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Radio Equipment and Systems (RES);
Trans-European Trunked Radio (TETRA);
Voice plus Data (V+D);
Part 11: Supplementary Services (SS) Stage 2;
Part 11-22: Dynamic Group Number Assignment (DGNA)

ETSI

Contents

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", (DE/RES-06001-14).

Part 15:   "Inter-working - Extended Operations", (DE/RES-06001-15).

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 European Telecommunication Standard (ETS) defines the stage 2 specifications of the Supplementary Service Dynamic Group Number Assignment (SS-DGNA) for the Trans-European Trunked Radio (TETRA).

The SS-DGNA enables a user to dynamically define group identities and group related parameters to the TETRA system and to the subscribers in the system. These definitions are used to enable group call invocations to dynamically defined groups. This ETS specifies the creation, modification, deletion and interrogation of group definitions in the Switching and Management Infrastructure (SwMI), in the Mobile Station (MS) and in the Line Station (LS). The operations can be made within one TETRA system or over the Inter System Interface (ISI).

This specification does not include the specification for access priority used for random access in uplink and call priority used by SwMI for resource allocation for a group. Access priority and call priority can be specified for groups using Supplementary Service Access Priority (SS-AP), Supplementary Service Priority Call (SS-PC) and Supplementary Service Pre-emptive Priority Call (SS-PPC).

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

Stage 2 describes the functional capabilities of the Supplementary Service introduced in stage 1 description. Stage 2 identifies the functional capabilities for the management of the service in the SwMI, in the MS and in the LS. Stage 2 describes the information flows exchanged between these entities, and it also describes the flows sent over the ISI.

> NOTE: The stage 2 description is followed by the stage 3 description, which specifies the encoding rules for the information flows and process behaviour for the different entities in SwMI, MS and LS of the service.

2 Definitions and abbreviations

2.1 Definitions

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

affected user: An identified MS or LS user to whom the service is assigned.

authorized user: A user who is authorized to define, cancel, delete and interrogate SS-DGNA numbers.

bearer service: A type of telecommunication service that provides the capability for the transmission of signals between user-network interfaces.

call related DGNA: Creation of a group based on the participants of a referenced call.

call unrelated DGNA: Creation of a group based on identities.

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).

provision: The act of supplying a given service.

supplementary service: A supplementary service modifies or supplements a bearer service or a teleservice. A supplementary service cannot be offered to a customer as a stand alone service. It should be offered in combination with a bearer service or a teleservice.

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.

teleservice: A type of telecommunications service that provides the complete capability, including terminal equipment functions, for communication between users according to agreed protocols.

2.2 Abbreviations

2.2.1 General abbreviations

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

AP	Access Priority
CC	Call Control
CCA	Call Control (functional entity Agent)
DGNA	Dynamic Group Number Assignment
FE	Functional Entity
GSSI	Group Short Subscriber Identity
GTSI	Group TETRA Subscriber Identity
ISI	Inter-System Interface
MS	Mobile Station
LS	Line Station
PC	Priority Call
PPC	Pre-emptive Priority Call
SS	Supplementary Service

   NOTE: The abbreviation SS is only used when referring to a specific supplementary service.

SwMI   Switching and Management Infrastructure

3 Supplementary Service Dynamic Group Number Assignment (SS-DGNA) stage 2 specification

3.1 Functional model

3.1.1 Functional model description

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

- FE1   Authorized user's definition, cancellation and interrogation functional entity in the SS-DGNA system 1;

- FE2   Dynamic Group Number Assignment functional entity;

- FE3   Affected user's functional entity;

- FE4   Generic Dynamic Group Number Assignment functional entity in system 2;

- CC   Call Control (functional entity);

- CCA   Call Control (functional entity Agent).

The following relationships shall exist between these FEs:

- ra   between FE1 and FE2;

- rb   between FE2 and FE3;

- rc   between FE2 and FE4;

- rd   between FE4 and FE1;

- re   between FE4 and FE3.

Figure 1 shows these FEs and their relationships.

SYSTEM 1
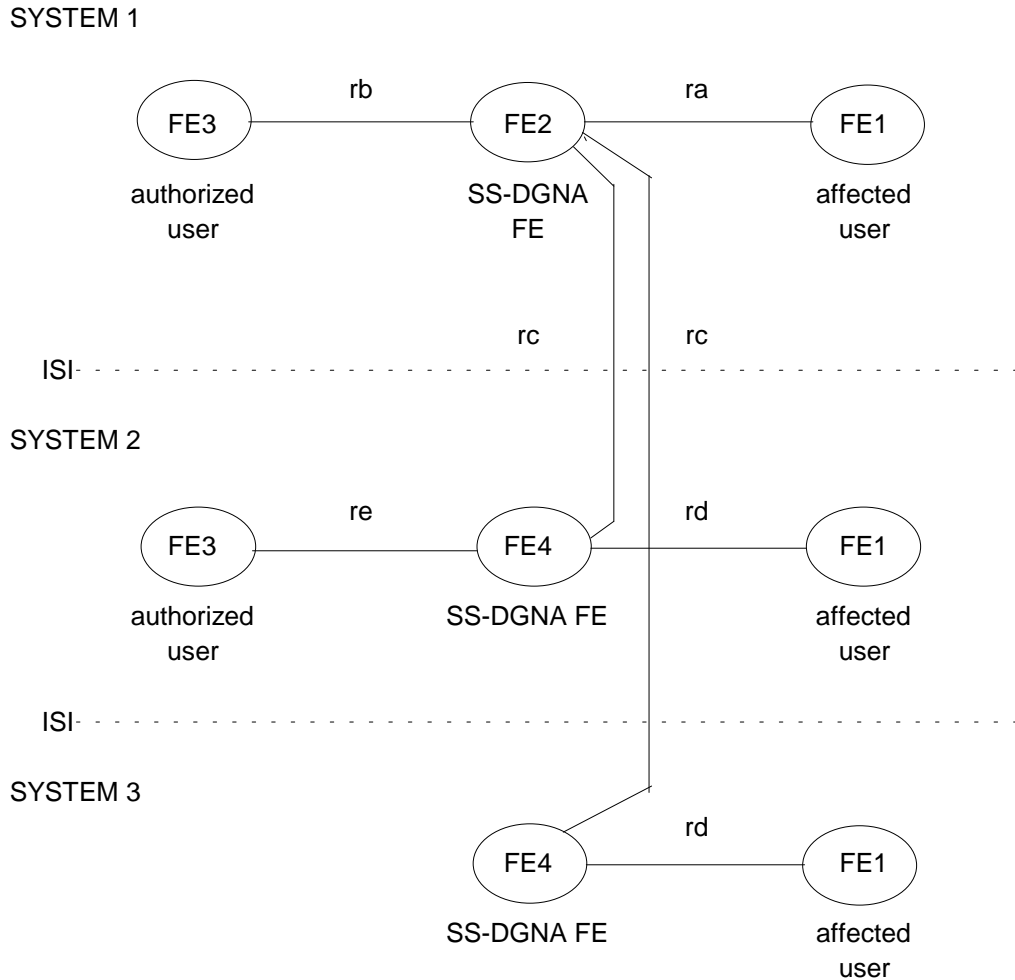
Figure 1: Functional model for SS-DGNA

3.1.2 Description of FEs

3.1.2.1 Affected user's functional entity, FE1

FE1 shall receive the SS-DGNA addition/modification and removal information flows to affected users from FE2. When the addition/modification data is sent to FE1, FE1 shall add the SS-DGNA number and parameters to the database in the MS; in case of removal of SS-DGNA number, FE1 shall remove the SS-DGNA number and its parameters from the database in the MS. FE1 should acknowledge the definition/deletion requests to FE2 if acknowledgement have been requested.

In case of addition/modification or removal of SS-DGNA, the FE1 may make local checks before accepting the request. FE1 should also use the network authorization procedure before accepting any SS-DGNA changes. However, FE1 should accept the SS-DGNA requests if they are authorized and valid.

At the reception of interrogation request from a service user, FE1 should send the request to FE2. When FE1 receives the response from FE2, FE1 should indicate the response to the service user.

3.1.2.2 SS-DGNA functional entity, FE2

FE2 shall make the SS-DGNA additions/modifications, deletions, cancellation and interrogations in the SwMI.

At the reception of any SS-DGNA request, FE2 shall verify the SS-DGNA identity, check the validity of parameters and verify that the request is authorized. Upon these checks, FE2 shall reject the service request or accept and perform it.

In case of an accepted SS-DGNA addition/modification, FE2 shall save the definition to the database in SwMI. In case of an on-going call to which the user requests a call related SS-DGNA definition, FE2 shall also fetch the call related data from CC.

When the user requests the addition/modification of SS-DGNA, optionally, the FE2 may make the operation to assign the SS-DGNA number and group-related data to affected users.

As an operator option, when the user requests addition/modification of SS-DGNA, FE2 may verify the dynamic group composition. If the composition exists as a group number, FE2 may offer the authorized user the possibility to cancel the SS-DGNA definition request. In that case, FE2 shall send the SS-DGNA cancellation request and receive the response. If the response indicates to continue to make the definition, FE2 shall do so; if the response indicates that FE2 shall not continue, FE2 shall stop the service execution, but FE2 shall send an acknowledgement to FE3.

In case of SS-DGNA deletion, FE2 shall remove the definition from the database in SwMI. Optionally, the FE2 may also remove the SS-DGNA number and group-related data from the database of affected users.

In case of interrogation, FE2 shall fetch the SS-DGNA data from the database and send the interrogation response to the requesting party.

If the system enables SS-DGNA service to be requested for a released call, FE2 shall be able to provide means to recover the call specific data needed for the definition when the request is made. It shall be an operator option defined by the CC-SS call retention timer, if the call related DGNA definition can be invoked within a time limit.

3.1.2.3 Authorized user's functional entity, FE3

FE3 shall receive addition/modification, deletion, cancellation or interrogation requests from the user. FE3 may check these requests and if FE3 finds them valid, it shall send them to FE2. When FE2 sends the responses for these requests FE3 displays them to the user.

FE2 may also request continuation for a requested SS-DGNA addition, if a SS-DGNA definition with the same parameters is found in the system. FE3 shall receive and display these request to the user and return the user's response to FE2.

If the user requests a call related DGNA addition, FE3 shall fetch the call identifier and add it to the definition request.

3.1.2.4 Functional entity in system 2, FE4

FE4 shall act as an control entity in an other TETRA system, if the SS-DGNA service request are sent over the Inter System Interface. FE4 shall deliver SS-DGNA service requests from FE2 to FE1 or FE3, or from FE1 or FE3 to FE2. The FE4 shall also add the (V)GTSIs or GTSIs to messages, and in case of call related SS-DGNA definition FE4 shall provide the information flows with the system 2 or home system call identifier. FE4 shall also add the routeing addresses and may perform authorization checks.

3.1.3 Relationship with a basic service

In case of call related SS-DGNA FE1 shall be collocated with user A's CCA. The CCA shall support the definition process by giving the call identifier used for the definition request.

In case of call related SS-DGNA FE2 shall be collocated with CC in SwMI as the CC provides FE2 with the call related data used for the SS-DGNA definition.

Figure 2 shows the relationships that shall exist between FEs and CC/CCA in case of call related SS-DGNA definition. There shall not be any relationships between FEs and CC/CCAs in case of interrogation or call unrelated SS-DGNA definition, deletion or interrogation.

SYSTEM 1

SYSTEM 2

SYSTEM 3
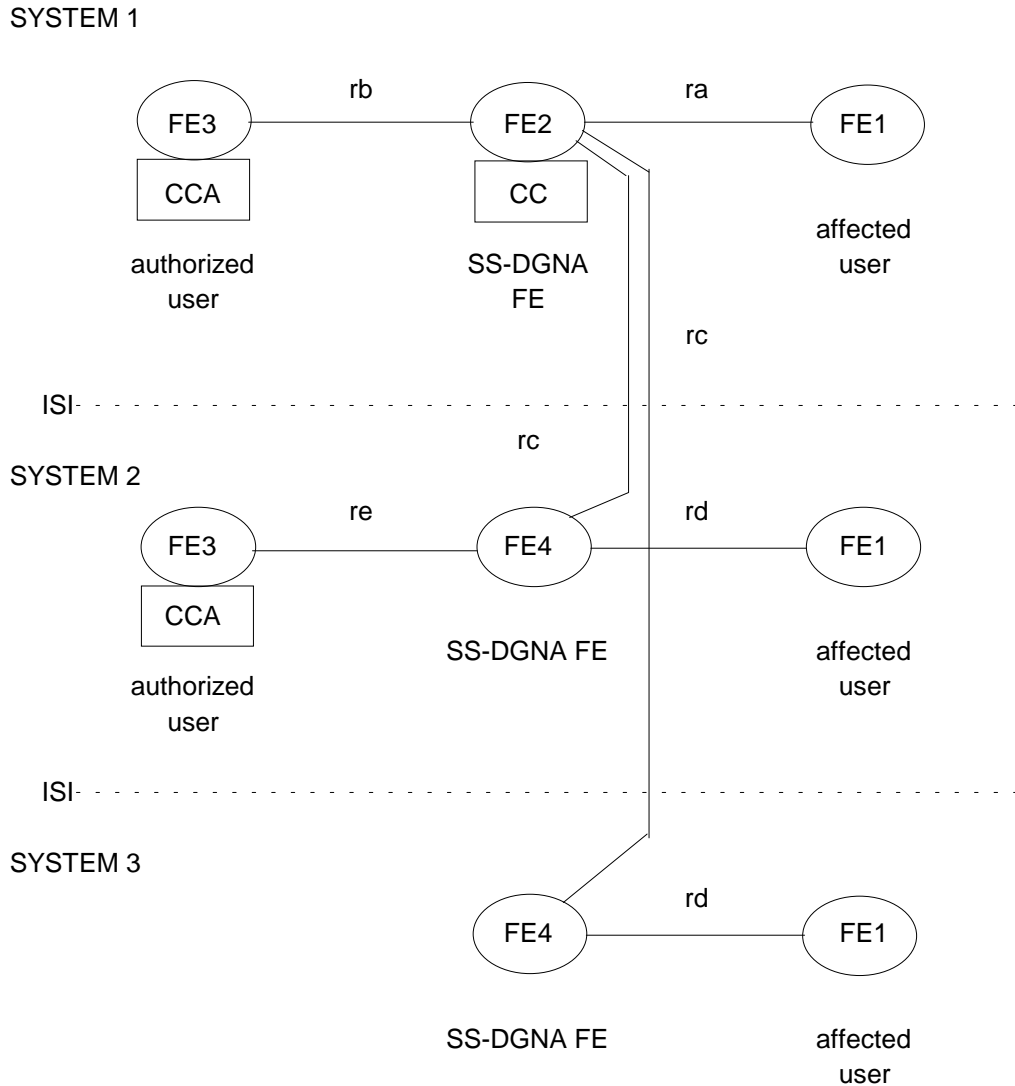
Figure 2: The relationships between the basic service and call related SS-DGNA FEs

3.2 Information flows

3.2.1 Definition of information flows

The definitions of information flows define the informational contents exchanged between the different functional entities.

In the tables listing the element type indicates whether the data type is mandatory "M", conditional "C" or optional "O". The responses to request or interrogation messages are named as the request/interrogation messages with the extension "ACK".

3.2.1.1 Addition/modification of SS-DGNA number

A SS-DGNA definition can comprise of an addition or modification of a DGNA number definition. The addition and modification are made with the same SS-DGNA information flow.

The SS-DGNA addition shall be call related or call unrelated. When authorized user is making a call related DGNA addition, he shall refer to a call with call identifier. The SwMI should define the call parameters according to the referred call. However, the authorized user can define some or all parameter values by giving the values explicitly in the definition command. After the SS-DGNA addition (creation) is completed, the call related DGNA shall be ended. After that, there is no difference between the call related and call unrelated DGNA. The modification, deletion and interrogation of SS-DGNA shall be done independently of any ongoing call, and these actions shall be always call unrelated.

In case of call unrelated SS-DGNA addition, the authorized user shall give the parameters for the definition. However, the authorized user can omit the DGNA number, in which case SwMI shall find a valid DGNA, make the definition for that number and return it to the authorized user.

The authorized user can change the parameters of a group, e.g. new affected users can be added to the group. For addition and modification the same information flow (DEFINE) shall be used, as described below.

The authorized user can make DGNA definitions to the SwMI only or to the SwMI and to the affected users.

At the reception of SS-DGNA definition request, FE2 can authenticate FE3 that made the request before accepting the definition. For that purpose, the general authentication procedures, that are defined for TETRA in order to authenticate MS- or LS-subscribers, shall be applied.

3.2.1.1.1 DEFINE request

The DEFINE information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE3 to FE2 or from FE3 to FE2 via FE4. The flow shall be used to add and modify a call related and call unrelated SS-DGNA number.

The addition and modification shall be done with the same information flow. The parameters included in an addition/modification request shall override the previously defined parameters, if any. If a parameter is not given in the request, the previously defined parameter value shall be valid for the group identity.

It shall be possible to modify groups with SS-DGNA defined in FE1 or in FE2, even if the group is not created with SS-DGNA.

The defined DGNA number shall be allocated by the FE2, if the number is not given by FE3.

The DEFINE information flow elements are described in table 1.

Table 1: Contents of DEFINE

Element	Type
Defining authorized user	M
Call identifier	C
Defined group identity (identities)	C
Reference to a pre-defined parameter set	O
Additional authorized user(s)	O
Acknowledged group call	O
Broadcast group call	O
Mnemonic group name	O
Affected user(s)	O
Acknowledgement request from aff. users	O
Importance of group	O
Group activation in MS/LS	O
Duration of assignment	O

3.2.1.1.2 DEFINE-ACK

The DEFINE-ACK information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE2 to FE3 or from FE2 to FE3 via FE4. The flow shall be used to acknowledge a previously sent DEFINE request to a call related or call unrelated SS-DGNA definition.

The DEFINE-ACK information flow shall be used for both addition and modification acknowledgement. The acknowledgement may be positive or negative indicating the result of the attempt to add/modify the group number.

The DEFINE-ACK information flow elements are described in table 2.

Table 2: Contents of DEFINE-ACK

Element	Type
Receiving party address	M
Call identifier	C
Defined group identity (identities)	M
Result for definition	M

3.2.1.2 Deletion of SS-DGNA number and/or removal of affected users from the group

An authorized user can delete the group definition from the SwMI or from the SwMI and from all affected users. Or, the authorized user can remove the group only from all or some affected users. The affected users can be requested to acknowledge the removal request.

At the reception of SS-DGNA deletion request, FE2 can authenticate FE3 that made the request before accepting the deletion. For that purpose, the general authentication procedures, that are defined for TETRA in order to authenticate MS- or LS-subscribers, shall be used.

3.2.1.2.1 DELETE request

The DELETE information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE3 to FE2 or from FE3 to FE2 via FE4. The flow shall be used to delete groups from the system and de-assign (remove) group identities from affected users.

The DELETE information flow elements are described in table 3.

Table 3: Contents of DELETE

Element	Type
Deleting authorized user	M
Deleted group identity (identities)	M
Group deleted from SwMI	M
Removal of group from affected users(s)	M
Affected user(s)	C

3.2.1.2.2 DELETE-ACK

The DELETE-ACK information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE2 to FE3 or from FE2 to FE3 via FE4. The flow shall be used to acknowledge a previously sent deletion and/or removal request to a call related and call unrelated SS-DGNA number. The acknowledgement may be positive or negative indicating the result of the attempt to delete and/or remove the group number.

The DELETE-ACK information flow elements are described in table 4.

Table 4: Contents of DELETE-ACK

Element	Type
Deleting authorized user	M
Deleted group identity (identities)	M
Result for deletion	M

3.2.1.3 DGNA assignment to affected users

The authorized user can make DGNA definitions to the SwMI only or to the SwMI and to the affected users. These affected users can be requested to acknowledge these assignment requests or the requests can be sent unacknowledged.

If the SwMI does not succeed in delivering the assignment(s) to affected user(s). The SwMI may, as an operator option, send the request(s) to affected user(s) at a later time.

At the reception of SS-DGNA assignment, FE1 can authenticate FE2 (FE4) that is making the request before accepting the assignment. For that purpose, the general authentication procedures, that are defined for TETRA in order to authenticate SwMI, shall be used.

3.2.1.3.1 ASSIGN request

The ASSIGN information flow shall be for the relationship ra, rc and rd. The flow shall be sent from FE2 to FE1 or from FE2 to FE1 via FE4. The flow shall be used to add and modify a call related and call unrelated SS-DGNA number to an affected user.

The addition and modification are done with the same information flow. The parameters included in a new addition/modification override the previously defined parameters for the group. If a parameter is not given in the request, the previously assigned parameter value shall be valid.

The ASSIGN information flow elements are described in table 5.

Table 5: Contents of ASSIGN

Element	Type
Assigned affected user	M
Added/modified group identity(ies)	M
Acknowledgement requested for assignment	O
Acknowledged group call	O
Broadcast group call	O
Mnemonic group name	O
Importance of group	O
Activation of group	O
Duration of assignment	O
Visited system TETRA identity of the group	O (note)
NOTE: Allocated for migrated affected user	

3.2.1.3.2 ASSIGN-ACK

The ASSIGN-ACK information flow shall be for the relationship ra, rc and rd. The flow shall be sent from FE1 to FE2 or from FE1 to FE2 via FE4. The flow shall be used to acknowledge a previously sent addition and modification request of a call related and call unrelated SS-DGNA number to an affected user.

The ASSIGN-ACK information flow shall be used for both addition and modification acknowledgement. The acknowledgement may be positive or negative indicating the result of the attempt to add/modify the group number or its parameters.

The ASSIGN-ACK information flow elements are described in table 6.

Table 6: Contents of ASSIGN-ACK

Element	Type
Acknowledging affected user	M
Assigned group identity (identities)	M
Result for assignment	M

3.2.1.4 DGNA de-assignment of affected user

The authorized user can make DGNA number deletions to the SwMI only or to the SwMI and to the affected users. These affected users can be requested to acknowledge these de-assignment requests or the requests can be sent unacknowledged.

If the SwMI does not succeed in delivering the de-assignment(s) to affected user(s). The SwMI may, as an operator option, send the request(s) to affected user(s) at a later time.

At the reception of SS-DGNA de-assignment, FE1 can authenticate FE2 (FE4) that is making the request before accepting the de-assignment. For that purpose, the general authentication procedures, that are defined for TETRA in order to authenticate SwMI, shall be used.

3.2.1.4.1 DEASSIGN request

The DEASSIGN information flow shall be for the relationship ra, rc and rd. The flow shall be sent from FE2 to FE1 or from FE2 to FE1 via FE4. The flow shall be used to remove groups and their parameters from affected users.

The DEASSIGN information flow elements are described in table 7.

Table 7: Contents of DEASSIGN

Element	Type
De-assigned affected user	M
De-assigned group identity (identities)	M
Acknowledgement requested for de-assignment	O

3.2.1.4.2 DEASSIGN-ACK

The DEASSIGN-ACK information flow shall be for the relationship ra, rc and rd. The flow shall be sent from FE1 to FE2 or from FE1 to FE2 via FE4. The flow shall be used to acknowledge a previously sent de-assignment (removal) request of a call related and call unrelated SS-DGNA number. The acknowledgement may be positive or negative indicating the result of the attempt to remove the group number from an affected user.

The DEASSIGN-ACK information flow elements are described in table 8.

Table 8: Contents of DEASSIGN-ACK

Element	Type
Acknowledging affected user	M
De-assigned group identity (identities)	M
Result for de-assignment	M

3.2.1.5 Interrogation of the definition

An authorized user can interrogate the definition(s) of one group identity or a list or range of group identities. An affected user can interrogate the parameters of a group he is member of (he is assigned the group number).

The authorized user can interrogate the completion status of a group that has been defined (added/modified) to the system. The response for this interrogation tells whether the definition is completed or partially completed, e.g. whether the assignments are delivered to affected users. The result shall not specify to which ones the assignment is sent and to which ones it is not sent.

The authorized user can interrogate the completion status of a group that has been defined to the system. The interrogation response shall also specify the affected users to which the assignment is delivered and about their acknowledgements, e.g. if acknowledgement was requested for the assignment from affected users.

The authorized user can request the parameters of a group that has been defined to the system. The interrogation response shall include all defined parameters except the affected users.

The affected user can request the parameters of the group he is member of. The interrogation response shall include the parameters that are included in the assignment request (ASSIGN). If the parameters or their values are different in the MS/LS unit from the parameters received as interrogation response, the MS/LS should update the parameters according to the received ones.

The authorized user can also interrogate the group parameters of a group saved in the database in SwMI on the behalf of an affected user. This can be done e.g. to support the operation and management functions.

3.2.1.5.1   INTERROGATE request

The INTERROGATE information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE3/FE1 to FE2 or from FE3/FE1 to FE2 via FE4. The flow shall be used to interrogate a group definition made to the system.

The authorized user may interrogate:

-       on a DGNA number basis for the (completion) status of the SS-DGNA definition. As a result the FE2 returns to FE3 the information about the DGNA number definition status (defined/not defined/partially defined (the specific reason shall be not returned));

-       an authorized user can request if the assignment request is delivered to affected users, and if they have acknowledged the group definition, if acknowledgement was requested;

-       an authorized user can request the parameters of a group;

-       an affected user is authorized to request the parameters of a group he is member of;

-       on authorized user basis. As a result FE2 returns a list of DGNA numbers added/modified by the given user identity (authorized user).

The INTERROGATE information flow elements are described in table 9.

Table 9: Contents of INTERROGATE

Element	Type
Interrogating authorized/affected user	M
Interrogated group(s)/authorized user	M
Interrogation type	M

3.2.1.5.2   INTERROGATE-ACK

This shall be an information flow for the relationship rb, rc and re. The flow shall be sent from FE2 to FE3/FE1 or from FE2 to FE3/FE1 via FE4. The flow shall be used to give a response to a interrogated a SS-DGNA definition.

The interrogation response contains:

-       the current status of the SS-DGNA definition (can be different from the result that FE2 returned at the reception of the addition/modification/deletion request);

-       list of DGNA numbers: GTSIs created by the given user identity (authorized user);

-       list of the defined parameters for the given SS-DGNA number for authorized user;

-       list of the defined parameters for the given SS-DGNA number for authorized user, FE1 should update the parameters in the database in MS/LS according to the received parameters, if different;

-       list of affected users that are assigned the given SS-DGNA and whether the user has acknowledged the assignment.

        NOTE: If FE3 requested the SS-DGNA interrogations of several identities in one definition request, FE2 may send several responses (DEFINE-ACKs).

The INTERROGATE-ACK information flow elements are described in table 10.

Table 10: Contents of INTERROGATE-ACK

Element	Type
Interrogating authorized/affected user	M
Call identifier	C
Defined group identity (identities)	C
Reference to a pre-defined parameter set	O
Additional authorized user(s)	O
Acknowledged group call	O
Broadcast group call	O
Mnemonic group name	O
Affected user(s)	O
Acknowledgement request from aff. users	O
Importance of group	O
Group activation in MS/LS	O
Duration of assignment	O

3.2.1.6 Cancellation of a SS-DGNA number addition/modification

Cancellation request shall be an optional feature. The purpose of cancellation request shall be to provide the authorized user a possibility to cancel the requested DGNA addition/modification if the requested parameter composition exists already for a group in the system.

3.2.1.6.1 CANCEL request

The CANCEL information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE2 to FE3 or from FE2 to FE3 via FE4. The flow shall be used to request from an authorized user if he wishes to cancel the addition/modification request of SS-DGNA when the given parameter composition exists already in the system.

The CANCEL request information flow elements are described in table 11.

Table 11: Contents of CANCEL

Element	Type
Defining authorized user	M
Call identifier	C
Defined group identity	C
Existing group identity	M

3.2.1.6.2 CANCEL-ACK

The CANCEL-ACK information flow shall be for the relationship rb, rc and re. The flow shall be sent from FE3 to FE2 or from FE3 to FE2 via FE4. The flow shall be used to acknowledge a received request to cancel the addition/modification request of SS-DGNA when the given parameter composition exists already in the system.

The CANCEL-ACK information flow elements are described in table 12.

Table 12: Contents of CANCEL-ACK

Element	Type
Defining authorized user	M
Call identifier	C
Defined group identity	C
Response to cancellation request	M

3.2.1.7 Information flows between different TETRA systems

The general principles and mechanism for sending supplementary service information flows between different TETRA systems apply for SS-DGNA.

3.2.2 Relationship of SS-DGNA information flows to other information flows

The SS-DGNA information flows may be sent with FACILITY PDU or any basic call information flow that shall be able to include SS-FACILITY element.

3.3 Information flow sequences of call unrelated DGNA definition

Signalling procedures in support of the information flow sequences are specified in the following subclauses. In addition, signalling procedures should be provided to cover other sequences arising from error situations, interactions with other supplementary services, different topologies etc.

No timers are used in the figures.

> NOTE: The information flow sequences are examples and they do not cover all possible variations of the service.

3.3.1 Successful addition/modification and operation when authorized user in system 1

Figure 3 shows the information flow sequence for successful addition/modification and operation of SS-DGNA definition. In the scenario below the authorized user and an affected user are in the home system (TETRA system 2) but another affected user is in TETRA system 2. The operation, the sending of group identities and associated data to affected users, shall be optional.
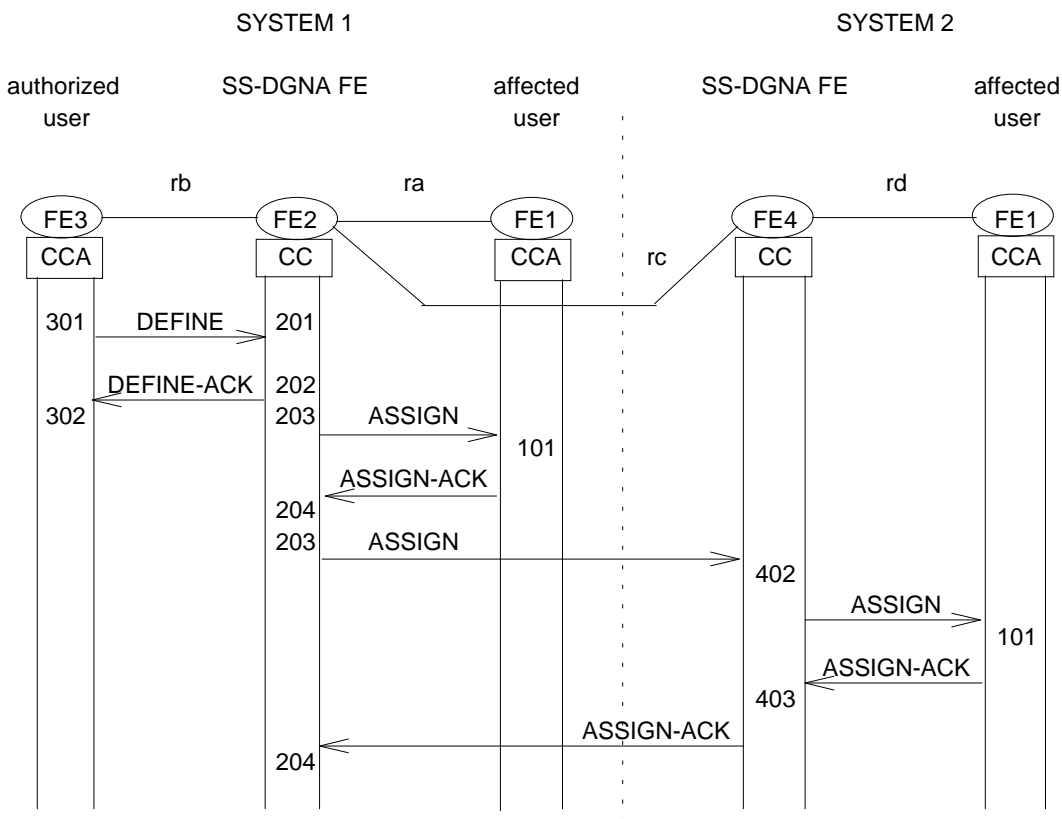

Figure 3: Successful definition and operation of call unrelated SS-DGNA

There may not be any affected users or there may be several of them in the same system or in other systems.

3.3.2 Successful deletion and removal operation when authorized user in system 1

Figure 4 shows the information flow sequence for successful deletion and removal operation of SS-DGNA. In the scenario below the authorized user and an affected user are in the home system (TETRA system 2) but another affected user is in TETRA system 2. The removal operation, the sending of group identities to affected users in order to remove the group identity from the subscriber, shall be optional.
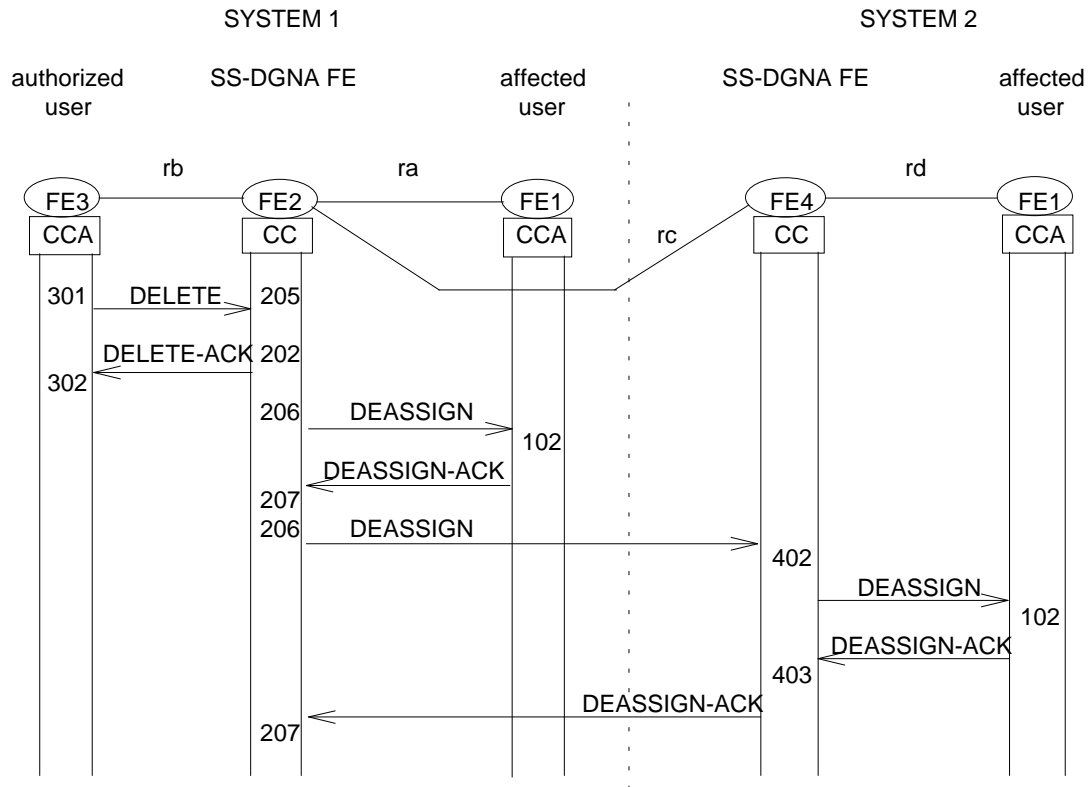

Figure 4: Successful deletion and removal operation of call unrelated SS-DGNA when authorized user is in visited system

There may not be any affected users or there may be several of them in the same system or in other systems.

3.4 FE actions of call unrelated DGNA definition and operation

3.4.1 FE actions of FE1

101 The FE1 receives the SS-DGNA addition/modification for affected user. FE1 shall verify the parameters and their values and if FE1 finds them suitable it shall add/modify the definition data to MS database and FE1 shall send an acknowledgement to FE2. Otherwise, FE1 sends a negative acknowledgement to FE2. Or, if for any other reason FE1 is not able to accept the parameters and make the definition.

FE1 may perform the network authentication procedure in order to accept the definition. This is recommended especially when a group with any of the highest class of usage values is added/modified, e.g. class of usage between 5-7.

102   The FE1 receives the SS-DGNA removal from affected user. FE1 shall verify parameters and their values and if FE1 finds them suitable it shall remove the definition data from MS database and FE1 shall send an acknowledgement to FE2. Otherwise, FE1 sends a negative acknowledgement to FE2. Or, if for any other reason FE1 is not able to accept the parameters and make the removal.

        FE1 may perform the network authentication procedure in order to accept the removal. This is recommended especially when a group with any of the highest class of usage values is removed, e.g. class of usage between 5-7.

3.4.2   FE actions of FE2

201   At the reception of DEFINE request FE2 shall detect the user request for adding/modifying a SS-DGNA definition. FE2 performs authorization checks and verifies the given SS-DGNA identity and the parameters in the request. If these checks are successful, FE2 adds the SS-DGNA to the database in the SwMI or modifies the parameters according to the request.

202   When FE2 has accepted or rejected the definition/deletion request it shall send the acknowledgement to FE3.

203   If the definition request included any affected users that the group is to be defined, the FE2 prepares the data to be sent to FE1. FE2 locates and delivers the data to the FE1s.

204   At the reception of acknowledgement FE2 notifies if the definition to FE1 was successful or unsuccessful. If FE2 is unable to contact FE1, as an operational option FE2 may buffer the data for affected user and deliver it later to FE1.

205   At the reception of deletion request FE2 shall detect the user request for deleting a SS-DGNA definition. FE2 performs authorization checks and verifies the given SS-DGNA identity and the parameters in the request. If these checks are successful, FE2 removes the SS-DGNA from the database in the SwMI.

206   If the deletion request included any affected users that the group is to be removed from, the FE2 prepares the data to be sent to FE1. FE2 locates and delivers the data to the FE1s.

207   At the reception of acknowledgement FE2 notifies if the de-assignment from FE1 was successful or unsuccessful. If FE2 is unable to contact FE1, as an operational option FE2 may buffer the data for affected user and deliver it later to FE1.

3.4.3   FE actions of FE3

301   FE3 shall detect the user request for adding/modifying (DEFINE) or deleting (DELETE) a SS-DGNA definition. Local checks on the suitability of the request may be made and the request rejected on the basis of such checks. If the request is not barred locally it shall be sent to FE2.

302   At the receipt of definition acknowledgement the FE3 shall inform the user of the result. The result may be successful or unsuccessful addition/modification or deletion. In case of successful definition with minor problems or unsuccessful definition the reason indicating the result is sent from FE2 to FE3. FE3 shall display the result for the user.

3.4.4   FE actions of FE4

401   After the reception of definition request from FE3, FE4 determines the routeing address for FE2, adds the address to the message and sends the definition message to FE2.

402   After the reception of the assignment/de-assignment message to FE1 in this system, FE4 tries to locate FE1. If FE4 is able to determine the location of FE1 in the system, FE4 sends the definition data to FE1. FE4 also adds the Visited system GSSI (V)(GSSI) in addition to the genuine GSSI.

403   At the reception of acknowledgement from FE1, FE4 acknowledges the definition/deletion request to FE2.

404   FE2 acknowledges the definition request and sends the acknowledgement to FE4, which routes it to FE3.

3.5 Information flow sequences of call unrelated DGNA interrogation

3.5.1 Interrogation when authorized user in system 1

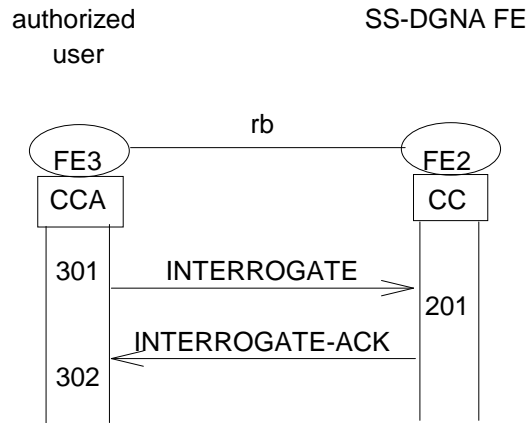Figure 5 shows the information flow sequence for interrogation when authorized user in system 1.

Figure 5: SS-DGNA interrogation when authorized user in system 1

The same information flow applies to successful interrogation and to an interrogation that is rejected by the SS-DGNA control entity.

3.5.2 Interrogation when authorized user in system 2

Figure 6 shows the information flow sequence for interrogation of SS-DGNA definition when authorized user is in system 2.
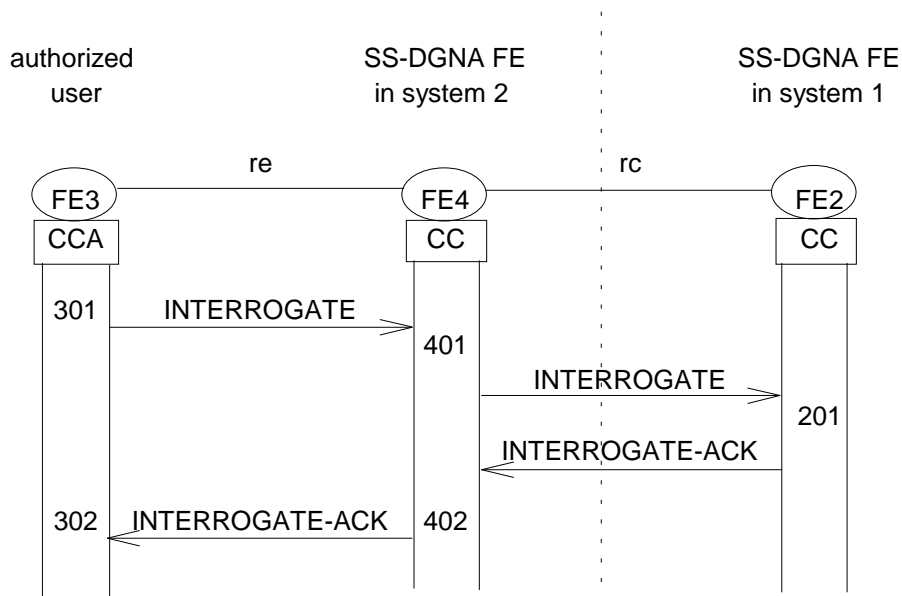
Figure 6: Call unrelated SS-DGNA interrogation when authorized user in visited system

The same information flow applies to successful interrogation and to an interrogation that is rejected by the SS-DGNA control entity.

3.6 FE actions of call unrelated DGNA interrogation

3.6.1 FE actions of FE2

201 FE2 shall verify that the request is authorized and if so, fetch the group data on the basis of the parameters in the request. If the requested data is found, it shall be sent to FE3. If the request fails, the valid error code shall be returned. After the service execution or the rejection of it, FE2 sends the acknowledgement to the requesting user.

3.6.2 FE actions of FE3

301 FE3 shall detect the users request for interrogation. Local checks on the suitability may be made and the request rejected on the basis of such checks. If the transfer is not barred locally, an interrogation request shall be sent to FE2. The request shall include the group number and the interrogation parameter.

302 On the receipt of the interrogation response, FE3 shall give the information for the requesting user.

3.6.3 FE actions of FE4

401 FE4 shall find out the routeing address of FE2 and add it to the message. FE4 may bar the service request e.g. on the basis of authority checks.

402 At the reception of the response for the request FE4 shall deliver it to FE3. If FE4 barred the request, this shall be indicated in the response.

3.7 Information flow sequences of call related DGNA definition and operation

3.7.1 Definition and operation when authorized user in system 1

Figure 7 shows the information flow sequence for successful addition/modification and operation of SS-DGNA definition. In the scenario below the authorized user and an affected user are in the home system (TETRA system 2) but another affected user is in TETRA system 2. The operation, the sending of group identities and associated data to affected users, shall be optional.
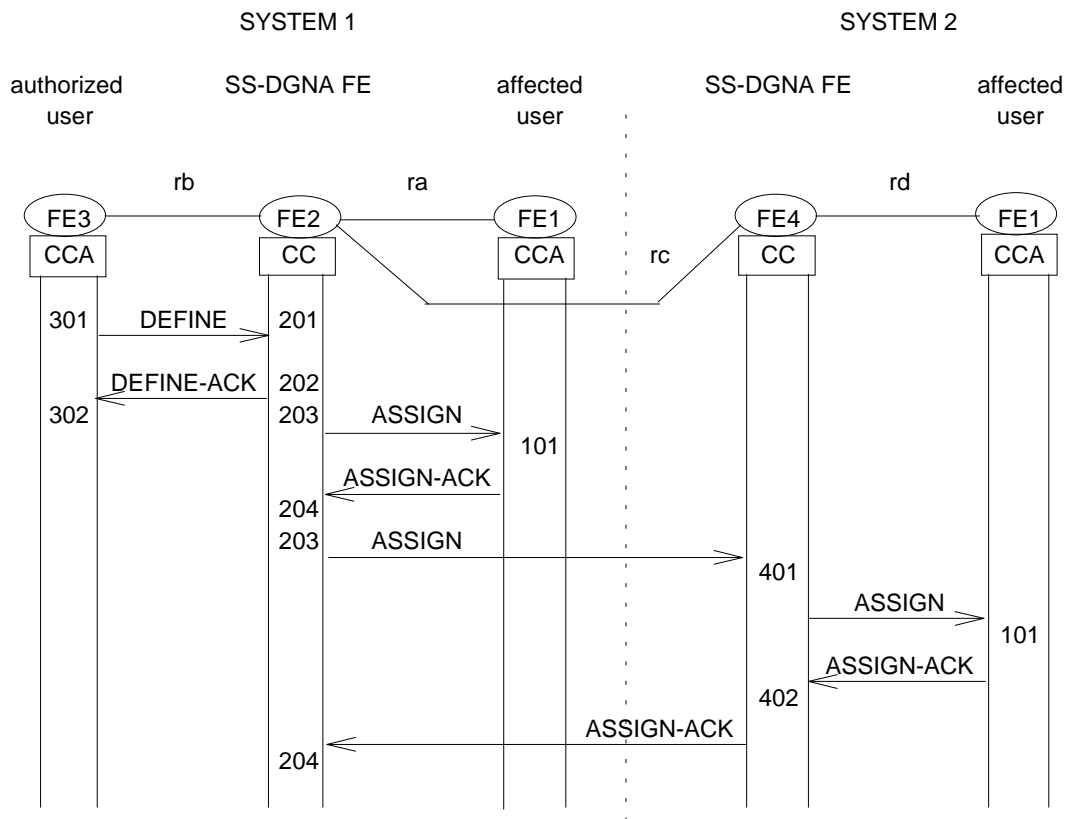
Figure 7: Successful definition and operation of call related SS-DGNA

There may not be any affected users or there may be several of them in the same system or in other systems.

3.8   FE actions of call related DGNA definition and operation

3.8.1   FE actions of FE1

101   The FE1 receives the group data definition for affected user. The data parameters and their values shall be verified and if they are found suitable the definition data shall be saved and the acknowledgement shall be sent to FE2. If the parameters or their values are found unsuitable, this shall be indicated in the acknowledgement to the FE2. Or, if for any other reason FE1 is not able to accept the parameters and make the definition.

3.8.2   FE actions of FE2

201   FE2 shall detect the user request for defining a SS-DGNA definition. It performs authorization checks and verifies the given SS-DGNA identity and the call identifier. The call identifier shall be used to identify the related call. If these are valid FE2 verifies the other parameters, if any in the request. The parameters that are not given in the request command FE2 fetches from the related call in the system. If the parameter values are valid the FE2 saves the definition to the system.

As an operator option, the SwMI shall keep call related data a certain time after the call release for call related DGNA purposes. During this time the authorized user shall be able to invoke call related SS-DGNA definition and the system shall be able to offer the call related data for the definition. This time shall be determined by SS call retention value.

FE2 defines the affected users, if any in the request. As an operator option, the FE2 may regard as the affected users for the definition either the parties that are within the call, e.g. acknowledged subscribers in case of ack. group call, or the parties that upon the knowledge of FE2 shall be parties of the call.

202 When FE2 has accepted or rejected the definition/deletion request it shall send the acknowledgement to FE3.

203 If the definition request included any affected users that the group is to be defined, the FE2 prepares the data to be sent to FE1. FE2 locates and delivers the data to the FE3s.

204 On the reception of acknowledgement FE2 notifies if the definition to FE1 was successful or unsuccessful. If FE2 is unable to contact FE1, as an operational option FE2 may buffer the data for affected user and deliver it later to FE1.

3.8.3 FE actions of FE3

301 FE3 shall detect the user request for defining a SS-DGNA definition. Local checks on the suitability of the definition may be made and the request rejected on the basis of such checks. FE3 adds the call identifier to the definition request. If the definition is not barred locally the request shall be sent to FE2.

302 At the receipt of definition acknowledgement the FE3 shall inform the user of the result. The result may be successful or unsuccessful definition. In case of successful definition with minor problems or unsuccessful definition the reason indicating the result shall be sent from FE2 to FE3. FE3 shall display the result for the user.

3.8.4 FE actions of FE4

401 After the reception of the assignment message to FE1 in this system, FE4 should locate FE1 and deliver the message to FE1. FE4 also adds the Visited system GSSI (V)(GSSI) to the information flow.

402 At the reception of acknowledgement from FE1, FE4 should send the acknowledgement to FE2.

3.9 Examples of exceptional operation of call unrelated and call related DGNA

3.9.1 Cancellation request of call unrelated or call related DGNA definition

Figure 8 shows the information flows for the cancellation request of call unrelated or call related DGNA definition.
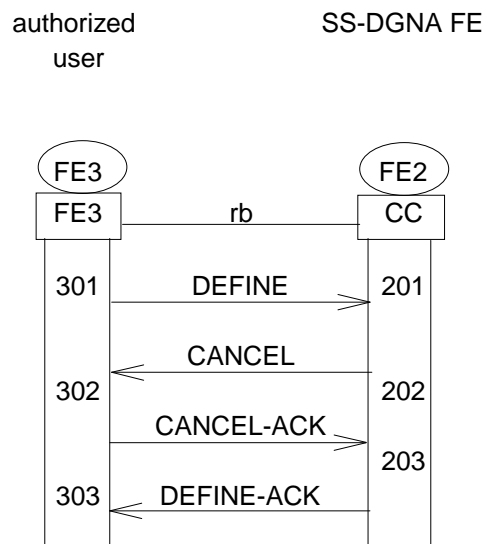

Figure 8: Cancellation request when authorized user in home system

3.9.2 FE actions of DGNA definition cancellation request

3.9.2.1 FE actions of FE2

201 FE2 shall detect the user request for defining a SS-DGNA definition.

202 If the given group composition exists in the system as a group number, as an operational option, FE2 may offer the user the possibility to cancel the SS-DGNA definition request. This shall be done by sending the definition cancellation request to FE3.

203 FE2 shall act upon the request. It shall or shall not continue to carry out the service. If FE2 shall not continue to make the definition, it sends an acknowledgement to FE3.

3.9.2.2 FE actions of FE3

301 FE3 shall detect the user request for defining a SS-DGNA definition. Local checks on the suitability of the definition may be made and the request rejected on the basis of such checks. In case of call related DGNA addition, FE3 adds the call identifier to the definition request. If the definition is not barred locally the request shall be sent to FE2.

302 If FE2 have found the group composition in the system, it sends definition cancellation request for the FE3 to request from the user if the definition request shall be cancelled. FE3 sends the user's response to FE2 that shall act upon the response.

303 If the definition service is not continued, FE3 receives an acknowledgement from FE2 and it shall display it to the user.

3.10 Allocation of FEs to physical equipment

Table 15 shows the allocation of FEs to physical equipment.

Table 15: Allocation of FE to physical equipment.

FE/PE	SwMI	LS	MS
FE1	-	+	+
FE2	+	-	-
FE3	-	+	+
FE4	+	-	-
FE5	-	+	+
KEY:	+ = applicable - = not applicable		

3.11 Inter-working considerations

The usage of SS-DGNA may extend to several TETRA networks. In order to support the inter-system SS-DGNA feature the TETRA system 1 (which initially invokes the service) and the TETRA system 2 (the additional system where the service extends to) need to be able to deliver SS-DGNA specific information over the Inter-System Interface (ISI).

History

Document history		
September 1996	Public Enquiry	PE 114: 1996-09-23 to 1997-01-17