Products: R&S® CRTU-W

FTP Automation Guide

with WCDMA Protocol Tester R&S® CRTU-W

Application Note 1CM68

This application note shows how to operate the *Automation Manager* tool in the R&S® CRTU-W to perform an automated FTP operation during a test scenario.

Contents

Abbreviations

AT Command	Automatic Test Command
FTP	File Transfer Protocol
LAN	Local Area Network
PDP	Packet Data Protocol
PC	Personal Computer
TCP/IP	Transmission Control Protocol/Internet Protocol
UE	User Equipment
WCDMA	Wideband Code Division Multiple Access

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1   Overview

The CRTU-W is a platform to perform conformance test cases and scenarios on WCDMA mobile phones. Due to the large number of test cases and scenarios, an *Automation Manager* tool has been implemented. This allows full automation while executing all the test cases and scenarios with minimum or no human interaction required.

With technological advancements and the need for faster data transfers in mobile phones, a quick and easy way to test the speed of data transfer is to set up a FTP file transfer. This will allow the measurement of the throughput of the file transfer.

This application note shows how to operate the *Automation Manager* tool in the CRTU-W to perform an automated FTP transfer during a test scenario, and assumes that the user has prior knowledge on the operational use of FTP file transfers as well as the CRTU-W *Automation Manager* tool.

2   Hardware and Software Requirements

PC hardware requirements

CPU: Pentium 1 GHz or better

RAM: 1 GB or more

Monitor: SVGA color monitor

Data Connection Interface: RS232 serial port or USB 1.1 or more

LAN Interface: Ethernet 10/100 MBps

PC software requirements

Microsoft 32-bit operating system (Windows 2000/XP)

Sun Microsystems J2SE runtime environment 5.0 or better

3 Connecting the Computers and the Instrument

The instrument connection is set up as follows:

1. Connect PC1 LAN port to the CRTU-W Ethernet 1 LAN port via a RJ45 LAN cross-cable.

2. Connect PC1 USB or RS232 port to the UE communication port via a USB or RS232 cable.

3. Connect PC2 LAN port to the CRTU-W LAN switch multiport via a RJ45 LAN cross-cable.

4. Connect CRTU-W RF2 port to the UE antenna coupler via a RF cable.
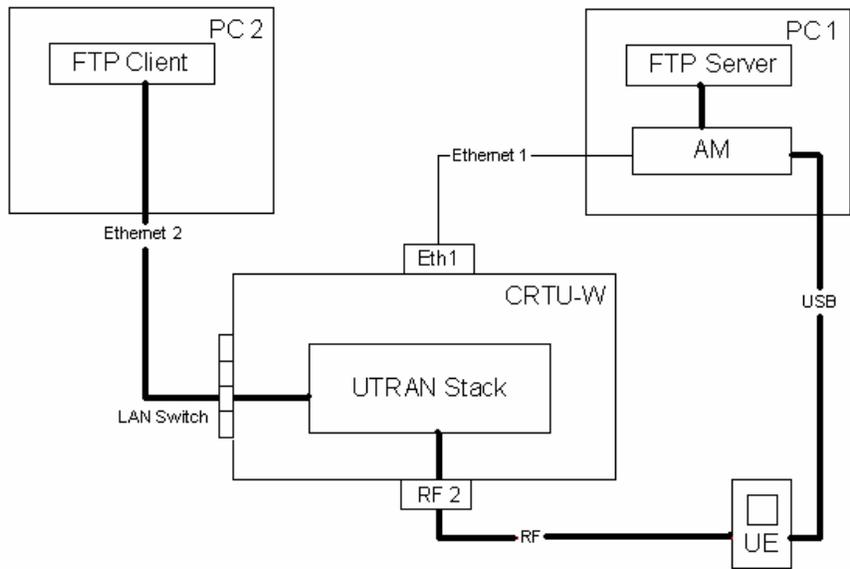
Figure 1: Hardware connection setup

In this example the IP addresses that have been used are:

IP Address CRTU-W Windows 2000 : 169.254.80.27

IP Address CRTU-W UTRAN Stack : 192.168.48.149 (Do not change!)

IP Address PC 1 (FTP Server) : 169.254.54.20

IP Address PC 2 (FTP Client) : 192.168.48.129

Port Number : 4754

Other than the IP Address CRTU-W UTRAN Stack, the other IP addresses are automatically assigned by *Microsoft Windows 2000/XP* once a LAN connection is detected. The IP address can be determined by performing an *ipconfig* in the DOS command window.

The path (in **bold)** represents the data path that will be used for the file transfer from PC 2 to PC 1. Two PCs are used in order to prevent any IP bypass which will let IP data packets travel from the CRTU-W to PC 1 via the Ethernet 1 cable instead of the RF cable.

4   Configuration of Software Tools

4.1   PC 1 Configuration (FTP Server)

Install and setup the following configuration on PC 1:

4.1.1   CRTU-W Automation Manager

Install CRTU-W *Automation Manager* on PC 1.

Set up a new profile or load an existing profile in order to perform automatic power-off and power-on, as well as PDP context activation and deactivation.

For automation of FTP data transfer(s), a few mandatory commands need to be included in the profile:

a.   *Power off UE*

b.   *Please switch on the UE*

c.   *AT\+CGACT=1*

d.   *Start IP(.+)*

e.   *AT\+CGACT=0*

f.   *(.+)*
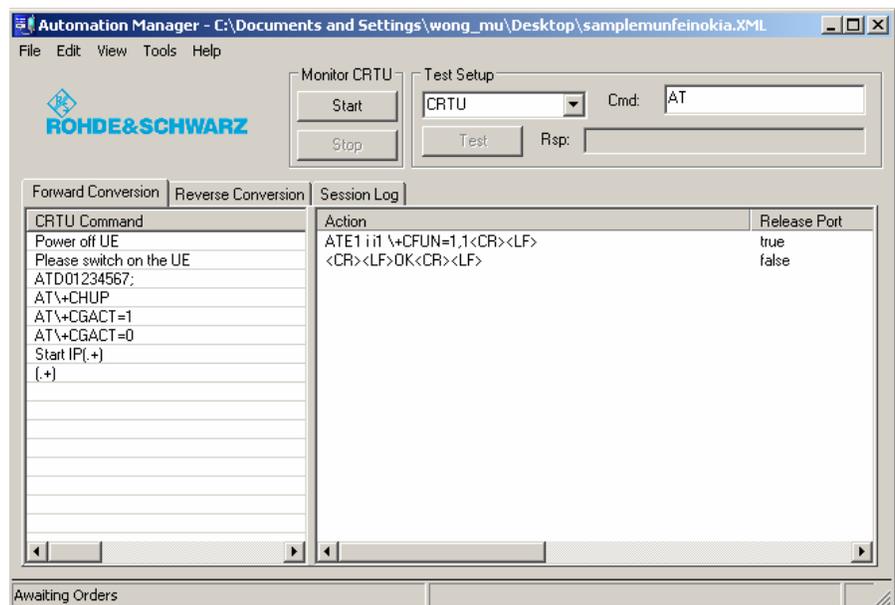
Figure 2: *Automation Manager* Profile

a.   Power off UE

The power-off commands are proprietary to individual UEs. Please obtain it from the UE manufacturer.

b.   Please switch on the UE

The power-on commands are proprietary to individual UEs. Please obtain it from the UE manufacturer.

c.   AT\+CGACT=1

For PDP context activation, *AT+CGACT=1* is used.
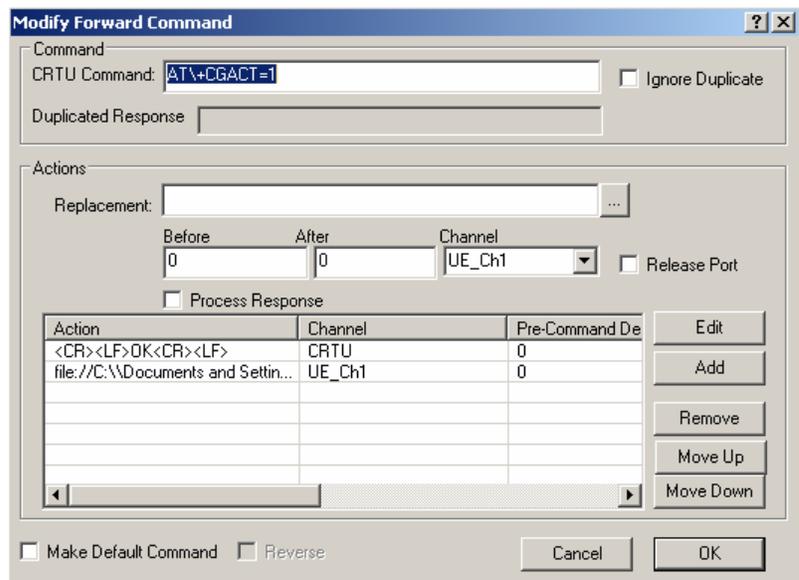
Figure 3: Example for AT Command *AT+CGACT=1*

For the PDP activation command there is a batch file that you need to create that will be called upon by inserting the file location in the *AT\+CGACT=1* command.

The batch file created is called *testrasdial.bat*. This batch file will perform a dialup connection from the UE to the CRTU-W. *DIALTEST* is a dialup connection that you need to create, and more details will be explained in the following chapter on *Dial up Connection*. The contents of the *testrasdial.bat* are as follows:
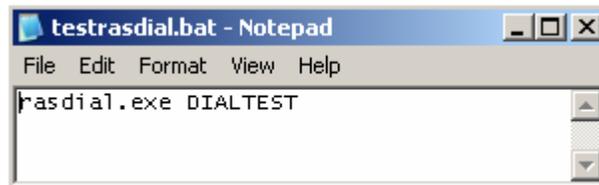
Figure 4: Contents of *testrasdial.bat*

d.   Start IP(.+)

For file transfer, *Start IP(.+)* is used.
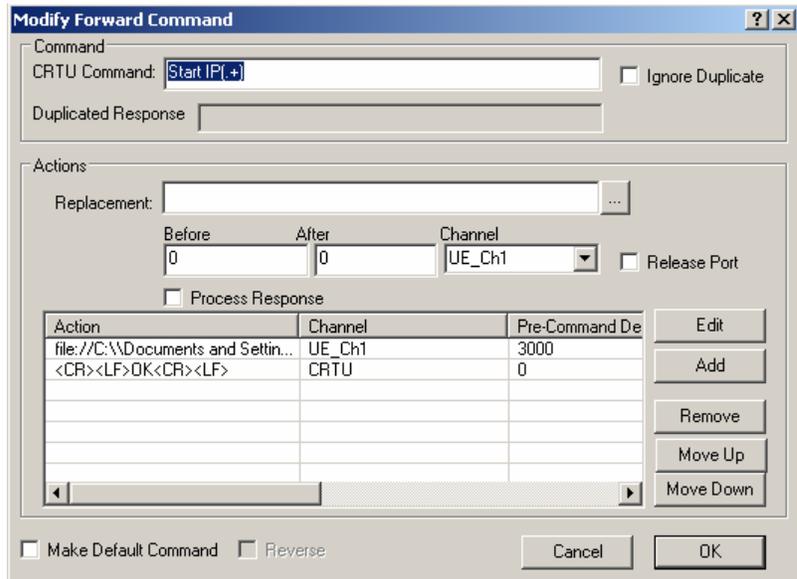
Figure 5: Example for AT Command *Start IP(.+)*

For the file transfer there is a batch file that you need to create that will be called upon by inserting the file location in the *Start IP(.+)* command.

The batch file created is called *testftp.bat*. This batch file will perform a FTP connection from PC 1 to PC 2, with the IP address of PC 2 to be used in the batch file.
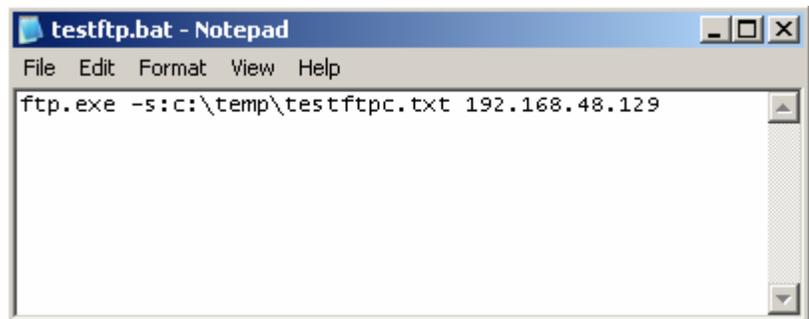

Figure 6: Contents of *testftp.bat*

At the same time a text file called *testftpc.txt* is being called. This text file hides the commands that are physically required to be typed in the DOS window. The contents are shown as follows:
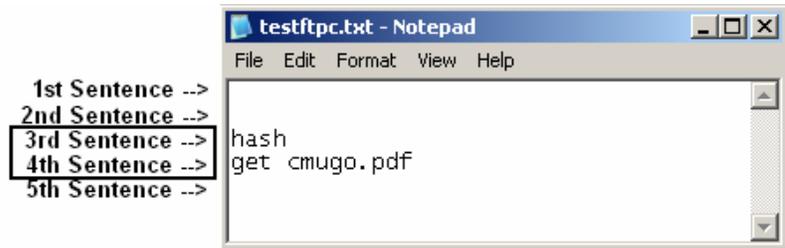
Figure 7: Contents of *testftpc.txt*

The 1st and 2nd sentence is blank to indicate that the *Username* and *Password* for the FTP connection is empty and being set to default. The 3rd sentence is to generate hash while the file transfer is ongoing and the 4th sentence is to retrieve a file from the PC 2, in this example, *cmugo.pdf* is being used for transfer. Change the name to the required file name that you need to use for file transfer. By default, the location of the file needs to be stored in *C:\Temp*.

If you do not need the DOS window to be retained in the background after the test, you can add a *'quit'* as the 5th sentence. The purpose of the retention is to view the throughput which is displayed at the end of the DOS window.

More information on the timing delays requirements are explained in Annex A.

e. *AT\+CGACT=0*

For PDP context deactivation, *AT+CGACT=0* is used.
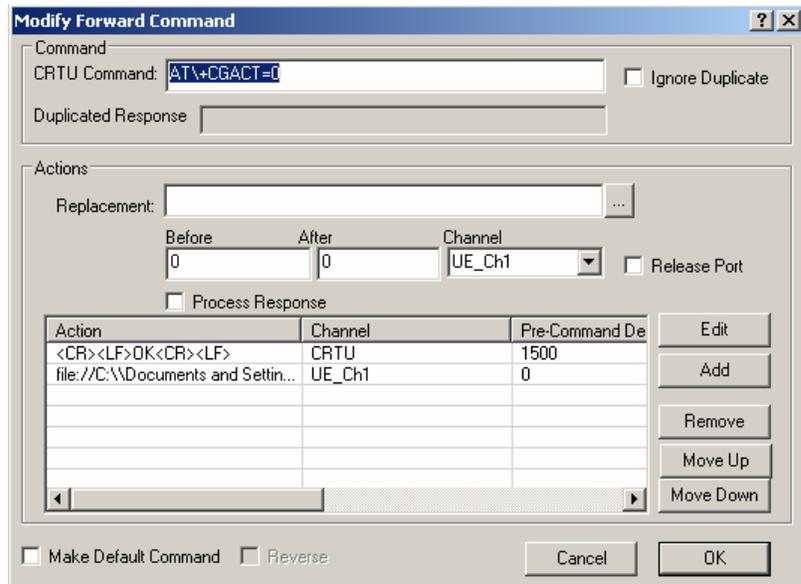
Figure 8: Example of AT Command *AT+CGACT=0*

For the PDP deactivation command, there is one batch file that you need to create that will be called upon by inserting the file locations in the *AT\+CGACT=0* command.

The batch file created is called *testrasdialdc.bat*. This batch file will deactivate the dialup connection *DIALTEST*. The contents are shown below:

Figure 9: Contents of *testrasdialdc.bat*

More information on the timing delay requirements are explained in Annex A.

f.   (.+)

This command will pass any AT commands from the test scenario that goes directly into the *Automation Manager* to the UE without any modifications.

It is important to note that this command must always be included and it must appear as the last command in the *Automation Manager*. This will ensure that only those commands not interpreted by the *Automation Manager* will be routed to the UE.

Set up the *Tools->Channel Setup* to include the CRTU TCP/IP link as follows.

Make sure the *Port number* is similar to the configured CRTU-W Port number, and the *Address* is the address of the CRTU-W Ethernet 1 connection.

The *UE_Ch1* is set to the USB configured *COM port* that is connected to the UE.
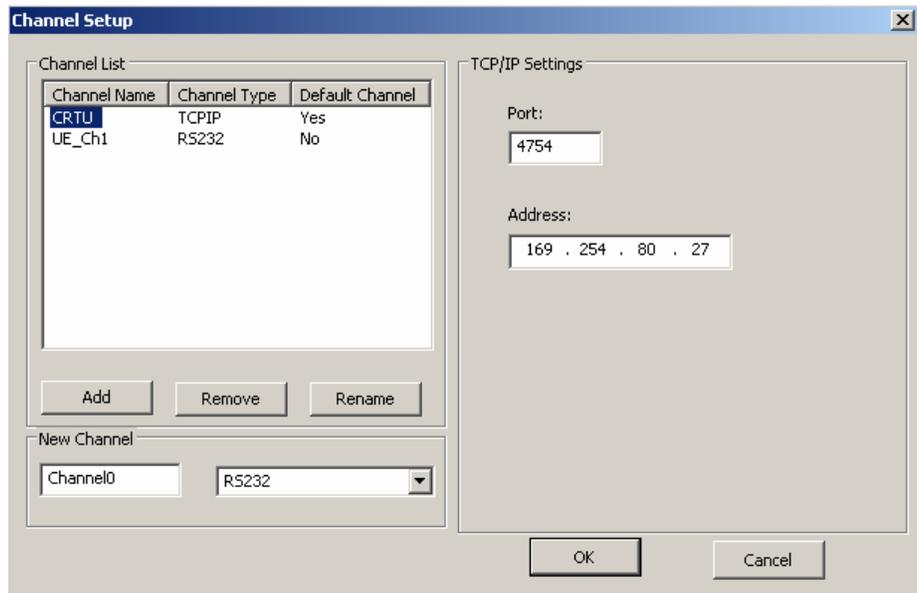
Figure 10: Channel Setup for *Automation Manager*

When the UE is switched on and is correctly linked to the *COM port* configured by the USB drivers, press the *Start* button in the *Monitor CRTU* box. This will start the *Automation Manager* and allow it to monitor the AT commands sent out by the CRTU-W.

Figure 11: Starting the CRTU-W *Automation Manager*

4.1.2 FTP Server

Launch the FTP server which is provided by *CMU-K92* in this example. Any FTP server may be used depending on user's preference.

Figure 12: FTP Server

Ensure the FTP server is started and let the FTP server run in the background without any interactions.

4.1.3 Dialup Connection

Set up a dialup connection from the *New Connection Wizard*.

Figure 13: New Dial-up Connection for *DIALTEST*

An example of connection is created here called *DIALTEST*. Make sure that the modem of the correct *COM port* is selected for the UE, and the number to dial is *99#.*
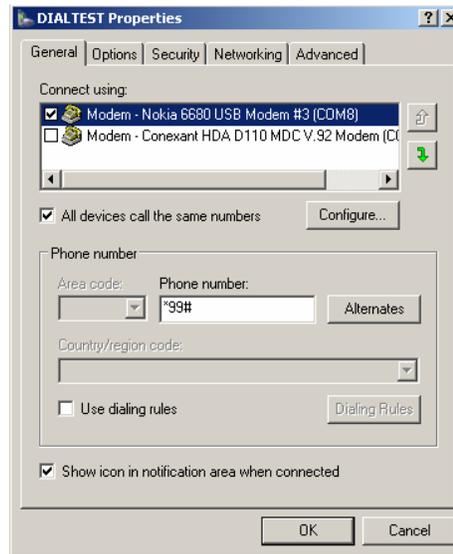
Figure 14: *DIALTEST* Configurations

4.2 PC 2 Configuration (FTP Client)

4.2.1 FTP Client

Launch the FTP client which is provided by *CMU-K92* option in this example. Any FTP client may be used depending on user's preference. The FTP server operates as a FTP client in our example.
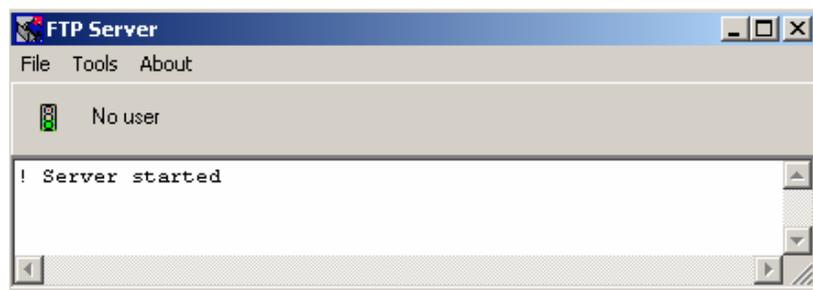
Figure 15: FTP Client Running in Background

Ensure the FTP client is started and let the FTP client run in the background without any interactions.

4.3   CRTU-W Configuration

Set up the following configurations on the CRTU-W.

4.3.1 EMMI Configuration

Open

C:\Rohde-Schwarz\Scenarios\<version>\APPL\MLAPI

rsbasecommon\config\parameters.xml.
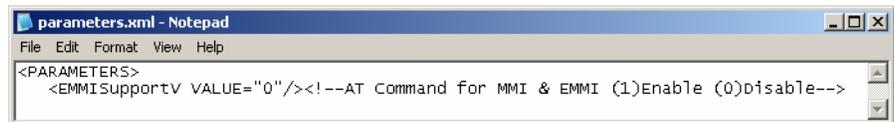
Figure 16: EMMI Configurations on *parameters.xml*

Change to **<EMMISupportV VALUE="1"/>** in order to perform full automation.

In the *Project Explorer*, select *View->Settings* and choose *EMMI Routing Settings* for *TCP/IP* connection.
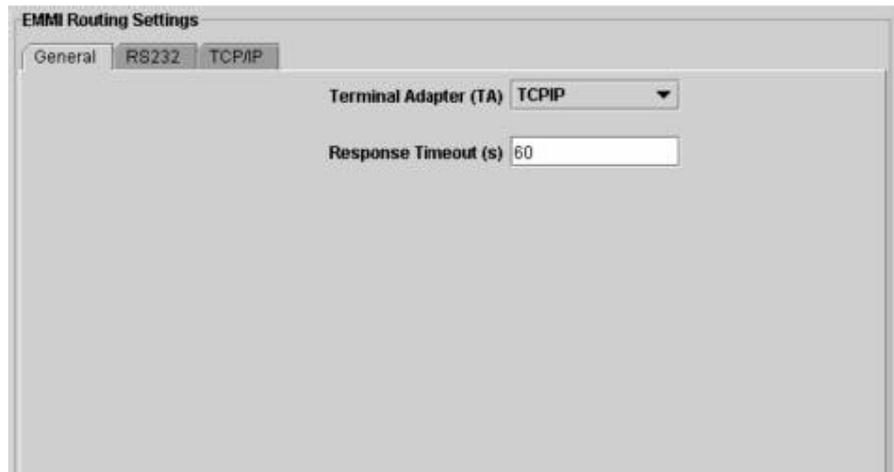

Figure 17: EMMI Routing Settings for CRTU-W

In the *TCP/IP* settings, make sure the *Hostname* is the IP address of PC 1 and the *Port* number is similar to those set in PC 1.
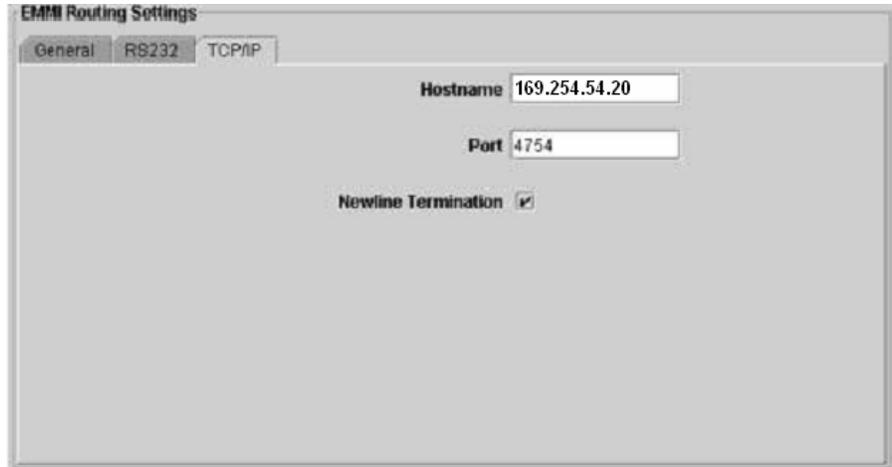
Figure 18: EMMI Routing Settings for Hostname IP Address

4.3.2 MLAPI WT02 program

Install and launch the WT02 program.

Open

C:\Rohde-Schwarz\Scenarios\<version>\MLAPI\WT02

TestProjectWT02.tpd.

Select *rs_003 PS Data* for this particular test example

Run the test using the *Play* icon. The test should now be performed with full automation.
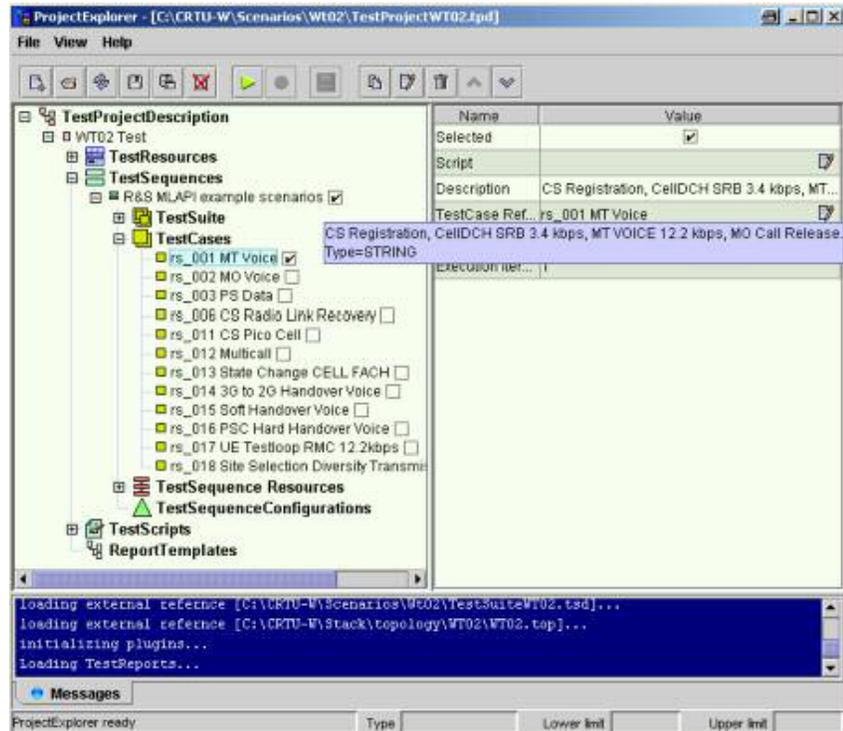

Figure 19: *Project Explorer* to select Test Scenario

Do note that a section of the code is required to be inserted in the WT02 source codes in order to make it work. These code snippets shown below are to be inserted after a PDP context is activated and before the PDP context is deactivated.

```
// Start IP Based Service
if ( retcode == EV_OK )
{
        RUN_NEWP_STATEMACHINE(sM_MMIPrompt, null,
        (string("Start IP Based Service")));
        RUN_NEWP_STATEMACHINE(sM_SystemTC, null,
        ( TC_PRELIMINARY_VERDICT,
        retcode=MLAPI::lastRunReturnCode ) );
}
```

Alternatively, the scenario test example *WZ_01_01_01a Static RAB Setup* from the WZ scenario package can be used, as the abovementioned code snippets are already implemented.

5 Running the Test Scenario in Full Automation

The test can then be restarted by clicking on the *START TEST* pushbutton. Please refer to the CRTU-W Operating Manual for instructions on how to run a test scenario. When the *rs_003* scenario is running, the test scenario will be fully automated so there is no user interaction required.

While the test is running, the *Session Log* in the *Automation Manager* will show you the AT commands being sent to the UE.
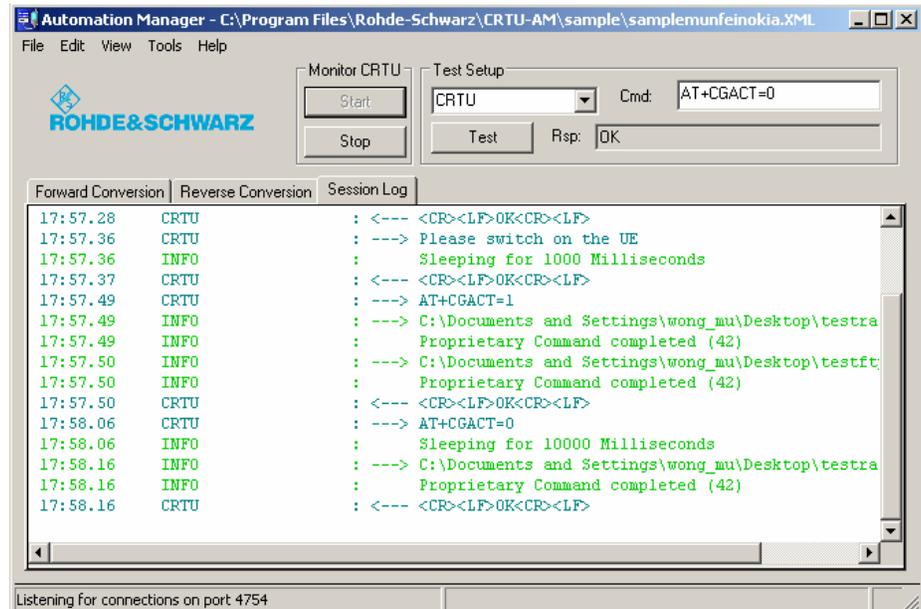

Figure 20: Automation Manager Session Log

The session log window on the PC 1 also shows if a file is being sent properly.
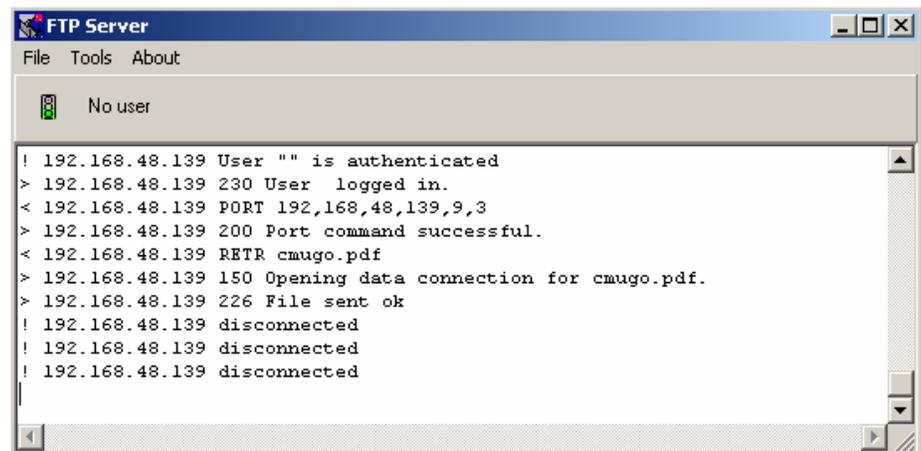
Figure 21: FTP Server Session Log

The FTP throughput can be monitored in the DOS window as shown. Note that if the *quit* command is added to *testftpc.txt* in the 5th sentence, the DOS window will close automatically before the throughput can be read.

Figure 22: FTP Server DOS Screen Session Log

The throughput will need to be read by the operator from the DOS window.

6   Annex A

The timing delays that need to be implemented in the AT commands, *AT+CGACT=1*, *Start IP(.+)*, and *AT+CGACT=0*, can be summarized below with a description of the *Pre-Command Delay* and *Post-Command Delay*. The user needs to set the timing accordingly depending on their applications and requirements.

Pre-Command Delay

This is the time in milliseconds the Automation Manager will wait before sending the replacement command.

Post-Command Delay

This is the time in milliseconds the *Automation Manager* will wait after sending the replacement command, to send the OK response back to the CRTU-W.

AT+CGACT=1	Pre-Command Delay (ms)	Post-Command Delay (ms)
<CR><LF>OK<CR><LF>	0	0
testrasdial.bat	0	0

Figure 23: Timing delays for *AT+CGACT=1* command

Start IP(.+)	Pre-Command Delay (ms)	Post-Command Delay (ms)
testftp.bat	*t1* = 3000	*t2* = 8000
<CR><LF>OK<CR><LF>	0	0

Figure 24: Timing delays for *Start IP(.+)* command

AT+CGACT=0	Pre-Command Delay (ms)	Post-Command Delay (ms)
<CR><LF>OK<CR><LF>	*t3* = 1500	0
testrasdialdc.bat	0	0

Figure 25: Timing delays for *AT+CGACT=0* command

The following figure shows the timing chart of the AT commands when the batch files are being called. The time is an approximation depending on individual files that are being used for the file transfer.
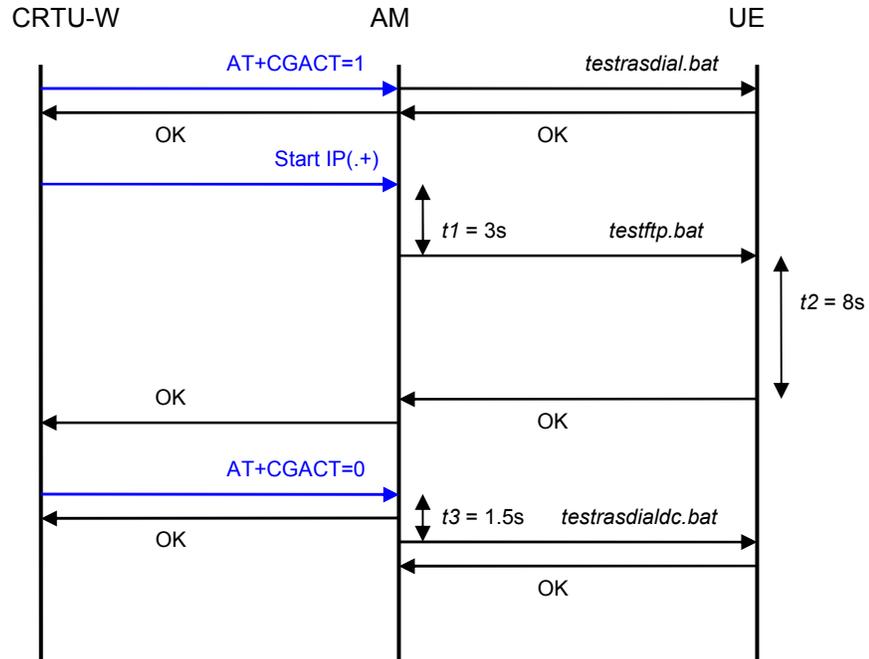

Figure 26: Timing diagram for *AT+CGACT* commands

When the *AT+CGACT=1* command is being sent in from the CRTU-W, the *testrasdial.bat* file is being processed and sent to the UE. This sets up a DIALTEST connection to be dialed up.

When the *Start IP(.+)* command is being sent in from the CRTU-W, the *testftp.bat* is being processed. The time buffer of *t1* allows the DIALTEST to be properly connected, followed by *t2* to allow the *testftp.bat* to activate the FTP server and to let the file transfer to be completed.

When the *AT+CGACT=0* command is being sent in from the CRTU-W, the *testrasdialdc.bat* is being processed after a time delay of *t3* in order to let the file transfer to be completed before disconnecting the dialup connection.

NOTE: t2 needs to be varied accordingly depending on the estimated time of download for the respective file size of the file being downloaded. The time delay t2 must be longer than the actual required download time.

7 Literature

WCDMA Protocol Tester R&S CRTU-W Operating Manual

Automation Manager R&S CRTU-AM Software Manual

8 Ordering Information

WCDMA Protocol Tester

R&S CRTU-W	**Test Equipment for Protocol Verification of WCDMA Mobiles**	1140.0509.K02
R&S CRTU-WT02	C Application Development Tools	1156.3377.02
R&S CRTU-WA11	WAN Adapter Driver for WCDMA/FDD Protocol Stack	1204.0103.02
R&S CRTU-WD04	Serving Scenario for Data Application Test Cases	1204.1600.02

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