



Linux-based Mobile Phone Middleware

Application Programming Interface

Packet-Switched Communication Service

Document: CELF_MPP_PS_FR4

WARNING : This is a working draft for review only, it is NOT a published specification of the CE Linux Forum. It is likely that further substantial changes will be made in the course of review and issue resolution. Send comments on this version to: MppApiComments@tree.celinuxforum.org

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0. Introduction

Packet-Switched Communication Service (PS Service) has the function of the packet call control and the packet data sending and receiving.

Packet-Switched Communication Service includes PPP dial-up communication service and IP connection data transfer service.

Exclusions and restrictions

The following exclusions and restrictions apply to this specification:

- This specification has been written for packet-switched communication in WCDMA context. It may be applicable to other bearers and technologies however it has not been studied in the current version.
- In the current version, only one PDP context could be active at a time
- An application shall not call several PS services in parallel using the same app_id

0.1 References

0.1.1 Normative

RFC 2119: "Key words for use in RFCs to Indicate Requirement Levels", S. Bradner. March 1997, URL: <http://www.ietf.org/rfc/rfc2119.txt>

RFC 2234: "Augmented BNF for Syntax Specifications: ABNF". D. Crocker, P. Overell. November 1997, URL: <http://www.ietf.org/rfc/rfc2234.txt>

RFC 2396: "Uniform Resource Identifiers (URI): Generic Syntax". T. Berners-Lee, R. Fielding, U.C. Irvine, L. Masinter. August 1998, URL: <http://www.ietf.org/rfc/rfc2396.txt>

0.1.2 Informative

3GPP TS 23.060 General Packet Radio Service (GPRS); Service Description; Stage 2
URL: http://www.3gpp.org/ftp/Specs/2005-09/Rel-5/23_series/23060-5b0.zip

1. Primitives

1.1 Constants

1.1.1 CELF_MP_PS_HOST_MAX

Description: Maximum length of the character string for the ISP (Internet Service Provider) URL

1.1.2 CELF_MP_PS_APN_MAX

Description: Maximum length of the character string for the APN

1.1.3 CELF_MP_PS_TITLE_MAX

Description: Maximum length of the character string for the APN title string

1.1.4 CELF_MP_PS_DNS_RECORD_MAX

Description: Maximum length of the character string for the DNS record

1.2 Enums

1.2.1 CelfMpPsEvent

Description: Packet-Switched events. Refer to section 1.4 for detailed description.

Definition:

CELF_MP_PS_IN_START_IND
CELF_MP_PS_OUT_START_IND
CELF_MP_PS_IN_REJECTED_IND
CELF_MP_PS_OUT_REJECTED_IND
CELF_MP_PS_CONNECT_START_IND
CELF_MP_PS_DISCONNECT_REQ
CELF_MP_PS_DEACTIVATE_CNF
CELF_MP_PS_DEACTIVATE_IND
CELF_MP_PS_IN_REJECT_REQ
CELF_MP_PS_IN_STOPPED_IND
CELF_MP_PS_SERVICE_RING
CELF_MP_PS_SERVICE_ERROR
CELF_MP_PS_SERVICE_OK
CELF_MP_PS_CONTROL_DISCONNECT
CELF_MP_PS_DATA_SEND_IND
CELF_MP_PS_DATA_RECV_IND
CELF_MP_PS_APN_INIT_END_IND

1.2.2 CelfMpPsApnId

Description: APN configuration identifier. The default APN is a fixed APN configuration personalized at implementation / factory. The other 10 APN configurations could be modified and a PS configuration application should exist to allow the user to edit these configurations using `celf_mp_ps_apn_set()`.

Definition:

CELF_MP_PS_APN_DEFAULT : Default setting
CELF_MP_PS_APN_USERSET1 : User-specified 1
CELF_MP_PS_APN_USERSET2 : User-specified 2
CELF_MP_PS_APN_USERSET3 : User-specified 3
CELF_MP_PS_APN_USERSET4 : User-specified 4
CELF_MP_PS_APN_USERSET5 : User-specified 5
CELF_MP_PS_APN_USERSET6 : User-specified 6
CELF_MP_PS_APN_USERSET7 : User-specified 7
CELF_MP_PS_APN_USERSET8 : User-specified 8
CELF_MP_PS_APN_USERSET9 : User-specified 9
CELF_MP_PS_APN_USERSET10 : User-specified 10

1.2.3 CelfMpPsApnInit

Description: result of the APN initialization

Definition:

CELF_MP_PS_UIM_UPDATED : Successful, UIM updated
 CELF_MP_PS_UIM_NOT_UPDATED : Successful, UIM not updated
 CELF_MP_PS_AUTH_ERR : Failure returned from the authentication service

1.2.4 CelfMpPsConn

Description: accept or reject an incoming PS connection

Definition:

CELF_MP_PS_COM_CONN_ACCEPT : Accept incoming PS connection
 CELF_MP_PS_COM_CONN_REJECT : Reject incoming PS connection

1.2.5 CelfMpPsApnMode

Description: default APN settings

Definition:

CELF_MP_PS_DEFAULT_APN_MS : APN settings stored in the mobile phone
 CELF_MP_PS_DEFAULT_APN_UIM : APN settings stored in the UIM

1.2.6 CelfMpPsExtEventSet

Description: External Equipment Event Notification class

Definition:

CELF_MP_PS_EXT_EVENT_APN_INIT_END : Notification of APN initialization completed
 CELF_MP_PS_EXT_EVENT_CLASS_ALL : All

1.2.7 CelfMpPsPdpType

Description: PDP type

Definition:

CELF_MP_PS_PDP_TYPE_X25 : X.25 connection
 CELF_MP_PS_PDP_TYPE_IP : IP connection
 CELF_MP_PS_PDP_TYPE_OSPIH : OSPIH connection
 CELF_MP_PS_PDP_TYPE_PPP : PPP (IP based PPP)
 CELF_MP_PS_PDP_TYPE_IPv6 : IPv6 connection

1.2.8 CelfMpPsEventClass

Description: Event notification class

Definition:

CELF_MP_PS_CLASS_CALL_STATE_MSG : PS call status message notification (except for data emission / reception)
 CELF_MP_PS_CLASS_SERVICE_STATE_MSG : PS service status message notification
 CELF_MP_PS_CLASS_CALL_DATA_MSG : PS call activity (data emission / reception) message notification
 CELF_MP_PS_CLASS_ALL : All

1.2.9 CelfMpPsUPlane

Description: User Plane connection status

Definition:

CELF_MP_PS_UPLANE_ON : U-Plane connected
 CELF_MP_PS_UPLANE_OFF : U-Plane not connected

1.2.10 CelfMpPsStatus

Description: status of the current PS communication. Refer to Annex 3 – Packet-Switched communication status

Definition:

Classification: Packet-Switched Communication Service

CELF_MP_PS_STATUS_IDLE : Communication ended (idle)
 CELF_MP_PS_STATUS_INCOMING_CONNECTION : Connecting for incoming call
 CELF_MP_PS_STATUS_CONNECTION_ACTIVATION : Activation of the connection
 CELF_MP_PS_STATUS_ACTIVE : Communication active (C-Plane active)
 CELF_MP_PS_STATUS_DISCONNECT : Disconnecting

1.3 Data Types and Structures

1.3.1 CelfMpPsHost

Description: It contains the ISP (Internet Service Provider) URL string terminated by a NULL character '\0'. The allowable size is 1 to CELF_MP_PS_HOST_MAX.

Definition: unsigned char[CELF_MP_PS_HOST_MAX + 1]

1.3.2 CelfMpPsApn

Description: It contains the Access Point Name string terminated by a NULL character '\0'. The allowable size is 1 to CELF_MP_PS_APN_MAX.

Definition: unsigned char[CELF_MP_PS_APN_MAX + 1]

1.3.3 CelfMpPsDnsRec

Description: It contains the DNS record name string terminated by a NULL character '\0'. The allowable size is 1 to CELF_MP_PS_DNS_RECORD_MAX.

Definition: unsigned char [CELF_MP_PS_DNS_RECORD_MAX + 1]

1.3.4 CelfMpPsTitle

Description: It contains the title string for the APN terminated by a NULL character '\0'. The allowable size is 1 to CELF_MP_PS_TITLE_MAX.

Definition: unsigned char[CELF_MP_PS_TITLE_MAX + 1]

1.3.5 CelfMpPsApnHostData

Description: APN/host data structure

Definition:

```

APN/host data structure
typedef struct {
    CelfMpPsApnId      apn_id ;
    CelfMpPsApn       apn ;
    CelfMpPsHost      host ;
    CelfMpPsTitle     title ;
} CelfMpPsApnHostData;
    
```

1.3.6 CelfMpPsEventSet

Description: Bit field where each bit corresponds to a PS event class to be registered. The PS event classes are defined by the enum CelfMpPsEventClass.

Definition: unsigned int

1.4 Events type

This paragraph describes all PS-related events. The associated data structure is CelfMpEvent (described in the Preface) with the following content:

- category : PacketNotify (this is the only value used for the PS services)
- subtype (constant value):
 - o PacketNotify_Call_State
 - o PacketNotify_Service_State
 - o PacketNotify_Call_Data
 - o PacketNotify_Apn_Init_End

- info : event from enum CelfMpPsEvent (see §1.2.1)
- subinfo : not used for PS services

1.4.1 Packet-switched call state notification event

In this sub-section, the associated data structure is CelfMpEvent with the following values:

category = PacketNotify;
subtype = Call_State;

The value of the field 'info' is the event from enum CelfMpPsEvent.

1.4.1.1 CELF_MP_PS_IN_START_IND

Description: It notifies the start of incoming Packet-Switched connection

1.4.1.2 CELF_MP_PS_OUT_START_IND

Description: It notifies the start of outgoing packet-switched connection

1.4.1.3 CELF_MP_PS_IN_REJECTED_IND

Description: It notifies the rejection of incoming packet-switched connection

1.4.1.4 CELF_MP_PS_OUT_REJECTED_IND

Description: It notifies the rejection of outgoing packet-switched connection

1.4.1.5 CELF_MP_PS_CONNECT_START_IND

Description: It notifies the start of packet-switched connection

1.4.1.6 CELF_MP_PS_DISCONNECT_REQ

Description: Notification of packet disconnecting (on mobile station) indication started

1.4.1.7 CELF_MP_PS_DEACTIVATE_CNF

Description: Notification of packet disconnecting indication ended

1.4.1.8 CELF_MP_PS_DEACTIVATE_IND

Description: Notification of packet disconnecting (on network) completed

1.4.1.9 CELF_MP_PS_CALLED_REJ_REQ

Description: Notification of missed termination record registered

1.4.1.10 CELF_MP_PS_CALLED_END_IND

Description: Notification of packet termination indication ended

1.4.2 Packet-Switched service status notification event

In this sub-section, the associated data structure is CelfMpEvent with the following parameters:

category = PacketNotify;
subtype = Service_State;

The value of the field 'info' is the event from enum CelfMpPsEvent.

1.4.2.1 CELF_MP_PS_SERVICE_RING

Description: packet-switched service establishment

Classification: Packet-Switched Communication Service

1.4.2.2 CELF_MP_PS_SERVICE_ERROR

Description: packet-switched service ERROR

1.4.2.3 CELF_MP_PS_SERVICE_OK

Description: packet-switched service OK (successful completion of primitive)

1.4.2.4 CELF_MP_PS_CONTROL_DISCONNECT

Description: packet-switched service DISCONNECT

1.4.3 Packet-switched call activity notification event

In this sub-section, the associated data structure is CelfMpEvent with the following parameters:

```
category = PacketNotify;  
subtype = Call_Data;
```

The value of the field 'info' is the event from enum CelfMpPsEvent.

These events are generated periodically (for example every second) to inform the applications there is data activity on the packet connection. The application may use these events to inform the user of data activity with a specific display (an icon for example).

1.4.3.1 CELF_MP_PS_DATA_SEND_IND

Description: Data sending activity notification

1.4.3.2 CELF_MP_PS_DATA_RECV_IND

Description: Data receiving activity notification

1.4.4 APN initialization status notification event

In this sub-section, the associated data structure is CelfMpEvent with the following parameters:

```
category = PacketNotify;  
subtype = Apn_Initialization;
```

The value of the field 'info' is the event from enum CelfMpPsEvent.

1.4.4.1 CELF_MP_PS_APN_INIT_END_IND

Description: APN initialization complete notification.

2. Start packet-switched communication notification

2.1 Symbol: `celf_mp_ps_notification_start`

2.1.1 Syntax

```
CelfMpStatus   celf_mp_ps_notification_start (
    CelfMpAppId    app_id,
    CelfMpPsEventSet event_set,
    CelfMpCallback callback_func );
```

2.1.2 Argument

Name: `app_id`

Type: `CelfMpAppId`

I/O: |

Description: Application identifier.

Name: `event_set`

Type: `CelfMpPsEventSet`

I/O: |

Description: Set of PS event classes . Events belonging to one of the `CelfMpPsEventClass` classes **may** be registered to have a callback function called when the event occurs for the application identified by `app_id`. Classes of events are selected by setting the corresponding bit in `event_set`.

Name: `callback_func`

Type: `CelfMpCallback`

I/O: |

Description: The callback function that shall be called when an event occurs from one of the classes registered in `event_set`.

2.1.3 Return Value

Type: `CelfMpStatus`

Description: `celf_mp_ps_notification_start ()` **shall** return one of the following values :

`CELF_MP_STATUS_OK`: Successful completion

`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID

`CELF_MP_STATUS_EVENT_SET_ERR`: The set of event is invalid

`CELF_MP_STATUS_ERR`: Other unsuccessful completion

2.1.4 Include File

`/usr/include/celf/mp_ps.h`

2.1.5 Functional Description

This function is a synchronous service.

This function is used to start notification for events related to packet-switched communication. Events from a registered class **shall** cause the registered callback function to be called when the event occurs for the application identified by `app_id`. If a class of events does not have a registered callback function, no callback shall occur for those events.

Different callback functions **may** be registered for different classes of events. Only the most recently registered callback for an event class **shall** be called when an event of that class occurs, and no notification shall be given when a callback for an event class is superseded. Callbacks **may** be canceled using the `celf_mp_ps_notification_stop()` function.

The following notification event classes **shall** be supported:

`CELF_MP_PS_CLASS_CALL_STATE_MSG`

`CELF_MP_PS_CLASS_SERVICE_STATE_MSG`

`CELF_MP_PS_CLASS_CALL_DATA_MSG`

Classification: Packet-Switched Communication Service

A callback may be registered for all classes of events using the special event class `CELF_MP_PS_CLASS_ALL`, however to reduce overhead it is recommended that only the needed event classes should be registered.

In case the parameter `event_set` contains a bit set not defined in `CelfMpPsEventClass` the error `CELF_MP_STATUS_EVENT_SET_ERR` shall be returned.

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3. Stop packet-switched communication notification

3.1 Symbol: `celf_mp_ps_notification_stop`

3.1.1 Syntax

```
CelfMpStatus  celf_mp_ps_notification_stop (
    CelfMpAppId  app_id,
    CelfMpPsEventSet  event_set );
```

3.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: |
Description: Application identifier.

Name: `event_set`
Type: `CelfMpPsEventSet`
I/O: |
Description: Set of PS event classes (see 2. Start packet-switched communication notification).

3.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_notification_stop ()` **shall** return one of the following values :
`CELF_MP_STATUS_OK`: Successful completion
`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELF_MP_STATUS_EVENT_SET_ERR`: The set of event is invalid
`CELF_MP_STATUS_ERR`: Other unsuccessful completion

3.1.4 Include File

`/usr/include/celf/mp_ps.h`

3.1.5 Functional Description

This function is a synchronous service.

This function stops notification callbacks for the selected event classes related to packet-switched communication.

Events from the classes identified by `event_set` **shall** have their callbacks cancelled for the application identified by `app_id`. If no callback is registered for a selected class, no error **shall** occur.

To restart callbacks for these event classes, the application **must** call `celf_mp_ps_notification_start()` again.

For more information about packet communication classes see 2. Start packet-switched communication notification.

4. Get packet-switched communication status

4.1 Symbol: `celf_mp_ps_com_status_get`

4.1.1 Syntax

```
CelfMpStatus celf_mp_ps_com_status_get (
    CelfMpAppId app_id,
    CelfMpPsPdpType pdp_type,
    CelfMpPsStatus * status);
```

4.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: I
Description: Application identifier.

Name: `pdp_type`
Type: `CelfMpPsPdpType`
I/O: I
Description: This parameter **shall** have one of the following values :
`CELf_MP_PS_PDP_TYPE_X25`
`CELf_MP_PS_PDP_TYPE_IP`
`CELf_MP_PS_PDP_TYPE_OSPIH`
`CELf_MP_PS_PDP_TYPE_PPP`
`CELf_MP_PS_PDP_TYPE_IPv6`

Name: `status`
Type: `CelfMpPsStatus`
I/O: O
Description: packet-switched communication status :
`CELf_MP_PS_EMPTY`: Communication ended (idle)
`CELf_MP_PS_ACCEP_CONN`: Connected for incoming call
`CELf_MP_PS_CONNECT`: Connected for outgoing call
`CELf_MP_PS_ACTIVE`: Communication active (C-Plane active)
`CELf_MP_PS_DISCONNECT`: Disconnected

4.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_com_status_get ()` **shall** return one of the following values :
`CELf_MP_STATUS_OK`: Successful completion
`CELf_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELf_MP_STATUS_PS_PDP_TYPE_ERR`: unsupported PDP type
`CELf_MP_STATUS_ERR`: Other unsuccessful completion

4.1.4 Include File

`/usr/include/celf/mp_ps.h`

4.1.5 Functional Description

This function is a synchronous service.

This function **shall** return the current packet communication status of the specified PDP type for the application identified by `app_id`. It is not necessary to call

`celf_mp_ps_notification_start ()` to use `celf_mp_ps_com_status_get()`.

`pdp_type` **must** be an individual enumerator (`pdp_type` does not allow the OR operator)

5. Request packet-switched communication connection

5.1 Symbol: `celf_mp_ps_connect`

5.1.1 Syntax

```
CelfMpStatus   celf_mp_ps_connect (
    CelfMpAppId   app_id,
    CelfMpPsPdpType pdp_type);
```

5.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: |
Description: Application identifier.

Name: `pdp_type`
Type: `CelfMpPsPdpType`
I/O: |
Description: This parameter **shall** have one of the following values :

- `CELf_MP_PS_PDP_TYPE_X25`
- `CELf_MP_PS_PDP_TYPE_IP`
- `CELf_MP_PS_PDP_TYPE_OSPIH`
- `CELf_MP_PS_PDP_TYPE_PPP`
- `CELf_MP_PS_PDP_TYPE_IPv6`

5.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_connect ()` **shall** return one of the following values :

<code>CELf_MP_STATUS_OK:</code>	Successful completion
<code>CELf_MP_STATUS_APP_ID_ERR:</code>	Invalid Application ID
<code>CELf_MP_STATUS_PS_PDP_TYPE_ERR:</code>	unsupported PDP type
<code>CELf_MP_STATUS_PS_DENIED:</code>	Request rejected by network due to no subscription to packet communication service
<code>CELf_MP_STATUS_ERR:</code>	Other error

5.1.4 Include File

`/usr/include/celf/mp_ps.h`

5.1.5 Functional Description

This function is an asynchronous service.

This function **shall** open a packet communication channel of the specified type for the application specified by `app_id`. The APN setting to be used for packet-switched communication should have been selected using `celf_mp_ps_apn_select()`.

The application is notified through events of the progress and the completion of the processing, refer to sequence chart in Annex 1.

The start of the connection procedure **is** notified by the event `CELf_MP_PS_OUT_START_IND`. Applications **should** wait for this message before starting another MPP packet-switched service related function call.

The activation of the PDP context is notified by the event `CELf_MP_PS_CONNECT_START_IND` containing the call reference.

Classification: Packet-Switched Communication Service

If the channel is successfully opened, it **shall** cause the CELF_MP_PS_SERVICE_OK event to occur.

If the channel is not successfully opened, it **shall** cause the CELF_MP_PS_CONTROL_ERR event to occur.

DRAFT

6. Response to a network request for packet-switched connection

6.1 Symbol: `celf_mp_ps_connect_rsp`

6.1.1 Syntax

```
CelfMpStatus   celf_mp_ps_connect_rsp (
    CelfMpAppId      app_id,
    CelfMpPsConn     type,
    CelfMpCallRef    call_ref );
```

6.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: `I`
Description: Application identifier.

Name: `type`
Type: `CelfMpPsConn`
I/O: `I`
Description: `CELf_MP_PS_COM_CONN_ACCEPT`: Accept incoming
`CELf_MP_PS_COM_CONN_REJECT`: Reject incoming

Name: `call_ref`
Type: `CelfMpCallRef`
I/O: `I`
Description: Call Reference for incoming call

6.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_connect_rsp ()` shall return one of the following values :
`CELf_MP_STATUS_OK`: Successful completion
`CELf_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELf_MP_STATUS_CALL_REF_ERR`: Invalid Call reference
`CELf_MP_STATUS_ERR`: Other unsuccessful completion

6.1.4 Include File

`/usr/include/celf/mp_ps.h`

6.1.5 Functional Description

This function is an asynchronous service.

This function accepts or rejects the packet communication depending on the parameter 'type'. If the parameter 'type' is incorrect the function shall return the error `CELf_MP_STATUS_ERR`.

The application is notified through events of the progress and the completion of the processing, refer to sequence chart in Annex 2.

The start of processing by MPP shall be notified by the following event:
`CELf_MP_PS_IN_START_IND`

The completion of this function shall be notified by the following event:
`CELf_MP_PS_SERVICE_OK`

Unsuccessful processing of this function shall be notified by the following event:
`CELf_MP_PS_SERVICE_ERROR`

7. Request the deactivation of packet-switched communication

7.1 Symbol: `celf_mp_ps_call_disconnect`

7.1.1 Syntax

```
CelfMpStatus   celf_mp_ps_disconnect (  
    CelfMpAppId      app_id,  
    CelfMpCallRef    call_ref );
```

7.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: I
Description: Application identifier.

Name: `call_ref`
Type: `CelfMpCallRef`
I/O: I
Description: Call Reference of the packet-switched call to be disconnected

7.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_disconnect ()` shall return one of the following values :
`CELF_MP_STATUS_OK`: Successful completion
`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELF_MP_STATUS_CALL_REF_ERR`: Invalid Call reference
`CELF_MP_STATUS_ERR`: Other unsuccessful completion

7.1.4 Include File

`/usr/include/celf/mp_ps.h`

7.1.5 Functional Description

This function is an asynchronous service.
This function disconnects a packet-switched communication.

The application is notified through events of the progress and the completion of the processing.

The start of processing by MPP shall be notified by the following event:
`CELF_MP_PS_DISCONNECT_REQ`

The completion of this function shall be notified by the following event:
`CELF_MP_PS_SERVICE_OK`

Unsuccessful processing of this function shall be notified by the following event:
`CELF_MP_PS_SERVICE_ERROR`

8. Specify APN settings

8.1 Symbol: celf_mp_ps_apn_set

8.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_set (
    CelfMpAppld app_id,
    CelfMpPsApnHostData * apn_data );
```

8.1.2 Argument

Name: app_id
Type: CelfMpAppld
I/O: |
Description: Application identifier.

Name: apn_data
Type: CelfMpPsApnHostData *
I/O: |
Description: APN data where apn_id specifies the user APN to set:

CELF_MP_PS_APN_USERSET1:	User-specified 1
CELF_MP_PS_APN_USERSET2:	User-specified 2
CELF_MP_PS_APN_USERSET3:	User-specified 3
CELF_MP_PS_APN_USERSET4:	User-specified 4
CELF_MP_PS_APN_USERSET5:	User-specified 5
CELF_MP_PS_APN_USERSET6:	User-specified 6
CELF_MP_PS_APN_USERSET7:	User-specified 7
CELF_MP_PS_APN_USERSET8:	User-specified 8
CELF_MP_PS_APN_USERSET9:	User-specified 9
CELF_MP_PS_APN_USERSET10:	User-specified 10

8.1.3 Return Value

Type: CelfMpStatus
Description: `celf_mp_ps_apn_set ()` shall return one of the following values :
 CELF_MP_STATUS_OK: Successful completion
 CELF_MP_STATUS_APP_ID_ERR: Invalid Application ID
 CELF_MP_STATUS_ERR: Other unsuccessful completion

8.1.4 Include File

/usr/include/celf/mp_ps.h

8.1.5 Functional Description

This function is a synchronous service.

This function allows the modification of the APN, host and title data of one of the 10 user-specified APNs.

If the values in parameter 'apn_data' are incorrect, the function shall return the error CELF_MP_STATUS_ERR.

9. Get APN settings

9.1 Symbol: `celf_mp_ps_apn_get`

9.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_get (  
    CelfMpAppId app_id,  
    CelfMpPsApnHostData * apn_data );
```

9.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: I
Description: Application identifier.

Name: `apn_data`
Type: `CelfMpPsApnHostData`
I/O: O
Description: APN/host data structure

9.1.3 Return Value

Type: `CelfMpStatus`

Description: `celf_mp_ps_apn_get ()` shall return one of the following values :

`CELF_MP_STATUS_OK`: Successful completion
`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELF_MP_STATUS_ERR`: Other unsuccessful completion

9.1.4 Include File

`/usr/include/celf/mp_ps.h`

9.1.5 Functional Description

This function is a synchronous service.

This function returns the current APN data, host data and title data.

10. Select APN for packet-switched communication

10.1 Symbol: celf_mp_ps_apn_select

10.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_select (
    CelfMpAppId app_id,
    CelfMpPsApnId apn_id);
```

10.1.2 Argument

Name: app_id
Type: CelfMpAppId
I/O: I
Description: Application identifier.

Name: apn_id
Type: CelfMpPsApnId
I/O: I
Description: APN setting to be used

CELF_MP_PS_APN_DEFAULT :	Default setting
CELF_MP_PS_APN_USERSET1:	User-specified 1
CELF_MP_PS_APN_USERSET2:	User-specified 2
CELF_MP_PS_APN_USERSET3:	User-specified 3
CELF_MP_PS_APN_USERSET4:	User-specified 4
CELF_MP_PS_APN_USERSET5:	User-specified 5
CELF_MP_PS_APN_USERSET6:	User-specified 6
CELF_MP_PS_APN_USERSET7:	User-specified 7
CELF_MP_PS_APN_USERSET8:	User-specified 8
CELF_MP_PS_APN_USERSET9:	User-specified 9
CELF_MP_PS_APN_USERSET10:	User-specified 10

10.1.3 Return Value

Type: CelfMpStatus
Description: `celf_mp_ps_apn_select ()` shall return one of the following values :

CELF_MP_STATUS_OK:	Successful completion
CELF_MP_STATUS_APP_ID_ERR:	Invalid Application ID
CELF_MP_STATUS_ERR:	Other unsuccessful completion

10.1.4 Include File

/usr/include/celf/mp_ps.h

10.1.5 Functional Description

This function is a synchronous service.
 This function selects the APN setting to be used for packet-switched communication.

If the parameter 'apn_id' is incorrect, the function shall return the error CELF_MP_STATUS_ERR.

11. Get APN used for packet-switched communication

11.1 Symbol: `celf_mp_ps_apn_id_get`

11.1.1 Syntax

```
CelfMpStatus          celf_mp_ps_apn_id_get (  
    CelfMpAppld        app_id,  
    CelfMpPsApnId *    apn_id );
```

11.1.2 Argument

Name: `app_id`
Type: `CelfMpAppld`
I/O: I
Description: Application identifier.

Name: `apn_id`
Type: `CelfMpPsApnId`
I/O: O
Description: APN id currently used for packet-switched communication:

- CELf_MP_PS_APN_DEFAULT: Default setting
- CELf_MP_PS_APN_USERSET1: User-specified 1
- CELf_MP_PS_APN_USERSET2: User-specified 2
- CELf_MP_PS_APN_USERSET3: User-specified 3
- CELf_MP_PS_APN_USERSET4: User-specified 4
- CELf_MP_PS_APN_USERSET5: User-specified 5
- CELf_MP_PS_APN_USERSET6: User-specified 6
- CELf_MP_PS_APN_USERSET7: User-specified 7
- CELf_MP_PS_APN_USERSET8: User-specified 8
- CELf_MP_PS_APN_USERSET9: User-specified 9
- CELf_MP_PS_APN_USERSET10: User-specified 10

11.1.3 Return Value

Type: `CelfMpPsApnId`

Description: `celf_mp_ps_apn_id_get ()` shall return one of the following values :

- CELf_MP_STATUS_OK: Successful completion
- CELf_MP_STATUS_APP_ID_ERR: Invalid Application ID
- CELf_MP_STATUS_ERR: Other unsuccessful completion

11.1.4 Include File

`/usr/include/celf/mp_ps.h`

11.1.5 Functional Description

This function is a synchronous service.

This function returns the APN being used for packet-switched communication.

12. Request the deactivation of external equipment packet communication

12.1 Symbol: `celf_mp_ps_ext_equipment_disconnect`

12.1.1 Syntax

```
CelfMpStatus  celf_mp_ps_ext_equipment_disconnect (
    CelfMpAppId  app_id,
    CelfMpCallRef  call_ref );
```

12.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: |
Description: Application identifier.

Name: `call_ref`
Type: `CelfMpCallRef`
I/O: |
Description: Packet-switched call reference to be disconnected.

12.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_ext_equipment_disconnect ()` shall return one of the following values :
`CELF_MP_STATUS_OK`: Successful completion
`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID
`CELF_MP_STATUS_CALL_REF_ERR`: Invalid Call reference
`CELF_MP_STATUS_ERR`: Other unsuccessful completion

12.1.4 Include File

```
/usr/include/celf/mp_ps.h
```

12.1.5 Functional Description

This function is an asynchronous service.

This function disconnects the external equipment packet communication (typically PC using the ME as modem)..

The application is notified through events of the completion of the processing.

The completion of this function shall be notified by the following event:

```
CELF_MP_PS_DEACTIVATE_IND
```

Unsuccessful processing of this function shall be notified by the following event:

```
CELF_MP_PS_SERVICE_ERROR
```


13. Get User Plane connection status

13.1 Symbol: `celf_mp_ps_uplane_status_get`

13.1.1 Syntax

```
CelfMpStatus      celf_mp_ps_uplane_status_get (  
    CelfMpAppId   app_id  
    CelfMpPsUPlane * status );
```

13.1.2 Argument

Name: `app_id`
Type: `CelfMpAppId`
I/O: I
Description: Application identifier.

Name: `status`
Type: `CelfMpPsUPlane`
I/O: O
Description: U-Plane connection status:
 `CELF_MP_PS_UPLANE_ON` : U-Plane connected
 `CELF_MP_PS_UPLANE_OFF`: U-Plane not connected

13.1.3 Return Value

Type: `CelfMpStatus`
Description: `celf_mp_ps_uplane_status_get ()` shall return one of the following values :
 `CELF_MP_STATUS_OK`: Successful completion
 `CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID
 `CELF_MP_STATUS_ERR`: Other unsuccessful completion

13.1.4 Include File

`/usr/include/celf/mp_ps.h`

13.1.5 Functional Description

This function is a synchronous service.
This function gets the current U-Plane connection status.

14. Get DNS record name

14.1 Symbol: celf_mp_ps_dns_record_get

14.1.1 Syntax

```
CelfMpStatus celf_mp_ps_dns_record_get (  
    CelfMpAppId app_id,  
    CelfMpPsDnsRec * dns_record );
```

14.1.2 Argument

Name: app_id
Type: CelfMpAppId
I/O: I
Description: Application identifier.

Name: dns_record
Type: CelfMpPsDnsRec
I/O: O
Description: DNS record name.

14.1.3 Return Value

Type: CelfMpStatus

Description: celf_mp_ps_dns_record_get () shall return one of the following values :

CELLF_MP_STATUS_OK: Successful completion
CELLF_MP_STATUS_APP_ID_ERR: Invalid Application ID
CELLF_MP_STATUS_ERR: Other unsuccessful completion

14.1.4 Include File

/usr/include/celf/mp_ps.h

14.1.5 Functional Description

This function is a synchronous service.

This function retrieves the name of the DNS for the APN currently being used.

15. Get default APN mode

15.1 Symbol: `celf_mp_ps_apn_mode_get`

15.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_mode_get (  
    CelfMpAppId app_id,  
    CelfMpPsApnMode * apn_mode );
```

15.1.2 Argument

Name: `app_id`

Type: `CelfMpAppId`

I/O: I

Description: Application identifier.

Name: `apn_mode`

Type: `CelfMpPsApnMode`

I/O: O

Description: U-Plane connection status:

`CELF_MP_PS_DEFAULT_APN_MS`: Settings in the mobile phone

`CELF_MP_PS_DEFAULT_APN_UIM`: Settings in the UIM

15.1.3 Return Value

Type: `CelfMpStatus`

Description: `celf_mp_ps_apn_mode_get ()` shall return one of the following values :

`CELF_MP_STATUS_OK`: Successful completion

`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID

`CELF_MP_STATUS_ERR`: Other unsuccessful completion

15.1.4 Include File

`/usr/include/celf/mp_ps.h`

15.1.5 Functional Description

This function is a synchronous service.

This function gets the type of default APN settings. The default APN could be set to UIM or to Mobile phone.

16. Force deactivation of all packet-switched communications

16.1 Symbol: `celf_mp_ps_service_shutdown`

16.1.1 Syntax

```
CelfMpStatus celf_mp_ps_service_shutdown (
    CelfMpAppId app_id );
```

16.1.2 Argument

Name: `app_id`

Type: `CelfMpAppId`

I/O: I

Description: Application identifier.

16.1.3 Return Value

Type: `CelfMpStatus`

Description: `celf_mp_ps_service_shutdown ()` shall return one of the following values :

`CELF_MP_STATUS_OK`: Successful completion

`CELF_MP_STATUS_APP_ID_ERR`: Invalid Application ID

`CELF_MP_STATUS_ERR`: Other unsuccessful completion

16.1.4 Include File

`/usr/include/celf/mp_ps.h`

16.1.5 Functional Description

This function is an asynchronous service.

This function disconnects all packet-switched communications currently being used by the application.

The applications are notified through events of the progress and the completion of the processing.

The start of processing by MPP **shall** be notified by the following event:

`CELF_MP_PS_DISCONNECT_REQ`

The completion of this function **shall** be notified by the following event:

`CELF_MP_PS_SERVICE_OK`

Unsuccessful processing of this function **shall** be notified by the following event:

`CELF_MP_PS_SERVICE_ERROR`

17.Request APN initialization

17.1 Symbol: celf_mp_ps_apn_initialize

17.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_initialize (
    CelfMpAppld app_id,
    CelfMpPsApnInit * result );
```

17.1.2 Argument

Name: app_id

Type: CelfMpAppld

I/O: I

Description: Application identifier.

Name: result

Type: CelfMpPsApnInit *

I/O: O

Description: Result of the APN initialization:

CELF_MP_PS_UIM_UPDATED: Successful, UIM updated

CELF_MP_PS_UIM_NOT_UPDATED: Successful, UIM not updated

CELF_MP_PS_AUTH_ERR : Failure returned from the authentication service

17.1.3 Return Value

Type: CelfMpStatus

Description: celf_mp_ps_apn_initialize () shall return one of the following values :

CELF_MP_STATUS_OK: Successful completion

CELF_MP_STATUS_APP_ID_ERR: Invalid Application ID

CELF_MP_STATUS_ERR: Other unsuccessful completion

17.1.4 Include File

/usr/include/celf/mp_ps.h

17.1.5 Functional Description

This function is an asynchronous service.

Apn init: checking and initi of APN in mobile or external module (UIM)

Ps_app:

- 1) register to event apn_init
- 2) request apn_init
- 3) use ps service

This function initializes APN, this initialized APN is called default APN.

When the power is turned on, this function starts APN initialization according to a request from an authentication application which initializes APN according to the process below:

(case1) When the APN information in the UIM is not the same as the APN information requested by the authentication application,

The APN information requested by the authentication application is stored in the UIM or in the mobile phone.

(case2) When the APN information in UIM is same as the APN information requested by authentication application,

The information in the UIM is not changed.

(case3) In case of an error such as failure of reading the UIM information,

The APN information requested by the authentication application is set in the mobile phone.

Classification: Packet-Switched Communication Service

The APN initialization completion is notified as an event
CELF_MP_PS_EXT_EVENT_APN_INIT_END
Additional information to it is used to post the APN used.

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18.Start monitoring APN initialisation

18.1 Symbol: celf_mp_ps_apn_init_notification_start

18.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_init_notification_start (
    CelfMpAppId app_id,
    CelfMpPsExtEventSet mask,
    CelfMpCallback callback_func);
```

18.1.2 Argument

Name: app_id
Type: CelfMpAppId
I/O: |
Description: Application identifier.

Name: mask
Type: CelfMpPsExtEventSet
I/O: |
Description: Set of external notification events.
 Enabled with the bit turned ON
 CELF_MP_PS_EXT_EVENT_APN_INIT_END : Notification of APN initialization completed
 CELF_MP_PS_EXT_EVENT_CLASS_ALL : All

Name: callback_func
Type: CelfMpCallback
I/O: |
Description: Callback function used to notify the event.

18.1.3 Return Value

Type: CelfMpStatus
Description: celf_mp_ps_apn_init_notification_start () shall return one of the following values:
 CELF_MP_STATUS_OK: Successful completion
 CELF_MP_STATUS_APP_ID_ERR: Invalid Application ID
 CELF_MP_STATUS_EVENT_SET_ERR: The set of event is invalid
 CELF_MP_STATUS_ERR: Other unsuccessful completion

18.1.4 Include File

/usr/include/celf/mp_ps.h

18.1.5 Functional Description

This function is a synchronous service.
 This function starts sending event notification regarding the APN initialization.
 Applications may be notified of the following events:

- APN initialization completed: Notifies the APN initialization completed.

19. Stop monitoring APN initialization

19.1 Symbol: `celf_mp_ps_apn_init_notification_stop`

19.1.1 Syntax

```
CelfMpStatus celf_mp_ps_apn_init_notification_stop (
    CelfMpAppId app_id,
    CelfMpPsExtEventSet mask );
```

19.1.2 Argument

Name: `app_id`

Type: `CelfMpAppId`

I/O: |

Description: Application identifier.

Name: `mask`

Type: `CelfMpPsExtEventSet`

I/O: |

Description: Set of external notification events.

Stops the notification when the bit is set

`CELf_MP_PS_EXT_EVENT_APN_INIT_END` : Notification of APN initialization completed

`CELf_MP_PS_EXT_EVENT_CLASS_ALL` : All

19.1.3 Return Value

Type: `CelfMpStatus`

Description: `celf_mp_ps_apn_init_notification_stop ()` shall return one of the following values:

`CELf_MP_STATUS_OK`: Successful completion

`CELf_MP_STATUS_APP_ID_ERR`: Invalid Application ID

`CELf_MP_STATUS_EVENT_SET_ERR`: The set of event is invalid

`CELf_MP_STATUS_ERR`: Other unsuccessful completion

19.1.4 Include File

`/usr/include/celf/mp_ps.h`

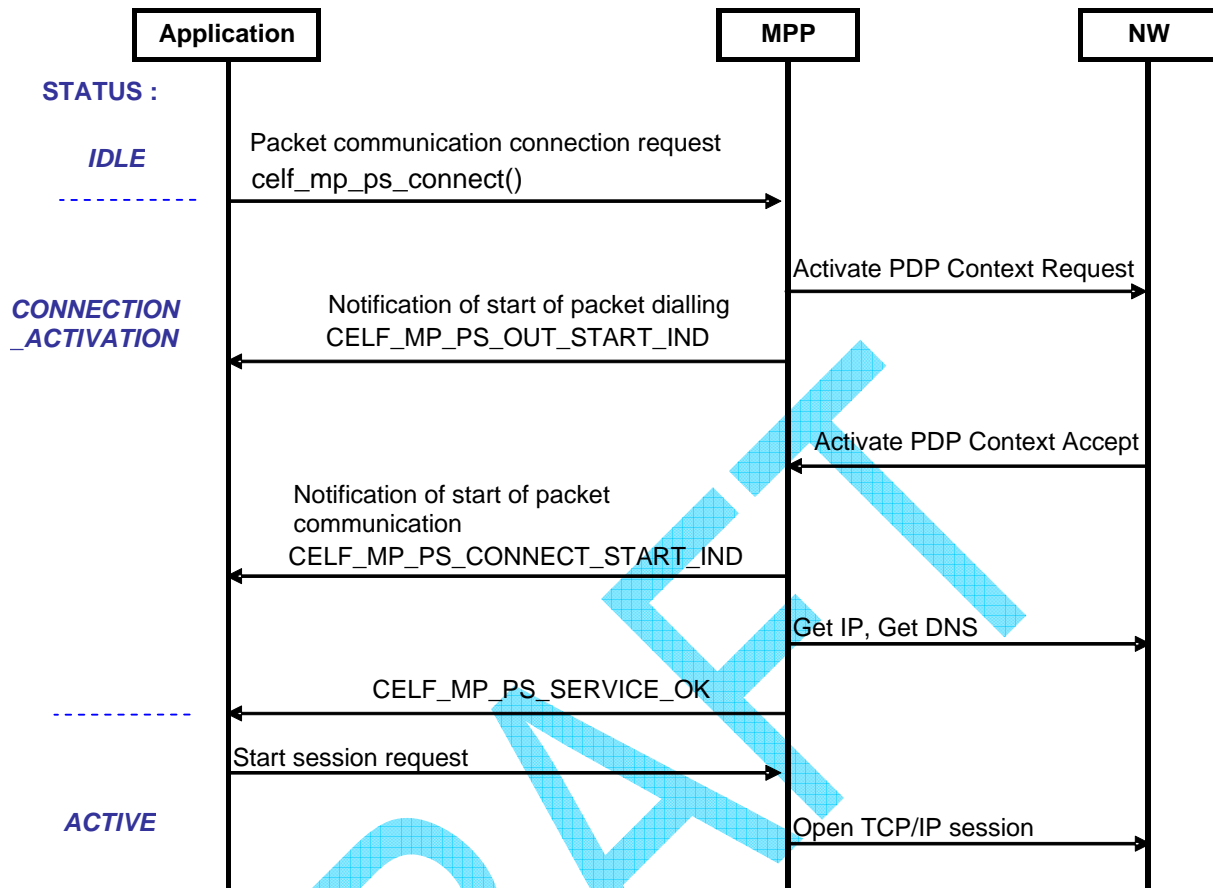
19.1.5 Functional Description

This function is a synchronous service.

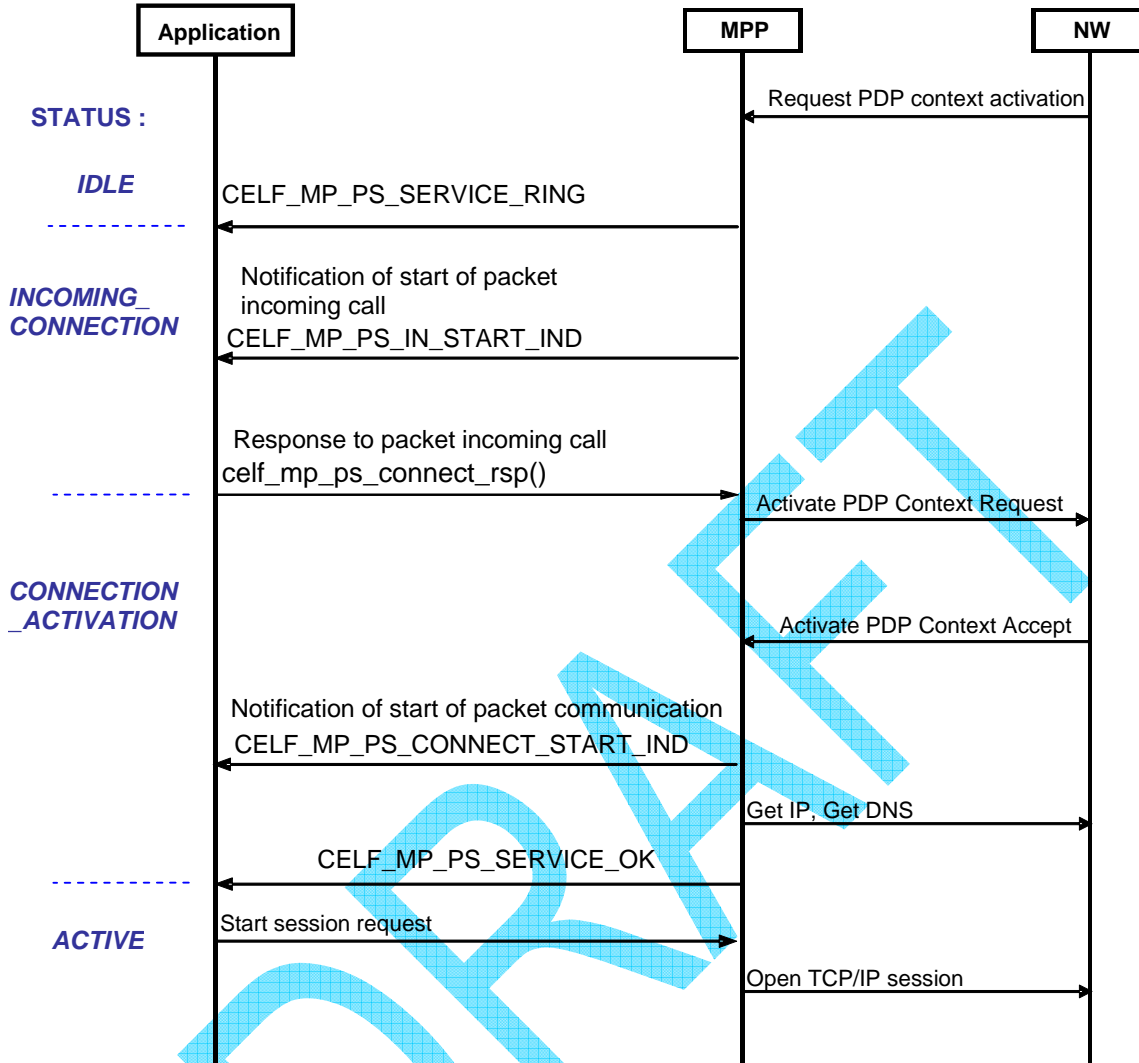
This function stops sending event notification for the events specified in

`celf_mp_ps_apn_init_notification_start`.

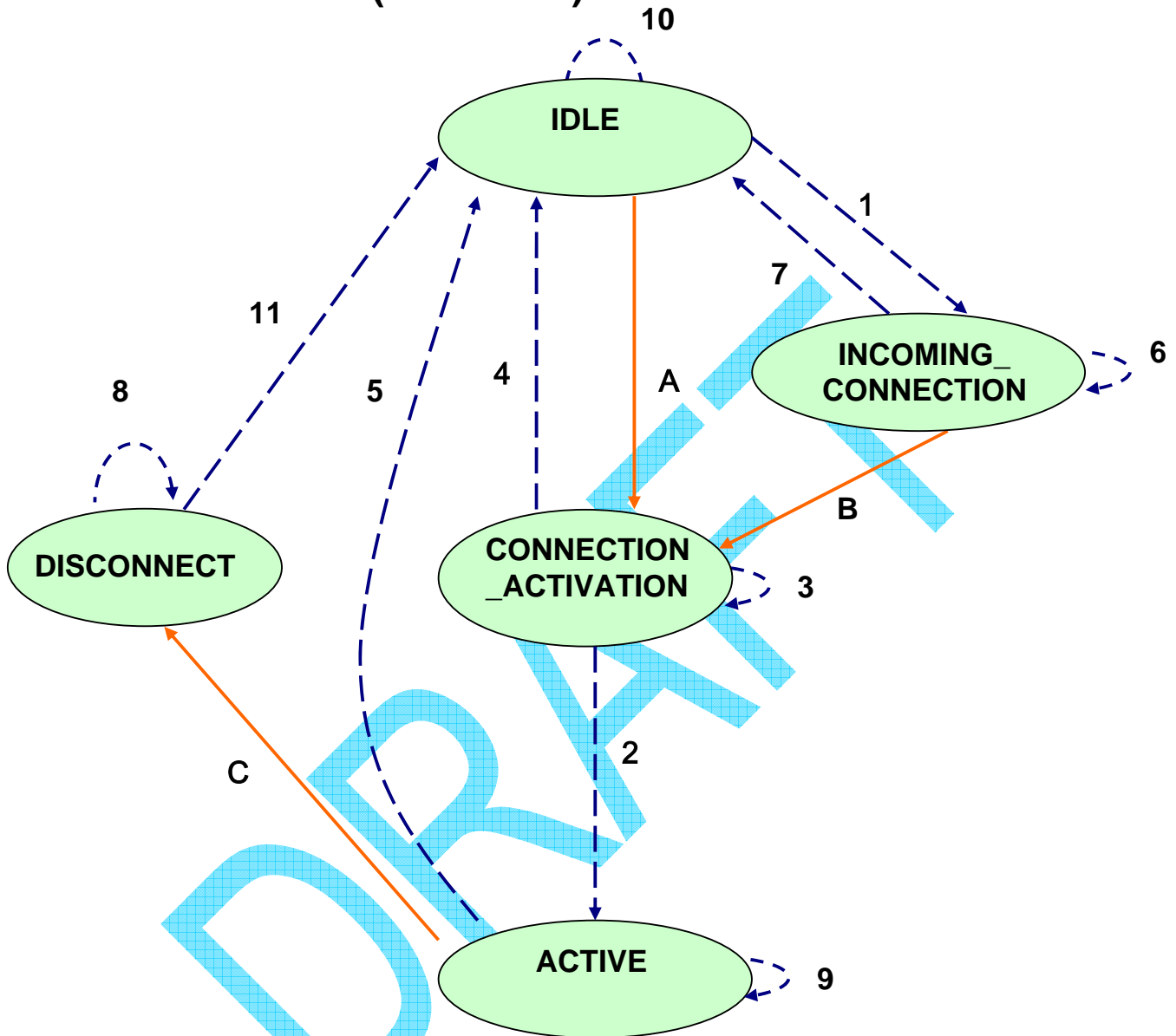
20. Annex 1 - PS outgoing connection (normative)



21. Annex 2 – PS incoming connection (normative)



22. Annex 3 – Packet-switched communication status and events (normative)



A: celf_mp_ps_connect

B: celf_mp_ps_connect_rsp

C: celf_mp_ps_call_disconnect
celf_mp_ps_service_shutdown

1: CELF_MP_PS_SERVICE_RING

2: CELF_MP_PS_SERVICE_OK

3: CELF_MP_PS_OUT_START_IND

CELF_MP_PS_CONNECT_START_IND

CELF_MP_PS_DISCONNECT_REQ

4: CELF_MP_PS_OUT_REJECTED_IND

5: CELF_MP_PS_DEACTIVATE_IND

6: CELF_MP_PS_IN_START_IND

7: CELF_MP_PS_IN_REJECTED_IND

CELF_MP_PS_IN_STOPPED_IND

8: CELF_MP_PS_DISCONNECT_REQ

9: CELF_MP_PS_DATA_SEND_IND

CELF_MP_PS_DATA_RECV_IND

10: CELF_MP_PS_APN_INIT_END_IND

11: CELF_MP_PS_DEACTIVATE_CNF

All: CELF_MP_PS_SERVICE_ERROR