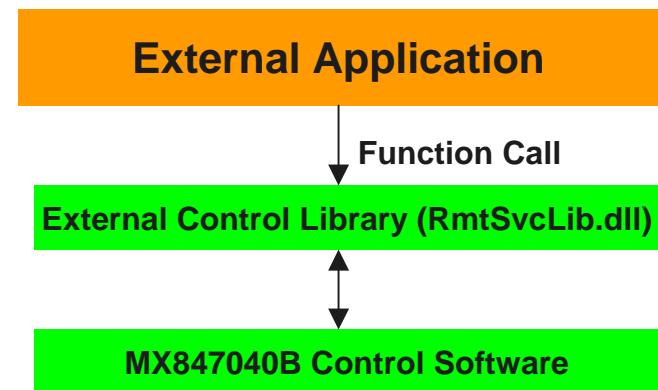


MX847040B Control Software

External Control Interface

Ideal for R&D/UE Verification

- Supports Automatic and Continuous Testing
- The DLL library allows external applications to control the MX847040B Control Software. By using this library, external applications can control scenario loading, parameter setting, and simulation execution to support multiple scenarios, repeated testing, and automated test systems.



The Scenario Scheduler application is bundled with the MD8470A to execute scenarios continuously using the external control function of the MX847040B Control Software.

Specifications

Supported TD-SCDMA Downlink Channel

Channel	Logical Channel	Transport Channel	Physical Channel	
Common	BCCH	BCH	P-CCPCH	2Codes
			DwPCH	
			FPACH	1Codes
			PICH	2Codes
	PCCH	PCH	S-CCPCH	Max 16Codes
	CCCH/DCCH/DTCH	FACH		
Dedicated	DCCH+DTCH	DCH	DPCH	Max 16Codes, 4Slots
		HS-DSCH	HS-PDSCH	Max 16Codes, 5Slots

Supported TD-SCDMA Uplink Channel

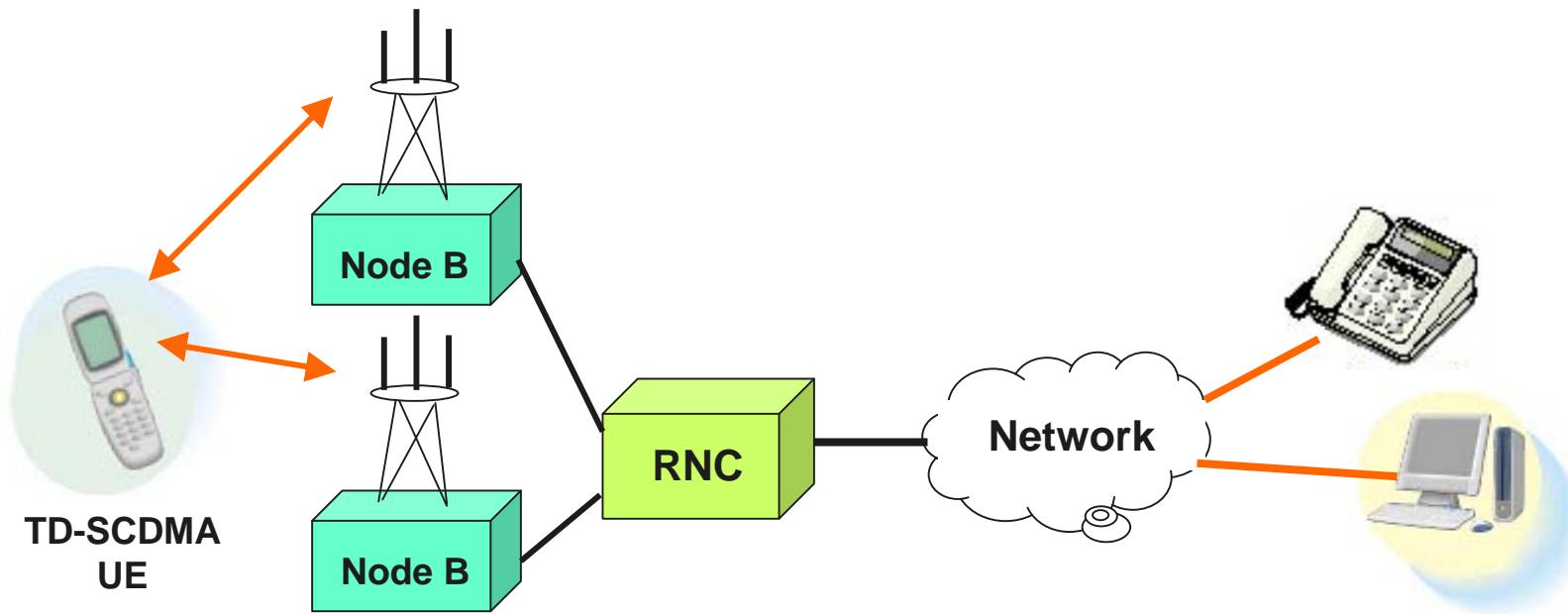
Channel	Logical Channel	Transport Channel	Physical Channel	
Common			UpPCH	
	CCCH	RACH	PRACH	Max 2Codes
			HS-SICH	1Code
Dedicated	DCCH/DTCH	DCH	DPCH	Max 2Codes, 4Slots
		E-DCH	E-PUCH	Max 2Codes, 5Slots

Supported Bearer Service

Service	Data rate	DL Physical Channel	UL Physical Channel
Protocol (Standalone DCCH)		DPCH (1code)	DPCH (SF8, 1code)
Voice Call (GSM-AMR)	12.2 kbps	DPCH (2codes)	DPCH (SF8, 1code)
Video Call	64 kbps	DPCH (8codes)	DPCH (SF2, 1slot)
Packet Switched Data	64 kbps	DPCH (8codes)	DPCH (SF2, 1slot)
	144 kbps	DPCH (9codes, 2slots)	DPCH (SF2, 2slots)
	384 kbps	DPCH (SF1, 3slots)	DPCH (SF2+SF16, 4slots)
Packet Switched Data (HSDPA)	2.8 Mbps	HS-PDSCH (16codes, 5slots)	
Packet Switched Data (HSUPA)	2.2 Mbps		E-PUCH (SF1, 4slots)
Reference Measurement Channel	12.2 kbps	DPCH (2codes)	DPCH (SF8, 1code) or DPCH (SF16, 2code)
	64 kbps	DPCH (8codes)	DPCH (SF2, 1slot)
	144 kbps	DPCH (8codes, 2slots)	DPCH (SF2, 2slots)
	384 kbps	DPCH (9codes, 4slots)	DPCH (SF2+SF16, 4slots)
Reference measurement channels (HSDPA)	1278.6 kbps	HS-PDSCH (12codes, 5slots)	
Reference measurement channels (HSUPA)	56.4 kbps		E-PUCH (SF4, 2slots)
	515.6 kbps		E-PUCH (SF2, 3slots)

3. Merits of Signalling Tester

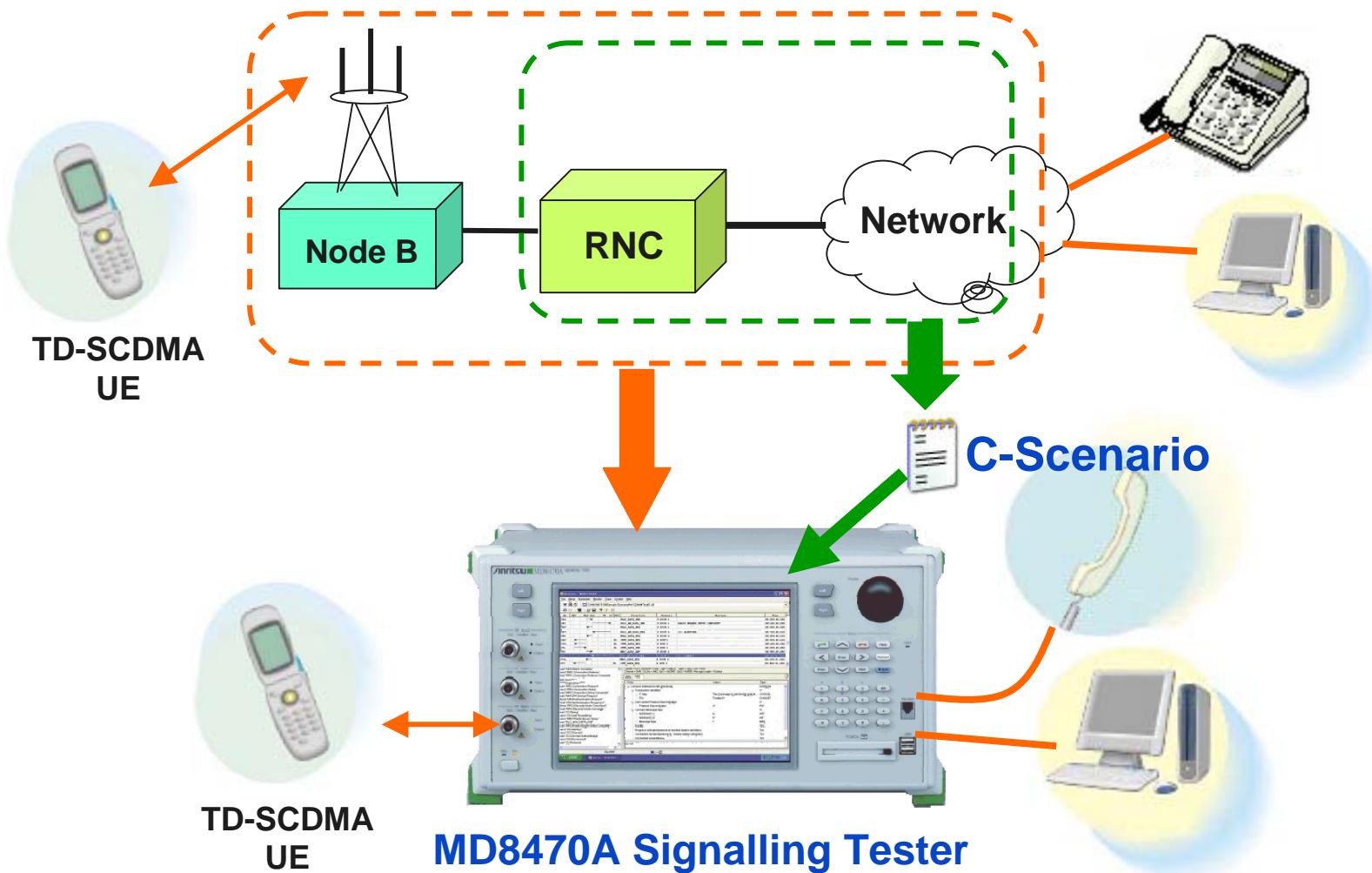
Actual Mobile Network



Problems using actual base stations at TD-SCDMA UE R&D:

- ✖ Cannot change network parameters freely
- ✖ Difficult to perform detailed troubleshooting
- ✖ Difficult to perform TD-SCDMA and GSM InterRAT handovers
- ✖ Restricted test locations

Area Supported by MD8470A



MD8470A Solves Every Issue

* Impossible to change network parameters freely

- ✓ Set any network parameters at PHY, MAC and RLC layer
- ✓ Send and receive any RRC and higher-layer messages



* Difficult to perform detailed troubleshooting

- ✓ Powerful log sorting, searching, and filtering for monitoring communications between UE and tester

* Difficult to perform TD-SCDMA and GSM InterRAT handovers

- ✓ The all-in-one MD8470A supports 2-cell InterRAT tests with flexible scenario capabilities

* Restricted test locations

- ✓ Small footprint for crowded benchtops and easy portability

Set Any Network Parameters

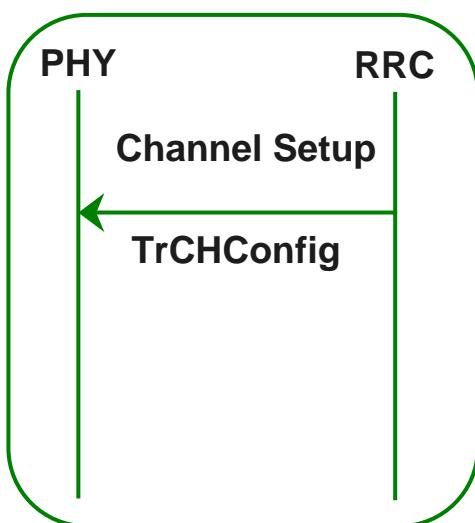


Set any network parameters at each PHY, MAC and RLC layer with MD8470A



Verify various bearers

Scenario



Channel type and number
CphyTrchConfigTds
(• • •,
D_DPCH,0,
&CphyTrchConfigD_DPCH_AMR,
ACTIVATE_NOW,
• • •);

Activation time

Transport format structure

TB size, CRC length,
RM Att, ...

Send and Receive Any Messages



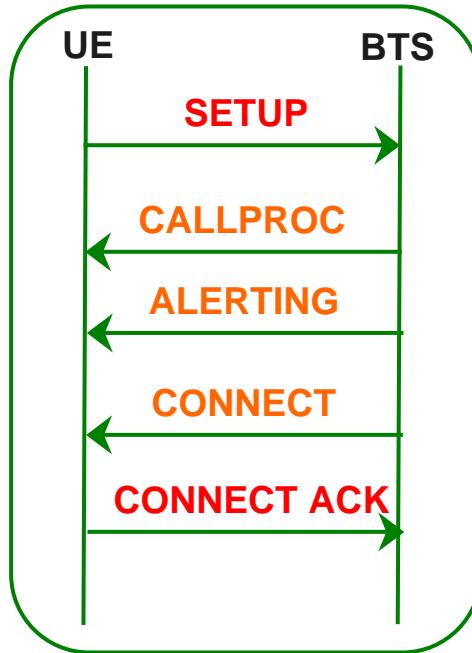
Send and receive any RRC and higher-layer messages with MD8470A



Various protocol testing conditions



Scenario



```
for(;;){
    RcvMessage (&BtsNo, &Frame, &Lo_Ch, &Lo_No, RcvData, NO_TIMEOUT);
    if ((Frame==RLC_AM_DATA_IND)&&(RcvData[0]==CC_SETUP)) break;
};

UCHAR SndData[] = {DOWNLINK_DIRECT_TRANSFER,CC_CALLPROC, ..... };
SndMessage(UNIT_BTS1,RLC_AM_DATA_REQ,D_DCCH,1,SndData,);

UCHAR SndData[] = {DOWNLINK_DIRECT_TRANSFER,CC_ALERT, ..... };
SndMessage(UNIT_BTS1,RLC_AM_DATA_REQ,D_DCCH,1,SndData,);

UCHAR SndData[] = {DOWNLINK_DIRECT_TRANSFER,CC_CONNECT, ..... };
SndMessage(UNIT_BTS1,RLC_AM_DATA_REQ,D_DCCH,1,SndData,);

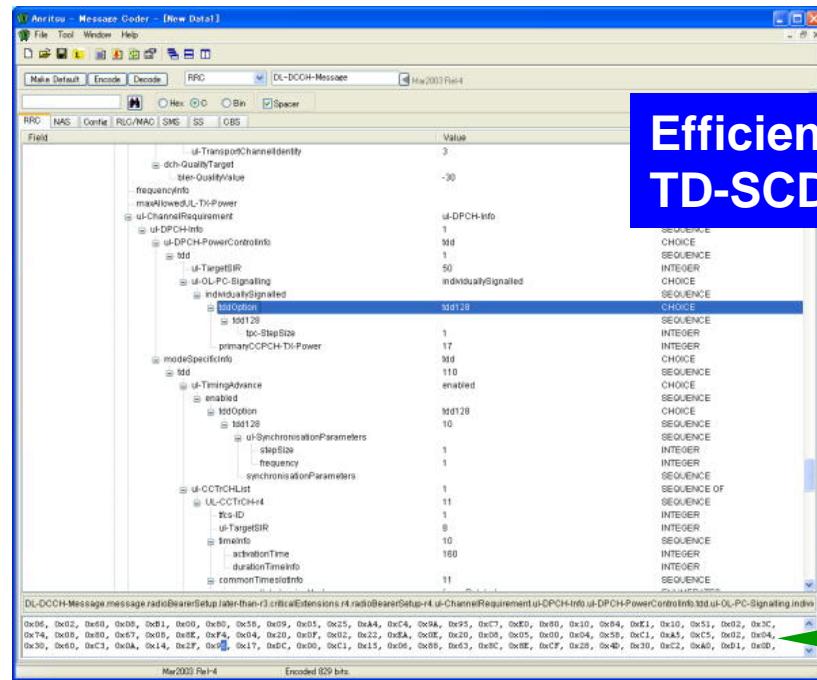
for(;;{
    RcvMessage (&BtsNo, &Frame, &Lo_Ch, &Lo_No, RcvData, NO_TIMEOUT);
    if ((Frame==RLC_AM_DATA_IND)&&(RcvData[0]==CC_CONNACK)) break;
};
```

Message Coder

Message Coder is a protocol message encoder/decoder tool supporting RRC, NAS (RR, CC, MM, GMM, SM), SMS and SS (Supplementary Service).



Supports efficient creation of protocol messages for test scenarios



Efficient creation of scenarios for verifying TD-SCDMA UEs



Encode/Decode

00 23 35 73 81 52 97 69...

MX847040A-E-L-1

Trace Analysis



Powerful log sorting, searching, and filtering to monitor communications between UE and tester

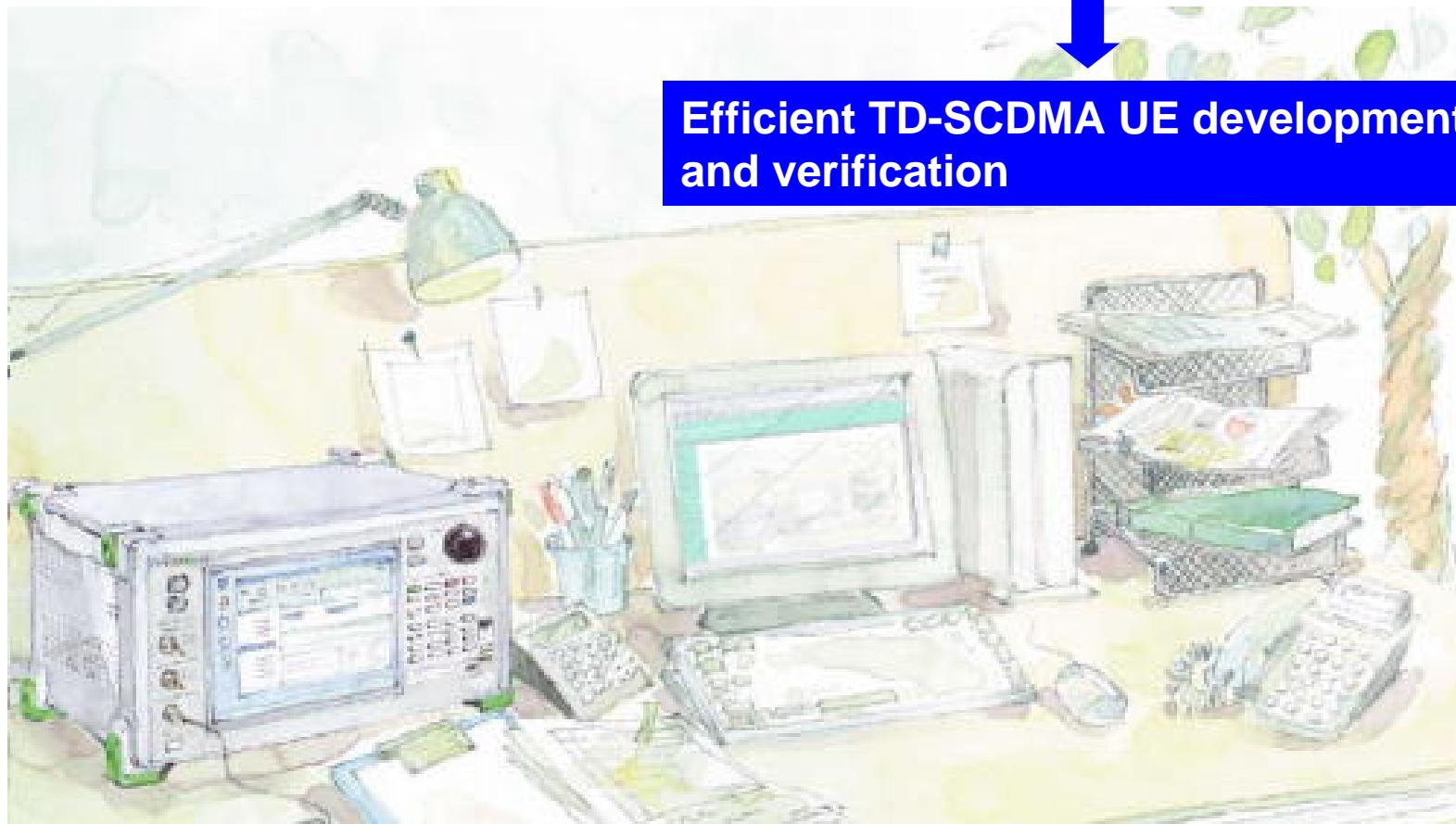
The screenshot shows the Anritsu MX847040A simulation monitor trace system. The main window displays a timeline of captured primitives, color-coded by channel (U-DCH, D-DCH). A red arrow points from the 'Sequence' callout to this timeline. Below the timeline, a detailed decode window is shown for a selected primitive (e.g., T1 PHY DATA IND). This window shows the field structure and values of the primitive, with a green arrow pointing from the 'Decode' callout to it.

Efficient TD-SCDMA UE development and verification

Space Saving

The small footprint saves benchtop space and supports easy portability.

Efficient TD-SCDMA UE development and verification



The MD8470A — Ideal For ...

- TD-SCDMA UE chipset and protocol development
- TD-SCDMA UE development and verifications
- TD-SCDMA UE application development
- TD-SCDMA UE inter-operability tests
- TD-SCDMA acceptance tests
- TD-SCDMA UE inspection and functional tests for pre-production (as core system simulator)



**MD8470A Signalling Tester
TD-SCDMA Options**

4. Required Configuration

Units/Options/Software [1/2]

■ Main Frame

- MD8470A Signalling Tester

■ Hardware Options

- MU847040B TD-SCDMA/HSPA Signalling Unit **New**
- MU847020B GSM Signalling Unit
- MD8470A-02 Second RF Option

■ Software Options

- MX847040B TD-SCDMA/GSM Simulation Kit **New**
- MX847040B-13 TD-HSPA Software **New**
- MX847010A-01 EGPRS Software

■ Software Support Contract

- MX847040B-SS110 MX847040B Support Service (1 year) **New**

Units/Options/Software [2/2]

■ Test Configurations

Configurations	Options/Units/Software	MD8470A	MD8470A-02	MU847040B	MU847020B	MU847020B	MX847040B	MX847040B-13	MX847010A-01	MX847040B-SS110
Single Configuration (1BTS)	TD-SCDMA Test Configuration	v		v			v		v	v
	TD-SCDMA/TD-HSPA (HSDPA/HSUPA) Test Configuration	v		v			v	v	v	v
	TD-SCDMA・GSM/GPRS Test Configuration	v		v		v	v	v	v	v
	TD-SCDMA/TD-HSPA・GSM/GPRS/EGPRS Test Configuration	v		v		v	v	v	v	v
InterRAT Handover Test Configuration (TDS-GSM 2BTS)	TD-SCDMA ↔ GSM/GPRS InterRAT Test Configuration	v	v	v		v	v	v	v	v
	TD-SCDMA/TD-HSPA ↔ GSM/GPRS/EGPRS InterRAT Test Configuration	v	v	v		v	v	v	v	v
IntraRAT Handover Test Configuration (TDS-TDS 2BTS)	TD-SCDMA ↔ TD-SCDMA IntraRAT Test Configuration	v	v	v			v		v	v
	TD-SCDMA/TD-HSPA ↔ TD-SCDMA/TD-HSPA IntraRAT Test Configuration	v	v	v			v	v	v	v
IntraRAT/InterRAT Handover Test Configuration (TD-S/GSM Full Configuration)	TD-SCDMA 2-cell, GSM/GPRS 2-cell Test Configuration	v	v	v	v	v	v	v	v	v
	TD-SCDMA/TD-HSPA 2-cell, GSM/GPRS/EGPRS 2-cell Test Configuration	v	v	v	v	v	v	v	v	v

[Note]

- Compiling test scenarios requires Microsoft® Visual C++® .net (Standard 2003) or Microsoft® Visual Studio® 2005 Standard Edition or Microsoft® Visual Studio® 2008 Standard Edition.
- Order either English or Japanese Windows® XP when ordering the MD8470A.

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*Windows is a registered trademark of Microsoft Corporation in the USA and other countries.

5. Support Service Outline

MX847040B-SS110: MX847040B Support Service (1 year)

■ Basic Policy

- 1-year support contract**

■ Support Details

- Responses to enquiries**
 - Dedicated mail address for enquiries**
- Software version upgrades for duration of contract (web download)**
- Maintenance releases (including bug fixes)**

Please note the support contract is mandatory.

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