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SERIES Q: SWITCHING AND SIGNALLING

Intelligent Network

Distributed functional plane for intelligent network capability Set 2: Parts 3 and 4

ITU-T Recommendation Q.1224 – Fascicle 3/3

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

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Recommendation Q.1224

DISTRIBUTED FUNCTIONAL PLANE FOR INTELLIGENT NETWORK CAPABILITY SET 2

FASCICLE 3

FOREWORD

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The World Telecommunication Standardization Conference (WTSC), which meets every four years, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation Q.1224

DISTRIBUTED FUNCTIONAL PLANE FOR INTELLIGENT NETWORK CAPABILITY SET 2

(Geneva, 1997)

PARTS 3 AND 4

12 Relationships between FEs

12.1 General

This subclause provides a mapping of the information flows on an FE to FE interface basis in a format consistent with the abstract syntax defined in Recommendation Q.1228.

Subclause 4.1 of associated Recommendation Q.1204 describes architectural aspects of relationships between FEs.

12.2 Relationships

For IN CS-2, information flows are defined for the following relationships:

- SCF-SSF.
- SCF-SRF.
- SCF-SCF.
- SCF-CUSF.
- SCF-SDF.
- SDF-SDF.

For each relationship, the following information is given:

i) The conditions under which the relationship can be established and terminated.

ii) The information flows between the two entities concerned in the relationship, in alphabetical order.

For each information flow, the following is listed:

a) The name of the information flow.

b) The FE relationship involved (e.g. SSF to SCF, or SCF to SSF).

c) The names of each of the information elements in the information flow. For each IE it is stated whether it is Mandatory (M), i.e. it must be included in the IF, or it is Optional (O), i.e. there are some circumstances in which the IE may be omitted. If the IE is optional, then the precise circumstances under which it is optional, and any default values are given.

d) The mapping between this IF and the corresponding FE model(s) is provided in this subclause. This is described in terms of the conditions involved before (precondition) and after (postcondition) the IF concerned is either sent or received. In certain cases a mapping is not appropriate, and the details about this are provided.

An Information Element (IE) is described according to the format:

IE Name: (M/O).

"M" (Mandatory) or "O" (Optional) is self-explanatory.

12.3 Information flows between FEs

Information flows between two FEs either consist of a request/response pair or of a request alone. Note that information flows may not map one-to-one on to signalling messages between the corresponding physical entities in the physical plane.

The SCF performs coordination of information flows between FEs when required. Implications on the sequencing of certain information flows are noted.

The complete set of IFs between two FEs defines the relationship between those FEs.

Where necessary, specific information flows have been identified to cancel the effect of other information flows.

Note that IFs relating to error conditions are not described.

12.4 SCF-SSF relationship

12.4.1 General

A relationship between the SCF and SSF is established either as a result of the SSF sending a request for instruction to the SCF, or at the request of the SCF for initiation of a call or for some non call-related reason.

A relationship between a SCF and a SSF is normally terminated at the request of the SCF. The SSF may also terminate the relationship, e.g. in error cases.

A single SCF may have concurrent relationships with multiple SSFs. A single SSF may only have a relationship with one SCF at a time for any given call. Note that this refers to control as opposed to monitor relationships.

When the SSF receives call-related IEs from the SCF, it substitutes these IEs for the corresponding call information, and retains all other call information. This applies to ALL call processing-related messages.

It is for further study to determine whether additional IEs from signalling messages (e.g., IAM ISUP message) should be included in call processing-related messages.

12.4.2 DP Specific Common Elements

These elements are common to all the DP specific requests for instructions. They have the following form:

Call ID	(M)
Service Address Information	(M)
BCSM Event Correlation ID	(O)
Bearer Capability	(O)
Call Gapping Encountered	(O)
Called Party Number	(O)
Calling Party Number	(O)
Calling Party’s Category	(O)
Charge Number	(O)
Created Call Segment Association ID	(O)

Forward GVNS	(O)
IN Service Compatibility Indication	(O)
ISDN Access Related Information	(O)
Location Number	(O)
Service Interaction Indicators	(O)
Service Profile Identifier	(O)
Serving Area ID	(O)
SRF Available	(O)
SRF/SSF Capabilities	(O)
Terminal Type	(O)
USI Information	(O)
USI Service Indicator	(O)

12.4.3 Information flows between SCF and SSF

12.4.3.1 Activate Service Filtering

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF activates service filtering, and may only be invoked outside the context of a call. The SCF uses this to instruct the SSF to deal with requests for a specific service and to count each specific attempt. The count of filtered calls will be returned to the SCF after a specified interval.

c) Information Elements:

Call ID	(M)
Filtered Call Treatment	(M)
Filtering Characteristics	(M)
Filtering Timeout	(M)
Filtering Criteria	(O)
Start Time	(O)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.2 Activate Trigger Data

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow is used by the SCF to request the SSF/CCF to change the value of activation/deactivation control field to active.

c) Information Elements:

Call ID	(M)
Trigger Data Identifier	(M)
Registrator Identifier	(O)

d) Mapping to FE Model(s):

SCF Precondition

– SCF determines that trigger data management actions are to be performed.

SCF Postcondition

– The SCF waits for the result.

SSF Precondition

– None.

SSF Postcondition

– The SSF performs the request and sends the information to the SCF.

12.4.3.3 Activate Trigger Data Confirmation

a) FE Relationship: SSF to SCF.

b) Synopsis:

This information flow is used by the SSF/CCF to report the results of the Activate Trigger Data IF.

c) Information Elements:

Call ID	(M)
Trigger Data Identifier	(M)
Failure Cause	(O)

d) Mapping to FE Model(s):

SCF Precondition

– The SCF is awaiting confirmation of an Active Trigger Data.

SCF Postcondition

– None.

SSF Precondition

– The SSF has received a request and sends the information to the SCF.

SSF Postcondition

– Returns to idle.

12.4.3.4 Activity Test

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to check for the continued existence of a relationship between the SCF and SSF. If the relationship is still in existence, then the SSF will respond with Activity Test Response. If no reply is received, then the SCF will assume that the SSF has failed in some way and will take the appropriate action.

c) Information Elements:

Call ID	(M)

d) Mapping to FE Model(s):

SCF Precondition

1) A relationship exists between the SCF and the SSF.

2) The SCF wishes to check for the continued existence of the SSF Relationship.

SCF Postcondition

– The SCF is waiting for the response from the SSF.

SSF Precondition

– None.

SSF Postcondition

– If the relationship exists, the SSF will respond with an Activity Test Response.

12.4.3.5 Activity Test Response

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is the response to the Activity Test IF.

c) Information Elements:

Call ID	(M)

d) Mapping to FE Model(s):

SCF Precondition

– The SCF is awaiting confirmation of an Activity Test.

SCF Postcondition

– Remains in the same state.

SSF Precondition

– The SSF has received a request and sends the result to the SCF.

SSF Postcondition

– Idle.

12.4.3.6 Analyse Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the originating basic call processing actions to analyse destination information that is either collected from a calling party, or provided by the SCF (e.g. for number translation). This includes actions to validate the destination information according to a specified dialling plan, and if valid, to determine call setup information (e.g. called party address, nature of address, and route index to a list of one or more outgoing trunk groups). No implicit activation or deactivation of DPs occurs as a result of this operation.

c) Information Elements:

Call ID	(M)
Destination Routing Address	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Call Segment ID	(O)
Called Party Number	(O)
Calling Party Number	(O)
Calling Party's Category	(O)
Carrier	(O)
Charge Number	(O)
Correlation ID	(O)
Forward GVNS	(O)
IN Service Compatibility Response	(O)

ISDN Access Related Information	(O)
Leg ID To Be Created	(O)
Original Called Party ID	(O)
SCF ID	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP; however, it is a matter for network operators to specify whether these IEs are required outside of the originating SSF.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one IN Service Compatibility Response element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies in an originating BCSM for a two-party Call Segment.

Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.
3) Destination information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at one of the following DPs:

   Origination_Attempt_Authorized
   Collected_Info
   Analysed_Info
   Route_Select_Failure
   O_Called_Party_Busy
   O_No_Answer
   O_Disconnect (called party disconnect only).

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Analyse Information PIC.

12.4.3.7 Analysed Information

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Analysed Information DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Access Code	(O)
Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)

Component Correlation ID	(O)
Component Type	(O)
Dialled Digits	(O)
Feature Code	(O)
Original Called Party ID	(O)
Prefix	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at Analyse Information DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Called Party Number is available and nature of address is determined.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at Analyse Information DP, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at Analyse Information PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.8 Apply Charging

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is to be used for interacting with the SSF on-line mechanisms that are used in calculating the current call charge. This IF may be invoked several times during a call.

c) Information Elements:

Billing Charging Characteristics	(M)
Call ID	(M)
Party To Charge	(O)

d) Mapping to FE Model(s):

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SCF determines charging characteristics at the SSF must be changed.

SCF Postcondition

– The SCF waits for a confirmation.

SSF Precondition

– None.

SSF Postcondition

– The SSF applies the charging characteristics to the call.

12.4.3.9 Apply Charging Report

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is the response to the Apply Charging IF, when the report has been previously requested. This result is sent at the end of the call (that is when the switch decides to stop charging).

c) Information Elements:

Call ID	(M)
Call Result	(M)

d) Mapping to FE Model(s):

SCF Precondition

– Waiting for confirmation message from Apply Charging.

SCF Postcondition

– Remains in the same state.

SSF Precondition

– Received an Apply Charging IF.

SSF Postcondition

– Applied the charging characteristics to the call.

12.4.3.10 Assist Request Instructions

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is sent to the SCF by an SSF, which is acting as the Assisting SSF in an Assist or Hand-off procedure. It is generated when the Assisting SSF receives a call from an initiating SSF containing information indicating an Assist or Hand-off procedure.

NOTE – In the INAP, this Information Flow and the Assist Request Instructions from SRF Information Flow are mapped on to a single operation.

c) Information Elements:

Call ID	(M)
Correlation ID	(M)
SSF/SRF Capabilities	(O)
SRF Available	(O)

d) Mapping to FE Model(s):

An assisting SSF sends this information flow to the SCF as part of an SSF Service Assist/Hand-off.

12.4.3.11 Authorize Termination

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform terminating basic call processing actions at the Authorize_Termination_Attempt PIC (i.e., to verify the authority to route the call to the destination number).

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Calling Party Number	(O)
Destination Routing Address	(O)
Display Information	(O)
Forward GVNS	(O)
IN Service Compatibility Response	(O)
ISDN Access Related Information	(O)
Leg ID To Be Created	(O)
Original Called Party ID	(O)
SCF ID	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies during call setup in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) Authority/ability to route the call to a specified terminating resource (or group) has not been verified.
3) Routing information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at

   Termination_Attempt,
   Termination_Attempt_Authorized,
   T_Busy, or
   T_No_Answer DPs (i.e. the call setup phase).

SSF Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at the Authorize_Termination_Attempt PIC.

12.4.3.12 Call Gap

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to reduce the rate at which specific service requests are sent to the SCF.

c) Information Elements:

Call ID	(M)
Gap Criteria	(M)
Gap Indicators	(M)
Control Type	(O)
Gap Treatment	(O)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.13 Call Information Report

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is used to send specific call information for a single call to the SCF as requested by the SCF in a previous Call Information Request IF. This IF is sent at the end of the call. It can also be sent upon transitions to state other than the idle state.

c) Information Elements:

Call ID	(M)
Requested Information List	(M)
Correlation ID	(O)
Last Event Indicator	(O)
Leg ID	(O)

If the Leg ID is absent, it shall apply to the first passive leg for the O_BCSM and to the controlling leg for the T_BCSM within the initial call segment.

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship for a two-party Call Segment. The SSF sends this information flow to the SCF when a call party disconnects or if call setup is not completed.

SSF Precondition

1) Call origination attempt has been initiated.
2) Requested call information has been collected.

SSF Postcondition

– None.

SCF Precondition

– A Call Information Request IF has been sent at the request of an SLPI and the SLPI is expecting a call information report from the SSF.

SCF Postcondition

– None.

12.4.3.14 Call Information Request

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to save specific information about a single call and report it to the SCF at the end of the call (see Call Information Report IF).

c) Information Elements:

Call ID	(M)
Requested Information Type	(M)
Correlation ID	(O)
Leg ID	(O)

If the Leg ID is absent, it shall apply to the first passive leg for the O_BCSM and to the controlling leg for the T_BCSM within the initial call segment.

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and SSF for a given two-party Call Segment.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that a Call Information Request IF should be sent.

SCF Postcondition

– The SLPI is expecting a call information report from the SSF.

SSF Precondition

– Call origination attempt has been initiated.

SSF Postcondition

1) Requested call information is retained by the SSF, as specified.
2) If basic call processing is suspended at a DP, the SSF is waiting for further instructions from the SCF.

12.4.3.15 Cancel all Requests

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to cancel all active requests for EDP reports (generic or DP Specific), "Apply Charging Report", and "Call Information Report". It will cancel all requests within a CSA. Note that in the INAP this IF is mapped on to a generic cancel operation.

c) Information Elements:

Call ID	(M)

d) Mapping to FE Model(s):

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) An SLPI has determined that it is no longer interested in any reports or notifications from the SSF.

SCF Postcondition

– The control relationship with the SSF is ended.

SSF Precondition

– The SSF is waiting for instructions or monitoring for an EDP.

SSF Postcondition

– All active requests for reports and notifications have been cancelled.

12.4.3.16 Cancel Status Report Request

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to cancel a previous request to monitor the busy/idle status of a physical termination resource (see Request Status Report IF).

c) Information Elements:

Call ID	(M)
Resource ID	(M)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.17 Collect Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the originating basic call processing actions to prompt a calling party for destination information, then collect destination information from the calling party according to a specified Numbering Plan Indicator (e.g. for virtual private networks).

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Call Segment ID	(O)
Calling Party Number	(O)
Dialled Digits	(O)
Forward GVNS	(O)
IN Service Compatibility Response	(O)
Leg ID To Be Created	(O)
Numbering Plan	(O)
Original Called Party ID	(O)
SCF ID	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies during call setup in an originating BCSM for a two-party Call Segment, in an SSF which can directly communicate with the calling party.

Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.

3) Basic call processing has been suspended at DPs.

Origination_Attempt_Authorized
Collected_Info
Analysed_Info
Route_Select_Failure
O_Called_Party_Busy
O_No_Answer (i.e. the call setup phase).

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Collect Information PIC.

12.4.3.18 Collected Information

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Collected Information DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Access Code	(O)
Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Dialled Digits	(O)
Feature Code	(O)
Original Called Party ID	(O)
Prefix	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at Collected Information DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.
3) Complete initial information package/dialling string is available from the originating party.
4) Call gapping or service filtering are not in effect for the Call Segment.
5) DP criteria are met.

6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at Collected Information DP and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at Analyse Information PIC and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.19 Connect

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to create a call to a defined destination, in the case of an existing call in the setup phase, or to forward a call to another destination.

c) Information Elements:

Call ID	(M)
Destination Routing Address	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Call Segment ID	(O)
Calling Party Number	(O)
Calling Party's Category	(O)
Carrier	(O)
Charge Number	(O)
Correlation ID	(O)
Cut and Paste	(O)
Display Information	(O)
Forward Call Indicators	(O)
Forward GVNS	(O)
Forwarding Condition	(O)
Generic Number	(O)
IN Service Compatibility Response	(O)
ISDN Access Related Information	(O)
Leg ID To Be Created	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
SCF ID	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

If this IF is being used in the context of a hand-off procedure, the Destination Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if

Correlation ID and SCF ID are not specified separately. In this case, the Destination Routing Address IE contains only one address.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies before the Active PIC in an originating or terminating BCSM for a two-party Call Segment.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) An SLPI has determined that a Connect IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

1) Call origination attempt has been initiated.
2) For the incoming leg (i.e. the controlling leg in an O_BCSM or the passive leg in a T_BCSM) in a CS the following conditions apply. For the O_BCSM the call processing is to be suspended at any DP before O_Active or in the O_MidCall DP in case no passive leg exists. For the T_BCSM call processing is to be suspended at a DP before the T_Active PIC.
3) Destination information and optional call setup information is provided by the SCF.

SSF Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) The SSF performs the call processing actions to route or forward the call to the specified destination.

12.4.3.20 Connect to Resource

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to create a connection between the SSF and the SRF, so that interaction with the end user can take place.

c) Information Elements:

Call ID	(M)
Resource Address	
Call Segment ID	(O)
IP Routing Address	(O)
IP Routing Address and Leg ID	(O)
IP Routing Address and Call Segment ID	(O)
Leg ID	(O)
Service Interaction Indicators	(O)

Only one of CSID or LegID can be specified.

d) Mapping to FE Model(s):

The SCF sends this information flow to an SSF to establish a connection to an SRF for a two-party Call Segment.

12.4.3.21 Continue

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to proceed with call processing at the DP at which it previously suspended call processing to await SCF instructions. The SSF completes DP processing, and continues basic call processing (i.e. proceeds to the next point in call in the BCSM). Data in the response should be used or substituted with existing data.

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Forward GVNS	(O)
Generic Name	(O)
IN Service Compatibility Response	(O)
Leg ID	(O)

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow applies to the BCSM of the controlling leg if a Leg ID is not present or to the BCSM identified by the LegID. It is equally applicable in originating and terminating BCSMs, and at any phase of call processing.

Precondition

1) Call origination attempt has been initiated.
2) Basic call processing has been suspended at any DP.

Postcondition

– Basic call processing resumes at the current DP and transitions to the next PIC if no other TDPs or EDPs are detected.

12.4.3.22 Create Call Segment Association

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF creates a new CSA. The new CSA will not contain any Call Segments after creation. The SSF is responsible for specifying a unique CSA identifier for the created CSA.

c) Information Elements:

Call ID	(M)

d) Mapping to FE Model(s):

SCF Precondition

1) The Call is in an appropriate Call Connection View state.
2) Call processing has been suspended.
3) A control relationship has been established and the SLPI is processing the incoming request.

SCF Postcondition

1) SLPI execution is terminated if no monitoring is requested.

2) SLPI execution is suspended pending the monitored event occurring, if monitoring is requested.

SSF Precondition

1) A TDP or EDP request has been invoked.
2) An appropriate Call Connection View state exists.

SSF Postcondition

1) The SSF performs the appropriate call processing actions.
2) The appropriate Call Connection View state is determined.

12.4.3.23 Create Call Segment Association Result

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF reports the new CSA ID to the SCF. The CSA was created with the Create Call Segment Association IF.

c) Information Elements:

New Call Segment Association (M)

d) Mapping to FE Model(s):

SCF Precondition

1) The Call is in an appropriate Call Connection View state.
2) Call processing has been suspended.
3) A control relationship has been established and the SLPI is processing the incoming request.

SCF Postcondition

1) SLPI execution is terminated if no monitoring is requested.
2) SLPI execution is suspended pending the monitored event occurring, if monitoring is requested.

SSF Precondition

1) A TDP or EDP request has been invoked.
2) An appropriate Call Connection View state exists.

SSF Postcondition

1) The SSF performs the appropriate call processing actions.
2) The appropriate Call Connection View state is determined.

12.4.3.24 Deactivate Trigger Data

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow is used by the SCF to request the SSF/CCF to change the value of activation/deactivation control field to deactivate value. If the trigger addressed trigger data has the RegistratorIdentifier field, the value of this field is set to NULL by this information flow.

c) Information Elements:

Call Id (M)
Trigger Data Identifier (M)

d) Mapping to FE Model(s):

SCF Precondition

– SCF determines that trigger data management actions are to be performed.

SCF Postcondition

– The SCF waits for the result.

SSF Precondition

– None.

SSF Postcondition

– The SSF performs the request and sends the information to the SCF.

12.4.3.25 Deactivate Trigger Data Confirmation

a) FE Relationship: SSF to SCF.

b) Synopsis:

This information flow is used by the SSF/CCF to report result to the SCF of the value change of activation/deactivation control field to deactivate value.

c) Information Elements:

Call ID	(M)
Trigger Data Identifier	(M)
Failure Cause	(O)

d) Mapping to FE Model(s):

SCF Precondition

– The SCF is awaiting confirmation of a Deactivate Trigger Data.

SCF Postcondition

– None.

SSF Precondition

– The SSF has received a request and sends the information to the SCF.

SSF Postcondition

– Returns to idle.

12.4.3.26 Disconnect Forward Connection

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is sent to the non-assisting SSF of a pair of SSFs involved in an Assist Procedure. It is used to disconnect the connection between the Initiating SSF and the Assisting SSF, and the Assisting SSF and its associated SRF. (These were set up by the use of the Establish temporary connection and Connect to Resource information flows as appropriate.) This IF can also be used to clear the connection between an SSF and SRF established as the result of using the Connect to Resource IF.

c) Information Elements:

Call ID	(M)
Call Segment ID	(O)
Leg ID	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SSF to terminate a Service Assist or interaction with an end user for a two-party Call Segment.

12.4.3.27 Disconnect Leg

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to release a specific leg associated with the call and retain any other legs not specified in the Disconnect_Leg IF. Any leg may be disconnected, including the controlling leg, without completely releasing all legs.

c) Information Elements:

Call ID	(M)
Leg ID	(M)
Release Cause	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to release a specific leg associated with a call and retain any other legs.

SSF Precondition

1) Call processing has been suspended. A control relationship exists between the SCF and the SSF.
2) When the involved leg is an outgoing leg (i.e. the passive leg in an O_BCSM or the controlling leg in a T_BCSM), the corresponding BCSM shall be at least at the Send_Call PIC in case of an O_BCSM or T_Active in case of a T_BCSM.
3) An appropriate Connection View State exists.

SSF Postcondition

1) Call processing resumes. The SSF performs the call processing actions to release the indicated party.
2) The appropriate Connection View State is determined. Any outstanding EDPs on that leg are disarmed, any pending reports will be sent.
3) The SSF FSM remains in the same state, or if the released leg was the last leg within the Call Segment, the SSF FSM for that CS returns to the "idle" state.
4) If the leg was the last leg within the CSA, the CSA FSM returns to "idle" state.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that a Disconnect Leg IF should be sent.

SCF Postcondition

– SLPI execution may continue, the SCSM transits to "idle" on receiving the last pending report (if any), if the released leg was the last leg within the Call Segment Association.

12.4.3.28 Entity Released

a) FE Relationship: SSF to SCF.

b) Synopsis:

This operation is used to inform the SCP about the release of an entity (CS, BCSM) caused by exception or errors. It is sent by the CSA FSM if this information cannot be conveyed

within an TC_ABORT or TC_END if the TC dialogue has to be kept because of other existing entities (CS, BCSM) in this CSA which are not affected by this error/exception. This operation is not sent if the last CS was released.

The operation EntityReleased is not used if the release of the entity can be reported through other operations, e.g. EventReportBCSM, O_Disconnect, CallInformationRequest.

c) Information Elements:

CS Failure	(O)
BCSM Failure	(O)

d) Mapping to FE Model(s):

SSF Precondition

– Any state except idle.

SSF Postcondition

1) If the released entity was a BCSM (leg), then only the appropriate resources are released.
2) If the released entity was a CS the related FSM goes to idle.

SCF Precondition

– A control relationship exists between the SCF and the SSF.

SCF Postcondition

1) The SCF-resources related to the released entity are released.
2) The SLPI is further executed.

12.4.3.29 Establish Temporary Connection

a) FE Relationship: SCF to SSF.

b) Synopsis:

This is used to create a connection between an initiating SSF and an Assisting SSF as part of a service assist procedure. It can also be used to create a connection between an SSF and an SRF, for the case where the SRF exists in a separately addressable physical entity.

c) Information Elements:

Assisting SSF/SRF Routing Address	(M)
Call ID	(M)
Call Segment ID	(O)
Carrier	(O)
Correlation ID	(O)
Leg ID	(O)
Service Interaction Indicators	(O)
SCF ID	(O)

If this IF is being used in the context of a hand-off procedure, the Assisting SSF/SRF Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if Correlation ID and SCF ID are not specified separately.

Only one of CSID or LegID can be specified.

d) Mapping to FE Model(s):

The SCF sends this information flow to an SSF to initiate a Service Assist or to create a connection between an SSF and an SRF for a two-party Call Segment.

12.4.3.30 Event Notification Charging

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is used to report the occurrence of a specific charging event as requested by the SCF using the Request Notification Charging Event IF.

c) Information Elements:

Call ID	(M)
Event Type Charging	(M)
Event Specific Information Charging	(O)
Leg ID	(O)
Monitor Mode	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a charging event for a two-party Call Segment.

When the monitor mode is "Interrupted", the SSF has to send a report to the SCF using the Event Notification Charging IF, and await further instructions.

12.4.3.31 Event Report BCSM

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is used to notify the SCF of a call-related event (e.g. BCSM events such as busy or no answer) previously requested by the SCF in a Request Report BCSM Event IF.

c) Information Elements:

Call ID	(M)
Event type BCSM	(M)
BCSM Event Correlation ID	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Correlator	(O)
Event Specific Information BCSM	(O)
Leg ID	(O)
Misc Call Info	(O)

When the Leg ID IE is not present, a default value of A party is assumed.

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting an EDP in a BCSM, for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) An event has been detected at a DP that is armed as an EDP.

SSF Postcondition

1) For an EDP-R, basic call processing has been suspended at the DP, and the control relationship persists.
2) For an EDP-N, basic call processing continues, and if there are no more EDP-Rs armed and > = 1 EDP-Ns armed, a non-control relationship persists.

SCF Precondition

1) An SLPI has been invoked.
2) A Request Report BCSM Event IF has been sent at the request of an SLPI and the SLPI is expecting an event report from the SSF.

SCF Postcondition

1) The SLPI expecting the report can continue.
2) For an EDP-R, an SSF instruction is being prepared.

12.4.3.32 Event Report Facility

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF to report to the SCF that FACILITY IE received within appropriate DSS 1 message. This flow is issued by SSF during the BCSM suspended at a Detection Point, when the SCF previously requested the event with the Request Report Facility Event IF.

c) Information Elements:

Call ID	(M)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Leg ID	(O)

d) Mapping to FE Model(s):

SCF Precondition

– Waiting for a response from the SSF.

SCF Postcondition

– Processed the response.

SSF Precondition

– Received a Request Report Facility Event.

SSF Postcondition

– Reported the Facility to the SCF.

12.4.3.33 Facility Selected and Available

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Facility_Selected_and_Available DP in the BCSM or to report an event requested by the RequestReportBCSMEvent information flow.

c) Information Elements:

DP Specific Common Elements IE plus:

Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Calling Party Business Group ID	(O)
Component	(O)
Component Correlation ID	(O)

Component Type	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at the Facility_Selected_and_Available DP in a terminating BCSM for a two-party Call Segment.

12.4.3.34 Furnish Charging Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is to be used for interacting with off-line operations. It gives some charging information to the SSF, to enable it to generate an appropriate billing record for the current call. The generated record at the end of the call may be sent by the SSF to some OA&M system. This IF may be invoked several times during a call.

c) Information Elements:

Call ID	(M)
Billing Charging Characteristics	(M)

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and SSF for a given two-party Call Segment.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) An SLPI has determined that a Furnish Charging IF should be sent to the SSF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

– Call origination attempt has been initiated.

SSF Postcondition

1) Billing information is retained by the SSF, as specified.
2) If basic call processing was suspended at a DP, the SSF is waiting for further instructions from the SCF.

12.4.3.35 Hold Call in Network

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to provide the capability of queuing a call during the setup phase. This IF informs the SSF that the call has been queued. The actions carried out by the SSF on receipt of this IF are:

– fill the hold cause field in a record (for billing purposes, or statistics) with the instant of receipt of the IF;

– do all the activities necessary to keep the call waiting in the network (e.g. management of signalling message like ACM/ANM, managing network timers, possible interaction with the specific charging mechanism.). This is done by the switch and is not seen from the SCF.

c) Information Elements:

Call ID	(M)
Hold Cause	(O)

d) Mapping to FE Model(s):

This information flow only applies before the Active PIC in an originating or terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Basic call processing has been suspended at a DP.
3) The call has not yet been answered.

SSF Postcondition

– The SSF is waiting for further instructions from the SCF.

12.4.3.36 Initial DP

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is generated by the SSF when a trigger is detected at any DP in the BCSM, to request instructions from the SCF. DP specific requests for Instructions may also be issued by the SSF. Which version is issued for any specific DP is determined by data held within the SSF.

c) Information Elements:

Call ID	(M)
Additional Calling Party Number	(O)
Bearer Capability	(O)
Call Gapping Encountered	(O)
Called Party Number	(O)
Calling Party Business Group ID	(O)
Calling Party Number	(O)
Calling Party Subaddress	(O)
Calling Party's Category	(O)
Cause	(O)
Created Call Segment Association ID	(O)
Dialled Digits	(O)
Event Type BCSM	(O)
Forward Call Indicators	(O)
Forward GVNS	(O)
Generic Number	(O)
Higher Layer Compatibility	(O)
IN Service Compatibility Indication	(O)
ISDN Access Related Information	(O)
Location Number	(O)
Misc Call Info	(O)
Original Called Party ID	(O)

Redirecting Party ID	(O)
Redirection Information	(O)
Service Interaction Indicators	(O)
Service Key	(O)
Service Profile Identifier	(O)
SSF/SRF Capabilities	(O)
SRF Available	(O)
Terminal Type	(O)
Trigger Type	(O)
USI Information	(O)
USI Service Indicator	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP in a BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) An event has been detected at a DP.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at the DP, and a control relationship has been established.
2) For a TDP-N, basic call processing continues, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.37 Initiate Call Attempt

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to create a new call to one call party using address information provided by the SCF (e.g. wake-up call). An EDP-R must be set on Answer or No Answer, in order to have the SCF treat this call segment appropriately when either of these two conditions is encountered.

c) Information Elements:

Call ID	(M)
Leg ID To Be Created	(M)
New Call Segment	(M)
Alerting Pattern	(O)
Calling Party Number	(O)
Destination Routing Address	(O)

IN Service Compatibility Response	(O)
ISDN Access Related Information	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF.

SCF Precondition

1) An SLPI has been invoked.

2) The SLPI has determined that an Initiate Call Attempt IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

– None.

SSF Postcondition

– A new originating Call Segment has been initiated.

12.4.3.38 Merge Call Segments

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to merge two associated CSs with a single controlling leg into one CS with that controlling leg. The net effect of the Merge Call Segment message is to create a communication among the controlling leg and both passive legs, with each party being able to communicate with both other parties.

c) Information Elements:

Call ID	(M)
Source Call Segment	(M)
Target Call Segment	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to merge two associated CSs with a single controlling leg into one CS with that controlling leg.

SSF Precondition

1) A control relationship exists between the SCF and the SSF.

2) For the source Call Segment , the corresponding BCSMs shall be at least at the Send_Call PIC in the case of an O_BCSM or T_Active in the case of a T_BCSM. For the target Call Segment, the corresponding BCSMs shall be either at least in the O_Active PIC or before the Select_Route PIC in case of an O_BCSM, or at least in the T_Active PIC in case of a T_BCSM.

3) The SSF FSM of the source CS is in the state "Waiting For Instructions" or "Monitoring".

SSF Postcondition

1) The SSF performs the necessary actions to merge the indicated Call Segments. All legs of the source CS are now connected to the Connection Point of the target CS. When applied to a single two-party CS, it re-establishes the bearer connection between the two legs of the CS.
2) The SSF FSM of the target CS remains in the same state, the SSF FSM of the source CS returns to "idle" state.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that two Call Segments shall be merged or that the bearer connection needs to be re-established within a two-party CS.

SCF Postcondition

1) SLPI execution may continue.
2) The SCSM remains in the same state.

12.4.3.39 Move Call Segments

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF moves a Call Segment from the source Call Segment Association to the target Call Segment Association. The SCF specifies a new identifier for the moved CS, as well as for each leg associated with the moved CS.

This operation ends the association between the moved Call Segment and any Call Segments remaining in the source Call Segment Association. The SCF may optionally assign correlators for future reference to each disassociated Call Segment.

A CS may not be moved into a CSA containing another CS with a relationship to a different controlling leg party. A moved CS inherits the TCAP transaction opened for the target CSA.

A Call Segment Association may contain any number of Call Segments. The number of Call Segments that may be moved into or out of a CSA is not limited by physical restrictions on the number of parties a particular switch implementation can support in a multi-party call.

If the MoveCallSegments operation results in a null source Call Segment Association (i.e. no remaining Call Segments), the source CSA is deleted.

c) Information Elements:

Call ID	(M)
Legs	(M)
Source Leg ID	
Leg ID To Be Created	
New Call Segment	(M)
Source Call Segment Association	(M)
Target Call Segment Association	(M)

d) Mapping to FE Model(s):

This information flow only applies during a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.

2) Terminating called party found to be busy, basic call processing has been suspended at T_Busy DP.

SSF Postcondition

– Basic call processing resumes.

From Bridge Call

This information flow is applicable to two call segments in the SSF/CCF.

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the SSF on at least one of the call segments.
3) Both call segments have correlators assigned by the same SCF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

1) Both call segments have correlators assigned by the same SCF.
2) Neither call segment is already associated with another call segment.

SSF Postcondition

1) The parties identified in the two call segments are bridged together. The parties not identified are not cleared.
2) If only one of the call segments has a control relationship with the SCF, the resultant bridged call segment inherits the control relationship and any requested events (i.e. EDPs). If both call segments have control relationships with the SCF, the resultant bridged call segment inherits the control relationship for the call segment identified by Correlator 1 and inherits the requested events, if any exist, from both call segments. The control relationship for the call segment identified by Correlator 2 ends.
3) The SSF/CCF associates the resultant bridged call segments with Correlator 1. The SSF/CCF ceases to use Correlator 2.

12.4.3.40 Move Leg

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to move the leg from one CS to another CS with which it is associated. The net effect of the Move Leg message is to interrupt the current communication of the controlling leg, without clearing the passive leg on that communication, and to establish communication for the controlling leg with the other passive leg. The effect of MoveLeg for the passive leg is to move the Leg and the associated BCSM instance from one CS to another CS with which it is associated.

c) Information Elements:

Call Id	(M)
Leg ID	(M)
Target Call Segment	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to move the controlling leg from one CS to another CS with which it is associated.

SSF Precondition

1) Call processing has been suspended. When the involved leg is an outgoing leg (i.e. the passive leg in an O_BCSM or the controlling leg in a T_BCSM), the corresponding BCSM shall be at least at the Send_Call PIC in case of an O_BCSM or T_Active in case of a T_BCSM.
2) An appropriate Connection View State exists.

SSF Postcondition

1) Call processing resumes.
2) The appropriate Connection View State is determined.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that a Move Leg IF should be sent.

SCF Postcondition

– SLPI execution may continue.

12.4.3.41 O_Abandon

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_Abandon DP in the BCSM or to report an event requested by the RequestReportBCSMEvent information flow. O_Abandon is always for the controlling leg.

c) Information Elements:

DP Specific Common Elements plus:

Call Segment ID	(M)
Release Cause	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting the O_Abandon DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Calling Party Number is available and nature of address determined.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R or EDP-R, an SSF instruction is being prepared.

12.4.3.42 O_Answer

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_Answer DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at O_Answer DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Indication received from terminating BCSM that the call has been accepted and the terminating party has answered.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at O_Answer DP, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at O_Active PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.43 O_Called_Party_Busy

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_Called_Party_Busy DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Busy Cause	(O)
Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Original Called Party ID	(O)
Prefix	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at O_Called_Party_Busy DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Indication received from terminating BCSM that the terminating party is busy.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at O_Called_Party_Busy DP, and a control relationship has been established.
2) For a TDP-N, default exception handling has been provided, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.44 O_Disconnect

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_Disconnect DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Connect Time	(O)
Release Cause	(O)
Route List	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at O_Disconnect DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Indication received from terminating BCSM that the call is accepted and the terminating party has answered.
3) Disconnect indication received from an originating party, or received from a terminating party via the terminating BCSM.
4) Call gapping or service filtering are not in effect for the Call Segment.
5) DP criteria have been met.
6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at O_Disconnect DP, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at O_Null PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.45 O_MidCall

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_MidCall DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation. This IF can only be sent when the SSF is capable of detecting this trigger.

c) Information Elements:

DP Specific Common Elements plus:

Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Feature Request Indicator	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at O_MidCall DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Indication received from terminating BCSM that the call is accepted and the terminating party has answered.
3) Feature request received from originating party.
4) Call gapping or service filtering are not in effect for the Call Segment.
5) DP criteria have been met.
6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at O_MidCall DP, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at O_Active PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.46 O_No_Answer

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_No_Answer DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)

Calling Party Subaddress	(O)
Carrier	(O)
Original Called Party ID	(O)
Prefix	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at O_No_Answer DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Indication received from terminating BCSM that the terminating party has not answered within a specified time period (this indication is not mapped to an explicit Information Flow).
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at O_No_Answer DP, and a control relationship has been established.
2) For a TDP-N, default exception handling has been provided, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.47 O_Suspended

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the O_Suspended DP in the BCSM or to report an event requested by the RequestReportBCSMEvent information flow. LegID is unique for a given CSA.

c) Information Elements:

DP Specific Common Elements plus:

LegID	(M)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting the O_Suspended DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.

2) Calling Party Number is available and nature of address determined.

3) Call gapping or service filtering are not in effect for the Call Segment.

4) DP criteria have been met.

5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R or EDP-R, an SSF instruction is being prepared.

12.4.3.48 Origination Attempt

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Origination_Attempt DP in the BCSM.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at the Origination_Attempt DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.

2) Call gapping or service filtering are not in effect for the Call Segment.

3) TDP criteria have been met.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at the Origination_Attempt DP, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at the Authorize_Origination_Attempt PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, an SSF instruction is being prepared.

12.4.3.49 Origination Attempt Authorized

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Origination Attempt Authorized DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Dialled Digits	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a at DP Origination Attempt Authorized DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.

2) Authority/ability to place outgoing call has been verified.

3) Call gapping or service filtering are not in effect for the Call Segment.

4) DP criteria have been met.

5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at Origination Attempt Authorized DP, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at Collect Information PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.50 Reconnect

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to re-establish communication between the controlling leg and the (held) passive leg(s) of a call with two or more parties, when the controlling leg has disconnected. In particular, this IF requests that BCSM processing set the reconnect timer to the value specified by the Notification Duration IE, and provide the requested Alerting Pattern and/or Display Information to the controlling leg.

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Call Segment	(O)
Display Information	(O)
Notification Duration	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to re-establish communication between the controlling leg and the (held) passive leg(s) of a call with two or more parties.

SSF Precondition

1) SSF has received disconnect indication from a controlling leg[7].
2) Call processing has been suspended.

SSF Postcondition

1) Call processing resumes.
2) SSF sets the reconnect timer to the value specified by the Notification Duration IE.
3) SSF alerts the controlling leg using the indicated Alerting Pattern and/or Display Information.
4) SSF continues call processing at the O_Active, O_Suspended or T_Active PIC (as appropriate) if a reconnect indication is received from the controlling leg before the timer expires.
5) SSF initiates release procedures if the timer expires, and a reconnect indication has not yet been received from the controlling leg.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that a Reconnect IF should be sent.

SCF Postcondition

– SLPI execution may continue.

12.4.3.51 Release Call

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to kill an existing call at any phase of the call.

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[7] Existing signalling does not support the use of Reconnect for a controlling leg at a transit exchange.

In addition to Release Call in Recommendation Q.1214, this flow is also issued by SCF for forward clearing of B party after encountering Disconnect DP.

c) Information Elements:

Call ID	(M)
All Call Segments	(O)
Associated Call Segment	(O)
Initial Call Segment	(O)

NOTE – One of the three optional Information Elements shall be included.

d) Mapping to FE Model(s):

This information flow applies during any phase of originating or terminating call processing for a two-party Call Segment.

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the SSF.
3) The SLPI has determined that a Release Call IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

– Call origination attempt has been initiated.

SSF Postcondition

1) All BCSMs in the Call Segment transition to O_Null PIC for originating BCSMs, or to T_Null PIC for terminating BCSMs.
2) The Call Segment has been cleared.

12.4.3.52 Report UTSI

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is the response to the Request Report UTSI IF, when the monitoring has been previously requested. This IF is sent if a User to Service Information (UTSI) IE was received and the UTSI IE meets the conditions which were requested by the Request Report UTSI IF before.

c) Information Elements:

Call ID	(M)
Leg ID	(M)
USI Information	(M)
USI Service Indicator	(M)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF to report the receipt of a User to Service Information (UTSI) information element.

SSF Precondition

1) A control relationship exists between the SCF and the SSF.
2) An UTSI IE was received for which monitoring was requested before.

SSF Postcondition

– The appropriate monitoring for the specified UTSI IE remains activated.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.

2) The SLPI has sent a Request Report UTSI IF, an UTSI monitor relationship is activated.

SCF Postcondition

– The SLPI expecting the UTSI IE continues.

12.4.3.53 Request Notification Charging Event

a) FE Relationship: SCF to SSF.

b) Synopsis:

This operation is used to request the SSF to monitor for a charging related event, then send a notification back to the SCF when the event is detected. Charging events are specific events defined by network operators, and as such were not defined in the call model.

c) Information Elements:

Call ID	(M)
Sequence Of Charging Event	(M)

d) Mapping to FE Model(s):

The SCF sends this IF to the SSF to request the SSF to monitor for a specified charging event, for a two-party Call Segment.

12.4.3.54 Request Report BCSM Event

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to monitor for a call-related event (e.g., BCSM events such as busy or no answer), then send a notification back to the SCF when the event is detected (see Event Report BCSM).

c) Information Elements:

BCSM Event List	(M)
Call ID	(M)
BCSM Event Correlation ID	(O)

d) Mapping to FE Model(s):

This information flow applies to all BCSMs in a Call Segment and associated Call Segment, if any. It is equally applicable in originating and terminating BCSMs, and at any phase of call processing.

SCF Precondition

1) An SLPI has been invoked.

2) A control relationship exists between the SCF and the SSF.

3) The SLPI has determined that a Request Report BCSM Event IF should be sent by the SCF.

SCF Postcondition

1) In the case where Monitor mode has the values of Interrupted or Notify & Continue, the SLPI is expecting an event report from the SSF.

2) SLPI execution may continue.

SSF Precondition

– Call origination attempt has been initiated.

SSF Postcondition

1) Specified EDPs have been armed or disarmed, as identified.
2) If all EDP-Rs are disarmed, then the relationship becomes a non-control relationship.
3) If basic call processing is suspended at a DP, the SSF waits for further instructions from the SCF.

12.4.3.55 Request Report Facility Event

a) FE Relationship: SCF to SSF.

b) Synopsis:

This flow is issued by SCF for requesting SSF to report the event of FACILITY IE reception to SCF.

c) Information Elements:

Call ID	(M)
Component Correlation ID	(O)
Component Type	(O)
Leg ID	(O)
Monitor Duration	(O)

d) Mapping to FE Model(s):

The BCSM is suspended at a Detection Point.

The SCF sends this IF for requesting the SSF to report the event that FACILITY IE received during the BCSM suspended at a Detection Point.

12.4.3.56 Request Report UTSI

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to request the SSF to monitor for a User to Service Information (UTSI) information element. A notification is sent back to the SCF when the UTSI IE is detected by the SSF.

c) Information Elements:

Call ID	(M)
Leg ID	(M)
USI Monitor Mode	(M)
USI Service Indicator	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to request the monitoring for a User to Service Information (UTSI) information element.

SSF Precondition

– A control relationship exists between the SCF and the SSF.

SSF Postcondition

– The appropriate Monitoring for the specified UTSI IE is activated or deactivated.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.

2) The SLPI has determined that a Request Report UTSI IF should be sent.

SCF Postcondition

– SLPI execution continues.

12.4.3.57 Request Status Report

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to monitor the busy/idle status of a physical termination resource (e.g. line, trunk group, hunt group). This information may be requested immediately (poll resource status), or when the resource changes status (monitor for change or continuous monitor). For poll resource status (RequestCurrentStatusReport operation) this information is requested immediately; the SSF responds with the Status Report IF. For monitor for change (RequestFirstStatusMatchReport operation), the SSF reports to the SCF when the resource reaches the indicated busy/idle status. For continuous monitor (RequestEveryStatusChangeReport operation) the SSF reports to the SCF each time the resource changes busy/idle status.

NOTE – This IF is monitoring physical resources, NOT the BCSM; Request Report BCSM event is used to monitor for BCSM events. Note that in the INAP, this IF is mapped on to three different operations, one for each type of monitoring which can be requested.

c) Information Elements:

Call ID	(M)
Monitor Type	(M)
Resource ID	(M)
Correlation ID	(O)
Monitor Duration	(O)
Resource Status	(O)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.58 Reset Timer

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to request the SSF to refresh an application timer in the SSF set by a previous IF. The purpose is to prevent the SSF from timing out the dialogue with the SCF while waiting for the SCF to provide further disposition of a call. It should not be used during the active phase of a call. Activity test should be used instead.

NOTE – There are TCAP timers (e.g. response/error, linked operation), network timers (e.g. no answer, ACM), and application timers. This IF only applies to application timers. The general rule for the use of this IF is that an application timer is set in the SSF on receipt of a previous IF. The SCF can then use this IF to reset the timer if need be before it expires.

If the CSID is not included, then the initial CS is assumed.

c) Information Elements:

Call ID	(M)
Timer ID	(M)

Timer Value	(M)
Call Segment ID	(O)

d) Mapping to FE Model(s):

This information flow applies to an application timer set in the context of an existing control relationship between the SCF and SSF for a given two-party Call Segment.

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the SSF.
3) The SLPI has determined that a Reset Timer IF should be sent by the SCF.

SCF Postcondition

– None.

SSF Precondition

1) Call origination attempt has been initiated.
2) An application timer is running in the SSF.

SSF Postcondition

1) The application timer has been reset, as specified.
2) If basic call processing has been suspended at a DP, the SSF is waiting for further instructions from the SCF.

12.4.3.59 Route Select Failure

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Route Select Failure DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Calling Facility Group	(O)
Calling Facility Group Member	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Dialled Digits	(O)
Failure Cause	(O)
Original Called Party ID	(O)
Prefix	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at Route Select Failure DP in an originating BCSM for a two-party Call Segment.

SSF Precondition

1) Call origination attempt has been initiated.
2) Routing address available and nature of address is determined.
3) Unable to select route, or indication received from terminating BCSM that call cannot be presented to terminating party, due to network congestion.
4) Call gapping or service filtering are not in effect for the Call Segment.
5) DP criteria have been met.
6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at Route Select Failure DP, and a control relationship has been established.
2) For a TDP-N, default exception handling has been provided, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.60 Select Facility

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the terminating basic call processing actions to select the terminating line if it is idle, or selects an idle line from a multiline hunt group, or select an idle trunk from a trunk group, as appropriate. If no idle line or trunk is available, the SSF determines that the terminating facility is busy.

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Call Segment	(O)
Called Facility Group	(O)
Called Facility Group Member	(O)
Correlation ID	(O)
Destination Routing Address	(O)
Display Information	(O)
Forward GVNS	(O)
IN Service Compatibility Response	(O)
ISDN Access Related Information	(O)
Leg ID To Be Created	(O)
Original Called Party ID	(O)
SCF ID	(O)
Service Interaction Indicators	(O)

If this IF is being used in the context of a hand-off procedure, the Destination Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if

Correlation ID and SCF ID are not specified separately. In this case, the Destination Routing Address IE contains only one address.

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP; however, it is not clearly understood whether these IEs are required outside of the originating SSF.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies during call setup in a terminating BCSM for a two-party Call Segment.

Precondition

1) Incoming call received from originating BCSM.
2) Authority/ability to route the call to a specified terminating resource (or group) has been verified.
3) Facility information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at one of the following DPs:

   Termination Attempt Authorized
   T_Busy
   T_No_Answer (i.e. the call setup phase).

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Present Call PIC.

12.4.3.61 Select Route

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the originating basic call processing actions to determine routing information and select a route for a call, based on call setup information that is either available in the SSF, or provided by the SCF (e.g. for alternate routing). This includes actions to select a primary route for the call, and if the route is busy, to select an alternate route.

c) Information Elements:

Call ID	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Call Segment	(O)
Carrier	(O)
Correlation ID	(O)
Destination Routing Address	(O)
Forward GVNS	(O)
IN Service Compatibility Response	(O)
ISDN Access Related Information	(O)
Leg ID To Be Created	(O)
Original Called Party ID	(O)

Route List	(O)
SCF ID	(O)
Service Interaction Indicators	(O)
Travelling Class Mark	(O)

If this IF is being used in the context of a hand-off procedure, the Destination Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if Correlation ID and SCF ID are not specified separately. In this case, the Destination Routing Address IE contains only one address.

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP; however, it is not clearly understood whether these IEs are required outside of the originating SSF.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies during call setup in an originating BCSM for a two-party Call Segment.

Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.
3) Call setup information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at one of the following DPs:

   Origination Attempt Authorized
   Collected Information
   Analysed Information
   Route Selected Failure
   O_Called_Party_Busy
   O_No_Answer (i.e. the call setup phase).

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Select Route PIC.

12.4.3.62 Send Charging Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used when the SSF is able to handle network specific SS No. 7 tariff messages (but may not have the capability of calculating the call charge or the capability of generating a billing record). This may be used for two purposes:

– It allows the SSF, when it is a local exchange, to act as if it has received a number of pulses or some SS No. 7 tariff messages, and when the SSF is a transit exchange, to send a number of pulses or some SS No. 7 tariff messages to the A party local exchange.

– It is also used when SS No. 7 tariff messages considered as charging events are requested as EDP-R (intercepted). The result of this IF may be either to continue normal SS No. 7 tariff message processing (that is forward the SS No. 7 tariff message), possibly with some parameter changes, or to acknowledge the receipt of SS No. 7 tariff

messages (that is, send back an SS No. 7 ACK message). It should be stressed that no charging related event DP has been defined in the call model.

NOTE – This IF is used when network-specific charging mechanisms are to be used. For instance, when this IF indicates that charging must be started, and if the SSF is a gateway or a transit exchange, it may imply the sending of an answer message to indicate the start of the charging.

c) Information Elements:

Billing Charging Characteristics	(M)
Call ID	(M)
Party To Charge	(O)

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and SSF for a given two-party Call Segment.

12.4.3.63 Send Facility Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This flow is issued by SCF for requesting SSF to send Facility IE to call party. It should also support Facility IE delivery within call establishing messages or Facility message.

c) Information Elements:

Call ID	(M)
Call Processing Correlation ID	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Leg ID	(O)

d) Mapping to FE Model(s):

The BCSM is suspended at a DP.

The SCF sends this IF for requesting the SSF to send FACILITY IE with appropriate message of DSS 1, such as call establishing message or a FACILITY message.

12.4.3.64 Send STUI

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to send an Service to User Information (STUI) information element to a user.

c) Information Elements:

Call ID	(M)
Leg ID	(M)
USI Information	(M)
USI Service Indicator	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to send a Service to User Information (STUI) information element to the user.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.

2) The SLPI has determined that a Send STUI IF should be sent.

SCF Postcondition

– SLPI execution continues.

SSF Precondition

– A control relationship exists between the SCF and the SSF.

SSF Postcondition

– No impact.

12.4.3.65 Service Filtering Response

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is sent at the expiry of the timeout contained in the Activate Service Filtering IF, and when a call is allowed through.

c) Information Elements:

Call ID	(M)
Counters Value	(M)
Filtering Criteria	(M)
Response Condition	(O)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.66 Split Leg

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is issued by the SCF to separate one party from its Call Segment and, in case of a multiparty CS, place it in a new associated CS. It interrupts the speech connection between the leg to be split and the legs remaining in the original Call Segment. The IF is the inverse of the Merge Call Segments IF.

c) Information Elements:

Call ID	(M)
Leg ID	(M)
New Call Segment	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to the SSF to separate one leg from a CS and , in case of a multiparty CS, place it in a new CS.

SSF Precondition

1) A control relationship exists between the SCF and the SSF.

2) The leg to be split has the status "joined".

3) When the involved leg is an "outgoing" leg (i.e. the passive leg in an O_BCSM or the controlling leg in a T_BCSM), the corresponding BCSM shall be at least at the Send_Call PIC in case of an O_BCSM or T_Active in case of a T_BCSM.

SSF Postcondition

1) The SSF performs the necessary actions to separate the indicated leg from its original Call Segment and place it in a new CS, or in case of a two-party CS, interrupt the bearer connection between the two legs.
2) The SSF FSM of the new Call Segment moves to the "Waiting For Instructions" state.
3) The FSM for the involved Call Segments will move to the "Waiting for instructions" state. The remaining BCSM instances within the two involved Call Segments will move to the O_/T_MidCall DP. Note that no MidCall EDP will be reported for this case.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) The SLPI has determined that a call party shall be split from its current connection point.

SCF Postcondition

1) SLPI execution may continue.
2) The SCSM FSM remains in the same state.

12.4.3.67 Status Report

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is used to notify the SCF of the busy/idle status of a physical termination resource (e.g. line, trunk group, hunt group) previously requested by the SCF in a Request Status Report IF.

c) Information Elements:

Call ID	(M)
Resource Status	(M)
Correlation ID	(O)
Report Condition	(O)
Resource ID	(O)

d) Mapping to FE Model(s):

This information flow applies outside the context of an existing relationship between the SCF and the SSF, or within the context of an existing control relationship for a given two-party Call Segment. In the latter case, it is processed independent of the given Call Segment.

12.4.3.68 T_Answer

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_Answer DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Called Facility Group	(O)
Called Facility Group Member	(O)
Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Component	(O)

Component Correlation ID	(O)
Component Type	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at T_Answer DP in an terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) Call has been accepted and the terminating party has answered.
3) For TDP, call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at T_Answer DP and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at T_Active PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.69 T_Busy

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_Busy DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Busy Cause	(O)
Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at T_Busy DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) All resources in specified terminating group busy.

3) Call gapping or service filtering are not in effect for the Call Segment.

4) DP criteria have been met.

5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at T_Busy DP , and a control relationship has been established.

2) For a TDP-N, default exception handling has been provided, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.70 T_Disconnect

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_Disconnect DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Called Facility Group	(O)
Called Facility Group Member	(O)
Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Connect Time	(O)
Release Cause	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at T_Disconnect DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.

2) Call has been accepted and the terminating party has answered.

3) Disconnect indication received from terminating party, or received from originating party via the originating BCSM.

4) Call gapping or service filtering are not in effect for the Call Segment.

5) DP criteria have been met.

6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at T_Disconnect DP, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at T_Null PIC and no control relationship is established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.71 T_MidCall

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_MidCall DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation. This IF can only be sent when the SSF has the ability to detect this trigger.

c) Information Elements:

DP Specific Common Elements plus:

Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Carrier	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Feature Request Indicator	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at T_MidCall DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.

2) Call has been accepted and the terminating party has answered.

3) Feature request received from terminating party.

4) Call gapping or service filtering are not in effect for the Call Segment.

5) DP criteria have been met.

6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at T_MidCall DP, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at T_Active PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.72 T_No_Answer

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_No_Answer DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Called Facility Group	(O)
Called Facility Group Member	(O)
Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at T_No Answer DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) The terminating party has not answered within a specified time period.
3) Call gapping or service filtering are not in effect for the Call Segment.
4) DP criteria have been met.
5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at T_Busy DP, and a control relationship has been established.
2) For a TDP-N, default exception handling has been provided, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.73 T_Suspended

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the T_Suspended DP in the BCSM or to report an event requested by the RequestReportBCSMEvent information flow.

c) Information Elements:

DP Specific Common Elements

Leg ID	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting the T_Suspended DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) Call has been accepted and the terminating party has answered.
3) Disconnect indication received from terminating party.
4) Call gapping or service filtering are not in effect for the Call Segment.
5) DP criteria have been met.
6) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R or EDP-R, an SSF instruction is being prepared.

12.4.3.74 Termination Attempt

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Termination_Attempt DP in the BCSM.

c) Information Elements:

DP Specific Common Elements plus:

Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)

Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at the Termination Attempt DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Call termination attempt has been initiated.
2) Call gapping or service filtering are not in effect for the Call Segment.
3) TDP criteria have been met.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at the Termination_Attempt DP, and a control relationship has been established.
2) For a TDP-N, basic call processing proceeds at the Authorize_Termination_Attempt PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, an SSF instruction is being prepared.

12.4.3.75 Termination Attempt Authorized

a) FE Relationship: SSF to SCF.

b) Synopsis:

This IF is issued by the SSF after detecting a valid trigger condition at the Term Attempt Authorized DP in the BCSM or to report an event requested by the RequestReportBCSMEvent operation.

c) Information Elements:

DP Specific Common Elements plus:

Called Party Business Group ID	(O)
Called Party Subaddress	(O)
Calling Party Business Group ID	(O)
Calling Party Subaddress	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Route List	(O)
Travelling Class Mark	(O)

d) Mapping to FE Model(s):

The SSF sends this information flow to the SCF upon detecting a DP at Termination Attempted and Authorized DP in a terminating BCSM for a two-party Call Segment.

SSF Precondition

1) Incoming call received from originating BCSM.
2) Authority to route call to specified terminating resource/group verified.

3) Call gapping or service filtering are not in effect for the Call Segment.

4) TDP criteria have been met.

5) For a TDP-R, there is no existing control relationship influencing the Call Segment.

SSF Postcondition

1) For a TDP-R, basic call processing has been suspended at Termination Attempted and Authorized DP, and a control relationship has been established.

2) For a TDP-N, basic call processing proceeds at Select Facility PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.

2) For a TDP-R, or EDP-R, an SSF instruction is being prepared.

12.4.3.76 Trigger Data Status Report

a) FE Relationship: SSF to SCF.

b) Synopsis:

This information flow is used by the SSF/CCF to report the value of field requested by the Trigger Data Status Request IF.

c) Information Elements:

Call ID	(M)
Trigger Data Identifier	(M)
Requested Field Value	(O)

d) Mapping to FE Model(s):

SCF Precondition

– SCF determines that trigger data management actions are to be performed.

SCF Postcondition

– The SCF waits for the result.

SSF Precondition

– None.

SSF Postcondition

– The SSF performs the request and sends the information to the SCF.

12.4.3.77 Trigger Data Status Request

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow is used by the SCF to request the SSF/CCF to retrieve the value of activation/deactivation control field and other fields if necessary.

c) Information Elements:

Call ID	(M)
Requested Field	(M)
Trigger Data Identifier	(M)

d) Mapping to FE Model(s):

SCF Precondition

– The SCF is awaiting confirmation of a Trigger Data Status.

SCF Postcondition

– None.

SSF Precondition

– The SSF has received a request and sends the information to the SCF.

SSF Postcondition

– Returns to idle.

12.4.4 IE Definitions for SSF/CCF to SCF Information Flows

12.4.4.1 Access Code

The SSF sends this IE when the originating access uses a customized dialling plan and the caller dials an access code.

12.4.4.2 Additional Calling Party Number

Contains the calling party number provided by the access signalling system of the calling user.

12.4.4.3 Alerting Pattern

This IE is the same as the DSS 1 Signal parameter. It is used to specify the type of alerting to be applied. Since present signalling systems do not convey this information, this IE may only apply at the terminating SSF. If the alertingPattern is supplied, the SSF uses this information when it presents the call to the called party.

12.4.4.4 All Call Segments

This IE indicates that all Call Segments within the Call Segment Association shall be released. It includes a release cause value.

12.4.4.5 Assisting SSF/SRF Routing Address

May contain embedded within it, a Correlation ID and SCF ID, but ONLY if Correlation ID and SCF ID are not specified separately.

12.4.4.6 Associated Call Segment

This IE indicates that one of the associated Call Segments shall be released. It includes a Call segment Identifier and a release cause value.

12.4.4.7 Backwards GVNS

Information sent backwards to the originating side about how the VPN call is terminated at the terminating side.

12.4.4.8 BCSM Event Correlation ID

This IE is used by the SCF to correlate the Event Report BCSM response with the original request.

12.4.4.9 BCSM Event List

This IE is a list containing one or more sets of the following information:

– Event type (M)

– Monitor Mode (M)

– Leg ID (O)

– DP Specific Criteria (O)

Event type

Indicates a specific BCSM DP (e.g. Collected Info, O Called Party Busy etc.). Note that this IF can only be used to request BCSM events in either an originating or Terminating BCSM.

Monitor Mode

Specifies whether call processing should be suspended when the event is detected and how the event is to be reported. The value of this IE is interrupted, notify & continue, or transparent. Interrupted (i.e. intercept) means that the SSF notifies the SCF of the event, does not process the event or propagate the signal, and waits for SCF instructions (e.g. handled as EDP-R for BCSM events). Notify & continue (i.e. duplicate) means that the SSF notifies the SCF of the event, and continues processing the event or signal without waiting for SCF instructions (e.g. handled as EDP-N for BCSM events). Transparent means that the SSF does not notify the SCF of the event. This value is used to end monitoring of a previously requested event (e.g. disarm an EDP). Previously requested events are monitored until ended by a transparent monitor mode, or in the case of BCSM events, until the end of the call.

Leg ID

This IE is needed in two (or more) party calls for monitoring events specific to a particular party (e.g. monitor for disconnect from one party or the other). When not present, a default value is assumed.

DP Specific Criteria

Indicates information specific to the EDP to be armed. It specifies the application timer, the Number of digits or in case of arming of O_MidCall or T_MidCall, which specific mid call events are to be monitored.

The Application Timer is used only when the event type is "no answer". It is used to specify how long the SSF should monitor for the answer signal before reporting the no answer event. The value of this timer should be less than the network no answer timer, except in the originating local exchange. If this timer expires, the SSF automatically tears down the forward connection to the B-party to avoid synchronization problems, then notifies the SCF.

Number of digits is only used when the event type is "collected info." It indicates the number of digits to be collected by the SSF before the Collected Info event is reported to the SCF.

NOTE – Generic call record building is provided by Call Information Request. If the SCF wants more specific call details, the SCF should use this IF. Statistics for multiple calls can be built by the SCF using Call Information Request for each call; otherwise such statistics should be provided by a TMN interface, rather than by SSF-SCF information flows.

12.4.4.10 BCSM Failure

BCSM Failure consists of the following:

LegID

Identifies the released leg.

Reason

Gives network specific information about the kind of error/exception (e.g. external or internal error or exception).

Cause

Indicates the cause of releasing this specific entity. The cause may be used by the SCF to decide about the further handling of the call.

12.4.4.11 Bearer Capability

This IE defines the type of the bearer capability connection to the user. This IE contains the value of the DSS 1 Bearer Capability parameter in case the SSF is at local exchange level or the value of the ISUP User Service Information parameter in case the SSF is at transit exchange level. This IE shall only be included in case the DSS 1 Bearer Capability parameter or the ISUP User Service Information parameter is available at the SSP. If this IE is omitted, a default value of "Speech" will be assumed by the SCF.

12.4.4.12 Billing Charging Characteristics

This IE is network-operator specific. It contains any relevant information for calculating the call charge. Examples may be a tariff table that the exchange will apply (taking into account the destination) to calculate the call charge, or a number of pulses to add to the current call charge, or the call tariff itself.

12.4.4.13 Busy Cause

Busy Cause identifies the reason why the called party was busy.

12.4.4.14 Call Gapping Encountered

This IE is used to indicate that this operation has been subject to and passed a call gapping procedure. This IE is network-operator optional.

12.4.4.15 Call ID

Identifies a specific instance of a relationship between a SCF and SSF. At the physical plane for IN CS-2, it is mapped on to a TCAP transaction identity.

12.4.4.16 Call Processing Correlation ID

This IE indicates what message should be used to deliver the specified UNI APDU with the component. Default id Facility and in this case the APDU is delivered during the BCSM suspended at a DP.

12.4.4.17 Call Result

This IE is network-operator specific. It will contain the result of the charging operation (e.g. number of pulses applied).

12.4.4.18 Call Segment ID

This IE indicates the Call Segment where call processing shall be resumed.

12.4.4.19 Called Facility Group

Called Facility Group identifies the facility group for trunks or private facilities to which the call is being terminated. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has this information available.

12.4.4.20 Called Facility Group Member

Called Facility Group Member identifies an individual member of a called facility group. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has this information available.

12.4.4.21 Called Party Business Group ID

This IE identifies the Business Group associated with the called party. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.22 Called Party Number

This IE contains the number used to identify the called party in the forward direction (i.e. it is used to populate the bearer signalling protocol's Called Party Number information element).

12.4.4.23 Called Party Subaddress

This IE (if available) contains subaddress information for the called party.

12.4.4.24 Calling Facility Group

This IE identifies the facility group for incoming trunks or private facilities. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.25 Calling Facility Group Member

This IE (if available) identifies an individual member of a facility group for incoming trunks or private facilities. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.26 Calling Party Business Group ID

This IE (if available) identifies the business group associated with the calling party. The SCF can use this IE to select SLPs based on the group and for authorization purposes. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.27 Calling Party Number

This IE carries the calling party number to identify the calling party or the origin of the call.

12.4.4.28 Calling Party Subaddress

This IE (if available) contains subaddress information for the calling party.

12.4.4.29 Calling Party's Category

This IE indicates the type of Calling Party (e.g., operator, payphone, ordinary subscriber).

12.4.4.30 Carrier

This IE consists of two parts, the Carrier Selection indicates whether the primary carrier was presubscribed or dialled and the Carrier ID indicates the presubscribed carrier of the caller. This is useful for networks where the user can select the carrier for the call.

12.4.4.31 Cause

Indicates the cause of releasing this specific entity. The cause may be used by the SCF to decide about the further handling of the call.

12.4.4.32 Charge Number

This IE is the automatic number identification of the calling party. It is based on the signalled charge number parameter (network-operator specific).

12.4.4.33 Component

This IE contains the operation value (object identifier) error value, etc., within the UNI APDU, in addition, it also contains the parameter set/sequence for the operation invocation/return result or return error/reject on UNI. Or, this IE contains whole UNI APDU (this means, it contains semantically Component Correlation ID and Component Type, in this case, these two IEs will not be used).

12.4.4.34 Component Correlation ID

This IE gives the relationship between the local operation and the reported component. This IE is assigned by the operation invocation entity.

12.4.4.35 Component Type

Specifies the component should be reported by the CUSF. The component is invoke or return result or error.

12.4.4.36 Connect Time

Connect Time indicates the duration between the received answer indication from the called party side and the release of the connection.

12.4.4.37 Control Type

Specifies the reason why gapping is invoked. Examples of values: SCF overload (the SCF has started gapping), Manually initiated (through the SMS). This IE allows the SSF to set priorities among gapped traffic, the manually initiated case having greater priority.

12.4.4.38 Correlation ID

This IE is used to identify the call, and in the assist case, must be passed to the assisting SSP via ISUP. Since it does not have to be translated by the assisting SSP, it does not have to be meaningful beyond being a call identifier.

12.4.4.39 Correlator

The Correlator IE is an ID previously provided by the SCF to the SSF for future reference to a call segment.

12.4.4.40 Counters Value

Contains the count of calls filtered during the filtering period. It is a list of counter identities and their values.

12.4.4.41 Created Call Segment Association ID

This information element identifies for the SCF unambiguously the CSA instance in the SSF under the SCF control in the involved relationship instance. The SCF may use this information to address

CSA instances in the SSF, for example when a call segment should be moved from one CSA instance under one SLPI control to another CSA instance in the SSF under another SLPI control.

12.4.4.42 CS Failure

Indicates that a CS was released. It consists of the following structure.

Call Segment ID

Identifies the released CS.

Reason

Gives network-specific information about the kind of error/exception (e.g. external or internal error or exception).

Cause

Indicates the cause of releasing this specific entity. The cause may be used by the SCF to decide about the further handling of the call.

12.4.4.43 Cut and Paste

This IE is used by the SCF to instruct the SSF to delete (cut) a specified number of the digits it has received from the calling party and paste the remaining dialled digits on to the end of the digits supplied by the SCF in the destination routing address. As an example, if the user dials XXX-YYYY, the SSF will trigger on XXX and query the SCF. (Note that the SSF will treat the YYYY digits as normal.) The SCF will send back new ZZZZ digits and a cut and paste of 3. The SSF will replace XXX with ZZZZ and paste it to YYYY.

12.4.4.44 Destination Routing Address

This IE contains a list called party number towards which the call is to be routed. The encoding of the parameter is defined in Recommendation Q.763.

12.4.4.45 Dialled Digits

This IE contains the actual digits received by the SSF from either the calling party (in the case of the originating local exchange) or the previous SSF handling the call (in all other cases).

12.4.4.46 Display Information

If the Display Information IE is included, the SSF/CCF should try to deliver this information to the user. This IE represents specific information that is to be displayed to the call party. This would allow IN to be involved in a service like calling name delivery on call waiting.

12.4.4.47 Event Specific Information BCSM

Contains call-related information specific to the event (e.g. EDP-specific information).

In case a requested mid call event has been detected, the SSF indicates which specific mid call event has caused the sending of the ERB operation. This is necessary if different mid call events are possible in general.

12.4.4.48 Event Specific Information Charging

Network-operator specific.

12.4.4.49 Event Type BCSM

Denotes a specific BCSM DP (e.g. Origination_Attempt_Authorized).

12.4.4.50 Event Type Charging

This IE indicates the charging event type which has occurred. Its contents are network-operator specific, which may be "charge pulses" or "charge messages".

12.4.4.51 Failure Cause

Failure cause identifies the reason for the failure to select a route (e.g. network congestion).

12.4.4.52 Feature Code

This IE is included when the caller dials a Feature Code (e.g. *XX or 11XX). The * or 11 digits are included, if dialled.

12.4.4.53 Feature Request Indicator

Feature Request Indicator indicates the type of feature requested.

12.4.4.54 Filtered Call Treatment

Specifies how filtered calls are to be treated. It includes information about what announcement should be played, how they are to be billed/charged, how many counters should be used for counting filtered calls and what release cause should be applied to filtered calls.

12.4.4.55 Filtering Characteristics

Defines the severity of the filtering to be applied and the point in time when the service filtering report will be sent. Filtering characteristics are either Interval or Number of calls. If interval is set then at periodic intervals, a call will be allowed through and a Service Filtering Response will be sent to the SCF. If Number of calls is set, then every Nth call will be allowed through, and a Service Filtering Response will be sent to the SCF.

12.4.4.56 Filtering Criteria

It is used to specify those calls which are to be filtered out. This IE is used when this IF is sent outside the context of a specific call.

Filtering Criteria is a choice of:

– Dialled Number.

– Calling Party Number.

– Service Key.

– Address and Service.

This IE is also used in correlating a response with a previously issued service filtering.

12.4.4.57 Filtering Timeout

Defines the maximum duration of the filtering. When the timer expires, a service filtering response is sent to the SCF. It is a choice of either a duration or a specified stop time.

12.4.4.58 Forward Call Indicators

Indicates if the call shall be treated as a national or international call. It also indicates the signalling capabilities of the network access, preceding network connection and the preferred signalling capabilities of the succeeding network connection. The network access capabilities does not indicate the terminal type. For example, an ISPBX will have an ISDN type of access, but the end user terminal behind the ISPBX may be ISDN or non-ISDN.

12.4.4.59 Forward GVNS

Identifies the originating service provider and provides information for the terminating GVNS network.

12.4.4.60 Forwarding Condition

Specifies a condition upon which an alternate Destination Routing Address would apply. It has values of "Busy", "No Answer", and "Any".

12.4.4.61 Gap Criteria

Specifies which calls are to be gapped. This is a choice of:

– Called party number.

– Calling party number.

– Service specific.

One and only one of these options must be present:

Called party number

Means that calls to a specific called party number will be subject to gapping.

Calling party number

Means that calls from a specific calling party will be subject to gapping.

Service specific

Means that calls resulting in a request for a specific service key and at a specific DP will be subject to gapping.

12.4.4.62 Gap Indicators

Specifies how the gapping is to be applied. The sub-elements are:

– Duration (M)

– Gap Interval (M)

Duration

Specifies the time for which gapping is to remain in force before being removed by the SSF.

Gap Interval

Specifies the time allowed between calls being allowed through. An interval of 0 specifies that gapping is to be removed. An interval of –1, specifies that all calls meeting the gap criteria are to be rejected, but only for the time for which call gapping is in force.

12.4.4.63 Gap Treatment

Specifies how gapped calls are to be treated. It consists of two sub-elements, announcement ID and release cause. If omitted, a default, network-operator specific treatment will be assumed.

12.4.4.64 Generic Name

This parameter indicates one Party name (Calling Party or Called Party) to be displayed to the end-user identified by the Leg ID.

12.4.4.65 Generic Number

This IE allows the SCF to modify the Generic Number information received from the SSF. As well, it allows the SCF to indicate a Generic Number information to the SSF.

12.4.4.66 Higher Layer Compatibility

This IE indicates the type of higher layer compatibility used to determine the teleservice of a connected ISDN terminal.

12.4.4.67 Hold Cause

Specifies the reason for the hold (e.g. queuing). A default value will be assumed if none is supplied. The use of this IE is network-operator specific.

12.4.4.68 IN Service Compatibility Indication

The Service Compatibility ID IE contains the identifier for a class of IN services that has been triggered during the call. A class of IN service is defined as an IN service which has the same compatibility characteristics.

12.4.4.69 IN Service Compatibility Response

This IE is used by the SSF to override the IN Service Compatibility Indication element which has been derived during triggering of the given IN service. It is up to the Network Operator whether or not the overwrite is allowed.

12.4.4.70 Initial Call Segment

This IE indicates that the initial Call Segment shall be released. It includes a release cause value.

12.4.4.71 IP Routing Address

Gives information to enable the SSF to establish a connection to the SRF.

12.4.4.72 ISDN Access Related Information

This IE carries the same information as the protocol element ISUP Access Transport parameter.

12.4.4.73 Last Event Indicator

This IE means that the Call Information Report is the last in the Call Segment. This is needed for deciding whether the event is last in the SCF. If the event is last in the Call Segment, "TRUE" must be set. In CS-1 this parameter should not be sent, and the meaning of DEFAULT is not applied. The SCF must decide whether the report is last without this parameter.

12.4.4.74 Leg ID

Identifies the leg on which the action specified in the IF is to take place.

12.4.4.75 Leg ID To Be Created

This IE indicates the Leg Identifier to be assigned to the newly-created call party.

12.4.4.76 Legs

Legs consist of the following IEs.

Source Leg ID

This parameter specifies a source leg ID from the moved CS.

Leg ID To Be Created

This parameter specifies the new LegID of the source leg.

12.4.4.77 Location Number

This IE is used to convey the geographical area address for mobility services. It is used when "callingPartyNumber" does not contain any information about the geographical location of the calling party (e.g. origin dependent routing when the calling party is a mobile subscriber). Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.78 Miscellaneous Call Info

This IE is a sequence of DP type (Notification or Request) and DP Assignment (Individual Line, Group Based, or Office Based). DP type and DP Assignment is network-operator optional.

12.4.4.79 Monitor Duration

Monitor duration is used for monitor for change (RequestFirstStatusMatchReport) or continuous monitor (RequestEveryStatusChangeReport) only. For monitor for change the SSF will monitor the specified resource until the state change requested occurs, the timeout expires, or a Cancel Status Report Request is received. For continuous monitor the SSF will monitor the specified resource and report all state changes until the timer expires or a Cancel Status Report Request is received.

12.4.4.80 Monitor Mode

Monitor mode is either "Notify and Continue", "Transparent", or "Interrupted".

12.4.4.81 Monitor Type

Specifies the type of monitoring to be applied. Values include: poll resource status (i.e. what is the current status?), monitor for change (i.e. send a report when the status changes to the desired status, then end the operation), and continuous monitor (i.e. send a report every time the status changes). See the STATUS NOTIFICATION SIB Stage 2 for applicable procedures.

12.4.4.82 New Call Segment

This IE indicates the Call Segment Identifier to be assigned to the newly-created CS.

12.4.4.83 New Call Segment Association

This parameter specifies the new CSAID.

12.4.4.84 Notification Duration

This Information Element indicates the duration (in seconds) to apply alerting to a line before determining that no answer is expected.

12.4.4.85 Numbering Plan

This IE is used to indicate the numbering plan to be used when decoding destination information. If omitted a default value of E.164 numbering will be assumed.

12.4.4.86 Operation Identifier

Identifies the specific Call Information Request to be cancelled. This will be mapped on to an Invoke Id in the physical plane.

12.4.4.87 Original Called Party ID

This IE (if available) is the directory number of the first redirecting party (i.e. the number originally dialled by the caller).

12.4.4.88 Party To Charge

Indicates the party in the call to which this procedure should be applied. If it is not present, then it is applied to the A party.

12.4.4.89 Prefix

This IE contains any prefix digits input by the calling party.

12.4.4.90 Redirecting Party ID

This IE (if available) is the directory number of the last redirecting party.

12.4.4.91 Redirection Information

This IE (if available) indicates the reason for forwarding the call from the DN of the first and last redirecting party, and indicates the number of forwardings that have occurred.

12.4.4.92 Registrator Identifier

Indicates the requester of trigger data activation. This information element may be used as part of service address information elements when the CCF/SSF detects the query to the SCF. This information element may be used for UPT service.

12.4.4.93 Release Cause

This IE may be used by the SSF for generating specific tones to the party to be released or to fill in the "cause" parameter in the release message.

12.4.4.94 Report Condition

Report Condition specifies the cause of sending Status Report (may be status reported, timer expired, or cancelled).

12.4.4.95 Requested Field

Indicates the list of fields to be retrieved such as Activation/DeactivationControl field and RegistratorIdentifier field.

12.4.4.96 Requested Field Value

Indicates the list of value of fields retrieved by the TriggerDataStatusRequest IF.

12.4.4.97 Requested Information List

Provides values for Requested Information Type IE.

12.4.4.98 Requested Information Type

This IE is a list of specific items of information which can be requested. The list is:

– Call attempt elapsed time.
– Call stop time.
– Call connected elapsed time.
– Called address.

– Calling address.

– Bearer capability.

Any set of these items can be requested.

12.4.4.99 Resource ID

Resource ID specifies the particular resource. It is a choice of DN (ID for line), facility group ID (ID for hunt group), facility group member (ID for hunt group member), or trunk group ID (ID trunk group).

12.4.4.100 Resource Status

Resource Status IE contains values of either busy or idle. It is used to report either the condition to monitor, or the status of a resource.

12.4.4.101 Response Condition

This IE is used to identify the reason (service filtering is running and the interval time is expired and a call is received, service filtering is running and the threshold value is reached, the duration time is expired and service filtering has been finished, or the stop time has been met and service filtering has been finished) why this IF is sent.

12.4.4.102 Route List

This IE (if available) represents the list of routes which would have been used in order to route the call. It is network-operator specific. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.4.4.103 SCF ID

It enables the SSF to which the call is handed off to identify which SCF the Assist Request Instructions should be sent to.

The SCF ID is required to be passed to the assisting SSP in the hand-off case, to allow the assisting SSP to identify the SCP with which the assisting SSP must set up a relationship, and therefore must map onto ISUP. The SCF ID must be translated by the assisting SSP into an INAP address and must therefore be in a form which is meaningful to the assisting SSP.

12.4.4.104 Sequence of Charging Event

This IE is similar in structure to the IE in the Request Report BCSM Event. That is a sequence of the following structure:

– Event Type Charging (M)

– Monitor Mode (M)

– Leg ID (O)

Event Type Charging

This IE is network-operator specific. Some examples of charging events which might be reported are:

Receipt of charging information from the network, (called party side). This charging information may be:

– Call Tariff.

– Tariff change and time of change.

– Number of Pulses.

Receipt of charging information from the network (calling party side). The charging information may be an acknowledgment message.

Monitor Mode

Monitor mode is either "Notify and Continue", "Transparent", or "Interrupted". When the monitor mode is "Interrupted", the SSF has to send a report to the SCF using the Event Notification Charging IF, and await further instructions.

Leg ID

This IE is used to identify an individual party in a call. This is needed in a two-party call for requesting the reporting of charging events specific to one party.

12.4.4.105 Service Address Information

This IE is a sequence of Trigger Type and Miscellaneous Call Information. It is used by the SCF to select the correct application. The Trigger Type IE indicates to the SCF the type of trigger that caused the SSF to detect a valid trigger condition.

12.4.4.106 Service Interaction Indicators

Contains indicators for control of the network based services.

Details for Service Interaction Indicators SCF to SSF IE

Control Information	Values
Call to be offered indicator	– Call offering allowed – Call offering not allowed (default)
Time limits for timer T_{SUS}	– As in Rec. Q.764 for timer T6 – 4-10 seconds 0 seconds (default)
Bothway throughconnect indicator NOTE 1 – The indicator should be set to "require" in the Connect To Resource or Establish Temporary Connection IF, if user interaction has to be performed. If an announcement is to be connected or in other IFs the indicator should be set to "not required".	– Required (default) – Not required
Call to be diverted indicator	– Call diversion allowed (default) – Call diversion not allowed
Conference at DLE acceptance indicator	– Accept conference request (default) – Reject conference request
Conference at OLE acceptance indicator	– Accept conference request (default) – Reject conference request
Connected number treatment indicator	– No impact – Set "presentation restricted" – Present called IN number (default)
Call transfer notification treatment indicator	– No impact (default) – Suppress information

Details for Service Interaction Indicators SCF to SSF IE *(concluded)*

Control Information	Values
Call diversion notification treatment indicator	– No impact (default) – Suppress information
Called IN number presentation restricted indicator	– Presentation allowed – Presentation not allowed (default)
User interactive dialogue duration indicator NOTE 2 – The indicator should be set to "long duration" in the ConnectToResource or EstablishTemporary Connection operation, if the user interaction may last longer than 90 seconds. Otherwise the indicator should be set to "short duration".	– Long duration (default) – Short duration
Call completion treatment indicator	– Reject call completion request – Accept call completion request (default)

12.4.4.107 Service Key

This IE is used to address the correct application/SLP within the SCF (not for SCP addressing).

For example, it can be used to notify the SCF directly the service, or which other parameters should be examined to determine the service (e.g. dialled digits, calling line identity, terminal service profile identifier). This IE must be datafilled at each SSP for every desired trigger criteria. This value should be defined by and be under the control of the network operator.

12.4.4.108 Service Profile Identifier

This IE identifies the particular terminal using an ISDN interface.

12.4.4.109 Serving Area ID

This IE identifies the local serving area where a network provider operates.

12.4.4.110 Source Call Segment

This IE indicates the CS that shall be merged with another CS. After the merge, this CS instance will be deleted.

12.4.4.111 Source Call Segment Association

This parameter indicates the source Call Segment Association from which the Call Segment is to be moved.

12.4.4.112 SRF available

Indicates the status of the SRF attached to the SSF (if any). Its use is network-operator optional.

12.4.4.113 SRF/SSF capabilities

This IE is used to indicate the capabilities of the SSF and SRF to the SCF. The SCF uses this information to decide if an Assist or Hand-off procedure is to be used. It can also be used to decide if a Connect to Resource IF will be necessary. The usage of this IE is operator-dependent. If an operator does use this IE, then it must be included.

12.4.4.114 Start Time

Defines when the filtering is to start. If it is omitted, the SSF will start filtering immediately.

12.4.4.115 Target Call Segment

This IE indicates the CS that shall be merged with another CS. After the merge, this CS instance will be kept.

12.4.4.116 Target Call Segment Association

This parameter indicates the target Call Segment Association into which the Call Segment is to be moved.

12.4.4.117 Terminal type

Indicates the type of terminal to the SCF (e.g. DTMF phone, ISDN terminal). The SCF uses this to determine the most appropriate form of user-interaction to use (e.g. in-band announcements). If the information is not available then "unknown" will be sent. "Optional" for terminal type indicates that this IE only applies if the SSF has this information available.

12.4.4.118 Timer ID

Identifies the specific timer to be reset. For IN CS-1 it is only possible to reset the inter-operation timeout in the SSF. (T_{SSF}) This will have been set on receipt of a previous IF from the SCF.

12.4.4.119 Timer Value

Specifies the new value that the timer is to be set to.

12.4.4.120 Travelling Class Mark

This IE (if available) indicates the physical characteristics of the call, e.g. the usage of echo-cancellers.

12.4.4.121 Trigger Data Identifier

Identifies the trigger data to be addressed by the information flow. This information element is composed of line/group number and service address information.

12.4.4.122 Trigger Type

Indicates to the SCF the particular event that caused the detection of a valid trigger condition.

12.4.4.123 USI Information

Information which is exchanged between the user and the IN service logic. This information is IN service feature specific and the content is transparent from the CCF/SSF point of view.

12.4.4.124 USI Monitor Mode

This IE indicates if the UTSI IE should be reported to the SCF or not the values are "monitoring active" to activate a monitor relationship and "monitoring inactive" to end a monitor relationship.

12.4.4.125 USI Service Indicator

This IE indicates a matching criteria for a Report UTSI. The USI Service Indicator is mapped unambiguous to the related service logic. This IE carries the OCCAUI Service Indicator. The Service Indicator indicates unambiguously the IN service, which uses the OCCAUI. The Service Indicator may be used in the user equipment to access the appropriate process to handle a received STUI IE. The Service Indicator is used in the SCF to decide whether to send the UTSI IE to the SCF. The Service Indicator may be used in the SCF to access the appropriate process to handle a received UTSI IE.

12.5 SCF-SRF relationship

12.5.1 General

A relationship between the SCF and SRF is established by the SRF sending an "assist request instructions from SRF" to the SCF. The SCF can now instruct the SRF to perform some interaction with an end user (e.g. play an announcement and collect some digits). The relationship is terminated by the SCF. The establishment of this relationship must be preceded by the establishment of a relationship between the SCF and SSF.

12.5.2 Information flows between the SCF and SRF

12.5.2.1 Assist Request Instructions from SRF

a) FE Relationship: SRF to SCF.

b) Synopsis:

This IF is sent by the SRF to the SCF, when the SRF has received an incoming call from an SSF/CCF as a result of the SCF sending an Establish Temporary Connection IF or one of the PIC specific information flows to the SSF.

NOTE – In the INAP, this information flow and the assist request instructions information flow are mapped on to a single operation.

c) Information Elements:

As for Assist Request Instructions IF in the SCF-SSF relationship.

d) Mapping to FE Model(s):

An assisting SRF sends this information flow to the SCF in order to obtain user interaction instructions.

12.5.2.2 Cancel Announcement

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is used to request the SRF to terminate the playing of an announcement, or cancel a prompt and collect user information. At the physical plane, a generic cancel operation will be used.

c) Information Elements:

Operation Identifier	(M)
Call Segment ID	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SRF to terminate user interaction for a two-party call segment in an SSF.

12.5.2.3 Collected User Information

a) FE Relationship: SRF to SCF.

b) Synopsis:

This IF is sent as the response to the prompt and collect user information IF. It contains the information collected from the user. Note that in the INAP, this IF maps on to the RESULT part of the prompt and collect user information operation.

c) Information Elements:

Received Information	(M)
SRF Connect ID	(M)

d) Mapping to FE Model(s):

The SRF sends this IF to the SCF to provide information collected from a specific party in a two-party call segment.

12.5.2.4 Message Received

a) FE Relationship: SRF to SCF.

b) Synopsis:

This IF is used for confirmation by SCF that message is received by SRF completely.

c) Information Elements:

Received Message ID	(M)
Received Status	(M)
SRF Connect ID	(M)
Received Message Length	(O)

d) Mapping to FE Model(s):

The SRF sends this information flow to the SCF when the SRF receives voice messages and records it. More details are for further study.

12.5.2.5 Play Announcement

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is to be used after establish temporary connection (assist procedure with a second SSF or SRF assist procedure), a connect to resource (no assist) IFs, or one of the PIC specific information flows. It may be used for in-band interaction with an analogue user, or for interaction with an ISDN user. In the former case, the SRF is usually collocated with the SSF for standard tones (e.g. congestion tone) or standard announcements. In the latter case, the SRF is always collocated with the SSF in the switch.

If a Leg ID is specified, only a Tone or Display Message can be provided to the Leg ID. If a User Interaction for digit collection is desired, only a Call Segment must be specified. If a Leg ID is not specified, the entire Call Segment is connected to the SRF, and therefore all parties receive the announcement. If it is desired that only one party have an interaction with the SRF, that leg must first be split off to a separate Call Segment.

c) Information Elements:

Disconnection from IP Forbidden	(M)
Information To Send	(M)
Request Announcement Completed Indication	(M)
SRF Connect ID	(M)
Call Segment ID	(O)
Leg ID	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SRF to initiate user interaction for a two-party call segment in an SSF.

12.5.2.6 Prompt and Collect User Information

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is to be used after establish temporary connection (assist procedure with a second SSF or SRF assist procedure), a connect to resource (no assist) IFs, or one of the PIC specific information flows. This information flow is used to interact with the user in order to collect information.

c) Information Elements:

Collected Info	(M)
Disconnection From IP Forbidden	(M)
SRF Connect ID	(M)
Call Segment	(O)
Information To Send	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SRF to initiate user interaction for a two-party call segment in an SSF.

12.5.2.7 Prompt and Receive Message

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is used to receive voice message from call party and record it in voice message sender/receiver. Some announcements are provided if necessary.

c) Information Elements:

Disconnect from IP Forbidden	(M)
SRF Connect ID	(M)
Call Segment	(O)
Information To Record	(O)
Information To Send	(O)
Mailbox ID	(O)
Media	(O)
Message Receiving Completion Condition	(O)
Subscriber ID	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SRF to request for receiving voice message provided by end user. More further details are for further study.

12.5.2.8 Script Close

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is issued by the SCF to de-allocate the resources used to perform the instance of the "User Interaction" script: the context is released.

c) Information Elements:

User Interaction Script ID	(M)
Call Segment	(O)
User Interaction Script Specific Information	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to de-allocate the resources used to perform the instance of the "User Interaction" script: the context is released.

12.5.2.9 Script Event

a) FE Relationship: SRF to SCF.

b) Synopsis:

This IF is issued by the SRF to return information to the SCF on the results of the execution of the instance of User Interaction script. This result might be the partial result during the user interaction execution script or the final result of the user interaction script.

c) Information Elements:

User Interaction Script ID	(M)
User Interaction Script Result Information	(M)
Call Segment	(O)

d) Mapping to FE Model(s):

The SRF sends this information flow to return information to the SCF on the results of the execution of the instance of User Interaction script (yes/no/cancel, identifier + PIN, dialled number, etc.).

The SCF may interpret the receipt of the last Script Event IF as an indication that the dialogue between the SCF and the SRF has to be terminated. In this particular case, the dialogue will be terminated without sending an explicitly Close Script IF.

12.5.2.10 Script Information

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is issued by the SCF to send to the SRF additional information during the User Interaction script execution.

c) Information Elements:

User Interaction Script ID	(M)
User Interaction Script Specific Information	(M)
Call Segment	(O)

d) Mapping to FE Model(s):

The SCF uses this information flow to send to the SRF additional information during the User Interaction script execution.

SCF Precondition

– The SLPI has decided that it is necessary to send to the SRF additional information during the User Interaction script execution.

SCF Postcondition

– SLPI execution continues.

SRF Precondition

1) The SRF can receive order from the SCF.

2) The SRF FSM is in the state "User Interaction".

SRF Postcondition

– The SRF FSM remains in the same state.

12.5.2.11 Script Run

a) FE Relationship: SCF to SRF.

b) Synopsis:

This IF is issued by the SCF to allocate the necessary resources to perform the instance of the "User Interaction" script and then to activate this "User Interaction" script instance. A context is partially defined for it if necessary.

c) Information Elements:

User Interaction Script ID	(M)
User Interaction Script SpecificInformation	(M)
Call Segment	(O)
Disconnect From IP Forbidden	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to allocate the resources necessary to perform the instance of the "User Interaction" script (a context is partially defined for it) if necessary, then to activate this "User Interaction" script instance.

12.5.2.12 Specialized Resource Report

a) FE Relationship: SRF to SCF.

b) Synopsis:

This IF is the response to a play announcement IF when the request announcement completed indication IE is set. In addition to this, this IF is used to confirm the completion of the message sending which was requested by means of Send Message IF.

c) Information Elements:

SRF Connect ID	(M)
Type of Report	(M)

d) Mapping to FE Model(s):

The SRF sends this information flow to the SCF to report announcement completion in a two-party call segment, or to report the completion of message sending.

12.5.3 IE Definitions for SCF to SRF Information Flows

12.5.3.1 Call Segment ID

As defined for the SSF-SCF interface.

12.5.3.2 Collected Info

This IE describes how the information is to be collected from the user. It is a choice of:

– Digits; or

– IA5 information.

Digits have the following structure:

– Minimum number of digits	(M)
– Maximum number of digits	(M)
– End of reply digit	(O)
– Cancel digit	(O)
– Start digit	(O)
– Voiceback	(O)
– First digit timeout	(O)

– Inter digit timeout (O)
– Error treatment (O)
– Voiceinfo (O)
– Interruptible announcement indicator (O)

Minimum and maximum number of digits

This IE is used where the number of digits is not known.

End of reply digit

Indicates the type of digit used to signal the end of input [one or two character(s), e.g. * or #, digits 0-9 shall not be used].

Cancel digit

Specifies the digit which can be used by the user to cancel erroneous input [one or two character(s), e.g. * or #, digits 0-9 shall not be used].

Start digit

Specifies the type of digit which is used to signal the start of some particular piece of input information [one or two character(s), e.g. * or #, digits 0-9 shall not be used].

Voiceback

Indicates to the SRF that it should play back to the user the digits they have input in the form of an announcement. Non-valid digits shall not be voicebacked.

First digit timeout

Specifies the maximum time which can elapse between the end of the announcement and the first digit being input. If this is not supplied, a default value will be assumed.

Inter digit timeout

Specifies the maximum time which can elapse between successive digits. If this is not supplied, a default value will be assumed.

Error treatment

Defines what specific actions should be taken by the SRF in the event of error conditions occurring, such as the expire of one of the timers described above.

The options available are:

a) Report error to the SCF (this is the default action).

b) Send any collected information to the SCF.

c) Repeat the prompting announcement.

d) Play the user a special "help" announcement .

Voiceinfo

Indicates that the digits may be collected by the use of voice recognition.

Interruptible announcement

Indicator if TRUE means that input from the user will be accepted before the prompt inviting input is complete.

IA5 information

This IE is used if it is required to collect text input from the user, e.g. "ABC".

12.5.3.3 Control Condition by Call Party

Indicates the condition related to message sending which is sent from call party. Following conditions may be indicated:

– End of Sending Digit (O)

– Repetition Digit (O)

12.5.3.4 Disconnect from IP Forbidden

This IE informs the SRF whether it can release the connection to the SSF/CCF after the announcement has been completed. This is to be used mainly when the SRF is not collocated with the switch. For instance, when there is a sequence of announcements, it would prevent path release between each announcement. For not direct case, the disconnection from IP is always forbidden (see Recommendation Q.1228 for more detail).

12.5.3.5 Information to Record

This IE defines the information which is to be recorded. The IE is a structure composed of several smaller elements consisting of:

- Message ID;
- Message Deletion Time Out;
- Time to Record;
- Control Digits.

12.5.3.6 Information to Send

Specifies what information the SRF should send to the end user. It is a choice of the following:

– Inbandinfo.

– Displayinformation.

– Tone.

In-bandinfo

This structure is used for in-band interaction with any user.

– MessageID (M) (Note 1)

– Number of repetitions (O) (Note 2)

– Duration (O) (Note 2)

– Interval (O)

NOTE 1 – Message ID is a choice of:

– Elementary Message ID;

– Text;

– Elementary Message Ids; or

– Variable Message.

One sub-element of the above list must always be present. "Elementary Message ID" indicates a single announcement.

"Text" will be transformed by the SRF into speech.

"ElementaryMessageIDs" specifies a sequence of announcements.

"Variable Message" specifies an announcement with one or more variable parts.

NOTE 2 – Number of repetitions and duration have a default value that may be pre-assigned or defined by network management.

Number of repetitions, duration and interval may be used in any combination. It is up to the service logic to decide which combination is most appropriate for the needs of the service.

Display information

This IE is used for interacting with an ISDN user.

Tone

This structure is used when sending an information tone to an analogue or ISDN user.

– Tone ID (M)

– Duration (O)

12.5.3.7 Leg ID

As defined for the SSF-SCF interface.

12.5.3.8 Mailbox ID

This IE identifies the mailbox for which information shall be recorded, in case the subscriber owns multiple mailboxes.

12.5.3.9 Media

This IE indicates the type of media for the recording.

12.5.3.10 Message ID to Send

Identifies the message id which should be sent.

12.5.3.11 Message Receiving Completion Condition

Specifies the condition which is referred by the SRF to judge the end of message receiving. It is a choice of the following:

– Maximum Receiving time Duration.

– End of Receiving Digit.

– Re-receiving Digit.

Maximum Receiving time Duration

This field may be used when the receiving voice message has a time duration limitation to receive.

End of Receiving Digit

This field may be used by call party when the receiving is likely to stop.

Re-receiving Digit

This IE may be used by call party when the received message should be initialized and message should be received again.

12.5.3.12 Number of Repetitions

Indicates the number of repetitions for message sending.

12.5.3.13 Operation Identifier

This IE identifies the specific play announcement or prompt and collect to be cancelled. This will be mapped on to an Invoke ID in the physical plane.

12.5.3.14 Received Information

Contains the information collected from the user. This is either digits or an IA5 string.

12.5.3.15 Received Message ID

Identifies the message which is received in voice message sender/receiver.

12.5.3.16 Received Message Length

Indicates the length of the message in a time duration scale.

12.5.3.17 Received Status

Indicates the cause of message receiving completion. This cause can be one of the following three values:

– received and ended by the end of receiving digit;

– received and receiving message length has reached;

– not received caused by call party improper behavior such as disconnection.

12.5.3.18 Request Announcement Completed Indication

This IE indicates that the SRF should send a specialized resource report IF when the announcement is complete.

12.5.3.19 Request Send Message Completed

This IE indicates that the SRF should send a Specialized Resource Report IF when the message is sent.

12.5.3.20 SRF Connect ID

Identifies a specific instance of a relationship between the SCF and the SRF. It is mapped to a TCAP transaction ID in the physical plane.

12.5.3.21 Subscriber ID

This IE identifies to the SRF, the subscriber for whom information shall be recorded.

12.5.3.22 Type of Report

This IE indicates that whether the Specialized resource Report IF is for Play Announcement or for send message IF.

12.5.3.23 User Interaction Script ID

This IE is used to address the User Interaction script.

12.5.3.24 User Interaction Script Result Information

This IE is used to give to the SCF the result of the User Interaction: yes/no/cancel, identifier + PIN, dialled number, etc.

12.5.3.25 User Interaction Script Specific Information

This IE is used to give to the SRF information dependent on the User Interaction script invoked (e.g. context information of the Service Logic).

12.6 SCF-SCF relationship

12.6.1 General

A relationship between two SCFs is established when IN CS-2 service logic in one SCF requires interactions with service logic in another SCF. Such service logic distribution can be call (processing) related. In general, the SCF which invokes the relation (called "controlling" SCF), requests the other (invoked) SCF (called "supporting") to perform certain actions. Results of these actions may be sent to the controlling SCF either as an immediate response or at a later time in the form of event notifications (solicited notifications).

One SCF may also send event notifications to the other SCF to inform it of asynchronous changes in the remote service logic (e.g. the cancellation of a service in the user's home network during call processing for this user).

The information that one SCF sends to another SCF is the result of service logic processing in that SCF. In particular, such service logic may lead to the establishment of an SCF-SDF relationship. The supporting SCF may then retrieve and process data. Subsequently, that supporting SCF may pass such data to the controlling SCF, which may further process and retain the data in a local SDF.

A request to perform an action or event notification can trigger a supporting SCF to establish an additional relationship with a third SCF.

The relationship may be normally terminated by service logic in either of the two SCFs involved in the relationship. It can also be aborted in case of abnormal conditions in the network (e.g. timer expiration, fraudulent access is detected, or too many connection attempts).

The SCF-SCF relationship is established by the controlling SCF to the supporting SCF (or IAF) when the controlling SCF detects the origination of a call (i.e. call routing) that requires the relationship. In addition, the SCFs relating to the call have other relationships to other FEs (e.g. SCF, SDF, etc.), but the termination of the SCF-SCF relationship does not affect these relationships and vice versa.

The specifications in this subclause are provided independently to the relationships to other FEs (e.g. the SDF) in the network where the SCF resides. It should be noted that theses relationships are outside scope of this subclause; however, each network performs appropriate internal actions to provide the services requiring the SCF-SCF relationship.

12.6.2 Information flows between the SCF and SCF

12.6.2.1 Activity Test

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF), or supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is used to check for the continued existence of a relationship between the controlling SCF and the supporting SCF. If the relationship still needs to exist, then the SCF (or IAF) will respond with the Activity Test Result IF. If no reply is received, then the SCF issuing this IF will assume that the SCF has failed in some way and will take the appropriate action.

The initiation criteria and the interval of this IF should not interfere with the normal processing between the SCFs (or the SCF and the IAF), and are pre-arranged between two network operators.

c) Information Elements:

Service Processing ID (M)

d) Mapping to FE Model(s):

Precondition

– A relationship exists between the controlling SCF and the supporting SCF. The AT timer in the SCF issuing this IF expires.

Postcondition

– If an Activity Test Result IF is received, the SCF issuing this IF resets the Activity Test timer.

12.6.2.2 Activity Test Result

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF) , or supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is the response to the Activity Test IF. If the relationship should be maintained, this IF is issued.

c) Information Elements:

Service Processing ID (M)

d) Mapping to FE Model(s):

The SCF that received the Activity Test (AT) IF sends this IF to provide the result of the AT IF.

12.6.2.3 Additional Information Result

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

This IF sends back additional information to the supporting SCF that has requested it in order to assist the controlling SCF. It can also send back indication that a user interaction has failed and the user information could not be collected from the user.

c) Information Elements:

Information (M)
Service Processing ID (M)
Security Information (O)

d) Mapping to FE Model(s):

Precondition

– The controlling SCF is requested for additional information by means of Provide User Information IF.

Postcondition

– The controlling SCF waits for receiving the Handling Information Result IF.

12.6.2.4 Confirmed Notification Provided

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

The Confirmed Notification Provided IF informs the service logic in the supporting SCF of service processing related information from the controlling SCF. The conditions of notification can either be requested to the controlling SCF by the reception of a Request Notification IF from the supporting SCF or be pre-arranged as part of the agreement between the two SCFs.

c) Information Elements:

Request Confirmation	(M)
SCF Notification	(M)
Service Processing ID	(M)
Security Information	(O)

d) Mapping to FE Model(s):

Precondition

– A relationship has been established between the two SCFs and a Handling Information Request IF has been sent to the supporting SCF. A Request Notification IF might have been received by the controlling SCF. The controlling SCF detects the event to be notified to the supporting SCF, notifies it and requests the supporting SCF to give back the confirmation IF.

Postcondition

– The controlling SCF is waiting a Notification Provided Confirmation IF from the supporting SCF.

12.6.2.5 Confirmed Report Charging Information

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

This IF is issued by the controlling SCF to the supporting SCF (or IAF) to provide with the charging related information which will be used as the charge record of a call in the controlling SCF. This IF may either be the response to the previously received Establish Charging Record IF or can be sent without having received the Establish Charging Record IF, in the pre-arranged case. In any case a Handling Information Request has been sent.

c) Information Elements:

Calling Party Number	(M)
Service Processing ID	(M)
Request Confirmation	(M)
Account Number	(O)
Call Record	(O)
Called Party Number	(O)
Remaining User Credit	(O)
Security Information	(O)
Unique Call ID	(O)

d) Mapping to FE Model(s):

Precondition

1) The Handling Information Request IF has been sent to the supporting SCF. An Establish Charging Record IF might have been received by the controlling SCF.

2) A call has taken place.

Postcondition

– The controlling SCF is waiting a Report Charging Information Confirmation IF from the supporting SCF.

12.6.2.6 Establish Charging Record

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is issued by the supporting SCF (or IAF) to give the controlling SCF charging related information needed for the call to proceed, e.g. charging rate information and maximum allowed credit. When the call instance is terminated, a response is returned to the supporting SCF.

This IF is a way to enable both SCFs to manage the charging information without pre-defined manner (this means the charging related information will vary call-by-call even if the same service/service features are invoked in the controlling SCF).

c) Information Elements:

Service Processing ID	(M)
Charging Parameters	(O)
Report Expected	(O)
Security Information	(O)
User Credit	(O)

d) Mapping to FE Model(s):

This IF applies in the context of an existing relationship between two SCFs.

Precondition

– A Handling Information Request IF has been received.

Postcondition

1) The controlling SCF monitors for charging notification requested event.

2) The supporting SCF waits for the Report Charging Information IF or the Confirmed Report Charging Information IF.

12.6.2.7 Handling Information Referral

a) FE Relationship: supporting SCF to controlling SCF.

b) Synopsis:

This IF is the response to the Handling Information IF in the case where the supporting SCF does not contain the data involved in the request, and is used to provide the controlling SCF with the information required to redirect the query to another supporting SCF. Note that on the physical plane this IF maps on to the ERROR part of the Handling Information Request operation.

c) Information Elements:

Authorized Relationship ID	(M)
Referral Information	(M)

d) Mapping to FE Model(s):

The SDF does not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.6.2.8 Handling Information Request

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

The Handling Information Request IF enables the controlling SCF to request information from the supporting SCF for the call to proceed. The requested information is returned in a Handling Information Result IF. This IF is issued by the controlling SCF for requesting a call processing information to the other SCF, or for requesting the other SCF to perform the predefined actions. This IF supports the case with Service Logic in one SCF communicating with Service logic in the other SCF. The presence of the parameters in the IF is dependent on the Service Logic type exchanged in the SCF Bind Request IF. This IF will not be sent empty.

c) Information Elements:

Service Processing ID	(M)
Active Supplementary Services	(O)
Bearer Capability	(O)
Called Party Number	(O)
Calling Party Number	(O)
Calling Party Business Group ID	(O)
Calling Party's Category	(O)
Cause Of Last Call Failure	(O)
Dialled Digits	(O)
High Lever Compatibility	(O)
Input Information	(O)
Invoked Supplementary Services	(O)
Location Number	(O)
Number Of Call Attempts	(O)
Original Called Party ID	(O)
Redirecting Party ID	(O)
Redirection Information	(O)
Requested Type	(O)
Security Information	(O)
User Interaction Mode	(O)

d) Mapping to FE Model(s):

Precondition

1) The controlling SCF has received a user request that it is not able to handle, or the SCF has recognized a call condition previously registered as a call condition for which assistance from another SCF is needed; or

2) the controlling SCF has deducted from user information the address of the SCF being able to provide assistance, or the controlling SCF has already issued this operation and the dialogue with the supporting SCF has been established.

Postcondition

– The supporting SCF processes the Handling Information Request HIReq IF and prepares for response.

12.6.2.9 Handling Information Result

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is a response to Handling Information Request.

c) Information Elements:

Service Processing ID	(M)
Calling Party Number	(O)
Calling Party's Category	(O)
Carrier	(O)
High Layer Compatibility	(O)
Language ID	(O)
Original Called Party ID	(O)
Output Information	(O)
Redirecting Party Id	(O)
Redirection Information	(O)
Routing Address	(O)
Security Information	(O)
Supplementary Services	(O)

d) Mapping to FE Model(s):

Precondition

– A relationship has been established and a response to a previous HIReq is pending.

Postcondition

– If there is no HIReq pending, the relationship is closed.

12.6.2.10 Network Capability Request

a) FE Relationship: supporting SCF to controlling SCF (or SCF to IAF).

b) Synopsis:

The Network Capability Request (NCReq) IF enables the supporting SCF to request from the controlling SCF the type of services that can be fulfilled by the controlling SCF, if not already specified by the agreement. This IF can only take place when a relationship exists between the two entities involved in the IF. It must be preceded by a HIReq IF. The requested information is returned in the Network Capability Result (NCRes). It gives the level of service that can be expected from the controlling SCF. This type of information can be used to build the response to the initial Handling Information Request.

c) Information Elements:

Service Processing ID	(M)
Bearer services	(O)
Security Information	(O)
Supplementary Services	(O)
Teleservices	(O)

d) Mapping to FE Model(s):

Precondition

– A relationship has been established and a HIReq has been received by the supporting SCF. The supporting SCF has identified the need to know which type of services is provided by the controlling SCF.

Postcondition

– The controlling SCF can either send a Network Capability Result IF or an error indication is returned. The latter case may include the situation where the controlling SCF is unwilling to provide the requested information.

12.6.2.11 Network Capability Result

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

The Network Capability Result (NCRes) IF is a response to the Network Capability Request (NCReq) IF. The use of this IF is described in the subclause on the Network Capability Request IF.

c) Information Elements:

Service Processing ID	(M)
Bearer Services	(O)
Security Information	(O)
Supplementary Services	(O)
Teleservices	(O)

d) Mapping to FE Model(s):

The mapping is identical to the one provided in the Network Capability Request IF.

Precondition

– An NCReq IF has been received by the controlling SCF.

Postcondition

– The supporting SCF uses the information received in the NCRes to provide the assistance.

12.6.2.12 Notification Provided

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

The Notification Provided IF informs the service logic in the supporting SCF of service processing related information from the controlling SCF. The conditions of notification can either be requested to the controlling SCF by the reception of a Request Notification IF from the supporting SCF or be pre-arranged as part of the agreement between the two SCFs.

c) Information Elements:

Service Processing ID	(M)
SCF Notification	(M)

d) Mapping to FE Model(s):

Precondition

– A relationship has been established between the two SCFs and a Handling Information Request IF has been sent to the supporting SCF. A Request Notification IF might have been received by the controlling SCF. The controlling SCF detects the event to be notified to the supporting SCF.

Postcondition

– None.

12.6.2.13 Notification Provided Confirmation

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is the response to the Confirmed Notification Provided IF. It is sent from the supporting SCF to the controlling SCF.

c) Information Elements:

Service Processing ID	(M)

d) Mapping to FE Model(s):

Precondition

1) A relationship is established between the controlling SCF and the supporting SCF.
2) The supporting SCF has received a Confirmed Notification Provided IF from controlling SCF.

Postcondition

– On receipt of this IF, the SLPI in the controlling SCF is informed of the reception.

12.6.2.14 Provide User Information

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is used by the supporting SCF to request additional information from the controlling SCF. This IF is initiated when the supporting SCF receives a Handling Information Request IF from the controlling SCF and it detects that additional information is needed from the calling user/controlling SCF in order for the call to proceed. The supporting SCF requests the controlling SCF for additional information by means of a Provide User Information IF. The controlling SCF executes the actions needed to retrieve the information requested and returns the information to the supporting SCF by the Additional Information Result IF. The supporting SCF will then execute the service features subscribed to and return to the controlling SCF the appropriate handling information as a result to the first Handling Information Request. The supporting SCF may invoke multiple Provide User Information IFs.

c) Information Elements:

Constraints	(M)
Information To Send	(M)
Number Of Allowed Retries	(M)
Service Processing ID	(M)
Type Of Requested Info	(M)
Actions	(O)
Error Info	(O)
Language ID	(O)
Security Information	(O)

d) Mapping to FE Model(s):

Precondition

– The supporting SCF received Handling Information Request and it detects that additional information is needed from the controlling SCF in order for the call to proceed.

Postcondition

– The supporting SCF will receive the requested information with the Additional Information Result IF from the controlling SCF.

12.6.2.15 Report Charging Information

a) FE Relationship: controlling SCF to supporting SCF (or SCF to IAF).

b) Synopsis:

This IF is issued by the controlling SCF to the supporting SCF (or IAF) to provide with the charging related information which will be used as the charge record of a call in the controlling SCF. This IF may either be the response to the previously received Establish Charging Record IF or can be sent without having received the Establish Charging Record IF, in the pre-arranged case. In any case a Handling Information Request has been sent.

c) Information Elements:

Service Processing ID	(M)
Calling Party Number	(M)
Account Number	(O)
Call Record	(O)
Called Party Number	(O)
Remaining User Credit	(O)
Security Information	(O)
Unique Call ID	(O)

d) Mapping to FE Model(s):

Precondition

1) The Handling Information Request IF has been sent to the supporting SCF. An Establish Charging Report IF might have been received by the controlling SCF.

2) A call has taken place.

Postcondition

– None.

12.6.2.16 Report Charging Information Confirmation

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

This IF is issued by the supporting SCF (or IAF) to enable the controlling SCF to confirm the Confirmed Report Charging Information IF reception.

c) Information Elements:

Service Processing ID	(M)

d) Mapping to FE Model(s):

Precondition

– A Confirmed Report Charging Information IF has been received by the supporting SCF.

Postcondition

– On receipt of this IF, the controlling SCF is informed of the reception.

12.6.2.17 Request Notification

a) FE Relationship: supporting SCF to controlling SCF (or IAF to SCF).

b) Synopsis:

The Request Notification IF requires from the supporting SCF the service logic in the controlling SCF the notifications of service processing related information.

c) Information Elements:

Requested Notifications	(M)
Service Processing ID	(M)
Security Information	(O)

d) Mapping to FE Model(s):

Precondition

– A relationship has been established between the SCFs and the supporting SCF recognizes the need to request for notification.

Postcondition

1) The controlling SCF monitors for notification requested events.
2) The supporting SCF waits for the Notification Provided IF or the Confirmed Notification Provided IF.

12.6.2.18 SCF Bind Request

a) FE Relationship: controlling SCF to supporting SCF.

b) Synopsis:

The SCF Bind Request IF is used to establish relationship between two SCFs. This IF is mandatory. This information flow is sent by a controlling SCF each time it needs to initiate communications with another (supporting) SCF and to ensure that the called entity has all facilities to operate on messages to be sent. It is mapped to the SCF Bind operation of the SCF-SCF protocol.

c) Information Elements:

Agreement ID	(M)
Service Processing ID	(M)
SCF Address	(O)
Security Information	(O)

d) Mapping to FE Model(s):

The controlling SCF sends this information flow to the supporting SCF to establish the SCF-SCF association.

12.6.2.19 SCF Bind Result

a) FE Relationship: supporting SCF to controlling SCF.

b) Synopsis:

The SCF Bind Result IF is used by the supporting SCF to respond to the request for an association from the controlling SCF. It is mapped to the Return Result of the SCF Bind operation of the SCF-SCF protocol. The supporting SCF either accepts the SCF Bind Request sending via SCF Bind Result IF an information about the entity accepting the association, or rejects it sending optionally the reason for it. Before the supporting SCF sends the positive SCF Bind Result, it shall not accept any other messages from the requesting side for this association. Neither shall it send any messages for this association to the controlling SCF other than SCF Bind Result.

c) Information Elements:

Service Processing ID	(M)
Security Information	(O)
Supporting SCF Address	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to the controlling SCF in the response to the SCF Bind Request IF to confirm/reject the establishment of the SCF-SCF communications.

12.6.2.20 SCF Unbind Request

a) FE Relationship: controlling SCF to supporting SCF.

b) Synopsis:

The SCF Unbind Request IF is used to request the termination of the active association with the supporting SCF. It can be sent only by the controlling SCF.

c) Information Elements:

Service Processing ID	(M)

d) Mapping to FE Model(s):

The controlling SCF sends this information flow to the supporting SCF to terminate the SCF-SCF association.

12.6.3 IE Definitions for SCF to SCF Information Flows

12.6.3.1 Account Number

This IE is unique identification of the account to which the cost of the call is registered.

12.6.3.2 Actions

This IE identifies actions that the controlling SCF should take to collect information from the user: play an announcement and/or collect digits.

12.6.3.3 Active Supplementary Services

This IE contains the list of supplementary services that have been activated by the user. These activated supplementary services can have an impact on the call. Only information available to the SCF can be provided.

12.6.3.4 Agreement ID

The Agreement ID identifies the service logic type which will be supported across the SCF-SCF interface during the lifetime of the association. An agreement may correspond to a service logic type which is standardized at the ITU level, or by a regional standard organization. It may also correspond to a service logic bilaterally defined by two cooperating operators.

In order to allow the exchange of this information across networks, each agreement should be assigned an object identifier. The Agreement ID value is the object identifier value.

12.6.3.5 Bearer Capability

This IE indicates the type of bearer capability connection or the transmission medium requirements to the user.

12.6.3.6 Bearer Services

Contains the bearer services that might be needed by the supporting SCF in the context of the call.

12.6.3.7 Call Record

Contains the call record related to the call. This information is network specific and defined by bilateral agreements between network operators.

12.6.3.8 Called Party Number

This IE is used to identify the called party in the forward direction. This IE is present if the service logic has been able to recognize a called party number in the information provided by the user. When the format has not be recognized the called party number can be conveyed in the IE "Dialled Digits".

12.6.3.9 Calling Party Business Group ID

This IE (if available) identifies the business group associated with the calling party. The SCF can use this IE to select SLPs based on the group and for authorization purposes. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

12.6.3.10 Calling Party Number

This IE carries the calling party number to identify the calling party or the origin of the call.

12.6.3.11 Calling Party's Category

It indicates the type of calling party (e.g. operator, pay-phone, ordinary user).

12.6.3.12 Carrier

This IE consists of two parts, the Carrier Selection indicates whether the primary carrier was presubscribed or dialled and the Carrier ID indicates the presubscribed carrier of the caller. This is useful for networks where the user can select the carrier for the call.

12.6.3.13 Cause of Last Call Failure

This IE gives the reason of the failure of the last call, if any. This last call is considered within the same service logic program instance.

12.6.3.14 Charging Parameters

Contains the different parameters that are used to parameterize the generic charging function.

12.6.3.15 Constraints

This IE defines what information should be expected from the user. It indicates the type and the size of the input to be dialled by the user. It also contains the number of times an announcement can be played to a user without getting a correct user input, before being considered as failed.

12.6.3.16 Dialled Digits

This IE is used to convey information collected from the user through a user interaction procedure or in the setup phase and that has not been recognized as information to be included in another IE.

12.6.3.17 Error Info

This IE contains the information to be passed to the user if the latter has failed to provide correct inputs to a previous interaction. To verify its correctness, the user input is only challenged against the information provided in the "constraints" IE.

12.6.3.18 High Layer Compatibility

This IE indicates the type of high layer compatibility, which will be used to determine the ISDN-teleservice of a connected ISDN terminal.

12.6.3.19 Information

This IE contains the values of the information requested.

12.6.3.20 Information To Send

This IE is used to convey the contents of the information passed to the user.

12.6.3.21 Input Information

This IE contains any other kind of information that might be needed by a specific kind of service logic. Information that can be conveyed has been agreed between network operators when defining the service logic object.

12.6.3.22 Invoked Supplementary Services

This IE contains the supplementary service that has been invoked by the user. Only information available to the controlling SCF can be provided.

12.6.3.23 Language ID

Identifies the calling party preferred language that was used. This information is not sent if it was previously sent (or is ignored).

12.6.3.24 Location Number

This IE contains information on the location of the user. It conveys the geographical address for mobility services. It is used when the "callingPartyNumber" does not contain any information about the location of the calling party. It may be used by the supporting SCF in case of a location dependent routing.

12.6.3.25 Number of Allowed Retries

The IE provides the number of retries the user is allowed to make.

12.6.3.26 Number of Call Attempts

This IE gives the number of previous call attempts before the one that is currently handled. The number of call attempts is considered within the same service logic program instance.

12.6.3.27 Original Called Party ID

This IE (if available) is the directory number of the first redirecting party (i.e. the number originally dialled by the caller).

12.6.3.28 Output Information

This IE contains any other kind of information that might be the results of a specific kind of service logic. Information that can be conveyed has been agreed between network operators when defining the service logic object.

12.6.3.29 Redirecting Party ID

This IE indicates the last directory number of the last redirecting party.

12.6.3.30 Redirection Information

This IE (if available) indicates the reason for forwarding the call from the DN of the first and last redirecting party, and indicates the number of forwardings that have occurred.

12.6.3.31 Referral Information

Specifies to the identity of the alternative SDF which can be used to handle the requested operation. The Referral Information specification can be found in the Referral Error specification in 16.1.13/Q.1228.

12.6.3.32 Remaining User Credit

Contains the user's credit after the call.

12.6.3.33 Report Expected

A boolean indicating if the charging information should be passed back to the supporting SCF at the end of the call.

12.6.3.34 Request Confirmation

If this IE exists, it shows that the controlling SCF will wait for a confirmation from the supporting SCF after issuing the Confirmed Report Charging Information IF or Confirmed Notification Provided IF.

12.6.3.35 Requested Notifications

This IE contains a set of call conditions which request the notification from controlling SCF when met.

12.6.3.36 Requested Type

This IE is used to identify the context in which the operation will be used in a service logic type. The list of allowed values (and the associated semantic) is part of the definition of each service logic type. The scope of the Requested Type IE is local to an Agreement ID.

12.6.3.37 Routing Address

This IE contains indications on how the call should be handled. These indication can be a request to forbid the call or the list of called party numbers towards which the call is to be routed.

12.6.3.38 SCF Address

This IE is the address of the SCP that requests the agreement.

12.6.3.39 SCF Notifications

This IE contains an indication that a call condition previously expressed by the supporting SCF has been met. It holds together with the type of call condition parameter which are associated to the call condition (if any).

12.6.3.40 Security Information

The IE conveys the security parameters (e.g. credentials), used for integrity, confidentiality, authentication. The type of information it contains used should be established via agreement ahead of time.

12.6.3.41 Service Processing ID

This IE identifies the relationship between SCFs and is mapped on a TCAP transaction identity (similar to the call ID for the SCF-SSF relationship).

12.6.3.42 Supplementary Services

Contains the supplementary services that might be needed by the supporting SCF in the context of the call.

12.6.3.43 Supporting SCF Address

This IE represents the address of the supporting SCF.

12.6.3.44 Teleservices

Contains the teleservices that might be needed by the supporting SCF in the context of the call.

12.6.3.45 Type of Requested Info

The IE provides the type info to be requested to the user.

12.6.3.46 Unique Call ID

This IE is information to uniquely identify the call.

12.6.3.47 User Credit

Contains the user's available credit.

12.6.3.48 User Interaction Mode

This IE conveys the type of user interaction modes that are available in the controlling SCF.

12.7 SCF-CUSF relationship

12.7.1 General

A relationship between the SCF and the CUSF is established either as a result of the CUSF sending a request for instruction to the SCF, or at the request of the SCF for initiation of an association. A single SCF may have concurrent relationships with multiple CUSFs. A single CUSF only has one control relationship with one SCF at a given time; however, there may be additional monitor relationships. These are the same for the SCF-SSF relationship. When the CUSF receives call unrelated processing related IEs from the SCF, it substitutes these IEs for the corresponding call unrelated process information.

12.7.2 Information flows between the SCF and CUSF

The following IFs and IEs are for Call unrelated out-channel user interaction:

12.7.2.1 Activation Received and Authorized

a) FE Relationship: CUSF to SCF.

b) Synopsis:

This IF is issued by the CUSF for reporting the TDP event to the SCF that an association request (optionally with a request of an invocation of operation) has been received, and criteria for the Activation Received and Authorized DP were met.

c) Information Elements:

Call ID	(M)
Service Address Information	(M)
Terminal Type	(M)
Calling Party Number	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Location Number	(O)

d) Mapping to FE Model(s):

The CUSF sends this information flow to the SCF upon detecting a DP at Activation Received and Authorized DP in an BCUSM.

CUSF Precondition

1) Call unrelated process has been initiated.
2) The authority/ability of the user invoking the particular operation was verified (optional).
3) DP criteria have been met (optional).
4) For a TDP-R, there is no existing control relationship for the call unrelated process.

CUSF Postcondition

1) For a TDP-R, call unrelated process has been suspended at Activation Received and Authorized DP, and a control relationship has been established.
2) For a TDP-N, call unrelated proceeds at Activation Received and Authorized PIA, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, a CUSF instruction is being prepared.

12.7.2.2 Activity Test

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This IF is used to check for the continued existence of a relationship between the SCF and CUSF. If the relationship is still in existence, then the CUSF will respond with Activity Test For CUSF Response. If no reply is received, then the SCF will assume that the CUSF has failed in some way and will take the appropriate action.

c) Information Elements:

Call ID	(M)

d) Mapping to FE Model(s)

12.7.2.3 Activity Test Response

a) FE Relationship: CUSF to SCF.

b) Synopsis:

This IF is the response to the Activity Test For CUSF IF.

c) Information Elements:

Call ID (M)

d) Mapping to FE Model(s)

12.7.2.4 Association Release Requested

a) FE Relationship: CUSF to SCF.

b) Synopsis:

This IF is issued by the CUSF for reporting the TDP/EDP event to the SCF that a request of association release with optionally an operation invocation request or an response/error has been received, and criteria for the Association release Requested DP were met.

c) Information Elements:

Call ID	(M)
Service Address Information	(M)
Terminal Type	(M)
Calling Party Number	(O)
Component	(O)
Component Correlation ID	(O)
Component Type	(O)
Location Number	(O)

d) Mapping to FE Model(s):

The CUSF sends this information flow to the SCF upon detecting a DP at Association Release Requested DP in a BCUSM.

CUSF Precondition

1) Call unrelated process has been initiated and the association has been established.
2) Indication received that the association is about to be cleared.
3) DP criteria have been met.
4) For a TDP-R, there is no existing control relationship for the call unrelated process.

CUSF Postcondition

1) For a TDP-R, call unrelated process has been suspended at Association Release Requested DP, and a control relationship has been established.
2) For a TDP-N, call unrelated proceeds at Release PIA, and no control relationship has been established.
3) For an EDP-R, there is an existing control relationship and the EDP Association Release Requested is armed.
4) For an EDP-N, there is a monitoring or control relationship.

SCF Precondition

– None (TDP case).
  An SLPI has been invoked (EDP case).

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, a CUSF instruction is being prepared.

12.7.2.5 Component Received

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This IF is issued by the CUSF for reporting the TDP/EDP event to the SCF that an operation invocation request or a response/error has been received, and criteria for the Component Received DP were met.

c) Information Elements:

Call ID	(M)
Service Address Information	(M)
Terminal Type	(M)
Component	(O)
Component Correlation ID	(M)
Component Type	(O)
Calling Party Number	(O)
Location Number	(O)

d) Mapping to FE Model(s):

The CUSF sends this information flow to the SCF upon detecting a DP at Component Received DP in a BCUSM.

CUSF Precondition

1) Call unrelated process has been initiated and the association has been established.
2) Indication received that the component has been received.
3) DP criteria have been met.
4) For a TDP-R, there is no existing control relationship for the call unrelated process.

CUSF Postcondition

1) For a TDP-R, call unrelated process has been suspended at Component Received DP, and a control relationship has been established.
2) For a TDP-N, call unrelated proceeds at Release PIA, and no control relationship has been established.
3) For an EDP-R, there is an existing control relationship and the EDP Component Received is armed.
4) For an EDP-N, there is a monitoring or control relationship.

SCF Precondition

– None (TDP case).
  An SLPI has been invoked (EDP case).

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, a CUSF instruction is being prepared.

12.7.2.6 Initiate Association

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This information flow is used to allow the SCF to initiate a call unrelated association with the user.

c) Information Elements:

Call ID	(M)
Called Party Number	(M)

d) Mapping to FE Model(s):

This operation is used to allow the SCF to initiate a call unrelated association with the user.

Precondition

– One SLPI in the SCF requests to initiate a call unrelated association with the user.

Postcondition

– This SLPI prepares to send a component to the user.

12.7.2.7 Request Report BCUSM Event

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This IF is issued by the SCF for requesting the CUSF to report an EDP event to the SCF. The EDP event may be selectively reported by the CUSF with criteria for the DPs specified by this information flow, such as invoke, return result, etc., but this capability is optional.

c) Information Elements:

Call ID	(M)
BCUSM Event List	(M)
Component Correlation ID	(O)
Component Type	(M)
Monitor Duration	(O)

d) Mapping to FE Model(s):

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the CUSF.
3) The SLPI has determined that a Request Report BCUSM Event IF should be sent by the SCF.

SCF Postcondition

1) In the case where Monitor mode has the values of Interrupted or Notify & Continue, the SLPI is expecting an event report from the CUSF.
2) SLPI execution continues.

CUSF Precondition

– Call unrelated process origination attempt has been initiated.

CUSF Postcondition

1) Specified EDPs have been armed or disarmed, as identified.
2) If all EDP-Rs are disarmed, then the relationship becomes a non-control relationship.
3) If call unrelated processing is suspended at a DP, the CUSF waits for further instructions from the SCF.

12.7.2.8 Release Association

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This IF is issued by the SCF for requesting the CUSF to release the logical connection.

c) Information Elements:

Call ID	(M)
Cause	(M)

d) Mapping to FE Model(s):

This information flow applies during any phase of call unrelated processing.

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the CUSF.
3) The SLPI has determined that a Release Association IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

CUSF Precondition

– Association establishment attempt has been initiated.

CUSF Postcondition

– BCUSM transition to Null PIA.

12.7.2.9 Send Component

a) FE Relationship: SCF to CUSF.

b) Synopsis:

This IF is issued by the SCF for requesting the CUSF to send a specified component to the SCUAF with a specified message. If the invocation from a network side takes place, the CUSF establishes a logical connection for a user with Called Party Number.

c) Information Elements:

Call ID	(M)
Component	(O)
Component Correlation ID	(M)
Message	(M)
Monitor Duration	(O)

d) Mapping to FE Model(s):

SCF Precondition

1) An SLPI has been invoked.
2) A control relationship exists between the SCF and the CUSF.
3) The SLPI has determined that a Send Component IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

CUSF Precondition:

1) Association establishment attempt has been initiated.
2) The authority/ability of the user invoking the particular operation was verified (optional).
3) Call unrelated process processing has been suspended at a DP.

CUSF Postcondition

1) BCUSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Call unrelated processing resumes at Active (for Component Received DP) or Release (for Association Release Request DP) PIA.

12.7.3 IE Description for the SCF-CUSF information flows

12.7.3.1 BCUSM Event List

This IE has a list structure (Event Type specifies one of the BCUSM DP):

– Event Type (M)

– Monitor Mode (M)

12.7.3.2 Call ID

Defined as per the SCF-SSF relationship.

12.7.3.3 Called Party Number

Defined as per the SCF-SSF relationship.

12.7.3.4 Calling Party Number

Defined as per the SCF-SSF relationship.

12.7.3.5 Cause

This IE provides the cause value for determining the end of the relationship.

12.7.3.6 Component

This IE contains the operation value (object identifier) error value, etc. within the UNI APDU, in addition, it also contains the parameter set/sequence for the operation invocation/return result or return error/reject on UNI. Or, this IE contains whole UNI APDU (this means, it contains semantically Component Correlation ID and Component Type, in this case, these two IEs will not be used).

12.7.3.7 Component Correlation ID

This IE gives the relationship between the local operation and the reported component. This IE is assigned by the operation invocation entity.

12.7.3.8 Component Type

Specifies the component type should be reported or used by the CUSF. The component type is invoke or return result or error or reject. When this IE is used with Request Report BCUSM Event IF, it may be sequence of them (max. 3) or "any" ("any" means all four types are specified simultaneously).

12.7.3.9 Location Number

Defined as per the SCF-SSF relationship.

12.7.3.10 Message

Specifies the message to deliver the component that is different from the used signalling system. For example, REGISTER, FACILITY, REL, REL COMP can be used for DSS 1.

12.7.3.11 Monitor Duration

Defined as per the SCF-SSF relationship.

12.7.3.12 Service Address Information

Defined as per the SCF-SSF relationship.

12.7.3.13 Terminal Type

Defined as per the SCF-SSF relationship.

12.8 SCF-SDF relationship

12.8.1 General

A relationship is established between the SCF and SDF at the request of the SCF when the SCF requires to retrieve or modify some data contained within the SDF. The relationship is terminated by the SDF.

IFs related to the SDF may be associated with some degree of processing, depending on the supported service. This processing is related to data manipulation but not to call control.

Only a logical view of data is known to the SCF. The IFs do not imply any physical organization of data or how they are stored. In particular, the fact that data are replicated is not known to the SCF.

As the Directory access protocol was introduced to this version on the physical plane, Information Flows (IFs) are aligned with them, and many Information Elements (IEs) are replaced with the equivalent parameters in Recommendation X.511. However, some of them are not employed in this version on physical plane.

12.8.2 Information flows between the SCF and SDF

12.8.2.1 Add Entry

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is used to add a leaf entry in the DIT in an SDF.

c) Information Elements:

Authorized Relationship ID	(M)
Entry	(M)
Object	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SDF to add a leaf entry in the DIT in the SDF.

12.8.2.2 Add Entry Referral

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Add Entry IF in the case where the SDF dose not contain the data involved in the request, and is used to provide the SCF with the information required to redirect the query to another SDF. Note that on the physical plane this IF maps on to the ERROR part of the Add Entry operation.

c) Information Elements:

Authorized Relationship ID (M)
Referral Information (M)

d) Mapping to FE Model(s):

The SDF dose not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.8.2.3 Add Entry Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Add Entry IF. Note that on the physical plane this IF maps on to the RESULT part of the Add Entry operation.

c) Information Elements:

Authorized Relationship ID (M)

d) Mapping to FE Model(s):

The SDF sends this IF to the SCF to provide the result of adding a leaf entry to the DIT in the SDF.

12.8.2.4 Authenticate

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is used to request the establishment of the authenticated relationship between the SCF and the SDF on behalf of the end user.

c) Information Elements:

Authentication Information (M)
Authorized Relationship ID (M)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SDF to request the SDF to perform authentication.

12.8.2.5 Authenticate Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is used to confirm an establishment of an authenticated relationship between the SCF and the SDF on behalf of the end user.

c) Information Elements:

Authorized Relationship ID (M)
Authentication Information (O)

d) Mapping to FE Model(s):

The SDF sends this information flow to an SCF to inform SCF of authentication result and/or to perform a mutual authentication.

12.8.2.6 End Authenticated Relationship

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is issued by the SCF to end an authenticated relationship between the SCF and the SDF on behalf of the end user.

c) Information Elements:

Authorized Relationship ID (M)

d) Mapping to FE Model(s):

The SCF sends the information flow to an SDF to end a previous authenticated relationship between the SCF and SDF on behalf of an end user.

For further details refer to the distributed service logic for SCF-SDF interaction in 11.2.

12.8.2.7 Execute

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is used to request the SDF to perform the data access script associated with a particular item of data held in the DIT in the SDF.

c) Information Elements:

Authorized Relationship ID	(M)
Execute Identifier	(M)
Object	(M)
Specific Input Value	(M)
Input Attributes	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to execute a data access script associated with a service object.

12.8.2.8 Execute Referral

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Execute IF in the case where the SDF dose not contain the data involved in the request, and is used to provide the SCF with the information required to redirect the query to another SDF. Note that on the physical plane this IF maps on to the ERROR part of the Execute operation.

c) Information Elements:

Authorized Relationship ID	(M)
Referral Information	(M)

d) Mapping to FE Model(s):

The SDF dose not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.8.2.9 Execute Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Execute IF. Note that on the physical plane this IF maps on to the RESULT part of Execute operation.

c) Information Elements:

Authorized Relationship ID	(M)
Specific Output Value	(M)
Output Attributes	(O)

d) Mapping to FE Model(s):

The SDF sends this information flow to execute a data access script associated with a service object.

12.8.2.10 Modify Entry

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF when requested will entail an atomic execution of the update.

However, problems such as concurrent access to the data are not solved by the IFs.

c) Information Elements:

Authorized Relationship ID	(M)
Changes	(M)
Object	(M)
Selection	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SDF to write to a service data object.

12.8.2.11 Modify Entry Referral

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Modify Entry IF in the case where the SDF dose not contain the data involved in the request, and is used to provide the SCF with the information required to redirect the query to another SDF. Note that on the physical plane this IF maps on to the ERROR part of the ModifyEntry operation.

c) Information Elements:

Authorized Relationship ID	(M)
Referral Information	(M)

d) Mapping to FE Model(s):

The SDF dose not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.8.2.12 Modify Entry Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Modify Entry IF. Note that in the INAP this IF maps on to the RESULT part of the ModifyEntry operation.

c) Information Elements:

Authorized Relationship ID	(M)
Information	(O)

d) Mapping to FE Model(s):

The SDF sends this information flow to an SCF to provide the result of writing the modification to a specified service data object.

12.8.2.13 Remove Entry

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is used to remove a leaf entry in the DIT in an SDF.

c) Information Elements:

Authorized Relationship ID	(M)
Object	(M)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SDF to remove a leaf entry in the DIT in the SDF.

12.8.2.14 Remove Entry Referral

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Remove Entry IF in the case where the SDF dose not contain the data involved in the request, and is used to provide the SCF with the information required to redirect the query to another SDF. Note that on the physical plane this IF maps on to the ERROR part of the RemoveEntry operation.

c) Information Elements:

Authorized Relationship ID	(M)
Referral Information	(M)

d) Mapping to FE Model(s):

The SDF dose not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.8.2.15 Remove Entry Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Remove Entry IF. Note that on the physical plane this IF maps on to the RESULT part of the RemoveEntry operation.

c) Information Elements:

Authorized Relationship ID	(M)

d) Mapping to FE Model(s):

The SDF sends this IF to the SCF to provide the result of removing a leaf entry in the DIT in the SDF.

12.8.2.16 Search

a) FE Relationship: SCF to SDF.

b) Synopsis:

This IF is used to query items of data held in the DIT in the SDF (e.g. a translation of a freephone number).

c) Information Elements:

Authorized Relationship ID	(M)
Base Object	(M)
Selection	(M)
Subset	(M)
Filter	(O)
Matched Values Only	(O)

d) Mapping to FE Model(s):

The SCF sends this information flow to an SDF to read a service data object (search for an object whose name is not completely known and to compare objects according to some given criteria).

12.8.2.17 Search Referral

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Search IF in the case where the SDF dose not contain the data involved in the request, and is used to provide the SCF with the information required to redirect the query to another SDF. Note that on the physical plane this IF maps on to the ERROR part of the Search operation.

c) Information Elements:

Authorized Relationship ID	(M)
Referral Information	(M)

d) Mapping to FE Model(s):

The SDF dose not contain the data required and sends this IF to the SCF to provide it with the information necessary to redirect the query to another SDF.

12.8.2.18 Search Result

a) FE Relationship: SDF to SCF.

b) Synopsis:

This IF is the response to the Search IF. Note that on the physical plane this IF maps on to the RESULT part of the Search operation.

c) Information Elements:

Authorized Relationship ID	(M)
Search Info	(M)

d) Mapping to FE Model(s):

The SDF sends this information flow to an SCF to provide the result of reading specified service data objects or the result of comparison.

12.8.3 IE Description for the SCF-SDF information flows

12.8.3.1 Authentication Information

This IE, if being used with Authenticate IF, contains information needed to perform the required type of authentication. No information might be needed.

This IE, if being used with Authenticate Result IF, is as defined for the Authenticate IF, except for the meaning of the information is reversed.

12.8.3.2 Authorized Relationship ID

Identifies the established Authorized Relationship between the service logic and the database through which operations can be applied. At the physical plane for IN CS-2, it is mapped on to a TCAP transaction identity.

12.8.3.3 Base Object

Identifies a specific entry within the DIB in which or under which the requested information may reside.

12.8.3.4 Changes

Specifies a sequence of modifications that are applied in the order specified. There are six modification types: add/remove Attribute or Values, alter Values, and set Values to its default.

12.8.3.5 Entry

This IE contains the (set of) attribute information to be created.

12.8.3.6 Execute Identifier

Identifies the particular Object data access script requiring execution.

12.8.3.7 Filter

This IE eliminates entries which are not of interest from the search space specified with Base Object and Subset.

12.8.3.8 Information

This IE describes the result of the requested operation, e.g. success or failure with a specific reason. (If not empty, it contains the results of the modifications, i.e. the modified data, it can also contain some information requested during the Modify Entry IF as explained before.)

12.8.3.9 Input Attributes

This IE describes the attributes with may be submitted as input to the execution of Execute IF.

12.8.3.10 Matched Values only

Specifies that certain attribute values are to be omitted from the returned entry information.

Following is the possible information queried by Search IF:

– Routing address;

– Off net/On net indicator (destination address in VPN or not);

– Expected authorization result;

– Expected verification result;

– Expected screening result.

NOTE – The verification and screening mentioned here should not be related to authentication which uses the Authenticate IF.

Following are the examples which are candidates for Base Object, Subset, Extended filter, and Selection; however, precise mapping between them depends on an information model:

– Called number;
– PIN + ID;
– Calling Party Number;
– Input From User (Dialled digits);
– Calling terminal capabilities;
– Calling/called line service profile;
– Screened list ID + Screened information ID;
– Bearer resource type (this key must be combined with other keys);
– etc.

Information elements in the initial DP IF are all candidates for determining a set of Base Object, Subset, Selection, and Extended Filter. The precise structure and possible values for the IEs in this IF will be service specific.

12.8.3.11 Object

Specifies the one specific entry to be targeted.

Identifies, if being used with Execute IF, a specific entry within the DIB to which the requested data access script is associated.

12.8.3.12 Output Attributes

This IE contains the attributes which may be returned as output of the execution of Execute IF.

12.8.3.13 Referral Information

Specifies to the identity of the alternative SDF which can be used to handle the requested operation.

12.8.3.14 Search info

This IE contains the information requested using the Search IF. It may contain data or more simply a result of the comparison.

12.8.3.15 Selection

Specifies what information from the entries is requested, if being used with Search IF.

This IE, if being used with Modify Entry IF, is used to request some data contained in the object where the modifications take place.

12.8.3.16 Specific Input Value

Specifies parameter information required for the execution of the specified data access script. The type and form of the information is dependent on the requested data access script.

12.8.3.17 Specific Output Value

This IE contains the information requested using the Execute IF. The type and form of the information is dependent on the particular data access script requested with the Execute IF.

12.8.3.18 Subset

Specifies to what level(s) the search should be done, i.e. the Base Object only, or the immediate subordinates of the Base Object, or the Base Object and all its subordinates.

12.9 SDF-SDF relationship

12.9.1 General

The purpose of the SDF-SDF relationship is twofold. It should provide both data location transparency and efficiency of data distribution.

These two usages of the SDF-SDF relationship correspond to two types of operations. First, when hiding the data distribution, an operation sent to an SDF could be forwarded to another SDF which holds the relevant data by using the SDF-SDF interface. In this case, the procedures over the SDF-SDF interface used are for the chaining of SCF-SDF procedures. When the SDF-SDF relationship is used to manage the data distribution and to improve the overall efficiency of the data procedures, the SDF-SDF interface is used to transfer data from an SDF to another SDF. In this case, the procedures are transfer and copy procedures.

12.9.2 Information flows between the SDF and SDF

12.9.2.1 Authenticate

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to have identification and authentication of two SDFs involved in an SDF-SDF relationship. This procedure is prior to any procedure on the SDF-SDF interface. It is used to enforce access control policy between databases.

c) Information Elements:

Authentication Information	(M)
Authorized Relationship ID	(M)

d) Mapping to FE Model(s):

The initiating SDF sends this information flow to an SDF with which it is interacting in order to perform authentication.

12.9.2.2 Authenticate Result

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to confirm the result of authentication by the interacting SDF.

c) Information Elements:

Authentication Information	(M)
Authorized Relationship ID	(M)

d) Mapping to FE Model(s):

The responding SDF sends this information flow to an SDF with which it is interacting in order to perform authentication.

12.9.2.3 Chaining Request

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to pass from the invoking SDF to the responding SDF a database request that cannot be fulfilled by the invoking SDF. The responding SDF is considered by the invoking SDF as the SDF holding the data needed to perform the database request.

Indications contained in the database of the invoking SDF motivate the sending of the chaining procedure to the responding SDF.

c) Information Elements:

Authorized Relationship ID	(M)
Chained Argument	(M)
Security Parameters	(M)

d) Mapping to FE Model(s):

The initiating SDF sends this information flow to an SDF with which it is interacting in order to perform the chained operation. This would include indication of the manner in which authentication has been carried out between the SDFs.

12.9.2.4 Chaining Result

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to pass from the responding SDF to the invoking SDF the results of the request for performing a database request that cannot be fulfilled by the invoking SDF.

c) Information Elements:

Authorized Relationship ID	(M)
Chained Result	(M)
Security Parameters	(M)

d) Mapping to FE Model(s):

The responding SDF sends this information flow to the initiating SDF with which it is interacting in order to perform the chained operation.

12.9.2.5 Copy Request

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to copy data contained in the responding SDF to the invoking SDF. The copy (or a part of it) can be refreshed regularly or not at all. This maintenance of the copy is done through the use of the Update Copy procedure. The need for a Copy procedure originates from network events or service events. This procedure puts indications in the invoking SDF about the location of the master copy.

c) Information Elements:

Authorized Relationship ID	(M)
Maintained Part	(M)
Master	(M)
Replication Area	(M)
Update Mode	(M)
Update Strategy	(M)

d) Mapping to FE Model(s):

The invoking SDF sends this information flow to the responding SDF in order to request a copy.

12.9.2.6 Copy Result

a) FE Relationship: SDF to SDF.

b) Synopsis:

This procedure is used to provide the copy data contained in the responding SDF to the invoking SDF.

c) Information Elements:

Authorized Relationship ID (M)
Replicated Data (M)

d) Mapping to FE Model(s):

The responding SDF sends this information flow to the invoking SDF in order to provide a copy.

12.9.2.7 End Authenticated Relationship

a) FE Relationship: SDF to SDF.

b) Synopsis:

This IF is issued by the SDF to end an authenticated relationship between two SDFs.

c) Information Elements:

Authorized Relationship ID (M)

d) Mapping to FE Model(s):

The invoking SDF sends the information flow to an SDF to end a previously authenticated relationship.

12.9.2.8 Update Copy

a) FE Relationship: SDF to SDF.

b) Synopsis:

This IF is used to maintain a copy contained in the SDF to which a copy was originally provided because the selected update mode indicates that an update of the copy should be sent (e.g. modification of the copy in the responding network). The format of the information to be sent follows the indications contained in the information element update strategy of the Copy procedure.

c) Information Elements:

Authorized Relationship ID (M)
Refreshed Information (M)

d) Mapping to FE Model(s):

The invoking SDF sends this information flow to an SDF to which a copy was previously provided in order to update the copy.

12.9.2.9 Update Copy Result

a) FE Relationship: SDF to SDF.

b) Synopsis:

This IF confirms results of the Update Copy Request.

c) Information Elements:

Authorized Relationship ID (M)

d) Mapping to FE Model(s):

The SDF to which a copy update was provided sends this IF to confirm results of the UpdateCopy.

12.9.3 IE Description for the SDF-SDF information flows

12.9.3.1 Authentication Information

This IE, if being used with Authenticate IF, contains information needed to perform the required type of authentication. No information might be needed.

This IE, if being used with Authenticate Result IF, contains information used in providing results of the authentication procedure, as previously defined.

12.9.3.2 Authorized Relationship ID

Identifies the established Authorized Relationship between two FEs through which operations can be applied. At the physical plane for IN CS-2, it is mapped on to a TCAP transaction identity.

12.9.3.3 Chained Argument

This IE contains the argument of a database operation of the SCF-SDF interface as defined in CS-1. That is the argument of the forwarded operation.

12.9.3.4 Chained Result

This IE gives the result of the chained request.

12.9.3.5 Maintained Part

This IE describes the part of the copy that should be regularly maintained.

12.9.3.6 Master

This IE gives the name of the master. It is used to know the origin of the copy.

12.9.3.7 Refreshed Information

This IE contains the update of the copy according to the format specified in the information element update strategy of the Copy procedure.

12.9.3.8 Replication Area

This IE describes the part of the database of the responding SDF that should be replicated in the database of the invoking SDF.

12.9.3.9 Replicated Data

This IE contains the copy that should be placed in the invoking network.

12.9.3.10 Security Parameters

This IE, if being used with Chaining Request, governs the operation of various security features associated with the directory operation.

This IE, if being used with Chaining Result, governs the operation of various security features associated with the directory operation. This would include indication of the manner in which authentication has been carried out between the SDFs.

12.9.3.11 Update Mode

This IE indicates when the copy should be updated (on changes or periodically) and who will take the initiative of updating it.

12.9.3.12 Update Strategy

This IE indicates whether the full copy should be returned or only the changes made to it.

12.10 IE Population Rules

12.10.1 SSF/CCF to SCF Information Flows

Following are the initial IN CS-1 population rules for the IFs listed in Table 12.10-1. The IEs are declared in the Sequence order which they are defined in Recommendation Q.1228. IEs which are reported only for TDPs are indicated with *(TDP)*, all other IEs are reported for both TDPs and EDPs. Only those IEs which are impacted by the PIC preceding the DP are reported for EDPs. Population rules for other IFs are for further study. The exact interworking with ISUP/DSS 1 is for further study.

Table 12.10-1/Q.1224 – Information Flow Pointers

Subclause	Information Flow	Information Element
12.10.1.1	Analysed Information	Access Code Bearer Capability Called Party Number Calling Facility Group Calling Facility Group Member Calling Party Business Group ID Calling Party Number Calling Party's Category Calling Party Subaddress Carrier Call Gapping Encountered Charge Number Dialled Digits Extensions Extensions (Specific to the DP) Feature Code ISDN Access Related Information Location Number Original Called Party ID Prefix Redirecting Party ID Redirection Information Route List Service Address Information Service Profile Identifier Serving Area Id SRF Available SRF/SSF Capabilities Terminal Type Travelling Class Mark
12.10.1.2	Collected Information	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.3	O Answer	Extensions (specific to the DP) Service Address Information (specific to the DP)

Table 12.10-1/Q.1224 – Information Flow Pointers *(concluded)*

Subclause	Information Flow	Information Element
12.10.1.4	O Called Party Busy	Busy Cause Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.5	O Disconnect	Connect Time Extensions (specific to the DP) Release Cause Service Address Information (specific to the DP)
12.10.1.6	O No Answer	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.7	Origination Attempt Authorized	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.8	Route Select Failure	Failure Cause Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.9	T Answer	Called Facility Group Called Facility Group Member Called Party Business Group ID Called Party Subaddress Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.10	T Busy	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.11	T Disconnect	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.12	T No Answer	Extensions (specific to the DP) Service Address Information (specific to the DP)
12.10.1.13	Term Attempt Authorized	Extensions (specific to the DP) Service Address Information (specific to the DP)

12.10.1.1 Analysed Information

For the Analysed Information IF, the EDP IEs are those related to the dialling phase of the call.

DP Common IEs

1) Service Address Information – This IE consists of three additional IEs:

   a) serviceKey (TDP) – This IE optionally specifies a pointer to the SCF-based service logic and is populated based on analysis of either the Called Party Number, or the Calling Party Number, or the Charge Number as specified by information associated with the trigger type assignment for the numbering plan (network-operator defined).

   b) miscCallInfo – The miscCallInfo IE indicates whether the IF is expecting a response (i.e. request) or not (i.e. notify). For TDPs, this IE is populated based on information in the SSF/CCF associated with the trigger type assignment. For EDPs, this IE is populated with "requested" if the bcsmEvent monitorMode indicates interrupted, else the IE is populated with "notification" if the bcsmEvent monitorMode indicates

notifyAndContinue. This IE also optionally indicates whether the triggering condition encountered is line, group, or office based (network-operator specific).

c) triggerType (TDP) – Depending on the trigger encountered in the numbering plan, the applicable triggerType shall be populated:

Trigger Encountered	**Trigger Type**
BRI_Feature_Activation_Indicator	featureActivator
Public_Feature_Code	verticalServiceCode
Specific_Feature_Code	specificFeatureCode
Customized_Dialling_Plan	customizedAccess, customizedIntercom
Specific_Digit_String	as per numbering plan
Emergency_Service	emergencyService

2) Bearer Capability (TDP) – This IE contains the bearer capability of the call that encountered the trigger. The SSF/CCF shall include the Bearer Capability IE in the IF regardless of the originating access type, according to:

- If the originating UNI is a DSS 1 interface, the Bearer Capability shall be populated from the information received in the Bearer Capability IE defined in Recommendation Q.931.
- If the originating NNI is an SS No. 7 interface, the Bearer Capability shall be all included from the information received as the User Service Information, User Service Information Prime, Transmission Medium Requirement, or Transmission Medium Requirement Prime parameter (choice is network-operator specific) as defined in Recommendation Q.762.
- If the originating UNI is a non-ISDN interface, the Bearer Capability should be populated with a network-operator specific value (e.g. 3.1 kHz audio).
- If the originating NNI is a non-SS No. 7 interface, the Bearer Capability should be populated with a network-operator specific value (e.g. 3.1 kHz audio).

3) Called Party Number – This IE contains the address of the called party and shall be included in the IF when routing digits are received from the originating facility.

Depending on the numbering plan, the trigger type, and the information provided by the originating facility, this IE may or may not be populated:

a) For the trigger types of featureActivator, verticalServiceCode and customizedAccess for which the numbering plan requires either a variable number of digits or no additional digits, the Called Party Number IE shall not be provided.

b) For all other trigger types and numbering plan requirements, the Called Party Number shall be populated as follows:

- If the originating UNI is a DSS 1 interface, the Called Party Number shall be populated from the information received as the Called Party Number IE as defined in Recommendation Q.931.
- If the originating NNI is an SS No. 7 interface, the Called Party Number shall be populated from the information received as the Called Party Number parameter as defined in Recommendation Q.762.
- If the originating UNI is a non-ISDN interface, the Called Party Number shall be populated as a result of digit analysis.
- If the originating NNI is a non-SS No. 7 interface, the Called Party Number shall be populated as a result of digit analysis.

4) Calling Party Number (TDP) – This IE contains the address of the calling party. The Calling Party Number shall be populated as follows:

- If the originating UNI is a DSS 1 interface, the Calling Party Number shall be populated in the same manner that the ISDN-UP Calling Party Number parameter is determined as defined in DSS 1.
- If the originating NNI is an SS No. 7 interface, the Calling Party Number shall be populated from the information received as the Calling Party Number parameter as defined in Recommendation Q.762.
- If the originating UNI is a non-ISDN interface, the Calling Party Number shall be populated as a result of SSF/CCF processing.
- If the originating NNI is a non-SS No. 7 interface, the Calling Party Number shall be populated as a result of SSF/CCF processing, if available.

5) Calling Party's Category (TDP) – This IE contains the subscriber category of the calling party. The Calling Party's Category shall be populated as follows:

- If the originating UNI is a DSS 1 or non-ISDN interface, the Calling Party's Category should be populated using the internal data of the SSF/CCF (network-operator specific).
- If the originating NNI is an SS No. 7 interface, the Calling Party's Category shall be included from the information received as the Calling Party’s Category parameter as defined in Recommendation Q.762. Additional mappings are network-operator specific.
- If the originating NNI is a non-SS No. 7 interface, the Calling Party's Category should be populated using the information received (network-operator specific).

6) SRF/SSF Capabilities (TDP) – This IE is network-operator specific. If used, it should be populated from SSF/CCF information which indicates the IP functionality available on the SSF/CCF.

7) SRF Available (TDP) – This IE is network-operator specific. If used, it should be populated with the status of the SRF if the SSF/CCF has SRF capabilities.

8) ISDN Access Related Information (TDP) – The ISDN Access Related Information shall be populated as follows:

- If the originating UNI is a DSS 1 interface, the ISDN Access Related Information shall be populated from the information received as Bearer Capability IE as defined in Recommendation Q.931.
- If the originating NNI is an SS No. 7 trunk, the ISDN Access Related Information shall be included from the information received as the Access Transport parameter as defined in Recommendation Q.762. This IE contains information that may not have been checked by the network for coding errors.
- If the originating NNI is a non-SS No. 7 interface or the UNI is a non-ISDN interface, this IE shall not be included.

9) Call Gapping Encountered (TDP) – When the gap criteria associated with the detected TDP has call gapping active and the TDP is allowed to be sent, this IE shall be populated depending on the control type.

10) Location Number (TDP) – This IE shall be populated if it is available.

11) Service Profile Identifier (TDP) – This IE shall be populated when a Service Profile Identifier information element is received in the SETUP message from a DSS 1 interface.

12) Terminal Type (TDP) – This IE reflects the characteristics of the originating facility. This IE reflects the terminal signalling capabilities, if known, as defined by the network operator.

13) Extensions – If used, it is populated as defined by the network operator.

14) Charge Number (TDP) – This IE contains the charge number for the calling party. Population and/or mapping of this IE is network-operator specific.

15) Serving Area ID (TDP) – This IE contains the serving area of the originating facility and should be included if available. Population of this IE is network-operator specific.

Analysed Information Specific IEs

16) Dialled Digits – This IE contains the routing digits provided by the originating facility and shall be included in the IF when routing digits are received from the originating facility. The contents of the IE are dependent on the trigger type encountered and the numbering plan:

   a) For the trigger types of featureCode or accessCode for which the numbering plan required no additional digits following the code, the Dialled Digits IE shall not be reported.

   b) For the trigger types of featureCode or accessCode for which the numbering plan required a variable number of digits to be collected following the code (e.g. PIN) , the Dialled Digits IE shall be populated with the collected digits, Nature Of Address Indicator = unknown, Numbering Plan = network-operator specific.

   c) For Customized Dialing Plan triggers, the Dialled Digit IE shall be populated with: Nature Of Address Indicator = unknown, Numbering Plan = network-operator specific, digits populated with the collected digits.

   d) For all other cases, the Dialled Digits IE should be populated in the same manner as the Called Party Number. Other cases may be network-operator specific.

17) Calling Party Business Group ID (TDP) – Population and/or mapping of this IE is network-operator specific.

18) Calling Party Subaddress (TDP) – The information contained in this IE is available either as a result of DSS 1 or ISDN-UP signalling and shall be populated if available, according to the following:

   - If the originating UNI is a DSS 1 interface, the Calling Party Subaddress shall be included from the information received in the Calling Party Subaddress IE of the SETUP message, as defined in Recommendation Q.931.
   - If the originating NNI is an SS No. 7 trunk, the Calling Party Subaddress shall be included from the information received as the Access Transport parameter calling party subaddress of the IAM message, as defined in Recommendation Q.762. This IE contains information that may not have been checked by the network for coding errors.

19) Callinific – For example, depending on the originating facility type the following procedures may apply:

   a) Public trunk group – The trunkGroupID choice should be populated with the trunk group number.

   b) Private trunk group – The privateFacilityID choice should be populated with the trunk group number of that facility.

   c) Multiline hunt group – The huntGroup choice should be populated with the hunt group number of the facility.

20) Calling Facility Group Member (TDP) – Population and/or mapping of this IE is network-operator specific. For example, for group related SSF/CCF originating facilities which meet the example three types defined for Calling Facility Group, this IE should be populated with the specific member number of the originating facility.

21) Original Called Party ID (TDP) – This IE is the address of the first party that redirected the call. This number is encoded as per the numbering plan in the corresponding parameter.

- When available as a result of call forwarding, the SSF/CCF shall populate the Original Called Party lD IE, if this information is available. This information would only be necessary when the call has been forwarded at least twice (Redirecting Party ID is used if the call is forwarded only once).
- When the originating access is an SS No. 7 trunk and the received IAM contains the original called number parameter, the SSF/CCF shall use this information to populate the Original Called Party lD IE.

22) Prefix – This IE shall be populated whenever the calling party dials any prefix digits (as administered by the network operator). The method of extracting the prefix is network-operator specific.

23) Redirecting Party ID (TDP) – This IE is the address of the last party that redirected the call. This value is encoded as per the numbering plan.

- When available as a result of call forwarding, the SSF/CCF shall include the Redirecting Party ID IE. This information would only be available when the call has been forwarded at least once.
- When the originating access is an SS No. 7 trunk and the received IAM contains the redirecting number parameter, the SSF/CCF shall use this information to populate the Redirecting Party ID IE.

24) Redirection Information (TDP) – This IE contains the original redirecting reason (i.e. the reason for the first redirection of the call), the redirecting reason (i.e. the reason for the last redirection of the call), and the ISDN-UP redirection counter.

- When available as a result of call forwarding, the SSF/CCF shall include the Redirection Information IE.
- When the originating access is an SS No. 7 trunk and the received IAM contains the redirection information parameter, the SSF/CCF shall use this information to populate the Redirection Information IE.

25) Route List – This IE provides a pointer to a list of routes associated with the dialled digits. It should be populated whenever the dialled digit string identifies outgoing trunk routes. The value of the IE is network-operator administered.

26) Travelling Class Mark (TDP) – This IE contains the travelling class mark of the calling party. Population and/or mapping of this IE is network-operator specific.

27) Extensions – If used, it is populated as defined by the network operator.

28) Feature Code – This IE should be populated when the originating access is a non-ISDN line or a DSS 1 interface and the SSF/CCF receives information that can be mapped to a feature code. Population and/or mapping of this IE is network-operator specific.

29) Access Code – This IE should be populated when the originating access uses a customized numbering plan and the SSF/CCF receives an access code. The received access code should populate the digits field of the Access Code IE. Population and/or mapping of this IE is network operator specific.

30) Carrier – Population and/or mapping of this IE is network-operator specific. This IE consists of two fields:

- The Carrier Selection field indicates whether the carrier was presubscribed or dialled. If presubscribed, the IE should be populated only for TDPs.

- The Carrier ID field indicates the presubscribed carrier of the originating facility, the carrier specified by a dialled code as per the numbering plan, or the carrier specified in signalling (network-operator specific).

Carrier is of local significance and carrying its value through the ISDN-UP is for further study.

12.10.1.2 Collected Information

For the Collected Information IF, the EDP IEs are those related to the dialling phase of the call.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IE:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated based on the criteria defined:

Trigger Encountered	Trigger Type
Offhook-Delay	offhookDelay
Channel Setup PRI	channelSetupPRI
Shared Interoffice Trunk	sharedInterofficeTrunk

Collected Information Specific IEs

2) Dialled Digits – See 12.10.1.1.
3) Calling Party Business Group ID (TDP) – See 12.10.1.1.
4) Calling Party Subaddress (TDP) – See 12.10.1.1.
5) Calling Facility Group – (TDP) – See 12.10.1.1.
6) Calling Facility Group Member (TDP) – See 12.10.1.1.
7) Original Called Party ID (TDP) – See 12.10.1.1.
8) Prefix – See 12.10.1.1.
9) Redirecting Party ID (TDP) – See 12.10.1.1.
10) Redirection Information (TDP) – See 12.10.1.1.
11) Travelling Class Mark (TDP) – See 12.10.1.1.
12) Extensions – If used, it is populated as defined by the network operator.
13) Feature Code – See 12.10.1.1.
14) Access Code – See 12.10.1.1.
15) Carrier – See 12.10.1.1.

12.10.1.3 O Answer

For the O Answer IF, the EDP IEs are those related to answered condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of oAnswer.
2) Called Party Number (TDP) – See 12.10.1.1.

O Answer Specific IEs

3) Calling Party Business Group ID (TDP) – See 12.10.1.1.

4) Calling Party Subaddress (TDP) – See 12.10.1.1.

5) Calling Facility Group (TDP) – See 12.10.1.1.

6) Calling Facility Group Member (TDP) – See 12.10.1.1.

7) Original Called Party ID (TDP) – See 12.10.1.1.

8) Redirecting Party ID (TDP) – See 12.10.1.1.

9) Redirection Information (TDP) – See 12.10.1.1.

10) Route List (TDP) – See 12.10.1.1.

11) Travelling Class Mark (TDP) – See 12.10.1.1.

12) Extensions – If used, it is populated as defined by the network operator.

12.10.1.4 O Called Party Busy

For the O Called Party Busy IF, the EDP IEs are those related to busy condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of oCalledPartyBusy.

2) Called Party Number (TDP) – See 12.10.1.1.

O Called Party Busy Specific IEs

3) Busy Cause – This IE reflects the cause of the busy condition for the terminating party. This IE shall be populated as described in Recommendation Q.763. The cause/location values can be found in Recommendation Q.850. This IE shall be populated as follows:

   a) For network-determined user busy of non-ISDN lines:

      – Coding Standard = ITU-T (ex-CCITT) standard;

      – General Location = public network serving the remote user;

      – Cause = user busy.

   b) For DSS 1 interfaces, the Cause IE as defined in Recommendations Q.931, Q.762, and Q.850 shall be mapped to the Busy Cause IE.

   c) For outgoing SS No. 7 trunks, the received cause parameter as defined in Recommendation Q.763 for the ISDN-UP REL message shall be mapped to the Busy Cause IE.

   d) For other conditions causing the TDP to be encountered, the cause should be mapped as follows (network-operator specific). Examples include:

      – Number not assigned to office equipment: cause = no route to destination;

      – Call rejected event not specifying user busy: cause = call rejected.

4) Calling Party Business Group ID (TDP) – See 12.10.1.1.

5) Calling Party Subaddress (TDP) – See 12.10.1.1.

6) Calling Facility Group (TDP) – See 12.10.1.1.

7) Calling Facility Group Member (TDP) – See 12.10.1.1.

8) Original Called Party ID (TDP) – See 12.10.1.1.

9) Prefix (TDP) – See 12.10.1.1.

10) Redirecting Party ID (TDP) – See 12.10.1.1.

11) Redirection Information (TDP) – See 12.10.1.1.

12) Route List (TDP) – See 12.10.1.1.

13) Travelling Class Mark (TDP) – See 12.10.1.1.

14) Extensions – If used, it is populated as defined by the network operator.

12.10.1.5 O Disconnect

For the O Disconnect IF, the EDP IEs are those related to disconnect condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of oDisconnect.

2) Called Party Number (TDP) – See 12.10.1.1.

O Disconnect Specific IEs

3) Calling Party Business Group ID (TDP) – See 12.10.1.1.

4) Calling Party Subaddress (TDP) – See 12.10.1.1.

5) Calling Facility Group (TDP) – See 12.10.1.1.

6) Calling Facility Group Member (TDP) – See 12.10.1.1.

7) Release Cause – This IE reflects the cause of the disconnect event received from the terminating party. This IE shall be populated as described in Recommendation Q.763. The cause/location values can be found in Recommendation Q.850. This IE shall be populated as follows:

   a) For call clearing of non-ISDN lines:
      - Coding Standard = ITU-T (ex-CCITT) standard;
      - General Location = public network serving the remote user;
      - Cause = normal clearing.

   b) For DSS 1 interfaces, the Cause IE as defined in Recommendations Q.931, Q.762, and Q.850 shall be mapped to the Release Cause IE.

   c) For outgoing SS No. 7 trunks, the received cause parameter as defined in Recommendation Q.763 for the ISDN-UP REL message shall be mapped to the Release Cause IE.

   d) Other conditions are for further study.

8) Route List (TDP) – See 12.10.1.1.

9) Extensions – If used, it is populated as defined by the network operator.

10) Carrier (TDP) – See 12.10.1.1.

11) Connect Time – This IE shall be populated with the amount of time which has elapsed between the processing of the answered event from the terminating party and the disconnect event.

12.10.1.6 O No Answer

For the O No Answer IF, the EDP IEs are those related to the no answer condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of oNoAnswer.
2) Called Party Number (TDP) – See 12.10.1.1.

O No Answer Specific IEs

3) Calling Party Business Group ID (TDP) – See 12.10.1.1.
4) Calling Party Subaddress (TDP) – See 12.10.1.1.
5) Calling Facility Group (TDP) – See 12.10.1.1.
6) Calling Facility Group Member (TDP) – See 12.10.1.1.
7) Original Called Party ID (TDP) – See 12.10.1.1.
8) Prefix (TDP) – See 12.10.1.1.
9) Redirecting Party ID (TDP) – See 12.10.1.1.
10) Redirection Information (TDP) – See 12.10.1.1.
11) Route List (TDP) – See 12.10.1.1.
12) Travelling Class Mark (TDP) – See 12.10.1.1.
13) Extensions – If used, it is populated as defined by the network operator.
14) Carrier (TDP) – See 12.10.1.1.

12.10.1.7 Origination Attempt Authorized

Since this is the first DP encountered in the originating call model, it cannot be reported as an EDP.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of originationAttemptAuthorized.

Orig Attempt Authorized Specific IEs

2) Dialled Digits (TDP) – See 12.10.1.1.
3) Calling Party Business Group ID (TDP) – See 12.10.1.1.
4) Calling Party Subaddress (TDP) – See 12.10.1.1.
5) Calling Facility Group (TDP) – See 12.10.1.1.
6) Calling Facility Group Member (TDP) – See 12.10.1.1.
7) Travelling Class Mark (TDP) – See 12.10.1.1.
8) Extensions – If used, it is populated as defined by the network operator.
9) Carrier (TDP) – See 12.10.1.1.

12.10.1.8 Route Select Failure

For the Route Select Failure IF, the EDP IEs are those related to the routing phase of the call.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of routeSelectFailure.
2) Called Party Number (TDP) – See 12.10.1.1.

Route Select Failure Specific IEs

3) Dialled Digits (TDP) – see 12.10.1.1.
4) Calling Party Business Group ID (TDP) – See 12.10.1.1.
5) Calling Party Subaddress (TDP) – See 12.10.1.1.
6) Calling Facility Group (TDP) – See 12.10.1.1.
7) Calling Facility Group Member (TDP) – See 12.10.1.1.
8) Failure Cause – This IE reflects the cause of the routing failure. This IE shall be populated as described in Recommendation Q.763. The cause/location values can be found in Recommendation Q.850.
9) Original Called Party ID (TDP) – See 12.10.1.1.
10) Prefix (TDP) – See 12.10.1.1.
11) Redirecting Party ID (TDP) – See 12.10.1.1.
12) Redirection Information (TDP) – See 12.10.1.1.
13) Route List (TDP) – See 12.10.1.1.
14) Travelling Class Mark (TDP) – See 12.10.1.1.
15) Extensions – If used, it is populated as defined by the network operator.
16) Carrier (TDP) – See 12.10.1.1.

12.10.1.9 T Answer

For the T Answer IF, the EDP IEs are those related to the answer condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of tAnswer.
2) Called Party Number (TDP) – See 12.10.1.1.

T Answer Specific IEs

3) Called Party Business Group ID (TDP) – This IE reflects the business group associated with the Called Party Number and should be populated when the called party is a member of a business group. The population of the IE is network-operator specific.

4) Called Party Subaddress (TDP) – This IE contains the called party subaddress. This IE shall be populated as follows:

- If the terminating UNI is a DSS 1 interface, this IE shall be populated with the DSS 1 called party subaddress IE, as defined in Recommendation Q.931.
- If the terminating NNI is an SS No. 7 interface, this IE shall be populated with the called party subaddress in the Access Transport parameter, as defined in Recommendation Q.762.

5) Called Facility Group (TDP) – For group related SSF/CCF terminating facilities, this IE identifies the type of group and group number. Population and/or mapping of this IE is network-operator specific. For example, depending on the terminating facility type, the following procedures may apply:

   a) Public trunk group – The trunkGroupID choice should be populated with the trunk group number.

   b) Private trunk group – The privateFacilityID choice should be populated with the trunk group number of that facility.

   c) Multiline hunt group – The huntGroup choice should be populated with the hunt group number of the facility.

   d) Route Index – For those facilities which do not belong in the above categories, this IE should contain the route index (network-operator provided).

6) Called Facility Group Member (TDP) – Population and/or mapping of this IE is network-operator specific. For example, for group related SSF/CCF terminating facilities which meet the example four types defined for Called Facility Group, this IE should be populated with the specific member number of the terminating facility.

7) Extensions – If used, it is populated as defined by the network operator.

12.10.1.10 T Busy

For the T Busy IF, the EDP IEs are those related to busy condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of tBusy.

2) Called Party Number (TDP) – See 12.10.1.1.

T Busy Specific IEs

3) Busy Cause – See 12.10.1.4.

4) Called Party Business Group ID (TDP) – See 12.10.1.9.

5) Called Party Subaddress (TDP) – See 12.10.1.9.

6) Original Called Party ID (TDP) – See 12.10.1.1.

7) Redirecting Party ID (TDP) – See 12.10.1.1.

8) Redirection Information (TDP) – See 12.10.1.1.

9) Route List (TDP) – See 12.10.1.1.

10) Travelling Class Mark (TDP) – See 12.10.1.1.

11) Extensions – If used, it is populated as defined by the network operator.

12.10.1.11 T Disconnect

For the T Disconnect IF, the EDP IEs are those related to the disconnect condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of tDisconnect.
2) Called Party Number (TDP) – See 12.10.1.1.

T Disconnect Specific IEs

3) Called Party Business Group ID (TDP) – See 12.10.1.9.
4) Called Party Subaddress (TDP) – See 12.10.1.9.
5) Called Facility Group (TDP) – See 12.10.1.9.
6) Called Party Facility Group Member (TDP) – See 12.10.1.9.
7) Release Cause – See 12.10.1.5.
8) Extensions – If used, it is populated as defined by the network operator.
9) Connect Time – See 12.10.1.5.

12.10.1.12 T No Answer

For the T No Answer IF, the EDP IEs are those related to the no answer condition.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of tNoAnswer.
2) Called Party Number (TDP) – See 12.10.1.1.

T No Answer Specific IEs

3) Called Party Business Group ID (TDP) – See 12.10.1.9.
4) Called Party Subaddress (TDP) – See 12.10.1.9.
5) Called Facility Group (TDP) – See 12.10.1.9.
6) Called Facility Group Member (TDP) – See 12.10.1.9.
7) Original Called Party ID (TDP) – See 12.10.1.1.
8) Redirecting Party ID (TDP) – See 12.10.1.1.
9) Redirection Information (TDP) – See 12.10.1.1.
10) Travelling Class Mark (TDP) – See 12.10.1.1.
11) Extensions – If used, it is populated as defined by the network operator.

12.10.1.13 Term Attempt Authorized

Since this is the first DP encountered in the terminating call model, it cannot be reported as an EDP.

DP Common IEs

The population rules for the common IEs are defined in 12.10.1.1, with the exception of the following IEs:

1) Service Address Information triggerType (TDP) – The trigger type shall be populated with the value of termAttemptAuthorized.

2) Called Party Number (TDP) – See 12.10.1.1.

Term Attempt Authorized Specific IEs

3) Called Party Business Group ID (TDP) – See 12.10.1.9.

4) Called Party Subaddress (TDP) – See 12.10.1.9.

5) Calling Party Business Group ID (TDP) – See 12.10.1.1.

6) Original Called Party ID (TDP) – See 12.10.1.1.

7) Redirecting Party ID (TDP) – See 12.10.1.1.

8) Redirection Information (TDP) – See 12.10.1.1.

9) Route List (TDP) – See 12.10.1.1.

10) Travelling Class Mark (TDP) – See 12.10.1.1.

11) Extensions – If used, it is populated as defined by the network operator.

12.11 Summary of information flows and related SIBs

SCF-SSF relationship

Defined in CS		1	2	2	1	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	2
Access Code	1						O												O						
Additional Calling Party Number	1																								
Alerting Pattern	1							O			O		O							O	O		O		
All Call Segments	2																								
Assisting SSF/ SRF Routing Address	1																								
Associated Call Segment	2																								
Backward GVNS	2							O					O							O	O		O		
BCSM Event Correlation ID	1						O												O						
BCSM Event List	1																								
BCSM Failure	2																								
Bearer Capability	1						O												O						
Billing Charging Characteristics	1								M																
Busy Cause	1																								
Call Gapping Encountered	1						O												O						
Call ID	1	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Call Processing Correlation ID	2																								
Call Result	1									M															
Call Segment ID	2																					O			
Called Facility Group	1																								
Called Facility Group Member	1																								
Called Party Business Group ID	1																								
Called Party Number	1						O	O																	
Called Party Subaddress	1																								
Calling Facility Group	1						O												O						
Calling Facility Group Member	1						O												O						
Calling Party Business Group ID	1						O												O						
Calling Party Number	1						O	O			O		O						O	O	O				
Calling Party Subaddress	1						O												O						
Calling Party's+A1s Category	1						O	O											O		O				
Carrier	1						O	O											O		O				
Cause	1																								
Charge Number	1						O	O											O						
Clear Reason	2																								
Component	2						O												O						
Component Correlation ID	2						O												O						
Component Type	2						O												O						
Connect Time	1																								
Control Type	1													O											
Correlation ID	1							O				M			O	O					O				
Correlator	2										O														
Counters Value	1																								

SCF-SSF relationship

	Defined in CS	Activate Service Filtering	Activate Trigger Data	Activate Trigger Data Confirmation	Activity Test	Activity Test Response	Analysed Information	Analyse Information	Apply Charging	Apply Charging Report	Apply User Treatment	Assist Request Instructions	Authorize Termination	Call Gap	Call Information Report	Call Information Request	Cancel All Requests	Cancel Status Report Request	Collected Information	Collect Information	Connect	Connect to Resource	Continue	Create Call Segment	Create Call Segment Result
Defined in CS		1	2	2	1	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	2
Access Code	1						O												O						
Created Call Segment Association ID	2						O												O						
CS Failure	2																								
Cut and Paste	1																				O				
Destination Routing Address	1							M					O								M				
Dialled Digits	1						O												O	O					
Display Information	2										O		O								O				
Event Specific Information BCSM	1																								
Event Specific Information Charging	1																								
Event Type BCSM	1																								
Event Type Charging	1																								
Failure Cause	1			O																					
Feature Code	1						O												O						
Feature Request Indicator	1																								
Filtered Call Treatment	1	M																							
Filtering Characteristics	1	M																							
Filtering Criteria	1	O																							
Filtering Timeout	1	M																							
Forward Call Indicators	1																				O				
Forward GVNS	2						O	O					O						O	O	O		O		
Forwarding Condition	1																				O				
Gap Criteria	1													M											
Gap Indicators	1													M											
Gap Treatment	1													O											
Generic Name	2																						O		
Generic Number	2																				O				
Higher Layer Compatibility	2																								
Hold Cause	1																								
IN Service Compatibility Indication	2						O												O						
IN Service Compatibility Response	2							O					O							O	O		O		
Initial Call Segment	2																								
IP Routing Address	1																					O			
ISDN Access Related Information	1						O	O					O						O		O				
Last Event Indicator	2														O										
Leg ID	1														O	O						O	O		
Leg ID To Be Created	2																								
Legs	2																								
Location Number	1						O												O						
Miscellaneous Call Info	1																								
Monitor Duration	1																								
Monitor Mode	1																								

SCF-SSF relationship

	Defined in CS	Activate Service Filtering	Activate Trigger Data	Activate Trigger Data Confirmation	Activity Test	Activity Test Response	Analysed Information	Analyse Information	Apply Charging	Apply Charging Report	Apply User Treatment	Assist Request Instructions	Authorize Termination	Call Gap	Call Information Report	Call Information Request	Cancel All Requests	Cancel Status Report Request	Collected Information	Collect Information	Connect	Connect to Resource	Continue	Create Call Segment	Create Call Segment Result
Defined in CS		1	2	2	1	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	2
Access Code	1						O												O						
Monitor Type	1																								
New Call Segment	2																								
New Call Segment Association	2																								M
Notification Duration	2																								
Numbering Plan	1																			O					
Operation Identifier	1																								
Original Called Party ID	1						O	O					O						O	O	O				
Party To Charge	1								O																
Prefix	1						O												O						
Redirecting Party ID	1						O												O		O				
Redirection Information	1						O												O		O				
Registrator Identifier	2		O																						
ReleaseCause	1																								
Report Condition	1																								
Requested Field	2																								
Requested Field Value	2																								
Requested Information List	2														M										
Requested Information Type	1															M									
Resource ID	1																	M							
Resource Status	1																								
Response Condition	1																								
Route List	1																				O				
SCF ID	1							O					O							O	O				
Sequence of Charging Event	1																								
Service Address Information	1						M												M						
Service Interaction Indicators	1						O	O					O						O	O	O				
Service Key	1																								
Service Profile Identifier	1						O												O						
Serving Area ID	1						O												O						
Source Call Segment	2																								
Source Call Segment Association	2																								
SRF Available	1						O					O							O						
SRF/ SSF Capabilities	1						O					O							O						
Start Time	1	O																							
Target Call Segment	2																								
Target Call Segment Association	2																								
Terminal Type	1						O												O						
Timer ID	1																								
Timer Value	1																								
Travelling Class Mark	1						O	O					O						O	O	O				

SCF-SSF relationship

	Defined in CS	Activate Service Filtering	Activate Trigger Data	Activate Trigger Data Confirmation	Activity Test	Activity Test Response	Analysed Information	Analyse Information	Apply Charging	Apply Charging Report	Apply User Treatment	Assist Request Instructions	Authorize Termination	Call Gap	Call Information Report	Call Information Request	Cancel All Requests	Cancel Status Report Request	Collected Information	Collect Information	Connect	Connect to Resource	Continue	Create Call Segment	Create Call Segment Result
Defined in CS		1	2	2	1	1	1	1	1	1	2	1	2	1	1	1	2	1	1	1	1	1	1	2	2
Access Code	1						O												O						
Trigger Data Identifier	2		M	M																					
Trigger Type	1																								
USI Information	2						O												O						
USI Monitor Mode	2																								
USI Service Indicator	2						O												O						

SCF-SSF relationship

	Defined in CS	Deactivate Trigger Data	Deactivate Trigger Data Confirmation	Disconnect Forward Connection	Disconnect Leg	Entity Released	Establish Temporary Connection	Event Notification Charging	Event Report BCSM	Event Report Facility	Facility Selected And Available	Furnish Charging Information	Hold Call In Network	Initial DP	Initiate Call Attempt	Merge Call Segments	Move Call Segments	Move Leg	O_Abandon	O_Answer	O_Called Party Busy	O_Disconnect	O_MidCall	O_No_Answer	O_Suspended
Defined in CS		2	2	1	2	2	1	1	1	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	2
Access Code	1																								
Additional Calling Party Number	1													O											
Alerting Pattern	1														O										
All Call Segments	2																								
Assisting SSF/ SRF Routing Address	1						M																		
Associated Call Segment	2																								
Backward GVNS	2																								
BCSM Event Correlation ID	1								O		O								O	O	O	O	O	O	O
BCSM Event List	1																								
BCSM Failure	2					O																			
Bearer Capability	1										O			O					O	O	O	O	O	O	O
Billing Charging Characteristics	1											M													
Busy Cause	1																				O				
Call Gapping Encountered	1										O			O					O	O	O	O	O	O	O
Call ID	1	M	M	M	M		M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Call Processing Correlation ID	2																								
Call Result	1																								
Call Segment ID	2			O			O												O						
Called Facility Group	1																								
Called Facility Group Member	1																								
Called Party Business Group ID	1										O												O		
Called Party Number	1										O			O					O	O	O	O	O	O	O
Called Party Subaddress	1										O												O		
Calling Facility Group	1																			O	O	O		O	
Calling Facility Group Member	1																			O	O	O		O	
Calling Party Business Group ID	1										O			O						O	O	O	O	O	
Calling Party Number	1										O			O	O				O	O	O	O	O	O	O
Calling Party Subaddress	1													O						O	O	O	O	O	
Calling Party's Category	1										O			O					O	O	O	O	O	O	O
Carrier	1						O														O	O	O	O	
Cause	1													O											
Charge Number	1										O								O	O	O	O	O	O	O
Clear Reason	2																								
Component	2								O	O	O											O	O		
Component Correlation ID	2								O	O	O											O	O		
Component Type	2								O	O	O											O	O		
Connect Time	1																					O			
Control Type	1																								
Correlation ID	1						O																		
Correlator	2								O																
Counters Value	1																								

SCF-SSF relationship

	Defined in CS	Deactivate Trigger Data	Deactivate Trigger Data Confirmation	Disconnect Forward Connection	Disconnect Leg	Entity Released	Establish Temporary Connection	Event Notification Charging	Event Report BCSM	Event Report Facility	Facility Selected And Available	Furnish Charging Information	Hold Call In Network	Initial DP	Initiate Call Attempt	Merge Call Segments	Move Call Segments	Move Leg	O_Abandon	O_Answer	O_Called Party Busy	O_Disconnect	O_MidCall	O_No_Answer	O_Suspended
Defined in CS		2	2	1	2	2	1	1	1	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	2
Access Code	1																								
Created Call Segment Association ID	2										O			O					O	O	O	O	O	O	O
CS Failure	2					O																			
Cut and Paste	1																								
Destination Routing Address	1														O										
Dialled Digits	1													O											
Display Information	2																								
Event Specific Information BCSM	1								O																
Event Specific Information Charging	1							O																	
Event Type BCSM	1								M					O											
Event Type Charging	1							M																	
Failure Cause	1		O																						
Feature Code	1																								
Feature Request Indicator	1																						O		
Filtered Call Treatment	1																								
Filtering Characteristics	1																								
Filtering Criteria	1																								
Filtering Timeout	1																								
Forward Call Indicators	1													O											
Forward GVNS	2										O			O					O	O	O	O	O	O	O
Forwarding Condition	1																								
Gap Criteria	1																								
Gap Indicators	1																								
Gap Treatment	1																								
Generic Name	2																								
Generic Number	2													O											
Higher Layer Compatibility	2																								
Hold Cause	1												O												
IN Service Compatibility Indication	2										O								O	O	O	O	O	O	O
IN Service Compatibility Response	2														O										
Initial Call Segment	2																								
IP Routing Address	1																								
ISDN Access Related Information	1										O			O	O				O	O	O	O	O	O	O
Last Event Indicator	2																								
Leg ID	1			O	M		O	O	O	O								M							M
Leg ID To Be Created	2														M										
Legs	2																M								
Location Number	1										O			O					O	O	O	O	O	O	O
Miscellaneous Call Info	1								O					O											
Monitor Duration	1																								
Monitor Mode	1							O																	

SCF-SSF relationship

	Defined in CS	Deactivate Trigger Data	Deactivate Trigger Data Confirmation	Disconnect Forward Connection	Disconnect Leg	Entity Released	Establish Temporary Connection	Event Notification Charging	Event Report BCSM	Event Report Facility	Facility Selected And Available	Furnish Charging Information	Hold Call In Network	Initial DP	Initiate Call Attempt	Merge Call Segments	Move Call Segments	Move Leg	O_Abandon	O_Answer	O_Called Party Busy	O_Disconnect	O_MidCall	O_No_Answer	O_Suspended
Defined in CS		2	2	1	2	2	1	1	1	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	2
Access Code	1																								
Monitor Type	1																								
New Call Segment	2														M		M								
New Call Segment Association	2																								
Notification Duration	2																								
Numbering Plan	1																								
Operation Identifier	1																								
Original Called Party ID	1										O			O						O	O			O	
Party To Charge	1																								
Prefix	1																				O			O	
Redirecting Party ID	1										O			O						O	O			O	
Redirection Information	1										O			O						O	O			O	
Registrator Identifier	2																								
ReleaseCause	1				O														O			O			
Report Condition	1																								
Requested Field	2																								
Requested Field Value	2																								
Requested Information List	2																								
Requested Information Type	1																								
Resource ID	1																								
Resource Status	1																								
Response Condition	1																								
Route List	1										O									O	O	O		O	
SCF ID	1						O																		
Sequence of Charging Event	1																								
Service Address Information	1										M								M	M	M	M	M	M	M
Service Interaction Indicators	1						O				O			O	O				O	O	O	O	O	O	O
Service Key	1													O											
Service Profile Identifier	1										O			O					O	O	O	O	O	O	O
Serving Area ID	1										O								O	O	O	O	O	O	O
Source Call Segment	2															M									
Source Call Segment Association	2																M								
SRF Available	1										O			O					O	O	O	O	O	O	O
SRF/ SSF Capabilities	1										O			O					O	O	O	O	O	O	O
Start Time	1																								
Target Call Segment	2															M		M							
Target Call Segment Association	2																M								
Terminal Type	1										O			O					O	O	O	O	O	O	O
Timer ID	1																								
Timer Value	1																								
Travelling Class Mark	1										O				O					O	O			O	

SCF-SSF relationship

	Defined in CS	Deactivate Trigger Data	Deactivate Trigger Data Confirmation	Disconnect Forward Connection	Disconnect Leg	Entity Released	Establish Temporary Connection	Event Notification Charging	Event Report BCSM	Event Report Facility	Facility Selected And Available	Furnish Charging Information	Hold Call In Network	Initial DP	Initiate Call Attempt	Merge Call Segments	Move Call Segments	Move Leg	O_Abandon	O_Answer	O_Called Party Busy	O_Disconnect	O_MidCall	O_No_Answer	O_Suspended
Defined in CS		2	2	1	2	2	1	1	1	2	2	1	1	1	1	2	2	2	2	1	1	1	1	1	2
Access Code	1																								
Trigger Data Identifier	2	M	O																						
Trigger Type	1													O											
USI Information	2										O			O					O	O	O	O	O	O	O
USI Monitor Mode	2																								
USI Service Indicator	2										O			O					O	O	O	O	O	O	O

SCF-SSF relationship

	Defined in CS	Origination Attempt	Origination Attempt Authorized	Reconnect	Release Call	Report UTSI	Request Notification Charging Event	Request Report BCSM Event	Request Report Facility Event	Request Report UTSI	Request Status Report	Reset Timer	Route Select Failure	Select Facility	Select Route	Send Charging Information	Send Facility Information	Send STUI	Service Filtering Response	Split Leg	Status Report	T_Answer	T_Busy	T_Disconnect	T_MidCall
Defined in CS		2	1	2	1	2	1	1	2	2	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1
Access Code	1																								
Additional Calling Party Number	1																								
Alerting Pattern	1			O										O	O										
All Call Segments	2				O																				
Assisting SSF/ SRF Routing Address	1																								
Associated Call Segment	2				O																				
Backward GVNS	2													O	O										
BCSM Event Correlation ID	1	O	O					O					O									O	O	O	O
BCSM Event List	1							M																	
BCSM Failure	2																								
Bearer Capability	1	O	O										O									O	O	O	O
Billing Charging Characteristics	1															M									
Busy Cause	1																						O		
Call Gapping Encountered	1	O	O										O									O	O	O	O
Call ID	1	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Call Processing Correlation ID	2																O								
Call Result	1																								
Call Segment ID	2											O													
Called Facility Group	1													O								O		O	
Called Facility Group Member	1													O								O		O	
Called Party Business Group ID	1																					O	O	O	O
Called Party Number	1	O	O										O									O	O	O	O
Called Party Subaddress	1																					O	O	O	O
Calling Facility Group	1	O	O										O												
Calling Facility Group Member	1	O	O										O												
Calling Party Business Group ID	1	O	O										O												O
Calling Party Number	1	O	O										O									O	O	O	O
Calling Party Subaddress	1	O	O										O												O
Calling Party's Category	1	O	O										O									O	O	O	O
Carrier	1	O	O												O										O
Cause	1																								
Charge Number	1	O	O										O									O	O	O	O
Clear Reason	2																								
Component	2	O	O														O					O		O	O
Component Correlation ID	2	O	O						O								O					O		O	O
Component Type	2	O	O						O								O					O		O	O
Connect Time	1																							O	
Control Type	1																								
Correlation ID	1										O			O	O						O				
Correlator	2																								
Counters Value	1																		M						

SCF-SSF relationship

	Defined in CS	Origination Attempt	Origination Attempt Authorized	Reconnect	Release Call	Report UTSI	Request Notification Charging Event	Request Report BCSM Event	Request Report Facility Event	Request Report UTSI	Request Status Report	Reset Timer	Route Select Failure	Select Facility	Select Route	Send Charging Information	Send Facility Information	Send STUI	Service Filtering Response	Split Leg	Status Report	T_Answer	T_Busy	T_Disconnect	T_MidCall
Defined in CS		2	1	2	1	2	1	1	2	2	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1
Access Code	1																								
Created Call Segment Association ID	2	O	O										O									O	O	O	O
CS Failure	2																								
Cut and Paste	1																								
Destination Routing Address	1													O	O										
Dialled Digits	1		O										O												
Display Information	2			O										O											
Event Specific Information BCSM	1																								
Event Specific Information Charging	1																								
Event Type BCSM	1																								
Event Type Charging	1																								
Failure Cause	1												O												
Feature Code	1																								
Feature Request Indicator	1																								O
Filtered Call Treatment	1																								
Filtering Characteristics	1																								
Filtering Criteria	1																		M						
Filtering Timeout	1																								
Forward Call Indicators	1																								
Forward GVNS	2	O	O										O	O	O							O	O	O	O
Forwarding Condition	1																								
Gap Criteria	1																								
Gap Indicators	1																								
Gap Treatment	1																								
Generic Name	2																								
Generic Number	2																								
Higher Layer Compatibility	2																								
Hold Cause	1																								
IN Service Compatibility Indication	2	O	O										O									O	O	O	O
IN Service Compatibility Response	2													O	O										
Initial Call Segment	2				O																				
IP Routing Address	1																								
ISDN Access Related Information	1	O	O										O	O	O							O	O	O	O
Last Event Indicator	2																								
Leg ID	1					M			O								O	M		M					
Leg ID To Be Created	2																								
Legs	2																								
Location Number	1	O	O										O									O	O	O	O
Miscellaneous Call Info	1																								
Monitor Duration	1								O		O														
Monitor Mode	1																								

SCF-SSF relationship

	Defined in CS	Origination Attempt	Origination Attempt Authorized	Reconnect	Release Call	Report UTSI	Request Notification Charging Event	Request Report BCSM Event	Request Report Facility Event	Request Report UTSI	Request Status Report	Reset Timer	Route Select Failure	Select Facility	Select Route	Send Charging Information	Send Facility Information	Send STUI	Service Filtering Response	Split Leg	Status Report	T_Answer	T_Busy	T_Disconnect	T_MidCall
Defined in CS		2	1	2	1	2	1	1	2	2	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1
Access Code	1																								
Monitor Type	1										M														
New Call Segment	2																			M					
New Call Segment Association	2																								
Notification Duration	2			O																					
Numbering Plan	1																								
Operation Identifier	1																								
Original Called Party ID	1												O	O	O								O		
Party To Charge	1															O									
Prefix	1												O												
Redirecting Party ID	1												O										O		
Redirection Information	1												O										O		
Registrator Identifier	2																								
ReleaseCause	1																							O	
Report Condition	1																				O				
Requested Field	2																								
Requested Field Value	2																								
Requested Information List	2																								
Requested Information Type	1																								
Resource ID	1										M										O				
Resource Status	1										O										M				
Response Condition	1																		O						
Route List	1												O		O								O		
SCF ID	1													O	O										
Sequence of Charging Event	1						M																		
Service Address Information	1	M	M										M									M	M	M	M
Service Interaction Indicators	1	O	O										O	O	O							O	O	O	O
Service Key	1																								
Service Profile Identifier	1	O	O										O									O	O	O	O
Serving Area ID	1	O	O										O									O	O	O	O
Source Call Segment	2																								
Source Call Segment Association	2																								
SRF Available	1	O	O										O									O	O	O	O
SRF/ SSF Capabilities	1	O	O										O									O	O	O	O
Start Time	1																								
Target Call Segment	2																								
Target Call Segment Association	2																								
Terminal Type	1	O	O										O									O	O	O	O
Timer ID	1											M													
Timer Value	1											M													
Travelling Class Mark	1	O	O										O		O								O		

SCF-SSF relationship

	Defined in CS	Origination Attempt	Origination Attempt Authorized	Reconnect	Release Call	Report UTSI	Request Notification Charging Event	Request Report BCSM Event	Request Report Facility Event	Request Report UTSI	Request Status Report	Reset Timer	Route Select Failure	Select Facility	Select Route	Send Charging Information	Send Facility Information	Send STUI	Service Filtering Response	Split Leg	Status Report	T_Answer	T_Busy	T_Disconnect	T_MidCall
Defined in CS		2	1	2	1	2	1	1	2	2	1	1	1	1	1	1	2	2	1	2	1	1	1	1	1
Access Code	1																								
Trigger Data Identifier	2																								
Trigger Type	1																								
USI Information	2	O	O			M							O					M				O	O	O	O
USI Monitor Mode	2									M															
USI Service Indicator	2	O	O			M				M			O					M				O	O	O	O

SCF-SSF relationship

	Defined in CS	Origination Attempt	T_No_Answer	T_Suspended	Termination Attempt	Termination Attempt Authorized	Trigger Data Status Report	Trigger Data Status Request
Defined in CS		2	1	2	2	1	2	2
Access Code	1							
Additional Calling Party Number	1							
Alerting Pattern	1							
All Call Segments	2							
Assisting SSF/ SRF Routing Address	1							
Associated Call Segment	2							
Backward GVNS	2							
BCSM Event Correlation ID	1	O	O	O	O	O		
BCSM Event List	1							
BCSM Failure	2							
Bearer Capability	1	O	O	O	O	O		
Billing Charging Characteristics	1							
Busy Cause	1							
Call Gapping Encountered	1	O	O	O	O	O		
Call ID	1	M	M	M	M	M	M	M
Call Processing Correlation ID	2							
Call Result	1							
Call Segment ID	2							
Called Facility Group	1		O					
Called Facility Group Member	1		O					
Called Party Business Group ID	1		O		O	O		
Called Party Number	1	O	O	O	O	O		
Called Party Subaddress	1		O		O	O		
Calling Facility Group	1	O						
Calling Facility Group Member	1	O						
Calling Party Business Group ID	1	O			O	O		
Calling Party Number	1	O	O	O	O	O		
Calling Party Subaddress	1	O			O	O		
Calling Party's Category	1	O	O	O	O	O		
Carrier	1	O			O			
Cause	1							
Charge Number	1	O	O	O	O	O		
Clear Reason	2							
Component	2	O	O					
Component Correlation ID	2	O	O					
Component Type	2	O	O					
Connect Time	1							
Control Type	1							
Correlation ID	1							
Correlator	2							
Counters Value	1							

SCF-SSF relationship

	Defined in CS	Origination Attempt	T_No_Answer	T_Suspended	Termination Attempt	Termination Attempt Authorized	Trigger Data Status Report	Trigger Data Status Request
Defined in CS		2	1	2	2	1	2	2
Access Code	1							
Created Call Segment Association ID	2	O	O	O	O	O		
CS Failure	2							
Cut and Paste	1							
Destination Routing Address	1							
Dialled Digits	1							
Display Information	2							
Event Specific Information BCSM	1							
Event Specific Information Charging	1							
Event Type BCSM	1							
Event Type Charging	1							
Failure Cause	1							
Feature Code	1							
Feature Request Indicator	1							
Filtered Call Treatment	1							
Filtering Characteristics	1							
Filtering Criteria	1							
Filtering Timeout	1							
Forward Call Indicators	1							
Forward GVNS	2	O	O	O	O	O		
Forwarding Condition	1							
Gap Criteria	1							
Gap Indicators	1							
Gap Treatment	1							
Generic Name	2							
Generic Number	2							
Higher Layer Compatibility	2							
Hold Cause	1							
IN Service Compatibility Indication	2	O	O	O	O	O		
IN Service Compatibility Response	2							
Initial Call Segment	2							
IP Routing Address	1							
ISDN Access Related Information	1	O	O	O	O	O		
Last Event Indicator	2							
Leg ID	1							
Leg ID To Be Created	2							
Legs	2							
Location Number	1	O	O	O	O	O		
Miscellaneous Call Info	1							
Monitor Duration	1							
Monitor Mode	1							

SCF-SSF relationship

	Defined in CS ...	Origination Attempt	T_No_Answer	T_Suspended	Termination Attempt	Termination Attempt Authorized	Trigger Data Status Report	Trigger Data Status Request
Defined in CS....		2	1	2	2	1	2	2
Access Code	1							
Monitor Type	1							
New Call Segment	2							
New Call Segment Association	2							
Notification Duration	2							
Numbering Plan	1							
Operation Identifier	1							
Original Called Party ID	1		O		O	O		
Party To Charge	1							
Prefix	1							
Redirecting Party ID	1		O		O	O		
Redirection Information	1		O		O	O		
Registrator Identifier	2							
ReleaseCause	1							
Report Condition	1							
Requested Field	2							M
Requested Field Value	2						O	
Requested Information List	2							
Requested Information Type	1							
Resource ID	1							
Resource Status	1							
Response Condition	1							
Route List	1				O	O		
SCF ID	1							
Sequence of Charging Event	1							
Service Address Information	1	M	M	M	M	M		
Service Interaction Indicators	1	O	O	O	O	O		
Service Key	1							
Service Profile Identifier	1	O	O	O	O	O		
Serving Area ID	1	O	O	O	O	O		
Source Call Segment	2							
Source Call Segment Association	2							
SRF Available	1	O	O	O	O	O		
SRF/ SSF Capabilities	1	O	O	O	O	O		
Start Time	1							
Target Call Segment	2							
Target Call Segment Association	2							
Terminal Type	1	O	O	O	O	O		
Timer ID	1							
Timer Value	1							
Travelling Class Mark	1	O	O		O	O		

SCF-SSF relationship

	Defined in CS ...	Origination Attempt	T_No_Answer	T_Suspended	Termination Attempt	Termination Attempt Authorized	Trigger Data Status Report	Trigger Data Status Request
Defined in CS....		2	1	2	2	1	2	2
Access Code	1							
Trigger Data Identifier	2						M	M
Trigger Type	1							
USI Information	2	O	O	O	O	O		
USI Monitor Mode	2							
USI Service Indicator	2	O	O	O	O	O		

SCF-SRF

	Defined in CS...	Assist Request Instructions From SRF	Cancel Announcement	Collected User Information	Erase Message	Message Erased Confirmation	Message Received	Play Announcement	Prompt And Collect User Information	Prompt and Receive Message	Script Close	Script Event	Script Information	Script Run	Send Message	Specialized Resource Report
Defined in CS ...		1	1	1	2	2	2	1	1	2	2	2	2	2	2	1
Call ID	1	M														
Call Segemnt ID	2		O													
Collected Info	1								M							
Control Condition By Call Party	2														O	
Correlation ID	1	M														
Disconnection From IP Forbidden	1				M			M	M	M				O	M	
Information To Send	1							M	O	O						
Message ID To Send	2														M	
Message Receiving Completion Condition	2									O						
Message to Erase	2				M											
Number Of Repetition	2														M	
Operational Identifier	1		M													
Received Information	1			M												
Received Message ID	2						M									
Received Message Length	2						O									
Received Status	2						M									
Request Announcement Completed Indication	2							M								
Request Send Message Completed	2														M	
SRF Available	1	O														
SRF Connect ID	1			M	M	M	M	M	M	M					M	M
SSF/ SRF Capabilities	1	O														
Type Of Report	2															M
User Interaction Script ID	2										M	M	M	M		
User Interaction Script Result Information	2											M				
User Interaction Script Specific Information	2										O		M	M		

SCF-SCF

	Defined in CS	Activity Test	Activity Test Result	Additional Information Result	Charge Record Report	Charge Record Report Confirmation	Establish Charging Record	Handling Information Request	Handling Information Result	Network Capability Request	Network Capability Result	Notification Provided	Notification Provided Confirmation	Provide User Information	Request Notification	SCF Bind Request	SCF Bind Result	SCF Unbind Request
Defined in CS		2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Account Number	2				O													
Actions	2													O				
Active Supplementary Services	2							O										
Agreement ID	2															M		
Bearer Capability	2							O										
Bearer Services	2									O	O							
Call Record	2				O													
Called Party Number	2				O			O										
Calling Party Business Group ID	2							O										
Calling Party Number	2				M			O	O									
Calling Party's Category	2							O	O									
Carrier	2								O									
Cause Of LastCall Failure	2							O										
Charging Parameters	2						O											
Constraints	2													M				
Dialled Digits	2							O										
Error Info	2													O				
High Layer Compatibility	2							O	O									
Information	2			M														
Information To Send	2													O				
Input Information	2							O										
Invoked Supplementary Services	2							O										
Language ID	2								O					O				
Location Number	2							O										
Number of Allowed Retries	2																	
Number Of Call Attempts	2							O										
Original Called Party ID	2							O	O									
Output Information	2								O									
Redirecting Party ID	2							O	O									
Redirection Information	2							O	O									
Refferal Information	2																	
Remaining User Credit	2				O													
Report Expected	2						O											
Request Confirmation	2				O													
Requested Notifications	2														M			
Requested Type	2							O										
Routing Address	2								O									

SCF-SCF

	Defined in CS	Activity Test	Activity Test Result	Additional Information Result	Charge Record Report	Charge Record Report Confirmation	Establish Charging Record	Handling Information Request	Handling Information Result	Network Capability Request	Network Capability Result	Notification Provided	Notification Provided Confirmation	Provide User Information	Request Notification	SCF Bind Request	SCF Bind Result	SCF Unbind Request
Requested Type	2							O										
Routing Address	2								O									
SCF Address	2															O		
SCF Notification	2											M						
Security Information	2			O	O	O	O	O	O	O	O	O	O	O	O	O	O	
Service Processing ID	2	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Specific Service Features	2									O	O							
Supplementary Services	2								O	O	O							
Supporting SCF Address	2																O	
Teleservices	2									O	O							
Type of Requested Info	2													M				
Unique Call ID	2				O													
User Credit	2						O											
User Interaction Mode	2							O										

SCF-CUSF

	Defined in CS	Activation Received and Authorized	Association Release Requested	Component Received	Initiate Association	Request Report BCUSM Event	Release	Send Component
Defined in CS		2	2	2	2	2	2	2
BCUSM Event List	2					M		
Called Party Number	2				M			O
Calling Party Number	2	O	O	O		O	O	
Component Correlation ID	2	O	O	M		O		M
Component Type	2					O		
Location Number	2	O	O	O		O	O	O
Message	2							O
Monitor Duration	2					O		
Operation Code	2	O	O	O				O
Parameters	2	O	O	O				O
Service Address Information	2	M	M	M				

SCF-SDF

	Defined in CS	Add Entry	Add Entry Result	Authenticate	Authenticate Result	End Authenticated Relationship	Execute	Execute Result	Modify Entry	Modify Entry Result	Remove Entry	Remove Entry Result	SDM IF Referral	Search	Search Result
Defined in CS		1	1	1	1	2	2	2	1	1	1	1	2	1	1
Authentication Information	1			M	O										
Authorized Relationship ID	1	M	M	M	M	M	M	M	M	M	M	M	M	M	M
Base Object	1													M	
Changes	1								M						
Entry	1	M													
Execute Identifier	2						M								
Filter	1													O	
Information	1									O					
Input Attributes	2						O								
Matched Values Only	1													O	
Object	1	M					M		M		M				
Output Attributes	2							O							
Referral Information	2												M		
Search Info	1														M
Selection	1								O					M	
Specific Input Value	2						M								
Specific Output Value	2							M							
Subset	1													M	

SDF-SDF

	Defined in CS	Authenticate	Authenticate Result	Chaining Request	Chaining Result	Copy Request	Copy Result	End Authenticated Relationship	Update Copy	Update Copy Result
Defined in CS		2	2	2	2	2	2	2	2	2
Authentication Information	2	M	M							
Authorized Relationship ID	2	M	M	M	M	M	M	M	M	M
Chained Argument	2				M					
Chained Result	2			M						
Maintained Part	2					M				
Master	2					M				
Refreshed Information	2								M	
Replicated Data	2						M			
Replication Area	2					M				
Security Parameters	2			M	M					
Update Mode	2					M				
Update Strategy	2					M				

ANNEX A

Mobility aspects

A.1 General

General aspects of the DFP are contained in clause 1/Q.1204. The materials included in this Annex will be integrated with other aspects in CS-3.

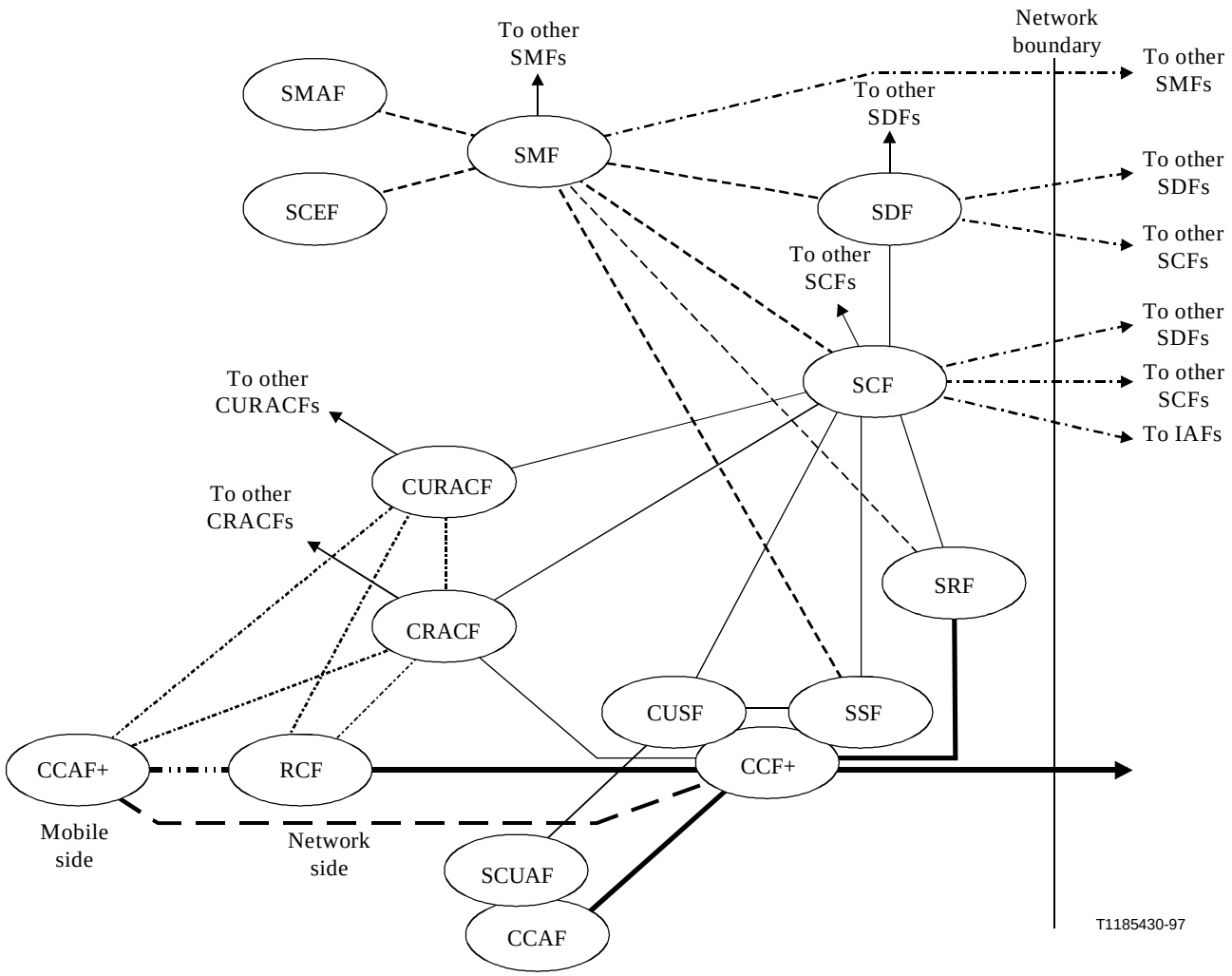
A.2 Scope

This Annex builds upon the IN CS-2 functional architecture to provide guidance and direction as to how IN CS-2 can be used as the basis for wireless systems. As such, it will provide those enhancements to the functional architecture found in other clauses of this Recommendation. It is not intended that this Annex impose limitations on the development of detailed wireless access Recommendations, such as those for IMT-2000. But instead, this Annex is intended to impart to the reader insight as to the manner in which the IN principles can be applied to wireless access.

A.3 Mobility Aspects of Distributed Functional Model for IN CS-2

A.3.1 Explanation of the diagram

Figure A.1 identifies the enhancements to the IN CS-2 DFP Model for mobility aspects. The IN CS-2 DFP model can be found in 3.1. This diagram depicts all of the functional entities and relationships applicable to IN CS-2. This diagram is a subset of the generic IN DFP model described in clause 2/Q.1204. A general explanation of functional entities, relationships, and the diagram are contained in 2.1/Q.1204.



Management Relationship

IN Service Control

Bearer Connection Control

Non-IN Call Control

Call Unrelated IN Service Control
and
Radio Bearer Associated Control

Interworking Relationship

Radio Bearer Connection Control

CCAF	Call Control Agent Function
CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
CUSF	Call Unrelated Service Function
IAF	Intelligent Access Function
RCF	Radio Control Function
SCEF	Service Creation Environment Function
SCF	Service Control Function
SCUAF	Service Control User Agent Function
SDF	Service Data Function
SMAF	Service Management Access Function
SMF	Service Management Function
SRF	Specialized Resource Function
SSF	Service Switching Function

Figure A.1/Q.1224 – IN CS-2 DFP architecture with mobility aspects

A.3.2 Wireless access enhancements to the IN functional model

The IN CS-2 DFP is a subset of the general IN DFP. In particular, for wireless access, the CRACF, CURACF, RCF and CCAF+ functional entities are included.

A.3.3 Definitions of wireless access specific functional entities related to IN service execution

This subclause only contains descriptions for those functional entities to be included in the IN CS-2 DFP to support wireless access. The definitions for the remaining IN CS-2 FEs can be found in subclause 3.3.

Call Control Agent Function-Plus (CCAF+): The CCAF+ is based on the CCAF that is identified by ISDN and IN for the wireline, call related case. But, The CCAF+ provides both call related and call unrelated access for wireless users/terminals. As such, the CCAF+ includes specific reference to the wireless environment. It is the interface between wireless user/terminal and network call control functions. It:

a) provides for user agent access, interacting with the user to establish, maintain, modify and release, as required, a call or instance of call related or call unrelated service;

b) accesses the service-providing capabilities of the Call Control Function (CCF+), Radio Control Function (RCF) and Call related Radio Access Control Function (CRACF), using service requests (e.g. setup, transfer, hold, etc.) for the establishment, manipulation and release of a call or instance of a call related service;

c) receives indications relating to the call or call related service from the CCF and relays them to the user/terminal as required;

d) maintains call/call related service state information as perceived by this functional entity;

e) accesses the service-providing capabilities of the Radio Control Function (RCF) and Call Unrelated Radio Access Control Function (CURACF), using service requests (e.g. setup, transfer, hold, etc.) for call unrelated service interactions;

f) receives call unrelated service indications from the RCF and relays them to the user/terminal as required;

g) maintains call unrelated service state information as perceived by this functional entity.

The CRAC Function (CRACF): The CRACF is the Call related Radio Access Control Function that supports service/features and signalling that require handling and manipulation of the Radio Link. That is, the CRACF supports wireless specific interactions within an IN network after a call reference is established and/or where a relationship exists between the specific signalling that must take place and a particular call. As such the CRACF functions relating to a call (incoming or outgoing) as well as handover are included in this category. It:

a) manages the relationship between the CCAF+ and the network for the support of services/features that require specific radio link support in support of a call (e.g. terminal paging, radio bearer setup and handover);

b) includes the recognition of call related service control events, internally generated, externally generated by the CCAF+ or externally generated by the SSF/CCF;

c) provides the mechanisms to detect call related interactions that require IN functionality that exists within the CRACF or within other FEs (e.g. recognizes the need for IN processing and passes call related events and information to the SCF or SSF/CCF);

d) modifies its internal processing to assist call processing (in the SSF/CCF) for IN provided service usage under the control of the SCF;

e) is managed, updated and/or otherwise administered for its IN-related, call related functions;

f) allocates specific network radio system elements and other network resources for use during a call;

g) may support the acquisition of current terminal location information within the local radio system environment, to support delivery of calls to the terminal.

The CURAC Function (CURACF): The CURACF is the Call Unrelated Radio Access Control Function supports call unrelated service/features and signalling. That is, the CURACF supports interactions within an IN network prior to a call reference being established or for which their is no type of relationship to a particular call. It:

a) includes the recognition of call unrelated service control events, internally generated, externally generated by the CCAF+ or externally generated by the SCF;

b) manages the radio system side of signalling to/from the SCF for part or all of a given call unrelated service/feature;

c) manages an instance of the relationship between the CCAF+ and the network for the call unrelated interactions between users and service processing;

d) provides the mechanisms to detect call unrelated interactions that require IN functionality that exists within the CURACF or within other FEs (e.g. recognizes a IN "trigger" and passes call unrelated events and information to the SCF);

e) handles mobile specific aspects of charging;

f) is managed, updated and/or otherwise administered for its IN-related, call unrelated functions by a Service Management Function (SMF);

g) modifies its call unrelated functions as required to process requests for IN provided service usage under the control of the SCF.

RC Function (RCF): The Radio Control Function (RCF) assists in providing access to users/terminals. It provides the network call related and call unrelated, radio link functions. It:

a) establishes, maintains, modifies and releases a radio and fixed line bearer connection between a mobile terminal and the network;

b) establishes and maintains security and privacy (i.e. ciphering) between the user agent/terminal agent and network;

c) accesses the call related, radio link capabilities of the CRACF using service requests;

d) receives indications from the user agent/terminal agent and/or determines the state of the radio link connections between the terminal and network and relays them to the CRACF and/or CURACF as required;

e) maintains state of the radio link connections, for a given call, between a user agent/terminal agent and the network as perceived by this functional entity.

A.3.4 Use of individual relationships between FEs for wireless access

Within IN, not all the reference points shown in the DFP architecture with wireless enhancements will be studied. Interfaces between the CCAF+ and the RCF, CRACF, CURACF and CCF+, and RCF to CRACF, CURACF and CCF+, are outside the scope of IN but are shown and required for correct service and protocol interworking. All reference points including the SCF, SRF, SSF, SDF, SCEF, SMAF and SMF are within the scope of IN, including the reference point between the CRACF and the CCF+. The reference points between the SCUAF and the CUSF, and the CCAF and the CCF, are not specific to wireless access and are outside the specific scope of IN; these reference points are shown for service and protocol interworking.

The SCF-CURACF relationship: This relationship is established either as a result of the CURACF sending a request to the SCF for instruction when DP is met in BNCSM' (Basic Non-Call Associate State Model for CURACF), or at the request of the SCF to CURACF for initiation of some call unrelated features. Call unrelated features are supported by this relationship, such as terminal location registration.

The SCF-CRACF relationship: This relationship is established either as a result of the CRACF sending a request to the SCF for instruction when DP is met in TASM, or at the request of the SCF for initiation of some call related features. Call/connection related features are supported by this relationship, such as terminal paging, terminal authentication and so on.

The CRACF-CURACF relationship: It is possible that a handover situation may occur during the call unrelated interactions for which only the CURACF is participating. In such a case, this relationship may be used by CURACF to coordinate the handover with the CRACF.

The CRACF-CCF+ relationship: This relationship is established either as a result of the CRACF sending a request to the CCF+ for instruction, or at the request of the CCF+ for initiation of some call related features. The relationship is used for such features as bearer selection.

The CRACF-RCF relationship: This relationship is used by call related features to exchange IFs between the terminal/user, and CRACF, in the system where the RCF consumes and/or generates information when the terminal/user passes or receives information from the CRACF in the network.

The CURACF-RCF relationship: This relationship is used by call unrelated features to exchange IFs between the terminal/user, and CURACF, in the system where the RCF consumes and/or generates information when the terminal/user passes or receives information from the CURACF in the network.

The CCAF+-RCF relationship: This relationship is used by either call related or call unrelated features to exchange IFs between a terminal and a network.

The CCAF+-CRACF relationship: This relationship is used by call related features to exchange IFs between a terminal and a network.

The CCAF+-CURACF relationship: This relationship is used by call unrelated features to exchange IFs between a terminal and a network.

The CCAF+-CCF+ relationship: This relationship is used to exchange call control related IFs.

A.4 Example mapping of wireless access FEs to physical platforms

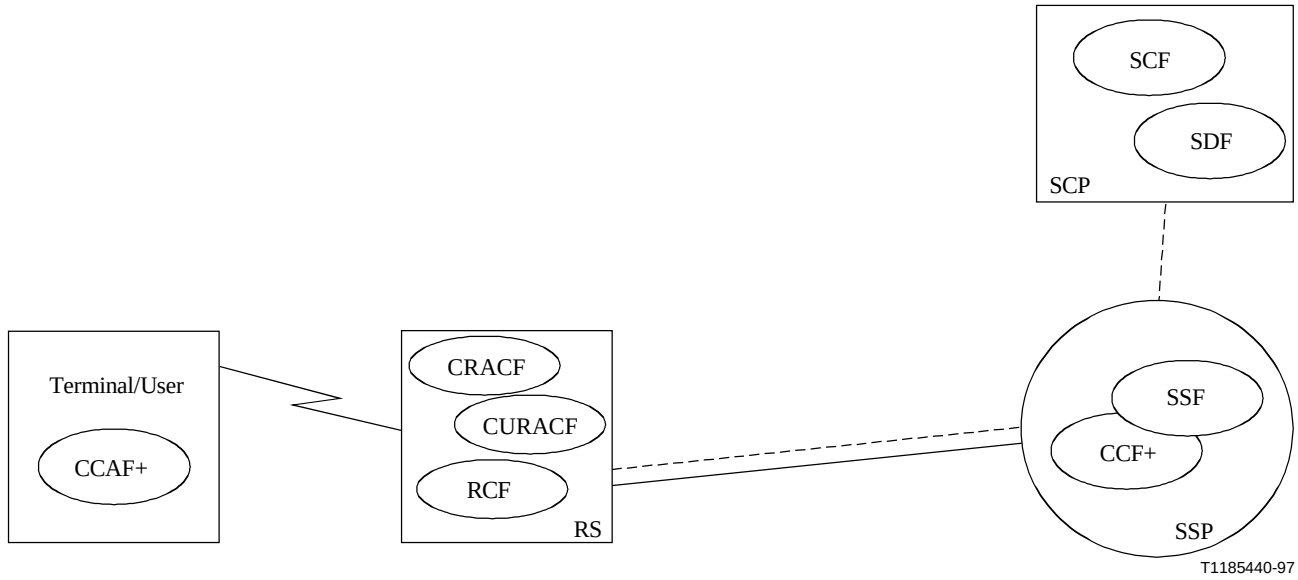
To assist the reader in the evaluation of the wireless aspects of the IN CS-2 DFP architecture, this subclause contains some examples of FE allocations to physical platforms.

These mappings are only to assist in the DFP architecture studies and are not to be considered as a limitation to possible physical implementations. The wireless access enhancements to the IN CS-2 functional architecture must be applicable to many physical implementations, such mappings must be considered in order to appropriately evaluate the functional architecture.

A.4.1 Example mapping 1

In this scenario the network wireless access specific functional entities are grouped into a single physical platform, the Radio System (RS). Example mapping of wireless access FEs to physical platforms is shown in Figure A.2. A single interface exists between this RS and the SSP, which must carry the wireless call and connection control signalling, as well as the signalling to support the mobility of the terminal and the user.

Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP must traverse this interface. Also, operations between the RS and SCP, which are to be processed and used by the RS or SCP must also traverse this interface. In this case, the SSP serves a routing function to pass the operations between the RS and SCP.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control FunctionRCF
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

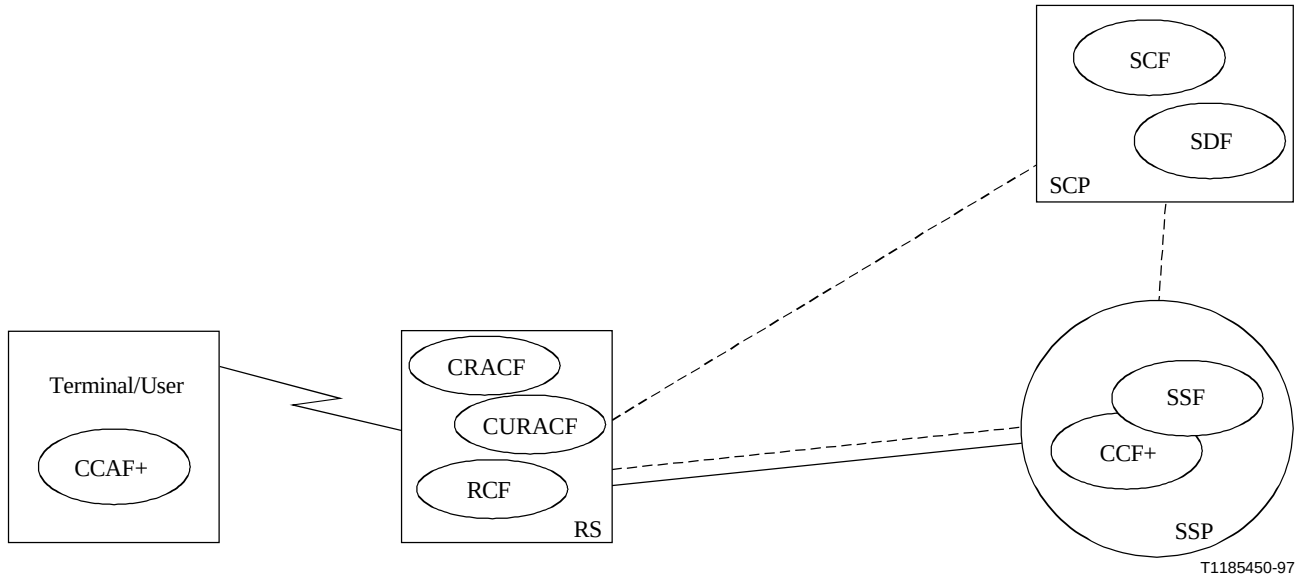
Figure A.2/Q.1224 – Example mapping of wireless access FE to physical platforms – 1

A.4.2 Example mapping 2

In this scenario the network wireless access specific functional entities are also grouped into a single physical platform, the Radio System (RS). Example mapping of wireless access FEs to physical platforms is shown in Figure A.3. But in this case, two interfaces exist between this RS and other network elements.

The interface between the RS and the SSP has both transport and signalling parts and can carry the wireless call and connection control signalling, as well as additional signalling to support the mobility of the terminal and the user. Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP would traverse this interface.

The interface between the RS and the SCP would support signalling. Operations between the RS and SCP, which are to be processed and used by the RS or SCP would traverse this interface.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.3/Q.1224 – Example mapping of wireless access FE to physical platforms – 2

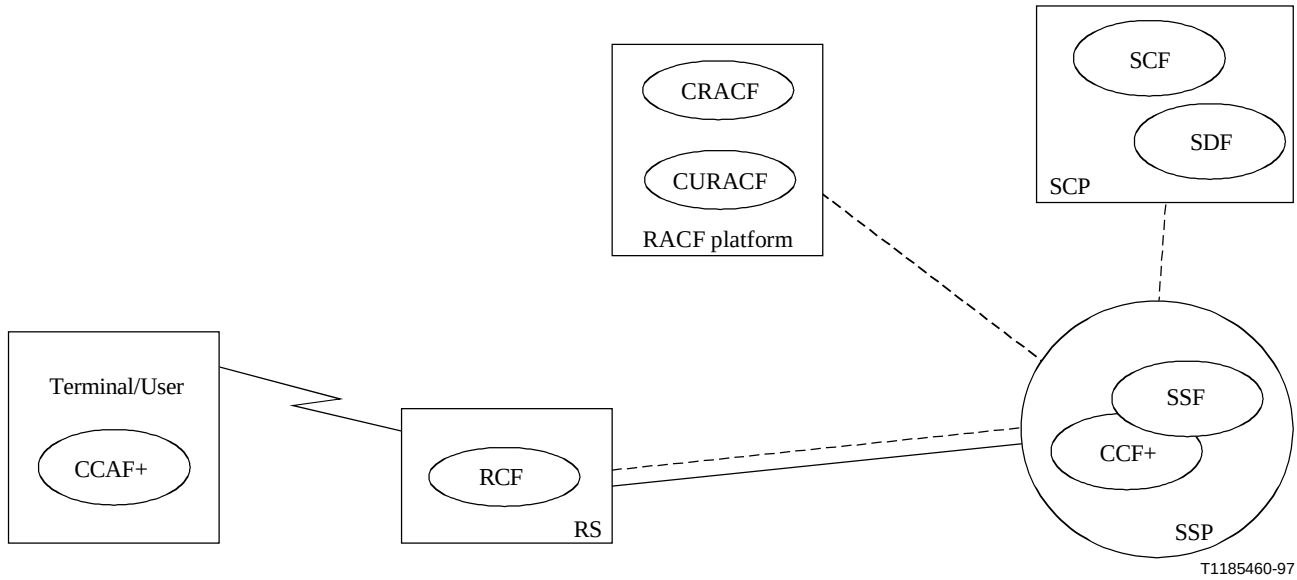
A.4.3 Example mapping 3

In this scenario the network wireless access specific functional entities are grouped into two physical platforms, the Radio System (RS) contains the RCF, while the RACF Platform contains the CRACF and the CURACF. Example mapping of wireless access FEs to physical platforms is shown in Figure A.4. Two interfaces exist, one from each of these platforms to the SSP.

The interface between the RS and the SSP has both transport and signalling parts and can carry the wireless call and connection control signalling, as well as additional signalling to support the mobility of the terminal and the user. Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP, would traverse this interface. Also, operations and parameters between the RS and RACF Platform, which are to be processed and used by the RS or RACF Platform, would traverse this interface.

The interface between the RACF Platform and the SSP would support signalling. Operations between the RACF Platform and SSP, which are to be processed and used by the CRACF or SSP would traverse this interface. Operations between the RACF Platform and SCP, which are to be processed and used by the RACF Platform or SCP, would traverse this interface. And finally,

Operations between the RACF Platform and the RS, which are to be processed and used by the RACF Platform or RS, would traverse this interface.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

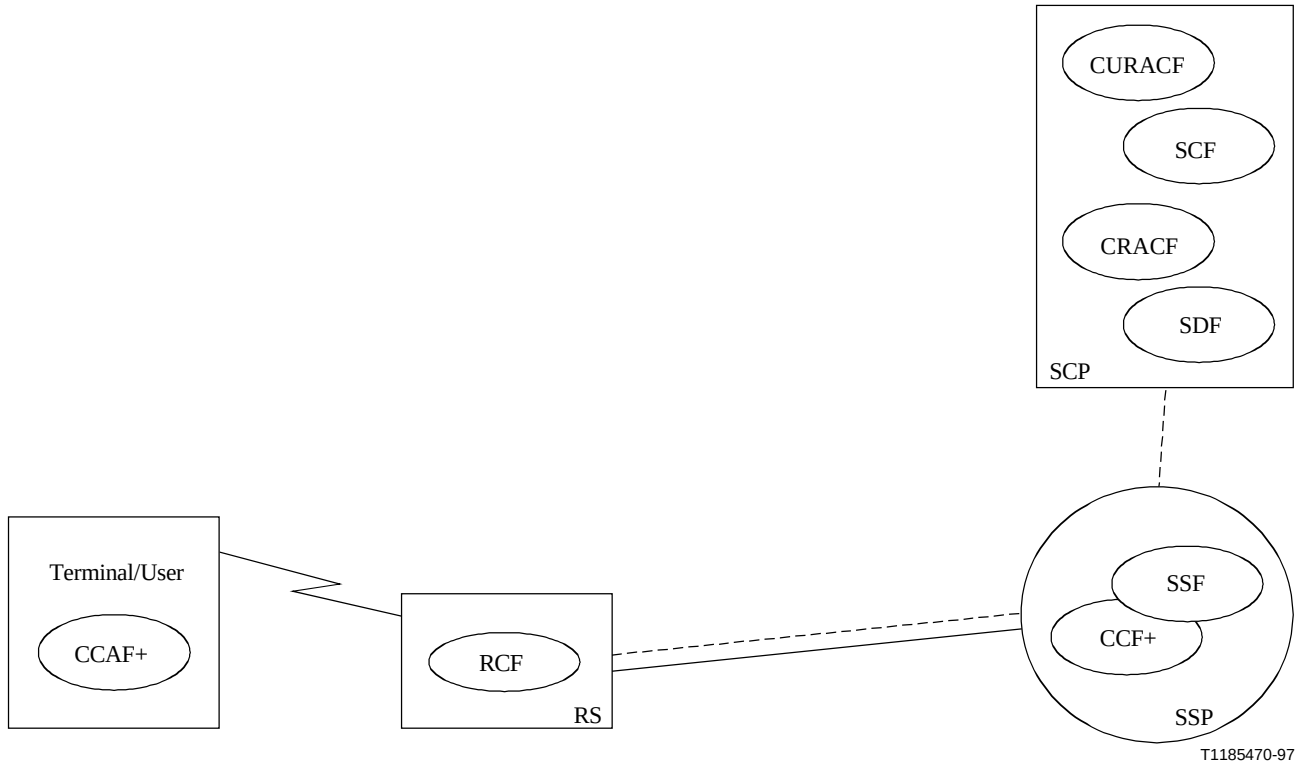
Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.4/Q.1224 – Example mapping of wireless access FE to physical platforms – 3

A.4.4 Example mapping 4

In this scenario the network wireless access specific functional entities are once again grouped into two physical platforms. The Radio System (RS) contains the RCF, and in this case, the SCP contains the CRACF and the CURACF. Example mapping of wireless access FEs to physical platforms is shown in Figure A.5. A single interface exists from the RS to the SSP.

The interface between the RS and the SSP has both transport and signalling parts and can carry the wireless call and connection control signalling, as well as additional signalling to support the mobility of the terminal and the user. Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP, would traverse this interface. Also, operations and parameters between the RS and SCP, which are to be processed and used by the RS or SCP, would traverse this interface.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

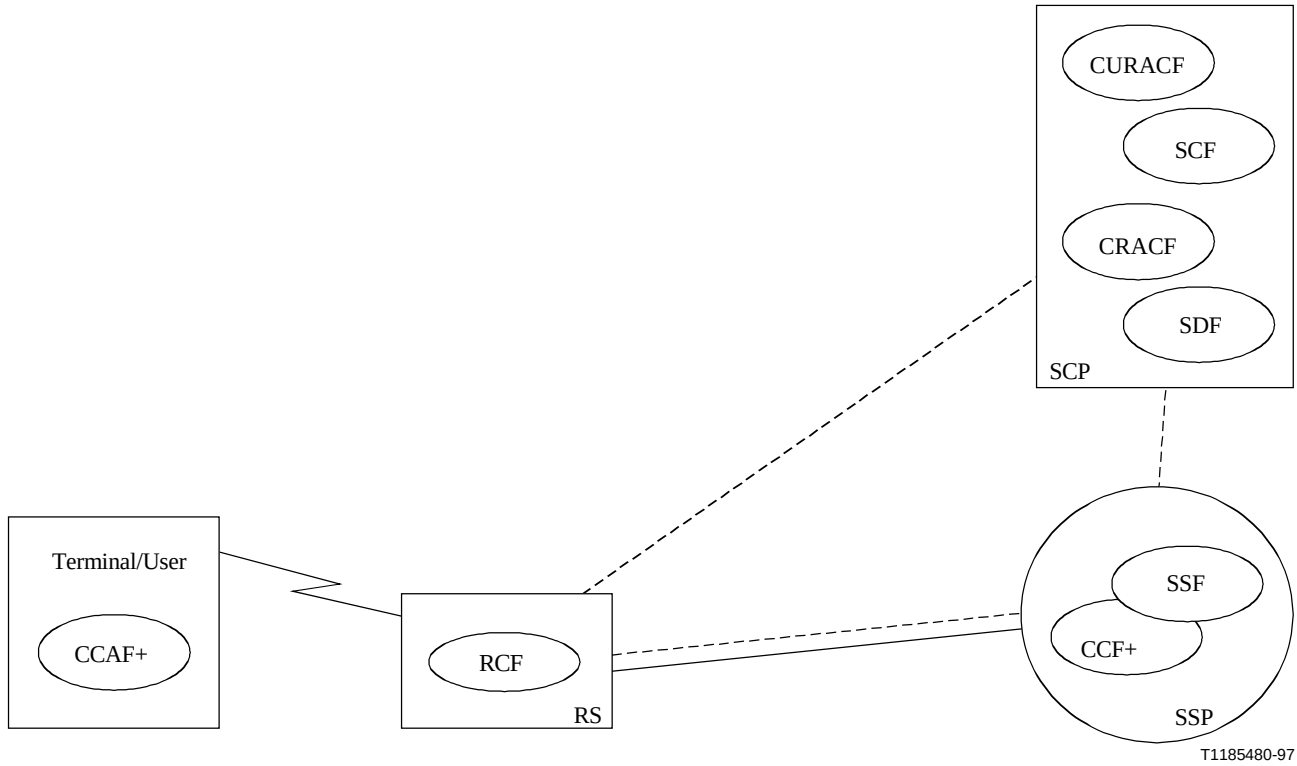
Figure A.5/Q.1224 – Example mapping of wireless access FE to physical platforms – 4

A.4.5 Example mapping 5

In this scenario the network wireless access specific functional entities are once again grouped into two physical platforms. The Radio System (RS) contains the RCF, and in this case, the SCP contains the CRACF and the CURACF. Example mapping of wireless access FEs to physical platforms is shown in Figure A.6. Interfaces exist from the RS to the SSP and from the RS to the SCP.

The interface between the RS and the SSP has both transport and signalling parts and can carry the wireless call and connection control signalling, as well as additional signalling to support the mobility of the terminal and the user. Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP, would traverse this interface.

The interface between the RS and SCP would support signalling. Operations and parameters between the RS and SCP, which are to be processed and used by the RS or SCP, would traverse this interface.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

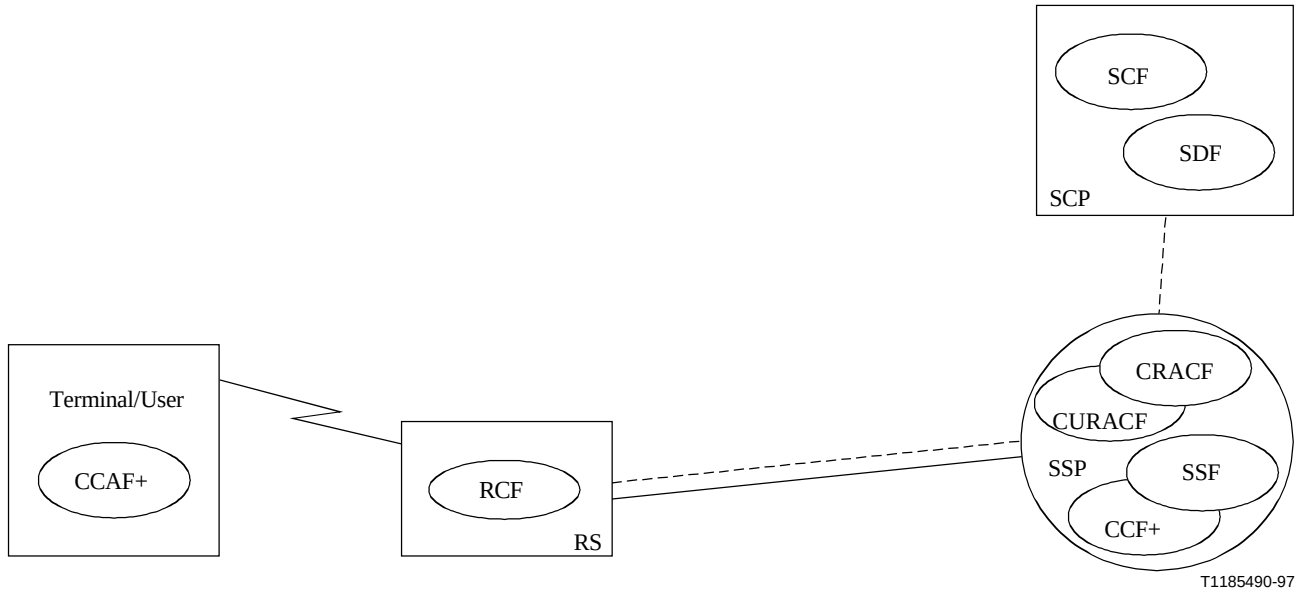
Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.6/Q.1224 – Example mapping of wireless access FE to physical platforms – 5

A.4.6 Example mapping 6

In this scenario the wireless access specific functional entities are grouped into two physical platforms, the Radio System (RS) and in this case, the SSP, which contains also the CRACF and the CURACF. Example mapping of wireless access FEs to physical platforms is shown in Figure A.7.

The interface between the RS and the SSP has both transport and signalling parts and can carry the wireless call and connection control signalling, as well as additional signalling to support the mobility of the terminal and the user. Operations and parameters between the RS and SSP, which are to be processed and used by the RS or SSP, would traverse this interface. Also, operations and parameters between the RS and SCP, which are to be processed and used by the RS or SCP, would traverse this interface.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

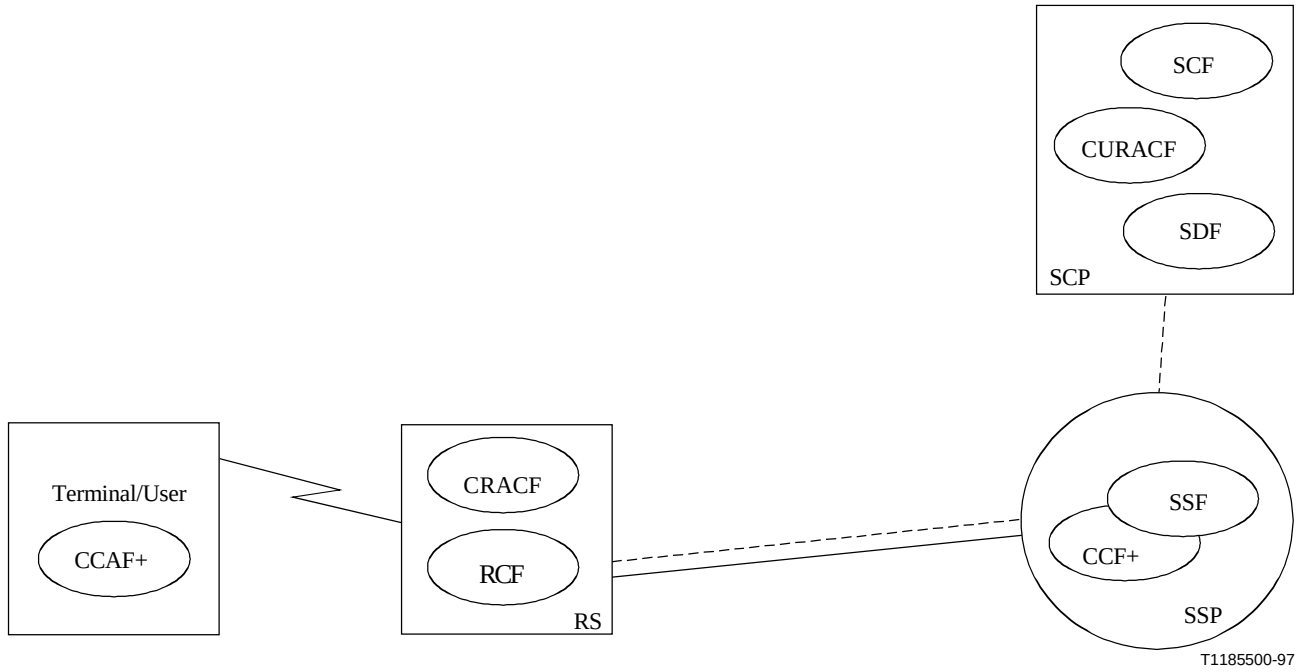
Figure A.7/Q.1224 – Example mapping of wireless access FE to physical platforms – 6

A.4.7 Example mapping 7: RCF and CRACF in RS, CURACF in SCP

In this scenario, the RCF and the CRACF are located within the Radio System (RS) and the CURACF is located in the SCP. Example mapping of wireless access FEs to physical platforms is shown in Figure A.8. Two interfaces are utilized as follows:

1) **The RS-SSP interface**: is used for RCF-SSF/CCF+, RCF-CURACF, CRACF-SSF/CCF+, CRACF-CURACF and CRACF-SCF operations.

2) **The SSP-SCP interface**: is used for RCF-CURACF, CRACF-CURACF, CRACF-SCF and SCF-SSF/CCF+ operations.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.8/Q.1224 – Example mapping of wireless access FE to physical platforms – 7

A.4.8 Example mapping 8: RCF and CRACF in RS, CURACF in standalone platform

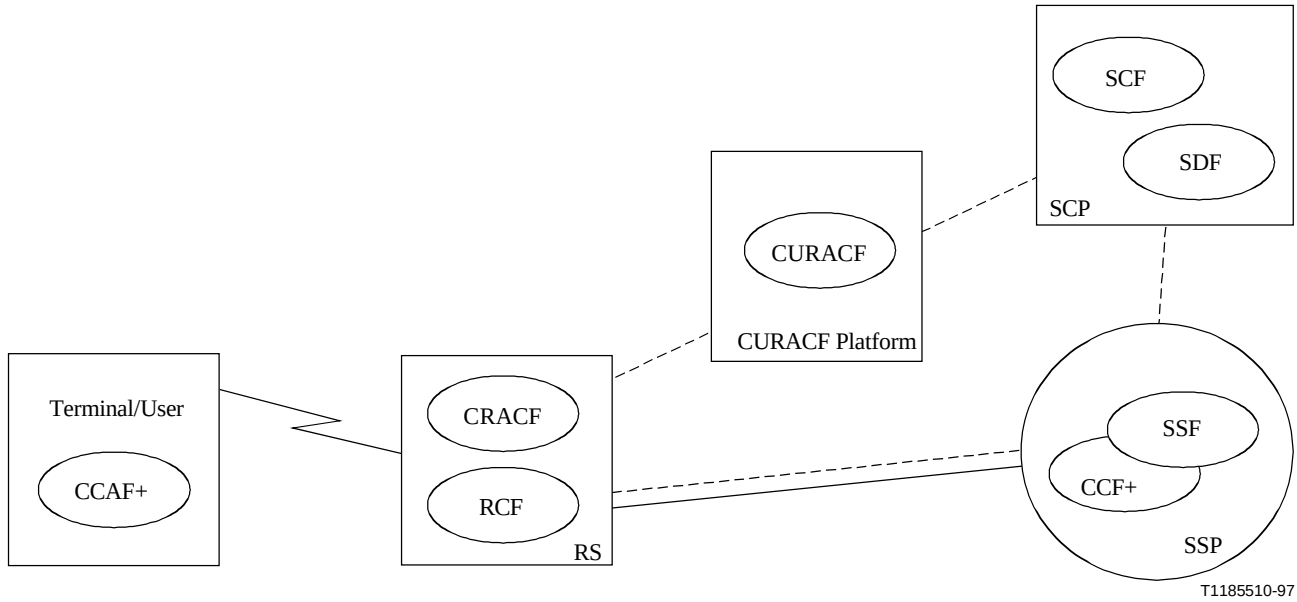
In this scenario, the RCF and the CRACF are located within the Radio System (RS) and the CURACF is located in a Standalone Platform. Example mapping of wireless access FEs to physical platforms is shown in Figure A.9. Four interfaces are utilized as follows:

1) **The RS-SSP interface**: is used for RCF-SSF/CCF+, CRACF-SSF/CCF+, and CRACF-SCF operations.

2) **The RS-CURACF Platform interface**: is used for RCF-CURACF and CRACF-CURACF operations.

3) **The CURACF Platform-SCP interface**: is used for CURACF-SCF operations.

4) **The SSP-SCP interface**: is used for CRACF-SCF and SCF-SSF/CCF+ operations.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.9/Q.1224 – Example mapping of wireless access FE to physical platforms – 8

A.4.9 Example mapping 9: RCF in Radio System, CRACF in standalone platform and CURACF in SCP

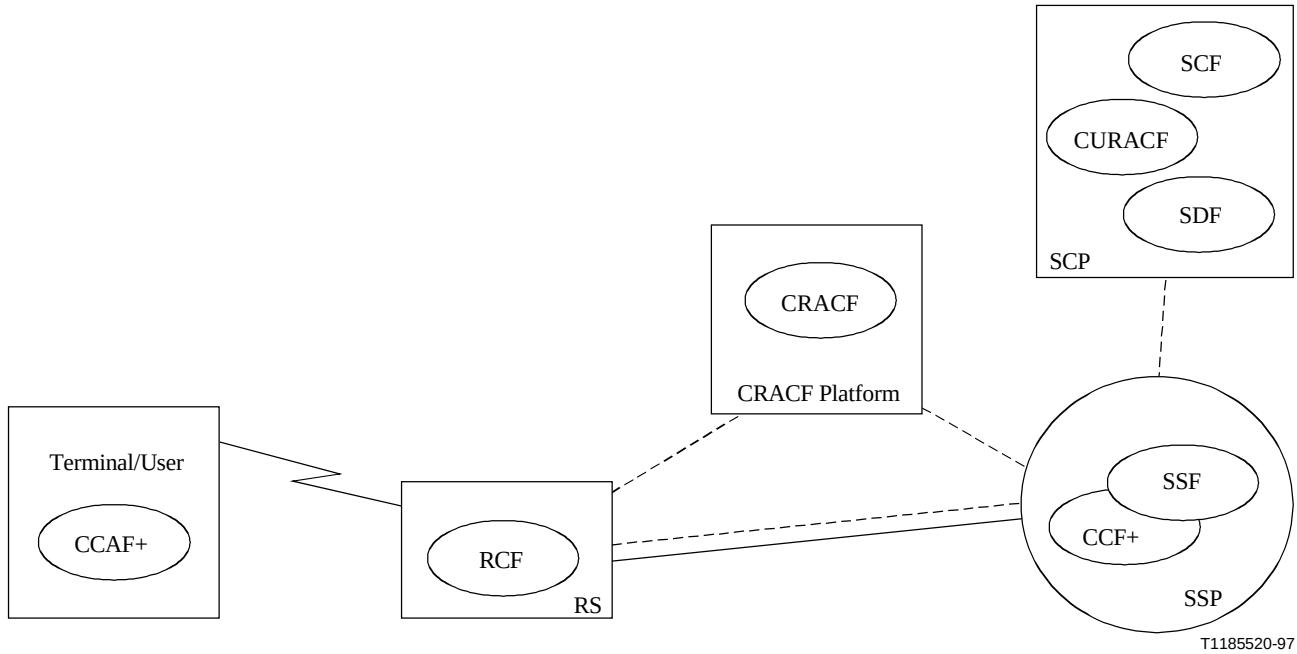
In this scenario, the RCF is located in the Radio System (RS), the CRACF is located in a Standalone Platform and the CURACF is located in the SCP. Example mapping of wireless access FEs to physical platforms is shown in Figure A.10. Four interfaces are utilized as follows:

1) **The RS-SSP interface**: is used for RCF-SSF/CCF+ and RCF-CURACF operations.

2) **The RS-CRACF Platform interface**: is used for RCF-CRACF operations.

3) **The SSP-CRACF Platform interface**: is used for CRACF-CURACF, CRACF-SSF/CCF+ operations.

4) **The SSP-SCP interface**: is used for, RCF-CURACF, CRACF-CURACF, CRACF-SCF and SCF-SSF/CCF+ operations.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.10/Q.1224 – Example mapping of wireless access FE to physical platforms – 9

A.4.10 Example mapping 10: RCF in Radio System, CRACF in standalone platform and CURACF in standalone platform

In this scenario, the RCF is located in the Radio System (RS), the CRACF is located in a Standalone Platform and the CURACF is located in another standalone platform. Example mapping of wireless access FEs to physical platforms is shown in Figure A.11. Eight interfaces are utilized as follows:

1) **The RS-SSP interface**: is used for RCF-SSF/CCF+ operations.

2) **The RS-CRACF Platform interface**: is used for RCF-CRACF operations.

3) **The RS-CURACF Platform interface**: is used for RCF-CURACF operations.

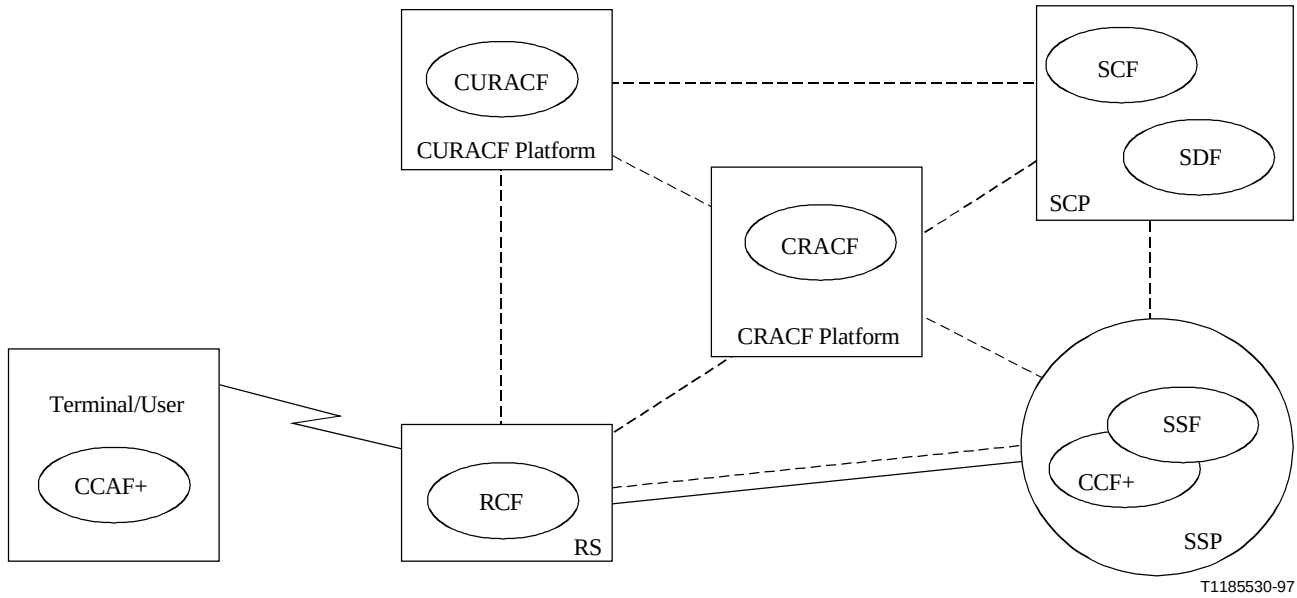
4) **The CRACF Platform-CURACF Platform interface**: is used for CRACF-CURACF operations.

5) **The CRACF Platform-SCP interface**: is used for CRACF-SCF operations.

6) **The CURACF Platform-SCP interface**: is used for CURACF-SCF operations.

7) **The SSP-CRACF Platform interface**: is used for CRACF-SSF/CCF+ operations.

8) **The SSP-SCP interface**: is used for SCF-SSF/CCF+ operations.



CCAF+	Call Control Agent Function (Plus)
CCF+	Call Control Function (Plus)
CRACF	Call Related Radio Access Control Function
CURACF	Call Unrelated Radio Access Control Function
RCF	Radio Control Function
RS	Radio System
SCF	Service Control Function
SCP	Service Control Point
SDF	Service Data Function
SSF	Service Switching Function
SSP	Service Switching Point

Physical Elements
Functional Entity
Signalling Interface
Transport
Air Interface

Figure A.11/Q.1224 – Example mapping of wireless access FE to physical platforms – 10

ANNEX B

Telecommunications Management Network (TMN) concepts

B.1 Introduction

The basic concept behind a TMN is to provide an organized architecture to achieve interconnection between various types of Operations System Functions (OSFs) and telecommunications equipment for the exchange of management information through the use of standardized protocols and interfaces.

B.2 The TMN functional architecture

The TMN functional architecture (as described in Recommendation M.3010) describes the appropriate distribution of functionality within a TMN to allow for the creation of functional blocks, from which a TMN of any complexity can be implemented. The model defines the exchange of management information on reference points, defined between the function blocks.

The TMN functional architecture is described by:

- function blocks such as Network Element Functions (NEFs), Operations System Function (OSF) and Work Station Functions (WSFs); and
- reference points which delineate management function blocks. Reference points are considered as being service boundaries between the management function blocks.

Five classes of reference points are defined:

- q class between OSF, QAF, MF, and NEF;
- f class for attachment of work stations;
- g class between WSF and users;
- m class between QAF and non-TMN managed entity;
- x class between TMN and other networks (e.g. TMNs).

The TMN Logical Layered Architecture (LLA) enables an operator to establish a hierarchy of OSFs to perform management activities. Recommendation M.3010 contains an example of an LLA in which the management functionality is considered to be partitioned into layers (service management layer, network management layer, element management layer and network management layer). In this hierarchy, each layer restricts management activity within the boundary of the layer to a clearly-defined rank, that is concerned with some subset of the total management activity.

The SERVICE MANAGEMENT (SM) LAYER is concerned with, and responsible for services. The SM layer relies on the NM layer for the technical provisioning of a service.

The SM layer has five principle roles:

1) customer facing (see Note) and interfacing with other Network/Service Providers;
2) interaction with service providers;
3) interaction with the NM layer;
4) maintaining statistical data [e.g. Quality of Service (QOS)];
5) interaction between services.

NOTE 1 – Customer facing provides the basic point of contact with customers for all service transactions including provision/cessation of service, accounts, QOS, fault reporting, etc.

The NETWORK MANAGEMENT LAYER (NM) LAYER is responsible for the network aspects of the services requested by the service management layer. It knows what resources are available in the network, how these are interrelated and geographically allocated and how the resources can be controlled. It has an overview of the network. It is also responsible for and provides for the range and initial amount of network resources that meets the planned extensions in the range of services offered to the market and the expected growth in service usage by the customers. Furthermore, this layer is responsible for the technical performance of the actual network and will control the available network capabilities and capacity to give the agreed accessibility and quality of service.

The NM layer has the responsibility for the management of all the Network Elements (NEs), as presented by the EM layer, both individually and as a set. Functions addressing the management of a wide geographical area are located at this layer.

The NM layer has three principle roles:

1) control and coordination of the network view of all network elements within its scope or domain;

2) provisioning of network capabilities for the support of services;

3) interaction with the SM layer on performance, usage, availability, etc.

Thus the NM layer provides the functionality to manage a network by coordinating activity across the network and supports the "networking" demand made by the SM layer.

The ELEMENT MANAGEMENT (EM) LAYER is responsible for the management of a subset of the network elements in the network. The EM layer is responsible for the detailed planning, engineering and construction of the NEs. Furthermore, it monitors and controls the resulting equipment and facilities. Hereby, it masks the manufacturer specific management functions for the network management layer: the manufacturer specific data is stored and converted to a uniform format.

The EM layer manages each network element on an individual basis and supports an abstraction of the functions provided by the NE layer.

The EM layer has a set of element managers, that are individually responsible, on a devolved basis from the NM layer, for some subset of network elements.

The EM layer has three principle roles:

1) control and coordination of a subset of network elements;

2) providing a gateway (mediation) function to permit the NM layer to interact with network elements;

3) maintaining statistical, log and other data about elements.

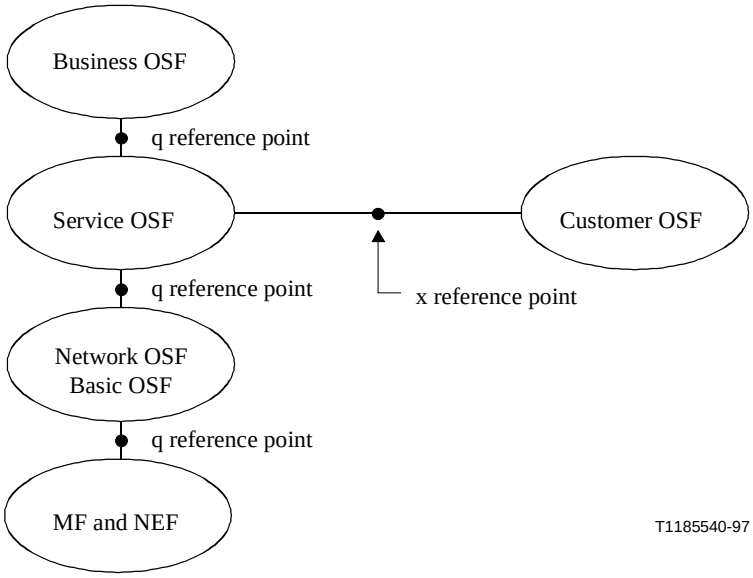
NOTE 2 – All mediation functions, including those physically located elsewhere (e.g. in an NE) are logically located in the EM layer.

The NETWORK ELEMENT (NE) LAYER comprises the NE Functions (NEFs). The NE Functions include the telecommunications functions which are subject to management.

NOTE 3 – The TMN Business Management Layer is outside the scope of standardization and is therefore not addressed.

B.2.1 Operations Systems

There are many types of OSFs with the types being dependent on the structure of the TMN. One possible categorization of OSFs based upon descending abstraction is – business, service, network and basic. An example is shown in Figure B.1 (as taken from Recommendation M.3010). As shown, some TMN implementations may include business OSFs which are concerned with a total enterprise (i.e. all services and networks) and carry out overall business coordination. Service OSFs are concerned with the service aspects of one or more networks and will normally perform a customer interfacing role.



NOTE 1 – Customer OSF is peer of Service OSF.
NOTE 2 – Splitting of Network OSF and Basic OSF is an item for further study.

Figure B.1/Q.1224 – Example of an OSF functional architecture

Operations System Functions perform the duty assigned to each of the layers within the TMN hierarchy. Therefore the Service OSF (S-OSF) are concerned with the Service aspects of one or more Networks and will, among others, normally perform a customer interfacing role. The Network OSF (N-OSF) covers the realisation of Network-based TMN application functions by communicating with basic or Element OSFs (E-OSF). Thus the basic and Network OSFs provide the functionality to manage a Network by coordinating the activity across a network and supporting "networking" demands of Service OSFs. Basic and Network OSFs share management of infrastructure aspects of a telecommunications network. In smaller networks, basic OSFs may not be present and Network OSFs will communicate with NEFs and or MFs directly.

B.2.2 Work Station Functions

The WSFs provide the user at the terminal with the general functions to handle input and output of data to/from the user's terminal. The typical work station functions are:

- security access, log in, etc., to the terminal;
- recognize and validate input;
- format and validate output;
- support the menus, screens, windows, scrolling, paging, etc.;
- access to TMN;
- screen development tools to allow development, modification of screen layouts;
- definition of fixed text;
- help information;
- field validation rules.

B.2.3 The Human Machine Adaptation (HMA)

The HMA performs the conversion from the Management Application Function (MAF) information model to the WSF information model and vice versa (it masks and possibly reorganizes some data and it adds information). In addition, it supports the authentication and authorization of the human operators. In the TMN, the HMA is shown at the OSF/MF side of the f reference point (see Figure 1/M.3300).

B.2.4 TMN information modelling

ITU-T has adopted ISO's OSI Systems Management (ISO/IEC 10165) principles in its 'TMN Information Architecture' to describe the information exchange between the function blocks in the TMN functional architecture. These OSI systems management principles are based on an object-oriented paradigm: the management information to be exchanged is modelled in terms of (physical or logical) resources that are being managed or may exist to support certain management functions, e.g. event forwarding or event logging. A set of objects sharing the same attributes, notifications and management operations is referred to as a class. It is defined precisely what messages can be used to manage the object (syntax) and what these messages mean (semantics). More information on the way of modelling of the managed object classes can be found in Guidelines for the Definition of Managed Objects (GDMO).

The standards that present guidelines on how to define managed object classes include:

- The "Management Information Model" defines the model for managed objects. Here, the attributes, the management operations that can be performed on the objects, the notifications they may emit and the appropriate naming schemes are identified. Based on this, the managed objects and attributes can be identified in a protocol.
- The "Definition of Management Information" which defines managed objects and templates that can be imported into a variety of managed object class definitions. Hereby, a consistent definition of attributes, notifications, and management operations is achieved.
- The "Guidelines for the definition of managed objects" provides guidance, methods and notation techniques (templates) for specifying managed object classes and their management information.

The protocols to be used to transfer this information are defined in several protocol profiles. The profiles define all protocols of the corresponding OSI 7-layer stack.

The OSI management principles are used for modelling the information exchange between the function blocks; this technique is based on an object-oriented paradigm. All aspects visible on a reference point are modelled in terms of managed objects (classes). For each reference point the instances of the managed object classes (i.e. the managed objects) are arranged in a naming tree. The collection of (managed) objects within a open system is referred to as the Management Information Base (MIB) of that system.

Using the information and guidelines from the systems management standards and the appropriate protocol standards, it is possible to fully define all relevant management information on the interfaces. However, to get an idea of what aspects should be modelled, it is often found useful to follow the "TMN Interface Specification Methodology".

B.3 Applying TMN concepts to the IN

B.3.1 IN management functional model

The IN management model addresses the management aspect of the IN Distributed Functional Plane. The functional entities identified in Recommendation Q.1204, related to IN service creation and service management, can be mapped to the proper function blocks in the TMN functional architecture.

B.3.1.1 IN SMF and IN SMAF definition revision

1) The IN SMF maps to one or more TMN OSFs.

2) The existing IN SMAF should be replaced by the TMN WSF.

NOTE – Authentication and authorization functions that are required are performed by the TMN HMA which is in the TMN OSF.

The IN SMF functions map on to one or more TMN logical layers. The initiation of the SMF identified activities will in many cases be done on the Service Management Layer (by the service provider or service subscriber). And resulting from this, the effectuation of these activities will in many cases be performed by generic, service independent functionality within the network, in the Network Management Layer and the Element Management Layer.

For example purposes, the service Generic Data Allocation Function is mapped on the TMN functional layers:

- *Service management layer*

  Service data allocation is performed after the service software has been created and tested successfully. The service data is passed onto a network deployment and provisioning function on the Network Management layer. This should be done in a coordinated way, performed by one subfunction for all kinds of data.

- *Network management layer*

  In the Network Management layer, it is determined for which part of the network the service data is relevant. The service data is passed in to the network element management functions on the Element Management layer. This should be done in a coordinated way, performed by one subfunction for all kinds of data.

- *Element management layer*

  Here, the individual IN network elements are managed: it is determined for which IN network elements the service data is relevant. The service data is downloaded to the corresponding network elements.

The mapping of IN Management FEs (SMF/SMAF) to TMN function blocks is illustrated in Figure B.2.

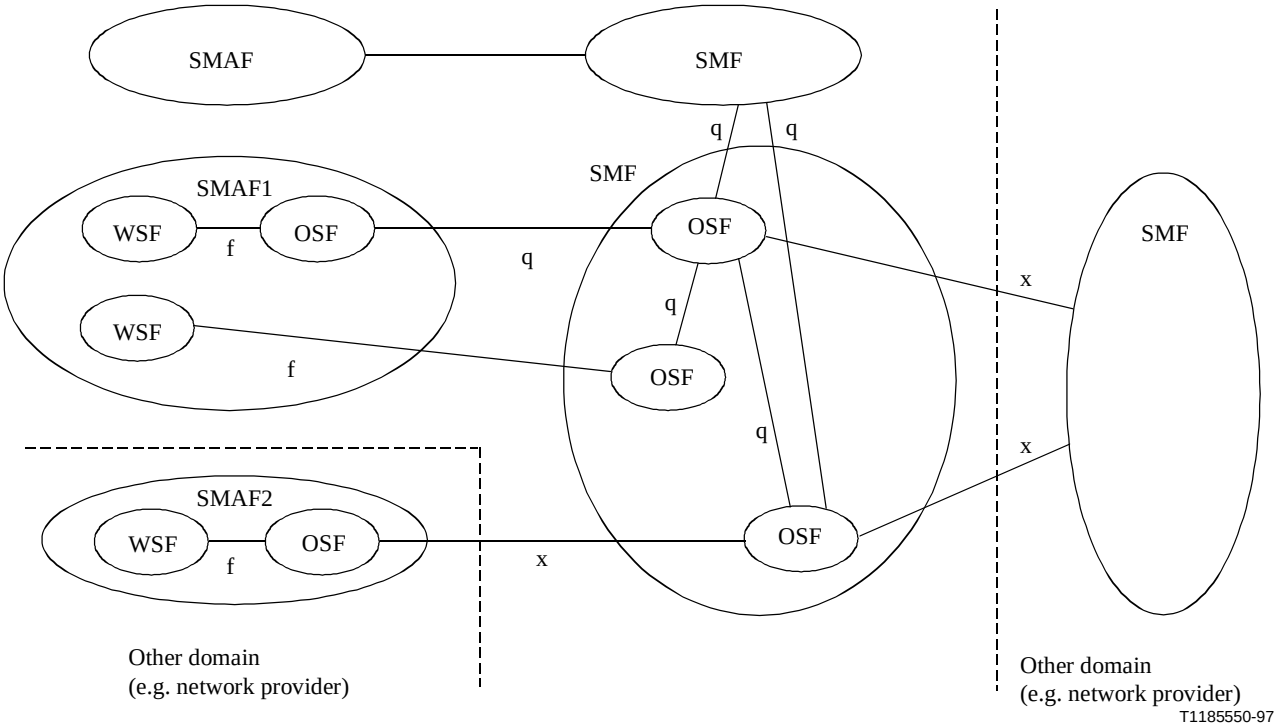


Figure B.2/Q.1224 – Mapping of IN management FEs (SMF/SMAF) to TMN function blocks

Separated by a dotted line, the figure shows a relation peer-to-peer between two SMFs located in different domains. This relationship maps onto a "x" reference point. On the left-hand side of the dotted line, the figure shows the relation between SMAF and SMF in two particular cases:

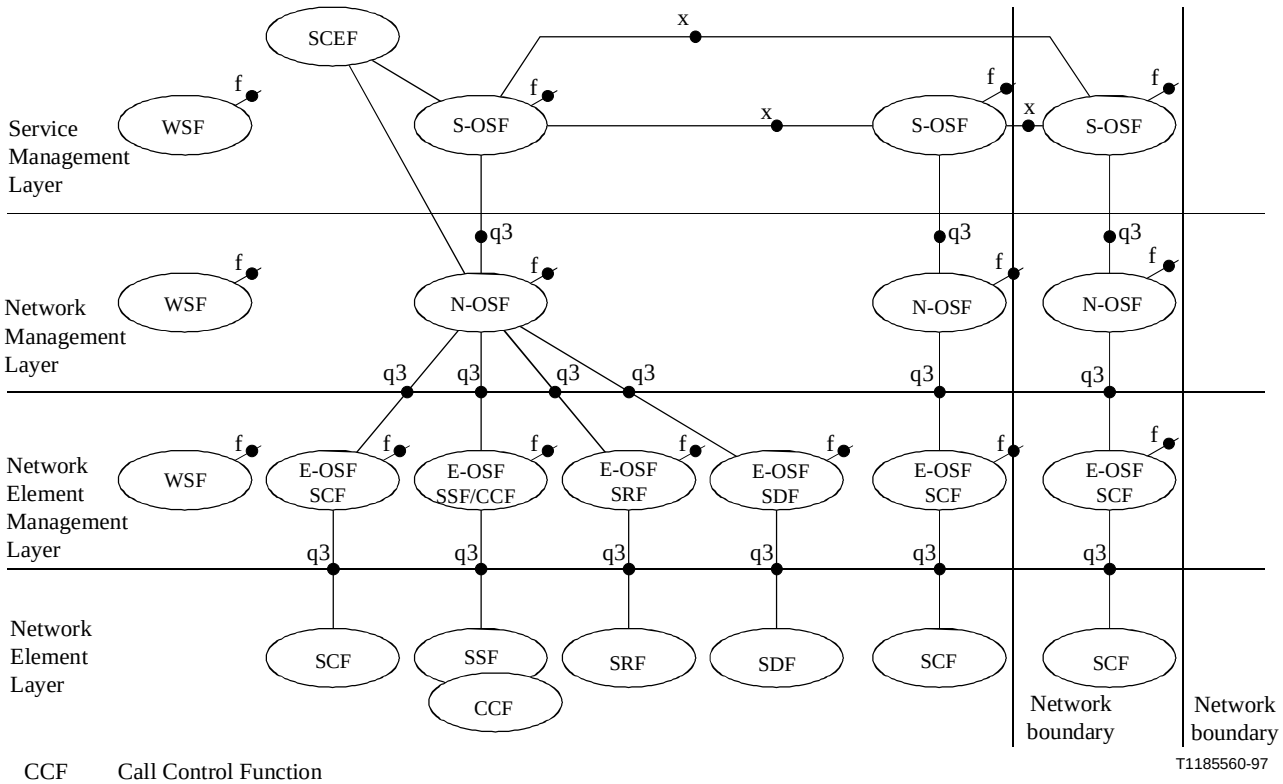
- In the first case, SMAF1 is in the same domain as the SMF so the relationship can be mapped onto either a "q" reference point when the access to the SMF is done via the network, or a "f" reference point when the SMAF is collocated with the SMF.
- In the second case, SMAF2 does not belong to the same domain as the SMF. It is the case when an operator gives access to another service provider. In this case the relationship maps onto a "x" reference point.

Figure B.3 shows the functional entities in the IN management functional model for IN CS-2. Although the different TMN layers are listed in the model, it should be noted that the function of the layers in this model is not normative in Recommendation M.3010.

TMN provides maximum flexibility in modelling OSF-OSF and OSF-NEF (Network Element Function) relationships. Therefore several alternative combinations of OSF-OSF and OSF-NEF could be considered to cover specific modelling objectives. For this reason, the model in Figure B.3 should only be seen as an example.

In the IN management domain there is no CCF-E-OSF relation because a separate CCF is not an IN functional entity. The CCF with a SSF relation has however a relationship with the IN management entities (E-OSF CCF/SSF). This CCF does include different functionality compared to a normal CCF because of its relation to the SSF.

Figure B.3 shows also the relations which can cross network boundaries in the management area. The networks on the right side in the figure are shown to depict internetworking, and they do not list all possible IN functional entities.



CCF	Call Control Function
E-OSF	Element Operation Support Function
N-OSF	Network Operation Support Function
S-OSF	Service Operation Support Function
SCEF	Service Creation Environment Function
SCF	Service Control Function
SDF	Service Data Function
SRF	Specialized Resource Function
SSF	Service Switching Function
WSF	Work Station Function

Figure B.3/Q.1224 – Example of an IN management functional model with TMN functional hierarchy

B.3.2 Correspondence between the IN concept of SIB and the TMN concept of MO

Previous papers and discussions have shown that the terminology issues are among the most critical ones. Some debates have taken place in particular on the correspondence between the IN concept of SIB (Service Independent Building Block) and the TMN concept of MO (Managed Object). A thorough review of these concepts led the TMN experts to conclude that SIBs and MOs are to be considered in different planes (according to the IN model) and therefore are not really subject to comparison.

- The SIBs are conceptual abstractions used during the service creation phase of an IN service. These SIBs will sooner or later materialize in FEs (distributed functional plane) and be actually implemented via interworking FEAs (physical plane). As such SIBs are never accessible or visible by the service user. The actual implementation of distributed FEs will make use of a series of components that interwork via a dedicated protocol (e.g. INAP) across IN interfaces. The manageable properties of these FEs may scale from 0% (no manageable aspect) to x%. We shall call "x" the management dimension of an FE.

- In the TMN model, the MOs are conceptual views of manageable resources. MOs actually represent the management dimension of resources. They are used as a means of defining and accessing to the manageable aspects of resources. As such they are made visible and accessible at q reference points and Q interfaces via agents.

Figure B.4 shows how the two approaches complement each other in the physical plane. The way the agent interacts with the manageable resource that represents the FE/FEA is a local matter (i.e. not currently subject to standardization).

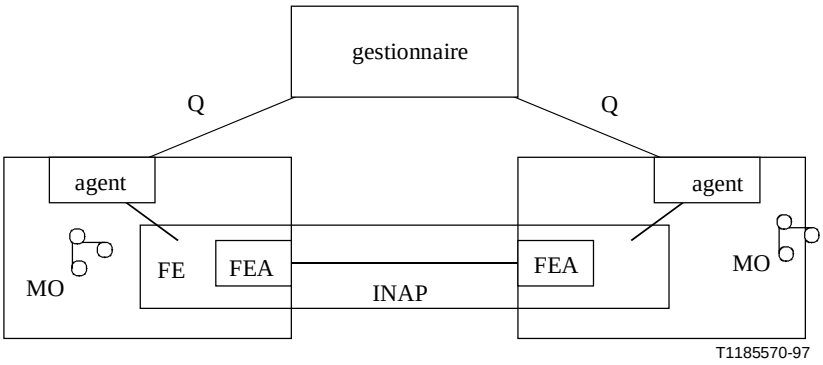


Figure B.4/Q.1224 – Positioning IN and TMN concepts in the physical plane

This figure actually points out that the service dimension of an IN service can be considered as orthogonal to the management dimension of it. This is depicted in Figure B.5.

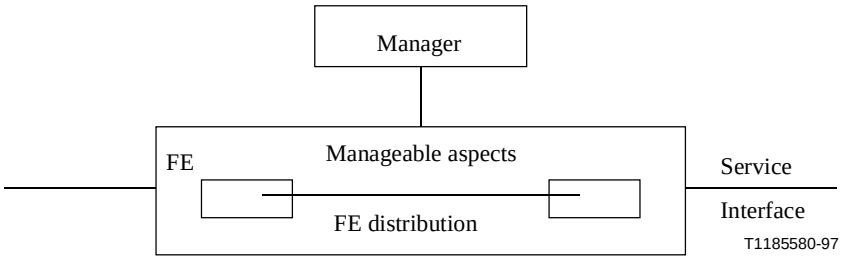


Figure B.5/Q.1224 – Orthogonality of service management aspects

Figure B.5 has attempted to highlight the orthogonality of the service and the management dimension of FEs. In reality, the IN management may take place at different levels and this will essentially depend on who is managing:

1) Service level: A user or subscriber may need access to service level information (i.e. QOS), performance, usage, etc.

2) FE level: The service provider may need to monitor and control elements which have FE level significance.

3) FEA level: The real time control of a service may imply access to information that pertains to the elementary subcomponents of the distributed application.

4) Resource level: The network operator in any case will have to monitor and control the underlying resources but this is a classical case of TMN managing classical NEs.

Figure B.6 attempts to summarize this. Note that all elements of Figure B.6 are to be found in the IN physical plane. They may all be managed separately for different reasons. In order to get these elements managed by the TMN conceptual representation, they will have to be modelled as MOs. The relationship that exists between the various components identified in Figure B.6 may or may not require to be reflected at the MO (modelling) level.

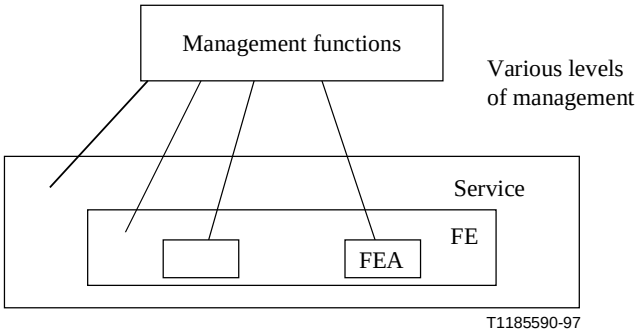


Figure B.6/Q.1224 – Various levels of management

B.3.3 IN management protocols

The assumed protocol to be used for management aspects in IN CS-2 (SMF-SMAF, SMF-SCF, SMF-SDF, SMF-SRF, SMF-SSF/CCF, SMF-SCEF) are the TMN Generic Protocols [e.g. Common Management Information Protocol (CMIP) as defined in Recommendation Q.812]. No modifications to INAP (Recommendation Q.1228) are foreseen for management aspects.

B.4 Modelling aspects imported from TMN

B.4.1 Mappings of IN SMF onto TMN logical layers

One SMF activity can be divided into two subactivities: one is "service independent" and the other is "service dependent".

Generally, the SMF activities are service independent and they are invoked by service management programs which are specific to each IN service and thus are mapped onto the S-OSF level. Among the service independent activities, some need to have a view on the whole network and they are mapped onto the N-OSF level, others need to have a link with the physical entities and they are mapped onto the NE-OSF level.

Service related activities do not necessarily map directly onto the S-OSF only. An example of this is the activity associated with the downloading and alteration of Service Logic which will probably involve the S-OSF, N-OSF and E-OSF.

B.4.1.1 Service deployment functions

- *Service Scripts Allocation*

  This activity is service independent but it is related to the network. The first step of this activity consists of choosing one or several physical entities and needs an overall knowledge on the network. So it is mapped onto the NE-OSF level. The second step consists of a dialogue with the selected physical entities, so it is mapped onto the NE-OSF level. Finally, "Service Scripts Allocation" is mapped onto the S-OSF (for the management program which invokes the generic mechanisms), the N-OSF and NE-OSF levels.

- *Service Generic Data Allocation*

  As above, we can distinguish two steps for this activity, one step consists of determining the entities which are aimed to receive the service generic data, and the other step consists of passing the data. So, "Service Generic Data Allocation" is mapped onto the S-OSF (for the management program which invokes the generic mechanisms), the N-OSF and NE-OSF levels.

- *Signalling Routing Data Introduction and Allocation*

  For the same reasons as above, this activity is mapped onto the S-OSF (for the management program which invokes the generic mechanisms), the N-OSF and NE-OSF levels.

- *Trigger Data Introduction and Allocation*

  For the same reasons as above, this activity is mapped onto the S-OSF (for the management program which invokes the generic mechanisms), the N-OSF and NE-OSF levels.

- *Specialized Resource Data Introduction and Allocation*

  For the same reasons as above, this activity is mapped onto the S-OSF (for the management program which invokes the generic mechanisms), the N-OSF and NE-OSF levels.

- *Service Testing*

  For one part this activity is service dependent because the service consistency has to be tested; so it is mapped onto the S-OSF level. For the other part, the Service Testing activity uses generic mechanisms in order to test the service consistency with the existing services. So it is mapped onto the N-OSF and NE-OSF levels. Finally, Service Testing activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

B.4.1.2 Service provisioning functions

- *Customer Specific Data Introduction and Allocation*

  This activity can be split into two sub-activities: data introduction and data allocation. The data introduction needs to have an interface with the customer and this interface is service dependent. So Customer Specific Data Introduction is mapped onto the S-OSF level. The data allocation is service independent but is network dependent. So, Customer Specific Data Allocation is mapped onto N-OSF and NE-OSF levels. Finally, Customer Specific Data Introduction and Allocation is mapped onto the S-OSF, N-OSF and NE-OSF levels.

B.4.1.3 Service operation control functions

- *Service Maintenance*
  - Software Maintenance:

    This activity consists of modifying the service logic, so it is close to the Service Scripts Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.
  - Updating Service Generic Data:

    This activity is close to the Service Generic Data Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.
  - Updating Customer Specific Data:

    This activity is close to the Customer Specific Data Introduction and Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.
  - Updating Signalling Routing Data:

    This activity is close to the Signalling Routing Data Introduction and Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Updating Trigger Data:

  This activity is close to the Trigger Data Introduction and Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Updating Specialized Resource Data:

  This activity is close to the Specialized Resource Data Introduction and Allocation activity. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Adjustment of the SMAF:

  This activity consists of the updating of the interface to the customer and the SMF. So it seems to be mapped on the S-OSF level. Furthermore, one can imagine that such an updating implies modifications on the physical entities of the network which are concerned with the customer data. So this activity is probably mapped onto N-OSF and NE-OSF levels. Finally, Adjustment of the SMAF activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Service Reconfiguration:

  This activity consists of the re-allocation of service scripts, service generic data and customer specific data in the physical entities. For this reason this activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Service (de)activation:

  This activity consists of the re-allocation of service scripts, service generic data and customer specific data in the physical entities. For this reason this activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

– Service dismantlement:

  This activity allows to take the service definitively out of operation when it becomes evident that this service does not satisfy anymore, and cannot or does not have to be adjusted. It is close to Service (de)activation activity and is mapped onto the S-OSF, N-OSF and NE-OSF levels.

- *Security*

  Two types of security can be distinguished: access control and data control. Access control covers the identification, authentication and authorization of the customer. Therefore it is mapped onto the S-OSF level. Data control covers the control of the input of data by the customer; it is a service-specific activity, so it is mapped onto S-OSF level. Finally, the Security activity is mapped onto the S-OSF level.

B.4.1.4 Billing functions

- *Generating and Storing Charging Records*

  This activity needs both generic mechanisms and service specific actions, so it is mapped onto the S-OSF, N-OSF and NE-OSF levels.

- *Collecting Charging Records*

  This activity needs generic mechanisms and in addition needs a dialogue with the physical entities to which the charging records belong. So it is mapped onto the S-OSF, N-OSF and NE-OSF levels.

- *Modification of Tariffs*

  This activity is performed at the network level, but sometimes it can be performed in particular physical entities like switching systems. It can also be customer dependent.

Finally, the Modification of Tariffs activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

B.4.1.5 Service monitoring

- *Initiating Measurements and Collecting Measurement Data*

  This activity can be divided into two sub-activities. The first one initiates measurements which could be specific of either the service, or the network or a network element. The second one is concerned with collecting measurement mechanisms and is generic. So this global activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

- *Analysis and Reporting of Measurement Data*

  The analysis sub-activity can be generic but it can be dependent on the nature of the data (service specific data or network specific data, etc.). The Reporting sub-activity involves generic mechanisms. So this global activity is mapped onto the S-OSF, N-OSF and NE-OSF levels.

B.4.2 Mapping of IN SMF onto TMN management functions

According with the description of SMF functionality, the following text describes the mapping of IN SMF activities onto TMN management functions:

B.4.2.1 Service deployment functions

The Service Deployment functions relate to activities like service script allocation, resource allocation and data introduction in NEs like switching systems, IPs, etc. These functions could correspond to the TMN management function called "NE installation" (see 4.3/M.3400). The Testing activity can be also done under the control of, or supported by, the TMN by the TMN management function "NE installation".

B.4.2.2 Service Provisioning Functions

The Service Provisioning functions relate to the introduction and allocation of customer specific data in NEs such as databases. These functions could correspond to the TMN configuration management functions such as "database management" (see 4.1.3/M.3400) or as "set parameters" (see 4.1.1/M.3400).

B.4.2.3 Service operation control functions

- *Service Maintenance*

  The Service Maintenance includes several different aspects:

  – One aspect is updating data. As above, it could correspond to the TMN configuration management function "database management". It could correspond with the TMN management function called "NE installation" as well, if re-installation is necessary.

  – Adjustment of the SMAF is provided, in the TMN OSF, with the TMN functional component "Human Machine Adaptation" (HMA) and TMN configuration management functions.

  – Service Reconfiguration, service (de)activation and service dismantlement could be provided with connected TMN configuration management functions like "NE database management", "NE configuration" or "NE installation".

- *Security*

  These functions could be provided with the HMA and TMN security management functions (see clause 6/M.3400).

- *Billing functions*

  These functions are fully provided with the TMN accounting management functions (see clause 5/M.3400).

- *Service monitoring*

  The information which can be collected for service monitoring purposes relate to performance aspects, and to faults and alarms as well. So, Service Monitoring functions could be provided with TMN performance monitoring functions and TMN performance management control functions (see subclauses 2.1 and 2.2/M.3400). In addition, they could be provided with TMN alarm surveillance functions (see 3.1/M.3400) and fault management functions (see 3.2/M.3400).

B.4.3 Mapping of the IN SCEF onto TMN logical layers

In this subclause, the SCEF is decomposed into TMN logical layers. See Figure B.7.

This decomposition should also allow the detailing and standardization of each logical layer to be developed and evolved at different rates. For example, agreements may be achieved between service providers on service specifications, and between network providers on location of service logic and data, but there may not be sufficient standardization of (element specific) service execution environments to allow common service programs between element providers.

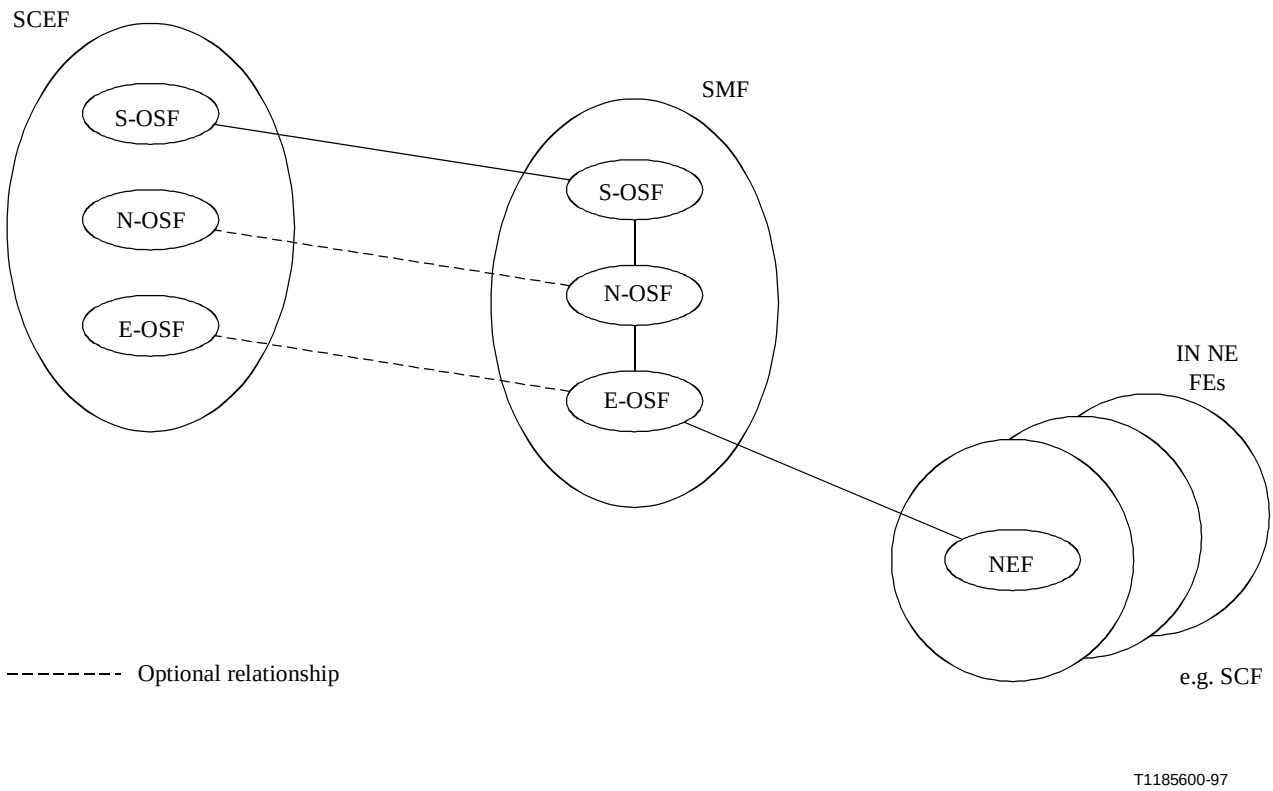


Figure B.7/Q.1224 – Mapping of the IN SCEF onto TMN logical layers

A goal of the SCEF is to provide service creation capabilities independent of the underlying IN network and element detail. However, there may be instances where network or element specific aspects may impact the definition of a service. To provide network and element independence, while still allowing network and element specific aspects to be defined when there is a need to do so, the following logical partitioning of the SCEF is defined:

- SCEF S-OSF: The portion of the SCEF that provides service creation function independent of network specific aspects including location, and independent of element specific aspects.
- SCEF N-OSF: The portion of the SCEF that provides network specific aspects including location, independent of service and element specific aspects.
- SCEF E-OSF: The portion of the SCEF that provides element specific service creation aspects, independent of service and network specific aspects.

For example, specific switches may have differing levels of call model capabilities. Specific IP service resources may not be uniformly available at every network location. Therefore, a service designer may wish to specify service logic that can check for network or element specific capabilities and provide alternate service logic or other special treatment for such situations. This could occur in two ways:

1) A service layer designer could specify "generic" service logic, and rely on corresponding logic developed by a network layer designer, or an element layer designer to adapt or tailor the generic service logic to any network or element specific aspects. In this case network layer logic could (most economically) route a call to a point in the network where a specific service resource exists.
2) A service layer designer could anticipate certain network or element specific aspects, and create a service logic program that conditionally specifies service logic based on specific network or element aspects. A service logic program developed in this way could adapt the behaviour of a service to accommodate differences in switch call model capabilities or local service resources.

SCEF layers communicate through corresponding SMF layers. For example, to determine the ability of specific network sites to accommodate specific service features, the SCEF S-OSF would request the SMF S-OSF to provide information on network topology (configuration). The SMF S-OSF would obtain this information through the SMF N-OSF. The SMF N-OSF would then request the SMF N-OSF to provide information on capabilities of specific elements. The SMF N-OSF and E-OSFs can obtain this information from network repositories or from direct query of network elements.

NOTE – The TMN logical layers and TMN OSF notation is being used in the SCEF to facilitate alignment of IN and TMN. No assumptions are made about SCEF capabilities and current TMN scope.

B.5 IN management and generic TMN management

If SMF component functionality is defined in IN terms only, a second step would be needed to map the IN component functionality to TMN generic and IN specific functionality. The alternative is to express SMF functionality using the framework of TMN Management Functional Areas, and TMN logical layers, as one step.

Management Functional Areas (MFAs)

	Fault Management	Configuration Management	Performance Management	Accounting Management	Security Management
Service Management Layer (SML)					
Network Management Layer (NML)					
Element Management Layer (EML)					

In either case, each provider would decide whether to build on generic TMN MFA capabilities, or replicate capabilities to support IN management on another structure. Expressing SMF functionality in terms of TMN MFAs and Logical Layers facilitates incremental integration and migration to TMN, and can provide a common means to decompose management complexity.

A slightly hybrid approach is illustrated in Figure B.8. The core SMF functionality would be expressed in terms of TMN MFAs (not shown) and Logical Layers (shown). Layered MIBs are shown to indicate that the core SMF function has access to Management Information Base(s). The layering is shown to emphasize the need to isolate service, network, and element functionality. As in TMN, a physical implementation is not implied.

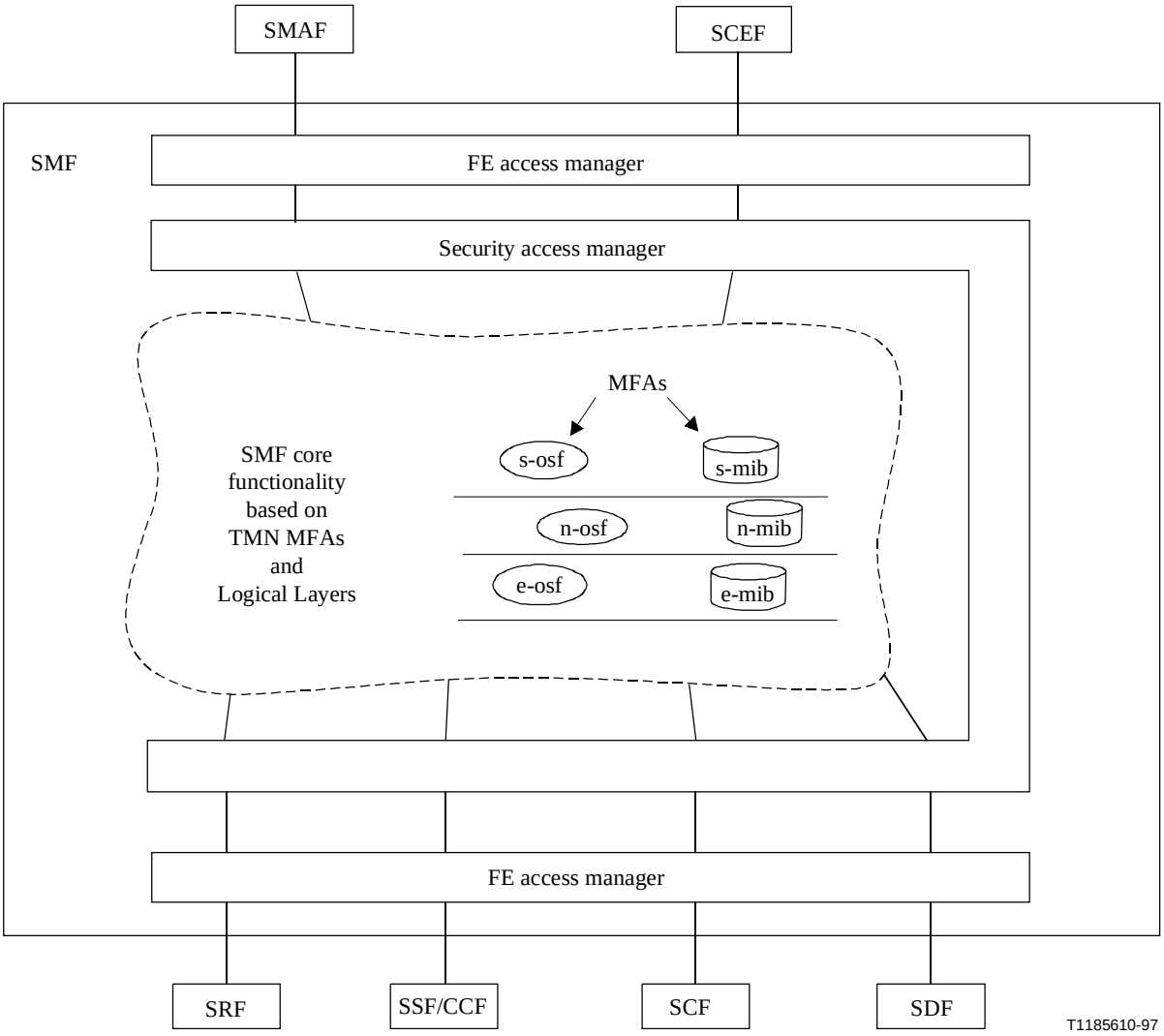


Figure B.8/Q.1224 – SMF functionality expressed in terms of TMN MFAs (not shown) and logical layers (shown)

The FE access manager, and security access manager functions are shown in the figure to mirror the corresponding capabilities in the FE component models already defined. The security access manager must be common for security to be effective.

B.5.1 Management process independence

Each provider is assumed to have management processes in place, which may be specific, and outside the scope of IN Recommendations. These processes and systems implementations may or may not be IN specific (e.g. may or may not be integrated). An IN SMF component model should not constrain a provider's ability to re-engineer its management processes. However, the information flows and information elements to and from the SMF need to be defined within IN Recommendations. The SMF core TMN MFA and Logical Layer functionality is assumed to consist of standard TMN functionality, interconnected through provider specific management process flows, analogous to HLSIBs consisting of standard SIBs through global service logic. To facilitate the understanding of information flows to and from the SMF, scenarios should be generated to illustrate assumed internal SMF functionality, without constraining management process options.

B.5.2 SMF complexity

Even if the SMF only addresses IN requirements, a number of interfaces to non-IN systems would still likely be required for fault and configuration management, as non-IN network element faults can produce IN faults, and IN element configuration can be impacted by non-IN service, network, and element configuration changes. The MFA and logical layering allows a degree of functional decomposition to be realized using a common (TMN) framework.

B.6 IN SMF-SMF internetworking relationship mapping to TMN

Internetworking should support all TMN Management Functional Areas (MFAs): Fault Management, Configuration Management, Accounting Management, Performance Management, and Security Management.

An example of this would be service provider A, maintaining a relationship with service provider B, to jointly offer or support one or more IN services. It is assumed the initial business agreements between providers for the roles assumed in each service were defined and resulted in some set of rules and conditions for each service offered. Such relationships are related to the TMN Business Management Layer and not discussed here except to understand that there should exist in a Management Information Base (MIB) a basic set of rules and conditions (e.g. polices) to guide the MFAs in managing services. See Figure B.9.

B.6.1 Fault management example

The most obvious example of internetwork fault management is when a fault is detected in one network in an internetwork service (the fault may be detected by automatic means, e.g. through a report of a service malfunction for one or more subscribers). If provider A detects the fault, it will invoke its internal processes to verify and clear the fault. If Provider A determines the fault may be in Provider B's network, it can initiate "trouble report" information flows with Provider B. Under the principle that IN FEs in one provider's network are (only) managed by SMFs within that provider's network, Provider A would not initiate management information flows to Provider B's FEs to attempt to clear the fault (would not use SMF-IN FE information flows). Provider A would initiate a "trouble report" information flow with Provider B via SMF-SMF communication, and Provider B would attempt to clear the fault through Provider's B internal SMF-IN FE information flows.

In the above example(s) the information flow are SMF-SMF, to support service execution through other IN FE-IN FE information flows. For IN FEs, the distinction between a TMN OS and TMN NE may not be clear. For example, the SDF could include data management. The SCF could contain logic that performs a management function. In these cases, the SCF and SDF could be considered to be performing OS functions, or at least, acting on behalf of the SMF (IN OSF).

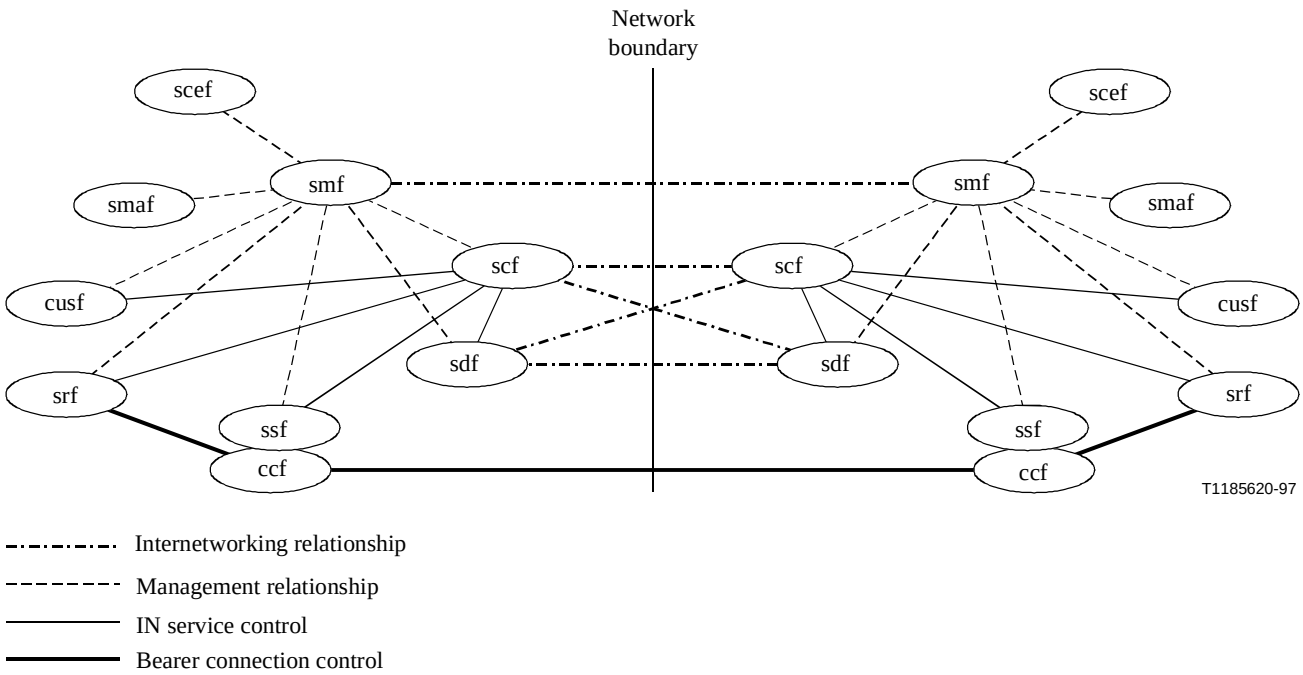


Figure B.9/Q.1224 – IN SMF-SMF internetworking relationship

ANNEX C

IN SSF Q3 Management Information Model

C.1 Introduction

This Annex describes the method for the specification of Information Models. For the purpose of this Annex, the IN SSF Q3 Interface model is provided.

C.1.1 Technical approach

The approach used to eventually provide the specifications for management of the SSF is divided into three steps (see Figure C.1).

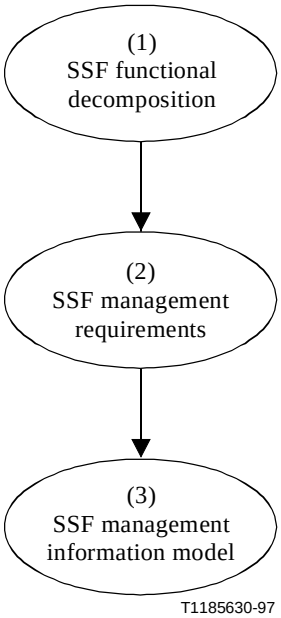


Figure C.1/Q.1224 – Overview of the approach

In the following subclauses, these steps will be described in more detail.

C.2 SSF functional decomposition

C.2.1 Rationale

In order to come to the specification of a management information model of an SSF, it should first of all be clear **what** is to be managed. Therefore it is necessary to establish a common understanding of the functionality of an SSF. The basis for such a common understanding can be provided by a functional decomposition of the SSF functionality. This functional decomposition is based on the definition of the SSF as given in the IN Distributed Functional Plane (DFP) Recommendations.

The purpose of the functional decomposition is to:

- provide the basis for the common understanding of the SSF basic functionality (the target of the management study);
- provide a basis for the identification of management requirements and management modelling;
- improve the readability of the Recommendation.

This functional decomposition could be compared with the computational model view of ODP. It is more or less in the form of an identification of (computational) objects in the SSF.

Note that this functional decomposition is one of many possible decompositions. The reader is not constrained to the derived internal SSF structure or the perceived interactions. It is possible for other SSF functionality to exist, which may impact the management information model.

C.2.2 Method

The method used to come to the functional decomposition of the SSF contains the following steps (see also Figure C.2):

1.1 Analyse SSF documentation

Within the Distributed Functional Plane Recommendations the SSF and its relationships with other IN-FEs are described. Based on this description an initial functional decomposition of the SSF, i.e. a "SSF subentities model", can be made.

1.2 Analyse and select INAP procedures

In the Physical Plane specifications the information flow exchange between the IN-FEs are described in detail. Identify which of the operations involve the SSF. Describe DFP scenarios for these operations.

1.3 Pick scenario

Choose a scenario that has not yet been mapped.

1.4 Correct/extend model

For the chosen scenario, identify the required data and functions in the SSF and try to map these to the identified SSF subentities.

If the mapping can be made, detail and validate the decomposition by considering the detailed operations and parameters in the DFP scenarios. Check also whether specific functionality has already been studied elsewhere, such as charging or routing. If this is the case, try to harmonize/reuse these.

If a mapping cannot be made, the functional decomposition should be adapted to allow the mapping.

1.5 Next Scenario?

If all identified scenarios have been mapped, and the model appears complete (i.e. all SSF functions and data relevant for management seems to be identified sufficiently well), this model can be used as the basis for the requirements capture.

If there are any scenarios left that have to be mapped, repeat steps 1.3 to 1.5.

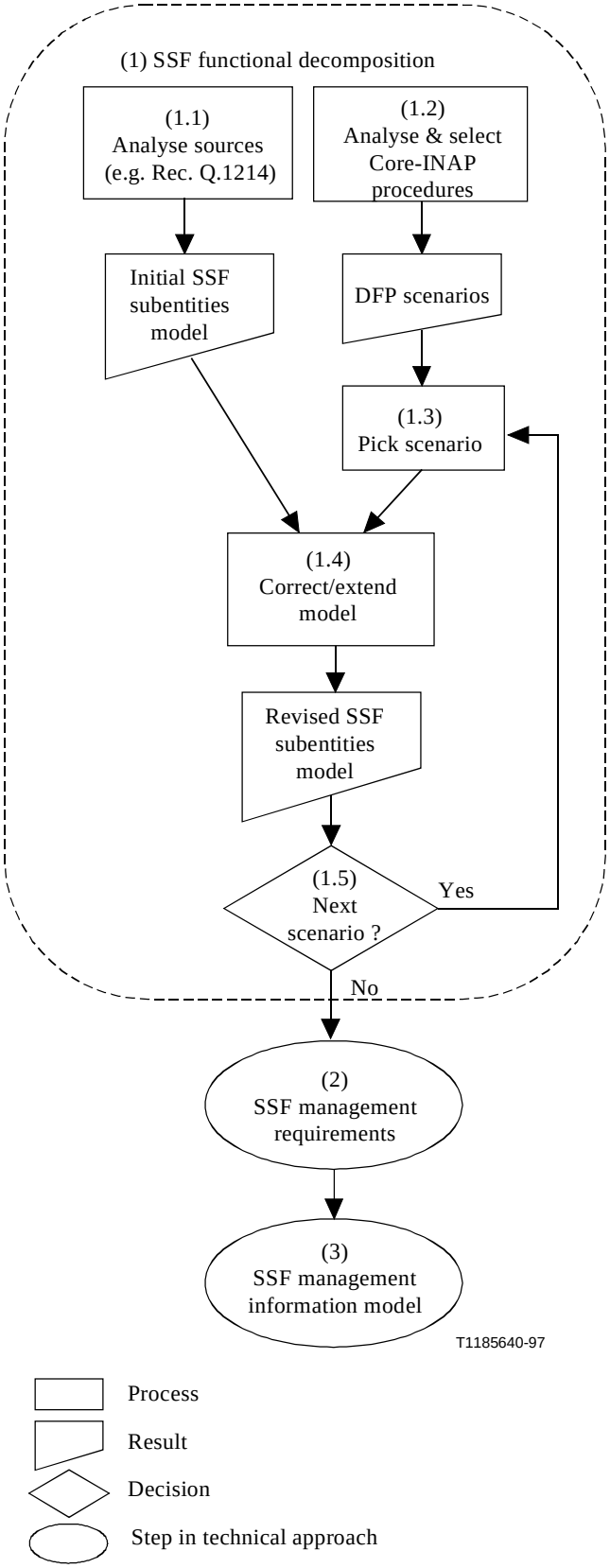


Figure C.2/Q.1224 – Method for SSF functional decomposition related to the overall approach

C.3 SSF management requirements

C.3.1 Rationale

For each SSF subentity as identified in the SSF functional decomposition, it should be analysed what part of the identified functionality and data should be subject to management (bottom-up). In order to put these management requirements into perspective, and to check whether they are really required from an operational perspective, they should be related to real (or envisioned) operational requirements. It should be possible to map each operational requirement – at least partly – to operations on the data and functions of the SSF subentities. The operational requirements and the management activities that are derived in this subprocess are completely arbitrary. These steps are only taken to categorize the management requirements. The only goal is to identify the resulting management operations on SSF data.

C.3.2 Method

In the process of SSF Management requirements capture, the following terminology is used:

- *operational requirement*: a description of a management process that an IN operator would be needing for its business
- *management activity*: set of management (OSF) operations upon one or more data entities

In this requirements capture phase, the following steps are identified:

2.1 Identify operational requirements

The operational requirements are the basis for the top-down approach to derive the SSF management requirements. To identify these operational requirements use can be made of the experience of operational staff in managing IN structured networks; the DFP scenarios identified in step 1.2 can be used as a starting point in this analysis.

To fulfill an operational requirement, one or more "management activities" need to be performed (a many-to-many containment relationship). The description of the operational requirements and the list of the containing management activities is recorded in an "operational requirement template".

2.2 Identify management activities

The management activities are the basic activities required to fulfill the operational requirements. Certain (and may be most) management activities will be found relevant for a number of operational requirements. To fulfill a management activities, one or more management operations on SSF data need to be performed (a many to many containment relationship). The description of the management activities and the list of the containing management operations is recorded in a "management activity template".

2.3 Identify management operations on SSF data

The identification of the SSF data is based on the SSF subentity model provided in step 1.4. From this, it can be derived what management operations on data are *possible* (bottom-up). From step 2.2, it can be derived what management operations on data are *required* (to satisfy the operational management requirements). So this activity performs a cross-checking between the top-down and the bottom-up requirements. From this, a conclusion has to be drawn on the SSF data that is really required to be managed. The "management operations on data" are formulated here as CRUD[8] operations on the data elements identified in the SSF subentities. A fairly detailed description of the

[8] CRUD = Create, Read, Update, Delete. These CRUD operations can be mapped directly to CMIP operations on managed objects. This, however, is for later concern.

data elements and the operations should be provided, so that a straightforward mapping to actual specifications can be made.

The analysis of the operational requirements, the management activities and the management operations on data in SSF subentities will influence each other and the results will evolve in an iterative manner.

When the description of the management requirements is stable, the next step of providing the specifications for management of an SSF can be started.

This methodology for deriving the management requirements is depicted in Figure C.3.

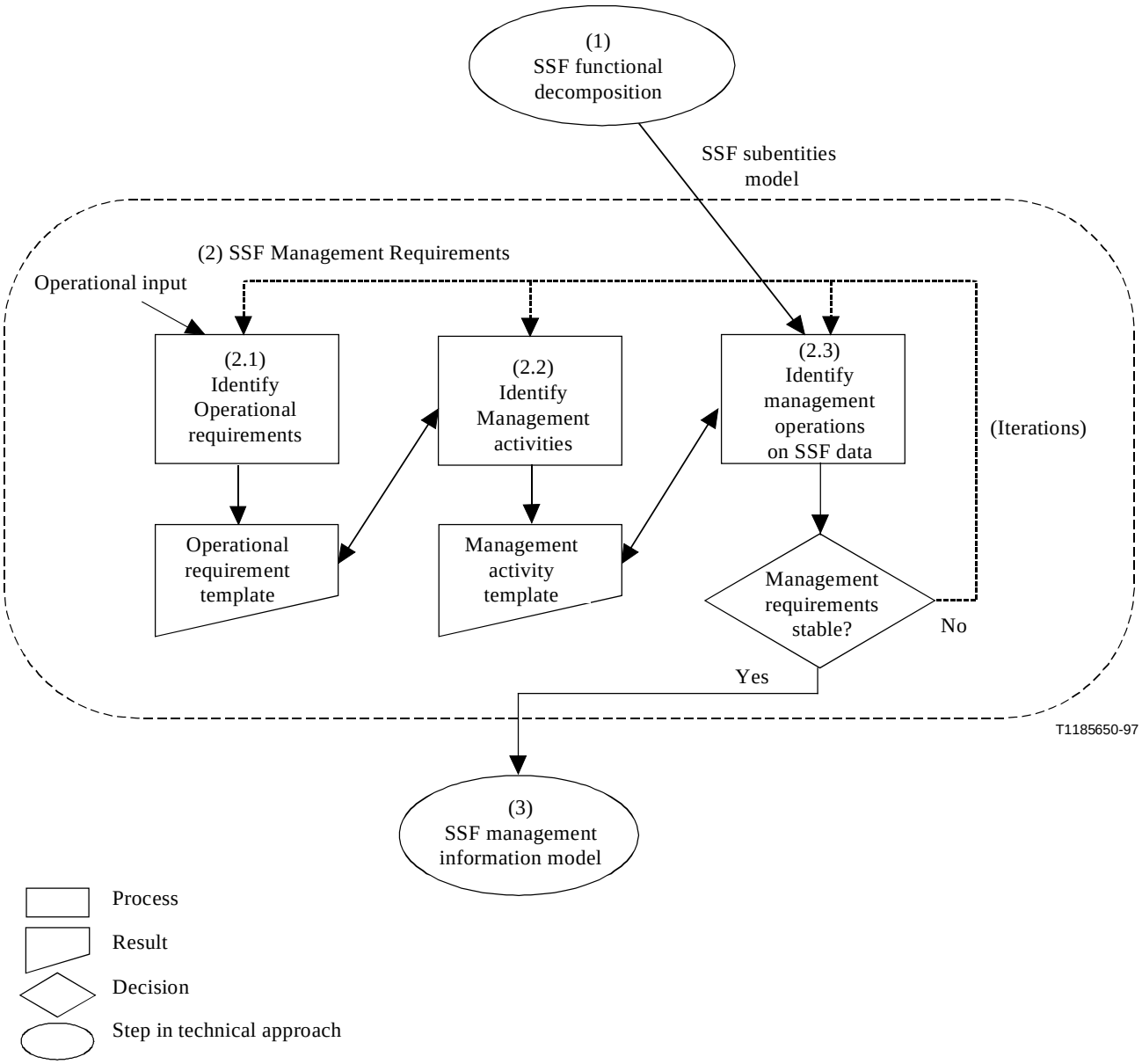


Figure C.3/Q.1224 – Method for capturing SSF management requirements related to the overall approach

C.4 SSF management information model

The management information model is the final step in the modelling process described in this Annex. It builds upon and uses the information provided by the functional decomposition and management requirements in the previous subclauses. The result is the specification of managed objects and shared management knowledge making up the Q3 information model.

- Define relation with other models.
- Define containment tree for the SSF.
- Identify the entities that will be subject to management and identify these as potential MOs.
- Study other documents that have specified MOs for overlapping functionality.
- Give a detailed description of the data to be managed.
- Define the methodology and format of the specifications.
- Provide the specifications.

ANNEX D

IN testing and fault management

D.1 Introduction

This subclause addresses initial capabilities required for IN-based service fault detection and isolation to enable early deployment of IN technology. Subclause D.2 addresses IN testing capabilities at the SSF/CCF which do not require any information flow or protocol adjustments. Subclause D.3 addresses IN end-to-end testing for verification of system functioning for an IN-based service.

D.2 IN testing capabilities for the SSF/CCF

A call involving an IN-based service may require multiple Network Elements (NEs) and Network Systems (NSs) processing for its completion. Testing of this service is different from that of switch based services since the IN-based service is distributed over the intelligent network. Therefore the task of fault detection and isolation becomes more complex.

This subclause addresses capabilities needed in the SSF/CCF for fault detection and isolation.

An IN-based service offering implies the cooperation of different systems, typically the SSF/CCF, SRF and SCF. The capabilities presented here for IN service and maintenance account for the distributed nature of IN-based services and network diversity (e.g. multi-vendor NEs and NSs to process and complete a call).

These testing capabilities are required for initial IN deployment. The capabilities are local to the SSF/CCF and the output results of these tests would not require further processing.

The following are the capabilities required: Translation Check, Trigger Data Check and Query Test.

D.2.1 Translation Check

The Translation Check represents simulation of an originating or terminating call (i.e. traverses through the call model) and displays various data associated with the call such as translation tables and routing tables. This capability is not IN specific; however, it provides information related to specific calls and it represents one of the steps required to test a service. As a result, it will determine if a given call encounters a trigger and if so, it will display information about the call.

D.2.2 Trigger Data Check

The Trigger Data Check is an IN specific capability. Trigger Data Check displays various trigger related information and it helps the tester to make inferences about SSF/CCF component faults (e.g. wrong datafill in trigger assignment).

D.2.3 SSF/CCF Query Test

The Query Test allows a craftsperson to formulate and launch an IN Query (initiating a TCAP transaction), and to observe responding SCF messages. This capability enables verification that the SSF/CCF has end-to-end connectivity with an IN application process at the SCF. At the SCF, the query is not distinguishable from any other query launched as a result of encountering a trigger at the SSF/CCF. The Query Test enables the tester to isolate faults between the SSF/CCF and SCF.

Mechanisms to handle any charging functions invoked at the SCF and any internetworking aspects are not defined in this Annex.

D.2.4 Using the SSF/CCF testing capabilities

Figure D.1 represents an example of using these capabilities when trouble is detected by a craftsperson, by a customer or by an operator debugging a new service.

When a trouble is reported, a tester will first make a POTS test call to verify the trouble. If the call does not find an error and the problem persists, the tester can use the SSF/CCF based maintenance capabilities. If the problem is evident, the tester will verify if the call is an IN call and if it encounters a trigger, by performing a Translation Check to simulate the call and to display the various data associated with the call. If there is an invalid trigger associated with the call, then the Translation Check capability should be used and the results analysed; also for viewing subscription data, the tester should use the Trigger Data Check capability, and any logs generated by the exchange. If there is a valid trigger associated with the call, the next step will be to launch a Query Test. If the SCF responds to the query, any faults in the SCF response can be identified using Query Test and Translation Check test results. In the case of faulty or no response from the SCF, the Trigger Data Check can also be used to view subscription data and office parameters, after the results of the Translation Check and Query Test have been analysed.

The above-mentioned capabilities are all SSF/CCF based. To fully test an IN service, the IN end-to-end testing capability should be used.

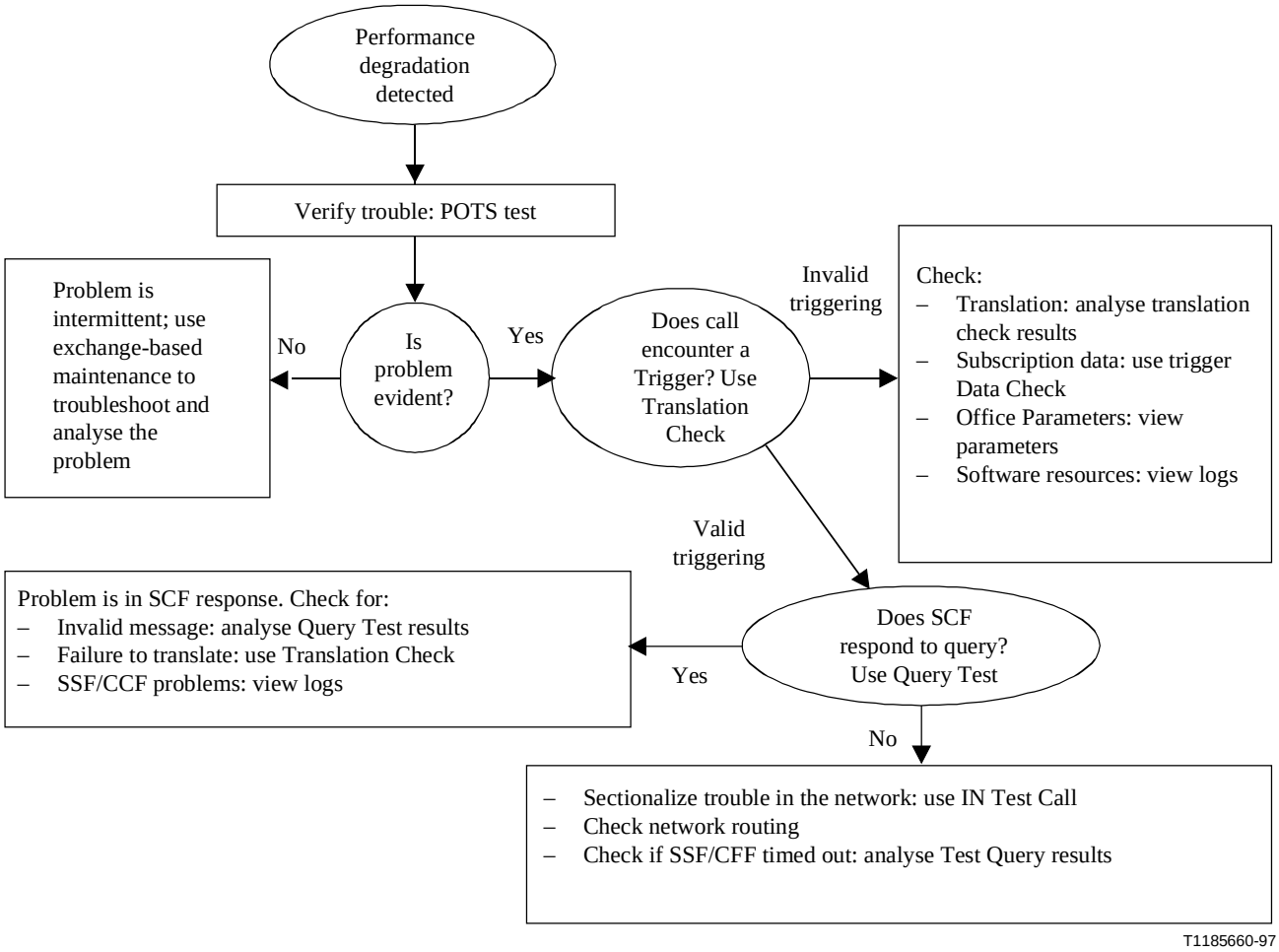


Figure D.1/Q.1224 – Example application of IN SSF/CCF trouble solving capabilities

D.3 IN end-to-end testing

An IN-based service offering implies cooperation among different functional entities, typically the SSF/CCF and the SCF. The objective of IN end-to-end testing is to troubleshoot the IN implementation of the entities applied to a service to ensure that they operate harmoniously.

Troubleshooting in an environment involving multiple functional entities (SSF/CCFs, SCFs, SRFs) requires either manual operations which are not practical or advanced Operations Systems (OSs) which may not be available for a long time, to analyse and correlate the events and messages from the various elements in the network.

When customers report troubles, or network surveillance processes and operations systems detect problems in the network, the tester (or switch maintenance personnel) can use the SSF/CCF maintenance capabilities to both verify and help isolate these problems, and then check that they have been repaired.

IN end-to-end testing is not addressed by these capabilities. A capability for IN end-to-end testing is required. IN end-to-end test information and results do not require further processing by external operations systems. Therefore, maintaining the integrity and sanity of the IN may be facilitated while minimizing manual operations.

The IN Test Call capability helps isolate IN call processing failures by correlating the events and the messages generated on the various interfaces, and recording them in a log report. This log report is referred to as the Travelling Log (TLog).

The IN end-to-end testing capability is local to the initiating node and determines the nodes traversed in the handling of the call and IN-based service. The IN end-to-end testing capability will, at a given node, determine if the message is an IN end-to-end testing message. If so, it will apply the Test Call Parameter (TCP) values and (optionally) add local information to the Travelling Log parameter. Both the TCP and the extended TLog parameters are attached to the message sent to the next node. This procedure continues for all messages among all nodes involved in the realization of the call and its IN-based service(s) until the call ends. By this process, a record is built up of what happened at various NEs in the realization of the call and its associated IN-based service(s).

This capability helps the tester isolate troubles and faults in the network without having to log onto or monitor each node involved. It provides information in the Travelling Log on each node involved. This end-to-end view of the call enables the tester to determine where the trouble is.

The tester can access the capability locally or remotely by using a craft terminal or an Operations System (OS), but is independent of the method of initiation. The SMF-SSF/CCF or other SMF-functional entity interface for remote initiation of the IN end-to-end testing capability is for further study.

The initial focus of this capability is intranetwork testing. Application to internetwork testing is beyond the scope of this Annex.

D.3.1 IN end-to-end testing information elements

Two information elements are needed to support the IN end-to-end testing capability:

1) Test Call Parameter (TCP);

2) Travelling Log (TLog).

The TCP information element attributes are read-only and will not be modified by any of the IN network elements to which they are propagated. The TLog will be extended by each NE, adding relevant local NE information to it.

If the TLog information element is not used, network elements receiving the TCP information element are expected to generate local log reports.

The Test Call Parameter (TCP) contains the following information:

- whether or not called party alerting should be performed;
- whether or not billing records should be created;
- whether or not a TLog should be generated;
- report indicator showing how the TLog records are to be reported;
- a travelling log ID which identifies the travelling log relevant to a specific IN service test call related data;
- artificial time and date that SCF service logic should use when processing the IN Test Call.

The Travelling log (TLog) Information Element contains the following information:

- length indicator;
- selector indicator;
- data:
  - node address;
  - information flow;
  - time stamp;

– fault/error code;
– other (to be defined).

The TLog information element has variable length. The maximum length is not defined in this Annex.

These information elements should be added to the following information flows as optional information elements. The presence of the TCP information element indicates an IN end-to-end test. The TLog information element may only be present when the TCP information element is present.

D.3.2 SSF to SCF

1) Initial DP.
2) Collected Information.
3) Analysed Information.
4) O_Called_Party_Busy.
5) O_Answer.
6) O_No_Answer.
7) Term Attempt Authorized.
8) T_Answer.
9) T_Busy.
10) T_No_Answer.

D.3.3 SCF to SSF

1) Analyse_Info.
2) Collect_Info.
3) Connect.
4) Release_Call.
5) Connect_To_Resource.

D.3.4 SCF-SRF

1) Cancel_Announcement.
2) Play_Announcement.
3) Prompt and Collect User Information.

D.3.5 SRF-SCF

– Collected user information.

NOTE – Applicability to Information Flows for other FE relationships are not defined in this Annex.

APPENDIX I

Example/application of IN SSF Q3 management information model

The model used in this description is an example and can be used for many different possible implementations. It is provided to aid the reader in understanding the processes captured within the model and should not be seen in any way as definitive.

I.1 Introduction

The modelling techniques in Annex C describe three phases in the description of the IN SSF management Information model:

1) SSF functional decomposition;

2) SSF management requirements;

3) SSF management information model.

Subclause I.2 looks in closer detail at step 1; SSF Functional Decomposition.

I.2 SSF functional decomposition

I.2.1 SSF model

The purpose of this subclause is to provide the reader with information on the functional decomposition of the SSF. Having achieved this, an analysis can then be made on the interaction between each of the entities to fully understand the management requirements of the SSF. The interaction between the subentities will require a knowledge of the information that is input to the SSF, either as a result of interactions between the SSF and SCF/SRF, or as a result of an IN Call being invoked by the CCF.

As a first step to decomposing the SSF, use should be made of the information contained within the Distributed Functional Plane Recommendations.

To enable the production of this subclause a subset of this specification contained within Q.1224 was used. Within this a description is made of the following SSF/CCF entities:

- Basic Call Model (BCM);
- Intelligent Network Switching Manager (IN-SM);
- Feature Interaction Manager/Call Manager (FIM/CM).

Each entity is further decomposed into a number of subentities. For example the IN-SM is composed of the following:

– Call Gapping and Service Filtering (CG & SF);

– Default Charging Information;

– Charge Generation;

– Charge registration;

– SSF Resource manager;

– MSF&I Message Formulation and Interpretation;

– SCF Access Manager;

– SRF Access Manager.

The BCM can also be expanded into:

– BCSM control;

– Exchange Function;

– CCF Charging;

– Charge Event (CE) Processing;

– Event Detection Point and Call Information processing (EDP and CI);

– TDP Processing.

The interaction between each of these entities needs to be studied to accomplish the first stage of the model. It should be noted here that for the purposes of management, a number of assumptions need to be made as to the precise operation and interaction of each of the SSF subentities. The relationships shown in Figure I.1 between each of the subentities should only be seen as example relationships.

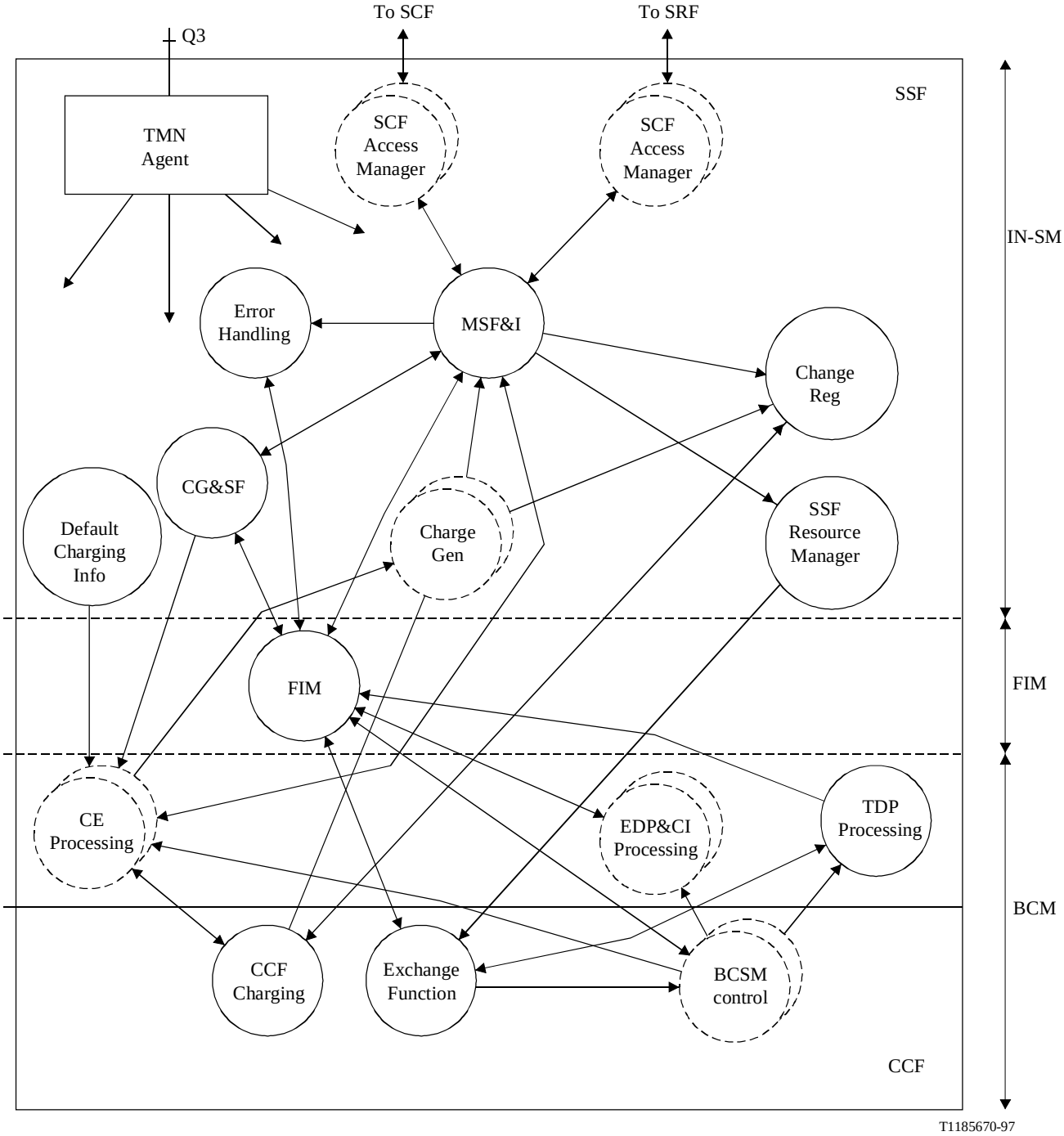


Figure I.1/Q.1224 – SSF/CCF functional decomposition

Figure I.1 above gives a pictorial representation of the SSF subentities. The arrows show interactions between those entities. Additional description of the TMN agent function is made, as this is a basic requisite for our requirements. The arrows from this function represent connections to the SSF functionality for management purposes.

The next stage in the verification process is to analyse the Procedure sections of the INAP to determine which operations act upon the SSF and the purpose of those operations. This will give greater understanding of the internal structure and the identification of tables, data or processes which could be under the control of or accessed by management operations from the TMN.

I.3 Example to illustrate development of information models and managed object requirements

I.3.1 General

This subclause provides an example of the development of information models and managed object requirements. The method used parallels the methodology described in C.2 relating to steps used to identify operational requirements and management activities.

I.3.2 Example of trigger management information model and managed object requirements

Trigger management is presented as an example to develop information models and managed object requirements. The method used is as follows:

- determine relevant actors;
- determine appropriate actor roles;
- develop a set of scenarios, based on these actor roles;
- review appropriate functional entity descriptions; ensure consistent mapping to scenarios;
- review appropriate functional entity relationships and functions; ensure consistent mapping to scenarios;
- determine information model objects and relationships;
- determine managed object requirements.

In order to develop material, one may begin with the actors/roles which relate to trigger management:

- *Service Provider*
  - Enable/disable (parts of) the service on a global (network wide) level.
- *Network Operator*
  - Install and configure trigger data.
  - Update trigger data.
  - Remove trigger data.

The next step is to review the appropriate functional entity descriptions, in this case the SMF and SSF/CCF. The following functionalities relate to trigger management:

- *Service Deployment Function*
  - Trigger Data Introduction and Allocation.
- *Service Operation Control Function*
  - Updating Trigger Data.
  - Service (de)activation.

In addition, one must analyse the SSF/CCF functional description to ensure that appropriate sub-functions are provided to install, configure, update, remove, and (de)activate the trigger information.

Our analysis continues with a review of the SMF-SSF/CCF relationship and related functions. For example, Configuration Management includes Trigger Table Configuration, with a description of the trigger data. The subfunctions include installation, configuration, deletion, and (de)activation of triggers. The subfunction Configuration Verification also provides the ability to review configuration information.

I.3.3 SMF functionality mapping to information model

Table I.1 provides an initial mapping between SMF functionalities and the Information Model (IM) elements. Blank fields indicate work in progress. Once complete IM Objects and Relationships are defined, a graphical representation of the Information Model would be appropriate.

Table I.1/Q.1224 – SMF functionality mapping to information model elements

Role	SMF Subfunction	Relationship	Relationship function	IM object	IM relationship
Install and configure trigger data	Service Deployment: Trigger Data Introduction and Allocation	SMF-SSF/CCF	Configuration Management: Trigger Table Configuration	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Add entry
Update trigger data	Service Operation and Control: Updating Trigger Data	SMF-SSF/CCF		SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Update entry
Remove Trigger data		SMF-SSF/CCF	Configuration Management: Trigger Table Configuration	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Remove entry
Enable/disable the service	Service Operation and Control: Service (de)activation	SMF-SSF/CCF	Configuration Management: Trigger Table Configuration	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: (De)Activate entry
		SMF-SSF/CCF	Configuration Management: Configuration Verification	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Request to Retrieve trigger table entry; SSF/CCF to SMF: Retrieved entry

I.3.4 SSF/CCF functionality mapping to information model

The Table I.2 provides an initial mapping between SSF/CCF functionalities and the Information Model elements. Blank fields indicate work in progress. Once complete IM Objects and Relationships are defined, a graphical representation of the Information model would be appropriate.

Table I.2/Q.1224 – SSF/CCF functionality mapping to information model elements

Role	Relationship	IM object	IM relationship
Install and configure trigger data	SMF-SSF/CCF	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Add entry
Update trigger data	SMF-SSF/CCF	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Update entry
Remove Trigger data	SMF-SSF/CCF	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Remove entry
Enable/disable the service	SMF-SSF/CCF	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: (De)Activate entry
	SMF-SSF/CCF	SSF/CCF: Trigger Table Entry	SMF to SSF/CCF: Request to Retrieve trigger table entry; SSF/CCF to SMF: Retrieve entry

I.3.5 SSF/CCF information model managed object requirements

Managed Object: Trigger Table Entry

Requirements

- Trigger name.
- Trigger detection point.
- Trigger criteria.
- Trigger type (request or Notification).
- Service key.
- Routing to SCF.
- Activation status.

APPENDIX II

Information flows and call models for terminal mobility

II.1 General

This Appendix to IN CS-2 contains two types of information: IN State Models for the support of Terminal Mobility and Information Flows and Information Elements, supporting the detection points derived from the State models and the required service features to support Terminal Mobility. This information is based on the material found in Annex A describing the IN/Terminal Mobility Functional Architecture and a catalogue of Reference Configurations based on physical mapping of this Functional Architecture into various known scenarios.

The contents of this Appendix have been regarded as agreed material within the context of IN CS-2; however, it was agreed that they are forwarded to IN CS-3 for further refinement.

II.2 Functional entity call/service processing models for wireless access

II.2.1 Overview

IN call/service logic processing for wireless access encompasses terminal access control processing in the CRACF and the CURACF, service logic execution in the SCF, and the use of supporting resources and data in the SRF and SDF, respectively. This subclause describes this IN service logic processing in terms of terminal access modelling and modelling of service logic processing.

– Terminal access modelling provides a high-level service and vendor/implementation independent abstraction of IN processing in the CRACF and the CURACF. This abstraction provides an observable view of CRACF and CURACF activities and resources to the SCF, enabling the SCF to interact with these FEs in the course of executing service logic.

– The modelling of service logic processing provides an abstraction of SCF activities and resources needed to support this service logic execution, as well as an abstraction of SRF and SDF activities and resources accessible to the SCF.

Since this modelling only provides an observable (i.e. external) view of CRACF, CURACF, SCF, SRF, and SDF activities and resources, this modelling does not imply an obligation to vendors to implement functional entities into products as a one-to-one mapping of functional entity model components.

II.2.2 Terminal Access State Model (TASM)

The TASM is a high-level description of the CRACF activities required to establish and maintain a terminal access between a mobile terminal and the network. The TASM is primarily an explanatory tool for providing a representation of CRACF activities that can be analysed to determine which aspects of the TASM will be visible to IN. Figure II.1 shows the TASM for terminal access.

II.2.2.1 TASM descriptions

State 1: Null

Entry event

– Disconnect and clearing of a previous call, or default handling of exceptions.

Function

– The mobile terminal has not accessed the network, the state information of the mobile terminal in the network is "idle".

Exit events

– Indication of terminal access from mobile side or network side.

– Radio Setup Requested event. This event occurs when the CCF requests radio setup.

State 2: Paging

Entry event

– Terminal access event from network side.

Function

– For a terminating call to a user on the mobile terminal, paging of the mobile terminal is being executed.

Exit events

– Paging Response Received event. This event occurs when the mobile terminal responds to the paging request.
– No Response event. This event occurs when the mobile terminal does not respond to the paging request before the paging timer expire.
– Terminal Access Abandon event.

State 3: Terminal Access Reserved

Entry events

– Paging Response Received event.
– Terminal Access Attempted event from mobile side.

Function

– Paging response has been accepted and access of the mobile terminal to the network is being reserved. Radio setup request from the CCF is monitored.

Exit events

– Radio Setup Requested event. This event occurs when the CCF requests radio setup.
– Terminal Access Abandon event.
– Terminal Access Failure event. This event occurs when the signalling channel to the mobile terminal is disconnected.
– TA Release Requested event. This event occurs when all the calls on the mobile terminal are terminated.

State 4: Radio Setup

Entry event

– Radio Setup Requested event.

Function

– Access of the mobile terminal to the network has been accepted and radio channel is being set up.

Exit events

– Radio Setup event. This event occurs when the radio channel between the mobile terminal and the network is established.
– Terminal Access Abandon event.
– Setup Failure event. This event occurs when the setup of radio channel between the mobile terminal and the network is failed.

State 5: Active

Entry event

– Radio Setup event.

Function

– Access of the mobile terminal to the network has been established and radio channel is being provided to the CCF. Events such as setup of a new call, release of a call, or initiation of handover is being monitored.

Exit events

– Terminal Access Release Requested event. This event occurs when all the calls on the mobile terminal are terminated.

– Terminal Access Failure event. This event occurs when the signalling channel to the mobile terminal is disconnected.

– Radio Access Change Notification event. This event occurs when a setup of a new call, release of a call or execution of handover is initiated.

State 6: Terminal Access Release

Entry event

– Terminal Access Release Requested event.

Function

– Release of all calls on the mobile terminal has resulted in the release of mobile terminal access. The access and all the related resources are being released.

Exit event

– Release of all calls on the mobile terminal is completed.

State 7: Exception

Entry event

– An exception condition is encountered.

Function

– Default handling of the exception is being provided.

Exit event

– Default handling of the exception condition by CRACF is completed.

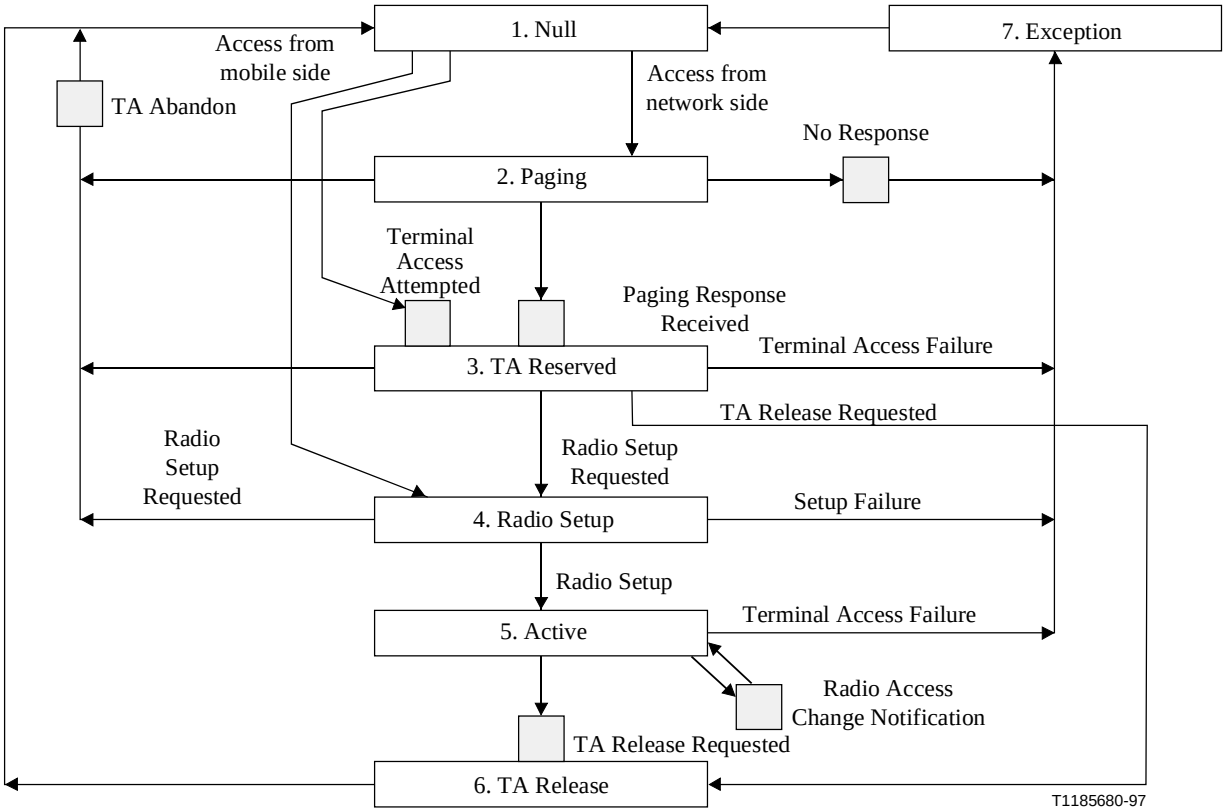


Figure II.1/Q.1224 – Terminal Access State Model (TASM)

II.2.3 Basic Non-Call Associate State Model for CURACF (BNCSM')

Figure II.2 shows Basic Non-Call Associate State Model for CURACF (BNCSM'). BNCSM' is a state model for call/bearer unrelated interaction, which gives a high-level description of the CURACF activities.

II.2.3.1 BNCSM' description

1 Idle

Entry Event

– All previously invoked operations between a user and a network are completed, or the (last) invocation of an operation was rejected by the user or the network. There is no relationship between the user and the network.

Functions

– Logical connection is idled (e.g. no data link connection).

– When the indication to establish an association and optionally invoke an operation is received, the authority/ability of the user invoking the particular operation is verified.

Exit Event

– An indication to establish an association and optionally invoke an operation is received (DP Activation Received).

2 Active

Entry Event

– An indication to establish an association and optionally invoke an operation is received (DP Activation Received), or a response/invocation from the user is received (DP Component Received).

Functions

– Logical connection is established.

– The received operation is processed and an appropriate response is sent to the user, or the response/invocation from the user is monitored.

Exit Events

– A response/invocation from the user is received (DP Component Received).

– Activation is failed (Activation Failed).

– An association release request is received from the user or the network (Released). This request may contain an operation; however, it will not be informed to the SCF.

3 Release

Entry Event

– An association release request is received from the user or the network (DP Deactivation).

Function

– Logical connection is being released with appropriate procedure (a pending response may be delivered with an association release message).

Exit Event

– Logical connection is completely released (Released).

Transition for BNCSM'

From	To
Activation Received	Idle and Authorize Activation/Association request
Activation Received	Active
Component Received	Idle and Authorize Activation/Association request

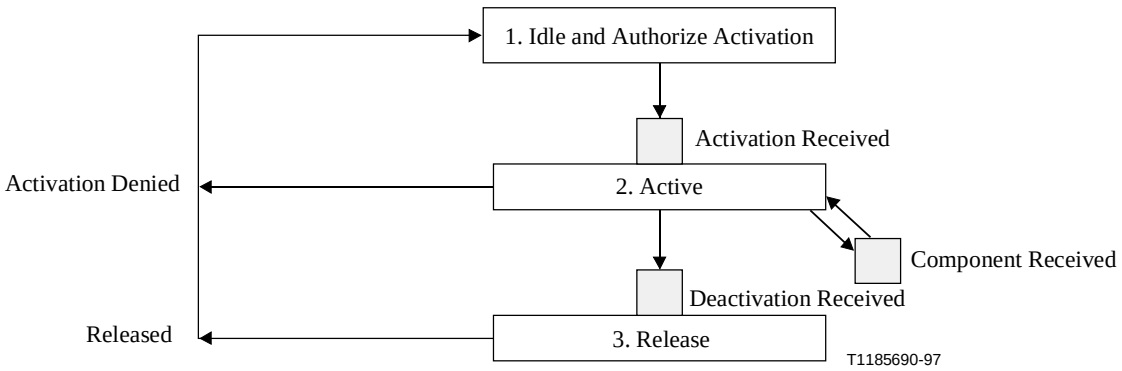


Figure II.2/Q.1224 – Basic Non-Call Associate State Model for CURACF (BNCSM')

II.2.4 BCSM

BCSM in Q.1224 is applicable to wireless system. Current study has shown that busy condition might meet at Analysed-Information DP. The details are not specified for CS-2 time-frame.

II.3 Information flow enhancements for wireless access

II.3.1 General

This subclause provides a mapping of the information flows on an FE to FE interface.

Subclause 4.1 of associated Recommendation Q.1204 describes architectural aspects of relationships between FEs.

II.3.2 Relationships

For IN CS-2, information flows for mobility aspect are defined for the following relationships:

– SCF-SCF;

– SCF-CRACF;

– SCF-CURACF.

For each relationship the following information is given:

i) The conditions under which the relationship can be established and terminated.

ii) The information flows between the two entities concerned in the relationship, in alphabetical order.

For each information flow, the following is listed:

a) The name of the information flow.

b) The FE relationship involved (e.g. SSF to SCF, or SCF to SSF).

c) The names of each of the information elements in the information flow. For each IE it is stated whether it is Mandatory (M), i.e. it must be included in the IF, or it is Optional (O), i.e. there are some circumstances in which the IE may be omitted. If the IE is optional, then the precise circumstances under which it is optional, and any default values are given.

d) The description of each of the IEs. The mapping of IEs to parameters in the signalling protocol is given in clause 2/Q.1228.

e) Where appropriate, the mapping between this IF and the corresponding FE model(s). This is described in terms of the conditions involved before (precondition) and after (post-condition) the IF concerned is either sent or received. For IFs where this is not appropriate, reference is made to the corresponding SIB description.

II.3.3 Information flows between FEs

Information flows between two FEs either consist of a request/response pair or of a request alone. Note that information flows may not map one-to-one on to signalling messages between the corresponding physical entities in the physical plane.

The SCF performs coordination of information flows between FEs when required. Implications on the sequencing of certain information flows are noted.

The complete set of IFs between two FEs defines the relationship between those FEs.

Where necessary, specific information flows have been identified to cancel the effect of other information flows.

Note that IFs relating to error conditions are not described.

II.3.4 SCF-SSF relationship

II.3.4.1 General

A relationship between the SCF and SSF is established either as a result of the SSF sending a request for instruction to the SCF, or at the request of the SCF for initiation of a call or for some non call-related reason.

A relationship between a SCF and a SSF is normally terminated at the request of the SCF. The SSF may also terminate the relationship, e.g. in error cases.

A single SCF may have concurrent relationships with multiple SSFs. A single SSF may only have a relationship with one SCF at a time for any given call. Note that this refers to control as opposed to monitor relationships.

When the SSF receives call-related IEs from the SCF, it substitutes these IEs for the corresponding call information, and retains all other call information. This applies to ALL call processing-related messages.

It is for further study to determine whether additional IEs from signalling messages (e.g. IAM ISUP message) should be included in call processing-related messages.

II.3.4.2 Information flows between SCF and SSF

II.3.4.2.1 Analyse Information

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the originating basic call processing actions to analyse destination information that is either collected from a calling party, or provided by the SCF (e.g. for number translation). This includes actions to validate the destination information according to a specified dialling plan, and if valid, to determine call setup information (e.g. called party address, nature of address, and route index to a list of one or more outgoing trunk groups). No implicit activation or deactivation of DPs occurs as a result of this operation.

c) Information Elements:

Call ID	(M)	
Destination Routing Address	(M)	
Alerting Pattern	(O)	
Backward GVNS	(O)	
Called Party Number	(O)	
Calling Party Number	(O)	
Calling Party’s Category	(O)	
Carrier	(O)	
Charge Number	(O)	
Correlation ID	(O)	
Forward GVNS	(O)	
IN Service Compatibility Response	(O)	
ISDN Access Related Information	(O)	
Original Called Party ID	(O)	
SCF ID	(O)	
Service Interaction Indicators	(O)	
Travelling Class Mark	(O)	
CRACF Instance ID	(O)	(Wireless access only)

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP; however, it is not clearly understood whether these IEs are required outside of the originating SSF.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one IN Service Compatibility Response element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies in an originating BCSM for a two-party Call Segment.

Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.
3) Destination information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at one of the following DPs:

   Origination_Attempt_Authorized
   Collected_Info
   Analysed_Info
   Route_Select_Failure
   O_Called_Party_Busy
   O_No_Answer
   O_Disconnect (called party disconnect only)

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Analyse Information PIC.

II.3.4.2.2 Connect

a) FE Relationship: SCF to SSF.

b) Synopsis:

This IF is used to create a call to a defined destination, in the case of an existing call in the setup phase, or to forward a call to another destination.

c) Information Elements:

Call ID	(M)
Destination Routing Address	(M)
Alerting Pattern	(O)
Backward GVNS	(O)
Calling Party Number	(O)
Calling Party’s Category	(O)
Carrier	(O)
Charge Number	(O)
Correlation ID	(O)
Cut and Paste	(O)
Display Information	(O)
Forward Call Indicators	(O)
Forward GVNS	(O)
Forwarding Condition	(O)
Generic Number	(O)
IN Service Compatibility Response	(O)

ISDN Access Related Information	(O)	
Original Called Party ID	(O)	
Redirection Information	(O)	
Redirecting Party ID	(O)	
Route List	(O)	
SCF ID	(O)	
Service Interaction Indicators	(O)	
Travelling Class Mark	(O)	
CRACF instance ID	(O)	(Wireless access only)

If this IF is being used in the context of a hand-off procedure, the Destination Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if Correlation ID and SCF ID are not specified separately. In this case, the Destination Routing Address IE contains only one address.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies before the Active PIC in an originating or terminating BCSM for a two-party Call Segment.

SCF Precondition

1) A control relationship exists between the SCF and the SSF.
2) An SLPI has determined that a Connect IF should be sent by the SCF.

SCF Postcondition

– SLPI execution may continue.

SSF Precondition

1) Call origination attempt has been initiated.
2) For the incoming leg (i.e. the controlling leg in an O_BCSM or the passive leg in a T_BCSM) in a CS the following conditions apply. For the O_BCSM the call processing is to be suspended at any DP before O_Active or in the O_MidCall DP in case no passive leg exists. For the T_BCSM call processing is to be suspended at a DP before the T_Active PIC.
3) Destination information and optional call setup information is provided by the SCF.

SSF Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at its DP is to be ignored.
3) The SSF performs the call processing actions to route or forward the call to the specified destination.

II.3.4.2.3 Select Route

a) FE Relationship: SCF to SSF.

b) Synopsis:

This information flow requests the SSF to perform the originating basic call processing actions to determine routing information and select a route for a call, based on call setup information that is either available in the SSF, or provided by the SCF (e.g. for alternate routing). This includes actions to select a primary route for the call, and if the route is busy, to select an alternate route.

c) Information Elements:

Call ID	(M)	
Alerting Pattern	(O)	
Backward GVNS	(O)	
Carrier	(O)	
Correlation ID	(O)	
Destination Routing Address	(O)	
Forward GVNS	(O)	
IN Service Compatibility Response	(O)	
ISDN Access Related Information	(O)	
Original Called Party ID	(O)	
Route List	(O)	
SCF ID	(O)	
Service Interaction Indicators	(O)	
Travelling Class Mark	(O)	
CRACF Instance ID	(O)	(Wireless access only)

If this IF is being used in the context of a hand-off procedure, the Destination Routing Address IE may contain embedded within it, a Correlation ID and SCF ID, but ONLY if Correlation ID and SCF ID are not specified separately. In this case, the Destination Routing Address IE contains only one address.

The SCF ID and Correlation ID IEs are presently mapped down to the protocol level on ISUP; however, it is not clearly understood whether these IEs are required outside of the originating SSF.

According to the service feature(s) actually invoked in the SCF, the SCF may return only one ServiceCompatibilityResponse element in the response to the SSF.

d) Mapping to FE Model(s):

This information flow only applies during call setup in an originating BCSM for a two-party Call Segment.

Precondition

1) Call origination attempt has been initiated.
2) Authority/ability to place outgoing call has been verified.
3) Call setup information is available in the SSF or provided by the SCF.
4) Basic call processing has been suspended at one of the following DPs:

   Origination Attempt Authorized
   Collected Information
   Analysed Information
   Route Selected Failure
   O_Called Party Busy
   O_No Answer
   (i.e. the call setup phase)

Postcondition

1) BCSM Processing resumes at the currently suspended DP.
2) Any additional trigger criteria at this DP is to be ignored.
3) Basic call processing resumes at Select Route PIC.

II.3.4.3 IE definitions for SSF/CCF to SCF information flows

II.3.4.3.1 Alerting Pattern

This IE is the same as the DSS 1 Signal parameter. It is used to specify the type of alerting to be applied. Since present signalling systems do not convey this information, this IE may only apply at the terminating SSF. If the alertingPattern is supplied, the SSF uses this information when it presents the call to the called party.

II.3.4.3.2 Backward GVNS

Information sent backwards to the originating side about how the VPN call is terminated at the terminating side.

II.3.4.3.3 Call ID

This IE identifies a specific instance of a relationship between a SCF and SSF. At the physical plane for IN CS-2, it is mapped on to a TCAP transaction identity.

II.3.4.3.4 Called Party Number

This IE contains the number used to identify the called party in the forward direction (i.e. it is used to populate the bearer signalling protocol's Called Party Number information element).

II.3.4.3.5 Calling Party Number

This IE carries the calling party number to identify the calling party or the origin of the call.

II.3.4.3.6 Calling Party's Category

This IE indicates the type of Calling Party (e.g. operator, pay-phone, ordinary subscriber).

II.3.4.3.7 Carrier

This IE consists of two parts: the Carrier Selection indicates whether the primary carrier was presubscribed or dialled and the Carrier ID indicates the presubscribed carrier of the caller. This is useful for networks where the user can select the carrier for the call.

II.3.4.3.8 Charge Number

This IE is the automatic number identification of the calling party. It is based on the signalled charge number parameter (network-operator specific).

II.3.4.3.9 Correlation ID

This IE is used to identify the call, and in the assist case, must be passed to the assisting SSP via ISUP. Since it does not have to be translated by the assisting SSP, it does not have to be meaningful beyond being a call identifier.

II.3.4.3.10 CRACF instance ID

The CRACF instance ID is used to identify the call and the state, hence the further procedure in CRACF, which is issued by CRACF and kept through call handling CCFs.

II.3.4.3.11 Cut and Paste

This IE is used by the SCF to instruct the SSF to delete (cut) a specified number of the digits it has received from the calling party and paste the remaining dialled digits on to the end of the digits supplied by the SCF in the destination routing address. As an example, if the user dials XXX-YYYY, the SSF will trigger on XXX and query the SCF. (Note that the SSF will treat the

YYYY digits as normal.) The SCF will send back new ZZZZ digits and a cut and paste of 3. The SSF will replace XXX with ZZZZ and paste it to YYYY.

II.3.4.3.12 Destination Routing Address

This IE contains a list of called party number towards which the call is to be routed. The encoding of the parameter is defined in Recommendation Q.763.

II.3.4.3.13 Display Information

If the Display Information IE is included, the SSF/CCF should try to deliver this information to the user. This IE represents specific information that is to be displayed to the call party. This would allow IN to be involved in a service like calling name delivery on call waiting.

II.3.4.3.14 Forward Call Indicators

Indicates if the call shall be treated as a national or international call. It also indicates the signalling capabilities of the network access, preceding network connection and the preferred signalling capabilities of the succeeding network connection. The network access capabilities do not indicate the terminal type. For example, an ISPBX will have an ISDN type of access, but the end user terminal behind the ISPBX may be ISDN or non-ISDN.

II.3.4.3.15 Forward GVNS

Identifies the originating service provider and provides information for the terminating GVNS network.

II.3.4.3.16 Forwarding Condition

This IE specifies a condition upon which an alternate Destination Routing Address would apply. It has values of "Busy", "No Answer", and "Any".

II.3.4.3.17 Generic Number

This IE allows the SCF to modify the Generic Number information received from the SSF. As well, it allows the SCF to indicate a Generic Number information to the SSF.

II.3.4.3.18 IN Service Compatibility Response

This IE is used by the SSF to override the IN Service Compatibility Indication element which has been derived during triggering of the given IN service. It is up to the Network Operator whether or not the overwrite is allowed.

II.3.4.3.19 ISDN Access Related Information

This IE carries the same information as the protocol element ISUP Access Transport parameter.

II.3.4.3.20 Original Called Party ID

This IE contains (if available) the identity of the first redirecting party (i.e. the number originally dialled by the caller).

II.3.4.3.21 Redirection Information

This IE (if available) indicates the reason for forwarding the call from the DN of the first and last redirecting party, and indicates the number of forwardings that have occurred.

II.3.4.3.22 Redirecting Party ID

This IE (if available) is the directory number of the last redirecting party.

II.3.4.3.23 Route List

This IE (if available) represents the list of routes which would have been used in order to route the call. It is network-operator specific. Note that "Optional" in this case means that network operators can specify that this IE should be used if their particular network has the information available.

II.3.4.3.24 SCF ID

It enables the SSF, to which the call is handed off, to identify which SCF the Assist Request Instructions should be sent to.

The SCF ID is required to be passed to the assisting SSP in the hand-off case, to allow the assisting SSP to identify the SCP with which the assisting SSP must set up a relationship, and therefore must map onto ISUP. The SCF ID must be translated by the assisting SSP into an INAP address and must therefore be in a form which is meaningful to the assisting SSP.

II.3.4.3.25 Service Interaction Indicators

Contains indicators for control of the network based services.

Table II.1 shows the details for Service Interaction Indicators SCF to SSF IE:

Table II.1/Q.1224

Control information	Values
Call to be offered indicator	– Call offering allowed – Call offering not allowed (default)
Time limits for timer T_{SUS}	– As in Rec. Q.764 for timer T6 – 4-10 seconds 0 seconds (default)
Bothway throughconnect indicator NOTE – The indicator should be set to "require" in the Connect To Resource or Establish Temporary Connection IF, if user interaction has to be performed. If an announcement is to be connected or in other IFs the indicator should be set to "not required".	– Required (default) – Not required
Call to be diverted indicator	– Call diversion allowed (default) – Call diversion not allowed
Conference at DLE acceptance indicator	– Accept conference request (default) – Reject conference request
Conference at OLE acceptance indicator	– Accept conference request (default) – Reject conference request
Connected number treatment indicator	– No impact – Set "presentation restricted" – Present called IN number (default)
Call transfer notification treatment indicator	– No impact (default) – Suppress information
Call diversion notification treatment indicator	– No impact (default) – Suppress information

II.3.4.3.26 Travelling Class Mark

This IE (if available) indicates the physical characteristics of the call, e.g. the usage of echo-cancellers.

II.3.5 SCF-CRACF relationship

II.3.5.1 General

A relationship between the SCF and CRACF is established either as a result of the CRACF sending a request for instruction to the SCF, or at the request of the SCF for initiation of a terminal access call related reason.

A relationship between a SCF and a CRACF is normally terminated at the request of the SCF. The CRACF may also terminate the relationship, e.g. in error cases.

A single SCF may have concurrent relationships with multiple CRACFs. A single CRACF may only have a relationship with one SCF at a time for any given processing. Note that this refers to control as opposed to monitor relationships.

When the CRACF receives call-related IEs from the SCF, it substitutes these IEs for the corresponding call information, and retains all other information. This applies to ALL call processing-related messages.

II.3.5.2 Information flows between the SCF and CRACF

II.3.5.2.1 Cancel Page

a) FE Relationship: SCF to CRACF.

b) Synopsis:

This information flow is used to cancel the paging instructed by SCF. Page IF may be sent to several CRACFs. If the SCF receives Page Response IF from a CRACF, then it sends Cancel Page IF to other CRACF(s).

c) Information Elements:

Paging Relationship ID (M)

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and CRACF. This information flow is sent upon receiving Page Response from another CRACF.

SCF Precondition

1) A control relationship exists between the SCF and the CRACF(s).
2) Page Response is received from another CRACF.
3) The SLPI has determined that a Cancel Page IF should be sent.

SCF Postcondition

– None.

CRACF Precondition

– Page has been attempted.

CRACF Postcondition

1) Page processing is suspended.
2) Terminal access processing transition to null.

II.3.5.2.2 Page

a) FE Relationship: SCF to CRACF.

b) Synopsis:

Page information flow can be used for determination of the appropriate CRACF to route a call.

c) Information Elements:

Terminal Id	(M)
Location Area Id	(M)
Paging Relationship ID	(M)

d) Mapping to FE Model(s):

This information flow is used to page the mobile terminal in the terminal location registration area based on the stored terminal location information, and to determine the visited cell by the response from the terminal.

SCF Precondition

– The SLPI has determined that a Page IF should be sent.

SCF Postcondition

1) A control relationship exists between the SCF and the CRACF(s).

2) SLPI execution continues.

CRACF Precondition

– None.

CRACF Postcondition

1) For a terminating call to a user on the mobile terminal, paging of the mobile terminal is being executed.

2) Paging Response Received is armed.

II.3.5.2.3 Page Response

a) FE Relationship: CRACF to SCF.

b) Synopsis:

Page Response information flow is a response to the previously issued Page IF.

c) Information Elements:

Terminal Id	(M)
Radio zone Id	(M)
Paging Relationship ID	(M)
CRACF instance ID	(M)
Routing Address	(M)

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and CRACF. This information flow is sent upon receiving the response of the paging from the mobile terminal.

SCF Precondition

1) A control relationship exists between the SCF and the CRACF(s).

2) SLPI is processing paging.

SCF Postcondition

1) SLPI may continue.

2) The SLPI may initiate the terminal authentication procedure.

CRACF Precondition

– Response of the paging from the mobile terminal has been received.

CRACF Postcondition

– The processing is suspended at Page Response Received DP.

II.3.5.2.4 Page Response Not Received

a) FE Relationship: CRACF to SCF.

b) Synopsis:

If CRACF does not receive the answer from the mobile terminal in paging in certain time duration after receiving Page IF, it notifies the SCF using Page Response Not Received IF.

c) Information Elements:

Paging Relationship ID	(M)

d) Mapping to FE Model(s):

This information flow applies in the context of an existing control relationship between the SCF and CRACF. This information flow is sent when no response to the paging from the mobile terminal has been received.

SCF Precondition

1) A control relationship exists between the SCF and the CRACF.

2) Page information flow has been sent at the request of an SLPI, and the SLPI is expecting Page Response or Page Response Not Received information flow.

SCF Postcondition

– None.

CRACF Precondition

1) Page has been attempted.

2) Timer has expired for the response from the mobile terminal.

CRACF Postcondition

– Terminal access processing transition to null.

II.3.5.2.5 Terminal Access Attempted

a) FE Relationship: CRACF to SCF.

b) Synopsis:

This IF is issued by CRACF to request authorization of the mobile terminal access to the network.

c) Information Elements:

Relationship ID	(M)
Terminal ID	(M)
Service Address Information	(M)
CRACF instance ID	(M)
Routing Address	(M)
Location Area ID	(O)

d) Mapping to FE Model(s):

CRACF sends this IF for authorizing the mobile terminal access.

CRACF Precondition

1) Terminal access attempt has been initiated.
2) The information for DP criteria is available in the CRACF.

CRACF Postcondition

– The processing has been suspended at Terminal Access Attempted DP and a control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) A SLPI has been invoked.
2) A CRACF instruction is being prepared.

II.3.5.2.6 Terminal Access Authorized

a) FE Relationship: SCF to CRACF.

b) Synopsis:

This IF is issued by SCF to notify that the terminal access attempt or the paging response has been authorized.

c) Information Elements:

Relationship ID	(M)

d) Mapping to FE Model(s):

SCF Precondition

1) A SLPI has been invoked.
2) A control relationship exists between the SCF and the CRACF.

SCF Postcondition

– None.

CRACF Precondition

1) The processing has been suspended at Terminal Access Attempted DP.
2) A control relationship exists between the SCF and the CRACF.

CRACF Postcondition

– The processing resumes at TA Reserved PIC.

II.3.5.2.7 Terminal Access Release

a) FE Relationship: SCF to CRACF.

b) Synopsis:

This IF is issued by SCF to request CRACF to release all the resources for the call concerning the mobile terminal.

c) Information Elements:

Relationship ID	(M)

d) Mapping to FE model(s):

The SCF sends this information flow to the CRACF to release control channel and all related resources. For further details, refer to the terminal access state model description.

II.3.5.2.8 Terminal Access Release Requested

a) FE Relationship: CRACF to SCF.

b) Synopsis:

This IF is issued by CRACF to inform SCF that the attempt of releasing call was detected.

c) Information Elements:

Relationship ID	(M)
Terminal ID	(M)
Service Address Information	(M)

d) Mapping to FE model(s):

The CRACF sends this information flow to the SCF to inform the attempt of releasing call has been detected. For further details, refer to the terminal access state model description.

II.3.5.2.9 Wireless Call related Component Received

a) FE Relationship: CRACF to SCF.

b) Synopsis:

This IF is issued by CRACF for reporting the TDP/EDP event to SCF that an operation invocation request or a response/error has been received, and criteria for the Component Received DP were met.

c) Information Elements:

Service Address Information	(M)
Relationship ID	(M)
Component Correlation ID	(O)
Component	(M)

d) Mapping to FE model(s):

The CRACF sends this information flow to report the TDP/EDP event that an operation invocation request or a response/error has been received, and criteria for the specific DP were met.

II.3.5.2.10 Wireless Call related Send Component

a) FE Relationship: SCF to CRACF.

b) Synopsis:

This IF is issued by SCF for requesting CRACF to send a specified component to CCAF+ with a specified message.

c) Information Elements:

Relationship ID	(M)
Component Correlation ID	(O)
Component	(M)
Message	(O)

d) Mapping to FE model(s):

The SCF sends this information flow to request the CRACF to send a specified component to CCAF+ with a specified message.

II.3.5.3 IE definitions for SCF to CRACF information flows

II.3.5.3.1 CRACF instance ID

This IE identifies the call and the state, hence the further procedure in CRACF, which is issued by CRACF and kept through call handling CCFs.

II.3.5.3.2 Component

This IE contains the operation value (object identifier) error value, etc., within the UNI APDU, in addition, it also contains the parameter set/sequence for the operation invocation/return result or return error/reject on UNI. Or, this IE contains whole UNI APDU (this means, it contains semantically Component Correlation ID and Component Type, in this case, and these two IEs will not be used).

II.3.5.3.3 Component Correlation ID

This IE gives the relationship between the local operation and the reported component. This IE is assigned by the operation invocation entity.

II.3.5.3.4 Location Area ID

This IE identifies the location area in which the terminal paging is executed.

II.3.5.3.5 Message

Specifies the message to deliver the component that is different from the used signalling system. For example, REGISTER, FACILITY, REL, REL COMP can be used for DSS 1.

II.3.5.3.6 Paging Relationship ID

This IE identifies a CRACF for the paging procedure.

II.3.5.3.7 Radio zone ID

This IE identifies the radio zone where the terminal resides.

II.3.5.3.8 Relationship ID

This IE identifies the relationship between CRACF and SCF. It is corresponding to the TCAP Transaction ID.

II.3.5.3.9 Routing Address

This IE, if available at the CRACF in paging process, is informed as the result of the paging which may be used for call routing information, and is used for the further process which route the terminating call to the terminal in CCFs.

II.3.5.3.10 Service Address Information

This IE is sequence of Trigger Type and Miscellaneous Call Information. It is used by the SCF to select the correct application. The Trigger Type IE indicates to the SCF the type of trigger that caused the SSF to detect a valid trigger condition.

II.3.5.3.11 Terminal Id

This IE identifies the terminal which should be paged by the terminating network.

II.3.6 SCF-CURACF relationship

II.3.6.1 General

A relationship between the SCF and CURACF is established as a result of the CURACF sending a request for instruction to the SCF for initiation of a terminal access call unrelated reason.

A relationship between a SCF and a CURACF is normally terminated at the request of the SCF. The CURACF may also terminate the relationship, e.g. in error cases.

II.3.6.2 Information flows between the SCF and CURACF

II.3.6.2.1 Wireless Call unrelated Activation Received

a) FE Relationship: CURACF to SCF.

b) Synopsis:

This IF is issued by the CURACF for reporting the TDP event to the SCF that an association request (with a request of an invocation of operation) has been received, and criteria for the Activation Received were met.

c) Information Elements:

IEs for this information flow are:

Service Address Information	(M)
Relationship ID	(O)
Component Correlation ID	(O)
Component	(O)

d) Mapping to FE Model(s):

CURACF Precondition

1) Call unrelated service is requested from CCAF+.
2) DP criteria have been met.

CURACF Postcondition

1) For a TDP-R, call unrelated processing has been suspended at Activation Received DP, and a control relationship has been established.
2) For a TDP-N, call unrelated processing proceeds at Active PIC, and no control relationship has been established.

SCF Precondition

– None.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, a CURACF instruction is being prepared.

II.3.6.2.2 Wireless Call unrelated Component Received

a) FE Relationship: CURACF to SCF.

b) Synopsis:

This IF is issued by CURACF for reporting the TDP/EDP event to SCF that an operation invocation request or an response/error has been received, and criteria for the Component Received DP were met.

c) Information Elements:

Service Address Information	(M)
Relationship ID	(M)
Component Correlation ID	(O)
Component	(M)

d) Mapping to FE Model(s):

CURACF Precondition

1) Wireless Call unrelated Component Received may have been received.
2) Call unrelated event is initiated.
3) DP criteria have been met.

CURACF Postcondition

1) For a TDP-R, call unrelated processing has been suspended at Component Received DP, and a control relationship has been established.
2) For a TDP-N, call unrelated processing proceeds at Active PIC, and no control relationship has been established.

SCF Precondition

– None or an SLPI has been invoked and sent Wireless Call unrelated Send Component to CURACF.

SCF Postcondition

1) An SLPI has been invoked.
2) For a TDP-R, or EDP-R, an CURACF instruction is being prepared.

II.3.6.2.3 Wireless Call unrelated Send Component

a) FE Relationship: SCF to CURACF.

b) Synopsis:

This IF is issued by the SCF for reporting a specified message to the CURACF.

c) Information Elements:

Relationship ID	(M)
Component Correlation ID	(O)
Component	(M)
Message	(O)

d) Mapping to FE Model(s):

SCF Precondition

1) An SLPI has been invoked.
2) DP criteria have been met.

SCF Postcondition

– The SLPI may expect Wireless Call unrelated Component Received from CURACF.

CURACF Precondition

– Call unrelated service request has been initiated.

CURACF Postcondition

1) CURACF transfers the request to CCAF+.
2) CURACF state is staying at Active PIC.

II.3.6.3 IE definitions for SCF to CURACF information flows

II.3.6.3.1 Component

This IE contains the operation value (object identifier) error value, etc., within the UNI APDU, in addition, it also contains the parameter set/sequence for the operation invocation/return result or return error/reject on UNI. Or, this IE contains whole UNI APDU (this means, it contains semantically Component Correlation ID and Component Type, in this case, and these two IEs will not be used).

II.3.6.3.2 Component Correlation ID

This IE gives the relationship between the local operation and the reported component. This IE is assigned by the operation invocation entity.

II.3.6.3.3 Message

Specifies the message to deliver the component that is different from the used signalling system. For example, REGISTER, FACILITY, REL, REL COMP can be used for DSS 1.

II.3.6.3.4 Relationship ID

This IE identifies the relationship between CURACF and SCF.

II.3.6.3.5 Service Address Information

This IE is sequence of Trigger Type and Miscellaneous Call Information. It is used by the SCF to select the correct application. The Trigger Type IE indicates to the SCF the type of trigger that caused the SSF to detect a valid trigger condition.

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