Cellular Interface

Teldat Dm781-I

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Chapter 1 Introduction

1.1 Introduction

A router cellular interface allows corporate networks to connect to mobile broadband networks.

This interface supports multiple technologies and bands.

Technology	**Band (Frequency)**	Standard	**Diversity**
LTE	Band 1 (2100 MHz) Band 3 (1800 MHz) Band 7 (2600 MHz) Band 8 (900 MHz) Band 4 (AWS) (1700 / 2100 MHz) Band 17 (700 MHz) Band 13 (700 MHz)	3GPP release 8	YES (MIMO)
UMTS (WCDMA) HSDPA HSUPA HSPA+ DC-HSPA	Band 1 (2100 MHz) Band 2 (1900 MHz) Band 5 (850 Mhz) Band 6 (800 Mhz) Band 8 (900 MHz)	3GPP Release 5 3GPP Release 6 3GPP Release 7 3GPP Release 8	YES
GSM GPRS EDGE	GSM 850 (850MHz) GSM 900 (900 MHz) DCS 1800 (1800 MHz) PCS 1900 (1900 MHz)	3GPP Release 99	NO
CDMA	Cellular (800 MHz) PCS (1900 MHz)	TIA-EIA.95-A/B TIA-EIA-IS-2000 TIA-EIA-856	YES
TD-SCDMA	TD-SCDMA (1880-1920/2010-2025 MHz) GPRS (900,1800 MHz)	3GPP TDD	NO

Theoretical data speeds depend on the technology summarized in the following table:

Packet data service		**Theoretical Maximum**
EDGE	Upload	236 Kbps
	Download	236 Kbps
UMTS	Upload	384 Kbps
	Download	384 Kbps
HSUPA	Upload	5.76 Mbps
HSDPA	Download	14.4 Mbps
HSPA+	Upload	5.76 Kbps
	Download	21 Mbps
DC-HSPA	Upload	12 Mbps
	Download	42 Mbps
LTE	Upload	50 Mbps

	Download	100 Mbps
CDMA EvDo	Upload	1,8 Mbps
	Download	3,1 Mbps
TD-SCDMA	Upload	384 Kbps
	Download	2,8 Mbps

Moreover, they are grouped into categories depending on the maximum speed supported by each module within each technology.

Effective speeds obtained by each technology are variable and depend on multiple factors such as, for example, the availability of the network, the network load, what it is being used for, the quality of the received signal and the number of users sharing it.

Support for technologies and bands depends on the cellular module installed.

For further information on the module installed in your router, please contact your dealer.

This manual contains information on how to configure and monitor these interfaces.

1.2 Additional Information

1.2.1 Installing SIM

When inserting a SIM card, please protect yourself against electrostatic discharges (ESD).

Do not touch the SIM card connector.

If the device being used allows you to select a SIM port, use the following configuration menu command to configure the port prior to inserting the SIM:

sim-select <option>

Note

Keep in mind that with some devices you cannot use commands to select the SIM (socket) port (e.g., PMC HSDPA/HSUPA DATA).

1.2.2 Placing the Antenna

Antenna orientation and its location with respect to other wireless and radiation devices (such as communication devices, personal computers, etc.) can significantly influence device performance.

Antennas transmit and receive radio signals. Performance is also affected by environmental factors such as the distance between the device and the base station, physical obstacles and other interferences due to radiofrequencies (RF).

For optimum coverage, follow these steps:

- Whenever, possible, make sure that there are no physical obstacles between the antenna and the base station. Obstacles between the antenna and the base station can degrade the wireless signal. Place the antenna above ground level facing the nearest base station.
- The density of materials also affects antennas. Place them away from all types of walls, metal screens, mirrors, etc.
- Do not place the antenna near columns, which may throw shadows and reduce the coverage area.
- Keep the antenna away from metal pipes such as canals, air-conditioning, etc.
- Please bear in mind that other wireless devices (such as telephones, microwaves, etc.) can temporarily interfere with the quality of the wireless signal.
- We do not recommend installing antennas in racks containing communication devices, computers, etc. Use an extension cable and place the antenna outside.
- If your SIM card supports antenna diversity and does not require a secondary antenna, the latter must be disabled through the diversity command (found in the configuration menu).

1.2.3 Security Information

The following recommendations apply to all wireless devices:

- Do not touch or move the antenna while the device is transmitting or receiving.
- When the antenna is transmitting, do not touch any radiating equipment that is close to any exposed part of the body (particularly the face and eyes).
- Do not install the device in areas where the atmosphere is potentially explosive.
- Wireless devices can cause interferences in other devices. Do not use the device in areas where medical equipment is installed.
- To ensure the R&TTE 1999/5/EC directive is complied with, the device must be operated at a minimum distance of 20 cm from a person's body.

Chapter 2 Configuration

2.1 Accessing the Interface Configuration

To access the interface configuration menu, first access the general configuration menu and from there access the cellular interface.

```
Config>list device
Interface            Connector     Type of interface
ethernet0/0          GE0/FE0/LAN1  Fast Ethernet interface
ethernet0/1          GE1/FE1/LAN2  Fast Ethernet interface
serial0/0            SERIAL0/WAN1  Auto Install Interface
bri0/0               BRI/ISDN1     ISDN Basic Rate Int
x25-node             ---           Router->Node
               cellular1/0 SLOT1 AT COM
               cellular1/1 SLOT1 AT COM
               cellular1/2 SLOT1 AT COM
ppp1                 ---           Generic PPP
Config>
```

There are three interfaces for each card.

BASE cellular1/0 Interface:

Constant link monitoring is carried out over this interface. Network connection parameters are also configured here.

It is also used for making voice calls.

In dual context data configurations, this interface is used to associate the second context.

The base cellular interface appears as **cellular1/0** in this example:

```
Config>network cellular1/0
-- Interface AT. Configuration  --
cellular1/0 AT config>
```

SECONDARY cellular1/1 Interface:

This interface is normally associated with data connections and does not allow programming of network configuration parameters (pin, network mode).

The secondary cellular interface appears as **cellular1/1** in this example:

```
Config>network cellular1/1
-- Interface AT. Configuration  --
cellular1/1 AT config>
```

TERTIARY cellular1/2 Interface:

This interface is normally associated with data connections and does not allow programming of network configuration parameter (pin, network mode).

The tertiary cellular interface appears as **cellular1/2** in this example:

```
Config>network cellular1/2
-- Interface AT. Configuration  --
cellular1/2 AT config>
```

2.2 Configuration Commands

This section focuses on interface configuration commands.

Not all commands are available for all interfaces. Availability depends on the type of interface. Commands related to module behavior in the network are only available for the base interface.

Available configuration commands are as follows:

Command	Function
? (HELP)	Lists available commands or their options.
ADDITIONAL-CONTROL-COMMAND	Configures connectivity control.
COVERAGE-DISC-TIME	APN disconnection time to obtain coverage measurement.
COVERAGE-TIMER	Coverage monitoring timer.
DIVERSITY	Diversity options at reception.
GPS	GPS configuration options.
LOCAL-ADDRESS	Configures local number for interface.
NETWORK	Configures network parameters for connection.
NO	Sets default values or negates a command.
PIN	Programs a PIN number for the SIM module used.
RECORD-CHANGES	Configures record-changes in some connection parameters, for debugging problems.
REGISTER-DENIED-RESET	Resets 3G module radio interface when register status for the mobile network is DENIED.
REGISTRATION-APN	Configures APN when you register in the carrier network. Mandatory for some LTE networks.
REGISTRATION-AUTHENTICATION	Configures authentication parameters for the APN used when registering in the carrier network. Mandatory for some LTE networks.
SIM	Configures dual SIM management parameters, if supported by the hardware.
SIM-SELECT	Selects active SIM or main SIM where hardware supports two SIMs.
SMS	Configures SMS message reception feature and commands via SMS messages.
VOICE-CALL	Configures voice-call supervision parameters according to the coverage and module registration with the cellular network.
WAIT-TIME	Configures maximum physical connection wait time.
EXIT	Returns to the configuration menu.

When it comes to certain devices, you may need a guide on what SIMs can be assigned to a given module and how to make them work. Since only two SIMs can be assigned to a module, the first assignable SIM is always referred to as **external-socket-1** and the second (where applicable) is always referred to as **internal-socket-2**. For example, when you set a dual-SIM configuration for the first module in an H2 Auto+ device, the parameters under **external-socket-1** are applied to the SIM in external tray SIM1 and the ones under **internal-socket-2** are applied to the SIM in external tray SIM3. However, if you are configuring a dual-SIM for the second module in an H2 Auto+, parameters under **external-socket-1** are applied to the SIM in external tray SIM2 and those under **internal-socket-2** are applied to the SIM in external tray SIM4.

This table shows some of those mappings (devices where the meaning of **external-socket-1** / **internal-socket-2** is unambiguous are not shown):

Device and module	external-socket-1	internal-socket-2
H2 Auto+ MOD1	SIM 1	SIM 3
H2 Auto+ MOD2	SIM 2	SIM 4
H2 Auto+ MOD3	SIM 3	X
H2 Auto+ MOD4	SIM 4	X
H2 Rail MOD1	SIM 1	SIM 3
H2 Rail MOD2	SIM 2	SIM 4
H2 Rail MOD3	SIM 3	X
H2 Rail MOD4	SIM 4	X
H2 Rail Lite MOD1	internal SK 1	internal SK 2
H2 Rail Lite MOD2	internal SK 2	X
H2 Auto MOD1	FRONT SIM	X
H2 Auto MOD2	REAR SIM	internal SK

2.2.1 ? (HELP)

Lists all valid commands and their available options at the layer where you are configuring the router.

Syntax:

```
cellular1/0 AT config>?
```

Example:

```
cellular1/0 AT config>?
  additional-control-command    Set additional AT commands
  coverage-disc-time            Set APN disconnection time for coverage measure
  coverage-timer                Set timer for coverage measure
  description                   Enter interface description
  diversity                     WCDMA receive diversity options on HSUPA
                                modules
  gps                           Configures GPS options
  local-address                 Configures the local number for the interface
  network                       Network connection mode configuration
  no                            Negate a command or set its defaults
  pin                           Set PIN number for active SIM
  record-changes                Set events recording parameters
  register-denied-reset         Set RF module restart for DENIED registration
  registration-apn              Configure APN for network registration time
  registration-authentication   Configure authentication parameters for the
                                network registration APN
  shutdown                      Change state to administratively down
  sim                           Double SIM management parameters
  sim-select                    Set active/main SIM
  sms                           SMS configuration
  update                        Update a level indicator
  voice-call                    Voice-call supervision
  wait-time                     Set maximum connection time
  exit                          Return to previous menu
cellular1/0 AT config>
```

2.2.2 ADDITIONAL-CONTROL-COMMAND

Displays additional AT commands to configure the internal module. Admits a string of up to 59 characters. Default is no configuration. This command is sent to the module after the last start up command.

Syntax:

```
cellular1/0 AT config>additional-control-command ?
  no-command    No command for this action
  <word>        Text
```

Example:

```
cellular1/0 AT config>additional-control-command i
```

Example:

```
cellular1/0 AT config>additional-control-command no-command
```

2.2.3 COVERAGE-DISC-TIME

Allows you to configure the maximum time a data connection is established for, in order to obtain monitoring information from the radio interface.

This command is only valid in devices that support simultaneous dual context maintenance (APN). If you need to maintain a dual context (two simultaneous data sessions), monitoring information from the radio interface will be unavailable. This command (when configured together with other dial profile commands) enables the device to drop the current connection, obtain monitoring data and subsequently reestablish said connection.

This command is dynamic (i.e., you do not have to restart the device for the value to take effect, provided said command is executed from **P5**), which means you can interrupt the periodic monitoring information collection process. It also makes accessing the device through a data connection for said interface possible, as well as executing maintenance or configuration tasks (Telnet, FTP, SSH, etc., sessions aren't interrupted). You can also download device software, monitor protocols in use, etc.

To execute these operations, simply deactivate this feature by setting the parameter to zero (so the device doesn't disconnect the active data session). Once the tasks you wanted to execute have come to an end, reconfigure this

parameter so the device resumes its periodic monitoring activity.

Accepts values ranging from 0 to 172,800 seconds.

A 0 value deactivates this feature.

This can only be entered in a **cellularX/0** interface, as this is the only interface that can obtain monitoring information.

Syntax:

```
cellular1/0 AT config>coverage-disc-time ?
  <0..172800>    Value in the specified range
```

Example:

```
cellular1/0 AT config> coverage-disc-time 300
```

2.2.4 COVERAGE-TIMER

Automatically selects the frequency used to analyze the quality of reception (+CSQ) and to sample network connection data. Data may be subsequently monitored through the **network state** command. Accepts values ranging from 10 to 255 seconds. Default is 60.

Syntax:

```
cellular1/0 AT config> coverage-timer ?
  <10..255>    Value in the specified range
```

Example:

```
cellular1/0 AT config>coverage-timer 10
```

2.2.5 DIVERSITY

Allows you to select **diversity** operating mode on the reception side (for modules that support this functionality).

This mechanism improves signal reception and the quality of the signal in wireless systems. It is based on using multiple antennas to receive multiple copies of the signal, and combining these copies of the signal to mitigate the effects of propagation (multipaths, phase displacements, delays, attenuation, distortion, etc.).

The options are as follows:

Command	**Function**
DISABLED	Disables diversity functionality at reception. Select this mode if you only have one antenna.
ENABLED	Allows diversity to be configured at reception. 2 antennas, primary and auxiliary, **must** be connected. This is default.
PRIMARY-PATH	Allows the auxiliary antenna to operate as main.

Syntax:

```
cellular1/0 AT config> >diversity ?
  disabled        Disable Rx diversity
  enabled         Enable Rx diversity
  primary-path    Rx diversity is primary path
```

Example:

```
cellular1/0 AT config>diversity disabled
```

2.2.6 GPS

Enables/disables NMEA message reception.

For further information on GPS, please see manual Teldat *Dm812 - GPS*.

Syntax:

```
-- Interface AT. Configuration  --
cellular1/0 AT config>gps ?
  enable        Enable GPS reception
  cellular1/0 AT config>gps
```

Example:

```
cellular1/0 AT config>gps enable
```

2.2.7 LOCAL-ADDRESS

Configures a **local-address** assigned to an interface and used for voice functions.

Syntax:

```
cellular1/0 AT config> local-address ?
  <1..23 chars>    Local address
```

Example:

```
cellular1/0 AT config>local address 66666666
```

2.2.8 NETWORK

Configures network options in the device.

Options are:

Command	Function
DOMAIN	Selects type of data domain (Circuit, Packet or Both).
MODE	Selects network mode (GPRS, WCDMA, LTE or AUTO).
CDMA	CDMA network preferences.
BAND-PREFERENCE	Selects network band preferences.

2.2.8.1 NETWORK DOMAIN

Allows you to choose the data mode.

The PS (Packet Service) mode is normally used for UMTS/HSDPA and supported by the carrier.

Syntax:

```
cellular1/0 AT config>network domain ?
  cs       Circuit switched only
  ps       Packet switched only
  cs+ps    CS+PS
```

Example:

```
cellular1/0 AT config>network domain ps
```

2.2.8.2 NETWORK MODE

Allows you to select the type of technology used when connecting to the cellular network and to sort them in order of preference. By default, the network mode is "*automatic*". In automatic mode, the module will connect using the best technology the cellular network can provide.

Syntax:

```
cellular1/0 AT config>network mode ?
  automatic          Automatic
  gprs               GPRS only
  wcdma              UMTS only
  gprs-preferred     GPRS preferred
  wcdma-preferred    UMTS preferred
  lte                LTE only
  cdma               CDMA (2G) only
  hrpd               CDMA HRPD (3G) only
  hybrid             CDMA Hybrid CDMA/HRPD
```

Example:

```
cellular1/0 AT config>network mode wcdma
```

Command history:

Release	Modification
11.00.07	Default value changed from WCDMA to AUTOMATIC as of version 11.00.07.
11.01.02	Default value changed from WCDMA to AUTOMATIC as of version 11.01.02.
11.00.07	CDMA, HRPD and HYBRID options added as of version 11.00.07.
11.01.02	CDMA, HRPD and HYBRID options added as of version 11.01.02.

2.2.8.3 NETWORK CDMA

Allows you to select the type of technology used when connecting to CDMA networks. Default is *"hybrid"*.

Syntax:

```
cellular1/0 AT config>network cdma ?
  hybrid    Automatic
  1xrtt     CDMA 1xRTT (2G) only
  evdo      CDMA EVDO (3G) only
```

Example:

```
cellular1/0 AT config>network cdma evdo
```

Command history:

Release	Modification
11.00.07	This command is obsolete as of version 11.00.07.
11.01.02	This command is obsolete as of version 11.01.02.

2.2.8.4 NETWORK BAND-PREFERENCE

Allows you to select the network band preferences (i.e., the bands allowed at each module for every technology).

Syntax:

```
cellular1/0 AT config>network band-preference ?
  lte-fdd    Select LTE-FDD bands
  lte-tdd    Select LTE-TDD bands
  wcdma      Select WCDMA bands
```

Command history:

Release	Modification
11.00.07	This command was introduced as of version 11.00.07
11.01.01.70.01	This command was introduced as of version 11.01.01.70.01
11.01.02	This command was introduced as of version 11.01.02

2.2.8.4.1 band-preference lte-fdd

Selects the preferred bands for LTE-FDD technology. The bands are entered as a list of numbers separated by commas, where each number identifies a band for the desired technology. If you want to disable all the bands for this technology, please use the *"none"* option. All bands supported by the cellular module are enabled by default.

Syntax:

```
cellular1/0 AT config>network band-preference lte-fdd ?
  <values 1-32>    LTE FDD Band number
  none             All LTE FDD Bands disabled
```

Example:

```
cellular1/0 AT config>network band-preference lte-fdd 3,7,20
```

2.2.8.4.2 band-preference lte-tdd

Selects the preferred bands for LTE-TDD technology. The bands are entered as a list of numbers separated by commas, where each number identifies a band for the desired technology. If you want to disable all the bands for this technology, please use the *"none"* option. All bands supported by the cellular module are enabled by default.

Syntax:

```
cellular1/0 AT config>network band-preference lte-tdd ?
  <values 1-32>    LTE TDD Band number
  none             All LTE TDD Bands disabled
```

Example:

```
cellular1/0 AT config>network band-preference lte-tdd none
```

2.2.8.4.3 band-preference wcdma

Selects the preferred bands for WCDMA technology. The bands are entered as a list of numbers separated by commas, where each number identifies a band for the desired technology. If you want to disable all the bands for this technology, please use the *"none"* option. All bands supported by the cellular module are enabled by default.

Syntax:

```
cellular1/0 AT config>network band-preference wcdma ?
  <values 1-32>    WCDMA Band number
  none             All WCDMA Bands disabled
```

Example:

```
cellular1/0 AT config>network band-preference wcdma 1,5
```

2.2.9 NO

Sets default values.

Syntax:

```
cellular1/0 AT config>no <command>
```

Example:

```
cellular1/0 AT config>no ?
  additional-control-command    Set additional AT commands
  coverage-disc-time            Set APN disconnection time for coverage measure
  coverage-timer                Set timer for coverage measure
  description                   Enter interface description
  diversity                     WCDMA receive diversity options on HSUPA
                                modules
  gps                           Configures GPS options
  local-address                 Configures the local number for the interface
  network                       Network connection mode configuration
  pin                           Set PIN number for active SIM
  record-changes                Set events recording parameters
  register-denied-reset         Set RF module restart for DENIED registration
  shutdown                      Change state to administratively down
  sim                           Double SIM management parameters
  update                        Update a level indicator
  voice-call                    Voice-call supervision
  wait-time                     Set maximum connection time
cellular1/0 AT config>
```

2.2.10 PIN

Configures a **PIN** number for a SIM inserted in the module.

Syntax:

```
cellular1/0 AT config> pin ?
  ciphered    Enter ciphered PIN
  plain       Enter plain PIN
```

Example:

```
cellular1/0 AT config>pin plain 1235
```

Note

On listing interface configuration, the PIN value is displayed in ciphered mode.

Example:

```
cellular1/0 AT config>show conf
; Showing Menu and Submenu Configuration ...
   pin ciphered 0xFEC7DB8210108C93
```

2.2.11 RECORD-CHANGES

In order to debug problems, it may be a good idea to use *record-changes* and find out what parameters register when connecting. This command allows you to configure the parameters that require monitoring and to set the number of traces (changes) to be kept for future review.

Traces (changes in a parameter) are stored in the dynamic RAM and lost when the device is restarted. A new value for said parameter is registered with each change, showing when (date and time) it took place. A record shows independent traces per parameter. The number of traces stored for each parameter may be different, depending on their variability. The lists where the traces for each parameter are stored are dealt with in round robin mode.

The parameters that can be monitored are:

- State of register in the base station.
- State of call.
- Cell the device is connected to.
- Coverage.
- Mobile telephone carrier (PLMN).
- Network access technology.

Traces can be dynamically configured from process **5** (*running-config*). If global configuration is enabled, memory is set aside to record changes on said parameter. However, if it's disabled, used memory is released. Changing the number of traces to support implies releasing used memory and reserving a new block. This means all stored traces are lost. Globally disabling trace record-changes means releasing all memory reserved for said parameters. Consequently, all stored traces are also lost.

Traces (changes) can be viewed from the cellular interface, which monitors the console through the **trace record-changes list**. Traces are displayed for each parameter (synchronizing them is up to the user).

Syntax:

```
cellular1/0 AT config>record-changes ?
  call-state      Call state
  cell            Serving cell: LAC + Cell-Id
  coverage        Coverage under user´s configuration thresholds
  enable          Global recording enable
  plmn            Public Land Mobile Network code
  registration    Registration state to the IP mobile network
  sim             Active SIM
  technology      Access technology
```

2.2.11.1 record-changes call-state

Controls the **record-changes call state** associated with the interface. Allows you to enable **record-changes** and configure the number of traces to keep.

Syntax:

```
cellular1/0 AT config>record-changes call-state ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.1.1 record-changes call-state enable

Enables **record-changes** for this parameter. Default is trace recording disabled.

Syntax:

```
cellular1/0 AT config>record-changes call-state enable
```

2.2.11.1.2 record-changes call-state samples

Configures a number of traces to store for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100 traces. Admits values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes call-state samples <value>
```

2.2.11.2 record-changes cell

Controls the **record-changes cell** option for the cell the interface is connected to. By connected cell, we mean the tuple formed by the LAC (*Location Area Code*) and Cell-ID (active Cell Identification). Allows you to enable a **record-changes cell** and indicate the number of traces (changes) to be kept. Both LAC and Cell-ID are expressed in hexadecimal values.

Syntax:

```
cellular1/0 AT config>record-changes cell ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.2.1 record-changes cell enable

Enables the **record-changes cell enable** option for this parameter. Default is **trace recording disabled**.

Syntax:

```
cellular1/0 AT config>record-changes cell enable
```

2.2.11.2.2 record-changes cell samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100 traces. Accepts values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes cell samples <value>
```

2.2.11.3 record-changes coverage

Controls **interface record-changes coverage** (received signal level). Coverage changes are recorded based on thresholds, which depend on network access technology. For GSM/GPRS, coverage is given by RSSI (*Received Strength Signal Indicator*) expressed in dBm; for UMTS/HSDPA, coverage is given by RSCP (*Received Signal Code Power*) expressed in dBm and by EcNo (*Received energy per chip divided by the power density,* also known as Ec/Io) expressed in dB. In case of LTE technology, signal level parameters are RSRP (*Reference Signal Received Power*) and RSRQ (*Reference Signal Received Quality*). Each time a configured threshold is crossed, a change is recorded.

Allows you to enable **record-changes**, indicate the number of traces (changes) to keep and define thresholds for each network access technology.

Syntax:

```
cellular1/0 AT config>record-changes coverage ?
  enable      Enable recording of the changes of this parameter
  samples     Max number of traces to store
  gsm-gprs    Set coverage threshold for GSM and GPRS
  umts        Set coverage threshold for WCDMA technology(UMTS, HSDPA)
  lte         Set coverage threshold for LTE technology
```

2.2.11.3.1 record-changes coverage enable

Enables the **record-changes coverage enable** option for this parameter. Default is trace recording disabled.

Syntax:

```
cellular1/0 AT config>record-changes coverage enable
```

2.2.11.3.2 record-changes coverage samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100 traces. Accepts values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes coverage samples <value>
```

2.2.11.3.3 record-changes coverage gsm-gprs

Configures the **record-changes coverage** threshold when the access technology is GSM or GPRS. The measured value is RSSI (*Received Strength Signal Indicator*) expressed in dBm. The threshold is considered crossed when:

- RSSI was greater than the threshold but is now lower or equal to it.
- RSSI was equal to, or lower than, the threshold but now exceeds it.

Each time a threshold is crossed, a trace with new values is recorded. Default is threshold -91 dBm. Accepts values ranging from -113 to 0. For further information, please see **network cell-info** under monitoring.

Syntax:

```
cellular1/0 AT config>record-changes coverage gsm-gprs threshold <value>
```

2.2.11.3.4 record-changes coverage umts

Configures the **record-changes coverage** threshold when access technology is UMTS or HSDPA. Values are measured by RSCP (*Received Signal Code Power*), expressed in dBm, and by EcNo (*Received energy per chip divided by the power density,* also known as Ec/Io), expressed in dB. The threshold is considered crossed when:

- RSCP or EcNo is lower than or equal to the configured values.
- RSCP and EcNo exceed the configured values.

Each time a threshold is crossed, a trace with new values is recorded.

Default RSCP threshold is -101 dBm and EcNo -9 dB. Accepts values ranging from -113 to 0 for RSCP, and from -50 to 0 for EcNo. For further information, please see **network status** under monitoring.

Syntax:

```
cellular1/0 AT config>record-changes coverage umts threshold <dBm_val> ecno <dB_val>
```

2.2.11.3.5 record-changes coverage lte

Configures the **record-changes coverage** threshold when the access technology is LTE. Values are measured by RSRP (*Reference Signal Received Power*) and expressed in dBm, or by RSRQ (*Reference Signal Received Quality*) and expressed in dB. The threshold is deemed crossed when:

- RSRP or RSRQ is lower than, or equal to, the configured values.
- RSRP and RSRQ exceed the configured values.

Each time a threshold is crossed, a trace with new values is recorded.

The default RSRP threshold is -120 dBm (-13 dB for RSRQ). Accepted values range from -140 to 0 for RSRP, and from -20 to 0 for RSRQ. For further information, please see **network status** under monitoring.

Syntax:

```
cellular1/0 AT config>record-changes coverage lte rsrp <dBm_val> rsrq <dB_val>
```

Command history:

Release	Modification
11.00.05	The LTE option was introduced as of version 11.00.05.
11.01.01	The LTE option was introduced as of version 11.01.01.

2.2.11.4 record-changes enable

Globally enables **record-changes** for parameters enabled individually. Default is record-changes disabled.

2.2.11.5 record-changes registration

Controls **record-changes registration**. Allows you to enable record-changes and indicate the number of traces (changes) to be kept.

Syntax:

```
cellular1/0 AT config>record-changes registration ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.5.1 record-changes registration enable

Enables **record-changes** for this parameter. Default is trace recording disabled.

Syntax:

```
cellular1/0 AT config>record-changes registration enable
```

2.2.11.5.2 record-changes registration samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. **Default is** 100 traces. Accepts values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes registration samples <value>
```

2.2.11.6 record-changes plmn

Controls the **record-changes plmn** option for carrier changes in the interface. Allows you to enable record-changes and indicate the number of traces (changes) to be maintained.

Syntax:

```
cellular1/0 AT config>record-changes plmn ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.6.1 record-changes plmn enable

Enables the **record-changes plmn enable** option to track changes in this parameter. Default is trace recording disabled.

Syntax:

```
cellular1/0 AT config>record-changes plmn enable
```

2.2.11.6.2 record-changes plmn samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100 traces. Accepts values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes plmn samples <value>
```

2.2.11.7 record-changes sim

Controls **record-changes sim**. Allows you to enable record-changes and indicate the number of changes to keep. This command can only be used if hardware supports dual SIM management.

Syntax:

```
cellular1/0 AT config>record-changes sim ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.7.1 record-changes sim enable

Enables **record-changes sim enable** for this parameter. Default is record traces disabled.

Syntax:

```
cellular1/0 AT config>record-changes sim enable
```

2.2.11.7.2 record-changes sim samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100. Accepts values ranging from 10 to 65535 traces.

Syntax:

```
cellular1/0 AT config>record-changes sim samples <value>
```

2.2.11.8 record-changes technology

Controls **record-changes technology**, focusing on changes in interface access technology. Allows you to enable record-changes and indicate the number of traces (changes) to be kept.

Syntax:

```
cellular1/0 AT config>record-changes technology ?
  enable     Enable recording of the changes of this parameter
  samples    Max number of traces to store
```

2.2.11.8.1 record-changes technology enable

Enables record-changes for this parameter. Default is trace recording disabled.

Syntax:

```
cellular1/0 AT config>record-changes technology enable
```

2.2.11.8.2 record-changes technology samples

Configures the number of traces to be stored for this parameter. If too many traces are generated and storing them all is impossible, the oldest are overwritten. Default is 100 traces. Accepts values ranging from 10 to 65535.

Syntax:

```
cellular1/0 AT config>record-changes technology samples <value>
```

2.2.12 REGISTER-DENIED-RESET

Allows you to reset 3G module radio interface when the register status for the mobile network is DENIED.

The mobile carrier network occasionally denies router access. To access said network, try to re-register by switching off the radio interface for the internal mobile telephony module and switching it on again later.

With this command enabled, and provided the router can monitor the radio module status, a new attempt is made to re-register in said network when the register status is DENIED.

Syntax:

```
cellular1/0 AT config>register-denied-reset ?
  <cr>
```

Example:

```
cellular1/0 AT config> register-denied-reset
```

2.2.13 REGISTRATION-APN

Allows you to configure the **registration-APN** option for LTE networks.

When registering a mobile device, some LTE mobile telephone carrier networks require the device to have a certain APN configured. If said APN isn't configured properly, then network registration may not take place or, if it does, it may not be correct. This means data contexts can't establish. Using this option depends on the network: each carrier decides whether it is necessary. This option only makes sense when the carrier network makes use of LTE techno-

logy.

This command is only visible for devices supporting LTE.

Syntax:

```
cellular1/0 AT config>registration-apn <apn-name> pdp-type <type>
  <apn-name>
   <1..63 chars>    Access Point Name
  <type>
   ip         IP Ver. 4 type
   ppp        PPP type
   ipv6       IP Ver. 6 type
   ipv4v6     IP Ver. 4 and Ver. 6 types
  <cr>
```

Example:

```
cellular1/0 AT config>registration-apn internet pdp-type ipv4v6
```

2.2.14 REGISTRATION-AUTHENTICATION

Allows you to configure **registration-authentication** parameters for APN registration in LTE networks.Using this option depends on the network: each carrier decides whether or not it is necessary. This option only makes sense when the carrier network makes use of LTE technology. This command is only visible for devices supporting LTE.

Syntax:

```
cellular1/0 AT config>registration-authentication <type> user <user> password <pass>
  <type>
   chap       Registration authentication chap
   pap        Registration authentication pap
   none       Registration authentication none
  <user>
   <1..63 chars>    Username
  <password>
   <1..63 chars>    Password
  <cr>
```

2.2.15 SIM

Configures dual SIM management, provided the hardware supports it. SIMs are identified through their portaSIM and may be referred to as internal SIM and external SIM, or SOCKET-1 and SOCKET-2. Unlike what happens with external SIMs, you have to open the device to handle an internal one.

Note

Keep in mind that with some devices you cannot use commands to select the SIM (socket) port (e.g., PMC HSDPA/HSUPA DATA). In such cases, this command has no effect.

The dual SIM management/supervision option identifies a main SIM and a backup SIM. The main SIM is the one initially used, identified through **sim-select**. You can establish a series of criteria to supervise the main SIM. When one of these commands is matched, the system triggers the use of the backup SIM. You can also define certain criteria for the backup SIM to force the device to switch to the main SIM again.

When the main SIM is active, the following can be supervised: cellular interface registration status in the network, access technology, coverage levels depending on access technology and NSM/NSLA polling status. When the backup SIM is active, criteria to return to the main SIM depend on the cellular interface registration status in the network, coverage levels per access technology, interface idle time (i.e., when calls are not being made), status for an NSM/NSLA poll and a time condition (SIM is used during a given maximum time or up to a given hour). For further information on polls, please see manuals Teldat *Dm749-I* and Teldat *Dm754-I*.

Parameters are checked every 30 seconds. When configuring supervision parameters, please bear in mind that switching from one SIM to another is a slow process.

Syntax:

```
cellular1/0 AT config>sim ?
  external-socket-1        Set external/socket 1 SIM parameters
```

```
  internal-socket-2         Set internal/socket 2 SIM parameters
  nsla-criteria             Use a NSLA Advisor as supervision criteria
  connection-timeout        Set SIM connection timeout in seconds
  registration-criteria     Set backup parameters to registration states
  return-criteria           Set return conditions to main SIM
  rssi-criteria             GPRS coverage changes set SIM switching
  rscp-criteria             UTRAN coverage changes set SIM switching
  rsrp-criteria             E-UTRAN coverage changes set SIM switching
  supervision               Set global SIM management parameters
  technology-criteria       Technology changes set SIM switching
```

A change in SIMs is reported through CELL subsystem events and WWAN subsystem events. If configured, this change is also recorded through **record-changes sim enable**. For further information, please see the record-changes section in this manual.

There are specific non-configurable situations that cause SIMs to switch from one to the other (for example, if access failure to SIM is detected or a SIM is blocked and requires a PUK). Similarly, some situations put an end to the switch process. For instance, when a wrong PIN has been configured.

This command is not available for interfaces that are not base or main, or where the hardware doesn't support a dual SIM.

2.2.15.1 SIM EXTERNAL-SOCKET-1

Configures the data used by the external SIM/porta-SIM-1. Enabling management/supervision for dual SIM is impossible if you don't configure the **pin** and **local-address** fields, together with the internal **sim/sim2-port**. Similarly, if you delete one of these parameters, management/supervision is automatically disabled.

Syntax:

```
cellular1/0 AT config>sim external-socket-1 ?
  pin                           PIN number
  local-address                 SIM telephone number
  network-mode                  Network technology mode
  registration-apn              APN for registration time
  registration-authentication   Authentication data for registration APN
```

2.2.15.1.1 SIM EXTERNAL-SOCKET-1 PIN

Configures a PIN number associated with the external SIM/porta-SIM-1. This can be configured in clear through **sim external-socket-1 pin plain**, or encrypted through **sim external-socket-1 pin ciphered**.

Syntax:

```
cellular1/0 AT config>sim external-socket-1 pin ?
  plain       readable number
  ciphered    ciphered number
```

Default is not configured.

The PIN always appears encrypted for security reasons.

Example:

```
cellular1/0 AT config>sim external-socket-1 pin plain 1234
cellular1/0 AT config>show config
; Showing Menu and Submenus Configuration for access-level 15 ...

     sim external-socket-1 pin ciphered 0x4698601DE5BFA77D
cellular1/0 AT config>
```

2.2.15.1.2 SIM EXTERNAL-SOCKET-1 LOCAL-ADDRESS

Configures a telephone number associated with the external SIM/porta-SIM-1. This number is used to:

- Associate dial interfaces with said SIM so interfaces using this SIM are UP when said SIM is active. When it isn't active, said interfaces are DOWN.
- Route incoming audio calls at VoIP level.

Association between SIM and dial interfaces (FR, PPP and VOIP) is carried out through profiles configured in the **global-profiles dial** and **local-address** fields. When a SIM is active, it activates all dial interfaces it has as base in-

terface. Moreover, it uses profiles whose **local-address** matches the active SIM. Interfaces that meet the first condition but not the second will remain DOWN.

Syntax:

```
cellular1/0 AT config>sim external-socket-1 local-address ?
  <1..23 chars>    Text
```

No number is configured by default.

2.2.15.1.3 SIM EXTERNAL-SOCKET-1 NETWORK-MODE

Configures radio network technology. The internal module must be used when said SIM is selected.

You can configure the following options:

NONE

AUTO

GPRS (2)

WCDMA (3G)

LTE (4G)

CDMA (2G)

HRPD (3G)

HYBRID (CDMA/HRPD)

Default is disabled through **none**. To select network technology when the option is disabled, take the value configured in the cellular interface's **network mode**.

Syntax:

```
cellular1/0 AT config>sim external-socket-1 network-mode ?
  none     Take global conf. value
  auto     Automatic
  gprs     GPRS (2G) only
  wcdma    UMTS/HSDPA (3G) only
  lte      LTE (4G) only
  cdma     CDMA (2G) only
  hrpd     HRPD (3G) only
  hybrid   HYBRID (CDMA/HRPD)
```

Command history:

Release	Modification
10.09.26	The LTE option was introduced as of version 10.09.26.
11.00.05	The LTE option was introduced as of version 11.00.05.
11.01.00	The LTE option was introduced as of version 11.01.00.
11.00.07	The CDMA, HRPD and HYBRID options were introduced as of version 11.00.07.
11.01.02	The CDMA, HRPD and HYBRID options were introduced as of version 11.01.02.

2.2.15.1.4 SIM EXTERNAL-SOCKET-1 REGISTRATION-APN

Allows you to configure a registration APN for LTE networks, associated with socket 1's carrier.

When registering a mobile device, some LTE mobile telephone carrier networks require the device to have a certain APN configured. If said APN isn't configured properly, network registration may not take place or, if it does, it may not be correct. This would stop data contexts from establishing.

Using this option depends on the network: each carrier decides whether or not it is necessary.

This option is only available if the carrier network uses LTE technology.

This command is only visible for devices that support LTE.

Syntax:

```
cellular1/0 AT config>sim external-socket-1 registration-apn <name> pdp-type <type>
```

```
  <apn-name>
   <1..63 chars>    Access Point Name
  <type>
   ip         IP Ver. 4 type
   ppp        PPP type
   ipv6       IP Ver. 6 type
   ipv4v6     IP Ver. 4 and Ver. 6 types
  <cr>
```

2.2.15.1.5 REGISTRATION-AUTHENTICATION

Allows you to configure authentication parameters for APN registration in LTE networks. Using this option depends on the network: each carrier decides whether or not it is necessary. This option only makes sense when the carrier network makes use of LTE technology. This command is only visible for devices that support LTE.

Syntax:

```
cellular1/0 AT config> sim external-socket-1 registration-authentication <type> user
<user> password <pass>
  <type>
   chap       Registration authentication chap
   pap        Registration authentication pap
   none       Registration authentication none
  <user>
   <1..63 chars>    Username
  <password>
   <1..63 chars>    Password
  <cr>
```

2.2.15.2 SIM INTERNAL-SOCKET-2

Configures data used by the internal SIM/porta-SIM-2. If you don't configure **the pin** and **local-address** fields, together with the external SIM/SIM-1-port fields, enabling management/supervision for dual SIM is impossible and **sim supervision** is not available. Similarly, if you delete one of these parameters, management/supervision is automatically disabled.

Syntax:

```
cellular1/0 AT config>sim internal-socket-2 ?
  pin                           PIN number
  local-address                 SIM telephone number
  network-mode                  Network technology mode
  registration-apn              APN for registration time
  registration-authentication   Authentication data for registration APN
```

2.2.15.2.1 SIM INTERNAL-SOCKET-2 PIN

Configures a PIN number associated with the internal SIM/porta-SIM-2. This is configured in clear via the **sim internal-socket-2 pin plain** command, or encrypted through the **sim internal-socket-2 pin ciphered** command.

Syntax:

```
cellular1/0 AT config>sim internal-socket-2 pin ?
  plain       readable number
  ciphered    ciphered number
```

Default is not configured.

The PIN always appears encrypted for security reasons.

Example:

```
cellular1/0 AT config>sim internal-socket-2 pin plain 1234
cellular1/0 AT config>show config
; Showing Menu and Submenus Configuration for access-level 15 ...
      sim internal-socket-2 pin ciphered 0x4698601DE5BFA77D
cellular1/0 AT config>
```

2.2.15.2.2 SIM INTERNAL-SOCKET-2 LOCAL-ADDRESS

Configures a telephone associated with the internal SIM/porta-SIM-2. This number is used to:

- Associate dial interfaces with said SIM so interfaces using this are UP when said SIM is active. When it isn't, said interfaces are DOWN.
- Route incoming audio calls at VoIP level.

Association between SIM and dial interfaces (FR, PPP and VOIP) is carried out through profiles configured in the **global-profiles dial** and the **local-address** fields. When a SIM is active, it activates all dial interfaces it has as base interface and uses profiles whose **local-address** matches the active SIM. Interfaces that fulfill the first condition but not the second remain DOWN.

Syntax:

```
cellular1/0 AT config>sim internal-socket-2 local-address ?
  <1..23 chars>    Text
```

No number is configured by default.

2.2.15.2.3 SIM INTERNAL-SOCKET-2 NETWORK-MODE

Configures radio network technology, which must use the internal module when this SIM is selected.

The following options are available:

NONE

AUTO

GPRS (2)

WCDMA (3G)

LTE (4G)

CDMA (2G)

HRPD (3G)

HYBRID (CDMA/HRPD)

Default is disabled through **none**. To select the network technology when the option is disabled, take the value configured in the cellular interface's network mode.

Syntax:

```
cellular1/0 AT config>sim internal-socket-2 network-mode ?
  none     Take global conf. value
  auto     Automatic
  gprs     GPRS (2G) only
  wcdma    UMTS/HSDPA (3G) only
  lte      LTE (4G) only
  cdma     CDMA (2G) only
  hrpd     HRPD (3G) only
  hybrid   HYBRID (CDMA/HRPD)
```

Command history:

Release	Modification
10.09.26	The LTE option was introduced as of version 10.09.26.
11.00.05	The LTE option was introduced as of version 11.00.05.
11.01.00	The LTE option was introduced as of version 11.01.00.
11.00.07	The CDMA, HRPD and HYBRID options were introduced as of version 11.00.07.
11.01.02	The CDMA, HRPD and HYBRID options were introduced as of version 11.01.02.

2.2.15.2.4 SIM INTERNAL-SOCKET-2 REGISTRATION-APN

Allows you to configure a registration APN for LTE networks, associated with socket 2's carrier.

When registering a mobile device, some LTE mobile telephone carrier networks require the device to have a certain APN configured. If said APN isn't configured properly, network registration may not take place or, if it does, it may not be correct. This would stop data contexts from establishing.

Using this option depends on the network: each carrier decides whether or not it is necessary.

This option only makes sense when the carrier network uses LTE technology.

This command is only visible for devices that support LTE.

Syntax:

```
cellular1/0 AT config>sim internal-socket-2 registration-apn <name> pdp-type <type>
  <apn-name>
   <1..63 chars>    Access Point Name
  <type>
   ip         IP Ver. 4 type
   ppp        PPP type
   ipv6       IP Ver. 6 type
   ipv4v6     IP Ver. 4 and Ver. 6 types
  <cr>
```

2.2.15.2.5 REGISTRATION-AUTHENTICATION

Allows you to configure authentication parameters for APN registration in LTE networks. This option depends on the network: each carrier decides whether or not it is necessary. This option only makes sense when the carrier network uses LTE technology. This command is only visible if the device supports LTE.

Syntax:

```
cellular1/0 AT config> sim internal-socket-1 registration-authentication <type> user
<user> password <pass>
  <type>
   chap       Registration authentication chap
   pap        Registration authentication pap
   none       Registration authentication none
  <user>
   <1..63 chars>    Username
  <password>
   <1..63 chars>    Password
  <cr>
```

2.2.15.3 SIM NSLA-CRITERIA

Configures NSM/NSLA polling as supervision criteria for the main SIM. This proves useful when supervising the IP connection to a given point through the main SIM. It studies not only the wireless connection, but also all connections with the required destination.

Through NSM/NSLA polling, an NSM poll sends a given type of IP traffic to a known destination over an active interface (main SIM is active too). The traffic sent helps measure where NSLA Advisor is supported. The latter decides if the connection is valid (or not). When the connection is invalid, the device switches to the backup SIM. The NSLA-Advisor that decides whether or not the connection is valid is configured through this parameter. For further information, please see manuals Teldat *Dm749-I* and Teldat *Dm754-I*.

Please note, when using NSM/NSLA polling, that NSM polls never stop sending traffic (even when the backup SIM is the one that is active).

Also, bear in mind that NSLA-Advisor, NSLA-Alarm and NSLA-Filter activate and deactivate depending on the status of the main SIM. We do not recommend reusing them for other tasks.

An example can be found in the relevant Appendix.

2.2.15.3.1 SIM NSLA-CRITERIA NSLA-ADVISOR

Configures the NSLA advisor used as supervision criteria for the main SIM.

Syntax:

```
cellular1/0 AT config>SIM nsla-criteria nsla-advisor <id>
```

Accepts values ranging from 0 to 65535. Value 0 disables this parameter as the main SIM's supervision criteria. Default is criteria not enabled.

2.2.15.3.2 SIM NSLA-CRITERIA UPDATE-NOTIFICATION

Enables advisors configured as supervision criteria and return criteria to perform SIM switching, regardless of the SIM card that is currently active.

Syntax:

```
cellular1/0 AT config>SIM nsla-criteria update-notification {shared | exclusive}
```

- *Shared*: both advisors configured as supervision criteria and return criteria perform SIM switching, regardless of the SIM card that is currently active. This is the default option.
- *Exclusive*: the advisor configured as supervision criteria is the only one that can trigger SIM switching when the main SIM is active. Similarly, only the advisor configured as return criteria can trigger SIM switching when the backup SIM is active.

Command history:

Release	Modification
10.09.26	The LTE option was introduced as of version 10.09.26.
11.00.05	The LTE option was introduced as of version 11.00.05.
11.01.01	The LTE option was introduced as of version 11.01.01.

2.2.15.4 SIM CONNECTION-TIME0UT

Configures the maximum time for establishing data communications through the GPRS interface for the active SIM. Given the way NSLA polls operate, this parameter is essential. Under certain circumstances, if only NSLA polls are used, a problem or drop in the data link may not be detected. Therefore, when you configure NSLA polls, this parameter must also be configured.

This parameter affects both SIMs. It only activates when dual SIM supervision activation is configured using the **sim supervision enable** command.

Said parameter is associated with a timer. This allows you to control the maximum waiting time between SIM switching and the moment the associated NSLA poll indicates there is connectivity. If this times out and the poll hasn't detected connectivity, the SIMs switch. Given the nature of NSLA polls, when the timer times out, the state of the poll is verified again. This allows you to rule out poll shooting problems when SIMs are switching.

The timer starts up when the GPRS interface initializes correctly (i.e., when it is able to establish a data connection).

This parameter is **unique and the same** for both SIMs. It only activates if NSLA polls associated with the SIM have been configured.

Note

You must be particularly careful when configuring NSLA polls associated with each SIM. Detection time must always be below connection-timeout. Otherwise, polls may not have enough time to detect connectivity before SIMs switch.

Syntax:

```
cellular1/0 AT config>sim connection-timeout ?
  <0s..1200s>    Time value
```

Accepts values ranging from 0 to 1200 seconds. Value 0 disables this parameter as active SIM supervision criteria. Default is 300 seconds.

2.2.15.5 SIM REGISTRATION-CRITERIA

Configures the status for interface registration in base station as a key **sim registration-criteria**. Allows you to configure the maximum time, in minutes, the interface can go without registering. Once this has timed out, the device switches to the backup SIM.

Syntax:

```
cellular1/0 AT config>sim registration-criteria lost over <time>
```

Accepts values ranging from 0 to 180. Value 0 disables this parameter as a key **sim registration-criteria**. This supervision criteria is not enabled by default.

2.2.15.6 SIM RETURN-CRITERIA

Configures the return to main SIM criteria. These are: physical interface inactivity (base interface and secondary interface, if applicable), coverage levels depending on access technology, NSM/NSLA polling status, status registered in the base station and the time it takes to switch to the backup SIM.

Syntax:

```
cellular1/0 AT config>sim return-criteria ?
  inactivity           Max no-calls time the backup SIM is maintained
  level                Level (2G/3G) as condition to return to main SIM.
  nsla-advisor         Use a NSLA Advisor as return criteria
  registration-lost    Max time the registration condition is lost
  time                 Max time the backup SIM is used
```

Default is return criteria not configured.

2.2.15.6.1 SIM RETURN-CRITERIA INACTIVITY OVER

Configures the minimum time, in minutes, the physical interface remains without calls as return to main SIM criteria.

Syntax:

```
cellular1/0 AT config>sim return-criteria inactivity over ?
  <2..65535>    Value in the specified range
```

Accepts values ranging from 0 to 180. Value 0 disables this parameter as return to main SIM criteria. Default is criteria not enabled for return to main SIM.

2.2.15.6.2 SIM RETURN-CRITERIA NSLA-ADVISOR

Configures NSM/NSLA polling as supervision criteria for the main SIM. This proves useful when supervising IP connection to a given point through the main SIM. It studies not only the wireless connection, but also all connections with the required destination.

Through NSM/NSLA polling, an NSM poll sends a given type of IP traffic to a known destination over an active interface (main SIM is active too). Traffic sent allows for measurements to be taken where NSLA Advisor is supported. The latter decides whether or not the connection is valid. When the connection is invalid, the device switches to the backup SIM. The NSLA-Advisor that decides whether the connection is valid is configured through this parameter. For further information, please see manuals Teldat *Dm749-I* and Teldat *Dm754-I*.

Syntax:

```
cellular1/0 AT config>sim return-criteria nsla-advisor ?
  <0..65535>    Value in the specified range
```

Please note, when using NSM/NSLA polling, that NSM polls never stop sending traffic. They also send traffic when the active SIM is the main SIM.

Also, bear in mind that the NSLA-Advisor, NSLA-Alarm and NSLA-Filter options activate and deactivate depending on the status of the backup SIM. We do not recommend reusing them for other tasks.

An application example can be found in the relevant Appendix.

2.2.15.6.3 SIM RETURN-CRITERIA REGISTRATION-LOST

Configures interface registration in the base station as return to main SIM criteria. Allows you to configure the maximum time, in minutes, the interface can remain without registering. Once this has timed out, return to main SIM is triggered.

Syntax:

```
cellular1/0 AT config>sim return-criteria registration-lost over ?
  <0..180>    Value in the specified range
```

Accepts values ranging from 0 to 180. Value 0 disables this parameter as return to main SIM criteria. By default, this criteria is not enabled.

2.2.15.6.4 SIM RETURN-CRITERIA TIME

Controls the backup SIM's lifetime. This criteria is disabled by default.

Syntax:

```
cellular1/0 AT config>sim return-criteria time ?
  ignore    Main SIM is never used again
  after     Main SIM is used after the configured minutes
  at        Main SIM is used at the configured time
```

SIM RETURN-CRITERIA TIME IGNORE

Disables time criteria as return to main SIM criteria.

Syntax:

```
cellular1/0 AT config>sim return-criteria time ignore
```

SIM RETURN-CRITERIA TIME AFTER

Configures the maximum time the backup SIM can be used (in minutes). Once this has timed out, return to main SIM triggers (regardless of whether there are calls in progress).

Syntax:

```
cellular1/0 AT config>sim return-criteria time after ?
  <1..65535>    Value in the specified range
```

Accepts time values ranging from 1 to 65535.

SIM RETURN-CRITERIA TIME AT

Determines whether the backup SIM is going to be used up to the time and minutes indicated, regardless of whether there are calls in progress.

Syntax:

```
cellular1/0 AT config>sim return-criteria time at ?
  <00:00..24:00>    Time value
```

2.2.15.6.5 SIM RETURN-CRITERIA LEVEL NO-CALL-RSSI

Configures coverage as backup SIM supervision criteria when using GSM/GPRS and if the interface is not processing any calls. Coverage is given through RSSI in dBm. If this value is continuously equal to (or lower than) the one configured during the time indicated (in minutes), the device will switch to the main SIM.

Syntax:

```
cellular1/0 AT config>sim return-criteria level no-call-rssi <rssi level> over <time>
```

This level accepts values ranging from -113 to 0, as well as time values between 0 and 180. Time value 0 disables this parameter as backup SIM supervision criteria. Default is criteria disabled for backup SIM supervision.

2.2.15.6.6 SIM RETURN-CRITERIA LEVEL IN-CALL-RSSI

Configures coverage as backup SIM supervision criteria when using GSM/GPRS and if the interface is processing calls. Coverage is given through RSSI in dBm. If this value is continuously equal to (or lower than) the one configured during the time indicated (in minutes), the device will switch to the main SIM. If a voice call is in progress, return doesn't trigger until the call ends.

Syntax:

```
cellular1/0 AT config>sim return-criteria level in-call-rssi <rssi level> over <time>
```

This level accepts values ranging from -113 to 0, as well as time values between 0 and 180. Time value 0 disables this parameter as backup SIM supervision criteria. Default is criteria disabled for backup SIM supervision.

2.2.15.6.7 SIM RETURN-CRITERIA LEVEL NO-CALL-RSCP

Configures coverage as backup SIM supervision criteria when using UMTS/HSDPA (and as long as the interface isn't processing any calls). Coverage is given through RSSI in dBm and through EcNo in dB. If either of these values is continuously equal to (or lower than) the one configured during the time indicated, return to the main SIM is triggered.

Syntax:

```
cellular1/0 AT config>sim return-criteria level no-call-rscp <rscp level> ecno <ecno level> over <time>
```

RSCP accepts values ranging from -113 to 0, EcNo values between -50 and 5 and time values between 0 and 180. Time value 0, used by default, disables this parameter as backup SIM supervision criteria.

2.2.15.6.8 SIM RETURN-CRITERIA LEVEL IN-CALL-RSCP

Configures coverage as backup SIM supervision criteria when using UMTS/HSDPA and the interface is processing calls. Coverage is given through RSSI in dBm and through EcNo in dB. If either of these values is continuously equal to (or lower than) the one configured during the time indicated, return to the main SIM is triggered. If there is a voice call in progress, return doesn't trigger until the call ends.

Syntax:

```
cellular1/0 AT config>sim return-criteria level in-call-rscp <rscp level> ecno <ecno level> over <time>
```

RSCP accepts values ranging from -113 to 0, EcNo values between -50 and 5 and time values between 0 and 180. Time value 0, used by default, disables this parameter as backup SIM supervision criteria.

2.2.15.6.9 SIM RETURN-CRITERIA LEVEL NO-CALL-RSRP

Configures coverage as backup SIM supervision criteria when using LTE (as long as the interface isn't processing any calls). Coverage is given through RSRP in dBm and through RSRQ in dB. If either of these values is continuously equal to (or lower than) the one configured during the time indicated, return to the main SIM is triggered.

Syntax:

```
cellular1/0 AT config>sim return-criteria level no-call-rsrp <rsrp level> rsrq <rsrq level> over <time>
```

RSRP accepts values ranging from -140 to 0, RSRQ values between -20 and 0 and time values between 0 and 180. Time value 0, used by default, disables this parameter as backup SIM supervision criteria.

Command history:

Release	Modification
11.00.05	This command was introduced as of version 11.00.05.
11.01.01	This command was introduced as of version 11.01.01.

2.2.15.6.10 SIM RETURN-CRITERIA LEVEL IN-CALL-RSRP

Configures coverage as backup SIM supervision criteria when using LTE technology and having the interface process calls. Coverage is given through RSRP in dBm and through RSRQ in dB. If either of these values is continuously equal to (or lower than) the one configured during the time indicated, return to the main SIM is triggered. If there is a voice call in progress, return doesn't trigger until the call ends.

Syntax:

```
cellular1/0 AT config>sim return-criteria level in-call-rsrp <rsrp level> rsrq <rsrq level> over <time>
```

RSRP accepts values ranging from -140 to 0, RSRQ values between -20 and 0 and time values between 0 and 180. Time value 0, used by default, disables this parameter as backup SIM supervision criteria.

Command history:

Release	Modification
11.00.05	This command was introduced as of version 11.00.05.
11.01.01	This command was introduced as of version 11.01.01.

2.2.15.7 SIM RSSI-CRITERIA

Configures coverage as main SIM supervision criteria when the technology used is GSM/GPRS. Coverage is given by RSSI (*Received Strength Signal Indicator*) expressed in dBm. For this criteria to be taken into account, measured RSSI must be equal to (or lower than) the value configured during the time indicated in minutes.

Syntax:

```
cellular1/0 AT config>sim rssi-criteria ?
  no-call-level    No call condition is selected
  in-call-level    Call-progress condition is selected
```

By default, this criteria is not enabled for main SIM supervision.

You can configure separate levels depending on whether or not calls are in progress. If you configure supervision when data calls are in progress, they will be dropped if there is a switch between SIMs. If the call is voice, SIM switching doesn't trigger.

2.2.15.7.1 SIM RSSI-CRITERIA NO-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is GSM/GPRS, and as long as the interface does not broadcast calls of any type. Coverage is given by RSSI (in dBm). If this value is equal to (or lower than) the one configured during the time indicated in minutes, the device will switch to backup SIM.

Syntax:

```
cellular1/0 AT config>sim rssi-criteria no-call-level <rssi level> over <time>
```

Level parameter accepts values ranging from -113 to 0, and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.15.7.2 SIM RSSI-CRITERIA IN-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is GSM/GPRS and the interface transmits calls. Coverage is given by RSSI (in dBm). If this value is equal to (or lower than) the one configured during the time indicated in minutes, switch to backup SIM triggers. If there is a voice call, then switch only executes when the call ends.

Syntax:

```
cellular1/0 AT config>sim rssi-criteria in-call-level <rssi level> over <time>
```

Level parameter accepts values ranging from -113 to 0, and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.15.8 SIM RSCP-CRITERIA

Configures coverage as main SIM supervision criteria when the technology used is UMTS/HSDPA. Coverage is given by RSCP (*Received Signal Code Power*) expressed in dBm and by EcNo (*Received energy per chip divided by the power density,* also known as Ec/Io) expressed in dB. For this criteria to be taken into account, RSCP and/or EcNo must be equal to (or lower than) the values configured during the time indicated in minutes.

Syntax:

```
cellular1/0 AT config>sim rscp-criteria ?
  no-call-level    No call condition is selected
  in-call-level    Call-progress condition is selected
```

By default, this main SIM supervision criteria is not enabled.

You can configure separate levels depending on whether calls are in progress. If you configure supervision when data calls are in progress, they will be dropped if there is a switch between SIMs. If the call is voice, SIM switching doesn't trigger.

2.2.15.8.1 SIM RSCP-CRITERIA NO-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is UMTS/HSDPA and the interface does not broadcast calls of any type. Coverage is given by RSCP expressed in dBm and by EcNo in dB. If one of these values is equal to (or lower than) the one configured during the time indicated, the device will switch to the backup SIM.

Syntax:

```
cellular1/0 AT config>sim rscp-criteria no-call-level <rscp level> ecno <ecno level> over <time>
```

RSCP accepts values ranging from -113 to 0, EcNo values between -50 and 5 and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.15.8.2 SIM RSCP-CRITERIA IN-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is UMTS/HSDPA and the interface broadcasts calls. Coverage is given by RSCP expressed in dBm and by EcNo in dB. If one of these values is equal to (or lower than) the one configured during the time indicated in minutes, switch to backup SIM triggers. If it is a voice call, switching won't take place until the call ends.

Syntax:

```
cellular1/0 AT config>sim rscp-criteria in-call-level <rscp level> ecno <ecno level> over <time>
```

RSCP accepts values ranging from -113 to 0, EcNo values between -50 and 5 and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.15.9 SIM RSRP-CRITERIA

Configures coverage as main SIM supervision criteria when the technology used is LTE. Coverage is given by RSRP (*Reference Signal Received Power*) expressed in dBm and by RSRQ (*Reference Signal Received Quality*) expressed in dB. For this criteria to be taken into account, RSRP and/or RSRQ must be equal to (or less than) the values configured under the time indicated in minutes.

Syntax:

```
cellular1/0 AT config>sim rsrp-criteria ?
  no-call-level    No call condition is selected
  in-call-level    Call-progress condition is selected
```

By default, this main SIM supervision criteria is not enabled.

You can configure separate levels depending on whether or not calls are in progress. If you configure supervision when data calls are in progress, they will be dropped if there is a switch between SIMs. If the call is voice, switching won't happen until the call ends.

2.2.15.9.1 SIM RSRP-CRITERIA NO-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is LTE and the interface does not broadcast calls of any type. Coverage is given by RSRP, expressed in dBm, and by RSRQ, in dB. If one of these values is equal to (or lower than) the one configured during the time indicated in minutes, switch to backup SIM triggers.

Syntax:

```
cellular1/0 AT config>sim rsrp-criteria no-call-level <rsrp level> rsrq <rsrq level> over <time>
```

RSRP accepts values ranging from -140 to 0, RSRQ values between -20 and 0 and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

Command history:

Release	Modification
11.00.05	This command was introduced as of version 11.00.05.
11.01.01	This command was introduced as of version 11.01.01.

2.2.15.9.2 SIM RSRP-CRITERIA IN-CALL-LEVEL

Configures coverage as main SIM supervision criteria when the technology used is LTE and the interface broadcast calls. Coverage is given by RSRP, expressed in dBm, and by RSRQ, in dB. If one of these values is equal to (or lower than) the one configured under the time indicated in minutes, switch to backup SIM triggers. If the call is voice, switching does not take place until the call ends.

Syntax:

```
cellular1/0 AT config>sim rsrp-criteria in-call-level <rsrp level> rsrq <rsrq level> over <time>
```

RSRP accepts values ranging from -140 to 0, RSRQ values between -20 and 0 and time values between 0 and 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

Command history:

Release	Modification
11.00.05	This command was introduced as of version 11.00.05.
11.01.01	This command was introduced as of version 11.01.01.

2.2.15.10 SIM SUPERVISION

Configures global parameters for dual SIM management/supervision. Default is dual SIM management/supervision disabled. Available parameters are as follows:

Syntax:

```
cellular1/0 AT config>sim supervision ?
  enable    Enable SIM socket management
```

2.2.15.10.1 SIM SUPERVISION ENABLE

Enables dual SIM management/supervision. This command is unavailable until you receive data for both SIMs: pin and local-address. For further information, please see the following commands: **sim external-socket-1 pin**, **sim external-socket-1 local-address**, **sim external-socket-2 pin**, **sim external-socket-2 local-address**. Supervision is automatically disabled if one of the aforementioned commands is deleted.

Syntax:

```
cellular1/0 AT config>sim supervision enable
```

If supervision is dynamically disabled, the interface goes back to using global PIN and local-address. If this occurs while backup SIM is active, automatic return to main SIM triggers.

2.2.15.11 SIM TECHNOLOGY-CRITERIA

Configures network access technology as a main SIM supervision criteria. Allows you to configure the maximum time, in minutes, the interface can use undesired technology. Once this times out, switch to backup SIM triggers.

Syntax:

```
cellular1/0 AT config>sim technology-criteria ?
  no-call-tech    No-call condition is selected
  in-call-tech    Call-active condition is selected
```

Only GPRS/GSM is considered undesirable technology.

By default, this main SIM supervision criteria is not enabled.

You can enter separate configurations depending on whether or not calls are in progress. If you configure supervision when data calls are in progress, they will be dropped if there is a switch between SIMs. If the call is voice, switching won't happen until the call ends.

2.2.15.11.1 SIM TECHNOLOGY-CRITERIA NO-CALL-TECH

Configures access technology as a main SIM supervision criteria when the interface does not broadcast calls of any type. Allows you to configure the maximum time, in minutes, the interface can use an undesired technology.

Syntax:

```
cellular1/0 AT config>sim technology-criteria no-call-tech <technology> over <time>
```

Only admits GPRS technology and time values ranging from 0 to 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.15.11.2 SIM TECHNOLOGY-CRITERIA IN-CALL-TECH

Configures access technology as main SIM supervision criteria when the interface transmits calls. Allows you to configure the maximum time, in minutes, the interface can use undesired technology. If there is a voice call, switching does not take place until the call ends.

Syntax:

```
cellular1/0 AT config>sim technology-criteria in-call-tech <technology> over <time>
```

Only supports GPRS technology and time values ranging from 0 to 180. Value 0, used by default, disables this parameter as main SIM supervision criteria.

2.2.16 SMS

Allows you to configure the SMS message reception feature. This feature can also receive commands that trigger certain predefined actions in the router (such as rebooting) from SMS messages. There are four predefined actions. The content of SMS messages must be exactly the same as in the following table:

Action	SMS Content
Deactivates associated PPP interface	DISCONNECT WWAN
Activates associated PPP interface	CONNECT WWAN
Reboots WWAN module	REBOOT WWAN
Reboots router	REBOOT

Configuration commands for the SMS message reception feature appear in the cellular interface BASE interface con-

figuration menu. They do not appear in the secondary interface menu.

Ten seconds after the SMS message is received, the **reboot** command triggers device reboot.

Commands **connect wwan** and **disconnect wwan** also activate or deactivate the PPP interface used as base interface. The cellular interface receives the SMS message through said commands.

Note

For PPP interface activation and deactivation control to trigger through SMS messages and for the link to be established when activated, do not configure **idle time** in the call profile associated with the PPP interface.

To stop certain telephone numbers from executing actions over the router via SMS, you can define authorized numbers. As a result, only messages received from said numbers can execute defined actions over the router.

You can also configure a telephone number or address for the carrier SMS message center.

Note

If you want to boot the device with the PPP interface deactivated, you must configure the **shutdown** command in order to activate it through SMS commands. This specifically refers to a PPP interface whose base interface is the cellular interface SMS messages are received through.

Syntax:

```
cellular1/0 AT config>sms ?
  reception                enable/disable SMS reception
  command-reception        enable/disable SMS command reception
  authorized-number        Authorized SMS command sender
  service-center-address   Service center address
```

2.2.16.1 SMS RECEPTION

Enables SMS message reception in a router.

Syntax:

```
cellular1/0 AT config>sms reception
```

2.2.16.2 SMS COMMAND-RECEPTION

Allows commands to be received via SMS messages. The table at the beginning of the section on SMS includes examples of possible commands and actions.

Syntax:

```
cellular1/0 AT config>sms command-reception
```

2.2.16.3 SMS AUTHORIZED-NUMBER

Allows you to define up to 10 authorized numbers to send commands via SMS. If you configure authorized numbers, only these can execute actions over a router through SMS messages. If you do not define authorized numbers, any SMS command received from any telephone number can execute actions over the router.

Note

To make sure it works properly, enter a + sign followed by the appropriate country code and telephone number.

Syntax:

```
cellular1/0 AT config>sms authorized-number ?
  <1..20 chars>    Authorized telephone number
cellular1/0 AT config>sms authorized-number +34639201696
```

2.2.16.4 SMS SERVICE-CENTER-ADDRESS

Allows you to configure the number or address of the mobile carrier SMS message center that belongs to the SIM card you insert in the router.

Note

To make sure it works properly, enter a + sign followed by the appropriate country code and telephone number.

Syntax:

```
cellular1/0 AT config>sms service-center-address ?
  <1..20 chars>    Service center address
cellular1/0 AT config> sms service-center-address +34609090999
```

2.2.17 SIM-SELECT

Allows you to select an active or main SIM for dual SIM management.

Note

Keep in mind that with some devices you cannot use commands to select the SIM (socket) port (e.g., PMC HSDPA/HSUPA DATA). In such cases, this command has no effect.

Syntax:

```
cellular1/0 AT>sim-select ?
  external-socket-1    Externally removable/socket 1 SIM
  internal-socket-2    Internally removable/socket 2 SIM
  sequential           Sequential Order
  random               Random Order
```

2.2.17.1 SIM-SELECT INTERNAL

Selects the internal SIM as active. The corresponding portaSIM is on the back of the PMC card.

Syntax:

```
cellular1/0 AT>sim-select internal
```

2.2.17.2 SIM-SELECT EXTERNAL

Selects the external SIM as active. The corresponding portaSIM is on the right side of the card.

Syntax:

```
cellular1/0 AT>+sim-select external
```

2.2.17.3 SIM-SELECT SEQUENTIAL

Sequentially selects the active SIM on device boot up. The previously active SIM is now backup.

Syntax:

```
cellular1/0 AT config>sim-select sequential
```

2.2.17.4 SIM-SELECT RANDOM

Randomly selects the active SIM on device boot up.

Syntax:

```
cellular1/0 AT config>sim-select random
```

2.2.18 VOICE-CALL

Allows you to supervise outgoing voice calls so, if the interface is not registered in the network and coverage is below the configured thresholds, the calls are rejected. Rejected calls can then be routed through other voice interfaces. For further information, please see manual Teldat *Dm722-I Telephony over IP* .

Syntax:

```
cellular1/0 AT config>voice-call ?
  gsm-gprs       Set coverage threshold for GSM and GPRS
  umts           Set coverage threshold for WCDMA technology (UMTS, HSDPA)
  supervision    Set global voice-call supervision parameters
```

To specify coverage levels, take the technology being used into account (as values can be different depending on this).

Coverage is obtained at the cadence specified through the **coverage timer** command. Said timer defines a temporary resolution that supervises voice calls. If you wish voice call supervision to be quick, then configure this timer to a low value.

To avoid erratic supervision, coverage needs to be maintained for a given time. Consequently, you must configure a minimum time for coverage to be continuously lost and voice calls rejected. This state will not change until coverage exceeds the configured thresholds at least three times (based on the cadence configured through **coverage timer**).

Voice call supervision can be managed through CELL subsystem events.

2.2.18.1 voice-call gsm-gprs

Configures the coverage threshold (when the access technology is GSM/GPRS) and the time it takes for the device to consider outgoing voice calls cannot be routed.

Measured value is RSSI (*Received Strength Signal Indicator*), expressed in dBm. Coverage is considered to have crossed a threshold when:

- RSSI was greater than the threshold and now is lower or the same.
- RSSI was lower or equal to the threshold and now is greater.

Default is threshold -91 dBm. Accepts values ranging from -113 to 0.

Time period to drop coverage (meaning voice calls are rejected) is configured in minutes. It supports values ranging from 0 to 180 minutes. Default is 2 minutes.

Syntax:

```
cellular1/0 AT config>voice-call gsm-gprs threshold <level> over <time>
```

2.2.18.2 voice-call umts

Configures the coverage threshold when the access technology used is UMTS/HSDPA and the time set is not enough for outgoing voice calls to be routed.

Coverage is given through RSSI (*Received Strength Signal Indicator*), expressed in dBm, and by EcNo (*Received energy per chip divided by the power density,* also known as Ec/Io), expressed in dB. Coverage is considered to have crossed a threshold when:

- RSCP or EcNo is equal to, or lower than, the configured values.
- RSCP and EcNo exceed the configured values.

Default is threshold RSCP -101 dBm and EcNo -9 dB. Accepts values ranging from -113 to 0 for RSCP and from -50 to 0 for EcNo.

Time period to drop coverage (meaning voice calls are rejected) is configured in minutes and accepts values ranging from 0 to 180 minutes. Default is 2 minutes. Value 0 means calls are rejected as soon as coverage loss is detected.

Syntax:

```
cellular1/0 AT config>voice-call umts threshold <dBm val> ecno <dB val> over <time>
```

2.2.18.3 voice-call supervision

Configures global parameters for voice call supervision depending on the coverage available.

Syntax:

```
cellular1/0 AT config>voice-call supervision ?
  enable    Enable coverage supervision
```

2.2.18.3.1 voice-call supervision enable

Enables voice call supervision. Depending on the register and the coverage, voice call supervision is not enabled by default.

Syntax:

```
cellular1/0 AT config>voice-call supervision enable
```

2.2.19 WAIT-TIME

Allows you to configure the maximum connection wait time when connections are GSM.

Syntax:

```
cellular1/0 AT config>wait-time ?
  <0..65535>    Value in the specified range
```

Example:

```
cellular1/0 AT config>wait-time 60
```

2.2.20 EXIT

Returns to the previous menu.

Example:

```
cellular1/0 AT config>exit
Config>
```

2.3 Configuring a Data Connection

This section details the steps needed to create a data connection through this interface.

These are:

- Create a connection profile.
- Create a data interface. Add PPP or DIRECT-IP interface and configure it.
- Configure the network parameters required in the base interface.
- Configure the IP address and the necessary routes.
- Debug events, if required.
- Check connection.

2.3.1 Connection DIAL Profile

You need to program the following values:

remote-address:

Remote address: this is only necessary when connection is carried out through CSD calls (remote subscriber number). When connection is carried out through the data network, APN should be configured.

3gpp-apn:

This is the Access Point Network for the mobile network where the connection is made. Values depend on the carrier and can be private or public.

3gpp-pdp-type:

Configures the type of Protocol Data Packet Type to be used in the connection. Depends on the service provided by the carrier. Normally this is IP (default).

3gpp-accessibility-control:

Allows you to enable connectivity control over the profile. Moreover, different accessibility controls can be used for different profiles. This is explained in more detail further on.

3gpp-bearer-service:

Allows you to configure a series of characteristics for CSD connections (i.e., those not made to an APN, but to a number). This way, a user may program the norm, speed, etc, as long as the inserted module supports this. This is explained in more detail further on.

3gpp-restart-on-disc:

When disconnecting a context and establishing a new connection, certain networks face problems or are unable to reestablish said connection. Use this command to program the router to trigger a radio module restart. This restart forces reregistration in the carrier network, allowing context to establish.

3gpp-restart-on-cnxs-fails:

Resets hardware for a mobile telephone internal daughter card when there are repetitive connection failures. These failures may be triggered by the network, or by abnormal situations in the device itself. You can configure a maximum number of failures allowed under the configured time.

idle- time:

Indicates the time where disconnection is executed due to absence of data.

When **idle-time** is set to 0, it allows a device to immediately execute UMTS connection. Any other value configures disconnection time without data.

Connection to a cellular network through APN

Example:

```
;
   global-profiles dial
; -- Dial Profiles Configuration --
      profile MYACCESS default
      profile MYACCESS dialout
      profile MYACCESS 3gpp-apn myapn.com
      profile MYACCESS idle-time 300
;
   exit
;
```

Connection to a CDMA cellular network

Example:

```
;
   global-profiles dial
; -- Dial Profiles Configuration --
      profile MYACCESS default
      profile MYACCESS dialout
      profile MYACCESS remote-address #777
      profile MYACCESS idle-time 300
;
   exit
;
```

2.3.1.1 ACCESSIBILITY-CONTROL

Verifying availability is hard for connections established through mobile devices.

The mechanism used by PPP to control point-to-point connections (Echo-request/Echo-reply) is impractical here, since it works at local level only (i.e., between a router and a connected module).

There are, however, other mechanisms that can be implemented to verify the connection status. These are generally grouped into 2 types: intrusive (they generate data traffic online and are therefore billable) and non-intrusive (they do not generate data traffic).

The above mechanisms can be independently configured over each profile configured in the interface.

2.3.1.1.1 3GPP-ACCESSIBILITY-CONTROL PING

Once connection is established, pings are sent to the configured IP address every **n** seconds (established in the command).

If no response is received within said time, a second ping is sent and response is expected within 10 seconds. If there is no response, two further pings are sent (at 5-second intervals). If there is still no response, the device disconnects.

Command is:

3gpp-accessibility-control ping <A.B.C.D> <timer>

Where:

<A.B.C.D>: IP address pings are sent to.

<timer>: Time between them.

Example:

```
profile MYACCESS 3gpp-accessibility-control ping 10.10.1.1 60
```

Intrusive

2.3.1.1.2 3GPP-ACCESSIBILITY-CONTROL TRACE

Just like above, but with an ICMP trace route instead.

Command is:

3gpp-accessibility-control trace <A.B.C.D> <timer>

Where:

<A.B.C.D> : IP address traces are sent to.

<timer>: Time between them.

Example:

```
profile MYACCESS 3gpp-accessibility-control trace 10.10.1.1 60
```

Non Intrusive

2.3.1.1.3 3GPP-ACCESSIBILITY-CONTROL TIMER

The device disconnects when the timer value is reached, regardless of the idle-time configured in the connection.

Command is:

3gpp-accessibility-control timer <value>

Where:

<value>: timer value between 60 and 86399 seconds.

Example:

```
profile MYACCESS 3gpp-accessibility-control timer 60
```

2.3.1.1.4 3GPP-ACCESSIBILITY-CONTROL TRAFFIC

Monitors data flow in both directions at IP and/or TCP levels.

Since there is always incoming traffic, the mechanism runs when there is outgoing traffic. A counter begins for outgoing frames (depending on the type) and resets at any incoming (regardless of type).

Command is:

3gpp-accessibility-control traffic <counter> <type>

Where:

<counter>: represents a limit for outgoing packets (sent to the network) for the configured type, without receiving in-

coming packets. Once this value has been reached, the link disconnection process activates to try a new connection.

<type>: Type of outgoing monitored traffic.

IP: All IP traffic (TCP, UDP, etc.).

TCP: Only TCP traffic.

ALL: All traffic is considered, including non-IP traffic.

Example:

```
profile MYACCESS 3gpp-accessibility-control traffic 6 IP
```

2.3.1.1.5 3GPP-ACCESSIBILITY-CONTROL RX-TIMER

Monitors the incoming data flow with maximum time without data. If the maximum time set is exceeded, the router assumes the connection is down and disconnects.

This type of monitoring is useful if the incoming data flow is always maintained. Depending on the type of application, the programmed time may need adjusting.

Command is:

3gpp-accessibility-control rx-timer <time>

<time>: Maximum time a connection is active without incoming data (preventing disconnection). Once timed out, link disconnection executes and a new connection is tried. Values range from 1 to 86399.

Example:

```
profile MYACCESS 3gpp-accessibility-control rx_timer 120
```

2.3.1.2 BEARER-SERVICE-TYPE

The following commands appear in the profile:

```
profile MYACCESS 3gpp-bearer-service speed <value>
profile MYACCESS 3gpp-bearer-service name <value>
profile MYACCESS 3gpp-bearer-service name <value>
```

These commands allow CSD calls (i.e., calls made to a number, not to an APN) to have a series of characters.

If your model allows this, calls can be made to an ISDN number destination (speed V.110).

Values that appear are defined in the 3GPP TS 27.007 standard for CSD calls.

The values that can be used depend on the module and network installed. If this command is wrongly configured, the module displays an error message but tries to make the call anyway. This command must be used with great care.

I.e., with events enabled, before making an ATDXXXXXXXX call, the following command appears:

AT+CBST=speed,name,ce

Default is: 0,0,1--> Automode.

Enter the command's mode (explained under the section on monitoring) and enter **AT+CBST=?** to discover what values are allowed for a specific module or card.

2.3.2 Configuring the Data Interface

Depending on the module used by the device, a data interface is created through PPP (Dial UP Networking) or DIRECT-IP (NDIS).

Configuration for both methods is described below.

For further information, please see the following manuals:

- Teldat *Dm710-I – PPP Interface* .
- Teldat *Dm811-I – DirectIP Interface* .

2.3.2.1 Configuring PPP

2.3.2.1.1 Global profile

Configures PPP parameters relative to the base interface being used.

Example:

```
;
   network cellular1/1
; -- Interface AT. Configuration  --
      ppp lcp-options acfc
      ppp lcp-options pfc
      ppp lcp-options accm a0000
   exit
;
```

2.3.2.1.2 Connection PPP profile

Tells the PPP interface to use the UMTS interface as base interface (**base-interface cellular1/1 link** command) and MYACCESS profile for dialing (**base-interface cellular1/1 profile MYACCESS** command).

At the same time, the user must configure the appropriate parameters for the protocol.

The user and password sent during authentication must be appropriate for the carrier and service you are connecting to (**authentication sent-user XXXXXX password YYYYY** command). The latter are examples.

The IP address is normally assigned during negotiation (**ipcp local address assigned** command).

Echo is not required (**lcp echo-req off** command). PPP is only locally significant, i.e., between the router and the connected UMTS module. Echo **does not** detect link drops and coverage loss.

The remote-end IP address, which appears during negotiation, does not need to appear in the routing table. Ignore this through the **no ipcp peer-route** command.

Note

To activate the IP protocol in a PPP interface, configure an IP address even if you enable dynamic IP address acquisition through IPCP (normally by configuring the unnumbered interface address).

Example:

```
;
   add device ppp 1
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user PASSWORD ciphered-pwd 0x93A25C42AE31E48B
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile MYACCESS
;
      exit
;
   exit
;
```

2.3.2.2 Configuring Direct-IP

2.3.2.2.1 NIC Interface

Configures the cellular data interface to encapsulate data in NIC.

Example:

```
;
set data-link NIC celluar1/1
;
```

2.3.2.2.2 Direct-IP Interface

A DIRECT_IP interface must use the WWAN interface as base interface (**base-interface cellular1/1 link** command) and use the MYACCESS profile for dialing (**base-interface cellular1/1 profile MYACCESS** command).

At the same time, the user must configure appropriate parameters for the protocol.

The user and password sent during authentication must be appropriate for the carrier and service you are connecting to (for instance, **authentication sent-user XXXXXX password YYYYY** command).

The IP address is obtained via a DHCP query through the module.

Example:

```
;
   add device direct-ip 1
;
;
   network direct-ip1
; -- Generic Direct IP Encapsulation User Configuration --
      ip address dhcp-negotiated
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile MYACCESS
;
      exit
;
      direct-ip
; -- Direct IP encapsulator user configuration --
         address dhcp
         authentication sent-user PASSWORD ciphered-pwd 0x93A25C42AE31E48B
      exit
;
   exit
;
```

2.3.3 Configuring base interface parameters

Configures the connection and PIN parameters in the base interface (as detailed under the section on configuration).

Example:

```
;
   network cellular1/0
; -- Interface AT. Configuration  --
      coverage-timer 15
      pin ciphered 0x3BEB2E351FDDE243
      network mode automatic
      network domain cs+ps
   exit
;
```

2.3.4 Configuring IP

Cellular connection assigns a public or private IP address to a device in each connection.

Configure the IP addresses so that the default route leads to the PPP interface over the cellular interface.

Example:

Configuration with data interface in PPP mode.

```
;
   protocol ip
; -- Internet protocol user configuration --
      route 0.0.0.0 0.0.0.0 ppp1
;
      rule 1 local-ip ppp1 remote-ip any
      rule 1 napt translation
      rule 1 napt firewall
;
      classless
;
   exit
;
```

Configuration with data interface in Direct-IP mode. A default route is installed by the direct-ip interface when the IP address is obtained by DHCP, so there is no need to add the default address. The installation of the default address can be avoided by configuring *router ignore* in the direct-ip submenu of the configuration menu belonging to the direct-ip interface.

```
;
   protocol ip
; -- Internet protocol user configuration --
;
      rule 1 local-ip direct-ip1 remote-ip any
      rule 1 napt translation
      rule 1 napt firewall
;
      classless
;
   exit
;
```

2.3.5 Events

Despite being optional, this command helps identify problems. The recommended traces for PPP interfaces are shown in the next example.

Example:

```
;
   event
; -- ELS Config --
      enable trace subsystem AT ALL
      enable trace subsystem CELL ALL
      enable trace subsystem PPP ALL
   exit
;
```

For DIRECT-IP interfaces, the recommended group of subsystem events are the ones that appear in the next example.

Example:

```
;
   event
; -- ELS Config --
      enable trace subsystem AT ALL
      enable trace subsystem CELL ALL
      enable trace subsystem QMI ALL
      enable trace subsystem NIC ALL
   exit
;
```

2.3.6 Saving the configuration

For the new configuration to activate, you must save it and reboot the device.

Example:

```
Config>save yes

Building configuration as text... OK
Writing configuration... OK on Flash
Config>
```

2.3.7 Testing module detection

Once you have configured and rebooted the device, check the PMC HSDPA Voice works.

```
03/15/07 17:22:57  AT.020 Module CELLULAR detected intf cellular1/0
03/15/07 17:23:01  AT.020 ATCMD-->AT+CFUN=1 intf cellular1/0
03/15/07 17:23:01  AT.020 ATCMD-->AT+CFUN=1 intf cellular1/1
03/15/07 17:23:02  AT.020 ATCMD-->AT+CPIN? intf cellular1/0
03/15/07 17:23:02  AT.020 Waiting SIM base ifc activation intf cellular1/1
03/15/07 17:23:03  AT.020 Wakeup started on intf cellular1/0
03/15/07 17:23:04  AT.020 Setup module on intf cellular1/0
03/15/07 17:23:04  AT.020 ATCMD-->AT&F intf cellular1/0
03/15/07 17:23:04  AT.020 ATCMD-->AT&C1&D2 intf cellular1/0
03/15/07 17:23:04  AT.020 ATCMD-->AT+IFC=2,2;+CMEE=1 intf cellular1/0
03/15/07 17:23:04  AT.020 ATCMD-->AT+CGMI intf cellular1/0
03/15/07 17:23:04  AT.020 ATCMD-->AT+CGMM intf cellular1/0
03/15/07 17:23:05  AT.020 ATCMD-->AT+GMR intf cellular1/0
03/15/07 17:23:05  AT.020 ATCMD-->AT+CGSN intf cellular1/0
03/15/07 17:23:05  AT.020 ATCMD-->AT+CIMI intf cellular1/0
03/15/07 17:23:05  AT.020 ATCMD-->AT!ICCID? intf cellular1/0
03/15/07 17:23:05  AT.020 ATCMD-->AT+COPS=3,2;^SYSCONFIG=2,3,2,2 intf cellular1/0
03/15/07 17:23:06  AT.020 ATCMD-->AT+CLIP=1 intf cellular1/0
03/15/07 17:23:06  AT.020 ATCMD-->AT+CRC=1 intf cellular1/0
03/15/07 17:23:06  AT.020 ATCMD-->AT!AVEXTPCMCFG=1,1,0 intf cellular1/0
03/15/07 17:23:06  AT.020 ATCMD-->AT!AVEXTPCMSEL=0,1 intf cellular1/0
03/15/07 17:23:07  AT.020 ATCMD-->AT!AVSETPROFILE=0,0,0,0,2 intf cellular1/0
03/15/07 17:23:09  AT.001 Modem initialized successfully intf cellular1/0
03/15/07 17:23:11  AT.020 Setup module on intf cellular1/1
03/15/07 17:23:11  AT.020 ATCMD-->AT&C1&D2 intf cellular1/1
03/15/07 17:23:11  AT.020 ATCMD-->AT+IFC=2,2;+CMEE=1 intf cellular1/1
03/15/07 17:23:13  AT.001 Modem initialized successfully intf cellular1/1
03/15/07 17:23:18  PPP.001 Interface ppp1 ready
```

2.3.8 Testing the connection

2.3.8.1 Monitoring the connection in PPP mode

Executes a ping to a known IP address and monitors the events.

```
*ping 216.239.37.99

PING 216.239.37.99: 56 data bytes
03/15/07 17:25:52  AT.020 Dialer MYACCESS command CIR_OPEN[0] local st 1 intf cellular1/1
03/15/07 17:25:52  AT.020 Connection request on intf cellular1/1
03/15/07 17:25:52  AT.020 ATCMD-->AT+CGDCONT=2,"IP","myaccess.com" intf cellular1/1
03/15/07 17:25:52  AT.020 Attach successful intf cellular1/1
03/15/07 17:25:52  AT.020 ATCMD-->ATD*99***2# intf cellular1/1
03/15/07 17:25:52  AT.006 Dial Req Call, addr = movistar.es intf cellular1/1
03/15/07 17:25:52  AT.020 Connection successful intf cellular1/1
03/15/07 17:25:52  AT.007 Out Call movistar.es establ intf cellular1/1
03/15/07 17:25:52  PPP.087 ppp2:cellular1/1 LCP Negotiation started
03/15/07 17:25:52  AT.020 Dialer MYACCESS command CIR_FLOWCONTROL[4] local st 5 intf cellular1/1
03/15/07 17:25:52  PPP.051 ppp2:cellular1/1 LCP Out CONF-REQ [starting] id 1 len 20
03/15/07 17:25:52  PPP.053 ppp2:cellular1/1 LCP   AsyncMap 0 (0x0206000000000)
```

```
03/15/07 17:25:52  PPP.055 ppp2:cellular1/1 LCP   MagicNumber a5f0b000 (0x0506a5f0b000)
03/15/07 17:25:52  PPP.056 ppp2:cellular1/1 LCP   ProtComp available (0x0702)
03/15/07 17:25:52  PPP.057 ppp2:cellular1/1 LCP   AddrCtrlComp available (0x0802)
03/15/07 17:25:52  AT.020 Event up CIR_OPEN[2] local st 5 intf cellular1/1
03/15/07 17:25:52  AT.020 Dialer MYACCESS command CIR_CONFIG[2] local st 5 intf cellular1/1
03/15/07 17:25:52  PPP.011 ppp2:cellular1/1 In frame, type 0xc021, size 27
03/15/07 17:25:52  PPP.051 ppp2:cellular1/1 LCP In CONF-REQ [req-sent] id 0 len 25
03/15/07 17:25:52  PPP.053 ppp2:cellular1/1 LCP   AsyncMap 0 (0x020600000000)
03/15/07 17:25:52  PPP.054 ppp2:cellular1/1 LCP   AuthProt CHAP (0x0305c22305)
03/15/07 17:25:52  PPP.055 ppp2:cellular1/1 LCP   MagicNumber c6cae4 (0x050600c6cae4)
03/15/07 17:25:52  PPP.056 ppp2:cellular1/1 LCP   ProtComp available (0x0702)
03/15/07 17:25:52  PPP.057 ppp2:cellular1/1 LCP   AddrCtrlComp available (0x0802)
03/15/07 17:25:52  PPP.051 ppp2:cellular1/1 LCP Out CONF-ACK [req-sent] id 0 len 25
03/15/07 17:25:52  PPP.053 ppp2:cellular1/1 LCP   AsyncMap 0 (0x020600000000)
03/15/07 17:25:52  PPP.054 ppp2:cellular1/1 LCP   AuthProt CHAP (0x0305c22305)
03/15/07 17:25:52  PPP.055 ppp2:cellular1/1 LCP   MagicNumber c6cae4 (0x050600c6cae4)
03/15/07 17:25:52  PPP.056 ppp2:cellular1/1 LCP   ProtComp available (0x0702)
03/15/07 17:25:52  PPP.057 ppp2:cellular1/1 LCP   AddrCtrlComp available (0x0802)
03/15/07 17:25:52  PPP.011 ppp2:cellular1/1 In frame, type 0xc021, size 22
03/15/07 17:25:52  PPP.051 ppp2:cellular1/1 LCP In CONF-ACK [ack-sent] id 1 len 20
03/15/07 17:25:52  PPP.053 ppp2:cellular1/1 LCP   AsyncMap 0 (0x020600000000)
03/15/07 17:25:52  PPP.055 ppp2:cellular1/1 LCP   MagicNumber a5f0b000 (0x0506a5f0b000)
03/15/07 17:25:52  PPP.056 ppp2:cellular1/1 LCP   ProtComp available (0x0702)
03/15/07 17:25:52  PPP.057 ppp2:cellular1/1 LCP   AddrCtrlComp available (0x0802)
03/15/07 17:25:52  PPP.087 ppp2: MYACCESS /1 LCP Negotiation successful
03/15/07 17:25:52  AT.020 Dialer MOVISTAR command CIR_FLOWCONTROL[4] local st 5 intf cellular1/1
03/15/07 17:25:52  AT.020 Dialer MYACCESS command CIR_CONFIG[2] local st 5 intf cellular1/1
03/15/07 17:25:52  PPP.085 ppp2:cellular1/1 CHAP required by peer
03/15/07 17:25:52  PPP.011 ppp2:cellular1/1 In frame, type 0xc021, size 10
03/15/07 17:25:52  PPP.051 ppp2:cellular1/1 LCP In DISC-REQ [opened] id 1 len 8
03/15/07 17:25:52  PPP.011 ppp2:cellular1/1 In frame, type 0xc223, size 37
03/15/07 17:25:52  PPP.067 ppp2:cellular1/1 CHAP In CHALLENGE [ack-sent] id 1 len 35
03/15/07 17:25:52  PPP.070 ppp2:cellular1/1 CHAP   Challenge 2820c2f932a2cd373c9d539dd41e78dc
03/15/07 17:25:52  PPP.068 ppp2:cellular1/1 CHAP   Peer-Name UMTS_CHAP_SRVR
03/15/07 17:25:52  PPP.067 ppp2:cellular1/1 CHAP Out RESPONSE [ack-sent] id 1 len 29
03/15/07 17:25:52  PPP.071 ppp2:cellular1/1 CHAP   MD5 faae3d8a4eea22683fcab52016bc9296
03/15/07 17:25:52  PPP.068 ppp2:cellular1/1 CHAP   Peer-Name MOVISTAR
03/15/07 17:25:52  PPP.011 ppp2:cellular1/1 In frame, type 0xc223, size 6
03/15/07 17:25:52  PPP.067 ppp2:cellular1/1 CHAP In SUCCESS [ack-sent] id 1 len 4
03/15/07 17:25:52  PPP.088 ppp2 IPCP Negotiation started
03/15/07 17:25:52  PPP.072 ppp2 IPCP Out CONF-REQ [starting] id 1 len 10
03/15/07 17:25:52  PPP.073 ppp2 IPCP   Address 0.0.0.0 (0x030600000000)
03/15/07 17:25:52  PPP.001 Interface ppp2 ready
03/15/07 17:25:53  PPP.011 ppp2:cellular1/1 In frame, type 0x8021, size 18
03/15/07 17:25:53  PPP.072 ppp2 IPCP In CONF-NAK [req-sent] id 1 len 16
03/15/07 17:25:53  PPP.093 ppp2 IPCP   Primary DNS 10.11.12.13 (0x81060a0b0c0d)
03/15/07 17:25:53  PPP.093 ppp2 IPCP   Secondary DNS 10.11.12.14 (0x83060a0b0c0e)
03/15/07 17:25:53  PPP.072 ppp2 IPCP Out CONF-REQ [req-sent] id 2 len 10
03/15/07 17:25:53  PPP.073 ppp2 IPCP   Address 0.0.0.0 (0x030600000000)
03/15/07 17:25:56  AT.020 ATCMD-->AT+CSQ;+COPS?;+CGREG?;^SYSINFO;*CNTI=0 intf cellular1/0
03/15/07 17:25:56  AT.020 +CSQ-->RSSI 16 intf cellular1/0
03/15/07 17:25:56  AT.020 *CNTI-->GPRS intf cellular1/0
03/15/07 17:25:56  AT.020 ATCMD-->AT!GSTATUS? intf cellular1/0
03/15/07 17:25:56  AT.020 RX level (dBm):-71 intf cellular1/0
03/15/07 17:25:58  PPP.011 ppp2:cellular1/1 In frame, type 0x8021, size 12
03/15/07 17:25:58  PPP.072 ppp2 IPCP In CONF-NAK [ack-sent] id 7 len 10
03/15/07 17:25:58  PPP.073 ppp2 IPCP   Address 80.27.183.182 (0x0306501bb7b6)
03/15/07 17:25:58  PPP.072 ppp2 IPCP Out CONF-REQ [ack-sent] id 8 len 10
03/15/07 17:25:58  PPP.073 ppp2 IPCP   Address 80.27.183.182 (0x0306501bb7b6)
03/15/07 17:25:58  PPP.011 ppp2:cellular1/1 In frame, type 0x8021, size 12
03/15/07 17:25:58  PPP.072 ppp2 IPCP In CONF-ACK [ack-sent] id 8 len 10
03/15/07 17:25:58  PPP.073 ppp2 IPCP   Address 80.27.183.182 (0x0306501bb7b6)
03/15/07 17:25:58  PPP.088 ppp2 IPCP Negotiation successful
```

2.3.8.2 Monitoring the connection in DIRECT-IP mode

Sends a ping to a known IP address and monitors the events.

```
*ping 216.239.37.99
PING 216.239.37.99: 56 data bytes
01/27/00 01:36:56  CELL.010 CHNGD Call state to INIT_CALL (2) intf cellular1/1
01/27/00 01:36:56  AT.020 ATCMD-->AT+CGREG? intf cellular1/0
01/27/00 01:36:56  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:36:57  AT.020 ATCMD-->AT+CGDCONT=1,"IP","ac.vodafone.es","0.0.0.0" intf cellular1/0
01/27/00 01:36:57  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:36:57  CELL.010 CHNGD Call state to WAIT_AT_APN (12) intf cellular1/1
01/27/00 01:36:58  AT.020 ATCMD-->AT*EIAAUW=1,1,"VODAFONE","VODAFONE",00011,0 intf cellular1/0
01/27/00 01:36:58  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:36:58  CELL.010 CHNGD Call state to MAKE_CALL (3) intf cellular1/1
01/27/00 01:36:59  AT.020 ATCMD-->AT*ENAP=1,1 intf cellular1/0
01/27/00 01:36:59  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:36:59  AT.020 ATURC-->*EPSB: 3 intf cellular1/0
01/27/00 01:37:00  AT.020 ATCMD-->AT*ENAP? intf cellular1/0
01/27/00 01:37:00  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:37:01  AT.020 ATCMD-->AT*ENAP? intf cellular1/0
01/27/00 01:37:01  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:37:01  AT.020 ATURC-->*EPSB: 99 intf cellular1/0
01/27/00 01:37:01  AT.020 ATURC-->*ERINFO: 1,0,3 intf cellular1/0
01/27/00 01:37:01  AT.020 *CNTI-->HSPA+ intf cellular1/0
01/27/00 01:37:02  AT.020 ATCMD-->AT*ENAP? intf cellular1/0
01/27/00 01:37:02  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:37:03  AT.020 ATCMD-->AT*E2IPCFG? intf cellular1/0
01/27/00 01:37:03  AT.020 EXT CMD successful intf cellular1/0
01/27/00 01:37:03  CELL.010 CHNGD Call state to EST (5) intf cellular1/1
01/27/00 01:37:04  AT.020 ATCMD-->AT+CSQ;+COPS=3,2;+COPS?;+CGREG? intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->+CSQ: 23,99 intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->+COPS: 0,2,"21401",2  intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->+CGREG: 2,1,"430E","007C0C03",6 intf cellular1/0
01/27/00 01:37:04  AT.020 ATCMD-->AT*E2CHAN?;*ERINFO?;*EPSB?;*E2OTR?;*EWSCI;*EWNCI intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*E2CHAN: 0,0,0,1,10763 intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*ERINFO: 1,0,3 intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*EPSB: 1,99 intf cellular1/0
01/27/00 01:37:04  AT.020 *CNTI-->HSPA+ (*EPSB: 99) intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*E2OTR: 0,75,80,85,1,32 intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*EWSCI: 10763,376,48,33,46 intf cellular1/0
01/27/00 01:37:04  AT.020 ATRSP-->*EWNCI: 10763,383,39,17,46 intf cellular1/0
```

Chapter 3 Monitoring

3.1 Accessing the interface monitoring

To access the cellular interface monitoring menu, first access the general monitoring menu and from there the desired cellular interface.

```
+configuration

Teldat's Router, ATLAS150 7 96  S/N: 106/00375
P.C.B.=89  Mask=0c10  Microcode=00e1  CLK=262144 KHz  BUSCLK=65536 KHz PCICLK=65536 KHz
ID: AT150-16F128R L7.96
Boot ROM release:
 BIOS CODE VERSION: 01.10  Oct 30 2006 17:17:43
  gzip  Oct 30 2006 17:08:44
  io1  Oct 30 2006 17:17:36
  io2  Oct 30 2006 17:08:20
  io3  Oct 30 2006 17:17:36
 START FROM FLASH L1    Watchdog timer Enabled
Software release: 10.7.4 Mar 15 2007 10:39:27
Compiled by    INTEGRATOR on    INTEGRATOR2000
Loaded from primary partition
Hostname:                     Active user:
Date:  Thursday, 03/15/07     Time: 17:41:32
Router uptime: 18m40s
Num  Name     Protocol
0    IP       DOD-IP
3    ARP      Address Resolution Protocol
4    H323     H323
6    DHCP     Dynamic Host Configuration Protocol
11   SNMP     SNMP
13   RIP      Route Information Protocol
17   SIP      SIP
30   EAPOL    Extensible Authentication Protocol Over LAN
31   Preauth  WLAN Preauthentication
33   BFD      Bidirectional Forwarding Detection
11 interfaces:
Connector     Interface            MAC/Data-Link        Status
GE0/FE0/LAN1  ethernet0/0          Ethernet/IEEE 802.3  Up
GE1/FE1/LAN2  ethernet0/1          Ethernet/IEEE 802.3  Testing
SERIAL0/WAN1  serial0/0            Auto Install         Down
BRI/ISDN1     bri0/0               BRI Net              Testing
---           x25-node             internal             Up

               SLOT1 cellular1/0 Async serial line Up

               SLOT1 cellular1/1 Async serial line Up

---           ppp1                 PPP                  Up

SNMP OperStatus:
Interface       OperStatus
ethernet0/0     Up
ethernet0/1     Down
serial0/0       Down
bri0/0          Down
x25-node        Up
cellular1/0     Up
cellular1/1     Up
ppp1            Dormant (Up)
Encryption Engines:
    Hardware: SEC-8272 Revision: 0xA, block 0x0
+
```

Two interfaces appear for each card:

BASE **cellular1**/0 interface:

Constant link monitoring is carried out over this interface.

The base cellular interface appears as **cellular1/0** in this example:

```
+net cellular1/0
--  AT Console --
cellular1/0 AT+
```

SECONDARY **cellular1/1** interface:

This is normally associated with data connections.

The secondary cellular interface appears as **cellular1/1** in this example:

```
+net cellular1/1
--  AT Console --
cellular1/1 AT+
```

3.2 Interface Monitoring

Cellular interface monitoring commands are described and numerated in this section.

Not all commands are available on all interfaces. Availability depends on the type of interface. All commands related to network coverage and SIM characteristics are only available on the base interface.

Command	Function
? (HELP)	Allows you to view available commands or options within a command.
AT-MODE	Sends AT commands directly to the module.
BITRATE	Real time monitoring of connection data rate.
BUFFER	Displays results for the latest commands sent to the module.
CLEAR	Deletes various elements from the interface.
COMMAND	Sends AT commands to the module.
LIST	Lists current parameters for the interface.
MODULE	Commands related to module and SIM monitoring.
NETWORK	Commands related to network monitoring.
POWER-MODULE	Allows you to switch power to the module on/off.
RESET	Allows you to execute a hardware reset over the internal module.
SIM-MANAGEMENT	Commands related to dual SIM management monitoring.
SMS	Reception statistics of SMS message commands.
STATISTICS	Displays various interface statistics.
TRACE	Allows you to view, modify and delete different debugging elements, which detect problems in the interface.
VOICE-CALL	Commands related to voice call supervision depending on coverage.
EXIT	Returns to the previous menu.

3.2.1 ? (HELP)

Lists all commands available at the layer where you are monitoring the router, together with their options.

Syntax:

```
cellular1/0 AT+?
```

Example:

```
cellular1/0 AT+?
  at-mode           Send AT commands directly to the module
  bitrate           Bit rate monitor
  buffer            Display saved commands and answers
  clear             Clear interface and module parameters
  command           Send AT command to the module
```

```
  list              List interface and module parameters
  module            Module related commands
  network           3G Network related commands
  power-module      Module power control
  reset             Send reset command
  sim-management    Double SIM management commands
  sms               SMS menu
  statistics        Interface statistics
  trace             Control and list interface traces
  voice-call        Voice-call supervision commands
  exit
```

3.2.2 AT-MODE

Sends AT commands directly over the connected device.

Syntax:

```
cellular1/0 AT+at-mode
```

Note

The user must have administrator privileges to execute this command.

Executing commands directly over the module can have uncertain effects on said module.

Example:

```
cellular1/0 AT+at
You are now entering AT command mode on interface cellular1/0
Please type CTRL-C to exit AT command mode
ati
Manufacturer: Sierra Wireless, Incorporated
Model: MC8705
Revision: T3_5_4_1AP R604 CNSZXD00000155 2013/03/15 10:05:05
IMEI: 353567040943038
IMEI SV: 10
FSN: CC33212048010
3GPP Release 7
+GCAP: +CGSM,+FCLASS,+DS
OK
*
```

3.2.3 BITRATE

Allows you to monitor the interface's data bit rate.

Syntax:

```
cellular1/0 AT+bitrate
```

Example:

```
cellular1/0 AT+bitrate

                            Interface cellular1/0
 ------------------------------------------------------------------------------
 Current trx rate (bps)  =       2000    Current rcv rate (bps)   =      96000
 Current trx rate (bps)  =      12000    Current rcv rate (bps)   =          0
 Current trx rate (bps)  =      24000    Current rcv rate (bps)   =      94000
 Current trx rate (bps)  =       4000    Current rcv rate (bps)   =     128000
 Current trx rate (bps)  =       4000    Current rcv rate (bps)   =     166000
 Current trx rate (bps)  =       8000    Current rcv rate (bps)   =     336000
 Current trx rate (bps)  =       8000    Current rcv rate (bps)   =     356000
 Current trx rate (bps)  =       8000    Current rcv rate (bps)   =     370000
 Current trx rate (bps)  =      20000    Current rcv rate (bps)   =     174000
cellular1/0 AT+
```

3.2.4 BUFFER

Allows you to monitor commands sent to the module and their results. This is a 2-kbyte circular buffer, deleted each time it's displayed.

Syntax:

```
cellular1/0 AT+buffer
```

Note: To execute this command, the user must have configuration privileges.

Example:

```
cellular1/0 AT+buffer
AT+CFUN=1
OK
AT&F
OK
AT&C1&D2
OK
AT+IFC=2,2;+CMEE=1
OK
AT+CGMI
Sierra Wireless, Incorporated

OK
AT+CGMM
MC8705

OK
AT+GMR
T3_5_4_1AP R604 CNSZXD00000155 2013/03/15 10:05:05

OK
AT+CGSN
353567040943038

OK
AT+CIMI
214072530000435

OK
AT!ICCID?
!ICCID: 8934074100102494953F

OK
AT+COPS=3,2;^SYSCONFIG=2,3,2,2
OK
AT+CLIP=1
OK
AT+CRC=1
OK
AT!AVEXTPCMCFG=1,1,0
OK
AT!AVEXTPCMSEL=0,1
OK
AT!AVSETPROFILE=0,0,0,0,2
OK
AT+CSQ;+COPS?;+CGREG?;^SYSINFO;*CNTI=0
+CSQ: 13,99

+COPS: 0,2,"21407",2

+CGREG: 0,1,0B2E,3126

^SYSINFO: 2,3,0,5,1

*CNTI: 0,UMTS
```

```
OK
AT+RSCP?;+ECIO?;!GSTATUS?
+RSCP:
 RSCP: -90 dBm

+ECIO:
Tot Ec/Io: -4.5 dB

!GSTATUS:
Current Time:  1376            Temperature: 39
Bootup Time:   1360            Mode:        ONLINE
System mode:   WCDMA           PS state:    Attached
WCDMA band:    IMT2000         GSM band:    Unknown
WCDMA channel: 10838           GSM channel: 65535
GMM (PS) state:REGISTERED      NORMAL SERVICE
MM (CS) state: IDLE            NORMAL SERVICE
WCDMA L1 State:L1M_PCH_SLEEP   RRC State:   DISCONNECTED
RX level (dBm):-80

OK
cellular1/0 AT+
```

3.2.5 CLEAR

Deletes different elements from the interface. This command is not available if the interface is in SHUTDOWN mode.

Syntax:

```
cellular1/0 AT+clear ?
  layer3-stats    Layer 3 interface statistics
```

3.2.5.1 CLEAR LAYER3-STATS

Deletes layer 3 interface statistics (i.e., statistics for packets and bytes exchanged by the radio interface). Please note that the interface statistics displayed when using the process 3 (*monitor*) **statistics** command refer to all packets and bytes exchanged with the module. In addition to layer 3 statistics, statistics for module control AT commands and for PPP encapsulation are also included.

Syntax:

```
cellular1/0 AT+clear layer3-stats
```

Layer 3 statistics are displayed using the cellular interface statistics **layer3-stats** command.

3.2.6 COMMAND

Sends AT commands to the module. Sending AT commands to the module is available when not connected.

Sending any command or waiting for a result can be aborted by pressing any key.

Syntax:

```
cellular1/0 AT+command <at-command>
```

Note

The user must have administrator privileges to execute this command.

Executing commands directly over the module can have uncertain effects on said module.

Example:

```
cellular1/0 AT+command at&v
at&v
at&v
&C: 2; &D: 2; &F: 0; &W: 0; E: 1; L: 0; M: 0; Q: 0; V: 1; X: 0; Z: 0;
S0: 0; S2: 43; S3: 13; S4: 10; S5: 8; S6: 2; S7: 50; S8: 2; S9: 6;
```

```
S10: 14; S11: 95; +FCLASS: 0; +ICF: 3,3; +IFC: 2,2; +IPR: 115200; +DR: 0;
+DS: 0,0,2048,6; +WS46: 12; +CBST: 0,0,1;
+CRLP: (61,61,48,6,0),(61,61,48,6,1),(240,240,52,6,2);
+CV120: 1,1,1,0,0,0; +CHSN: 0,0,0,0; +CSSN: 0,0; +CREG: 0; +CGREG: 0;
+CFUN:; +CSCS: "IRA"; +CSTA: 129; +CR: 0; +CRC: 0; +CMEE: 2; +CGDCONT: (2,"IP","internet","",0,0)
; +CGDSCONT: ; +CGTFT: ; +CGEQREQ: ; +CGEQMIN: ; +CGQREQ: ; +CGQMIN: ;
+CGEREP: 0,0; +CGDATA: "PPP"; +CGCLASS: "B"; +CGSMS: 0; +CSMS: 0;
+CMGF: 0; +CSCA: "",; +CSMP: ,,0,0; +CSDH: 0; +CSCB: 0,"","; +FDD: 0;
+FAR: 0; +FCL: 0; +FIT: 0,0; +ES: ,,; +ESA: 0,,,,0,0,255,; +CMOD: 0;
+CVHU: 0; +CPIN: ÿÿ +CMEC: 0,0,0; +CKPD: 1,1; +CGATT: 0;
+CGACT: 0; +CPBS: "SM"; +CPMS: "SM","SM","SM"; +CNMI: 0,0,0,0,0;
+CMMS: 0; +FTS: 0; +FRS: 0; +FTH: 3; +FRH: 3; +FTM: 96; +FRM: 96;
+CCUG: 0,0,0;  +COPS: 0,0,""; +CUSD: 0; +CAOC: 1; +CCWA: 0;
+CPOL: 0,2,"",0,0,0; +CPLS: 0; +CTZR: 0; +CTZU: 0; +CLIP: 0; +COLP: 0;
+CDIP: 0; +CMUX: 0,0,5,31,10,3,30,10,2; !CMUX: 0,0,5,31,10,3,30,10,2

OK
+
```

3.2.7 LIST

Allows you to monitor information on the state of the interface.

Syntax:

```
cellular1/0 AT+list
```

Example:

```
cellular1/0 AT+list
        Module Detected             = TRUE
        Daughter Board              = CELLULAR HSDPA DATA+VOICE card
        Module Manufacturer         = Sierra Wireless, Incorporated
        Module Model                = MC8705
        Module Firmware             = T3_5_4_1AP R604 CNSZXD00000155 2013/03/15
        IMEI                        = 352679010037468
        IMSI                        = 214072530000435
        SIM Card ID                 = 8934074100102494953F
        Drop by ping failed         = 0
        Drop by tracert failed      = 0
        Drop by traffic failed      = 0
        Dialers registered          = none
        Current dialer registered   = none
        State                       = (1) DISCONNECT
        Call request                = 0
        Telephone number            =
        Total connection time       = 0 seconds
        Current connection time     = 0 seconds
        Time to establish connection = 0 sec
cellular1/0 AT+
```

Command history:

Release	Modification
11.01.08	Module detected information was included as of version 11.01.08.

3.2.8 MODULE

Executes monitoring commands related to the module and SIM.

Syntax:

```
cellular1/0 AT+module ?
  direct-upg-frm       Direct Upgrade telephony module microcode
  imei                 Display IMEI module number
  imsi                 Display SIM IMSI module number
  profile              Profile management menu
  remote-diagnostic    Enter Remote Diagnostic Monitoring menu
```

```
  sim-id               Display SIM ID module number
  upgrade-frm          Upgrade telephony module microcode
```

3.2.8.1 MODULE BAND

Lists or sets preferred bands in the cellular module.

Syntax:

```
cellular1/0 AT+module band ?
  available    Display available module bands
  preferred    Display preferred module bands
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.
11.01.00	This command was introduced as of version 11.01.00.

3.2.8.1.1 MODULE BAND LIST

Lists preferred bands in the cellular module.

Syntax:

```
cellular1/0 AT+module list
```

Example:

```
cellular1/0 AT+module band list
        Band Selection Preference = 0002000004e80380
                --> GSM DCS band (1800)
                --> GSM Extended GSM (E-GSM) band (900)
                --> GSM Primary GSM (P-GSM) band (900)
                --> GSM 850 band
                --> GSM PCS band (1900)
                --> WCDMA (Europe, Japan, and China) 2100 band
                --> WCDMA US PCS 1900 band
                --> WCDMA US 850 band
                --> WCDMA Europe and Japan 900 band
        LTE Band Selection Preferen. = 00000000000800c5
                --> Band 1 UL:1920-1980; DL: 2110-2170
                --> Band 3 UL:1710-1785; DL: 1805-1880
                --> Band 7 UL:2500-2570; DL: 2620-2690
                --> Band 8 UL: 880-915; DL: 925-960
                --> Band 20 UL: 832-862; DL: 791-821
cellular1/0 AT+
```

Command history:

Release	Modification
11.00.04	This command was introduced as of version 11.00.04.
11.01.00	This command was introduced as of version 11.01.00.
11.00.07	Option LIST changed its name to PREFERRED as of version 11.00.07.
11.01.02	Option LIST changed its name to PREFERRED as of version 11.01.02.

3.2.8.1.2 MODULE BAND AVAILABLE

Lists all the bands supported by the cellular module.

Syntax:

```
cellular1/0 AT+module band available
```

Example:

```
cellular1/0 AT+module band available
        Module Band Capabilities     = 0002000007c00000
                --> WCDMA Band 1 IMT 2100 band
```

```
                --> WCDMA Band 2 US PCS 1900 band
                --> WCDMA Band 3 DCS 1800 band
                --> WCDMA Band 4 AWS 1700 band
                --> WCDMA Band 5 CLR 850 band
                --> WCDMA Band 8 E-GSM 900 band
        Module LTE Band Capabilities = 00000100330818df
                --> Band 1 UL:1920-1980; DL: 2110-2170
                --> Band 2 UL:1850-1910; DL: 1930-1990
                --> Band 3 UL:1710-1785; DL: 1805-1880
                --> Band 4 UL:1710-1755; DL: 2110-2155
                --> Band 5 UL: 824-849; DL: 869-894
                --> Band 7 UL:2500-2570; DL: 2620-2690
                --> Band 8 UL: 880-915; DL: 925-960
                --> Band 12 UL:698-716; DL: 728-746
                --> Band 13 UL: 777-787; DL: 746-756
                --> Band 20 UL: 832-862; DL: 791-821
                --> Band 25 UL: 1850-1915; DL: 1930-1995
                --> Band 41 UL: 2496-2690; DL: 2496-2690
cellular1/0 AT+
```

Command history:

Release	Modification
11.00.07	This command was introduced as of version 11.00.07.
11.01.02	This command was introduced as of version 11.01.02.

3.2.8.1.3 MODULE BAND PREFERRED

Lists the preferred bands in the cellular module.

Syntax:

```
cellular1/0 AT+module band preferred
```

Example:

```
cellular1/0 AT+module band preferred
        Band Selection Preference    = 0000000000000000
        LTE Band Selection Preferen. = 0000000000080044
                --> Band 3 UL:1710-1785; DL: 1805-1880
                --> Band 7 UL:2500-2570; DL: 2620-2690
                --> Band 20 UL: 832-862; DL: 791-821
cellular1/0 AT+
```

Command history:

Release	Modification
11.00.07	This command was introduced as of version 11.00.07.
11.01.02	This command was introduced as of version 11.01.02.

3.2.8.2 MODULE DIRECT-UPG-FRM

Starts the firmware upgrading process without waiting for verification from the cellular interface's internal module. This is useful in modules that allow firmware upgrading after process failures. For further information, please see the chapter on upgrading in this manual.

Syntax:

```
cellular1/0 AT+module DIRECT-UPG-FRM [yes]
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Command history:

Release	Modification
11.01.06	The "[yes]" option was added as of version 11.01.06

3.2.8.3 MODULE IMEI

Provides the module's International Mobile station Equipment Identity (IMEI).

Syntax:

```
cellular1/0 AT+module imei
```

Example:

```
cellular1/0 AT+module imei
AT+CGSN
500161111199050
OK
```

3.2.8.4 MODULE IMSI

Provides the SIM's International Mobile station Equipment Identity (IMEI).

Syntax:

```
cellular1/0 AT+module imsi
```

Example:

```
cellular1/0 AT+module imsi
AT+CIMI
214031303057905
OK
```

3.2.8.5 MODULE PROFILE

Displays the list of profiles included in the 3G list and shows where to delete it or restore it to the manufacturer's default values.

Syntax:

```
cellular1/0 AT+module profile ?
  clear      Clear profile list stored in the module
  list       Show profile list stored in the module
  restore    Restore manufacturer default profile list
```

3.2.8.5.1 MODULE PROFILE CLEAR

Deletes the list of profiles from the 3G module memory (this option is not available for all modules).

Syntax:

```
cellular1/0 AT+module profile clear [yes]
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Example:

```
cellular1/0 AT+module profile clear
  Are you sure to clear the profile list of the module?(Yes/No)? y
  Clearing profiles.............................
  Module profiles were cleared
  Remember to restart the module so the changes can take effect
cellular1/0 AT+
```

Command history:

Release	Modification
11.01.06	The "[yes]" option was added as of version 11.01.06.

3.2.8.5.2 MODULE PROFILE LIST

Displays the list of profiles included in the 3G module memory and shows the profile that is currently active.

Example:

```
cellular1/0 AT+module profile list
  Profile 1:
        Access Point Name (APN): vzwims
        PDP type: IPV6
  Profile 2:
        Access Point Name (APN): vzwadmin
        PDP type: IPV4V6
  Profile 3:
        Access Point Name (APN): vzwinternet
        PDP type: IPV4V6
  Profile 4:
        Access Point Name (APN): vzwapp
        PDP type: IPV4V6
  Current active profile: 3

cellular1/0 AT+
```

3.2.8.5.3 MODULE PROFILE RESTORE

Restores the list of memory profiles to the default values defined by the module manufacturer (this option is not available for all modules).

Syntax:

```
cellular1/0 AT+module profile restore [yes]
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Example:

```
cellular1/0 AT+module profile restore
  Are you sure to restore default profile list of the module?(Yes/No)? y
  Restoring default profiles.....................
  Module default profiles were restored
  Remember to restart the module so the changes can take effect
cellular1/0 AT+
```

Command history:

Release	Modification
11.01.06	The "[yes]" option was added as of version 11.01.06.

3.2.8.6 MODULE REMOTE-DIAGNOSTIC

Allows you to remotely access the manufacturer's debugging interface for the 3G module. Qualcomm has a series of tools to carry out an exhaustive real time analysis on what is happening in the module. To do this, you need a special interface known as DM. Through this interface, the application can request the necessary information to detect all kinds of problems (both for the radio and communication protocols).

The router allows access to said interface through TCP. Qualcomm monitoring applications, which run in a PC, are generally connected to external devices through COM ports. The latter can be both physical and virtual (i.e., when you are dealing with a device connected via USB).

To connect to the router's DM port, install an application to create a virtual COM port in the PC. This allows you to establish a TCP session with a remote device.

The application must connect to a TCP port configuration supported by our routers.

Configuring parameters to remotely connect to the DM interface is executed through the RDM submenu, using the **remote-diagnostic** option.

Syntax:

```
cellular1/0 AT+MODULE REMOTE-DIAGNOSTIC
```

Example:

```
cellular1/0 AT+MODULE REMOTE-DIAGNOSTIC
- Remote Diagnostic Monitoring -
cellular1/0 RDM+
```

Once you've accessed RDM, the following options are available:

LIST	Lists the state of the TCP connection.
PORT	Selects the access TCP port.
START	Opens the TCP listening port.
STOP	Closes the TCP listening port.
EXIT	Returns to the previous menu.

Syntax:

```
cellular1/0 RDM+?
  list     Show Remote DM status
  port     Change TCP port
  start    Start Remote Diagnostic Monitoring
  stop     Stop Remote Diagnostic Monitoring
  exit
```

3.2.8.6.1 LIST

Lists the TCP session's state and current configuration.

Syntax:

```
cellular1/0 RDM+LIST
```

Example:

```
cellular1/0 RDM+LIST
Remote DM state: CLOSED
TCP state : DISCONNECTED        port 21200
tx_queue: 0
cellular1/0 RDM+
```

3.2.8.6.2 PORT

Configures the TCP listening port established through the remote application. This can take values ranging from 0 to 65535. You must select ports that are different from those used by the most common protocols (FTP, Telnet, http, etc.). We recommend using ports higher than 1000.

Syntax:

```
cellular1/0 RDM+PORT <port>
```

Example:

```
cellular1/0 RDM+PORT 1500
cellular1/0 RDM+
```

3.2.8.6.3 START

Enables the TCP listening port. To establish a TCP session between the remote application and the router, execute this command.

Syntax:

```
cellular1/0 RDM+START
```

Example:

```
cellular1/0 RDM+ START
cellular1/0 RDM+
```

3.2.8.6.4 STOP

Disables the TCP listening port. Once introduced, any TCP session requested by the remote application cannot be established. We recommend entering the **stop** command when the monitoring session has finished and a new one is not going to be launched within a reasonable time period.

Syntax:

```
cellular1/0 RDM+STOP
```

Example:

```
cellular1/0 RDM+STOP
cellular1/0 RDM+
```

3.2.8.6.5 EXIT

Returns to the previous menu.

Syntax:

```
cellular1/0 RDM+EXIT
cellular1/0 AT+
```

3.2.8.7 MODULE SIM-ID

Provides the SIM identifier.

Syntax:

```
cellular1/0 AT+module sim-id
```

Example:

```
cellular1/0 AT+module sim-id
AT!ICCID?
!ICCID: 8934074100102494953F
OK
```

3.2.8.8 MODULE UPGRADE-FRM

Starts firmware upgrading related to the cellular interface's internal module. For further information, please refer to the chapter on upgrading.

Syntax:

```
cellular1/0 AT+module upgrade-frm [yes]
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Command history:

Release	Modification
10.09.28	Error message appears if the data interface (cellularX/1) is not in NIC mode when the module requires data encapsulation in NIC.
11.00.07	Error message appears if the data interface (cellularX/1) is not in NIC mode when the module requires data encapsulation in NIC.
11.01.02	Error message appears if the data interface (cellularX/1) is not in NIC mode when the module requires data encapsulation in NIC.
11.01.06	The "[yes]" option was added as of version 11.01.06

3.2.9 NETWORK

Executes monitoring commands related to the network.

Syntax:

```
cellular1/0 AT+network ?
  attach      Perform manually network attach
  cell-info   Display information about serving and neighbour cells
  detach      Perform manually network detach
  operator    Operator information menu
  performance Display signal quality samples
  quality     Display RSSI value
  status      List GPRS/UMTS/HSDPA connection status
```

3.2.9.1 NETWORK ATTACH

Manually executes an **attach** (register) to the GPRS or WCDMA network.

Note

Before making each call, the device always tries to carry out a network attach to make sure it is still registered there.

Syntax:

```
cellular1/0 AT+network attach
```

Note

The user must have administrator privileges to execute this command.

Example:

```
cellular1/0 AT+network attach
AT+CGATT=1
OK
```

3.2.9.2 NETWORK CELL-INFO

Provides information on the serving cell and neighbors.

Note

Not all modules display the same information. This depends on the type and technology used.

Syntax:

```
cellular1/0 AT+network cell-info
```

Example.

On 2G connection.

```
cellular1/0 AT+network cell-info
Querying...Please wait...
Serving Cell:
PLMN:           2147
LAC:            2821
Cell ID:        2092
BSIC:           42
NCC:            5
BSCC:           2
RAC:            5
Min Rx Lvl Rqd: -102
Max Rach:       Not Available
Band:           E900
ARFCN:          15
RX level (dBm): -47
C1:             55
C2:             55
C31:            0
C32:            0

Neighbour Cells:
Band:           E900    1800    1800
ARFCN:          21      523     528
RAC:            5       5       5
RX level (dBm): -68     -69     -74
C1:             34      33      28
C2:             34      33      28
C31:            0       0       0
C32:            0       0       0
```

Example:

On 3G connection.

```
cellular1/0 AT+network cell-info
Querying...Please wait...
              UARFCN PSC ECIO(-dBm) RSCP(-dBm)
              ------ --- ---------- ----------
Serving Cell:  10738 376        7.0         72
Neighbour  1:  10738 383        9.5         74
Neighbour  2:  10738 382       17.0         82
```

The meaning of each value is as follows:

- **On 2G connection.**

Serving cell parameters

Parameter	Description
PLMN	Public Land Mobile Network Code. This is made up of the MCC and MNC and indicates the mobile telephony carrier, owner of the serving cell.
LAC	Location Area Code in decimal. A Local Area (LA) contains various cells. The LAC occupies two bytes. This, together with the MCC and MNC, forms the LAI.
Cell ID	Active cell identifier (Cell ID) in decimal. Cell ID is unique in the LA. Unique cell description is obtained through Cell Global Identity (CGI) and made up of Cell ID, MCC, MNC and LAC.
BSIC	Base Station Identity Code. Base station identifier.
NCC	Network Color Code.
BSCC	Base Station Color Code. BTS color code.
RAC	Routing Area Code.
MinRxLvl Rqd	Minimum reception level, in dBm, to allow for registration. Minimum sensitivity for the GSM/GPRS module.
Max Rach	Maximum power on RACH burst (not currently implemented).
ARFCN	Absolute Frequency Channel Number. Selected channel number.
RxLEV	BCCH carrier reception level in dBm. The higher this figure (lowest number in absolute value), the better the reception power.
C1	Cell selection criteria. The higher this value, the better. This is also known as *pathloss criterion parameter* and defined as: C1=(RxLev-RxLevAm-MAX((MSTxPwr-MSMaxTxPwr),0) used to select and reselect the cell. MS calculates said value and uses it to decide which cell to attach to. C1 is more useful than just reception power, as it also considers transmission power and maximum transmission power (normally 33 dBm). Under certain conditions, this value cannot be shown (for instance, when GPRS does not calculate it and the following appears: “-“).
C2	Cell reselection criteria. The higher this value, the better. C2 is identical to C1 when the module is in a 900 MHz cell. Dual modules take preference in 1800 band. C1 can be much bigger than C2 without this implying a module change to 900 MHz. C2 is included to manage small cells where an MS can select a cell but does not have enough time to do anything with it before losing it. C2 varies with time and can increase after a certain period. If MS can still see this cell, it changes.
C31	Cell reselection criteria.
C32	Cell reselection criteria.

Neighbor Cells parameters

Parameter	Description
Band	Type of 2G band detected by the module: "E900", "P900", "1900", "1800", "850", "Unknown"
ARFCN	Absolute Frequency Channel Number. Channel number selected.
RAC	Routing Area Code.
RxLEV	BCCH carrier reception level in dBm. The higher this figure (lowest number in absolute value), the better the reception power.
C1,C2, C31, C32	Cell selection criterion.

- **On a 3G connection.**

Common parameters (Serving Cell/Neighbor Cells)

Parameter	Description
UARFCN	UTRA Absolute Radio Frequency Channel Number. WCDMA Channel.
PSC	Primary Scrambling Code.
EcIo	Total energy per chip per power density.
RSCP	Receive Signal Code Power. For further information on the meaning of these parameters, please see the **network status** command.

Coverage criteria in 2G environments

Generally, measurements of previously described coverage parameters have small oscillations for a given location that should be considered normal. To obtain reference values, we recommend taking various samples from each parameter and estimating the average.

According to our previous description, criteria to select the best position for the antenna can be summarized as follows

(1) Look for a first location to place the antenna where you think the reception is satisfactory (high and away from vertical metal surfaces, etc.).

(2) In compliance with the **ARFCN** parameter, identify the serving cell and neighboring frequency band to use the antenna satisfactorily when you have various options. Directional antennas are usually adjusted to only one specific band, while omni-directional antennas are quite often dual.

(3) If reception power **RxLEV** is greater than -75 dBm, go to point 5.

(4) If reception power is between -75 and -90 dBm, try to find a better location for the antenna (and return to point 1).

(5) For the location to be considered satisfactory, check that the reception level for the first neighboring cell is (at least) 6 dBm lower than the serving cell. If it isn't and you want some guarantee that the antenna will work at all times, go back to point 1 and try to find a better location.

Coverage criteria in 3G environments

Please see the **network status** command.

3.2.9.3 NETWORK DETACH

Manually executes a **detach** (de-register) from the network.

Syntax:

```
cellular1/0 AT+network detach
```

Note

The user must have administrator privileges to execute this command.

Example:

```
cellular1/0 AT+network detach
AT+CGATT=0
OK
```

3.2.9.4 NETWORK OPERATOR

Provides information on the network available and on the registered carrier.

Syntax:

```
cellular1/0 AT+network operator ?
  available     List operators available
  registered    List operator registered
```

3.2.9.4.1 NETWORK OPERATOR AVAILABLE

Provides information on available carriers. Please be patient, as it may take several seconds for this command to obtain an answer.

Note

Before executing this command, check that no data call has been established over the cellular interface. Otherwise, the result is ERROR. Hang up the call by placing the PPP interface (or Direct-IP), which takes the cellular interface as the associated base interface, into shutdown.

Syntax:

```
cellular1/0 AT+ network operator available
```

Example:

```
cellular1/0 AT+network operator available
Searching for available PLMNS...Please wait...
AT+COPS=?
+COPS: (2,"movistar","MSTAR","21407",2),(3,"Orange
ES","Orange","21403",2),(3,"vodafone ES","voda ES","21401",2),,(0,1,3,4),(0,1,2)
OK
```

3.2.9.4.2 NETWORK OPERATOR REGISTERED

Provides information on the registered carrier.

Syntax:

```
cellular1/0 AT+ network operator registered
```

Example:

```
cellular1/0 AT+network operator registered
AT+COPS?
+COPS: 0,2,"21407",2
OK
```

3.2.9.5 NETWORK PERFORMANCE

Provides information on the evolution of the Radio interface state, which shows the latest quality samples stored.

The updating range value is programmed in the **coverage-timer** parameter, under the configuration menu.

Syntax:

```
cellular1/0 AT+ network performance
```

Example:

```
cellular1/0 AT+network performance

Rx_Level (-dBm) measured during the last 60 samples

     7777777777777777777777777777777777777778888877888777775888888
  0_ 3333333339999933333399999999999999939999911115533377771333333
 10_|
 20_|
 30_|
 40_|
 50_|
 60_|                                                    :
 70_|                                                    :
 80_|.........     ......               .        ..   ....:
 90_|:::::::::::::::::::::::::::::::::::: ::::::::...::::.....
100_|:::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     older                                                newest

Rx_Level (-dBm) measured during the last 60 samples

     7777777777777777777777777777777777777777777777777777777777777
 50_ 9999999999999999999999999999999999999999999999999999999999999
 55_|
 60_|
```

```
 65_|
 70_|
 75_|
 80_|
 85_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 90_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 95_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
100_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
105_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
110_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     Older                                                  newest

RSCP (-dBm) measured during the last 60 samples

     7878888787877777888787777788877777888777887787888887878777777
 50_ 709000020919979903086988993308887800096915780821102319388898
 55_|
 60_|
 65_|
 70_|
 75_|       .                                          .
 80_|.      :     .     .  ..     .....    :   .. .     :   ... .
 85_|::::::::::::::::::.:: ::::::..:::::::::::::: ::::.:::.:::.::::::
 90_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 95_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
100_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
105_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
110_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
115_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
120_|::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     Older                                                  newest

EcNo (-dB) measured during the last 60 samples

      2     1      111  11  111 11111          11 111   11  1111
  0_ 304444534333251236412662336321424344457449214233544133921235
  2_|
  4_|.        ...:                    .                   .
  6_|: ::::. :::::.    :             ::::::. ::  :   .::  :     .
  8_|: ::::: ::::::   ::  ::   :     :::::::.::   :   :::  :     :
 10_|: ::::: ::::::   ::  ::   :     ::::::::::.  :   :::  :.    :
 12_|: ::::: :::::::.  ::. ::   :  .  :::::::::: .:   :::. :: .  :
 14_|: ::::::.:::::::::.::::::..:.:: ::::::::::::::..:::::.::::::.:
 16_|: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 18_|: ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
 20_|:_::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
     Older                                                  newest

cellular1/0 AT+
```

3.2.9.6 NETWORK QUALITY

Information on the quality of the signal received by the module. This is known as RSSI (*Received Signal Strength Indication*).

Syntax:

```
cellular1/0 AT+ network quality
```

Example:

```
cellular1/0 AT+ network quality
+CSQ: 15,99
OK
```

The module returns the signal level detected using the following format: +CSQ:<rssi>,<ber>

<rssi> Receive level:

0 #-113 dBm or less

1 #-111 dBm

2...30 # -109... -53 dBm

31 # -51 dBm or greater

99 not detectable

<ber> Bit error rate:

0...7 depending on the values described in the GSM 05.08 specification, section 8.2.4.

99 unknown (not measurable or no call carried out).

3.2.9.7 NETWORK STATUS

Provides information on the state of the radio link, as well as on network registration.

Note

Not all modules display the same information. This depends on the type and technology used.

Syntax:

```
cellular1/0 AT+ network status
```

Example:

```
cellular1/0 AT+network status
Querying...Please wait...
Registration state: Home network
PLMN Public Land Mobile Network code; 21407
Cell Location Area Code 0x0b2e (2862), Identification 0x3126 (12582)
System Mode WCDMA, Service domain: CS+PS
Network technology currently in use: HSDPA
Receive signal code power of the active set's strongest cells:  -85 dBm
Total energy per chip per power density value of set's strongest cells:  -5.5 dB
Primary Scrambling Code (PSC) 0x017e (382)
Operational status
Current Time:  3376            Temperature: 43
Bootup Time:   2791            Mode:        ONLINE
System mode:   WCDMA           PS state:    Attached
WCDMA band:    IMT2000         GSM band:    Unknown
WCDMA channel: 10838           GSM channel: 65535
GMM (PS) state:REGISTERED      NORMAL SERVICE
MM (CS) state: IDLE            NORMAL SERVICE

WCDMA L1 State:L1M_DCH         RRC State:   CELL_DCH

RX level (dBm):-85
```

Note

If the interface is idle, a new request is made on executing said command.

The updating range value is programmed by the **coverage-timer**, under the configuration menu.

The parameters offered by this command are described below:

Last Measure

Time lapsed since the last measurement was carried out. This is done by sending certain AT commands to the module. Responses for these are stored, processed and displayed.

Registration State

State of the GSM module registered in the network.

PLMN Public Land Mobile Network code

Said code indicates the mobile telephony carrier (owner of cell).

Cell Location Area Code

Location Area code. This is a Local Area (LA) containing various cells.

Identification

Active cell identifier (Cell ID). Cell ID is unique in the LA. A unique cell description, made up of a Cell ID, PLNM and LAC, can be obtained through Cell Global Identity (CGI).

System Mode

Mode used to access the network. This can be GSM (GPRS) or WCDMA (HMTS/HSDPA).

Service Domain

Transfer (domain) mode used. This can be "Circuit-Switched", "Packet-Switched" or "Circuit and Packet Switched".

Network technology currently in use

Access technology used by the module at a specific time. This can be GPRS, UNTS, HSDPA.

Receive signal code power (RSCP) for the strongest active cells set

Power level for a signal received in a physical channel (code) after de-spreading from the nearest group of cells, which receive the signal with the strongest power. It is a *level measurement*.

In CDMA/UMTS systems, this is normally associated with a downlink, measured by user equipment (UE) and reported to Node-B. The reference point is the antenna connector.

The module uses this value to calculate pathloss and as criteria when changing cells (handovers – HO).

Pathloss = Transmitted channel power [dBm] - RSCP [dBm]

Only available when the connection is WCDMA.

Total energy per chip per power density value of strongest cells set (Ec/Io)

Power relation, measured in the closest cells, between the pilot tone (Ec) and the total power received or the total spectral density (Io). It is a *quality measurement*.

Also known as Pilot Strength.

EcIo = RSCP [dBm] / RSSI [dBm]

Only available when the connection is WCDMA.

Primary Scrambling Code (PSC)

This is a random code used between the device and Node B. It is displayed in hexadecimal and decimal values.

Only available when the connection is WCDMA.

Current Time

Seconds lapsed since the module powered up.

Bootup Time

Seconds lapsed since the last reset took place through commands sent to the module.

Temperature

Approximate temperature of the module.

Mode

Internal operating mode of the modem, where the following is important:

OFFLINE: No network connection.

ONLINE: Connecting to network.

RESETTING:

System mode

Wireless access technology that the network allows you to use at this point:

AMPS

CDMA

GSM

HDR

WCDMA

GPS

WCDMA+GSM

Unknown

PS state

Register state in the data network: **Attached** or **Not Attached**. Corresponds to the latest results from the AT-CGATT command.

WCDMA band

WCDMA band accessed.

IMT2000

WCDMA 1900

WCDMA 1800

WCDMA 800

GSM EGSM900

GSM DCS 1800

GSM 850

GSM 1900

Unknown

WCDMA Channel

WCDMA channel number that can be used. Assigned channel.

GSM band

GSM band that can be used.

GSM850

GSM900

DCS1800

PCS1900

Unknown.

GSM Channel

GSM channel number that can be used. Channel assigned.

GMM(PS)state

Module register state in data network (Packet Service).

MM(CS)state

Module register state in circuit network (Circuit Service).

RxLevel (-dBm)

Reception level measured by the module and associated with RSSI. Obtained through AT-CSQ.

Coverage criteria in 2G environments

Please see the **network cell-info** command.

Coverage criteria in 3G environments

Generally, measurements of the previously described coverage parameters show small oscillations for a given location. This should be considered normal. To obtain reference values, we recommend taking various samples from each parameter and estimating the average.

To correctly determine this, samples should be taken from the **Ec/Io** (Total energy per chip per power density value) and **RSCP** (*Receive signal code power*) parameters with a connection that is both established and transferring data.

The following values can be used as a guideline:

- Optimum Scenario: EcIo is greater than -7 dB, and RSCP greater than -85 dBm.
- Acceptable Scenario: EcIo between -8 dB and -7 dB, and/or RSCP between -85 dBm and -100 dBm.
- Invalid Scenario: EcIo lower than -8 dB, or RSCP lower than -100 dBm.

These values are only offered as **GUIDANCE**. They can vary depending on the type of technology used, the carrier, the module installed, etc.

The latest cellular modules supported show the information in a new way.

Example:

```
+ cellular1/0 AT+net status
Querying...Please wait...

========================================
..:: NETWORK STATUS ::..
========================================

        SIM status: OK
        Registration state: Registered
        Public Land Mobile Network code: 21403
        Public Land Mobile Network name: Orange
        Network technology currently in use: LTE
        Current Service Domain registered: PS (capable PS)
        Current Roaming status: Off
        3GPP Cell ID: 00084D0C
        Radio Band EUTRABand3_1800_DCS
        LTE Rx chan: 1849
        LTE Tx chan: 19849
        LTE Network Bandwidth: 20 MHz
        LTE Advanced Carrier Aggregation Info:
                Secondary Cell Info:
                        Downlink Bandwidth: 10 MHz
                        Frequency: 6200
                        LTE Band Value: E-UTRA Band 20
                        Physical cell ID: 362
                        Cell State: INACTIVE
                Primary Cell Info
                        Downlink Bandwidth: 20 MHz
                        Frequency: 1849
                        LTE Band Value: E-UTRA Band 3
                        Physical cell ID: 29
        PS Attach State: Attached
        EMM State: (2) Registered
        EMM Substate: (0) Normal Service
        EMM Connection: (2) RRC Connected
        LTE Tracking Area Code (TAC): 0606
        RX level (dBm): -73
        Coverage level: 4 (**** )

========================================
```

```
..:: NETWORK DATA CONNECTION ::..
=======================================

        Connection status: Connected
        Radio Access Technology: LTE
        Traffic channel status: Active
        Uplink Flow control: Deactivated
        Max. TX channel rate (bps): 0
        Max. RX channel rate (bps): 0
        IPv4 address: 10.11.38.4
        IPv4 mask: 255.255.255.248
        IPv4 gateway: 10.11.38.5
        IPv4 primary DNS: 85.62.229.135
        IPv4 secondary DNS: 85.62.229.136
```

Information is now shown on the data connection (including the status of the connection), the technology used and the IP address. When the connection is not established, the reason why it failed appears.

If the module and cellular network support LTE Advanced technology (as in the example above), the carrier aggregation information is shown (with primary and secondary cell data).

3.2.10 POWER-MODULE

Switches the module on or off. Since this command cuts power to the cellular module, be cautious when using it. This command must be executed by qualified personnel with in-depth knowledge of the device and is particularly useful for testing.

On executing it (power down module) and prior to switch off, all data connections are dropped and the device deregisters from the network.

This is useful when carrying out a planned switch off in the module. It also helps preserve SIMs as, in some cases, they can be damaged by an abrupt power disconnection.

Syntax:

```
cellular1/0 AT+power-module ? [yes]
  off    Module power Switch OFF
  on     Module power Switch ON
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Example:

```
cellular1/0 AT+power-module off
Are you sure to switch OFF the module(Yes/No)? y
    Module switched OFF
cellular1/0 AT+
```

Note

By executing this command, you may permanently lose all data sessions established and the communication with the module.

Command history:

Release	Modification
11.01.06	The "[yes]" option was added as of version 11.01.06.

3.2.11 RESET

Resets the internal module hardware.

Syntax:

```
cellular1/0 AT+reset [yes]
```

- optional parameter **yes** allows the device to run an operation without prompting the user to confirm first. If this parameter is set to **yes**, no such confirmation is required. If not, the device prompts the user for confirmation.

Example:

```
cellular1/0 AT+reset
Are you sure to restart the module(Yes/No)? y
Restarting......
cellular1/0 AT+
```

Note

When executing this command, all data sessions established are lost (together with the communication with the module) for a few seconds.

Command history:

Release	Modification
11.01.06	The "[yes]" option was added as of version 11.01.06.

3.2.12 SIM-MANAGEMENT

Monitors several hardware elements for dual SIM management. If this command is not supported, it's unavailable.

Syntax:

```
cellular1/0 AT+sim-management ?
  list      Show SIM management status
  switch    Switch to unused SIM socket
```

3.2.12.1 SIM-MANAGEMENT LIST

Displays information on dual SIM management. Indicates which SIM is main, which one is currently in use (if dual SIM management/supervision is enabled), and displays the SIM's identification information (SIM ID and IMSI).

Syntax:

```
cellular1/0 AT+ sim-management list
```

Example:

```
cellular1/0 AT+sim-management list

Current SIM Socket: external/socket 1
Main SIM Socket:    external/socket 1
SIM supervision:    enabled

SIMs identification:
  External/sockt1:
    SIM_ID   : 8934016261449013244F
    IMSI     : 214036630136323
  Internal/sockt2 :
    SIM_ID   : 8934569821305399747F
    IMSI     : 214019816249848

cellular1/0 AT+
```

Command history:

Release	Modification
11.01.05	The "SIMs identification" information has been added as of version 11.01.05.

3.2.12.2 SIM-MANAGEMENT SWITCH

Allows you to manually switch between active and inactive SIMs, without taking into consideration whether they are main or backup. You are asked for confirmation, as switching implies restarting the module and consequently dropping all established connections and calls.

Syntax:

```
cellular1/0 AT+ sim-management switch
```

```
Are you sure(Yes/No)?
```

Example:

```
cellular1/0 AT+sim-management switch
Are you sure(Yes/No)? y
OK

cellular1/0 AT+
```

Switching cannot take place if dual SIM management/supervision isn't enabled, if hardware activates the cellular interface, or if switching is in progress. An error message is displayed in all cases.

A WWAN.014 event appears when the console triggers the switching. This event also shows which SIM is currently active.

Example:

```
11/27/07 18:58:23  WWAN.014 Criteria CONSOLE met, switch to backup SIM (external/socket 1) intf cellular1/0
11/27/07 18:58:23  WWAN.009 CHNGD SIM to external/socket 1 sckt intf cellular1/0
11/27/07 18:58:23  WWAN.013 Backup SIM (external/socket 1) is active intf cellular1/0
```

If SIM record-changes is enabled, changes are registered. Check this through the **trace record-changes list sim** monitoring command.

3.2.13 SMS

Monitoring menu for SMS message reception. Statistics related to the reception of SMS commands can be found here.

Syntax:

```
cellular1/0 AT+sms ?
  statistics    Sms command statistics
```

3.2.13.1 SMS STATISTICS

Displays statistics for SMS command reception. Statistics for the **reboot** command are not stored, since the device reboots 10 seconds later and the statistics information is lost.

Syntax:

```
cellular1/0 AT+sms statistics
```

Example:

```
cellular1/0 AT+sms statistics
    SMS commands received statistics:
    ---------------------------------
    Number of CONNECT WWAN commands:             1
    Number of DISCONNECT WWAN commands:          0
    Number of REBOOT WWAN commands:              0
    Total number of SMS commands received:       1
```

3.2.14 STATISTICS

Displays some interface statistics. This command is unavailable if the interface is in shutdown mode.

Syntax:

```
cellular1/0 AT+statistics ?
  layer3-stats    Layer 3 interface statistics
```

3.2.14.1 STATISTICS LAYER3-STATS

Displays layer 3 interface statistics corresponding to statistics for packets and bytes exchanged by the radio interface. In addition to layer 3 statistics, including statistics for module control AT commands and PPP encapsulation, interface statistics obtained through the process 3 (*monitor*) **statistics** command refer to all packets and bytes exchanged with the module.

Syntax:

```
cellular1/0 AT+statistics layer3-stats
```

Example:

```
cellular1/0 AT+statistics layer3-stats
Total
Rx pkts:            36   Tx pkts:            35
Rx bytes:         3564   Tx bytes:         3477
Throughput (bps)
Last sec   Rx:           0    Tx:           0
Last 1 min Rx:         110    Tx:          71
Last 5 min Rx:          95    Tx:          92
cellular1/0 AT+
```

3.2.15 TRACE

Allows you to control, display and delete different debugging elements in interface operations. This is useful to identify and limit problems.

This command is unavailable if the interface is in shutdown mode.

Syntax:

```
cellular1/0 AT+trace ?
  level             Set trace level
  record-changes    Handle parameters related to record-changes
```

3.2.15.1 TRACE LEVEL

For low level debugging tasks, you may need information on internally-executed processes. Through this command, you can control the level of detail of the traces supplied. By default, traces are disabled. This command requests several values, which are used to control certain aspects of the traces. Setting the trace level to 0 disables this.

Syntax:

```
cellular1/0 AT+TRACE LEVEL <item1-lev> <item2-lev> <item3-lev>
cellular1/0 AT+
```

Displayed traces are not associated with any events subsystem. Since the process of displaying traces may overload the device, don't enable them unless our technical support team so requires.

3.2.15.2 TRACE RECORD-CHANGES

Displays, enables, disables and deletes traces stored because of changes detected in the configured parameters.

```
cellular1/0 AT+trace record-changes ?
  clear      Clear recorded data
  disable    Stop recording
  enable     Restart recording
  list       List recorded data
```

3.2.15.2.1 TRACE RECORD-CHANGES CLEAR

Deletes the information stored on changes the indicated parameter went through.

Syntax:

```
cellular1/0 AT+trace record-changes clear ?
  all    all parameters
```

TRACE RECORD-CHANGES CLEAR ALL

Deletes the information on changes detected in all supported parameters.

Syntax:

```
cellular1/0 AT+trace record-changes clear all
```

3.2.15.2.2 TRACE RECORD-CHANGES DISABLE

Disables the process for capturing trace changes in the indicated parameter. This command does not delete stored traces and does not release memory reserved for their storage. The capture process can be restarted through the **trace record-changes enable** command.

Syntax:

```
cellular1/0 AT+trace record-changes disable ?
  all    all parameters
```

TRACE RECORD-CHANGES DISABLE ALL

Disables the capturing of all supported parameters.

Syntax:

```
cellular1/0 AT+trace record-changes disable all
```

3.2.15.2.3 TRACE RECORD-CHANGES ENABLE

Activates the process for capturing trace changes in the indicated parameter. The capture process can be disabled through the **trace record-changes disable** command.

Syntax:

```
cellular1/0 AT+trace record-changes enable ?
  all    all parameters
```

TRACE RECORD-CHANGES ENABLE ALL

Enables the capture of all supported parameters.

Syntax:

```
cellular1/0 AT+trace record-changes enable all
```

3.2.15.2.4 TRACE RECORD-CHANGES LIST

Displays traces captured for the indicated parameter.

Syntax:

```
cellular1/0 AT+trace record-changes list ?
  call-state      Display call state
  cell            Display serving cell (LAC+ CiD)
  coverage        Display coverage
  plmn            Display Public Land Mobile Network code
  registration    Display registration state to base station
  sim             Display SIM Socket in use
  technology      Display access technology
```

TRACE RECORD-CHANGES LIST CALL-STATE

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list call-state
```

TRACE RECORD-CHANGES LIST CELL

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list cell
```

Example:

```
cellular1/0 AT+trace record-changes list cell
```

```
     1 07/17/07 10:58:09 Serving-Cell to lac 0B2E cid 3126
cellular1/0 AT+
```

TRACE RECORD-CHANGES LIST COVERAGE

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list coverage
```

Example:

```
cellular1/0 AT+trace record-changes list coverage
     2 07/17/07 11:39:23 Coverage to r -120 e -14
     1 07/17/07 11:38:22 Coverage to r -85 e 1

cellular1/0 AT+
```

TRACE RECORD-CHANGES LIST PLMN

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list plmn
```

Example:

```
cellular1/0 AT+trace record-changes list plmn
     1 07/17/07 11:29:44 PLMN to 21407
cellular1/0 AT+
```

TRACE RECORD-CHANGES LIST REGISTRATION

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list registration
```

Example:

```
cellular1/0 AT+trace record-changes list registration
     2 07/17/07 11:31:45 Registration to Searching
     1 07/17/07 11:29:44 Registration to Home network
cellular1/0 AT+
```

TRACE RECORD-CHANGES LIST SIM

Displays traces captured for the indicated parameter, even if there aren't any. They are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list sim
```

Example:

```
cellular1/0 AT+trace record-changes list sim
     2 07/17/07 17:21:45 CHNGD SIM to external/socket 1 sckt intf cellular1/0
     1 07/17/07 13:24:34 CHNGD SIM to internal/socket 2 sckt intf cellular1/0

cellular1/0 AT+
```

TRACE RECORD-CHANGES LIST TECHNOLOGY

Displays traces captured for the indicated parameter, even if there aren't any. Traces are listed in the same order they were registered in. Hit any key to stop said display.

Syntax:

```
cellular1/0 AT+trace record-changes list technology
```

Example:

```
cellular1/0 AT+trace record-changes list technology
     2 07/17/07 11:31:45 Technology to GSM/GPRS
     1 07/17/07 11:29:44 Technology to UMTS

cellular1/0 AT+
```

3.2.16 VOICE-CALL

Checks information relative to voice call supervision, depending on network registration and available coverage.

Syntax:

```
cellular1/0 AT+voice-call ?
  list  Show voice-call supervision status
```

3.2.16.1 VOICE-CALL LIST

Allows you to check the state of voice call supervision based on network registration and available coverage. This command shows how voice call supervision is configured and its current state.

Syntax:

```
cellular1/0 AT+voice-call list
```

Example:

```
cellular1/0 AT+voice-call list
 voice-call supervision: enabled
 voice-calls allowed:    no

cellular1/0 AT+
```

3.2.17 EXIT

Exits the interface monitoring console and accesses the general monitoring prompt (**+**) for the device.

Syntax:

```
cellular1/0 AT+exit
+
```

3.3 LEDS

Routers have front panel LEDs for monitoring purposes.

The PMC-HSDPA card has front panel LEDs A and B assigned to the slot where it is inserted. The following table shows the meaning of each:

SLOT X	Meaning
A	Cellularx/0 base interface functionality: **OFF:** - System stopped. **RED**: - The interface has been disabled (shutdown), is unavailable because it is being installed, or the auto-test has failed. **YELLOW**: - Interface is on standby, without data or voice connection. The registration and coverage status

	is monitored in this state and displayed by a blinking LED. **RAPID BLINKING**: - The device has not been able to register on the network, or the quality is insufficient. **SLOW BLINKING**: - GSM connection (GPRS). **STEADY**: - WCDMA connection (UMTS/HSDPA). **GREEN**: - The interface has established a connection. Blinking means there is data activity.
B	Cellularx/1 base interface functionality: **OFF**: - System stopped. **RED**: - The interface has been disabled (shutdown), is unavailable because it is being installed, or the auto-test has failed. **YELLOW**: - Interface is on standby, no data connection. **GREEN**: - The interface has established a connection. Blinking means there is data activity.

Chapter 4 Upgrading Firmware

4.1 Introduction

Due to the rapid progression of cellular technology, modules used in access solutions must be upgradeable so they can offer the latest available features.

Cellular interfaces in routers have a mechanism to specifically upgrade cellular telephone firmware.

This is done by:

- Obtaining the upgraded software.
- Transferring the software to the device through FTP.
- Loading it in the card cellular telephony module.

4.2 Procedure

4.2.1 Obtaining the upgrade

To perform the firmware upgrade, you need the correct load file for the module you want to update. You also need information on the type and version of the module installed to determine which firmware versions are compatible.

The user can obtain firmware for various types of modules, as well as several versions for each, from our Technical Service. Simply contact our Technical Service and give them all the information on the module. This information can be found on the device monitoring console.

Example:

```
cellular1/0 AT+list
        Daughter Board              = CELLULAR PCI card
        Module Manufacturer         = Sierra Wireless, Incorporated
        Module Model                = MC8705
        Module Firmware             = T3_5_4_1AP R604 CNSZXD00000155 2013/03/15
        IMEI                        = 353567040943038
        IMSI                        = 214072530000435
        SIM Card ID                 = 8934074100102494953F
        Drop by ping failed         = 0
        Drop by tracert failed      = 0
        Drop by traffic failed      = 0
        Dialers registered          = VoIP
        Current dialer registered   = none
        State                       = (1) DISCONNECT
        Call request                = 0
        Telephone number            =
        Total connection time       = 0 seconds
        Current connection time     = 0 seconds
        Time to establish connection = 0 sec
cellular1/0 AT+
```

The file that contains the new module firmware has an *UPF extension.

4.2.2 Transferring to the device

Routers have an FTP server they transfer files to in order to upgrade the device software or to load firmware for internal devices. This server is only accessible if the device has started up correctly (application executed).

Follow these steps to perform an upgrade:

(1) Place the upgrade file in a directory in the machine where you are going to launch the FTP session.

(2) In order to perform the upgrade process, your device needs enough memory space to store the upgrade file. Likewise, the FTP temporary buffer must have more space than that needed by the file. We recommend preconfiguring the FTP server through the **temp-buff** command.
For further information, please see Teldat *Dm724-I FTP Protocol*.
Example:

```
Config>set ftp
-- FTP user configuration --
hsdpa FTP config> temp-buff 13000000
FTP config>
```

(3) Connect to the FTP server (default is user **root** and no password).

(4) Configure the binary mode through the **bin** command.

(5) Transfer the file containing the firmware using the **put myfmwr.upf** command.

(6) When the transfer completes, disconnect using the **bye** command.

```
C:\tmp>ftp 172.24.79.12
Connected to 172.24.79.12.
220 FTP server ready, 1 active clients of 1 simultaneous clients allowed.
User (172.24.79.12:(none)): root
331 User name accepted, need password.
Password:
230 User login complete.
ftp> bin

200 TYPE is set to IMAGE.
ftp> hash
Impresión de marcas "hash" Active  ftp: (2048 bytes/marca "hash") .
ftp> put myfmwr.upf

200 PORT is set to IP ADDR = 172.24.51.96  PORT = 5001
150 Data connection open, file transfer in process...
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
-----
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
############################################################
226 STOR completed, 12248960 bytes processed, data connection is closed.
ftp: 12248960 bytes sent in 13,23 seconds 925,57 at KB/s.
ftp> bye

C:\tmp>
```

4.2.3 Upgrading the module

(1) For the card to update, access the base interface (**cellularX/0**) monitoring menu (as explained in the chapter on monitoring).

(2) Execute **module upgrade-frm** to start loading. If you have not preloaded the upgrade file in RAM, you will receive an error message. Remember that an error message will appear on the console if the module used requires data encapsulation in NIC and the data interface (cellularX/1) is not configured in this mode (see section 2.3.2.2.1):

```
CLI Error: No NIC interface registered
CLI Error: Command error
```

(3) Wait until the process finishes. Messages will display the upgrading progress and its state. These messages can vary depending on the type of module you are upgrading (numerical, multiplication sign, etc.).

Note

Do not, under any circumstances, switch off or restart the device during this process.

Note

The process can take a few minutes.

(4) When requested, you can erase the FTP file from memory if you no longer need it. However, you may want to store the file if you intend to upgrade more modules in the same device. You can also erase the file using FTP.

(5) Check this is the correct version through the interface **list** command.

Example:

```
+net cellular1/0
cellular1/0 AT+list
        Daughter Board              = CELLULAR HSDPA DATA+VOICE card
        Module Manufacturer         = Sierra Wireless, Incorporated
        Module Model                = MC8705
        Module Firmware             = T3_5_2_1AP R604 CNSZXD00000155 2013/03/15
        IMEI                        = 353567040943038
        IMSI                        = 214014501725717
        SIM Card ID                 = 8934564520700509612F
        SIM Card ICC                = 984365540207509016F2
        Drop by ping failed         = 0
        Drop by tracert failed      = 0
        Drop by traffic failed      = 0
        Dialers registered          = none
        Current dialer registered   = none
        State                       = (1) DISCONNECT
        Call request                = 0
        Telephone number            =
        Total connection time       = 0 seconds
        Current connection time     = 0 seconds
        Time to establish connection = 0 sec
cellular1/0 AT+
cellular1/0 AT+MODULE UPGRADE-FRM
Reading upgrading file from /MEM, 12265344 bytes
 Module Sierra Wireless MC8705 detected
Are you sure of upgrading the module(Yes/No)? y
Upgrade in progress
  Upgrade initializing... OK
  Detected Upgrade release 3.5.4.1
  BOOT  upgrade
        Reading upgrade item ... OK
        Upgrading( )...: 135
        OK
  Additional 1 upgrade
        Reading upgrade item ... OK
        Upgrading(*)...: 187
        OK
  APPL  upgrade
```

```
        Reading upgrade item ... OK
        Upgrading( )...: 11949
        OK
        Upgrade done
cellular1/0 AT+
cellular1/0 AT+list
        Daughter Board              = CELLULAR HSDPA DATA+VOICE card
        Module Manufacturer         = Sierra Wireless, Incorporated
        Module Model                = MC8705
        Module Firmware             = T3_5_4_1AP R604 CNSZXD00000155 2013/03/15
        IMEI                        = 353567040943038
        IMSI                        = 214014501725717
        SIM Card ID                 = 8934564520700509612F
        SIM Card ICC                = 984365540207509016F2
        Drop by ping failed         = 0
        Drop by tracert failed      = 0
        Drop by traffic failed      = 0
        Dialers registered          = none
        Current dialer registered   = none
        State                       = (0) INITIAL
        Call request                = 0
        Telephone number            =
        Total connection time       = 0 seconds
        Current connection time     = 0 seconds
        Time to establish connection = 0 sec
cellular1/0 AT+
```

Note

Progress information displayed on the console may differ from the one shown in this example. It shall depend on the number and size of the modules installed in the router, as well as their models.

4.2.4 Direct upgrading

During a 3G module upgrade, abnormal situations may arise that can prevent the update from completing. This means 3G cannot be accessed at the AT command level, but may be accessible at a lower level. Despite the fact that, in this state, some 3G models can be upgraded, important information needed for successful upgrading won't be available as these models cannot be accessed through AT commands.

The **direct-upg-frm** command has been specifically designed for these situations. It makes downloading possible without the pertinent checks carried out during said procedures (**upgrade-frm**).

The risk of destroying a 3G module is very low, as routers only allow this command to be executed over compatible modules. We recommend, however, reserving this method for special situations such as the one described above. Please take care when selecting the firmware version and make sure they are compatible (even though the module will normally reject non-compatible ones).

The upgrade process is similar to the generic method, but the **direct-upg-frm** command is executed instead of the **upgrade-frm one**.

Example:

```
hsdpa cellular1/0 AT+MODULE DIRECT-UPG-FRM
Reading upgrading file from /MEM, 12265344 bytes
WARNING: This command doesn't verify firmware compatibility, module can be destroyed
Are you sure to upgrade the module(Yes/No)? y
Upgrade in progress
  Upgrade initializing... OK
  Detected Upgrade release 3.5.4.1
  BOOT  upgrade
        Reading upgrade item ... OK
        Upgrading( )...: 135
        OK
  Additional 1 upgrade
        Reading upgrade item ... OK
        Upgrading(*)...: 187
        OK
```

```
  APPL  upgrade
        Reading upgrade item ... OK
        Upgrading( ).:.: 11949
        OK
        Upgrade done
hsdpa cellular1/0 AT+
```

Chapter 5 Examples

5.1 Connecting to Internet

The following two examples show the same client network connection scenario, both cabled (LAN) and wireless (WiFi), using PPP data or DirectIP connection.

Ethernet and WLAN interfaces are grouped in a bridge directly provided by DHCP. The router behaves as a DNS server for these.

To remotely access the device, a name to make accessing the device through the **DNS-Updater** feature possible must be registered.

An **NSM ipicmp** poll is configured to test link connectivity and checks carried out through **access control** on data reception availability.

To avoid fragmentation, which causes packet loss and disorder in mobile networks, frame length (**ip mtu**) has been limited and an adjustment in TCP connections (**ip tcp adjust-mss**) has been made.

Note

DIRECT-IP interface is not available for all router models used in cellular interfaces.

5.1.1 PPP Connection

```
   log-command-errors
   no configuration
   add device ppp 1
   add device bvi 0
   set data-link at cellular1/0
   set data-link at cellular1/1
;
   global-profiles dial
; -- Dial Profiles Configuration --
      profile INTERNET default
      profile INTERNET dialout
      profile INTERNET 3gpp-accessibility-control rx-timer 60s
      profile INTERNET 3gpp-apn internet
;
   exit
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      input-buffers 256
   exit
;
   network cellular1/0
; -- Interface AT. Configuration  --
      coverage-timer 10
      no register-denied-reset
   exit
;   network cellular1/1
; -- Interface AT. Configuration  --
      ppp lcp-options acfc
      ppp lcp-options pfc
      ppp lcp-options accm a0000
   exit
;
   network wlan0/0
; -- Wireless LAN Interface. Configuration --
      bss "Router"
         privacy-invoked
         rsn wpa
         rsn wpa2
         cipher tkip
         cipher aes-ccmp
         akm-suite psk
         wpa-psk passphrase plain teldat.teldat
      exit
;
   exit
;
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ip mtu 1200
      ip tcp adjust-mss 1100
      ppp
; -- PPP Configuration --
         authentication sent-user USER password PASSWORD
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
```

```
        base-interface cellular1/1 link
        base-interface cellular1/1 profile INTERNET
;
      exit
;
   exit
;
;
;
   network bvi0
; -- Bridge Virtual Interface configuration --
      ip address 172.16.1.1 255.255.255.0
;
   exit
;
   event
; -- ELS Config --
      enable trace subsystem AT ALL
      enable trace subsystem PPP ALL
      enable trace subsystem DNS ALL
      disable trace event PPP.011
      disable trace event PPP.012
      ev-buffer 3000 200
   exit
;
   protocol asrt
; -- ASRT Bridge user configuration --
      bridge
      irb
      port ethernet0/0 1
      port wlan0/0 2
      route-protocol ip
   exit
;
;
   protocol ip
; -- Internet protocol user configuration --
      route 0.0.0.0 0.0.0.0 ppp1
;
      rule 1 local-ip ppp1 remote-ip any
      rule 1 napt translation
;
      classless
;
   exit
;
   protocol dhcp
; -- DHCP Configuration --
      server
; -- DHCP Server Configuration --
        enable
;
;
        shared 1
;
        subnet local 1 network 172.16.1.0 255.255.255.0
        subnet local 1 range 172.16.1.5 172.16.1.162
        subnet local 1 dns-server 172.16.1.1
        subnet local 1 router 172.16.1.1
;
      exit
;
   exit
;
   feature dns
; -- DNS resolver user configuration --
      server 8.8.8.8
```

```
      server 4.2.2.2
      t-retransmissions 5s
   exit
;
   feature nsm
 ; -- Network Service Monitor configuration --
      operation 1
; -- NSM Operation configuration --
         type echo ipicmp 8.8.8.8
         frequency 10
      exit
;
      schedule 1 life forever
      schedule 1 start-time now
   exit
;
   feature dns-updater
; -- DNS UPDATER configuration --
      enable
;
      entry 1 protocol DynDNS system dynamic
      entry 1 interface direct-ip1
      entry 1 hostname router_name.no-ip.org
      entry 1 servername dynupdate.no-ip.com
      entry 1 user user@mail.com password userpassword
;
   exit
;
   dump-command-errors
   end
```

5.1.2 DIRECT-IP Connection

```
   log-command-errors
   no configuration
   add device direct-ip 1
   add device bvi 0
   set data-link at cellular1/0
   set data-link at cellular1/1
;
   global-profiles dial
; -- Dial Profiles Configuration --
      profile INTERNET default
      profile INTERNET dialout
      profile INTERNET 3gpp-accessibility-control rx-timer 60s
      profile INTERNET 3gpp-apn internet
;
   exit
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      input-buffers 256
   exit
;
   network cellular1/0
; -- Interface AT. Configuration  --
      coverage-timer 10
      no register-denied-reset
   exit
;
   network wlan0/0
; -- Wireless LAN Interface. Configuration --
      bss "Router"
         privacy-invoked
         rsn wpa
         rsn wpa2
         cipher tkip
         cipher aes-ccmp
         akm-suite psk
         wpa-psk passphrase plain teldat.teldat
      exit
;
   exit
;
;
   network direct-ip1
; -- Generic Direct IP Encapsulation User Configuration --
      ip address dhcp-negotiated
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile INTERNET
;
      exit
;
      direct-ip
; -- Direct IP encapsulator user configuration --
         address dhcp
         authentication sent-user USER password PASSWORD
      exit
;
   exit
;
;
;
   network bvi0
```

```
; -- Bridge Virtual Interface configuration --
      ip address 172.16.1.1 255.255.255.0
;
   exit
;
   event
; -- ELS Config --
      enable trace subsystem AT ALL
      enable trace subsystem DNS ALL
      ev-buffer 3000 200
   exit
;
   protocol asrt
; -- ASRT Bridge user configuration --
      bridge
      irb
      port ethernet0/0 1
      port wlan0/0 2
      route-protocol ip
   exit
;
;
   protocol ip
; -- Internet protocol user configuration --
      rule 1 local-ip direct-ip1 remote-ip any
      rule 1 napt translation
;
      classless
;
   exit
;
   protocol dhcp
; -- DHCP Configuration --
      server
; -- DHCP Server Configuration --
         enable
;
;
         shared 1
;
         subnet local 1 network 172.16.1.0 255.255.255.0
         subnet local 1 range 172.16.1.5 172.16.1.162
         subnet local 1 dns-server 172.16.1.1
         subnet local 1 router 172.16.1.1
;
      exit
;
   exit
;
   feature dns
; -- DNS resolver user configuration --
      server 8.8.8.8
      server 4.2.2.2
      t-retransmissions 5s
   exit
;
   feature nsm
; -- Network Service Monitor configuration --
      operation 1
; -- NSM Operation configuration --
         type echo ipicmp 8.8.8.8
         frequency 10
      exit
;
      schedule 1 life forever
      schedule 1 start-time now
   exit
```

```
;
   feature dns-updater
 ; -- DNS UPDATER configuration --
      enable
;
      entry 1 protocol DynDNS system dynamic
      entry 1 interface direct-ip1
      entry 1 hostname router_name.no-ip.org
      entry 1 servername dynupdate.no-ip.com
      entry 1 user user@mail.com password userpassword
;
   exit
;
;
   dump-command-errors
   end
```

5.2 Dual SIM Management

This example shows the capacity of dual SIM management/supervision. For SIM supervision, 2 NSM/NSLA polls are employed and backup SIM use is limited to 4 minutes.

NSM ping polling checks the connection to a a known address at a rate of 1 every 5 seconds. One poll is used for the main SIM and another for the backup SIM.

Note

Keep in mind that with some devices you cannot use commands to select the SIM (socket) port (e.g., PMC HSDPA/HSUPA DATA). In such cases, this command has no effect.

Configuration is:

```
   log-command-errors
   no configuration
   set hostname HSDPA
   add device ppp 1
   add device ppp 2
   set data-link at cellular1/0
   set data-link at cellular1/1
   set data-link x25 serial0/0
   set data-link x25 serial0/1
   set data-link x25 serial0/2
   global-profiles dial
; -- Dial Profiles Configuration --
      profile HSDPA1 default
      profile HSDPA1 dialout
      profile HSDPA1 local-address 616000111
      profile HSDPA1 3gpp-apn company1.es
      profile HSDPA1 idle-time 300
;
      profile HSDPA2 default
      profile HSDPA2 dialout
      profile HSDPA2 local-address 616000222
      profile HSDPA2 3gpp-apn company2.es
      profile HSDPA2 idle-time 300
;
   exit
;
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 172.24.78.94 255.255.0.0
;
;
;
;
```

```
   exit
;
;
    network cellular1/0
; -- Interface AT. Configuration  --
      sim-select internal-socket-2
;
      record-changes enable
      record-changes sim enable
      record-changes sim samples 200
;
;
      sim external-socket-1 local-address 616000222
      sim external-socket-1 pin ciphered 0x4698601DE5BFA77D
      sim internal-socket-2 local-address 616000111
      sim internal-socket-2 pin ciphered 0x5F03923F51F2AA1D
      sim supervision enable
      sim nsla-criteria nsla-advisor 5
      sim return-criteria time after 4
      sim return-criteria nsla-advisor 7
      sim connection-timeout 120s
;
      network domain cs+ps
   exit
;
   network cellular1/1
; -- Interface AT. Configuration  --
      ppp lcp-options acfc
      ppp lcp-options pfc
      ppp lcp-options accm a0000
   exit
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user COMPANY1 password PSSWRD1
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile HSDPA1
;
      exit
;
   exit
;
;
   network ppp2
; -- Generic PPP User Configuration --
      ip address unnumbered
;
;
;
;
      ppp
; -- PPP Configuration --
         authentication sent-user COMPANY2 password PSSWRD2
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
```

```
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile HSDPA2
;
      exit
;
   exit
;
   event
; -- ELS Config --
      enable trace event PPP.001
      enable trace event PPP.002
      enable trace subsystem NSLA ALL
      enable trace subsystem CELL ALL
      enable trace subsystem WWAN ALL
      enable filter
      ev-buffer 3000 200
      filter 1 default
      filter 1 text "SIM"
      filter 1 action cyan
   exit
;
;
   protocol ip
; -- Internet protocol user configuration --
      route 0.0.0.0 0.0.0.0 ppp1
      route 0.0.0.0 0.0.0.0 ppp2 2
;
      classless
;
   exit
;
   feature nsm
; -- Network Service Monitor configuration --
      operation 1
; -- NSM Operation configuration --
         type echo ipicmp 10.26.4.66
         frequency 5
         timeout 1000
      exit
;
      operation 2
; -- NSM Operation configuration --
         type echo ipicmp 10.26.3.28
         frequency 5
         timeout 1000
      exit
;
      schedule 1 life forever
      schedule 1 start-time now
   exit
;
   feature nsla
; -- Feature Network Service Level Advisor --
      enable
;
      filter 5 nsm-op 1 rtt
      filter 5 significant-samples 2
      filter 5 activation threshold timeout
      filter 5 activation sensibility 100
      filter 5 activation stabilization-time 1
      filter 5 deactivation threshold timeout
      filter 5 deactivation sensibility 100
      filter 5 deactivation stabilization-time 1
```

```
;
      filter 7 nsm-op 2 rtt
      filter 7 significant-samples 2
      filter 7 activation threshold timeout
      filter 7 activation sensibility 100
      filter 7 activation stabilization-time 1
      filter 7 deactivation threshold timeout
      filter 7 deactivation sensibility 100
      filter 7 deactivation stabilization-time 1
;
      alarm 5 filter-id 5
;
      alarm 7 filter-id 7
;
      advisor 5 alarm-id 5
;
      advisor 7 alarm-id 7
;
   exit
;
   dump-command-errors
   end
```

On startup, a check executes to ensure only NSLA 5 activates. The latter is associated with the main SIM.

```
11/30/07 11:08:50  NSLA.005 advisor/5 client (0x0018dc58 0x010cd3c0) mutated to zombie
11/30/07 11:08:50  NSLA.005 advisor/7 client (0x0018de38 0x010cd3c0) mutated to zombie
11/30/07 11:08:51  GW.005 Bffrs: 1674 avail 1674 idle   fair 325 low 334
11/30/07 11:08:51  NSLA.002 filter/5 creation ok
11/30/07 11:08:51  NSLA.002 filter/7 creation ok
11/30/07 11:08:51  NSLA.002 filter/5 client (0x0043c530 0x0132b790 0x00) registration ok
11/30/07 11:08:51  NSLA.004 alarm/5 registration in filter 5 ok
11/30/07 11:08:51  NSLA.004 alarm/5 creation ok
11/30/07 11:08:51  NSLA.002 filter/7 client (0x0043c530 0x0132b710 0x00) registration ok
11/30/07 11:08:51  NSLA.004 alarm/7 registration in filter 7 ok
11/30/07 11:08:51  NSLA.004 alarm/7 creation ok
11/30/07 11:08:51  NSLA.004 alarm/5 client (0x0043ee08 0x0132b690 0x00) registration ok
11/30/07 11:08:51  NSLA.005 advisor/5 registration in alarm 5 ok
11/30/07 11:08:51  NSLA.005 advisor/5 creation ok
11/30/07 11:08:51  NSLA.005 advisor/5 client (0x0018dc58 0x010cd3c0) zombie reanimated
11/30/07 11:08:51  NSLA.004 alarm/7 client (0x0043ee08 0x0132b610 0x00) registration ok
11/30/07 11:08:51  NSLA.005 advisor/7 registration in alarm 7 ok
11/30/07 11:08:51  NSLA.005 advisor/7 creation ok
11/30/07 11:08:51  NSLA.005 advisor/7 client (0x0018de38 0x010cd3c0) zombie reanimated
11/30/07 11:08:51  NSLA.005 advisor/5 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.002 filter/5 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.004 alarm/5 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.005 advisor/7 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.002 filter/7 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.004 alarm/7 ioctl DEACTIVATE
11/30/07 11:08:51  NSLA.002 filter/5 client (0x0043c530 0x0132b790 0x00) notification FALSE
11/30/07 11:08:51  NSLA.004 alarm/5 notification from filter 5: FALSE
11/30/07 11:08:51  NSLA.002 filter/7 client (0x0043c530 0x0132b710 0x00) notification FALSE
11/30/07 11:08:51  NSLA.004 alarm/7 notification from filter 7: FALSE
11/30/07 11:08:51  NSLA.004 alarm/5 client (0x0043ee08 0x0132b690 0x00) notification FALSE
11/30/07 11:08:51  NSLA.005 advisor/5 notification from alarm 5: FALSE
11/30/07 11:08:51  NSLA.004 alarm/7 client (0x0043ee08 0x0132b610 0x00) notification FALSE
11/30/07 11:08:51  NSLA.005 advisor/7 notification from alarm 7: FALSE
11/30/07 11:08:51  NSLA.005 advisor/5 client (0x0018dc58 0x010cd3c0) notification FALSE
11/30/07 11:08:51  NSLA.005 advisor/7 client (0x0018de38 0x010cd3c0) notification FALSE
11/30/07 11:09:09  NSLA.005 advisor/5 ioctl ACTIVATE
11/30/07 11:09:09  NSLA.002 filter/5 ioctl ACTIVATE
11/30/07 11:09:09  NSLA.004 alarm/5 ioctl ACTIVATE
```

A further check is carried out to ensure only the main SIM activates PPP1 (UP), which is the interface used by said SIM.

```
HSDPA *p 3
```

```
Console Operator
HSDPA +conf

Teldat's Router, ATLAS 2 156  S/N: 403/09356
P.C.B.=43  Mask=0502  Microcode=0000  CLK=49152 KHz  BUSCLK=49152 KHz PCICLK=32768 KHz
ID: AT-8F64R L2.156
Boot ROM release:
BIOS CODE VERSION: 01.10.03   Jul  6 2007 15:28:31
  gzip  Apr 17 2007 09:17:18
  io1  Jul  6 2007 15:26:07
  io2  Jul  6 2007 13:07:13
  io3  Jul  6 2007 15:28:23
START FROM FLASH L1    Watchdog timer Enabled
Software release: 10.7.11-Alfa NV Nov 29 2007 19:28:51
Compiled by   MBERROJO on   MBERROJO

Hostname: HSDPA               Active user:
Date:    Friday, 11/30/07     Time: 11:11:48
Router uptime: 2m57s
Num  Name     Protocol
0    IP       DOD-IP
3    ARP      Address Resolution Protocol
11   SNMP     SNMP
28   PPPoE    Point-to-Point Protocol Over Ethernet

10 interfaces:
Connector     Interface            MAC/Data-Link        Status
LAN1          ethernet0/0          Ethernet/IEEE 802.3  Up
SERIAL0/WAN1  serial0/0            X25                  Down
SERIAL1/WAN2  serial0/1            X25                  Down
SERIAL2/WAN3  serial0/2            X25                  Down
BRI/ISDN1     bri0/0               BRI Net              Testing
---           x25-node             internal             Up
SLOT1         cellular1/0          Async serial line    Up
SLOT1         cellular1/1          Async serial line    Up

               --- ppp1 PPP Up
               --- ppp2 PPP Down
SNMP OperStatus:
Interface            OperStatus
ethernet0/0          Up
serial0/0            Down
serial0/1            Down
serial0/2            Down
bri0/0               Down
x25-node             Up
cellular1/0          Up
cellular1/1          Up
ppp1                 Up
ppp2                 Dormant (Down)
HSDPA +
```

A poll begins checking the connection at router startup and starts counting the failures until PPP is negotiated and established and responses to NSM polling return. NSLA-Advisor 5 then indicates that switchover is not triggered.

```
11/30/07 11:09:12  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:09:12  NSLA.002 filter/5 act cond detected
11/30/07 11:09:16  PPP.001 Interface ppp1 ready
11/30/07 11:09:16  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:09:21  PPP.001 Interface ppp1 ready
11/30/07 11:09:21  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:09:27  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:09:31  NSLA.003 filter/5 sample = 121 -> DEACTIVATE
11/30/07 11:09:31  NSLA.002 filter/5 act cond removed
11/30/07 11:09:31  NSLA.002 filter/5 deact cond detected
11/30/07 11:09:36  NSLA.003 filter/5 sample = 138 -> DEACTIVATE
11/30/07 11:09:41  NSLA.003 filter/5 sample = 136 -> DEACTIVATE
11/30/07 11:09:46  NSLA.003 filter/5 sample = 134 -> DEACTIVATE
```

```
11/30/07 11:09:51  NSLA.003 filter/5 sample = 132 -> DEACTIVATE
11/30/07 11:09:55  CELL.004 CHNGD PLMN to 21407 intf cellular1/0
11/30/07 11:09:55  WWAN.004 CHNGD PLMN to 21407 intf cellular1/0
11/30/07 11:09:55  CELL.006 CHNGD Technology to UMTS intf cellular1/0
11/30/07 11:09:55  WWAN.006 CHNGD Technology to UMTS intf cellular1/0
11/30/07 11:09:55  CELL.003 CHNGD Regst state to Home network intf cellular1/0
11/30/07 11:09:55  WWAN.003 CHNGD Regst state to Home network intf cellular1/0
11/30/07 11:09:55  CELL.005 CHNGD Conn cell to LAC B2E CID 3126 intf cellular1/0
11/30/07 11:09:55  WWAN.005 CHNGD Conn cell to LAC B2E CID 3126 intf cellular1/0
11/30/07 11:09:55  NSLA.006 filter/5 output FALSE
11/30/07 11:09:55  NSLA.002 filter/5 client notification bypassed
11/30/07 11:09:55  NSLA.003 filter/5 sample = 129 -> DEACTIVATE
11/30/07 11:10:01  NSLA.003 filter/5 sample = 127 -> DEACTIVATE
11/30/07 11:10:06  NSLA.003 filter/5 sample = 125 -> DEACTIVATE
11/30/07 11:10:11  NSLA.003 filter/5 sample = 133 -> DEACTIVATE
11/30/07 11:10:16  NSLA.003 filter/5 sample = 130 -> DEACTIVATE
11/30/07 11:10:21  NSLA.003 filter/5 sample = 138 -> DEACTIVATE
11/30/07 11:10:26  NSLA.003 filter/5 sample = 136 -> DEACTIVATE
11/30/07 11:10:31  NSLA.003 filter/5 sample = 144 -> DEACTIVATE
```

If the connection drops (in this case, because we've removed the antenna from the device), the poll begins to fail and, after the establishment time elapses, the router switches to the backup SIM. The change, and the cause of the change, are reported through events.

```
11/30/07 11:13:26  NSLA.003 filter/5 sample = 121 -> DEACTIVATE
11/30/07 11:13:32  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:13:32  NSLA.002 filter/5 act cond detected
11/30/07 11:13:32  NSLA.002 filter/5 deact cond removed
11/30/07 11:13:37  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:13:42  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:13:47  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:13:52  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:13:56  CELL.004 CHNGD PLMN to 0 intf cellular1/0
11/30/07 11:13:56  WWAN.004 CHNGD PLMN to 0 intf cellular1/0
11/30/07 11:13:56  CELL.006 CHNGD Technology to GSM/GPRS intf cellular1/0
11/30/07 11:13:56  WWAN.006 CHNGD Technology to GSM/GPRS intf cellular1/0
11/30/07 11:13:56  CELL.003 CHNGD Regst state to Attaching intf cellular1/0
11/30/07 11:13:56  WWAN.003 CHNGD Regst state to Attaching intf cellular1/0
11/30/07 11:13:57  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:02  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:07  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:12  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:17  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:22  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:27  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:32  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:14:32  NSLA.006 filter/5 output TRUE
11/30/07 11:14:32  NSLA.002 filter/5 client (0x0043c530 0x0132b790 0x00) notification TRUE
11/30/07 11:14:32  NSLA.004 alarm/5 notification from filter 5: TRUE
11/30/07 11:14:32  NSLA.004 alarm/5 filter map change (0xfffe --> 0xffff)
11/30/07 11:14:32  NSLA.007 alarm/5 output TRUE
11/30/07 11:14:32  NSLA.004 alarm/5 client (0x0043ee08 0x0132b690 0x00) notification TRUE
11/30/07 11:14:32  NSLA.005 advisor/5 notification from alarm 5: TRUE
11/30/07 11:14:32  NSLA.005 advisor/5 alarm map change (0x0000 --> 0x0001)
11/30/07 11:14:32  NSLA.008 advisor/5 output TRUE
11/30/07 11:14:32  NSLA.005 advisor/5 client (0x0018dc58 0x010cd3c0) notification TRUE
11/30/07 11:14:32  WWAN.014 Criteria NSLA met, switch to backup SIM (external/socket 1)
intf cellular1/0

11/30/07 11:14:32  NSLA.005 advisor/5 ioctl DEACTIVATE
11/30/07 11:14:32  NSLA.002 filter/5 ioctl DEACTIVATE
11/30/07 11:14:32  NSLA.004 alarm/5 ioctl DEACTIVATE
11/30/07 11:14:32 CELL.009 CHNGD SIM to external/socket 1 sckt intf cellular1/0
11/30/07 11:14:32 WWAN.009 CHNGD SIM to external/socket 1 sckt intf cellular1/0
11/30/07 11:14:32 WWAN.013 Backup SIM (external/socket 1) is active intf cellular1/0
```

The PPP1 interface drops and the PPP2 interface associated with the backup SIM activates (UP). Once up and re-

sponding to NSM polling, NSLA-Advisor 7 reports that return to the main SIM hasn't triggered.

```
11/30/07 11:14:48  PPP.002 Interface ppp1 down
11/30/07 11:15:01  NSLA.005 advisor/7 ioctl ACTIVATE
11/30/07 11:15:01  NSLA.002 filter/7 ioctl ACTIVATE
11/30/07 11:15:01  NSLA.004 alarm/7 ioctl ACTIVATE
11/30/07 11:15:03  NSLA.003 filter/7 sample = timeout -> ACTIVATE
11/30/07 11:15:03  NSLA.002 filter/7 act cond detected
11/30/07 11:15:07  PPP.001 Interface ppp2 ready
11/30/07 11:15:07  NSLA.003 filter/7 sample = timeout -> ACTIVATE
11/30/07 11:15:12  PPP.001 Interface ppp2 ready
11/30/07 11:15:12  NSLA.003 filter/7 sample = timeout -> ACTIVATE
11/30/07 11:15:17  NSLA.003 filter/7 sample = 129 -> DEACTIVATE
11/30/07 11:15:17  NSLA.002 filter/7 act cond removed
11/30/07 11:15:17  NSLA.002 filter/7 deact cond detected
11/30/07 11:15:22  NSLA.003 filter/7 sample = 126 -> DEACTIVATE
11/30/07 11:15:27  NSLA.003 filter/7 sample = 124 -> DEACTIVATE
11/30/07 11:15:32  NSLA.003 filter/7 sample = 122 -> DEACTIVATE
11/30/07 11:15:37  NSLA.003 filter/7 sample = 120 -> DEACTIVATE
11/30/07 11:15:42  NSLA.006 filter/7 output FALSE
11/30/07 11:15:42  NSLA.002 filter/7 client notification bypassed
11/30/07 11:15:42  NSLA.003 filter/7 sample = 138 -> DEACTIVATE
11/30/07 11:15:47  NSLA.003 filter/7 sample = 145 -> DEACTIVATE
11/30/07 11:15:52  NSLA.003 filter/7 sample = 133 -> DEACTIVATE
11/30/07 11:15:57  CELL.004 CHNGD PLMN to 21407 intf cellular1/0
11/30/07 11:15:57  WWAN.004 CHNGD PLMN to 21407 intf cellular1/0
11/30/07 11:15:57  CELL.006 CHNGD Technology to UMTS intf cellular1/0
11/30/07 11:15:57  WWAN.006 CHNGD Technology to UMTS intf cellular1/0
11/30/07 11:15:57  CELL.003 CHNGD Regst state to Home network intf cellular1/0
11/30/07 11:15:57  WWAN.003 CHNGD Regst state to Home network intf cellular1/0
11/30/07 11:15:57  NSLA.003 filter/7 sample = 141 -> DEACTIVATE
11/30/07 11:16:02  NSLA.003 filter/7 sample = 129 -> DEACTIVATE
11/30/07 11:16:07  NSLA.003 filter/7 sample = 137 -> DEACTIVATE
```

After the backup SIM has been in use for 4 minutes, the device returns to the main SIM (changes and causes are reported through events), PPP2 drops and PPP1 activates (UP).

```
11/30/07 11:18:57  NSLA.003 filter/7 sample = 130 -> DEACTIVATE
11/30/07 11:19:01  WWAN.015 Return crtia TIME AT/AFTER met, switch to main SIM (internal/socket 2) intf cellular1/0

11/30/07 11:19:01  NSLA.005 advisor/7 ioctl DEACTIVATE
11/30/07 11:19:01  NSLA.002 filter/7 ioctl DEACTIVATE
11/30/07 11:19:01  NSLA.004 alarm/7 ioctl DEACTIVATE

11/30/07 11:19:01 CELL.009 CHNGD SIM to internal/socket 2 sckt intf cellular1/0

11/30/07 11:19:01 WWAN.009 CHNGD SIM to internal/socket 2 sckt intf cellular1/0

11/30/07 11:19:01 WWAN.012 Main SIM (internal/socket 2) is active intf cellular1/0

11/30/07 11:19:12  PPP.002 Interface ppp2 down
11/30/07 11:19:26  NSLA.005 advisor/5 ioctl ACTIVATE
11/30/07 11:19:26  NSLA.002 filter/5 ioctl ACTIVATE
11/30/07 11:19:26  NSLA.004 alarm/5 ioctl ACTIVATE
11/30/07 11:19:29  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:19:29  NSLA.002 filter/5 act cond detected
11/30/07 11:19:31  PPP.001 Interface ppp1 ready
11/30/07 11:19:31  PPP.001 Interface ppp1 ready
11/30/07 11:19:34  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:19:39  NSLA.003 filter/5 sample = timeout -> ACTIVATE
11/30/07 11:19:43  NSLA.003 filter/5 sample = 123 -> DEACTIVATE
```

5.3 WEB warning due to loss of coverage

The following example shows a configuration where the router provides Internet access for devices that connect through WIFI or Ethernet, providing an IP address, default router and SNA server through the DHCP protocol.

At the same time, the device behaves as a DNS server for devices that connect to the network (**full-resolver** configuration).

Accessibility control is also configured. This means that if 20 output packets do not receive a response, the device assumes the connection has terminated. The router then deletes the DNS cache, disables all DNS servers found through the connection and redirects DNS A requests (addresses) coming from network devices toward it. It also responds to HTTP URL requests with an access error page.

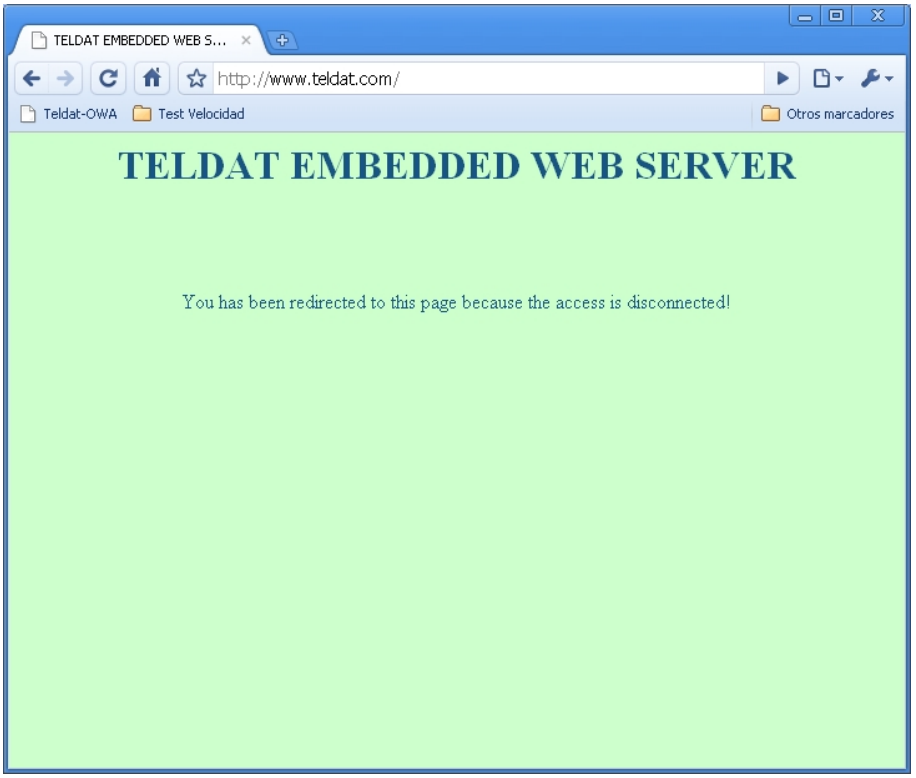
The configuration is shown below:

```
   log-command-errors
   no configuration
   description "default config: Router.Teldat"
   set hostname router.teldat
   add device ppp 1
   add device bvi 0
   set data-link at cellular1/0
   set data-link at cellular1/1
   global-profiles dial
; -- Dial Profiles Configuration --
      profile internet default
      profile internet dialout
      profile internet 3gpp-accessibility-control traffic 20 all
      profile internet 3gpp-apn myprovider.com
;
   exit
;
   network cellular1/1
; -- Interface AT. Configuration  --
      ppp lcp-options acfc
      ppp lcp-options pfc
      ppp lcp-options accm 0
   exit
;


;
   network wlan2/0
; -- Wireless LAN Interface. Configuration --
      bss "teldat_xx"
         privacy-invoked
         key 1 size 104 ascii ciphered plain ZZZZZZZZZZZZZ
;
      exit
;
   exit
;
;
   network cellular1/0
; -- Interface AT. Configuration  --
      coverage-timer 15
;
      pin plain 1234
      sim-select internal-socket-2
;
;
;
;
      network mode automatic
      network domain cs+ps
   exit
;
;
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
```

```
; -- PPP Configuration --
        authentication sent-user USER password PASSWORD
        chap refuse
        ipcp local address assigned

              ipcp dns request

        no ipcp peer-route
        lcp echo-req off
     exit
;
     base-interface
; -- Base Interface Configuration --
        base-interface cellular1/1 link
        base-interface cellular1/1 profile internet
;
     exit
;
   exit
;
;
   network bvi0
; -- Bridge Virtual Interface configuration --
     ip address 192.168.1.1 255.255.255.0
;
;
   exit
;
   event
; -- ELS Config --
     enable trace subsystem AT ALL
     enable trace subsystem DNS ALL
     enable trace subsystem PPP ALL
     enable trace event ETH.050
     enable trace event ETH.051
     ev-buffer 3000 200
   exit
;
   protocol asrt
; -- ASRT Bridge user configuration --
     bridge
     irb
     port ethernet0/0 1
     port wlan2/0 2
     no stp
     route-protocol ip
   exit
;
;
   protocol ip
; -- Internet protocol user configuration --
     route 0.0.0.0 0.0.0.0 ppp1
;
     rule 1 local-ip ppp1 remote-ip any
     rule 1 napt translation
     rule 1 napt firewall
;     classless
;
   exit
;
   protocol dhcp
; -- DHCP Configuration --
              server
; -- DHCP Server Configuration --
             enable
;
global server-name my_dhcp_server
```

```
;
                subnet my_dhcp_server 0 network 192.168.1.0 255.255.255.0
                subnet my_dhcp_server 0 range 192.168.1.10 192.168.1.20
                subnet my_dhcp_server 0 dns-server 192.168.1.1
                subnet my_dhcp_server 0 router 192.168.1.1   ;
;
   exit
;
   exit
;
   feature dns
; -- DNS resolver user configuration --
      permanent-entry router.teldat type A 192.168.1.1

                servers-checking

      source-address 192.168.1.1
   exit
;
   dump-command-errors
   end
```

If access fails, the following page appears:



5.4 Receiving commands via SMS

The following is a configuration example for the SMS command reception feature.

Options belonging to the SMS command reception feature and the **shutdown** command are shown in **bold** in the PPP1 interface. The PPP1 interface can be activated when needed by sending a **CONNECT WWAN** SMS message.

+34639201696 is defined as the authorized number and +34609090999 as the number for the message center.

AT subsystem traces have also been activated to monitor delivery of messages in the router.

```
   log-command-errors
   no configuration
   set hostname SMS
   set inactivity-timer disabled
   add device ppp 1
   set data-link at cellular1/0
   set data-link at cellular1/1
```

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile MOVISTAR default
      profile MOVISTAR dialout
      profile MOVISTAR 3gpp-apn movistar.es
;
   exit
;
   network cellular1/1
; -- Interface AT. Configuration  --
      ppp lcp-options acfc
      ppp lcp-options pfc
      ppp lcp-options accm 0
   exit
;

   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 192.168.212.140 255.255.254.0
;
   exit
;
   network cellular1/0
; -- Interface AT. Configuration  --
      pin ciphered 0xE46250411B19DF5F
;
      sms reception
      sms service-center-address +34609090999
      sms command-reception
      sms authorized-number +34639201696
      network mode automatic
      network domain cs+ps
   exit
;
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user movistar ciphered-pwd 0x809103D9DBC73D2B4C7C7B1ACB92D345
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface cellular1/1 link
         base-interface cellular1/1 profile MOVISTAR
;
      exit
;
      shutdown
   exit
;
   event
; -- ELS Config --
      enable trace subsystem AT ALL
      enable trace subsystem PPP ALL
      disable trace event PPP.011
      disable trace event PPP.012
   exit
;
   set ftp
; -- FTP user configuration --
```

```
      temp-buff 25000000
   exit
;
;
   protocol ip
; -- Internet protocol user configuration --
      route 0.0.0.0 0.0.0.0 ppp1
;
      rule 1 local-ip ppp1 remote-ip any
      rule 1 napt translation
      rule 1 napt firewall
;
      classless
   exit
;
;
   dump-command-errors
   end
```

5.5 Configuration examples for LTE

This section offers several cellular interface configuration examples for specific mobile carriers with LTE technology.

Note

Only configuration extracts for cellular interfaces and call profiles with basic options have been included.

For LTE technology connections, you must first define two APNs in the router configuration: one to register in the LTE network (registration APN) and the other to establish data calls (data APN).

APN registration is configured in the base cellular interface configuration (**cellularxx/0**) through the **registration-apn** command.

```
   network cellular10/0
; -- Interface AT. Configuration  --
      registration-apn movistar.es pdp-type ipv4v6                registration-authentication chap user movistar password movi
      network mode automatic
      network domain cs+ps
   exit
;
```

APN registration is always saved under the 3G module PDP 1 context. APN 3Gpp is saved by default under the 3G module PDP 2 context, but you can select a different PDP context number using the **3gpp-profile-number** located in the call profile menu.

APN data is usually configured under the call profile configuration menu.

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile LTE default
      profile LTE dialout
      profile LTE 3gpp-apn movistar.es
      profile LTE 3gpp-pdp-type ipv4v6
   exit
;
```

For SIM cards that use the carrier data default service, configure the registration APN and the call 1 profile number.

```
   network cellular10/0
; -- Interface AT. Configuration --
      registration-apn movistar.es pdp-type ipv4v6
      registration-authentication chap user movistar password movistar
      network mode automatic
      network domain cs+ps
   exit
;
```

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile LTE default
      profile LTE dialout
      profile LTE 3gpp-profile-number 1
   exit
;
```

For SIM cards using the carrier's value added services (such as private APNs or static IP services), we recommend configuring APN registration and the APN service in the call profile.

```
   network cellular10/0
; -- Interface AT. Configuration --
      registration-apn movistar.es pdp-type ipv4v6
      registration-authentication chap user movistar password movistar
      network mode automatic
      network domain cs+ps
   exit
;
```

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile LTE default
      profile LTE dialout
      profile LTE 3gpp-apn apn1.movistar.es
      profile LTE 3gpp-pdp-type ipv4v6
   exit
;
```

5.5.1 Examples for Verizon Wireless (USA)

For Verizon Wireless, APNs are provided over the air (OTA). Only select a profile that establishes calls (i.e., profile 3).

To configure OTA APNs, a SIM card must be inserted into the device. Once done, connect the antennas to the device and switch it on. Provisioning can take up to 10 minutes. If you need to configure the **3gpp-restart-on-disc** feature, add a further delay of at least 10 minutes to ensure provisioning is successful. Please do not, under any circumstances, switch the device off or restart it during this time period.

To verify APN provisioning has been successful, check the list of APNs through the **module profile list** command (found in the cellular base interface monitoring menu). If the SIM card has a different service from the dynamic IP basic service contracted, profile 3 will have an APN that is different from **vzwinternet** (which is the default profile for dynamic IP connections to the Verizon Wireless network).

If, for any reason, provisioning is unsuccessful, and the device doesn't connect to the Verizon network, repeat the process as follows. First, restore the module profile table to the manufacturer's default values using the **module profile restore** command. When this command has executed, switch off the device, remove the SIM card, insert it in another device (a USB modem for example) and connect it to the Verizon Wireless network. Once connected, disconnect the USB modem, remove the SIM card, insert it in the original router and switch it on. Repeat the provisioning process. Please remember this can take up 10 minutes and YOU CANNOT switch off or restart the device or LTE module.

When provisioning has finished, the device registers in the network and a data call establishes.

The configuration recommended for Verizon Wireless, both for SIM cards with dynamic IP service and static IP service, is as follows:

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile VERIZON default
      profile VERIZON dialout
      profile VERIZON 3gpp-profile-number 3
   exit
;
   network cellular10/0
; -- Interface AT. Configuration --
      network mode automatic
      network domain cs+ps
   exit
;
```

5.5.2 Examples for AT&T (USA)

5.5.2.1 For SIM cards with dynamic IP

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile ATT default
      profile ATT dialout
      profile ATT 3gpp-profile-number 1
   exit
;
   network cellular10/0
; -- Interface AT. Configuration --
      registration-apn broadband pdp-type ipv4v6
      network mode automatic
      network domain cs+ps
   exit
;
```

5.5.2.2 For SIM cards with static IP

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile ATT default
      profile ATT dialout

      profile ATT 3gpp-profile-number  1
   exit
;
   network cellular10/0
; -- Interface AT. Configuration --
      registration-apn i2gold pdp-type ipv4v6
      network mode automatic
      network domain cs+ps
   exit
;
```