NOE Protocol

bintec Dm777-I

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bintec Dm722-I Voice over IP

bintec Dm754-I NSLA

Chapter 1 Introduction

1.1 UA/NOE Protocol: Description

The letters UA stand for Universal Alcatel, a name given to the Alcatel's telephony signaling protocol. The most advanced version of this protocol is known as NOE (New Office Environment). This protocol will be referred to as NOE in this manual. The IP version for this protocol encapsulates the signaling messages in UAUDP protocol packets (a light protocol, orientated to connection and runs over UDP).

The UDP port used by the terminals is the base-port configured in the Call Server. The Call Server however, uses the base-port + 128 as the NOE signaling port. By default, this port is 32512 and the Call Server uses 32640.

The startup mechanism for the IP NOE telephones contemplates the following steps:

(1)   The terminal obtains the network configuration through DHCP or is statically configured.

(2)   This connects to the TFTP server to update firmware and configuration files.

(3)   Through the **startnoe-aabbccddeeff** file petition via TFTP where **aabbccddeeff** is the terminal's MAC, this notifies the Call Server that it is ready to initiate the UAUDP connection at the same time as obtaining the base-port (used to receive/send signaling).

(4)   The Call Server initiates the UAUDP connection through the primitives providing this protocol for it.

(5)   Once the UAUDP connection has established, the Call Server and the terminal exchange the NOE signaling through said connection.

One peculiarity of the UAUDP connection is that the Call Server sends a Keepalive packet so the terminal can detect when the connection is down. If this occurs, it restarts and returns to the startup process. To do this, a UDP_LOST time is defined. This is the time the telephone takes to realize the connection is down (lack of packets from the Call Server). Once the connection is lost, the telephone reinitiates after the UDP_LOST_REINIT has timed out. Consequently, the period of time between Keepalives endings (when there is no NOE traffic) must be less than the UDP_LOST time, so the terminal does not restart.

The following values are recommended for the Call Server's UAUDP connection, for the default values of the NOE protocol timers implemented in the router:

• KEEPALIVE : 10s.

• UDP_LOST: 22s (12s more than the KEEPALIVE).

• UDP_LOST_REINIT: 7s.

The NOE signaling protocol is a protocol orientated to stimulations, where the telephone reports events occurring during interaction with a user to the Call Server (e.g. pressed key, hook-off) and the server handles the elements available in the telephone: LEDs, LCD screen, RTP generator/receiver, etc.

1.2 Features available in the router

The router can provide IP telephony survival features for NOE terminals so, if connectivity is lost with the Call Server, the telephones can continue to make calls between them (e.g. incoming and outgoing calls over the PSTN/ISDN interfaces the device has available). It is also capable of carrying out call transfers between NOE telephones or between the NOE telephones and the PSTN/ISDN interfaces the device has. Likewise, the router acts as an autonomous Call Server with a feature similar to survival, without the need for a main server.

There are two different applications available for this: *survival* and *server*.

As a backup device, where there is an external Call Server, the two applications can be used. The difference between them is that in survival mode, the backup server takes the place of the Call Server (when this latter does not respond) so the terminals do not detect connectivity loss. In *survival* mode, the router automatically discovers the telephone number and name of each NOE terminal connected to the Call Server. It's essential that in this mode, the NOE signaling traffic /between terminals and the Call Server) pass through the router and thus spy on the connections to obtain the telephone numbers for each terminal. In *server* mode, the telephones have the IP of the device configured as Backup Media Gateway, so on detecting loss of connectivity with the Call Server, these try to connect directly to said IP. In this mode, if the NOE traffic doesn't go through the router, the telephone number for each terminals must be either explicitly configured in the router, or the user must enter it. When the traffic goes through the router, you can configure the device so the telephone numbers are automatically detected by snooping on the communications between the terminals and the Call Server.

For operating as an autonomous Call Server, only the *server* application is used. So the terminals connect to the router, they must, on startup, download a **lanpbx.cfg** file through TFTP. This file contains the address of your Call Server (i.e. the router).

1.2.1 *Survival* **Application**

The *survival* application is enabled through the **application survival access-list <id>** command. This uses an access list to classify NOE signaling traffic that runs over the device, so it discovers which terminals have active connects to the Call Server, what type of terminal it is and its telephone number. Furthermore, by running **application survival track nsla-advisor <id>**, the router monitors the connection with the Call Server by configuring Network Service Level Advisor (bintec Dm754-I NSLA) through a poll. If IP connectivity is lost, the router maintains the UAUDP connections by sending the necessary keepalives and takes control of the signaling.

The *survival* application can be in two different states: *transparent* and *survival*, depending on the NSLA poll notification.

There are three possible states for each UAUDP connection detected by the router: *initial*, *transparent* and *survival*.

When a new connection is discovered, it is in an *initial* state waiting to detect the type of terminal and its telephone number. Once a period of time has elapsed (configurable through **timers new-connection,** default is 10 seconds), a check is made to see if the necessary data has been received, in which case the connection passes to a *transparent* state. If the data has not been discovered, then the behavior is configurable (by default the terminals are restarted to discover said data). If the **allow unknown-connections** command has been configured, the connection passes to a *transparent* state, however this function is more limited as the extension cannot be individually addressed (lack of telephone number) but can be solved if the **ask-number** command has been configured. This command is further explained later on in this manual.

For a connection in *initial* as well as in *transparent*, the router simply lets the signaling packets through transparently without intervening.

When the NSLA poll reports the loss of connectivity with the Call Server, the *survival* application switches to *survival* and all the connections in a *transparent* state pass to *survival*. If there are connections in an *initial* state, these directly pass to *survival* when the time to verify the terminal's data times out. If the extension has not be verified and the **ask-number** command has been configured, this asks the user to enter his extension in the telephone (digits only). Once entered, the user should press OK.

When a connection passes to a *survival* state, an NOE dynamic dial-peer is created in the device's IP telephony feature (bintec Dm722-I Voice over IP), so that this is available to execute calls using the router's IP telephony server. From this point on, the NOE terminals can establish calls complying with the device's dial plan, based on dial-peers. Calls between NOE terminals can be established (NOE call server function), between NOE terminals and ports with VOIP interfaces in the device (NOE Gateway Media function). When a terminal passes to a *survival* state, the display showing a configurable warning text on the connectivity loss situation is modified.

The device, for a connection in a *survival* state, blocks packets from the Call Server to the telephones, should there be any. It also undertakes to send the necessary keepalives and NOE signaling to the terminals supplanting the connection with the Call Server. The terminal does not detect any difference at any point and thinks it is still talking to the Call Server, even though it is the router that is carrying out the Call Server functions.

As soon as the NSLA poll indicates connectivity has been recovered with the Call Server, the NOE application returns to a *transparent* state and all the terminal connections are in idle, i.e. they do not have any active calls and are restarted so they can reconnect to the Call Server. Terminals that do have an active call, connect to the Call Server as soon as the call is released.

1.2.2 *Server* **Application**

The *server* application is enabled through the **application server default** command.

To operate as server in autonomous mode, no configuration is necessary: however, the NOE terminals need to know which is their Call Server. To configure them, the router must have pre-received the **lanpbx.cfg file**, whose content consists of a single line:

TYPE=A4400 VERSION=1 IP_DOWNLOAD=192.168.0.1

Instead of the IP address in the example shown here (192.168.0.1), enter the IP address for the device NOE application; the NOE terminals, in step 2 of the startup (described in section 1 of this chapter), download the file through TFTP and configure their Call Server IP address.

For the router to depend on a Call Server (operating as a backup device), configure the **application server track nsla-advisor <id>** command, which is associated to a Network Service Level Advisor (bintec Dm754-I NSLA) poll to monitor connectivity with the Call Server.

Here, the **lanpbx.cfg file** is not required. The NOE terminals must have the NOE application IP configured for the device as its Backup IP Media Gateway, which is configured in the Call Server creating an IP domain and configuring the Backup Address parameter. When the telephones detect loss of connection with the Call Server, they restart and try to connect to their backup server. In this case, skip step 2 at initialization.

In the device, configure **target mac <mac>** in NOE dial-peers to associate the number configured (**destination-pattern <tlphn>)** for this dial-peer to the telephone with said MAC. Also configure **display-name <name>** to associate a name to this terminal.

If the traffic between the NOE terminals and the Call Server goes through the router, configure an access list (**application server snooping-list <id>**) to classify and analyze said traffic and to automatically detect the terminal telephone numbers. If the server finds a dial-peer associated to a terminal, the value configured (**destination-pattern <tlphn>**) is taken as a telephone number, ignoring the value obtained in the automatic detection.

However the application operates, in step 3 of initialization, each terminal makes a petition from the TFTP startnoe-aabbccddeeff file where aabbccddeeff is the terminal's MAC. The TFTP server must be enabled in the device (**server enable**, **feature tftp** menu), however it's not necessary that a file with this name exists. The router generates the appropriate file and searches through the active NOE dial-peers for the first one that has the terminal MAC configured. If it finds one, it associates this dial-peer's destination-pattern to the telephone as its extension and the display-name as its name.

To avoid configuring each telephone with its MAC in dial-peers, establish a phrase to use to ask the user for his terminal's extension number (**ask-number**). Consequently, if it doesn't find a dial-peer with the MAC (or the destination-pattern isn't configured) or if it hasn't detected the number by snooping on the NOE traffic, the configured phrase is displayed (on the telephone) and it waits for the user to enter the extension. This must be made up of digits only; once written, the user needs to press OK. If the **ask-number** command hasn't been configured or, where the user presses OK without entering any numbers, the terminal won't have an extension. It can make outgoing calls and received group calls (destined to all dynamic dial-peers), but it can't call this terminal individually (it doesn't have an extension).

Each new terminal connection creates a NOE dynamic dial-peer in the device IP telephony feature (bintec-Dm 722-I Voice over IP) so it is available to execute calls using the router's IP telephony server. The NOE terminals can establish calls according to the global dial-plan, based on dial-peers. They can establish calls between NOE terminals (NOE call server feature), between NOE terminals and SIP terminals (NOE-SIP signaling gateway feature) and between NOE terminals and ports with VOIP interfaces in the device (Media Gateway NOE feature). When a terminal connects to the device, the display is modified showing a configurable text using the **screen survival** command; if the application is operating as backup server, the text is used as a warning on connectivity loss with the Call Server.

If the application is operating as a backup device, when the NSLA poll reports the recuperation of connectivity with the Call Server, all terminal connections that are in idle, (no active calls) are reinitiated so they reconnect to the Call Server. Those terminals that do have a call in progress, connect to the Call Server as soon as the call is released.

1.2.3 Supported Terminals and Features

Alcatel terminals supported by the router are as follows:

- IP Touch 4018
- IP Touch 4028
- IP Touch 4038
- IP Touch 4068

Below is a list of the services for the terminals:

- Automatic detection of the terminal extensions and types of terminals so avoiding the need to provide terminals in the router configuration (*survival* application only).
- Option so the user can configure his own extension number from the telephone.
- Survival situation warning text on the terminal display.
- Calls between Alcatel NOE telephones.
- Calls such as incoming and outgoing NOE Media Gateway.
- Calls between NOE telephones and SIP devices.
- Number identification and caller/calling name.
- Storing of CDRs.
- Maintenance of date.
- Volume and mute keys.
- Re-dial.
- Receiver and hands free.
- Mute key to activate intercom (autoanswer).
- Call holding generating music while on hold in PSTN/ISDN interfaces.
- Ring groups (simultaneous call to various mixed telephones, NOE, SIP, FXS).
- Forward if busy.

- Group capture and Directed pickup.
- Consult Call.
- Attended and semi-attended call transfer.
- Call waiting.

Chapter 2 Configuring the NOE Protocol

2.1 Configuring the NOE Protocol

To configure NOE, enter **protocol noe** from the general configuration menu.

Syntax:

```
Config>protocol noe


-- NOE protocol configuration --
NOE config>
```

The options given in the NOE protocol configuration menu are as follows:

```
NOE config>?
  allow         Configure allowed terminals
  application   UA/NOE application configuration
  ask-number     Require extension if not configured
  call-waiting   Allow a second call when one is already established
  no            Negate a command or set its defaults
  screen        Telephones screen configuration
  timers        UA/NOE timers configuration
  tones          Terminal tones configuration
  exit
NOE config>
```

2.1.1 [NO] ALLOW UNKNOWN-CONNECTION

For *survival* application only. NOE connections are allowed (**allow unknown-connection)** even if the telephone number and type of terminal are unavailable. If this command is not enabled and the telephone number and terminal type cannot be detected within a certain period of time, the connection is eliminated through a **RELEASE** packet to the NOE telephone.

Syntax:

```
NOE config>allow unknown-connection
NOE config>
```

2.1.2 APPLICATION

Configures the global parameters relative to NOE operations.

2.1.2.1 [NO] APPLICATION ADDRESS

Configures the IP address used as source in the RTP packets sent by the device to the NOE telephones. This IP address must be associated to one of the device interfaces. In the server application, this is also the IP used by the NOE signaling.

If no address is specified, the internal one is used.

Syntax:

```
NOE config>application address <ip-address>
NOE config>
```

2.1.2.2 [NO] APPLICATION BASE-PORT

Configures the UDP port where the NOE protocol listens to the terminals. Default is 32512 and must coincide with the port configured in the Call-Server as BASE-PORT.

Syntax:

```
NOE config>application base-port <port>
NOE config>
```

2.1.2.3 [NO] APPLICATION SERVER DEFAULT

Enables the *server* application, establishing its default configuration.

Syntax:

```
NOE config>application server default
NOE config>
```

2.1.2.4 [NO] APPLICATION SERVER SNOOPING-LIST

Configures an access list to classify the IP packets the device forwards and associates to the NOE server application. This device only processes packets that match this access list as NOE traffic. Said access list should only classify NOE signaling to prevent the application dropping.

An example of the access list is as follows:

```
access-list 100
   entry 1 default
   entry 1 permit
   entry 1 source address <CallServer IP> 255.255.255.255
   entry 1 source port-range <BASE-PORT + 128> <BASE-PORT + 128>
   entry 1 protocol udp
;
   entry 2 default
   entry 2 permit
   entry 2 destination address <CallServer IP> 255.255.255.255
   entry 2 destination port-range <BASE-PORT + 128> <BASE-PORT + 128>
   entry 2 protocol udp
;
   exit
```

Limits the processed packets to UDP and that have the IP source and destination from the Call Server and the NOE signaling port in this (the configured base port + 128).

Syntax:

```
NOE config>application server snooping-list <access-list>
NOE config>
```

2.1.2.5 [NO] APPLICATION SERVER TRACK NSLA-ADVISOR

Configures an nsla advisor to report the connectivity with the Call Server to the *server* application. When this advisor gives a false value, the device considers the Call Server to be inaccessible. When the value is true, it restarts the connected terminals so they reconnect to the Call Server. If the **application server default** command hasn't been configured, it's created so the application enables.

Syntax:

```
NOE config>application server track nsla-advisor <advisor>
NOE config>
```

2.1.2.6 [NO] APPLICATION SURVIVAL ACCESS-LIST

Enables the *survival* application.

Configures an access list to classify the IP packets routed by the device and associated to the NOE *survival* application. The device only processes packets matching said access list as NOE traffic. The access list must only classify the NOE signaling to avoid overloading the application.

The following is an example of an access list:

```
access-list 100
   entry 1 default
   entry 1 permit
   entry 1 source address <CallServer IP> 255.255.255.255
   entry 1 source port-range <BASE-PORT + 128> <BASE-PORT + 128>
   entry 1 protocol udp
;
   entry 2 default
   entry 2 permit
```

```
        entry 2 destination address <CallServer IP> 255.255.255.255
        entry 2 destination port-range <BASE-PORT + 128> <BASE-PORT + 128>
        entry 2 protocol udp
;
   exit
```

Limits the processed packets to UDP, which have the Call Server IP as source and destination and the NOE signaling port in this (configured base port + 128).

Syntax:

```
NOE config>application survival access-list <access-list>
NOE config>
```

2.1.2.7 [NO] APPLICATION SURVIVAL TRACK NSLA-ADVISOR

Configures an NSLA advisor to report to the *survival* application protocol when the situation changes from normal to emergency and vice versa. When this advisor gives a false value, the device assumes the call-server is not accessible and begins to manage the NOE calls.

Syntax:

```
NOE config>application survival track nsla-advisor <advisor>
NOE config>
```

2.1.3 [NO] ASK-NUMBER

Enables the extension number petition for the telephone user, displaying the configured phrase asking him to enter his number. If the length of the text exceeds the available size on the display, it is presented in parts.

Default is disabled.

Syntax:

```
NOE config>ask-number <msg>
NOE config>
```

2.1.4 [NO] CALL-WAITING

Enables call waiting for NOE terminals. Default is call waiting enabled. This can be disabled through **no call-waiting**.

Syntax:

```
NOE config>call-waiting
NOE config>
```

2.1.5 SCREEN

Configures the texts displayed on the NOE telephone screen when the device is in emergency mode and consequently behaving as server.

2.1.5.1 [NO] SCREEN ACCEPT-CALL

Configures the text the device displays on the NOE telephone screens when there is a call waiting, which has not been accepted as yet.

Default displays **Accept**.

Syntax:

```
NOE config>screen accept-call <msg>
NOE config>
```

2.1.5.2 [NO] SCREEN BUSY-MESSAGE

Configures the text the device displays on the NOE telephone screens when in an emergency situation a user, who is busy, is called.

Default displays **Busy**.

Syntax:

```
NOE config>screen busy-message <msg>
NOE config>
```

2.1.5.3 [NO] SCREEN CONSULT-CALL

Configures the text the device displays on the NOE telephone screens to execute call consult to which the call in progress is subsequently transferred.

Default displays **Consult**.

Syntax:

```
NOE config>screen consult-call <msg>
NOE config>
```

2.1.5.4 [NO] SCREEN DATE

Configures the date language the device displays on the NOE telephone screens when using the server application. This can be established as *English* or *Spanish*.

Default is English.

Syntax:

```
NOE config>screen date [english / spanish]
NOE config>
```

2.1.5.5 [NO] SCREEN DIAL-NUMBER

Configures the text the device displays on the NOE telephone screens when in an emergency situation the user is asked to dial a number.

Default displays **Dial number**.

Syntax:

```
NOE config>screen dial-number <msg>
NOE config>
```

2.1.5.6 [NO] SCREEN END-CONSULT-CALL

Configures the text the device displays on the NOE telephone screens to terminate a call consult and recover the original call.

Default displays **End Consult**.

Syntax:

```
NOE config>screen end-consult-call <msg>
NOE config>
```

2.1.5.7 [NO] SCREEN FREE-PEER

Configures the text the device displays on the NOE telephone screens when in an emergency situation a user, who is not busy, is called. The call can be processed normally.

Default displays **Free**.

Syntax:

```
NOE config>screen free-peer <msg>
NOE config>
```

2.1.5.8 [NO] SCREEN HANGUP-TELEPHONE

Configures the text the device displays on the NOE telephone screens when a user is asked to hang-up the telephone.

Default displays **Hang Up**.

Syntax:

```
NOE config>screen hangup-telephone <msg>
NOE config>
```

2.1.5.9 [NO] SCREEN HELD-CALL

Configures the text the device displays on the NOE telephone screens to tell the user that his call is on hold.

Default displays **On Hold**.

Syntax:

```
NOE config>screen held-call <msg>
NOE config>
```

2.1.5.10 [NO] SCREEN HOLD-CALL

Configures the text the device displays on the NOE telephone screens to inform the user that he can put the call on hold.

Default displays **Hold**.

Syntax:

```
NOE config>screen hold-call <msg>
NOE config>
```

2.1.5.11 [NO] SCREEN INCOMING-CALL

Configures the text the device displays on the NOE telephone screens to inform the user that he has an incoming call.

Default displays **Call**.

Syntax:

```
NOE config>screen incoming-call <msg>
NOE config>
```

2.1.5.12 [NO] SCREEN ONHOLD-CALL

Configures the text the device displays on the NOE telephone screens to inform the user that his call has been put on hold by the other interlocutor.

Default displays **Wait**.

Syntax:

```
NOE config>screen onhold-call <msg>
NOE config>
```

2.1.5.13 [NO] SCREEN STABLISHED-CALL

Configures the text the device displays on the NOE telephone screens to inform the user that he has an established call.

Default displays **Connected**.

Syntax:

```
NOE config>screen established-call <msg>
NOE config>
```

2.1.5.14 [NO] SCREEN SURVIVAL

Configures the text the device displays on the NOE telephone screens indicating that the Call-Server is not available and this has passed to an emergency mode.

Default is no text displayed.

Syntax:

```
NOE config>screen survival <msg>
NOE config>
```

2.1.5.15 [NO] SCREEN TRANSFER-CALL

Configures the text the device displays on the NOE telephone screens to indicate that the transfer of a consult call to the original call can be executed.

Default displays **Transfer**.

Syntax:

```
NOE config>screen transfer-call <msg>
NOE config>
```

2.1.5.16 [NO] SCREEN UNHOLD-CALL

Configures the text the device displays on the NOE telephone screens to inform the user that he can recover a call that is on hold.

Default displays **Unhold**.

Syntax:

```
NOE config>screen unhold-call <msg>
NOE config>
```

2.1.5.17 [NO] SCREEN VOLUME

Configures the text the device displays on the NOE telephone screens to inform the user that the volume is being modified.

Default displays **Volume**.

Syntax:

```
NOE config>screen volume <msg>
NOE config>
```

2.1.6 TIMERS

Configures the value for the various timers used by the NOE protocol

2.1.6.1 [NO] TIMERS CONNECTION-TIMEOUT

Configures the maximum time that a connection can be active without traffic. If this times out, the device sends a keepalive to prevent the NOE telephone from reinitiating.

Default is 20 seconds. If you configure the *survival* application, this parameter is intended for a 22 second UDP_LOST time in the Call Server configuration. An appropriate configuration value in the Call Server for the keepalive is 10 seconds, so detection of keepalive failure has a sufficiently wide window.

Syntax:

```
NOE config>timers connection-timeout <seconds>
NOE config>
```

2.1.6.2 [NO] TIMERS EMERGENCY-BLINK

The device alternately displays the date/time and a message indicating an emergency situation in all NOE terminals. This timer configures the period of the alternation.

Default is 2 seconds. If you set this to 0 seconds, only the emergency message is displayed.

Syntax:

```
NOE config>timers emergency-blink <seconds>
NOE config>
```

2.1.6.3 [NO] TIMERS HANDSET-IDLE

The device automatically hangs up all NOE terminals that have been in an error state for a long time. This timer configures said time if the telephone is in handset mode.

Default is 10 seconds.

Syntax:

```
NOE config>timers handset-idle <seconds>
NOE config>
```

2.1.6.4 [NO] TIMERS HANDSFREE-IDLE

The device automatically hangs up all NOE terminals that have been in an error state for a long time. This timer configures said time if the telephone is in hands free mode.

Default is 4 seconds.

Syntax:

```
NOE config>timers handsfree-idle <seconds>
NOE config>
```

2.1.6.5 [NO] TIMERS KEEPALIVE-ERROR

The *survival* application prevents the terminals from reinitiating when a keepalive from the Call Server is absent by sending a keepalive from the device. If this situation occurs in transparent mode (NSLA poll does not detect an emergency situation), this timer activates to restart the terminal if an emergency situation does not occur. Thus, the terminal restarts and reconnects to the Call Server.

This command configures the maximum time waited from when a keepalive packet is sent in transparent mode until the NSLA poll reports an emergency situation. If this times out, the terminal reinitiates.

In the *server* application, this is the time waited to restart new connections produced while the poll indicates the Call Server is active. If, before time out, the Call Server passes to an inaccessible state, the terminal is not restarted until the poll indicates the Call Server is active again.

Default is 30 seconds.

Syntax:

```
NOE config>timers keepalive-error <seconds>
NOE config>
```

2.1.6.6 [NO] TIMERS NEW-CONNECTION

Configures, for *survival* application only, the maximum time the device waits from when it detects a new connection to discovering the telephone number and type of terminal (for said connection). If the device does not obtain this data, the connection is either reinitiated or accepted (depending if the **allow unknown-connection** mode is configured or not).

Default is 10 seconds.

Syntax:

```
NOE config>timers new-connection <seconds>
NOE config>
```

2.1.7 TONES

Configures the NOE telephone tones.

2.1.7.1 [NO] TONES RING CADENCE

Configures the telephone ring cadence. You can configure values from 0 to 6 for different ring time and silent time patterns.

Default is 0.

Syntax:

```
NOE config>tones ring cadence <num>
NOE config>
```

2.1.7.2 [NO] TONES RING LEVEL

Configures the telephone ring volume. You can configure values from -40dB and 10dB relative to the default value (0 dB).

Syntax:

```
NOE config>tones ring level <dB>
NOE config>
```

2.1.7.3 [NO] TONES RING MELODY

Configures the telephone ring melody. You can configure values between 0 and 15. Default is 0.

Syntax:

```
NOE config>tones ring melody <num>
NOE config>
```

2.1.7.4 [NO] TONES RING PROGRESSIVE

Configures the ring to progressively rise in volume. The values are from 1 to 3 indicating different progressive levels, 1 being fast and 3, slow. Default value 0 is non progressive.

Syntax:

```
NOE config>tones ring progressive <num>
NOE config>
```

2.1.8 EXIT

Run **exit** to return to the general configuration prompt, *Config>.*

Example:

```
NOE config>exit
Config>
```

Chapter 3 Monitoring the NOE Protocol

3.1 Monitoring the NOE Protocol

3.1.1 Accessing the monitoring prompt

Run **protocol noe** from the root monitoring menu (+) to access the NOE monitoring prompt.

```
+protocol noe
UA/NOE Monitor
NOE Mon+
```

3.1.2 Monitoring Commands

All the NOE protocol monitoring commands must be entered at the previously specified prompt: NOE Mon +.

The commands are described below:

3.1.2.1 ? (HELP)

Displays the options available from the menu you are in and lists the possible options for a command. The commands available in the corresponding console menu for monitoring are as follows:

```
NOE Mon+?
  clear                   Clear counters
  drop-connection         Eliminate a connection
  drop-snooped-terminal   Eliminate a snooped terminal
  list                    List NOE information
  exit
NOE Mon+
```

3.1.2.2 CLEAR STATISTICS

Zeroizes the received packet counters.

Example:

```
NOE Mon+clear statistics
NOE Mon+
```

3.1.2.3 DROP-CONNECTION

Eliminates a NOE connection, restarting the associated telephone.

Example:

```
NOE Mon+drop-connection 1
NOE Mon+
```

3.1.2.4 DROP-SNOOPED-TERMINAL

The terminals detected processing the NOE traffic through access lists (configured through **application server snooping-list)** are known as *snooped terminals*.

This command eliminates information on a *snooped terminal*, restarting the associated telephone.

Example:

```
NOE Mon+drop-snooped-terminal 5
NOE Mon+
```

3.1.2.5 LIST

The following commands are available at this level.

3.1.2.5.1 LIST ALL

Lists all the information relative to the NOE , general and for each specific connection.

Example:

```
NOE Mon+list all
Application Survival state: Transparent
Application Server state: Disabled


Application Survival: Protocol statistics
----------------------------------------
        Packets received: 56
        Non UA/NOE packets ignored: 0
        Transparent processed packets: 56
        Survival processed packets: 0
        Call Server packets dropped in survival mode: 0
NOE Mon+
```

3.1.2.5.2 LIST APPLICATION

Displays information relative to the NOE. The most important is the status of the applications, the *survival* application can be *transparent* or *survival* mode, and the *server* application displays the state *Disabled*, *Autonomous, OXE Up* or *OXE Down*. The state of the individual connections may be different to the state of the application (view this by running **list connections)**.

The *survival* application, for connections in *transparent* mode, routes the NOE packets in the same way as any IP packet to the Call Server. However in *survival* mode, the application assumes the Call Server is not available and processes the packets and calls going to or coming from NOE telephones and at the same time blocks the packets going from the Call Server to the terminals.

Example:

```
NOE Mon+list application
Application Survival state: Transparent
Application Server state: Disabled


Application Survival: Protocol statistics
----------------------------------------
        Packets received: 56
        Non UA/NOE packets ignored: 0
        Transparent processed packets: 56
        Survival processed packets: 0
        Call Server packets dropped in survival mode: 0
NOE Mon+
```

3.1.2.5.3 LIST CONNECTIONS

Displays the NOE telephones the device has detected. This provides information on the telephone extension, name, IP and the state of the telephones.

Example:

```
NOE Mon+list connections
ConnId:      2 Extension:    31311 Name:  bintec 1
TermType: 4028 Terminal IP: 192.168.11.100 Server IP: 10.81.32.17
App: Survival   State: Transparent   Last pkt: Outgoing
Phone state idle, hook on, Call no, Mute no, Handsfree no


ConnId:      1 Extension:    31314 Name:  bintec 4
TermType: 4038 Terminal IP: 192.168.11.101 Server IP: 10.81.32.17
App: Survival   State: Transparent   Last pkt: Outgoing
Phone state idle, hook on, Call no, Mute no, Handsfree no


NOE Mon+
```

3.1.2.5.4 LIST SNOOPED-TERMINALS

Displays the NOE telephones the device has detected (operating in server mode) when an access list has been configured (**application server snooping-list**). This provides information on the telephone extension, name IP and the serial number of the telephones.

Example:

```
NOE Mon+list snooped-terminals
Snooped terminals
----------------------------------------
Id:     10 Extension:     1001 Name:  bintec 1
TermType: 4068 Terminal IP: 192.168.1.2 Server IP: 192.168.212.83
Serial number: H0500531516645

Id:      9 Extension:     1002 Name:  bintec 2
TermType: 4028 Terminal IP: 192.168.1.1 Server IP: 192.168.212.83
Serial number: H0500510374871

NOE Mon+
```

3.1.2.6 EXIT

Run **exit** to exit the NOE protocol monitoring prompt and return to the previous prompt.

Example:

```
NOE Mon+exit
+
```

Chapter 4 Configuration Example

4.1 Survival Application

The device is the router for an office with NOE telephones. The telephones connect to the Call Server accessed through the WAN. The router also acts as the SIP Media Gateway, so the Call Server can make and receive calls over a basic ISDN interface connected to the device. The idea here is that when connectivity with the Call Server is lost, the router is able to provide emergency telephony functions for the NOE telephones (so they can call each other and make and receive calls) over ISDN. We also want texts for telephones in survival mode to be in Spanish and display an "Only external Calls" message, when connectivity is lost in the telephones.

The following figure shows the schema:
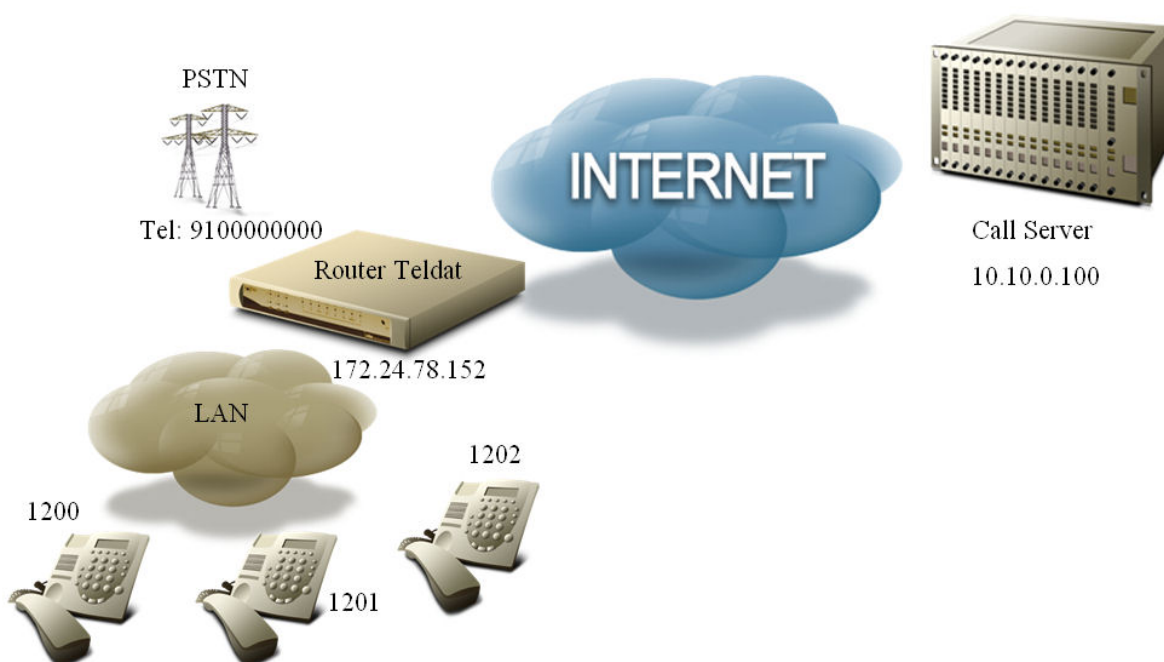
The configuration for the access-list filtering the NOE signaling traffic between the telephones and the Call Server is as follows:

```
feature access-lists
; -- Access Lists user configuration --
   access-list 101
      entry 1 default
      entry 1 permit
      entry 1 source address 10.10.0.100 255.255.255.255
      entry 1 source port-range 32640 32640
      entry 1 protocol udp
;
      entry 2 default
      entry 2 permit
      entry 2 destination port-range 32640 32640
      entry 2 destination address 10.10.0.100 255.255.255.255
      entry 2 protocol udp
;
   exit
;
exit
```

Subsequently, configure an NSLA poll to monitor the connection with the Call Server. A ping is configured every 10 seconds and a three sample window. If two of the three samples have an RTT of more than 500ms, the Call Server is presumed down. If the three samples are below 200ms, this means connectivity has been recovered. Advisor 1 deactivates when the Call Server drops.

```
feature nsm
; -- Network Service Monitor configuration --
```

```
    operation 1
; -- NSM Operation configuration --
      type echo ipicmp 10.10.0.100
      frequency 10
      source-ipaddr 172.24.78.152
      timeout 1000
   exit
;
   schedule 1 life forever
   schedule 1 start-time now
exit
;
feature nsla
; -- Feature Network Service Level Advisor --
   enable
;
   filter 1 nsm-op 1 rtt
   filter 1 significant-samples 3
   filter 1 activation threshold 500
   filter 1 activation sensibility 50
   filter 1 activation stabilization-time 1
   filter 1 deactivation threshold 200
   filter 1 deactivation sensibility 100
   filter 1 deactivation stabilization-time 1
;
   alarm 1 filter-id 1
;
   advisor 1 not alarm-id 1
;
exit
```

The SIP protocol Gateway feature is enabled:

```
protocol sip
; -- SIP protocol configuration –
   application address 172.24.78.152
   application gateway
exit
```

The configuration for the ISDN card for voice calls (in spot 1):

```
global-profiles dial
; -- Dial Profiles Configuration --
   profile audio default
   profile audio inout
   profile audio isdn-type audio
;
exit
;
network voip1/0
; -- VoIP interface Configuration --
   base-interface
; -- Base Interface Configuration --
      base-interface bri1/0 255 link
      base-interface bri1/0 255 profile audio
      base-interface bri1/0 255 number-of-circuits 2
;
   exit
;
exit
```

The NOE protocol is configured with the preconfigured access-list and advisor. The texts are configured in Spanish for the terminal screen messages and text "Only external calls" as the survival text.

```
protocol noe
; -- NOE protocol configuration –
   application address 172.24.78.152
   application survival access-list 101
   application survival track nsla-advisor 1
```

```
   screen busy-message "Ocupado"
   screen dial-numer "Marque numero"
   screen date spanish
   screen free-peer "Sonando"
   screen hangup-telephone "Cuelgue"
   screen accept-call "Aceptar llamada"
   screen consult-call "Consulta"
   screen incoming-call "Llamada nueva"
   screen stablished-call "Conectado"
   screen held-call "Llamada retenida"
   screen survival "Solo llamadas externas"
   screen onhold-call "Espere"
   screen end-consult-call "Terminar consulta"
   screen transfer-call "Transferir"
   screen hold-call "Retener"
   screen unhold-call "Volver"
   screen other-call "Llamada en espera"
   screen volume "Volumen"
exit
```

Lastly, the dial-plan. The calls through the ISDN are forwarded to office public telephone number 910000000. Dial-peer 1 sends these calls to the Call Server using SIP. Calls to the telephone network 9 digit numbers and variables that begin with 0 or 1, are sent through the ISDN interface through dial-peer 2. Finally, dial-peer 3 routes the incoming calls to the NOE telephone 1200 by changing the called number. This dial-peer is used when dial-peer 1 is inactive (if the poll has detected the Call Server is down for example).

```
telephony
; -- Telephony configuration --
   dial-peer 1 sip
      description "Incoming public calls to the Call Server in normal mode"
      destination-pattern 910000000
      target ipv4 10.10.0.100
      track nsla-advisor 1
   exit
;
   dial-peer 2 voice-port
      description "outgoing public calls"
      destination-pattern .........
      destination-pattern 0..T
      destination-pattern 1..T
      no vad
      target voice-port voip100 1
   exit
;
   dial-peer 3 noe
      description "incoming public calls in emergency mode ring 1200"
      destination-pattern 910000000
      outgoing prefix 1200
      outgoing strip-digits 9
      target dynamic
   exit
;
exit
```

4.2 Server Application

4.2.1 Configured Telephones

The device here is a Media Gateway for an office with NOE telephones connected to the Call Server through another external router. This acts as the SIP Media Gateway so the Call Server can make and receive calls through an FXO interface connected to the device. Furthermore, this operates as a Backup Media Gateway for the office NOE telephones. When the telephones lose connectivity with their Call Server, they connect to our device (backup server), which provides them with emergency telephony functions to call each other and to make and receive calls over the telephone line. In the emergency state, we only want telephone 1200 to receive the incoming calls through the FXO. We also want the date and the texts to be displayed on the phones in Spanish and to show "In emergency state" when connectivity with the Call Server is lost.

The example schema is as follows:
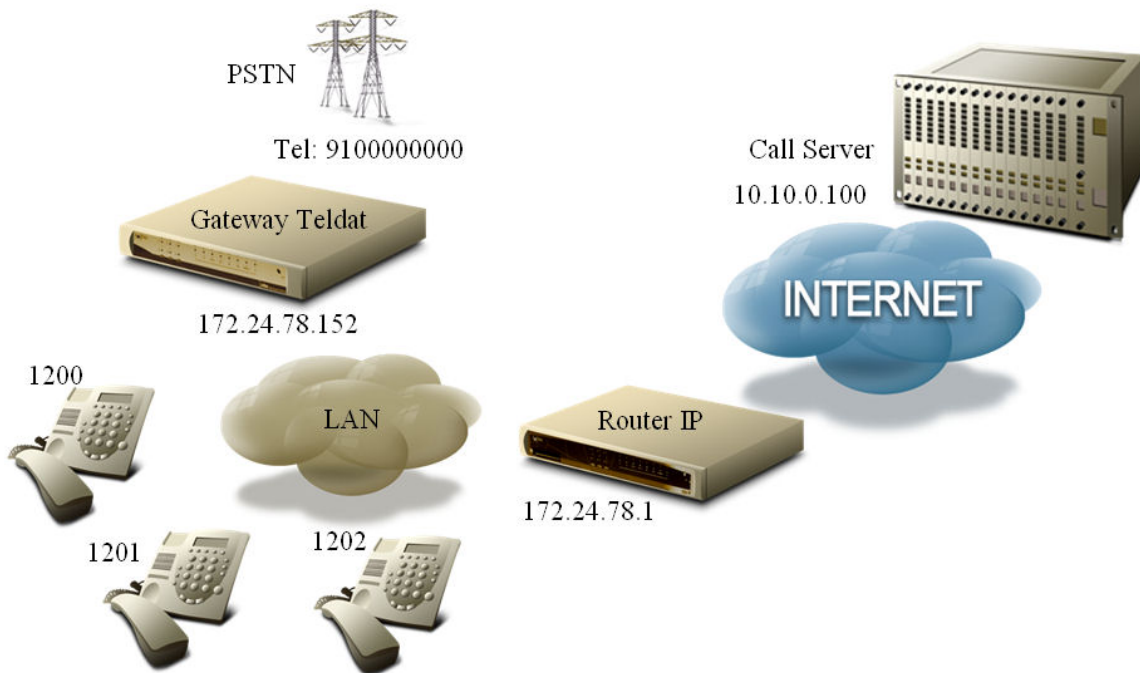
The NOE telephones already have our router IP address 172.24.78.152 (acts as Backup Media Gateway) as the Call Server provided this address when starting up said phones. The device configuration is shown below. You must enable the TFTP server so the telephones can request the startnoe-aabbccddeeff file, where aabbccddeeff represents the MAC for the terminal making the petition. This file doesn't have to be in the device flash as it's transparently generated by the NOE application.

```
feature tftp
; -- TFTP user configuration --
   server enable
exit
```

As in the previous example, an NSLA poll is configured to monitor the connection with the Call Server. Consequently, when connectivity is recovered, a command to restart the terminals is sent so they reconnect to the Call Server. If telephone connections are received when the router detects connectivity with the Call Server, these are temporarily accepted. However, if connectivity persists, the connected terminals are restarted (to connect to their Call Server).

```
feature nsm
; -- Network Service Monitor configuration --
   operation 1
; -- NSM Operation configuration --
      type echo ipicmp 10.10.0.100
      frequency 10
      source-ipaddr 172.24.78.152
      timeout 1000
   exit
;
   schedule 1 life forever
   schedule 1 start-time now
exit
;
feature nsla
; -- Feature Network Service Level Advisor --
   enable
;
   filter 1 nsm-op 1 rtt
   filter 1 significant-samples 3
   filter 1 activation threshold 500
   filter 1 activation sensibility 50
   filter 1 activation stabilization-time 1
   filter 1 deactivation threshold 200
   filter 1 deactivation sensibility 100
   filter 1 deactivation stabilization-time 1
```

```
;
   alarm 1 filter-id 1
;
   advisor 1 not alarm-id 1
;
exit
```

The SIP Gateway feature is also enabled:

```
protocol sip
; -- SIP protocol configuration –
   application address 172.24.78.152
   application gateway
exit
```

The FXO line is enabled by default, no command is necessary. The NOE protocol is configured with the created advisor in addition to setting Spanish as the language to show the date on the terminal screens; texts in Spanish and the text "In emergency state" as the survival text.

```
protocol noe
; -- NOE protocol configuration –
   application address 172.24.78.152
   application server default
   application server track nsla-advisor 1
   screen busy-message "Ocupado"
   screen dial-numer "Marque numero"
   screen date spanish
   screen free-peer "Sonando"
   screen hangup-telephone "Cuelgue"
   screen accept-call "Aceptar llamada"
   screen consult-call "Consulta"
   screen incoming-call "Llamada nueva"
   screen stablished-call "Conectado"
   screen held-call "Llamada retenida"
   screen survival "En estado de emergencia"
   screen onhold-call "Espere"
   screen end-consult-call "Terminar consulta"
   screen transfer-call "Transferir"
   screen hold-call "Retener"
   screen unhold-call "Volver"
   screen other-call "Llamada en espera"
   screen volume "Volumen"
exit
```

Lastly, the dial-plan must be configured. The calls through the FXO are forwarded to the office public telephone number 910000000. Under normal conditions, dial-peer 1 sends these calls to the Call Server using SIP. Calls to the telephone network, 9 digit numbers and variables that begin with 0 or 1, are sent through the FXO interface through dial-peer 2. Dial-peer 3 is created so calls from the FXO in emergency state are received on telephone 1200. Finally, a dial-peer is configured for each telephone you want to support, establishing the terminal MAC address as the target MAC and the extension number as the destination-pattern. Consequently, the existing dial-plan is maintained when the terminals are connected to the Call Server to execute calls between them. The display-name is also configured to associate a name.

```
telephony
; -- Telephony configuration --
   dial-peer 1 sip
      description "Incoming public calls to the Call Server in normal mode"
      destination-pattern 910000000
      target ipv4 10.10.0.100
      track nsla-advisor 1
   exit
;
   dial-peer 2 voice-port
      description "Outgoing public calls"
      destination-pattern .........
      destination-pattern 0..T
      destination-pattern 1..T
      no vad
      target voice-port voip1/0 1
   exit
```

```
;
   dial-peer 3 group
      description "Incoming public calls in emergency mode ring 1200"
      destination-pattern 910000000
      outgoing prefix 1200
      outgoing strip-digits 9
      target dynamic
   exit
;
   dial-peer 4 noe
      display-name "Despacho A"
      destination-pattern 1200
      target mac 00-80-9f-57-bf-76
   exit
;
   dial-peer 5 noe
      display-name "Despacho B"
      destination-pattern 1201
      target mac 00-80-9f-57-23-9b
   exit
;
   dial-peer 6 noe
      display-name "Despacho C"
      destination-pattern 1202
      target mac 00-80-9f-5a-86-cd
   exit
;
exit
```

4.2.2 Non Configured Telephones

The scenario for this second *server* application example is the same as the previous one. The telephones are configured in the same way (to connect to the device as Backup Media Gateway) but the router does not have the telephones that try and connect to it configured in emergency state. When a terminal can't detect connectivity with the Call Server, it resets and initiates a connection with our device, requesting the startnoe-aabbccddeeff file where aabbccddeeff is the telephone MAC. As the router does not acknowledge the terminal MAC (it doesn't have it configured) it provides the automatically generated file and establishes the connection. However, it does not provide the extension number (configured in the destination-pattern), nor does it ask the user for the number as the **ask-number** command hasn't been configured. The telephones are in an emergency state and without extension number, so cannot individually receive calls. However, they can receive them with the rest of the dynamically registered terminals (forming a group). They can also execute calls to the exterior, or to the group, but not to a specific NOE terminal.

The only appreciable change in this example is found in the dial-plan, the rest staying as it was.

```
telephony
; -- Telephony configuration --
   dial-peer 1 sip
      description "Incoming public calls to the Call Server in normal mode"
      destination-pattern 910000000
      target ipv4 10.10.0.100
      track nsla-advisor 1
   exit
;
   dial-peer 2 voice-port
      description "Outgoing public calls"
      destination-pattern .........
      destination-pattern 0..T
      destination-pattern 1..T
      no vad
      target voice-port voip1/0 1
   exit
;
   dial-peer 3 group
      description "Incoming public calls in emergency mode ring all"
      destination-pattern 910000000
      destination-pattern 1299
      target group 1
   exit
```

```
;
   peer-group 1
      dynamic-peers
   exit
;
exit
```

Dial-peer 3 in this case is a group. Its aim is for calls from the FXO (in an emergency situation) ring in all the terminals. Additionally, using the short number 1299, you can call all the telephones simultaneously. Dial-peers 4, 5 and 6 are not configured as the extension number for each terminal is assigned. Under normal conditions, the Call Server provides them with the corresponding extension number but the terminals lose this when they pass to an emergency state. If our device detects that the Call Server is operating again, it restarts the telephones so they reconnect to the Call Server and recover all their functionalities.

4.2.3 Autonomous Server

In the scenario in this example for the *server* application, there is no external Call Server. The device is configured as an autonomous server and the NOE telephones are directly connected to it as the Call Server. Therefore, the device operates as a Media Gateway with limited functionality, allowing calls between the NOE telephones and the telephone line (through an FXO interface). In this example, we don't want to configure each NOE telephone in the router, but we do want each NOE terminal to individually receive calls. With this aim, the users are asked to enter their number through a text "Please enter your extension number" when their phone initializes. Finally, only telephone 1200 should receive incoming calls from the FXO and the date and texts visible on the telephone screens should be in Spanish.

The example schema is as follows:
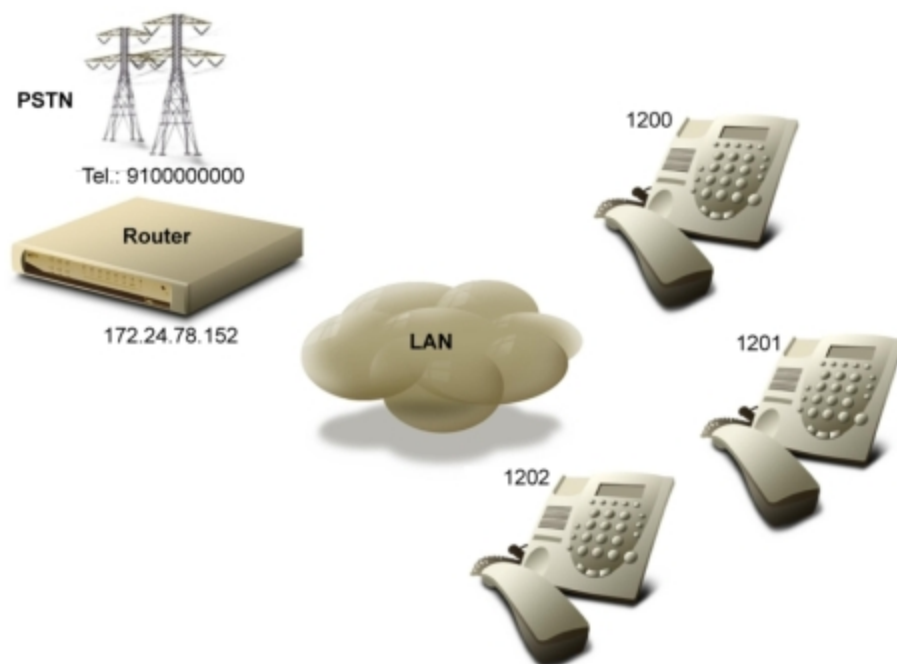
In this case, configure our router IP address in the phones (as TFTP server) to download from this the lanpbx.cfg and startnoe-aabbccddeeff files where aabbccddeeff is the MAC of the terminal making the petition. The startnoe-aabbccddeeff files are automatically generated, but the lanpbx.cfg file must be in the router's flash.

TYPE=A4400 VERSION=1 IP_DOWNLOAD=172.24.78.152

So the telephones can execute TFTP petitions, enable the TFTP server as in the previous examples:

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

You don't need to configure an NSLA poll in this example, since we don't have an external Call Server to monitor as the application acts as an autonomous server. The FXO interface is already configured. Next, configure the NOE protocol according to your requirements:

```
protocol noe
```

```
; -- NOE protocol configuration –
   application address 172.24.78.152
   application server default
   ask-number "Introduzca, por favor, su numero de extension"
   screen busy-message "Ocupado"
   screen dial-numer "Marque numero"
   screen date spanish
   screen free-peer "Sonando"
   screen hangup-telephone "Cuelgue"
   screen accept-call "Aceptar llamada"
   screen consult-call "Consulta"
   screen incoming-call "Llamada nueva"
   screen stablished-call "Conectado"
   screen held-call "Llamada retenida"
   screen onhold-call "Espere"
   screen end-consult-call "Terminar consulta"
   screen transfer-call "Transferir"
   screen hold-call "Retener"
   screen unhold-call "Volver"
   screen other-call "Llamada en espera"
   screen volume "Volumen"
exit
```

Finally, configure the dial-plan. Calls to the FXO are sent to office public number, 910000000, and received in tele-phone 1200 thanks to the first dial-peer. Calls to telephone network numbers, which contain nine digits, and variables that begin with 0 or 1 are sent over the FXO interface through dial-peer 2. Lastly, to allow calls to the office tele-phones, configure a dial-peer with a dynamic *target* for calls to extensions containing four digits and begin with 12; this number is searched for in the dynamic dial-peers until the telephone (with this extension registered) is found.

```
telephony
; -- Telephony configuration --
   dial-peer 1 noe
      description "Incoming public calls sent to 1200"
      destination-pattern 910000000
      outgoing prefix 1200
      outgoing strip-digits 9
      target dynamic
   exit
;
   dial-peer 2 voice-port
      description "Outgoing public calls"
      no vad
      destination-pattern .........
      destination-pattern 0..T
      destination-pattern 1..T
      target voice-port voip1/0 1
   exit
;
   dial-peer 3 noe
      description "Calls between office telephones"
      destination-pattern 12..T
      target dynamic
   exit
;
exit
```