

# CDMA2000 Protocol Testing and Analysis

► K1297-G20 Monitor • K1297-G20



## ► Features & Benefits

- K1297-G20 Monitor
  - Easy to Use with Graphical User Interface
  - Field Monitoring
  - Portable and Rugged
  - 16+ Physical Links (E1/T1, etc.) and 64+ Time Slots
  - Ethernet Board (4 x 10/100Base-T)
  - Large Number of Supported Protocols
  - A1, A10/A11 Multi-interface Calltrace up to IOS-4.2
  - Advanced Troubleshooting Applications

- K1297-G20
  - Hardware, Software and User Interface Based on the K1297-G20 Monitor
  - Graphical User Interface is Compatible with K1297-G20 Monitor
  - Offers All Monitoring and Analysis Features of the K1297-G20 Monitor, Plus Simulation and Emulation

## K1297-G20 Monitor

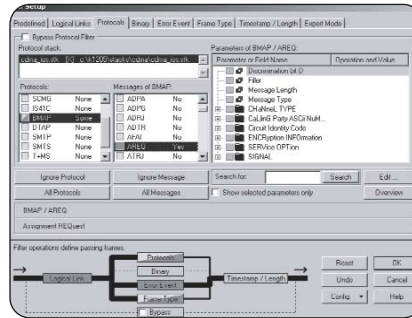
The K1297-G20 Monitor is specifically designed for field monitoring applications and provides users with many advanced monitoring features for analysis and troubleshooting.

For example, a click on the “Zoom” button, as shown in Figure 1, will extract all messages that belong to one particular call, even from a large recording. This saves time and is as easy as it could be.



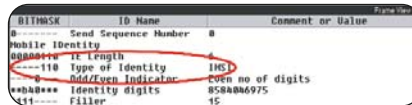
► Figure 1. Click on the Zoom button to extract all messages.

A sophisticated filter configuration dialogue, as shown in Figure 2, enables the user to select messages according to a certain criteria (e.g., containing a certain IMSI, etc.).



► Figure 2. Filter dialogue allows user to select messages according to certain criteria.

Decoding down to bit-level for all parameters is essential for troubleshooting and problem analysis, as shown in Figure 3.



► Figure 3. All parameters can be decoded down to the bit-level.

## ► Applications

- K1297-G20 Monitor
  - Creation of Network Statistics and Call Detail Records
  - Call Tracing and Troubleshooting
- K1297-G20
  - Replacing Real Equipment in a Network for Testing Purposes
  - System Verification and End-to-End Testing
  - Voice Channel Verification

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## K1297-G20

The K1297-G20 features protocol monitoring, simulation, and emulation. The instrument's hardware, software, and user interface are based on the K1205/K1297-G20 Monitor users to adapt to the G20.

Capabilities in the K1297-G20 allow applications that are particularly valuable for Network Installation and Commissioning in the field.

## Network Element Emulations for Replacing of Real Equipment

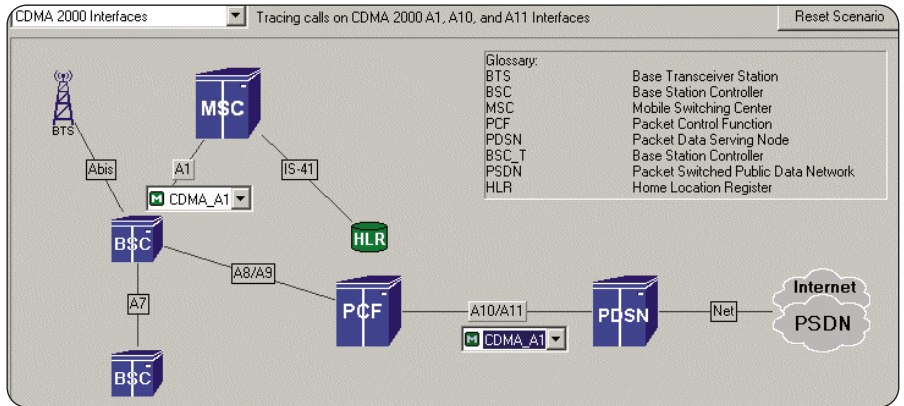
Network Element Emulations on the K1297-G20 are designed to allow network elements (such as MSC, HL, etc.) to be replaced by the Emulation for testing purposes.

All parameters – for example, phone numbers, IMSIs, and more – are configured through menus. Once activated, the Network Element Emulation will automatically respond to incoming messages and/or initiate calls and procedures. Outgoing calls or procedures can be initiated interactively with a mouse click, or with the help of a simple script interface by defining specific call scenarios, as shown in Figure 5.

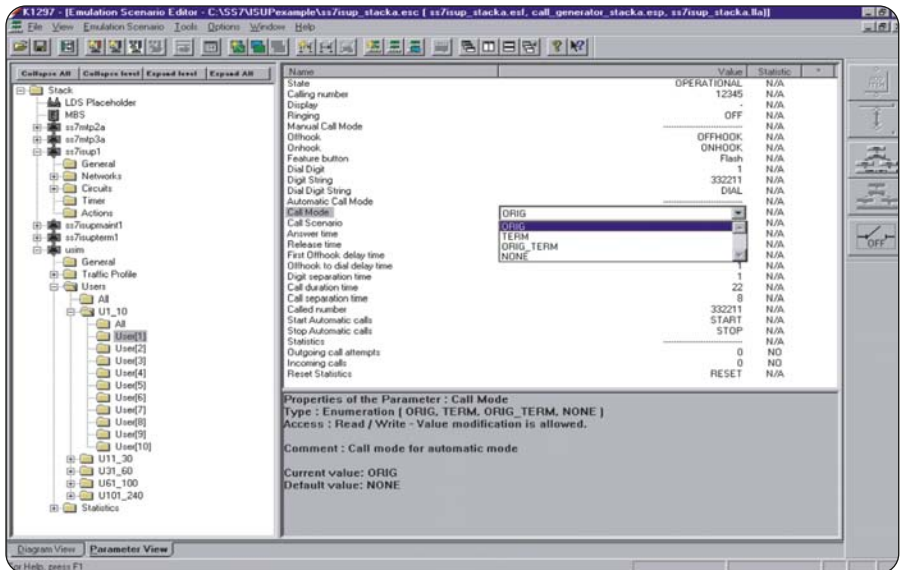
## MBS/MSCTools for Detail Level Testing and Troubleshooting

The MBS (Message Building System) and MSC (Message Sequence Chart Tool) allow users to graphically design and modify Test Cases.

Users have full control over message flow and message content. Virtually any equipment behavior (correct or faulty) can be simulated with the MBS/MSCTools, making it particularly useful for detail level testing or troubleshooting.



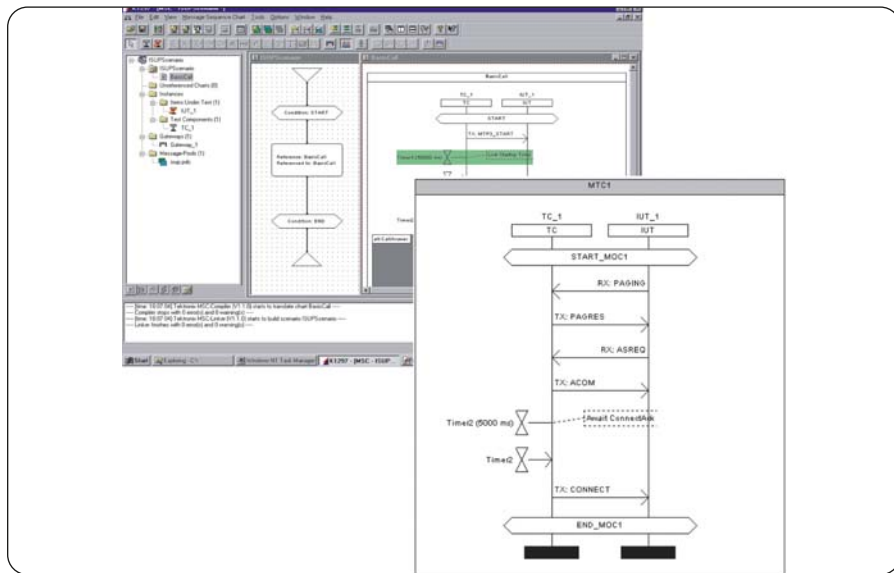
► Figure 4. Convenient troubleshooting: cdma Multi-interface Calltrace captures messages from different interfaces belonging to the same transaction.



► Figure 5. Configuration dialog for a Network Element Emulation.



► Figure 6. Message Building System (MBS) and Message Sequence Chart Tool (MSC) displays.



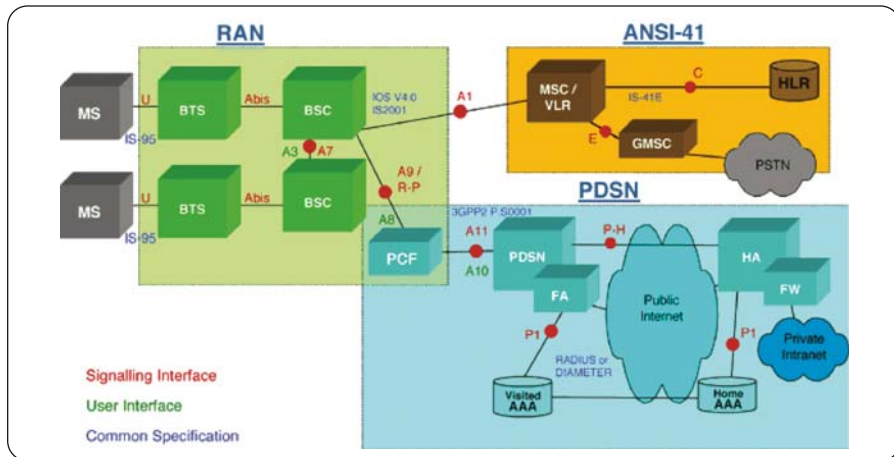
► Figure 7. Message Sequence Chart Tool displays.

The MBS is used to create messages and edit their parameters. Variables can be used to handle parameters dynamically. Figure 6 illustrates how the MBS and MSC tools are used. Messages are built by selecting the Message Type and Parameters (IEs) from menus.

As shown in Figure 7, the MSC is used to define the message flow of a test case. The messages (indicated by arrows in the chart) are defined within the MBS.

## CDMA2000 System Architecture

Figure 8 illustrates the CDMA2000 system architecture.



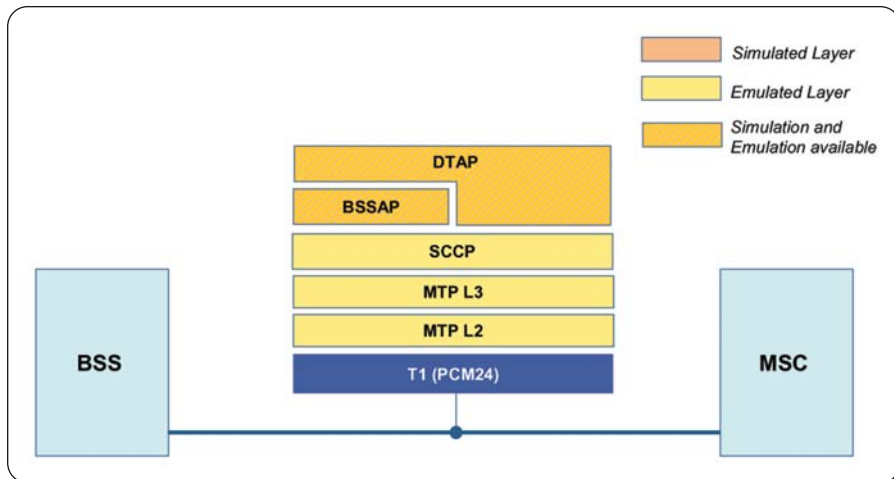
► Figure 8. CDMA2000 architecture diagram.

## A1 Interface

The A1 interface is the Interface between the BSS (Base Station Subsystem) and MSC (Mobile Switching Center) for the circuit-switched side of the CDMA2000 network, as shown in Figure 9.

## A1 Interface Test Capabilities

- Monitoring with advanced Filtering and Analysis applications
- Simulation with Message Building System (MBS) and Message Sequence Chart Tool – test case development and detail level testing
- Voice Channel Verification feature
- BSS and MSC Network Element Emulation for system level testing, supporting 240 subscribers



► Figure 9. A1 Interface testing diagram.

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## Features of MBS/MSC Test Suite for A1 Interface

A suite of predefined Test Cases is based on the MBS/MSC tool. These Test Cases are particularly useful for troubleshooting or detail-level testing since any equipment behavior can be simulated.

A Voice Path Verification feature ensures that B-channels are switched correctly.

The user may modify or add Test Cases as needed (message content as well as message sequence), using the MBS and MSC tools. The time needed for recompiling and reloading a test case is very short (<1 min).

## A10/A11 and P-H Interface

See Figures 10, 11, and 12.

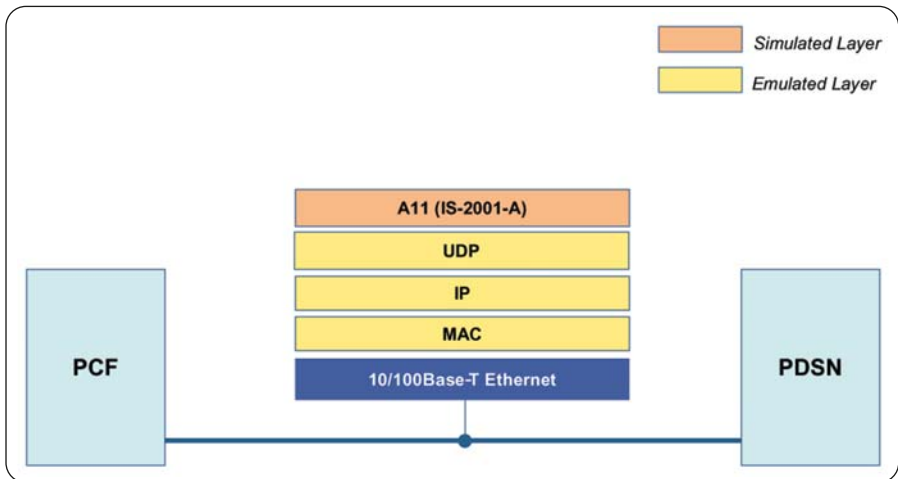
## ► Features of K1297-G20 Network Element Emulation for A1 Interface

### Network Element Emulation for A1 Interface

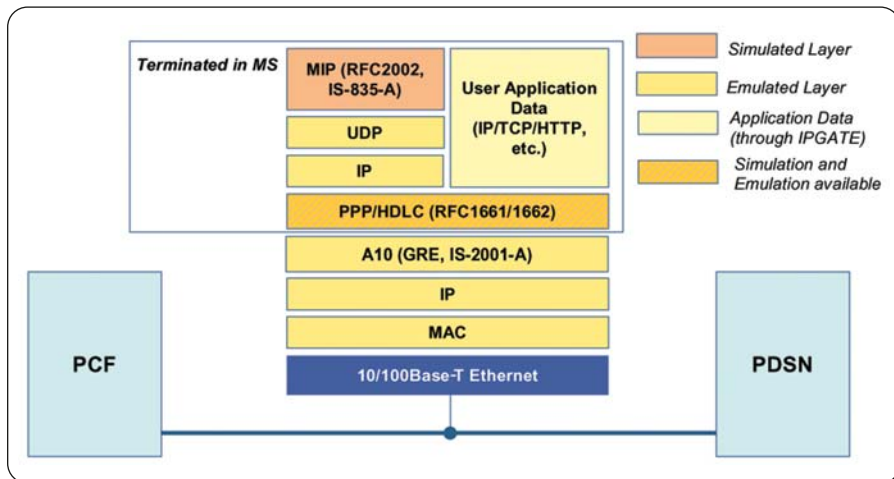
Emulated Equipment	BSS, MSC
Supported Procedures	Location Registration
	Mobile Originated Call (MOC)
	Mobile Terminated Call (MTC)
	Call Clearing (MO and MT)
Number of Subscribers	240

### MBS/MSC Test Suite for A1 Interface

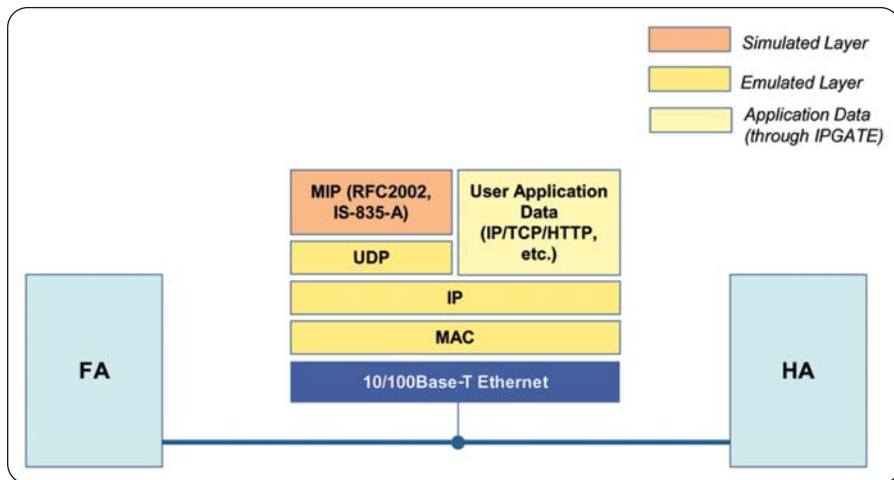
The following procedures are covered in the predefined test suite for testing the BSS and MSC side:	Location Registration
	Mobile Originated Call (MOC)
	Mobile Terminated Call (MTC)
	Call Clearing (MO and MT)
	Call Waiting
	Message Waiting Indication (MS Idle and in Traffic)
	SMS (MS Idle and in Traffic)
	Voice Path Verification



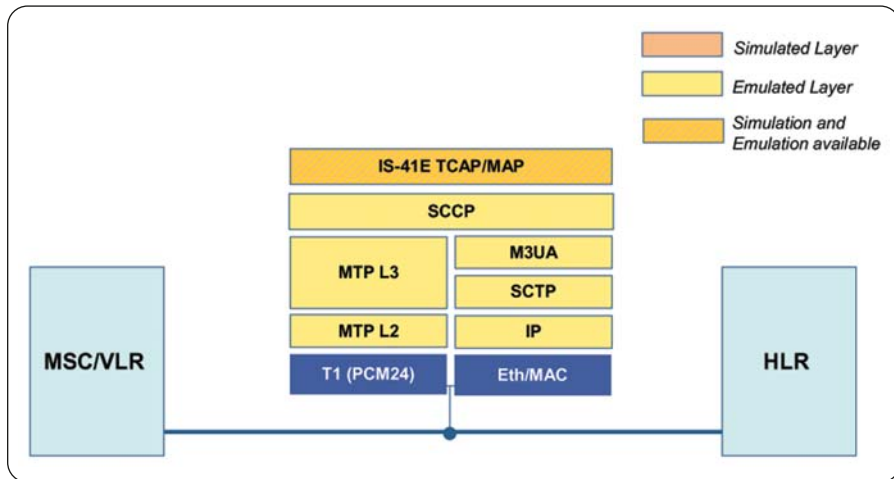
► Figure 10. A11 Interface testing diagram (Open R-P Control Plane).



► Figure 11. A10 Interface testing diagram (Open R-P Data Plane).



► Figure 12. P-H Interface testing diagram (Mobile IP).



► Figure 13. IS-41 Interface testing diagram.

## A10/A11 and P-H (Mobile IP) Interface Test Tools

- Monitoring with advanced Filtering and Analysis applications
- Simulation with Message Building System (MBS) and Message Sequence Chart Tool – test case development and detail level testing
- IP Gateway Emulation for feeding IP application data (Web browsing) into the A10 protocol stack
- IP Packet Generator/Comparator

## IS-41 Interface

See Figure 13.

## IS-41 Test Tools

- Monitoring with advanced Filtering and Analysis applications
- Simulation with Message Building System (MBS) and Message Sequence Chart Tool – test case development and detail level testing
- Support of WIN and Prepaid Services Protocols (IS-771, IS-826)
- HLR Network Element Emulation for system level testing

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## ► Ordering Information

### ► K12xx SW Configuration for A1 Interface Testing

	K1297-G20 MONITOR (Monitoring)	K1297-G20 (Monitoring, Simulation, Emulation)
SS7 Transport SW Package	7PK1221-6TN11	7PK1221-7TN11
SCCP Transport SW Package	7PK1221-6TC11	7PK1221-7TC11
CDMA SW Package	7PK1221-6MC11	7PK1221-7MC11
SMS SW Package	7PK1221-6MS11	7PK1221-7MS11
Handset (for voice channel verification)	–	7KK1200-5HS11
Network Element Emulation SW	–	7KK1223-8MC11

### ► K12xx SW Configuration for A8/A9, A10/A11 and P-H Interfaces

	K1297-G20 MONITOR (Monitoring)	K1297-G20 (Monitoring, Simulation, Emulation)
Data Transport SW Package	7PK1221-6TP11	7PK1221-7TP11
CDMA2000 SW Package	7PK1221-6DR11	7PK1221-7DR11
PPP SW Package	7PK1221-6PP11	7PK1221-7PP11
IP Application Protocol SW Package	7PK1221-6JJ11	7PK1221-6JJ11
IP Gateway Emulation/Packet Gen/Comp.	–	7KK1226-9GA11

### ► K12xx CDMA2000 RAN Multi-interface Calltrace

	K1297-G20 MONITOR (Monitoring)	K1297-G20 (Monitoring, Simulation, Emulation)
Calltrace A1, A10/A11	7PK1221-6KM11	7PK1221-6KM11

### ► K12xx SW Configuration for IS-41 Interfaces

	K1297-G20 MONITOR (Monitoring)	K1297-G20 (Monitoring, Simulation, Emulation)
<b>SS7 Based Stack</b>		
SS7 Transport SW Package	7PK1221-6TN11	7PK1221-7TN11
<b>IPS7 Stack</b>		
Data Transport SW Package	7PK1221-6TP11	7PK1221-7TP11
IPS7 SW Package	7PK1221-6JS11	7PK1221-7JS11
<b>SCCP Transport SW Package</b>		
SCCP Transport SW Package	7PK1221-6TC11	7PK1221-7TC11
CDMA SW Package	7PK1221-6MC11	7PK1221-7MC11
SMS SW Package	7PK1221-6MS11	7PK1221-7MS11

## ► cdmaOne and CDMA2000 Products and Standards Summary

	Monitoring	Simulation (MBS/MSC)	Network Element Emulation
<b>A1 Interface</b>			
IS-634B	7PK1221-6MC11	7PK1221-7MC11	7KK1223-8MC11
IOS-2.4	7PK1221-6MC11	7PK1221-7MC11	
IOS-3.1	7PK1221-6MC11	7PK1221-7MC11	7KK1223-8MC11
IOS-4.0	7PK1221-6MC11	7PK1221-7MC11	
IOS-4.1	7PK1221-6MC11	7PK1221-7MC11	
IOS-4.2	7PK1221-6MC11	7PK1221-7MC11	
IOS-4.3	7PK1221-6MC11	7PK1221-7MC11	
<b>SMS</b>			
IS-637	7PK1221-6MS11	7PK1221-7MS11	
<b>MAP/IN</b>			
IS-41C/D	7PK1221-6MC11	7PK1221-7MC11	
IS-41E	7PK1221-6MC11	7PK1221-7MC11	
IS-771 (Prepaid Services)	7PK1221-6MC11	7PK1221-7MC11	
IS-826 (Wireless IN)	7PK1221-6MC11	7PK1221-7MC11	
<b>IPS7</b>			
SCTP/M3UA (RFC2960/M3UA Draft V6)	7PK1221-6JS11	7PK1221-7JS11	7PK1221-7JS11
<b>Other CDMA2000 Interfaces</b>			
A9/A11 (Signaling BSC/PCF-PDSN) (105-4.0, 4.1, 4.2)	7PK1221-6DR11	7PK1221-7DR11	
A8/A10 (Data Plane BSC/PCF-PDSN) (105-4.0, 4.1, 4.2)	7PK1221-6DR11	7PK1221-7DR11	
A3/A7 (BSC-BSC Signaling Plane)	7PK1221-6DR11	7PK1221-7DR11	
P-H (PDSN/FA-HA)	7PK1221-6JJ11		
P1 (FA/HA-AAA)	7PK1221-6JJ11		

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