

MiVoice MX-ONE

# Control Telephony Functions (including GSM-R) - Operational Directions

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# General

The “Control Telephony” Function described in these solution-level operational directions constitutes functions such as CSI, CLI, Priority Disconnect, and possibly modified ring cadences for analog telephones. Abbreviated numbers are also used, for the dynamic selection of call priority.

This functionality shall fulfill the UK National Grid Operational Telephony Networks (OTN) requirements, as well as the Irish ESB ditto. It also fulfills parts of the GSM-R feature used for European Train Control System (ECTS).

## Brief Description of the Control Telephony Function

### General

The “Control Telephony” Functions are a combination of several PBX features, such as CSI/Priority Routing, CLI, Priority Disconnect, Ring signal cadence, and possibly other more standard PBX functions (not described here), such as LCR, CIL and CSTA functions.

### Call Service Information (Call Priority Based on FRL/TCM)

CSI is based on the FRL/TCM categories, and provides a call priority information, both in a single node, and in a private network of appropriate tie-lines.

There are three control call priority (and protection) levels supported; Emergency, Priority and Routine, which use the FRL/TCM values 7, 6, and 5 respectively.

A normal/administrative call will not have any priority (that is value 0 is set as default). Thus, the call priorities can be summarized as follows:

Type of call	External TCM/CSI (via MFC, CCS)	Protection level (for Priority Disconnect)
Normal call	0	0
Administrative call	0	0
Routine control call	5	5
Priority control call	6	6
Emergency control call	7	7

### Calling Line Identity (CLI)

Calling line identity (A-number) shall always be included in CSI calls, and the A-number shall normally be presented to the called B-party.

Normal/Administrator calls will not get any CLI if the CAS or analog trunks (TL22 or TL37) are used. If DPNSS, ISDN, or H.323 tie-lines are used, the CLIs are always included, if available from the originator.

## Priority Routing of Trunk Calls

FRL/TCM and CSI categories can control the routing and access to external line resources. With the equivalent categories assigned for calling extensions and routes, the routing and access to external line resources can be prioritized. See the FRL/TCM documentation for details.

## Priority Disconnection of Trunk Calls

The Priority Disconnect function (new in MX-ONE 6.0 SP2) is controlled by the AS parameter 74. The function is not enabled by default, but the AS 74 will enable the function, and then automatic priority disconnection of a lower priority trunk call occurs, if a call with CSI encounters a trunk congestion situation.

Priority Disconnect rules:

- Emergency control calls (CSI 7) are not allowed to be disconnected using Priority Disconnect. Emergency control calls are allowed to disconnect all other call types.
- Priority control calls (6) are allowed to disconnect normal/administrative calls and routine control calls.
- Routine control calls (5) are allowed to disconnect normal/administrative calls.

## Optional Ring Cadence Change for ATS

If needed, the ring signal cadence of analog phones can be modified by a command (new in MX-ONE 6.0 SP2). This can provide a “continuous ring signal” for high-priority calls.

With ELU34 boards being used in analog telephones, the ring signal would not be fully continuous, but could be up to 25 seconds, with a few interrupts of milliseconds. The number of ATS per board must be limited to 4 if “continuous ringing” is set.

## Abbreviated Numbers for Dynamic CSI Selection

To get a dynamic selection of call priority (CSI or FRL), three common abbreviated numbers must be defined. These numbers, when expanded, equal the CSI levels.

The translation must also include a CSI prefix that determines the type of control call as follows:

- Administrative calls have no CSI prefix
- AA = Routine Control Call
- AB = Priority Control Call
- BB = Emergency Control Call

The following table shows some examples:

ABBR	TRA	Description
105	AA 7759 105	Routine control call to ZBE
125	AB 7759 105	Priority control call to ZBE

ABBR	TRA	Description
135	7759 105	Administrative call to ZBE
195	BB 7759 105	Emergency control call to ZBE

A caller who dials, for example the abbreviated number 125 will get a call that will be a Priority control call to the number 7759 105.

## Supported Trunk Signaling and Settings

TL22, TL37 MFC tie-lines are supported.

Inter-switch links can be CAS E1 or analog E&M trunks supporting a proprietary MFC signaling protocol based on CEPT-L1 MFC signaling. The standard CEPT-L1 MFC signaling has been enhanced to provide advanced network features such as, A-Party Number Identity, Call Service Information, and Network Priority Routing.

The VARC parameter is modified in the RODAx commands, to allow the TL22 and TL37 (to support A-number request/reception), using A7 pulse signal for proprietary additions to request the CLI and convey the CSI.

DPNSS, ISDN, and H.323 tie-lines can also be used, and require no specific settings (except possibly FRL/TCM categories for the Priority Routing function).

Inter-working between CAS/analog tie-line and CCS tie-lines is supported.

# Glossary

For a complete list of abbreviations and glossary, see the description for Acronyms, Abbreviations, and Glossary.

Here is a list over some common terms used in this document:

**CAS**

Channel Associated Signaling (legacy trunk protocols).

**CSI**

Call Service Information, a type of call information.

**CCS**

Common Channel Signaling trunks, such as DPNSS, DASS, ISDN, H.323, SIP.

**DPNSS**

Digital Private Network Signaling System (tie-line protocol defined by BT).

**FRL**

Facility Restriction Level, an 8-level (0-7) priority and protection information for route access, which can also be assigned to extensions and routes as calling party, indicating which routes they are allowed to access.

**H.323**

IP Standard defined by ITU-T, here as tie-line protocol.

**ISDN**

Integrated Services Digital Network (defined by ITU-T).

**MFC**

Multi Frequency Compelled (trunk signaling).

**Priority Routing**

A function that will route trunk calls based on a priority information.

**Priority Disconnect**

A preemption function that will disconnect used trunk resources for a call of lower priority, and use these trunk resources for a new call, with higher priority.

**TCM**

Traveling Class Mark, basically the same as FRL, but when sent via a tie-line in the private network.



# Prerequisites for Control Telephony Function

A private network with appropriate tie-lines supporting the CSI and CLI functions, and connecting ASP 113 systems where the control telephony functionality is wanted shall exist.

Analog telephones shall be initiated.

# Tools

I/O terminal(s), for the administration of the functions.

# Procedure for Control Telephony Function

The following procedure must be followed for the initiation of the Call Park Pool:

1. (Optionally) initiate the FRL categories for all relevant extensions, route directions, and so on.
2. Initiate the route data (VAR parameters) if MFC trunks (TL22, TL37) are used. If CCS tie-lines are used, no specific settings are required.
3. If Priority Disconnect shall be active, set the AS parameter 74 appropriately.
4. Initiate the abbreviated numbers for the dynamic selection of call priorities.
5. Change to “continuous ring cadence” for analog telephones, if wanted.
6. Verify the settings by printing the relevant data.

# Execution of Control Telephony Function

## Initiate FRL/TCM Categories

### General

The FRL/TCM categories will control the routing priorities and route access, and indirectly also other related functions.

### Prerequisites

The “control telephony” FRL/TCM functionality may be used in this network and system.

If the dynamic selection of FRL/CSI on per call basis shall be used, through abbreviated numbers, the fix CoS settings are optional and could be skipped, but both methods can be used simultaneously.

### Procedure

1. Initiate the FRL categories for all relevant extensions and routes, through the `extension_profile` and `RODIX`(route direction) commands.
2. Verify the FRL categories by printing the settings.

## Initiate the Route Signaling (If MFC Trunks are Used)

### General

The MFC trunk signaling must be appropriately configured for this functionality. Proprietary MFC signaling is used (A7 pulse).

### Prerequisites

The “control telephony functions” shall be used, in particular the conveying of CSI and CLI data through the used tie-lines.

### Procedure

1. Initiate the VARC parameter settings for TL22/TL37 by entering the `RODAI` command, to get the wanted CSI and CLI signaling.
2. Verify by printing the parameters with the command `RODAP`.

# Initiate Dedicated Abbreviated Numbers

## General

Common (or individual) abbreviated numbers should be initiated, one for each call priority level, to facilitate dynamic selection of call priority. See Operational directions for *Abbreviated Dialling* for details.

## Prerequisites

The “control telephony” FRL/TCM functionality shall be used in this network and system.  
Dynamic selection of FRL/CSI on per call basis shall be used, through abbreviated numbers.

## Procedure

1. Initiate the common abbreviated numbers using the `ADCOI` command (Individual abbreviated numbers are also possible to use).
2. Verify the defined abbreviated numbers by entering `ADCDP`.

# Enable the Priority Disconnect Feature

## General

The Priority Disconnect function will perform an automatic release of a low priority trunk call (usually a normal/administrative call), is a CSI call encounters a trunk resource congestion situation. Default is that the function is inactive.

## Prerequisites

The Priority Disconnect function shall be active in this network and system.

## Procedure

1. Enable the Priority Disconnect function by entering the command `ASPAC`, setting parameter 74 to allow automatic Priority Disconnect. (Default is that it is disabled).
2. Verify by printing the parameter with the command `ASPAP`.

# Change ATS Ring Cadence If Wanted

## General

Ring signal cadence can be modified by I/O command. The “control telephones at remote nodes” shall when they receive a CSI/control telephony call get a specific ring signal, indicating that it is a call with higher priority. AS parameter 74 controls the function.

**NOTE:** The Mitel 6800/6900 SIP phones support a “Bellcore ring cadence”, which can override the internal ring cadence, as a customized ring cadence. This could be used if SIP phones were used instead of analog phones, or if a Terminal Adapter (SIP-Analog) is used.

## Prerequisites

The CSI calls shall get a specific ringing on analog phones.

## Procedure

1. Change/check the ASPAC parameter 74 setting so it allows ring cadence change.
2. Change the ring signal cadence for analog phones by entering the `ring_cadence -c` command with appropriate cadence (e.g. “continuous ringing”), if it has to deviate from the applications system’s ordinary cadence.
3. Restart all ELUxx boards, by entering the `board_restart` command, to make the cadence change take effect.
4. Verify by printing the parameter with the command `ring_cadence -p`.

# Brief Description of the GSM-R Function

## Implementation of GSM-R

The purpose of this section is to describe different traffic cases and how the information exchange between GSM-R and MX-ONE is handled in these cases. The configuration and functions used in GSM-R are not described in the chapter.

## Existing Function for Priority

As functions similar to the requirements for priority already exist within Control Telephony Function, the GSM-R priority (MLPP) is mapped towards this function. This will enhance the functions existing in Control Telephony Function to interwork with PSTN/PLMN when the ISDN trunk supports the MLPP standard.

The existing function handles three priority levels:

Emergency, Priority, and Routine which use the FRL/TCM values 7, 6, and 5 respectively. A normal/administrative call will not have any priority (that is; the FRL/TCM value is set to 0 by default).

This is mapped towards the MLPP priority as shown in the following table:

Type of call	External TCM/CSI	Protection level	MLPP	Priority level	ABB
Normal call	0	0	NA	NA	
	3	0	Routine	4	
Administrative call	4	0	Priority	3	
Routine control call	5	5	Immediate	2	**
Priority control call	6	6	Flash	1	*#
Emergency control call	7	7	Flash override	0	##

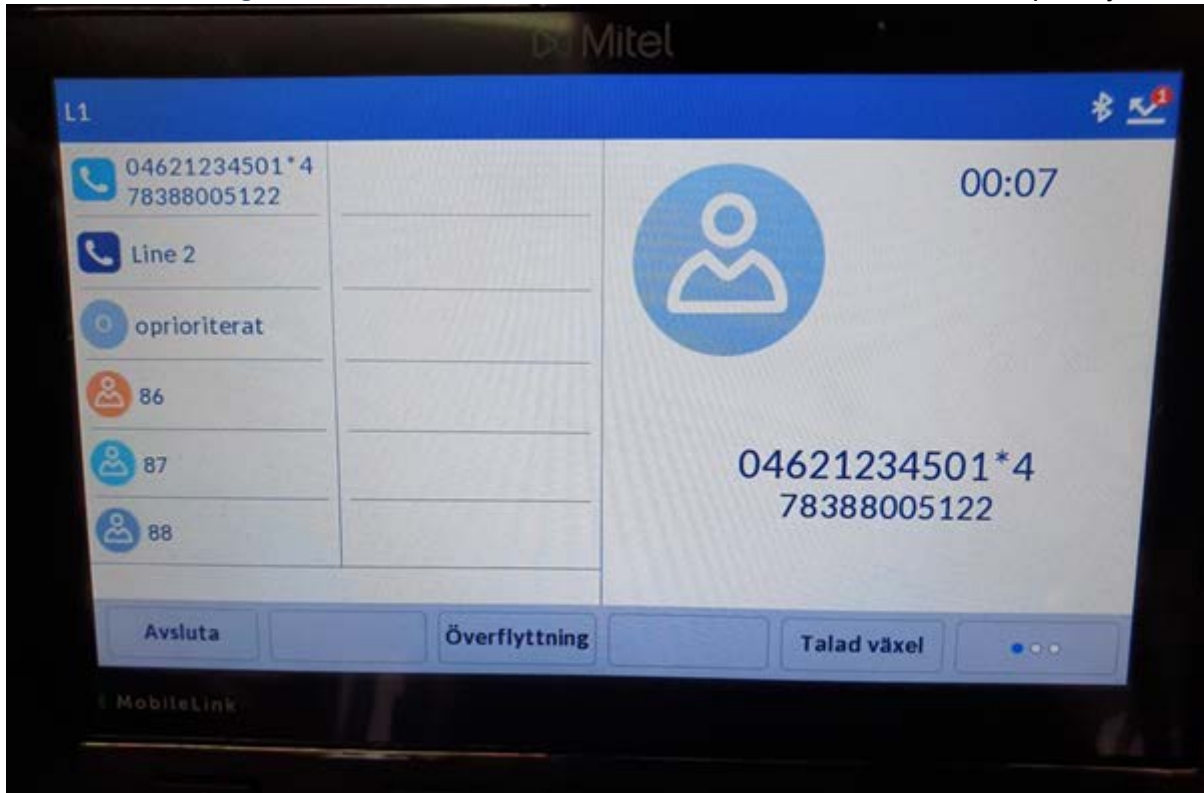
With no priority is set to “Normal call” IE, no MLPP IE is sent with the call.

## Information Handling for Incoming Calls

In addition to priority, UUI information is received for incoming calls. This is used to display additional information about the caller, for example; train number and role. To be able to show this information on the phone, the UUI must be converted to ASCII, added in the name field, and displayed on the phone. In

addition to the name, the priority value is added if received at the end of the name. See the following figure:

**Figure 7.1:** Call from 78388005122 with UUI 04621234501 and priority 4



In addition to the display on the phone, the same string is sent as correlated data on CSTa3 in the delivered event. If MiCCE is used, this string is mapped to the associated data so that this can be handled in the application.

## Information Handling for Outgoing Calls

In addition to priority, which is set with TCM and dynamically with the abbreviated number, the function of the caller needs to be set as UUI. The UUI is constructed with the name of the caller set and sent with the call. If caller name is not set, the UUI is not sent at all.



**Figure 7.2:** Call from 078389910002 with UUI (name1) 4677014401



# Prerequisites for GSM-R

A public connection supporting the CSI and CLI functions and connecting ASP 113 systems where the GSM-R functionality is needed must exist.

It must be possible to initiate arbitrary type of telephones.

# Tools

I/O terminal(s), for the administration of the functions.

# Procedure for GSM-R

The following procedure must be followed for the initiation of the GSM-R functionality:

Important parameters:

- Route
  - VARC: D7 “Full ISDN functionality” must be set to yes to send name1 as UII (function number)
  - VARO: D4 “Connected system is GSM-R” must be set to yes
- Dest
  - ADC: D13 “Sending of Traveling Class Mark” must be set to 1 to send outgoing priority (MLPP)
- System parameters
  - PARNUM 74 must be set to 6 to allow priority.
- Abbreviated numbers
  - TRA starts with
    - AA = MLPP prio 2
    - AB = MLPP prio 1
    - BB = MLPP prio 0
- Name parameter needs to be programmed with the functional number to be used by the calling user.
  - Name1 parameter is the only parameter used.

# Execution of GSM-R

## Initiate FRL/TCM Categories

### General

The FRL/TCM categories control the routing priorities and route access, and also indirectly control the other related functions.

### Prerequisites

The control telephony FRL/TCM functionality can be used in this network and system.

If the dynamic selection of FRL/CSI on a per call basis is used through abbreviated numbers, the fix CoS settings are optional and can be skipped; but both methods can be used simultaneously.

### Procedure

1. Initiate the FRL categories for all relevant extensions and routes, through the `extension_profile` and `RODDIX` (route direction) commands.
2. Verify the FRL categories by printing the settings.
3. Initiate the system parameter 74 to value 6 to always allow priority.
4. Verify the system parameter with the `ASPAP` command.

## Initiate the Route Signaling

### General

The ISDN trunk signaling must be appropriately configured for this functionality. Full ISDN functionality (VARC D7) and connected signaling system is GSM-R (VARO D4).

### Prerequisites

The Control Telephony functions must be used, in particular the conveying of CSI and CLI data through the used public trunk.

### Procedure

1. Initiate the VARx parameter settings for TL60/SL60 by entering the `RODAI` command, to convey the MLPP and Functional Number (UUI).
2. Verify by printing the parameters with the `RODAP` command.

3. Initiate the ADC parameter D13 to allow “Sending of Traveling Class Mark” needs to be set to 1 to send outgoing priority (MLPP).
4. Verify the ADC settings with the `RODDP` command.

## Initiate Dedicated Abbreviated Numbers

### General

Common (or individual) abbreviated numbers should be initiated, one for each call priority level, to facilitate dynamic selection of call priority. For more information, see Abbreviated Dialing- Operational directions.

### Prerequisites

The Control Telephony FRL/TCM function must be used in this network and system.

Dynamic selection of FRL/CSI on a per call basis must be used, through abbreviated numbers.

### Procedure

1. Initiate the common abbreviated numbers using the `ADCOI` command (Individual abbreviated numbers are also be used).
2. Verify the defined abbreviated numbers by entering the `ADCDF` command.

## Enable the Functional Number

### General

The Functional Number function performs the name feature. The `name1` field will contain the specific train information as well as the role of the user (for example, train driver).

### Prerequisites

The Name function shall be active in this network and system.

### Procedure

1. Enable the Name function by entering the `name` command, with specific parameter `name1` indicating the functional number. Incorrect information will cause the feature to not work.
2. Verify by printing the parameter with the `name -p` command.

