# MediaTek LinkIt™ Development Platform for RTOS Telephony Connection Manager Developer's Guide

Version: 1.2
Release date: 23 January 2018

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# Document Revision History

| Revision | Date | Description |
|---|---|---|
| 1.0 | 13 October 2017 | Initial release |
| 1.1 | 29 December 2017 | Added an interface for default APN |
| 1.2 | 23 January 2018 | Delete the interface for default APN |

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# Lists of Tables and Figures



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# 1. Introduction

MediaTek MT2625 platform, a MediaTek LinkIt™ development platform for RTOS, provides Telephony Connection Manager support for IoT and Wearables applications. The platform provides AP domain and Modem domain and Telephony Connection Manager (TCM) is in the AP domain. It includes the interfaces for the users to activate or deactivate a Packet Data Protocol (PDP) connection. To achieve this, the TCM sends a series of AT commands from AP to modem in a specific order. In addition, it supports multiple users to activate or deactivate the same PDP connection or other PDP connections, simultaneously.

This document guides you through:

- Telephony Connection Manager architecture layout
- Telephony Connection Manager workflow
- Telephony Connection Manager interfaces

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# 2. Telephony Connection Manager Architecture Layout

The TCM provides APIs for the upper layer applications to activate or deactivate a PDP connection and returns the result in a message. When the activation or deactivation API is called by an application, a message is sent to the TCM task. Based on the activation or deactivation requirement inside the message, the task will utilize the interfaces provided by Radio Interface Layer (RIL) to send certain AT commands to the modem. In addition to returning the result to the applications, TCM will notify TCPIP task or NIDD task of the result including the PDP connection details (see Figure 1).

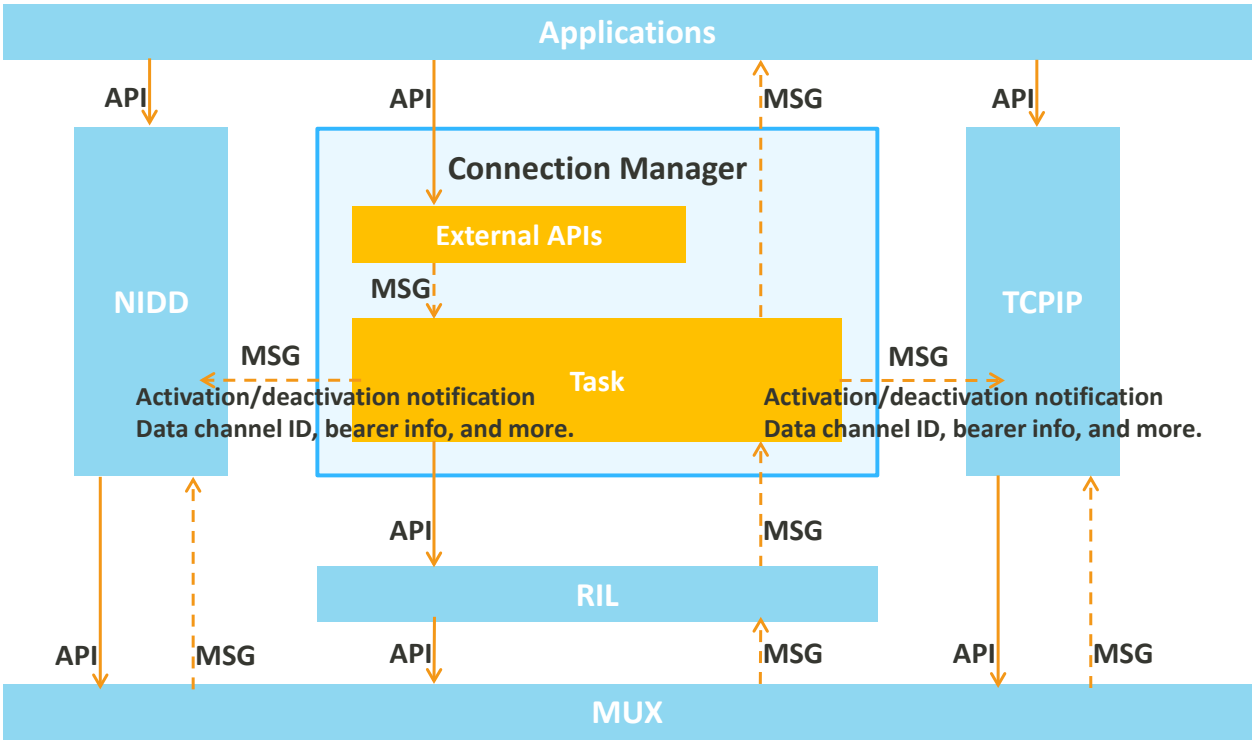


***Figure 1. TCM architecture layout***

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# 3. Telephony Connection Manager Workflow

There are three operations in the TCM for activation, active deactivation and passive deactivation.

## 3.1. The activation workflow

The TCM sends +CEREG and +CGEREP to enable two unsolicited result codes (URC) +CEREG and +CGEV separately, when it receives the activation requirement for the first time, as shown in Figure 2. +CEREG URC is for the network registration change while +CGEV URC is for the PDP context activation or deactivation events.

The TCM sends AT commands +CGDCONT, +CGAUTH and +CGDATA to configure and activate the PDP context when it receives +CEREG URC, which indicates the network is registered.

Once the modem reports **"**+CGEV: ME PDN ACT <cid>**"**, the PDP context is activated successfully. Then +CGCONTRDP is sent to obtain the relevant information of the activated PDP context, including the IP address, gateway address and IP address of DNS server.

After that, the TCM sends a message to TCPIP task with the relevant information of the activated PDP context and another message to the application to indicate the activation result.

If the PDP type of the PDN context is No-IP, +CGCONTRDP is omitted and the relevant information of the activated PDP context is sent to the NIDD task instead of TCPIP task.

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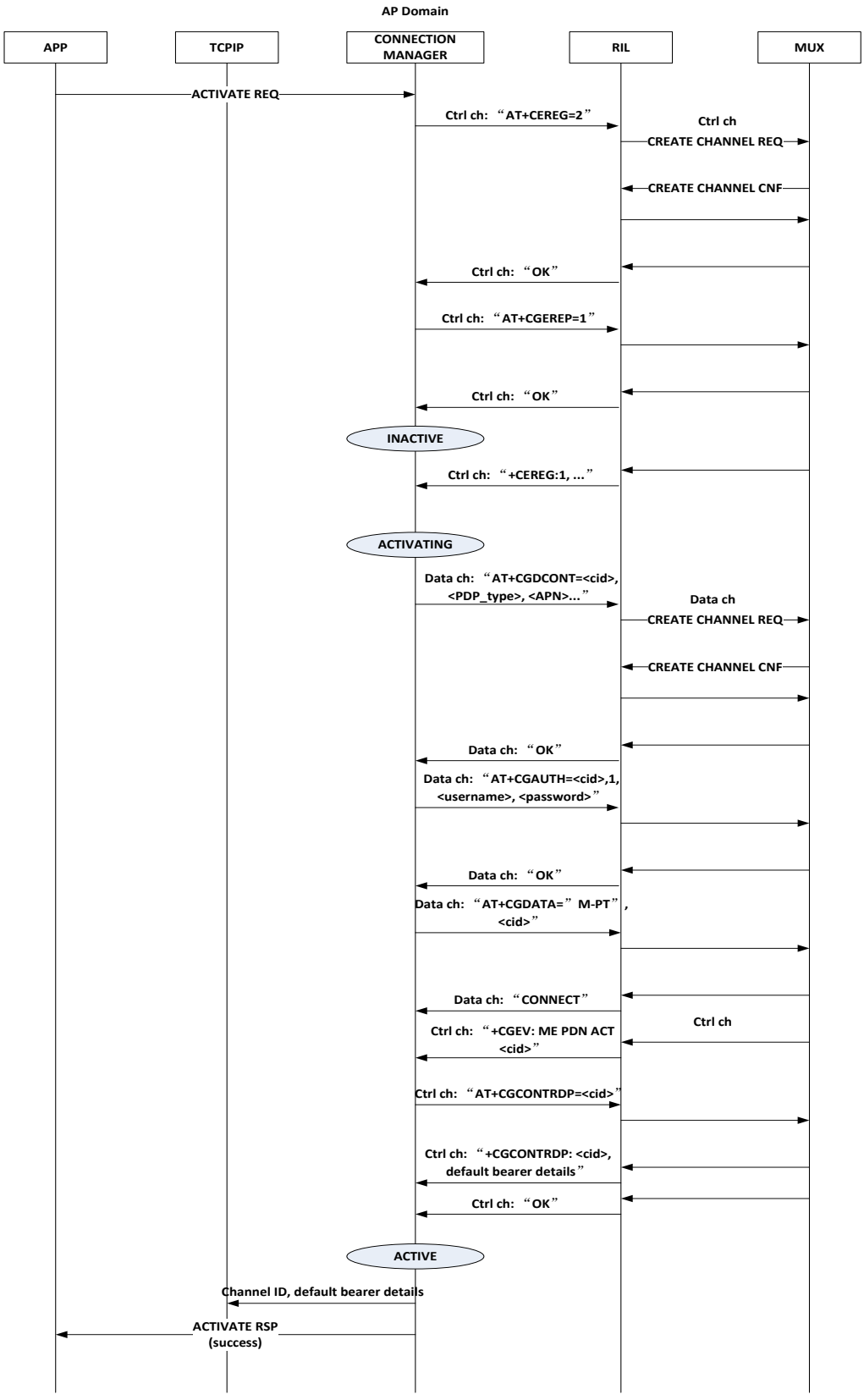


***Figure 2. The activation workflow***

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## 3.2. The active deactivation work flow

Once the TCM receives a deactivation request from the application, it sends +CGACT to modem, as shown in Figure 3.

When the modem reports **"+CGEV: ME PDN DEACT <cid>"**, the PDP context is deactivated successfully. By then, the TCM notifies both TCPIP task and the application of the deactivation result. If the PDP type of the PDN context is No-IP, the NIDD task will be notified instead of the TCPIP task.

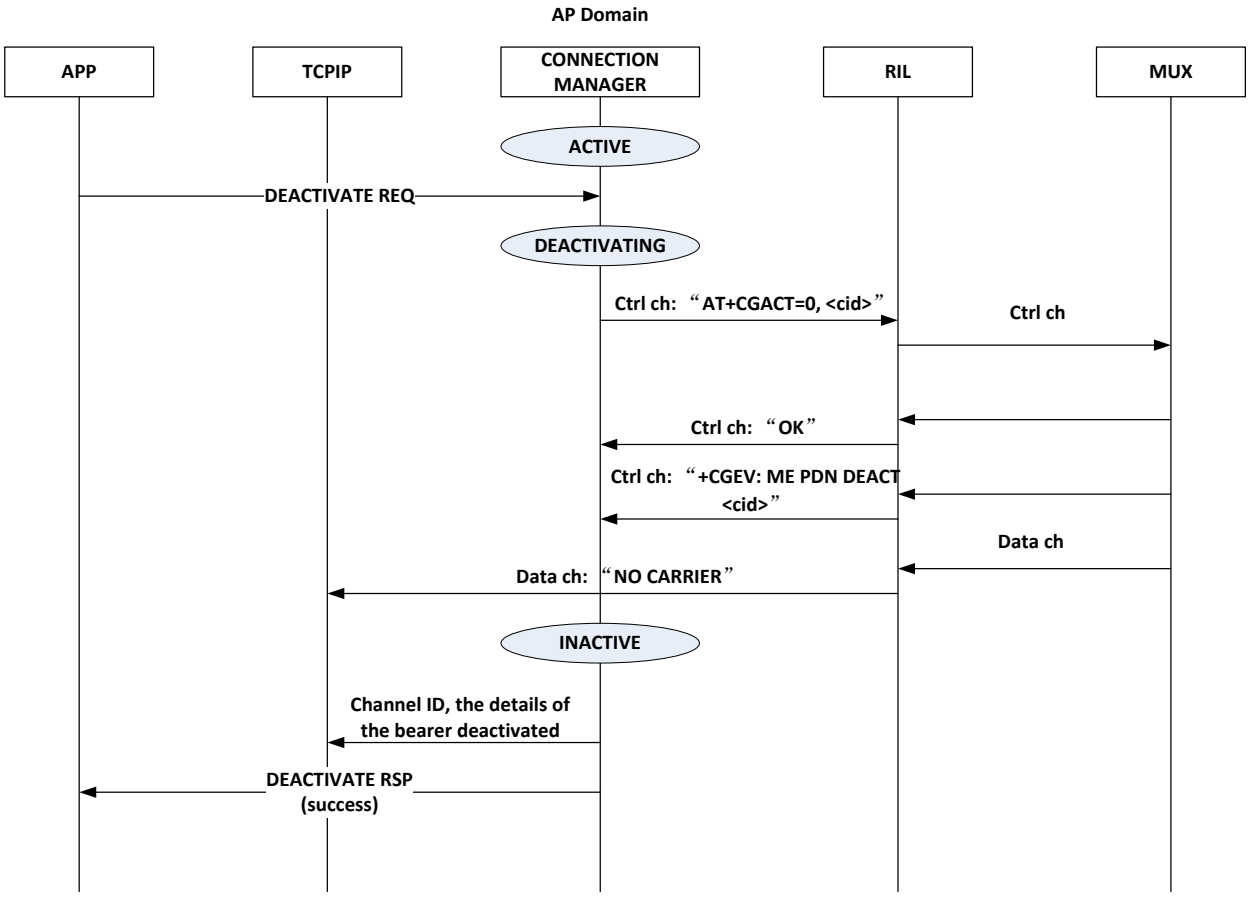


***Figure 3. The active deactivation workflow***

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## 3.3. The passive deactivation work flow

The modem reports "+CGEV: NW PDN DEACT <cid>", if the network has forced a PDP context deactivation, as shown in Figure 4.

The TCM notifies both the TCPIP task and the application of the passive deactivation. If the PDP type of the PDN context is No-IP, the NIDD task will be notified instead of the TCPIP task.

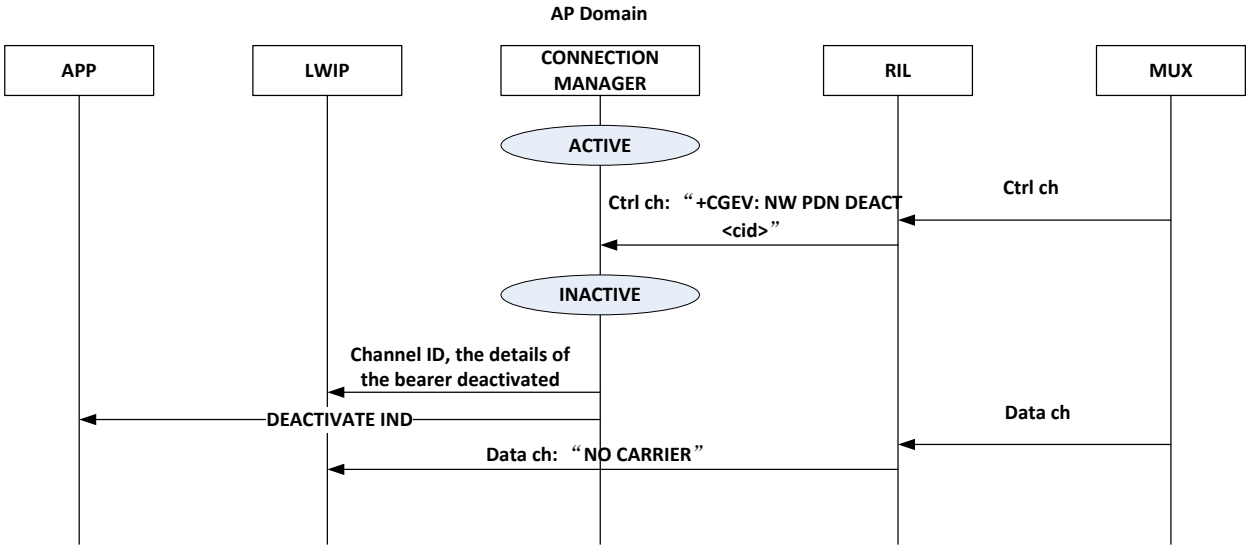


*Figure 4. The passive deactivation workflow*

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# 4. Telephony Connection Manager Interfaces

This section describes the source code and header file hierarchy for the TCM and the interface usage. The files are located at "<sdk_root>/middleware/MTK/tel_conn_mgr".

***Table 1. TCM source code description***

| File | Description |
|---|---|
| middleware/MTK/tel_conn_mgr/app/* | Support for multiple applications. |
| middleware/MTK/tel_conn_mgr/bearer/* | PDP context activation and deactivation. |
| middleware/MTK/tel_conn_mgr/common/* | Macros, structures, APIs, and more, used by files under the "app" and "bearer" folders. |

## 4.1. Supported APIs

For more details about the APIs, please refer to tel_conn_mgr_app_api.h and tel_conn_mgr_common_def.h.

### 4.1.1. tel_conn_mgr_init()

| | |
|---|---|
| **Description** | This function initializes and creates the TCM task. |
| **Parameters** | No input parameter is needed. |

### 4.1.2. tel_conn_mgr_activate()

| | |
|---|---|
| **Description** | This function is used to activate a specific bearer. Each time this function is called, it returns a unique app_id. |
| **Parameters** | [IN] bearer_type. The type of the bearer.<br>[IN] sim_id. The ID of the SIM card.<br>[IN] pdp_type. The PDP type to activate.<br>[IN] apn. APN string, a null-terminated string. The maximum length allowed is TEL_CONN_MGR_APN_MAX_LEN.<br>[IN] username. Username string, a null-terminated string. The maximum length allowed is #TEL_CONN_MGR_USERNAME_MAX_LEN.<br>[IN] password. Password string, a null-terminated string. The maximum length allowed is TEL_CONN_MGR_PASSWORD_MAX_LEN.<br>[IN] queue_hdl. The queue handler of the thread where the TCM messages are handled.<br>[OUT] app_id. A unique application ID. Valid value will be returned only if there is no error.<br>[OUT] activated_pdp_type. If TEL_CONN_MGR_RET_OK is returned, the real activated pdp_type will be returned. |
| **Return** | TEL_CONN_MGR_RET_OK, the bearer is activated and the input parameter pdp_type is compatible.<br>TEL_CONN_MGR_RET_WOULDBLOCK, the activation result is returned in a message.<br>Other, an error occurred. |

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### 4.1.3. tel_conn_mgr_deactivate()

| | |
|---|---|
| **Description** | This function is used to deactivate an active bearer. If MSG_ID_TEL_CONN_MGR_DEACTIVATION_IND is received, no need to call this function. |
| **Parameters** | [IN] app_id. The one returned by tel_conn_mgr_activate(). |
| **Return** | TEL_CONN_MGR_RET_OK, the bearer has been deactivated.<br>TEL_CONN_MGR_RET_WOULDBLOCK, the deactivation result is returned in a message.<br>TEL_CONN_MGR_RET_IS_HOLD, the connection is still in use. There is no need to try again.<br>TEL_CONN_MGR_RET_DUPLICATION, the function has been called with the same app_id.<br>Other, an error occurred. |

## 4.2. TCM API usage

An example application showing the usage of TCM APIs is provided.

Call tel_conn_mgr_init() before calling any other TCM API:

```
#include "tel_conn_mgr_app_api.h"
tel_conn_mgr_init();
```

Create the application task:

```
QueueHandle_t app_queue_hdl = xQueueCreate(...);
xTaskCreate(app_main,...);
```

The application calls the TCM API to activate or deactivate a PDP context.

```
#include "tel_conn_mgr_app_api.h"
#include "tel_conn_mgr_common_def.h"


// Activate a PDP context.
tel_conn_mgr_ret_enum ret;
tel_conn_mgr_pdp_type_enum activated_pdp_type;
int app_id;

ret = tel_conn_mgr_activate(TEL_CONN_MGR_BEARER_TYPE_NBIOT,
                            TEL_CONN_MGR_SIM_ID_1,
                            TEL_CONN_MGR_PDP_TYPE_IPV4V6,
                            "apn_example", //If you want use the default pdn
link, the apn should be "".
                            "user_name_example", //If you want use the
default pdn link, the user name should be "".
                            "password_example", //If you want use the
default pdn link, the password should be "".
                            app_queue_hdl,
                            &app_id,
                            &activated_pdp_type);
if (TEL_CONN_MGR_RET_OK == ret)
{
    // The PDP context is active now.
```

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```
}
else if (TEL_CONN_MGR_RET_WOULDBLOCK == ret)
{
    // The result will be returned in a message.
}
else
{
    // Error handle.
}


// Deactivate a PDP context.
tel_conn_mgr_ret_enum ret;

ret = tel_conn_mgr_deactivate(app_id);
if (TEL_CONN_MGR_RET_OK == ret)
{
    // The PDP context is inactive now.
}
else if (TEL_CONN_MGR_RET_IS_HOLD == ret)
{
   /* The PDP context is still in use by other application(s).
      No need to deactivate again. */
}
else if (TEL_CONN_MGR_RET_WOULDBLOCK == ret)
{
    // The result will be returned in a message.
}
else
{
    // Error handle.
}
```

The application processes the messages from the TCM in the main function of the application task.

```
#include "tel_conn_mgr_common_def.h"

void app_main(void *param)
{
    tel_conn_mgr_msg_struct *app_msg = NULL;

    while (1) {
        if (xQueueReceive(app_queue_hdl, &app_msg, portMAX_DELAY) ==
pdPASS) {
            switch (app_msg->msg_id) {
                case MSG_ID_TEL_CONN_MGR_ACTIVATION_RSP: {
                    tel_conn_mgr_activation_rsp_struct *act_msg =
(tel_conn_mgr_activation_rsp_struct *)app_msg;
                    if (act_msg->result)
                    {
                        // Activation succeeded.
                    }
                    else
                    {
                        // Activation failed.
                    }
```

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```
                    break;
                }
                case MSG_ID_TEL_CONN_MGR_DEACTIVATION_RSP: {
                    tel_conn_mgr_deactivation_rsp_struct *deact_msg =
(tel_conn_mgr_deactivation_rsp_struct *)app_msg;
                    if (deact_msg->result)
                    {
                        // Active deactivation succeeded.
                    }
                    else
                    {
                        // Active deactivation failed.
                    }
                    break;
                }
                case MSG_ID_TEL_CONN_MGR_DEACTIVATION_IND: {
                    tel_conn_mgr_deactivation_ind_struct *deact_ind_msg =
(tel_conn_mgr_deactivation_ind_struct *)app_msg;
                    // Passive deactivation.
                    break;
                }
                default:
                    break;
            }
        }
    }
}
```

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