

Test and Measurement Division

User Guide

Application Testing with the R&S[®] CMU200

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1 Introduction

Rohde & Schwarz test instruments are well established in the field of radio communication and protocol testing, but some customers have identified the additional need for testing the actual data functions and applications of mobile phones under clearly defined, and reliably reproduceable, conditions. In essence, emerging technologies have demanded a broadening of the testing focus, as applications are increasingly integrated into mobile devices.

The solution here described facilitates Application Testing on a network simulation of (E)GPRS, CDMA2000, or WCDMA, and requires the relevant options for the R&S CMU200. It also relies on a group of software packages, whose installation and configuration are described in this document.

For all three network options, installation of the Application Test Environment (ATE) software makes available various application enablers and testcases: for example, an MMS server, with which sending and receiving MMS messages can be tested.

Although the option of a live internet connection is supported for each of the network simulations, this document describes a test setup which, instead, uses a "Server PC" to provide the various required services within the simulated network.

In the chapters that follow, some familiarity with IP addressing and TCP Ports is assumed, but an overview of these topics is provided in Appendix A.

General guidelines are given for the whole process, from installation through to running the actual tests, and more specific guidance is given for some of the required settings (especially those which are less intuitively accessible). However, for fuller coverage, please refer to the relevant document for the product you are using.

Although the current document is particularly directed towards the Universal Radio Communication Tester, i.e. the R&S CMU200, the test procedures it describes apply equally well, overall, to R&S CRTU Protocol Testers that support the same network simulations.

Hardware and Software Requirements

Application Testing is carried out in a special test environment which simulates a radio network and offers access to various IP Data based services (e.g. servers for file and message transfers, and for video streaming). There are specific hardware and software requirements for the R&S CMU and the Server PC, as follows:

R&S CMU200

Network Support	R&S CMU Options
(E)GPRS	R&S CMU-K92
CDMA2000	R&S CMU-B87, R&S CMU- K87
WCDMA	R&S CMU-K96

For full details, please refer to Appendix C - Mandatory R&S CMU200 HW/SW Configuration

Server PC

For Application Testing over (E)GPRS, you must use a PC that has an available Ethernet port (at least 100 Mbps) and is running either Windows XP or Windows 2000.

For Application Testing over WCDMA or CDMA2000, a free Ethernet port (at least 100 Mbps) is required, but no particular platform is necessary, as long as the various IP Data based facilities are supported. Of course, if you wish to install any of the specific IP Data based packages described in this document then the Windows requirement still applies.

Client PC

Application Testing when the phone is being used as a modem needs a Client PC attached to the phone. There are no particular requirements for this PC, except that it can provide the relevant IP Data based support as required.

Configuration

- 1. A consistent set of IP addresses and TCP Ports is required on the R&S CMU, in the software installed on the Server PC (and Client PC), and in the mobile phone under test. The IP addresses and ports used throughout this document are not mandatory, but if you use different values you are advised to comply with IANA guidelines for non-routable addresses and port numbers.
- 2. Mobile phones are usually supplied with preset factory settings, typically relating to a particular network operator. During MMS testing, for example, it is important to make sure that the message centre address is changed to that of the MMS server within the test environment.

The configuration steps are described below, but for the mobile phone it is not possible to provide exact instructions: there is no universal manufacturer agreement on naming conventions, or on menu layout. It is common to find significant differences even between different models from the same manufacturer. However, the guidelines that *are* given should be enough to locate and set the relevant values.

General System Arrangement

The layout of equipment and software is largely the same for all of the tests described later, but the exact setup depends on the chosen network environment and whether the mobile phone is being used standalone or as a modem for the Client PC.

The general system arrangement for Application Testing is shown in Figure 1. All tests require a PC to be attached to the R&S CMU, and this is referred to as the "Server PC". A second PC, attached to the phone and called the "Client PC", is needed for tests that just use the phone as a modem, such as the FTP session.



Figure 1 General system arrangement for application testing

2 Connection Configuration and Settings

The following sections describe the steps necessary for correct configuration and setting of connections between the R&S CMU200, Server PC, Mobile Phone and, when required, the Client PC.

Note: The IP Addresses used throughout this document form a consistent set that is recommended for your own test setup, but their use is not mandatory. However, if you choose different IP addresses, it is recommended that you follow <u>IANA guidelines</u>, especially in terms of assigned non-routable addresses (i.e. "private IP addresses").

Server PC - R&S CMU200 Connection

Server PC

(1) Setup the Ethernet adapter:

On the Server PC, open the *Control Panel*.

Double-click the Network Connections Icon.

Double-click the icon for the Ethernet Adapter you will use with the R&S CMU200.

Click on **Properties** Tab.

Double-click on Internet Protocol (TC/IP).

Click the Radio button **Use the following IP Address**.

Enter 192.168.168.169 in the IP address field.

Enter 255.255.0.0 for the Subnet mask.

Click OK twice.

Note: the Ethernet card must support speeds of at least 100 Mbps.

Internet Protocol (TCP/IP) Propertie	s ? X
General	
You can get IP settings assigned autom this capability. Otherwise, you need to a the appropriate IP settings.	atically if your network supports sk your network administrator for
C Obtain an IP address automatically	/
• Use the following IP address:	
IP address:	192 . 168 . 168 . 169
Subnet mask:	255.255.0.0
Default gateway:	· · ·
C Obtain DNS server address autom	atically
☐ Use the following DNS server add	resses:
Preferred DNS server:	
Alternate DNS server:	
	Advanced
	OK Cancel

Figure 2 TCP/IP Properties

(2) Only for (E)GPRS Application Testing, a special PC-based software package called the Data Applications Test Suite (DATS) is required. For correct DATS configuration, the following IP addresses have to be set on the Server PC:

Open the file *prostacklink.ini* in the *C:\OPSW\<version>\CR02P2P* folder.

[Config] CMU_IP_ADDRESS=192.168.168.170 WS_IP_ADDRESS=192.168.168.169 IP_PORT=3000 [Log] ENABLE_LOG=0

Note: In addition to setting the IP addresses, make sure that the Port number is set to 3000.

(3) Only for (E)GPRS Application Testing, configure the IP addresses for incoming connections:

Open Network Connections.

Click Incoming Connections.

On the Networking tab, under **This connection** uses the following items, click *Internet Protocol (TCP/IP)*,

Click Properties.

Select Allow callers to access my local area network.

Click Specify TCP/IP addresses.

In From, type the starting IP address.

In To, type the ending IP address.

Select Allow calling computer to specify its own IP address.

R&S CMU200

IP addresses are set in the R&S CMU as follows:

(a) (E)GPRS

Press Setup key on the front panel.

Press TCP/IP tab.

Select the CMU-B21 and expand item.

Set the IP address to **192.168.168.170**. This is the IP address for the link handler R&S CMU-B21.

Set Subnet Mask to 255.255.0.0.

Set Default Gateway to **192.168.0.1**. This is the IP address for the Ethernet network adapter on the Server PC.

Press Connect/Control tab.

Press 1-2 tab.

Press Misc tab.

Set IP Address Server PC to 192.168.168.169.

Press 1-2 tab to return to connection screen.

Incoming TCP/IP Proper	ties	? ×
Network access		
Allow callers to ac	cess my local area network	
TCP/IP address assignm	nent	
C Assign TCP/IP ad	dresses automatically using DHCP	
Specify TCP/IP ac	Idresses	
From:	192 . 168 . 1 . 19	
To:	192 . 168 . 1 . 20	
Total:	2	
Allow calling comp	uter to specify its own IP address	
	OK Car	icel

Figure 3 Configure incoming connections

Ch. 1 Ch. 2 GSM900 Ov	erview		P.D. MCS 6 111 ff Test M. B	L	Connect Control
😑 Setup					
- Setup			Static/Default Ga	iteway	0
CMU-B21 v14 universal Default Settings Static IP Address Subnet Mask Default Gateway CMU-B83 comazooo sig	Signaling Unit 19: 253 19: 19: 19:	2 . 168 5 . 255 2 . 168	. 168 . . 0 . . 0 .	170 0 1	
Print Remote Co	mm. Options	Time	Misc.	тср/ір	

Figure 4 Set IP Addresses for R&S CMU

Ch. 1 Ch. 2	SM900	Overvie	w		P.D. M III †† Test M	ся 6 .в	Ъ	Connect Control
😑 GSM 900	Connectio	n Control 📲						Idle
Setup)				Application 1	esting/IP Ad	ldress Wo	rkstation
Defa • Conn Opy Clor • Autor Bese • Appli IP A Por	ult All Setting ect Control (en autorn if n se autorn if o M Selections the as Meno the as Meno the as Meno t	js Guidance ot connected onnected ; ; (E)GPRS g station	✓ ✓ 19 <u>8</u> 3000	168	. 168	. 169		
Trigger	I/Q-IF	Analyzer				M	lisc.	1 2

Figure 5 Set IP Address for Server PC

Application Testing

(b) WCDMA

Press Setup key on the front panel.

Press TCP/IP tab.

Select the CMU-B21 and expand item.

Set the IP address to **192.168.168.170**. This is the IP address for the link handler R&S CMU-B21.

Set Subnet Mask to 255.255.0.0.

Set Default Gateway to **192.168.0.1**. This is the IP address for the Ethernet network adapter on the Server PC.



Figure 6 Set IP Addresses for R&S CMU

Set the IP address for the Mobile Phone:

Press 1-2 tab.

Press Misc tab.

Enter the Virtual IP address.

The default is 192.168.1.19.

Enter the *UE IP address*. This is the Mobile Phone address during the PPP connection.

The default is **192.168.1.20**.

Press 1-2 tab.



Figure 7 Set IP address for mobile phone

(c) CDMA2000

Press SETUP key on front panel.

Press TCP/IP tab.

Expand the R&S CMU-B83 **CDMA2000 signaling** *unit* item.

Expand Static item.

Enter **192.168.168.170** for *IP Address*. This is the IP address of the R&S CMU during the packet data connection.

Enter Subnet Mask: 255.255.0.0.

Enter *Default Gateway* Address **192.168.0.1**. This is the address of the Server PC.

Press *Escape* and then *Connect Control* tab.

Ch. 1 CDMA2000 NAmer. C	Overview	RC 3/3 H-PSK SO 33	Connect Control
<mark>=</mark> Setup			
-Setup		/Static/Default Gatewa	ay Q
▼CMU-B21 v14 Universal Signalling Unit			
Default Settings	\checkmark		
 Static 			
IP Address	192 . 168	. 168 . 1	70
Subnet Mask	255 . 255	. 0 . 0	
Default Gateway	192 . 168	. 0 . 1	
CMU-B83 CDMA2000 Signalling Unit			
Default Settings			
Type of CMU IP Addressing	Static		
 Static 			
IP Address	192 . 168	. 0 . 2	
Subnet Mask	255 . 255	. 0 . 0	
Default Gateway	192 . 168	. 0 . 1	
 Dynamic 			
Print Remote Comm. Opt	ions Time	Misc. T	CP/IP

Figure 8 Set IP address for R&S CMU and Server PC

Now the setting for the Mobile Phone:

Scroll down and expand *Protocol* item.

Expand *Mobile IP* item.

Set *Mobile Node Home IP Addr* to **192.168.0.10.** This is the IP address allocated to the phone during the packet data session.

Scroll Down and expand PPP item.

Expand IP Address item.

Expand Static item.

Set **MS PPP IP Address** to **192.168.1.20**.

Set **BS PPP IP Address** to **192.168.1.19**.

CDMA2000 ^{N.Amer.} O	verview	RC 3/3 H-PSK SO 33	1	Connect Control
CDMA2000NA.PCS Connection Cont	rol 📄		S	ignal On
-Setup	Priz	mary Service Cl	ass/	
MIP Stand Alone Mode	On			
Mobile Node Home IP Addr.	192 . 168	. 0	10	
Foreign Agent IP Addr.	192 . 168	. 0	. 9	
MS Node Home Agent Secret	cmu			
MS Node Home Agent IPAddr.				
Care Of Address				
MIP Agent Advertisements	On			
Registration Reply Code	0 Reg. accep	ted		
Registration Reply Lifetime	600 s			
▼PPP				
✓IP Address				
✓ Static				
MS PPP IP Address	192 . 168	. 1	. 1	
BS PPP IP Address	192 . 168	. 1	. 2	_
► Dynamic				
Connection Handoff Service Cfg. BS Sig	nal Network	AF/RF 🕀	Sync.	1 2

Figure 9 Set IP address for mobile phone

Connection Check

With all settings made for the connection between Server PC and R&S CMU, we can now check that the connection works:

First make the physical connection between the R&S CMU and the Server PC using a crossover Ethernet cable (Cat 5/RJ-45). Note that the R&S CMU has two Ethernet ports:

- a) The upper port is labeled Ethernet B-87 and should be used for CDMA2000
- b) The lower port is labeled Ethernet B-56 and should be used for (E)GPRS and WCDMA.

Open a Command Prompt window (Start|Run|cmd) and type: ping 192.168.168.170 <Enter>

If the two devices are properly connected, the system confirms a response from the R&S CMU and reports the time taken for the "round trip". If there is a problem with the physical connection, you will see a message that the Ping has timed out. If the IP address setup is wrong, the system reports that the Host cannot be found.

Ping is a very useful command, and perhaps the easiest way to confirm "mutual reachability" across a connection. For details of the command options, type "ping /?".

R&S CMU200 - Mobile Phone Connection

(E)GPRS

Press Menu Select on the R&S CMU front panel.

Scroll Down and select GSM Mobile Station.

Expand the GSM application and select (for example) the **GSM900** function group.

Launch the application.

Note: Make sure the selected GSM band is correct for the phone you are using.

🗖 Manu Salaat		
Selection GSM Mobile Stati	on <mark>(S</mark> SM 900/Signalling/Overview/P/t Normal GMSK -	Hotkeys - Set 1
Basic Functions 3G UMTS User Equipment GSM Mobile Station GSM 400	Non-Signalling → Anatyzer/Generator Signalling → Overview	RF Analyzer/Generator
GSM 850 GSM 900 GSM 1800 GSM 1800		WCDMA UE FDD 📑 Power Maximum
• GSM GT800		WCDMA UE FDD Modulation WCDMA Overview
	Ent	P/t Normal GMSK GSM 400 Overview P/t Normal GMSK
Menu Select	Hotkeys Set 1 Set 2	tkeys Set 3 Assign.

Universal Radio Communication Tester

Figure 10 Setup GSM application

GSM900 Overview Connect GSM900 Connection Control Signal Off AE Connector Overvi **RF** Connector Setur RF 3 OUT RF 2 RF 1 Analyzer 2 🕢 🛛 💮 Generator 2 Output Generator Э er 1 📀 Ext. Att. Output +0.0 dB + 12.0 dB + 0.0 dB RF Input Speech Encoder RF 4 IN RF 2 RF 1 Handset 💵 œ Speech Decoder Ext. Att. Handset 🗉 +0.0 dB + 1 2.0 dB +0.0 dB Input lálideband Power K AF/RF 🕀 Sync. Connection 1 2





Figure 12 Set frequency band and RF parameters

Configure the AF/RF settings as follows:

Press RF Output and select the RF port.

Press Ext. Att. Output and enter the compensation.

Press **RF Input** and select the RF port.

Press Ext Att Input and enter the compensation.

RF Connection Check:

With settings completed, we now check the RF connection (see section 0).

WCDMA

Set the frequency band and RF parameters:

Press the Band Select tab.

Select the band in which the mobile operates.

Press *RF* Chn Downlink or Uplink Chn tab and set the channel or the corresponding frequency.

Set the correct levels for Uplink and Downlink power.

Configure the RF Path:

Press the AF/RF tab.

Press RF Ouput and select the RF Outport port.

Press *Ext Att Output* and enter a compensation value in dB.

Repeat this process for the RF Input port.

RF Connection Check:

CDMA2000

Press Menu select.

The band and RF settings are now complete, so we check the RF connection (see section 0).

Select the IMT2000 Mobile Station function group.

Select the CDMA2000 PCS frequency band.

Press the knob to start CDMA2000 PCS mode.

These settings are now complete, so we check the

Select Signaling -> Overview mode.

RF Connection Check:

RF connection (see section 0).

							Connect Control
	FDD Connec	tion Contr	ol 🛔	PS:	Idle	CS:	Signal On
	AF Connector	Overview		RF	Connector S	etup	
	AUX1 AUX2 Analyzer 2 🕜 💮 Generator 2			RF 3 OUT	RF 2	RF 1	RF Output
	Analyzer 1 🌔	Generator 1	+ 0.0 dB	С⊅ + 15.0 ав	+0.0 dB	Ext. Att. Output	
Speech Encoder		Handset	Ŧ	RF 4 IN	RF 2	RF 1	RF Input
Speech Decoder		Handset	Ŧ	+ 0.0 dB	н 1⊡.0 ав	<mark>э</mark> +0.0 dB	Ext. Att. Input
					_		
Connection	Handover	UE Signal	BS Signal	Network	AF/RF (€ Sync.	1 2



Universal Radio Communication Tester Hotkeys - Set 1 Selection CDMA2000 PCS/Sig Basic Functions Non-Signalling → Analyzer / Gen. Analyzer/Generato AMPS Mobile Station Signalling → Overview GSM Mobile Station AUDIO Analyzer/Generato MT-2000 Mobile Station • CDMA2000 450 CDMA2000 Cellular Analyzer/Generato Modulation CDMA2000 Pr CDMA2000 IMT-2000 • 1xEV-DO TDMA Mobile Station Hotkeys Set 1 Set 2 Hotkeys Set 3 Ass

Figure 14 Configure the CDMA2000 settings

R&S CMU - Mobile Phone RF Connection Check

Run a simple test to confirm that the RF connection between R&S CMU and phone is working correctly:

Set up a link between the R&S CMU and the mobile phone by means of a simple RF measurement, with the settings just entered for frequency and power level, and additional channel configuration and coding.

Mobile Phone - Client PC

For Application Testing when the mobile is being used simply as a modem, a second PC is included in the setup. This is termed the "Client PC" and is attached to the mobile phone.

Mobile Phone

Arrange a suitable connection between the mobile phone and the Client PC: a serial cable link, or a connection that uses either Bluetooth or infra-red. Consult the phone's operating manual for guidance.

Client PC

The objective in this section is to create dial-up networking on the Client PC. However, before you can do that you must install the relevant driver for the mobile phone to which the PC is connected. The software for that, along with instructions for installing it, are usually available for download from the manufacturer's website. Once the relevant driver is installed, you then create the dial-up-networking so you may then setup a packet connection from the Client PC, using the mobile phone as a modem:

Open the Network Connections window, click New Connection Wizard.



Click Next





Select the modem for your phone, click Next. Enter CMU200 as ISP Name, click Next.

Click Connect to the Internet, click Next.



Click Set up my connection manually, click Next. Click Connect using dial-up modem, click Next.



Enter *99# for WCDMA/(E)GPRS packet data, or #777 for CDMA2000 packet data, click Next.



Click the radio button Anyone's use, click Next.



Click Finish.

Wireless Network Card

An alternative to the Clent PC/Phone combination is to use a wireless network card (plugged into the Client PC). A typical setup procedure for installing the software is as follows, but consult the installation documentation that is supplied with the card:.

- 1. Insert the installation CD and start the installation procedure.
- 2. Follow the installer instructions to complete the software installation.
- 3. When prompted to do so, insert the card into the PCMCIA slot on the Client PC.

Note: Do not plug in the card before you start the installation.



Enter the Username and Password, click Next.

3 Service Installation and Configuration

Web Server Lite

From the R&S CMU-K92/R&S CMU-K96 installation CD copy the contents of Freeware\HTTP_Server to the folder C:\HTTP_Server on the Server PC (the default web page and some images for download are included).

The software can also be downloaded from the <u>Gloris</u> CMU Customer Web.

On the desktop, create a shortcut to WebServerLite.exe.

On the Server PC, ensure that the file Index.html is in the folder C:\http_server. This is the default page that will be downloaded to the mobile phone when the packet connection is established via the phone's browser.

Copy into the C:\http_server folder any other files that you want to use for your Web session.

Video Streaming Server

A video streaming server allows you to stream media to clients across the Internet using the industry standard RTP and RTSP protocols. Darwin Streaming Server (DSS) is the open source version of Apple's QuickTime Streaming Server, and can be downloaded from:

http://developer.apple.com/darwin/projects/streaming.

Download the files and follow the installation instructions.

The following sample movies, in 3gp format, are available on the installation CD, and can also be downloaded from the <u>Gloris</u> CMU Customer Web:

RS1-50kbps.3gp RS2-50kbps.3gp RS2-100kbps.3gp

Copy the sample movies into the folder c:\Program Files\Darwin Streaming Server\Movies\.

The files can be viewed with any suitable media player/viewer, such as Quicktime from Apple (<u>http://www.apple.com/quicktime/download/win.html</u>).

Configure the DSS Service

By default, DSS is installed to start automatically when the computer boots. If you prefer manual starting, configure the service as follows, with reference to Figure 15:

- (1) Open the Control Panel and double-click *Administrative Tools*.
- (2) Double-click **Services** for a list of all installed services.
- (3) Double-click *Darwin Streaming Server* to display the DSS Properties screen.
- (4) Click on the down-arrow in "Startup type" and then click *Manual*.
- (5) Click OK.

Darwin Streaming	; Server Properties (Local Computer)
General Log On F	Recovery Dependencies
Service name:	Darwin Streaming Server
Display name:	Darwin Streaming Server
Description:	 ×
Path to executable	
"c:\Program Files\[Darwin Streaming Server\DarwinStreamingServer.exe"
Startup type:	Manual
Service status:	Stopped
Start	Stop Pause Resume
You can specify the here.	e start parameters that apply when you start the service from
Start parameters:	
	OK Cancel Apply

Figure 15 Properties page for DSS

FTP Server

An FTP server is supplied in the folder "Freeware" on the CD for K92 and K96, and can also be downloaded from the <u>Gloris</u> CMU Customer Web.

Copy the program file, Ftpserv.exe, to folder **c:\FTP_Server**. For easy startup later, create a shortcut to Ftpserve.exe on the Server PC desktop.

MMS

Server PC

MMS support is provided as an extension (R&S CRTU-AA01) of ATE: the Application Test Environment software package (R&S CRTU-AP01). You first do a base installation of R&S CRTU-AP01, and then install R&S CRTU-AA01. For detailed information on installation the ATE Desktop software and the MMS plug-in, please refer to the following Manuals:

1204.0003.02 Application Test Environment R&S CRTU-AP01

1166.0958.02 Application Test Environment R&S CRTU-AA01

Preconditions for ATE installation: note that a hardware "Dongle" and software licensing are required for access to the full range of features of the software.

The MMS server, combined with the MMS composer/viewer enables the user to parse, compose, edit, send and receive Multimedia Messages.

The MMS server communicates directly with the mobile phone over the defined (OMA) MMS Interface.

After installing R&S CRTU-AA01, the MMS icon and window are available in the ATE Desktop as shown below, in Figure 16:

💮 Rohde&Schwarz A	ApplicationTestEnvironment Desktop - [MMS]	×
		_ B ×
	MMSC MMS Composer/Viewer	MMS Transaction Explorer
Control Panel	IMM11E] *INF0* decode: X-Mms-Transaction-Id=*1121276587* IMM11E] *INF0* decode: X-Mms-MMS-Version=*1.0* IMMSC] *INF0* Set the reply stream to the peer. [QUEUE] *INF0* Add an event into the event queue. [QUEUE] *INF0* Gas an event into the event queue. [MMSC] *INF0* Get an event into the event queue. [MMSC] *INF0* Gaspatching new event M_ACKNOWLEDGE_IND_SIG [MMSC] *INF0* The variation and with Acknowledge.Ind [L0GGER] *DEBUG* Write an MM1 message to hard disk: /cgo\516_MT_20050713_10_43_28\M-Acknowledge.ind.mm1>. [MMSC] *INF0* The variation is deferred delivered [HTTP] *INF0* creating HTTP message without a body [MMSC] *INF0* Socket[add=/881.31.117.pot=1395_localport=8090]: Socket: Shutdown from Client? [HTTP] *INF0* socket[add=/881.31.11.17.pot=1395_localport=8090]: Socket: Shutdown from Client? [HTTP] *INF0* creating HTTP message e [HTTP] *INF	■ 100_M0_20050509_12_07_05 ■ 101_M0_20050509_12_07_59 ■ 101_M0_20050509_12_07_59 ■ 102_MT_20050510_11_40_10 ■ 103_MT_20050510_11_40_00 ■ 104_MT_20050510_11_46_00 ■ 105_MT_20050510_11_46_00 ■ 105_MT_20050510_14_09_24 ■ 107_MT_20050510_14_19_24 ■ 107_MT_20050512_14_34_01 ■ 110_MT_20050513_09_36_39 ■ 113_MT_20050513_09_37_32 ■ 113_MT_20050513_09_37_32 ■ 114_MT_20050513_09_37_32 ■ 121_MT_20050519_09_32_02 ■ 121_MT_20050519_09_32_24 ■ 121_MT_20050519_09_32_44 ■ 122_MT_20050519_09_32_44 ■ 122_MT_20050519_09_32_44 ■ 122_MT_20050519_09_32_44 ■ 122_MT_20050519_09_32_44 ■ 122_MT_20050519_09_30_40_20 ■ 123_MO_20050519_12_26_54

Figure 16 MMS on the ATE Desktop

The "Serving Scenario" IP address has to match the IP address assigned in the network simulation, i.e. to the Server PC (192.168.168.169). The Port for the Serving Scenario must be 8080. These values are configured as follows:

- (1) Double-click the Control Panel icon on the ATE Desktop.
- (2) Click the Configuration tab, and expand the left hand column (+).
- (3) Click **MMSC** to open the configuration parameters pane.
- (4) Double-click the parameter you wish to change.
- (5) The parameter dialogue box is displayed, as in Figure 17:

👸 Rohde&Schwarz A	ApplicationTestEnvironment Desktop			
	Control Panel			
Control Panel	Overview Configuration OTAP			
MMS	E Configuration	Name Java Log File Name Log Level MM File Extension Pcap File Name Serving Scenario Port Working Directory Parameter Name Serving Scenari Value: [192.168.168]	Type Path String String String String IP Int Path a. 169	Value C:\WINNT\system32\java.exe signaling.xml FAILURE .mm .mm1 signaling.pcap 127.0.01 8080 C:\Program Files\Rohde&Schwar2\CRTU-AA01

Figure 17 MMSC Configuration

🌌 WebServerLite.ini - Notepad
File Edit Format Help
[General] Directories=2 Port=8080 DNSLookup=0 ThreadPoolSize=10
[Dir0] Alias=/ Path=c:\GD03_INET DefaultFile=index.html DirectoryListing=0 Writable=0 Script=0
[Dir1] Alias=/scripts Path=c:\GD03_INET\scripts DirectoryListing=0 Writable=0 Script=1

Figure 18 Webserver Lite configuration (.ini file)

Open the file WebServerLite.ini, as in Figure 18, and change the port number from 80 to 8080 (this is the port on which the webserver listens for requests).

Mobile Phone

There are several settings in the mobile phone which are only used by that phone's MMS client, and some of these will be set to factory defaults (usually relating to a network operator). For connection to the network simulation, some of these values are ignored, and could even be left blank. However, many phones will not even try to connect without these settings, so they still must be set. There is no agreement between manufacturers on naming and location, so it is advisable to follow the relevant phone's user guide for finding and setting them, as well as following the guidelines given below.

Setting MMSC Parameters

The one setting which *must* be located and reset is the address for the Multimedia Message Service Center (MMSC). Typically, this will be preset to the MMSC of a network operator but we must tell the phone that MMS messages are to be routed through the MMSC in the network simulation. If it's location is not clear from the phone user guide, then start your search by looking for menu paths such as:

Settings>Messages>MMS>Service Center Address

Settings>Message Settings>Multimedia Messages >Homepage

Messages>Settings>MMS>Edit Active Settings >Homepage (or Service Center Address)

At the end of the correct path to the MMSC we are looking for a web page name (or IP address), probably with a Port number appended to it. This must be changed to the address for the MMSC in the ATE and the correct port, i.e. <u>http://192.168.168.169:8090</u> (or whatever IP address you have set for the Server PC, plus the MMS port number).

In addition, the following are recommended settings but, as above, it is not possible to predict the exact parameter name and menu location, as these vary from one manufacturer to another (even between different models from the same manufacturer):

Access Point: Ignored by ATE MMSC. Use a meaningful string for this context (e.g. R&S CMU200).

Retrieval Mode: Choose "Immediate".

Creation Mode: Choose "restricted" or "basic" (allows only core content, with size restrictions).

Image/Message Size (restriction): Choose "None".

Expiry/Validity: Ignored by the ATE MMSC, but choose the value for maximum validity.

Requesting Reports (Delivery and Read): Switch off this option.

Deny Reports: Controls whether Read reports are sent. Enable report sending.

Anonymous Messages: Allow.

Adverts: Allow.

(These settings are fully described in the Software Manual for R&S CRTU-AA01, 1166.0958.02)

Over the Air Provisioning (OATP)

If your mobile phone supports OATP, then you have an easier way to set up the MMS parameters (using SMS), without having to search the phone menus. Open the ATE Control Panel and click the OTAP tab. This opens the OTAP pane for entering the MMS parameters, as can be seen in Figure 19, but you first have to set the message format (most mobile phones are OMA, but there is also SEN).

😹 Rohde&Schwarz #	ApplicationTestEnvironment Desktop	
Control Panel	Control Panel Overview Configuration OTAP MMS PoC IMPS	
MMS	Message Format Message Format	WAP Gateway
	Port: 8090 🚊	Port: 9201
	Serving Scenario IP: 192 . 163 . 168 . 169	Port: 8080

Once you have a link established to the mobile phone, do the following:

Enter the parameter values.

Click **Send** to send the SMS to the phone.

Normally, on receipt of the SMS, you have to confirm receipt, and may also need to *activate* the new parameters before they take effect.

Figure 19 Parameter entry for OATP

Email

This section describes how to configure the **Mercury** mail server, which is a Freeware download from the Pegasus mail site <u>www.pmail.com</u> (version 3.32 was used in the preparation of this document).

Installing the Mercury Mail server

The Mercury mail server supports the POP3 and SMTP protocols, among others, and has the ability to send, receive, store, and forward electronic mail from large numbers of clients.

Note: R&S disclaims any responsibility or liability for the above mentioned information. R&S makes no representation or warranty whatsoever as regards the existence, functionality or contents of the links or any relevant application.

The mail server is installed from the self-extracting executable in which it is distributed, as follows:

- 1. Double-click the downloaded **Setup.exe**.
- 2. Click New Installation.
- 3. Click No NetWare Support.
- 4. Accept the default directory path (C:\Mercury) and click OK.
- 5. Click No Pegasus Mail integration.
- 6. Accept the default directory path (C:\Mercury\mail) for mailbox directory and Click OK.
- 7. Select MercuryS SMTP Server Module and "Mercury POP3 Server Module, Click OK.
- 8. Click Install no SMTP client
- 9. Enter the dummy domain name *crtu.net* and username *Admin*, Click *OK*.
- 10. Click *Normal* for the relay control.
- 11. Enter C:\MERCURY\QUEUE for mail queue location, Click OK.
- 12. Click Install Mercury/32 for installation.
- 13. Start the Mercury Server and select *Manage local users...* from the Configuration menu.
- 14. Create a user with Username *DtsUser* and Password *dtspass*.
- 15. Create a second user with Username *Testuser* and Password *testpass*.

User details	
E Settings for this user	
Username DtsUser	
Personal name Dts User	Cancel
Mail pass <u>w</u> ord	
APOP secret	
☐ Administrator privileges (for Per ☑ Copy default mail messages	gasus Mail)

Figure 20 Adding Users

Configuration of Outlook Express

With Mercury mail server installed, we now need a mail client to send and receive mail. This example uses Microsoft Outlook Express, which may already be installed on the Server PC.

rnet Lonnection Wizard		
-mail Server Names		
My incoming mail <u>s</u> erver is a POP3	server.	
Incoming mail (POP3, IMAP or HTTP) se	erver:	
127.0.0.1		
127.0.0.1	d for your outgoing o mail	
127.0.0.1 An SMTP server is the server that is use Outgoing mail (SMTP) server:	d for your outgoing e-mail.	
127.0.0.1 An SMTP server is the server that is use Outgoing mail (SMTP) server: 127.0.0.1	d for your outgoing e-mail.	
127.0.0.1 An SMTP server is the server that is use <u>O</u> utgoing mail (SMTP) server: 127.0.0.1	d for your outgoing e-mail.	
127.0.0.1 An SMTP server is the server that is use Outgoing mail (SMTP) server: 127.0.0.1	d for your outgoing e-mail.	
127.0.0.1 An SMTP server is the server that is use Qutgoing mail (SMTP) server: 127.0.0.1	d for your outgoing e-mail.	

Figure 21 Setting up the server addresses

- 1. Launch Outlook Express.
- 2. Select *Accounts* from the Tools menu.
- 3. Click Add and select Mail.
- 4. Enter *DtsUser* in Display Name, click *Next*.
- 5. Enter <u>DtsUser@crtu.net</u> in Email address, click **Next**.
- 6. Enter the E-mail server addresses as in Figure 21 and click *Next*.

On the next screen, enter account name *DtsUser* and password *dtspass*.

Click Next.

Note: The mail account can be tested by clicking on *Send/Receive* in Outlook Express, with the Mercury mail server running. Outlook Express should successfully connect to the server.

Configuring the Mobile Phone

Some settings must be made in the mobile in order to access the E-mail server. These will vary according to the type of mobile and the access method used (Circuit Switched or GPRS).

It will be assumed here that the profile for connecting the mobile using DATS is already established as described earlier. This could, for example, be used to access WAP servers using the connection, though E-mail can be transferred over either a Circuit Switched or GPRS session.

The following settings are those required for correct configuration of the E-mail service on the mobile:

Setting Name	Value
Mailbox Name	DATS
Access Point	An access point set up correctly for DATS (i.e. that used for WAP testing with the DATS)
My mail address	testuser@crtu.net
Outgoing Mail Server	192.168.1.19
User Name	Testuser
Password	testpass
Incoming Mail Server	192.168.1.19
Mailbox Type	POP3
Security	Off

4 Launch Services

Web Server Lite

To start Web Server Lite on the Server PC:

Double-click the Desktop shortcut, or navigate to c:\http_server and double-click **webserverlite.exe.** (To stop Webserver Lite, close the windows.)

Darwin Streaming Server (DSS)

Services (Local)						
Darwin Streaming Server	Name /	Description	Status	Startup Type	Log On As	
	Alerter 🔁		Notifies sele		Manual	Local Serv
Stop the service	Application Layer Gatewa	ay Service	Provides s	Started	Manual	Local Serv
Restart the service	Application Managemer	Start	Provides s		Manual	Local Syst
	ASP.NET State Service	Chan	Provides s		Manual	Network S
	Ati HotKey Poler	amp		Started	Automatic	Local Syst
	Automatic Updates	Pause	Enables th	Started	Automatic	Local Syst
	Background Intelligent	Resume	Uses idle n		Manual	Local Syst
	Bluetooth Service	Restart	Handles ins	Started	Automatic	Local Syst
	Broadcom ASF IP mon		IP monitori	Started	Automatic	Local Syst
	Clent32	All Tasks		Started	Automatic	Local Syst
	SclipBook	O. Fash	Enables Cl		Manual	Local Syst
	SCOM+ Event System	NEITCHT	Supports S	Started	Manual	Local Syst
	Second System Applicat	Properties	Manages t		Manual	Local Syst
	Computer Browser		Maintains a	Started	Automatic	Local Syst
	Cryptographic Service:	Help	Provides th	Started	Automatic	Local Syst
	Darwin Streaming Server			Started	Automatic	Local Syst
	SefWatch			Started	Automatic	Local Syst
	S DHCP Clent	Manages n	Started	Automatic	Local Syst	
	Distributed Link Tracking	Maintains I	Started	Automatic	Local Syst	
	Distributed Transaction (Subscributed Transaction Coordinator			Manual	Local Syst
	S DNS Client				Automatic	Network S
	Service Service		Allows erro	Started	Automatic	Local Syst
	Second Log		Enables ev	Started	Automatic	Local Syst
	Fast User Switching Con	patibility	Provides m		Manual	Local Syst

Figure 22 Starting the Darwin Streaming Server

- 1. Open the Windows Control Panel and double-click *Administrative Tools*.
- 2. Double-click Services to display the list of available services.
- 3. Right-click *Darwin Streaming Server* to see the command list, as in Figure 22.
- 4. Click *Restart* (or *Start* if the service is installed with manual start).

MMS

- (1) Double-click the Desktop shortcut, or navigate to c:\GD03_INET and double-click *webserverlite.exe.*
- (2) Start ATE Desktop and select **MMS**.
- (3) Click *Start Server* to start the MMS server running.

The button changes to Stop Server (as in Figure 16).

Note: the server must be started before any MMS transactions can be performed.

FTP Server

Either open c:\Ftp_Server and double-click *Ftpserve.exe*, or, Double-click the *FTP_Server* shortcut on the Server PC Desktop. The startup screen is displayed, as in Figure 23



Figure 23 FTP Startup

Email

When starting the mail server, DATS should already be running.

Click Start|(All) Programs|Mercury for win32| Mercury for win32.

Note that the Kannel WAP gateway and Web Server Lite need not be started when testing E-mail.

The appropriate signalling mode (Circuit Switched or GPRS) should be selected in the DATS signalling configuration menu before selecting *Run Test*.

(E)GPRS

Press Connection tab

Press Network Support tab

Use knob to select **GSM+EGPRS** and press knob to validate your selection.



Figure 24 Configure network support

Ch. 1 Ch. 2 GSM90	0 0	verviev	v		Circuit Switched Single Slot	1	Connect Control
😑 GSM 900 Connection Control 🚦 💦 Signa							
Signalling States Circuit Switched Packet Data	Signal On						Signal
✓MS Capabilities MS Revision Level ✓S Bands/PowClass	 support.	GMSK-PC	8PSK-PC	mot	Waiting for bile synchroni call from the r	zation nobile	Off
+ GSM 400 GSM 450							Mobile
GSM 480 GSM 700 GSM 850							Send SMS
GSM 900 P-GSM E-GSM					Circuit Sw	itched 💵	Main Service
R-GSM GSM 1800 GSM 1900				Circuit Packe	t Switched t Data	Q Ente	Network
GSM GT 800 UMTS FDD UMTS TDD						P	Wideband
CDMA 2000 ↓Multislot Class					Peak		Power
Connection	MS	Signal	BS Signal	Network	AF/RF ⊕	Sync.	1 2

Figure 25 Select packet data

Ch. 1 Ch. 2 GSM90	0 0	verviev	J	PD. CS 1 4 T Test M. A			
😑 GSM 900 Connec	🛥 GSM 900 Connection Control 🚪						
■ GSM 900 Connect Signaling States Circuit Switched Packet Data +MS Capabilities MS Revision Level +SBands/PowClass +GSM 400 GSM 450 GSM 450 GSM 450 GSM 450 GSM 450 CSM 450 GSM 450 CSM 4	Signal On Idle support. 	GMSK-PC	8PSK-PC	Waiting for mobile synchronization or call from the mobile. Signal Off Off Test Mode A Off Test Mode A Auto Sid Config Service Selection Auto Sid Config Sig. EGPRS sym. Med. Sig. EGPRS saym. Main Service Downlink only BLER Network Support			
UMTS FDD • UMTS TDD COMA 2000 • Multislot Class	 MS	Signal	BS Signal	Network AF/RF Or Sync. 12			

Figure 26 Initialise Application Test

Press *Main Service* tab Select *Packet Data*

Press Service Selection tab

Scroll down in the list box and select

A yellow box displays the message

Initializing Application Test Please Wait

Approx. 30 Sec.

Application Test.

Before starting a packet data session, you must launch and configure the **R&S CRTU-GD03** (DATS) software. On the Server PC desktop, double-click the **CRTU-GD03** icon, click **Test – Configuration – Signaling,** to open the DATS Configuration pane:

DATS Configuration	\mathbf{X}
Band	
• GSM 900	C GSM 1900 (PCS)
C GSM 1800 (PCN)	C GSM 850
Broadcast Channel	Traffic Channel
ARFCN 36	ARFCN 62
Level -65	Level -65
(E)GPRS Slot Combinati	on Downlink Slots Advanced 💌
Advanced	Uplink Slots Advanced 💌
(E)GPRS Configuration -	
Coding Scheme	MCS6 -
Gamma	7
	,
	OK Cancel

Select band (the same band that was previously selected on the R&S CMU. Set the Broadcast Channel: ARFCN 36 Level -65 Set the Traffic Channel: ARFCN 62 Level -65 Click Advanced. Set Multislot Class to an appropriate value (depends on the phone's multi-shot capability) Set Coding Scheme to MCS6. Set Gamma to 7. Click .OK

Figure 27 DATS configuration

To start the (E)GPRS session, click the Green light icon in the Menu Bar. Ensure that the message "BTS Ready" is displayed:

[Ri	&S CRTU-GDO	3					IX
File	Test View T	ools Help					
	1 🔹 🗐 📈	2					
	Frame	Description		Channel	Sta	atus	
		R&S CRTU-GD03 v2.30 (build 320)					
L		Signalling: (E)GPRS (3+2) - MCS6 - GSM	1 900				
L		AutoLog: Limited to most recent 64000) KBytes				
L		Signalling: (E)GPRS (3+2) - MCS6 - GSM	1 900				
L		Signalling: (E)GPRS (3+2) - MCS6 - GSM	1 900				
L		Starting System					
L		BTS Initialising (GPRS)					
L		BTS Starting					
L		Connected to LAN					
L		BTS Ready					
L							
Ready	/	[DETACHE	ED AF	RFCN 36	TN 0	

Figure 28 Starting the (E)GPRS session

Finally, switch on the mobile phone and wait for "Attach completed".

WCDMA

WCDMARDD Connection Control PS: Attached CS: Registered Setup Packet Switched Packet Switched Default Settings DCH(Dedicated Chn) Type Packet Data Data Rate HSDPA Test Mode HSDPA Test Mode Site Attached Settings Compressed Mode Settings		eceiver Quality	PA	Connect Control
Setup Packet Switched/Packet Data/Date Rate • Node-B Settings • Circut Switched • Packet Switched • Packet Switched Default Settings DCH(Dedicated Chn) Type • Packet Data Data Rate • HSDPA Test Mode • HSDPA Test Mode • HSDPA Test Mode • HSDPA Test Mode • Compressed Mode Settings	😑 WCDMA FDD_Connection Control 🛓	PS: Attached	CS: Re	gistered
 Node-B Settings Circut Switched Packet Switched Default Settings DCH(Dedicated Chn) Type HSDPA Test Mode Packet Data Data Rate 384 ktps Downlink / 64 ktps Uplink HSDPA Test Mode HSDPA Test Mode HSDPA Test Mode HSDPA Test Mode MisDPA Test Mode Mis	Setup	Packet Switch	ned/Packet Data/Dat	ta Rate
	Node-B Settings Circuit Switched Packet Switched Default Settings DCH(Dedicated Chn) Type Packet Data Data Rate HSDPATest Mode HSDPA HS-DSCH Downink Physical Channels TPC Settings Compressed Mode Settings	HSDPA Test Mode	s Uplink	

Figure 29 Set the data rate

Set the Data Rate:

Press **BS Signal** tab Expand **Packet Switched** item Expand **Packet Data**

Set Data Rate to: 384 kbps Downlink / 64 kbps Uplink or to 64 Kbps Downlink / 64 kbps Uplink

	Mo	dulation	CM OF		Connect Control
WCDMA FDD Connection Control	E.	PS: /	Attached	CS:	Registered
_Setup			Requested UE D	ata/Auther	ntication
Default All Settings WCDMA Band Select Packet Switched Domain • Network Identity • Random Access Settings • Requested UE Data Default Settings Authentication Security Secret Key UE Radio Access Capability IMEI SRB Reconfiguration Keep RRC Connection	Part1 Part2	Operating E On Off Off 000102030 08090A0B0 On Off On Off On Off	3and I 4050607 _{hex} CODDEOF _{hex}	4 4	
Connection Handover UE Signal E	3S Sigi	nal Network	AF/RF G	+ Syn	IC. 1 2

Figure 30 Set packet data service

Set Packet Data Service:

Press Network tab.

Set Packet Switch Domain to On.

Expand *Requested UE Data* and turn OFF *security* or *authentification* if necessary.

Finally, switch on the mobile phone.

CDMA2000

Universal Radio Communication Tester 🗖 Menu Select IMT-2000 Mobile Station Selection Hotkevs - Set 1 Basc Functions RF Analyzer/Generator AMPS Nobile Station ▶ GSM Mobile Station AUDIO Analyzer/Gei ▶ IMT-2000 Mobile Station TDMA Mobile Station AMPS Analyzer/Ge Modulation AMPS Overview Modulation GSM 850 🖬 Analyzer/Generato P/(Normal GMSK GSM 850 Overview P/(Normal GMSK Menu Select Hotkeys Set 1 Set 2 Hotkeys Set 3 Assign

Figure 31 Launch CDMA2000



Figure 32 Select frequency band

	00 NAmer. Over	view RC 1/4 So 01 E Connect Control
CDMA2000NA.PCS C	onnection Control	Signal On
Cornection Information Messaging (I/MT2) Information Relected Order Information Mis Information Signalling Setup System ID Number RF Charanel CDMA Power FR Connector In RF Connector In RF Ad th	1 150 - 7C.00 cBm RF2G 0 - 00 dB	Waiting for mobile registration ur call from the mobile.
RF Connector Out RF Ext Att Out → AF G+	RF2 ⊙ ∙ 00 dB	Test Data Service Packet Data Service Messaging (WMT) Speech Service Class Liandby Access Proce
Connection Handott St	avuce Cta HS Signal	Network AL(VL®t Supe
Connection Handoff St	ervice Citg. BS Signal	Network AFJRF 97 Sync. 2

Figure 33 Select packet data service

Launch CDMA2000:

Press **Menu select** key to invoke the Main R&S CMU Menu.

Use the down arrow or knob to select the **IMT2000 Mobile Station** function group.

Use the down arrow or knob key to select the desired frequency band, on this occasion **CDMA2000 PCS**.

Use right, up/down arrows and/or knob to select **Signaling -> overview** mode.

Press the Knob to start the CDMA2000 PCS mode and invoke the Connection Control Menu.

Select Packet Data service:

Press Connection tab.

Press 1st Service Class tab.

Use the knob to navigate and select *Packet Data Service*. (This option will only pop up if the R&S CMU-K87 or K0 option is available).



Figure 34 Set up service to packet data service SO

Ch. Ch.	1 2	DMA2	2000 N.Am PCS	s ^{ner.} O	verv	/iew		R C H S	: 3/3 -PSK 0 33		٦.	Conr Conf	nect trol
<mark>- 0</mark>	DMA2	000NA.PCS	Connection	n Cont	rol 🛔						Sig	gnal C	'n
Г	Setup						Pri	imary Ser	vice Cl	ass/]_0
	•	-CH&SCH	Config		F-R0	2			R-RC				
		FCH& SCI	- Radio Cfg.		3				3				
		 FCHConfig 	g										
		SCH0 Enal	ole		Or	ı			On				
	· ·	 SCH0 Con 	fig		F-SO	CHO-RC	F-SCł	HO-MO	R-SC	HO-RC	R-SCI	HD-MO	
		SCH0			3		093	21 _{hex}	3		092	1 _{hex}	
		SCH0 (Sp	oreading = 3)		3								
		SCH0 QC)F		0								
		SCH0 Da	ate Config		Forv	Jerd			Reve	se			
		■Data Rat	e		- 18	53.6 kb	рз		153	8.6 kbj	D5		
		MuxPDI	Js/Layer		8				8			Comp	ress
		Frame	Гүзе		Ra	ate 2			Rat	e 2			
		Coding			Co	onvolut	ticnal		Cor	voluti	onal		
		Frame Si	ze		20	ms			20 r	ns			
		SCH1 Enal	ole		Ot	t			Off				
													_
Con	nection	Handott	Service Ctg.	BS Sig	nal	Netwo	orK	A⊦∫H	⊪⊕	Syr	nc.	1	z

Figure 35 Set up supplementary channel



Figure 36 Set up BS signal screen

Set up Service to Packet Data Service SO:

Press Service Cfg. Tab. Expand Packet Data Service item. Expand Service Option33 item. Expand FCH & SCH Config item. Turn ON SCH0 Enable.

Set up Supplementary Channel:

Expand SCH0 Config item.

Scroll Down to Data Rate and expand.

Set *MuxPDUs/Layer* to 8 for *Forward* and *Reverse*.

Set **Frame Type** to **Rate 2** for **Forward** and **Reverse**.

Data Rate should display 153.6 Kbps.

Set up BS Signal Screen:

Press **BS Signal** tab Set **RF Channel** to **150** Set **CDMA Power** to **-50** dBm

CDMA2000 NAmer. O	verview Connect
CDMA2000NA.PCS Connection Contr	ol 🛔 Signal On
Setup	Network Identity/Network ID Number
Network Standard	BC 1. N.American PCS
 System Parameters 	
System IC Number	1
Activo/Candidate Window(sra LAINLA)	8 (60 PN Chips)
Neighbor Window (sra+LwinLn)	8 (60 PN Chips)
Remaining Window (sech_win_e)	8 (60 PN Chips)
Protocol Revision	6
Mir. Protocol Revision	1
Base Station ID Number	1
MSI_11_12	01
Use Wildcard	OFF _
Authentication	OFF
Authentication Challenge	EEEEEE hox
*Network Identity	27
Network ID Number	
Connection Handoff Service Cfg. BS Sig	nal Network AF/RF 🗇 Sync. 📃 2

Figure 37 Set network screen

CDMA2000	LAmer. DCS Overview	RC 3/3 11-25K S0 33	Connect Control
UN Overview H-PEK Current	Settings	<mark>(</mark>	Pilot Pow
- 26.00 dBm expected NS Pr	nv/er Meas. Control		Report
measured	CDMA Puww	- 60.0 dEm	
	E-PICH LEVE	- 70 dB	Appii-
Carrier Freq. Error	F-FCH Level	-74 dB	cation
Ty Time Ermr	F-FCH EWNL		
TX TIME ETG	F-SCH0 Level	-7.0 dB	Analyzer
Maveform Quality	F-SCH0 Eb/Nt		Level Tra
Lower Fidebore	F-SCH1 Level	-7.0 dB	<u> </u>
	F-SCH1 Eb/Nt		
Upper-	✓Impairments		
C Statictic Count	AMON Level	Off	
O Statistic Count	DG reg. Offset	Off	DS Signal
Pilot Fower Report	- DC Const Settings		Bo olginal
	E-ECH Frama Pata	Eur I	Level mp
reported F-PICH La	VEI RE Channel	150	
UNI Observations the	RF Freq. (Fyvd)	1937,5000 MHz	BS Signal
	RF Freq. (Rev)	1657.50C0 MHz	Set. P.Ctr
FFR	+Power Contro		
Confidence Level	Power Ctrl. Eits	Auto	
Samario Ector	Secuence Mode	Repested	
Frames	→Area 1		
			1
rview Pilot Power Channel	Overview		Menus

Figure 38 Disable the pilot report

The R&S CMU is now ready for a packet data call. Switch on the mobile phone.

Set Network Screen:

Press *Network* tab. Expand *System Parameters* item. Set *System ID Number* to *1.*

Disable the Pilot Report:

Press **Connect/Control** tab. Press **Menus** tab. Press **Overview** tab. Press **Application** tab. Press **Pilot Power** Report tab and Turn Off the measurement. Press **Connect Control** tab. Press **Connection** tab. Expand **MS Information** in the connection Control box.

6 Run the Application Tests

Web serving

First, we download an html page:

In the phone browser, enter the address of the HTML page to be downloaded:

http://192.168.168.169/index.html

The requested page is displayed on the mobile phone.

Now download a graphic file:

In the phone browser, enter the following address:

<u>http://192.168.168.169/picture.gif</u> The picture is downloaded to the phone and displayed.

Video Streaming

In the phone's browser, enter the following to initiate the video stream:

rtsp://198.168.168.169/RS1-50kbps.3gp

The clip is streamed to the phone and displayed.

MMS

To test the MMS system you can send an MMS from the phone, using the network simulation's IP address as the "phone number" ---- the message will be returned to the phone.

To use any IP address as a phone number, the octets must be expressed in full. So, for example, 192.168.0.2 expands to 192.168.000.002:

Create an MMS message on the phone, perhaps a picture with some text.

For the destination number enter **192168168169** and send the MMS. The phone will announce that the message has been sent, and shortly after (following a "Push" from the network) it will announce that you have a new message: this is, of course, the returning message that you recently sent.

File Transfer (FTP)

Setup dialup networking (WCDMA/EGPRS)

Connect Dial-u	p Connection	<u>? ×</u>
	16	P P
User name:		
Password:		
	Save password	
Dial:	[*] 99#	•
Dial	Cancel Properties	Help

Open the dial-up Networking for your WCDMA/EGPRS phone.

Ensure the number is set to *99#.

Click Dial.

Disconnection

To disconnect the packet data call, click the toolbar icon for the connection and when the dialogue pane is displayed, click **Disconnect**.

Figure 39 Dial-up networking

Setup dialup networking (CDMA2000)

Connect SH7	00_C2K_CMU	? 🛛
C		
User name:		
Password:		
Save this u	user name and password for the follo	wing users:
⊜ Me only O Anyone	who uses this computer	
Dial:	#777	~
Dial	Cancel Properties	Help

Figure 40 Dial-up networking

Open the Dial-up Networking for the CDMA2000 phone you are using.

Click Dial.

Disconnection

To disconnect the packet data call, click the packet connection icon on the toolbar.

Click Disconnect.

Start modem card

From HyperTerminal on the Client PC, you send AT commands to start the modem:

Start the Modem:

- 1. Type twice **ATZ <enter>**. Modem is set in Echo mode.
- 2. Type AT+CGMM. Modem type should display as ATI1.
- 3. Type *AT+CFUN*? Test if radio is ON (+CFUN: 1) or OFF.(+CFUN: 0).
- 4. If Radio is OFF type the command AT+CFUN=1 <enter> and wait until +CFUN: 1 is displayed.

Attach the Modem:

- 1. Type *AT+CGATT?* <*enter*>. The modem will answer +CGATT: 0 if not attached or +CGATT: 1 if attached.
- 2. Type **AT+CGATT=1** to attach the modem, if necessary.

Setup a PDP context:

Type AT+CGDCONT =1,"IP","","192.168.000.020",0,0

This is the IP address of the phone given by the PPP adapter during the packet data session.

Setup a packet call:

- 1. Type the command **AT+CGACT =1,1** to active a PDP context.
- 2. Type the command **AT+CGACT =0,1** to release the PDP context.

Start FTP session

The FTP server should already be running on the Server PC. If not, double-click the FTP shortcut. Alternatively, navigate to c:\FTP_Server and double-click the program icon ftpserve.exe.

To connect to FTP from the Client PC, open a Command Prompt window (or you can use another suitable tool, such as Total Commander) and type *ftp* 192.168.168.169.

A username and password are not required for the ftp client.

Type *hash* (toggles on and off the printing of a # sign for each data block downloaded).

Type *dir* for a listing of available files.

To download a file, use get <filename>, for example: get map.gif.

To upload a file, use *put <filename>*, for example: *put cmu_hspda.pdf*.

When you are finished with FTP, type quit.

Email

Start the email facility in the mobile phone.

Create an email and send it to dtsuser@crtu.net.

Start Outlook Express on the Server PC.

Click Send/Receive to download the email from the mail server.

Reply to the email, or else create a new message and send it to testuser@crtu.net.

Appendix A - Introduction to IP Addressing and Ports

Keywords:	IP Address	CIDR	IPv4	IPv6	NAT	PAT	VISM	DNS
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An IP (Internet Protocol) address uniquely identifies every "Host" (or "Node") connection on an IP Network. Perhaps the best example is the Internet itself, a vast network of computers worldwide, where every directly connected node has such a unique address. Today, most people are familiar with Domain Names for websites (<u>www.Rohde-Schwarz.com</u>, for example) but these are simply a user-friendly disguise for an IP Address. Typically, the web browser that is in use (e.g. Internet Explorer, Mozilla Firefox) obtains a translation of the Domain Name into the relevant IP address, transparently to the user (usually by accessing a "DNS Server"). The resulting IP address identifies the access point on the Internet for the particular site.

An IP address is actually a 32-bit binary number, but is most often represented by four groups of numbers, in "dotted decimal" format (e.g. 206.215.49.9). Each "octet" is the decimal value (0 to 255) of an 8-bit binary number, as can be seen here:

Table 5.1 IP Address Format

Binary	11001110	11010111	00110001	00001001
Decimal	206	215	49	9

In the early days of the Internet, it was thought that 2^{32} unique addresses (32-bit binary number = 4,294,967,296) would be plenty enough for every node to be directly connected, each with its own unique IP address. This was quickly disproved (for some time, the Internet has been roughly doubling in size every year), and refinements were required. The first of these was Classless Inter-Domain Routing (CIDR), which makes much better use of the available address range (the original classification makes a lot of the addresses effectively unavailable), but it is not an adequate solution in the longer term. The real solution would seem to be IPv6, which is currently in the process of introduction. With IP addresses extended from 32 to 128 bits it is inconceivable that IPv6 will not be a durable solution.

Although largely phased out in favour of CIDR, the class-based system is a good introduction to IP addressing and is still common in documentation. There are five classes of address defined, with the leading bits of the first octet identifying in which class the address belongs. IP addresses in Classes A, B, and C notionally split into a Network section, and a Host or Node section:

Class of Address	First bit(s)	1 st Octet Value	Network Section	Node Section
А	0	1 to 126	First octet	Last three octets
В	10	128 to 191	First two octets	Last two octets
С	110	192 to 223	First three octets	Fourth octet
D	1110	224 to 239	n/a	n/a
E	1111	240 to 255	n/a	n/a

Table 5.2 IP Address Classification

Class A: 126 very large networks, each with a possible 16,777,214 nodes.

Class B: A possible 16,384 "medium-sized" networks, each able to support 65,534 nodes.

Class C: Up to 2,097,152 networks, each with a maximum of 254 nodes.

(Classes D and E are reserved, reducing the range of publicly available IP addresses)

IP Subnet Addressing

There are various reasons for subnetting a network. For example, you may wish to incorporate different types of physical network in an IP network, or achieve more control over network traffic (the latter is especially important in Ethernet networks, where heavy traffic can result in degraded network performance due to multiple collisions).

"Gateways", or "Routers", are used to split the network into smaller sections: i.e. into subnets.

Subnet Masks

A subnet mask allows separate identification of the network and host (node) components of an IP address. A bitwise **AND** applied to the IP address and subnet mask reveals the network address as a result. This is easily seen with the Class-based "self-encoded" or "natural" masks, which are 255.0.0.0 for Class A addresses, 255.255.0.0 for Class B, and 255.255.255.0 for Class C, as illustrated here (for Class B):

10011110	11010101	00010001	00001010	158.213.17.10	IP Address
11111111	11111111	00000000	0000000	255.255.000.000	Subnet Mask
	bitv	vise AND			
10011110	11010101	00000000	0000000	158.213.000.000	Network Address

The network can be subnetted further by adding more bits to the self-encoded submask for a particular class. This time, the bitwise **AND** delivers the subnet address, as in this example:

10011110	11010101	00010001	00001010	158.213.17.10	IP Address			
11111111	11111111	<u>1111</u> 0000	0000000	255.255. <u>24</u> 0.000	Subnet Mask			
bitwise AND								
10011110	11010101	00010000	0000000	158.213.16.000	Subnet Address			

In this case, using a four-bit extension to the subnet mask, there are 16 possible subnets (actually only 14 in non-CIDR addressing, since all 0s and all 1s are not allowed). Each subnet has available over 4000 host addresses (using the 12 rightmost bits of the IP address).

Variable Length Subnet Mask (VLSM)

Whilst the concepts described above largely still apply in CIDR, there is a major difference: the fixed size default subnet mask for each class leads to a potentially large number of unused (and unusable) IP addresses, and this is fixed in CIDR by the Variable Length Subnet Mask (VLSM). This scheme is much more efficient in its allocation of IP addresses, and allows that allocation to be more clearly hierarchical (greatly reducing the amount and complexity of routing information held online worldwide). CIDR uses the VLSM to allocate IP addresses to subnets according to the actual need, rather than by the fixed allocation built in to the Class-based system. In particular, the Network/Host division can be at any of the address bits, and this can be seen in the way network details are now expressed: still with the four octets, but with the addition of a "prefix length" number which identifies how many of the leftmost bits are shared by a given IP address "group" (or alternatively, defines the length of the all 1s section in the subnet mask, and by implication the number of 0s that follow).

IANA issues very large, "short-prefix" CIDR blocks to Regional Internet Registries (RIR): for example, the block 62.0.0.0/8, with over 16 million addresses, was issued to RIPE, the European RIR.

Now consider the IP address 208.130.29.33, which at one time was in use by the <u>www.freesoft.org</u> web server (a single IP address, i.e. a host, where the prefix length is assumed, but strictly speaking it could be expressed as 208.130.29.33/32). Block 208.128.0.0/11 (over 2 million host addresses) was issued to MCI by the North American RIR. MCI then leased an Internet connection to ARS, assigning the 208.130.28.0/22 block (over 1000 addresses), and from this allocation ARS used a /24 block for its publicly accessible servers. One of these 32 possible host addresses was 208.130.29.33.

Network Address Translation and TCP Ports

Detailed knowledge of Network and Port Address Translation is not required for understanding the network simulation by the R&S CMU/ATE combination, but the following overview provides an introduction.

All IP addresses for "public" use have to be unique (in that context). This is guaranteed by the IANA (Internet Assigned Numbers Authority), which is ultimately responsible for IP address allocation. Such unique IP addresses are said to be "registered". Typically, a private network will be a LAN (Local Area Network) with mostly internal traffic between computers on that LAN. In the absence of external traffic, the IP addresses need only be unique internally, and could all be "unregistered" (in practice, there will almost always be devices on the LAN which *do* use registered IP addresses).

Network Address Translation

Using Network Address Translation (NAT), a small group of registered IP addresses (in fact, even just one) can represent on the Internet a whole group of computers inside a private network.

The key to understanding NAT is that each IP packet has a header that initially contains:

Source Address (SA) the actual IP address of the sending computer

Destination Address (DA) the (perceived) IP address of the receiving computer

When a LAN member with an Inside Local address (only visible to other LAN members) tries to access a computer on the public network (Outside Global address), its first packet is intercepted by the router, which makes an entry in an Address Translation Table and modifies the packet header accordingly: the original SA (Inside Local address) is mapped to a new SA that is a registered, IANA-assigned "Inside Global" address. The modified packet is forwarded to the destination, which responds to the Inside Global address (not the Inside Local address of the *real* sender). The router now does a reverse lookup in the Address Translation Table and then forwards the response to the computer at the original Inside Local address. The router continues using the table entry for address translation (in both directions) until communication between the two computers ceases. This is shown in Figure 5-1.



Figure 5-1 Network Address Translation

If Inside Local address 10.1.1.1 *always* translates to Inside Global 212.20.5.5 this is termed **Static NAT** (or sometimes **Inbound Mapping**) and is useful when an "inside" computer needs a lot of access to the public network, especially if it must be accessible *from* the public network.

When the network has a block of registered IP addresses (as is common), then **Dynamic NAT** can be configured. Now, an Inside Local address is mapped to the first available registered IP address from the pool. When the mapping is no longer in use, its translation table entry is removed and the Inside Global address is released back to the pool. This allows a potentially large group of computers inside the LAN to share one or a few Inside Global (registered) addresses, over time.

Port Address Translation

Port Address Translation (PAT), often referred to as "NAT overloading", allows multiple private addresses to be mapped simultaneously to just one or a few external addresses.

With reference to Figure 5-1, the Inside Local addresses for *both* computers shown in the LAN can each be mapped simultaneously to 212.20.5.5, but this requires the addition of internally unique "port number" information, to distinguish between the two mappings.

The assigned source port must be above 1023, since ports below 1024 are reserved for standard services. For example, port 80 is reserved for HTTP protocol, so the destination port for access to a web site page will, by default, be port 80.

So now the address translation table (as well as the IP packet header) carries source and destination port numbers in addition to IP address mapping, but the source port alone is sufficient for the router to identify an individual table entry. Consider the scenario shown in Figure 5-2, whose starting point is the IP arrangement used earlier (see Figure 5-1):

PC 1 is running two applications, one of which accesses a web page at 175.24.9.5, the other talking to an application at the remote address 175.20.5.7.

PC 2 is also running two applications, one accessing the same web page as PC1 (175.24.9.5), the other talking to an application at the remote address 213.18.1.2.



Figure 5-2 Port Address Translation

Even when a large number of applications run on many computers in the private network, they can all be mapped to a single registered IP address, though PAT still essentially works in the same way if there are several registered IP addresses in the pool.

Note especially that when two (or more) applications access the same remote address, the unique source port numbers enable correct routing of any response back to the relevant application. Even if the two web page accesses in Figure 5-2 were from different sessions on the same computer, this still holds true. In that case, all source and destination information would be identical ---- except for the source port numbers (which ensure correct reverse lookups for responses).

Appendix B – Frequently Used Abbreviations

The following list of abbreviations is offered as an aid to reading this guide and other documents to which it makes reference.

ATE	Application Test Environment
AE	Application Enabler
CDMA	Code Division Multiple Access
CDMA2000	CDMA version of the IMT-2000 standard
CIDR	Classless Inter-Domain Routing
DNS	Domain Name System (as in DNS Server)
DUT	Device Under Test
EDGE	Enhanced Data Rates for GSM Evolution
EGPRS	Enhanced General Packet Radio Service (also known as EDGE)
FTP	File Transfer Protocol
GPRS	General Packet Radio Service
HTTP	Hyper Text Transfer Protocol
IP	Internet Protocol
LAN	Local Area Network
MM	Multimedia Message
MMS	Multimedia Messaging Service
MMS-C	MMS Center
МО	Mobile Originated
MT	Mobile Terminated
NAT	Network Address Translation
OPSW	Operational Software
PAT	Port Address Translation
RAN	Radio Access Network
ТСР	Transmission Control Protocol
UE	User Equipment
WAN	Wide Area Network
WAP	Wireless Application Protocol
WCDMA	Wideband Code Division Multiple Access
WSP	Wireless Session Protocol

Appendix C - Mandatory R&S CMU200 HW/SW Configuration

R&S CMU-K92: (E)GPRS Application Testing

R&S CMU-B21 v14	Universal Signalling Unit
R&S CMU-B54 v14	Signalling Module
R&S CMU-B56 v14	3GPP Signalling Unit (including Ethernet USU connector)
R&S CMU-B95/-B96	Additional RF Generator
R&S CMU-U65 v04	Measurement DSP Module
R&S CMU-K2024	Required GSM Frequency Bands
R&S CMU-K42/K43	GPRS/EGPRS

R&S CMU-K96: WCDMA Application Testing

R&S CMU-B21 v14	Universal Signalling Unit
R&S CMU-B68 v02	Layer 1 Board
R&S CMU- B56 v14	3GPP Signalling Unit (including Ethernet USU connector)
R&S CMU-U65 v04	Measurement DSP Module
R&S CMU-K65	WCDMA Analyser
R&S CMU-K66	WCDMA Generator
R&S CMU-K61/62/63/67/68/69 (at least one)	WCDMA Bands

R&S CMU-K87: CDMA Application Testing R&S CMU-B87: Interface CDMA Datatest

R&S CMU-B83 R&S CMU-U65 R&S CMU-K83.....86 (at least one)

CDMA2000 Signalling Unit Measurement DSP Module CDMA2000 Bands

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