Teldat-3Ge Quick Guide

Teldat-Dm 406-I

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Chapter 1 Introduction

1.1 Introduction

The **Teldat-3Ge** is a backup device for 3G communication routers that face one of the following issues:

- Poor coverage at the router's location.
- Inability to run 3G communications due to not having the necessary hardware module.
- In addition to data backup, the **Teldat-3Ge** is capable of acting as a SIP-gateway for one or various client telephones. In cases where the telephone communications are interrupted, calls to the outside can be made from these telephones. Similarly, external calls can be received on the same phones or on one single phone.

Fig. 1: **Teldat-3Ge** *device.*

The **Teldat-3Ge** device has two communication interfaces; one being a Wireless WAN interface and the other an Ethernet interface (providing 3G communications to the office router).

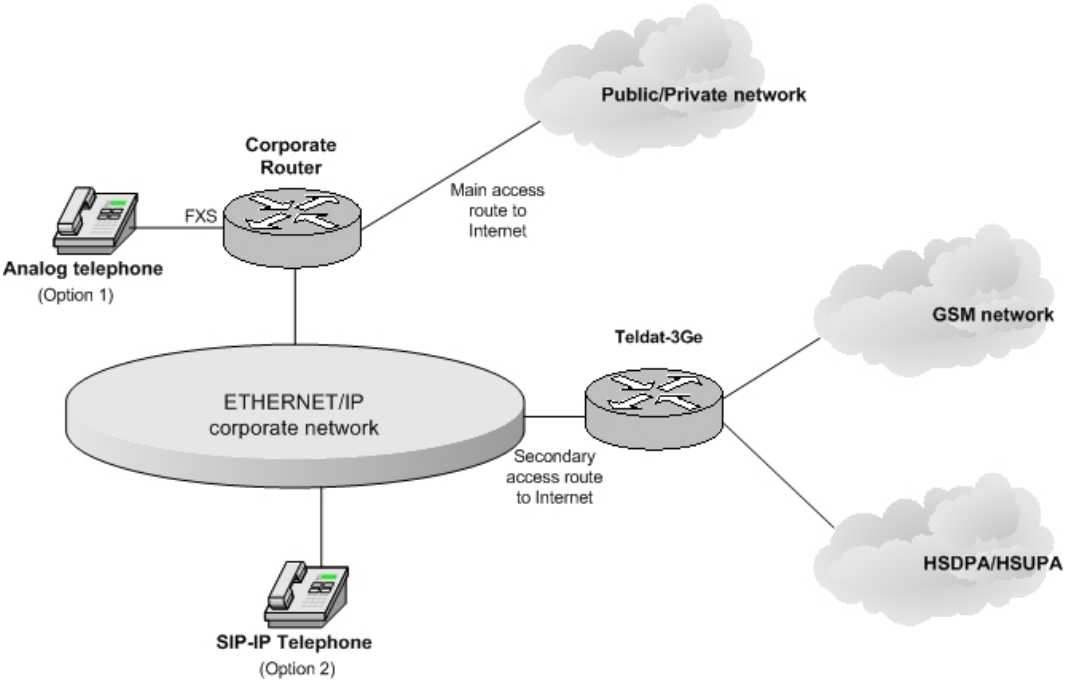


Fig. 2: **Teldat-3Ge** *: Application scenario.*

Since it operates as an external 3G interface for the company's communications router, the management and opera-

tion of the **Teldat-3Ge** is fully carried out from said router. For it to work properly, you need to add the necessary configuration.

In cases where a **Teldat-3Ge** is going to be used as a SIP-gateway, the telephones receiving telephonic backup can be:

- Analog (Option 1). In this case, the corporate communications router must have a VoIP expansion module installed and the telephones must be connected to an FXS input.
- SIP IP Telephone (Option 2). In this case, the corporate communications router acts as a SIP-proxy between the IP telephones and the **Teldat-3Ge** .

This document describes the text commands that need to be added to the router's Command Line Interface (CLI) for it to manage the **Teldat-3Ge** serving as backup. The following sections offer a brief description on the communication between the **Teldat-3Ge** and the router. They go on to describe how to access the commands console and add the configuration and monitoring commands for the available radio link. Finally, the Appendix shows how to combine several **Teldat-3Ge** devices in a single private network and gives a description of the **Teldat-3Ge** status LEDs.

The device uses High Speed Uplink Packet Access technology (HSUPA).

Voice backup functionality is available in devices that are equipped with the Sierra Wireless MC8775V, MC8790V. MC8791V, MC8792V, MC8795V, Option GTM382, Qisda H20 or Qisda H20D modems. To be able to use it, the voice backup feature must be enabled by means of a license.

The **Teldat-3Ge** works with two types of electric power supply:

- An external power source handed together with the device.
- Through POE (Power over Ethernet).

If both are available, the external power source option is preferred.

Note

Before reading this document, Teldat recommends that you read the **Teldat-3Ge** Installation manual (Dm398-I)

Chapter 2 Configuration

2.1 Operating documentation

2.1.1 Data Backup

The Teldat router manages the **Teldat-3Ge** through three virtual *rcellular* interfaces. This approach lets the router provide the same configuration and monitoring features for the **Teldat-3Ge** as those offered over physical 3G interfaces (internal interfaces). Each *rcellular* interface has a different operational task:

- The first virtual interface (*recellular1*) monitors the radio link
- The second one (*recellular2*) is responsible for transmitting traffic the Teldat router sends over the 3G link.
- The third (*recellular3*) updates the **Teldat-3Ge** image (firmware).

Communications between the router and the **Teldat-3Ge** are achieved through a pseudowire L2TP tunnel where three independent L2TP sessions are established; one for each *rcellular* interface registered in the router. Consequently, a monitoring session, a data session and a firmware updating session are transported through this L2TP tunnel.

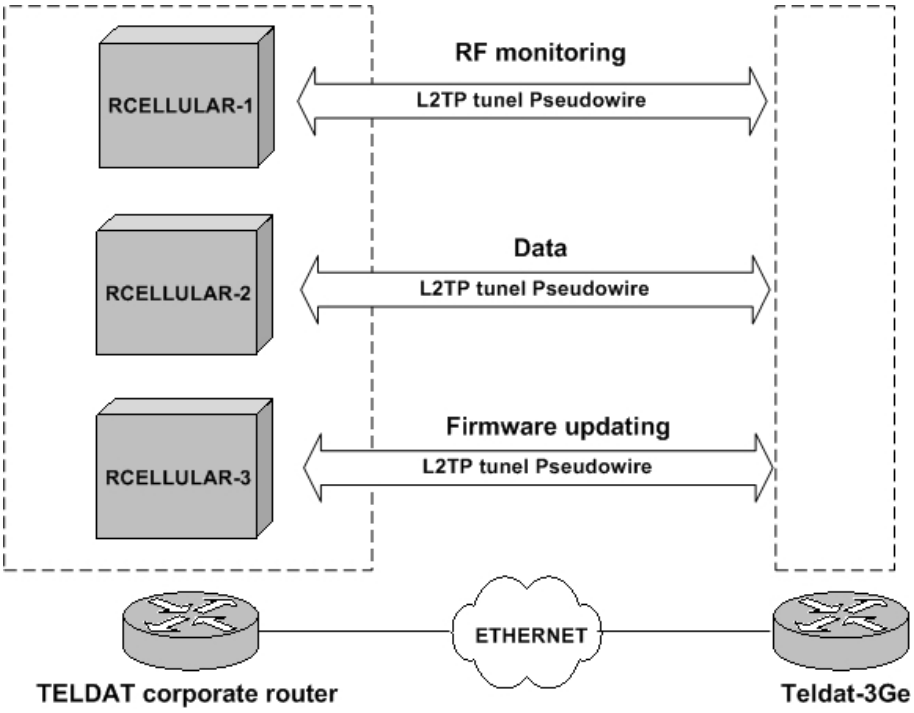


Fig. 3: L2TP tunnels between the corporate Router and the **Teldat-3Ge** .

RF monitoring consists of a series of parameters on the Teldat-3Ge RF connection level of quality with the GSM and HSDPA/HSUPA network. This information enables you to appropriately select the location for the device. Monitoring can be carried out in various ways:

(1) Through the rcellular1 interface sending an AT monitoring command (see manual **Dm781-I Cellular Interface**).

(2) Opening a Telnet session with the device and executing the monitoring line command.

(3) Accessing the device's web page.

As already indicated, the backup traffic is sent through the rcellular2 interface L2TP tunnel. A PPP session between the corporate router and the **Teldat-3Ge** is established over this tunnel with the aim of initiating the connection with the HSDPA/HSUPA network (authentication and to obtain an IP address from the network).

2.1.2 DHCP

The **Teldat-3Ge** starts up without a configuration (as this is defined in the router). The **Teldat-3Ge** gets its configuration through DHCP.

On startup, the **Teldat-3Ge** requests an IP address for its Ethernet interface through a DHCP_DISCOVER packet. The device waits for a response from, among other DHCP servers, the TELDAT corporate router. For this to happen, the router must have a DHCP server activated. Through the DHCP protocol options, both devices identify and the **Teldat-3Ge** only accepts the IP address offered by the TELDAT corporate router. Once the IP address has been received, the **Teldat-3Ge** obtains the necessary operating information via the DHCP options.

2.1.3 Voice Backup

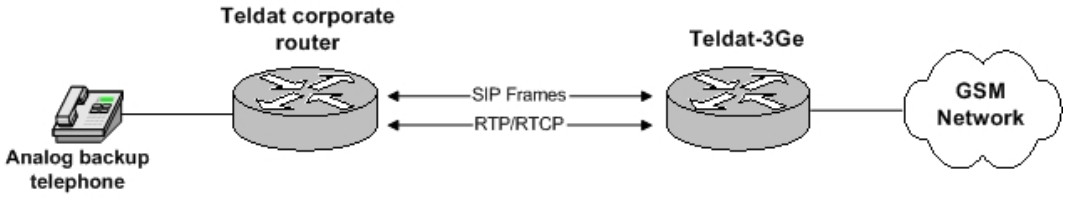
Voice backup uses SIP for signaling and RTP/RTCP to send the voice samples. Through these standard protocols, the **Teldat-3Ge** can operate with routers that are not TELDAT.

As already mentioned, the **Teldat-3Ge** is a SIP-gateway.

Calls generated by the corporate telephone or telephones that are meant to exit through the device SIP-gateway are routed through the GSM network. The person receiving the call takes it as if it were a call from a mobile phone. In the same way, external calls to the corporate network telephones have to be made to the telephone number corresponding to the SIM card incorporated in the **Teldat-3Ge** . The device's SIP-gateway routes the external GSM call to the corporate router using SIP and RTP/RTCP. The latter transfers it to the telephone (or telephones) the router has configured to receive calls that arrive through the **Teldat-3Ge** .

Both in the analog and in the SIP IP telephone options, the corporate router acts as the SIP-proxy. That is, SIP traffic is always produced between the corporate router and the **Teldat-3Ge** .

OPTION 1: Analog telephone connected to an FXS input from a VoIP expansion module



OPTION 2: SIP-IP telephone using the corporate router as a SIP-proxy

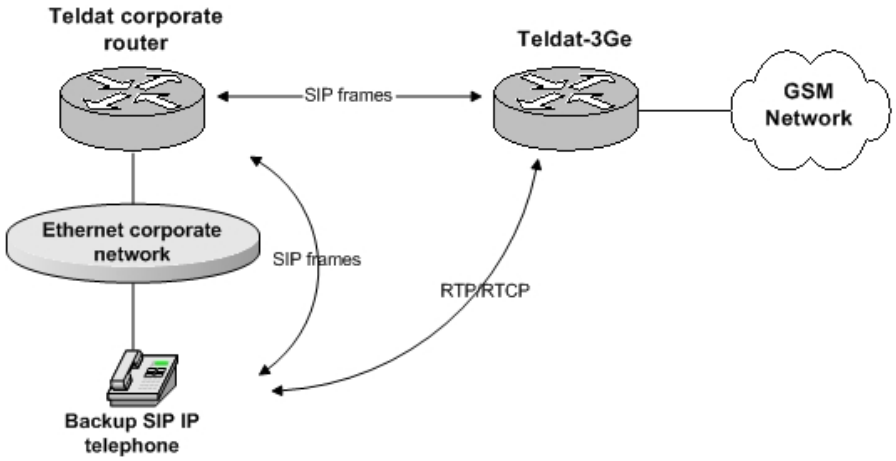


Fig. 4: Voice backup scenarios.

2.2 Teldat Router: Commands Console

Teldat-3Ge management is fully carried out through the Teldat router commands console. The console can be accessed both locally (through the device's configuration interface) and remotely (through a telnet connection to the device's access IP address).

Explanations on how to access and operate the commands console are given in chapter 1 of manual **Dm704-I Configuration and Monitoring**. The Teldat console opening message looks like this:

```
User: Root
Password:****
Teldat               (c)2001-2002
Router model XXXXX CPU MPC860      S/N: YYYY/YYYYY
1 LAN, 2 WAN Line , 2 ISDN Line
CIT software version: ZZZZZ
*
```

The configuration commands shown in this chapter are executed in the commands console configuration process. The user can access this by executing the **config** command, as shown below:

```
*config 4
User Configuration
Config>
```

2.3 Creating 3G Virtual Interfaces

First we add the virtual interfaces *recellular1*, *recellular2* and *rcellular3*, running the following commands:

```
   add device rcellular 1
   add device rcellular 2
   add device rcellular 3
```

Then we define the function of each interface and configure the startup parameters for the **Teldat-3Ge** 3G module in the monitoring interface (*rcellular1*).

```
   network rcellular1
; -- Interface AT. Configuration  --
      description ETH-ANT-MON
      coverage-timer 15
      pin plain 5710
      monitor-ifc 1
      network mode automatic
      network domain cs+ps
   exit
;
   network rcellular2
; -- Interface AT. Configuration  --
      description ETH-ANT-PPP
      ppp-ifc 1
   exit
;
   network rcellular3
; -- Interface AT. Configuration  --
      description ETH-ANT-UPG
      upgrade-ifc 1
   exit
```

The **pin plain 5710** command sets the PIN for the SIM card inserted in the **Teldat-3Ge** to 5710. If you want to set a different PIN code, simply edit it using this command.

The "cs+ps" command network domain configures the device so that it can access the GSM and the HSDPA/HSUPA networks at the same time.

Note

If the **Teldat-3Ge** is equipped with a module that doesn't support voice backup, you should only configure the "ps" network domain.

On device startup, the sequence of events is as follows:

- The L2TP tunnels try and open on detecting the presence of an *rcellular* interface.

- Once the L2TP tunnel is open, the link layer is considered to be established in this interface.
- Subsequently, the connection is tried through AT commands for the *rcellular1* interface.
- Lastly the PPP connection is established through the *rcellular2* interface.

Note

Configuring an incorrect PIN in the Teldat-3Ge can block your SIM card.

2.4 3G Access Parameters

The Name of the Access Point to the 3G network (APN) is configured as a call profile. Below, you can see an example showing how to access a fictitious carrier APN:

```
   global-profiles dial
; -- Dial Profiles Configuration --
      profile WWAN default
      profile WWAN dialout
      profile WWAN 3gpp-accessibility-control traffic 20 all
      profile WWAN 3gpp-apn internet.es
      profile WWAN idle-time 300
;
   exit
```

If you want to access a different APN, the user must substitute **internet.es** in the **profile WWAN 3gpp-apn internet.es** command for the APN given by the cellular provider.

For further information on call profiles, please see manual **Dm732-I Call Profiles**.

Next, we define and configure a PPP interface. This is responsible for providing registration information to the 3G network. The PPP interface must be mounted over the *rcellular2* interface. The commands for accessing the 3G service are:

```
   add device ppp 1
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user internet password internet
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
   network rcellular2
; -- Interface AT. Configuration --
      lcp-options acfc
      lcp-options pfc
      lcp-options accm 0
 exit
;

      base-interface
; -- Base Interface Configuration --
      base-interface rcellular2 link
      base-interface rcellular2 profile WWAN
;
      exit
;
   exit
;
```

The **authentication sent-user internet password internet** command configures the access credentials (login/password). The user must replace **internet** with the corresponding login and password supplied by the carrier.

2.5 IP Configuration

The router Ethernet interface IP address and the static route to transmit traffic over the 3G network are configured. Optionally, the router firewall is enabled. The following example shows how to configure the IP address 172.24.78.29/16 on the Ethernet interface and declare the default route over the PPP1 interface, which is the interface that inherits the IP address that the WWAN network assigned to the **Teldat-3Ge** .

```
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 172.24.78.29 255.255.0.0
;
   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
;
```

2.6 L2TP Tunnel

The router initiates (LAC) the L2TP session with the **Teldat-3Ge** , which acts as the L2TP server (LNS). An L2TP *Pseudowire* type tunnel is established between both devices through which the three sessions needed to ensure this functions correctly are established.

It is important that you do not change the name of each session in the router's configuration, *ETH-ANT-MON* , *ETH-ANT-PPP* and *ETH-ANT-UPG,* as these are the ones configured in the Teldat-3Ge.

```
   protocol l2tp
; -- Layer 2 Tunneling Protocol user configuration --
      enable
;
      group 1
; -- L2TP group configuration --
         pseudowire ETH-ANT-MON
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular1
         hello 9
      exit
;
      group 2
; -- L2TP group configuration --
         pseudowire ETH-ANT-PPP
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular2
         hello 9
      exit
;
      group 3
; -- L2TP group configuration --
         pseudowire ETH-ANT-UPG
         initiate-to 172.24.78.28
```

```
         request-dialin
         interface rcellular3
         hello 9
      exit
;
   exit
```

2.7 DHCP Server

A DHCP server is configured on the router to respond to requests for IP parameters from the **Teldat-3Ge** .

To avoid conflicts with other DHCP servers on the company network, we must restrict the Teldat router DHCP service to only accept requests from the registered **Teldat-3Ge** so that, in turn, the Teldat router is always selected.

To achieve this, the DHCP configuration is as follows:

```
   protocol dhcp
; -- DHCP Configuration --
      server
; -- DHCP Server Configuration --
;
         subnet teldatsubnet 0 network 172.24.0.0 255.255.0.0
         subnet teldatsubnet 0 bootfile fwethant.img
         subnet teldatsubnet 0 next-server 172.24.78.29
         subnet teldatsubnet 0 router 172.24.78.29
;
         enable
;
         host eth-ant 0 client-id asc teldat
         host eth-ant 0 fixed-ip 172.24.78.28
         host eth-ant 0 option 43 asc antenna&sipport=5060&localphone=607081119&
ntpserver=80.26.59.78
;
      exit
;
   exit
;
```

The **host eth-ant 0 option 43 asc antenna** command specifies the option the **Teldat-3Ge** expects to receive from the server in order to accept the received address (“antenna” in ASCII). The *“client-id”* command gives the *“client-id”* the router expects to receive (“teldat” in ASCII).

Other important parameters that can be configured through option 43 are as follows:

- “sipport=”, SIP agent UDP port in the device.
- “localphone=”, telephone number the GSM external call is transferred to.
- “sipserver=”, SIP-proxy IP address, if you want this to be a different device from the Teldat router. If you don’t set this IP address, the SIP-proxy is the default route IP address assigned to the Teldat-3Ge by default.
- “ntpserver=”, NTP server IP address the device uses to synchronize the time.
- “ntpinterval=”, time between synchronization requests. Default is 3600.
- “ntpoffset=”, offset time corresponding to the time zone where the device is installed. Default is 2 (GMT +2). From software version 1.09 for the Teldat-3Ge, this parameter is ignored and is substituted for the “ *timezone*” parameter.
- “timezone=”, this specifies the time zone the device is in. The default value is the Paris/Madrid zone specified as “timezone=CET-1CEST,M3.5.0/2,M10.5.0/3”.

You can also see that the **subnet teldatsubnet 0 bootfile fwethant.img** command and the **subnet teldatsubnet 0 next-server 172.24.78.29** command specify, respectively, the Teldat-3Ge firmware file name and the access IP address for the TFTP server the Teldat-3Ge must go to in order to download the firmware.

Note

In order for the voice backup feature to work, you must either give the **Teldat-3Ge** device a default route from the DHCP server, or configure a SIP-proxy address through the “sipserver” parameter in option 43 of the DHCP protocol.

2.8 Configuring Voice Backup

The backup telephone configuration depends on the selected option (be this analog telephones, SIP telephones, or a mixture of both).

The Teldat-3Ge device can operate with a SIP-proxy which is different from the router to which it is connected. You only need to configure the SIP-proxy IP address through the “ *sipserver*” parameter (DHCP option 43). In this case, the router connected to the Teldat-3Ge device does not need voice features.

Note

In order for the voice backup feature to work, you must either give the Teldat-3Ge device a default route from the DHCP server, or configure a SIP-proxy address through the “sipserver” parameter in option 43 of the DHCP protocol.

2.8.1 Backup with analog telephones

Operating with one or several analog telephones means you have to install a VoIP expansion card in the TELDAT router. The card has 4 lines that can be configured as FXS or FXO, depending on whether you are going to connect telephone terminals or telephone lines. In this case, since the analog telephone is connected, you have to indicate which line is going to be connected in the configuration. The following configuration defines the telephone connection to line 1:

```
   network voip1/0
; -- VoIP interface Configuration --
      line 1 interface-type fxs
   exit
;
```

The following point in the configuration is the definition of the dial-peers (for further information, please see manual **Dm722-I Telephony over IP**). The following configuration defines two dial-peers, one for calls generated by the analog telephone and the other for calls to the analog telephone:

```
   telephony
; -- Telephony configuration --
      dial-peer 1 voice-port
         no vad
         destination-pattern 607081119
         target voice-port voip1/0 1
      exit
;
      dial-peer 2 sip
         no vad
         codec g711alaw
         destination-pattern T
         target ipv4 192.24.78.28
      exit
;
   exit
;
```

Dial-peer 1 defines the mechanism to be followed when executing a call from the **Teldat-3Ge** . The destination-pattern parameter indicates that if the called number is the number that appears in the configuration, the call is routed over the expansion module’s line 1.

Dial-peer 2 establishes the **Teldat-3Ge** IP address of any calls detected by the SIP session to the IP address defined in the target ipv4 parameter. Additionally, if RTP traffic is generated during the moments of silence and the audio codification is G711, the **Teldat-3Ge** must accept it.

The final step is to configure the router's SIP agent (for more information, see manual **Dm 766-I SIP**):

```
   protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.29
      application gateway
   exit
;
```

The IP address that appears in the application address parameter is the router's address. This is the address where the router receives the SIP traffic.

The application gateway parameter activates the router so it can establish calls between VoIP interfaces (analog telephones) and SIP dial-peers.

The UDP/TCP port where the SIP server listens is, by default, 5060. In cases where you wish to change the port value (e.g. to 5000), use the application port command as follows:

```
   protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.29
      application port 5000
      application gateway
   exit
;
```

A change in the value of this port affects the DHCP configuration. Option 43 must be modified to reconfigure the **Teldat-3Ge** SIP agent listening port.

By default, the SIP traffic transport protocol in the corporate router is UDP. The transport protocol cannot be changed to either TCP or TLS. The **Teldat-3Ge** SIP agent only uses the UDP protocol as in a corporate Ethernet environment. It doesn't make sense to use protocols that further complicate SIP transport.

Note

The **Teldat-3Ge** SIP agent always uses the UDP protocol to transport SIP traffic. It never uses TCP. The UDP port value is configurable through the DHCP protocol option 43 (configured in the router).

2.8.2 Backup with SIP-IP telephones

A VoIP expansion module is not necessary in this schema, meaning the configuration is limited to the part involving the dial-peer and the SIP protocol.

The dial-peer configuration is as follows:

```
   telephony
; -- Telephony configuration --
      dial-peer 1 sip
         no vad
         destination-pattern T
         target ipv4 192.24.78.28
      exit
;
      dial-peer 2 sip
         destination-pattern 607081119
         target dynamic
      exit
;
   exit
;
```

Dial-peer 1 defines how to route the call made from a SIP telephone, to the address defined in the target ipv4 parameter, which should be the one corresponding to the **Teldat-3Ge** .

Dial-peer 2 defines how to route the call coming from the **Teldat-3Ge** device. The telephone number that appears in the destination-pattern parameter corresponds to that defined in the DHCP configuration with the *localphone* parameter, which is that corresponding to the **Teldat-3Ge** SIM card. If the number assigned to the SIP telephone is the same one as that defined for the backup telephone, the configuration is reduced to the previous one. If, however, you want to use a configuration where various SIP telephones can make and receive external calls over the **Teldat-3Ge** GSM line, the following configuration is recommended:

```
   telephony
; -- Telephony configuration --
      dial-peer 1 sip
         description "Outgoing external calls through the Teldat-3Ge "
         no vad
         destination-pattern T
         target ipv4 192.24.78.28
      exit
;
      dial-peer 2 sip
         description "Extension receiving external calls from the Teldat-3Ge "
         destination-pattern 4560.
         target dynamic
      exit
;
      dial-peer 3 group
         description "Incoming external calls through the Teldat-3Ge "
         destination-pattern 607081119
         target group 1
      exit
;
      peer-group 1
         dial-peer 2 45600
         dial-peer 2 45601
         dial-peer 2 45602
         dial-peer 2 45603
      exit
;
   exit
;
```

In this case, any call destined to a telephone number that does not match any defined dial-peer (different from extension 4560x or number 607081119) is routed to the **Teldat-3Ge** . If the **Teldat-3Ge** line is busy due to an incoming or outgoing call, a signal indicating that the number trying to be reached is temporally unavailable will be heard. Incoming calls ring on all extensions defined by the peer-group 1.

The SIP protocol is configured as follows:

```
   protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.29
      application server default
   exit
;
```

The IP address that appears in the application address parameter is the router's address. This is the address where the router receives SIP traffic.

The application gateway parameter activates the router so calls can be established between VoIP interfaces (analog telephones) and SIP dial-peers.

The UDP/TCP port where the SIP server listens is, by default, 5060. If you want to change the port value (e.g. to 5000), use the application port command as follows:

```
   protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.29
```

```
      application port 5000
      application gateway
   exit
;
```

A change in the value of this port affects the DHCP configuration. Option 43 must be modified to reconfigure the **Teldat-3Ge** SIP agent listening port.

The SIP traffic transport protocol in the corporate router is UDP by default. The transport protocol cannot be changed to either TCP or TLS. Since the **Teldat-3Ge** SIP agent only uses the UDP protocol as in a corporate Ethernet environment, it doesn't make sense to use protocols that further complicate the SIP transport.

Note

The **Teldat-3Ge** SIP agent always uses the UDP protocol to transport SIP traffic. It never uses TCP. The UDP port value is configurable through the DHCP protocol (option 43,configured in the router).

For the system to operate properly, the SIP-IP telephones configuration must have the following parameters configured:

The SIP server IP address, which is the same as that configured in the backup TELDAT router.

The SIP server port to which the telephone sends SIP traffic, which is the same as that configured in the corporate router.

The SIP server transport protocol, which is UDP.

Audio codification: G711 A-law.

Time between RTP packets: 10ms, 20ms, 30ms and 40 ms. We recommend using 20ms.

Deactivate Voice Activation Detection.

DTMF SIP INFO signaling out of band.

2.9 WAN Reroute Backup Facility

To prevent the router from routing backup traffic if the connection between the device and the **Teldat-3Ge** drops, you need to add an entry to the router's WAN Reroute Backup feature (see manual **Dm727-I Backup WAN Reroute**).

The configuration steps are as follows:

(1) Access the feature configuration menu:

```
      feature wrr-backup-wan
      ; -- WAN Reroute Backup user configuration --
```

(2) Enable the feature:

```
        enable
```

(3) Associate the Ethernet interface of the router connected to the **Teldat-3Ge** device and the PPP interface:

```
        pair 1 primary interface ethernet0/0 secondary interface ppp1
```

(4) Configure it as an inverse backup (i.e. if the main interface drops, the secondary also drops and if the main interface activates, the secondary does as well).

```
        pair 1 inverse-wrr
```

Thus, the configuration part we need to add is:

```
      feature wrr-backup-wan
      ; -- WAN Reroute Backup user configuration --
        pair 1 primary interface ethernet0/0 secondary interface ppp1
        pair 1 inverse-wrr
      ;
        enable
      exit
```

2.10 Updating the Firmware

The updating process initializes once the firmware file name (*fwethant.img*) and the TFTP server IP address have been received during the DHCP negotiation, as explained in the previous section.

The **Teldat-3Ge** sends periodic requests (approximately every 30 seconds) to the TFTP server to check if the version stored in this is different to the one currently being executed. In cases where it is different, the new application is downloaded and the device restarted.

The user can check the current firmware version by looking at the **RemoteName** field for the created L2TP tunnels, which is the result of running the **tunnel-info all** monitoring command in the L2TP protocol monitoring menu:

```
RemoteIP:10.1.2.2  LocalIP:0.0.0.0  Port:1701
RemoteName:01.00-EthAnt-00 State:established
LocalID:9240  RemoteID:1589  Sessions:3
group 3
    Pseudowire:ETH-ANT-MON  Interface:rcellular1  Sequencing:off
     (...)
```

You can also check the current firmware version by visiting the **Teldat-3Ge** Web page. To do this, start the Web browser and ask for the HTTP page for the **Teldat-3Ge** access IP address (in the example given here, this is http://172.24.78.28).

The STATUS LED lights up in steady YELLOW while the application is being updated.

2.10.1 Using the router as a TFTP Server

You can configure the Teldat router TFTP server to teleload the **Teldat-3Ge** firmware.

Firstly, you must teleload the required file in the Teldat router by means of the usual FTP process.

You also have to enable the TFTP protocol in the server router, executing the configuration commands shown below.

```
   feature tftp
 -- TFTP user configuration --
      server file-system DSK
      server enable
   exit
```

2.11 Final Result

Once all the steps indicated in this chapter have been carried out, the Teldat router is configured. You can list the new active configuration by using the **show config** command. The results for an analog telephone and a VoIP expansion module are as follows:

```
   log-command-errors
   no configuration
   add device ppp 1
   add device rcellular 1
   add device rcellular 2
   add device rcellular 3
   global-profiles dial
; -- Dial Profiles Configuration --
      profile WWAN default
      profile WWAN dialout
      profile WWAN 3gpp-accessibility-control traffic 20 all
      profile WWAN 3gpp-apn internet.es
      profile WWAN idle-time 300
;
   exit
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 172.24.78.29 255.255.0.0
```

```
;
   exit
;

 network rcellular2
; -- Interface AT. Configuration --
  lcp-options acfc
  lcp-options pfc
  lcp-options accm 0
 exit
;
   telephony
; -- Telephony configuration --
      dial-peer 1 voice-port
         no vad
         destination-pattern 607081119
         target voice-port voip1/0 1
      exit
;
      dial-peer 2 sip
         no vad
         codec g711alaw
         destination-pattern T
         target ipv4 192.24.78.28
      exit
;
   exit
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 172.24.78.29 255.255.0.0
;
   exit
;
;
   network rcellular1
; -- Interface AT. Configuration  --
      description ETH-ANT-MON
      coverage-timer 15
      pin plain 5710
      monitor-ifc 1
      network mode automatic
      network domain cs+ps
   exit
;
   network rcellular2
; -- Interface AT. Configuration  --
      description ETH-ANT-PPP
      ppp-ifc 1
   exit
;
   network rcellular3
; -- Interface AT. Configuration  --
      description ETH-ANT-UPG
      upgrade-ifc 1
   exit
;
   network voip1/0
; -- VoIP interface Configuration --
      line 1 interface-type fxs
;
   exit
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
```

```
      ppp
; -- PPP Configuration --
         authentication sent-user internet password internet
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface rcellular2 link
         base-interface rcellular2 profile WWAN
;
      exit
;
   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 --
;
         subnet teldatsubnet 0 network 172.24.0.0 255.255.0.0
         subnet teldatsubnet 0 bootfile fwethant.img
         subnet teldatsubnet 0 next-server 172.24.78.29
         subnet teldatsubnet 0 router 172.24.78.29
;
         enable
;
         host eth-ant 0 client-id asc teldat
         host eth-ant 0 fixed-ip 172.24.78.28
         host eth-ant 0 option 43 asc antenna&sipport=5060&localphone=607081119
;
      exit
;
   exit
;
   protocol l2tp
; -- Layer 2 Tunneling Protocol user configuration --
      enable
;
      group 1
; -- L2TP group configuration --
         pseudowire ETH-ANT-MON
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular1
         hello 9
      exit
;
      group 2
; -- L2TP group configuration --
         pseudowire ETH-ANT-PPP
         initiate-to 172.24.78.28
```

```
        request-dialin
        interface rcellular2
        hello 9
     exit
;
     group 3
; -- L2TP group configuration --
        pseudowire ETH-ANT-UPG
        initiate-to 172.24.78.28
        request-dialin
        interface rcellular3
        hello 9
     exit
;
 exit
;
   protocol sip
; -- SIP protocol configuration --
     application address 172.24.78.29
     application gateway
   exit
;
   feature tftp
 -- TFTP user configuration --
     server file-system DSK
     server enable
   exit
;
   feature wrr-backup-wan
; -- WAN Reroute Backup user configuration --
     pair 1 primary interface ethernet0/0 secondary interface ppp1
     pair 1 inverse-wrr
;
     enable
   exit
;
   dump-command-errors
   end
```

Configuration for SIP-IP telephones is as follows:

```
   log-command-errors
   no configuration
   add device ppp 1
   add device rcellular 1
   add device rcellular 2
   add device rcellular 3
   global-profiles dial
; -- Dial Profiles Configuration --
     profile WWAN default
     profile WWAN dialout
     profile WWAN 3gpp-accessibility-control traffic 20 all
     profile WWAN 3gpp-apn internet.es
     profile WWAN idle-time 300
;
   exit

 network rcellular2
; -- Interface AT. Configuration --
  lcp-options acfc
  lcp-options pfc
  lcp-options accm 0
 exit
;
   telephony
; -- Telephony configuration --
     dial-peer 1 sip
        description “Outgoing external calls through the Teldat-3Ge”
```

```
        no vad
        destination-pattern T
        target ipv4 192.24.78.28
     exit
;
     dial-peer 2 sip
        description “Extension receiving external calls from the Teldat-3Ge
        destination-pattern 4560.
        target dynamic
     exit
;
     dial-peer 3 group
        description “Incoming external calls through the Teldat-3Ge”
        destination-pattern 607081119
        target group 1
     exit
;
     peer-group 1
        dial-peer 2 45600
        dial-peer 2 45601
        dial-peer 2 45602
        dial-peer 2 45603
     exit
;
   exit
;
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
     ip address 172.24.78.29 255.255.0.0
;
   exit
;
;
;
   network rcellular1
; -- Interface AT. Configuration  --
     description ETH-ANT-MON
     coverage-timer 15
     pin plain 5710
     monitor-ifc 1
     network mode automatic
     network domain cs+ps
   exit
;
   network rcellular2
; -- Interface AT. Configuration  --
     description ETH-ANT-PPP
     ppp-ifc 1
   exit
;
   network rcellular3
; -- Interface AT. Configuration  --
     description ETH-ANT-UPG
     upgrade-ifc 1
   exit
;
   network ppp1
; -- Generic PPP User Configuration --
     ip address unnumbered

;
     ppp
; -- PPP Configuration --
        authentication sent-user internet password internet
        ipcp local address assigned
        no ipcp peer-route
```

```
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface rcellular2 link
         base-interface rcellular2 profile WWAN
;
      exit
;
   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 --
;
         subnet teldatsubnet 0 network 172.24.0.0 255.255.0.0
         subnet teldatsubnet 0 bootfile fwethant.img
         subnet teldatsubnet 0 next-server 172.24.78.29
         subnet teldatsubnet 0 router 172.24.78.29
;
         enable
;
         host eth-ant 0 client-id asc teldat
         host eth-ant 0 fixed-ip 172.24.78.28
         host eth-ant 0 option 43 asc antenna&sipport=5060&localphone=607081119
;
      exit
;
   exit
;
   protocol l2tp
; -- Layer 2 Tunneling Protocol user configuration --
      enable
;
      group 1
; -- L2TP group configuration --
         pseudowire ETH-ANT-MON
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular1
         hello 9
      exit
;
      group 2
; -- L2TP group configuration --
         pseudowire ETH-ANT-PPP
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular2
         hello 9
      exit
```

```
;
      group 3
; -- L2TP group configuration --
         pseudowire ETH-ANT-UPG
         initiate-to 172.24.78.28
         request-dialin
         interface rcellular3
         hello 9
      exit
;
 exit
;
protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.29
      application server default
   exit
;
;
   feature tftp
 -- TFTP user configuration --
      server file-system DSK
      server enable
   exit
;
   feature wrr-backup-wan
; -- WAN Reroute Backup user configuration --
      pair 1 primary interface ethernet0/0 secondary interface ppp1
      pair 1 inverse-wrr
;
      enable
   exit
;
   dump-command-errors
   end
```

Chapter 3 Monitoring

3.1 Monitoring Communications with the Teldat-3Ge device

The L2TP tunnel monitoring commands can be accessed from the corresponding section in the monitoring process (process 3), as shown below:

```
*process 3
+protocol l2tp
L2TP+
```

As already mentioned in chapter2 “Configuration” section 6) L2TP Tunnel, the **tunnel-info all** monitoring command summarizes the L2TP general operations.

```
L2TP+tunnel-info all
Number of L2TP Tunnels: 1
Number of L2TP Sessions: 2
RemoteIP:172.24.78.28  LocalIP:0.0.0.0  Port:1701
RemoteName:ramfs-antennaeth  State:established
LocalID:52623  RemoteID:13425  Sessions:3
group 3
    Pseudowire:ETH-ANT-MON  Interface:rcellular1  Sequencing:off
    LAC  LocalID:20774  RemoteID:43001  State:established
    LastChange:4m35s  Events:Show
    encaps:20        decaps:32        missed:0      dropped:0
    Pseudowire:ETH-ANT-PPP  Interface:rcellular2  Sequencing:off
    LAC  LocalID:52943  RemoteID:58150  State:established
    LastChange:4m35s  Events:Show
    encaps:1         decaps:1         missed:0      dropped:0
    Pseudowire:ETH-ANT-UPG  Interface:rcellular3  Sequencing:off
    LAC  LocalID:14495  RemoteID:49170  State:established
    LastChange:4m35s  Events:Show
    encaps:0         decaps:0         missed:0      dropped:0
L2TP+
```

In cases where the tunnel is not established (unlike the above capture, where the state is shown as correct according to the **State:established** field) the router won't have access to the **Teldat-3Ge** . The reasons for this abnormal behavior can be one of two things:

- There is an element in the local network blocking the L2TP traffic.
- The DHCP negotiation between both devices has not completed correctly.

More detailed information on the DHCP negotiation can be obtained with the **leases** command (under the DHCP server monitoring section):

```
L2TP+exit
+protocol dhcp
DHCP Protocol monitor
DHCP+server
DHCP-Server+leases
=======================================
..:: Currently assigned DHCP Leases ::..
=======================================
172.24.78.28    hardware ethernet 00:a0:26:fe:98:89
                start Thu Sep 06 2007 11:25:55  end Thu Sep 06 2007 23:25:55
                uid 'teldat'
```

The **Teldat-3Ge** responds to the *ping* application. Therefore, you need to be able to obtain the responses to the *ping* command by sending this from the router to address 172.24.78.28, as in the example:

```
+ping 172.24.78.28
PING 172.24.78.28: 56 data bytes
64 bytes from 172.24.78.28: icmp_seq=0. time<1. ms
64 bytes from 172.24.78.28: icmp_seq=1. time<1. ms
```

3.2 Wireless WAN Service

The 3G service parameters are available from the *rcellular1* interface monitoring section. We will now see how to access the said section as well as the available commands.

```
+network rcellular1
rcellular1 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
  reset         Send reset command
  voice-call    Voice-call supervision commands
  exit
rcellular1 AT+
```

A more detailed description on each of the above commands can be found in the Teldat router 3G interface manual, chapter 3.1 (**Dm781-I Cellular Interface**).

Chapter 4 Appendix

4.1 Several Teldat-3Ge in the same corporate LAN

Particular care must be paid when installing several **Teldat-3Ge** devices on the same LAN network, especially when it comes to configuring the DHCP protocol. The DHCP server must identify the **Teldat-3Ge** s and offer different IP addresses to each. The **Teldat-3Ge** s are identified through the MAC address assigned to the device's Ethernet interface. The MAC address value is found on the label attached to the underside of the case containing the device.

4.1.1 Two Teldat-3Ge devices serving a router

DHCP server configuration in a Teldat router where two **Teldat-3Ge** devices serve a single router:

```
protocol dhcp
; -- DHCP Configuration --
   server
; -- DHCP Server Configuration --
   subnet subnetea 0 network 172.24.0.0 255.255.0.0
   subnet subnetea 0 bootfile fwethant.img
   subnet subnetea 0 next-server 172.24.78.29
   subnet subnetea 0 router 172.24.78.29
;
   enable
;
   host eth-ant1 0 ethernet 00-a0-26-53-29-02
   host eth-ant1 0 fixed-ip 172.24.78.31
   host eth-ant1 0 option 43 asc antenna&sipport=5060&localphone=607081119
;
   host eth-ant2 0 ethernet 00-a0-26-53-29-03
   host eth-ant2 0 fixed-ip 172.24.78.32
   host eth-ant2 0 option 43 asc antenna
```

In both configurations, the device with physical MAC address 00-a0-26-53-29-02 is given the SIP configuration and is the equipment that acts as the SIP-gateway. The other device will only back up data.

Moreover, when compared to the basic scenario explained in this document, in this case the user needs to specify 2 PPP interfaces (each one with an *rcellular* base interface and each of these with their L2TP tunnel). Consequently, and as you can see in the resulting configuration that follows, 6 *rcellular* interfaces and 6 L2TP tunnels are configured in the router.

```
   log-command-errors
   no configuration
   set hostname ATLAS
   add device ppp 1
   add device ppp 2
```

```
   add device rcellular 1
   add device rcellular 2
   add device rcellular 3
   add device rcellular 4
   add device rcellular 5
   add device rcellular 6
   global-profiles dial
; -- Dial Profiles Configuration --
      profile WWAN default
      profile WWAN dialout
      profile WWAN 3gpp-accessibility-control traffic 20 all
      profile WWAN 3gpp-apn internet.es
      profile WWAN idle-time 300
;
   exit
;
;
   network ethernet0/0
; -- Ethernet Interface User Configuration --
      ip address 172.24.78.29 255.255.0.0
;

   exit
;

   network rcellular1
; -- Interface AT. Configuration  --
      description ETH-ANT-MON
      coverage-timer 15
      pin plain 5710
      monitor-ifc 1
      network mode automatic
      network domain cs+ps
   exit
;
   network rcellular2
; -- Interface AT. Configuration  --
      description ETH-ANT-PPP
      ppp-ifc 1
      lcp-options acfc
      lcp-options pfc
      lcp-options accm 0
   exit
;
   network rcellular3
; -- Interface AT. Configuration  --
      description ETH-ANT-UPG
      upgrade-ifc 1
   exit

   network rcellular4
; -- Interface AT. Configuration  --
      description ETH-ANT-MON
      coverage-timer 15
      pin plain 6453
      monitor-ifc 2
      network mode automatic
      network domain cs+ps
   exit
;
   network rcellular5
; -- Interface AT. Configuration  --
      description ETH-ANT-PPP
      ppp-ifc 2
   exit
;
   network rcellular6
```

```
; -- Interface AT. Configuration  --
      description ETH-ANT-UPG
      upgrade-ifc 2
   exit
;
   network ppp1
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user internet password internet
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface rcellular2 link
         base-interface rcellular2 profile WWAN
;
      exit
;
   exit
;
;
   network ppp2
; -- Generic PPP User Configuration --
      ip address unnumbered
;
      ppp
; -- PPP Configuration --
         authentication sent-user internet password internet
         ipcp local address assigned
         no ipcp peer-route
         lcp echo-req off
      exit
;
      base-interface
; -- Base Interface Configuration --
         base-interface rcellular4 link
         base-interface rcellular4 profile WWAN
;
      exit
;
   exit
;
   telephony
; -- Telephony configuration --
      dial-peer 1 sip
         no vad
         destination-pattern T
         target ipv4 192.24.78.31
      exit
;
      dial-peer 2 sip
         destination-pattern 607081119
         target dynamic
      exit
;
   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
;
      rule 2 local-ip ppp2 remote-ip any
      rule 2 napt translation
      rule 2 napt firewall

      classless
;
   exit
;
;
   protocol dhcp
; -- DHCP Configuration --
      server
; -- DHCP Server Configuration --
         subnet subnetea 0 network 172.24.0.0 255.255.0.0
         subnet subnetea 0 bootfile fwethant.img
         subnet subnetea 0 next-server 172.24.78.29
         subnet subnetea 0 router 172.24.78.29
;
         enable
;
         host eth-ant1 0 ethernet 00-a0-26-53-29-02
         host eth-ant1 0 fixed-ip 172.24.78.31
         host eth-ant1 0 option 43 asc antenna&sipport=5060&localphone=607081119
;
         host eth-ant2 0 ethernet 00-a0-26-53-29-03
         host eth-ant2 0 fixed-ip 172.24.78.32
         host eth-ant2 0 option 43 asc antenna
;
;
      exit
;
   exit
;
   protocol l2tp
; -- Layer 2 Tunneling Protocol user configuration --
      enable
;
      group 1
; -- L2TP group configuration --
         pseudowire ETH-ANT-MON
         initiate-to 172.24.78.31
         request-dialin
         interface rcellular1
         hello 9
      exit
;
      group 2
; -- L2TP group configuration --
         pseudowire ETH-ANT-PPP
         initiate-to 172.24.78.31
         request-dialin
         interface rcellular2
         hello 9
      exit
;
      group 3
; -- L2TP group configuration --
         pseudowire ETH-ANT-UPG
         initiate-to 172.24.78.31
         request-dialin
         interface rcellular3
         hello 9
      exit
```

```
;
      group 4
; -- L2TP group configuration --
         pseudowire ETH-ANT-MON
         initiate-to 172.24.78.32
         request-dialin
         interface rcellular4
         hello 9
      exit
;
      group 5
; -- L2TP group configuration --
         pseudowire ETH-ANT-PPP
         initiate-to 172.24.78.32
         request-dialin
         interface rcellular5
         hello 9
      exit
;
      group 6
; -- L2TP group configuration --
         pseudowire ETH-ANT-UPG
         initiate-to 172.24.78.32
         request-dialin
         interface rcellular6
         hello 9
      exit
   exit
;
   protocol sip
; -- SIP protocol configuration --
      application address 172.24.78.31
      application gateway
   exit
;
   feature tftp
; -- TFTP user configuration --
      server file-system DSK
      server enable
   exit
;
   feature wrr-backup-wan
; -- WAN Reroute Backup user configuration --
      pair 1 primary interface ethernet0/0 secondary interface ppp1
      pair 1 inverse-wrr
;
      enable
   exit
;
   dump-command-errors
;
end
```

You can use the GSM telephone line in each **Teldat-3Ge** to execute voice calls using a suitable router configuration. To do this, you only have to add a *dial-peer* with the IP address for each **Teldat-3Ge** . You also have to add the *sip-port* parameters and the *localphone* to the DHCP configuration destined for each **Teldat-3Ge** . When this configuration is active, if one of the **Teldat-3Ge** GSM lines defined in the first *dial-peer* is busy, the router sends the call to the **Teldat-3Ge** defined in the next *dial-peer* and so on.

The following console shows an example of this type of voice backup configuration when three **Teldat-3Ge** devices are being used:

```
   telephony
; -- Telephony configuration --
      dial-peer 1 sip
         description "Outgoing external calls through the Teldat-3Ge  1"
         no vad
```

```
        destination-pattern T
        target ipv4 192.24.78.28
      exit
;
      dial-peer 2 sip
        description "Outgoing external calls through the Teldat-3Ge  2"
        no vad
        destination-pattern T
        target ipv4 192.24.78.27
      exit
;
      dial-peer 3 sip
        description "Outgoing external calls through the Teldat-3Ge  3"
        no vad
        destination-pattern T
        target ipv4 192.24.78.26
      exit
;
      dial-peer 4 sip
        description "Extension receiving calls from the Teldat-3Ge  devices"
        destination-pattern 4560.
        target dynamic
      exit
;
      dial-peer 5 group
        description "Incoming external calls through the Teldat-3Ge  1"
        destination-pattern 607081119
        target group 1
      exit
;
      dial-peer 6 group
        description "Incoming external calls through the Teldat-3Ge  2"
        destination-pattern 607081129
        target group 2
      exit
;
      dial-peer 7 group
        description "Incoming external calls through the Teldat-3Ge  3"
        destination-pattern 607081139
        target group 3
      exit
;
      peer-group 1
        dial-peer 2 45601
      exit
;
      peer-group 2
        dial-peer 2 45602
      exit
;
      peer-group 3
        dial-peer 2 45603
      exit
;
   exit
;
```

4.1.2 Two routers, each with a Teldat-3Ge

Case involving two routers and two **Teldat-3Ge** s connected to the same LAN: each router acts as server for its respective **Teldat-3Ge** . The DHCP configuration is shown below:

Router1:

```
   protocol dhcp
; -- DHCP Configuration --
      server
```

```
; -- DHCP Server Configuration --
         subnet subnetea 0 network 172.24.0.0 255.255.0.0
         subnet subnetea 0 bootfile fwethant.img
         subnet subnetea 0 next-server 172.24.78.29
         subnet subnetea 0 router 172.24.78.29
;
         enable
;
         host eth-ant 0 ethernet 00-a0-26-53-29-02
         host eth-ant 0 fixed-ip 172.24.78.31
         host eth-ant 0 option 43 asc antenna&sipport=5060&localphone=607081119
```

Router 2:

```
   protocol dhcp
; -- DHCP Configuration --
      server
; -- DHCP Server Configuration --
         subnet subnetea 0 network 172.24.0.0 255.255.0.0
         subnet subnetea 0 bootfile fwethant.img
         subnet subnetea 0 next-server 172.24.78.30
         subnet subnetea 0 router 172.24.78.30
;
         enable
;
         host eth-ant 0 ethernet 00-a0-26-53-29-03
         host eth-ant 0 fixed-ip 172.24.78.32
         host eth-ant 0 option 43 asc antenna&sipport=5060&localphone=607326598
```

4.2 LEDs

The device has several LEDs and their meaning is as follows:

LED	STATUS	DESCRIPTION
POWER	ON/OFF	When this is lit up, the device is receiving power.
WWAN	OFF	Error in the WWAN module. 3G communications are not possible.
	Flashing Green (slow)	The SIM card hasn't been detected or the PIN is incorrect.
	Flashing Green (fast)	The module cannot register in the network.
	Steady Green	Communications at the PPP layer.
Ethernet Connector	ON/OFF	The left hand LED lights up in yellow when there is link level and the right hand one flashes in green when there is data communication.
STATUS	Steady Red	Error in the WWAN module. 3G communications are not possible. • Check that the module is correctly connected. • Check that it has the appropriate software. • Look to see if the WWAN LED is lit up.
	Flashing Red	The WWAN module is operating correctly but the device hasn't got an IP address yet. • Check the status of the Ethernet connector LEDs. • The device has access to the DHCP server. • Follow the instructions given in the "Monitoring" section.
	Flashing yellow	The device has received the IP address but hasn't managed to es-

		tablish the L2TP tunnel. • Check the router's L2TP configuration. • Follow the instructions given in the "Monitoring" section.
	Steady Green	The L2TP tunnel has established. The device is ready to operate normally.
	Flashing Green	There is traffic through the WWAN interface.
	Steady Yellow	The device is updating the firmware.

The meaning of the STATUS LED after a startup or rebooting process once the firmware has been updated is as follows:

- On startup, it lights up for a moment in **yellow**.
- While the application starts up, it **flashes in green**.
- When the application is ready, it stays **green**.

If there is any problem during start-up, the LED lights up in **red** for a few seconds and then starts **flashing in green**.