

# Mobile and Fixed Remote Extension

## DESCRIPTION



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# 1 INTRODUCTION

This document describes the remote extension feature, which makes it possible to have public terminals as extensions.

## 1.1 TARGET GROUPS

This document is intended as an introduction to the remote extension feature for system administrators. It assumes a basic knowledge of telecommunications.

## 1.2 GLOSSARY

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

## 2

## GENERAL

The remote extension feature is implemented as generic extensions in the exchange. It is supported over the following signaling systems and protocols:

- ISDN trunk
- Digital Private Network Signaling System (DPNSS)
- Digital Access Subscriber System (DASS)
- Multi-Frequency Compelled R2 (R2 MFC)
- H.323 trunk
- Signaling System 7 (SS7)
- SIP trunk (see separate Operation Directions MOBILE AND REMOTE EXTENSION OVER SIP)

Two types of remote extensions are defined, each with its own level of functionality. One is called *Mobile Extension*, the other *Fixed Remote Extension*.

### 2.1

### MOBILE EXTENSION

A mobile extension can be any type of telephone, either a mobile telephone used in the PLMN or a terminal used in the PSTN or in a private network. It is possible to define additional public terminals that can alternate as answering position by dialing a procedure. These additional public terminals might have a DTMF key pad. In order to fully utilize the feature offered by the MX-ONE Service Node, these terminals should be able to convey digits, the asterisk or star sign (\*), and the hash sign (#).

A mobile extension user who calls a predefined number in the PBX by dialing either manually, using the phone book, or the calling card service and after executed validation, or by entering a valid PIN code will receive a dial tone from the PBX.

In order to simplify the call procedure for a user of a mobile extension, the PLMN network operator should offer prefixing of a dialed number and a direct access to the PBX. This means that the user only dials an internal PBX number to reach the desired person, and the predefined number is then added by the PLMN exchange.

### 2.2

### FIXED REMOTE EXTENSION

A fixed remote extension can be any type of telephone, either a mobile telephone used in the PLMN, or a terminal used in the PSTN or in the private network. When the fixed remote extension user makes a call, the call is established to a predefined number in the PBX. After validation of the received public calling party number, a dial tone will be sent to the terminal.

If a number presentation equipment is installed at the public terminal, calling number information will be received when a call is made from the PBX.

## 2.3 PBX APPLICATION

The user will get full access to the functionality and features as for a generic extension. Also, internal parties who make calls to the remote extension retain full functionality, such as callback, camp on from the PBX operator, and so on.

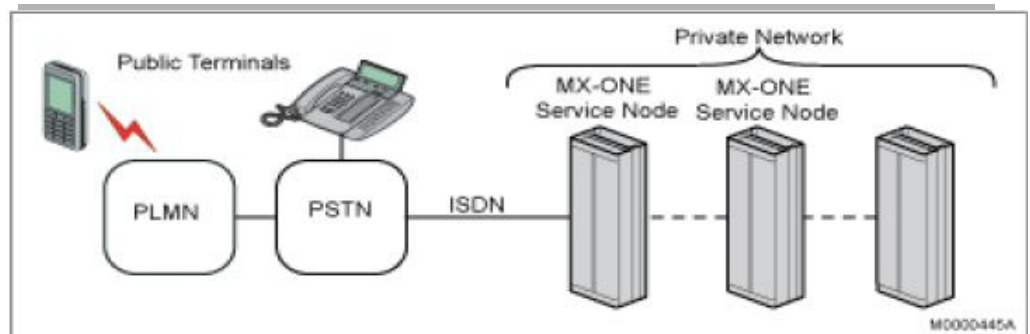
**Note:** The public terminal can be a member in a Computer Telephone Integration (CTI) call center solution, such as MiContact Center Enterprise.

There are different scenarios for connection to the MX-ONE Service Node, as described in the following sections.

Not that all figures in this section show ISDN as trunk example.

### 2.3.1 REMOTE EXTENSION THROUGH THE PSTN

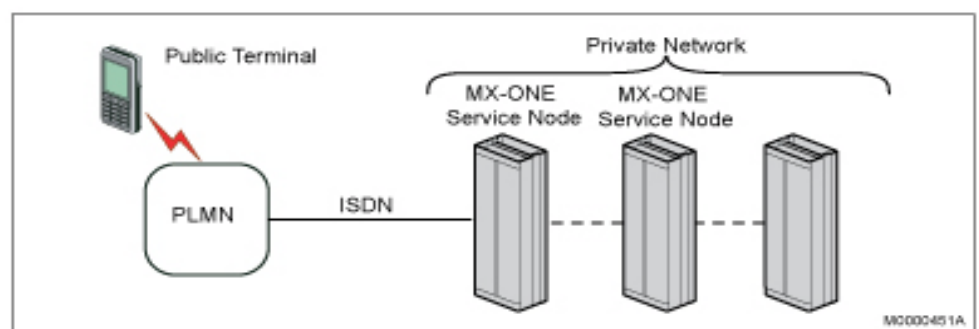
The connection between the PLMN and the MX-ONE Service Node is established through the PSTN, 1 Remote Extension Through the PSTN on page 5.



**Figure 1: Remote Extension Through the PSTN**

### 2.3.2 REMOTE EXTENSION DIRECTLY FROM THE PLMN

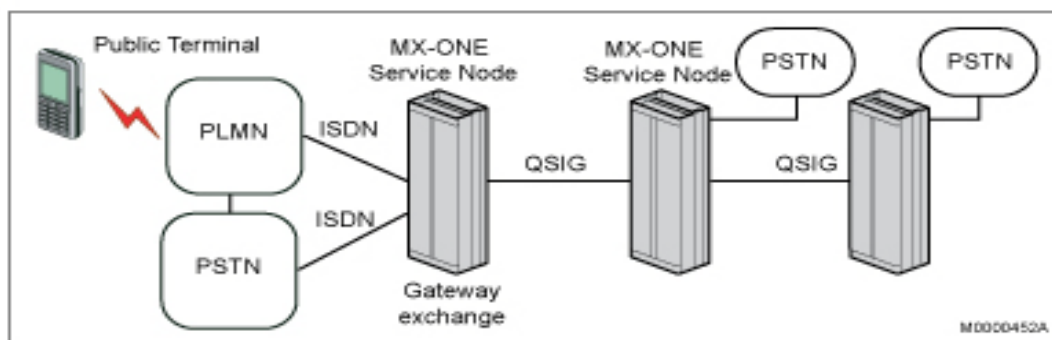
The PLMN is directly connected to the MX-ONE Service Node, 2 Remote Extension Directly from the PLMN on page 5. This option can be considered if the network operator is prepared to handle specific customer data, and if a direct connection between the PLMN and the MX-ONE Service Node can be established.



**Figure 2: Remote Extension Directly from the PLMN**

### 2.3.3 PRIVATE NETWORK SCENARIO

The PLMN and the PSTN are connected to a private network through the gateway exchange, 3 Private Network Scenario on page 6. The remote extension can be represented in any of the private network nodes.

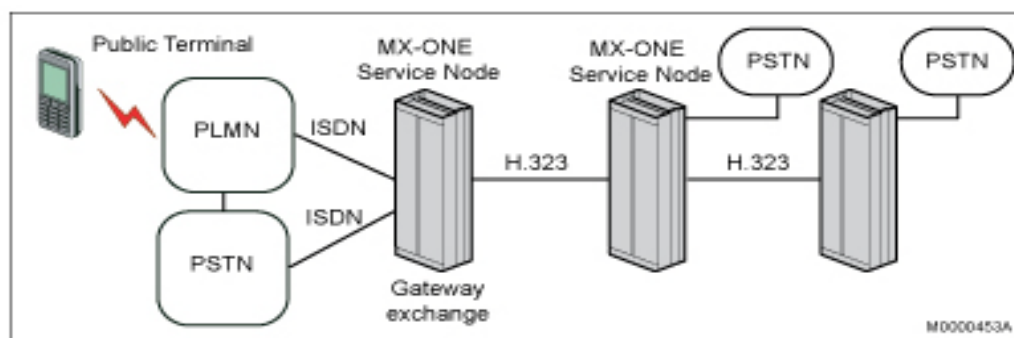


**Figure 3: Private Network Scenario**

#### 2.3.4

#### H.323 PRIVATE NETWORK SCENARIO

The PLMN and the PSTN are connected to a private network through the gateway exchange, 4 H.323 Private Network Scenario on page 6. The remote extension could be represented in any of the private network nodes.



**Figure 4: H.323 Private Network Scenario**

## 3 FACILITIES

### 3.1 TRAFFIC

Remote extensions are able to make calls as PBX extensions only if they are granted access to the PBX. There are three ways to obtain this access, depending on whether the calling party number of the public terminal can be conveyed by the public trunk signaling. If calling party number of the public terminal can be conveyed by the public trunk signaling, then remote extensions are able to make calls as PBX extensions without dialing the access number. Else access number has to be dialed, although this number is different depending on the way to get access. The access numbers are specific numbers within the direct in-dialing PBX numbering plan.

All digits and characters are sent as DTMF tones after reception of a dial tone, special dial tone, or Recorded Voice Announcement (RVA) from the PBX.

#### 3.1.1 CALL FROM A PUBLIC REMOTE EXTENSION

Two types of access numbers, called R1 and R2, can be initiated for calls from a remote extension. These are access numbers within the direct in-dialing numbering plan that allow full access to the MX-ONE Service Node functionality. R2 access number is not necessary if only mobile remote extensions exist in the system. Routes can be configured to allow remote extensions to access MX-ONE without using access numbers, see the **Remote extension without R1 access** section below.

##### **R1 access**

The public terminal user dials an R1 access number. The received calling party number is validated in the MX-ONE Service Node. After approval, the public terminal is granted full access to the MX-ONE Service Node functionality and receives a dial tone from the PBX. The dialing format would be one of the following:

- R1 (dial tone) + wanted number
- R1 (dial tone) + procedure

##### **R1 access (only for public terminals associated with a mobile extension)**

Only for ISDN signaling, for a public remote extension associated to a mobile extension, if extra digits are received together with the access number, they are stored for later analysis. No dial tone is provided until the extra digits are analyzed. If it turns out that these digits are a valid destination or a procedure within the MX-ONE Service Node, the call proceeds. Therefore, the dialing format for a mobile extension could also be one of the following:

- R1 + wanted number
- R1 + procedure

If the public calling party number is not received, the call is rejected. Once the public terminal is validated in the MX-ONE Service Node, this terminal is considered as a remote extension.

##### **R2 access (for public terminals associated with a mobile extension or with a fixed public telephone)**

If the A-number is not going to be received (or there exists uncertainty about its reception) in the MX-ONE Service Node, the public terminal user has to dial an access number called R2. The public terminal user is prompted to enter a PIN code associated with its MX-ONE Service Node directory number. This PIN code is the MX-ONE

Service Node Remote Extension (RXN) directory number plus its associated Individual Authorization Code (RAC). The way to prompt the user to enter this PIN code is either by an RVA or by a special dial tone.

The dialing format would be one of the following:

- R2 (special dial tone or RVA) + RXN\_dirno \* RAC # (dial tone) + wanted number
- R2 (special dial tone or RVA) + RXN\_dirno \* RAC # (dial tone) + procedure

The PIN code is validated in the PBX. After approval, the public terminal is granted full access to the MX-ONE Service Node functionality. The user receives a dial tone from the PBX. Any extra digit dialed before receiving the dial tone or announcement is ignored.

If the remote extension does not have an RAC, the access to the MX-ONE Service Node through this access number is denied (the call is rejected). If the entered PIN code is wrong, the call is rejected. If the PIN code is unsuccessfully entered three times, the remote extension directory number is blocked for one hour. No calls can be made from the blocked remote extension.

If the public terminal user dials the R2 access number, it does not matter if the public calling party number is received in the PBX (it is ignored as for identification purposes). The user is prompted to enter the PIN code anyway.

Once the public terminal is validated in the MX-ONE Service Node, this terminal is considered as a remote extension.

**Note:** As a MX-ONE Service Node extension, the user is allowed to change its associated RAC through a procedure.

#### Remote extension without R1 access

If calling party number of the public terminal can be conveyed by the public trunk signaling, and the trunk uses en-bloc sending of the destination number, then the public subscribers can dial direct inward dialing (DID) numbers of internal extensions, instead of dialing the R1/R2 access code and then internal extension number.

The dialing format would be the following:

- Wanted number

The calling party identity shall be associated with a remote extension number, and this shall only be done when the calling party is located outside the intelligent private network.

This function is managed on route level, using the **Route** task in MX-ONE Service Node Manager (Telephony>External Lines>Route). For more information, see *Route Data, RO, Parameter Description* (49/190 84-ANF 901 14).

The calling party number will be identified as and associated with a remote extension (without R1 access) only if the calling party is located outside the intelligent private network, i.e. the origin must be public even if the call should enter the PBX via a tie-line.

### 3.1.2

#### CALLS TO A REMOTE EXTENSION

When the remote extension is called, the call is routed to the public terminal through the public network. One public terminal is associated by default with the remote extension. As this kind of call takes longer than internal calls, a welcome announcement can be provided to the calling party, for direct call, follow-me, direct diversion, diversion on busy, call rerouted, and Personal Number when the called party is a remote extension. This RVA is interrupted when the call is established.



Calls to a busy or unavailable remote extension are handled in the same way as calls to a busy or unavailable MX-ONE Service Node extension, that is, the same level of service is provided (intrusion, callback, and so on).

It is possible to send a calling party number from the PBX if the PSTN supports calling party number transmission.

### 3.1.3

## CALL COLLISION

The establishment of calls from or to public terminals takes longer than internal calls. So, it is more likely that calls from and to the public terminal collide within the MX-ONE Service Node. This happens, for example, when a MX-ONE Service Node extension calls the remote extension while, at the same time, the public terminal associated with the same remote extension is initiating a call.

Calls from the public terminal have higher priority than calls addressed to that public terminal, except if a call to the public terminal is already in speech. The reason for giving higher priority to a call from the public terminal is that the public exchange is already connected for those calls. So, call attempts towards a remote extension are rejected if there is a call from the public terminal in progress. The PBX extension, calling to the public terminal, receives a message that the latter is busy.

If the party calling the remote extension is being provided with an announcement and the public terminal tries to make a call before ringing, the call made from the public terminal will have priority. The announcement will be interrupted and the calling party will get a number-unobtainable tone.

## 3.2

## SERVICES

The remote extensions have access to most of the services and features that are offered to other extension types in the MX-ONE Service Node.

Public terminals do not have the possibility to request inquiry (and thus, parking of the current call) through hook-flash, R-button, or earth-button as analog extensions do. This means that suffix procedure digits must be entered in order to request an inquiry call.

To be able to offer the mobile and fixed remote extensions the possibility to request features like Inquiry, Alternation, Transfer, and Conference, a specific procedure for the remote extension (with suffix digits) is used to simulate the R button or earth button (of analog telephones). It is possible to set for the remote extensions (I/O command per system) the character or signal that should be interpreted as that service. To detect the suffix procedure digits (by DTMF tones), a key code receiver has to be connected during the speech state to receive requests from the mobile or fixed remote extension.

An application system parameter determines specifically if the end-to-end DTMF mode for remote extensions is activated automatically or by suffix digit (this suffix digit is also set by an application system parameter).

Refer back and other services (callback, conference, and so on) can only be requested by using suffix digits. No services requested by suffix digits are allowed if end-to-end DTMF mode is active.

## 3.2.1

## SYSTEM FEATURES

The following system features are available for remote extensions:

- Authorization code
- Account code
- Diversion, bypass
- Callback, no reply
- Callback, busy extension
- Callback, not available
- Calling/Connected Line Identity (presentation, restriction)
- Connected Line Identity
- Calling/Connected Name Identity
- Call waiting
- Common speed dialing
- Direct In-dialing
- Call Pick-up, individual
- End-to-end DTMF signaling
- Follow-Me, external
- Follow-me, internal
- General deactivation
- Inquiry
- Last external number redial
- Least cost routing
- Malicious call tracing
- Manual Message Waiting (MMW)
- Personal number
- Refer back (alternation)
- Individual Repeated Distribution (IRD)
- Retrieve
- Transfer

## 3.2.2

## MULTI-PARTY FEATURES

The following multi-party features are available for remote extensions:

- Conference
- Alarm extension
- Intrusion

### 3.2.3 EXTENSION GROUP FEATURES

The following extension group features are available for remote extensions:

- Call pick-up, group
- Group hunting, internal
- Automatic Call Distribution (ACD) as a MiContact Center agent

### 3.2.4 SUPPORT SYSTEM FEATURES

Remote extensions are also supported by the following services:

- Computer Supported Telecommunication Application (CSTA) services
- Message diversion
- Message waiting
- Voice mail
- Recorded Voice Announcement (RVA)

Remote extensions can be logged by the following support system services:

- Call Information Logging (CIL)
- Call metering
- Traffic recording

## 3.2.5

## MULTIPLICITY

**Note:** The multiplicity feature is not supported for MOBILE AND REMOTE EXTENSION OVER SIP.

Additional public terminals can be associated within the MX-ONE Service Node with a remote extension. All these terminals share the same category profile.

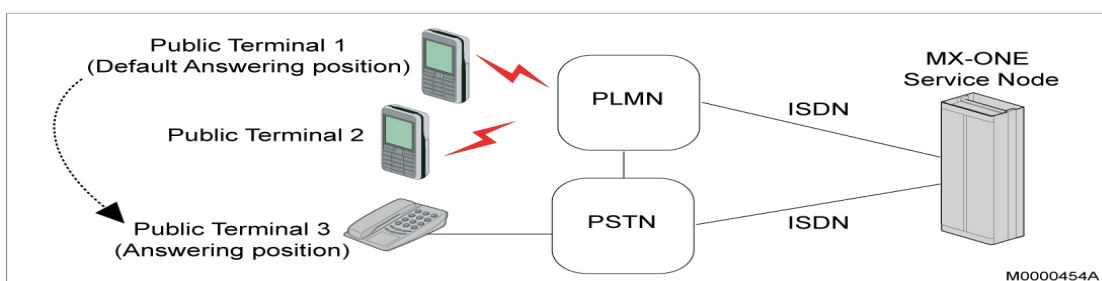
Only one of the public terminals associated with the same remote extension can make or receive calls at a time. This means that whenever one of the terminals is involved in a call, the rest of the terminals sharing the same directory number cannot make or receive calls through the PBX.

In case there are a number of terminals associated with one MX-ONE Service Node remote extension directory number, the answering position can be changed through a procedure, that is, calls can be addressed to a terminal, which is different from the one stated as default public remote extension. In this way, the remote extension with multiple terminals associated with the same directory number can decide at any moment to set as answering position the terminal the user is wearing or placed where the user is situated.

It is only possible to change the answering position if the public calling party number is received and if the remote extension associated with this public calling party number is a mobile extension. So, this facility is available if the R1 access number is used.

The procedure *\*FC #* (where FC is the Function Code for the application system) is used for the modification of an active answering position for multiple remote extensions, 5 Multiplicity; Moving the Answering Position on page 12. This procedure can be requested from the public terminal which is intended to become the new answering position.

The procedure *#FC #* is used for the setting of the default answering position for remote extensions with multiple terminals (the default one becomes active). This procedure could be entered from any of the associated public terminals.



**Figure 5: Multiplicity; Moving the Answering Position**

## 3.2.6

## LEAST COST ROUTING

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

The home area code is added to the dialed public number by means of an LCR Number Length Table. For details on Least Cost Routing, see the extra facility description for LEAST COST ROUTING. The home area code, in this case, is the area code associated to the calling Remote extension.

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

### 3.3

## CAPACITIES AND LIMITATIONS

For capacity figures, see the description for *CAPACITIES*.

The maximum number of digits for the public external number associated with the remote extension number is 20.

When the RVA message for diversion is played and the remote extension is the diverttee, the calling party will not be connected to the public remote extension until the RVA is finished, even if the public remote extension has already answered the call.

If the call to the mobile extension has been diverted in the public network before the exchange receives the call and if the exchange has received information from the public network on that diversion, the RVA feature for the mobile extension will be overridden.

The procedure codes for activating or deactivating of services may not be possible to execute in case of remote extension without the R1 access number. The public trunk must use en-bloc sending to allow "remote extension without the R1 access number".

**Note:** The Mobile and Remote extension over SIP is handled like an extension in the system, and does not support trunk related telephony traffic services, like alternative routing.