

H.323 Extension

DESCRIPTION



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GENERAL

Unless otherwise is stated the information in this document is valid H.323 extensions (IP extensions using H.323 signaling). Regarding SIP extension (IP extensions using SIP signaling), see separate description *SIP extension*.

H.323 extension is a facility in the MiVoice MX-ONE Service Node that allows the data network to transmit voice communication. Using TCP/IP the MX-ONE converts voice into packets before transmitting them over the IP network, where they are unpacked at the other end.

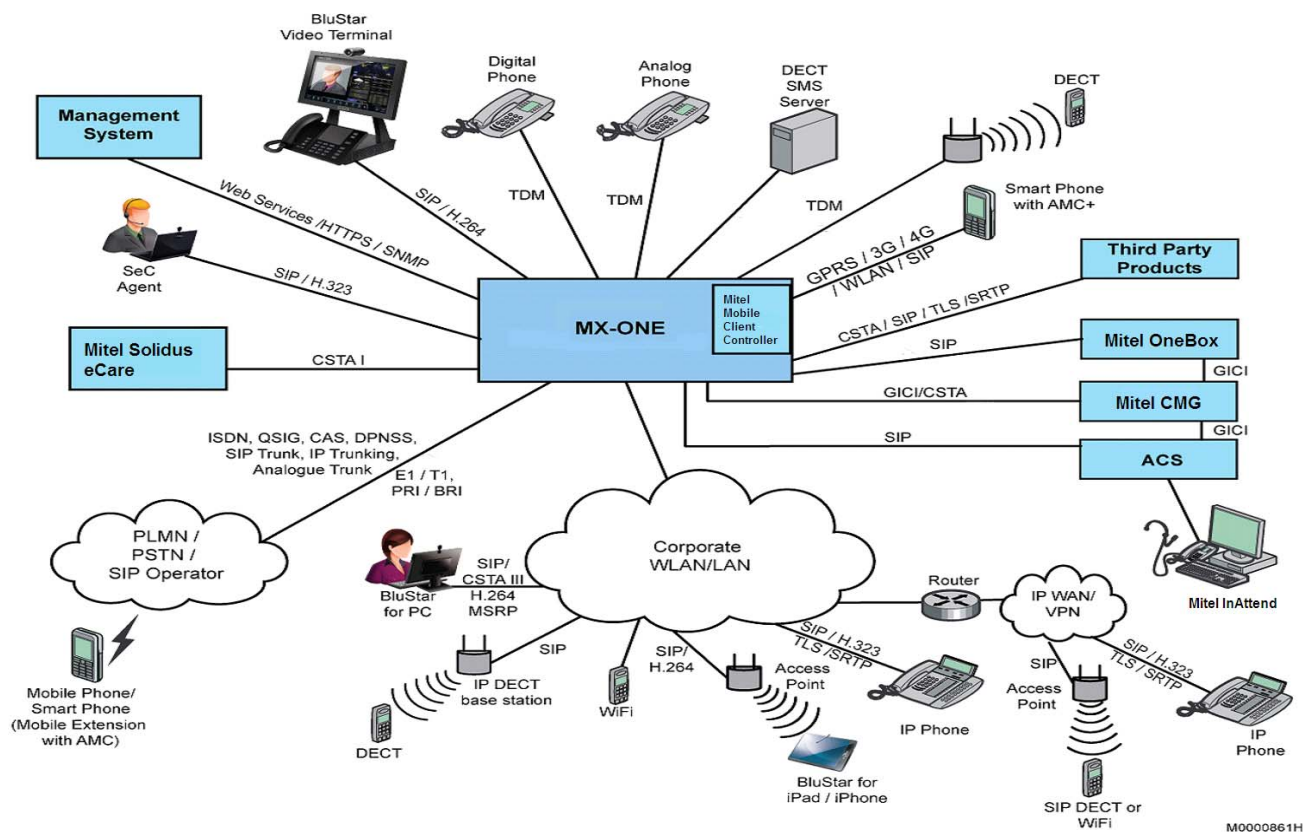


Figure 1: MX-ONE Telephony Scenario with H.323 extensions (and other end points)

Users at remote small offices can connect their terminals to the system. The MX-ONE Service Node grants access to and provide services for these terminals.

1.1

GLOSSARY

For a complete list of abbreviations and glossary, see the description for *ACRONYMS, ABBREVIATIONS AND GLOSSARY*.

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INTEGRATION IN THE MX-ONE SERVICE NODE

The H.323 extension feature is fully integrated in the MX-ONE Service Node architecture. This feature allows the H.323 terminals to call and be called, as any other type of extension in the MX-ONE Service Node.

For Non-Gateway (NGW) calls between two H.323 terminals, the media are directly transmitted from one endpoint to the other.

For Gateway (GW) calls to and from an H.323 terminal, the media is transmitted through the MX-ONE Media Gateway.

A detailed explanation of every component needed to make the H.323 extension work, is given in the following subsections.

2.1

H.323 EXTENSION

The H.323 extension feature allows terminals that are compliant with H.323 ITU-T standards, IETF RFCs, to connect to the MX-ONE Service Node. These standards give recommendations for multimedia communications over IP networks. The term IP extension includes both H.323 and SIP extensions.

The H.323 extension is implemented as a generic extension.

2.2

H.323 TERMINALS

The name *H.323 terminal* is used basically to refer to any H.323-compliant terminal attached to the IP network. It can be either an IP telephone or an IP PC client, also called softphone.

The H.323 terminals that are compliant to H.323 Version 2 and additionally support the proprietary protocol to communicate with the MX-ONE Service Node, are called MX-ONE H.323 terminals.

The H.323 terminal makes use of the mobility concept. That is, the user can log on to the MX-ONE Service Node using any compliant terminal and will get the capabilities profile defined for this specific user. Once the user has logged on to the system, the terminal becomes an H.323 terminal. The way to log on is by entering the extension number and optionally a PIN code, which is checked against the one stored by the system. The PIN can be changed by the end user.

2.3

IP NETWORK

The term IP network here embraces any kind of data network with the TCP/IP protocol, regardless of the underlying type of network. Most enterprises are comprised of a Local Area Network (LAN) for connecting IP devices, such as PCs, servers and printers. The MX-ONE Service Nodes, Media Gateways and IP terminals are connected to the LAN using 10/100 Mbit Ethernet interfaces. That is, other types of data networks (over FDDI, Token Ring, ATM, and so on) cannot be used to connect directly to these devices.

A corporate IP network can be comprised of several LAN segments, each with its own address range, which can reside on the same physical site or be spread over several locations. Several LAN networks spread over multiple sites can be inter-connected via

a Wide Area Network (WAN). This is usually accomplished using routers communicating via service provider connections between the sites. The underlying protocol (xDSL, ATM, MPLS, ISDN, etc...) is irrelevant as long as the routing protocol is IP.

In case a Dynamic Host Configuration Protocol (DHCP) server is set up correctly in the IP network, the server can provide an IP terminal with a network domain name.

2.4

MX-ONE MEDIA GATEWAYS

The different MX-ONE Media Gateways provide media transmission for GW calls (RTP and RTCP handling).

For an overview of the different Media Gateways, see the MX-ONE SYSTEM DESCRIPTION.

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FUNCTIONAL OVERVIEW

In order to completely integrate the IP extension in the MiVoice MX-ONE Service Node architecture, two functions are needed:

- The **Gatekeeper or Proxy** function.
 - H.323: The Gatekeeper, which basically deals with address translation, bandwidth management, admission control, and call management regarding IP terminals.
- The **Media Gateway**, which provides real-time, two-way communication between H.323 terminals on the IP network and other terminals in the circuit-switched network, or IP terminals in other IP networks.

In the MiVoice MX-ONE the gatekeeper and the registrar functions are handled in the same way.

Media (for example voice, video or text message) transmission in calls between an H.323 terminal and any other type of extension or trunk is made through the MX-ONE Media Gateway. Media transmission between two H.323 terminals belonging to the same IP network can pass directly through the IP network.

The gateway entity is composed of software and hardware, see Figure

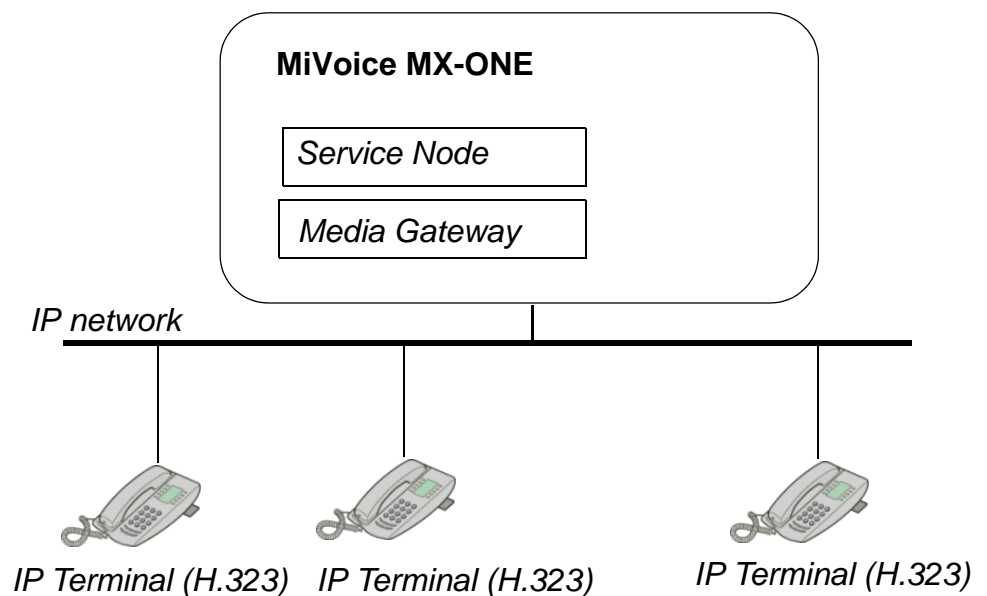


Figure 2: System Architecture, with H.323 extensions

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IP NETWORK CONFIGURATIONS

See the description for *MX-ONE SYSTEM PLANNING*, for example in the chapter IP Network Structure.

Note: The user phones and terminals should normally be located on a subnet, separate from the server and media gateway network or networks.

5 FACILITIES

5.1 TRAFFIC

Before an H.323 terminal can make a call or receive a call, a registration procedure has to be executed by the user, see 6.2 Registration on page 10 .

If an H.323 terminal is logged out or switched off, any call towards that terminal will not progress (the terminal is marked as unavailable in the MX-ONE Service Node).

For calls between an H.323 terminal and other types of extensions the Speech and 3.1 kHz Audio bearer services are supported (3.1 kHz Audio bearer service is only supported for calls received by the IP terminal). This means that calls between an H.323 terminal and other types of extensions can only exchange voice.

For calls between H.323 terminals within the same IP network there are no limitations regarding the bearer services (unless the IP terminals set any restriction). The reason is that the media are transmitted directly through the IP network. So, the Service Node cannot set any restriction to the media transmission. This means that calls between H.323 terminals within the same IP network are able to exchange voice, video and data without limitation. However, calls between H.323 terminals in the same network can be forced to be GW. In such cases the bearer services are limited by the media gateway.

When an H.323 terminal receives a call, the Service Node sends to the terminal the own extension directory number and the calling party directory number. The MX-ONE IP terminals receive additional information from the Service Node that can become visual and audible messages (information related to numbers and names, call progress, service execution). How these messages are handled by the terminal is dependent on its type.

When an H.323 terminal initiates a call, the Service Node only informs the terminal about the call progress (call establishment, call release, and so on). As above, the MX-ONE IP terminal receives from the Service Node additional information that can become visual and audible messages.

5.2 SERVICES

Most of the common telephony end user services, such as:

- number and name identity services
- do not disturb, group/individual
- forwarding/Personal number list
- callback
- call parking pool
- call pickup
- group memberships
- intrusion
- MNS multiple representation
- multiple terminal support
- parking
- transfer

- and other...

are supported for IP/H.323 extensions. Some of the services are also supported for third party H.323 extensions.

See the description for *MX-ONE FEATURE MATRIX* for the services are available for IP/H.323 terminals .

For information about a service available for the IP/H.323 extension, see the appropriate description of the service.

6

PROCEDURES

6.1

GATEKEEPER ADDRESSING

The terminal needs to know the server IP address. The server address can either be provided in configuration files or can be discovered by the terminals using Automatic Gatekeeper discovery for H.323.

Note: For MiVoice MX-ONE version 5.0 and later, the SIP proxy and registrar servers are addressed in a similar way as the H.323 gatekeeper servers, which means that these IP terminals can be treated in the same way.

6.2

REGISTRATION

Before an H.323 terminal can make or receive a call, the following steps must be taken:

- The terminal must be initiated in the MX-ONE Service Node as an H.323 extension.
- The terminal must know its own IP address. This address may be manually entered or may be acquired through a DHCP server. The DHCP server can also provide information about the name of the network domain the terminal belongs to. The MX-ONE IP terminals are able to understand this domain name information.
- The terminal must know the IP address of the MX-ONE Service Node where to request access to the system. This is handled by the Home Location Register (HLR) mechanism. See chapter 6.4 Initiation and Registration Distribution on page 11.
- The terminal must be manually set up with its associated directory number.
- Finally, the H.323 terminal sends its PIN code to the exchange to verify its identity, allowing its entry into the system under the user's request (see chapter 6.3 Authentication on page 10). The access to the system will be granted by the H.323 gatekeeper.
- For H.323 terminals/clients it is allowed to register one terminals to the same directory number. When one IP/H.323 terminal is already logged on when another logon is done, a 'push-out' (de-registration) will be done, of a terminal of the same type. See description for MULTIPLE TERMINAL SERVICE for details.

6.3

AUTHENTICATION

Authenticating an H.323 terminal means verifying its identity to allow its entry into the system. This procedure is always invoked in connection with the registration procedure.

When the IP terminal is initiated in the MX-ONE Service Node, the system administrator has to configure a Regional Authorization Code (RAC) for the IP terminal directory number which will be used as the PIN code. The user of the IP terminal needs to enter this PIN code in order to get registered in the system. The PIN code entered is compared to the RAC stored in the MX-ONE. The registration procedure is successful if the PIN code matches.

Note: If the IP terminal has been initiated in the MX-ONE Service Node without RAC, it is checked that no PIN code is provided by the IP terminal user.

If the authentication procedure is successful, the user gets the traffic categories associated with the IP terminal directory number.

In the case of an MX-ONE IP terminal, the MX-ONE Service Node will provide the terminal with its directory number and name, and information related to services that either are active or can be invoked from the terminal. If the terminal is not an MX-ONE IP terminal (standard IP terminal), all this information must be handled by the terminal itself.

EDNs can have separate passwords (Authorization codes), which can be different from the Line1 password. See description for AUTHORIZATION CODE FOR EXTENSION.

6.4 INITIATION AND REGISTRATION DISTRIBUTION

6.4.1 GENERAL

The initiation and registration distribution function applies to all generic extensions and thus here also for H.323 extension.

The function has two parts, initiation and registration (logon).

At initiation the HLR can be set to a selected server or, by using the initiation distribution function to let the system decide in which server of a domain it shall be located.

At registration the first choice of where to place the User Location Register (ULR) is always in the same server as the HLR. If the optional registration distribution is selected the ULR can be created in an other server of the domain, if the HLR server can take no more registrations. If the servers of the domain are full a server in an other domain, where there is registration capacity, will be selected by the system for creating the ULR.

It is mandatory to use an IP domain when using initiation/registration distribution, even if only one domain is used. It is important to define the IP networks that are part of the domain. There is a default domain for the whole system.

The initiation/registration distribution facility also requires terminals that support the load distribution mechanism. The following models support this type of distribution: DBC 4xx in H.323 mode.

For initiation/registration distribution to work, the MiVoice MX-ONE should either contain domains with local servers or a centralized server farm where domains do not have any servers locally.

Note: That the "load distribution" mechanism described here is quite different from the one used in MX-ONE Version 3.2. Effective distribution requires proper planning.

6.4.1.1

Initiation

When a generic extension is initiated an HLR is created for this extension in a Service Node. If the initiation/registration distribution function is used, the server selected is based on the capacity of the server and how many registrations that have already been done towards it. The HLR holds the static data that is initiated in the command for the extension.

The IP/H.323 extensions are initiated to their geographical domains or explicitly to selected servers.

If there are Service Nodes in the H.323 extension domains, they should be set to be part of the domain they reside in. When the H.323 extensions are initiated in a domain that contains more than one Service Node, HLRs will be created in the different servers depending on the server capacities. If the maximum HLR capacity has been reached for the domain, a server in another initiated domain will be selected if it has HLR initiation capacity left. If no more HLRs can be initiated an error will be indicated.

In case of a server farm, where all Service Nodes are located in one place and the IP terminals are located at different domains, there is no HLR capacity in the domains so all HLRs will be created at the server farm. The servers will belong to the default, system domain. The maximum number of terminals in a server can be set by command.

6.4.1.2

Registration

When an initiated IP/H.323 extension is logged on to the system a ULR is created in the Service Node. The ULR keeps track of the dynamic data for the extension. The system will try to create the ULR in the same Server as the HLR to minimize the signaling load between these records. If the number of ULRs in a server has reached the maximum value and the initiation/registration distribution function is used, the ULR will be created in another server of the domain where there is free capacity. If no ULR capacity is found in the own domain, the registration will be attempted in an other domain. This will increase the possibility to make successful logons, but as the ULR is allocated in an other domain, the call performance will be degraded.

The ULR load distribution is disabled by default, but can be enabled by command.

6.5

CALL ADMISSION CONTROL

The lowest common bandwidth between two domains can be set by command.

For a current description of Call Admission Control, see the operational directions for CALL ADMISSION CONTROL.

6.6

SECURITY

Media encryption according to SRTP is supported for some models of H.323 extensions, both for GW and non-GW calls, provided all end-points support SRTP. Three different security policies are supported, and can be selected via O&M.

The supported crypto suites are the standard ones according to RFC 4568, plus a proprietary one corresponding to AES_CM_128 without HMAC_SHA1_80/32. If any other crypto suite is received, the call will be rejected.

Emergency calls will override security policy restrictions.

6.7

REDIRECT CALLS TO MAROONED IP EXTENSIONS

This procedure allows incoming calls to marooned H.323/IP extensions to be re-directed to a back up answering position defined on a per-extension basis. For more information, see Figure 3.

The typical scenario where this function is useful is branch offices connected to the main PBX by means of an IP link.

If no special provisions are made, the H.323/IP extensions in the branch office will be unable to make or receive calls if the IP link between the branch office and the main office goes down.

Nevertheless, it is possible to provide voice service to users in the branch office when the IP connection is down, according to the following criteria:

- A backup answering position number must be provided for H.323 extensions located at the branch office. These backup positions must be public network numbers. These numbers must be handled by a branch node installed on the branch office premises.
- H.323/IP extensions at the branch office must be configured to periodically re-register to the Service Node. If an H.323 extension fails to re-register on time, the Service Node will consider it to be marooned and will redirect incoming calls to its backup answering position.
- H.323/IP terminals (in particular DBC 4xx/Mitel 74xx) at the branch office, when getting no reply to the reregistration requests sent to the Service Node, will automatically register to the branch node. Other IP terminals must be manually registered on the branch node, or accept calls directed to the H.323 telephone from static configuration.
- The branch node must be configured to associate every IP extension with its corresponding backup answering position as defined in the Service Node. The branch node must also be configured to have the same numbering plan as the Service Node so that users can dial the same directory number to reach a given destination regardless of whether they are registered in the Service Node or the branch node.

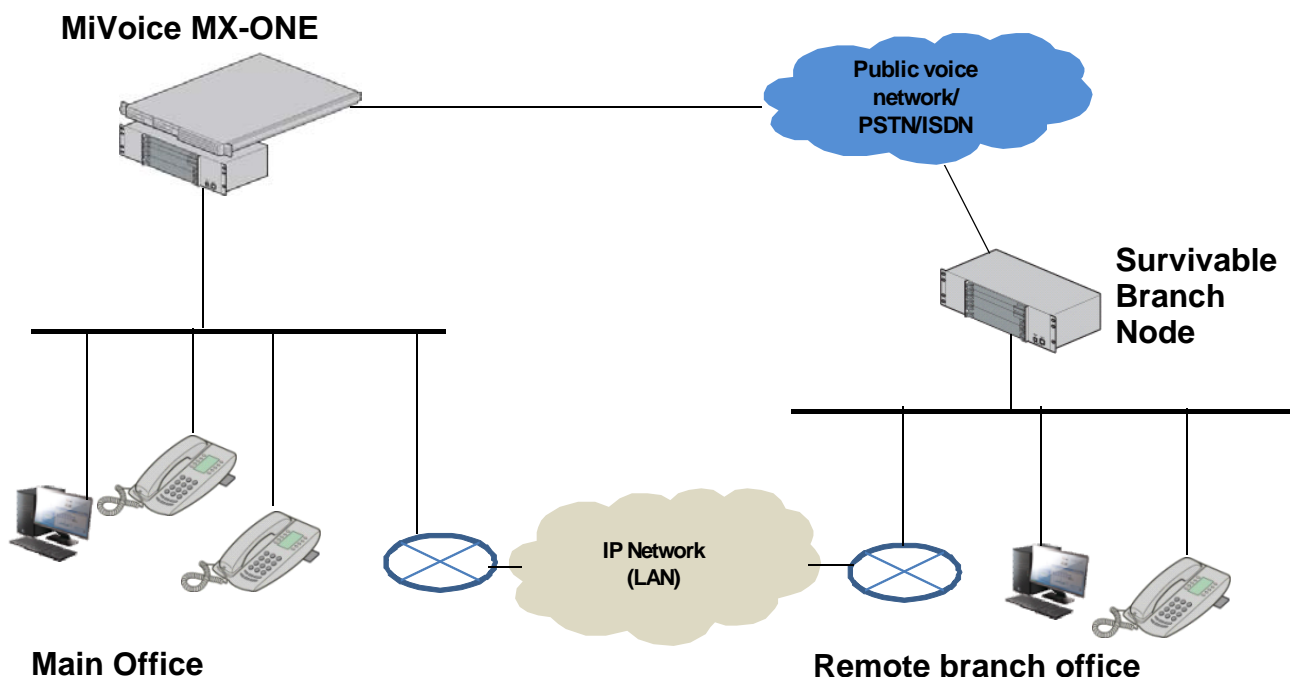


Figure 3: Branch Office with Marooned Extensions Scenario

Summarizing, the redirect calls to marooned IP extensions functionality, combined with properly configured IP terminals and a branch node on the branch office premises, make it possible for users of IP extensions at the branch office to make calls and to receive them on their usual directory number when the IP connection between the branch office and the main office is down.

Note: For an H.323 extension to be tagged as marooned, it must fail to re-register within the agreed-upon time span. This means that, for an H.323 extension to become marooned, it must be registered when the network connection goes down.

6.8

AREA CODE PER EXTENSION

It is possible to associate a home area code to an H.323 extension during extension initiation. This facility allows, in conjunction with the Least Cost Routing functionality, modification of the number dialed by an H.323 extension in order to route the call properly.

The typical scenario where this facility is useful is a branch office scenario, see chapter 6.7 Redirect Calls to Marooned IP Extensions on page 12 , where in addition it is required to route the public calls through the local branch node at each branch office, but dialed public numbers may contain no area code.

The home area code is added to the dialed public number by means of the LCR Number Length Table. For details on Least Cost Routing see the extra facility description for *LEAST COST ROUTING*. The home area code is, in this case, the area code associated to the calling H.323 extension. For the Branch Office scenario with area code, see Figure 4.

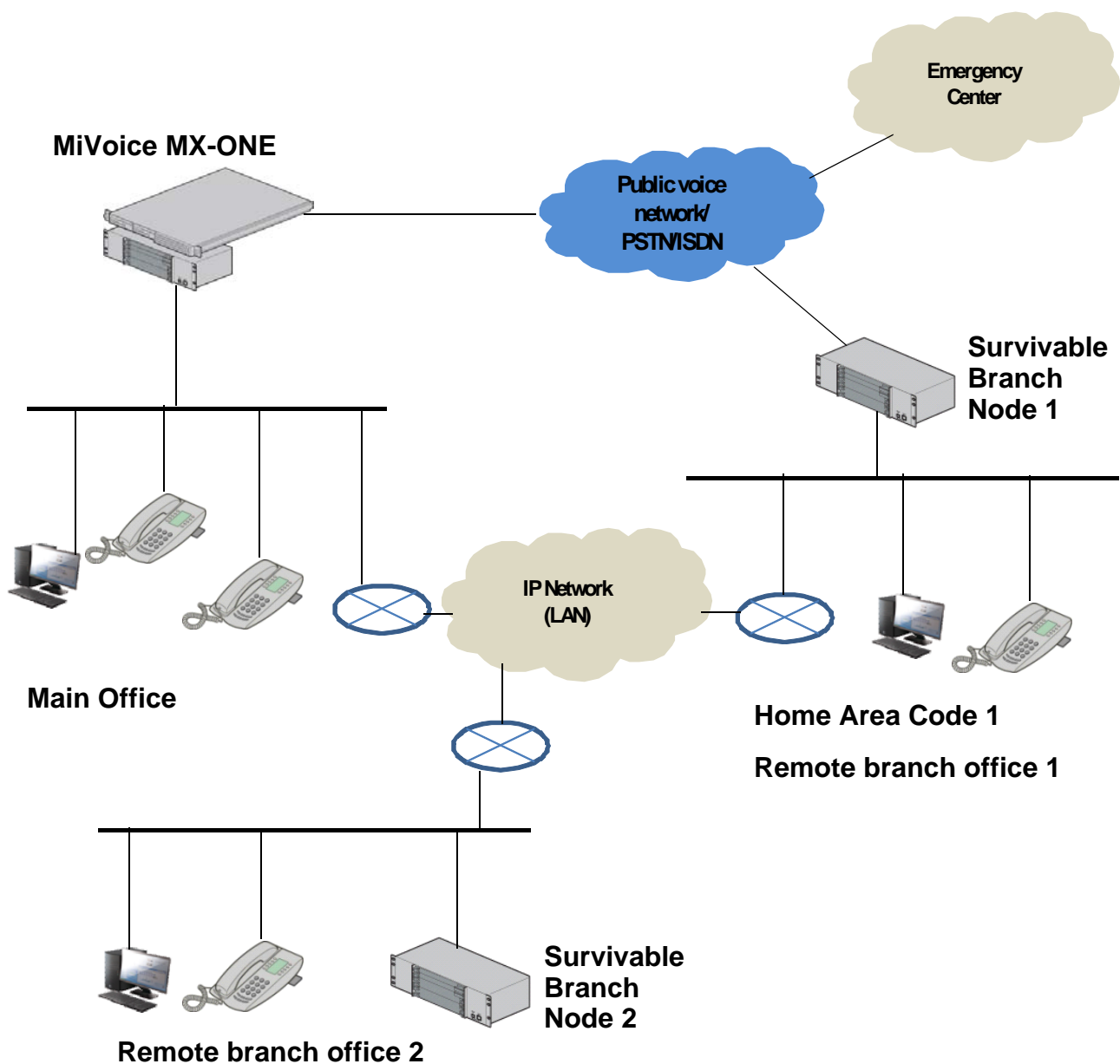


Figure 4: Branch Office scenario with Area Code

Having IP routes between the main office (where the calling H.323/IP extension is registered) and the branch node at each branch office, and having different destinations related to the area codes, the call can be routed towards the branch node in the calling party's branch office due to the added area code. The branch node is set up so the call is routed to the PSTN.

The home area code only takes effect if the LCR access code (LAC) and the LCR tables are set correctly.

If the calling party is one of the following the LAC and LCR tables are set to translate public dialed numbers:

- a non-IP extension
- an IP extension that does not have an associated home area code

The area code that will be added is the one associated to the calling party LIM. See the description for *LEAST COST ROUTING*.

6.9 AREA CODE PER DOMAIN

It is possible to associate an area code to a network domain. This facility allows, in conjunction with the Least Cost Routing functionality, modification of the number dialed by an IP extension in order to route the call properly. The domain area code works similarly to the home area code with the exception that only domain area code is used for Emergency Calls.

6.10 CALL PARK POOL

For H.323 extensions, the Call Park Pool feature is available, i.e. a call in speech can be parked 'remotely', by transferring it to a dedicated hunt group member, from which the call can be picked (answered) from any extension in the same system. A recall to the parking party can be done if the call is not picked within a few minutes.

See the operational directions for *CALL PARK POOL* for details.

6.11 EMERGENCY CALLS, SOS CALLS

This facility enables any registered H.323 terminal type to make emergency calls, SOS calls, to an emergency center. The DBC 4xx and Mitel 74xx terminals are able to make emergency calls even when they are logged off from the exchange.

It is also possible for the emergency center to dial back to the IP telephone which calls to the emergency center or to a pre-defined central answering position.

For further information, see operational directions for *EMERGENCY CALLS, SOS CALLS*.

6.12 HLR REDUNDANCY

HLR backup/HLR redundancy is a feature that provides back-up registration of certain IP extensions, when the ordinary HLR no longer can be accessed. After the process (called change-over) has taken part, a different (LIM) server hosts the temporary back-up HLR. To be able to create the backup HLR, an external database (LDAP) with replication functions is used. The ULR will register towards the backup HLR.

If the ordinary HLR recovers, a re-registration (change-back) towards this HLR will be performed. In order to not overload the server of the ordinary HLR, the re-registration will be done with a delay and distribution in time.

There is no need for the user to start the change-over or the change-back process, when HLR redundancy is activated. The system or the terminal will detect if the conditions for the change-over (or the change-back) process is fulfilled.

The conditions for change-over are the following:

- Ordinary HLR server (LIM) is out of order
- Isolation of ordinary HLR server (LIM) isolation
- Manual blocking of entire server (LIM)

Some services, like group functions and busy/queue functions are lost while registered to the backup HLR. Some services that depend on common/centralized resources may also be lost depending on configuration.

The HLR backup feature is activated/deactivated on system level, using commands. The default setting is inactive state.

For further information, see the description for *HOME LOCATION REGISTER REDUNDANCY*.

7

CAPACITIES AND LIMITATIONS

Only one IP network, or two at redundancy, can be connected to a particular MX-ONE Service Node.

The H.323/IP terminals can only be addressed by their directory number. Other types of addressing such as E-mail address and URL address are not allowed in MX-ONE Service Node for IP terminals.

The H.323 terminals cannot be included as a member in an ACD group, but can be agent phone in a CTI group.

The gatekeeper address must be manually set in the H.323 terminals since Automatic Gatekeeper Discovery is not supported by MX-ONE. This is true even when the H.323 terminals support the associated protocol messages, for example, multicast. However, as load distribution procedures are supported, the IP terminal may be registered in another LIM (gatekeeper) than in the LIM where the gatekeeper address was manually set.

Load distribution requires that the different domains either contain terminals and servers or, for the server farm case, only terminals.

MNS keys are supported by the following MX-ONE H.323 phones: DBC4xx/Mitel 74xx.

Extra Directory Numbers (EDN), Shared Call Appearance (SCA) and Intercom services are not supported for H.323 extensions.

Instant messaging calls (using MSRP) is not supported for H.323 extensions.

Forking is supported, but only with one H.323 terminal, together with another generic extension type.