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Foreword

This draft European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI), and is now submitted for the Public Enquiry phase of the ETSI standards approval procedure.

This ETS is a multi-part standard and will consist of the following parts:

Part 1: "General network design".

Part 2: "Air Interface (AI)".

Part 3: "Inter-working", (DE/RES-06001-3).

Part 4: "Gateways", (DE/RES-06001-4).

Part 5: "Terminal equipment interface", (DE/RES-06001-5).

Part 6: "Line connected stations", (DE/RES-06001-6).

Part 7: "Security".

Part 8: "Management services", (DE/RES-06001-8).

Part 9: "Performance objectives", (DE/RES-06001-9).

Part 10: "Supplementary Services (SS) Stage 1".

Part 11: "Supplementary Services (SS) Stage 2".

Part 12: "Supplementary Services (SS) Stage 3".

Part 13: "SDL Model of the Air Interface".

Part 14: "PICS Proforma".

Proposed transposition dates	
Date of latest announcement of this ETS (doa):	3 months after ETSI publication
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	6 months after doa
Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

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1 Scope

This ETS defines the stage 3 specifications of the Supplementary Service Pre-emptive Priority Call (SS-PPC) for the Trans-European Trunked Radio (TETRA).

SS-PPC enables a user to have preferential access to the network resources in a TETRA system in times of congestion including pre-emption of calls. SS-PPC is applicable for pre-emptive priorities including the emergency priority. SS-PPC includes the capability to pre-empt resources needed for higher priority calls and the capability to pre-empt users from ongoing calls in order to move them to a higher priority calls. SS-PPC specifies the definition, activation, deactivation and interrogation for the usage of pre-emptive call priorities in the TETRA system. The Switching and Management Infrastructure (SwMI) applies the SS-PPC priorities when it allocates the resources for calls. The SS-PPC operations are defined for the SwMI, for the Mobile Station (MS) and for the Line Station (LS).

SS-PPC is defined to subscribers of one TETRA system, but the subscribers may be located in several TETRA systems and the information flows may be delivered over the Inter System Interface (ISI). SS-PPC is invoked for calls within one TETRA system or for calls that extend over ISI to several TETRA systems.

Man-Machine Interface (MMI) and charging principles are outside the scope of this ETS.

Supplementary service stage 3 specification is preceded by the stage 1 and the stage 2 specifications of the service. Stage 1 describes the functional capabilities from the user's point of view. Stage 2 defines the functional behaviour in terms of Functional Entities (FEs) and information flows. Stage 3 gives a precise description of the supplementary service from the implementational point of view. It defines the protocol for the service and the encoding rules for the information flows. It defines the processes for the FEs and their behaviour. The described protocols and behaviour apply to the SwMI, for the MS and for the LS and may be applied over the ISI between TETRA systems.

2 Normative references

This ETS incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1] ETS 300 392-2: "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice plus Data (V+D); Part 2: Air Interface (AI)"

[2] ETS 300 392-1 (1996): "Radio Equipment and Systems (RES); Trans-European Trunked Radio (TETRA); Voice plus Data (V+D), Part 1: General network design".

[3] ITU-T Recommendation Z.100 (1993): "Functional Specification and Description Language (SDL)".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETS, the following definitions apply:

authorised user: A user who is authorised to define, activate, deactivate and interrogate SS-PPC.

basic service: In this ETS, basic service is either a circuit mode speech or a circuit mode data service (call), see ETS 300 392-2 [1] clause 11.

emergency priority: Highest pre-emptive priority.

Functional Entity (FE): FE specifies the functional characteristics of the SS sub-entity within an MS, an LS or a SwMI related to an SS-PPC action, e.g. definition or invocation.

home system: A TETRA system of which the Mobile Network Identity (MNI) is equal to the MNI of the authorised user. For more information about MNI, see ETS 300 392-1 [2], clause 7.

Mobile Station (MS): A physical grouping that contains all of the mobile equipment that is used to obtain TETRA services. By definition, a mobile station contains at least one Mobile Radio Stack (MRS).

SS-PPC call: The basic service (call) to which the defined SS-PPC priority is applied.

SS-PPC invocation: The sending of priority request to infrastructure. The SS-PPC invocation is done with the basic service invocation request.

SS-PPC operation: The usage of SS-PPC priority for and in a basic service set-up.

SS-PPC pre-emption: The exclusion of one or more parties from an ongoing basic service due an SS-PPC operation for another basic service. The pre-emption may be done due to the lack of resources or due to the need to join a called party to a higher priority pre-emptive call.

SS-PPC priority: Any pre-emptive priority invoked and operated for an SS-PPC call.

Switching and Management Infrastructure (SwMI): All of the TETRA equipment for a Voice plus Data (V+D) network except for subscriber terminals. The SwMI enables subscriber terminals to communicate with each other via the SwMI.

user A: Calling party, the party that invokes SS-PPC. SS-PPC is also defined on his behalf.

user B: Called party in a call in which SS-PPC is operated.

user C: Pre-empted party, a party that is involved in a call which is pre-empted due to SS-PPC. There may be one, two or more pre-empted parties in a pre-empted call.

visited system: A TETRA system of which the Mobile Network Identity (MNI) is not equal to the MNI of the authorised user.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

CC	Call Control sub-entity for SS-PPC in CMCE in SwMI
CCA	Call Control sub-entity for SS-PPC in CMCE in MS/LS
CMCE	Circuit Mode Control Entity
FE	Functional Entity
ISI	Inter System Interface
LS	Line Station
MCC	Mobile Country Code
MNC	Mobile Network Code
MS	Mobile Station
PDU	Protocol Data Unit
SS	Supplementary Service sub-entity within CMCE
SSI	Short Subscriber Identity
SS-PPC	Supplementary Service Pre-emptive Priority Call
SwMI	Switching and Management Infrastructure
TETRA	Trans-European Trunked Radio
TNCC-SAP	Call Control Service Access Point
TNSS-SAP	Supplementary Service Service Access Point
TSI	TETRA Subscriber Identity

4 SS-PPC stage 3 specification

4.1 Functional model

The functional model shall comprise the following Functional Entities (FEs):

FE1: SS sub-entity in Circuit Mode Control Entity (CMCE) for SS-PPC in user A's MS/LS;

FE2: SS sub-entity in CMCE for SS-PPC in SwMI;

FE3: SS sub-entity in CMCE for SS-PPC in authorised user's MS/LS;

FE4: generic SS sub-entity in CMCE for SS-PPC in SwMI;

FE5: SS sub-entity in CMCE for SS-PPC in user B's MS/LS;

FE6: SS sub-entity in CMCE for SS-PPC in user C's MS/LS;

CC: Call Control sub-entity for SS-PPC in CMCE in SwMI;

CCA: Call Control sub-entity for SS-PPC in CMCE in MS/LS.

The following relationships shall exist between these FEs:

ra between FE1 and FE2;

rb between FE2 and FE4 in different TETRA systems;

rc between FE2 and FE3;

rd between FE2 and FE5;

re between FE1 and FE4;

rf between FE3 and FE4;

rg between FE2s in different systems;

rh between FE2 and FE6.

Figure 1 shows these FEs and the possible relationships for the management part and figure 2 for the operational part.

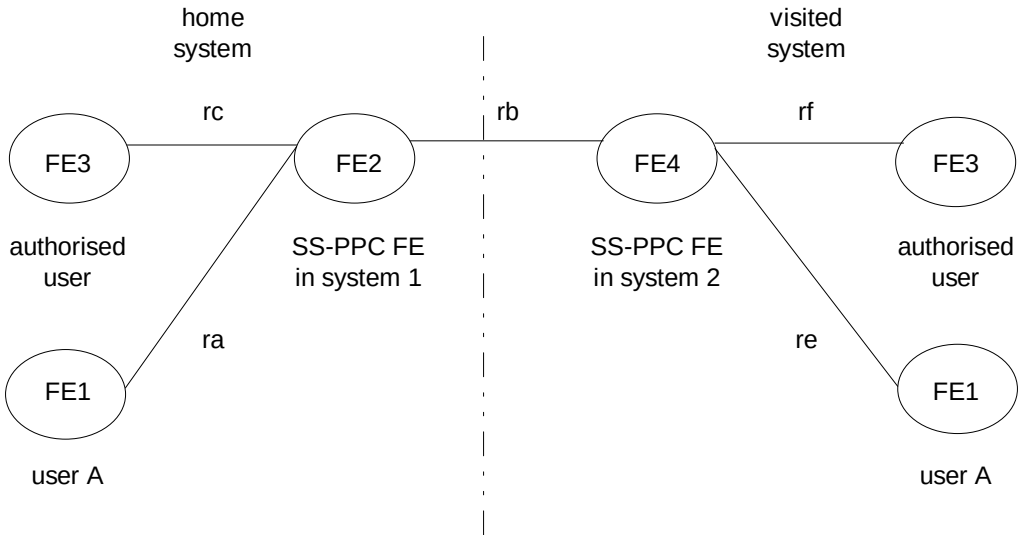


Figure 1: The relations and the FEs of the management part of SS-PPC

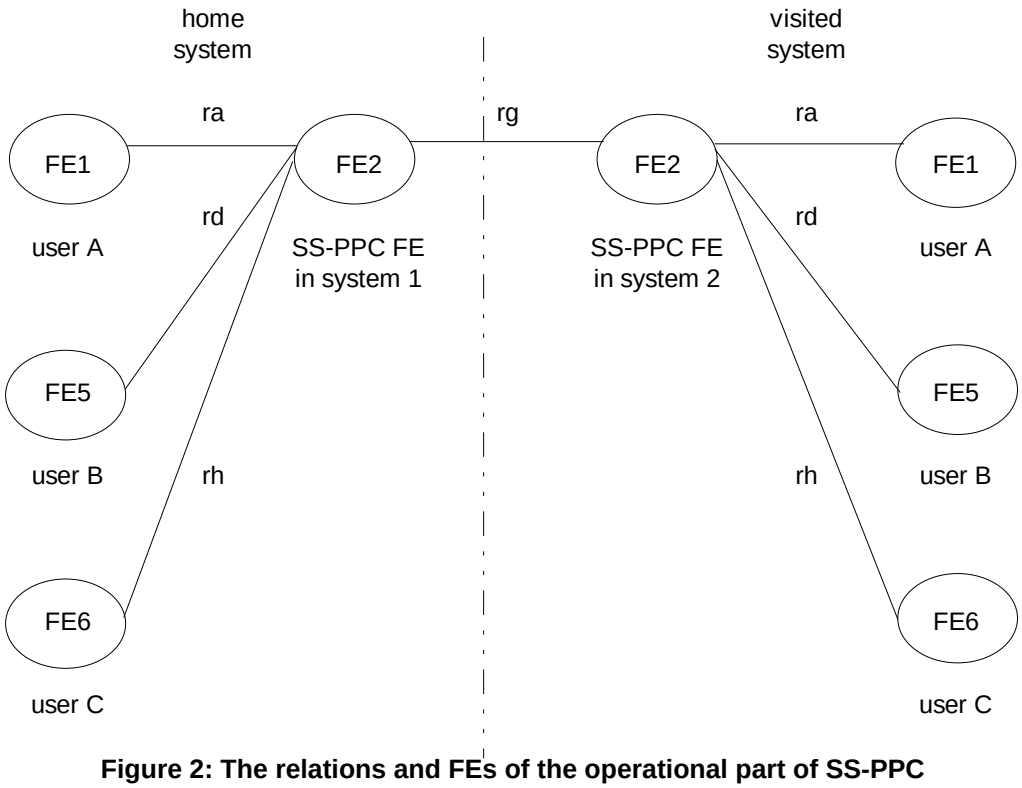


Figure 2: The relations and FEs of the operational part of SS-PPC

4.1.1 Relationship with a basic service

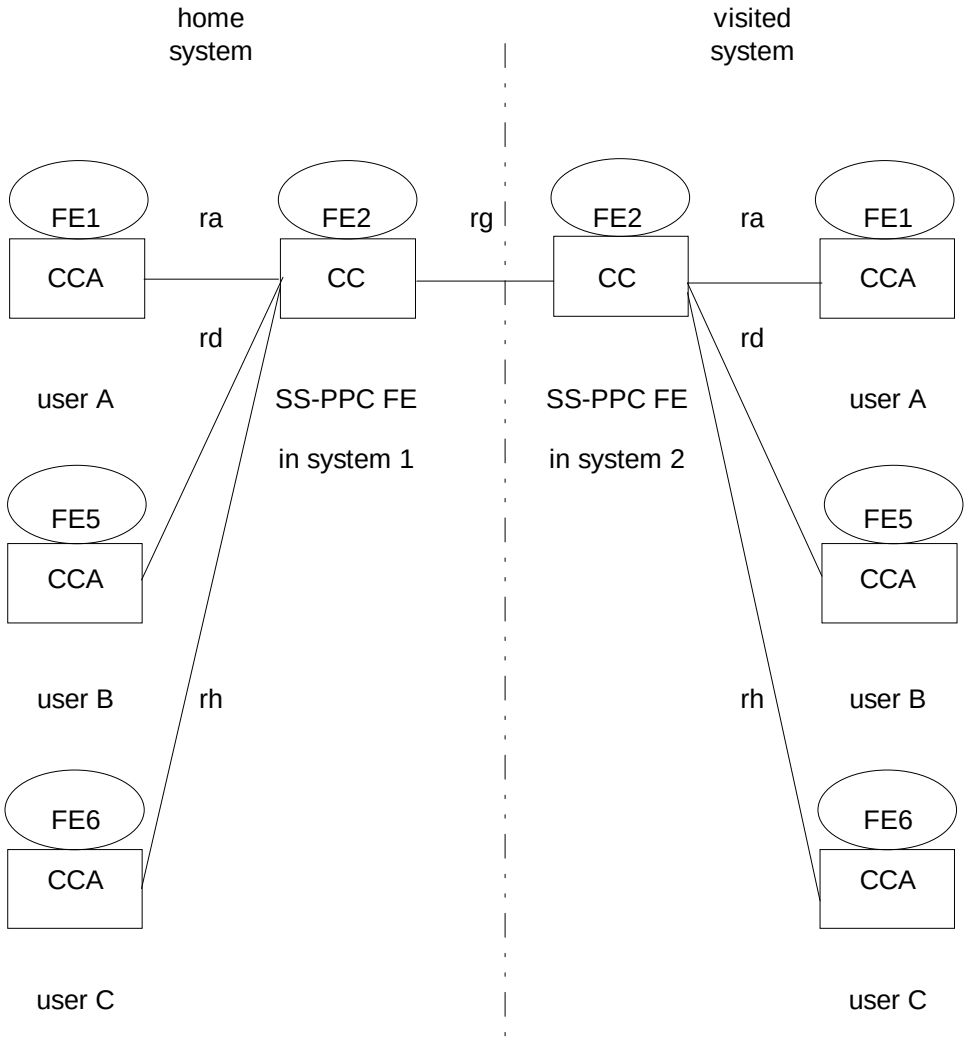
In case of SS-PPC invocation, FE1 shall be collocated with CCA at basic service invocation.

In case of SS-PPC operation, FE2 shall be collocated with CC.

In case of SS-PPC operation, FE5 shall be collocated with CCA.

In case of SS-PPC pre-emption for basic service, FE6 shall be collocated with CCA.

Figure 3 shows the different relationships that may exist between FEs and CC/CCA.



NOTE: The routes defined between FEs are applicable also for the CCs/CCAs to which the FEs are collocated.

Figure 3: The relationships between the basic service and SS-PPC FEs

5 SS-PPC service description

5.1 General

This clause describes the SS-PPC services offered by Supplementary Service (SS) and call control sub entities of CMCE of the TETRA voice plus data layer 3 service boundary in the MS/LS. The SS-PPC services shall be offered at the Supplementary Services service access point (TNSS-SAP) and the Call Control services Service Access Point (TNCC-SAP). The SS-PPC services described in this clause shall be applicable for the MS and the LS.

NOTE: The SS-PPC services within the SwMI are outside the scope of this ETS.

The SS-PPC services specified in this ETS shall complement the Supplementary services and Call control services specified in ETS 300 392-2 [1] clause 12 and 11 respectively. The SS-PPC services shall act as sub-services within the general Supplementary services and Call control services.

5.2 Offered services

SS-PPC shall be an optional supplementary service for TETRA voice plus data layer 3. If SS-PPC is supported, this subclause shall specify the services and their availability.

The following SS-PPC services shall be provided:

- impending pre-emption indication;
- pre-empted party indication;
- invocation;
- operation, including the joining to an SS-PPC call while engaged in another call;
- pre-emption.

The following SS-PPC services may be provided:

- definition;
- user definition;
- activation;
- deactivation;
- interrogation.

5.3 TNSS-SAP

If the SS-PPC definition, user definition, activation, deactivation, interrogation, impending pre-emption indication and pre-empted party indication are supported, see subclause 5.2, they shall be provided at TNSS-SAP.

The SS-PPC service elements shall be carried within the following three generic supplementary services primitives over TNSS-SAP:

a) TNSS-SERVICE;

b) TNSS-INFO;

c) TNSS-ERROR.

Figure 4 illustrates the flow for generic SS primitives.

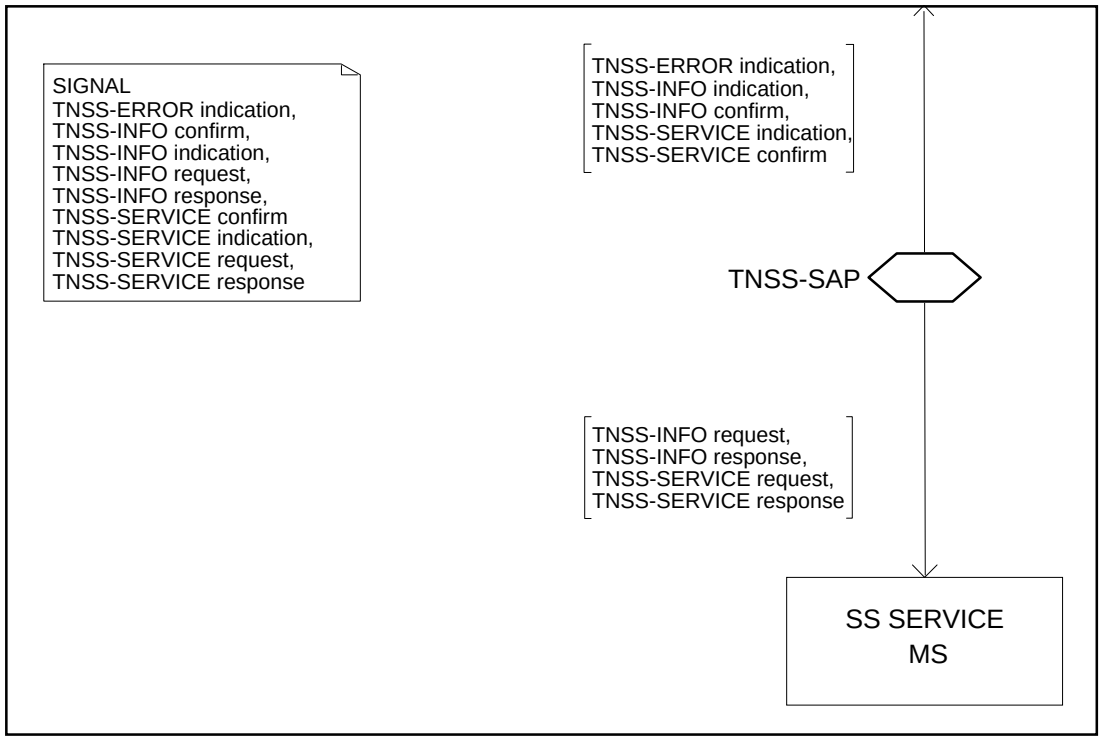


Figure 4: The flow for generic SS primitives

For a detailed description of the generic supplementary service primitives refer to ETS 300 392-2 [1], subclause 12.3.

5.4 TNCC-SAP

If the SS-PPC invocation, operation and pre-emption are supported, see subclause 5.2, they shall be provided at TNCC-SAP.

The SS-PPC service elements shall be carried within the following two Call Control primitives over TNCC-SAP:

a) TNCC-SETUP request, indication and confirm;

b) TNCC-RELEASE indication.

For a detailed description of the Call Control service primitives refer to ETS 300 392-2 [1], subclause 11.3.

5.4.1 SS-PPC services offered over the TNSS-SAP

In this subclause each numbered FE, e.g. FE1, shall represent the SS-PPC service within supplementary services service in layer 3.

5.4.1.1 SS-PPC primitives

The generic supplementary service primitives shall contain the following SS-PPC primitives.

a) DEFINE request;

b) DEFINE-ACK confirm;

c) DEFINE-USER indication;

d) DEFINE-USER-ACK response;

e) INTERROGATE request;

f) INTERROGATE-ACK confirm;

g) IMPENDING-PRE-EMPTION indication;

h) SUBSCRIBER-PRE-EMPTED indication.

The activation and deactivation shall be done with the DEFINE request; the acknowledgement for activation and deactivation shall be done with DEFINE-ACK confirm.

The information contained in the following primitive description tables correspond to the following key:

- Remark: comment;
- C: conditional;
- O: optional;
- M: mandatory.

5.4.1.2 DEFINE request

DEFINE request primitive shall be offered from application to FE3 over TNSS-SAP. The primitive shall contain the SS-PPC information elements listed in table 1.

The Number of subscriber identities element shall indicate, how many Subscriber identity elements shall follow. If there are several Subscriber identity elements in the primitive, the Number of subscriber identities element shall also indicate, how the following Subscriber identity elements shall be interpreted.

The Defined subscriber number element(s) shall indicate the subscriber number(s) on which behalf the following definition shall be made.

The Basic service type element shall indicate how many times the Basic service and SS-PPC priority element shall be repeated.

Table 1: DEFINE request contents

Element	Request	Remark
SS Type	M	SS-PPC
Operation type	M	(note 1)
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note 2)
Activated/deactivated	C	(note 3)
Number of basic services	M	
Basic service and SS-PPC priority	C	repeatable (note 4)
Delivered to user A(s)	C	(note 5)
Acknowledgement from user A(s)	C	(note 5)
NOTE 1: The Operation type shall be: - Definition for definition request; - Activation for activation request; - Deactivation for deactivation request. NOTE 2: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements. NOTE 3: Element shall be conditional on Operation type: - Activation, Deactivation: element shall be present; - Definition: element shall not be present. NOTE 4: Basic service element shall be repeated as many times as indicated in the Number of basic services element. NOTE 5: Element shall be conditional on Operation type: - Activation, Deactivation: element shall not be present; - Definition: element shall be present.		

5.4.1.3 DEFINE-ACK confirm

DEFINE-ACK confirm primitive shall be offered from FE3 to the application over TNSS-SAP as an acknowledgement to a previously made definition request. The primitive shall contain the SS-PPC information elements listed in table 2.

The elements shall be interpreted as described for DEFINE request.

However, the Result for definition(s) element shall indicate the result for all listed subscriber numbers and all basic service types.

NOTE 1: If the acknowledgements are different for different Subscriber identities, FE3 delivers several DEFINE-ACK indication primitives to the application.

NOTE 2: If the Result for definition/activation/deactivation is "accepted, but some values changed by SwMI", the interrogation can be used to interrogate the values.

Table 2: DEFINE-ACK confirm contents

Element	Confirm	Remark
SS Type	M	SS-PPC
Operation type	M	(note 1)
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note 2)
Result for definition/activation/ deactivation	M	repeatable
NOTE 1: The Operation type shall be: - Definition for definition confirmation; - Activation for activation confirmation; - Deactivation for deactivation confirmation. NOTE 2: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements.		

5.4.1.4 DEFINE-USER indication

DEFINE-USER indication primitive shall be offered from FE1 to the application over TNSS-SAP. It shall be an optional feature within MS/LS to be able to save the SS-PPC definitions. The primitive shall contain the SS-PPC information elements listed in table 3.

The elements shall be interpreted as described for DEFINE request.

FE1 shall only consider definitions made to user A's subscriber number or to a group number of which subscriber is member.

Table 3: DEFINE-USER indication contents

Element	Request	Remark
SS Type	M	SS-PPC
Operation type	M	Distribution
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note 1)
Number of basic services	M	
Basic service and SS-PPC priority	C	repeatable (note 2)
Acknowledgement from user A(s)	C	(note 3)
NOTE 1: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements. NOTE 2: Basic service element shall be repeated as many times as indicated in the Number of basic services element. NOTE 3: Element shall indicate, if FE3 shall acknowledge the reception of the definition.		

5.4.1.5 DEFINE-USER-ACK response

DEFINE-USER-ACK response primitive shall be offered from the application to FE1 over TNSS-SAP as an acknowledgement to a previously received DEFINE-USER request, if acknowledgement was requested. The primitive shall contain the SS-PPC information elements listed in table 4.

The elements shall be interpreted as described for DEFINE request.

If the Subscriber identity element contains several subscriber numbers, the Result for definition(s) element shall apply to all listed subscriber numbers and basic service types.

NOTE: If the acknowledgements are different for different Subscriber identity elements, FE1 receives several DEFINE-USER-ACK indication primitives from the application.

Table 4: DEFINE-USER-ACK response contents

Element	Response	Remark
SS Type	M	:= SS-PPC
Operation type	M	:= Distribution
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note)
Result for definition	M	repeatable
NOTE: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements.		

5.4.1.6 INTERROGATE request

INTERROGATE request primitive shall be offered from the application to FE1 or FE3 over TNSS-SAP and it shall be used to interrogate SS-PPC definitions. INTERROGATE request primitive shall contain the SS-PPC information elements listed in table 5.

The elements shall be interpreted as described for DEFINE request.

Table 5: INTERROGATE request contents

Element	Request	Remark
SS Type	M	SS-PPC
Operation type	M	Interrogation
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note)
NOTE: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements.		

5.4.1.7 INTERROGATE-ACK confirm

INTERROGATE-ACK confirm primitive shall be offered from FE1 or FE3 to the application over TNSS-SAP as a response to a previously sent interrogation request. INTERROGATE-ACK indication primitive shall contain the SS-PPC information elements listed in table 6.

The elements shall be interpreted as described for DEFINE request.

However, if the Subscriber identity element is repeated, the definition(s) shall be valid for all given numbers. The Delivered to user A(s) and Acknowledgement from user A(s) elements shall indicate if these have been requested with the last successful definition request. The Result for interrogation shall indicate, if the definition have been distributed to user A(s) and if these have acknowledged the distribution.

NOTE: If definitions/responses are different for different Subscriber identity elements FE3 sends several INTERROGATE-ACK indication primitives to the application.

Table 6: INTERROGATE-ACK confirm contents

Element	Confirm	Remark
SS Type	M	SS-PPC
Operation type	M	Interrogation
Number of subscriber identities	M	
Subscriber identity	C	repeatable (note 1)
Result for interrogation	M	
Activated/deactivated	C	(note 2)
Number of basic services	C	(note 2)
Basic service and SS-PPC priority	C	repeatable (note 3)
Delivered to user A(s)	C	MS/LS-subscribers (note 2)
Acknowledgement from user A(s)	C	(note 2)
NOTE 1: Element shall be present and interpreted as indicated by the element Number of subscriber identity elements. NOTE 2: The element shall appear only if the "Result for interrogation" has the value "accepted", "accepted, but request to user A(s) pending in the SwMI" or "accepted, but user A(s) could not accept the request/ user A(s) was not reached". NOTE 3: Basic service element shall be repeated as many times as indicated in the Number of basic services element.		

5.4.1.8 IMPENDING-PRE-EMPTION indication

IMPENDING-PRE-EMPTION indication shall be offered from FE6 to the application to inform of a forthcoming pre-emption. IMPENDING-PRE-EMPTION indication primitive shall contain the SS-PPC information elements listed in table 7.

Table 7: IMPENDING-PRE-EMPTION indication contents

Element	Indication	Remark
SS Type	M	SS-PPC
Operation type	M	Information
Impending pre-emption	M	
Time to pre-emption	O	(In seconds)

5.4.1.9 SUBSCRIBER-PRE-EMPTED indication

SUBSCRIBER-PRE-EMPTED indication shall be offered from FE1 and FE5 to the application to inform that one or more parties have been pre-empted from the ongoing call. SUBSCRIBER-PRE-EMPTED indication primitive shall contain the SS-PPC information elements listed in table 8.

Table 8: SUBSCRIBER-PRE-EMPTED indication contents

Element	Indication	Remark
SS Type	M	SS-PPC
Operation type	M	Information
Subscribers pre-empted	M	
Subscriber identity	C	Pre-empted party

5.5 SS-PPC services offered over the TNCC-SAP

The SS-PPC definition should be applied in the following way, if SS-PPC is defined for user A's MS/LS:

- the SS-PPC definition for user A should be applied, when user A invokes an individual call;
- the SS-PPC definition for a group id. should be applied, when user A invokes a group call to the defined group identity.

5.5.1 PRIORITY1 request - SS-PPC invocation

PRIORITY1 shall act as the invocation of SS-PPC and invoked SS-PPC priority shall be included within TNCC-SETUP request primitive and offered over TNCC-SAP.

The service user, e.g. user A, invokes SS-PPC by requesting a certain SS-PPC priority with a call invocation. The application shall pass the invoked Call priority within TNCC-SETUP to CC. If SS-PPC definition has been accepted by FE1, the application should verify that the priority is within the allowed range and if not, change it, before passing the priority to CC.

5.5.2 PRIORITY2 confirm/indication- SS-PPC operation

PRIORITY2 shall act as the operation of SS-PPC and the SwMI shall send the applied SS-PPC priority to user A and user B(s). The CC within user A and B(s) shall include the received SS-PPC priority to the TNCC-SETUP confirm and indication primitives and offer them over TNCC-SAP to the application. The application should indicate the SS-PPC priority to the service user.

NOTE: If the TNCC-SETUP indication is sent to a party that is already engaged in a call, a separate TNCC-RELEASE indication is not sent. The application is responsible for releasing the lower priority call within the MS/LS, if the MS/LS joins an SS-PPC call when it is already engaged in another call.

5.5.3 PRE-EMPTION

The pre-emption shall be indicated to the pre-empted party. Normally, the pre-empted call should be disconnected and CC should send TNCC-RELEASE indication to the application with the disconnection cause set as " "Pre-emptive use of resource" ("9"). The SwMI can pre-empt the resources without

disconnecting the pre-empted call by using the mechanisms defined in ETS 300 392-2 [1] clause 14, e.g. the call can be put into a queue. These mechanisms are outside the scope of this ETS.

5.5.4 Element descriptions

Acknowledgement from user A(s) =

0 Acknowledgement requested from user A(s);
1 Acknowledgement not requested from user A(s).

Activated/Deactivated =

0 Activated;
1 Deactivated.

Basic services =

0 all applicable basic services (circuit mode speech and circuit mode data);
1 circuit mode speech;
2 circuit mode data.

Basic service and SS-PPC priority =

Table 9: Basic service and SS-PPC priority contents

Parameter	C/O/M
Basic service	M
SS-PPC priority	M

Delivered to user A(s) =

0 Delivered;
1 Not delivered.

Impending pre-emption indication =

0 Impending pre-emption.

Number of basic services =

0 1 element;
1 2 elements.

Number of subscriber identities =

0 subscriber number, 1 subscriber number following;
1 range of numbers, 2 subscriber numbers following;
2 list of subscriber numbers, 2 subscriber numbers following;
3 list of subscriber numbers, 3 subscriber numbers following;
4 list of subscriber numbers, 4 subscriber numbers following;
5 list of subscriber numbers, 5 subscriber numbers following;
6 list of subscriber numbers, 6 subscriber numbers following;
7 list of subscriber numbers, 7 subscriber numbers following;
8 list of subscriber numbers, 8 subscriber numbers following;
9 list of subscriber numbers, 9 subscriber numbers following;
10 list of subscriber numbers, 10 subscriber numbers following.

Result for definition/activation/deactivation =

0 accepted by SwMI/MS;

NOTE 1: accepted by SwMI is applicable for DEFINE-ACK; accepted by MS is applicable for DEFINE-USER-ACK.

1 accepted but some priority values changed by SwMI;
2 user A could not accept the request/user A where not reached;

NOTE 2: Not applicable for activation and deactivation.

NOTE 3: User A can be referring to several user As.

3 request failed for any reason;
4 user not authorised;
5 unknown TETRA identity;
6 parameters not valid;
7 insufficient information.

Result for interrogation =

0 accepted;
1 accepted but request pending in SwMI to user A(s);
2 accepted but user A(s) could not accept the request/ user A(s) was not reached;
3 SS-PPC not defined for the given identity;
4 request failed for any reason;
5 user not authorised;
6 unknown TETRA identity;
7 parameters not valid.

SS-PPC priority =

0 Priority not defined;
1 not used;
... etc.
11 not used;

NOTE 4: Priority values from 1 to 11 are outside the scope of this ETS.

12 Pre-emptive priority 1;
13 Pre-emptive priority 2;
14 Pre-emptive priority 3;
15 Pre-emptive priority 4 (Emergency).

Subscriber number =

TETRA subscriber identity (TSI) = Short subscriber identity (SSI) + Mobile Country Code (MCC) + Mobile Network Code (MNC), see ETS 300 392-1 [2], clause 7.

Subscribers pre-empted =

0 Subscriber identity given;
1 Subscriber identity not given.

Time to pre-emption =

0 0 seconds;
1 1 second;
2 2 seconds;
3 3 seconds;
4 4 seconds;
5 5 seconds;
6 6 seconds;
7 7 seconds;
8 8 seconds;
9 9 seconds;
10 10 seconds.

5.5.5 Mapping of SS-PPC primitives to TNSS primitives

SS-PPC primitives shall be mapped by FEs to TNSS-SERVICE, TNSS-INFO and TNSS-ERROR primitives according to table 10.

Table 10: Mapping of the SS-PPC primitives to TNSS primitives

SS-PPC Primitive	TNSS-SERVICE request	TNSS-SERVICE confirm	TNSS-SERVICE indication	TNSS-SERVICE response	TNSS-ERROR indication
DEFINE req	in FE3	-	-	-	note
DEFINE-ACK con	-	in FE3	-	-	note
DEFINE-USER ind	-	-	in FE1	-	note
DEFINE-USER-ACK resp	-	-	-	in FE1	note
INTERROGATE req	in FE3/FE1	-	-	-	note
INTERROGATE-ACK con	-	in FE3/FE1	-	-	note
IMPENDING-PRE-EMPTION ind	-	-	in FE5/FE6	-	note
SUBSCRIBER-PRE-EMPTED ind	-	-	in FE1/FE5	-	note
NOTE: FE1/FE3 should include a primitive received from the application or from FE2/FE4 in TNSS-ERROR indication, if the FE cannot recognize or accept the primitive.					

6 SS-PPC protocol description

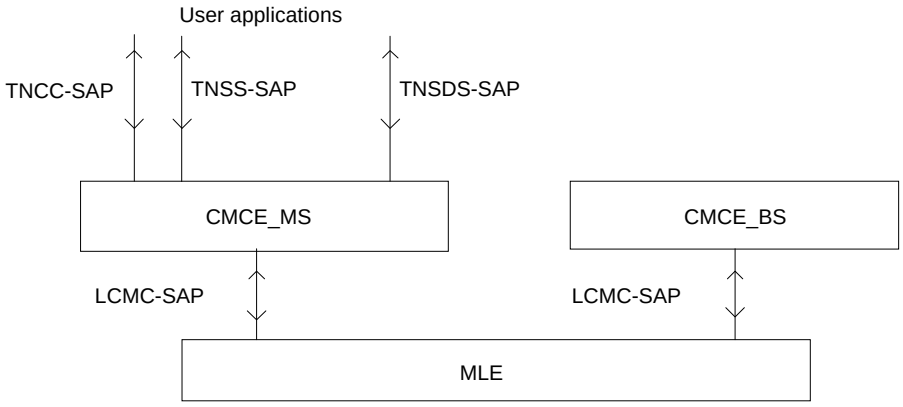
6.1 General

This clause defines with clause 7 the layer 3 SS-PPC specific CMCE air interface protocol for the MS and the LS. SS-PPC protocol defines the SS-PPC specific protocol for Supplementary Service sub-entity and call control sub-entity within CMCE. The SS-PPC specification shall be normative for the MS and the LS.

The protocol in this clause shall complement the CMCE protocol described in ETS 300 392-2 [1], clause 14, subclause 14.5.5 excluded, with the SS-PPC specific protocol actions.

6.2 Protocol structure

Figure 5 shows the position of CMCE in the MS/LS and in the Base station (BS) protocol stack. This ETS does not define user application service access points for the CMCE within SwMI.



CMCE-MS	Circuit Mode Control Entity, Mobile Station
CMCE-BS	Circuit Mode Control Entity, Base Station
LCMC-SAP	Mobile Link Entity - Circuit Mode Control Service Access Point
MLE	Mobile Link Entity
TNCC-SAP	TETRA Network - Call Control Service Access Point
TNSDS-SAP	TETRA Network - Short Data Service Service Access Point
TNSS-SAP	TETRA Network - Supplementary Service Service Access Point

Figure 5: The position of CMCE in MS/LS and BS protocol stack

The SS-PPC functionality within the MS/LS and the SwMI should take place in the following way:

SS-PPC definition, activation, deactivation, interrogation, impending pre-emption and pre-empted party indications should be carried out in layer 3 by SS within CMCE in both the MS/LS and in the SwMI protocol stack.

6.3 SS-PPC Protocol states

The normal SS-PPC protocol states are described below.

6.3.1 Protocol states of FE1

The capability to receive, save and acknowledge SS-PPC definitions shall be an optional feature within an MS/LS. The state definitions given for the reception and acknowledgement of SS-PPC definitions in this subclause shall apply only, if the feature is supported.

State IDLE shall be the normal state of FE1. In the state IDLE FE1 shall:

- upon reception of an SS-PPC definition request from the SwMI, FE1 shall pass the request to application;

- upon reception of an SS-PPC definition acknowledgement from application, FE1 shall send it to the SwMI;

- upon reception of an SS-PPC interrogation request from user, FE1 shall send it to the SwMI;

- upon reception of an SS-PPC interrogation response from the SwMI, FE1 shall pass it to application;

- upon reception of an SS-PPC pre-empted party, FE1 shall pass the information to application.

NOTE: The pre-empted party indication is processed by the SS process that has a fixed relationship with the corresponding Call control entity. See ETS 300 392-2 [1], subclause 14.2.4.2 for more information about SS processes within SS sub-entity.

6.3.2 Protocol states of CCA to which FE1 is collocated

6.3.2.1 State IDLE

CCA to which FE1 is collocated shall be able to receive call invocation requests including the SS-PPC invocation (call priority) from the application. The requested priority shall be sent to the SwMI with the call invocation request.

6.3.2.2 MO-CALL-SETUP

Upon reception of the call set-up confirmation, CCA should give the priority to the application in order to indicate the used priority to the service user.

NOTE: It is possible that the SwMI have changed the SS-PPC priority.

6.3.3 Protocol states of FE2

6.3.3.1 State IDLE

State IDLE shall be the normal state of FE2. In the state IDLE FE2 should:

- upon reception of an SS-PPC definition request, FE2 should save the SS-PPC definition into the SwMI, if the request is valid and authorised, and acknowledge the SS-PPC definition request to FE3;

- if FE2 was requested to send the SS-PPC definitions to FE1(s), FE2 should send the definitions to FE1s and start timer T1 and move to WAIT-FOR-ACK state;

- upon reception of an SS-PPC interrogation request from FE1 or FE3, FE2 should send the response to the request to FE1 or FE3 respectively.

Optionally, if FE2 supports the SS-PPC activation and deactivation, FE2 should:

- upon reception of an SS-PPC activation requests from FE3, FE2 should replace the SS-PPC definition by the SS-PPC activation in the SwMI;

- upon reception of an SS-PPC deactivation requests from FE3, FE2 should remove the SS-PPC activation and restore the SS-PPC definition;

- acknowledge SS-PPC activation and deactivation requests to FE3.

FE2 shall apply the SS-PPC definition, activation and deactivation from the moment it is made.

6.3.3.2 State WAIT-FOR-ACK

In WAIT-FOR-ACK state FE2 should wait for the response(s) from FE1(s). When all FE1(s) has have acknowledged the definition request or the timer T1 has expired, FE2 should return to state IDLE.

NOTE: As an operator option, FE2 may keep the definition requests in the SwMI, if any of the FE1(s) is not reachable and send them later, if one or more FE1s cannot be reached or has (have) not acknowledged the request.

6.3.4 Protocol states of CC to which FE2 is collocated

The protocol states of CC to which FE2 is collocated shall carry the following tasks:

- start the call set-up;

- pre-empt resources for the call, if needed;

- pre-empt subscriber(s) for the SS-PPC call, if needed;

- set-up the SS-PPC call.

For these actions the corresponding states shall be: ANY-STATE and PARTIES-PRE-EMPTED.

The SETUP-STARTED corresponds to normal continuation of the call set-up.

6.3.4.1 State ANY-STATE

The protocol described for "ANY-STATE" shall refer to any state in which a call set-up request shall be received and the call set-up started.

The functional tasks for the state ANY-STATE shall be:

- upon reception of an SS-PPC call invocation, CC shall accept or reject the request;

- if the request is accepted, CC should verify the SS-PPC priority;

- CC shall determine, if the pre-emption is needed due to lack of resources, and if the pre-emption is needed, CC shall:

    - determine based on Call Retention Value which call FE2 should pre-empt;

    NOTE 1: The network can use a different process to determine the priority for the allocation of resources.

    - determine the type of the call to be pre-empted:

        - if FE6 participates an individual call, the entire call should be pre-empted;
        - if FE6 participates a group call, the pre-empted party shall be excluded from the call and the call shall continue.

    NOTE 2: A TETRA system can clear the entire group call, if one or more subscribers are pre-empted from the call.

    - optionally, send the impending pre-emption indication to FE6(s);

    - pre-empt the resources and send D-RELEASE with the pre-emption indication to FE6;

    NOTE 3: If FE2 does not disconnect the call on behalf of the pre-empted party or parties when SS-PPC pre-emption takes place, the applied mechanisms are outside the scope of this ETS.

    - if one or two parties of a group call is pre-empted, FE2 may inform other parties of the call about the pre-emption.

- CC shall start the set-up procedure for the SS-PPC and send D-SETUP with the SS-PPC priority to the called party (parties);

- CC shall move to the SETUP-STARTED state; or, to the PARTIES-PRE-EMPTED state, if CC needs to pre-empt subscribers for the call.

6.3.4.2 State PARTIES-PRE-EMPTED

If the pre-emption is needed in order to join a subscriber to the SS-PPC call, CC shall in the state PARTIES-PRE-EMPTED:

- if the SS-PPC call is an individual call:

    - upon reception of the acceptance of the incoming call (U-ALERT or U-CONNECT for on/off hook signalling or for direct set-up signalling, respectively) from CCA to which FE5 is collocated, CC shall continue the call set-up.

If the previous call is an individual call, CC shall clear the call. If the previous call is a group call, CC may indicate to the members of the call, that a party has left the call. This is done by sending the SUBSCRIBER-PRE-EMPTED indication.

- Upon reception of the rejection of the incoming call (U-DISCONNECT) from CCA to which FE5 is collocated, CC shall clear the call and indicate the rejection to the calling party.

- if the SS-PPC call is a group call:

  - If the previous call is an individual call, upon reception of U-DISCONNECT to the previous individual call, CC shall clear the individual call, indicate that to the other party of the call and respond with D-RELEASE to FE5. U-DISCONNECT and D-RELEASE are sent in the traffic channel of the SS-PPC call in order to ascertain that the called party does not move back to control channel and join another call.

  - If the previous call is a group call, CC may indicate to the members of the call, that a party has left the call. This is done by sending the SUBSCRIBER-PRE-EMPTED indication.

  NOTE: Before sending the SUBSCRIBER-PRE-EMPTED indication, CC may poll the called subscriber in the previous call to find out, if he has left from the call. The polling is done with the poll request and poll response elements in the D-INFO and U-INFO PDUs respectively.

6.3.4.3 State SETUP-STARTED

CC shall complete the call set-up as described in ETS 300 392-2 [1], clause 14. In addition, CC shall send the SS-PPC priority within D-CONNECT to FE1.

6.3.5 Protocol states of FE3

State IDLE shall be the normal state of FE3. In the state IDLE FE3 shall:

- upon reception of an SS-PPC definition, activation, deactivation or interrogation request from application, FE3 shall send it to the SwMI;

- upon reception of an SS-PPC definition, activation, deactivation or interrogation responses from the SwMI, FE3 shall pass it to application.

6.3.6 Protocol states of FE4

IDLE should be the normal and only state of FE4. In this state:

- upon reception of an SS-PPC definition, activation, deactivation and interrogation request or response from FE3/FE1, FE4 should deliver it to FE2 in home system.;

- upon reception of an SS-PPC definition, activation, deactivation and interrogation request or response from FE2, FE4 should deliver it to FE1/FE3 located in visited system.

6.3.7 Protocol states of FE5

IDLE shall be the normal state of FE5. In this state:

- upon reception of an impending pre-emption indication, FE5 shall pass it to application;

- upon reception of an indication that one or more subscribers have been pre-empted from the call, FE5 shall pass it to application.

  NOTE: The impending pre-emption and pre-empted party indication are processed by the SS process that have a fixed relationship with the corresponding Call control entity. See ETS 300 392-2 [1], subclause 14.2.4.2 for more information about SS processes within SS sub-entity.

6.3.8 Protocol states of CCA to which FE5 is collocated

6.3.8.1 ANY STATE

The protocol described for "ANY STATE" shall refer to any state in which a call set-up request shall be received and the call set-up started.

The functional tasks for the state ANY STATE shall be: Upon reception of an incoming basic service invocation with SS-PPC operation from the SwMI, CCA shall indicate the SS-PPC priority to the application.

6.3.8.2 MT-CALL-SETUP

The functional tasks for the state MT-CALL-SETUP shall be:

- if the SS-PPC call is an individual call CCA shall:
    - Upon reception of the acceptance of the incoming call from application CCA shall send the response to CC to which FE2 is collocated. The response shall be U-ALERT for on/off hook signalling or U-CONNECT for direct set-up signalling. CCA shall continue the call set-up within the MS/LS.

      If the called party was engaged in an ongoing call, the SS-PPC SETUP shall also serve as disconnection to the previous call, if the application accepted the SS-PPC call and CCA shall clear the previous call within the MS/LS.
    - Upon reception of the rejection of the incoming call from application, CCA shall send U-DISCONNECT to CC to which FE2 is collocated and clear the SS-PPC call within it. CCA behaviour for the previous call, if any, shall not be affected.
- If the SS-PPC call is a group call CCA shall:
    - Upon reception of the acceptance of the incoming call from application CCA shall move to the new call and set-up the call within the MS/LS.

      If the called party was engaged in an individual call, the CCA shall after moving to the SS-PPC call, send U-DISCONNECT to CC to which FE2 is collocated to indicate that it has left the call. CCA shall receive the D-RELEASE from CC to which FE2 is collocated as a response. CCA shall clear the previous call within the MS/LS.

      If the called party was engaged in a group call, the SS-PPC SETUP shall also serve as disconnection to the previous call, if the application accepted the SS-PPC call and CCA shall clear the previous call within the MS/LS.
    - Upon reception of the rejection of the incoming call from application, CCA shall clear the SS-PPC call set-up within it. CCA behaviour for the previous call, if any, shall not be affected.
- When CCA joins a new higher priority call, when it is engaged in another call, CCA shall release the lower priority call within it.

6.3.9 Protocol states of FE6

IDLE shall be the normal state of FE6. In this state FE6 shall, upon reception of an impending pre-emption indication, pass it to application.

6.3.10 Protocol states of CCA to which FE6 is collocated

The functional tasks of CCA to which FE6 is collocated shall be applicable to any state where a call is ongoing (set-up has started and the call has not been cleared) and which is described in ETS 300 392-2 [1], clause 14. The tasks for CCA to which FE6 is collocated shall be: upon reception of a pre-emption indication within a D-DISCONNECT or D-RELEASE, CCA to which FE6 is collocated shall indicate it to application. FE6 shall disconnect the call as instructed by FE2 by any of the methods described in ETS 300 392-2 [1], clause 14.

NOTE: The impending pre-emption indication is processed by the SS process that have a fixed relationship with the corresponding Call control entity. See ETS 300 392-2 [1], subclause 14.2.4.2 for more information about SS processes within SS sub-entity.

6.4 Procedures

The normal SS-PPC procedures are described below.

6.4.1 Procedures for FE1

No procedures for FE1.

6.4.2 Procedures for FE2

6.4.2.1 Definition in FE2

Upon reception of SS-PPC definition or interrogation request, FE2 should:

- verify that the request is authorised;

  NOTE: Only FE3 is allowed to define SS-PPC.

- verify that the parameters are in the correct range;

- the parameters in the DEFINE PDU shall be used in the following way:

  - either continue to carry out the request and acknowledge it to FE1 or FE3, or rejects it and send a rejection to FE1 or FE3 respectively.

  NOTE: If a definition is requested for a subscriber number range or a list of subscriber numbers, the "Result for definition" can be different for different subscriber

6.4.2.2 Distribution in FE2

FE2 makes the definition to the SwMI, locates the FE1(s) and the definition request(s) to FE1(s).

FE2 shall construct the SS-PPC definition (DEFINE) Protocol Data Unit (PDU) for user A according to the authorised user's request. FE2 may, however, change the priority values if authorised user has defined values he is not allowed to define. The definition shall be made to:

- one subscriber or group number;

- a list of subscriber or group numbers;

- a range of subscriber or group numbers.

The priority may be defined to have different values for different basic services.

User A (FE1s) should acknowledge the definition request with DEFINE-USER-ACK, if requested.

6.4.2.3 Interrogation in FE2

FE2 should fetch the interrogated data in order to send it to FE3.

FE2 should construct the SS-PPC interrogation (INTERROGATE) elements for authorised user according to the user's request. The user shall interrogate the defined priority value for:

- one subscriber or group number;

- a list of subscriber or group numbers;

- a range of subscriber or group numbers.

The SS-PPC priority may be defined to have different values for different basic services. All defined values should be included in the INTERROGATE-ACK.

If the user has interrogated the SS-PPC for a subscriber number range or list, and if any of the parameters listed below are different for any of these numbers, FE2 should send separate INTERROGATE-ACK flows to FE3:

- result for interrogation;
- number of basic service definitions;
- number of basic services;
- basic services;
- priority for the basic service(s).

6.4.3 Procedures for CC to which FE2 is collocated

6.4.3.1 Verify priority in CC to which FE2 is collocated

CCA to which FE2 is collocated should receive call invocation requests including the priority from user A. CC should check the priority and if it finds it valid should set-up the call using the requested priority.

The SS-PPC definition should be applied in the following way, if SS-PPC is defined and if the user A invokes SS-PPC with the service request:

- the SS-PPC definition for user A should be applicable, when user A invokes an individual call;
- the SS-PPC definition for a group id. should be applicable, when user A invokes a group call to the defined group identity and if user A is a member of the called group.

FE2 shall not change an emergency priority. However, if the requested priority is not an emergency priority, FE2 can change the requested call priority, if:

- the requested priority was not authorised;
- if the call extends to several TETRA systems, FE2 of each system shall be able to select the applied call priority in that system;
- as operator option, FE2 may always change the requested priority, e.g. due to congestion.

If the SS-PPC call extends to several TETRA systems, FE2 in terminating the SwMI should not change the SS-PPC priority, however, it need not to use the priority for the resource allocation of the SS-PPC call.

6.4.4 Procedures for FE3

6.4.4.1 Verification in FE3

Upon reception of SS-PPC definition, activation, deactivation or interrogation request from application, FE3 shall verify the parameters and if it founds them suitable, it shall send the request to FE2. If FE3 cannot accept the request, FE3 shall bar a request locally and send an indication to the application.

FE3 shall construct the SS-PPC definition (DEFINE) SS-FACILITY element according to the user's request. The definition shall be made to:

- one subscriber or group number;
- a list of subscriber or group numbers;
- a range of subscriber or group numbers.

The authorised user shall define different priority values for different basic services, if needed.

FE3 shall construct the SS-PPC interrogation (INTERROGATE) SS-FACILITY element for authorised user according to the user's request. The user shall interrogate the defined priority values of:

- one subscriber or group number;

- a list of subscriber or group numbers;

- a range of subscriber or group numbers.

6.4.5 Procedures for FE4

6.4.5.1 Routing address in FE4

If FE4 receives any information flow, that should be routed over ISI to another TETRA system, FE4 adds the routing address to the request and delivers it to FE2. If FE4 receives any information flow from another TETRA system over ISI, FE4 should deliver the request to FE1/FE3 located within the system.

6.5 Protocol timers

6.5.1 Protocol timers for FE2

FE2 should use timer T1 to supervise the time it waits for acknowledgements from FE1(s) after FE2 has sent the definition requests to FE1(s), if FE1(s) were requested to acknowledge the requests.

6.6 PDU Descriptions

The SS-FACILITY and Call priority element shall be used to convey the supplementary service information to and from the MS/LS and over the ISI. SS-FACILITY element shall be transported in any call control PDU or in a D/U-FACILITY PDU. The Call priority element used for circuit mode basic service operation and invocation shall be conveyed in U/D-SETUP and D-CONNECT PDU. The element coding used for SS-PPC is in accordance with the general rules specified in ETS 300 392-2 [1], clause 14.

The element coding for SS-PPC is detailed in the following clauses.

The information contained in the following primitive description tables correspond to the following key:

- Length: length of the element in bits;
- Type: element type (1, 2 or 3) described in ETS 300 392-2 [1], clause 14;
- C/O/M: conditional/optional/mandatory;
- Remark: comment.

6.6.1 DEFINE

DEFINE shall contain the SS-PPC information elements listed in table 11.

Table 11: Definition of DEFINE PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M		(note 1)
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note 2)
Activation/Deactivation (note 3)	1	1	C	0	Activation
				1	Deactivation
Number of basic services	2	1	M		
Basic service and SS-PPC priority		1	C		(note 4)
Delivered to user A(s) (note 5)	1	1	C	0	To be delivered
				1	Not to be delivered
Acknowledgement from user A(s) (note 5)	1	1	C	0	Ackn. requested
				1	Ackn. not requested

NOTE 1: Action type shall be Definition, Activation or Deactivation.
NOTE 2: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element.
NOTE 3: Element shall be conditional on Action type:
Activation/Deactivation: element shall be present;
Definition: element shall not be present.
NOTE 4: Element shall be repeated as many times as indicated in the Number of basic service element.
NOTE 5: Element shall be conditional on Action type:
Activation/Deactivation: element shall not be present;
Definition: element shall be present.

6.6.2 DEFINE-ACK

DEFINE-ACK shall contain the SS-PPC information elements listed in table 12.

NOTE: If the Result is different for different Subscriber identities, FE2 shall send several DEFINE-ACKs to FE3.

Table 12: Definition of DEFINE-ACK PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M		(note 1)
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note 2)
Result	3	1	M		
NOTE 1: Action type shall be Definition, Activation or Deactivation. NOTE 2: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element.					

6.6.3 DEFINE-USER

DEFINE-USER shall contain the SS-PPC information elements listed in table 13.

Table 13: Definition of DEFINE-USER PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0010_2	Distribution
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note 1)
Number of basic services	2	1	M		
Basic service and SS-PPC priority		1	C		(note 2)
Acknowledgement from user A(s)	1	1	C	0	Ackn. requested
				1	Ackn. not requested
NOTE 1: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element. NOTE 2: Element shall be repeated as many times as indicated in the Number of basic service element.					

6.6.4 DEFINE-USER-ACK

DEFINE-USER-ACK shall contain the SS-PPC information elements listed in table 14.

NOTE: If the Result is different for different Subscriber identities, FE1 shall send several DEFINE-USER-ACKs to FE2.

The Result for definition shall be valid for all the Defined subscriber numbers listed in the PDU.

Table 14: Definition of DEFINE-USER-ACK PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0010_2	Distribution
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note)
Result	3	1	M		
NOTE: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element.					

6.6.5 INTERROGATE

INTERROGATE shall contain the SS-PPC information elements listed in table 15.

Table 15: Definition of INTERROGATE PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0011_2	Interrogation
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note)
NOTE: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element.					

6.6.6 INTERROGATE-ACK

INTERROGATE-ACK shall contain the SS-PPC information elements listed in table 16.

NOTE: If definitions/responses are different for different Subscriber identity elements, FE2 shall send several INTERROGATE-ACKs to FE1/FE3.

Table 16: Definition of INTERROGATE-ACK PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0011_2	Interrogation
Number of subscriber identities	4	1	M		
Subscriber identity		1	C		repeatable (note 1)
Result for interrogation	3	1	M		
Activated/Deactivated (note 2) (note 3)	1	1	C	0	Activated
				1	Deactivated
Number of basic services	2	1	C		(note 2)
Basic service and SS-PPC priority		1	C		(note 4)
Delivered to user A(s) (note 2)	1	1	C	0	Delivered
				1	Not delivered
Acknowledgement from user A(s) (note 2)	1	1	C	0	Ackn. requested
				1	Ackn. not requested
NOTE 1: Element shall be conditional and appear as many times as indicated in the Number of subscriber identities element.					
NOTE 2: Element shall be conditional on the value of Result for interrogation. The element shall be present if the value is accepted; accepted, but request pending in SwMI to user A(s); accepted, but user A(s) could not accept the request/user A(s) not reached					
NOTE 3: If separate activation is not supported, element shall have the value activated.					
NOTE 4: Element shall be repeated as many times as indicated in the Number of basic service element.					

6.6.7 IMPENDING-PRE-EMPTION

IMPENDING-PRE-EMPTION shall contain the SS-PPC information elements listed in table 17.

Table 17: Definition of IMPENDING-PRE-EMPTION PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0110_2	Information
Information type	1	1	M	0	Impending pre-emption
Call identifier	14	1	M		(note)
Time to pre-emption	4	2	O		
NOTE: Call identifier is defined in ETS 300 392-2 [1] clause 14.					

6.6.8 SUBSCRIBER-PRE-EMPTED

SUBSCRIBER-PRE-EMPTED shall contain the SS-PPC information elements listed in table 18.

Table 18: Definition of SUBSCRIBER-PRE-EMPTED PDU

Element	Length	Type	C/O/M	Value	Remark
SS-Type	6	1	M	011100_2	SS-PPC
Action Type	4	1	M	0110_2	Information
Information type	1	1	M	1	Subscriber pre-emption
Call identifier	14	1	M		(note 1)
Pre-empted party indication	1	1	M	0	Subs. identity given
				1	No subscriber identity given
Subscriber identity	48	2	C		(note 2)
NOTE 1: Call identifier is defined in ETS 300 392-2 [1] clause 14. NOTE 2: The element shall be present only if Pre-empted party indication has the value Subs. identity given.					

6.6.9 PDU Descriptions for the SS-PPC invocation, operation and pre-emption of circuit mode basic service

6.6.9.1 D-CONNECT

D-CONNECT PDU shall contain the elements defined in ETS 300 392-2 [1], clause 14. The Call priority element coding is described in subclause 6.7.

6.6.9.2 D-SETUP

D-SETUP PDU shall contain the elements defined in ETS 300 392-2 [1], clause 14. The Call priority element coding is described in subclause 6.7.

6.6.9.3 U-SETUP

U-SETUP PDU shall contain the elements defined in ETS 300 392-2 [1], clause 14. The Call priority element coding is described in subclause 6.7.

6.6.9.4 D-RELEASE and D-DISCONNECT

D-RELEASE and D-DISCONNECT PDU shall contain the elements defined in ETS 300 392-2 [1], clause 14. The Disconnection cause shall be set as "Pre-emptive use of resources".

6.7 Element coding

This subclause shall specify the element coding for the elements within the PDUs defined in subclause 6.6.

6.7.1 Action type

The Action type element shall indicate the type of the action as described in table 19.

Table 19: Action type contents

Element	Length	Value	Remark
Action type	4	0000_2	SS-Service not supported
		0001_2	Definition
		0010_2	Distribution
		0011_2	Interrogation
		0100_2	Cancellation
		0101_2	Invocation
		0110_2	Information
		0111_2	Operation
		1000_2	Deletion
		1001_2	Activation
		1010_2	Deactivation
		1011_2	Reserved
		...	etc.
		1111_2	Reserved

6.7.2 Basic service(s)

Basic service(s) shall indicate the basic service(s) to which the SS-PPC priority values are defined. Basic service element is described in table 20.

All applicable basic services shall comprise of circuit mode speech and circuit mode data basic service.

Table 20: Basic service contents

Element	Length	Value	Remarks
Basic service(s)	2	00_2	all applicable basic services
		01_2	circuit mode speech
		10_2	circuit mode data
		11_2	Reserved

6.7.3 Basic service and SS-PPC priority

The Basic service and SS-PPC priority element gives the basic service type and the SS-PPC priority defined for it. The Basic service and SS-PPC priority element is described in table 21.

Table 21: Basic service and SS-PPC priority contents

Parameter	Length	Type	C/O/M
Basic service	2	1	M
SS-PPC priority	4	1	M

6.7.4 Number of basic services

The Number of basic services element shall indicate how many Basic service and SS-PPC priority elements shall follow in the PDU. Number of basic service(s) element is described in table 22.

Table 22: Number of basic services contents

Element	Length	Value	Remarks
Number of basic services	2	00_2	1
		01_2	2
		10_2	Reserved.
		11_2	Reserved.

6.7.5 Number of subscriber identities

The Number of subscriber identities element shall indicate how many Subscriber identity elements shall follow in the PDU and how the elements shall be interpreted. The Number of subscriber identities element is described in table 23.

In case of range, first and last element of the range shall be given and the definition shall be requested to all subscriber numbers within the range including the first and last element of the range.

Table 23: Number of subscriber identities contents

Element	Length	Value	Remarks
Defined subscriber type	4	0000_2	Subscriber number, 1
		0001_2	Range of subscriber numbers, 2
		0010_2	List of subscriber numbers, 2
		0011_2	List of subscriber numbers, 3
		0100_2	List of subscriber numbers, 4
		0101_2	List of subscriber numbers, 5
		0110_2	List of subscriber numbers, 6
		0111_2	List of subscriber numbers, 7
		1000_2	List of subscriber numbers, 8
		1001_2	List of subscriber numbers, 9
		1010_2	List of subscriber numbers, 10
		1011_2	Reserved
		...	etc.
		1111_2	Reserved
NOTE: The number in Remark column indicates how many Subscriber number elements shall be present.			

6.7.6 Result for definition

Result for definition shall indicate whether the previously made definition request was successful or unsuccessful. Result for definition element is described in table 24.

Table 24: Result for definition contents

Element	Length	Value	Remark
Result for definition	3	000_2	accepted by SwMI or accepted by MS (Note 1)
		001_2	accepted but SS-PPC priority values changed (Note 2)
		010_2	users A(s)could not accept the request/ user A(s) was not reached (Note 2)
		011_2	request failed for any reason
		100_2	user not authorised
		101_2	unknown TETRA identity
		110_2	parameters not valid
		111_2	insufficient information
NOTE 1: "accepted by SwMI" shall be applied only for DEFINE-ACK; "accepted by MS" shall be applied only for DEFINE-USER-ACK. NOTE 2: The error code is applicable only to flows from FE2 (or FE4) to FE3.			

6.7.7 Result for interrogation

Result for interrogation shall indicate whether the previously made interrogation request was successful or unsuccessful. Result for interrogation element is described in table 25.

Table 25: Result for interrogation contents

Element	Length	Value	Remark
Result for interrogation	3	000_2	accepted
		001_2	accepted, but one or more affected users could not accept the request/accepted, but one or more affected users where not reached
		010_2	SS-PPC not defined for the given identity
		011_2	request failed for any reason
		100_2	user not authorised
		101_2	unknown TETRA identity
		110_2	parameters not valid
		111_2	Reserved

6.7.8 SS-PPC priority

The SS-PPC priority element shall indicate the highest numeric value for the call priority.

SS-PPC priority value element is described in table 26.

Table 26: SS-PPC priority value contents

Element	Length	Value	Remarks
SS-PPC priority value	4	0000_2	0 (note 1)
		0001_2	1 (note 2)
		...	etc.
		1011_2	11 (note 2)
		1100_2	Pre-emptive priority 1
		1101_2	Pre-emptive priority 2
		1110_2	Pre-emptive priority 3
		1111_2	Pre-emptive priority 4 (Emergency)
NOTE 1: Value 0 corresponds to undefined priority value. NOTE 2: Priority values from 1 to 11 are outside the scope of this ETS.			

6.7.9 Subscriber identity

The Subscriber identity element shall define a TSI. The Subscriber identity element is described in table 27.

Table 27: Subscriber identity contents

Element	Length	Value	Remark
SSI	24		See ETS 300 392-1 [2], clause 7.
MCC	10		See ETS 300 392-1 [2], clause 7.
MNC	14		See ETS 300 392-1 [2], clause 7.

6.7.10 Time to pre-emption

Time to pre-emption element shall indicate the time remaining to the forthcoming pre-emption of resources. Time to pre-emption element is described in table 28.

Table 28: Time to pre-emption contents

Element	Length	Value	Remark
Time to pre-emption	4	0000_2	0 seconds
		0001_2	1 second
		0010_2	2 seconds
		0011_2	3 seconds
		0100_2	4 seconds
		0101_2	5 seconds
		0110_2	6 seconds
		0111_2	7 seconds
		1000_2	8 seconds
		1001_2	9 seconds
		1010_2	10 seconds
		1011_2	Reserved
		...	etc.
		1111_2	Reserved

7 SS-PPC FE behaviour

The figures contained in this clause are intended to illustrate typical SS-PPC specific FE behaviour in terms of information flows sent and received.

NOTE: The intention of the figures in this clause is to describe the functionality of SS-PPC and the call related information flows are not complete, e.g. all the call set-up or call release primitives and PDUs are not included in the figures.

The behaviour of each FE is shown using the (Functional) Specification and Description Language defined in ITU-T Recommendation Z.100 [3]. Notice, however, that due to simplicity there are deviations from syntactical rules.

The convention used in the figures below is that output signals to the left represent information flows towards the user and output signals to the right represents information flows towards the SwMI part of the PPC function. Input signals from the left represent information from the user and input signals from the right represent information flows from the central part of the SwMI.

FE1 refers to a block and FE_1 refers to a process in the figures below.

7.1 Behaviour of FE1 (SS entity of user A)

7.1.1 Service interaction for FE1

Service interaction for FE1 is shown in figure 6.

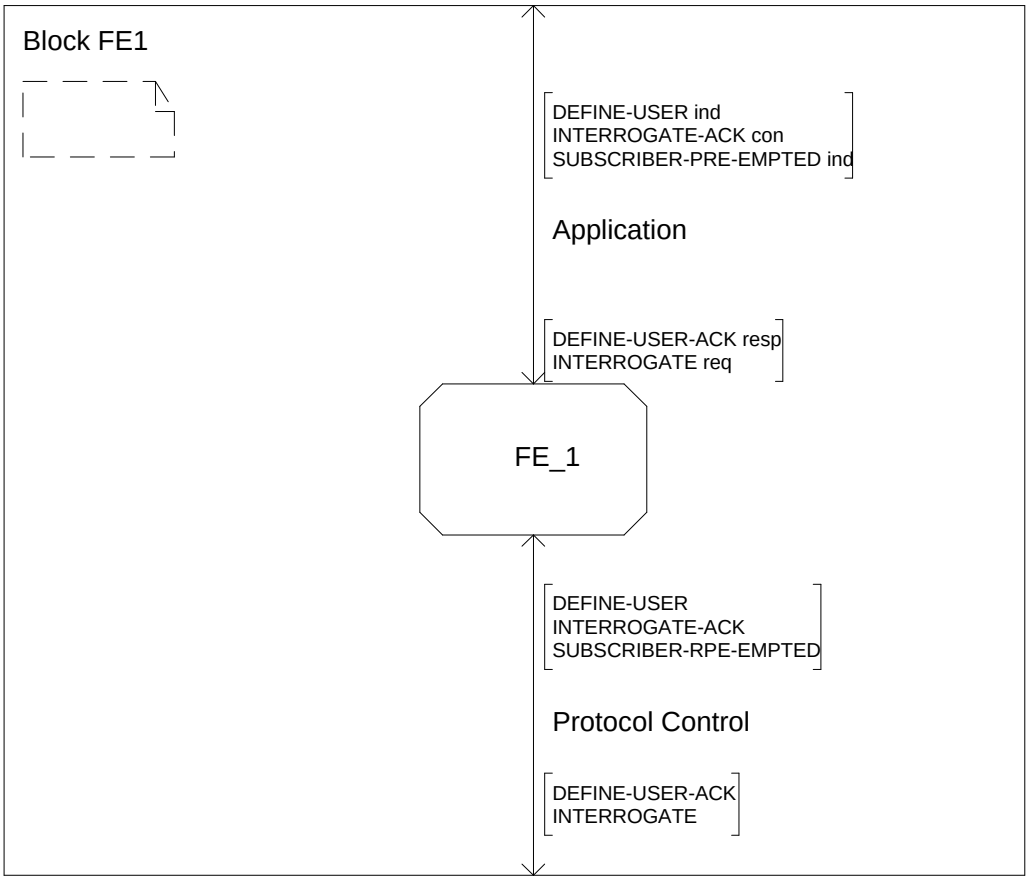


Figure 6: Service interaction for FE1

7.1.2 Process description for FE1

Process description of FE1 is shown in figure 7.

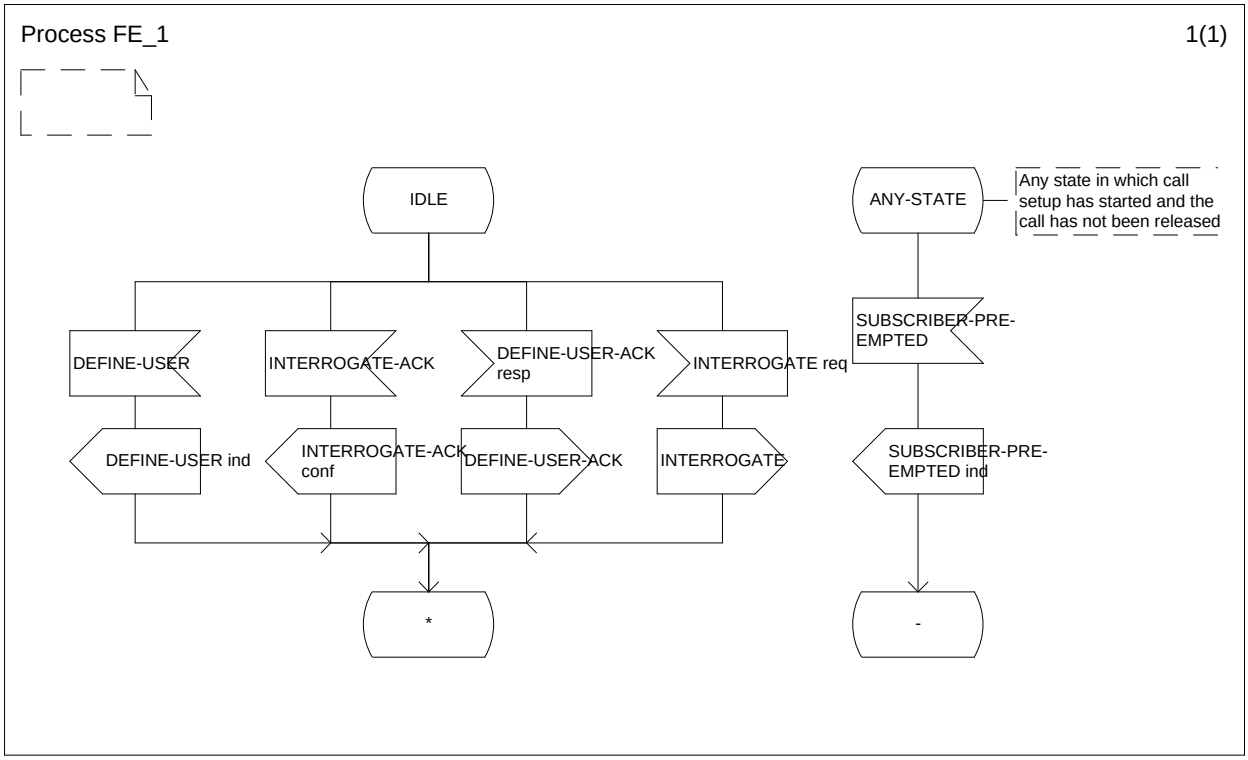


Figure 7: Process description for FE1

7.2 Behaviour of CCA to which FE1 is collocated

7.2.1 Service interaction for CCA to which FE1 is collocated

Service interaction for CCA to which FE1 is collocated is shown in figure 8.

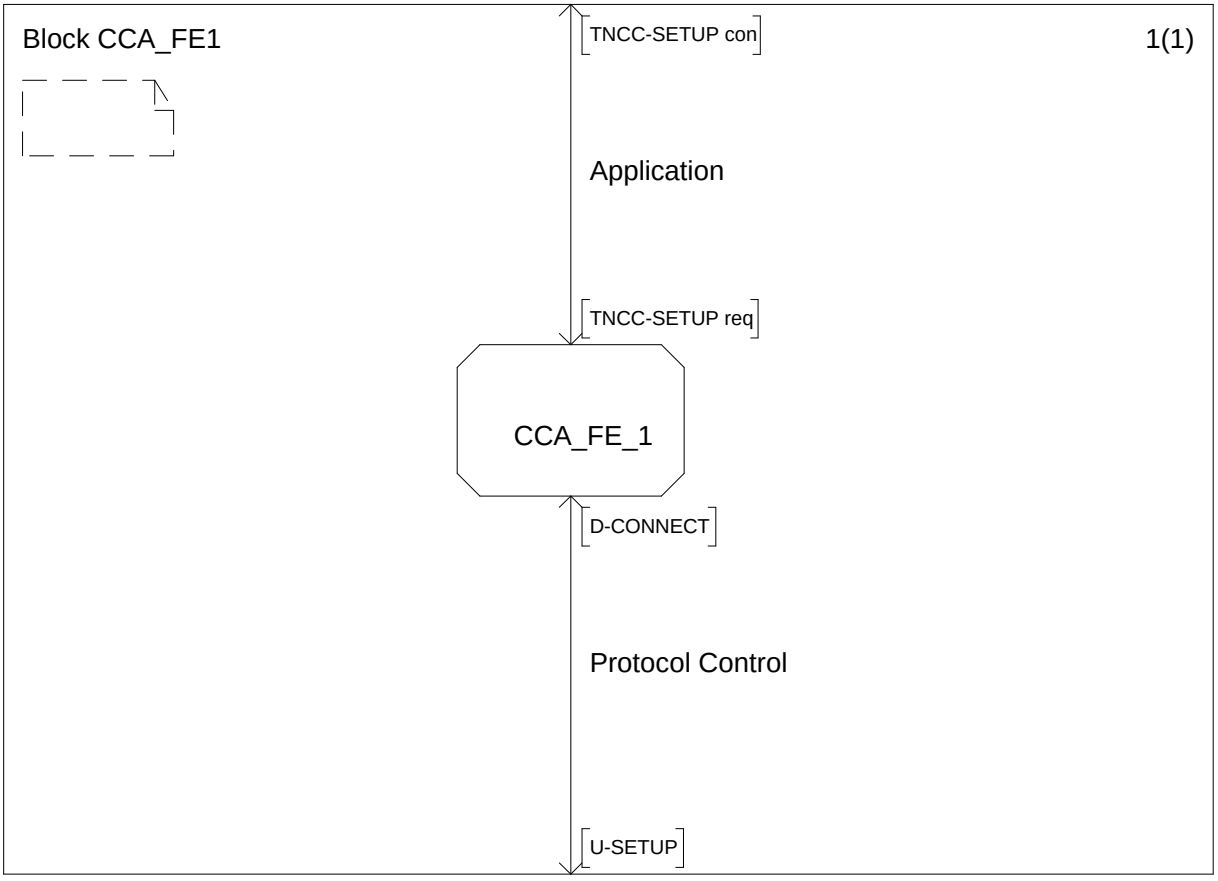


Figure 8: Service interaction for CCA to which FE1 is collocated

7.2.2 Process description for CCA to which FE1 is collocated

Process description for CCA to which FE1 is collocated is shown in figure 9.

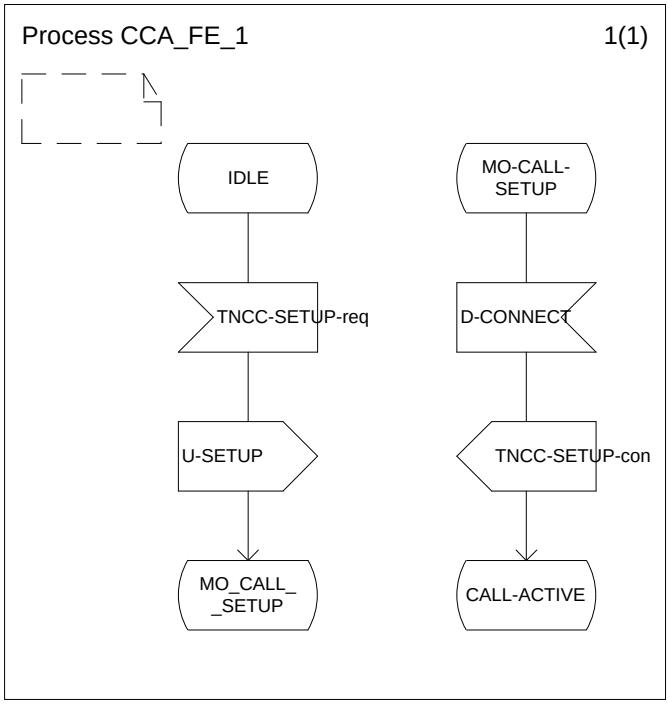


Figure 9: Process description for CCA to which FE1 is collocated

7.3 Behaviour of FE2

7.3.1 Service interaction for FE2

Service interaction for FE1 is shown in figure 10.

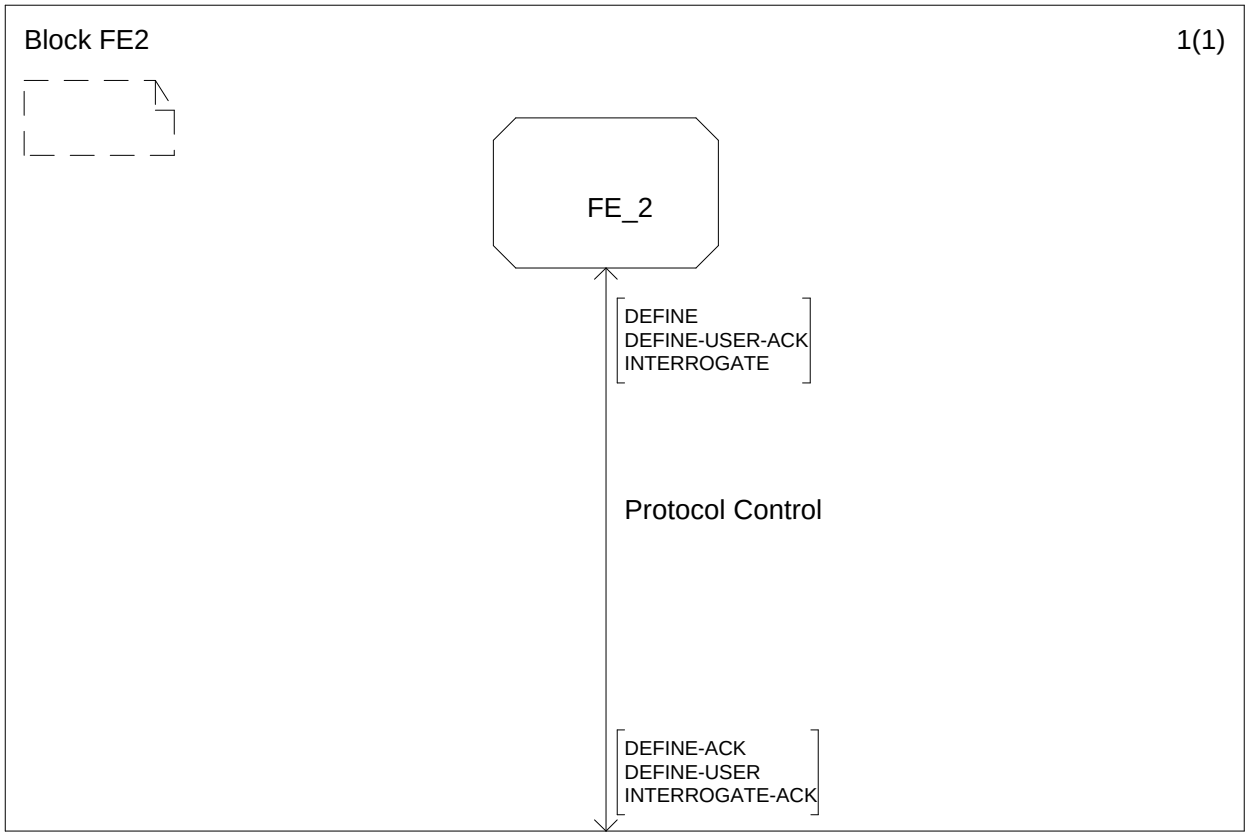


Figure 10: Service interaction for FE2

s7.3.2 Process description for FE2

Process descriptions for FE2 state IDLE and WAIT-FOR-ACK is shown in figures 11 and 12.

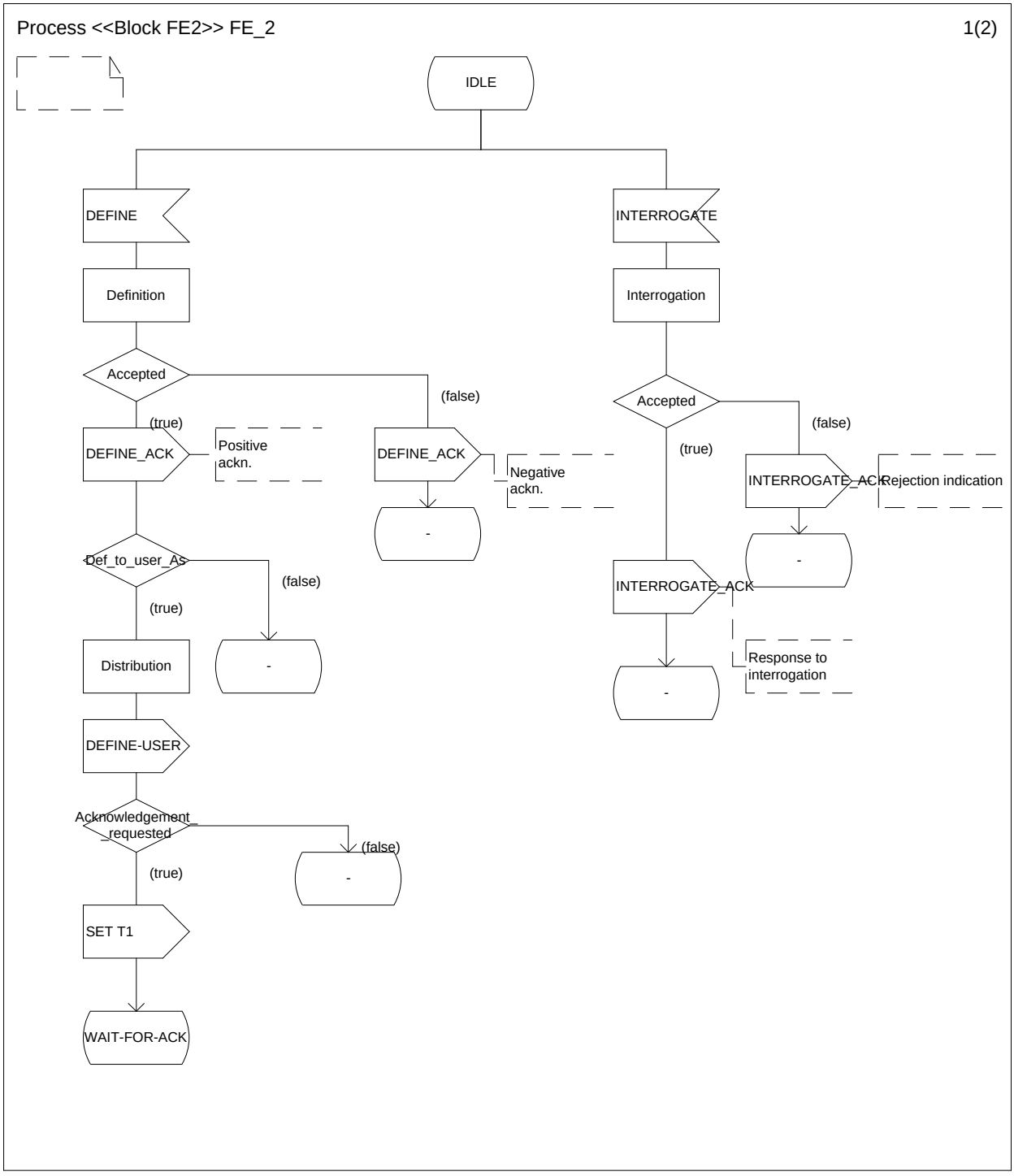


Figure 11: Process description for FE2 state IDLE

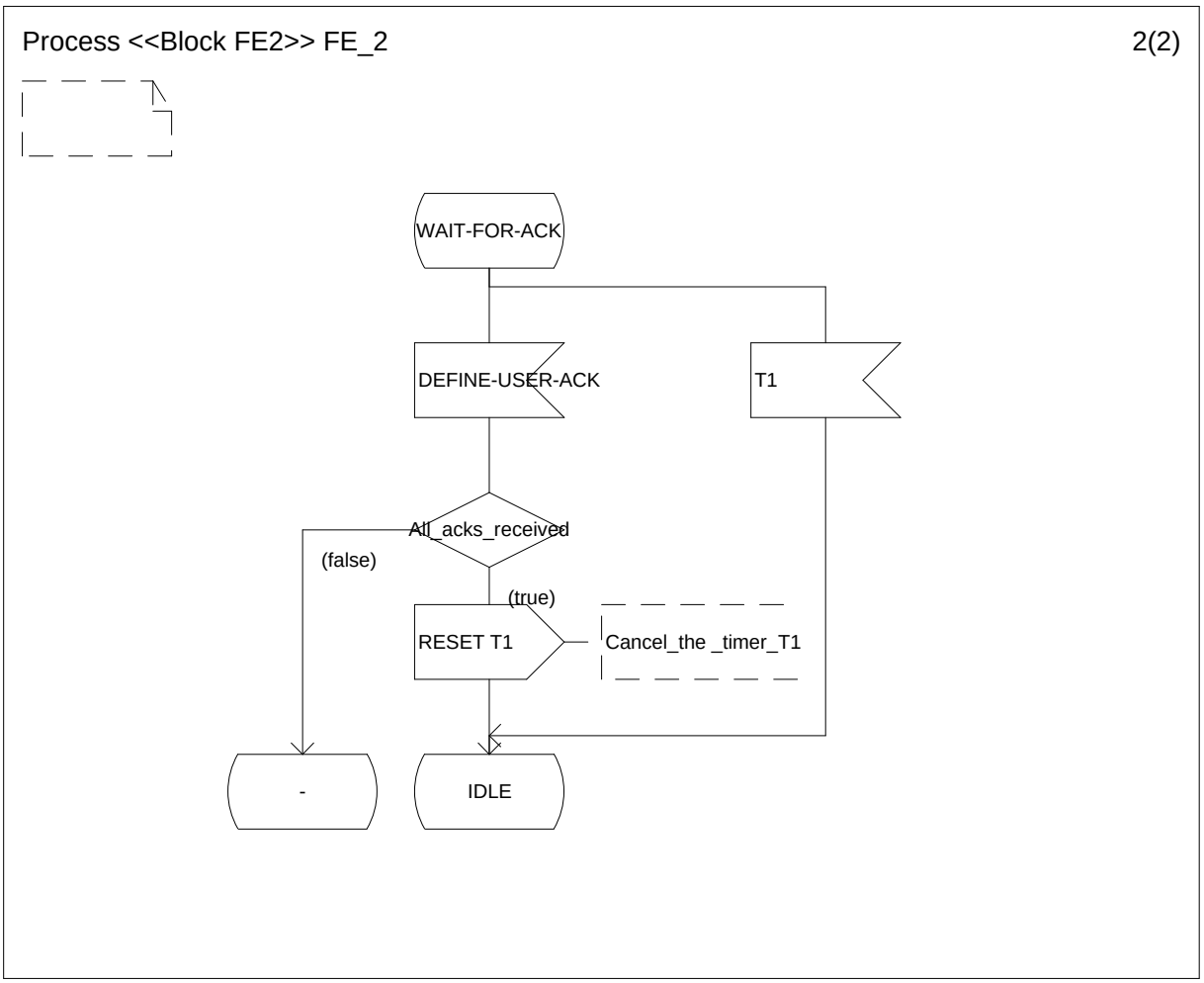


Figure 12: Process description for FE2 state WAIT-FOR-ACK

7.4 Behaviour of CC to which FE2 is collocated

7.4.1 Service interaction for CC to which FE2 is collocated

Service interaction for CC to which FE2 is collocated is shown in figure 13.

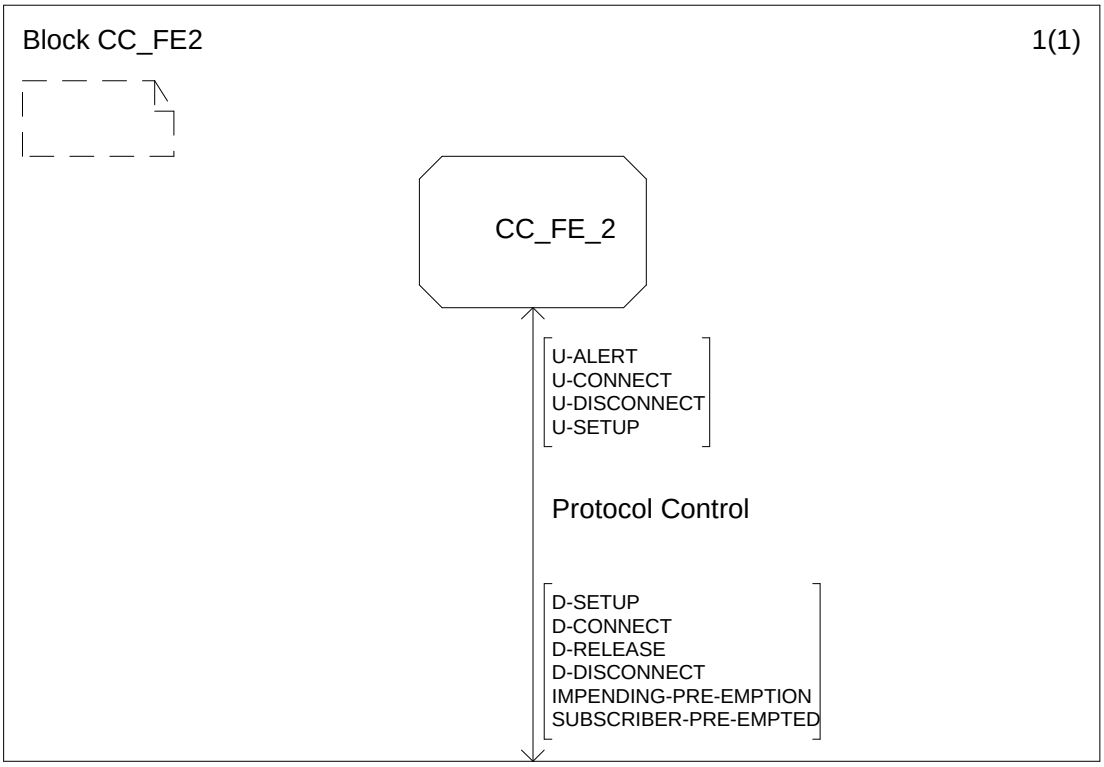


Figure 13: Service interaction for CC to which FE2 is collocated.

7.4.2 Process description for CC to which FE2 is collocated

Process description for CC to which FE2 is collocated is shown in figures 14, 15 and 16.

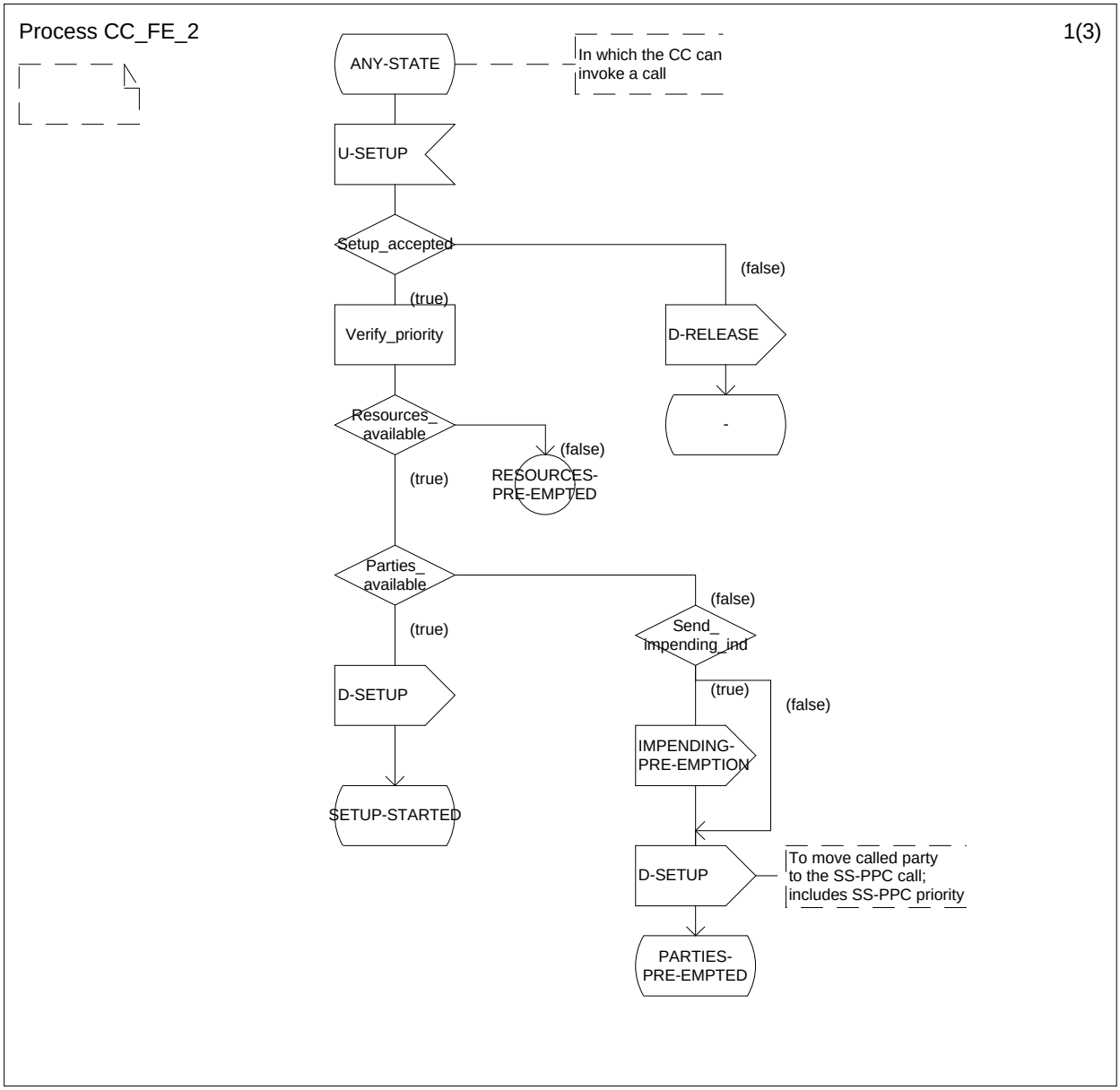


Figure 14: Process description for CC to which FE2 is collocated

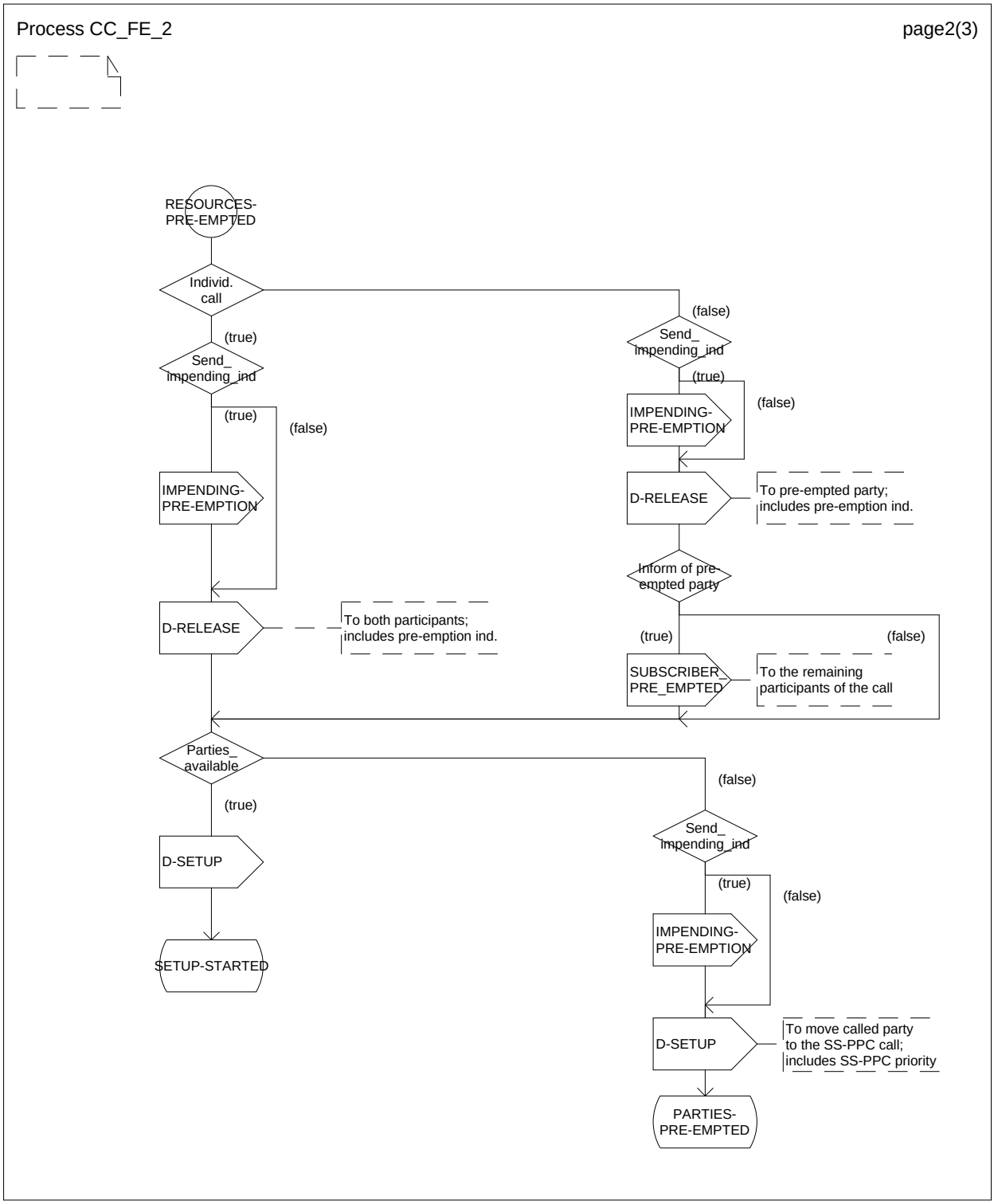


Figure 15: Process description for CC to which FE2 is collocated

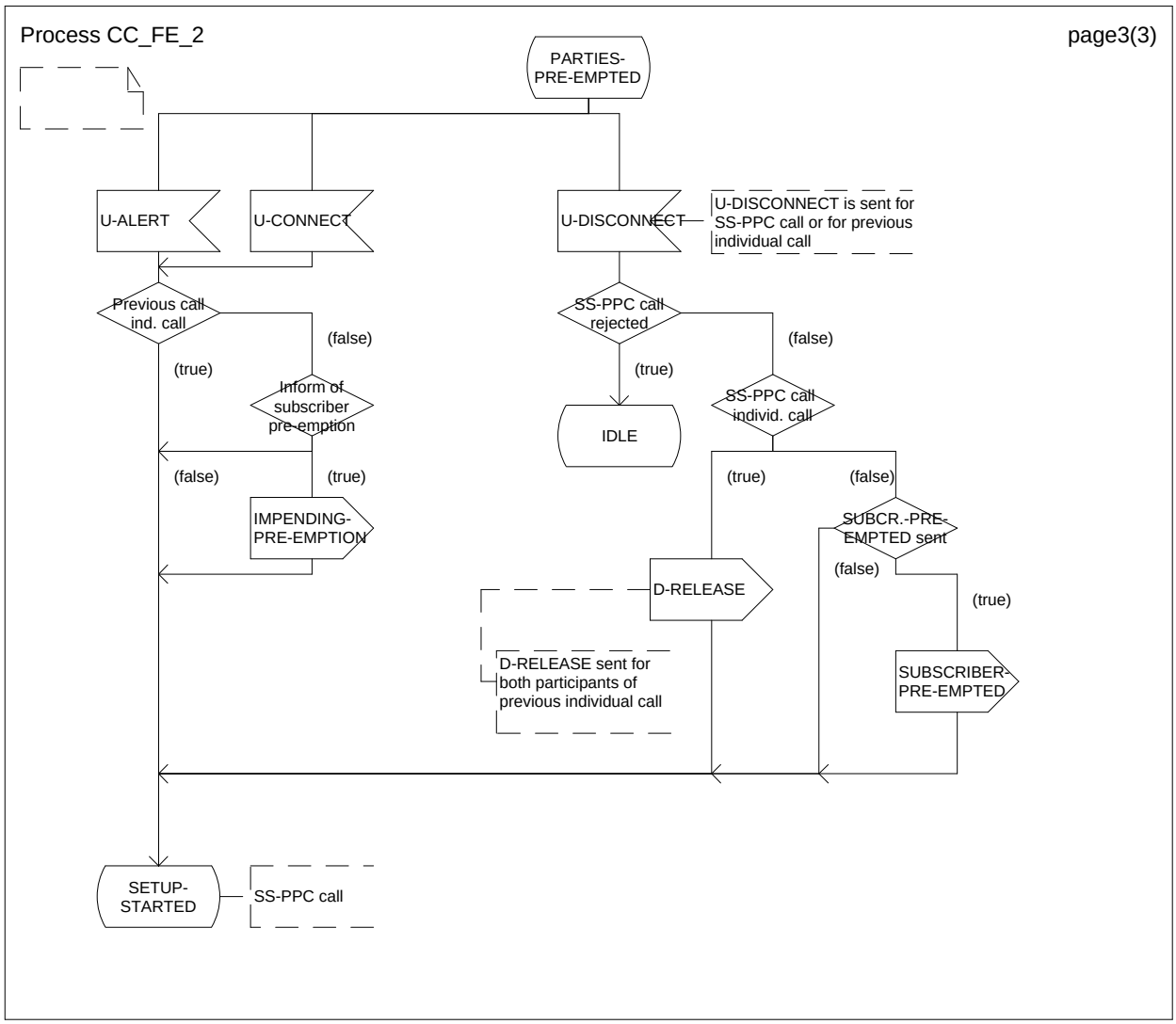


Figure 16: Process description for CC to which FE2 is collocated

7.5 Behaviour of FE3 (SS entity of authorised user)

7.5.1 Service interaction for FE3

Service interaction for FE3 is shown in figure 17.

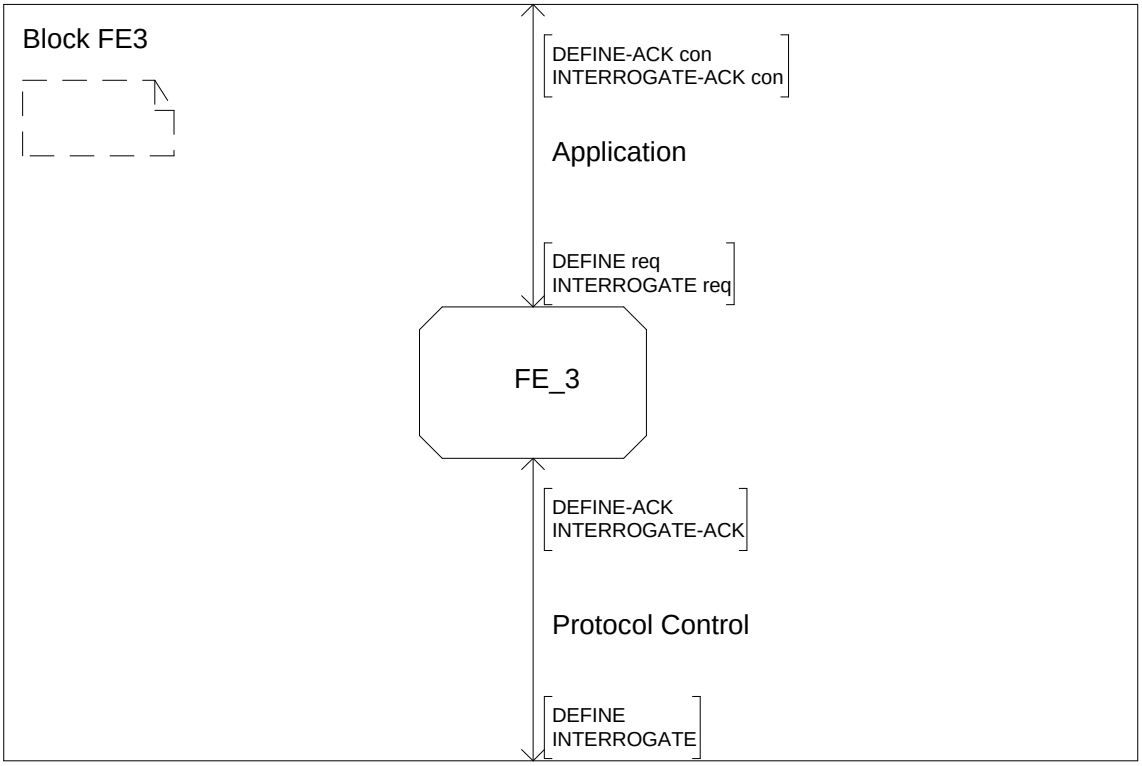


Figure 17: Service interaction for FE3

7.5.2 Process description for FE3

Process description of FE3 is shown in figure 18.

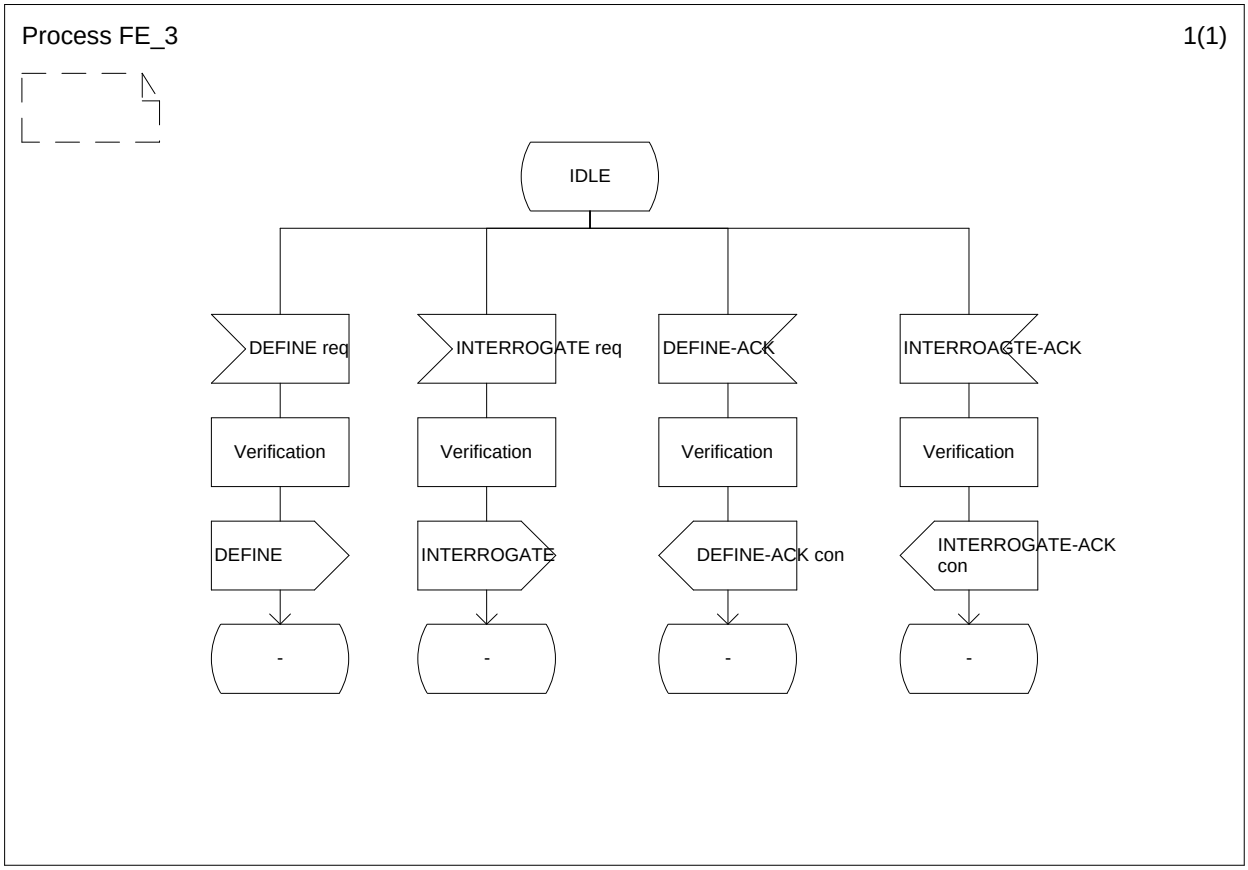


Figure 18: Process description for FE3

7.6 Behaviour of FE4

7.6.1 Service interaction for FE4

Service interaction for FE4 is shown in figure 19.

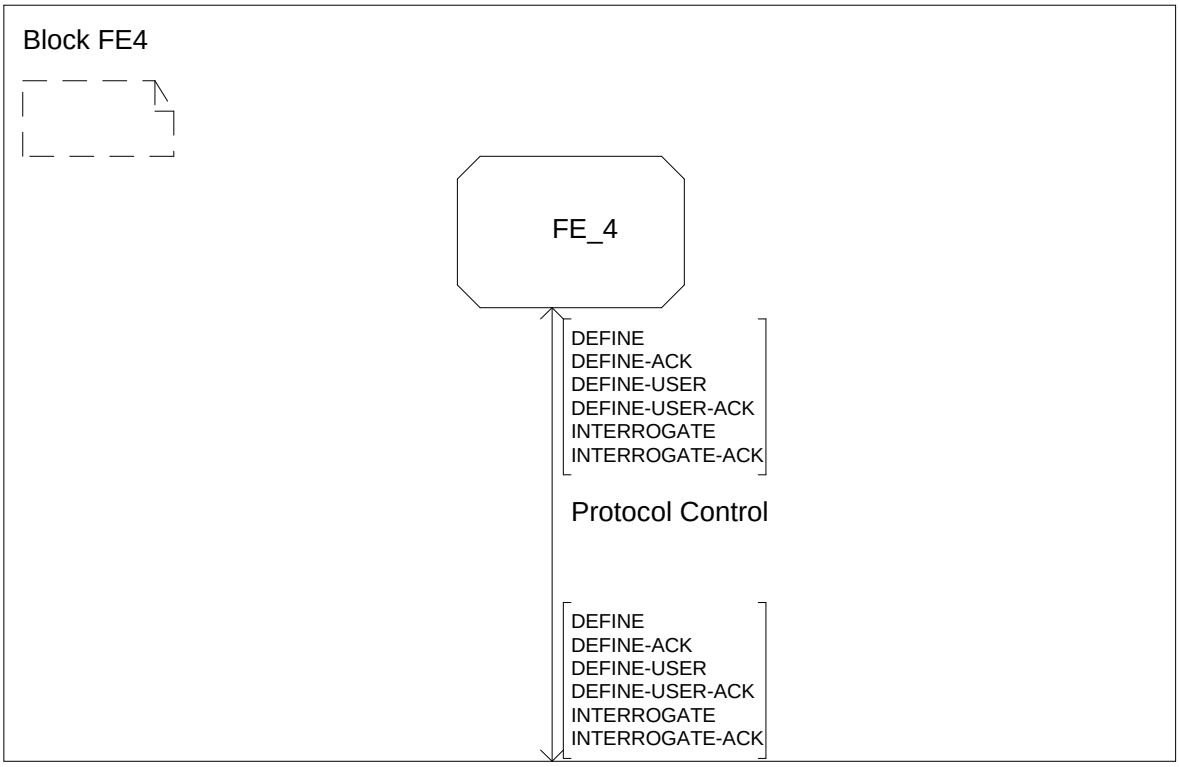


Figure 19: Service interaction for FE4

7.6.2 Process description for FE4

Process description for FE4 is shown in figure 20.

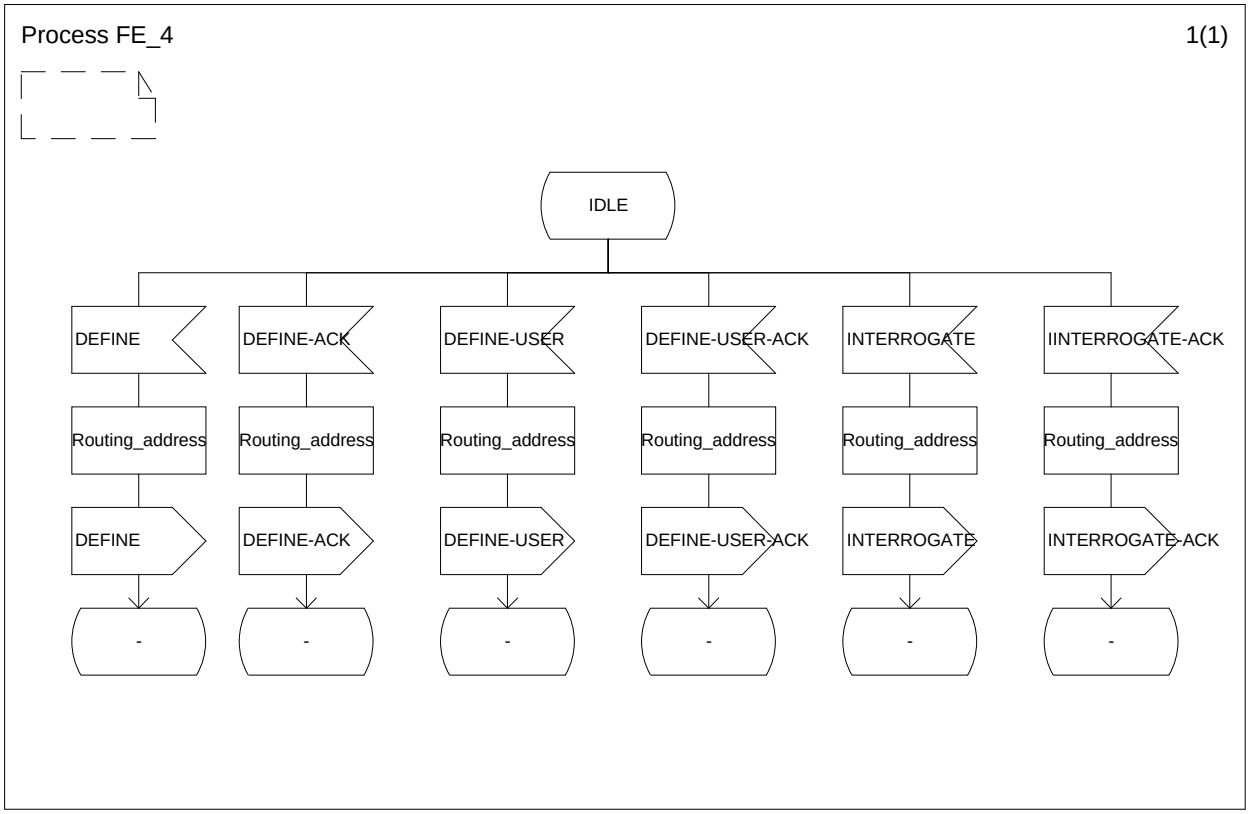


Figure 20: Process description for FE4

7.7 Behaviour of FE5

7.7.1 Service interaction for FE5

Service interaction for FE5 is shown in figure 21.

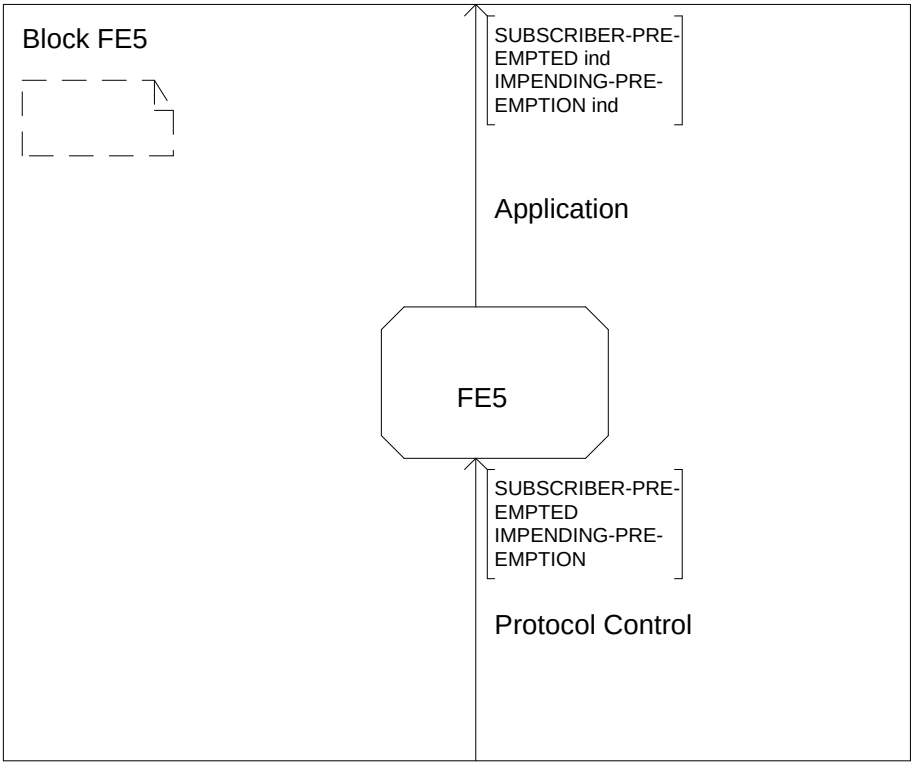


Figure 21: Service interaction for FE5

7.7.2 Process description for FE5

Process description for FE5 is shown in figure 22.

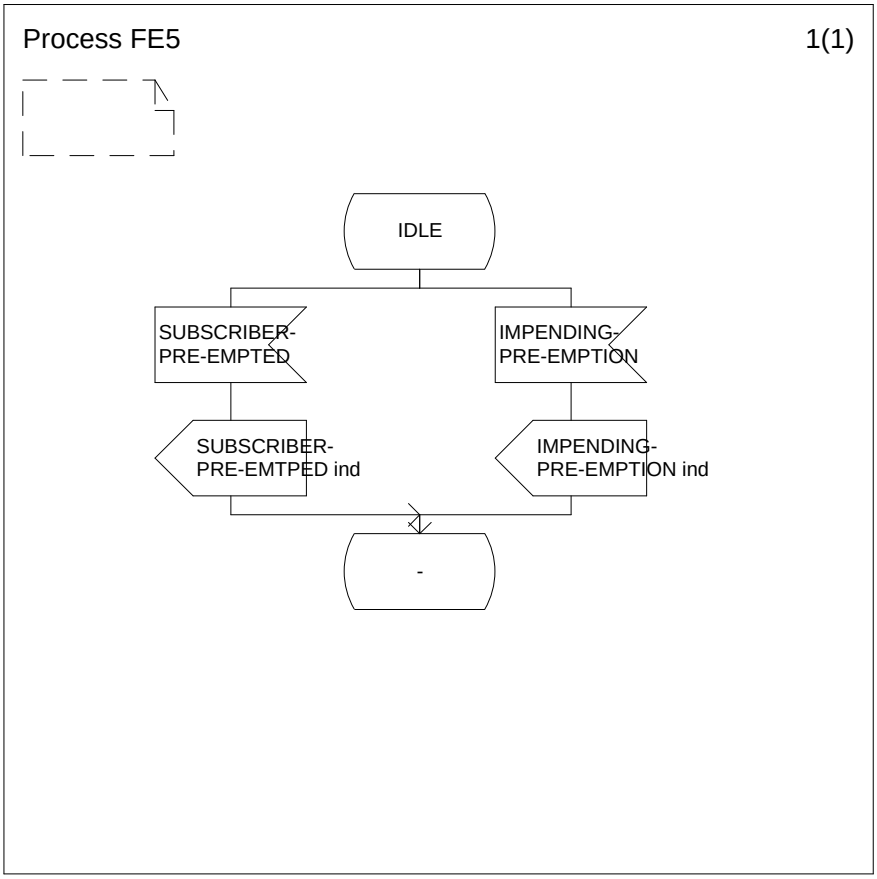


Figure 22: Process description for FE5

7.8 Behaviour of CCA to which FE5 is collocated

The disconnection of the possibly existing call within CCA collocated to FE5 is not shown in the figures below. However, upon reception of a higher priority SS-PPC call, the lower priority call should be released within CCA.

7.8.1 Service interaction for CCA to which FE5 is collocated

Service interaction for CCA to which FE5 is collocated is shown in figure 23.

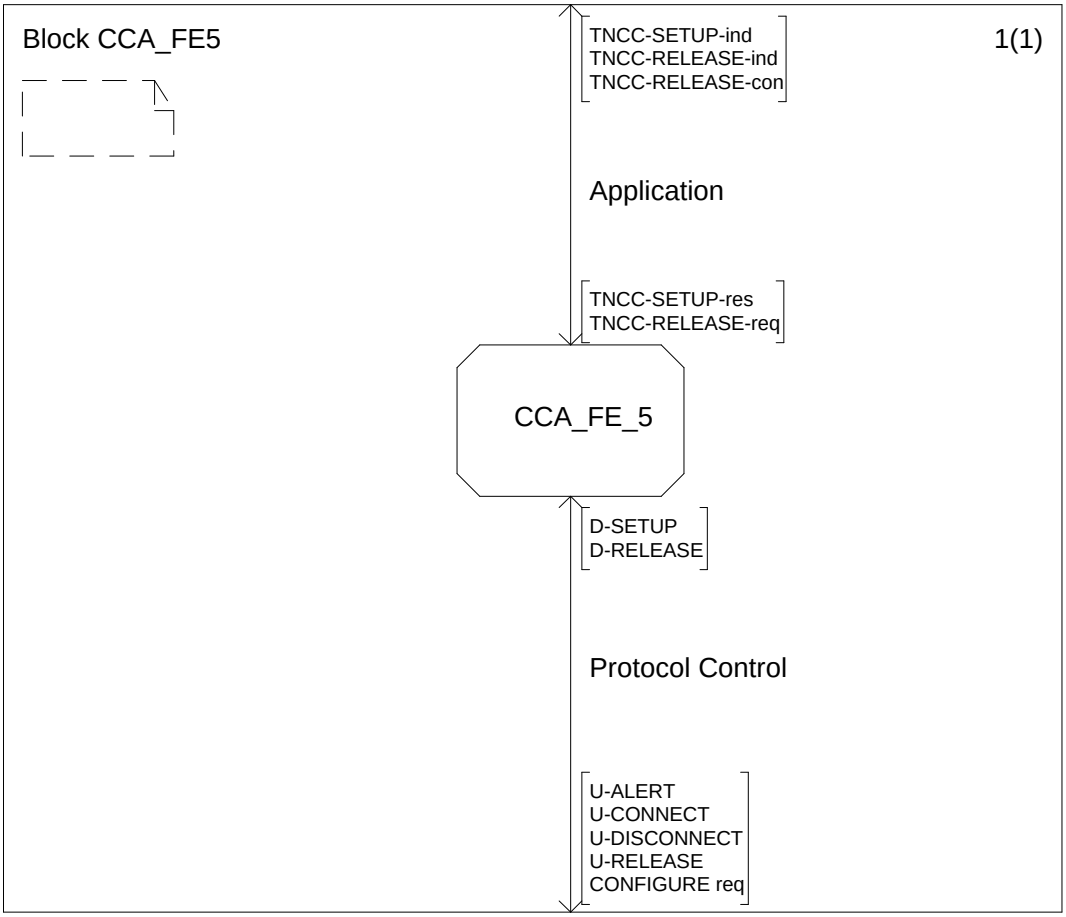


Figure 23: Service interaction for CCA to which FE5 is collocated

7.8.2 Process description for CCA collocated to FE5

Process description for CCA collocated to FE5 is shown in figures 24 and 25.

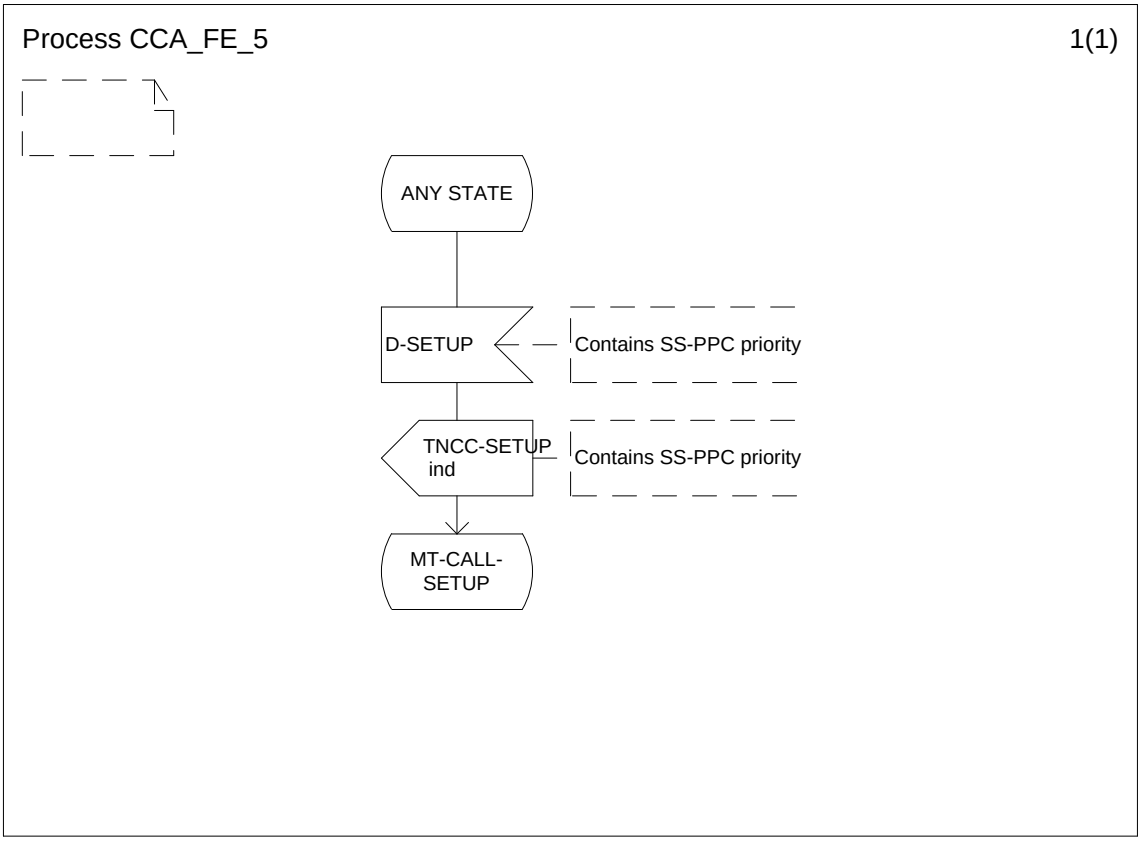


Figure 24: Process description of ANY STATE for CCA collocated to FE5

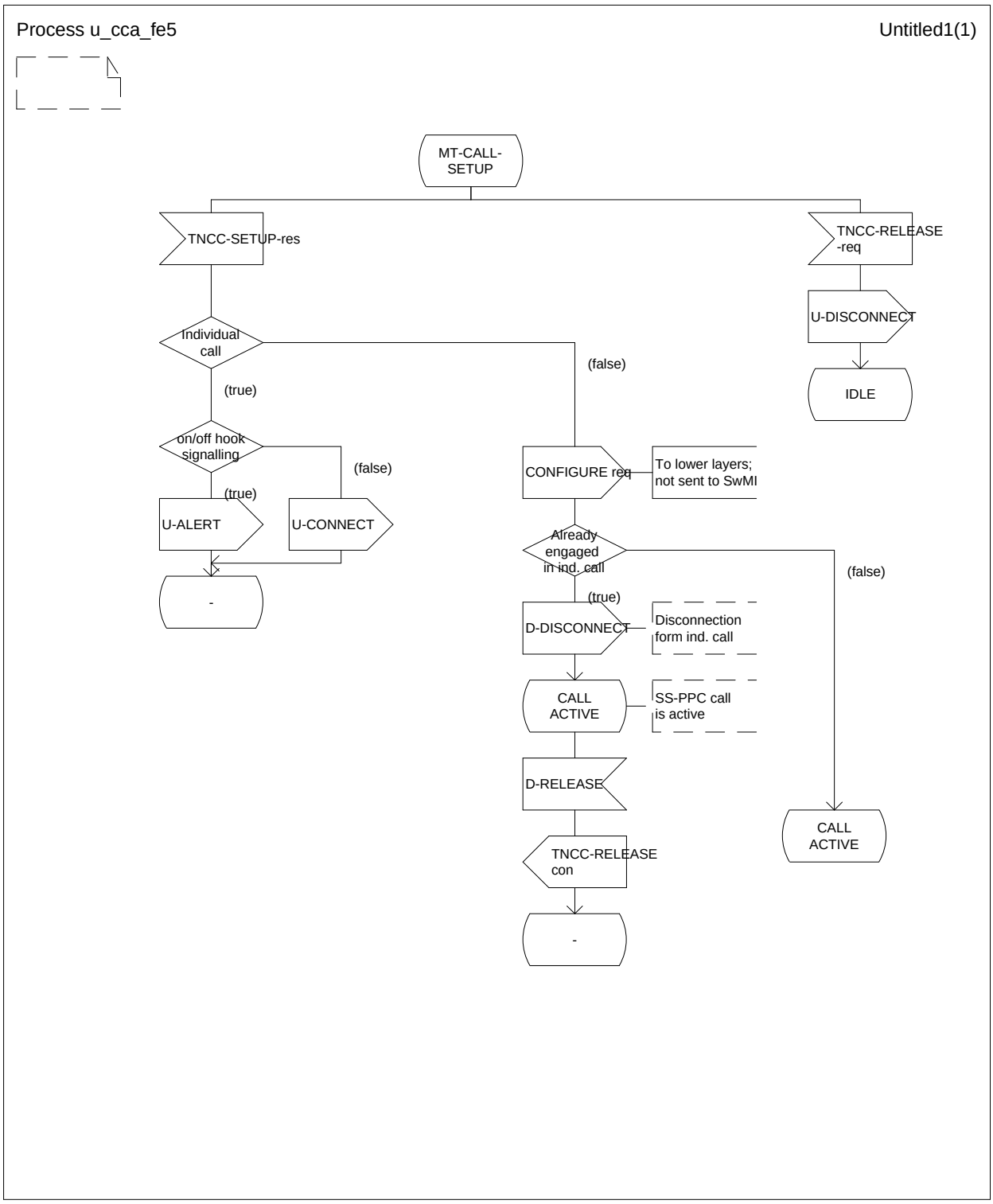


Figure 25: Process description of states MT-CALL-SETUP, CALL-ACTIVE and IDLE for CCA to which FE5 is collocated

7.9 Behaviour of FE6

7.9.1 Service interaction for FE6

Service interaction for FE6 is shown in figure 26.

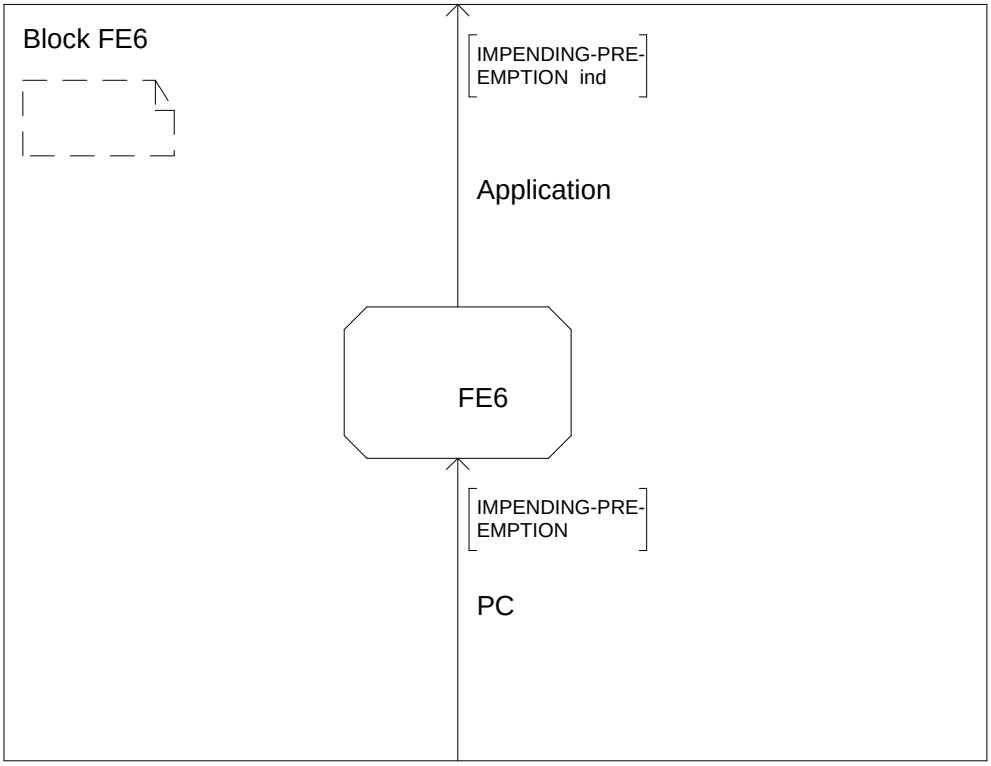


Figure 26: Service interaction for FE6

7.9.2 Process description for FE6

Process description for FE6 is shown in figure 27.

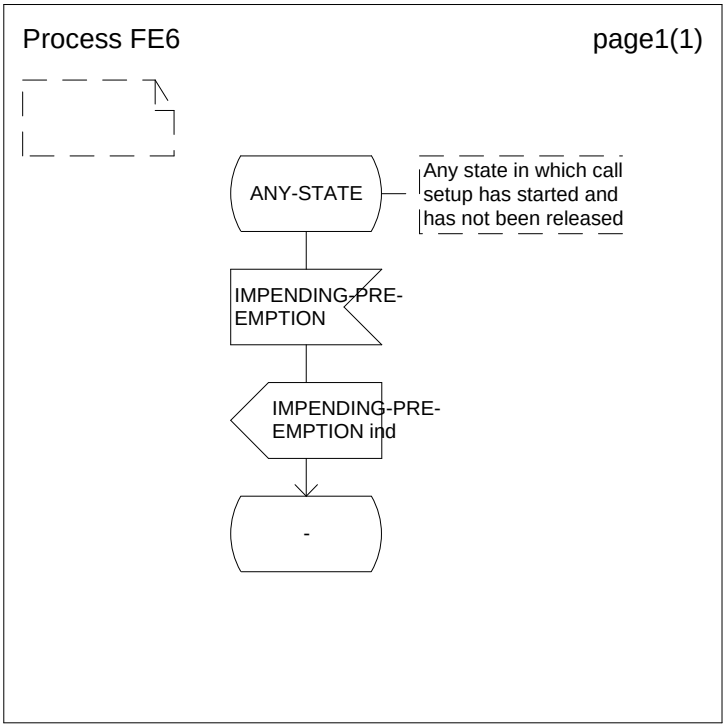


Figure 27: Process description for FE6

7.10 Behaviour of CCA to which FE6 is collocated

7.10.1 Service interaction for CCA to which FE6 is collocated

Service interaction for CCA to which FE6 is collocated is shown in figure 28.

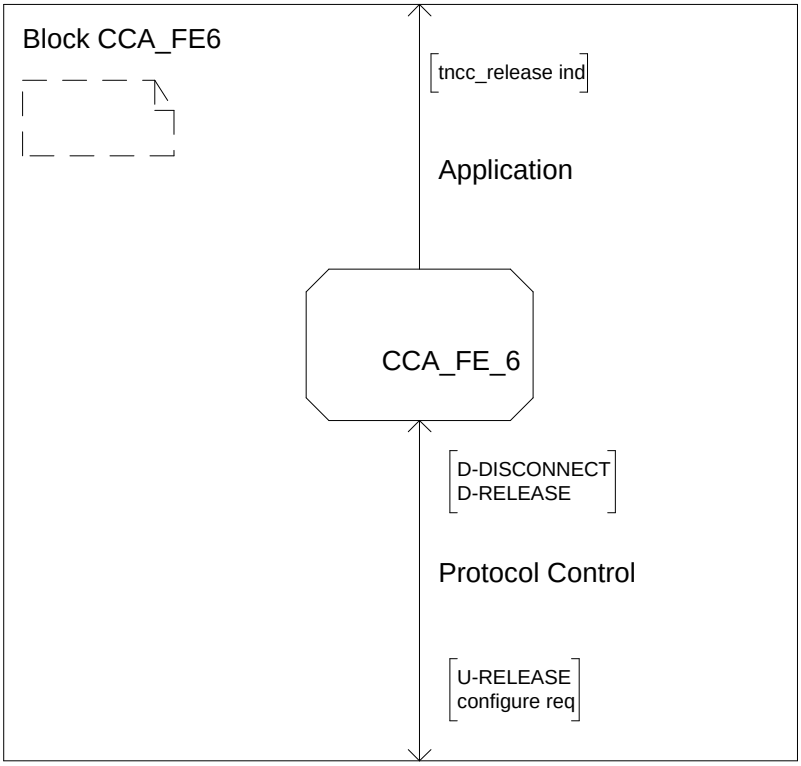


Figure 28: Service interaction for CCA to which FE6 is collocated

7.10.2 Process description for CCA collocated to FE6

Process description for CCA collocated to FE6 is shown in figure 29.

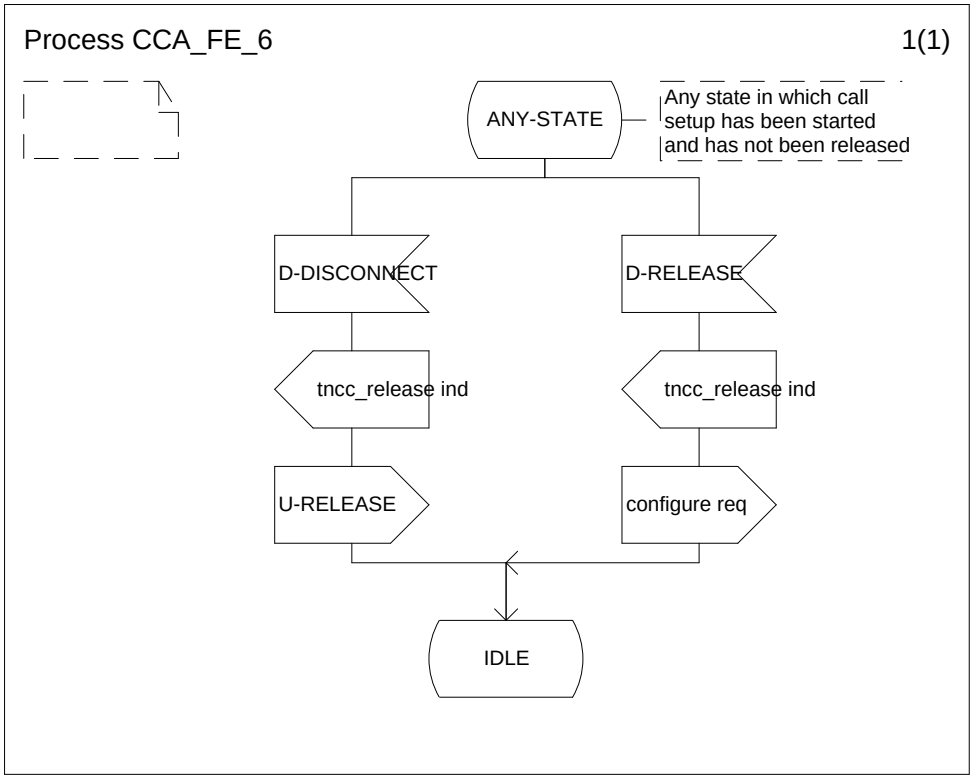


Figure 29: Process description for CCA collocated to FE6

7.11 Inter-working considerations

In order to enable the SS-PPC to extend to several TETRA systems over the ISI the FEs (FE2s and FE4s) in different TETRA systems shall be able to send and receive SS information flows over the ISI.

Annex A (informative): Mapping of SS-PPC priorities received from application to priorities in basic service PDUs (for the MS/LS)

The capability to save SS-PPC definitions in the MS/LS is an optional feature within the MS/LS and the recommendations given below are applicable only for user A (calling party), if this optional feature is supported in the MS/LS of user A.

FE1 should pass the SS-PPC definition requests to Application in the MS/LS. Application should save the definition in the database in the MS/LS. The Application should always accept the definition if the definition is made to the Individual TETRA Subscriber Identity (ITSI) related to the MS/LS or to any Group TETRA Subscriber Identity (GTSI), if the subscriber is member of the group. The Application should acknowledge the SS-PPC definition request, if a acknowledgement request was included in the definition request.

When the SS-PPC service is invoked to a call, the Application should give the correct SS-PPC priority value to layer 3. If defined, the SS-PPC definition should be applied in the following way:

- the SS-PPC definition for user A shall be applicable, when user A invokes an individual call;

- the SS-PPC definition for a group shall be applicable, when user A invokes a group call to the defined group identity and if user A is a member of the group.

Application should allow the user to only request values, that are allowed for the user. If the user is requesting a value that is not allowed for the user, Application should replace the value with a correct value and indicate this to the user or bar the basic service request. However, if the service user requests emergency priority, the Application should always allow the value.

When CC receives the call priority value from Application, it should not need to check the value. The Call Control sub-entity within layer 3 should include the priority into the Call priority parameter within SETUP PDU.

The SwMI sends the SS-PPC priority in the downlink messages to FE1 and FE5(s). FE1 and FE5 should pass the operated SS-PPC priority to Application.

NOTE: As the operated SS-PPC priority can be different from the invoked SS-PPC priority, FE1 should pass the priority to Application.

Application should then accept the received priority and act upon it.

History

Document history			
December 1996	Public Enquiry	PE 120:	1996-12-16 to 1997-04-11