

Teldat 4Ge

User Guide

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Chapter 1 About This Guide

This is the user guide for the **Teldat 4Ge** router and contains information to correctly handle this device in a working environment.

1.1 Supported Devices

The information contained in this user guide only applies to the **Teldat 4Ge** router.

1.2 Who should read this manual?

This manual should be read by the support personnel who need to configure, maintain and monitor the device.

1.3 When should this manual be read?

Read this guide as soon as you are ready to familiarize yourself with the device and its components.

This manual will help you understand your new device in greater depth.

1.4 What is in this manual?

This user guide contains the following information:

- A description of the device.
- Application scenarios.
- Device interfaces and connection.
- Operating features.
- Configuration.
- Monitoring.

1.5 What cannot be found in this manual?

This manual does not contain information on the device's hardware. For further information on the hardware features of this device, please see the relevant installation manuals found on the Teldat S.A. website: <http://www.teldat.com>.

1.6 How is the information organized?

Each chapter focuses on a specific part of device that the user must know. Information about possible scenarios, router behavior, configurations and monitoring can be found in the relevant chapters.

1.7 Technical Support

Teldat S.A. offers a technical support service. Device software can be upgraded on a regular basis for maintenance purposes and for new features.

Contact information:

Web: <http://www.teldat.com>

Tel. N°: +34 918 076 565

Fax: +34 918 076 566

Email: support@teldat.com

1.8 Related Documents

Teldat-Dm781 *Cellular interface*

Teldat-Dm730 *DHCP Protocol*

Teldat-Dm750 *Ethernet subinterface*

Chapter 2 Introduction

2.1 Description of the device

The **Teldat 4Ge** device routes outgoing data from a corporate network to the WWAN network (HSPA+/LTE).

- The **Teldat 4Ge** always operates with the corporate network output router, routing traffic to the WWAN network in cases where the main corporate output router drops its main connection.
- The technology used in the WWAN access depends on the wireless modem incorporated in the device. The modem provides access to the HSPA+/LTE networks for data transmission.
- The device has two possible power sources: external, through an element supplied together with the device, or through POE (Power over Ethernet). In cases where both are present, the external power source takes priority.



Fig. 1: Teldat 4Ge

2.2 Application Scenarios

The **Teldat 4Ge** has two application scenarios:

- (1) Routers with WWAN communications that have insufficient network coverage due to location problems. It's common practice to install the communication routers in racks, together with other devices, in rooms where the WWAN coverage isn't very good.
- (2) Backup for routers that don't have WWAN communications and can divert the outgoing traffic to the **Teldat 4Ge**.

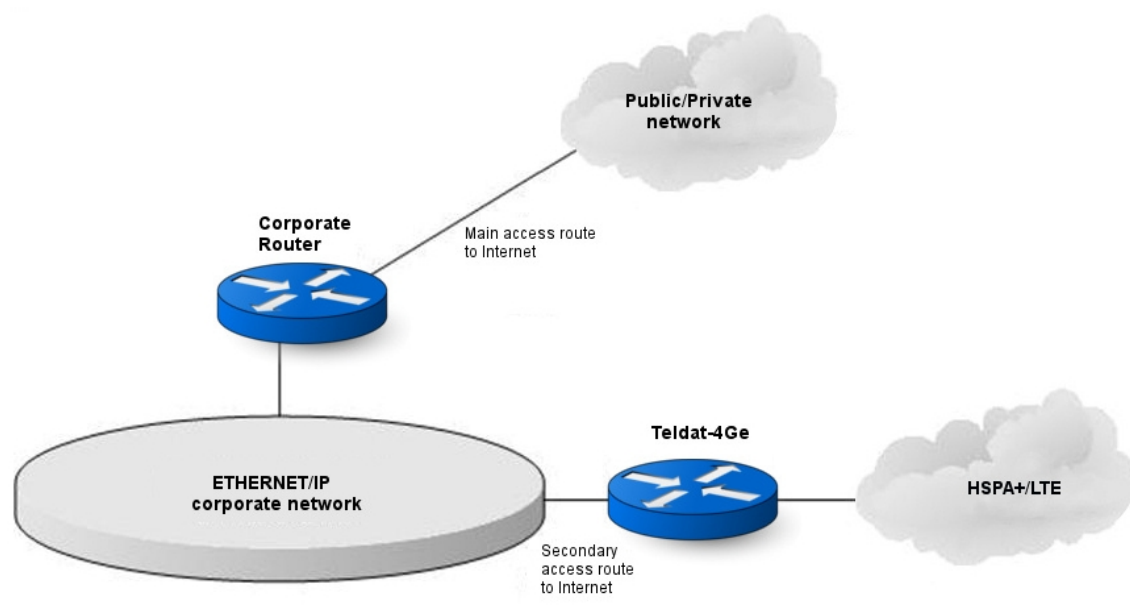


Fig. 2: Teldat 4Ge: Application Scenario

2.3 Device Interfaces and Connection

The **Teldat 4Ge** router has two interfaces:

- An interface that provides access to the WWAN network.
- An Ethernet interface.

There are two types of connection between the **Teldat 4Ge** and the output corporate router:

- (1) Connecting the **Teldat 4Ge** to the corporate network as an additional device on the network, sharing the Ethernet network with the corporate router.

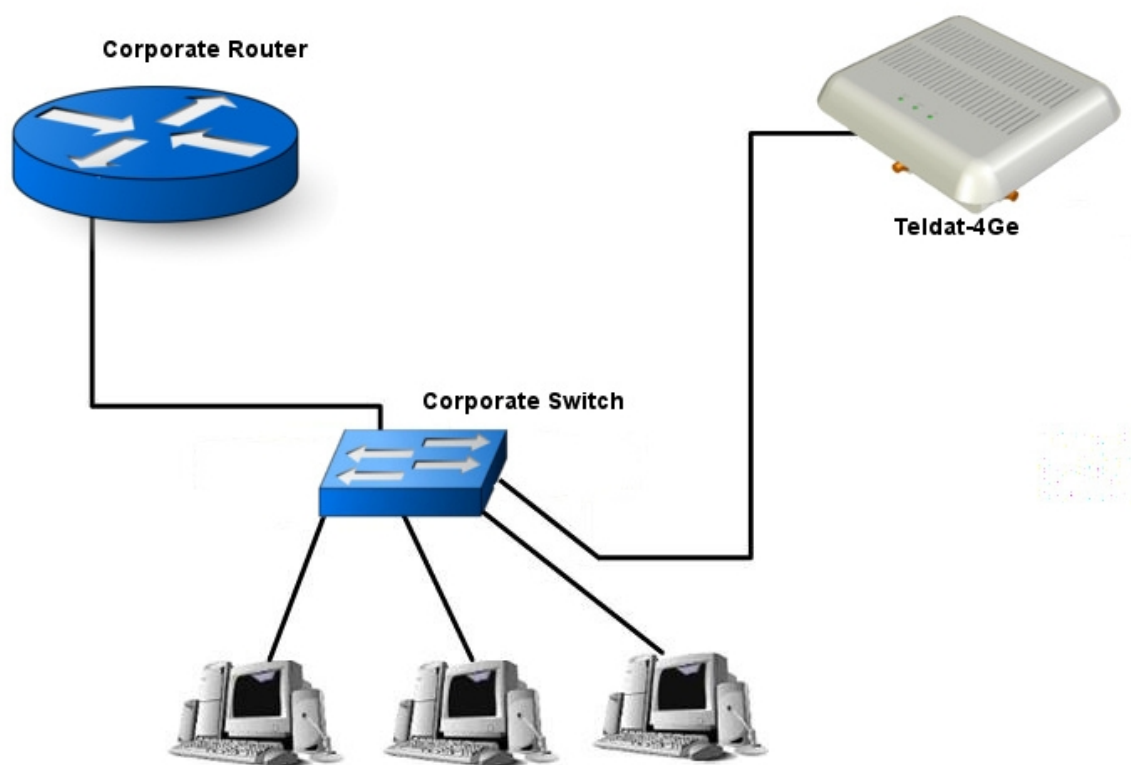


Fig. 3: Connecting the Teldat 4Ge to the Corporate Router through a Switch

- (2) If the corporate router has more than one Ethernet interface, you can connect a 10 BaseT cable directly from the router to the **Teldat 4Ge**, as shown in the following figure.

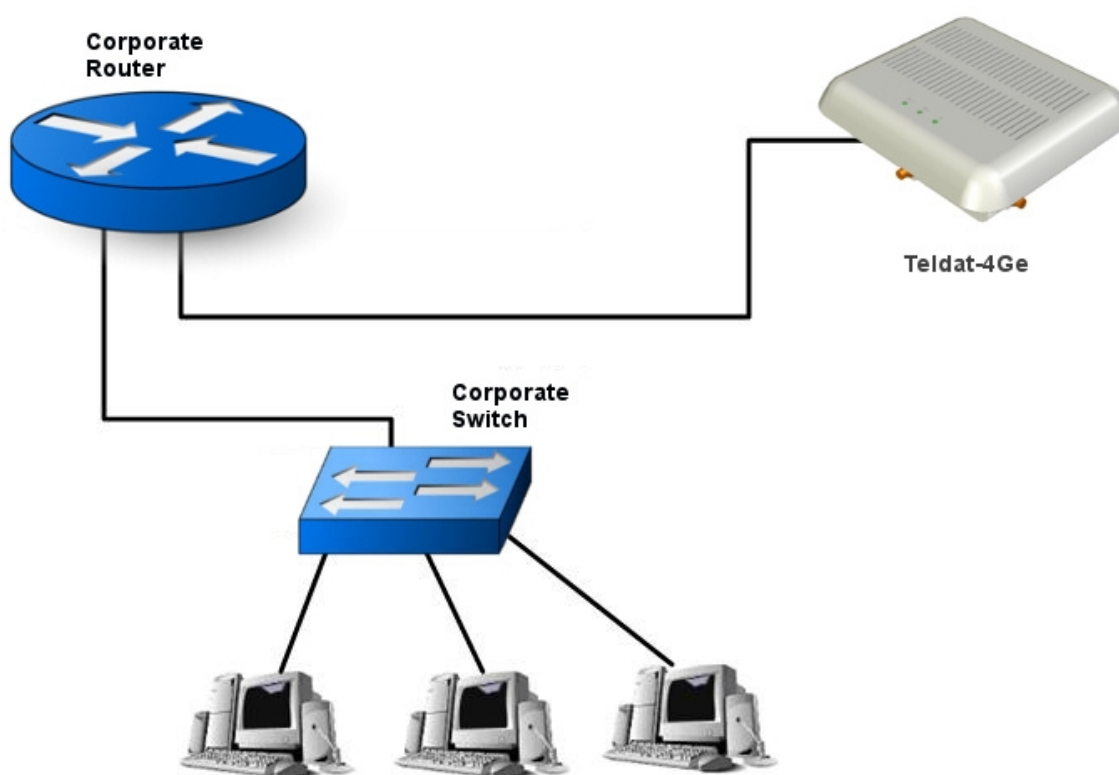


Fig. 4: Directly Connecting the Teldat 4Ge to the Corporate Router

2.4 Operating features

The **Teldat 4Ge** starts up without an IP address in its Ethernet (WAN) interface. By means of the DHCP protocol, it requests an IP address and only accepts the one offered by the corporate router (rejecting other address offers from other DHCP servers connected to the local corporate network). This is achieved when the corporate router is configured as a DHCP server programmed to only answer the IP address requests that come from a **Teldat 4Ge**. As well as offering an IP address, the DHCP protocol is also used to convey the **Teldat 4Ge**'s configuration.

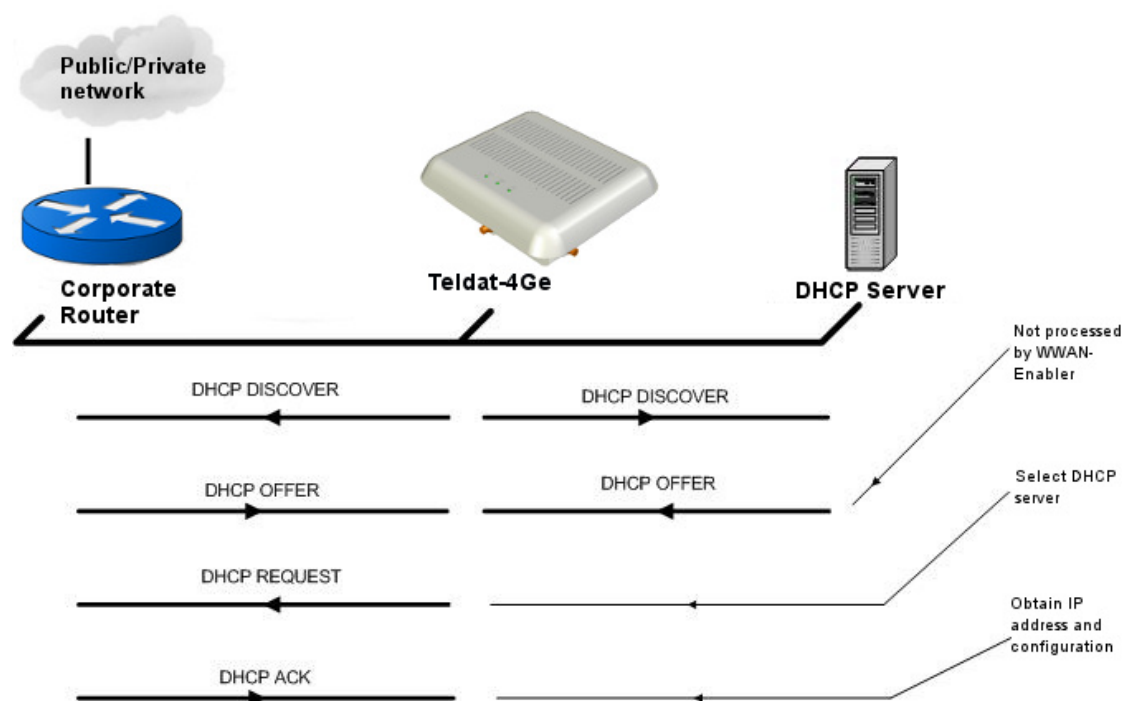


Fig. 5: DHCP Protocol

The section on how to configure the DHCP protocol explains how to identify the devices and the DHCP client and server. It also describes what configuration information is sent to the **Teldat 4Ge**.

The next step, once the **Teldat 4Ge** has a valid IP address, is to set the data backup mechanism.

The latter is performed by VLAN 463. Through this VLAN, the **Teldat 4Ge** assigns the public IP it has obtained to the router's Ethernet subinterface belonging to the same VLAN and sets a new default route to redirect traffic to the 4G network.

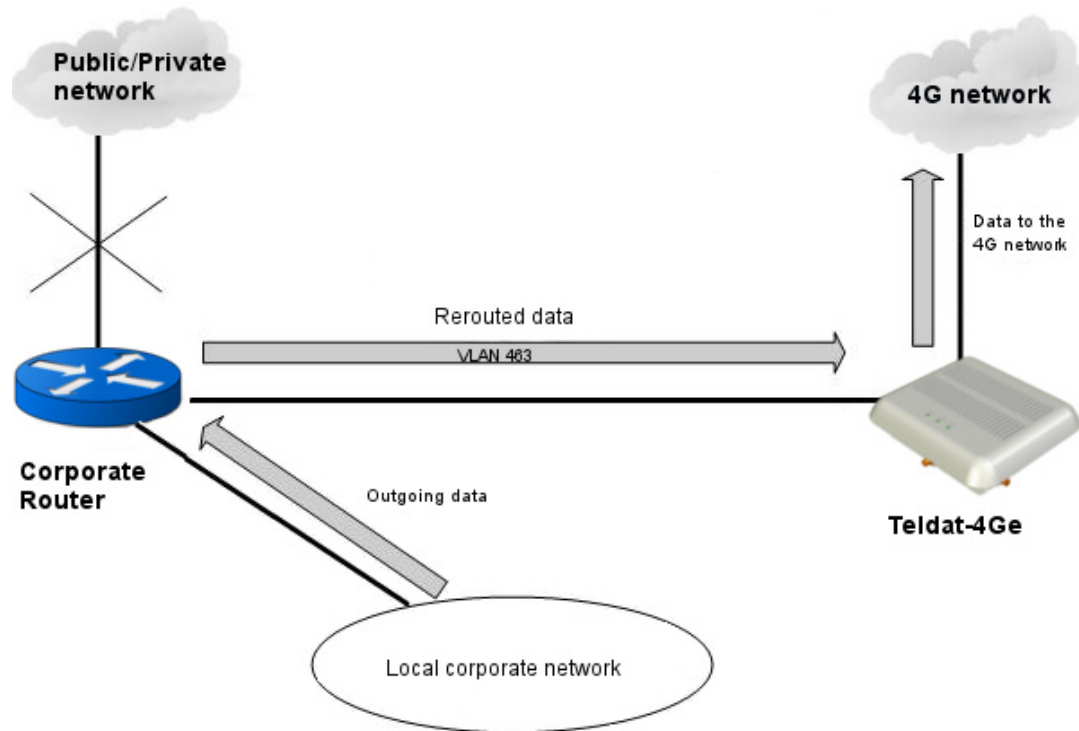


Fig. 6: Data Backup through the VLAN 463

Chapter 3 Configuration

You can connect to a 4G network through the **Teldat 4Ge** using a device from Teldat, Cisco or from a different manufacturer. The following sections show to configure the router in all cases.

3.1 Configuring a Cisco router

Connecting a Cisco router to a WWAN mobile network through a **Teldat 4Ge** with VLAN 463 is carried out through an Ethernet subinterface.

The following example can be used as a guideline on how to connect a Cisco router through the **Teldat 4Ge**:

```
Current configuration : 1634 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
logging message-counter syslog
enable secret 5 $1$Shh8$vJXxVHzI4oGPou3hFCq7E0
enable password cisco
!
no aaa new-model
!
!
dot11 syslog
ip source-route
!
!
ip dhcp pool 4Ge
    host 2.2.2.2 255.255.255.0
    client-identifier 7465.6c64.6174
    option 43 ascii
"antenna&apn=internet.es&pin=1844&ntps=192.168.212.14&usr=internet&pwd=internet"
default-router 2.2.2.1
!
!
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
!
archive
    log config
    hidekeys
!
!
interface FastEthernet0/0
ip address 192.168.212.133 255.255.255.0
ip nat inside
ip virtual-reassembly
duplex auto
speed auto
!
interface FastEthernet0/1
ip address 2.2.2.1 255.255.255.0
ip nat inside
```

```

ip virtual-reassembly
duplex auto
speed auto
!
interface FastEthernet0/1.463
encapsulation dot1Q 463
no ip dhcp client request tftp-server-address
no ip dhcp client request netbios-nameserver
no ip dhcp client request vendor-specific
no ip dhcp client request static-route
no ip dhcp client request domain-name
ip address dhcp
ip nat outside
ip virtual-reassembly
!
interface ATM0/0/0
no ip address
shutdown
no atm ilmi-keepalive
!
ip forward-protocol nd
no ip http server
no ip http secure-server
!
!
ip nat inside source list 1 interface FastEthernet0/1.463 overload
!
access-list 1 permit any
!
!
control-plane
!
!
line con 0
line aux 0
line vty 0 4
password cisco
absolute-timeout 10000
login
!
scheduler allocate 20000 1000
end

```

3.1.1 DHCP

The Cisco router acts as the DHCP server for the **Teldat 4Ge**. We use this protocol to configure certain parameters in the **Teldat 4Ge** (such as the SIM PIN number, the WWAN mobile network APN and the user and password necessary for authentication on the mobile network).

```

ip dhcp pool 4Ge
host 2.2.2.2 255.255.255.0
client-identifier 7465.6c64.6174
option 43 ascii
"antenna&apn=internet.es&pin=1844&ntps=192.168.212.14&usr=internet&pwd=internet"
default-router 2.2.2.1

```

The **client-identifier** specifies the **client-id** that the router must receive in order to accept the DHCP request from the **Teldat 4Ge**. In this case, it is "teldat" in ASCII (74656c646174 in hexadecimal).

Using option **43**, you can pass the configuration parameters to the **Teldat 4Ge** so that it can operate.

- The sentence syntax that we send consists of parameters separated by the **&** character.
- Having all parameters is not necessary.
- If a parameter is not sent, then the result depends on the **default** parameter value.
- If you have to enter a special character, you can use the **%** symbol followed by the ascii value with 2 hexadecimal

digits (e.g. the ‘&’ character would be %26). Thus, to enter an **apn** equal to **access&network.es** you can enter **apn=access%26network.es**.

- Some parameters have a shortened version. For instance, the short version for **password** is **pwd**.

The first word contained in option 43 should be “**antenna**”. Since the device accepts the address offered by the router, if you don’t enter this word the **Teldat 4Ge** won’t accept said address.

The configuration parameters available for the **Teldat 4Ge** are:

- “**pin=NNNN**”, allows you to configure the PIN number for the SIM card used in the **Teldat 4Ge**.
- “**apn=**”, configures the APN in the 4G network to which the **Teldat 4Ge** is going to be connected to.
- “**apntype=**”, or “**type=**” configures the APN type in the 4G network to which the **Teldat 4Ge** is going to be connected to. It can be *ipv4v6* or *ipv6*. If it is not configured by default, it will be *ip* (for IPV4 APNs).
- “**user=**”, or “**usr=**” allows the user to be configured so that it authenticates in the mobile operator’s APN.
- “**password=**”, or “**pwd=**” allows the password to be configured so that it authenticates in the mobile operator’s APN.
- “**rxtimeout=T**”, or “**rxto=T**”, indicates that the transmission and reception packets are monitored. After **T** seconds, if a response to a transmitted packet hasn’t been received, connections with the router and the access module for the WWAN network are restarted. You can configure a value between 10 and 86399 seconds. This parameter is deactivated by default.
- “**flowcontrol=N**”, or “**flow=N**”, indicates that the transmission and reception packets are monitored. After **N** transmitted packets, if nothing has been received, connections with the router and the access module for the WWAN network are restarted. You can configure a value between 1 and 65535 packets. This parameter is deactivated by default.
- “**ntpserver=AAA.BBB.CCC.DDD**”, or “**ntps=AAA.BBB.CCC.DDD**”, NTP server IP address used to synchronize the device.
- “**ntpoffset=N**”, or “**ntpo=N**”, the time is expressed in GMT + ntpoffset. Default value is 2 (i.e. GMT + 2). Acceptable values range from -12 to +12, in 1-hour intervals.
- “**mode=**”, helps select the technology that should be used to connect to the mobile network. This value can be one of *auto*, *gprs*, *wcdma*, *gprsp*, *wcdmap*, *lte*, *cdma*, *hrpd* or *hybrid*. The *gprsp* and *wcdmap* modes indicate that the technology used should preferably be GPRS or WCDMA. The default value is *auto*.
- “**domain=**”, or “**dmn=**”, allows the user to select the domain that the device will connect to. This value can be *cs*, *ps*, *cs+ps*. Since voice call support is not yet implemented, we recommend using the *ps* domain. The default domain is *ps*.
- “**idletime=T**”, or “**idle=T**”, configures the idle time (in seconds) for the 4G network session. If, when the session is established, this timer times out before receiving a new packet from the router, the **Teldat 4Ge** considers the session to be down and drops it. Acceptable values range from 0 to 65535 seconds. This parameter is not configured by default (equivalent to having a value 0).
- “**atafterpin=**”, or “**aft=**”, or “**beforepin=**”, or “**bef=**”, allows the user to configure an additional AT command that is sent during the 4G module’s startup. It is generally used to send a certain network or modem parameter.
- “**coveragetimer=N**”, or “**ct=N**”, configures the sample period for the 4G network coverage values (Rx_level, RSCP and EcIo). The N value is between 10 and 255 seconds. It is 60 seconds by default.
- “**clientid=no**”, or “**cid=no**” deactivates the *client identifier* that sends in the DHCP petitions. This is for configurations with various **Teldat 4Ge** devices and Cisco routers.
- “**regdenied=1**”, or “**regd=1**”, activates the feature that switches off the 4G module radio interface for 5 seconds in cases where the network initially denies registration (*registration DENIED*). This means you can avoid this state and the module can be re-registered in the 4G network.
- “**pnum=N**”, or “**profilenum=N**”, selects the calling profile that the ESR-WWAN-ENABLER will use to make the data call. This will allow you to select the calling profile of modules that make OTA (*Over The Air*) APN provisioning (i.e., without having to add an APN in the configuration). It admits values that range from 1 to 12.
- “**auth=**”, if the data APN requires authentication, this parameter allows you to select its type. This can be *chap*, *pap* or *none* if no authentication is required. If this parameter is not included, the authentication is *pap* by default.
- “**regapn=**”, or “**rapn=**” configures the registration APN of the 4G network that the **Teldat 4Ge** is going to be registered in. If the registration APN and the data APN are the same, we recommend using “*regapn=*” and “*pnum=1*”.
- “**regapntype=**”, or “**rtype=**” configures the registration APN type in the 4G network where the **Teldat 4Ge** is go-

ing to be registered in. It can be *ipv4v6* or *ipv6*. It will be IP if it is not configured by default.

- “**regauth=** ”, or “**rauth=** ” if the registration APN requires authentication, this parameter allows you to select its type. This can be *chap* or *pap* .
- “**regusr=** ”, or “**rusr=** ” if the registration APN requires authentication, this parameter allows you to configure the user.
- “**regpwd=** ”, or “**rpwd=** ” if the registration APN requires authentication, this parameter allows you to configure the password.
- “**wband=** ”, or “**wb =** ” this parameter allows to select the bands for WCDMA technology. A list of band numbers separated by commas must be provided, like for example “wb=1,2,3”. If you want to disable all bands, use the word “none”.
- “**lband=** ”, or “**lb =** ” this parameter allows to select the bands for LTE technology. A list of band numbers separated by commas must be provided, like for example “lb=3,7,20”. If you want to disable all bands, use the word “none”.



Note

You must replace the values in the example with the values that are relevant for the specific application.

You must pay particular attention when entering the PIN for the SIM you're going to insert into the **Teldat 4Ge**. If you enter the wrong PIN, the SIM may block.

If you enter the PIN incorrectly, the **Teldat 4Ge** will not try to use the SIM again until the PIN has been changed or the device rebooted.

3.2 Configuring a Teldat Router

Just like with Cisco routers, Teldat routers connected to the **Teldat 4Ge** in generic mode can be connected through the VLAN 463 in an Ethernet subinterface.

The following example may be used as a guideline configuration for Teldat routers:

```
log-command-errors
no configuration
set hostname 4Ge
set inactivity-timer disabled
add device eth-subinterface ethernet0/1 463
user monitor hash-password 8F3A0BC0A8B16595528D486487EEFB01
;
:
network ethernet0/0
; -- Ethernet Interface User Configuration --
ip address 192.168.212.143 255.255.254.0
;
exit
;
;
network ethernet0/1
; -- Ethernet Interface User Configuration --
ip address 1.1.1.1 255.255.255.0
;
exit
;
;
network ethernet0/1.463
; -- Ethernet Subinterface Configuration --
ip address dhcp-negotiated
;
encapsulation dot1q 463
;
;
exit
```

```

;
    event
; -- ELS Config --
    enable trace subsystem DHCPC ALL
    enable trace subsystem DHCP ALL
    exit
;
;
    protocol ip
; -- Internet protocol user configuration --
    rule 1 local-ip ethernet0/1.463 remote-ip any
    rule 1 napt translation
    rule 1 napt firewall
;
    classless
    exit
;
    protocol dhcp
; -- DHCP Configuration --
    Server
; -- DHCP Server Configuration --
    enable
;
;
    subnet 4Ge 0 network 1.1.1.0 255.255.255.0
;
    host 4Ge 0 fixed-ip 1.1.1.2
    host 4Ge 0 client-id asc teldat
    host 4Ge 0 router 1.1.1.1
    host 4Ge 0 subnet-mask 255.255.255.0
    host 4Ge 0 option 43 asc
antenna&apn=internet.es&pin=1844&ntps=192.168.212.14&usr=internet&pwd=internet
;
    exit
;
    exit
;
    dump-command-errors
    end

```

3.2.1 DHCP

Just like Cisco routers, Teldat routers can act as the DHCP server for the **Teldat 4Ge**. We use this protocol to configure certain parameters in the **Teldat 4Ge** (such as the SIM PIN number and the WWAN mobile network APN).

```

; -- DHCP Configuration --
    server
; -- DHCP Server Configuration --
    enable
;
;
    subnet 4Ge 0 network 1.1.1.0 255.255.255.0
;
    host 4Ge 0 fixed-ip 1.1.1.2
    host 4Ge 0 client-id asc teldat
    host 4Ge 0 router 1.1.1.1
    host 4Ge 0 subnet-mask 255.255.255.0
    host 4Ge 0 option 43 asc
antenna&apn=internet.es&pin=1844&ntps=192.168.212.14&usr=internet&pwd=internet
;
    exit
;
    exit

```

The **router** option assigns a default route to the **Teldat 4Ge**. This route is necessary if, for example, the **Teldat 4Ge** and the TFTP server are in different networks.

The **client-id** option indicates the “**client-id** ” that the router is expecting to receive in the DHCP request from the **Teldat 4Ge**. This value must be the “antenna” characteristics.

Through option **43**, the **Teldat 4Ge** receives the essential parameters for the configuration so it can operate. The syntax and meaning is the same as that described under section [DHCP](#) on page 8 in the section [Configuring a Cisco router](#) on page 7.

The first word contained in option 43 should be “**antenna**”. Since the device accepts the address offered by the router, if you don’t enter this word the **Teldat 4Ge** won’t accept said address.

Chapter 4 Monitoring via the console

To access the monitoring console of the **Teldat 4Ge**, you must use a telnet session through the IP address that it has been assigned using DHCP. To access using telnet, the default user is *monitor* and the password is *teldat*.

Once we have accessed the monitoring console, the following commands are available:

```
4Ge login...
User: monitor
Password: *****
Teldat S.A.                (c)2001-2010
Router model 4Ge 35 1 CPU QorIQ P101X  S/N: 809/00133
1 LAN, 1 WWAN Line
CIT software version: 11.00.02 Oct 11 2013 17:06:18
4Ge *?
  logout      Ends the Telnet connection established with the device
  monitor     Monitor the state of the system
  restart     Restart the device
4Ge *
```

By using the **monitor** command, we can access the monitoring menu. Here we can check the status of the interfaces, statistics, connection data, etc.

```
4Ge *monitor
Console Operator
4Ge +?
  buffer      Packet buffers assigned to each interface
  clear       Clear network statistics
  configuration List status of current protocols and interfaces
  device      List statistics for the specified interface
  error       List error counters
  event       Event Logging System environment
  log         Dump log data
  memory      Display memory, buffer and packet data
  network     Enter the console environment of a specified network
  protocol    Enter the commands environment for a specified protocol
  queue       Display buffer statistics for a specified interface
  statistics  Display statistics for a specified interface
  system      Permit monitoring of the system's memory and stacks
4Ge +
```

To obtain further information on how to monitor the different interfaces and protocols that the device has, we recommend you check the following manuals: *Teldat-Dm781 "Cellular Interface"*, *Teldat-Dm730 "DHCP Protocol"* and *Teldat-Dm750 "Ethernet Subinterface"*.

4.1 WWAN Monitoring

By accessing the monitoring menu of the **cellular1/0** interface, we can obtain information about the 4G module.

```
4Ge +network cellular1/0
-- AT Console --
4Ge cellular1/0 AT+?
  at-mode     Send AT commands directly to the module
  buffer      Display saved commands and answers
  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
  exit
4Ge cellular1/0 AT+
```

We can list this data using the **list** command.

```

4Ge cellular1/0 AT+list
Daughter Board           = CELLULAR LTE/WCDMA/CDMA-EVDO DATA card
Module Manufacturer      = Novatel Wireless Incorporated
Module Model             = E371 WWAN
Module Firmware          = 3.26 SVN 0 [2011-11-07 13:14:59]
IMEI                     = 012773000150969
IMSI                     = 214019804706344
SIM Card ID              = 8934569820709205294
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
4Ge cellular1/0 AT+

```

We can obtain information about the wireless network that we are connected to using the **network** command.

```

4Ge cellular1/0 AT+network ?
cell-info      Display information about serving and neighbour cells
operator       Operator information menu
performance    Display signal quality samples
quality        Display RSSI value
status         List GPRS/UMTS connection status
4Ge cellular1/0 AT+

```

For example, we can check on what cell we are registered in with using the **network cell-info** command.

```

4Ge cellular1/0 AT+network cell-info
Querying...Please wait...
      UARFCN PSC ECIO(-dBm) RSCP(-dBm)
      -----
Serving Cell: 10738 376          4          72
4Ge cellular1/0 AT+

```

We can also check the strength of the network signal and the technology being used by the module using the **network status** command.

```

4Ge cellular1/0 AT+network status
Querying...Please wait...
Registration state: Home network
PLMN Public Land Mobile Network code: 21401
PLMN Public Land Mobile Network name: vodafone
Cell Location Area Code 0x430e (17166), Identification 0x0c03 (3075)
System Mode WCDMA
Available module bands:
"GSM850","GSM900","GSM1800","GSM1900","UMTS850","UMTS1900","UMTS2100" (00df)
Available band: "UMTS2100"
Network technology currently in use: HSDPA/HSUPA
UTRAN Radio Frequency Channel Number: 10738
Receive signal code power of the active set's strongest cells(RSCP): -72 dBm
Total energy per chip per power density value of set's strongest cells(EcIo): -4 dB
Last EcIo measured in WCDMA DATA mode: -4 dB
Primary Scrambling Code (PSC) 0x0178 (376)
RRC State: 3 - CELL_PCH
RX level (dBm):-75
Coverage level: 4 (**** )
4Ge cellular1/0 AT+

```

The **network performance** command shows graphical representations of the three parameters that help choose the best location for the device.

```

4Ge cellular1/0 AT+network performance
Rx_Level (-dBm) measured during the last 60 samples

```

RSCP (-dBm) measured during the last 60 samples

EcIo (-dB) measured during the last 60 samples

[illegible]

In the monitoring menu of the **cellular1/1** interface we can check the data of the connection to the cellular network.

```
4Ge +network cellular1/1
-- Direct IP Monitor --
4Ge cellular1/1 NIC+?
    bitrate      Bit rate monitor
    clear        Clear interface parameters
    list         List interface parameters
    statistics    Interface statistics
    exit
4Ge cellular1/1 NIC+
```

With the **list** command we can see the data that identifies the 4G module and the status of the data connection to the 4G network.

```
4Ge cellular1/1 NIC+list
```

```

Drop by ping failed      = 0
Drop by tracert failed   = 0
Drop by traffic failed   = 0
Dialers registered      = PROFILE
Current dialer registered = PROFILE
State                   = (8) CONNECT
Call request            = 3
Access Point Name       = airtelnet.es
Total connection time   = 5 days 18 hours 15 minutes 21 seconds
Current connection time = 1 day 16 hours 37 minutes 57 seconds
Time to establish connection = 15 sec
Hardware Interface address = 00A0C6000000
Low layer link state    = Up
IP Interface addr.(reported) = 62.87.46.77
DNS primary server address = 0.0.0.0
DNS secondary server address = 0.0.0.0
4Ge cellular1/1 NIC+

```

We can also check the statistics of the data connection to the cellular network using the **statistics layer3-stats** command.

```

4Ge cellular1/1 NIC+statistics layer3-stats
Total
Rx pkts:      546191   Tx pkts:      486919
Rx bytes:    431009881 Tx bytes:    109615653
Throughput (bps)
Last sec  Rx:      0   Tx:      0
Last 1 min Rx:      0   Tx:     156
Last 5 min Rx:      0   Tx:     109
4Ge cellular1/1 NIC+

```

Using the **bitrate** command, we can see the transmission and reception bitrate in real time.

```

4Ge cellular1/1 NIC+bitrate
      Interface cellular1/1
Trx rate ( bps/pps)  Rcv rate ( bps/pps)
-----
    2328/    1      2480/    1
    9496/    4      7440/    3
   21144/   13      2400/    4
  150064/   97     619376/  101
  225760/  177     1758152/  212
  276488/  169     2301688/  248
  257432/  186     1024912/  168
  297296/  236     1381712/  246
      0/    0        0/    0
4Ge cellular1/1 NIC+

```