Survivable Branch Node, SBN, for Mi-Voice MX-ONE

DESCRIPTION

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1   GENERAL

For branch offices with requirements on local trunks and survivability, the MX-ONE solution offers two versions (from MX-ONE 6.0 SP1). A remote MX-ONE unit (MX-ONE Service Node and a media gateway) that is a part of the central system or a stand alone, separate MX-ONE system, an MX-ONE SBN. This document describes the second scenario.

Under normal operating conditions, IP telephones at branch offices are registered with and handled by the main node. In case of breakdown of the IP network, the telephones automatically register to the local MX-ONE SBN. Thus, the IP telephones keep the full capacity for handling local calls as well as external calls routed through the local MX-ONE's public network trunk lines. Upon restoration of the IP network, Mitel IP telephones can (if appropriate configuration is used) automatically register back to their main node and recover normal operating conditions.

The MX-ONE SBN is available in different packages depending on the public trunks used at the local office. Local users may only be IP end points that are normally registered with the central node. The MX-ONE SBN is delivered with a specific license file that in principle only allows basic telephony services for up to 100 IP telephones and two trunk routes, one to the PSTN and one to the central MX-ONE. Features like multiple terminal service, Hunt groups, CSTA, voice mail, operator etc. are prevented from being installed in an SBN.

Note: This document describes the principles from both a SIP telephone and an H.323 telephone perspective. Refer to Installation instruction for Mitel 6900/6800/6700 terminals in MX-ONE, 26/1531-ANF 901 14 Uen section 11.29 Registration at Branch Offices, for details on settings and limitations for Mitel SIP telephones. Refer to Dialog 442x and Mitel 744x Installation instructions for H.323 telephones.

1.1   ACRONYMS

CoS	Class of Service
GK	Gatekeeper
GW	Local Area Network
H.323	ITU-T Standard for IP telephony
LAN	Primary Rate Access
PRA	Primary Rate Access
PSTN	Public Switched Telephone Network
RRQ	Registration Request
Registrar	SIP Registrar (equivalent to GK)
SBN	Survivable Branch Node
SIP	Session Initiation Protocol, IETF Standards
WAN	Wide Area Network

2 MX-ONE SBN SOLUTION

The MX-ONE survivable gateway solution is intended to provide a remote site surviv-ability service for up to 100 SIP or H.323 IP telephones, located in remote branch offices but normally registered at head quarters, when the IP network is out of service. An advantage of using MX-ONE as survivable gateway is that management, function-ality and end user data can be virtually identical for the different logical systems.

The local MX-ONE may also be used to offer long-distance toll bypass to any user in the corporate network. The intent is to reduce the public long distance or international traffic costs for outgoing public calls originated by any user in a corporate IP network, using the public network resources available in the network node which is in the most immediate vicinity of the public call destination. Note that A-number can normally not be provided for outgoing calls using this method.

2.1 CONFIGURATION

The equipment at the branch office is a specific MX-ONE package with an ASU server and a media gateway for appropriate public trunks.

The branch office has a number of local IP users and a basic call (no network services) configured IP trunk, a choice has to be made between SIP or H.323 for users and the IP trunk.

Users must be defined in both the central main system and in the branch system. Note that visiting users will not be covered by this survivability feature unless they are defined as local users. Note that users covered needs user licenses in both systems, the sales object for SBN users are "survivable SIP" and have a significantly lower price than ordinary SIP extensions.

2.1.1 CONFIGURATION FOR UP TO 200 SBNS

The IP trunks shall be configured with different route access codes in the central and local system and it is recommended to use the IP address per route to reach the correct branch.

Note that this method limits the number of SBNs as the central MX-ONE can handle a maximum of 250 routes.

For the central site, all PSTN routes in a local system must be defined as an own route as there must be a one to one relation between the IP trunk and its corresponding PSTN trunk. LCR needs to be configured in the main node primarily to get proper handling of branches located in different area codes and also for correct routing of emergency calls. There is no absolute need for LCR in the MX-ONE SBN as there is only a single route for PSTN access and the area code is well known. If area codes are not used or if more than one branch is situated in the same area, a fictitious area code must be used.

However, if it is required that users in an isolated branch shall be able to dial users in the rest of the system with the normal extension number, the extension numbers of users that are not defined in the local system must be defined as external destinations in order to allow MX-ONE to overflow such calls via the public network. Assuming that the downtime of the IP network is minimal, we do not recommend use of this complex configuration unless a high number of business critical calls are made during such shorter breaks of service.

User data can be identical, except for features that are not supported by the SBN. For correct routing of calls to the users, their call list shall have own directory number in first position and own directory number prefixed with the local route access code as second. This route access code shall be a vacant number in the main node.

It is recommended to configure the back-up number for the users. When the IP network fails, registered users can not send their keep alive signals and are marked as marooned by the system. Calls to a marooned user will be distributed by the active call list (Personal Number) in which the users own number will be replaced by this back-up number.

If emergency calls for users that are not logged on must be handled, the SBN needs a specific route for this purpose.

2.1.2 CONFIGURATION FOR LARGER SOLUTIONS

If more than circa 200 SBNs must be handled, SIP is the only option.

Using SIP, a single route is sufficient in the central MX-ONE if an E-NUM server is configured to address the correct branch for outgoing calls towards the public network.

For redundancy and as E-NUM only provides a single IP address, it is recommended to use two SIP routes with different IP addresses to two different E-NUM servers.

LCR programming is still required in order to insert appropriate area code and to handle emergency calls. It is also recommended in order to directly route calls intended to go out via the main MX-ONE.

2.2 NORMAL MODE OPERATION

Under normal operating conditions, i.e. when the IP network used as backbone for the corporate network is in operation, IP telephones at a branch office are directly supported over the IP network by the main MX-ONE H.323 gatekeeper (for H.323 terminals) or SIP Registrar (for SIP terminals), which they are registered to.

That allows branch office users to have access to the same range of features and services as IP telephones users connected locally on the main site.

The local PSTN trunk is simply using the local MX-ONE as gateway between PSTN and an IP trunk that is used as connection between central and remote site.

Calls placed to and from the branch office users are processed by the main node. In the case where the local PSTN is involved in the call, the main node handles the call from a logical perspective via the IP trunk. As long as the users do not have CoS "forced gateway", direct media is used and no WAN resources are needed for local calls to/from PSTN.

In normal operation, calls originating in the local office (only applicable for incoming trunk traffic) will find all users logged off and route the call to the main office. Net services shall not be configured in order to make the call appear in the main node as a basic call without network services.
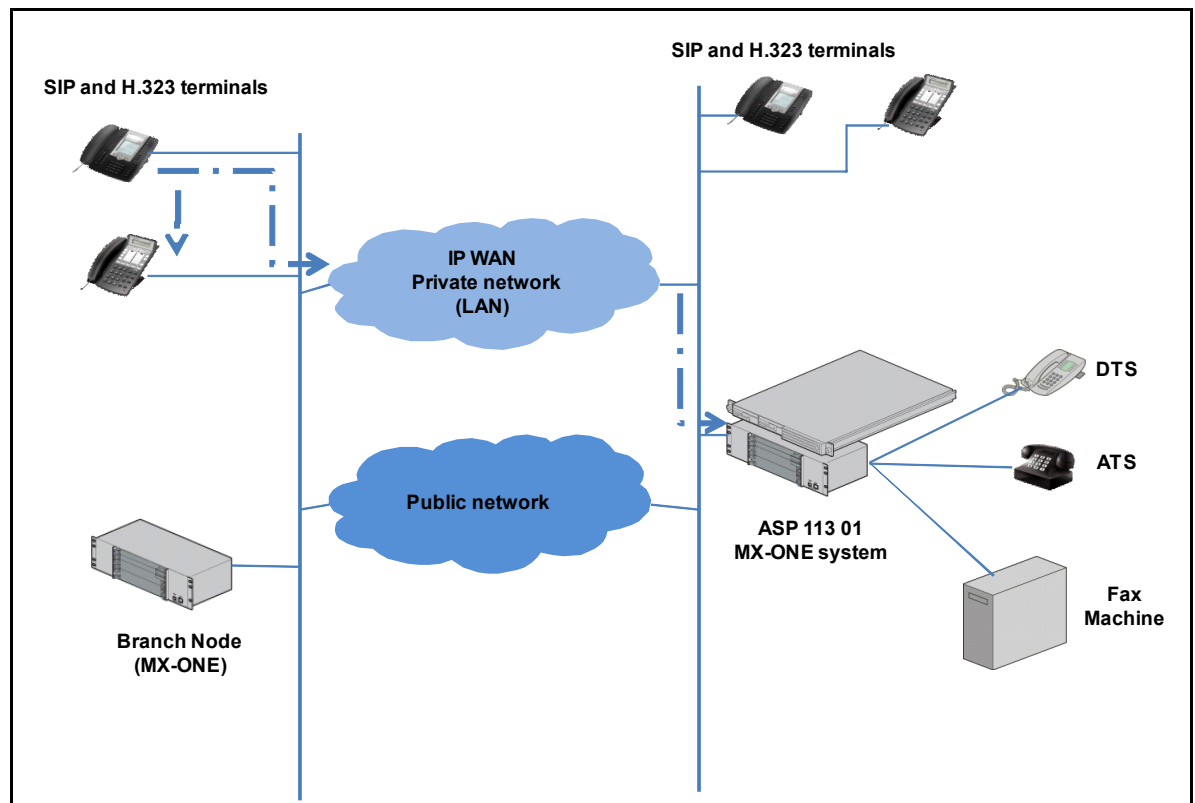
Figure 1:   Operation in normal mode.

2.3   ISOLATED MODE OPERATION

With an MX-ONE SBN at each remote branch office location, a survivability service is offered to remote branch office IP telephone users under circumstances when the corporate IP network is out of service.

Should the corporate IP network fail, IP telephones have a mechanism to automatically detect the loss of the IP network connection. This is based on a heartbeat mechanism using H.323 RRQ or SIP Re-Register messages that is always active, both during and between calls.

The Mitel 6900/6800/6700 SIP and H.323 telephones (of the models that support it) will sense the loss of the IP connection and, as a consequence, automatically re-register to their defined back-up SIP Registrar(s) or back-up H.323 gatekeeper. The identity of the back-up SIP Registrar(s) is obtained either from DNS or from the telephone's configuration file. The identity of the back-up H.323 gatekeeper is obtained from the telephone's configuration file.

Each IP telephone user must be defined in both local and central MX-ONE. For H.323 telephones there is an indication to the user that the telephone is in back-up mode (a flashing triangle in the lower right-hand corner of the display).

In the central system, when these keep-alive signals are not received, the user will be marked as marooned and calls to such a user are distributed to the back-up number, if specified.

When re-registered with the local MX-ONE, the IP telephones keep the full capacity for handling local calls as well as external public calls. Calls from and to the local IP telephones are now processed by the local MX-ONE.

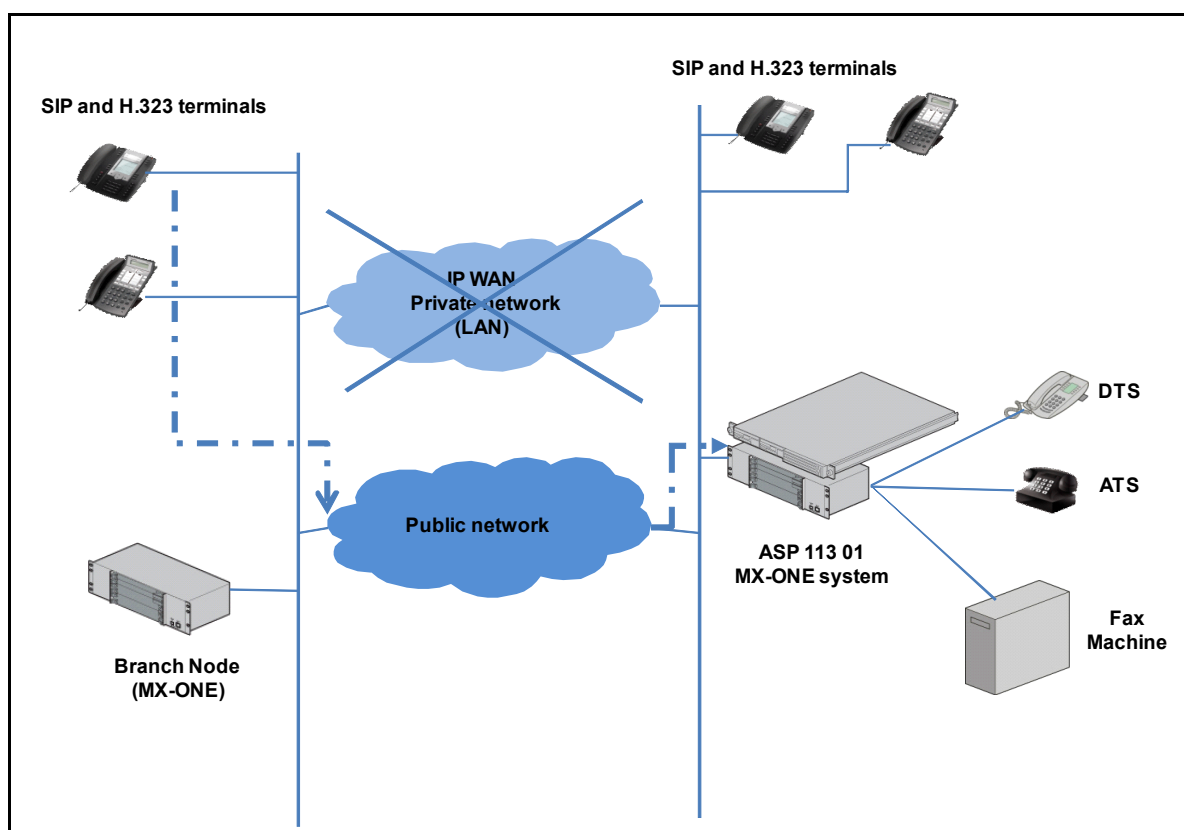This also guarantees local emergency call handling.

Figure 2: Operation in backup mode.

2.4 RESUMING THE NORMAL MODE OF OPERATION

As soon as the connection over the corporate IP network is re-established, the Mitel IP telephones (of appropriate model and configuration) detect this fact, using the same heart-beat mechanism as defined above. Then they automatically re-register back to the main MX-ONE node defined as their primary/secondary SIP Registrar or H.323 gatekeeper, and recover their normal operating conditions.

Any ongoing call with an IP telephone continues normally and the switchover will occur automatically when the IP telephone finishes the call.

Again, aside from the flashing triangle (for H.323 telephones), the branch office users will not be aware of the change in one direction or the other as the operation of the IP telephones is intended to be identical in both cases.

3 LICENSES

The central system needs normal IP trunk and IP extension licenses.

The SBN comes as a package with required licenses and the users are a specific sales object, survivable SIP/IP extension.