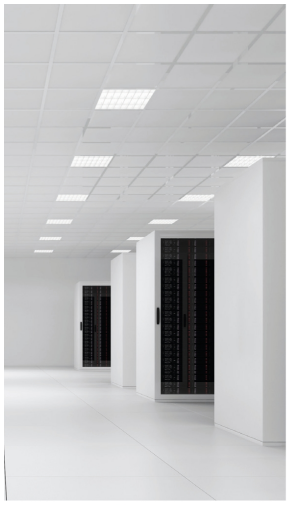

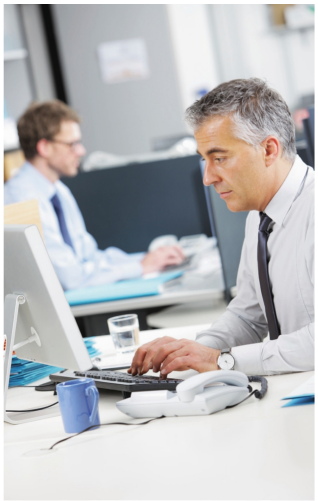

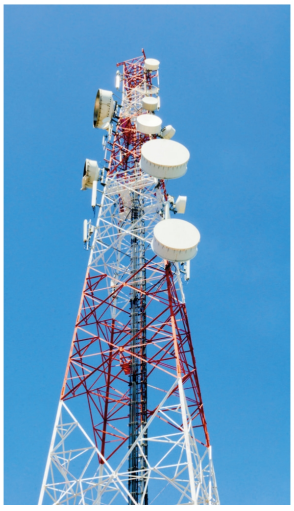

bintec 4Ge-LE

User Guide

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Chapter 1 About this manual

This user manual contains instructions on how to use the **bintec 4Ge-LE** router correctly.

1.1 Supported devices

The information contained in this user manual only applies to the **bintec 4Ge-LE** router.

1.2 Who should read this manual?

This manual should be read by those responsible for configuring, maintaining and monitoring the device.

1.3 When to read this manual

Read this manual before operating the **bintec 4Ge-LE** router to familiarize yourself with the device and its components. This manual will help you gain a greater understanding of your new device.

1.4 What does the manual cover?

This user guide contains the following information:

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

1.5 What the manual does not cover

This manual does not contain information on hardware. To obtain information on the matter, please visit the bintec elmeg website (http://www.bintec-elmeg.com) and see the relevant installation manuals.

1.6 How is the manual organized?

The manual is made up of several chapters. Each focuses on an aspect of the device that the user must know about. Details are provided on device behavior, the type of scenarios for which the device is intended, and configuration and monitoring functions.

1.7 Technical support

bintec elmeg 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.bintec-elmeg.com

Tel. Nº: +49 - 911 - 9673 0

Fax: +49 - 911 - 688 0725

Email: support@bintec-elmeg.com

1.8 Related documents

bintec-Dm730-I *DHCP Protocol*

bintec-Dm750-I *Ethernet subinterface*

bintec-Dm781-I *Cellular interface*

Chapter 2 Introduction

2.1 Device description

The **bintec 4Ge-LE** is a device that routes outbound data from a corporate network to a WWAN network (HSPA+/LTE).

- The **bintec 4Ge-LE** is designed to work with the corporate network outbound router, routing traffic to a WWAN if the primary outbound route for the corporate network fails.
- The device's built-in modem determines the WWAN access technology. The modem is responsible for providing access to HSPA+/LTE networks for data transmission.
- The device can be powered in two ways: via an external power source supplied along with the device or via Power over Ethernet (PoE). If both power sources are available, the external power source takes priority over PoE.

Fig. 1: **bintec 4Ge-LE**

2.2 Application scenarios

There are two usage scenarios for the **bintec 4Ge-LE**:

(1) Routers with WWAN communication capabilities that have insufficient signal coverage due to their location. Installing communication routers in racks in rooms that have poor WWAN signal coverage is a common practice.

(2) Backup for routers that don't have WWAN communication capabilities and that can divert their outbound traffic to the **bintec 4Ge-LE**.

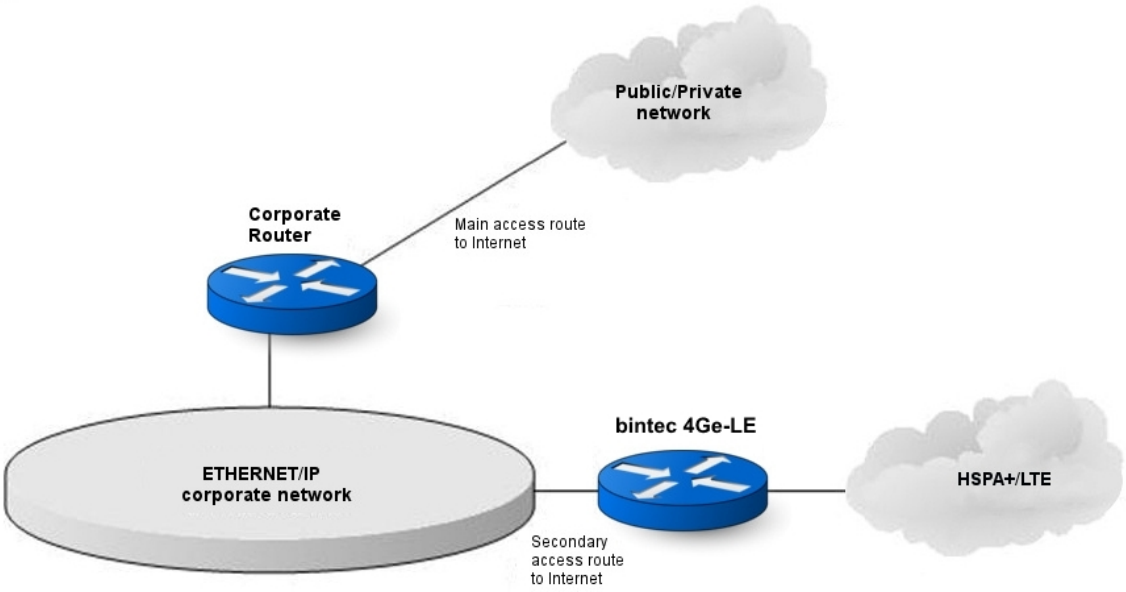

Fig. 2: **Application scenario** *for the* **bintec 4Ge-LE**

2.3 Device interfaces and connection

The **bintec 4Ge-LE** router has two interfaces:

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

The **bintec 4Ge-LE** can be connected to the corporate outbound router in two ways:

(1) Connect the **bintec 4Ge-LE** to the corporate network as if it were another network device, sharing the Ethernet network with the corporate router.

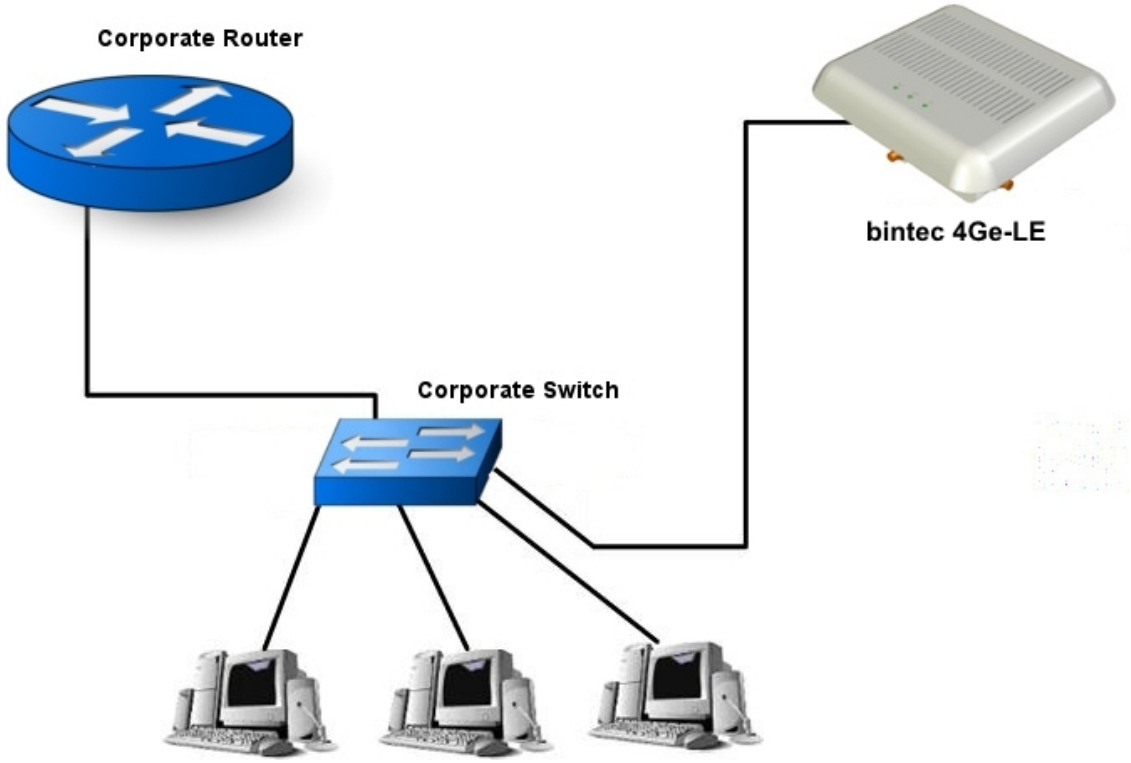

Fig. 3: **Connecting the bintec 4Ge-LE to the corporate router through a switch**

(2) If the corporate router has more than one Ethernet interface, you can use a 10BaseT cable that is directly connected to the router (as shown in the following figure).

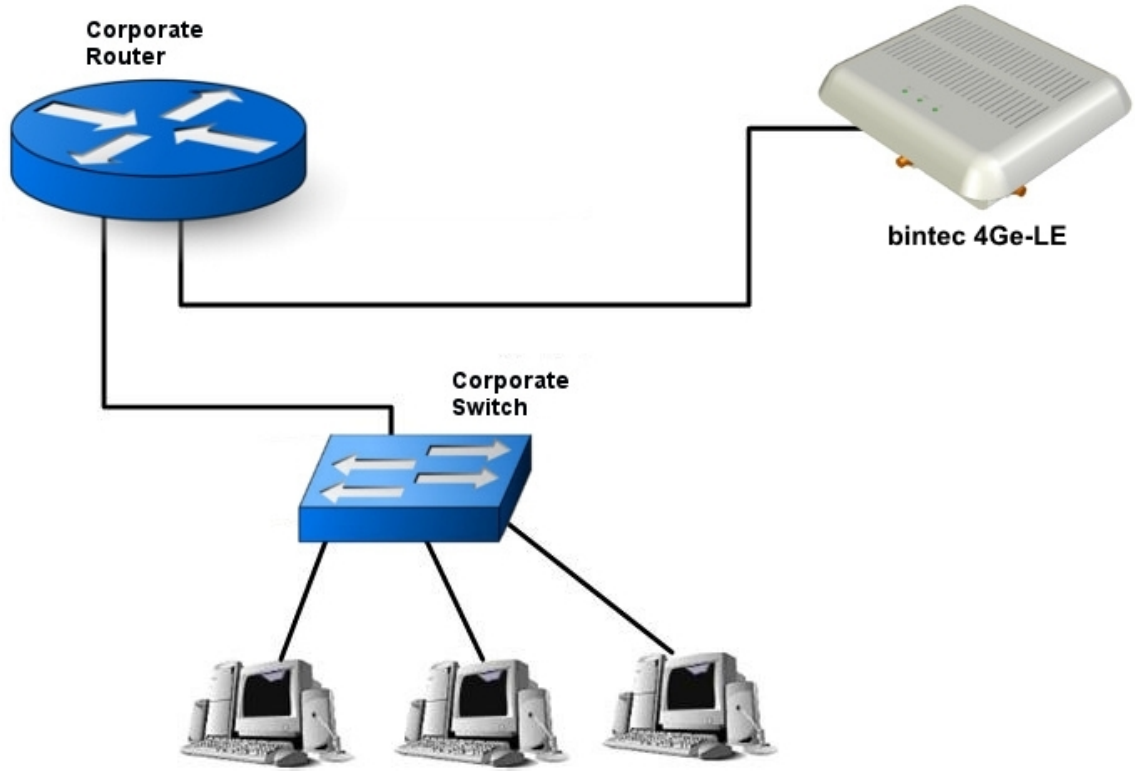

Fig. 4: Connecting the **bintec 4Ge-LE directly to the corporate router**

2.4 Operating description

When the **bintec 4Ge-LE** boots up, its Ethernet (WAN) interface comes up without an IP address. It uses the DHCP protocol to request an IP address and only accepts the one offered by the corporate router, rejecting offers from other DHCP servers connected to the corporate network. This is achieved by setting up the corporate router as a DHCP server and programing it to only handle IP address requests from a **bintec 4Ge-LE**. Apart from offering an IP address, DHCP is also used to convey configuration information to the **bintec 4Ge-LE**.

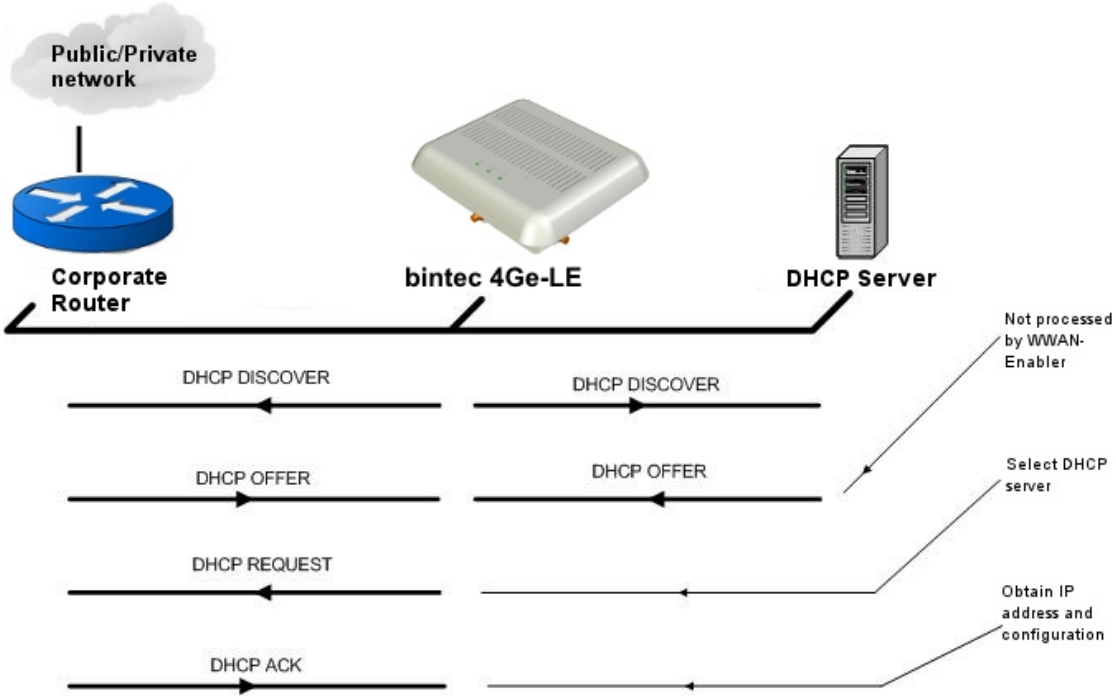

Fig. 5: **DHCP protocol**

The DHCP configuration section of this manual defines both how the two devices - DHCP client and server - are identified and the configuration information sent to the **bintec 4Ge-LE**.

Once the **bintec 4Ge-LE** has obtained a valid IP address, the next step is to establish the data backup mechanism.

The backup mechanism is obtained through VLAN 463. The **bintec 4Ge-LE** uses this VLAN to assign the public IP address provided to the router's Ethernet subinterface (which belongs to the same VLAN) and create a new default route pointing traffic to the 4G network.

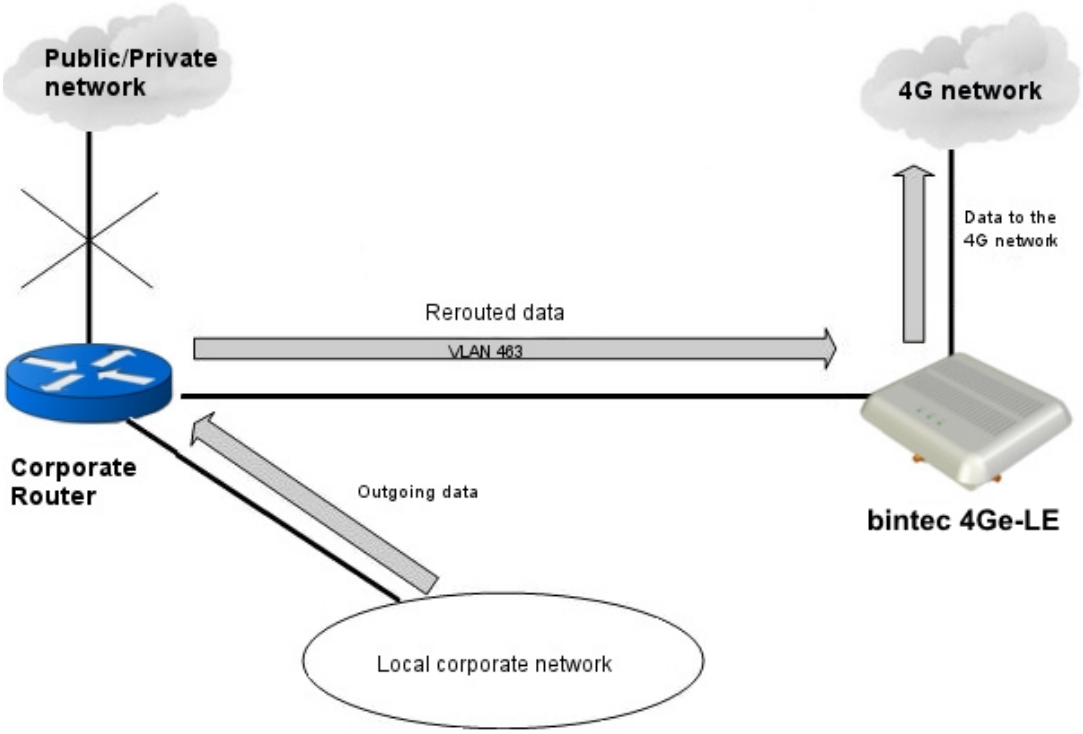

Fig. 6: **Data backup through VLAN 463**

Chapter 3 Configuration

The **bintec 4Ge-LE** can be used to connect any bintec, Cisco or third-party router to a 4G network. The following sections describe how to configure the router in these cases.

3.1 Configuring a Cisco router

Connecting a Cisco router to a cellular WWAN via the **bintec 4Ge-LE** is done through an Ethernet subinterface with VLAN 463.

The following configuration example shows how to connect a Cisco router via the **bintec 4Ge-LE**:

```
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=1016&ntps=192.168.215.115&usr=monitor&pwd=teldat"
   default-router 2.2.2.1
!
!
ip cef
no ipv6 cef
!
multilink bundle-name authenticated
!
!
archive
 log config
  hidekeys
!
!
interface FastEthernet0/0
 ip address 192.168.215.119 255.255.252.0
 ip nat inside
 iip 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 100 interface FastEthernet0/1.463 overload
!
access-list 100 deny   udp any eq bootpc any eq bootps
access-list 100 permit ip any 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 is the DHCP server for the **bintec 4Ge-LE** and we will use this protocol to set certain **bintec 4Ge-LE** parameters, such as the SIM PIN number, the cellular WWAN APN and the user and password needed to authenticate 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=1016&ntps=192.168.215.115&usr=monitor&pwd=teldat"
   default-router 2.2.2.1
```

The **client-identifier** specifies the **client-id** that the router waits to receive in order to accept the DHCP request from the **bintec 4Ge-LE** device. In this case, it is 74656c646174 in hexadecimal.

Using option **43**, we pass the configuration parameters along to the **bintec 4Ge-LE** to make it work.

- The syntax of the phrase we send consists of parameters separated by ampersands (**&)**.
- Not all parameters are required.
- If a parameter is not sent, the **default** parameter value determines the result.
- If you have multiple options, you need to include a code for each of them. The parameters specified here correspond to a single option with code 1.

- If you need to enter a special character, you can do so using the percent (**%**) sign followed by the ascii value with 2 hexadecimal digits. For example, the ampersand (**&**) 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 in option 43 should be "**antenna**". This allows the **bintec 4Ge-LE** to accept the address offered by the router. If you don't use this word, the **bintec 4Ge-LE** won't accept the address.

The configuration parameters available for the **bintec 4Ge-LE** include:

- "**pin=NNNN**", allows you to configure the PIN number for the SIM card used in the **bintec 4Ge-LE**.
- "**apn=**", configures the 4G network APN to which the **bintec 4Ge-LE** will be connected.
- "**apntype=**", or "**type=**", configures the type of 4G network APN to which the **bintec 4Ge-LE** will be connected. This can be *ipv4v6* or *ipv6*. If this parameter is not configured, it will be *ip* (for IPV4 APNs).
- "**user=**", or "**usr=**", allows you to configure a user for authentication in the cellular operator's APN.
- "**password=**", or "**pwd=**" allows you to configure a password for authentication in the cellular operator's APN.
- "**rxtimeout=T**", or "**rxto=T**", indicates that the transmission and reception packets are monitored. If, after **T** seconds, no response to a transmitted packet is received, the connection with the router and the WWAN access module is restarted. You can set a value between 10 and 86399 seconds. By default, this parameter is disabled.
- "**flowcontrol=N**", or "**flow=N**", indicates that the transmission and reception packets are monitored. If nothing is received after **N** transmitted packets, the connection with the router and the WWAN access module is restarted. You can set a value between 1 and 65535 packets. By default, this parameter is disabled.
- "**ntpserver=AAA.BBB.CCC.DDD**", or "**ntps=AAA.BBB.CCC.DDD**", IP address of the NTP server used to synchronize the device time.
- "**ntpoffset=N**", or "**ntpo=N**", the time is expressed in GMT + ntpoffset. The default value is 2 (i.e. GMT + 2). Acceptable values range from -12 to +12, in 1-hour intervals.
- "**mode=**", allows you to select the technology used to connect to the cellular network. The options are *auto*, *gprs*, *wcdma*, *gprsp*, *wcdmap*, *lte*, *cdma*, *hrpd* and *hybrid*. The *gprsp* and *wcdmap* modes indicate that GPRS and WCDMA technology, respectively, are preferable. Default is *auto*.
- "**domain=**", or "**dmn=**", allows you to select the domain the device connects to. The options are *cs*, *ps* and *cs+ps*. As backup support for voice calls hasn't been implemented yet, we recommend using *ps*. Default is *ps*.
- "**idletime=T**" , or "**idle=T**", configures the idle time, in seconds, for the 4G network session. After a session has been established, if the idle time expires without a new packet being received from the router, the **bintec 4Ge-LE** considers the session to be down and drops it. Acceptable values range from 0 to 65535 seconds. By default, this parameter is not configured (which is the same as setting it to 0).
- "**atafterpin=**", or "**aft=**", or "**beforepin=**", or "**bef=**", allows you 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 Ecl0). The N value must be between 10 and 255 seconds. Default is 60 seconds.
- "**clientid=no**", or "**cid=no**", disables sending the *client identifier* in DHCP requests. This is designed for configurations with several **bintec 4Ge-LE** devices and Cisco routers.
- "**regdenied=1**", or "**regd=1**", enables a feature that switches off the 4G module radio interface for 5 seconds if the network initially denies registration (*registration DENIED*). Thus, you have a way to get out of such a situation and the module can re-register in the 4G network.
- "**pnum=N**", or "**profilenum=N**", selects the call profile that 4Ge uses to make the data call. It allows you to specify the call profile for modules that provision the APN using *Over The Air* (OTA), without having to specify an APN in the configuration. It admits values ranging from 1 to 12.
- "**auth=**", if the data APN requires authentication, this parameter allows you to select the type of authentication. The options are *chap*, *pap* and *none* if no authentication is required. If you don't include this parameter, the default authentication method (*pap*) is used.
- "**regapn=**", or "**rapn=**", configures the 4G network registration APN used for the **bintec 4Ge-LE** router. If the registration APN and the data APN are the same, we recommend using "*reagapn=*" and "*pnum=1*".
- "**regapntype=**", or "**rtype=**", configures the type of 4G network registration APN used for the **bintec 4Ge-LE** router. The options are *ipv4v6* and *ipv6*. If this parameter is not configured, it will be *ip*.
- "**regauth=**", or "**rauth=**", this parameter allows you to select the type of authentication required by the registration

APN (if applicable). The options are *chap* and *pap*.

- *"***regusr=***"*, or *"***rusr=***"*, this parameter allows you to configure a user if the registration APN requires authentication.
- *"***regpwd=***"*, or *"***rpwd=***",* this parameter allows you to configure a password if the registration APN requires authentication.
- *"***wband=***"*, or *"***wb =***",* this parameter allows to select WCDMA bands. You need to provide a list of band numbers separated by commas (for example, "wb=1,2,3"). To disable all bands, use the word "none".
- *"***lband=***"*, or *"***lb =***",* this parameter allows you to select LTE bands. You need to provide a list of band numbers separated by commas (for example, "lb=3,7,20"). To disable all bands, use the word "none".
- *"***arp=1***"*, this parameter configures the 4Ge to act as a modem, answering every ARP request received in VLAN 463 with its own MAC address, as if it were the owner of the requested IP address. This setup supports host routers that are not able to update the "next hop" of configured static routes using the DHCP-provided gateway to the VLAN 463 interface and/or modify the cost of DHCP-learned routes (which causes the interface to be considered a Point-to-Point one, something that is conceptually wrong in Ethernet media). When using this mode, you may/should add a route with VLAN 463 subinterface as output/next-hop gateway to the host router configuration.
- *"***cpwd=***"*, this parameter configures the 4Ge *monitor* user password. Instead of using the password assigned by default, this parameter allows the user to change it to prevent the device from being illegally accessed (potentially). The initial 'c' in this parameter stands for clear, meaning the password will be sent as plain text. If this parameter is configured in a bintec device DHCP server, it will be automatically converted to its ciphered equivalent (i.e., a 'hpwd' parameter). The password must, at most, be 32 characters long. Example: "cpwd=mypassword123".
- *"***hpwd=***"*, this parameter configures the 4Ge *monitor* user password. Instead of using the password assigned by default, this parameter allows the user to change it to prevent the device from being illegally accessed (potentially). The initial 'h' in this parameter stands for hash, meaning the parameter value is the hash result of the original password. To obtain the hash value of a password, please use the output a bintec device gives when a new user is added or contact bintec support. The password must, at most, be 32 characters long. Example: "hpwd=F91F3540CDCDDB5A3181C5978871B209".
- *"***telnet=yes/no***",* or *"***tlnt=yes/no***",* this parameter enables or disables Telnet in the **bintec 4Ge-LE** router.

Command history:

Release	Modification
10.09.15, 11.00.02, 11.01.00	The "*profilenum*" parameter was introduced.
10.09.15, 11.00.02, 11.01.00	The "*pnum*" (short form for "*profilenum*") parameter was introduced.
10.08.42, 10.09.18, 11.00.02, 11.01.00	The "*regusr*" parameter was introduced.
10.08.42, 10.09.18, 11.00.02, 11.01.00	The "*regpwd*" parameter was introduced.
10.08.42, 10.09.18, 11.00.02, 11.01.00	The "*regauth*" parameter was introduced.
11.00.07, 11.01.02	The "*mode*" parameter now accepts values "*cdma*", "*hrpd*" and "*hybrid*".
10.09.31, 11.00.07, 11.01.04	The short form for the "*regusr*" parameter was enabled.
10.09.31, 11.00.07, 11.01.04	The short form for the "*regpwd*" parameter was enabled .
10.09.31, 11.00.07, 11.01.04	The short form for the "*regauth*" parameter was enabled.
10.09.31, 11.00.07, 11.01.04	The short form for the "*apntype*" parameter was enabled.
10.09.31, 11.00.07, 11.01.04	The short form for the "*regapn*" parameter was enabled.
10.09.31, 11.00.07, 11.01.04	The short form for the "*regapntype*" parameter was enabled.
10.09.31, 11.00.07, 11.01.04	The "*lband*" parameter was introduced.
10.09.31, 11.00.07, 11.01.04	The "*wband*" parameter was introduced.
10.09.31, 11.00.07, 11.01.04	The "*arp*" parameter was introduced.
11.01.08	The "*cpwd*" and "*hpwd*" parameters were introduced.
11.01.08	The "*telnet*" (or "*tlnt*") parameter was introduced.
11.02.02	Parameters "*rapn*", "*rusr*", "*rpwd*", "*rauth*", "*rtype*" and "*pnum*" are no longer needed.

Note

Remember to change the values in the example to the values that are specific to your application.

Be very careful when entering the PIN code for the SIM card that will be installed in the **bintec 4Ge-LE**. Entering an incorrect PIN may block the SIM.

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

3.2 Configuring a bintec router

As with a Cisco router, you can connect a bintec router to the **bintec 4Ge-LE** through an Ethernet subinterface belonging to VLAN 463.

The following configuration example shows how to connect a bintec router:

```
   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 192.168.215.119 255.255.252.0
;
   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 hex 74656c646174
         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=1016&ntps=192.168.215.115&usr=monitor&pwd=teldat
;
     exit
;
  exit
;
  dump-command-errors
  end
```

Command history:

Release	Modification
11.01.05	Option 43 can now be configured to add a code to each value that makes up the Vendor Specific Information.

3.2.1 DHCP

Like the Cisco router, the bintec router is the DHCP server for the **bintec 4Ge-LE** and we will use the DHCP protocol to set certain **bintec 4Ge-LE** parameters, 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 hex 74656c646174
         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=1016&ntps=192.168.215.115&usr=monitor&pwd=teldat
;

   exit
```

The **router** option assigns a default route to the **bintec 4Ge-LE**. This route is necessary if the **bintec 4Ge-LE** and the TFTP server are in different networks.

The **client-id** option indicates the “client-id” that the router expects to receive in the DHCP request from the **bintec 4Ge-LE**. The value of this option must match the “antenna” characteristics.

Through option **43**, the **bintec 4Ge-LE** receives the configuration parameters required to make it work. The syntax and meaning are the same as those described under section *DHCP* on page 8, in the part entitled *Configuring a Cisco router* on page 7.

The first word in option 43 should be “**antenna**”, which allows the **bintec 4Ge-LE** to accept the address offered by the router. If this word is not used, the **bintec 4Ge-LE** won’t accept the address.

Chapter 4 Monitoring via the console

To access the **bintec 4Ge-LE** monitoring console, a telnet session must be opened to the DHCP-assigned IP address. To open the Telnet session, we need to use the default username and password: *monitor/teldat*.

While in the router's startup menu, we will have access to the following commands:

```
4Ge login...
User: monitor
Password: ******
bintec elmeg               (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 *
```

We access the device's monitoring menu by running the **monitor** command. Here we'll be able to check the state 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
  last-app-version-changes    Display the latest application versions loaded
  list                        Display current devices
  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
  uptime                      List router uptime since last boot
  version                     List running software version
4Ge +
```

Please see the following manuals for more information on how to monitor the device's interfaces and protocols: *bintec-Dm781-I "Cellular Interface"*, *bintec-Dm730-I "DHCP Protocol"* and *bintec-Dm750-I "Ethernet Subinterface"*.

4.1 WWAN monitoring

Accessing the monitoring menu of the **cellular1/0** interface allows us to 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
  qmi             QMI options
  reset           Send reset command
```

```
  trace           Control and list interface traces
  exit
4Ge cellular1/0 AT+
```

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

```
4Ge cellular1/0 AT+list
  Daughter Board               = CELLULAR LTE/WCDMA DATA card
  Module Manufacturer          = Sierra Wireless, Incorporated
  Module Model                 = MC7304
  Module Firmware              = SWI9X15C_05.05.67.00 r31378 CARMD-EV-FRMWR1 2016/03/11 14:58:53
  Module Boot Version          = SWI9X15C_05.05.67.00 r31378 CARMD-EV-FRMWR1 2016/03/11 14:58:53
  UQCN                         = 9903554 05.02
  Preferred Image              = 05.05.67.00_GENEU-4G_005.028_000
  Hardware Revision            = 1.0
  IMEI                         = 356853051316190
  SIM Card ID                  = 8934076100141199496
  Interfaces                   = GSM UMTS LTE
  Data Service Capability      = Nonsimultaneous CS/PS
  Voice Support Capability     = GW_CSFB 1xCSFB
  Maximum TX/RX rate supported = 50000/100000 Kbps
  Module temperature           = 33 deg. C
  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+
```

The **network** command allows us to obtain information about the wireless network we are connected to.

```
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, the **network cell-info** command lets us check the cell the device is registered to.

```
4Ge cellular1/0 AT+network cell-info
Querying...Please wait...

========================================
..:: NETWORK CELL INFO ::..
========================================

- UMTS info:
        Cell ID: 26722
        PLMN ID coded: 21407
        Location Area Code: 2867
        UTRA absolute RF channel number: 10838
        Primary Scrambling Code: 510
        RSCP: -107 (dBm)
        ECIO: -9 (dB)
        WCDMA Cell #1
                UTRA absolute RF channel number: 10838
                PSC: 310
                RSCP: -109 (dBm)
                ECIO: -11 (dB)
        WCDMA Cell #2
                UTRA absolute RF channel number: 3011
```

```
                PSC: 310
                RSCP: -107 (dBm)
                ECIO: -9 (dB)
        WCDMA Cell #3
                UTRA absolute RF channel number: 10813
                PSC: 510
                RSCP: -100 (dBm)
                ECIO: -6 (dB)

- UMTS cellid avail info:
        Cell ID: 0D646862

- WCDMA info - Neighboring LTE:
        RRC state: 2

4Ge cellular1/0 AT+
```

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

```
4Ge cellular1/0 AT+network status
Querying...Please wait...

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

        SIM status: OK
        Registration state: Registered
        Public Land Mobile Network code: 21407
        Public Land Mobile Network name: Movista
        Network technology currently in use: WCDMA
        Current Service Domain registered: CS/PS (capable CS/PS)
        Current Roaming status: Off
        3GPP Location Area Code: 0B33
        3GPP Cell ID: 0D64686C
        Radio Band WCDMA2100
        Channel 10813
        WCDMA Primary Scrambling Code (PSC): 01fe
        WCDMA High-Speed Call Status: None
        WCDMA High-Speed Service Indication: None
        EcIo (dB): -9
        RX level (dBm): -99
        Coverage level: 2 (**   )

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

        Connection status: Connected
        Radio Access Technology: WCDMA
        Traffic channel status: Dormant
        Uplink Flow control: Deactivated
        Max. TX channel rate (bps): 8576000
        Max. RX channel rate (bps): 8682000
        IPv4 address: 10.24.177.93
        IPv4 mask: 255.255.255.252
        IPv4 gateway: 10.24.177.94
        IPv4 primary DNS: 80.58.61.250
        IPv4 secondary DNS: 80.58.61.254

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
```

```
RSCP (-dBm) measured during the last 9 samples
                                                        111111111
                                                        000000000
 20_                                                    771577766
 30_|
 40_|
 50_|
 60_|
 70_|
 80_|
 90_|
100_|
110_|                                                  ..:......
120_|_____________________________________________________:::::::::
     older                                                 newest

EcIo (-dB) measured during the last 9 samples

                                                        11      1
  0_                                                    335889892
  2_|
  4_|
  6_|                                                     .
  8_|                                                     :
 10_|                                                     :::.:.
 12_|                                                     ::::::
 14_|                                                   ..:::::::
 16_|                                                   :::::::::
 18_|                                                   :::::::::
 20_|_____________________________________________________:::::::::
     older                                                 newest


4Ge cellular1/0 AT+
```

In the monitoring menu of the **cellular1/1** interface, we can call up data on 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
        Drop by carrier loss         = 0
        Dialers registered           = PROFILE
        Current dialer registered    = PROFILE
        State                        = (9) CONNECT
        Call request                 = 1
        Connections established      = 1
        Access Point Name            = internet.es
        Total connection time        = 8 minutes 8 seconds
        Current connection time      = 8 minutes 8 seconds
        Time to establish connection = 9 sec
        Hardware Interface address   = D20A21370108
        Low layer link state         = Up
        IP Interface addr.(reported) = 10.24.177.93
```

```
        DNS primary server address   = 80.58.61.250
        DNS secondary server address = 80.58.61.254
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:             7   Tx pkts:            12
Rx bytes:         1990   Tx bytes:         3280
Throughput (bps)
Last sec   Rx:            0    Tx:            0
Last 1 min Rx:            0    Tx:           38
Last 5 min Rx:           17    Tx:           38
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)
 ----------------------------------------
       2336/    1            0/    0
       2336/    1         2560/    1
      74872/   33         8464/   19
      41816/   36        33488/   44
      14288/   13        37440/   14
      35336/   49       121680/   72
      17440/   18       144760/   31
          0/    0            0/    0
4Ge cellular1/1 NIC+
```