Product Introduction

MX847030A
CDMA2000® Simulation Kit

MD8470A
Signalling Tester
Contents

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**Product Overview — MD8470A Platform —**

The MD8470A Signalling Tester supports efficient testing of mobile functions and service upgrades.

**Multi-system Platform**
— Base stations are simulated by installing hardware and control software supporting each communication system. The MD8470A covers the 400 to 2700 MHz frequency band and supports CDMA2000 (1X/1xEV-DO), W-CDMA/GSM/GPRS/EGPRS and TD-SCDMA systems.

**Windows®-based GUI**
— The built-in Windows® XP-based PC supports simulation control without an external application server or PC controller.

**Compact Package**
— The space-saving design makes configuration of a personal simulation environment easy (281 D x 426 W x 221.5 H mm).

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**Product Overview — CDMA2000® Simulation Kit (1/2) —**

Supports Basic Call Processing

This option with bundled sample scripts simulates CDMA2000 and supports basic call processing, such as voice calls and packet communications.

**Voice Call Tests using Echo-back(1)**

**Tests such as Data Download**

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(1) Not supported for communication test with handset
(2) Not required when server software installed in MD8470A main frame
**Product Overview — CDMA2000® Simulation Kit (2/2) —**

Built-in PPP Simulator

The MX847030A CDMA2000® Simulation Kit incorporates PPP simulation, a packet communication connection protocol. This supports concurrent CDMA2000 simulation and PPP log browsing.

- Provides simple test environment
- Incorporates PPP simulator and PC controller
- PPP simulation at Soft Handoff
- Performs PPP simulation with single MD8470A during Soft Handoff, facilitating interface analysis
- Data communications after PPP session
- Supports data communication simulation after connection as well as PPP session check during Soft Handoff

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**Product Overview — Multi-Sector/Multi-Carrier (1/3) —**

One Unit Simulates Various Handoff Tests (Option)

Various CDMA2000 1X/1xEV-DO handoff tests (Soft, Softer, Hard, Idle, Access etc.) can be simulated with multiple frequency carriers (max. 2) and multiple sectors (1X: max. 6, 1xEV-DO: max. 3). One MD8470A unit supports testing in multi-carrier/multi-sector test environments where verification using a live network is difficult. Additionally, handoff testing under a multi-carrier (max. 2 ->4) environment is supported by synchronizing multiple MD8470A units.
Product Overview — Multi-Sector/Multi-Carrier (2/3) —

Softer Handoff tests between any sectors and 2-way communications between two sectors occurring during Softer Handoff can be simulated in a near-to-live network environment, because a basic Physical Channel is mounted in each sector in the MD8470A (requires MX847030A-01 Multi Sector/Multi Carrier option).

Examples of Softer Handoff in Same BS (Cell)

Product Overview — Multi-Sector/Multi-Carrier (3/3) —

Soft Handoff between two base stations with different frequencies is supported because one MD8470A unit supports simultaneous sending and receiving of up to two frequency carriers. And using two MD8470A units supports Soft/Hard Handoff testing with sending of four frequency carriers.

Examples of Soft Handoff between Two BSs

Examples of Hard Handoff between Two Frequencies
Control and Trace Functions

The CDMA2000® Simulation Kit has built-in control and trace functions supporting flexible verification of both normal and quasi-normal operations between a BS and mobile.

It provides an API (Perl module) enabling Perl descriptions for running simulations of Layer-3 operations, condition settings for each Layer, and data communications with a single script.

Furthermore, multi-session simulations are supported by using multiple scripts.

Decode Display Supported Messages

<table>
<thead>
<tr>
<th>Type</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signaling Link Access Control (LAC)</td>
<td>LAC Layer protocol defined in 3GPP2 C.S0004</td>
</tr>
<tr>
<td>CDMA2000 1X Upper Layer (Layer 3)</td>
<td>Layer-3 messages defined in 3GPP2 C.S0005</td>
</tr>
<tr>
<td>PPP Internet Protocol Control Protocol (IPCP)</td>
<td>IPCP Messages defined in RFC 1332</td>
</tr>
<tr>
<td>PPP Authentication Protocols (PAP)</td>
<td>Authentication messages defined in RFC 1334</td>
</tr>
<tr>
<td>Link Control Protocol (LCP)</td>
<td>LCP Messages defined in RFC 1471</td>
</tr>
<tr>
<td>Challenge Handshake Authentication Protocol (CHAP)</td>
<td>CHAP Messages defined in RFC 1994</td>
</tr>
</tbody>
</table>
Control and Trace Functions
— Protocol Visualization Tool (PVT) —

[Tool bar]
Executes log file
Open/Save, scripts, etc.

[Filter display]
Executes filter setup and
display for each trace,
such as CDMA2000
signalling messages,
PPP messages

[Decode data display]
Displays decode data of
messages selected in
trace display field

[Trace display]
Displays record number,
time stamp, message
type, call flow, channel
name, protocol revision
information, etc.

[Binary data display]
Displays binary data of
messages selected in
trace display field

Protocol Visualization Tool (PVT)

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Applications — CDMA2000® Simulation Kit —

Simulations can be run easily using the flexible script editing function of the
Simulation Kit. And the built-in PPP support plus various I/Fs for data
communications testing are ideal for tests ranging from the final stage of mobile
development thru to final inspection tests.

Typical Mobile R&D/Evaluation Flow

Application Software
RF Protocol (Layer 2, 3)
RF Part (Layer 1)
Integration
Integration Test
Interoperability Test (IOT)
Field Test
Commercial Service

Development phase
Evaluation phase

Supported by MX847030A CDMA2000® Simulation Kit

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Applications
— Mobile Development Verification —

The MD8470A supports RF protocol stand-alone testing during mobile development as well as general operation testing following integration with application software. At integration testing, in addition to checking basic application operations, one MD8470A unit supports confirmation of communications from lower (RF Layer 1) to upper layers (Application Layer), including PPP session at Handoff, data communications, etc.

Applications
— Interoperability Test —

Work efficiency is greatly improved by running pre-verification IOT test sequences with the MD8470A to check interoperability between the BS and mobile.

Test examples
- Voice call processing
- Data communication processing
- Multi-sector call processing
- Multi-carrier call processing
- Handoff tests (Soft, Softer, Hard, Idle, Access)
- Quasi-normal call processing

Prior simulation of interoperability greatly improves work efficiency
Applications — Pre-field Testing —

Work efficiency is greatly improved by testing with the MD8470A before field tests. Preliminary handoff checks are especially valuable because field verification is difficult.

1xEV-DO BCMCS\(^{(1)}\) — Broadcast/Multicast Services —

The MD8470A and mobile are connected by 1xEV-DO. The mobile packet connection starts at content distribution from the BCMCS server\(^{(2)}\) and Multicast IP packets with self-assigned Flow ID are received.

**MX84703A-supported Protocols (BCMCS)**
- BCMCS Broadcast Control Protocol
- BCMCS Broadcast Framing Protocol
- BCMCS Broadcast MAC Protocol

\(^{(1)}\) CDMA2000\(^{®}\) 1xEV-DO function. Unlike previous point-to-point data transfer, BCMCS (BroadcastMulticast Services) supports point-to-multipoint Services (multicast), meaning multiple users receive the same data from one source.

\(^{(2)}\) Please prepare separately.
**1xEV-DO Rev. A — IP Videophone (QoS) —**

The MD8470A and mobile are connected by 1xEV-DO. The call between the mobile and videophone server uses VoIP (Video over IP).

**MX847030A-supported Protocols (Rev. A)**
- RTC MAC Protocol Subtype 1
- Generic Attribute Update Protocol (GAUP)
- Physical Layer Subtype 2
- RTC MAC Protocol Subtype 3
- Enhanced FTC MAC Protocol
- Enhanced Idle State Protocol
- Multi-Flow Packet Application
- QoS Control for Each RLP (RSVP)

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**Multi-Band Test — Synchronous Function —**

The mobile can perform various handoff tests while receiving up to four carrier frequencies from the MD8470A (two connected units).

**Example of Synchronous Test (Two MD8480A Units)**
- Tri-Band Test (Band 3, Band 6, Band 0)
**Hybrid Test — 1X/1xEV-DO Hybrid Simulation —**

A 1X/1xEV-DO Hybrid mobile can run the 1xEV-DO→1X Hand-down test, etc., while simultaneously receiving both CDMA2000 1X and 1xEV-DO signals from the MD8470A.

**Two Simulators of Maker X**

- **MX847030A Hybrid Test Example**
  - Hand-down test (1xEV-DO → 1X)
  - Hybrid receive standby test (power consumption test, etc.)

**Mobile IP — Foreign Agent (FA)/Home Agent (HA) —**

Mobile IP simulation is supported using a Mobile IP server\(^1\).

**A built-in MIP server is planned.**
### Product Specifications

**— MU847030A CDMA2000® 1X Signalling Unit —**

<table>
<thead>
<tr>
<th>CDMA2000 1X</th>
<th><strong>Transmitter characteristics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range: 400 to 2700 MHz</td>
<td></td>
</tr>
<tr>
<td>Frequency setting resolution: 100 Hz</td>
<td></td>
</tr>
<tr>
<td>Channel*: Sync, Pilot, BCH, CCCH, DCCH, SCH, QPCH, QCCH</td>
<td></td>
</tr>
<tr>
<td>Channel level setting range: -30 to 0 dB, 0.25-dB steps (Relative level for Ior)</td>
<td></td>
</tr>
<tr>
<td>Sector level setting range: -30 to 0 dB, 0.1-dB steps (Relative level for Ior)</td>
<td></td>
</tr>
<tr>
<td>AWGN Level setting range: -20 to +12 dB (Relative level for Ior)</td>
<td></td>
</tr>
<tr>
<td>Waveform quality: &gt;0.99 (Only Pilot, AWGN OFF)</td>
<td></td>
</tr>
</tbody>
</table>

**Receiver characteristics**

| Frequency range: 400 to 2700 MHz |
| Input level range: -60 to +34 dBm |
| Channel*: ACH, EACH, BCH, DCCH, SCH |

**Standard**

CDMA2000 1X Release 0/A/C*

**Protocol revision**

PREV6, PREV7, PREV9/10 (non-EVDO)

**Service options**

SO3 (EVRC), SO15 (LSPD), SO33 (HSPD), SO6 (SMS), SO32768

**Data communications**

Transparent IP data transmission/Simple IP
PPP Simulation: LCP/PPCP/PAP/CHAP

**Functions**

Transmitter: 3GPP2-compliant channels
Receiver: 3GPP2-compliant channels

*1: There are restrictions on the combination of frame duration, rate, and channel.

*2: PREV 9/10, BCMCS, and 1xEV-DO Rev. A feature availability is controlled due to agreements Anritsu has with Qualcomm Incorporated and requires a separate license or written consent from Qualcomm Incorporated in order to gain access to and/or use such features. To gain consent, customers should send inquiries to the following Qualcomm email address: testequipment@qualcomm.com

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### Product Specifications

**— MU847032A CDMA2000® 1xEV-DO Signalling Unit —**

<table>
<thead>
<tr>
<th>CDMA2000 1xEV-DO</th>
<th><strong>Transmitter characteristics</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency range: 400 to 2700 MHz</td>
<td></td>
</tr>
<tr>
<td>Frequency setting resolution: 100 Hz</td>
<td></td>
</tr>
<tr>
<td>Channel*: Pilot, MAC, Control, Traffic</td>
<td></td>
</tr>
<tr>
<td>Sector level setting range: -30 to 0 dB, 0.1-dB steps (Relative level for Ior)</td>
<td></td>
</tr>
<tr>
<td>AWGN Level setting range: -20 to +12 dB (Relative level for Ior)</td>
<td></td>
</tr>
<tr>
<td>Waveform quality: &gt;0.99 (Only Pilot, AWGN OFF)</td>
<td></td>
</tr>
</tbody>
</table>

**Receiver characteristics**

| Frequency range: 400 to 2700 MHz |
| Input level range: -60 to +34 dBm |
| Channel*: Access, Traffic |

**Standard**

CDMA2000 1xEV-DO Revision 0/A, BCMCS*2

**Data communications**

Transparent IP data transmission/Simple IP
PPP Simulation: LCP/PPCP/PAP/CHAP

**Functions**

Transmitter: 3GPP2-compliant channels
Receiver: 3GPP2-compliant channels

*1: There are restrictions on the combination of frame duration, rate, and channel.

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Units/Options/Software

✓ Main frame
  - MD8470A Signalling Tester

✓ Hardware options
  - MD8470A-01 Second RF Option
  - MU847030A CDMA2000® 1X Signalling Unit
  - MU847032A CDMA2000® 1xEV-DO Signalling Unit

✓ Software options
  - MX847030A CDMA2000® Simulation Kit
  - MX847030A-01 Multi Sector/Multi Carrier

✓ Software support contract
  - MX847030A-20 MX847030A Support Service (1 year)

✓ Service options
  - MD8470A-90 Extended Three Year Warranty Service
  - MD8470A-91 Extended Five Year Warranty Service
  - MD8470A-ES312 3 Years Standard Calibration Service

Note: Options in bold are mandatory.

The following options can be installed simultaneously:
- W-CDMA (MU847010A)
- GSM/GPRS/EGPRS (MU847020B)
- TD-SCDMA (MU847040A)

Uns/Options/Software

✓ Configurations*1

<table>
<thead>
<tr>
<th>Configurations</th>
<th>Units/Options/Software</th>
<th>MU847030A CDMA2000® 1X Signalling Unit</th>
<th>MU847032A CDMA2000® 1xEV-DO Signalling Unit</th>
<th>MD8470A-01 Second RF Option</th>
<th>MX847030A CDMA2000® Simulation Kit</th>
<th>MX847030A-01 Multi Sector/Multi Carrier</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA2000 1X Test Configuration*2</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>CDMA2000 1X + Multi Sector/ Multi Carrier Test Configuration*3</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>CDMA2000 1X/1xEV-DO Test Configuration*4</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>CDMA2000 1X/1xEV-DO + Multi Sector/ Multi Carrier Test Configuration*5</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
</tbody>
</table>

*1: Select either the English or Japanese version of Windows® XP when ordering the MD8470A.
*2: CDMA2000 1X Test Configuration: Simulates CDMA2000 1X with one carrier and one sector
*3: CDMA2000 1X + Multi Sector/Multi Carrier Test Configuration: Simulates CDMA2000 1X with multi-carriers and multi-sectors
*4: CDMA2000 1X/1xEV-DO Test Configuration: Simulates CDMA2000 1X/1xEV-DO with one carrier and one sector
*5: CDMA2000 1X/1xEV-DO + Multi Sector/Multi Carrier Test Configuration: Simulates CDMA2000 1X/1xEV-DO with multi-carriers and multi-sectors

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**Units/Options/Software**

- **MX847030A-20: MX847030A Support Service (1 year)**
  - **Basic policy**
    - One-year support contract
  - **Support details**
    - Responses to enquiries by email
    - Software version upgrades for contract duration (Web download)
    - Maintenance releases (including bug fixes)

  ![This option is mandatory.]

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**Others**

- **Sample Scripts (Standard Software Bundle)**
  - 1X Voice Call (SO3)
  - 1X Voice Call HHO (SO3)
  - 1X Voice Call SHO (SO3)
  - 1X Data Call (SO33)
  - 1X Data Call SHO (SO33)
  - 1xEV-DO
  - Hybrid (1X + 1xEV-DO) (SO3, SO33)
  - 1X Dual Band (4RF: Band Class3, 6) (SO3, SO33)

  ![Further scripts are planned.]

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**Future Prospects**

The following materials are possible future ideas. They are not in the development program yet. We shall add further functions, based on customers’ ideas and requests.

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**WNS c2k — Wireless Network Simulator for CDMA2000® (1/2) —**

1. This would simulate interactive BS operation for effective basic mobile connection tests without a scenario.

**Features**
- Interactive operation by connecting mobile (Voice/Packet Communication, SMS, etc.)
- Operation from both mobile and network sides
- Supports 1X, 1xEV-DO hybrid mobile tests for at-a-glance confirmation

---

(1) Image still under construction
WNS c2k — Wireless Network Simulator for CDMA2000® (2/2)

Future Prospects

1X/1xEV-DO Hybrid Mode Selection
IP Address Setting
(Gateway, PDSN, MS, DNS, etc.)

CDMA2000 1X Parameter Setting
(Band Class/Channel/SID/NID/
Simulator Send Power/QPCH ON/OFF)

CDMA2000 1xEV-DO Parameter Settings
(Band Class/Channel/Sector ID/
Simulator Send Power)

Load/Save Power Meter Settings

CDMA2000 1X Voice Call
(Loopback)

Origin/Termination from
Virtual Terminal Voice Call
Interrupt at Data Comm

SMS Send
(PCH, TCH (SO3), TCH (SO6))

Call Interruption/Conference Call

Display Mobile Status

CDMA2000 1X Data Call
(SO15, SO33)

CDMA2000 1xEV-DO Data Call

Start/Stop Simulator

1X/1xEV-DO Hybrid Mode Selection
IP Address Setting
(Gateway, PDSN, MS, DNS, etc.)

CDMA2000 1X Parameter Setting
(Band Class/Channel/SID/NID/
Simulator Send Power/QPCH ON/OFF)

CDMA2000 1xEV-DO Parameter Settings
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CDMA2000 1X Data Call
(SO15, SO33)

CDMA2000 1xEV-DO Data Call

Start/Stop Simulator

Explanation of WNS c2k Parts

(1) Image still under construction

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Specifications are subject to change without notice.