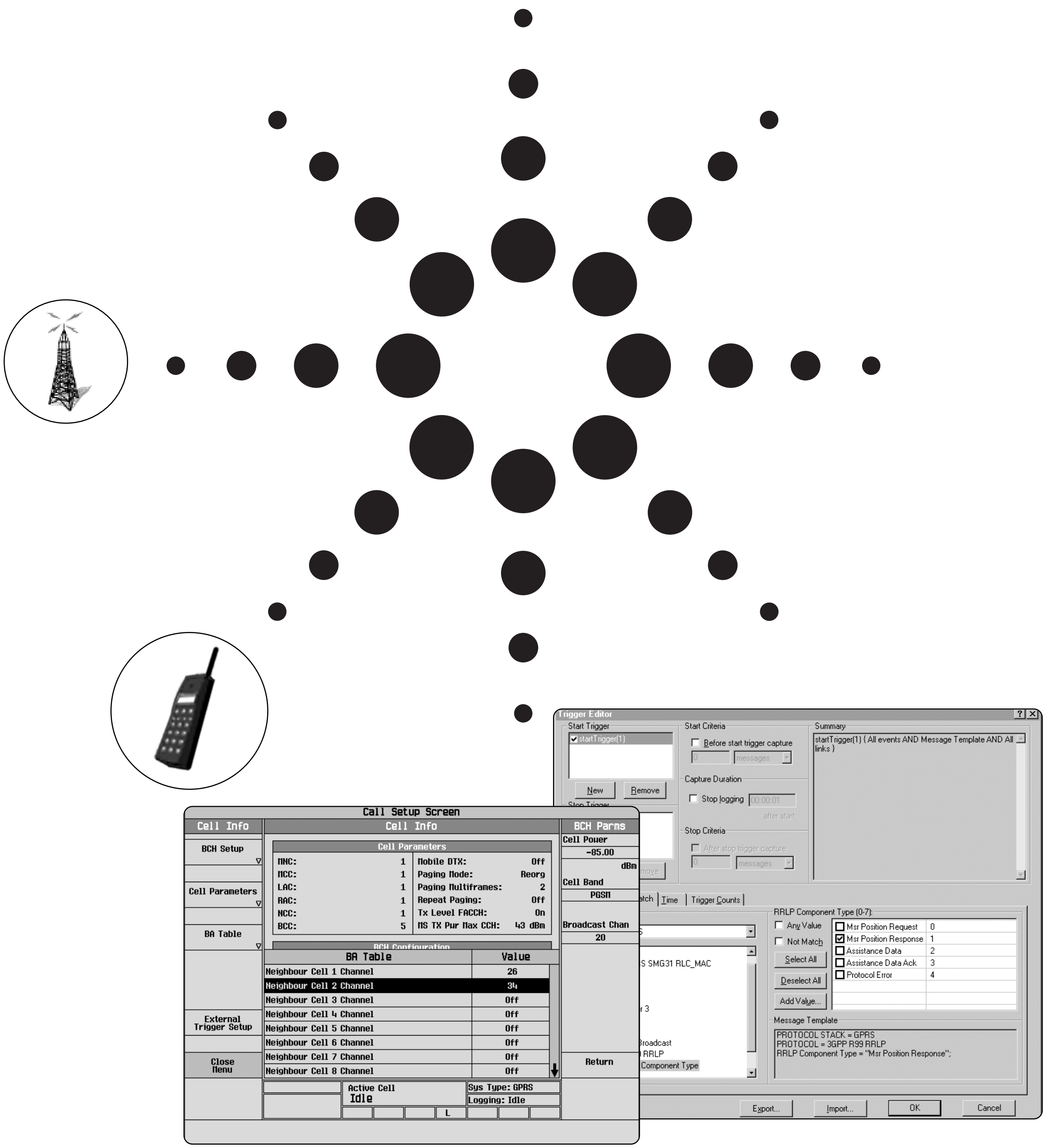
Agilent
Configuring the GSM/GPRS Lab Application for E-OTD Performance Testing

Application Note 1440



Agilent Technologies

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1 Introduction

The E-OTD (Enhanced Observed Time Difference) features included in the 8960 Wireless Communications Test Set are provided to enable the use and testing of the E-OTD location service capability in wireless devices which are designed to operate on a GSM/GPRS network. Access to E-OTD features in the 8960 is provided through the E6701C GSM/GPRS Lab Application (LA) as described in [2].

The E-OTD features are designed to be used as part of a system in conjunction with several ESGs (Economy Signal Generators) or equivalent instruments simulating neighbor cells in a GSM network. The 8960 in the system takes the role of the serving cell and performs the main location services interaction, issuing location requests to the device being tested and receiving location estimates or measurement results in response.

The primary aspect of the 8960 E-OTD solution is a partially customizable RRLP layer in the GSM/GPRS LA enabling a user to test MS-based or MS-assisted E-OTD. This allows the 8960 to be used as a constituent part in the system outlined above. In addition, it can be used alone as a tool for the wireless device RRLP layer developer.

This document is written from the perspective of the 8960 in a system, and as such should not be taken as a definitive reference to any complete E-OTD test system. The nature of a complete system will vary depending upon the nature of the testing performed, although some possible systems are briefly outlined at the end of this document.

Portions of this document describing how to use the RRLP layer would be useful during the implementation of the RRLP layer in a device.

Before using the 8960 RRLP features, a device with at least a partial implementation of RRLP should be physically connected to the 8960. This device is referred to throughout this document as the Device Under Test, or DUT.

This document outlines a typical use for the E-OTD features provided in the GSM/GPRS LA in the context of a larger E-OTD test system.

E-OTD features provided by the 8960 and all configurable options of these features are described in the E-OTD RRLP Definition, found in the E6701C Reference Guide [2]. This document looks in detail at the process of using these features and describes additional configuration (either internally to the 8960 or elsewhere within the system) that should be performed to make use of the 8960's E-OTD capabilities.

Using the 8960 E-OTD functionality in a larger test system will typically involve performing the following actions (Not all of these stages are required but most are likely to be involved.):

- Setting up the 8960 serving cell. See Sections 2.3 and 3.2.
- Setting up external instruments to simulate neighbor cells in a system (This is instrument-dependent and not covered extensively this document.).
- Synchronizing the 8960 serving cell with the neighbor cells in the system. See Section 4.2.3.
- Configuring the 8960 to reference these neighbor cells in information provided to the DUT. See Sections 2.4.2 and 3.3.
- Allowing a DUT to camp to the transmitted 8960 BCH. See Section 2.4.2.
- Sending RRLP messages to the DUT as a means to initiate E-OTD measurements or exercise RRLP protocol. See Section 2.4.
- Analyzing RRLP responses from the DUT as a means to test E-OTD measurement or protocol performance. See Section 2.5.

2 8960 RRLP overview

2.1 Introduction

E-OTD location services are primarily provided through the Radio Resource Location Services Protocol (RRLP) layer. To support E-OTD test capability, the GSM/GPRS LA allows partial configuration of the RRLP layer. Individual RRLP messages can be configured and sent and the contents of response messages from the DUT can be retrieved. This section examines how to configure and use the RRLP layer within the 8960. Subsequent sections will build upon this to look at the 8960 RRLP usage in the context of a larger test system.

While this section provides a guide to using the RRLP layer in the 8960, it does not attempt to fully describe all configurable options. For a complete description of the precise elements within the 8960 RRLP layer that can be manipulated, refer to the E6701C Reference Guide [2]. User interaction with the 8960 RRLP layer is performed via GPIB. For documentation on all the GPIB commands provided, refer to the E6701C Reference Guide [2].

References to the E6581A GPRS Wireless Protocol Advisor (WPA) are made throughout this section. This PC-based software is provided with the GSM/GPRS LA as a protocol analysis tool and incorporates handling for the RRLP layer. For further information on the GPRS WPA, refer to [2].

The RRLP layer implementation in the GSM/GPRS LA conforms to the applicable portions of 3GPP TS 04.31, version 8.9.0 [6].

2.2 RRLP overview

Five types of messages are defined in 3GPP TS 04.31 [6] for use in RRLP:

- Measure Position Request (Downlink)
- Measure Position Response (Uplink)
- Assistance Data (Downlink)
- Assistance Data Acknowledgement (Uplink)
- Protocol Error (Uplink & Downlink)

Handling is provided in the 8960 for each of these messages.

Measure Position Request and Assistance Data are the two main downlink messages. These are used for providing, amongst other things, network information to the phone and requesting E-OTD measurements.

The Measure Position Response message is sent by the MS in response to the Measure Position Request Message to return measured values and any further information.

The Assistance Data Acknowledgement is sent by the MS in response to an Assistance Data message.

The Protocol Error message is sent by a receiving entity to indicate an error has occurred.

2.3 Connecting the DUT

Before using the 8960 RRLP layer, a suitable cell band and ARFCN must be configured on the 8960 to allow the DUT to camp to the transmitted BCH. The cell band and ARFCN can be altered via either the 8960 Manual User Interface (MUI) or Remote User Interface (RUI). As an example, these could be set to PGSM and 20 respectively as follows:

Via the Manual User Interface:

- Press **Call Setup**.
- Press **F7 BCH Parameters**. This opens the BCH Parameters RHS menu.
- Press **F8 Cell Band** on this menu to open the Cell Band menu.
- Using the RPG, scroll to the desired band and make the selection. This will close the Cell Band menu and return control to the BCH Parameters menu.

Press **F9 Broadcast Channel**. Using the numeric keypad or RPG, enter the desired value for the ARFCN.

- After you have performed this configuration with a cell band of PGSM and a related ARFCN of 20, the BCH parameters will be displayed on the Call Setup Screen. See Figure 1.

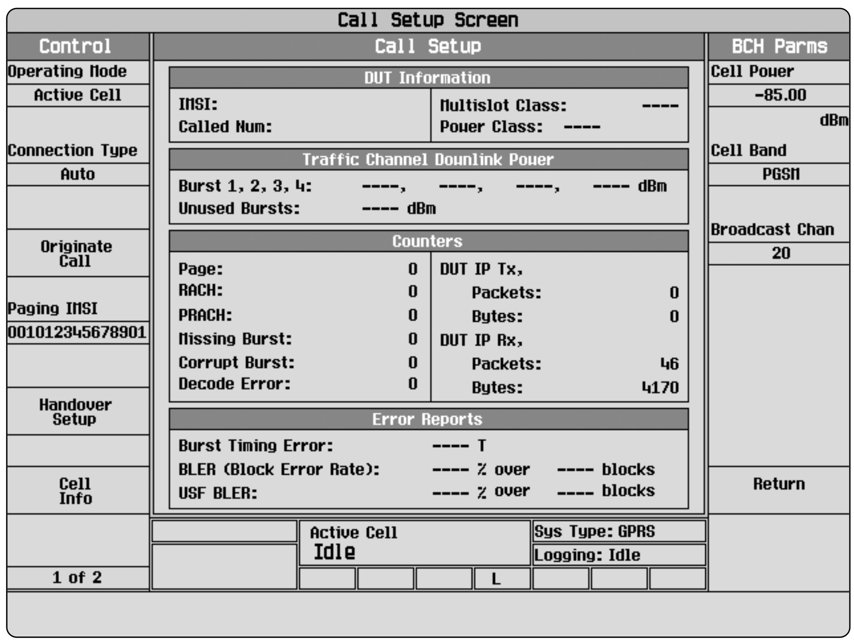

Figure 1. The Call Setup Screen

Via the Remote User Interface (GPIB):

A similar result can be achieved via the RUI by sending the following two GPIB commands:

```
CALL:CELL:BAND PGSM
CALL:CELL:BCH:ARFCN:PGSM 20
```

Once you have made the required settings and the DUT is turned on and camped to the 8960 BCH, RRLP messages can be exchanged between the two entities.

2.4 Configuring and sending a RRLP message

This section provides an example of how to configure an RRLP message and send it from the 8960 to the DUT. In this example, a simple Measure Position Request message is configured and sent. The steps involved for the other two downlink messages are identical.

2.4.1 Selecting what to include

Most RRLP messages are defined to contain optional components that may or may not be included in a transmitted message. In the 8960, optional components are excluded from RRLP messages by default. You may configure each optional component to be included or excluded from the message that is to be sent.

For the example of a simple Measure Position Request message, you may want to include the contents of the top level Reference BTS for Assistance Data and Measurement Assistance Data elements. You can do this by sending the following two GPIB commands respectively.

```
CALL:PPRocedure:PMEasurement:MPRequest:RAData INCLude
```

```
CALL:PPRocedure:PMEasurement:MPRequest:MAData INCLude
```

As any optional component is not included by default, there is no need to explicitly exclude anything from the message. A subsequent message may be configured without one of these components by sending the related command with an ‘EXCLude’ parameter in place of the ‘INCLude’.

The elements chosen to be included in the message contain further optional components. For example, you may include the BTS Position component of the Reference BTS for Assistance Data element by sending the following command.

```
CALL:PPRocedure:PMEasurement:MPRequest:RAData:
    BTSPosition INCLude
```

All of the defined mandatory components of messages are included by default and cannot be optionally included/excluded in this manner.

2.4.2 Setting the component values

Once a message is configured to include the required components, the values of each mandatory and included optional component should be set. For this example the default values of most components will be used so they need not be changed. For example, you may manually set the number of neighbor BTSs that are to be measured and provide information on these BTSs by changing the values of components in the Measurement Assistance Data element of the Measure Position Request message.

The number of neighbor BTSs to measure is set to 2 by setting the relevant component of the Measurement Assistance Data element through the following GPIB command:

```
CALL:PPRocedure:PMEasurement:MPRequest:MAData
    BTS:NUMBer 2
```

The BSIC and BCCH carrier are identified for these BTSs by setting the relevant components of the Measurement Assistance Data element via the following commands:

```
CALL:PPRocedure:PMEasurement:MPRequest:MAData:BTS1:
    BSICode 5
CALL:PPRocedure:PMEasurement:MPRequest:MAData:BTS1:
    BCHCarrier 26
CALL:PPRocedure:PMEasurement:MPRequest:MAData:BTS2:
    BSICode 9
CALL:PPRocedure:PMEasurement:MPRequest:MAData:BTS2:
    BCHCarrier 34
```

For this example, all the other component values will be sent as their default values. For further information on the default values of components, refer to [2]. In a more realistic scenario where precise tests are performed, the default values for many of the components would not suffice, as the DUT will need the correct information.

2.4.3 Sending a message

Once a message has been completely configured it can be sent to the DUT. Each downlink RRLP message can be sent to the DUT via a single GPIB command. In the case of the Measure Position Request message, this command is:

```
CALL:PPRocedure:PMEasurement:MPRequest:SEND
```

After receiving this GPIB command, the 8960 constructs the Measure Position Request message from the values currently set and sends it to the DUT.

2.5 Receiving a RRLP message

Both the Measure Position Request and Assistance Data downlink messages have associated responses that are expected from the DUT. The Protocol Error message has no associated response. After the 8960 receives a response message from the DUT, the message contents are available via GPIB.

2.5.1 Reacting to a response from the DUT

The indication that a response has been received from the DUT can be accessed via GPIB or through using WPA. This section examines both of these alternatives.

Continuing from the previous example, this section reviews receiving a Measure Position Response message from the DUT in response to the Measure Position Request that was sent previously. Information on other forms of uplink response is provided in Section 2.5.3.

2.5.1.1 Reacting to a response programmatically

Via the 8960 RUI, there are two ways to determine that a RRLP message has been received from the DUT. The first is through a simple RUI query. This query returns “1” if the message has been received since the last related request was sent. Otherwise, it returns “0”. In the case of the Measure Position Response message, the relevant GPIB query is:

```
CALL:PPRocedure:PMEasurement:PRESponse:AVAilable?
```

Alternatively, GPIB interrupts can be configured to trigger when the relevant message is received by the 8960. To configure a GPIB interrupt for the arrival of a Measure Position Response the following command can be used:

```
STATus:OPERation:CALL:GSM:ENABle 8192
```

This command sets the bit with a binary weighting of 8192 in the `CALL:GSM:ENABle` register (This bit represents a Measure Position Response arrival.). After entering this command, and assuming the default values for the other related status registers values are acceptable, the interrupt is configured and will be generated when the 8960 receives a Measure Position Response. See [1] for further information on the use of status registers and GPIB interrupts in the 8960.

Once it is known that a response has been received using either of the methods described in this section, the values from the message can be retrieved, as described in Section 2.5.2.

2.5.1.2 Reacting to a response in GPRS WPA

If a programmatic response is not required upon receipt of a RRLP message from the DUT, it may be more desirable to simply use the GPRS WPA to observe the response.

The GPRS WPA can be configured to begin logging protocol based on the arrival of an uplink (or sending of a downlink) RRLP message. If configured in this manner, it will display the RRLP message on screen as soon as it arrives at the 8960 and will begin logging all communication with the DUT from that point onward. The logging start point can be further constrained by specifying the RRLP message type to begin logging from.

By default, the GPRS WPA will log ALL communication between the 8960 and the DUT. There is no need to explicitly carry out the steps described in the remainder of this section, although they can be useful for constraining the start time of any log to a desired point, as well as aiding the readability and usefulness of the log.

Continuing with the example, WPA can be configured to begin logging upon receipt of a Measure Position Response message by performing the following actions:

1. Go to the Measurement Setup View in WPA by selecting it from the View menu.
2. Select the Triggers option by double clicking on it. This will open the Trigger Editor.
3. To specify a new start trigger, press the **New** button.
4. Select RRLP from the list of available protocols and select the component type that should initiate logging upon arrival. In the case of this example, the Trigger Editor will look like Figure 2 after you have completed the steps above.
5. Close the Trigger Editor by selecting **OK** and return to the Traffic Overview view by selecting the related option on the View menu.
6. Press the **Record** button on the WPA Toolbar to enable logging.

Once the above steps have been performed, WPA will begin logging all protocol from the point that the next Measure Position Response is received, including the Measure Position Response itself.

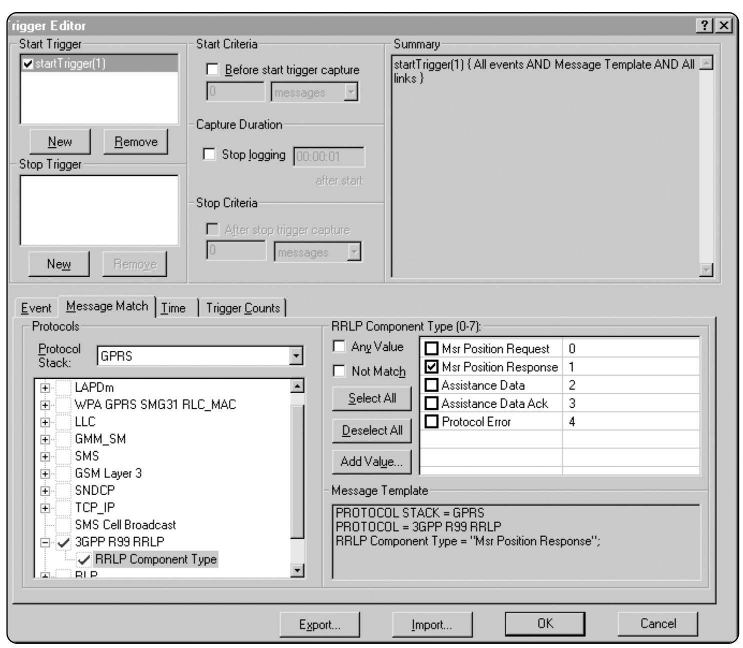

Figure 2. The GPRS WPA Trigger Editor

2.5.2 Examining a response from the DUT

With the exception of the error code included in the Protocol Error message, the only uplink message that contains useful values is the Measure Position Response. This section examines how these values can be obtained once the message has arrived at the 8960. It is through these values that measurement results are obtained from the DUT.

2.5.2.1 Examining the response via GPIB

As with downlink RRLP messages, a Measure Position Response message has optional components that may or may not be present. GPIB queries are provided to determine if these components are present in the last received message.

For example, to determine if the Measurement Information element is present in a received Measure Position Response, the following command should be used.

```
CALL:PPRocedure:PMEasurement:PRESponse:
    MINFormation: INCLuded?
```

A response of “1” indicates this element was received in the message and its components are available for query. A response of “0” indicates otherwise.

The presence of all optional message components that are of interest should be checked in a received message before the related values are read. Once this has been done, all the values of interest can be read individually via GPIB.

Continuing with the example from earlier, we may want to know how many neighbor cells were actually measured by the DUT. Determine this value by querying the relevant value in the Measure Position Response message via the following GPIB Query:

```
CALL:PPRocedure:PMEasurement:PRESponse:
    MINFormation:BTS:NUMBer?
```

Assuming two BTSs were measured, the OTD value for each of them can then be obtained by sending the following two queries:

```
CALL:PPRocedure:PMEasurement:PRESponse:
    MINFormation:BTS1:OTDifference?
CALL:PPRocedure:PMEasurement:PRESponse:
    MINFormation:BTS2:OTDifference?
```

All other values in a received message can be similarly obtained. Note that the values returned from these queries are the actual integer values present in the message. A conversion is not made to any value that this number is defined to represent.

Based on the contents of an uplink message, it may be necessary to and send further RRLP messages to the DUT. Precisely what the results are used for and what actions are taken upon their receipt of a message is dependent on the nature of the test being performed.

2.5.2.2 Examining the response in GPRS WPA

WPA can display a complete decode for each RRLP message received (and sent) either in isolation or in the context of messages from other GPRS layers. The decode for each message displays the content of the message in various formats and provides a textual description of each component and represented value.

As discussed previously, if WPA is configured correctly the message will be displayed on screen as soon as it is received. Figure 3 displays a decoded Measure Position Response message in WPA.

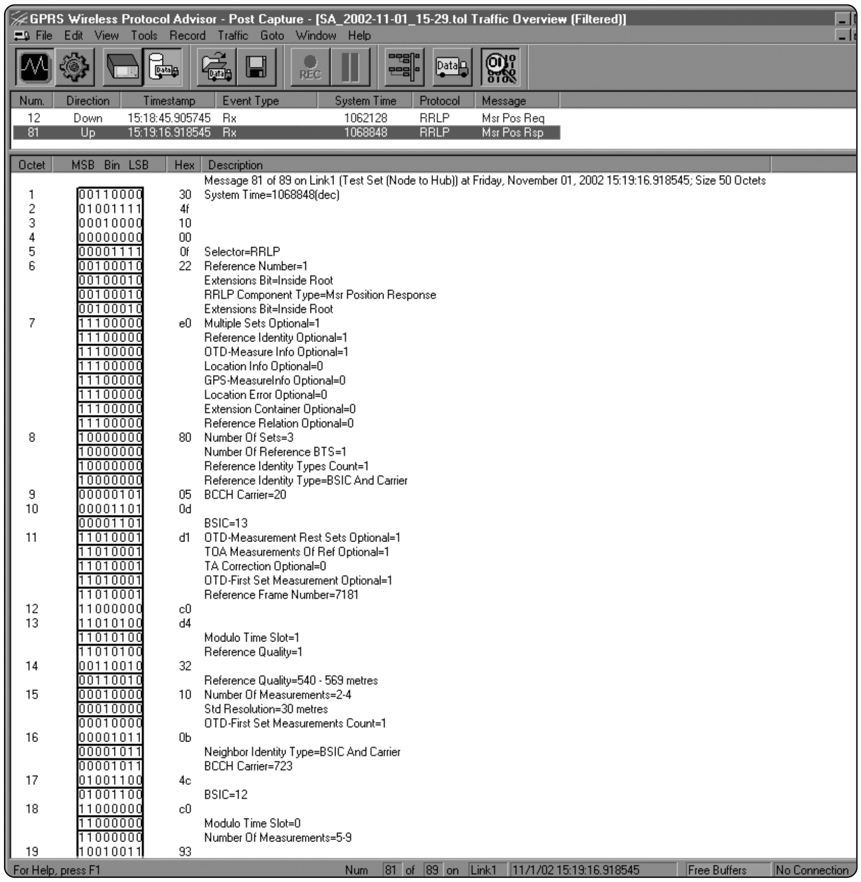

Figure 3. Measure Position Response message displayed in GPRS WPA

2.5.3 Other types of response

Assistance Data Acknowledgement and Protocol Error messages can also be received from the DUT. These too can be displayed in WPA as they arrive. With the exception of the error code in the Protocol Error message, no values are contained in these messages but action may be required upon their receipt. For example, you may want to examine why a DUT responded with an error to a Downlink Message or to send Further Assistance Data upon receipt of an acknowledgement for a previous Assistance Data message.

2.6 Summary

The 8960's E-OTD test capability is primarily provided through extensive access to the 8960's RRLP layer. Use of this layer will vary depending on the tests being performed but will generally involve most of the following actions.

- Connect a DUT to the 8960.
- Configure and send RRLP messages to the DUT.
- Examine RRLP response messages from the DUT as a means to analyze the DUT's RRLP protocol performance or as a basis for E-OTD measurement performance evaluation.
- Use message response values as a basis for sending further RRLP messages to the DUT.

3 RRLP related 8960 configuration

3.1 Introduction

The previous section reviewed the basic steps involved in communicating with the DUT via RRLP and described the necessary 8960 and DUT setup required. Further configuration of the 8960 is needed however to enable RRLP use in the context of a larger test system. Aspects of the 8960 that have a direct impact on RRLP and may require further configuration are the topic of this section.

3.2 The serving cell

The values entered for the 8960 BSIC and BCCH carrier settings have an impact on RRLP messages constructed and sent by the 8960. Elements of RRLP messages that relate directly to the ReferenceBTS BSIC and BCCH carrier are not directly configurable but are automatically set to the related 8960's current values at the time a message is sent. This behavior should be noted when configuring the Reference BTS information elements of any downlink RRLP message.

The BCCH carrier of the serving cell simulated by the 8960 can be configured as described earlier in Section 2.3.

The BSIC of the serving cell simulated by the 8960 can be configured through a combination of the 8960 Base Station Color Code (BCC) and Network Color Code (NCC) settings as follows.

Via the Remote User Interface:

- The BCC and NCC can be set via the RUI by sending the following GPIB commands where `<x>` is an integer in the range 0-7.

```
CALL:CELL:BCCode <x>
CALL:CELL:NCCode <x>
```

3.2 The serving cell *(Continued)*

Via the Manual User Interface:

- Press **Call Setup** on the instrument.
- Press **F1 Operating Mode** to open the Operating Mode menu.
- Using the RPG scroll and select **Cell Off** in this menu.
- Press **F6 Cell Info** to open the Cell Info screen.
- Press **F2 Cell Parameters** to open the Cell Parameters menu.
- Select the NCC setting by scrolling and selecting with the RPG.
- Enter the desired value using the numeric keypad or RPG.
- Select the BCC setting by scrolling and selecting with the RPG.
- Enter the desired value using the numeric keypad or RPG.
- Press **Call Setup** to return to the Call Setup screen.
- Press **F1 Operating Mode** to open the Operating Mode menu.
- Using the RPG scroll and select **Active Cell** in this menu.
- Figure 4 displays the Cell Parameters menu after the NCC and BCC have been set to 4 and 3, respectively. Using these values, the Reference BTS BSIC sent with transmitted RRLP messages is 35 (BSIC = NCC + BCC = 100 + 011 = 100011 = 35).

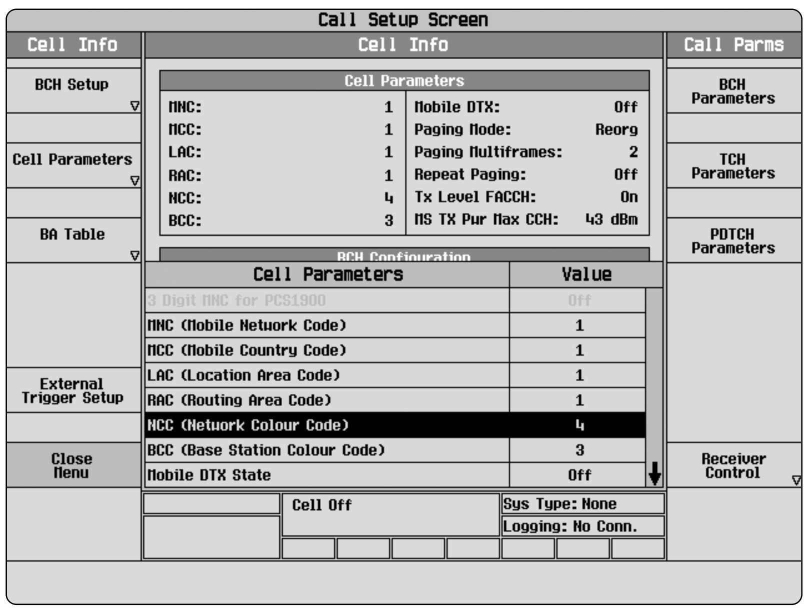

Figure 4. The Cell Parameters menu

3.3 Neighbor cells

The components of RRLP messages that refer directly to neighbor cells in the BA Table are not explicitly customizable and are not included with any sent message. To perform measurements on these cells, they must be individually specified in the Measurement Assistance Data element of the Measure Position Request or Assistance Data messages. See example in Section 2.4.2.

The 8960 BA Table should also be configured to include information on these cells. The values entered in the BA Table should match those specified in the Measure Position Request or Assistance Data message that is to be sent. BA Table entries can be set via the 8960 MUI or RUI as follows:

Via the Remote User Interface (GPIB):

- As an example, two neighbor cells can be specified with ARFCNs of 26 and 34, respectively, via the following GPIB command:

  ```
  CALL:CELL:BA:TABLe:SELected:GSM 26, 34
  ```

- The comma-separated list of integer ARFCNs provided to this command specifies the neighbor cells that are to be included in the BA Table. The order that these cells are entered does not have to match the order specified in any RRLP message.

3.3 Neighbor cells *(Continued)*

Via the Manual User Interface:

- Press **Call Setup**.
- Press the **F6 Cell Info** to open the Cell Info Screen.
- Press the **F3 BA Table** to open the BA Table menu.
- Select the first cell that is to be configured by scrolling and selecting with the RPG.
- Enter the desired ARFCN value for this cell on the numeric keypad or by scrolling and selecting with the RPG. This will return control to the BA Table menu.
- Configure the remainder of the neighbor cells in the same manner.
- Continuing with the example from earlier, Figure 5 displays the BA Table menu configured with the neighbor cells specified in Section 2.4.2.

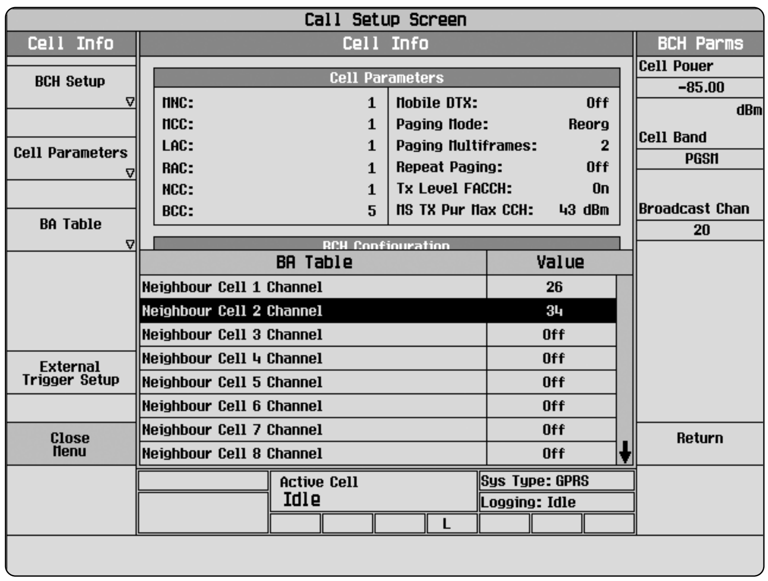

Figure 5. The BA Table menu

4 E-OTD test system integration

4.1 Introduction

The primary intended use for the E-OTD functionality provided in the 8960 is as a constituent part of a larger E-OTD test system. This section examines some possible components of such a system and provides suggestions on how the 8960 can be configured and used in conjunction with it.

4.2 8960 E-OTD test system integration

Two supplemental features are provided by the 8960 for use in integrating with a typical E-OTD test system. This section details the use of these features, touching on other aspects of typically required system configuration in the process.

4.2.1 Downlink delays

To simulate physical distance between the 8960 and the DUT in a test system, delays may be introduced externally from the 8960 on the downlink channel to the DUT. A demodulation trigger delay setting is provided by the 8960 to allow for this possibility. This setting provides the capability to offset the 8960 uplink demodulation by a specified number of symbols in order to compensate for any downlink delay introduced.

If any delay is introduced to the downlink, this setting should be configured to be equal to the number of symbols of delay present. The following GPIB command is provided to set the 8960 demodulation trigger delay where `<x>` is an integer in the range 0-64.

```
CALL:DEMod:DELay <x>
```

4.2.2 Neighbor cell configuration

The configuration of neighbor cells in the 8960 for use in RRLP was discussed earlier in Sections 2.4.2 and 3.3. Performing this configuration provides the DUT with information on which cells to perform measurements. In a typical E-OTD test system these cells will be provided in some form (through simulation or otherwise). Values specified in the 8960 BA Table and any RRLP message that is sent to the DUT should be set to match the values used for these cells.

4.2.3 Neighbor cell synchronization

To allow the DUT to perform accurate measurements on any cells included in a test system, the 8960 provides a neighbor cell synchronization trigger. This trigger can be used to align the frame start position of any simulated neighbor cells with that of the 8960.

The GPIB command used to send the neighbor cell synchronization trigger is:

```
CALL:TRIGger:OUTPut:FRAMe:SYNChronize
```

Upon the receipt of this command, the 8960 frame count is reset to 200 frames before the end of the hyperframe and a signal is generated at the 8960 rear panel TRIG OUT connector when the first symbol of the 0'th frame occurs.

The trigger can be configured to fire a number of symbols *before* the first symbol of the 0'th frame. The number of symbols of offset to apply is set with the following GPIB command where `<x>` is an integer in the range 0-150 symbols (by default this offset is 0):

```
CALL:TRIGger:OUTPut:FRAMe:SYNChronize:OFFSet <x>
```

All components of the test system that are to be synchronized with the 8960 should be synchronized using the same instance of the trigger as the 8960 frame count is reset upon each use. The synchronization of components within the test system should be completed before any RRLP based communication between the 8960 and DUT is performed. How to perform the synchronization of any neighbor cells upon receipt of this trigger is device dependent and beyond the scope of this document.

Measurements performed by the DUT on cells that are not synchronized with the 8960 are likely to return values unsuitable for use in E-OTD performance evaluation. However, an unsynchronized system may provide a means for basic evaluation of the DUT's RRLP protocol performance.

4.3 Example E-OTD test systems

The number of neighbor cells that can be used in each of the following system examples is constrained by the 8960 to a maximum of eight.

4.3.1 A simple unsynchronized system using real cells

If the BSIC and ARFCN of real world cells in the area where the test system is located are known, and the DUT is capable of receiving the transmitted BCCHs of these cells, it is possible for the DUT to perform measurements on the cells for use in MS Based or MS Assisted E-OTD.

Figure 6 outlines a system based on measurements of real cells.

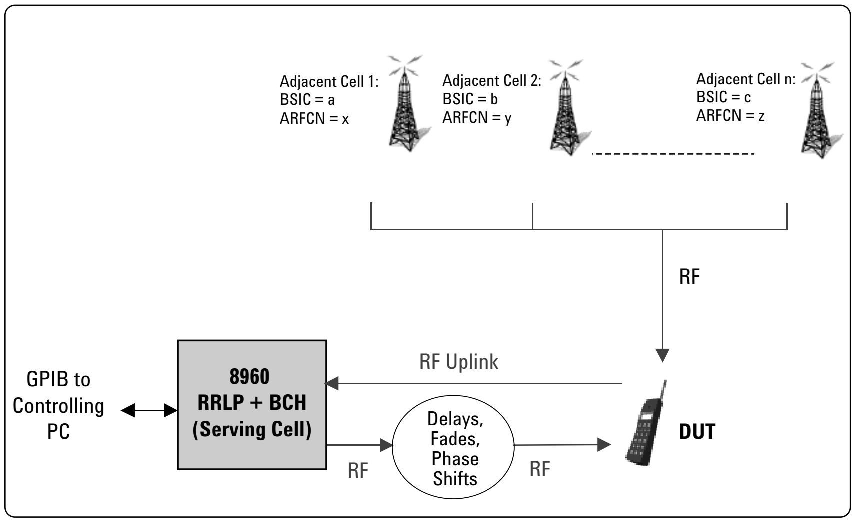

Figure 6. A simple unsynchronized system using real cells

In this scenario, the ARFCNs of the known cells should be entered into the 8960 BA Table as described in Section 3.3. The BSICs and ARFCNs of the cells should also be configured in the relevant components of the Measure Position Response or Assistance Data message that is to be sent requesting the measurements. After sending the relevant Measure Position Request and Assistance Data messages to the DUT, a Measure Position Response is expected in reply containing any measured values.

It is clearly not possible to control any aspects of the neighbor cells in such a system or synchronize them with the 8960. Measurement results obtained from these conditions will not be suitable for detailed E-OTD testing but may provide a reasonable level of accuracy for basic RRLP protocol testing.

4.3.2 A synchronized system using Agilent economy signal generators

For a more formal test system, one possibility is to use multiple Agilent economy signal generators (ESGs). This setup allows detailed configuration of each simulated neighbor cell BCH through configuration of the component ESGs. This system can and should be synchronized as described in Section 4.2.3 before detailed E-OTD testing is performed.

Figure 7 outlines a system based on ESG neighbor cells.

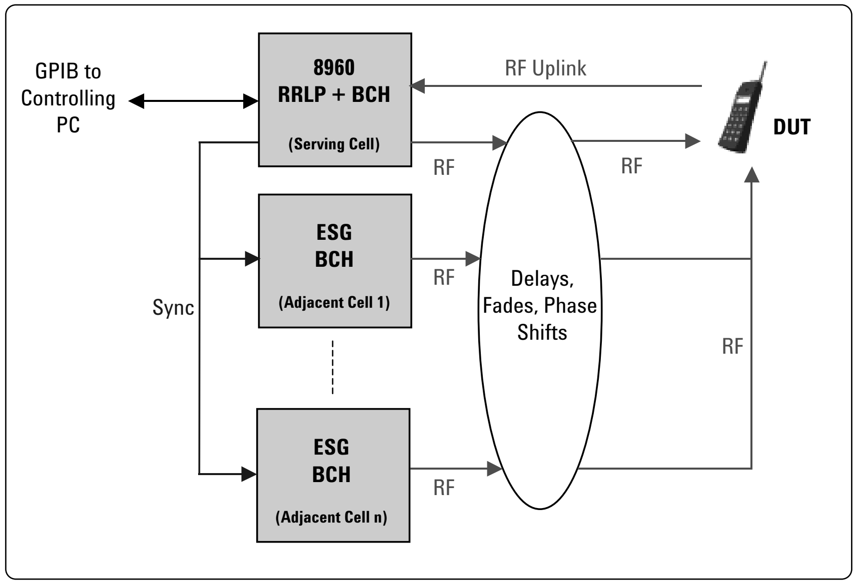

Figure 7. A synchronized system using ESGs

Similarly to the previous example, the 8960 and RRLP messages should be configured to match the relevant properties of each ESG BCH. These values may be dynamically changed during the course of a test.

A similar unsynchronized system could be constructed by using further 8960s in place of the ESGs.

4.3.3 An 8960 enabled proprietary E-OTD test system (synchronized or unsynchronized)

Any instrument or instruments capable of generating the required BCCHs for simulating neighbor cells can be used alongside the 8960 in an E-OTD test system. These instrument(s) may or may not be capable of synchronization with the 8960 and the level of configuration available for the simulated cells may vary.

Figure 8 outlines a generic E-OTD test system.

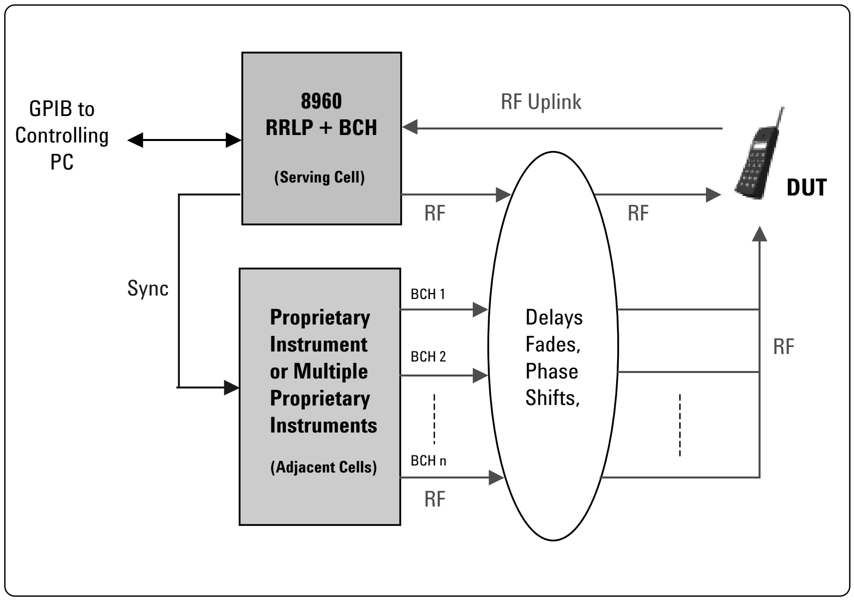

Figure 8. A system using proprietary components (synchronized or unsynchronized)

5 Appendix A – acronyms and abbreviations

BCC	Base Station Color Code
BSIC	Base Station Identity Code
DUT	Device Under Test
E-OTD	Enhanced Observed Time Difference
GPIB	General Purpose Interface Bus
GPS	Global Positioning System
LA	Lab Application
LCS	Location Services
MS	Mobile Station
MUI	Manual User Interface
NCC	Network Color Code
OTD	Observed Time Difference
RRLP	Radio Resource LCS Protocol
RUI	Remote User Interface
TA	Test Application
WPA	Wireless Protocol Advisor
RHS	Right Hand Side

6 References

6.1.2 Agilent literature

[1] Access to all 8960 documentation
http://www.agilent.com/find/8960

[2] E6701C documentation
http://www.agilent.com/find/e6701c

6.1.2 ETSI documents

8960 E-OTD functionality is developed to the following ETSI Release 99 specifications:

[3] 3GPP TS 23.032 Version 3.1.0, Universal Geographic Area Description (GAD)

[4] 3GPP TS 03.71 Version 8.5.0, Location Services (LCS); (Functional Description) – Stage 2

[5] 3GPP TS 04.18 Version 8.14.0, Mobile Radio Layer 3 Specification; Radio Resource Control Protocol

[6] 3GPP TS 04.31 Version 8.9.0, Location Services (LCS); Radio Resource LCS Protocol (RRLP)

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