

Agilent Short Message Service Testing Using the E6702B cdma2000 Test Set

Application Note



Agilent Technologies

Table of Contents

| | |
|--|----|
| 1.0 Introduction | 3 |
| 2.0 SMS Overview | 3 |
| 2.1 SMS network model..... | 4 |
| 2.2 Mobile-terminated SMS versus mobile-originated SMS..... | 4 |
| 2.3 Standards relating to SMS..... | 4 |
| 3.0 Agilent Solution for SMS Tests | 5 |
| 3.1 Overview of the test set SMS capabilities | 5 |
| 3.2 Mobile-terminated SMS operation | 6 |
| 3.3 General procedure for mobile-terminated SMS tests | 7 |
| 3.4 Performing CDG Stage 2 mobile-terminated SMS tests..... | 15 |
| 3.5 Mobile-originated SMS operation | 16 |
| 3.6 General procedure for mobile-originated SMS tests..... | 17 |
| 3.7 Performing CDG Stage 2 mobile-originated SMS tests | 23 |
| 3.8 Example of SMS protocol logging via WPA | 24 |
| 4.0 Conclusion | 31 |
| Glossary | 31 |
| Related References | 31 |

1.0 Introduction

With the release of E6702B firmware, revision B.00.04 and above, the 8960 Series test set has the ability to simulate a short message service (SMS) system. This simulation capability allows the transmission of short messages to, or reception of short messages from, an intended mobile station, and the return of acknowledgements or error messages. This feature allows testing of a mobile station's SMS capabilities as specified in the CDG Stage 2 standard. All of the SMS test procedures as specified in the standard can be performed.

With the wireless protocol advisor (WPA) software, which runs on an external PC, you can log the protocol messages exchanged between the test set and your wireless devices under test during the SMS operation. The log results can help you collect and interpret protocol messages, verify wireless device functionality, and troubleshoot protocol problems.

This application note provides an overview of the SMS and explains the Agilent solutions for testing devices deploying mobile-terminated SMS and mobile-originated SMS.

2.0 SMS Overview

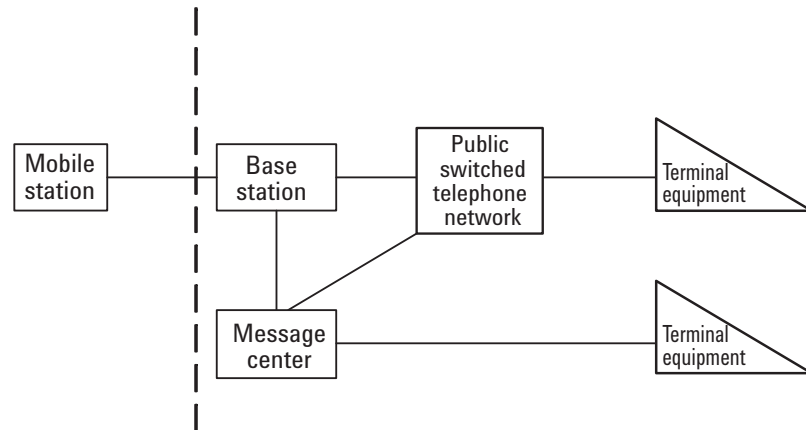
The Short Message Service (SMS) provides delivery of text and numeric information for functions such as paging, messaging, and voice mail notification. It allows the exchange of short messages between the wireless system and a mobile station (MS).

The SMS transmission capabilities provide for the transmission of short messages to or from an intended mobile station, and the return of acknowledgments and error messages. These messages and acknowledgments are transmitted to or from the mobile station whether it is idle or engaged in a voice or data call.

The wireless service provider may offer SMS transmission to its wireless voice and data customers only, or may provide an SMS-only service without additional voice or data transmission capabilities.

2.1 SMS network model

Figure 1 shows a simplified network reference model for SMS. This model presents functional entities and associated interface reference points that may logically comprise a wireless network.



Message center (MC): Represents a generic SMS message center function which provides end-to-end connectivity between the MS and the SMS system.

Base station (BS): Represents the CDMA system infrastructure. It contains base station transceiver, the mobile switching center (MSC) and any inter-working function (IWF) required for network connection.

Public switched telephone network (PSTN)

Terminal equipment (TE): Represents a voice or data equipment connected either directly or indirectly to the message center.

Figure 1. SMS network reference model

2.2 Mobile-terminated SMS vs. mobile-originated SMS

The CDMA system employs the data burst message (with BURST_TYPE set to 0x00011) to carry the SMS messages between the mobile station and the base station. Based on the SMS transmission direction, the SMS messages are divided into:

Mobile-terminated SMS: It is transmitted from the MC to the MS via paging channel or forward traffic channel. Both broadcast and point-to-point services are supported by the mobile-terminated SMS messages.

Mobile-originated SMS: It is transmitted from the MS to the MC via the access channel or reverse traffic channel. Only point-to-point service is available for the mobile-originated SMS messages.

2.3 Standards relating to SMS

The communication protocols used for exchanging short messages between the CDMA wireless system and the mobile stations are defined in the 3GPP2 C.S0015 (TIA/EIA-637-A) standard.

The CDG Stage 2 standard specifies the SMS test procedures and the performance requirements for the CDMA MS providing SMS capabilities.

3.0 Agile Solution for SMS Tests

As Figure 2 illustrates, the test set can simulate an SMS system by transmitting short messages to, or receiving short messages from, an intended MS, and providing the return of acknowledgments or error messages.

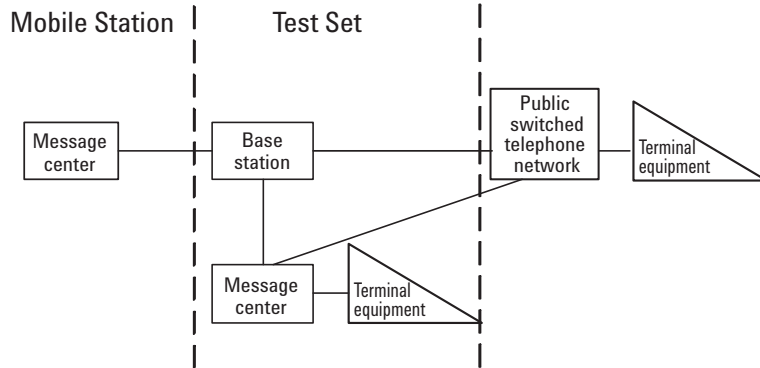


Figure 2. Test set SMS network reference model

3.1 Overview of the test set SMS capabilities

The test set supports:

- Mobile-terminated SMS operation (supporting both point-to-point and broadcast SMS)
- Mobile-originated SMS operation (supporting point-to-point SMS only)

NOTE: The test set does not guarantee the functionality of the simultaneous mobile-terminated and mobile-originated SMS messages, which may result in both messages not being properly handled or may result in one message being processed as normal and the other message not being properly handled.

All of the SMS tests as specified in the CDG Stage 2 standard (see Table 1) are supported by the test set. Using the wireless protocol advisor (WPA) software, which runs on an external PC, you can log the protocol messages exchanged between the test set and your wireless device under test (DUT) during the SMS operation. The log results can help you collect and interpret protocol messages, verify wireless device functionality, and troubleshoot protocol problems. See Section 3.8, “Example of Logging SMS Messages via WPA.”

Table 1. SMS tests specified in CDG Stage 2 Standard

| CDG Stage 2 Tests | Supported by E6702B |
|---|---------------------|
| 8.1 MS-Terminated SMS Tests | |
| 8.1.1 Paging Channel SMS Delivery Procedures | Yes |
| 8.1.2 SMS Delivery Procedures when Message Too Large for Paging Channel | Yes |
| 8.1.3 Traffic Channel SMS Delivery Procedures | Yes |
| 8.1.4 Delivery of Maximum Length Message | Yes |
| 8.1.5 Reserved | Yes |
| 8.1.6 SMS Delivery Error - MS Short Message Buffer Full | Yes |
| 8.1.7 Voice Mail Notification | Yes |
| 8.2 MS-Originated SMS Tests | |
| 8.2.1 Access Channel SMS Delivery | Yes |
| 8.2.2 SMS Delivery when Message too large for Access Channel | Yes |
| 8.2.3 Traffic Channel SMS Delivery | Yes |
| 8.2.4 Reserved | Yes |
| 8.2.5 Unknown Destination Address | Yes |
| 8.2.6 MS Originated SMS Disabled | Yes |
| 8.2.7 SMS Not Supported by Base Station | Yes |
| 8.3 Broadcast SMS Tests | |
| 8.3.1 Broadcast SMS Delivery | Yes |

3.2 Mobile-terminated SMS operation

The Mobile-terminated SMS is sent from the test set to the MS. This simulates sending short messages from the MC to the MS. Both point-to-point SMS and broadcast SMS messages can be sent from the test set to the MS either on the forward paging channel or over the forward traffic channel.

The test set supports sending SMS messages to the MS under configurations noted in Table 2.

Table 2. Different configurations for sending mobile-terminated SMS messages

| Method | Call status | Service option | Message type | Channel | Description |
|-----------------|-------------|---|------------------------------|--|--|
| Method 1 | Idle | Any value | Point-to-point and broadcast | F-PCH | An SMS message is sent to the MS on the F-PCH (forward paging channel) using a data burst message. No call is established in this process. |
| Method 2 | Idle | S06 or S014 | Point-to-point and broadcast | F-Traffic (for IS-95 system)/ F-FCH (for IS-2000 system) | A call is established. The SMS message is sent on the F-Traffic (forward traffic channel) (for IS-95 system) or F-FCH (forward fundamental channel) (for IS-2000 system) using a data burst message. Then the call is automatically terminated. |
| Method 3 | Connected | Any value other than S06 and S014 (for example, S01, S02, S03, S09, S033, etc.) | Point-to-point and broadcast | F-Traffic (for IS-95 system)/ F-FCH (for IS-2000 system) | An SMS message is sent to the MS on the F-Traffic (for IS-95 system) or F-FCH (for IS-2000 system) using a data burst message. The call remains connected after the message is sent. This simulates a user receiving a text message while having a conversation. |

3.3 General procedure for mobile-terminated SMS tests

NOTE: Standards specify that shorter messages are sent on the paging channel and longer messages are sent on the traffic channel. The test set does not support changing the channel based on the message length and will truncate the message to be sent to the MS as necessary for the current configuration.

This general procedure for mobile-terminated SMS tests

- Step 1: Set up the mobile-terminated SMS parameters
- Step 2: Create/Edit the mobile-terminated message contents
- Step 3: Send an SMS message to the MS using any of the following methods:
 - a: Send an SMS message while in idle state
 - b: Send an SMS message via a temporary SO6 or SO14 connection
 - c: Send an SMS message while in a voice or data call

Each of these procedures is described in detail below.

3.3.1 Step 1: Set up the mobile-terminated SMS parameters

1. Press the **Call Setup** key.
2. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
3. Press the **F5** (Short Message Service) key.
4. Press the **F2** (Mobile-Term SMS Parameters) key. The Mobile-Terminated SMS Parameters menu appears.

| SMS Control | |
|------------------------------|--|
| Send Message | |
| Mobile-Term SMS Parameters ▾ | |
| Mobile-Orig SMS Parameters ▾ | |
| Create/Edit Message | |
| Clear SMS Info/Status | |
| Close Menu | |

| Mobile-Terminated SMS Parameters | Value |
|----------------------------------|----------------|
| Service | Point To Point |
| Teleservice | Messaging |
| Service Category | Broadcast Emer |
| Originating Address | 5099214001 |
| Priority | Normal |
| Privacy | None |
| Voice Mail Count | 0 |
| MS Message Alert | Default |

NOTE: These settings determine the contents of the data burst message used for carrying SMS messages sent from the test set to the mobile station.

5. Set the parameters as desired. For example, set the **Service** to **Point To Point** for point-to-point SMS tests, or set the Service to Broadcast for broadcast SMS tests.
 - a. Turn the knob to highlight a parameter and then press the knob.
 - b. Enter a value or selection and press the knob.
6. Press the **F6** (Close Menu) key to go back to the SMS Control menu. The parameters you have set in step 5 are displayed in the Mobile-Terminated SMS Info window.

| Mobile-Terminated SMS Info | |
|----------------------------|----------------|
| Service: | Point to Point |
| Teleservice: | Messaging |
| Service Cat: | Broadcast Emer |
| Priority: | Normal |
| Privacy: | None |
| Voice Mail Count: | 0 |
| MS Message Alert: | Default |
| Msg Encoding: | 7-Bit ASCII |
| Message Length: | 0 |

3.3.2 Step 2: Create/Edit the mobile-terminated message contents

1. Press the **F4** (Create/Edit Message) key on the SMS Control menu. The Create/Edit menu appears.

| | |
|------------------------------|--------------------------------|
| SMS Control | |
| Send Message | |
| Mobile-Term SMS Parameters ▾ | |
| Mobile-Orig SMS Parameters ▾ | |
| Create/Edit Message | Create/Edit |
| Clear SMS Info/Status | Enter/Edit SMS ASCII Message ▾ |
| Return | Clear Message |
| 1 of 2 | Message Source ASCII |
| | Message Repeat 1 |

2. Press the **F3** (Message Source) key. You can select either ASCII or HEX data entry format.
3. (Optional) Press the **F2** (Clear Message) key, to clear the message contents currently in the Mobile-Terminated Message window.
4. Based on the setting of Message Source (**F3**) in step 2, the **F1** key is labeled as either **Enter/Edit SMS ASCII Message** or **Enter/Edit SMS Hex Message**. Press the **F1**. The Enter/Edit SMS Message menu for the selected message source appears.

| Call Setup Screen | | | |
|--------------------------------|---|--|---|
| Create/Edit | Short Message Service Information | | Call Parms |
| Enter/Edit SMS ASCII Message ▾ | Mobile-Terminated Message | Mobile-Originated Message | Cell 1 Power -55.00 dBm/1.23 MHz |
| Clear Message | | | Cell Band US PCS |
| Message Source ASCII | Mobile-Terminated SMS Info Service: Point to Point Teleservice: Messaging | Mobile-Originated SMS Info SMS Support: Enabled Message Count: 0 | Channel 525 |
| Message Repeat 1 | Enter/Edit SMS Message (ASCII) | | Protocol Rev 6 (IS-2000) |
| | Character Index | Value | Radio Config (Fud3, Rvs3) S03 (Voice) |
| | Data Entry Mode | Append | FCH Service Option Setup ▾ |
| | Edit (Clear To End, Backspace, Delete) | | |
| | A-Z | | |
| | a-z | | |
| | 0-9 | | |
| Close Menu | Other Characters | | |
| | Active Cell Idle | Sys Type: IS-2000 | |
| | IntRef | Logging: No Conn. | |
| | | | 1 of 4 |

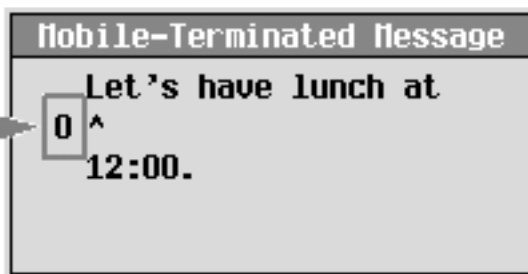
NOTE: The “<--” and the numeric keys on the DATA ENTRY field of the test set’s front panel have no effect on short message editing. All characters and editing commands are selected from the Enter/Edit SMS Message menu.

5. Enter/edit the message contents as desired. For example, send a message to the mobile station with the contents of “Let’s have lunch at 12:00.” Assuming ASCII is selected in the Message Source (F3).
 - a. Turn the knob to highlight the **A-Z** and then press the knob. Select the **L** and then **Done** by using the knob.
 - b. Turn the knob to highlight the **a-z** and then press the knob. Select the **e**, **t**, **s**, **space**, **h**, **a**, **v**, **e**, **space**, **l**, **u**, **n**, **c**, **h**, **space**, **a**, **t**, and then **Done** by using the knob.
 - c. Turn the knob to highlight the **0-9** and then press the knob. Select the **1**, **2**, **0**, **0**, **.** (period) and then **Done** by using the knob.
 - d. To insert the **:** (colon) between 2 and 0, turn and knob to highlight the **Character Index** and then press the knob. Turn the knob counterclockwise until the caret (^) is positioned at the 2 or current Character Index value is 20, then press the knob. Turn the knob to highlight the **Other Characters** and then press the knob. Select the **:** (colon) and then **Done** by using the knob.
 - e. To insert the **'** (apostrophe) between t and s, turn and knob to highlight the **Character Index** and then press the knob. Turn the knob counterclockwise until the caret (^) is positioned at the or current Character Index value is 2, then press the knob. Turn the knob to highlight the **Other Characters** and then press the knob. Select the **'** (apostrophe) and then **Done** by using the knob.
 - f. If you want to delete some characters due to wrong editing, highlight the **Edit Command** and then select **Delete** or **Backspace** command.

The contents you entered appear in the Mobile-Terminated Message window.

The Character Index is used to specify the position at which the character will be entered or edited. It starts from '0' indicating the first entered character and changed along with the editing.

The character index is used to specify the position at which the character will be entered or edited. It starts from '0', indicating the first entered character, and changes as edits are made.



6. Press the **F6** (Close Menu) key when you finish the message contents editing.
7. (Optional) If you want to send a long message, you can simply set the Message Repeat (F4) to repeat the message contents you’ve entered. You will notice that the Message Length in the Mobile-Terminated SMS Info window varies with the change of the Message Repeat (F4) setting. The repeats of the message contents are not shown in the Mobile-Terminated Message window.
8. Press the **F6** (Return) key to go back to the SMS Control menu. Now, you are ready to send a short message to the MS.

NOTE: The message length indicates the number of encoded characters in the SMS message to be sent to the MS. It represents the value of the NUM_FIELDS field of the user data sub-parameter. It is determined by the message encoding, message source, and message repeat. For example, the SMS message is in UNICODE message encoding and message source is in ASCII format, the number of characters entered in the Mobile-Terminated Message window is 26, the message length will be 13 if Message Repeat is 1 since two ASCII characters represent one UNICODE character. The message length will be 26 if Message Repeat is 2, and so on.

3.3.3 Step 3: Send an SMS message to the MS

You can send a short message to the MS via F-PCH or F-Traffic/F-FCH channel using one of three methods. The differences among these methods are described in Table 2.

Method 1: Sending an SMS message while in idle state

1. If you would like to log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, "Example of Logging SMS Messages via WPA."
2. Connect the MS to the test set.
3. Power on the MS and wait for the MS to perform a power up registration. You may need to set up the cell band, channel, or SID appropriate for the MS to ensure a successful registration. The MS information should appear in the Mobile Reported Information window after a successful registration. The current call status is Idle.

| Call Setup Screen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|---|-------------------|----------------------------|--|------------|------------|------------|--------------|------|---|------|--|-------|------------|-------------|---------|-------------------|---|--------------------|------------------|-------------|------------------|--------------------|-----------------|-----------------|---------|--------------------|-------------|-----------------|-----|----------------------|-----|-------------------------|---------|-------------------------|--|--------------|
| Call Control | Active Cell Operating Mode | | Call Params | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operating Mode | <table border="1"> <thead> <tr> <th colspan="2">Mobile Station Information</th> </tr> </thead> <tbody> <tr> <td>ESN (Hex):</td> <td>0x45FB38EC</td> </tr> <tr> <td>ESN (Dec):</td> <td>069-16464876</td> </tr> <tr> <td>MCC:</td> <td>0</td> </tr> <tr> <td>MNC:</td> <td></td> </tr> <tr> <td>MSIN:</td> <td>5099541530</td> </tr> <tr> <td>Slot Class:</td> <td>Slotted</td> </tr> <tr> <td>Slot Cycle Index:</td> <td>1</td> </tr> <tr> <td>Protocol Revision:</td> <td>6 (IS-2000_Rev0)</td> </tr> <tr> <td>Band Class:</td> <td>US Cell US PCS</td> </tr> <tr> <td>MS Operating Mode:</td> <td>DualMode CDMA</td> </tr> <tr> <td>Max EIRP (dBm):</td> <td>-7 -7</td> </tr> <tr> <td>Registration Type:</td> <td>Timer Based</td> </tr> <tr> <td>QPCH Supported:</td> <td>Yes</td> </tr> <tr> <td>Enhanced RC Support:</td> <td>Yes</td> </tr> <tr> <td>Min Power Control Step:</td> <td>Unknown</td> </tr> <tr> <td>MS Called Party Number:</td> <td></td> </tr> </tbody> </table> | | Mobile Station Information | | ESN (Hex): | 0x45FB38EC | ESN (Dec): | 069-16464876 | MCC: | 0 | MNC: | | MSIN: | 5099541530 | Slot Class: | Slotted | Slot Cycle Index: | 1 | Protocol Revision: | 6 (IS-2000_Rev0) | Band Class: | US Cell US PCS | MS Operating Mode: | DualMode CDMA | Max EIRP (dBm): | -7 -7 | Registration Type: | Timer Based | QPCH Supported: | Yes | Enhanced RC Support: | Yes | Min Power Control Step: | Unknown | MS Called Party Number: | | Cell 1 Power |
| Mobile Station Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Hex): | | | 0x45FB38EC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Dec): | | | 069-16464876 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MCC: | | | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MNC: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MSIN: | | | 5099541530 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Class: | | | Slotted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Cycle Index: | | | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protocol Revision: | | | 6 (IS-2000_Rev0) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Band Class: | US Cell US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Operating Mode: | DualMode CDMA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max EIRP (dBm): | -7 -7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Registration Type: | Timer Based | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QPCH Supported: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enhanced RC Support: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min Power Control Step: | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Called Party Number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active Cell | | | -55.00 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| System Type | | | dBm/1.23 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IS-2000 | | | Cell Band | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Originate Call | | | Channel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 525 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paging MMSI Setup ▾ | | | Protocol Rev | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 (IS-2000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Handoff Setup ▾ | | | Radio Config | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | (Fud3, Rvs3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Register Mobile | | | S03 (Voice) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | FCH Service Option Setup ▾ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Active Cell | Sys Type: IS-2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Idle | Logging: No Conn. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 of 3 | IntNet | L | 1 of 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

4. Send an SMS message you have created in 3.3.2 Step 2 to the MS.
 - a. Press the **Call Setup** key.
 - b. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
 - c. Press the **F5** (Short Message Service) key.
 - d. Press the **F1** (Send Message) key.

| Call Control | SMS Control |
|-----------------------|------------------------------|
| Protocol Logging | Send Message |
| Data Channel Info | Mobile-Term SMS Parameters ▾ |
| Ping | Mobile-Orig SMS Parameters ▾ |
| Short Message Service | Create/Edit Message |
| Paging Channel IER | Clear SMS Info/Status |
| 3 of 3 | |

5. The test set will wait for the acknowledgment from the MS. Observe the SMS Message Acknowledge Info window for the indications.

NOTE: If an SMS acknowledge message is received before the timeout period expires, the SMS status will change to MS Ack. Otherwise, an error message is generated and the SMS status will change to MS Not Acknowledged.

| SMS Message Acknowledge Info | |
|------------------------------|--------|
| Status: | MS Ack |
| MS Ack Cause Code: | ---- |

6. Observe the display on the MS to confirm that the message(s) were received.
7. If you are capturing a log, stop logging.

Method 2: Sending an SMS message via a temporary S06 or S014 connection

1. If you would like log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, "Example of Logging SMS Messages via WPA."
2. Connect the MS to the test set.
3. Power on the MS and wait for the MS to perform a power up registration. You may need to set up the cell band, channel, or SID appropriate for the MS to ensure a successful registration. The MS information should appear in the Mobile Reported Information window after a successful registration. The current call status is Idle.

4. Set the service option for the current selected radio configurations to SO6 or SO14.

| Call Setup Screen | | | |
|-------------------|--|-------------------|--------------|
| Call Control | Active Cell Operating Mode | | Call Params |
| Operating Node | Mobile Station Information ESN (Hex): 0x45FB3BEC ESN (Dec): 069-16464876 MCC: 0 MNC: MSIN: 5099541530 Slot Class: Slotted Slot Cycle Index: 1 Protocol Revision: 6 (IS-2000_Rev0) Band Class: US Cell US PCS MS Operating Mode: DualMode CDMA Max EIRP (dBm): -7 -7 Registration Type: Timer Based QPCH Supported: Yes Enhanced RC Support: Yes Min Power Control Step: Unknown MS Called Party Number: | | Cell 1 Power |
| Active Cell | | | -55.00 |
| System Type | | | dBm/1.23 MHz |
| IS-2000 | | | Cell Band |
| | | | US PCS |
| Originate Call | | | Channel |
| | | | 525 |
| Paging IMSI Setup | | | Protocol Rev |
| | | | 6 (IS-2000) |
| Handoff Setup | | | Radio Config |
| | (Fud3, Rvs3) | | |
| Register Mobile | S06 (SMS) | | |
| | FCH Service Option Setup | | |
| | Active Cell | Sys Type: IS-2000 | |
| | Idle | Logging: No Conn. | |
| 1 of 3 | IntRef | L | 1 of 4 |

5. Send an SMS message you have created in 3.3.2 Step 2 via a temporary SO6 or SO14 connection:
 - a. Press the **Call Setup** key.
 - b. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
 - c. Press the **F5** (Short Message Service) key.
 - d. Press the **More** key, to go to 2 of 2 of the SMS Control menu.
 - e. Press the **F3** (Originate Call) key.

| Call Control | SMS Control | SMS Control |
|-----------------------|----------------------------|----------------|
| Protocol Logging | Send Message | |
| Data Channel Info | Mobile-Term SMS Parameters | |
| Ping | Mobile-Orig SMS Parameters | Originate Call |
| Short Message Service | Create/Edit Message | |
| Paging Channel IER | Clear SMS Info/Status | |
| 3 of 3 | Return | |
| | 1 of 2 | 2 of 2 |

6. Observe the state changes of the SMS Status in the SMS Message Acknowledge Info window and the call status in the Active Cell field. You will notice that the SMS message is sent following a call establishment and the call is automatically disconnected when the test set receives the acknowledgment from the MS or after the period of approximately 15 seconds since the call connection.

- State changes in Active Cell field: Idle -> Paging -> Access Probe -> Connected -> Idle
- State changes in SMS Status: Idle -> Paging -> Sending -> Waiting -> MS Ack

| SMS Message Acknowledge Info | | |
|------------------------------|-------------|-------------------|
| Status: | MS Ack | |
| MS Ack Cause Code: | ---- | |
| | Active Cell | Sys Type: IS-2000 |
| | Idle | Logging: No Conn. |

7. Observe the display on the MS to confirm that the message(s) were received.

8. If you are capturing a log, stop logging.

Method 3: Sending an SMS message while in a voice or data call

1. If you would like to log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, *“Example of Logging SMS Messages via WPA.”*
2. Connect the MS to the test set.
3. Establish a voice or data call (for example, SO3). Verify that the call has established by checking for **Connected** in the Active Cell field.

| Call Setup Screen | | | |
|-------------------|----------------------------|-------------------|--------------------------|
| Call Control | Active Cell Operating Mode | | Call Params |
| Operating Mode | | | Cell 1 Power |
| Active Cell | | | -55.00 |
| | | | dBm/1.23 MHz |
| System Type | | | Cell Band |
| IS-2000 | | | US PCS |
| | | | Channel |
| End Call | | | 525 |
| | | | Protocol Rev |
| Paging INSI Setup | | | 6 (IS-2000) |
| | | | Radio Config |
| Handoff Setup | | | (Fud3, Rvs3) |
| | | | SO3 (Voice) |
| | | | FCH Service Option Setup |
| | Active Cell | Sys Type: IS-2000 | |
| | Connected | Logging: No Conn. | |
| 1 of 3 | IntRef | L | 1 of 4 |

4. Send an SMS message you have created in 3.3.2 Step 2 to the MS while in a call.
 - a. Press the **Call Setup** key.
 - b. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
 - c. Press the **F5** (Short Message Service) key.
 - d. Press the **F1** (Send Message) key.

| Call Control | SMS Control |
|-----------------------|------------------------------|
| Protocol Logging | Send Message |
| Data Channel Info | Mobile-Term SMS Parameters ▾ |
| Ping | Mobile-Orig SMS Parameters ▾ |
| Short Message Service | Create/Edit Message |
| Paging Channel IER | Clear SMS Info/Status |
| 3 of 3 | |

5. The test set will wait for the acknowledgment from the MS. Observe the SMS Message Acknowledge Info window for the indications. The call remains connected unless you disconnect the call.

NOTE: If an SMS acknowledge message is received before the timeout period expires, the SMS status will change to MS Ack. Otherwise, an error message is generated and the SMS status will change to MS Not Acknowledged.

| SMS Message Acknowledge Info | |
|------------------------------|-------------------|
| Status: | MS Ack |
| MS Ack Cause Code: | ---- |
| Active Cell Connected | Sys Type: IS-2000 |
| | Logging: No Conn. |

6. Observe the display on the MS to confirm that the message(s) were received.
7. If you are capturing a log, stop logging.

3.4 Performing CDG Stage 2 mobile-terminated SMS tests

All of the tests as specified in the CDG Stage 2 8.1 MS Terminated SMS Tests and 8.3 Broadcast SMS Tests can follow the general procedure described above. The special settings required for each test are listed in the Table 3.

Table 3: Specific configurations for CDG Stage 2 8.1 and 8.3 tests

| CDG Stage 2 Tests | Specific setting required for the test during the general procedure |
|--|---|
| 8.1 MS Terminated SMS Tests (for all 8.1x tests, set the Service to Point To Point use Step 1, substep 5 in Section 3.3.1) | |
| 8.1.1 Paging Channel SMS Delivery Procedures | Use Step 3, Method 1 in Section 3.3.3 to send the short message to the MS. |
| 8.1.2 SMS Delivery Procedures when Message Too Large for Paging Channel | Use Step 3, Method 2 in Section 3.3.3 to send the short message to the MS. NOTE: The test set does not support changing the channel based on the message length. You need to force the test set to send the short message to the MS over the traffic channel. |
| 8.1.3 Traffic Channel SMS Delivery Procedures | Use Step 3, Method 3 in Section 3.3.3 to send the short message to the MS. |
| 8.1.4 Delivery of Maximum Length Message | Use Step 3, Method 2 in Section 3.3.3 to send the short message to the MS. NOTE: The maximum length allowed is determined by many factors such as the protocol standards, the channel the message is sent on, message overhead, how many optional parameters are included, etc. If the desired message is truncated before being sent to the MS, the error message "SMS send message truncated due to protocol; <n> characters sent" (where n is the maximum length allowed), will be generated. |
| 8.1.5 Reserved | |
| 8.1.6 SMS Delivery Error – MS Short Message Buffer Full | Repeat the general procedure to send a number of short messages to the MS (typically 100 short messages) until "35 Destination resource shortage" appears on the MS Ack Cause Code of the SMS Message Acknowledge Info window. |
| 8.1.7 Voice Mail Notification | Use Step 1, substep 5 in Section 3.3.1 to: <ul style="list-style-type: none"> • set Service to Point To Point • set Teleservice to Voice Mail • set Voice Mail Count to 99 (for test 1) • set Voice Mail Count to 0 (for test 2) After the procedure, verify that the number of the voice mail messages shown on the MS screen is the number you have set above. |
| 8.3 Broadcast SMS Tests | |
| 8.3.1 Broadcast SMS Delivery | You can perform the tests first with the mobile station #1 which is configured to receive broadcast SMS, then do the same tests on mobile station #2 which is not configured to receive broadcast SMS. Use Step 1, substep 5 in Section 3.3.1 to: <ul style="list-style-type: none"> • set Service to Broadcast • set Priority to Normal (for test 1) • set Priority to Emergency (for test 2) Verify that both mobile stations shall display broadcast message (Emergency). Mobile station #1 shall display broadcast message (Normal) but mobile station #2 does not. All received broadcast messages shall be correct and complete. |

3.5 Mobile-originated SMS operation

The mobile-originated SMS operation is sent from a MS to the test set. This simulates sending short messages from the MS to the MC. You can send an SMS message from the MS to the test set via the reverse access channel or over the reverse traffic channel. The test set supports receiving SMS messages sent from the MS under the following configurations. See Table 4 for details.

Table 4: Different configurations for receiving mobile-originated SMS messages

| Method | Call status | Service option | Message type | Channel | Description |
|-----------------|-------------|---|----------------|---|--|
| Method 1 | Idle | Any value other than S06 and S014 (for example, S01, S02, S03, S09, S033, etc.) | Point-to-point | R-ACH | <ul style="list-style-type: none"> An SMS message is sent from the MS to the test set on the R-ACH (reverse access channel) via data burst message. No call is established in this process. If the message is too long for the R-ACH, the MS will attempt an S06 or S014 call to send an SMS message on the R-Traffic (reverse traffic channel) or R-FCH (reverse fundamental channel). The call will fail during service negotiation because the test set requires the MS to use the test set's service option setting. An error message appears for the error conditions |
| Method 2 | Idle | S06 or S014 | Point-to-point | R-ACH or R-Traffic (for IS-95 system)/ R-FCH (for IS-2000 system) | <ul style="list-style-type: none"> If the message length is shorter than what is allowed on R-ACH, the MS will send the message on R-ACH. No call is established in this process. Same as Method 1. If the message is too long for the R-ACH, the MS will attempt an S06 or S014 call to send an SMS message on the R-Traffic (reverse traffic channel) or R-FCH (reverse fundamental channel). |
| Method 3 | Connected | Any value other than S06 and S014 (for example, S01, S02, S03, S09, S033, etc.) | Point-to-point | R-Traffic (for IS-95 system)/ RFCH (for IS-2000 system) | Establish a voice or data call (other than S06/S014 connection). An SMS message is sent from the MS to the test set on the R-Traffic (reverse traffic channel) or R-FCH (reverse fundamental channel) via data burst message. The call remains connected when the MS has finished sending the SMS message unless you disconnect the call. |

3.6 General procedure for mobile-originated SMS tests

You can use any of the methods to send an SMS message from the MS to the test set. See Table 4 for the differences among these methods.

Method 1: Receiving an SMS message while in idle state (current service option is any service option other than SO6 or SO14.)

Method 2: Receiving an SMS message while in idle state (current service option is SO6 or SO14.)

Method 3: Receiving an SMS message while in a voice or data call.

3.6.1 Method 1: Receiving an SMS message while in idle state

Using this method, the current service option is any service option other than SO6 or SO14.

NOTE: The test set behaves differently with service option not set to SO6 and SO14 than with service option set to SO6 or SO14 when the MS attempts to send a long message. See the following step 9 in the procedure of "Method 2: Receiving an SMS message while in idle state (current service option is SO6 or SO14)."

1. If you would like to log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, "Example of Logging SMS Messages via WPA."
2. Connect the MS to the test set.
3. Power on the MS and wait for the MS to perform a power up registration. You may need to set up the cell band, channel, or SID appropriate for the MS to ensure a successful registration. The MS information should appear in the Mobile Reported Information window after a successful registration. Make sure the current call status is idle and the current service option is not set to SO6 or SO14.

| Call Setup Screen | | | |
|-------------------|----------------------------|-------------------|--------------------------|
| Call Control | Active Cell Operating Mode | | Call Params |
| Operating Mode | | | Cell 1 Power |
| Active Cell | | | -55.00 |
| | | | dBm/1.23 MHz |
| System Type | Mobile Station Information | | Cell Band |
| IS-2000 | ESN (Hex): | 0x45FB3BEC | US PCS |
| | ESN (Dec): | 069-16464876 | |
| | NCC: | 0 | Channel |
| | NMC: | | 525 |
| Originate Call | MSIN: | 5089541530 | Protocol Rev |
| | Slot Class: | Slotted | 6 (IS-2000) |
| | Slot Cycle Index: | 1 | |
| Paging INSI Setup | Protocol Revision: | 6 (IS-2000_Rev0) | |
| | Band Class: | US Cell US PCS | Radio Config |
| | MS Operating Mode: | DualMode CDMA | (Fud3, Rus3) |
| | Max EIRP (dBW): | -7 -7 | SO3 (Voice) |
| Handoff Setup | Registration Type: | | FCH Service Option Setup |
| | QPCH Supported: | Yes | |
| | Enhanced RC Support: | Yes | |
| | Min Power Control Step: | Unknown | |
| Register Mobile | MS Called Party Number: | | |
| | | | |
| | Active Cell | Sys Type: IS-2000 | |
| | Idle | Logging: No Conn. | |
| 1 of 3 | IntRef | L | 1 of 4 |

4. Press the **Call Setup** key.
5. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
6. Press the **F5** (Short Message Service) key. The Short Message Service Information screen appears.

7. (Optional) Press the **F3** (Mobile-Orig SMS Parameters) key, set the parameters as desired. (For example, to perform the CDG Stage 2 8.2.6 test, you need to set the **SMS Support** to **Disabled**.)

NOTE: When the SMS support is set to any value other than **Enabled**, the test set will still process the received SMS message (same as Enabled), but post an error message associated with the setting of SMS support when an SMS message is received. It is provided to support some of the CDG Stage 2 8.2 tests. **Enabled** indicates that the test set provides reception and confirmation to the MS. **Disabled** indicates that the reception is denied by the test set. It is useful for CDG Stage 2 8.2.6 tests. **Not Supported** indicates that SMS is not supported by the test set. It is useful for CDG Stage 2 8.2.7 tests. **Unknown Destination Address** indicates that the destination address is unknown to the test set. It is useful for CDG Stage 2 8.2.5 tests.

| Call Control |
|-----------------------|
| Protocol Logging |
| Data Channel Info |
| Ping |
| Short Message Service |
| Paging Channel IER |
| 3 of 3 |

| SMS Control |
|------------------------------|
| Send Message |
| Mobile-Term SMS Parameters ▾ |
| Mobile-Orig SMS Parameters ▾ |
| Create/Edit Message |
| Clear SMS Info/Status |
| Return |
| 1 of 2 |

| Mobile-Originated SMS Parameters | Value |
|------------------------------------|----------------|
| SMS Support | Enabled |
| Row Index | 0 |
| Display Format (Message/Addresses) | Auto |
| SMS Call Drop Timer | On |
| | |
| | |
| | |

- a. Turn the knob to highlight a parameter and then press the knob.
 - b. Enter a value or selection and press the knob.
 - c. Press the **F6** (Close Menu) key to go back to the SMS Control menu.
8. (Optional) To clear the last received SMS message, press the **F5** (Clear SMS Info/Status) key.
9. From the MS, send an SMS message to any address. This step depends upon the MS implementation. If the MS supports automatically selecting a channel to transmit the SMS message based on the message length.
- a. the MS will send the message on the R-ACH (reverse access channel) if the message length is allowed for the R-ACH. No call is established in this process. Or,
 - b. the MS will attempt to originate an SO6 or SO14 call and send the message on the reverse traffic channel if the message length is longer than what is allowed for the R-ACH. If it does so while the test set service option is other than SO6 or SO14, however, service negotiation between the test set and the MS will fail, the call will not be completed, and an error message will be generated. Use Section 3.6.2, "Method 2: Receiving an SMS message while in idle state," (current service option is SO6 or SO14) to send a long message.

- Observe the SMS Message Acknowledge Info window for indications that the test set has received the message. Observe the Mobile-Originated Message window for the received message contents. Observe the Mobile-Originated SMS Info window for the parameters included in the received message.

| Call Setup Screen | | | |
|------------------------------|---|---|--|
| SMS Control | Short Message Service Information | | Call Parms |
| Send Message | Mobile-Terminated Message Let's have lunch at 0 ^ 12:00. | Mobile-Originated Message What's up? | Cell 1 Power -55.00 dBm/1.23 MHz |
| Mobile-Term SMS Parameters ▾ | | | Cell Band US PCS |
| Mobile-Orig SMS Parameters ▾ | Mobile-Terminated SMS Info Service: Point to Point Teleservice: Messaging Service Cat: Broadcast Emer Priority: Normal Privacy: None Voice Mail Count: 0 MS Message Alert: Default MSg Encoding: 7-Bit ASCII Message Length: 26 | Mobile-Originated SMS Info SMS Support: Enabled Message Count: 2 Teleservice: Messaging Dest Addr: 123 Dest Addr Encod: 4-Bit DTMF Priority: Call-Back Num: Call-Back Encod: 4-Bit DTMF MSg Encoding: 7-Bit ASCII Message Length: 10 | Channel 525 |
| Create/Edit Message | | | Protocol Rev 6 (IS-2000) |
| Clear SMS Info/Status | | | Radio Config (Fud3, Rvs3) 903 (Voice) |
| Return | SMS Message Acknowledge Info Status: Received MS Ack Cause Code: ---- | | FCH Service Option Setup ▾ |
| | Active Cell Idle | Sys Type: IS-2000 Logging: No Conn. | |
| 1 of 2 | IntRef | L | 1 of 4 |

NOTE: If Auto is selected in the Display Format (Message/ Addresses), the test set depends upon the message encoding of the received SMS message to determine the display format of the Mobile-Originated Message window. If 7-bit ASCII, IA5, or GSM 7-bit default alphabet is shown in the **Msg Encoding** of the Mobile-Originated SMS Info window, ASCII mode is used. Otherwise, the Hex mode is used. The display format for the **Call-Back Num** and the **Dest Addr** in the Mobile-Originated SMS Info window is always in ASCII format when Auto is selected in the **Display Format** (Message/ Addresses).

- (Optional) If you want to scroll the display for viewing the long messages in the Mobile-Originated Message window, or change the display format (ASCII or Hex) for the received message contents in the Mobile-Originated Message window, as well as the call-back number (Call-Back Num) and the destination address (Dest Addr) in the Mobile-Originated SMS Info window, follow the procedure in Step 7 and set the **Row Index** and the **Display Format** (Message/Addresses).
- If you are capturing a log, stop logging.

3.6.2 Method 2: Receiving an SMS message while in idle state (current service option is SO6 or SO14)

1. If you would like to log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, *“Example of Logging SMS Messages via WPA.”*
2. Connect the MS to the test set.
3. Power on the MS and wait for the MS to perform a power up registration. You may need to set up the cell band, channel, or SID appropriate for the MS to ensure a successful registration. The MS information should appear in the Mobile Reported Information window after a successful registration. Make sure the current service option is set to **SO6** and **SO14**.

| Call Setup Screen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|---|-------------------|----------------------------|--|------------|------------|------------|--------------|------|---|------|--|-------|------------|-------------|---------|-------------------|---|--------------------|------------------|-------------|------------------|--------------------|-----------------|-----------------|---------|--------------------|-------------|-----------------|-----|----------------------|-----|-------------------------|---------|-------------------------|--|------------------------|
| Call Control | Active Cell Operating Mode | | Call Params | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operating Mode | Active Cell | | Cell 1 Power | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active Cell | <table border="1"> <thead> <tr> <th colspan="2">Mobile Station Information</th> </tr> </thead> <tbody> <tr> <td>ESN (Hex):</td> <td>0x45FB3BEC</td> </tr> <tr> <td>ESN (Dec):</td> <td>069-16464876</td> </tr> <tr> <td>NCC:</td> <td>0</td> </tr> <tr> <td>NNC:</td> <td></td> </tr> <tr> <td>MSIN:</td> <td>5099541530</td> </tr> <tr> <td>Slot Class:</td> <td>Slotted</td> </tr> <tr> <td>Slot Cycle Index:</td> <td>1</td> </tr> <tr> <td>Protocol Revision:</td> <td>6 (IS-2000_Rev0)</td> </tr> <tr> <td>Band Class:</td> <td>US Cell US PCS</td> </tr> <tr> <td>MS Operating Mode:</td> <td>DualMode CDMA</td> </tr> <tr> <td>Max EIRP (dBm):</td> <td>-7 -7</td> </tr> <tr> <td>Registration Type:</td> <td>Timer Based</td> </tr> <tr> <td>QPCH Supported:</td> <td>Yes</td> </tr> <tr> <td>Enhanced RC Support:</td> <td>Yes</td> </tr> <tr> <td>Min Power Control Step:</td> <td>Unknown</td> </tr> <tr> <td>MS Called Party Number:</td> <td></td> </tr> </tbody> </table> | | Mobile Station Information | | ESN (Hex): | 0x45FB3BEC | ESN (Dec): | 069-16464876 | NCC: | 0 | NNC: | | MSIN: | 5099541530 | Slot Class: | Slotted | Slot Cycle Index: | 1 | Protocol Revision: | 6 (IS-2000_Rev0) | Band Class: | US Cell US PCS | MS Operating Mode: | DualMode CDMA | Max EIRP (dBm): | -7 -7 | Registration Type: | Timer Based | QPCH Supported: | Yes | Enhanced RC Support: | Yes | Min Power Control Step: | Unknown | MS Called Party Number: | | -55.00 dBm/1.23 MHz |
| Mobile Station Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Hex): | 0x45FB3BEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Dec): | 069-16464876 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NCC: | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NNC: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MSIN: | 5099541530 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Class: | Slotted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Cycle Index: | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protocol Revision: | 6 (IS-2000_Rev0) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Band Class: | US Cell US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Operating Mode: | DualMode CDMA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max EIRP (dBm): | -7 -7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Registration Type: | Timer Based | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QPCH Supported: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enhanced RC Support: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min Power Control Step: | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Called Party Number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| System Type | IS-2000 | | Cell Band | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IS-2000 | | | US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Originate Call | | | Channel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 525 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paging INSI Setup | | | Protocol Rev | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 (IS-2000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Handoff Setup | | | Radio Config | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | (Fud3, Rus3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Register Mobile | | | SO6 (SIS) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | FCH Service Option Setup | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Active Cell | Sys Type: IS-2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Idle | Logging: No Conn. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 of 3 | IntRef | L | 1 of 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

4. Pressing the **Call Setup** key.
5. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
6. Press the **F5** (Short Message Service) key. The Short Message Service Information screen appears.
7. (Optional) Set up the **Mobile-Orig SMS Parameters** as desired. See Section 3.6.1, Step 7 of *“Method 1: Receiving an SMS message while in idle state,”* (current service option is any service option other than SO6/SO14).
8. (Optional) To clear the last received SMS message, press the **F5** (Clear SMS Info/Status) key.

9. From the MS, send an SMS message with any address to the test set. This step depends upon the MS implementation. If the MS supports automatically selecting a channel to transmit the SMS message based on the message length, the message is sent:
 - a. using the R-ACH (reverse access channel) if the message length is allowed by the R-ACH. No call is established in this process. Same as Section 3.6.1, “Method 1: Receiving an SMS message while in idle state,” (current service option is any service option other than SO6/SO14). Or,
 - b. using the R-Traffic (reverse traffic channel) if the message length is longer than what is allowed by the R-ACH. An SO6 or SO14 connection is established during the SMS sending. The call is then automatically disconnected when the message is sent.
10. Observe the SMS Message Acknowledge Info window for indications that the test set has received the message. Observe the Mobile-Originated Message window for the received message contents. Observe the Mobile-Originated SMS Info window for the parameters included in the received message.

NOTE: Standards specify that the shorter messages are sent on the R-ACH (Reverse Access Channel) and the longer messages are sent on the reverse traffic channel while in SO6 or SO14 service option.

| Call Setup Screen | | | |
|------------------------------|--|--|--|
| SMS Control | Short Message Service Information | | Call Parms |
| Send Message | Mobile-Terminated Message Let's have lunch at 0 ^ 12:00. | Mobile-Originated Message I'll be there in 15m | Cell 1 Power -55.00 dBm/1.23 MHz |
| Mobile-Term SMS Parameters ▾ | | | Cell Band US PCS |
| Mobile-Orig SMS Parameters ▾ | Mobile-Terminated SMS Info Service: Point to Point Teleservice: Messaging Service Cat: Broadcast Emer | Mobile-Originated SMS Info SMS Support: Enabled Message Count: 3 Teleservice: Messaging Dest Addr: 11 Dest Addr Encod: 4-Bit DTMF Priority: Call-Back Num: Call-Back Encod: 4-Bit DTMF Msg Encoding: 7-Bit ASCII Message Length: 20 | Channel 525 |
| Create/Edit Message | Priority: Normal Privacy: None Voice Mail Count: 0 MS Message Alert: Default Msg Encoding: 7-Bit ASCII Message Length: 26 | | Protocol Rev 6 (IS-2000) |
| Clear SMS Info/Status | SMS Message Acknowledge Info Status: <input type="text" value="Received"/> MS Ack Cause Code: ---- | | Radio Config (Fud3, Rvs3) SO6 (SMS) |
| Return | Active Cell Idle | | FCH Service Option Setup ▾ |
| | | Sys Type: IS-2000 Logging: No Conn. | |
| 1 of 2 | IntRef | L | 1 of 4 |

11. (Optional) Set up the **Mobile-Orig SMS Parameters** as desired. See Section 3.6.1, Step 11 of “Method 1: Receiving an SMS message while in idle state,” (current service option is any service option other than SO6/SO14).
12. If you are capturing a log, stop logging.

3.6.3 Method 3: Receiving an SMS message while in a voice or data call.

1. If you would like to log the protocol messages exchanged between the test set and the MS, set up the WPA and start logging. See Section 3.8, *“Example of Logging SMS Messages via WPA.”*
2. Connect the MS to the test set.
3. Establish a voice or data call (for example, SO3). Verify that the call has established by checking for **Connected** in the **Active Cell** field.

| Call Setup Screen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|--|-------------------|----------------------------|--|------------|------------|------------|--------------|------|---|------|--|-------|------------|-------------|---------|-------------------|---|--------------------|------------------|-------------|------------------|--------------------|-----------------|-----------------|---------|--------------------|--|-----------------|-----|----------------------|-----|-------------------------|---------|-------------------------|--|--------|
| Call Control | Active Cell Operating Mode | | Call Parm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operating Mode | Active Cell | | Cell 1 Power | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Active Cell | <table border="1"> <thead> <tr> <th colspan="2">Mobile Station Information</th> </tr> </thead> <tbody> <tr> <td>ESN (Hex):</td> <td>0x45FB3BEC</td> </tr> <tr> <td>ESN (Dec):</td> <td>069-16464876</td> </tr> <tr> <td>NCC:</td> <td>0</td> </tr> <tr> <td>NNC:</td> <td></td> </tr> <tr> <td>MSIN:</td> <td>5099541530</td> </tr> <tr> <td>Slot Class:</td> <td>Slotted</td> </tr> <tr> <td>Slot Cycle Index:</td> <td>1</td> </tr> <tr> <td>Protocol Revision:</td> <td>6 (IS-2000_Rev0)</td> </tr> <tr> <td>Band Class:</td> <td>US Cell US PCS</td> </tr> <tr> <td>MS Operating Mode:</td> <td>DualMode CDMA</td> </tr> <tr> <td>Max EIRP (dBm):</td> <td>-7 -7</td> </tr> <tr> <td>Registration Type:</td> <td></td> </tr> <tr> <td>QPCH Supported:</td> <td>Yes</td> </tr> <tr> <td>Enhanced RC Support:</td> <td>Yes</td> </tr> <tr> <td>Min Power Control Step:</td> <td>Unknown</td> </tr> <tr> <td>MS Called Party Number:</td> <td></td> </tr> </tbody> </table> | | Mobile Station Information | | ESN (Hex): | 0x45FB3BEC | ESN (Dec): | 069-16464876 | NCC: | 0 | NNC: | | MSIN: | 5099541530 | Slot Class: | Slotted | Slot Cycle Index: | 1 | Protocol Revision: | 6 (IS-2000_Rev0) | Band Class: | US Cell US PCS | MS Operating Mode: | DualMode CDMA | Max EIRP (dBm): | -7 -7 | Registration Type: | | QPCH Supported: | Yes | Enhanced RC Support: | Yes | Min Power Control Step: | Unknown | MS Called Party Number: | | -55.00 |
| Mobile Station Information | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Hex): | 0x45FB3BEC | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ESN (Dec): | 069-16464876 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NCC: | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NNC: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MSIN: | 5099541530 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Class: | Slotted | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Slot Cycle Index: | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Protocol Revision: | 6 (IS-2000_Rev0) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Band Class: | US Cell US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Operating Mode: | DualMode CDMA | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Max EIRP (dBm): | -7 -7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Registration Type: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QPCH Supported: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Enhanced RC Support: | Yes | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Min Power Control Step: | Unknown | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| MS Called Party Number: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| System Type | IS-2000 | | dBm/1.23 MHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| IS-2000 | | | Cell Band | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | US PCS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| End Call | | | Channel | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 525 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paging INSI Setup | | | Protocol Rev | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 (IS-2000) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Handoff Setup | | | Radio Config | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | (Fud3, Rvs3) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | SO3 (Voice) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | FCH Service Option Setup | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Active Cell | Sys Type: IS-2000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Connected | Logging: No Conn. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 of 3 | IntRef | L | 1 of 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

4. Pressing the **Call Setup** key.
5. Press the **More** key on the lower left side of the test set two times until *3 of 3* of the Call Control menu is displayed.
6. Press the **F5** (Short Message Service) key. The Short Message Service Information screen appears.
7. (Optional) Set up the **Mobile-Orig SMS Parameters** as desired. See Section 3.6.1, Step 7 of *“Method 1: Receiving an SMS message while in idle state,”* (current service option is any service option other than SO6/SO14).
8. (Optional) To clear the last received SMS message, press the **F5** (Clear SMS Info/Status) key.
9. (Optional) From the MS, send an SMS message with any address to the test set. This step depends upon the MS implementation.

- Observe the SMS Message Acknowledge Info window for indications that the test set has received the message. Observe the Mobile-Originated Message window for the received message contents. Observe the Mobile-Originated SMS Info window for the parameters included in the received message. The call remains connected unless you disconnect the call.

| Call Setup Screen | | | |
|----------------------------|---|--|---|
| SMS Control | Short Message Service Information | | Call Parms |
| Send Message | Mobile-Terminated Message Let.'s have lunch at 12:00. 25 ^ | Mobile-Originated Message Call me | Cell 1 Power -55.00 dBm/1.23 MHz |
| Mobile-Term SMS Parameters | | | Cell Band US PCS |
| Mobile-Orig SMS Parameters | Mobile-Terminated SMS Info Service: Point to Point Teleservice: Messaging Service Cat: Broadcast Emer Orig Addr: 5099214001 Priority: Normal Privacy: None Voice Mail Count: 0 MS Message Alert: Default Msg Encoding: 7-Bit ASCII Message Length: 26 | Mobile-Originated SMS Info SMS Support: Enabled Message Count: 1 Teleservice: Messaging Dest Addr: 1235 Dest Addr Encod: 4-Bit DTMF Priority: Call-Back Num: Call-Back Encod: 4-Bit DTMF Msg Encoding: 7-Bit ASCII Message Length: 7 | Channel 525 |
| Create/Edit Message | | | Protocol Rev 6 (IS-2000) |
| Clear SMS Info/Status | | | Radio Config (Fud3, Rvs3) S03 (Voice) |
| Return | SMS Message Acknowledge Info Status: Received MS Ack Cause Code: | | FCH Service Option Setup |
| | Active Cell Connected | Sys Type: IS-2000 Logging: No Conn. | |
| 1 of 2 | IntRef | L | Help |
| | | | 1 of 4 |

- (Optional) Set up the **Mobile-Orig SMS Parameters** as desired. See Section 3.6.1, Step 11 of *Method 1: Receiving an SMS message while in idle state,* (current service option is any service option other than S06/S014).
- If you are capturing a log, stop logging.

3.7 Performing CDG Stage 2 Mobile-Originated SMS Tests

All of the tests as specified in the CDG Stage 2 8.2 MS Originated SMS Tests can follow the general procedure explained above. The specific configurations required for each test are listed in the Table 5.

Table 5: Specific configurations for CDG Stage 2 8.2 tests

| CDG Stage 2 Tests | Specific setting required for the test during the general procedure |
|---|---|
| 8.2 MS Originated SMS Tests | |
| 8.2.1 Access Channel SMS Delivery | Refer to Section 3.6.1, Method 1 to send the short message from the MS to the test set |
| 8.2.2 SMS Delivery when Message too large for Access Channel | Refer to Section 3.6.1, Method 1 to attempt to send a long message from the mobile station to the test set and expect the error "CDMA call processing error; service option and radio configuration change failed due to MS messaging" prompted by the test set. Then try to use Section 3.6.2, Method 2 to send this long message and make sure that the message is successfully received by the test set. |
| 8.2.3 Traffic Channel SMS Delivery | Refer to Section 3.6.3, Method 3 to send the short message from the MS to the test set |
| 8.2.4 Reserved | |
| 8.2.5 Unknown Destination Address | Use any method. In Step 7, follow the procedure "Mobile-originated SMS operation" to: • set SMS support to Unknown Dest |
| 8.2.6 MS Originated SMS Disabled | Use any method. In Step 7, follow the procedure "Mobile-originated SMS operation" to: • set SMS support to Disabled |
| 8.2.7 SMS Not Supported by Base Station | Use any method. In Step 7, follow the procedure "Mobile-originated SMS operation" to: • set SMS support to Not Supported |

3.8 Example of Logging SMS Messages via WPA

You can use the WPA to log the messages exchanged between the test set and the mobile station during SMS procedures. The captured log allows you to determine exactly what is being exchanged between the test set and the mobile station and which channel is being used to carry the SMS messages. You can look in the decode details of the captured message to verify all the parameters associated with that message.

The following example is to demonstrate how to set up the WPA for SMS Logging. Two SMS messages, a point-to-point SMS message and a broadcast SMS message, are sent from the test set to the mobile station. Two traffic overviews are set up in the WPA. One of the traffic overviews is for displaying the point-to-point SMS message decoding information and another is for displaying the broadcast SMS message decoding information.

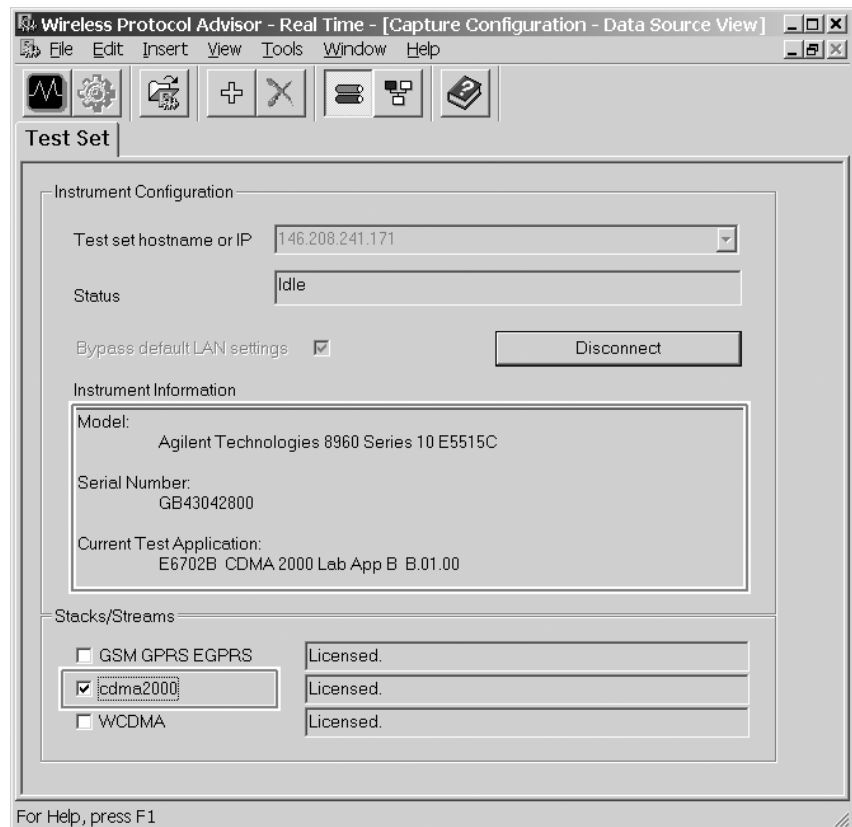
The general procedure for logging SMS messages are:

NOTE: For details on the numerous features and capabilities of the WPA software, refer to the software online help.

1. Connect the WPA to the test set.
2. Set up the WPA.
3. Start the logging.
4. Send mobile-terminated SMS messages (from the test set to mobile station) or mobile-originated SMS messages (from the mobile station to the test set). If desired, repeat the procedure to send several SMS messages.
5. Stop the logging.
6. Analyze the message log.

3.8.1 Connect the WPA to the test set

Start the WPA in real time mode. Enter the test set IP address appropriately assigned, then click **Connect**. If WPA was configured before, WPA automatically tries to connect with the test set. The test set information is displayed after a successful connection. Make sure the **cdma2000** is checked on the Stacks/Streams field.

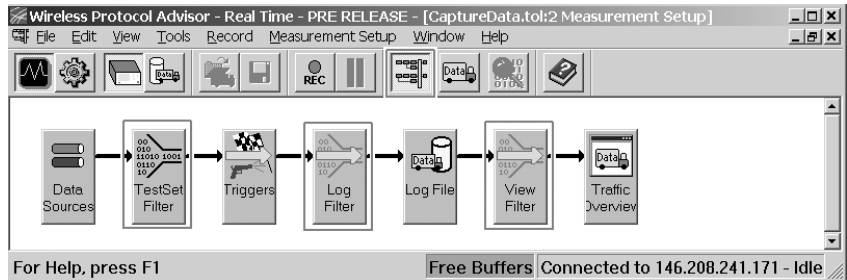


3.8.2 Set up the WPA

You can set up the WPA to capture and display as much or little information as you want. In this example, the logging filter is defined to capture only data burst message for SMS. Two view filters are specified. One of the view filters is configured to only display the point-to-point SMS messages and another is configured to display the broadcast SMS messages.

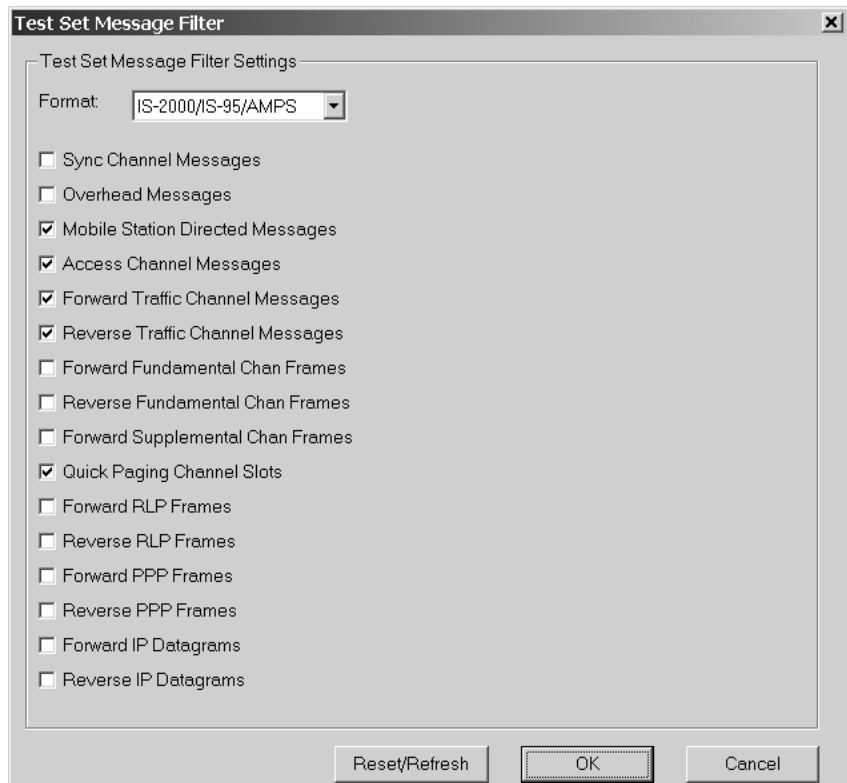
Accessing filters

All filters are accessed from the Measurement Setup view by clicking the **Measurement Setup View** button on the menu bar. Then double click the filter icon (for example, Log Filter, View Filter, etc.) to bring up the corresponding filter editor that you want to set up.



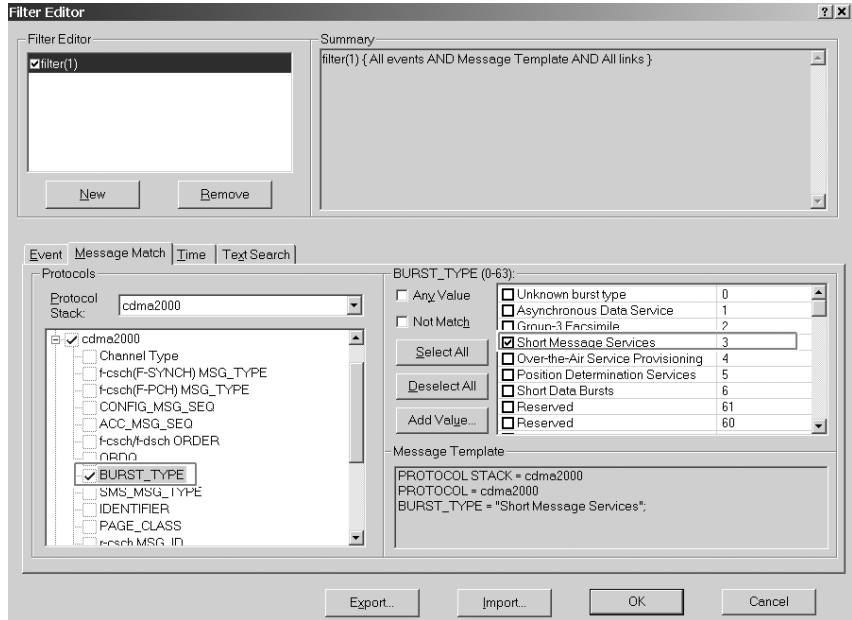
Test set message filter setup

The test set filter is useful for limiting the amount of data sent over the LAN connecting the test set and the WPA. To access the test set message filter, Press **TestSet Filter**, you can keep the default settings to log the messages related with SMS.



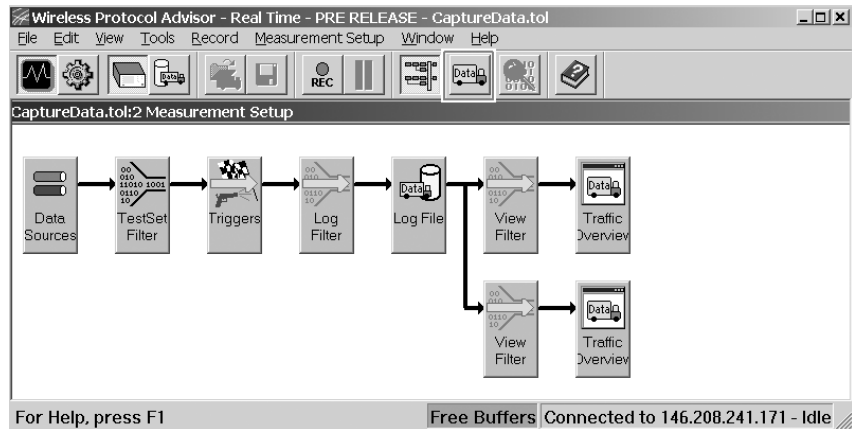
Log filter setup

The log filter is useful for limiting what messages get captured in your log. In this example, we are using the log filter to limit the captured log to only contain data burst messages for SMS. To access the log filter editor, press **Log Filter**. Set up the log filter as shown below.

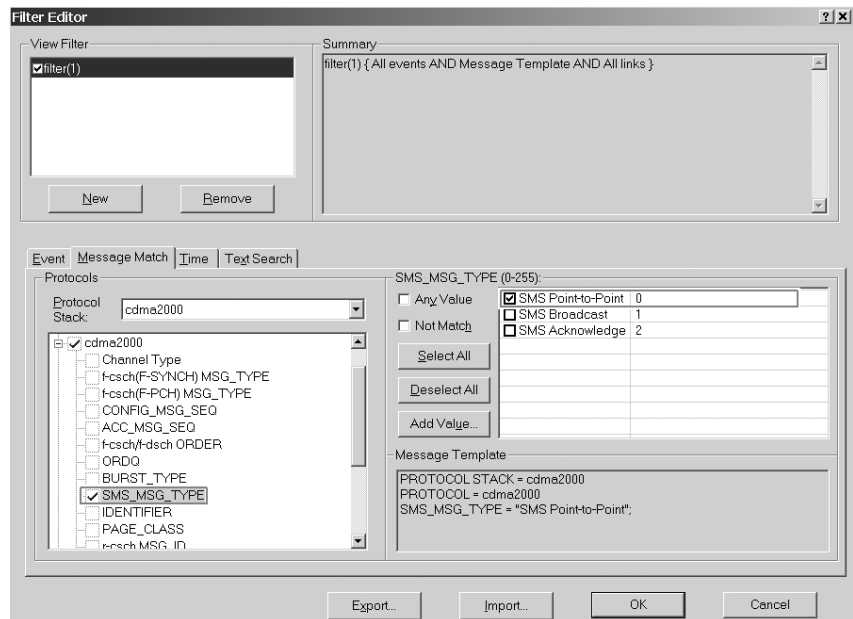


View filter setup

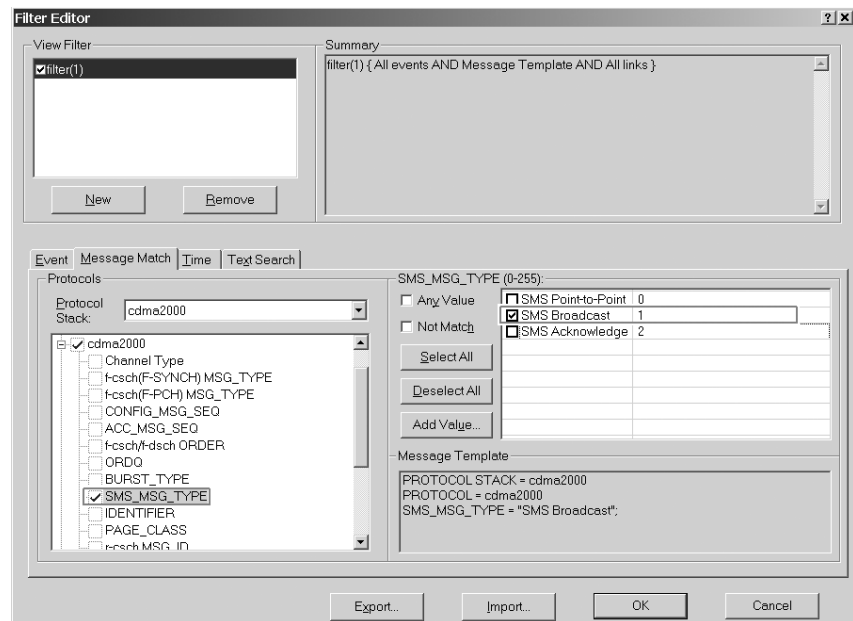
The view filter has no effect on what messages are captured. It simply limits the messages that are visible on the WPA's traffic overview. The following example is to set up two traffic overviews. One is configured for displaying the point-to-point SMS message and another is for displaying the broadcast SMS messages by setting their view filters. To access the view filters, press **View Filter**. To add another traffic overview, you can simply click the **Add a Traffic Overview** button from the menu bar.



Set up the upper Traffic Overview to display the point-to-point SMS messages. Double click the upper **View Filter** icon, the filter editor appears. Set up the view filter as shown below.



Set up the lower Traffic Overview to display the broadcast SMS messages. Double click the lower **View Filter** icon, the filter editor appears. Set up the view filter as shown below.



After finish the setup, close the Measurement Setup view by clicking the **Measurement Setup View** button on the menu bar again.

You can also easily add a new traffic overview anytime by clicking the **Add a Traffic Overview** button from the menu bar and set up its view filter by right-clicking your mouse in the new added traffic overview and selecting **View Filter** command.

3.8.3 Start the logging

Click the **Capture** button on the menu bar. Start the logging.

3.8.4 Send SMS messages

For the step-by-step procedure for setting up the test set to capture the log, see Section 3.3, “General procedure for mobile-terminated SMS tests” and Section 3.6, “General procedure for mobile-originated SMS tests.”

In this example, send two short messages from the test set to the mobile station. Follow the procedure in Section 3.2, “Mobile-terminated SMS.” Set the service to Point to Point in 3.3.1 Step 1, substep 5 if you want to send a point-to-point SMS message. If you want to send a Broadcast SMS message, set the service to Broadcast in 3.3.1 Step 1, substep 5.

If you want to send short messages from the mobile station to the test set, follow the procedure in Section 3.5, “Mobile-originated SMS operation.”

3.8.5 Stop the logging

To end logging, click the **Stop** button on the menu bar to stop the logging.

3.8.6 Analyze message log

The captured log allows you to determine exactly what is being exchanged between the test set and the mobile station and which channel is being used to carry the SMS messages. You can look in the decode of the captured message to verify all the parameters associated with that message.

In this example, the CaptureData:2 Traffic Overview is to display point-to-point SMS messages and the CaptureData:1 Traffic Overview is to display broadcast SMS messages. To look in the decode of the captured message, double-click on a message. The selected message details including all the parameters associated with that message are displayed in the Decode View (lower half of the Traffic Overview window).

The screenshot displays the Wireless Protocol Advisor interface. Two traffic overview windows are open: 'CaptureData:1 Traffic Overview (Filtered)' and 'CaptureData:2 Traffic Overview (Filtered)'. The 'CaptureData:2' window shows a list of captured messages, with the first message selected. Below this window, the decode view for that message is shown, displaying a table of octets with their bit patterns and descriptions.

| Num. | Direction | Timestamp | System Time |
|------|-----------|-----------------|-------------|
| 1 | For/Down | 10:34:13.100000 | 02:17 |

| Octet | MSB | Bin | LSB | Hex | Description |
|-------|-----------|-----|-----|-----|----------------------------|
| 1 | 00000 | 100 | | 04 | Message 1 of 3 on CDMA2000 |
| 2 | 100000001 | | | 81 | CDMA System Time= |
| 3 | 00010010 | | | 12 | |
| 4 | 11111011 | | | fb | |
| 5 | 00101000 | | | 28 | |
| 6 | 00000000 | | | 00 | Protocol=cdma2000 |
| 7 | 00000000 | | | 00 | MTAL Event Type=P |
| 8 | 00111011 | | | 3b | Channel Type=f-csch |
| 9 | 00001001 | | | 09 | MSG_LENGTH=59(dec) |
| 10 | 11000001 | | | c1 | ACK_SEQ=6 |
| | 11000001 | | | | MSG_SEQ=0 |
| | 11000001 | | | | ACK_REQ=Acknowledgment |
| | 11000001 | | | | VALID_ACK=Acknowledgment |
| 11 | 10101011 | | | ab | ADDR_TYPE=Broadcast |
| | 10101011 | | | | ADDR_LEN=5 (dec) |
| | 10101011 | | | | BC_ADDR=c10100 |
| 12 | 10000010 | | | 82 | |
| 13 | 00000010 | | | 02 | |
| 14 | 00000000 | | | 00 | |

| Num. | Direction | Timestamp | System Time |
|------|-----------|-----------------|-------------|
| 2 | For/Down | 10:34:33.580000 | 02:18:20.32 |

| Octet | MSB | Bin | LSB | Hex | Description |
|-------|-----------|-----|-----|-----|-----------------------------|
| 1 | 00000 | 100 | | 04 | Message 2 of 3 on CDMA2000 |
| 2 | 100000001 | | | 81 | CDMA System Time=Apr 10 1 |
| 3 | 00010010 | | | 12 | |
| 4 | 11111011 | | | ff | |
| 5 | 00101000 | | | 28 | |
| 6 | 00000000 | | | 00 | Protocol=cdma2000 |
| 7 | 00000000 | | | 00 | MTAL Event Type=PDU |
| 8 | 01001011 | | | 4b | Channel Type=f-csch (F-PCH) |
| 9 | 00001001 | | | 09 | MSG_LENGTH=75(dec) |
| 10 | 11110100 | | | f4 | ACK_SEQ=7 |
| | 11110100 | | | | MSG_SEQ=5 |
| | 11110100 | | | | ACK_REQ=Acknowledgment |
| | 11110100 | | | | VALID_ACK=Acknowledgment |
| 11 | 01001100 | | | 4c | ADDR_TYPE=IMSI |
| | 01001100 | | | | ADDR_LEN=6 (dec) |
| | 01001100 | | | | IMSI_CLASS=0 |
| 12 | 10011111 | | | 9f | IMSI_CLASS_0_TYPE=IMSI_S |
| | 10011111 | | | | RESERVED=0 |
| | 10011111 | | | | MCC= 000 |

1 Num 2 of 3 on CDMA2000Link 9/24/2003 10:34:33.580000 Free Buffers Connected to 146.208.241.

You can copy the logged messages and decoding details to another application (for example, Microsoft® Notepad) or save to a text file by right clicking your mouse in the Decode View window. See the WPA online help for detailed instructions.

A typical decoding display for a Point-to-Point SMS message sent via paging channel is shown below:

| Octet | Binary | Hex | Description |
|--|----------|-----|---|
| Message 2 of 4 on CDMA2000Link (Test Set (Hub to Node)) at Monday, August 25, 2003 16:55:21.840000; Size 91 Octets | | | |
| 1 | 00000100 | 04 | CDMA System Time=Apr 10 1992 09:41:15.68 |
| 2 | 10000001 | 81 | |
| 3 | 00100111 | 27 | |
| 4 | 01000101 | 45 | |
| 5 | 10101000 | a8 | |
| 6 | 000----- | 00 | Protocol=cdma2000 |
| | -----000 | | MTAL_Event_Type=PDU |
| 7 | 00000001 | 01 | Channel_Type=f-csch (F-PCH) |
| 8 | 01010100 | 54 | MSG_LENGTH=84(dec) |
| 9 | 00001001 | 09 | f-csch(F-PCH) MSG_TYPE=Data Burst Message |
| 10 | 001----- | 2c | ACK_SEQ=1 |
| | ---011-- | | MSG_SEQ=3 |
| | -----0- | | ACK_REQ=Acknowledgment is not required |
| | -----0 | | VALID_ACK=Acknowledgment is not included in this PDU |
| 11 | 010----- | 4c | ADDR_TYPE=IMSI |
| | ---0110- | | ADDR_LEN=6 (dec) |
| | -----0 | | IMSI_CLASS=0 |
| 12 | 10----- | 9f | IMSI_CLASS_0_TYPE=IMSI_S and MCC included |
| | --0----- | | RESERVED=0 |
| | ---11111 | | MCC= 000 |
| 13 | 00111--- | 3b | IMSI_S= 5099541530 |
| | -----011 | | |
| 14 | 11100101 | e5 | |
| 15 | 10100101 | a5 | |
| 16 | 10001011 | 8b | |
| 17 | 0101101- | 5a | |
| | -----0 | | MSG_NUMBER=1 |
| 18 | 0000001- | 02 | BURST_TYPE=Short Message Services |
| | -----0 | | |
| 19 | 00011--- | 18 | NUM_MSGS=1 |
| | -----000 | | |
| 20 | 00001--- | 0a | NUM_FIELDS=66 octet(s) |
| | -----010 | | |
| 21 | 00010--- | 10 | SMS_MSG_TYPE=SMS Point-to-Point |
| | -----000 | | |
| 22 | 00000--- | 00 | PARAMETER_ID=0(hex) - Teleservice Identifier |
| | -----000 | | |
| 23 | 00000--- | 00 | PARAMETER_LEN=2 octet(s) |
| | -----000 | | |
| 24 | 00010--- | 10 | IDENTIFIER=4098(Dec) - Wireless Messaging Teleservice |
| | -----000 | | |
| 25 | 10000000 | 80 | |
| 26 | 00010--- | 10 | PARAMETER_ID=2(hex) - Originating Address |
| | -----000 | | |
| 27 | 00010--- | 10 | PARAMETER_LEN=7 octet(s) |
| | -----000 | | |
| 28 | 00111--- | 38 | DIGIT_MODE=4-bit DTMF codes |
| | -----0-- | | NUMBER_MODE=ANSI T1.607 address |
| | -----0- | | NUM_FIELDS=10 |
| | -----0 | | |
| 29 | 0001010- | 14 | CHARi=5099214001 |
| | -----0 | | |
| 30 | 10110101 | b5 | |
| 31 | 00110010 | 32 | |
| 32 | 01000010 | 42 | |
| 33 | 10010101 | 95 | |
| 34 | 0100001- | 42 | RESERVED=0 |
| | -----0 | | |
| 35 | 00000--- | 00 | PARAMETER_ID=6(hex) - Bearer Reply Option |
| | -----000 | | |
| 36 | 00110--- | 30 | PARAMETER_LEN=1 octet(s) |
| | -----000 | | |
| 37 | 00001--- | 08 | REPLY_SEQ=1(hex) |
| | -----000 | | |
| 38 | 001----- | 20 | RESERVED=0 |
| | ---00--- | | |
| | -----000 | | PARAMETER_ID=8(hex) - Bearer Data |
| 39 | 01000--- | 41 | PARAMETER_LEN=47 octet(s) |
| | -----001 | | |

Continued

| | | | |
|----|----------|----|--|
| 40 | 01111--- | 78 | |
| | ----000 | | SUBPARAMETER_ID=0(hex) - Message Identifier |
| 41 | 00000--- | 00 | |
| | ----000 | | SUBPARAMETER_LEN=3 octet(s) |
| 42 | 00011--- | 18 | |
| | ----000 | | MESSAGE_TYPE=Deliver (MS-terminated) |
| 43 | 1----- | 80 | |
| | -0000000 | | MESSAGE_ID=1(hex) |
| 44 | 00000000 | 00 | |
| 45 | 1----- | 80 | |
| | -0000--- | | RESERVED=0 |
| | ----000 | | SUBPARAMETER_ID=1(hex) - User Data |
| 46 | 00001--- | 08 | |
| | ----000 | | SUBPARAMETER_LEN=25 octet(s) |
| 47 | 11001--- | c8 | |
| | ----000 | | MSG_ENCODING=7 Bit ASCII |
| 48 | 10----- | 86 | |
| | --000110 | | NUM_FIELDS=26 |
| 49 | 10----- | a6 | |
| | --100110 | | CHARi=Let's have lunch at 12:00. |
| 50 | 01100101 | 65 | |
| 51 | 11101000 | e8 | |
| 52 | 10011111 | 9f | |
| 53 | 10011010 | 9a | |
| 54 | 00001101 | 0d | |
| 55 | 00011000 | 18 | |
| 56 | 01111011 | 7b | |
| 57 | 01100101 | 65 | |
| 58 | 01000001 | 41 | |
| 59 | 10110011 | b3 | |
| 60 | 10101110 | ae | |
| 61 | 11101100 | ec | |
| 62 | 01111010 | 7a | |
| 63 | 00010000 | 10 | |
| 64 | 01100001 | 61 | |
| 65 | 11101000 | e8 | |
| 66 | 10000001 | 81 | |
| 67 | 10001011 | 8b | |
| 68 | 00100111 | 27 | |
| 69 | 01001100 | 4c | |
| 70 | 00011000 | 18 | |
| 71 | 00101110 | 2e | |
| 72 | 00000--- | 00 | RESERVED=0 |
| | ----000 | | SUBPARAMETER_ID=8(hex) - Priority Indicator |
| 73 | 01000--- | 40 | |
| | ----000 | | SUBPARAMETER_LEN=1 octet(s) |
| 74 | 00001--- | 08 | |
| | ----00- | | PRIORITY=Normal |
| | -----0 | | RESERVED=0 |
| 75 | 00000--- | 00 | |
| | ----000 | | SUBPARAMETER_ID=c(hex) - Alert on Message Delivery |
| 76 | 01100--- | 60 | |
| | ----000 | | SUBPARAMETER_LEN=1 octet(s) |
| 77 | 00001--- | 08 | |
| | ----00- | | ALERT_PRIORITY=Use Mobile default alert |
| | -----0 | | RESERVED=0 |
| 78 | 00000--- | 00 | |
| | ----000 | | SUBPARAMETER_ID=e(hex) - Call-Back Number |
| 79 | 01110--- | 70 | |
| | ----000 | | SUBPARAMETER_LEN=7 octet(s) |
| 80 | 00111--- | 38 | |
| | ----0-- | | DIGIT_MODE=4-bit DTMF codes |
| | -----00 | | NUM_FIELDS=10 |
| 81 | 001010-- | 29 | |
| | -----01 | | CHARi=5099214001 |
| 82 | 01101010 | 6a | |
| 83 | 01100100 | 64 | |
| 84 | 10000101 | 85 | |
| 85 | 00101010 | 2a | |
| 86 | 100001-- | 84 | |
| | -----00 | | RESERVED=0 |
| 87 | 00000--- | 00 | |
| | ----000 | | PADDING=0 |
| 88 | 00----- | 1a | |
| | --011010 | | CRC=1adf93bd(hex) |
| 89 | 11011111 | df | |
| 90 | 10010011 | 93 | |
| 91 | 10111101 | bd | |

4.0 Conclusion

The Agilent 8960 with the E6702B cdma2000 Lab Application, has the ability to simulate an SMS system for the CDMA mode of operation. This feature allows testing of a mobile station's SMS capabilities if supported by the mobile station. All of the SMS tests as specified in the CDG Stage 2 standard can be performed. With the WPA software, which is running on an external PC, you can log the messages during the SMS testing, which can help you collect and interpret protocol messages, verify wireless device functionality, and troubleshoot protocol problems.

Glossary

| | |
|------|-----------------------------------|
| BS | base station |
| IWF | inter-working function |
| MC | message center |
| MCS | mobile switching center |
| MS | mobile station |
| MO | mobile originated |
| MT | mobile terminated |
| PSTN | public switched telephone network |
| SMS | short message service |
| TE | terminal equipment |
| WPA | wireless protocol advisor |

Related References

For more information on Agilent products used for SMS testing, visit:

Agilent Technologies 8960 Series 10 Web page:
<http://www.agilent.com/find/8960>

E6702A cdma2000 lab application product page:
<http://www.agilent.com/find/e6702a>

WPA online help included in the WPA software *WPA Getting Started Guide* available from:
<http://cp.literature.agilent.com/litweb/pdf/1000-1868.pdf>

For CDMA testing standards visit:

3GPP2 C.S0015 standard:
<http://www.3gpp2.org>

CDG Stage 2 standard:
<http://www.cdg.org>

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