



H.323 Protocol (SIP)

bintec-Dm 767-I

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I Related Documents

bintec-Dm 722-I Telephony over IP

bintec-Dm 749-I NSM

bintec-Dm 754-I NSLA

bintec-Dm 770-I VoIP Interfaces

Chapter 1 Introduction

1.1 Introduction

1.1.1 H.323 recommendation

In order to enable multimedia communication over packet-switched networks, the International Telecommunication Union (ITU) has defined a series of standards grouped under the H.323 Recommendation.

The H.323 recommendation describes a series of elements, the most important of which are the terminals, gateways and gatekeepers.

Gateways enable interconnection between the H.323 systems and other telephony systems such as ISDN, analog (Plain Old Telephone Service -POTS-), etc., and the gatekeepers provide admission and control and address translation mechanisms between the different terminals.

The H.323 recommendation refers to other standards among which are:

- H.225.0: Describes the means by which the audio, video, data and control are associated, encoded and packaged for transport between H.323 terminals in a network without a guaranteed quality of service; and between H.323 terminals and H.323 gateways. H.225.0 specifies the protocols and the message format used in RTP (Real Time Protocol), RTCP (Real Time control Protocol), Q931 and RAS (Register Admission Status).
- Q.931: A connections establishment procedure is used derived from this standard in a similar way to ISDN. The Q.931 messages are sent encapsulated within TCP/IP sessions.
- RTP: Carries out the framing, numeration sequences, Timestamp, payload type and source identification functions.
- RTCP: This is associated with the RTP and provides feedback on the communication status and service.
- H.245: Defines procedures for capability negotiation, channel negotiation and flow control.

1.1.2 Functionality available in the router

The device implements an H.323 Media Gateway that allows you to establish calls between an H.323 device and any VoIP port in the device by enabling the **application gateway** command. As this is a Media Gateway, the gatekeeper can be configured for use. The gatekeeper can be used to register local extensions such as the calls destination depending on the called number if this is configured in the outgoing **target gatekeeper** dial-peer and to request permission in the calls entering through H.323 if the incoming dial-peer for the call has the **target gatekeeper** command. You can also not use gatekeeper by directly configuring the IP that each call is sent to in the dial-peers through the **target ipv4 <ip>** command. You can modify the protocol behavior by enabling or disabling the Fast Start mode and the H.245 Tunneling among other things.

A simple gatekeeper is also implemented which allows external H.323 terminals to be registered by configuring the **application gatekeeper** command. Registering a terminal through a Registration Request creates a dynamic H.323 dial-peer for each alias received. Consequently, if the gateway functionality is also configured, calls initiated in the router ports can match these dynamic dial-peers and be established with the registered terminals.

The gatekeeper functionality also allows you to respond to Admission Requests from the terminals with an Admission Confirm that includes the destination IP with which the terminal must establish the call. The dial-peers are consulted for this: if the call has to be established with another H.323 device, it is answered with the corresponding IP, and if the call has to be routed through a VoIP port, it is answered with the router's IP. If the device has the **gk-routed** command configured, it supports calls between two H.323 devices, indicating its own IP address in the Admission Confirm so the call is made through this. If this isn't configured, the call destination IP and the Direct call mode is returned in the Admission Confirm so the call is made directly to the destination without passing through the Gatekeeper. So, if the resulting call is between two external H.323 devices, the call does not go through the router unless this command is activated, and if the call exits through a device port, it is considered a normal Gateway call.

For further information on dial-plan configuration based on dial-peers, and on the available VoIP interfaces, please see manuals bintec-Dm722-I Telephony over IP and bintec-Dm770-I VoIP Interfaces.

Chapter 2 Configuration

2.1 Accessing the configuration menu

The H.323 protocol configuration commands should be entered in the setup menu associated with H.323 (*H323 Config>*). To access this menu, use the **protocol h323** command from the general configuration menu (*Config>*).

```
Config>protocol h323
H323 Config>
```

If you want the commands to take immediate effect without having to reboot the router, access the configuration through the dynamic general configuration menu (*Config\$*).

```
Config$protocol h323
H323 Config$
```

2.2 Configuration commands

2.2.1 APPLICATION

Configures the application implementing the H323 protocol.

Syntax:

```
H323 Config>application ?
address      Local service IP address
gatekeeper   Enable H323 gatekeeper application
gateway      Enable H323 gateway
```

2.2.1.1 [NO] APPLICATION ADDRESS

Configures the IP address used by the H323 in its messages. If this is not configured, the device's internal IP address is used. If this latter is not configured, the protocol will not function.

Syntax:

```
H323 Config>application address ?
<a.b.c.d>    Ipv4 format
```

Example:

```
H323 Config>application address 1.1.1.1
```

2.2.1.2 [NO] APPLICATION GATEKEEPER

Allows the device to operate as a gatekeeper, allowing H.323 clients to register.

Example:

```
H323 Config>application gatekeeper
```

2.2.1.3 [NO] APPLICATION GATEWAY

Enables the H323 protocol for calls between device ports and IP destinations. This command is essential for H323 to function correctly.

Example:

```
H323 Config>application gateway
```

2.2.2 [NO] FAST-CONNECT

Enables the fast connection procedures that speed up the H323 call setup process. By default the fast-connect procedure is enabled. The fast-connect mode can be individually configured for each dial-peer through the `h323-start` command, please see manual bintec-Dm 722-1 Telephony over IP. If you enable or disable the fast-connect procedure for a specific dial-peer, the configured value in said dial-peer takes preference over this command.

Example:

```
H323 Config>fast-connect
```

2.2.3 GATEKEEPER

Allows you to configure parameters associated with the gatekeeper under which the voice device is contained.

Syntax:

```
H323 Config>gatekeeper ?
address      Gatekeeper's IP address where the gateway will be registered
```

2.2.3.1 [NO] GATEKEEPER ADDRESS

Configures the gatekeeper's IP address where the Gateway will be registered. If a gatekeeper is configured, H.323 call signaling is sent to the gatekeeper. You can configure two gatekeepers with this command, so if the first is unavailable, the alternative gatekeeper can be used. By default the device does not register in any gatekeeper.

Example:

```
H323 Config>gatekeeper address 1.1.1.1
```

2.2.4 [NO] GK-ROUTED

Allows you to route calls between H.323 terminals through the device. If this is enabled when the H.323 client, registered in the device, requests the address of another terminal without specifying the call mode (GatekeeperRouted or Direct), the router responds with its own address at the same time as it initiates the call to the requested destination. If this command isn't enabled, the device responds with the destination IP address so it is the terminal that initiates the call. Activating this command permits an additional function: overlap dialing. Using this, an H.323 client who is dialing a number doesn't expect to have the full number in order to announce the new call to its gatekeeper, which is the router; instead of this a new message is sent with each pressed digit: thus if at some point the router detects that a dialed number doesn't match any dial-plan destination, the call is ended sooner. By default this command is disabled.

Example:

```
H323 Config>gk-routed
```

2.2.5 GW

Allows you to configure parameters associated with the H323 voice gateway.

Syntax:

```
H323 Config>gw ?
name          Name with which the gateway registers in the gatekeeper
tech-prefix   Technological prefix that defines the device
```

2.2.5.1 [NO] GW NAME

Configures the name with which the gateway registers in the gatekeeper. This admits a name of up to 18 characters. This is also used as a gatekeeper identifier if the gatekeeper application is configured. By default the device does not register in any gatekeeper and no name is configured.

Example:

```
H323 Config>gw name bintec-IPFON
```


2.2.5.2 [NO] GW TECH-PREFIX

Configures the technological prefix that defines the device in an environment controlled by a gatekeeper. Admits a text containing a maximum of 11 characters. By default the device does not register in any gatekeeper and no technological prefix is configured.

Example:

```
H323 Config>gw tech-prefix 78#
```

2.2.6 H225

Configures the parameters relative to the H225 protocol.

2.2.6.1 [NO] H225 TIMEOUT CONNECT

Configures the time the system waits before establishing an H323 call. If the specified duration times out, the H323 call terminates in error. Admits values between 1 and 300 seconds. The default value is 180 seconds.

Syntax:

```
H323 Config>h225 timeout connect ?  
<1s..300s> Time value
```

Example:

```
H323 Config>h225 timeout connect 30
```

2.2.6.2 [NO] H225 TIMEOUT SETUP

Configures the wait time before receiving a response to the initial H323 call establishment message. If this times out, the H323 call terminates in error. Admits values between 1 and 30 seconds. Default is 15 seconds.

Syntax:

```
H323 Config>h225 timeout setup ?  
<1s..30s> Time value
```

Example:

```
H323 Config>h225 timeout setup 5
```

2.2.7 H245

Configures parameters relative to the H245 protocol.

2.2.7.1 [NO] H245 TUNNELING

This sends the H245 messages tunneled in the facility Q931 messages. This option is enabled by default.

Syntax:

```
H323 Config>h245 tunneling
```

Example:

```
H323 Config>h245 tunneling
```

2.2.7.2 [NO] H245 CAPABILITY ALL-DTMF

This changes the negotiation mode for the DTMF relay capabilities so that instead of offering only the configured capability, it offers all those supported, i.e., RFC2833, alphanumeric and signal. This means any of them can be received and sent in the configured capability if the other ends supports it or if not, sent in one supported by the other end. If the other end doesn't support any, then the DTMFs are sent in band.

Syntax:

```
H323 Config>h245 capability all-dtmf
```

Example:

```
H323 Config>h245 capability all-dtmf
```

2.2.8 HOLD-ON-MCAST

This command holds the call when the other end indicates that it must receive audio in an IP multicast. This allows it to reproduce an internal voice message in the VoIP interfaces if the **<id> hold voice-message <num>** command is configured in the corresponding VoIP interface. This option is deactivated by default.

Syntax:

```
H323 Config>hold-on-mcast
```

2.2.9 [NO] IP-TOS

This command configures the IP header TOS field which is used to send IP packets relating to the H323 signaling.

Syntax:

```
H323 Config>ip-tos ?
<hex 0x0..0xff>   Hexadecimal value in the specified range
```

2.2.10 LIST

This command is used to view the different configured parameters.

Syntax:

```
H323 Config>list ?
gw                Display the gateway parameters
```

2.2.10.1 LIST GW

Displays the gateway parameters.

Example:

```
H323 Config>list gw

Gatekeeper address 192.168.212.173   Gateway name:
Gatekeeper address 192.168.212.175   Gateway name:
Gatekeeper zone:                    Tech-Prefix :
                                      Register E.164: Enabled

RAS port: 1719                       RAS time to live: 60
RAS timeout: 20                      RAS Connection attempt fail: 10

H323 Config>
```

2.2.11 [NO] MAP-CAUSE H323 REJECT PSTN BUSY

If you configure this command, when you receive an H.323 call release because the call has been rejected, this internally converts to busy so the other end of the call is released with a busy cause. The cause stored in the call CDR is busy. By default this command isn't active and does not convert into a reject cause.

Example:

```
H323 Config>map-cause h323 reject pstn busy
```

2.2.12 NO MAX-TLL

This command forms part of the gatekeeper application configuration. Any client, on registering in the gatekeeper application, can propose a duration TTL time from the register. If the proposed value is greater than the maximum time configured here, the response forces the client to reduce the TTL; in cases where it is below this, it is admitted as received. If before the agreed time has timed out a new RAS RRQ message is received from the client in question, the associated dynamic *dial-peer* updates, re-establishing the entry TTL; in the opposite case, said *dial-peer* is eliminated. The default value is 10 minutes and can be configured from 1 minute up to 1 hour.

Example:

```
H323 Config>max-ttl 5m
```

2.2.13 NO H323

Deletes the H.323 protocol configuration.

Syntax:

```
H323 Config>no h323          Clear all H323 configuration
```

2.2.14 PORT

Allows you to configure the port TCP and UDP values used in establishing protocols, management and the transport of call data.

Syntax:

```
H323 Config>port ?
q931      TCP port through which the Q931 transactions are carried out
ras       UDP port through which the RAS transactions are carried out
```

2.2.14.1 [NO] PORT Q931

Configures the TCP port through which the Q931 transactions are carried out. This admits values between 0 and 65535. By default this is 1720.

Example:

```
H323 Config>port q931 1800
```

2.2.14.2 [NO] PORT RAS

Configures the UDP port through which the RAS transactions are carried out. This admits values between 0 and 65535. By default this is 1719.

Example:

```
H323 Config>port ras 1900
```

2.2.15 RAS

Allows you to configure parameters associated with the H.323 RAS protocol.

Syntax:

```
H323 Config>ras ?
retries    Maximum number of retries in a RAS transaction
terminal-type  Terminal Type in a RAS transaction
timeout    Maximum wait time (in seconds) for a RAS transaction response
ttl        interval, in seconds, with which the gateway will send the RRQ
```

2.2.15.1 [NO] RAS RETRIES

This is the maximum number of retries in a RAS transaction. When the maximum number of retries is reached, the transaction is deemed to have failed. Valid values are between 0 and 100. By default, this value is 2.

Example:

```
H323 Config>ras retries 10
```

2.2.15.2 [NO] RAS TERMINAL TYPE

Configures the type of terminal sent in the RAS messages. Default is *gateway*.

Syntax:

```
H323 Config>ras terminal-type ?
gateway    Gateway endpoint
mcu        MCU endpoint
terminal   Terminal endpoint
```

2.2.15.3 [NO] RAS TIMEOUT

Configures the maximum wait time (in seconds) for an RAS transaction response from the configured gatekeeper. After this time has expired, the RAS petition is resent. This is repeated the number of times configured in the previous parameter. This admits values between 0 and 600 seconds. By default this value is 5 seconds.

Example:

```
H323 Config>ras timeout 10
```

2.2.15.4 [NO] RAS TTL

This configures the interval, in seconds, with which the gateway will send the RRQ messages with the field keepAlive=TRUE to the gatekeeper. This admits values between 0 and 600. By default this value is 60 seconds.

Example:

```
H323 Config>ras ttl 10
```

2.2.16 [NO] REGISTER-E164

The device, on registering in the gatekeeper (message RRQ from RAS), can include information on the extensions it has. This information can be expressed in many ways and one of them is the E.164 format. With this command you can communicate the E.164 identifiers that the lines have to the gatekeeper. By default the E.164 extensions register is enabled.

Example:

```
H323 Config>register-e164
```

2.2.17 EXIT

Use the **EXIT** command to return to the previous prompt.

Example:

```
H323 Config>exit  
Config>
```

Chapter 3 Monitoring

3.1 Accessing the monitoring menu

The H.323 protocol monitoring commands must be entered in the monitoring menu associated with the H.323 (H323 Mon+). To access this menu, use the **PROTOCOL H323** command from the general monitoring menu (+).

```
+protocol h323
H323 Mon
H323 Mon+
```

Once you have accessed the H.323 protocol monitoring menu, you can enter the commands described below.

3.2 Monitoring commands

3.2.1 DISPLAY

Dynamically displays the status of the protocol parameters.

Syntax:

```
H323 Mon+display ?
cause      RAS release codes
gatekeeper  View the application gatekeeper status
ras        View RAS status and identifiers
```

3.2.1.1 DISPLAY CAUSE RAS

This command displays the meaning of the release cause codes that are used in the rejection of RAS transactions.

Syntax:

```
H323 Mon+display cause ras ?
<0..29>    Value in the specified range
```

Example:

```
H323 Mon+display cause ras 1
Cause (1):  Insufficient Resources

H323 Mon+
```

3.2.1.2 DISPLAY GATEKEEPER

When an H.323 device registers in the gatekeeper application, a dynamic *dial-peer* is created. This command allows you to see both the application status and details of the existing *dial-peers*, including: username, *endpoint* identifier (there can be multiple users for each *endpoint*), the call signaling address and port and the time remaining until the entry is deleted. Also displayed here are the seconds that have elapsed since the *dial-peers* were last examined to check whether any of them have expired.

Example:

```
H323 Mon+display gatekeeper

App gatekeeper state: Running

Dumping clients locally registered, time since last purge 59

User Phone1 (Ep id Phone1) registered as 172.24.121.200:1720  ttl 342
User 200 (Ep id Phone1) registered as 172.24.121.200:1720  ttl 342
User 100 (Ep id 100) registered as 172.24.121.100:1720  ttl 109

H323 Mon+
```

3.2.1.3 DISPLAY RAS

Allows you to view the RAS client state as well as the name of the gatekeeper where this is registered and the identifier the latter assigned to the device.

Example:

```
H323 Mon+display ras
Primary Gatekeeper: 192.168.212.173
Secondary Gatekeeper: 192.168.212.175

Current Gatekeeper: 192.168.212.173
RAS state: Gateway has been registered
Gatekeeper ID: MainGk
Endpoint ID: 300
H323 Mon+
```

3.2.2 REGISTER

Sends a request register RAS packet (RRQ) to the configured gatekeeper.

Syntax:

```
H323 Mon+register
```

Example:

```
H323 Mon+register
H323 Mon+
```

3.2.3 UNREGISTER

Sends an RAS packet request to unregister (URQ) to the gatekeeper

Syntax:

```
H323 Mon+unregister
```

Example:

```
H323 Mon+unregister
H323 Mon+
```

3.2.4 EXIT

Use the **EXIT** command to return to the previous prompt.

Syntax:

```
H323 Mon+exit
```

Example:

```
H323 Mon+exit
+
```

Chapter 4 Examples

4.1 Two H.323 gateways without gatekeeper

Description:

A company has two offices connected to each other through an IP network and you wish to install a voice service between them using four traditional analog telephones in each office. The proposed numeration plan consists of 2 digit telephone numbers in such a way that office A begins with 1 and office B begins with 2. The G.723 codec is used because of its low bandwidth. In addition you want the calls to the two first telephones in the office to be forwarded to the other telephones should they be busy so the call isn't lost. An H.323 Media Gateway is installed in each office; office 1 has IP 172.1.1.1 and office 2 IP 172.1.2.2.

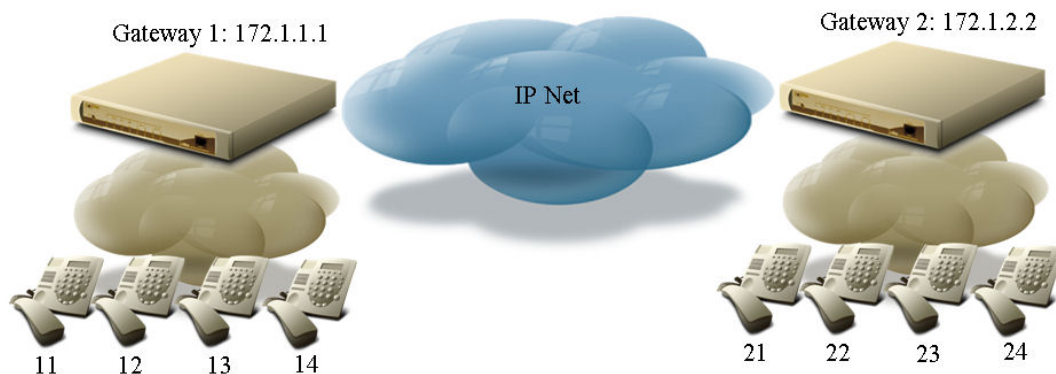


Fig. 1: Proposed Configuration:

Each gateway has a card with four FXS ports in slot 1. The corresponding dial-peers for each fxs line and another H.323 dial-peer are configured. In the case of the GW 1, this routes all telephone numbers that begin with 2 towards IP address 172.1.2.2 and in the case of GW 2, routes all telephone numbers beginning with 1 towards IP address 172.1.1.1. You also need to configure a peer-group so the call is forwarded if busy.

An important aspect of IP Telephony schemes is the quality of service. For this to operate correctly, you need to make sure that the voice traffic has a minimum LAN and WAN availability expressed in terms of bandwidth and access time. Problems will appear if the lines in question have a lot of traffic or have very high peaks of traffic. This can be resolved for WAN lines by applying fragmentation mechanisms (to decrease the delay of the voice frames) and bandwidth reservation mechanisms and traffic priority. In the case of the LAN, the use of switches is recommended. These separate the traffic and improve the use of the LAN bandwidth. In this example these problems are not addressed and it is assumed that the availability of the network is as required.

Configuration:

Only Gateway 1 configuration is shown since the configuration for 2 is similar, with just the IPs and the dial-plans changing.

```
log-command-errors
no configuration
set hostname gw-1
telephony
; -- Telephony configuration --
dial-peer 1 h323
  description "gw2 dial-peer"
  codec g7235k3
  destination-pattern 2.
  target ipv4 172.1.2.1
exit
;
dial-peer 2 voice-port
  description "VOIP1/0 line 1 dial-peer"
  destination-pattern 11
  forward busy peer-group 1
  target voice-port voip1/0 1
exit
;
dial-peer 3 voice-port
```

```

    description "VOIP1/0 line 2 dial-peer"
    destination-pattern 12
    forward busy peer-group 1
    target voice-port voip1/0 2
  exit
;
dial-peer 4 voice-port
  description "VOIP1/0 line 3 dial-peer"
  destination-pattern 13
  target voice-port voip1/0 3
  exit
;
dial-peer 5 voice-port
  description "VOIP1/0 line 4 dial-peer"
  destination-pattern 14
  target voice-port voip1/0 4
  exit
;
peer-group 1
  dial-peer 2
  dial-peer 3
  dial-peer 4
  dial-peer 5
  exit
;
exit
;
network ethernet0/0
; -- Ethernet Interface User Configuration --
  ip address 172.1.1.1 255.255.255.0
;
;
;
  exit
;
network voip1/0
; -- VoIP interface Configuration --
  line 1 interface-type fxs
;
  line 2 interface-type fxs
;
  line 3 interface-type fxs
;
  line 4 interface-type fxs
exit
;
;
protocol h323
  application address 172.1.1.1
  application gateway
exit
;
dump-command-errors
end
; --- end ---

```

4.2 H.323 gateways with external gatekeeper

The company in the above example is going to increase the number of branches and has decided to use a gatekeeper to manage the global dial-plan. In addition they want to add a Basic ISDN interface to each office in order to send calls to the telephone network. The incoming calls over ISDN need to ring in the first two branch telephones. The new internal dial-plan consists of prefix 3, a digit that identifies the office and a digit to identify each extension in an office.

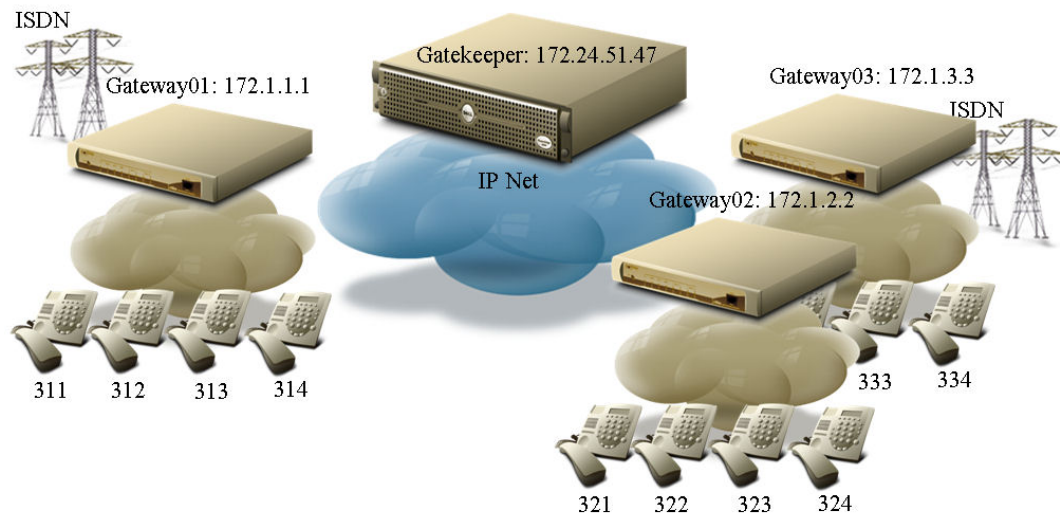


Fig. 2: H.323 Gateways with external gatekeeper

You need to configure a voice-port dial-peer for each analog telephone, an H.323 dial-peer with a target gatekeeper that the 3-digit numbers beginning with 3 are sent to, a voice-port dial-peer to send calls to the telephone network numbers over the 0 basic interface of the VoIP 2xBRI card in the device's 2 slot, a dial-peer group to send the calls entering over ISDN to the first two extensions. This latter takes the office extension 9. Interface 1 for the ISDN card is not used.

Calls coming in over ISDN match dial-peer 20 and the called telephone is changed to 319 through the **incoming called strip-digits** and **incoming called prefix** commands. In this way a call going out through dial-peer 5, which is a group dial-peer, rings on telephones 1 and 2 simultaneously.

The configuration proposed for office 01 is as follows:

```

log-command-errors
no configuration
global-profiles dial
; -- Dial Profiles Configuration --
  profile voip default
  profile voip inout
  profile voip isdn-type audio
;
exit
;
Telephony
; -- Telephony configuration --
  dial-peer 1 voice-port
    description "Employee 1"
    destination-pattern 311
    target voice-port voip1/0 1
  exit
;
  dial-peer 2 voice-port
    description " Employee 2"
    destination-pattern 312
    target voice-port voip1/0 2
  exit
;
  dial-peer 3 voice-port
    description "Employee 3"
    destination-pattern 313
    target voice-port voip1/0 3
  exit
;
  dial-peer 4 voice-port
    description "Employee 4"
    destination-pattern 314
    target voice-port voip1/0 4
  exit
;

```

```

dial-peer 5 group
  description "1 and 2"
  destination-pattern 319
  target group 1
exit
;
dial-peer 10 h323
  description "Intra-corporation calls"
  codec g7235k3
  destination-pattern 3..
  target gatekeeper
exit
;
dial-peer 20 voice-port
  description "Telephone network calls"
  destination-pattern .....
  destination-pattern 0.T
  destination-pattern 1.T
  incoming called strip-digits 9
  incoming called prefix 319
  target voice-port voip2/0 1
exit
;
peer-group 1
  dial-peer 1
  dial-peer 2
exit
;
exit
;
network ethernet0/0
; -- Ethernet Interface User Configuration --
  ip address 172.1.1.1 255.255.255.0
;
exit
;
network voip1/0
; -- VoIP interface Configuration --
  line 1 interface-type fxs
;
  line 2 interface-type fxs
;
  line 3 interface-type fxs
;
  line 4 interface-type fxs
;
exit
;
network voip2/0
; -- VoIP interface Configuration --
  base-interface
; -- Base Interface Configuration --
  base-interface bri2/0 255 link
  base-interface bri2/0 255 profile voip
  base-interface bri2/0 255 number-of-circuits all
;
exit
;
exit
;
network voip2/1
; -- VoIP interface Configuration --
  base-interface
; -- Base Interface Configuration --
  base-interface bri2/1 255 link
  base-interface bri2/1 255 number-of-circuits all
;

```

```

exit
;
exit
;
protocol h323
  application address 172.1.1.1
  application gateway
  gatekeeper address 172.24.51.47
  gw name Gateway01
exit
;
dump-command-errors
end

```

4.3 Gateway and gatekeeper for survival

The company in the two previous examples is going to migrate the analog telephones to H.323 IP telephones. They want the office device to provide backup gatekeeper service for the office telephones when the central gatekeeper isn't available so the telephones can continue to make calls to each other, make calls to numbers in the telephone network and receive calls that ring on the first two telephones in the office, and even the calls to corporate numbers pertaining to other branches are redirected to an automatic attention system available on the public network telephone 910000000. To do this, the H.323 telephones support the configuration for two gatekeepers, the main and the backup, and in cases where there is no access to the main, calls are registered and routed through the backup. The telephones must have the central gateway IP configured in the main gatekeeper and the office gateway IP in the backup gatekeeper.

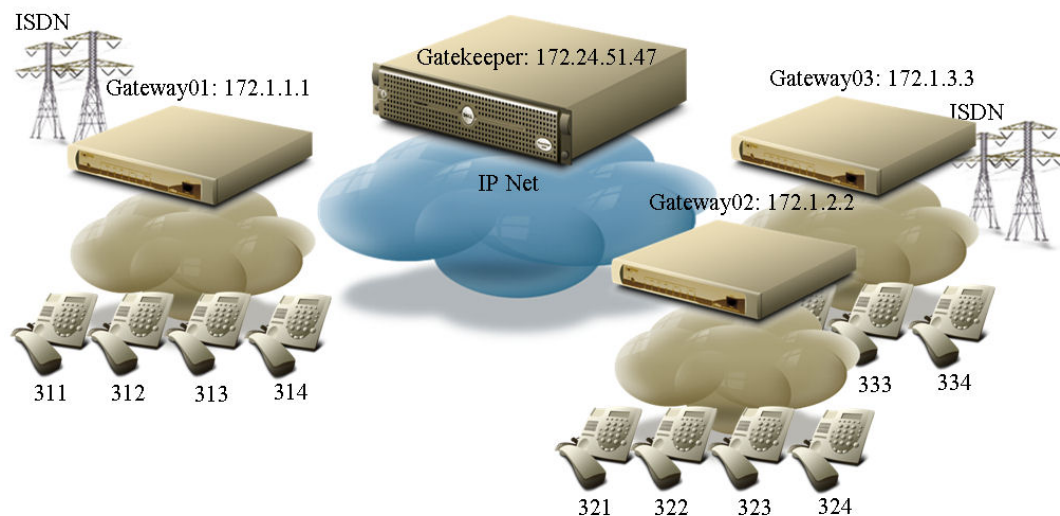


Fig. 3: Gateway and gatekeeper for survival

The office device only needs a VoIP 2xBRI card in slot 1 and the dial-peers destined to FXS ports disappear.

Under normal conditions, the calls executed through the H.323 telephones are managed by the central gatekeeper and only calls to the telephone network are sent to the router, which go out through dial-peer 20. Calls coming in over ISDN are destined to the office 911111111 public number therefore the call locates the outgoing dial-peer 1 and sends it to the gatekeeper to be routed. In cases where the call fails, it goes to dial-peer 2 provided that the cause is not busy (**huntstop busy** command). Through the **ras retries 1** and **ras timeout 2s** commands the failure time is limited in cases where the gatekeeper does not respond in 4 seconds after which the call is tried through dial-peer 2 which makes telephones 311 and 312 ring if they are registered and the corresponding dynamic dial-peer exists. In addition, in these local calls to the office the G.711 codec is used as the quality is better.

The 4 second delay can be avoided when checking the connectivity with the gatekeeper through an NSM/NSLA poll (see manuals bintec Dm749-I NSM and bintec Dm754-I NSLA) which monitors the connectivity and consequently activates or deactivates the dial-peer 10 through the **track nsia-advisor <id>** command.

Finally you need to add dial-peer 21 so that the calls to other offices through the internal numbers are redirected to the telephone network through a change in the called number. This dial-peer has **destination-pattern 3..**, therefore, so that the calls to the office itself are correctly sent to the locally registered telephones and not to the telephone network, dial-peer 30 is added which has a more specific dial-peer (**destination-pattern 31..**) and matches the local calls to the office so the destination is looked for in the registered H.323 telephones (**target dynamic**).

The configuration proposed for office 01 is as follows:

```
log-command-errors
no configuration
global-profiles dial
; -- Dial Profiles Configuration --
  profile voip default
  profile voip inout
  profile voip isdn-type audio
;
exit
;
telephony
; -- Telephony configuration --
  dial-peer 10 h323
    description "ISDN incoming calls to the gatekeeper"
    codec g7235k3
    destination-pattern 911111111
    huntstop busy
    target gatekeeper
  exit
;
  dial-peer 11 group
    description "ISDN incoming calls if gatekeeper fails"
    codec g711alaw
    destination-pattern 911111111
    huntstop all
    target group 1
  exit
;
  dial-peer 20 voice-port
    description "Telephone network calls"
    destination-pattern .....
    destination-pattern 0.T
    destination-pattern 1.T
    target voice-port voip1/0 1
  exit
;
  dial-peer 21 voice-port
    description "Automated attendant calls"
    destination-pattern 3..
    outgoing prefix 910000000
    outgoing strip-digits 3
    target voice-port voip1/0 1
  exit
;
  dial-peer 30 h323
    description "Internal calls in survival"
    codec g711alaw
    destination-pattern 31.
    target dynamic
  exit
;
  peer-group 1
    dial-peer 30 311
    dial-peer 30 312
  exit
;
exit
;
network ethernet0/0
; -- Ethernet Interface User Configuration --
  ip address 172.1.1.1 255.255.255.0
;
exit
;
network voip1/0
; -- VoIP interface Configuration --
  base-interface
```

```
; -- Base Interface Configuration --
    base-interface bri1/0 255 link
    base-interface bri1/0 255 profile voip
    base-interface bri1/0 255 number-of-circuits all
;
    exit
;
    exit
;
    network voip1/1
; -- VoIP interface Configuration --
    base-interface
; -- Base Interface Configuration --
    base-interface bri1/1 255 link
    base-interface bri1/1 255 number-of-circuits all
;
    exit
;
    exit
;
    protocol h323
        application address 172.1.1.1
        application gateway
        application gatekeeper
        gatekeeper address 172.24.51.47
        gw name Gateway01
        ras retries 1
        ras timeout 2s
    exit
;
    dump-command-errors
end
```