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SERIES Q: SWITCHING AND SIGNALLING
Intelligent Network

Interface Recommendation for intelligent network Capability Set 2: Part 3

ITU-T Recommendation Q.1228 – Fascicle 3/5

(Previously CCITT Recommendation)

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For further details, please refer to ITU-T List of Recommendations.

Recommendation Q.1228

**INTERFACE RECOMMENDATION 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.

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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.1228

INTERFACE RECOMMENDATION FOR INTELLIGENT NETWORK CAPABILITY SET 2

(Geneva, 1997)

PART 3

17 Detailed operation procedures

The intended use of the operations and parameters from clauses 4 to 10 not described in the following detailed procedure descriptions is for further study in IN CS-3. For more information, please refer to clause 12/Q.1224.

17.1 ActivateServiceFiltering procedure

17.1.1 General description

When receiving this operation, the SSF handles calls to destinations in a specified manner without request for instructions to the SCF. In the case of service filtering the SSF executes a specific service filtering algorithm. For the transfer of service filtering results, refer to the operation "ServiceFilteringResponse".

17.1.1.1 Parameters

– **filteredCallTreatment:**

This parameter specifies how filtered calls are treated. It includes information about the announcement to be played, the charging approach, the number of counters used and the release cause to be applied to filtered calls.

– **sFBillingChargingCharacteristics:**

This parameter determines the charging to be applied for service filtering. Its content is network specific.

NOTE – Actual format and encoding is for further study.

– **informationToSend:**

This parameter indicates an announcement, a tone or display information to be sent to the calling party. At the end of information sending, the call shall be released.

– **inbandInfo:**

This parameter specifies the inband information to be sent.

– **messageID:**

This parameter indicates the message(s) to be sent, it can be one of the following:

– **elementaryMessageID:**

This parameter indicates a single announcement.

- text:
This parameter indicates a text to be sent. The text shall be transformed to inband information (speech). This parameter consists of two sub-parameters, messageContent and attributes. The attributes of text may consist of items such as language.
- elementaryMessageIDs:
This parameter specifies a sequence of announcements.
- variableMessage:
This parameter specifies an announcement with one or more variable parts.
- numberOfRepetitions:
This parameter indicates the maximum number of times the message shall be sent to the end-user.
- duration:
This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.
- interval:
This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is > 1.
- tone:
This parameter specifies a tone to be sent to the end-user.
- toneID:
This parameter indicates the tone to be sent.
- duration:
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- displayInformation:
This parameter indicates a text string to be sent to the end-user. This information cannot be received by a PSTN end-user.
- maximumNumberOfCounters:
This parameter provides the number of counters to be allocated as well as the number of destinations included in the service filtering, i.e. "maximumNumberOfCounters" subsequent destination addresses beginning with the destination address provided in "filteringCriteria" are used for service filtering. One counter is assigned to each of these destination addresses. The number of counters may only be > 1 if the "filteringCriteria" are of the type "addressAndService".
- releaseCause:
This parameter provides the cause value used for call release after the "informationToSend" (for example announcement) has been sent to the calling party. If "releaseCause" is not present, the default value is the same as the ISUP value decimal 31 (normal unspecified).

– filteringCharacteristics:

This parameter indicates the severity of the filtering and the point in time when the "ServiceFilteringResponse" shall be sent. It determines whether the "interval" or the "numberOfCalls" are used.

– interval:

After expiration of the interval timer the next call to arrive causes the following actions:

- sending of an "InitialDP" or a DP-specific operation;
- sending of an "ServiceFilteringResponse";
- starting again the interval timer.

When filtering is started the first interval is started.

An interval of 0 indicates that all calls matching the filtering criteria will result in sending of an "InitialDP" or a DP-specific operation and no filtering will be applied (i.e. no "ServiceFilteringResponse" will be sent).

An interval of –1 indicates that none of the calls matching the filtering criteria will either result in sending of an "InitialDP" or a DP-specific operation or a "ServiceFilteringResponse" operation.

Other values indicate duration in seconds.

– numberOfCalls:

The nth call causes an "InitialDP" or a DP-specific operation and an "ServiceFilteringResponse" operation sent to the SCF. This threshold value is met if the sum of all counters assigned to one service filtering entity is equal to "numberOfCalls".

A number of calls of 0 indicates that none of the calls matching the filtering criteria will result in sending of an "InitialDP" or a DP-specific operation and a "ServiceFilteringResponse" operation.

– filteringTimeOut:

This parameter indicates the duration of the filtering. When the time expires, a "ServiceFilteringResponse" is sent to the SCF and service filtering is stopped. Two approaches are supported (duration or stopTime).

– duration:

If the duration time expires, then service filtering is stopped and the final report is sent to the SCF.

A duration of 0 indicates that service filtering is to be removed.

A duration of –1 indicates an infinite duration.

A duration of –2 indicates a network specific duration.

Other values indicate duration in seconds.

– stopTime:

When the "stopTime" is met then service filtering is stopped and the final report is sent to the SCF. If "stopTime" was already met, i.e. the value of the stopTime is less than the value of the actual time but the difference does not exceed the value equivalent to 50 years, then service filtering is immediately stopped and the actual counter values are reported to the SCF. This occurs in cases where the SCF wishes to explicitly stop a running service filtering.

- **filteringCriteria:**
This parameter specifies which calls are filtered based on "serviceKey", "callingAddressValue", "calledAddressValue" or "locationNumber". It is a choice of "serviceKey" or "addressAndService".
 - **dialledNumber:**
See Recommendation Q.1290.
 - **callingLineID:**
See Recommendation Q.1290.
 - **serviceKey:**
This parameter identifies unambiguously the requested IN service for which filtering should be applied.
 - **addressAndService:**
This parameter identifies the IN service and dialled number for which filtering should be applied. The geographical area may also be identified ("callingAddressValue" and/or "locationNumber").
 - **calledAddressValue:**
This parameter contains the dialled number towards which filtering shall be applied. The complete called party number shall be specified.
 - **serviceKey:**
This parameter identifies unambiguously the requested IN service for which filtering should be applied.
 - **callingAddressValue:**
This parameter contains the calling party number which identifies the calling party or geographical origin of the call for which filtering shall be applied.
 - **locationNumber:**
This parameter identifies the geographical area from which the call to be filtered originates. It is used when "callingAddressValue" does not contain any information about the geographical location of the calling party.
- **startTime:**
This parameter defines when filtering is started. If "startTime" is not provided or was already met, the SSF starts filtering immediately.

17.1.2 Invoking entity (SCF)

17.1.2.1 Normal procedure

SCF Precondition:

- SLPI detects that service filtering has to be initiated at the SSF.

SCF Postcondition:

- 1) SLPI starts an application timer to monitor the expected end of service filtering.
- 2) The SCME is in the state "Waiting For ServiceFilteringResponse".

Sending the "ActivateServiceFiltering" operation causes a transition of the SCME from the state "Service Filtering Idle" to the state "Waiting For SSF Service Filtering Response". The SCME remains in this state until the application timer in the SLPI expires. The SCME is informed by the SLPI about timer expiration. Then it moves to the state "Service Filtering Idle".

If no errors occurred after receiving an "ActivateServiceFiltering" at the SSF, an empty Return Result is sent to the SCF. That causes no state transition in the SCME.

To change the parameters of an existing service filtering entity, the SCF has to send an "ActivateServiceFiltering" operation with the same "filteringCriteria". The second parameter set replaces the first one.

17.1.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.1.3 Responding entity (SSF)

17.1.3.1 Normal procedure

SSF Precondition:

- None.

SSF Postcondition:

- The SSME-FSM is in the state "Non-Call Associated Treatment".

If there is no already existing SSME-FSM for the "filteringCriteria" provided then a new SSME-FSM is created. This SSME-FSM enters the state "Non-Call Associated Treatment" and initialises the service filtering for the specified IN calls. The parameters "filteredCallTreatment", "filteringCharacteristics", "filteringCriteria", "filteringTimeOut" and "startTime" are set as provided in the operation. A number of counters will be allocated and reset. In the case of the "startTime" that has not been met yet, the service filtering will be started at the specified point in time.

If the operation "ActivateServiceFiltering" addresses an already existing service filtering entity the parameters "filteredCallTreatment", "filteringCharacteristics" "filteringTimeOut" and "startTime" are modified as provided in the operation. In the case that the addressed service filtering entity is active, the SSF reports the counter values to the SCF via the operation "ServiceFilteringResponse". The service filtering process is stopped if an already expired "stopTime" or "duration" equal to ZERO or a new not yet met "startTime" is provided. The SSF then proceeds as described for "ServiceFilteringResponse". In the case of the "startTime" that has not been met yet, the service filtering will be continued at the specified point in time.

If the service filtering proceeds then the SSME-FSM remains in the state "Non-Call Associated Treatment". Otherwise the SSME-FSM moves to state "Idle Management".

When a call matches several active "filteringCriteria" it should be subject to filtering on the most specific criteria, i.e. the criteria with the longest "callingAddressValue" or "locationNumber", or alternatively the criteria with the largest number of parameters specified.

When performing service filtering with "addressAndService" as "filteringCriteria", the first parameters checked will always be the "serviceKey" and "calledAddressValue".

If an "ActivateServiceFiltering" operation is passed to the SSF with the "filteringCriteria" "addressAndService" with both callingAddressValue and "locationNumber" present, the following is applicable:

- When the SSF receives a call that matches "serviceKey" and "calledAddressValue" (in the active "filteringCriteria"), it investigates whether or not the "locationNumber" is present in the initial address message. If it is present and matches the active "filteringCriteria" the call is filtered. If the SSF finds that the "locationNumber" is absent, then it will check the "callingAddressValue" and perform filtering depending on that parameter.

If no errors occurred after receiving an "ActivateServiceFiltering" on the SSF, an empty Return Result is sent to the SCF. That causes no state transition in the SSME-FSM.

The following application timers are used:

- detect moment to start service filtering (start time);
- duration time for service filtering;
- interval time for service filtering (for timer controlled approach).

17.1.3.2 Error handling

If the SSF detects an error with any of the defined error values, then this error is reported to the SCF.

The event is recorded in the SSF and an error condition indicated.

In case a new SSME FSM should be created, the relationship is ended and all concerned resources (e.g. counters) are released. The SSME FSM remains in the state "Idle Management".

In case there is already an existing SSME FSM, the service filtering data remains unchanged. The SSME FSM remains in the state "Non-Call Associated Treatment".

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.2 ActivationReceivedAndAuthorized procedure

17.2.1 General description

This operation is sent by the CUSF to the SCF after detecting a valid trigger condition at the BCUSM ActivationReceivedAndAuthorized DP. As the association request can have a request to invoke an operation between the user and the network, this operation optionally indicates the component of the operation to the SCF. In this case, the received FACILITY information element from the user may have the component that meets the triggering criteria at the DP.

17.2.1.1 Parameters

- callUnrelatedDPSpecificCommonParameters consists of following parameters:
 - serviceAddressInformation;
 - callingPartyNumber;
 - locationNumber;
 - terminalType;serviceAddressInformation is the same as for AnalysedInformation callingPartyNumber represents the line identifier that is used for the association request locationNumber: see Q.763 terminalType shall take default value ISDN (isdn).
- componentType:

This parameter indicates the type of event that is reported to the SSF. For example, Invoke is used to report the invocation of an operation from a user with an association request.
- component:

Two alternatives are possible and one of which should be chosen:

 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.

- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the CUSF and the SCF that is assigned between the user and the network locally. The value indicated in this operation is used to correlate the response from the SCF (which will be done by SendComponent) within the CUSF.

17.2.2 Invoking entity (CUSF)

17.2.2.1 Normal procedure

CUSF Precondition (TDP):

- 1) CUSF-FSM is in state a: "Idle".
- 2) The association establishment request is received from the user, and the component portion of the FACILITY IE meets the triggering criteria (optional).

CUSF Postcondition:

- CUSF-FSM moves to state b: "Waiting For Instructions".

17.2.2.2 Error handling

If the error will occur within the CUSF, generic error handling for the operation related errors is described in clause 16 and the TCAP services which are used for reporting operation errors are described in clause 18.

17.2.3 Responding entity (SCF)

17.2.3.1 Normal procedure

SCF Precondition (TDP):

- FSM for CUSF within the SCF is in state N1: "Idle".

SCF Postcondition:

- 1) FSM for CUSF within the SCF moves to state N2: "Preparing CUSF Instructions".
- 2) Waiting for the request from the SLPI and CUSF instructions is being prepared.

17.2.3.2 Error handling

If the error will occur within the SCF, generic error handling for the operation related errors is described in clause 16 and the TCAP services which are used for reporting operation errors are described in clause 18.

17.3 ActivityTest procedure

17.3.1 General description

This operation is used to check for the continued existence of a relationship between the SCF and SSF, between the SCF and the CUSF or between SCFs. If the relationship is still in existence, then the receiving entity will respond. If no reply is received within a given time period, then the SCF which sent this operation will assume that the receiving entity has failed in some way and will take the appropriate action.

17.3.1.1 Parameters

None.

17.3.2 Invoking entity (SCF)

17.3.2.1 Normal procedure

SCF Precondition:

- 1) A relationship exists between the SCF and the SSF, between the SCF and the CUSF or between SCFs.
- 2) The activity test timer (T_{ati}) expires, after which the "ActivityTest" operation is sent to the remote entity.
- 3) The SCME is in state "Activity Test Idle".

SCF Postcondition:

- The SCME is in the state "Waiting for Activity Test Response". If a Return Result "ActivityTest" is received, the SCME resets the activity test timer, returns to state "Activity Test Idle", and takes no further action.

17.3.2.2 Error handling

If a time-out on the "ActivityTest" operation or a P-Abort is received from TCAP, this is an indication that the relationship with the remote entity was somehow lost. If a time-out is received, SCF aborts the dialogue.

The SLPI that was the user of this dialogue will be informed, the corresponding SCSM-FSM will move to the state "idle".

17.3.3 Responding entity (SSF)

17.3.3.1 Normal procedure

SSF Precondition:

- 1) A relationship exists between the SCF and the SSF.
- 2) The SSME FSM is the state "Idle Management".

SSF Postcondition:

- 1) The SSME-FSM stays in the state "Idle Management".
- 2) If the Dialogue ID is active and if there is a SSF-FSM using the dialogue, the SSME sends a Return Result "ActivityTest" to the SCF. The SSME-FSM returns to the state "Idle Management"; or
If the Dialogue ID is not active, the TCAP in the SSF will issue a P-Abort, the SSME will in that case never receive the "ActivityTest" req.ind and thus will not be able to reply.

17.3.3.2 Error handling

Operation related error handling is not applicable, due to class 3 operation.

17.3.4 Responding entity (CUSF)

17.3.4.1 Normal procedure

CUSF Precondition:

- A relationship exists between the SCF and the CUSF.

CUSF Postcondition:

- If the Dialogue ID is active and if there is a CUSF-FSM using the dialogue, the CUSME sends a Return Result "ActivityTest" to the SCF; or
If the Dialogue ID is not active, the TCAP in the CUSF will issue a P-Abort, the CUSME will in that case never receive the "ActivityTest" req.ind and thus will not be able to reply.

17.3.4.2 Error handling

Operation related error handling is not applicable, due to class 3 operation.

17.3.5 Responding entity (controlling SCF or supporting SCF)

17.3.5.1 Normal procedure

SCF Precondition:

- A dialogue between the two SCFs has been established.

SCF Postcondition:

- 1) The SCME-FSM stays in the same state.
- 2) If the Dialogue ID is active and if there is a SCF-FSM using the dialogue, the SCME sends a Return Result "ActivityTests" to the other SCF.
If the Dialogue ID is not active, the TCAP in the other SCF will issue a P-Abort, the SCME will in that case never receive the "ActivityTest" req.ind and thus will not be able to reply.

17.3.5.2 Error handling

Operation related error handling is not applicable, due to class 3 operation.

17.4 AddEntry procedure

17.4.1 General description

The X.500 "AddEntry" operation is used to request the SDF to add a leaf entry (either an object entry or an alias entry) in the DIT. For a full description of the AddEntry operation, see 11.1/X.511.

17.4.1.1 Parameters

See 11.1.1/X.511 and 11.1.2/X.511.

17.4.2 Invoking entity (SCF)

17.4.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound" or "Wait for Subsequent Requests".

SCF Postcondition:

- SCSM: "SDF Bound".

When the SCSM is in the state "Wait for Subsequent Requests" and a need of the service logic to add an entry in the SDF exists, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SCSM remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the SDF in a message containing a Bind argument. The SCSM waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF

to the state "SDF Bound" or to the state "Idle". When the SCSM has moved to state "Idle", the AddEntry operation was discarded. In the State "SDF Bound", the response of the AddEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the AddEntry operation or an error.

When the SCSM is in the state "SDF Bound" and a need of the service logic to add an entry in the SDF exists, an internal event occurs. This event, called (e6) Request_to_SDF causes a transition to the same state "SDF Bound" and the SCSM waits for the response from the SDF. The reception of the response [(E7) Response_from_SDF] to the AddEntry operation previously issued to the SDF causes a transition of the SCF to the same state "SDF Bound". The response from the SDF may be either the result of the AddEntry operation or an error.

17.4.2.2 Error handling

Generic error handling for the operation related errors is described in 11.1.4/X.511 and 11.1.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.4.3 Responding entity (SDF)

17.4.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM: "SCF Bound".

When the SDF is in the state "Bind Pending", the external event (E3) Request_from_SCF caused by the reception of a "AddEntry" operation from the SCF occurs. The SDF does not proceed to the operation until a Bind operation has been successfully executed. It remains in the same state.

When the SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a "AddEntry" operation from the SCF occurs. The SDF waits for the response to the operation.

On the receipt of the event (E7) and before adding the new entry item, the SDF takes the following actions:

- verify that the superior object to which the entry should be added exists in the SDF;
- verify that the entry does not already exist in the SDF;
- verify that the access rights to add the entry and each of its components (attributes and values) are sufficient;
- verify that the entry conforms to the Directory schema.

After the specified actions indicated above are successfully executed, the entry is added into the SDF database. A null result is returned to the SCF. The sending of the result corresponds to the event (e6) Response_to_SCF.

17.4.3.2 Error handling

Generic error handling for the operation related errors is described in 11.1.4/X.511 and 11.1.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.5 AnalysedInformation procedure

17.5.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the Analysed Info DP, or to report an event requested by RequestReportBCSMEvent.

17.5.1.1 Parameters:

– dPSpecificCommonParameters:

- serviceAddressInformation (triggerType, serviceKey, miscCallInfo):
 - triggerType:

This parameter indicates to the SCF the particular event which caused the detection of a valid trigger condition.
 - miscCallInfo:

The miscCallInfo indicates that a request for instructions has been issued to the SCF and the category for the trigger (line, group, office).
 - serviceKey:

The serviceKey is used in identifying the service logic to be invoked.
- bearerCapability:

This parameter indicates the type of bearer capability connection to the user. Refer to 12.10/Q.1224 for population rules for the bearer capability parameter.
- calledPartyNumber:

See Q.762 Called Party Number signalling information. This parameter is used to identify the called party in the forward direction.
- callingPartyNumber:

See Q.762 Calling Party Number signalling information. Refer to 12.10/Q.1224 for population rules for the callingPartyNumber parameter.
- callingPartysCategory:

See Q.762 Calling Party Category signalling information. Refer to 12.10/Q.1224 for population rules for the callingPartysCategory parameter.
- iPSSPCapabilities:

See Recommendation Q.1290.
- iPAvailable:

See Recommendation Q.1290.
- iSDNAccessRelatedInformation:

This parameter contains (possibly multiple) information elements as per Recommendation Q.931. See Access Transport Parameter signalling information in Recommendations Q.762, Q.763 and Q.931. Refer to 12.10/Q.1224 for population rules for ISDN access related information.
- cGEncountered:

See Recommendation Q.1290.
- locationNumber:

This parameter is used to convey the geographical area address for mobility services, see Recommendation Q.762. It is used when the "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).

- **serviceProfileIdentifier:**
See Annex A/Q.932. See 12.10/Q.1224 for population rules for serviceProfileIdentifier.
 - **terminalType:**
See Recommendation Q.1290. Identifies the terminal type so that the SCF can specify, to the SRF, the appropriate type of capability (voice recognition, DTMF, display capability, etc.).
 - **chargeNumber:**
See Recommendation Q.1290. See 12.10/Q.1224 for population rules for chargeNumber.
 - **servingAreaID:**
See Recommendation Q.1290.
 - **serviceInteractionIndicators:**
This parameter contains indicators sent from the SSF to the SCF for control of the network-based services at the originating exchange and the destination exchange.
 - **serviceInteractionIndicatorsTwo:**
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
 - **iNServiceCompatibilityIndication:**
This parameter contains the identifier for a class of IN services that has been triggered during the call. A class of IN services is defined as IN services which have the same compatibility characteristics.
 - **uSIInformation:**
This parameter conveys information provided by the User dedicated to the Service Logic. It is transparent at the SSF level.
 - **uSIServiceIndicator:**
It indicates the Service Logic requesting the Monitoring of an UTSI information element. It is used as a Monitoring criteria at the SSF level. It also provides the correlation with the RequestReportUTSI operation.
 - **forwardGVNS:**
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
 - **createdCallSegmentAssociation:**
This parameter identifies for the SCF unambiguously the CSA instance in the SSF under SCF control. This CSA identifier assigned by the SSF may be used to associate different CSA instances in the SSF. This parameter should exist, when the SSF has not previously informed the created CSA Identifier to the SCF, i.e. in case of a TDP.
- **dialledDigits:**
See Recommendation Q.1290.

- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this IE to select SLPs based on the group and for authorization purposes. The network operators can specify that this IE should be used if their particular network has the information available.
- callingPartySubaddress:
See Recommendation Q.931.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- prefix:
See Recommendation Q.1290.
- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
Route List represents the list of routes which would have been used in order to route the call. The network operators can specify that this IE should be used if their particular network has the information available.
- travellingClassMark:
See Recommendation Q.1290.
- featureCode:
See Recommendation Q.1290.
- accessCode:
See Recommendation Q.1290.
- carrier:
See Recommendation Q.1290.
- serviceInteractionIndicators:
This parameter provides an envelope for exchange of service interaction information.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.

- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.
- bcsmlEventCorrelationID:
Used by the SCF for correlation with a previous operation.

17.5.2 Invoking entity (SSF)

17.5.2.1 Normal procedure

SSF Precondition (TDP):

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

SSF Precondition (EDP):

- 1) For an EDP-R, there is an existing control relationship and the EDP AnalysedInformation is armed.
- 2) For an EDP-N, there is a monitoring or control relationship.

SSF Postcondition (TDP):

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

SSF Postcondition (EDP):

- 1) For an EDP-R, basic call processing has been suspended at Analysed_Info DP, and the existing control relationship continues.
- 2) For an EDP-N, basic call processing proceeds at Select_Route PIC, and the existing non-control relationship continues unless no further EDPs are armed and no "CallInformationReport or "ApplyChargingReport" are requested.

The SSF has sufficient information available associated with the originating call portion. This information has been analysed and the results are as described below.

- 1** From a non-ISDN line or ISDN interface, the Analysis Results consists of one or more of the following:
 - CalledPartyID – 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).
 - TypeOfCall – Indicates one of: interexchange carrier, international carrier, local exchange operator, interexchange carrier operator or international carrier operator.
 - Carrier (for calls requiring an interexchange carrier) – Indicates the type of carrier requested.

- CarrierIdentificationCode (for calls requiring an interexchange carrier) – Indicates the code for the specific carrier to be used.
- CarrierSelection (for calls requiring an interexchange carrier) – Indicates whether the caller dialled the selected carrier and whether the caller pre- subscribed to the selected carrier.
- RouteIndex – An index to a route list (if the call does not terminate on this SSF).
- Collected Information – Access Codes and Prefixes, Collected Address Information/Digits.

2 From a conventional or SS7-supported trunk interface, this consists of one or more of the following:

- ChargeNumber.
- CalledPartyID.
- TypeOfCall.
- CarrierIdentificationCode (for interexchange carrier calls).
- Carrier (for interexchange carrier calls).
- CarrierSelection (for interexchange carrier calls).
- RouteIndex.
- Collected Information – Collected Address Information, Prefixes, etc. The Collected Information for a call from an SS7-supported trunk is based on information provided in the IAM.

17.5.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.5.3 Responding entity (SCF)

17.5.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the substate "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or

The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or

The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.5.4 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.6 AnalyseInformation procedure

17.6.1 General description

This operation 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. This includes actions to validate the destination information according to a specified dialling plan, and if valid, to determine call setup information.

17.6.1.1 Parameters

- destinationRoutingAddress:
Represents a list of called party numbers (primary and alternates).
- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- iSDNAccessRelatedInformation:
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- callingPartyNumber:
See Recommendation Q.762.
- callingPartysCategory:
See Recommendation Q.762.
- calledPartyNumber:
See Recommendation Q.762. Either the calledPartyNumber or the destinationRoutingAddress shall be provided by the SCF in the AnalyseInformation operation.
- chargeNumber:
See Recommendation Q.1290.
- travellingClassMark:
See Recommendation Q.1290.
- carrier:
See Recommendation Q.1290. In this message, the carrier selection field is null (00000000) and Carrier ID indicates the carrier to use for the call.

- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network-based services at the originating and the destination exchange.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- correlationID:
This parameter is used by the SCF to associate the "AssistRequestInstructions" operation from the assisting SSF with the Request from the initiating SSF. The "correlationID" is used in the context of a hand-off procedure and only if the correlation id is not embedded in the "destinationRoutingAddress". The network operators has to decide about the actual mapping of this parameter on the used signalling system.
- scfID:
See Recommendation Q.1290. The scfID is used in the context of a hand-off procedure and only if the SCF id is not embedded in the "destinationRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- legToBeCreated:
This parameter indicates the LegID to be assigned to the newly-created party. When not provided, a default LegID of 2 is assumed.
- callSegment:
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.6.2 Invoking entity (SCF)

17.6.2.1 Normal procedure

SCF 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).
- 5) 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.

The AnalyseInformation message requests the SSF/CCF to resume call origination processing taking into account the address, routing, and billing information provided in the message parameters. Processing resumes at the ANALYSE_INFORMATION PIC.

17.6.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.6.3 Responding entity (SSF)

17.6.3.1 Normal procedure

SSF Precondition:

- A TDP or EDP request has been invoked.

SSF Postcondition:

- The SSF performs the call processing actions to analyse destination information.

The following message parameter configurations are supported and shall result in the SSF/CCF call processing actions specified:

- 1) No Carrier Specified:
 - Switch-based carrier selection shall be performed.
 - The called party address provided in the CalledPartyNumber parameter shall be subjected to trigger analysis. It should be noted that if the same called party address is returned, the same trigger may be detected and processed again at the Analysed Information TDP.
- 2) Carrier Specified:
 - The SSF/CCF shall resume call processing at the ANALYSE INFORMATION PIC using the designated carrier. (Network-operator specific.)

The following additional requirements also apply to the AnalyseInformation message:

- The SSF/CCF shall accept called party address information contained in the CalledPartyNumber parameter that conforms to the public network numbering plan.

- If a route requires a TCM, the value in the TCM parameter shall be used. If a TCM is required and the TCM parameter is not supplied in the AnalyseInformation, the SSF/CCF shall derive the TCM in accordance with requirements that apply assuming no IN involvement with the call. (Network-operator specific option.)
- If the SCF does not designate a carrier and carrier selection is performed by the SSF/CCF, this indicator shall be set in the normal fashion as if IN involvement with the call had not occurred. (Network-operator specific option.)

AnalyseInformation with CallingPartysCategory and ChargeNumber:

- If the CallingPartysCategory parameter is included, that value shall be used as the DTMF digits or the ISDN-UP Calling Party's Category parameter in any subsequent signalling including signalling to an operator system via operator services signalling (network-operator specific).
- When DTMF digits are needed for subsequent signalling, the decimal equivalent of the CallingPartysCategory value shall be used (e.g. "01000000" is equivalent to 16 digits of "64") (network-operator specific).
- If the CallingPartysCategory parameter is not included, a proper failure indication shall be used in any subsequent DTMF or ISDN-UP signalling (network-operator specific).
- If the ChargeNumber parameter is included, that value shall be used as the Calling party number on non-SS7 trunks or the network-specific ISDN-UP Charge Number parameter in any subsequent signalling including signalling to an operator system via Operator Services Signalling (network-operator specific).
- If the ChargeNumber parameter is not included, the value "0 digits" shall be used for the ChargeNumber in any subsequent non-SS7 trunk or network-specific ISDN-UP signalling (network-operator specific).

AnalyseInformation and O_Called_Party_Busy, O_No_Answer:

- When the SSF/CCF receives the AnalyseInformation message in response to an O_Called_Party_Busy message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF shall release any resources that were used to process the call between the ANALYSE_INFORMATION and ROUTING & ALERTING PICs.
 - 2) The SSF/CCF shall resume call processing at the ANALYSE_INFORMATION PIC, and process the message as described in this procedure description.
 - 3) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)
- When the AnalyseInformation message is received in response to an O_No_Answer TDP-Request Message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF, if it is providing audible ringing tone to the calling party, shall remove this tone.
 - 2) The SSF/CCF shall release any resources that were used to process the call between the ANALYSE_INFORMATION and ROUTING & ALERTING PICs.
 - 3) The SSF/CCF shall resume call processing at the ANALYSE_INFORMATION PIC, and process the message as described in this procedure description.
 - 4) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)

- When the Analyse Information message is received in response to an O_No_Answer EDP-Request message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF, if it is providing audible ringing tone to the calling party, shall remove this tone.
 - 2) The SSF/CCF shall release any resources that were used to process the call between the ANALYSE_INFORMATION and ROUTING & ALERTING PICs.
 - 3) The SSF/CCF shall resume call processing at the ANALYSE_INFORMATION PIC, and process the message as described in this Recommendation.
 - 4) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)

AnalyseInformation with OriginalCalledPartyID:

- When the SSF/CCF receives an AnalyseInformation message that contains the OriginalCalledPartyID parameter, the SSF/CCF shall map the received OriginalCalledPartyID parameter to, for example (ISUP interworking is for further study):
 - 1) The OriginalCalledNumber information element in the Facility Information Element if the SSF/CCF does not yet have a value for the OriginalCalledNumber AND if the SSF/CCF routes the call to an ISDN line (for Basic rate and Primary rate ISDN signalling).
 - 2) The OriginalCalledNumber parameter in the IAM if the SSF/CCF does not already have a value for the OriginalCalledNumber AND if the SSF/CCF routes the call to an SS7 trunk (for ISDN-UP signalling).

Other AnalyseInformation requirements:

- If the SSF/CCF has associated a Business Group ID with the call and the call is routed over an SS7 trunk, the SSF/CCF shall include this information in the Business Group parameter of the network-specific ISDN-UP IAM (network-operator specific).
- If the CalledPartyNumber or CallingPartyNumber parameter is included in the AnalyseInformation operation, that value shall be used subsequently for the call and the existing value replaced.

17.6.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.7 ApplyCharging procedure

17.7.1 General description

This operation is used for interacting from the SCF with the SSF charging mechanisms. The "ApplyChargingReport" operation provides the feedback from the SSF to the SCF.

As several connection configurations may be established during a call, a possibility exists for the "ApplyCharging" to be invoked at the beginning of each connection configuration, for each party.

The charging scenarios supported by this operation are 4.1 and 4.2 (refer to Appendix II/Q.1214, "Charging scenarios").

17.7.1.1 Parameters

- aChBillingChargingCharacteristics:
This parameter specifies the charging related information to be provided by the SSF and the conditions on which this information has to be reported back to the SCF via the "ApplyChargingReport" operation. Its contents are network-operator specific.
- partyToCharge:
This parameter indicates the party in the call to which the "ApplyCharging" operation should be applied. If it is not present, then it is applied to the A-party.

17.7.2 Invoking entity (SCF)

17.7.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The SLPI has determined that an "ApplyCharging" operation has to be sent.

SCF Postcondition:

- 1) No FSM state transition.
- 2) The SLPI is expecting "ApplyChargingReport" operations from the SSF.

The SCSM FSM is in state "Preparing SSF Instructions" or is in state "Queueing FSM". This operation is invoked by the SCF if a SLPI results in the request of interacting with the charging mechanisms within the SSF to get back information about the charging.

17.7.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.7.3 Responding entity (SSF)

17.7.3.1 Normal procedure

SSF Precondition:

- 1) The FSM for CS is in one of the following states:
 - "Waiting for Instructions";
 - "Waiting for End of User Interaction";
 - "Waiting for End of Temporary Connection";
 - "Monitoring";
- 2) or the assisting/hand-off SSF-FSM is in state:
 - "Waiting for Instructions".

SSF Postcondition:

- No FSM state transition.

On receipt of this operation, the SSF sets the charging data using the information elements included in the operation and acts accordingly. In addition, the SSF will start the monitoring of the end of the connection configuration and other charging events, if requested.

17.7.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.8 ApplyChargingReport procedure

17.8.1 General description

This operation is used by the SSF to report charging related information to the SCF as requested by the SCF using the "ApplyCharging" operation.

During a connection configuration the "ApplyChargingReport" operation may be invoked on multiple occasions. For each call party and each connection configuration, the "ApplyChargingReport" operation may be used several times. Note that at least one "ApplyChargingReport" operation is to be sent at the end of the connection configuration charging process.

The charging scenarios supported by this operation are 4.1 and 4.2 (refer to Appendix II/Q.1214, "Charging scenarios").

17.8.1.1 Parameters

- **callResult:**

This parameter provides the SCF with the charging related information previously requested using the "ApplyCharging" operation. The "CallResult" will include the "partyToCharge" parameter as received in the related "ApplyCharging" operation to correlate the result to the request. The remaining content of "CallResult" is network-operator specific. Examples of these contents may be: bulk counter values, costs, tariff change and time of change, time stamps, durations, etc.

NOTE – When the SSF sends the ApplyChargingReport operation as the last event from the Call Segment, the "lastEventIndicator" parameter such as the CallInformationReport operation is needed for indicating whether the event is last to the SCF. However, because there is no consideration for the parameter expansion in the CS-1, this parameter cannot be added.

17.8.2 Invoking entity (SSF)

17.8.2.1 Normal procedure

SSF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) A charging event has been detected that was requested by the SCF via an "ApplyCharging" operation.

SSF Postcondition:

- If the connection configuration does not change, then no FSM state transition shall occur. If the connection configuration changes, then the FSM shall move to:
 - "Idle" state if there is no other EDP armed and no report requests are pending, or otherwise;
 - shall remain in the same state.

This operation is invoked if a charging event has been detected that was requested by the SCF. The "ApplyChargingReport" operation only deals with charging events within the SSF itself. Examples of charging events may be: threshold value reached, timer expiration, tariff change, end of connection configuration, etc.

17.8.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.8.3 Responding entity (SCF)

17.8.3.1 Normal procedure

SCF Precondition:

- An "ApplyCharging" operation has been sent at the request of an SLPI and the SLPI is expecting an "ApplyChargingReport" from the SSF.

SCF Postcondition:

- No FSM state transition if further reports, including "EventReportBCSM" and "CallInformationReport", are expected, or Transition to the state "Idle" if the report is the last one and no "EventReportBCSM" or "CallInformationReport" is expected.

On receipt of this operation, the SLPI which is expecting this operation will continue.

17.8.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, the TCAP services used for reporting operation errors are described in clause 18.

17.9 AssistRequestInstructions procedure

17.9.1 General description

This operation is sent to the SCF by an SSF, which is acting as the assisting SSF in an assist or hand-off procedure, or by a SRF. The operation is sent when the assisting SSF or SRF receives an indication from an initiating SSF containing information indicating an assist or hand-off procedure.

17.9.1.1 Parameters

- correlationID:
This parameter is used by the SCF to associate the "AssistRequestInstructions" from the assisting SSF or by a SRF with the request from the initiating SSF. The value of the "correlationID" may be extracted from the digits received from the initiating SSF or be all of the digits.
- iPAvailable:
See Recommendation Q.1290. This parameter is applicable to this operation only in the physical scenarios corresponding to assist with relay or hand-off. The use of this parameter is network-operator dependent.
- iPSSPCapabilities:
See Recommendation Q.1290. This parameter is applicable to this operation only in the physical scenarios corresponding to assist with relay or hand-off. The use of this parameter is network-operator dependent.

17.9.2 Invoking entity (SSF/SRF)

17.9.2.1 Normal procedure

SSF Precondition:

- An assist indication is detected by the assisting or Hand-off SSF.

SSF Postcondition:

- The assisting or Hand-off SSF waits for instructions.

On receipt of an assist indication from the initiating SSF, the SSF or SRF shall assure that the required resources are available to invoke an "AssistRequestInstructions" operation in the SSF/SRF and indicate to the initiating SSF that the call is accepted (refer to Recommendation Q.71). The "AssistRequestInstructions" operation is invoked by the SSF or SRF after the call, which initiated the assist indication, is accepted. The assisting SSF FSM transitions to state "Waiting For Instructions".

17.9.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.9.3 Responding entity (SCF)

17.9.3.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the initiating SSF in case of assist procedure.
- 2) The SCF waits for "AssistRequestInstructions".

SCF Postcondition:

- An SSF or SRF instruction is being prepared.

On receipt of this operation in the SCSM state "Waiting for Assist Request Instructions", the SCP has to perform the following actions:

If the "AssistRequestInstructions" operation was received from an assisting SSF, and the resource is available, the SCSM prepares the "ConnectToResource" and "PlayAnnouncement" or "PromptAndCollectUserInformation" to be sent to the assisting SSF.

The SCF determines SSF/SRF by means of "correlationID", "destinationNumber" or network knowledge.

If the "AssistRequestInstructions" operation was received from a SRF, and the resource is available, the SCSM prepares the "PlayAnnouncement" or "PromptAndCollectUserInformation" to be sent to the SRF.

On receipt of this operation from the Hand-off SSF, the SCSM associated with the Hand-off SSF transits from the "Idle" state to the "Preparing SSF Instructions" state.

17.9.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.10 AssociationReleaseRequested procedure

17.10.1 General description

This operation is sent by the CUSF to the SCF after detecting a valid trigger condition at the BCUSM AssociationReleaseRequested DP (reported as TDP) or after detecting a previously requested event with RequestReportBCUSMEvent operation (reported as EDP). This operation indicates the SCF the received component from the user. For example, the relevant parts of the

received FACILITY information element from the user on the UNI is extracted, and mapped to the component parameter etc. of this operation.

17.10.1.1 Parameters

- callUnrelatedDPSSpecificCommonParameters consists of following parameters:
 - serviceAddressInformation:
serviceAddressInformation is the same as for AnalysedInformation.
 - callingPartyNumber:
callingPartyNumber represents the line identifier that is used for the association request.
 - locationNumber:
locationNumber: see Recommendation Q.763.
 - terminalType:
terminalType shall take default value ISDN (isdn).
- componentType:
This parameter indicates the type of event that is reported to the SCF. For example, Invoke is used to report the invocation of an operation from a user with an association request.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the CUSF and the SCF that is assigned between the user and the network locally. The value indicated in this operation is used to correlate the response from the SCF (which will be done by SendComponent) within the CUSF.

17.10.2 Invoking entity (CUSF)

17.10.2.1 Normal procedure

CUSF Precondition (TDP):

- 1) CUSF-FSM is in state a: "Idle".
- 2) The association establishment request is received from the user, and the component portion of the FACILITY IE meets the triggering criteria (optional).

CUSF Precondition (EDP):

- 1) CUSF-FSM is in state c: "Monitoring".
- 2) The operation invocation request is received from the user, and the component portion of the FACILITY IE meets the event report criteria (optional).

CUSF Postcondition [1) or 2]):

- 1) CUSF-FSM moves to state b: "Waiting For Instructions" (TDP-R or EDP-R).
- 2) CUSF-FSM remains in or moves to state a: "Idle" (TDP-N or last EDP-N).

- 3) CUSF-FSM remains in state c: "Monitoring" (not last EDP-N).

17.10.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.10.3 Responding entity (SCF)

17.10.3.1 Normal procedure

SCF Precondition (TDP):

- FSM for CUSF within the SCF is in state N1: "Idle".

SCF Precondition (EDP):

- FSM for CUSF within the SCF is in state N2.2: "Waiting for Notification or Request".

SCF Postcondition:

- 1) FSM for CUSF within the SCF moves to state N2: "Preparing CUSF Instructions" (TDP-R or EDP-R).
- 2) CUSF-FSM remains in or moves to state a: "Idle" (TDP-N or last EDP-N).
- 3) CUSF-FSM remains in state c: "Waiting for Notification or Request" (not last EDP-N).
- 4) Waiting for the request from the SLPI and CUSF instructions is being prepared.

17.10.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.11 Authorize Termination procedure

17.11.1 General description

This operation is sent by the SCF to the SSF and requests the SSF to perform the 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).

17.11.1.1 Parameters

- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- callingPartyNumber:
See Recommendation Q.762.
- destinationNumberRoutingAddress:
Represents a called party number.
- displayInformation:
This parameter indicates a text string to be sent to the end user. This information cannot be received by a PSTN end-user.
- iSDNAccessRelatedInformation:
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.

- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- travellingClassMark:
See Recommendation Q.1290.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- scfID:
See Recommendation Q.1290. The scfID is used in the context of a hand-off procedure and only if the SCF id is not embedded in the "destinationRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- legID:
This parameter indicates the LegID to which the operation shall apply.

17.11.2 Invoking entity (SSF/SRF)

17.11.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between a SCF and a SSF.
- 2) A SLPI has determined that an "AuthorizeTermination" is to be sent by the SCF.

SCF Postcondition:

- SLPI execution may continue.

In the SCSM FSM state "Preparing SSF Instructions," this operation is invoked by an SCF if the service logic results in the request to a SSF to route a call to a specific destination and to continue call processing at the AuthorizeTermination PIC. If no event monitoring has been requested and no reports (CallInformationReport and ApplyChargingReport) have been requested in a previously sent operation, a SCSM FSM transition to the state "Idle" occurs. Otherwise, if event monitoring has been requested or any report (CallInformationReport and ApplyChargingReport) has been requested, the SCSM FSM transitions to the state "Waiting for Notification or Request".

17.11.2.2 Error handling

If reject or error messages are received, then the SCSM informs the SLPI of the message and remains in the state "Preparing SSF Instructions".

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.11.3 Responding entity (SSF)

17.11.3.1 Normal procedure

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.

17.11.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.12 CallGap procedure

17.12.1 General description

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

17.12.1.1 Parameters

– gapCriteria:

This parameter identifies the criteria for a call to be subject to call gapping.

- calledAddressValue:

This parameter indicates that call gapping will be applied when the leading digits of the dialled number of a call attempt match those specified in "gapCriteria".

- gapOnService:

This parameter indicates that call gapping will be applied when the "serviceKey" of a call attempt matches those specified in "gapCriteria".

- calledAddressAndService:

This parameter indicates that call gapping will be applied when the "serviceKey" and the leading digits of the dialled number of a call attempt match those specified in "gapCriteria".

- **callingAddressAndService:**

This parameter indicates that call gapping will be applied when the "serviceKey" and the leading digits of the calling party number or the location number of a call attempt match those specified in "gapCriteria".

- **gapAllINTraffic:**

This parameter indicates that call gapping will be applied for every IN call.

– **gapIndicators:**

This parameter indicates the gapping characteristics.

- **duration:**

Duration specifies the total time interval during which call gapping for the specified gap criteria will be active.

A duration of 0 indicates that gapping is to be removed.

A duration of –1 indicates an infinite duration.

A duration of –2 indicates a network-specific duration.

Other values indicate duration in seconds.

- **gapInterval:**

This parameter specifies the minimum time between calls being allowed through.

An interval of 0 indicates that calls meeting the gap criteria are not to be rejected.

An interval of –1 indicates that all calls meeting the gap criteria are to be rejected.

Other values indicate interval in milliseconds.

– **controlType:**

This parameter indicates the reason for activating call gapping.

The "controlType" value "sCPOverloaded" indicates that an automatic congestion detection and control mechanism in the SCP has detected a congestion situation.

The "controlType" value "manuallyInitiated" indicates that the service and or network/service management centre has detected a congestion situation, or any other situation that requires manually initiated controls¹.

– **gapTreatment:**

This parameter indicates how calls that were stopped by the call gapping mechanism shall be treated.

- **informationToSend:**

This parameter indicates an announcement, a tone or display information to be sent to the calling party. At the end of information sending, the call shall be released.

- **inbandInfo:**

¹ The controlType "manuallyInitiated" will have priority over "sCPOverloaded" call gap.

It should be noted that also non-IN controlled traffic control mechanism can apply to an exchange with the SSF functionality. The non-IN controlled traffic control may also have some influence to the IN call. Therefore it is recommended to take measures to coordinate several traffic control mechanisms. The non-IN controlled traffic control and coordination of several traffic control mechanisms are out of the scope of INAP.

This parameter specifies the inband information to be sent.

- messageID:

This parameter indicates the message(s) to be sent, it can be one of the following:

- elementaryMessageID:

This parameter indicates a single announcement.

- text:

This parameter indicates a text to be sent. The text shall be transformed to inband information (speech). This parameter consists of two subparameters, messageContent and attributes. The attributes of text may consists of items such as language.

- elementaryMessageIDs:

This parameter specifies a sequence of announcements.

- variableMessage:

This parameter specifies an announcement with one or more variable parts.

- numberOfRepetitions:

This parameter indicates the maximum number of times the message shall be sent to the end-user.

- duration:

This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

- interval:

This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is > 1.

- tone:

This parameter specifies a tone to be sent to the end-user.

- toneID:

This parameter indicates the tone to be sent.

- duration:

This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.

- displayInformation:

This parameter indicates a text string to be sent to the end-user. This information cannot be received by a PSTN end-user.

- releaseCause:

This parameter indicates that the call shall be released using the given release cause. See Recommendation Q.762.

- Both:

This parameter indicates in-band info, a tone or display information to be sent to the calling party. At the end of information sending, the call shall be released, using the given release cause.

17.12.2 Invoking entity (SCF)

17.12.2.1 Normal procedure

SCF Precondition:

- The SCF detects an overload condition persists and call gapping has to be initiated at the SSF; or
The SCF receives a manually initiated call gapping request.

SCF Postcondition:

- The SCME FSM remains in the same state upon issuing the "CallGap" operation.

A congestion detection and control algorithm monitors the load of SCP resources. After detection of a congestion situation, the parameters for the "CallGap" operation are provided.

If the congestion level changes, new "CallGap" operations may be sent for active gap criteria but with new gap interval. If no congestion is detected gapping may be removed.

A manual initiated call gap will prevail over an automatic initiated call gap.

17.12.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.12.3 Responding entity (SSF)

17.12.3.1 Normal procedure

SSF Precondition:

- Call gapping for gapCriteria is not active, or;
Call gapping for gapCriteria is active.

SSF Postcondition:

- 1) The SSME-FSM is in the state "Non-call associated treatment".
- 2) Call gapping for gapCriteria is activated; or
Call gapping for gapCriteria is renewed; or
Call gapping for gapCriteria is removed.

If there is no already existing SSME-FSM for the gap criteria provided, a new SSME-FSM is created. This SSME-FSM enters the state "Non-call associated treatment" and initialises call gapping for the specified IN calls. The parameters "gapIndicators", "controlType" and "gapTreatment" for the indicated gap criteria will be set as provided by the "CallGap" operation.

In general, the manuallyInitiated call gapping will prevail over automatically initiated ("sCPOverloaded"). More specifically, the following rules will be applied in the SSF to manage the priority of different control Types associated with the same "gapCriteria":

- If an SSME-FSM already exists for the "gapCriteria" provided, then:
 - 1) If the (new) "controlType" equals an existing "controlType", then the new parameters (i.e. "gapIndicators" and "gapTreatment") will overwrite the existing parameter values.
 - 2) If the (new) "controlType" is different from the existing "controlType", then the new parameters (i.e. "controlType", "gapIndicators", and "gapTreatment") will be appended to the appropriate SSME-FSM (in addition to the existing parameters). The SSME-FSM remains in the state "Non-Call Associated Treatment".

If the SSF meets a TDP, it will check if call gapping was initiated either for the "serviceKey" or for the "calledAddressValue" assigned to this TDP. If not, an "InitialDP" or a DP-specific operation can be sent. In case call gapping was initiated for "calledAddressAndService"; or "callingAddressAndService" and the "serviceKey" matches, a check on the "calledAddressValue" and "callingAddressValue" – and optionally "locationNumber" – for active call gapping is performed. If not, an "InitialDP" or a DP-specific operation can be sent.

In case of gapping on "callingAddressAndService" and the parameter "locationNumber" is present, gapping will be performed on "locationNumber" instead of "callingAddressValue".

If a call to a controlled number matches only one "gapCriteria", then the corresponding control is applied. If both "manuallyInitiated" and "sCPOverload" controls are active, then only the manually initiated control will be applied.

If a call to a controlled called number matches several active "gapCriteria", then only the "gapCriteria" associated with the longest called party number should be used, and the corresponding control should be applied. For example, the codes 1234 and 12345 are under control. Then the call with 123456 is subject to the control on 12345. Furthermore, if both "manuallyInitiated" and "sCPOverloaded" "controlTypes" are active for this "gapCriteria", then the "manuallyInitiated" control will be applied.

If "gapAllINTraffic" is active, then the checks for other criteria will be applied as described above. After these checks, control according to "gapAllINTraffic" will be applied for every IN call not blocked by other active criteria.

If call gapping shall be applied and there is no gap interval active, an "InitialDP" or a DP-specific operation can be sent including the "cGEncountered" parameter according to the specified controlType. A new gap interval will be initiated as indicated by "gapInterval".

If a gap interval is active, no "InitialDP" or a DP-specific operation is sent and the call is treated as indicated by "gapTreatment".

The call gap process is stopped if the indicated duration equals ZERO.

If call gapping proceeds then the SSME-FSM remains in the state "Non-call associated treatment". Otherwise, the SSME-FSM moves to state "idle management".

17.12.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.13 CallInformationReport procedure

17.13.1 General description

This operation is used to send specific call information for a single call/call party to the SCF as requested by the SCF in previous "CallInformationRequest" operation. The report is sent at the end of a call/call party connection which is indicated by one of the events specified below.

17.13.1.1 Parameters

- requestedInformationList:
According to the requested information, the SSF sends the appropriate types and values to the SCF.
- correlationID:
Used by the SCF for correlation with a previous operation.

- legID:
This parameter indicates the party in the call for which the information shall be collected and at the end of connection of which the report shall be sent. When absent, it shall apply to the first "outgoing" leg (i.e. the passive leg in an O-BCSM or the controlling leg in an T-BCSM) within the initial Call Segment this can be a leg created by InitiateCallAttempt; or Connect/Continue/ContinueWithArgument/AnalyseInformation/SelectRoute.
- lastEventIndicator:
This parameter means that the CallInformationReport operation is 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 the 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.

17.13.2 Invoking entity (SSF)

17.13.2.1 Normal procedure

SSF Precondition:

- 1) The indicated or default party is released from the call or call setup towards the indicated or default party is not completed.
- 2) Requested call information has been collected.
- 3) "CallInformationReport" is pending due to a previously received "CallInformationRequest" operation.
- 4) A control relationship exists between the SCF and the SSF.

SSF Postcondition:

- 1) The FSM for CS in the SSF shall move to the "Idle" state in the case where no other report requests are pending and no EDPs are armed; otherwise, the SSF FSM shall remain in the same state.

NOTE – In CS-2, the "lastEventIndicator" parameter is set as the "TRUE" in the former case. In the latter case, the parameter is set as the "FALSE". In the CS-1, the parameter is not used.
- 2) When the CallInformationReport is sent due to the receipt of the operation DisconnectLeg, which was followed by a state change to Waiting for Instructions, the SSF-FSM remains in the same state independent of other pending reports or armed EDPs.

If the SSF FSM executes a state transition caused by one of the following events:

- A party release for the indicated party or where A-party release causes a release of the default party.
- A party abandon for the indicated party or where A-party release causes a release of the default party.
- B party release for the indicated or default party.
- B party busy for the indicated or default party.
- SSF no answer timer expiration for the indicated or default party.
- route select failure indicated by the network for the indicated or default party.
- release call initiated by the SCF,

and "CallInformationRequest" is pending then one "CallInformationReport" operation is sent to the SCF containing all information requested.

If a "CallInformationReport" has been sent to the SCF then no "CallInformationReport" is pending, i.e. a further "CallInformationReport", for example in the case of follow-on, has to be explicitly requested by the SCF.

If an event causing the "CallInformationReport" is also detected by an armed EDP-R, then immediately after "CallInformationReport" the corresponding "EventReportBCSM" has to be sent.

If an event causing the "CallInformationReport" is also detected by an armed EDP-N, then immediately before "CallInformationReport" the corresponding "EventReportBCSM" has to be sent.

17.13.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.13.3 Responding entity (SCF)

17.13.3.1 Normal procedure

SCF Precondition:

- 1) An SLPI is expecting "CallInformationReport".
- 2) A control relationship exists between the SCF and the SSF.

SCF Postcondition:

- The SLPI may be further executed.

In any state (except "Idle") the SCSM may receive "CallInformationReport" from the SSF, when the "CallInformationReport" is outstanding.

If "CallInformationReport" is outstanding and the service logic program indicates that the processing has been completed, the SCSM remains in the same state until it receives the "CallInformationReport" operation.

When the SCF receives the "CallInformationReport" operation and the service logic processing has been completed, then the FSM for CS in the SCSM moves to the "Idle" state. In the IN CS-2, whether the "CallInformationReport" operation is last is decided by the "lastEventIndicator" parameter.

When the SCF receives the "CallInformationReport" operation and the service logic processing has not been completed yet, then the SCSM remains in the same state (EventReportBCSM and/or ApplyChargingReport and/or CallInformationReport pending).

17.13.4 Error handling

If requested information is not available, a "CallInformationReport" will be sent, indicating the requested information type, but with "RequestedInformationValue" filled in with an appropriate default value as specified by the network operator.

Operation related error handling is not applicable, due to class 4 operation.

17.14 CallInformationRequest procedure

17.14.1 General description

This operation is used to request the SSF to record specific information about a single call and report it to the SCF using the "CallInformationReport" operation.

17.14.1.1 Parameters

– requestedInformationTypeList:

This parameter specifies a list of specific items of information which is requested.

The list may contain:

- callAttemptElapsedTime:

This parameter indicates the duration between the end of INAP processing of operations initiating call setup ("Connect", "AnalyseInformation", "CollectInformation", "Continue" and "SelectRoute") and the received answer indication from the indicated or default called party side.

In case of unsuccessful call setup, the network event indicating the unsuccessful call setup stops the measurement of "callAttemptElapsedTime".

- callStopTime:

This parameter indicates the time stamp when the connection to the indicated or default party is released.

- callConnectedElapsedTime:

This parameter indicates the duration between the received answer indication from the indicated or default called party side and the release of that connection.

- calledAddress:

This parameter indicates the incoming called party address that was received by the SSF (i.e. before translation by the SCF) and is available on the UNI or NNI and interpreted as per the numbering plan.

- releaseCause:

See Recommendation Q.762. The release cause that applied to the indicated or default party.

– legID:

This parameter indicates the party in the call for which the information has been collected. When absent, it indicates the first "outgoing" leg (i.e. the passive leg in an O-BCSM or the controlling leg in an T-BCSM) within the initial Call Segment, this can be a leg created by InitiateCallAttempt; or Connect/Continue/ContinueWithArgument/AnalyseInformation/SelectRoute.

Any set of these values can be requested.

17.14.2 Invoking entity (SCF)

17.14.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The SLPI has determined that a "CallInformationRequest" operation has to be sent by the SCF.

SCF Postcondition:

- The SLPI is expecting a "CallInformationReport" from SSF.

When the service logic program requests call information, the SCF sends the "CallInformationRequest" operation to the SSF to request the SSF to provide call related information.

The "CallInformationRequest" operation specifies the information items to be provided by the SSF.

17.14.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.14.3 Responding entity (SSF)

17.14.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) A control relationship exists between SSF and SCF.

SSF Postcondition:

- 1) Requested call information is retained by the SSF.
- 2) The SSF is waiting for further instructions.

The SSF may receive the "CallInformationRequest" operation within an existing call associated (CA) dialogue only.

The "CallInformationRequest" operation is accepted by the SSF Finite State Machine (SSF-FSM) only in the state "Waiting for Instructions". The operation does not lead to any transition to another state.

The SSF allocates a record for the indicated or default party and stores the requested information if already available and prepares the recording of information items, that will become available later like for example "callStopTimeValue".

Call information may be requested for any call party connection (identified by a legID). The indicated leg may be any controlling leg or passive leg.

17.14.3.2 Error handling

In any state other than the "Waiting for Instruction" state, the "CallInformationRequest" operation will be handled as an error with the error code "UnexpectedComponentSequence".

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.15 Cancel procedure

17.15.1 General description

The SCF uses this class 2 operation to request the SRF/SSF to cancel a correlated previous operation.

The SRF operation to be deleted can be either a "PlayAnnouncement" operation, a "PromptAndCollectUserInformation" operation or a PromptAndReceiveMessage operation.

The cancellation of an operation is indicated via a respective error indication, "Cancelled", to the invoking entity of the cancelled "PlayAnnouncement" or "PromptAndCollectUserInformation" operation. The "Cancel" operation can also be used to cancel all outstanding requests and enable the state machine (SSF) to go to idle. In this case the "Cancel" operation does not specify any specific operation to be cancelled.

17.15.1.1 Parameters

- invokeID:
This parameter specifies which operation invocation is to be cancelled, i.e. PromptAndCollectUserInfo, PromptAndReceiveMessage or PlayAnnouncement.
 - callSegmentToCancel:
This parameter specifies to which call segment the cancellation of a user interaction operation shall apply as well as the InvokeID to be cancelled.
 - allRequests:
This parameter indicates that all active requests for EDP reports (generic or DP specific), "ApplyChargingReport" and "CallInformationReport" should be cancelled.
- NOTE – This cancellation is different from the invokeID based cancel mechanism described above.

17.15.2 Invoking entity (SCF)

17.15.2.1 Normal procedure

The SCF may either invoke this operation to the SSF or to the SRF, different conditions will prevail in each case.

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF/SRF.
- 2) An SLPI in the "Waiting for response from SRF" state has determined that a previously requested operation is to be cancelled; or
An SLPI has determined that it is no longer interested in any reports or notifications from the SSF and that the control relationship should be ended.

SCF Postcondition:

- The SLPI remains in the "Waiting for Response from SRF" state; or
In case all requests are cancelled, the control relationship with the concerned FE (SSF) is ended and the SCSM FSM returns to "Idle" state.

17.15.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.15.3 Responding entity (SRF)

17.15.3.1 Normal procedure

SRF Precondition:

- A PlayAnnouncement or PromptAndCollectUserInfo operation has been received and the SRF is in the "User Interaction" state.

SRF Postcondition:

- The execution of the PlayAnnouncement or PromptAndCollectUserInfo operation has been aborted and the SRF remains in the "User Interaction" state.

17.15.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.15.4 Responding entity (SSF)

17.15.4.1 Normal procedure

SSF Precondition:

- The SSF-FSM is in the state "Waiting for Instructions" or "Monitoring".

SSF Postcondition:

- 1) All active requests for reports and notifications have been cancelled.
- 2) In case the SSF-FSM was in state "Monitoring" it shall return to idle; or
In case the SSF-FSM was in state "Waiting for Instructions" it will remain in that state.
A subsequent call-processing operation will move the SSF-FSM state to "Idle". The call, if in active state, is further treated by SSF autonomously as a normal (non-IN-) call.

17.15.4.2 Error handling

Sending of return error on cancel is not applicable in the cancel "allRequests" case. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.16 CancelStatusReportRequest procedure

17.16.1 General description

This operation is used to request the SSF to cancel a previous request to monitor the busy/idle status of a physical termination resource.

17.16.1.1 Parameters

- resourceID:
This parameter specifies the particular resource. It is a choice of destination number (ID for a line), facility group ID (ID for a hunt group), facility group member (ID for a hunt group member), or trunk group ID (ID for a trunk group).

17.16.2 Invoking entity (SCF)

17.16.2.1 Normal procedure

SCF Precondition:

- SCME is in state "Waiting for SSF Response Status Report".

SCF Postcondition:

- SCME moves to state "Status Report Idle".

17.16.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.16.3 Responding entity (SSF)

17.16.3.1 Normal procedure

SSF Precondition:

- SSME is in the state "Non-Call Associated Treatment".

SSF Postcondition:

- SSME is in the state "Idle Management".

17.16.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.17 chainedAddEntry procedure

17.17.1 General description

The X.500 'chainedAddEntry' operation is used to request remote processing of an AddEntry operation on behalf of an end user. For a full description of the chainedAddEntry operation, see 12.1/X.511.

17.17.1.1 Parameters

See 12.1/X.518.

17.17.2 Invoking entity (SDF)

17.17.2.1 Normal procedure

SDF Precondition:

- 1) The invoking SDF has received a request to perform an 'AddEntry' operation for an end user which requires the operation to be chained to a responding SDF for processing.
- 2) SDSM-ChI: "SDF Bound" or "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound".
- 2) A response to the request to perform an 'AddEntry' operation has been received by the invoking SDF.

When the SDSM-ChI is in the state "Wait for Subsequent Requests" and has received a request to add an entry in the service data which requires processing in the responding SDF, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SDSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the responding SDF in a message containing a Bind argument. The SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SDSM-ChI has moved to state "Idle", the 'AddEntry' operation was discarded. In the State "SDF Bound", the response of the chainedAddEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the chainedAddEntry operation or an error. This response will be returned to the originating end user.

When the SDSM-ChI is in the state "SDF Bound" and has received a request to add an entry in the service data which requires processing in the responding SDF, an internal event occurs. This event, called (e8) Request_to_SDF causes a transition to the same state "SDF Bound" and the SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E7) Response_from_SDF] to the chainedAddEntry operation previously issued to the responding SDF causes a transition of the invoking SDF to the same state "SDF Bound". The response from the

responding SDF may be either the result of the chainedAddEntry operation or an error. This response will be returned to the originating end user.

17.17.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.17.3 Responding entity (SDF)

17.17.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SDF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM-ChT: "SDF Bound".

When the responding SDF is in the state "Bind Pending", the external event (E3) Request_from_SDF caused by the reception of a 'chainedAddEntry' operation from the invoking SDF occurs. The responding SDF does not proceed with processing the operation until the 'dSABind' operation has been successfully executed. It remains in the same state. If the 'dSABind' fails then the operation is discarded. If the 'dSABind' operation succeeds then the chainedAddEntry operation is processed by the responding SDF.

When the responding SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a 'chainedAddEntry' operation from the invoking SDF occurs. This operation is processed by the responding SDF.

The responding SDF may process the 'chainedAddEntry' operation in one of two ways:

- 1) if the invoking SDF is located in another network, then the responding SDF may 'chain' the operation to another SDF within the same network as the responding SDF;
- 2) the operation is processed according to the actions described in the 'AddEntry' procedure.

After the responding SDF has finished processing the operation, any results or errors from the operation are returned to the invoking SDF. The sending of this response corresponds to the event (e6) Response_to_SDF.

17.17.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.18 ChainedConfirmedNotificationProvided procedure

17.18.1 General description

The operation reports to chaining terminator supporting SCF the outcome of the call in terms of charging information. This is achieved by chaining the confirmedReportChargingInformation operation received from the controlling SCF to the chaining terminator supporting SCF.

17.18.1.1 Parameters

The parameters of this operation are the ConfirmedNotificationProvided parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- **originatingSCF:**
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- **target:**
This parameter indicates the identity of the subscriber involved in the operation.
- **traceInformation:**
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (see 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- **scfAuthenticationLevel:**
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out on during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- **timelimit:**
This parameter indicates the time by which the operation is to be completed.
- **ultimateResponder:**
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- **securityParameters:**
This is an optional parameter that conveys security related in the operation and result operation.

17.18.2 Invoking entity (chaining initiator supporting SCF)

17.18.2.1 Normal procedure

SCF Precondition:

- 1) The chaining initiator supporting SCF has received a "chainedEstablishChargingRecord" operation from the chaining terminator supporting SCF.
- 2) The chaining initiator supporting SCF has received a "confirmedReportChargingInformation" operation from the controlling SCF.
- 3) The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.18.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.18.3 Responding entity (chaining terminator supporting SCF)

17.18.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.18.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.19 ChainedConfirmedReportChargingInformation procedure

17.19.1 General description

The operation is used by chaining initiator supporting SCF to report to the chaining terminator supporting SCF the outcome of the call in terms of charging information sent by the controlling SCF and at the same time requests for confirmation. This is achieved applying the SCF CHAINED syntax to ConfirmedReportChargingInformation operation.

It may be a response to a previously issued 'ChainedEstablishChargingRecord' operation or the first operation relating to the charge to the supporting SCF. In the latter case, the call-by-call charging related information exchange by ChainedEstablishChargingRecord operation is not necessary, because the charging rate, etc., is predefined and is properly applied to the call in the controlling SCF.

17.19.1.1 Parameters

The parameters of this operation are the ConfirmedReportChargingInformation parameters and the SCF chaining parameters (see chainedConfirmedNotificationProvided parameters).

17.19.2 Invoking entity (chaining initiator supporting SCF)

17.19.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.19.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.19.3 Responding entity (chaining terminator supporting SCF)

17.19.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT is in the state "SCF Bound".

17.19.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.20 ChainedEstablishChargingRecord procedure

17.20.1 General description

This operation is used by chaining terminator supporting SCF to give charging information to the chaining initiator supporting SCF. This operation is used by the chaining initiator supporting SCF to prepare and to send an establishChargingRecord operation to the controlling SCF.

17.20.1.1 Parameters

The parameters of this operation are the EstablishChargingRecord parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed.
- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.20.2 Invoking entity (chaining terminator supporting SCF)

17.20.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.20.2.2 Error handling

Generic error handling for the operation related errors described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.20.3 Responding entity (chaining initiator supporting SCF)

17.20.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.20.3.2 Error handling

If chaining initiator supporting SCF receives "chainedEstablishedChargingInformation" operation without "charging parameters and without "user credit" parameters, it replies with "missing parameter" error.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.21 chainedExecute procedure

17.21.1 General description

The 'chainedExecute' operation is used to request remote processing of an Execute operation on behalf of an end user. For a full description of the operation chaining mechanism, see 12.1/X.518.

17.21.1.1 Parameters

See 12.1/X.518 and Execute operation parameters.

17.21.2 Invoking entity (SDF)

17.21.2.1 Normal procedure

SDF Precondition:

- 1) The invoking SDF has received a request to perform an 'Execute' operation for an end user which requires the operation to be chained to a responding SDF for processing.
- 2) SDSM-ChI: "SDF Bound" or "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound".
- 2) A response to the request to perform an 'Execute' operation has been received by the invoking SDF.

When the SDSM-ChI is in the state "Wait for Subsequent Requests" and has received a request to add an entry in the service data which requires processing in the responding SDF, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SDSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the responding SDF in a message containing a Bind argument. The SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SDSM-ChI has moved to state "Idle", the 'Execute' operation was discarded. In the State "SDF Bound", the response of the chainedExecute operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be

either the result of the chainedExecute operation or an error. This response will be returned to the originating end user.

When the SDSM-ChI is in the state "SDF Bound" and has received a request to add an entry in the service data which requires processing in the responding SDF, an internal event occurs. This event, called (e8) Request_to_SDF causes a transition to the same state "SDF Bound" and the SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E7) Response_from_SDF] to the chainedExecute operation previously issued to the responding SDF causes a transition of the invoking SDF to the same state "SDF Bound". The response from the responding SDF may be either the result of the chainedExecute operation or an error. This response will be returned to the originating end user.

17.21.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.21.3 Responding entity (SDF)

17.21.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SDF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM-ChT: "SDF Bound".

When the responding SDF is in the state "Bind Pending", the external event (E3) Request_from_SDF caused by the reception of a 'chainedExecute' operation from the invoking SDF occurs. The responding SDF does not proceed with processing the operation until the 'dSABind' operation has been successfully executed. It remains in the same state. If the 'dSABind' fails then the operation is discarded. If the 'dSABind' operation succeeds, then the chainedExecute operation is processed by the responding SDF.

When the responding SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a 'chainedExecute' operation from the invoking SDF occurs. This operation is processed by the responding SDF.

The responding SDF may process the 'chainedExecute' operation in one of two ways:

- 1) If the invoking SDF is located in another network, then the responding SDF may 'chain' the operation to another SDF within the same network as the responding SDF.
- 2) The operation is processed according to the actions described in the 'Execute' procedure.

After the responding SDF has finished processing the operation, any results or errors from the operation are returned to the invoking SDF. The sending of this response corresponds to the event (e6) Response_to_SDF.

17.21.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518 and the TCAP services that are used for reporting operation errors are described in clause 18.

17.22 ChainedHandlingInformationRequest procedure

17.22.1 General description

This operation requests to chaining terminator supporting SCF assistance on how to proceed. This is achieved by chaining the HandlingInformationRequest Information operation received from the controlling SCF to the chaining terminator supporting SCF. The chainedHandlingInformationRequest operation can be sent to the chaining terminator SCF in the same message as the SCFBind operation.

17.22.1.1 Parameters

The parameters of this operation are the HandlingInformationRequest parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed
- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.22.2 Invoking entity (chaining initiator supporting SCF)

17.22.2.1 Normal procedure

SCF Precondition:

- 1) The chaining initiator supporting SCF has received a "HandlingInformationRequest" operation from the controlling SCF.
- 2) The SCSM-ChI is in the state "Prepare Chained HandlingInformationRequest".

SCF Postcondition:

- The SCSM-ChI moves to the state "Wait for Bound Result".

17.22.2.2 Error handling

If the chaining terminator supporting SCF is not accessible, the supporting SCF FSM (SCSM-sup) is informed.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.22.3 Responding entity (chaining terminator supporting SCF)

17.22.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "BindPending".

SCF Postcondition:

- The SCSM-ChT remains in the state "BindPending".

17.22.3.2 Error handling

If the chaining terminator supporting SCF receives a chainedHandlingInformationRequest operation while a ChainedHandlingInformationResult operation is still pending, taskrefused error is returned to chaining initiator supporting SCF.

If the chaining terminator supporting SCF receives a chainedHandlingInformationRequest operation that it is not able to handle, it can return a "referral" error to chaining initiator supporting SCF.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.23 ChainedHandlingInformationResult procedure

17.23.1 General description

This operation is used by chaining terminator supporting SCF to give the response to the chainedHandlingInformationRequest operation, received from the chaining initiator supporting SCF.

17.23.1.1 Parameters

The parameters of this operation are the HandlingInformationResult parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).

- **scfAuthenticationLevel:**
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- **timelimit:**
This parameter indicates the time by which the operation is to be completed.
- **ultimateResponder:**
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- **securityParameters:**
This is an optional parameter that conveys security related in the operation and result operation.

17.23.2 Invoking entity (chaining terminator supporting SCF)

17.23.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.23.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.23.3 Responding entity (chaining initiator supporting SCF)

17.23.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.23.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.24 chainedModifyEntry procedure

17.24.1 General description

The X.500 'chainedModifyEntry' operation is used to request remote processing of an ModifyEntry operation on behalf of an end user. For a full description of the chainedModifyEntry operation, see 12.1/X.518.

17.24.1.1 Parameters

See 12.1/X.518.

17.24.2 Invoking entity (SDF)

17.24.2.1 Normal procedure

SDF Precondition:

- 1) The invoking SDF has received a request to perform an 'ModifyEntry' operation for an end user which requires the operation to be chained to a responding SDF for processing.
- 2) SDSM-ChI: "SDF Bound" or "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound".
- 2) A response to the request to perform an 'ModifyEntry' operation has been received by the invoking SDF.

When the SDSM-ChI is in the state "Wait for Subsequent Requests" and has received a request to modify an entry in the service data which requires processing in the responding SDF, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SDSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the responding SDF in a message containing a Bind argument. The SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SDSM-ChI has moved to state "Idle", the 'ModifyEntry' operation was discarded. In the State "SDF Bound", the response of the chainedModifyEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the chainedModifyEntry operation or an error. This response will be returned to the originating end user.

When the SDSM-ChI is in the state "SDF Bound" and has received a request to modify an entry in the service data which requires processing in the responding SDF, an internal event occurs. This event, called (e8) Request_to_SDF causes a transition to the same state "SDF Bound" and the SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E7) Response_from_SDF] to the chainedModifyEntry operation previously issued to the responding SDF causes a transition of the invoking SDF to the same state "SDF Bound". The response from the responding SDF may be either the result of the chainedModifyEntry operation or an error. This response will be returned to the originating end user.

17.24.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.24.3 Responding entity (SDF)

17.24.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SDF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM-ChT: "SDF Bound".

When the responding SDF is in the state "Bind Pending", the external event [(E3) Request_from_SDF] caused by the reception of a 'chainedModifyEntry' operation from the invoking SDF occurs. The responding SDF does not proceed with processing the operation until the 'dSABind'

operation has been successfully executed. It remains in the same state. If the 'dSABind' fails then the operation is discarded. If the 'dSABind' operation succeeds, then the chainedModifyEntry operation is processed by the responding SDF.

When the responding SDF is in the state "SCF Bound", the external event [(E7) Request_from_SCF] caused by the reception of a 'chainedModifyEntry' operation from the invoking SDF occurs. This operation is processed by the responding SDF.

The responding SDF may process the 'chainedModifyEntry' operation in one of two ways:

- 1) if the invoking SDF is located in another network, then the responding SDF may 'chain' the operation to another SDF within the same network as the responding SDF;
- 2) the operation is processed according to the actions described in the 'ModifyEntry' procedure.

After the responding SDF has finished processing the operation, any results or errors from the operation are returned to the invoking SDF. The sending of this response corresponds to the event [(e6) Response_to_SDF].

17.24.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.25 ChainedNetworkCapability procedure

17.25.1 General description

Within the context of the call, this operation is used by chaining terminator supporting SCF to request from the chaining initiator supporting SCF the type of services supported for the user. This operation would not be used if there was a prior agreement of services supported for this user.

17.25.1.1 Parameters

The parameters of this operation are the NetworkCapability parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed.

- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.25.2 Invoking entity (chaining terminator supporting SCF)

17.25.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.25.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.25.3 Responding entity (chaining initiator supporting SCF)

17.25.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.25.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.26 ChainedNotificationProvided procedure

17.26.1 General description

This operation is used to report that a call condition previously specified by the "chaining terminator supporting SCF was met. This is achieved by chaining the notification Provided operation received from the controlling SCF to the chaining terminator supporting SCF".

17.26.1.1 Parameters

The parameters of this operation are the NotificationProvided parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.

- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed.
- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.26.2 Invoking entity (chaining initiator supporting SCF)

17.26.2.1 Normal procedure

SCF Precondition:

- 1) The chaining initiator supporting SCF has received a "chainedRequestNotification" operation from the chaining terminator supporting SCF.
- 2) The chaining initiator supporting SCF has received a "notificationProvided" operation from the controlling SCF.
- 3) The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.26.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.26.3 Responding entity (chaining terminator supporting SCF)

17.26.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.26.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.27 ChainedReportChargingInformation procedure

17.27.1 General description

The operation reports to chaining terminator supporting SCF the outcome of the call in terms of charging information. This is achieved by chaining the reportChargingInformation operation received from the controlling SCF to the chaining terminator supporting SCF.

17.27.1.1 Parameters

The parameters of this operation are the ReportChargingInformation parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed.
- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.27.2 Invoking entity (chaining initiator supporting SCF)

17.27.2.1 Normal procedure

SCF Precondition:

- 1) The chaining initiator supporting SCF has received a "chainedEstablishChargingRecord" operation from the chaining terminator supporting SCF.
- 2) The chaining initiator supporting SCF has received a "reportChargingInformation" operation from the controlling SCF.

- 3) The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.27.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.27.3 Responding entity (chaining terminator supporting SCF)

17.27.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.27.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.28 ChainedProvideUserInformation procedure

17.28.1 General description

This operation is used by chaining terminator supporting SCF to request the chaining initiator supporting SCF to send a provideUserInformation operation to the controlling SCF, in order to request the user information. The received user information will be used in the chaining terminator supporting SCF to determine the way the call should be treated.

17.28.1.1 Parameters

The parameters of this operation are the ProvideUserInformation parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.

- **timelimit:**
This parameter indicates the time by which the operation is to be completed.
- **ultimateResponder:**
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- **securityParameters:**
This is an optional parameter that conveys security related in the operation and result operation.

17.28.2 Invoking entity (chaining terminator supporting SCF)

17.28.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChT remains in the state "SCF Bound".

17.28.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.28.3 Responding entity (chaining initiator supporting SCF)

17.28.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.28.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.29 chainedRemoveEntry procedure

17.29.1 General description

The X.500 'chainedRemoveEntry' operation is used to request remote processing of a RemoveEntry operation on behalf of an end user. For a full description of the chainedRemoveEntry operation, see 12.1/X.518.

17.29.1.1 Parameters

See 12.1/X.518.

17.29.2 Invoking entity (SDF)

17.29.2.1 Normal procedure

SDF Precondition:

- 1) The invoking SDF has received a request to perform a 'RemoveEntry' operation for an end user which requires the operation to be chained to a responding SDF for processing.
- 2) SDSM-ChI: "SDF Bound" or "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound".
- 2) A response to the request to perform a 'RemoveEntry' operation has been received by the invoking SDF.

When the SDSM-ChI is in the state "Wait for Subsequent Requests" and has received a request to remove an entry from the service data which requires processing in the responding SDF, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SDSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the responding SDF in a message containing a Bind argument. The SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SDSM-ChI has moved to state "Idle", the 'RemoveEntry' operation was discarded. In the State "SDF Bound", the response of the chainedRemoveEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the chainedRemoveEntry operation or an error. This response will be returned to the originating end user.

When the SDSM-ChI is in the state "SDF Bound" and has received a request to remove an entry from the service data which requires processing in the responding SDF, an internal event occurs. This event, called [(e8) Request_to_SDF] causes a transition to the same state "SDF Bound" and the SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E7) Response_from_SDF] to the chainedRemoveEntry operation previously issued to the responding SDF causes a transition of the invoking SDF to the same state "SDF Bound". The response from the responding SDF may be either the result of the chainedRemoveEntry operation or an error. This response will be returned to the originating end user.

17.29.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.29.3 Responding entity (SDF)

17.29.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SDF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM-ChT: "SDF Bound".

When the responding SDF is in the state "Bind Pending", the external event [(E3) Request_from_SDF] caused by the reception of a 'chainedRemoveEntry' operation from the invoking SDF occurs. The responding SDF does not proceed with processing the operation until the 'dSABind'

operation has been successfully executed. It remains in the same state. If the 'dSABind' fails then the operation is discarded. If the 'dSABind' operation succeeds, then the chainedRemoveEntry operation is processed by the responding SDF.

When the responding SDF is in the state "SCF Bound", the external event [(E7) Request_from_SCF] caused by the reception of a 'chainedRemoveEntry' operation from the invoking SDF occurs. This operation is processed by the responding SDF.

The responding SDF may process the 'chainedRemoveEntry' operation in one of two ways:

- 1) if the invoking SDF is located in another network, then the responding SDF may 'chain' the operation to another SDF within the same network as the responding SDF.
- 2) the operation is processed according to the actions described in the 'RemoveEntry' procedure.

After the responding SDF has finished processing the operation, any results or errors from the operation are returned to the invoking SDF. The sending of this response corresponds to the event [(e6) Response_to_SDF].

17.29.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.30 ChainedRequestNotification procedure

17.30.1 General description

This operation is used by chaining terminator supporting SCF to request an event notification to the controlling SCF through the chaining initiator SCF; in fact it causes the chaining initiator supporting SCF to send a requestNotification operation to the controlling SCF.

17.30.1.1 Parameters

The parameters of this operation are the RequestNotification parameters and the following chaining parameters. It is to be noted that these parameters are common to all SCF chained operations except ultimateResponder present only in operations with result:

- originatingSCF:
This parameter is used to convey the SCF identity (the encoding of this parameter required bilateral agreement between the involved operators) of the (ultimate) originator of the request when similar information is not already conveyed in the security parameter.
- target:
This parameter indicates the identity of the subscriber involved in the operation.
- traceInformation:
This parameter contains information to prevent looping among SCFs when chaining is in operation, this information is similar to X.518 chaining mechanism (See 10.6/X.518). This parameter is present in the operation argument and in the result parameter (when existed).
- scfAuthenticationLevel:
This parameter is optionally supplied when it is required to indicate the manner in which authentication has been carried out during the bind operation. The type of the parameter is an **AuthenticationLevel** described in ITU-T Rec. X.501 | ISO/IEC 9594-2.
- timelimit:
This parameter indicates the time by which the operation is to be completed.

- ultimateResponder:
This result parameter is used to convey back the ISDN address of the (ultimate) SCF responder.
- securityParameters:
This is an optional parameter that conveys security related in the operation and result operation.

17.30.2 Invoking entity (chaining terminator supporting SCF)

17.30.2.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.30.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.30.3 Responding entity (chaining initiator supporting SCF)

17.30.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChI is in the state "SCF Bound".

SCF Postcondition:

- The SCSM-ChI remains in the state "SCF Bound".

17.30.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.31 chainedSearch procedure

17.31.1 General description

The X.500 'chainedSearch' operation is used to request remote processing of a Search operation on behalf of an end user. For a full description of the chainedSearch operation, see 12.1/X.518.

17.31.1.1 Parameters

See 12.1/X.518.

17.31.2 Invoking entity (SDF)

17.31.2.1 Normal procedure

SDF Precondition:

- 1) The invoking SDF has received a request to perform a 'Search' operation for an end user which requires the operation to be chained to a responding SDF for processing.
- 2) SDSM-ChI: "SDF Bound" or "Wait for Subsequent Requests"

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound".
- 2) A response to the request to perform a 'Search' operation has been received by the invoking SDF.

When the SDSM-ChI is in the state "Wait for Subsequent Requests" and has received a request to search for an entry in the service data which requires processing in the responding SDF, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SDSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the responding SDF in a message containing a Bind argument. The SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SDSM-ChI has moved to state "Idle", the 'Search' operation was discarded. In the State "SDF Bound", the response of the chainedSearch operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the chainedSearch operation or an error. This response will be returned to the originating end user.

When the SDSM-ChI is in the state "SDF Bound" and has received a request to search for an entry in the service data which requires processing in the responding SDF, an internal event occurs. This event, called [(e8) Request_to_SDF] causes a transition to the same state "SDF Bound" and the SDSM-ChI waits for the response from the responding SDF. The reception of the response [(E7) Response_from_SDF] to the chainedSearch operation previously issued to the responding SDF causes a transition of the invoking SDF to the same state "SDF Bound". The response from the responding SDF may be either the result of the chainedSearch operation or an error. This response will be returned to the originating end user.

17.31.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.31.3 Responding entity (SDF)

17.31.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SDF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM-ChT: "SDF Bound".

When the responding SDF is in the state "Bind Pending", the external event [(E3) Request_from_SDF] caused by the reception of a 'chainedSearch' operation from the invoking SDF occurs. The responding SDF does not proceed with processing the operation until the 'dSABind' operation has been successfully executed. It remains in the same state. If the 'dSABind' fails then the operation is discarded. If the 'dSABind' operation succeeds, then the chainedSearch operation is processed by the responding SDF.

When the responding SDF is in the state "SCF Bound", the external event [(E7) Request_from_SCF] caused by the reception of a 'chainedSearch' operation from the invoking SDF occurs. This operation is processed by the responding SDF.

The responding SDF may process the 'chainedSearch' operation in one of two ways:

- 1) if the invoking SDF is located in another network, then the responding SDF may 'chain' the operation to another SDF within the same network as the responding SDF;
- 2) the operation is processed according to the actions described in the 'Search' procedure.

After the responding SDF has finished processing the operation, any results or errors from the operation are returned to the invoking SDF. The sending of this response corresponds to the event [(e6) Response_to_SDF].

17.31.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.32 CollectedInformation procedure

17.32.1 General description

This operation is sent by the SSF after detection of a TDP-R, TDP-N, EDP-R, or EDP-N in the originating BCSM, to indicate availability of complete initial package/dialling string from the originating party.

17.32.1.1 Parameters

- dpSpecificCommonParameters:
See "AnalysedInformation" procedure.
- dialledDigits:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules for dialledDigits.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Recommendation Q.931 for details.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information. Refer to 12.10/Q.1224 for population rules for the originalCalledPartyID parameter.
- prefix:
See Recommendation Q.1290.
- redirectingPartyID:
Contains the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- travellingClassMark:
See Recommendation Q.1290. Refer to 12.10/Q.1224 for population rules for the travellingClassMark parameter.

- featureCode:
See Recommendation Q.1290.
- accessCode:
See Recommendation Q.1290.
- carrier:
See Recommendation Q.1290.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.32.2 Invoking entity (SSF)

17.32.2.1 Normal procedure

SSF Precondition for TDP-R and TDP-N:

- 1) An event resulting in trigger criteria being met has occurred at the Collected_Information DP (e.g. Off_Hook_Delay, Channel_Setup_PRI, Shared_Interoffice_Trunk).
- 2) Call gapping and SS7 overload are not in effect for the call, and the call is not to be filtered.

SSF Precondition for EDP-R and EDP-N:

- 1) A control relationship has been established and the SCF requests Collected_Information as EDP-R or EDP-N.
- 2) Call processing reaches the Collected_Information DP.

SSF Postcondition for TDP-R:

- A control relationship has been established and the SSF waits for instructions from the SCF.

SSF Postcondition for EDP-R:

- The control relationship continues and the SSF waits for instructions from the SCF.

SSF Postcondition for TDP-N and EDP-N:

- Call processing continues at the Analysed_Information PIC.

The SSF/CCF collects enough information (e.g. a feature code, prefix, address information, etc.) from the originating access to process the call. This information is collected according to the dialling plan assigned to the originating access.

- 1) For a call from a non-ISDN line, the SSF/CCF sends an in-band prompt (e.g. dial tone) to prompt the user, attaches a digit receiver, collects digits and applies inter-digit timing. From a non-ISDN line, the "dialling plan in force" is the dialling plan assigned to the line. For example, if a Private Dialling Plan (PDP) (sometimes referred to as a Customized Dialling Plan) is assigned, then that PDP is considered to be the "dialling plan in force". If, on a given call, the caller dials an access code to escape to a Public Office Dialling Plan (PODP) (i.e. E.164), then that PODP is considered to be the "dialling plan in force". In this case, call processing cannot return to the PDP at this SSF/CCF. If a PDP is not assigned, then a PODP is assumed to be the "dialling plan in force".
- 2) For a call from an ISDN user following *en bloc* sending procedures (i.e. all the information necessary to process the call, which can include a feature code, feature activator, called party number, etc., is included in the SETUP message), no further action is taken on the originating access interface. For a call from an ISDN user not following *en bloc* sending procedures, the SSF/CCF prompts the user with a SETUP ACKnowledge message to send more information. Overlap sending procedures are then followed.

For a call from an ISDN BRI or PRI, the "dialling plan in force" is determined by the type of number and numbering plan field of the called party number information element. If this field indicates "unknown" or if the keypad information element is used, then the dialling plan is determined as defined for non-ISDN lines above.
- 3) For conventional trunks, if required by the trunk type, an appropriate start signal is returned. A digit receiver is attached, digits are collected and inter-digit timing is applied.

For a call from a conventional trunk, the number received in signalling is expected to be a non-private number that conforms to Recommendation E.164.
- 4) For SS7 trunks, all the information may be available in the IAM or may come in subsequent messages (i.e. overlap sending). A check is made to ensure that the IAM contains all the information necessary to process the call.

For a call from an SS7 trunk, the number received in signalling is expected to be a non-private number that conforms to Recommendation E.164.
- 5) For private-facility trunks, if required by the private-facility trunk group, an appropriate start signal is returned. Depending on the private-facility trunk group, digits may be collected.

Following the trigger detection (due to the DP criteria assigned being met) related to an armed TDP-R or TDP-N in the BCSM at the Collected_Information DP, caused by a call origination attempt, the SSF checks if call gapping, SS7 overload, or service filtering are not in effect for the related call segment. If these conditions are met, then the CollectedInformation operation is invoked by the SSF. The address of the SCF to which the CollectedInformation has to be sent is determined on the basis of trigger instance related data. The SSF provides parameters as per rules defined in 12.10/Q.1224. For TDP-R, a control relationship is established to the SCF and the SSF application timer T_{SSF} is set when the SSF sends the CollectedInformation operation for requesting instructions from the SCF. T_{SSF} is used to prevent excessive call suspension time. For EDP-R, T_{SSF} is also used. For TDP-N and EDP-N, no new control relationship is established. Hence, T_{SSF} is not set.

17.32.2.2 Error handling

If the destination SCF is not accessible, then the call is given final treatment (other treatments are for further study). On expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and the call is given final treatment (e.g. routing to a final announcement). If the calling party abandons after the sending of the CollectedInformation operation, then the SSF aborts the control relationship after the first answer message from the SCF has been received. If the caller abandons the call and T_{SSF} is running, then the Transaction ID is held open until T_{SSF} is satisfied or

expires. If the caller abandons the call and Timer T_{SSF} is not running, then procedures to support the encountered situation (e.g. procedures to report the condition of Caller Abandon, procedures associated with the condition of T_{SSF} Timer Expired) shall be followed.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.32.3 Responding entity (SCF)

17.32.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the FSM for CS stays in the substate "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The FSM for CS moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The FSM for the CS moves to the state "Preparing CS Instructions" if the message type was request.

For TDP-R, on receipt of the CollectedInformation operation, the FSM for CS moves from "Idle" state to the state "Preparing CS Instructions". A control relationship to the related SSF is created. A Service Logic Program Instance (SLPI) is invoked for processing the CollectedInformation operation based on the triggerType parameter. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked. The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI (i.e. the requested IN service itself).

For EDP-R, on receipt of the CollectedInformation operation, the FSM for CS moves from "Waiting for Notification" state to the state "Preparing CS Instructions". A control relationship to the related SSF continues. A Service Logic Program Instance (SLPI) is invoked for processing the CollectedInformation operation based on the triggerType parameter. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked. The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI (i.e. the requested IN service itself).

For TDP-N, the SCSM remains in state "Idle" and takes appropriate action on the notification.

For EDP-N, if this is the last event notification and there are no CallInformationReport and ApplyChargingReport pending, the FSM for CS returns to state "Idle". Otherwise, it remains in state "Waiting for Notification or Report". Appropriate actions on the notification are taken.

17.32.3.2 Error handling

If the CollectedInformation operation is rejected, then the SCSM remains in the same state. The maintenance function is informed and no SLPI is invoked. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.33 CollectInformation procedure

17.33.1 General description

The CollectInformation is a class 2 operation which is used by the SCF to request the call to return to the Collect_Information PIC, and then perform the basic originating call processing actions associated with this PIC (e.g. the checking of information in the CalledPartyNumber parameter with the supported dialling plan). This operation uses only the resources of the SSF/CCF to collect the information. The use of this operation is only appropriate for a call which had not yet left the setup phase.

When the user provides calledPartyNumber, Collect_Information PIC processing includes collecting of destination information from a calling party. When the calledPartyNumber is included (as dialledDigits) in the Collect_Information operation, further collection is not performed (e.g. SSF/CCF checks the provided calledPartyNumber against the supported dialling plan).

17.33.1.1 Parameters

- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- numberingPlan:
See Q.763 Numbering Plan for encoding.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- travellingClassMark:
See Recommendation Q.1290. This parameter contains the travelling class mark information of the calling party. It uses the LocationNumber format which is based on the Q.763 Location Number format.
- callingPartyNumber:
See Recommendation Q.762.
- dialledDigits:
This parameter is applied against the supported dialling plan in the SSF/CCF and, if valid, is used in routing of the call. If provided, it replaces the calledPartyNumber for the call.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network based services at the originating and the destination exchange.

- **iNServiceCompatibilityResponse:**
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- **forwardGVNS:**
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- **backwardGVNS:**
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- **serviceInteractionIndicatorsTwo:**
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- **legToBeCreated:**
This parameter indicates the LegID to be assigned to the newly created party. When not provided, a default LegID of 2 is assumed.
- **callSegment:**
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.33.2 Invoking entity (SCF)

17.33.2.1 Normal procedure

SCF Precondition:

- An SLPI has determined that more information from the calling party is required to enable processing to proceed.

SCF Postcondition:

- SLPI execution is suspended pending receipt of dialled digits.

This operation is invoked in the SCSM FSM state "Preparing SSF Instructions" if the SLP requires additional information to progress the call. It causes a transition of the FSM to the state "Waiting for Notification or Report".

17.33.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.33.3 Responding entity (SSF)

17.33.3.1 Normal procedure

SSF Precondition:

- A TDP Request has been invoked.

SSF Postcondition:

- 1) The SSF has executed a transition to the state "Monitoring".
- 2) The SSF performs the call processing actions to collect destination information from the calling party. This may include prompting the party with in-band or out-band signals.
- 3) Basic call processing is resumed at PIC Collect Information.

The operation is only valid in the state "Waiting for Instructions" and after having received an operation "RequestReportBCSMEvent" for DP Collected Information. The SSP has to perform the following actions:

- The SSF cancels T_{SSF} .
- When DP Collected Information will be encountered, an "EventReportBCSM" operation will be invoked, and the SSF FSM will return to the state "Waiting for Instructions".

17.33.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.34 ComponentReceived procedure

17.34.1 General description

This operation is sent by the CUSF to the SCF after detecting a valid trigger condition at the BCUSM ComponentReceived DP (reported as TDP) or after detecting a previously requested event with RequestReportBCUSMEvent operation (reported as EDP). This operation indicates the SCF the received component from the user. For example, the relevant parts of the received FACILITY information element from the user on the UNI is extracted, and mapped to the component parameter etc. of this operation.

17.34.1.1 Parameters

- callUnrelatedDPSpecificCommonParameters:
This consists of the following parameters (these are optional for the EDP case):
 - serviceAddressInformation.
 - callingPartyNumber.
 - locationNumber.
 - terminalType.
 - serviceAddressInformation is the same as for AnalysedInformation.
 - callingPartyNumber represents the line identifier that is used for the association request.
 - locationNumber: see Recommendation Q.763.
 - terminalType has a default of ISDN [isdn (3)].
- componentType:
This parameter indicates the type of event that is reported to the SCF. For example, Invoke is used to report the invocation of an operation from a user, and Return Result is used to report the return result to the previously issued operation with SendComponent operation.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.

- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.

– componentCorrelationID:

In the CUSF and the SCF, this parameter links the invoke ID that is used by the CUSF and the SCF with the invoke ID assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF (which will be done by SendComponent) within the CUSF.

17.34.2 Invoking entity (CUSF)

17.34.2.1 Normal procedure

CUSF Precondition (TDP):

- 1) CUSF-FSM is in state a: "Idle".
- 2) The association has been established between the user and the network.
- 3) The operation invocation request is received from the user, and the component portion of the FACILITY IE meets the triggering criteria (optional).

CUSF Precondition (EDP):

- 1) CUSF-FSM is in state c: "Monitoring".
- 2) The operation invocation request is received from the user, and the component portion of the FACILITY IE meets the event report criteria (optional).

CUSF Postcondition [1) or 2]):

- 1) CUSF-FSM moves to state b: "Waiting For Instructions" (TDP-R or EDP-R).
- 2) CUSF-FSM remains in or moves to the state a: "Idle" (TDP-N or last EDP-N).
- 3) CUSF-FSM remains in state c: "Monitoring" (not last EDP-N).

17.34.2.2 Error handling

If the error will occur within the CUSF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.34.3 Responding entity (SCF)

17.34.3.1 Normal procedure

SCF Precondition (TDP):

- SCNSM (FSM for CUSF within the SCF) is in state N1: "Idle".

SCF Precondition (EDP):

- SCNSM (FSM for CUSF within the SCF) is in state N2.2: "Waiting for Notification or Request".

SCF Postcondition:

- 1) SCNSM moves to state N2.1: "Preparing CUSF Instructions".
- 2) CUSF-FSM remains in or moves to state a: "Idle" (TDP-N or last EDP-N).
- 3) CUSF-FSM remains in state c: "Waiting for Notification or Request" (not last EDP-N).

- 4) Waiting for the request from the SLPI and CUSF instructions are being prepared.

17.34.3.2 Error handling

If the error will occur within the SCF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.35 ConfirmedNotificationProvided procedure

17.35.1 General description

This operation is used to report that a call condition previously specified by the supporting SCF or pre-arranged between two network operators was met and at the same time to request for confirmation. This is achieved by applying the MAKE CONFIRM syntax to the Notification Provided operation.

17.35.1.1 Parameters

- notifications:
This parameter contains an indication that a call condition previously expressed by the supporting SCF or pre-arranged between the two operators has been met. It links together call condition met and some information related to call conditions (if any).
- notificationInformation:
This parameter contains any other kind of information that might be needed to be notified by a specific kind of service logic. Information that can be conveyed has been agreed between network operators when defining the service logic object.
- securityParameter:
This is an optional parameter that conveys security related information.

17.35.2 Invoking entity (controlling SCF)

17.35.2.1 Normal procedure

SCF Precondition:

- 1) The controlling SCF has received a "Request Notification" operation if call conditions at which this operation is sent has not been pre-arranged between two network operators.
- 2) A call condition specified earlier by the supporting SCF or pre-arranged between two network operators has been met.
- 3) The SCF FSM is in the state "Assisted Mode".
- 4) The need to request for confirmation has been realized from the service logic.

SCF Postcondition:

- SCF FSM remains in Assisted mode state.

If any call resource has been engaged before the "confirmedNotificationProvided" operation is sent (e.g. as a result of the "requested Notification" operation), it remains as it is.

If several call conditions as specified by the supporting SCF or as pre-arranged between two network operators have been met, they are reported in sequence to the supporting SCF, which takes the appropriate actions.

17.35.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.35.3 Responding entity (supporting SCF)

17.35.3.1 Normal procedure

SCF Precondition:

- 1) A dialogue between the two SCFs has been previously established.
- 2) The SCF FSM is in the state "Assisting Mode".

SCF Postcondition:

- 1) SCF FSM remains in the state "Assisting Mode".
- 2) A Return Result is sent for confirmation.

On receipt of the "ConfirmedNotificationProvided" operation the SLPI determines whether the call configuration should be modified as a consequence of the received notification information. If the call configuration in the invoking network needs to be modified, the SCF prepares instructions to assist the controlling SCF and sends them with a "handlingInformationResult" operation. Otherwise the SCF does not undertake any actions towards the controlling SCF, but the notification can be used in the SLPI (e.g. for charging purposes).

17.35.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.36 ConfirmedReportChargingInformation procedure

17.36.1 General description

The operation reports to a supporting SCF the outcome of the call in terms of charging information, the call being controlled by the controlling SCF and at the same time requests for confirmation. This is achieved by applying the MAKE CONFIRM syntax to ReportChargingInformation operation.

It may be a response to a previously issued "EstablishChargingRecord" operation or the first operation relating to the charge to the supporting SCF. In the latter case, the call-by-call charging related information exchange by EstablishChargingRecord operation is not necessary, because the charging rate, etc., is predefined and is properly applied to the call in the controlling SCF.

17.36.1.1 Parameters

- uniqueCallIdentity:
This parameter is used to indicate the identity of the call that has motivated the use of the operation. There is a one-to-one relationship between this identity, the identity of the service logic program instance that treats the call and the identity of the assisting service logic program instance. This information can be further used to address a specific logic program instance.
- remainingUserCredit:
This parameter contains the user's credit after the call. It is expressed in terms of telecommunication units.

- **callRecord:**
This parameter contains the call record related to the call. This information consists (at least) of call duration, calling party and called party number. It is network specific and defined by bilateral agreements between network operators.
- **accountNumber:**
This parameter provides the unique identification of the account to which the cost of the call is registered.
- **securityParameter:**
This is an optional parameter that conveys security related information.

17.36.2 Invoking entity (controlling SCF)

17.36.2.1 Normal procedure

SCF Precondition:

- 1) An "establishChargingRecord" operation has been received with the "expectedReport" parameter positioned to TRUE or it has been pre-arranged.
- 2) A call has taken place.
- 3) SCF FSM is in the "Assisted Mode" state.
- 4) SLP realizes the need to request for confirmation.

SCF Postcondition:

- SCF FSM moves to the state "Waiting for Response from Supporting SCF".

After a call has taken place and either if a "EstablishChargingRecord" operation has been sent by the supporting SCF with the "reportExpected" parameter set to TRUE, requesting the charging information to be reported, or if it has been pre-arranged, the controlling SCF sends a "confirmedReportChargingInformation" operation in order to report the outcome of the charging procedure that took place for the call and in order to request for further confirmation from the supporting SCF. It contains the call identity to know the call it refers to and the user credit after the call.

17.36.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.36.3 Responding entity (supporting SCF)

17.36.3.1 Normal procedure

SCF Precondition:

- 1) The SCF has sent an "establishChargingRecord" operation with the "reportExpected" parameter set to TRUE, or it has been pre-arranged.
- 2) SCF FSM is in the "Assisting Mode" state.

SCF Postcondition:

- 1) SCF FSM moves to "Preparing a Response to Controlling SCF".
- 2) A Return Result is sent for confirmation.

On receipt of the "confirmedChargingInformation" operation, the SCF uses the information to update the user's data and it could also report the information to the management functions for security and billing purposes.

17.36.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.37 Connect procedure

17.37.1 General description

This operation is used to request the SSF to perform the call processing actions to route a call to a specific destination. To do so, the SSF may use destination information from the calling party (e.g. dialled digits) and existing call setup information (e.g. route index to a list of trunk groups) depending on the information provided by the SCF.

In general all parameters which are provided in a Connect operation to the SSF shall replace the corresponding signalling parameter in the CCF, if the relevant parameter has already been received in the CCF, and shall be used for subsequent call processing. Parameters which are not provided by the Connect operation shall retain their value (if already assigned) in the CCF for subsequent call processing.

17.37.1.1 Parameters

- destinationRoutingAddress:
This parameter contains the list of called party numbers (see Recommendation Q.762) towards which the call is to be routed. The encoding of the parameter is defined in Recommendation Q.763. The "destinationRoutingAddress" may include the "correlationID" and "scfID" if used in the context of a hand-off procedure, but only if "correlationID" and "scfID" are not specified separately.
- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- correlationID:
This parameter is used by the SCF to associate the "AssistRequestInstructions" operation from the assisting SSF with the Request from the initiating SSF. The "correlationID" is used in the context of a hand-off procedure and only if the correlation id is not embedded in the "destinationRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- cutAndPaste:
This parameter is used by the SCF to instruct the SSF to delete (cut) a specified number of leading digits that it has received from the calling party and to paste the remaining dialled digits on to the end of the digits supplied by the SCF in the "destinationRoutingAddress".
- forwardingCondition:
Indicates the condition that must be met to complete the Connect operation.
- iSDNAccessRelatedInformation:
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.

- originalCalledPartyID:
See Q.762 Original Called Number signalling information. The use of this parameter in the context of the "Connect" operation is to be specified by the network operator.
- routeList:
This parameter is used to select the outgoing trunk group used for routing the call. A sequence of routes is provided to allow flexible routing for applications such as VPN without increasing the number of queries required for such applications.
- scfID:
See Recommendation Q.1290. The scfID is used in the context of a hand-off procedure and only if the SCF id is not embedded in the "destinationRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- travellingClassMark:
The SCF uses the travellingClassMark parameter to provide essential route selection information to the SSF. The SSF uses this information to populate the outgoing ISUP IAM message, the population and mapping of this parameter is network-operator specific.
- carrier:
See Recommendation Q.1290. In this message, the carrier selection field is null (00000000) and Carrier ID indicates the carrier to use for the call.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network-based services at the originating exchange and the destination exchange.
- callingPartyNumber:
This parameter, if present, is used to identify the calling party for the call (see Q.762 Calling Party Number). It may be used for applications such as UPT, where only the SCF can verify the identity of the calling party.
- callingPartysCategory:
See Q.762 Calling Party Category signalling information.
- redirectingPartyID:
This parameter, if present, indicates the last directory number the call was redirected from.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- displayInformation:
This parameter indicates a text string to be sent to the end user. This information cannot be received by a PSTN end-user.
- forwardCallIndicators:
This parameter 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.

- genericNumbers:
This parameter allows the SCF to modify the GenericNumber information received from the SSF, if any. Also, it allows the SCF to precise a Generic Number information to the SSF if the SSF has not previously done so.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- chargeNumber:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules for chargeNumber.
- legToBeCreated:
This parameter indicates the LegID to be assigned to the newly-created party. When not provided, a default LegID of 2 is assumed.
- callSegmentID:
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.37.2 Invoking entity (SCF)

17.37.2.1 Normal procedure

SCF Precondition:

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

SCF Postcondition:

- SLPI execution may continue.

In the SCSM FSM state "Preparing SSF Instructions", this operation is invoked by the SCF if the service logic results in the request to the SSF to route a call to a specific destination. If no event monitoring has been requested and no reports (CallInformationReport and ApplyChargingReport) have been requested in a previously sent operation, a SCSM FSM transition to state "Idle" occurs. Otherwise, if event monitoring has been requested or any report (CallInformationReport and ApplyChargingReport) has been requested, the SCSM FSM transitions to state "Waiting for Notification or Report". When the "Connect" operation is used in the context of a hand-off procedure, the SCSM FSM transitions to state "Idle". However, in this case, the SCF must maintain

sufficient information in order to correlate the subsequent "AssistRequestInstructions" operation (from the assisting SSF or SRF) to the existing SLPI.

17.37.2.2 Error handling

If reject or error messages are received, then the SCSM informs the SLPI and remains in the state "Preparing SSF Instructions".

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.37.3 Responding entity (SSF)

17.37.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The CS waits for instructions.
- 4) Only 1 BCSM instance may apply to the Call Segment (i.e. 1 or 2 party Call Segment).
- 5) In case of an O_BCSM, it shall be suspended at any DP before the O_Active PIC or O_MidCall, in case no passive leg exists.
- 6) In case of a T_BCSM, it shall be suspended at a DP before the T_Active PIC (call forwarding) or T_MidCall in case no controlling leg exists.

SSF Postcondition:

- 1) The SSF performs the call processing actions to route the call to the specified destination.
- 2) In the O-BCSM, when only address information is included in the Connect operation, call processing resumes at PIC Analyse_Information.
- 3) In the O-BCSM, when address information and routing information is included in the Connect operation, call processing resumes at PIC Select_Route.
- 4) In the T-BCSM, when the Connect operation is received with a DestinationRoutingAddress, then a new O_BCSM shall be created and chained to the T_BCSM. The T_BCSM shall pass the information available (e.g. new number to which the call is to be routed) to the O_BCSM. The call processing shall resume from the Select_Facility PIC in the T_BCSM and from the O_Null PIC in the O_BCSM.

On receipt of this operation in the SSF FSM state "Waiting for Instructions", the SSP performs the following actions:

- The SSF cancels T_{SSF}.
- If "cutAndPaste" is present, then the SSF deletes ("cut") from the dialled IN number the indicated number of digits and pastes the remaining dialled digits at the end of the "destinationRoutingAddress" parameter delivered by the SCF. The resulting directory number is used for routing to complete the related call.
- If "cutAndPaste" is not present, then the "destinationRoutingAddress" parameter delivered by the SCF is used for routing to complete the related call. Note that in the case of hand-off, this results in routing to an assisting SSP or IP.
- If the "callingPartyNumber" is supplied, this value may be used for all subsequent SSF processing.

- If no EDPs have been armed and neither a CallInformationReport nor an ApplyChargingReport has been requested, the FSM goes to state "Idle" (e9). Otherwise, the FSM goes to state "Monitoring" (e11).

No implicit activation or deactivation of DPs occurs.

Statistic counter(s) are not affected.

Connect completes when the INAP processing of the operation is complete and before the SSP starts the processing necessary to select a circuit.

Therefore in order to detect route select failure after a "Connect", it is necessary to explicitly arm the "Route Select Failure" EDP before sending the "Connect" (although they may be in the same message).

17.37.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.38 ConnectToResource procedure

17.38.1 General description

This operation is used to connect a call from the SSF to a specialised resource. After successful connection to the SRF, the interaction with the caller can take place. The SSF relays all operations for the SRF and all responses from the SRF.

17.38.1.1 Parameters

- resourceAddress:
This parameter identifies the physical location of the SRF.
 - iPRoutingAddress:
This parameter indicates the routing address to set up a connection towards the SRF.
 - legID:
This parameter indicates to which party in the call the subsequent interaction shall apply while maintaining the speech connection between that leg and any other legs connected to the same CS.
 - callSegmentID:
This parameter indicates to which call segment the subsequent user interaction shall apply, i.e. to all parties connected to the call segment.
 - iPAddressAndLegID:
This parameter indicates that both legID and iPRoutingAddress shall be used.
 - none:
This parameter indicates that the call party is to be connected to a predefined SRF in the initial CS.
 - iPAddressAndCallSegment:
This parameter indicates that both Call Segment ID and iPRoutingAddress shall be used.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCP to the SSP for control of the network-based services at the originating exchange and the destination exchange.

- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.

17.38.2 Invoking entity (SCF)

17.38.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The SLPI has determined that additional information from the call party is needed.
- 3) The FSM for CS is in the state "Routing to Resource", substate "Determine Mode".
- 4) The SLPI has determined that the SRF can be accessed from the SSF.

SCF Postcondition:

- 1) The SCSM sends out a "PlayAnnouncement", "PromptAndCollectUserInformation" or PromptAndReceiveMessage operation accompanying the "ConnectToResource".
- 2) The SCSM-FSM moves to the state "User Interaction".

17.38.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.38.3 Responding entity (SSF)

17.38.3.1 Normal procedure

SSF Precondition:

- 1) A control relationship has been established.
- 2) The FSM for CS is in the state "Waiting for Instructions". During monitoring state, it is possible to perform user interaction in order to send tones announcements or display information.

SSF Postcondition:

- 1) The call is switched to the SRF.
- 2) A control relationship to the SRF is established.
- 3) The FSM for the CS moves to the state "Waiting for End of User Interaction" If necessary, T_{SSF} is set.

NOTE 1 – Whether the T_{SSF} is used or not in this case is network operator dependent. But it must be synchronised with $T_{SCF-SSF}$ in the SCSM.

NOTE 2 – The successful connection to the SRF causes a state transition in the SRF FSM from "Idle" to "Connected".

17.38.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.39 Continue procedure

17.39.1 General description

This operation is used to request the SSF to proceed with call processing at the DP at which it previously suspended call processing to await SCF instructions. The SSF continues call processing without substituting new data from the SCF. This operation is only valid when used in a single call segment CSA and there are no more than 2 legs in the call segment.

17.39.1.1 Parameters

None.

17.39.2 Invoking entity (SCF)

17.39.2.1 Normal procedure

SCF Precondition:

- FSM for CS is in the state "Preparing CS instructions".

SCF Postcondition:

- FSM for CS is in the state "Waiting for Notification or Request", in case monitoring was required, or in the state "Idle", in case no monitoring was required.

The FSM for CS is in state "Preparing CS instructions". The "Continue" operation is invoked by a SLPI. This causes a SCSM transition to state "Idle" if no subsequent monitoring is required. However, if monitoring is required, like in the case of armed EDPs or outstanding report requests, the FSM for CS transitions to state "Waiting for Notification of Report".

17.39.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.39.3 Responding entity (SSF)

17.39.3.1 Normal procedure

SSF Precondition:

- 1) BCSM: Basic call processing has been suspended at any DP.
- 2) FSM for CS is in the state "Waiting for Instructions".

SSF Postcondition:

- 1) BCSM: Basic call processing continues.
- 2) FSM for CS is in the state "Monitoring", because at least one EDP was armed, or a "CallInformationReport" or "ApplyChargingReport" was requested; or
FSM for CS is in the state "Idle", because no EDPs were armed and neither the "CallInformationReport" nor the "ApplyChargingReport" was requested.

The SSF-FSM is in state "Waiting for instructions". The SSME-Control receives the "Continue" operation and relays it to the appropriate SSF-FSM. The SSF-FSM transitions to state "Idle" in case no EDPs are armed and no outstanding report requests are present. The SSF-FSM transits to state "Monitoring" if at least one EDP is armed, or if there is at least one outstanding report request. Basic call processing is resumed.

17.39.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.40 ContinueWithArgument procedure

17.40.1 General description

This operation is used to request the SSF to proceed with call processing at the DP at which it previously suspended call processing to await SCF instructions.. It is also used to provide additional service related information to a User (Called Party or Calling Party) whilst the call processing proceeds. This operation has to be sent for each BCSM instance in a CS for which call processing has been suspended.

17.40.1.1 Parameters

- legID:
This parameter indicates the party (Calling Party or Called Party) in the call who is interested in the additional service related information.
- alertingPattern:
This parameter indicates a specific pattern that is used to alert a subscriber (e.g. distinctive ringing, tones, etc.). It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- genericName:
This parameter indicates the Call Party Name to be displayed to the end-user.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.

17.40.2 Invoking entity (SCF)

17.40.2.1 Normal procedure

SCF Precondition:

- SCSM is in the state "Preparing SSF instructions".

SCF Postcondition:

- SCSM is in the state "Waiting for Notification or Request", in case monitoring was required, or in the state "Idle", in case no monitoring was required.

The SCSM is in state "Preparing SSF instructions". The "ContinueWithArgument" operation is invoked by a SLPI. This causes a SCSM transition to state "Idle" if no subsequent monitoring is

required. However, if monitoring is required, like in the case of armed EDPs or outstanding report requests, the SCSM transitions to state "Waiting for Notification of Report".

17.40.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.40.3 Responding entity (SSF)

17.40.3.1 Normal procedure

SSF Precondition:

- 1) BCSM: Basic call processing has been suspended at any DP.
- 2) SSF-FSM is in the state "Waiting for Instructions".

SSF Postcondition:

- 1) BCSM: Basic call processing continues.
- 2) SSF-FSM is in the state "Monitoring", because at least one EDP was armed, or a "CallInformationReport" or "ApplyChargingReport" was requested, or SSF-FSM is in the state "Idle", because no EDPs were armed and neither the "CallInformationReport" nor the "ApplyChargingReport" was requested.

When the SSF-FSM is in state "Waiting for instructions" and the SSME-Control receives the "ContinueWithArgument", it relays it to the appropriate SSF-FSM. The SSF-FSM transitions to state "Idle" in case no EDPs are armed and no outstanding report requests are present. The SSF-FSM transits to state "Monitoring" if at least one EDP is armed, or if at least one outstanding report request Basic call processing is resumed.

17.40.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.41 CoordinateShadowUpdate procedure

17.41.1 General description

The X.500 "shadowing" operations allow information to be copied between two SDFs. The shadowing operations are also used to maintain this copied information. For each shadowing agreement between a pair of SDFs, one SDF is designated as the supplier of copied information and the other SDF is the consumer.

The DSAShadowBind and DSAShadowUnbind operations are used by cooperating SDFs at the beginning and end of a particular period of providing copies. The coordinateShadowUpdate is used by a shadow supplier to indicate the shadowing agreement for which it intends to send updates. The requestShadowUpdate operation is used by the shadow consumer to request updates from the shadow supplier. The updateShadow operation is invoked by the shadow supplier to send copied data to the shadow consumer. This operation must be preceded first by either a coordinateShadowUpdate or a requestShadowUpdate operation. For a full description of the "shadowing" operations, see Recommendation X.525.

17.41.1.1 Parameters

For the coordinateShadowUpdate operation, see 11.1/X.525.

17.41.2 Supplier entity (SDF)

17.41.2.1 Normal procedure

17.41.2.1.1 CoordinateShadowUpdate sent by itself

SDF Precondition:

- SDSM-ShM: "SDF Bound".

SDF Postcondition:

- 1) SDSM-ShM: "Wait for Update" in case of success.
- 2) SDSM-ShM: "SDF Bound" in case of failure.

When the SDSM-ShM is in the state "SDF Bound" and a need of coordinating the shadow exists, an internal event occurs. This event, called (e16) Shadow_Coordinate_to_Consumer, causes a transition to the state "Wait for Coordination Result" and the operation is sent to the consumer SDF. The SDSM-ShM waits for the response from the consumer. The reception of the response [(E18) Shadow_Coordinate_Confirmed] to the "coordinateShadowUpdate" operation previously issued to the consumer SDF causes a transition to the state "Wait for Update" if the result of the "coordinateShadowUpdate" operation is positive. Otherwise the reception of an error [(E19) Coordinate_Failure] moves back the SDSM-ShM to the state "SDF Bound".

17.41.2.1.2 CoordinateShadowUpdate sent with DSAShadowBind

SDF Precondition:

- SDSM-ShM: "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ShM: "Wait for Update" in case of success.
- 2) SDSM-ShM: "SDF Bound" in case of failure.

When the SDSM-ShM is in the state " Wait for Subsequent Requests " and a need of coordinating the shadow exists, an internal event occurs. This event, called (e2) Shadow_Coordinate_to_Consumer, causes a transition to the state "Bind with Coordinate Shadow". The reception of the delimiter causes a transition to the state "Bind with CoordinateShadow Only" through the internal event (e5) Send_Bind_with_CoordShadow and the operations are sent to the consumer SDF. The SDSM-ShM then waits for the response from the consumer. The reception of the response (E7) SDF_Bind_Success to the previously issued "DSAShadowBind" causes a transition to the state "Wait for Coordination Result". The SDSM-ShM waits for the response from the consumer to the "coordinateShadowUpdate" operation previously issued to the consumer SDF. If the result of the "coordinateShadowUpdate" operation is positive, the event [(E18) Shadow_Coordinate_Confirmed] causes a transition to the state "Wait for Update". Otherwise the reception of an error [(E19) Coordinate_Failure] moves back the SDSM-ShM to the state "SDF Bound".

17.41.2.1.3 CoordinateShadowUpdate sent with DSAShadowBind and UpdateShadow

SDF Precondition:

- SDSM-ShM: " Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ShM: "Wait for Update Confirmation" in case of success.
- 2) SDSM-ShM: "SDF Bound" in case of failure.

When the SDSM-ShM is in the state "Wait for Subsequent Requests" and a need of coordinating the shadow exists, an internal event occurs. This event, called (e2) Shadow_Coordinate_to_Consumer, causes a transition to the state "Bind with Coordinate Shadow". The subsequent reception of an "UpdateShadow" operation through the internal event (e4) Update_to_Consumer causes a transition to the state "Bind with CoordinateShadow and Update" and the operations are sent to the consumer SDF. The SDSM-ShM then waits for the response from the consumer. The reception of the response (E9) SDF_Bind_Success to the previously issued "DSAShadowBind" causes a transition to the state "Bound with Coordinate Shadow Sent". The SDSM-ShM waits for the response from the consumer to the "coordinateShadowUpdate" operation previously issued to the consumer SDF. If the result of the "coordinateShadowUpdate" operation is positive, the event [(E10) Shadow_Coordinate_Confirmed] causes a transition to the state "Wait for Update Confirmation". Otherwise the reception of an error [(E11) Coordinate_Failure] moves back the SDSM-ShM to the state "SDF Bound".

17.41.2.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in clause 18.1.

17.41.3 Consumer entity (SDF)

17.41.3.1 Normal procedure

17.41.3.1.1 CoordinateShadowUpdate received by itself

SDF Precondition:

- SDSM-ShC: "SDF Bound".

SDF Postcondition:

- 1) SDSM-ShC: "Wait for Update" in case of success.
- 2) SDSM-ShC: "SDF Bound" in case of failure.

The SDF is initially in the state "SDF Bound". After accepting the external event (E7) Shadow_Coordinate_from_Supplier caused by the reception of a "coordinateShadowUpdate" operation from the supplier SDF, a transition to the state "Wait for Coordination Result" occurs. The SDF performs the "coordinateShadowUpdate" operation according to the contents of the "coordinateShadowUpdate" argument. Once the SDF has completed the "coordinateShadowUpdate" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "SDF Bound" if the coordinateShadowUpdate fails, or it returns to the state "Wait for Update" if the coordinateShadowUpdate is successful.

17.41.3.1.2 CoordinateShadowUpdate received with DSAShadowBind or DSAShadowBind and UpdateShadow

SDF Precondition:

- SDSM-ShC: "Wait for Bind Result".

SDF Postcondition:

- 1) SDSM-ShC: "Wait for Update" in case of success.
- 2) SDSM-ShC: "SDF Bound" in case of failure.

The SDF is initially in the state "Wait for Bind Result" waiting for other operations to be received than the "DSAShadowBind" operation. When receiving the "CoordinateShadowUpdate" operation, a transition to the same state occurs through the external event (E3) Request_from_Supplier. If the

"UpdateShadow" operation is also received, the same transition occurs. The SDF performs the "DSAShadowBind" operation and a transition to the state "SDF Bound" occurs through the internal event (e5) SDF_Bind_Success. Since the "CoordinateShadowUpdate" operation has already been received, a transition to the state "Wait for Coordination Result" occurs through the external event (E7) Shadow_Coordinate_from_Supplier. Then, the SDF performs the "CoordinateShadowUpdate" operation according to the contents of the "CoordinateShadowUpdate" argument. Once the SDF has completed the "CoordinateShadowUpdate" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "SDF Bound" if the "CoordinateShadowUpdate" fails, or it returns to the state "Wait for Update" if the "CoordinateShadowUpdate" is successful.

17.41.3.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in clause 18.1.

17.42 CreateCallSegmentAssociation procedure

17.42.1 General description

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

17.42.1.1 Parameters

Result Parameters:

- newCallSegmentAssociation:
This parameter specifies the new CSAID.

17.42.2 Invoking entity (SCF)

17.42.2.1 Normal procedure

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.

17.42.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.42.3 Responding entity (SSF)

17.42.3.1 Normal procedure

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.
- 3) A Return Result is sent to report the new CSAID to the SCF.

17.43 in-directoryBind procedure

17.43.1 General description

The X.500 'directoryBind' operation is used by the SCF to create an authenticated association between an SCF and an SDF on behalf of the end user. It carries the authentication information of the end user if any. For a full description of the directoryBind operation, see 8.1/X.511.

17.43.1.1 Parameters

See 8.1.2/X.511 and 8.1.3/X.511.

17.43.2 Invoking entity (SCF)

17.43.2.1 Normal procedure

SCF Precondition:

- SCSM-SDF: "Idle".

SCF Postcondition:

- 1) SCSM-SDF: "SDF Bound" in case of success.
- 2) SCSM-SDF: "Idle" in case of failure.

When the SCSM-SDF is in the state "Idle" and a need of the service logic to interrogate an SDF exists, an internal event occurs. This event, called (e1) Bind_Request, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. Until the application process has not indicated by a delimiter that the Bind should be sent, the SCSM-SDF remains in the state "Wait for Subsequent Requests" and the operation is not sent. The reception of the delimiter causes a transition to the state "Wait for Bind result" through the internal transition (e3) Request_to_SDF_with_Bind. The operation is sent to the SDF. The SCSM-SDF waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" if the result of the Bind operation is positive. Otherwise the reception of an error [(E4) Bind_Error] moves back the SCSM-SDF to the state "Idle".

17.43.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and 8.1.4/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.43.3 Responding entity (SDF)

17.43.3.1 Normal procedure

SDF Precondition:

- SDSM-SCF: "Idle".

SDF Postcondition:

- 1) SDSM-SCF: "SCF Bound" (success).
- 2) SDSM-SCF: "Idle" (failure).

The SDSM-SCF is initially in the state "Idle". After accepting the external event (E1) Bind_from_SCF caused by the reception of a 'directoryBind' operation from the SCF, a transition to state "Bind Pending" occurs. The SDF performs the Bind operation according to the contents of the directoryBind argument. Once the SDF has completed the 'directoryBind' operation, the result or error indication is returned to the SCF. The SDF returns to the state "Idle" if the Bind fails or to the state "SCF Bound" if the Bind is successful. Should the Bind request succeed, the result returned may consist of credentials of the DirectoryBindResult. These credentials allow the user to establish the identity of the Directory. They allow information identifying the DSA (that is directly providing the Directory service) to be conveyed to the DUA. The credentials are of the same form as those supplied by the user.

17.43.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and 8.1.4/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.44 DirectoryUnbind procedure

17.44.1 General description

The X.500 "Unbind" operation is used by the SDF to end an authenticated association between an SCF and an SDF on behalf of the end user. For a full description of the Unbind operation, see 8.2/X.511.

17.44.1.1 Parameters

None.

17.44.2 Invoking entity (SCF)

17.44.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound".

SCF Postcondition:

- SCSM: "Idle".

The SCSM has previously initiated a successful Bind operation to the SDF directory. It is in state "SDF Bound". The service logic determines that the authenticated access to the SDF is to be terminated. It issues an Unbind operation [(e8) Unbind_request] that causes the SCSM to transit back to the state "Idle".

17.44.2.2 Error handling

The "Unbind" operation does not have operation related errors.

17.44.3 Responding entity (SDF)

17.44.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound".

SDF Postcondition:

- SDSM: "Idle".

A Bind operation was previously issued and the SDSM is in State "SCF Bound" waiting for a request from the SCF and/or performing an operation. The reception of the Unbind operation causes a transition to State "Idle" with the transition (E5) Unbind_from_SCF.

17.44.3.2 Error handling

The "Unbind" operation does not have operation related errors.

17.45 DisconnectForwardConnection procedure

17.45.1 General description

This operation is used in the following two cases:

- 1) To clear a connection to a SRF:

This operation is used to explicitly disconnect a connection to a resource (SRF) established previously with a "ConnectToResource" or an "EstablishTemporaryConnection" operation. It is used for a forward disconnection from the SSF. An alternative solution is the backward disconnect from the SRF, controlled by the "DisconnectFromIPForbidden" parameter in the "PlayAnnouncement" and "PromptAndCollectUserInformation" operations.

- 2) To clear a connection to an assisting SSF:

This operation is sent to the non-assisting SSF of a pair of SSFs involved in an assist procedure. It is used to disconnect the temporary connection between the initiating SSF and the assisting SSF, and the assisting SSF and its associated SRF.

This operation is only valid when used in a single call segment CSA and there are no more than 2 legs in the call segment.

17.45.1.1 Parameters

None.

17.45.2 Invoking entity (SCF)

17.45.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An assist- or a relay-procedure is in progress.
- 3) An SLPI has determined that a "DisconnectForwardConnection" operation has to be sent by the SCF.

SCF Postcondition:

- SLPI execution may continue.

The "DisconnectForwardConnection" operation is used to instruct the SSF to disconnect the concerned forward connection to the assisting SSF or the physical entity containing the SRF.

In the SCSM FSM state "User Interaction", substate "Waiting for Response from the SRF", this operation is invoked by the SCF when the service logic determines that user interaction is finished and requests the SSF to disconnect the temporary connection to the assisting SSF or the SRF. The SCSM FSM then transitions to state "Preparing SSF Instructions".

17.45.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.45.3 Responding entity (SSF)

17.45.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The FSM for CS in the initiating SSF is in the state "Waiting for End of User Interaction" or "Waiting for End of Temporary Connection".

SSF Postcondition:

- 1) The connection to the SRF or assisting SSF is released.
- 2) The CS is waiting for instructions.

The receipt of "DisconnectForwardConnection" results in disconnecting the assisting SSF or the physical entity containing the SRF from the concerned call. It does not release the connection from the SSF back to the end user.

This operation is accepted in the SSF FSM states "Waiting for End of Temporary Connection" or "Waiting for End of User Interaction". On receipt of this operation in these states, the SSF must perform the following actions:

- The initiating SSF releases the connection to the assisting SSF or the relay SRF.
- The SSF resets T_{SSF} .
- The SSF FSM goes to state "Waiting for Instructions" (e8).

NOTE – The successful disconnection to the SRF causes a state transition in the SRF FSM to "Idle". A current order ("PlayAnnouncement" or "PromptAndCollectUserInformation") is cancelled and any queued order ("PlayAnnouncement" or "PromptAndCollectUserInformation") is discarded.

17.45.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.46 DisconnectForwardConnectionWithArgument procedure

17.46.1 General description

This operation is used in the following two cases:

- 1) To clear a connection to a SRF:
This operation is used to explicitly disconnect a connection to a resource (SRF) established previously with a "ConnectToResource" or an "EstablishTemporaryConnection" operation. It is used for a forward disconnection from the SSF. An alternative solution is the backward disconnect from the SRF, controlled by the "DisconnectFromIPForbidden" parameter in the "PlayAnnouncement" and "PromptAndCollectUserInformation" operations.
- 2) To clear a connection to an assisting SSF:
This operation is sent to the non-assisting SSF of a pair of SSFs involved in an assist procedure. It is used to disconnect the temporary connection between the initiating SSF and the assisting SSF, and the assisting SSF and its associated SRF.

17.46.1.1 Parameters

- partyToDisconnect:
 - legID:
This parameter indicates to which party in the call the resource is currently connected.
 - callSegmentID:
This parameter indicates to which call segment the resource is currently connected.

17.46.2 Invoking entity (SCF)

17.46.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An assist- or a relay-procedure is in progress.
- 3) An SLPI has determined that a "DisconnectForwardConnection" operation has to be sent by the SCF.

SCF Postcondition:

- SLPI execution may continue.

The "DisconnectForwardConnection" operation is used to instruct the SSF to disconnect the concerned forward connection to the assisting SSF or the physical entity containing the SRF.

In the SCSM FSM state "User Interaction", sub-state "Waiting for Response from the SRF", this operation is invoked by the SCF when the service logic determines that user interaction is finished and requests the SSF to disconnect the temporary connection to the assisting SSF or the SRF. The SCSM FSM then transitions to state "Preparing SSF Instructions".

17.46.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.46.3 Responding entity (SSF)

17.46.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The FSM for CS in the initiating SSF is in the state "Waiting for End of User Interaction" or "Waiting for End of Temporary Connection".

SSF Postcondition:

- 1) The connection to the SRF or assisting SSF is released.
- 2) The CS is waiting for instructions.

The receipt of "DisconnectForwardConnection" results in disconnecting the assisting SSF or the physical entity containing the SRF from the concerned call. It does not release the connection from the SSF back to the end user.

This operation is accepted in the SSF FSM states "Waiting for End of Temporary Connection" or "Waiting for End of User Interaction". On receipt of this operation in these states, the SSF must perform the following actions:

- The initiating SSF releases the connection to the assisting SSF or the relay SRF.
- The SSF resets T_{SSF} .
- The SSF FSM goes to state "Waiting for Instructions" (e8).

NOTE – The successful disconnection to the SRF causes a state transition in the SRF FSM to "Idle". A current order ("PlayAnnouncement" or "PromptAndCollectUserInformation") is cancelled and any queued order ("PlayAnnouncement" or "PromptAndCollectUserInformation") is discarded.

17.46.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.47 DisconnectLeg procedure

17.47.1 General description

This operation is used to request the SSF to release a specific leg associated with the call at any phase of the call and to retain any other leg not specified in the DisconnectLeg operation.

17.47.1.1 Parameters

- legToBeReleased:
This parameter indicates the party in the call to be released. See Q.1290 "LegID".
- releaseCause:
See Recommendation Q.850. This parameter 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.

17.47.2 Invoking entity (SCF)

17.47.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined that a call party shall be released.

SCF Postcondition:

- SLPI execution may continue. The FSM for CSA transits to "idle" on receiving the last pending report (if any), if the released leg was the last leg within the Call Segment Association.

17.47.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.47.3 Responding entity (SSF)

17.47.3.1 Normal procedure

SSF Precondition:

- 1) 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 Present_Call in case of a T_BCSM.

SSF Postcondition:

- 1) The SSF performs the call processing actions to release the indicated party.
- 2) Any outstanding EDPs on that leg are disarmed, any pending reports will be sent. If the leg is a controlling leg, the leg status becomes "surrogate" in all the CS of the CSA.
- 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.
- 5) The FSM for the involved Call Segment will move to the "Waiting for instructions" state. The remaining BCSM instances within the Call Segment will move to the O_/T_MidCall DP. Note that no MidCall EDP will be reported for this case.
- 6) A Return Result is sent immediately after the successful change of the leg configuration is executed, this allows the SCF to be updated with the established connection view and to cater for possible interference problems with signalling events.

17.47.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.48 dSABind procedure

17.48.1 General description

The X.500 'dSABind' operation is used by the invoking SDF to create an authenticated association between an invoking SDF and a responding SDF to enable distributed processing of operations on behalf of the end user. It carries the authentication information of the end user if any. For a full description of the dSABind operation, see 11.1/X.518. A full description of distributed operation procedures can be found in Recommendation X.518.

17.48.1.1 Parameters

See 11.1/X.518.

17.48.2 Invoking entity (SDF)

17.48.2.1 Normal procedure

SDF Precondition:

- 1) A request for data access operation from an end user has arrived which needs to be 'chained' to a remote SDF for processing and no chaining association exists between the SDFs for the originating end user.
- 2) SDSM-ChI: "Idle".

SDF Postcondition:

- 1) SDSM-ChI: "SDF Bound" in case of success.
- 2) SDSM-ChI: "Idle" in case of failure.
- 3) A chaining association exists between the invoking SDF and the responding SDF for the end user.

When the SCSM-ChI is in the state "Idle" and a need of the service logic to interrogate an SDF exists, an internal event occurs. This event, called (e1) DSABind_to_SDF, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. Until the application process has not indicated by a delimiter that the Bind should be sent, the SCSM-ChI remains in the state "Wait for Subsequent Requests" and the operation is not sent. The reception of the delimiter causes a transition to the state "Wait for Bind result" through the internal transition (e3) Send_Bind_with_Requests. The operation is sent to the responding SDF. The SCSM-SDF waits for the response from the responding SDF. The reception of the response [(E5) DSABind_Successful] to the Bind operation previously issued to the responding SDF causes a transition of the invoking SDF to the state "SDF Bound" if the result of the Bind operation is positive. Otherwise the reception of an error [(E4) DSABind_Error] moves back the SCSM-SDF to the state "Idle".

17.48.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.48.3 Responding entity (SDF)

17.48.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "Idle".

SDF Postcondition:

- 1) SDSM- ChT: "SCF Bound" (success).
- 2) SDSM- ChT: "Idle" (failure).

The SDSM-ChT is initially in the state "Idle". After accepting the external event (E1) DSABind_from_SDF caused by the reception of a 'dSABind' operation from the invoking SDF, a transition to state "Bind Pending" occurs. The responding SDF performs the Bind operation according to the contents of the dSABind argument. Once the responding SDF has completed the 'dSABind' operation, the result or error indication is returned to the invoking SDF. The responding SDF returns to the state "Idle" if the Bind fails or to the state "SDF Bound" if the Bind is successful. Should the Bind request succeed, the result returned may consist of credentials of the dSABindResult. These credentials allow the user to establish the identity of the Directory. They allow information identifying the responding SDF (that is directly providing the Directory service) to be conveyed to the invoking SDF. The credentials are of the same form as those supplied by the user.

17.48.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16 and clause 13/X.518, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.49 DSAShadowBind procedure

17.49.1 General description

The X.500 "shadowing" operations allow information to be copied between two SDFs. The shadowing operations are also used to maintain this copied information. For each shadowing agreement between a pair of SDFs, one SDF is designated as the supplier of copied information and the other SDF is the consumer.

The DSAShadowBind and DSAShadowUnbind operations are used by cooperating SDFs at the beginning and end of a particular period of providing copies. The coordinateShadowUpdate is used by a shadow supplier to indicate the shadowing agreement for which it intends to send updates. The

requestShadowUpdate operation is used by the shadow consumer to request updates from the shadow supplier. The updateShadow operation is invoked by the shadow supplier to send copied data to the shadow consumer. This operation must be preceded first by either a coordinateShadowUpdate or a requestShadowUpdate operation. For a full description of the "shadowing" operations, see Recommendation X.525.

17.49.1.1 Parameters

The parameters for the DSAShadowBind operation are the same as those for the in-DirectoryBind operation specified in this Recommendation.

17.49.2 Supplier entity (SDF)

17.49.2.1 Normal procedure

17.49.2.1.1 Supplier-initiated DSAShadowBind

17.49.2.1.1.1 DSAShadowBind sent by itself

SDF Precondition:

- SDSM-ShM: "Idle".

SDF Postcondition:

- 1) SDSM-ShM: "SDF Bound " in case of success.
- 2) SDSM-ShM: "Idle" in case of failure.

When the SDSM-ShM is in the state "Idle" and a need of providing copies exists, an internal event occurs. This event, called (e1) Bind_to_Consumer, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. The sending of the DSAShadowBind is delayed, to allow these subsequent operations to be sent at the same time as the DSAShadowBind. Until the application process has indicated by a delimiter that the DSAShadowBind should be sent, the SDSM-ShM remains in the state "Wait for Subsequent Requests" and the operation is not sent. The reception of the delimiter causes a transition to the state "Wait for Bind Result" through the internal event (e3) Send_Bind. The operation is then sent to another SDF (consumer SDF). The SDSM-ShM waits for the response from the consumer SDF. The reception of the response [(E14)SDF_Bind_Success] to the "DSAShadowBind" operation previously issued to the consumer SDF causes a transition to the state "SDF Bound" if the result of the "DSAShadowBind" operation is positive. Otherwise the reception of an error [(E13)SDF_Bind_Error] moves back the SDSM-ShM to the state "Idle".

17.49.2.1.1.2 DSAShadowBind sent with CoordinateShadowUpdate

SDF Precondition:

- SDSM-ShM: "Idle".

SDF Postcondition:

- 1) SDSM-ShM: "Wait For Coordination Result" in case of success.
- 2) SDSM-ShM: "Idle" in case of failure.

When the SDSM-ShM is in the state "Idle" and a need of providing copies exists, an internal event occurs. This event, called (e1) Bind_to_Consumer, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. The sending of the DSAShadowBind is delayed, to allow subsequent operations to be sent at the same time as the DSAShadowBind. The reception of a CoordinateShadowUpdate operation in the "Wait for Subsequent Requests" state

through the internal event (e2) Shadow_Coordinate_to_Consumer, causes a transition to the state "Bind with Coordinate Shadow".

The reception of the delimiter in the "Bind with Coordinate Shadow" state causes a transition to the state "Bind with CoordinateShadow Only" through the internal event (e5) Send_Bind_with_CoordShadow. This causes the two operations to be sent simultaneously to another SDF (consumer SDF). The SDSM-ShM waits for the response from the consumer SDF. The reception of the response [(E7)SDF_Bind_Success] to the "DSAShadowBind" operation previously issued to the consumer SDF causes a transition to the state "Wait for Coordination Result" if the result of the "DSAShadowBind" operation is positive. Otherwise the reception of an error [(E6)SDF_Bind_Error] moves back the SDSM-ShM to the state "Idle".

17.49.2.1.1.3 DSAShadowBind sent with CoordinateShadowUpdate and UpdateShadow

SDF Precondition:

- SDSM-ShM: "Idle".

SDF Postcondition:

- 1) SDSM-ShM: "Bound with CoordinateShadow Sent" in case of success.
- 2) SDSM-ShM: "Idle" in case of failure.

When the SDSM-ShM is in the state "Idle" and a need of providing copies exists, an internal event occurs. This event, called (e1) Bind_to_Consumer, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. The sending of the DSAShadowBind is delayed, to allow subsequent operations to be sent at the same time as the DSAShadowBind. The reception of a CoordinateShadowUpdate operation in the "Wait for Subsequent Requests" state through the internal event (e2) Shadow_Coordinate_to_Consumer, causes a transition to the state "Bind with Coordinate Shadow".

The subsequent reception of an "UpdateShadow" operation through the internal event (e4) Update_to_Consumer causes a transition to the state "Bind with CoordinateShadow and Update". This causes the three operations to be sent simultaneously to another SDF (consumer SDF). The SDSM-ShM waits for the response from the consumer SDF. The reception of the response [(E9) SDF_Bind_Success] to the "DSAShadowBind" operation previously issued to the consumer SDF causes a transition to the state "Bound with Coordinate Shadow Sent" if the result of the "DSAShadowBind" operation is positive. Otherwise the reception of an error [(E8)SDF_Bind_Error] moves back the SDSM-ShM to the state "Idle".

17.49.2.1.2 Consumer-initiated DSAShadowBind

SDF Precondition:

- SDSM-ShM: "Idle".

SDF Postcondition:

- 1) SDSM-ShM: "SDF Bound " in case of success.
- 2) SDSM-ShM: "Idle" in case of failure.

The SDF is initially in the state "Idle". After accepting the external event (E1) Bind_from_Consumer caused by the reception of a "DSAShadowBind" operation from the SDF (consumer SDF), a transition to the state "Wait for Bind Result" occurs. The DSAShadowBind operation may be received at the same time as the RequestShadowUpdate operation. In this case, a transition to the same state through the external event (E3) Request_from_Consumer occurs. The SDF performs the "DSAShadowBind" operation according to the contents of the "DSAShadowBind" argument. Once the SDF has completed the "DSAShadowBind" operation, the result or error indication is returned to

the consumer SDF. The SDF returns to the state "Idle" if the "DSAShadowBind" fails or to the state "SDF Bound" if the "DSAShadowBind" is successful.

17.49.2.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in 18.1.

17.49.3 Consumer entity (SDF)

17.49.3.1 Normal procedure

17.49.3.1.1 Supplier-initiated DSAShadowBind

SDF Precondition:

- SDSM-ShC: "Idle".

SDF Postcondition:

- 1) SDSM-ShC: "SDF Bound" in case of success.
- 2) SDSM-ShC: "Idle" in case of failure.

The SDF is initially in the state "Idle". After accepting the external event (E1) Bind_from_Supplier caused by the reception of a "DSAShadowBind" operation from the SDF (supplier SDF), a transition to the state "Wait for Bind Result" occurs. The DSAShadowBind operation may be received at the same time as the CoordinateShadowUpdate operation or the CoordinateShadowUpdate and the UpdateShadow operations. In these cases, a transition to the same state through the external event (E3) Request_from_Supplier occurs once or twice. The SDF performs the "DSAShadowBind" operation according to the contents of the "DSAShadowBind" argument. Once the SDF has completed the "DSAShadowBind" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "Idle" if the "DSAShadowBind" fails or to the state "SDF Bound" if the "DSAShadowBind" is successful.

17.49.3.1.2 Consumer-initiated DSAShadowBind

17.49.3.1.2.1 DSAShadowBind sent by itself

SDF Precondition:

- SDSM-ShC: "Idle".

SDF Postcondition:

- 1) SDSM-ShC: "SDF Bound" in case of success.
- 2) SDSM-ShC: "Idle" in case of failure.

When the SDSM-ShC is in the state "Idle" and a need of requesting updates exists, an internal event occurs. This event, called (e1) Bind_to_Supplier, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. The sending of the DSAShadowBind is delayed, to allow these subsequent operations to be sent at the same time as the DSAShadowBind. Until the application process has indicated by a delimiter that the DSAShadowBind should be sent, the SDSM-ShC remains in the state "Wait for Subsequent Requests" and the operation is not sent. The reception of the delimiter causes a transition to the state "Wait for Bind Result" through the internal event (e3) Send_Bind. The operation is then sent to another SDF (supplier SDF). The SDSM-ShC waits for the response from the supplier SDF. The reception of the response [(E7)SDF_Bind_Success] to the "DSAShadowBind" operation previously issued to the supplier SDF causes a transition to the state "SDF Bound" if the result of the "DSAShadowBind" operation is

positive. Otherwise the reception of an error [(E6)SDF_Bind_Error) moves back the SDSM-ShC to the state "Idle".

17.49.3.1.2.2 DSAShadowBind sent with RequestShadowUpdate

SDF Precondition:

- SDSM-ShC: "Idle".

SDF Postcondition:

- 1) SDSM-ShC: "Wait for RequestShadow Result" in case of success.
- 2) SDSM-ShC: "Idle" in case of failure.

When the SDSM-ShC is in the state "Idle" and a need of requesting updates exists, an internal event occurs. This event, called (e1) Bind_to_Supplier, causes a transition to the state "Wait for Subsequent Requests" and other operations are awaited. The sending of the DSAShadowBind is delayed, to allow these subsequent operations to be sent at the same time as the DSAShadowBind. The reception of the RequestShadowUpdate in the "Wait for Subsequent Requests" state through the internal event (e2) Request_to_Supplier, causes a transition to the state "Bind with RequestShadow". The two operations are then sent to another SDF (supplier SDF). The SDSM-ShC waits for the response from the supplier SDF. The reception of the response [(E5)SDF_Bind_Success] to the "DSAShadowBind" operation previously issued to the supplier SDF causes a transition to the state "Wait for RequestShadow Result" if the result of the "DSAShadowBind" operation is positive. Otherwise the reception of an error [(E4)SDF_Bind_Error] moves back the SDSM-ShC to the state "Idle".

17.49.3.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in 18.1.

17.50 in-DSAShadowUnbind procedure

17.50.1 General description

The X.500 "shadowing" operations allow information to be copied between two SDFs. The shadowing operations are also used to maintain this copied information. For each shadowing agreement between a pair of SDFs, one SDF is designated as the supplier of copied information and the other SDF is the consumer.

The DSAShadowBind and DSAShadowUnbind operations are used by cooperating SDFs at the beginning and end of a particular period of providing copies. The coordinateShadowUpdate is used by a shadow supplier to indicate the shadowing agreement for which it intends to send updates. The requestShadowUpdate operation is used by the shadow consumer to request updates from the shadow supplier. The updateShadow operation is invoked by the shadow supplier to send copied data to the shadow consumer. This operation must be preceded first by either a coordinateShadowUpdate or a requestShadowUpdate operation. For a full description of the "shadowing" operations, see Recommendation X.525.

17.50.1.1 Parameters

None.

17.50.2 Supplier entity (SDF)

17.50.2.1 Normal procedure

17.50.2.1.1 Supplier-initiated DSAShadowUnbind

SDF Precondition:

- 1) SDSM-ShM: "SDF Bound".
- 2) SDSM-ShM: "Bound with CoordinateShadow Sent".
- 3) SDSM-ShM: "Wait for Coordination Result".
- 4) SDSM-ShM: "Wait for Update".
- 5) SDSM-ShM: "Wait for Update Confirmation".

SDF Postcondition:

- SDSM-ShM: "Idle".

The SDSM-ShM has previously initiated a successful "DSAShadowBind" operation to the consumer SDF. It is in either of the states "SDF Bound", "Bound with CoordinateShadow Sent", "Wait for Coordination Result", "Wait for Update", or "Wait for Update Confirmation". It determines that the "authenticated association" established between two SDFs is to be terminated (e.g. during a user's release procedure) and issues a "DSAShadowUnbind" operation [(e12), (e15), (e17), (e20) or (e22) SDF_Unbind] that causes the SDSM-ShM to transit back to the state "Idle".

17.50.2.1.2 Consumer-initiated DSAShadowUnbind

SDF Precondition:

- 1) SDSM-ShM: "SDF Bound".
- 2) SDSM-ShM: "Wait for RequestShadow Result".
- 3) SDSM-ShM: "Wait for Update".
- 4) SDSM-ShM: "Wait for Update Confirmation".

SDF Postcondition:

- SDSM-ShM: "Idle".

A "DSAShadowBind" operation has previously been issued and the SDSM-ShM is in either of the states "SDF Bound", "Wait for RequestShadow Result", "Wait for Update", or "Wait for Update Confirmation" waiting for a request/response from the consumer SDF or performing an operation. The reception of the "DSAShadowUnbind" operation causes a transition to the state "Idle" with the transition SDF_Unbind [(E6), (E8), (E12), or (E15)].

17.50.2.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operating errors are described in 18.1.

17.50.3 Consumer entity (SDF)

17.50.3.1 Normal procedure

17.50.3.1.1 Supplier-initiated DSAShadowUnbind

SDF Precondition:

- 1) SDSM-ShC: "SDF Bound".
- 2) SDSM-ShC: "Wait for Coordination Result".

- 3) SDSM-ShC: "Wait for Update".
- 4) SDSM-ShC: "Wait for Update Confirmation".

SDF Postcondition:

- SDSM-ShC: "Idle".

A "DSAShadowBind" operation has previously been issued and the SDSM-ShC is in either of the states "SDF Bound", "Wait for Coordination Result", "Wait for Update", or "Wait for Update Confirmation" waiting for a request from the supplier SDF or performing an operation. The reception of the "DSAShadowUnbind" operation causes a transition to the state "Idle" with the transition SDF_Unbind [(E6), (E9), (E12), or (E14)].

17.50.3.1.2 Consumer-initiated DSAShadowUnbind

SDF Precondition:

- 1) SDSM-ShC: "SDF Bound".
- 2) SDSM-ShC: "Wait for RequestShadow Result".
- 3) SDSM-ShC: "Wait for Update".
- 4) SDSM-ShC: "Wait for Update Confirmation".

SDF Postcondition:

- SDSM-ShC: "Idle".

The SDSM-ShC has previously initiated a successful "DSAShadowBind" operation to the supplier SDF. It is in either of the states "SDF Bound", "Wait for RequestShadow Result", "Wait for Update", or "Wait for Update Confirmation". It determines that the "authenticated association" established between two SDFs is to be terminated (e.g. during a user's release procedure) and issues a "DSAShadowUnbind" operation [(e8), (e10), (e13), or (e15) SDF_Unbind] that causes the SDSM-ShC to transit back to the state "Idle".

17.51 EntityReleased procedure

17.51.1 General description

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.

17.51.1.1 Parameters

- CSFailure:
 - Indicates that a CS was released.
 - callSegmentID:
 - 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.
- BCSMFailure:
 - 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.

17.51.2 Invoking entity (SSF)

17.51.2.1 Normal procedure

SSF Precondition:

- Any state except idle.

SSF Postcondition:

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

17.51.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.51.3 Responding entity (SCF)

17.51.3.1 Normal procedure

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.

17.51.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.52 EstablishChargingRecord procedure

17.52.1 General description

This operation is used by the supporting SCF to give charging information to another SCF controlling a call, so that it can charge the user (on-line charging included). The sent information is used to parameterize a charging function. This charging function is generic and can be used to charge any kind of calls. (This option might not be used if the needed charging information has been pre-arranged).

17.52.1.1 Parameters

- userCredit:
This parameter contains the user's credit. It is expressed in terms of telecommunication units.
- chargingParameters:
This parameter contains the different parameters that are used to parameterize the generic charging function.
- reportExpected:
This parameter contains a boolean indicating if the charging information should be passed back to the supporting SCF at the end of the call.
- securityParameter:
This is an optional parameter that conveys security related.

17.52.2 Invoking entity (supporting SCF)

17.52.2.1 Normal procedure

SCF Precondition:

- 1) "handlingInformationRequest" operation has been received.
- 2) The need for providing the controlling SCF with charging information has been identified by the SLPI.
- 3) The SCF FSM is in the "Assisting mode" state.

SCF Postcondition:

- The SCF waits for the result of the "establishChargingRecord" operation or none.

Before sending the "establishChargingRecord" operation, the SCF has received a "handlingInformationRequest" operation containing information about the call, the controlling network and the user. According to the agreementID contained in the received SCFBind operation, the supporting SCF knows if it (or the controlling SCF) can perform the charging of the call. When charging is delegated to the controlling SCF, the supporting SCF has to send the parameters of the charging function, unless all the needed charging information has been pre-arranged. The supporting SCF then sends the "establishChargingInformation" operation containing either the charging parameters or the remaining user credit.

Once the operation has been sent, depending on the contents of the "expectedReport" parameter, the SCF waits for a reply (either a "confirmedReportChargingInformation" or "reportChargingInformation" operation).

17.52.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.52.3 Responding entity (controlling SCF)

17.52.3.1 Normal procedure

SCF Precondition:

- 1) A relationship between two SCFs has been established. A "handlingInformationRequest" operation has been sent.
- 2) The SCF FSM is in the "Assisted Mode" state.

SCF Postcondition:

- 1) The SCSM is able to charge the call. The charging function is parameterised and ready to be used.
- 2) The SCF FSM remains in the same state.

On receipt of the "establishChargingInformation" operation, the charging function is parameterised. Depending on the type of call and the invoked services, the SCF decides where charging can take place (i.e. in which functional entity), but charging will be done according to the charging function.

Depending on the value of the "expectedReport" parameter, the SCF is ready to send the reply or not (the type of reply is determined autonomously by the SLPI in the controlling SCF, i.e. a "reportChargingInformation" operation or a "confirmedChargingInformation" operation if further confirmation from the supporting SCF is expected) to the supporting SCF.

17.52.3.2 Error handling

If the controlling SCF receives an establishChargingInformation operation without the "chargingParameter" and without the "userCredit" parameter, it replies with a "missingParameter". Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.53 EstablishTemporaryConnection procedure

17.53.1 General description

This operation 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 a SSF and a SRF, for the case where the SRF exists in a separately addressable physical entity.

17.53.1.1 Parameters

- assistingSSPIPRoutingAddress:
This parameter indicates the destination address of the SRF for assist procedure. The "assistingSSPIPRoutingAddress" may contain embedded within it, a "correlationID" and "scfID", but only if "correlationID" and "scfID" are not specified separately.
- correlationID:
This parameter is used by the SCF to associate the "AssistRequestInstructions" from the assisting SSF (or the SRF) with the Request from the initiating SSF. The "correlationID" is used only if the correlation id is not embedded in the "assistingSSPIPRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.

- scfID:
See Recommendation Q.1290. The "scfID" is used only if the SCF id is not embedded in the "assistingSSIPRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- carrier:
See Recommendation Q.1290. In this message, the carrier selection field is null (00000000) and Carrier ID indicates the carrier to use for the call.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCP to the SSP for control of the network-based services at the originating exchange and the destination exchange.
- partyToConnect:
 - legID:
This parameter indicates to which party in the call the subsequent interaction shall apply while maintaining the speech connection between that leg and any other legs connected to the same CS.
 - callSegmentID:
This parameter indicates to which call segment the subsequent user interaction shall apply, i.e. to all parties connected to the call segment.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.

17.53.2 Invoking entity (SCF)

17.53.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The service logic has determined that a connection is needed between the SSF and SRF or between the SSF and an assisting SSF.

SCF Postcondition:

- The FSM for Assisting SSF is "Waiting for Assist Request Instructions".

In the SCSM FSM state "Routing to Resource", this operation is invoked by the SCF when the service logic determines that an assisting SSF or a Direct SCF-SRF relation is needed. The SCSM FSM then transitions to state "Waiting for Assist Request Instructions".

17.53.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.53.3 Responding entity (SSF)

17.53.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.

- 2) The CS waits for instructions or is monitoring.
- 3) The SSF is not an assisting SSF.

SSF Postcondition:

- 1) The SSF performs the call processing actions to route the call to the assisting SSF or SRF according to the "assistingSSPIPRoutingAddress" requested by the SCF.
- 2) The CS waits for end of temporary connection.

On receipt of this operation in the SSF FSM state "Waiting for Instructions", the SSP has to perform the following actions:

- Reset the T_{SSF} (optional).
NOTE – This "optional" means that the application timer T_{SSF} is optionally set. Whether it is used or not is network-operator dependent. But it must be synchronised with $T_{SCF-SSF}$ in the SCSM.
- Route the call to assisting SSF or SRF using "assistingSSPIPRoutingAddress".
- The SSF FSM goes to state "Waiting for End of Temporary Connection" (e7).

On receipt of this operation in the SSF FSM state "Monitoring", the SSP has to perform the following actions:

- Route the call to assisting SSF or SRF using "assistingSSPIPRoutingAddress".
- The SSF FSM goes to state "Temporary Connection And monitoring".

17.53.3.2 Error handling

Until the connection setup has been accepted (refer to Recommendation Q.71) by the assisting SSF/SRF, all received failure indications from the network on the ETC establishment shall be reported to the SCF as ETC error ETCFailed (e.g. busy, congestion). Note that the operation timer for ETC shall be longer than the maximum allowed time for the signalling procedures to accept the connection.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.54 EventNotificationCharging procedure

17.54.1 General description

This operation is used by the SSF to report to the SCF the occurrence of a specific charging event type as requested by the SCF using the "RequestNotificationChargingEvent" operation. The operation supports the options to cope with the interactions concerning the charging (refer to II.4/Q.1214 "Charging scenarios").

As several charging events may occur during a connection configuration, a possibility exists for the EventNotificationCharging operation to be invoked on multiple occasions. For each connection configuration EventNotificationCharging may be used several times.

17.54.1.1 Parameters

- eventTypeCharging:
This parameter indicates the charging event type which has occurred. Its content is network-operator specific, which may be "charge pulses" or "charge messages".
- eventSpecificInformationCharging:
This parameter contains charging related information specific to the event. Its content is network-operator specific.

- legID:
This parameter indicates the leg id on which the charging event type applies.
- monitorMode:
This parameter indicates how the charging event is reported. When the "monitorMode" is "interrupted", the event is reported as a request, if the "monitorMode" is "notifyAndContinue" the event is reported as a notification. The "monitorMode" "transparent" is not applicable for the EventNotificationCharging operation.

17.54.2 Invoking entity (SSF)

17.54.2.1 Normal procedure

SSF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) A charging event has been detected that is requested by the SCF.

SSF Postcondition:

- No FSM state transition.

The SSF-FSM is in any state except "idle". This operation is invoked if a charging event has been detected that is requested by the SCF. The detected charging event can be caused by:

- a) another SLPI; or
- b) another exchange.

Irrespective of the charging event cause, the SSF performs one of the following actions on occurrence of the charging event (according the corresponding monitorMode):

Interrupted

Notify the SCF of the charging event using "EventNotificationCharging" operation: do not process the event, but discard it. However, call and existing charging processing will not be suspended in the SSF.

NotifyAndContinue

Notify the SCF of the charging event using "EventNotificationCharging", and continue processing the event or signal.

17.54.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.54.3 Responding entity (SCF)

17.54.3.1 Normal procedure

SCF Precondition:

- A "RequestNotificationChargingEvent" has been sent at the request of a SLPI and the SLPI is expecting an "EventNotificationCharging" from the SSF.

SCF Postcondition:

- No FSM state transition.

On receipt of this operation the SLPI which is expecting this notification can continue. If the corresponding monitor mode was set by the SLPI to **Interrupted** the SLPI prepares instructions for the SSF if necessary.

17.54.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.55 EventReportBCSM procedure

17.55.1 General description

This operation is used to notify the SCF of a call related event previously requested by the SCF in an "RequestReportBCSMEvent" operation. The monitoring of more than one event could be requested with a "RequestReportBCSMEvent" operation, but each of these requested events is reported in a separate "EventReportBCSM" operation.

17.55.1.1 Parameters

- eventTypeBCSM:
This parameter specifies the type of event that is reported.
- bcsmEventCorrelationID:
Used by the SCF for correlation with a previous operation.
- eventSpecificInformationBCSM:
This parameter indicates the call related information specific to the event.
For "CollectedInfo" it will contain the "calledPartyNumber".
For "AnalysedInfo" it will contain the "calledPartyNumber".
For "RouteSelectFailure" it will contain the "FailureCause", if available.
For O- or T-Busy it will contain the "BusyCause", if available.
For O- or T-NoAnswer it will be empty.
For O-Answer it will contain the "BackwardGVNS", if available.
For T-Answer it will be empty.
For O- or T-MidCall it will contain "connectTime", if available as well as the indication, which specific mid call event has been detected. The latter is necessary only in case the network provider has defined different mid call events, the monitoring of which is interesting in the context of IN. In case of monitoring on specific control codes, the "iNServiceControlCode" contains the detected control code.
For O- or T-Disconnect it will contain the "releaseCause" and/or "connectTime", if available.
For O-Abandon and T-Abandon it will contain the "abandonCause", if available.
The connect time, if available, indicates the duration between the received answer indication from the called party side and the release of the connection in units of 100 msec.
For O- or T-Suspended, OriginationAttempt, OriginationAttemptAuthorized, TerminationAttemptAuthorized, O- or T-ReAnswer, FacilitySelectedAndAvailable, CallAccepted, it will be empty.
- legID:
This parameters indicates the party in the call for which the event is reported. SSF will use the option "ReceivingSideID" only.

- receivingSideID:

The following values for "legID" are assumed:

NOTE – The IN CS-1 definition of this parameter makes assumptions regarding the allocation of LegID values. With the introduction in IN CS-2 of Call Party Handling, these assumptions are no longer appropriate. For IN CS-2, the leg numbering is based on the following principles:

legID = 1 is the controlling leg and legID = 2 is the passive leg in case the initial call segment created was an originating call segment (CS state 'Originating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers.

legID = 1 is the passive leg and legID = 2 is the controlling leg (i.e. inverse to the above) in case the initial call segment created was a terminating call segment (CS state 'Terminating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers. For IN CS-1 implementations in the case of a mid call trigger, it was assumed that legID = 2 was assigned to the party not causing the trigger and legID = 1 was assigned to the party causing the trigger.

- miscCallInfo:

This parameter indicates detection point related information.

- messageType:

This parameter indicates whether the message is a request, i.e. resulting from a "RequestReportBCSMEEvent" with monitorMode = interrupted, or a notification, i.e. resulting from a "RequestReportBCSMEEvent" with "monitorMode" = "notifyAndContinue".

- dPAssignment:

This parameter shall be omitted for this operation.

- componentType:

This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.

- component:

Two alternatives are possible and one of which should be chosen:

- Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.

- componentCorrelationID:

This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

- bcsmeEventCorrelationID:

Used by the SCF for correlation with a previous operation.

17.55.2 Invoking entity (SSF)

17.55.2.1 Normal procedure

SSF Precondition:

- 1) The FSM for CS is in the state "Monitoring", or the FSM for CS may be in state "Waiting for Instructions" if the O/TDisconnect DP is armed and encountered, or the FSM for CS may be in any state if the O/TAbandon DP is armed and encountered.
- 2) The BCSM proceeds to an EDP that is armed.

SSF Postcondition:

- 1) The FSM for CS stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF for CS moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested. If this was the last CS within the CSA, also the FSM for CSA returns to idle.
- 3) The FSM for CS moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.55.2.2 Error handling

In case the message type is request, on expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and the call is given final treatment, e.g. a final announcement.

Operation related error handling is not applicable, due to class 4 operation.

17.55.3 Responding entity (SCF)

17.55.3.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SSF and the SCF.
- 2) The FSM for CS is in the state "Preparing CS Instructions", sub-state "Waiting for Notification or Request".

SCF Postcondition:

- 1) The FSM for CS stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The FSM for CS moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The FSM for CS moves to the state "Preparing CS Instructions" if the message type was request.
- 2) The event is reported to a SLPI, based on the dialogue ID. The SCF will prepare SSF or SRF instructions in accordance with the SLPI.

17.55.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.56 EventReportFacility procedure

17.56.1 General description

The SSF issues this operation to report the event that a ROSE APDU has been received during the BCSM being suspended at a DP, and to inform the APDU to the SCF. The event should be requested by the RequestReportFacilityEvent operation previously, and if the event will not be detected within the specified duration, it is informed to the SCF with the component being set to NULL to prevent the excess call suspension at a DP.

17.56.1.1 Parameters

- componentType:
This parameter indicates the type of component that is received by an APDU.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID may not be used.
- legID:
This parameter indicates what party should receive the specified APDU. The legID value assignment rules are the same as for the RequestReportBCSMEvent case. For the leg that represents a remote user may not be specified without proper signalling interwork capability (e.g. ISUP ROSE to DSS 1 ROSE etc.).
- componentCorrelationID:
In the SSF and the SCF, this parameter links the event managed by the SSF and the SCF with the invoke ID that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate this event report from the SSF within the SCF.

17.56.2 Invoking entity (SSF)

17.56.2.1 Normal procedure

SSF Precondition (two alternatives exist):

- FSM for CS is in state "Waiting For Facility Event".

SSF Postcondition:

Case 1: pending request for other componentCorrelationID exists.

- FSM for CS remains in state "Waiting For Facility Event".

Case 2: pending request for other componentCorrelationID does not exist.

- FSM for CS is in state "Waiting For Instructions".

17.56.2.2 Error handling

In case the message type is request, on expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and the call is given final treatment, e.g. a final announcement.

Operation related error handling is not applicable, due to class 4 operation.

17.56.3 Responding entity (SCF)

17.56.3.1 Normal procedure

SCF Precondition:

- FSM for CS is in state "Waiting For Facility Event".

SCF Postcondition:

- Remains in the same state "Waiting For Facility Event", if other pending componentCorrelationID exists, or transits to state "Preparing CS Instructions".

17.56.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.57 Execute procedure

17.57.1 General description

The "Execute" operation performs a sequence of execution steps, according to a predefined method, using input information and returns result information. Each step is either a DAP operation (that could be an execute operation), the execution of an algorithm or a decision test.

The "Execute" operation is used to execute a method on an Entry of the SDF resident DIT and to return selected information determined from the result of the method. A method is used to encapsulate a sequence of complex SDF operations, into a single SCF-SDF operation. It does this by associating a data access script with the entry method in the SDF. This script can involve one or more of any operations that can be invoked on the SCF-SDF interface, along with additional logic required to make subsequent operations. This additional logic may include decision making and data manipulation. The script may use part of the input value parameter as a parameter of any of the internal operations invoked by the script.

The SCF continues to provide service specific logic and to command call control functions in the SSF.

17.57.1.1 Parameters

- object:
This parameter identifies an entry of the SDF in the Directory Information Tree (DIT) on which the method is to be executed. The use of this parameter is defined in clause 9/X.501.
- method-id:
This parameter identifies the method which is to be executed on the entry. The value of this parameter is identified from the ASN.1 description of the method defined in the data schema. It is unique for the associated object.
- inputAssertions:
This parameter provides a set of attribute values which are used as an input to the method execution.
- input-Attributes:
This field identifies the attributes which may be submitted as input to the method execution.
- specificInput:
This parameter identifies the additional information which is required on the entry in order to perform the method. The type of this parameter is identified by the ASN.1 description of the method defined in the data schema.

- outputAssertions:
This parameter contains attribute values returned as a result of the method execution.
- output-Attributes:
This field identifies the attributes which may be returned as output to the method execution.
- specificOutput:
This parameter contains information returned as a result of the operation executed when the method on the entry is invoked. The type of this parameter is identified by the ASN.1 description of the method defined in the data schema.
- CommonArguments:
All X.500 operations contain common arguments such as security information. The use of these arguments is defined in 7.3/X.511.

17.57.2 Invoking entity (SCF)

17.57.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound" or "Wait for Subsequent Requests".

SCF Postcondition:

- SCSM: "SDF Bound".

When the SCSM is in the state "Wait for Subsequent Requests" an internal event [(e2) Request_to_SDF] occurs when service logic needs to execute an entry method on the SDF. Until the application process indicates with a delimiter that the operation should be sent, the SCSM remains in the state "Wait for Subsequent Requests" and the operation is not sent. When the delimiter is received, the operation is sent to the SDF in a message containing a Bind argument. The SCSM waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SCSM moves to state "Idle", the Execute operation is discarded. In the State "SDF Bound", the response of the Execute operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). The response from the SDF may be either the result of the Execute operation or an error.

When the SCSM is in the state "SDF Bound" an internal event [(e6) Request_to_SDF] occurs when service logic needs to execute an entry method on the SDF. This event causes a transition to the same state "SDF Bound" and the SCSM waits for the response from the SDF. The reception of the response [(E7) Response_from_SDF] to the Execute operation previously issued to the SDF causes a transition of the SCF to the same state "SDF Bound". The response from the SDF may be either the result of the Execute operation or an error.

17.57.2.2 Error handling

Generic error handling for the operation related errors is described in clause 12/X.511. The TCAP services that are used for reporting operating errors are described in clause 18.

17.57.3 Responding entity (SDF)

17.57.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM: "SCF Bound".

When the SDF is in the state "Bind Pending", the external event (E3) Request_from_SCF caused by the reception of a "Execute" operation from the SCF occurs. The SDF does not proceed to the operation until a Bind operation has been successfully executed. It remains in the same state.

When the SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a "Execute" operation from the SCF occurs. The SDF waits for the response to the operation.

On the receipt of the event (E7) and before retrieving the data as specified in the operation parameters, the SDF takes the following actions:

- the SDF verifies that the object accessed by the request exists;
- the SDF verifies that the method referenced in the operation exists in the object, and that the argument is of the correct type;
- the SDF verifies that the user on behalf of whom the request is performed has sufficient access rights to execute the method on the entry.

If these actions are successfully executed the SDF executes the data access script associated with the entry method in the SDF. Before each internal operation initiated by the script is performed, the SDF takes the following actions:

- the SDF may verify that the user on behalf of whom the request is performed has sufficient access rights to perform the operation;
- the SDF may verify that object, attributes or methods on which an operation should be performed exists in the DIT.

If all of the specified actions indicated above are successfully executed, the SDF returns the result of the script to the SCF. The sending of the result corresponds to the event (e6) Response_to_SCF.

17.57.3.2 Error handling

Generic error handling for the operation related errors is described in clause 12/X.511.

If basic-access-control is in effect for the entry on which the method is being executed, the following sequence of access controls applies.

- ExecuteMethod permission is required to the entry on which the method is being executed. If permission is not granted, the operation fails in accordance with 7.11.3/X.511. In this case a SecurityError with problem insufficientAccessRights or noInformation shall be returned.
- Before each internal operation initiated by a data access script associated with entry method is performed, basic access control is applied as if the operation had been invoked on the SCF-SDF interface. If any of these internal operations fails, the entire operation fails and an executionError with problem executionFailure shall be returned.

If the operation fails due to failure of any other data access logic, an executionError with problem executionFailure shall be returned.

If the operation fails due to an incorrect type or value of the input-value, an executionError with problem missinginputValues shall be returned.

If a request is made to execute a method on a non-existent entry, a NameError with problem noSuchObject shall be returned.

The TCAP services that are used for reporting operation errors are described in clause 18.

17.58 FacilitySelectedAndAvailable procedure

17.58.1 General description

This operation is sent from the SSF to the SCF at the FacilitySelectedAndAvailable DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.58.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
Contains the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
routeList represents the list of routes which would have been used in order to route the call. The network operators can specify that this IE should be used if their particular network has the information available.
- travellingClassMark:
See Recommendation Q.1290.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.58.2 Invoking entity (SSF)

17.58.2.1 Normal procedure

SSF Precondition:

- 1) Incoming call received.
- 2) Call gapping or service filtering is not in effect.
- 3) TDP criteria have been met.
- 4) For a TDP-R, there is no existing control relationship.

SSF Postcondition:

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

17.58.2.2 Error handling

If the destination SCF is not accessible, then the call is given final treatment (other treatments are for further study). If the calling party abandons after the sending of the FacilitySelectedAndAvailable operation, then the SSF aborts the control relationship after the first answer message from the SCF has been received: the Transaction ID is held open until T_{SSF} expires.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.58.3 Responding entity (SCF)

17.58.3.1 Normal procedure

SCF Precondition:

- 1) For TDP, none.
- 2) EDP case does not apply.

SCF Postcondition:

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

On receipt of the FacilitySelectedAndAvailable operation, the SCSM moves from "Idle" state to the state "Preparing SSF Instructions". A control relationship to the related SSF is created. A Service Logic Program Instance (SLPI) is invoked for processing the FacilitySelectedAndAvailable operation. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked. The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI (i.e. the requested IN service itself).

17.58.3.2 Error handling

If the FacilitySelectedAndAvailable operation is rejected, then the SCSM remains in the same state. The maintenance function is informed and no SLPI is invoked. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.59 FurnishChargingInformation procedure

17.59.1 General description

This operation is used to request the SSF to generate, register a call record or to include some information in the default call record. The registered call record is intended for off-line charging of the call. A possibility exists for the FurnishChargingInformation (FCI) operation to be invoked on multiple occasions. FCI could be applied at the beginning of the call in order to request to start call record generation. In addition FCI can also be applied at the end of the call or connection configuration (e.g. for follow-on calls). In this case FCI is used to include charge related information into the call record which was started at the beginning of the call. When additional FCIs are used, it is recommended to arm an EDP-R (indicating the end of call or connection configuration) to be able to apply FCI before the termination of the call record generation. The charging scenarios supported by this operation are: 2.2, 2.3 and 2.4 (refer to Appendix II/Q.1214, "Charging scenarios").

17.59.1.1 Parameters

– fCIBillingChargingCharacteristics:

This parameter indicates billing and/or charging characteristics. Its content is network-operator specific. Depending on the applied charging scenario, the following information elements can be included (refer to Appendix II/Q.1224, "Charging scenarios"):

- complete charging record (scenario 2.2);
- charge party (scenario 2.3);
- charge level (scenario 2.3);
- charge items (scenario 2.3);
- correlationID (scenario 2.4).

17.59.2 Invoking entity (SCF)

17.59.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined that a "FurnishChargingInformation" has to be sent by the SCF.

SCF Postcondition:

- 1) No FSM state transition.
- 2) SLPI execution may continue.

The SCSM FSM is in state "Preparing SSF instruction", "Waiting For Notification or Request" or is in state "Queueing FSM". This operation is invoked by the SCF if a SLPI results in the request of creating a call record to the SSF or to include some billing or charging information into the default call record. In the case of call queueing, this operation may contain information pertaining to the initiation of queueing or the call queueing time duration for call logging purpose. This causes no SCSM FSM state transition.

17.59.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.59.3 Responding entity (SCF)

17.59.3.1 Normal procedure

SSF Precondition:

- FSM: for CS State "Waiting for Instructions"; or
FSM for CS State "Waiting for End of User Interaction"; or
FSM for CS State "Waiting for End of Temporary Connection"; or
FSM for CS State "Monitoring"; or
Assisting/hand-off SSF-FSM State "Waiting for Instructions".

SSF Postcondition:

- No FSM state transition.

On receipt of this operation, the SSF performs actions to create the call record according to the off-line charging scenario which is applicable using the information elements included in the operation:

- registers the complete call record included in the operation;
- generates and registers a call record according to the information (charge party, charge level, charge items);
- include the information received "correlationID" in the default call record which is generated and, registered by default at the SSF.

By means of a parameter at the "FurnishChargingInformation" operation, the SCF can initiate the pulse metering function of the SSF.

In that case the SSF shall generate meter pulses according to the applicable charging level, account and record them.

The SSF records charge related data like for example the call duration, begin time stamp or end time stamp. Additionally the SSF records further data if required.

The charging level can be determined by:

- a) the SCF; or
- b) the SSF; or
- c) a succeeding exchange; or
- d) the post processing function.

If a) applies the charging level is included in the "FurnishChargingInformation" operation.

If b) applies the SSF shall determine the charging level based on the corresponding parameters contained in the operation.

If c) applies either the "FurnishChargingInformation" operation contains the corresponding parameters indicating that the charging level shall be determined in a succeeding exchange or the SSF detects during the determination of the charging level based on the provided parameters that the charging level shall be determined in a succeeding exchange.

The SSF can either account received pulses or convert any charging messages received from the B-side to pulses. In both cases, the accumulated pulses are included when the IN call record is generated or ignored.

17.59.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.60 HandlingInformationRequest procedure

17.60.1 General description

This operation is used when a SCF controlling a "call" has not sufficient information to process the call (e.g. routing, announcement) and requests assistance from another SCF having knowledge on how to proceed with the call. The call could be a user request with only one user involved. The operation initiates the dialogue between two SCFs and provides the supporting SCF with the context of the call so that it can help the controlling SCF in the processing of the call.

17.60.1.1 Parameters

- callingPartyNumber:
This parameter, if present, is used to identify the calling party for the call (see Q.762 Calling Party Number). It may be used for applications such as customized routing service, where the supporting SCF needs to know the identity of the calling party to give routing information to the controlling SCF.
- locationNumber:
This parameter contains information on the location of the user. It conveys the geographical address for mobility services, see Recommendation Q.762. 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.
- calledPartyNumber:
This parameter is used to identify the called party in the forward direction, see Recommendation Q.762. This parameter is present if the service logic has been able to recognise a called party number in the information provided by the user. When the format has not been recognised, the called party number can be conveyed in the parameter "dialledDigits".
- dialledDigits:
This parameter is used to convey information collected from the user through user interaction procedure or in the setup phase and that have not been recognized as information to be included in another parameter.
- redirectingPartyID:
This parameter indicates the last directory number the call was redirected from.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- callingpartyBusinessGroupID:
This parameter gives the identifier for the business group the user belongs to.
- originalCalledPartyID:
See Q.762 Original Called Party Number signalling information.

- **numberOfCallAttempts:**
This parameter 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.
- **highLayerCompatibility:**
This parameter indicates the type of high layer compatibility, which will be used to determine the ISDN-teleservice of a connected ISDN terminal. For encoding DSS 1 (Recommendation Q.931) is used. The highLayerCompatibility can also be transported by ISUP within ATP (see Recommendation Q.763) parameter.
- **bearerCapability:**
This parameter indicates the type of bearer capability connection or the transmission medium requirements to the user.
- **invokedSupplementaryServices:**
This parameter contains the supplementary service that has been invoked by the user. Only information available to the controlling SCF can be provided.
- **activeSupplementaryServices:**
This parameter 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.
- **causeOfLastCallFailure:**
This parameter gives the reason of the failure of the last call, if any. This last call is considered within the same service logic program instance.
- **userInteractionMode:**
This parameter conveys the type of user interaction modes that are available in the invoking network.
- **callingPartysCategory:**
See Q.762 Calling Party's Category signalling information. It indicates the type of calling party (e.g. operator, pay-phone, ordinary user). Refer to 12.10/Q.1224 for the population rules for this parameter.
- **requestedType:**
This parameter is used to identify the context in which the operation will be used. The list of allowed values (and the associated semantic) is part of the definition of each service logic type. The scope of the RequestedType IE is local to an AgreementID.
- **securityParameter:**
This is an optional parameter that conveys security related information.

17.60.2 Invoking entity (controlling SCF)

17.60.2.1 Normal procedure

SCF Precondition:

- 1) A relationship has been requested by controlling SCF if it is the first occurrence of the operation, otherwise the relationship has been already established between the two SCFs.
- 2) In the first case, the SCF FSM is in state "Preparing request for Assistance", in the second case it is in state "Assisted Mode".

SCF Postcondition:

- 1) The SCF FSM moves to the state "Waiting for Bind Result" from the state "Preparing request for Assistance" or it remains in the "Assisted Mode" state, if it was already there.
- 2) If SCF FSM has moved to the state "Waiting for Binds result state", it moves to "Assisted mode" state as soon as a positive result to SCF Bind operation is received, or to "Idle" state in case of a negative result.

The SCF provides parameters, that depend on the service logic invoked. The list of parameters that are needed depends on the agreement-referred with SCF Bind operation previously issued. When mandatory information for a given service logic is missing, the controlling SCF is responsible to conduct the necessary actions to get the information before sending of the "handlingInformationRequest" operation.

17.60.2.2 Error handling

If the supporting SCF is not accessible, the call is given final treatment which is service logic dependent.

If the calling user abandons after the sending of the "handlingInformationRequest" operation, then the SCF FSM moves the state "Preparing for SCFUnbind request" and the SCF aborts the SCF-SCF relationship by means of an abort to TCAP. Note that TCAP will wait until the first response message from the SCF has been received before it sends an abort to the SCF.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.60.3 Responding entity (supporting SCF)

17.60.3.1 Normal procedure

SCF Precondition:

- The SCF FSM is in the state "Processing SCF Bind" or in the state "Assisting Mode" or it has already successfully processed a previous "HandlingInformationRequest".

SCF Postcondition:

- The SCSM remains in the state "Assisting Mode".

The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the agreement, i.e. the requested IN service, itself.

17.60.3.2 Error handling

If the supporting SCF receives a "handlingInformationRequest" operation while it is in the Assisting mode and a "handlingInformationResult" is already pending for a previous "handlingInformationRequest" operation, then a "taskRefused" error is returned to the controlling SCF.

If the "handlingInformationRequest" operation is rejected the SCSM remains in the state "Idle", the maintenance function is informed and no SLPI is invoked.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.61 HandlingInformationResult procedure

17.61.1 General description

This operation is used by the supporting SCF to answer operations previously issued by the controlling SCF. Information contained in the "handlingInformationResult" operation can either be used to process the call (e.g. routing, announcement) that has initiated the SCF-SCF relationship, or to indicate to controlling SCF when it should contact the supporting SCF to receive instructions.

17.61.1.1 Parameters

- routingAddress:
This parameter contains indications on how the call should be handled. These indications can be a request to forbid the call or the list of called party numbers (see Recommendation Q.762) towards which the call is to be routed. The encoding of the list is defined in Recommendation Q.763. If no other agreements exist, the numbers from the list shall be used sequentially.
- highLayerCompatibility:
This parameter indicates the type of high layer compatibility, which will be used to determine the ISDN-teleservice of a connected ISDN terminal. For encoding DSS 1 (Recommendation Q.931) is used. The highLayerCompatibility can also be transported by ISUP within ATP (see Recommendation Q.763) parameter.
- supplementaryServices:
This parameter contains the list of supplementary services that have been activated by the user.
- preferredLanguage:
The parameter gives the language that should be preferably used in user interactions.
- carrier:
This parameter indicates the identity of the carrier to use for the call.
- callingPartyNumber:
This parameter, if present, is used to identify the calling party for the call (see Q.762 Calling Party Number). The parameter may be used to force the signalling information to a certain value.
- originalCalledPartyID:
See Q.762 Original Called Party Number signalling information.
- redirectingPartyID:
This parameter indicates the last directory number the call was redirected from.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- callingPartysCategory:
See Q.762 Calling Party's Category signalling information. It indicates the type of calling party (e.g. operator, pay-phone, ordinary user). Refer to 12.10/Q.1224 for the population rules for this parameter.

17.61.2 Invoking entity (supporting SCF)

17.61.2.1 Normal procedure

SCF Precondition:

- 1) A dialogue with the controlling SCF has been established.
- 2) The supporting SCF has previously received a "handlingInformationRequest" operation.
- 3) The SCF FSM is in the state "Assisted Mode".

SCF Postcondition:

- 1) The SLPI waits for operations coming from the controlling SCF or the SLPI can be ended.
- 2) The SCF FSM remains in the state "Assisting Mode".

This operation is invoked by the supporting SCF when the service logic is able to provide instructions to the controlling SCF on how to process the call.

Information contained in the "handlingInformationResult" operation can be used by the controlling SCF to build the operations needed to setup the call and/or to control it.

17.61.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.61.3 Responding entity (controlling SCF)

17.61.3.1 Normal procedure

SCF Precondition:

- 1) A "handlingInformationRequest" or "handlingInformationNotification Provided" operation has been sent.
- 2) The SCF FSM is in the state "Assisted Mode".

SCF Postcondition:

- 1) According to the information received, the SCF performs call processing actions and/or starts call monitoring functions.
- 2) The SCF FSM moves to the state "Preparing SCF Unbind request" from the state "Assisted Mode" if no more assistance is needed or it remains in the state "Assisted Mode", if a further "Handling Information Result" reception is still pending.

If the "routingAddress" parameter is present, it is used to handle the call. If the call has to be routed, the other parameters contained in the operation can be used to setup the call.

The contents of the parameter can be memorized by the SCF and/or stored in the SDF. The contents of the parameter can be kept for a longer time than the relationship duration.

17.61.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.62 HoldCallInNetwork procedure

17.62.1 General description

This operation is used to provide the capability of queueing a call during the setup phase (e.g. to provide a call completion to busy, a call would be queued until the destination becomes free).

17.62.1.1 Parameters

- holdcause:
This parameter is optional. When used, it is network-specific and denotes the cause for holding the call.

17.62.2 Invoking entity (SCF)

17.62.2.1 Normal procedure

SCF Precondition:

- The FSM for CS is in state "Preparing CS Instructions", and the event (Ce2.2.3) Busy_Line/Trunk has taken place.

SCF Postcondition:

- The FSM for CS enters state "Queueing".

17.62.2.2 Error handling

There is no specific error treatment associated with this operation. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.62.3 Responding entity (SSF)

17.62.3.1 Normal procedure

SSF Precondition:

- The FSM for CS is in state "Waiting for Instructions".

SSF Postcondition:

- The FSM for CS remains in the same state.

17.62.3.2 Error handling

There is no operation-specific error treatment associated with this operation. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.63 in-DSAUnbind procedure

17.63.1 General description

The in-DSAUnbind operation is used by the invoking SDF to end an authenticated chaining association between an invoking SDF and a responding SDF on behalf of the end user.

17.63.1.1 Parameters

None.

17.63.2 Invoking entity (SDF)

17.63.2.1 Normal procedure

SDF Precondition:

- 1) An 'Unbind' request has been received by the invoking SDF indicating that the end user association which required operation chaining has been released.
- 2) SDSM-ChI: "SDF Bound".

SDF Postcondition:

- SDSM-ChI: "Idle"

The SCSM-ChI has previously initiated a successful Bind operation to the responding SDF directory. It is in state "SDF Bound". The invoking SDF has received an indication that the authenticated chained access to the responding SDF is to be terminated. It issues an in-DSAUnbind operation [(e6) DSAUnbind_to_SDF] that causes the SCSM-ChI to transit back to the state "Idle".

17.63.2.2 Error handling

The 'Unbind' operation does not have operation related errors.

17.63.3 Responding entity (SDF)

17.63.3.1 Normal procedure

SDF Precondition:

- SDSM-ChT: "SCF Bound".

SDF Postcondition:

- SDSM-ChT: "Idle".

A dSABind operation was previously issued and the SDSM-ChT is in State "SDF Bound" waiting for a request from the invoking SDF and/or performing an operation. The reception of the in-DSAUnbind operation causes a transition to State "Idle" with the transition (E5) DSAUnbind_from_SDF.

17.63.3.2 Error handling

The 'Unbind' operation does not have operation related errors.

17.64 InitialDP procedure

17.64.1 General description

This operation is sent by the SSF after detection of a TDP-R in the BCSM, to request the SCF for instructions to complete the call.

17.64.1.1 Parameters

- serviceKey:
This parameter identifies for the SCF unambiguously the requested IN service. It is used to address the correct application/SLP within the SCF (not for SCP addressing).
- dialledDigits:
See Recommendation Q.1290.

- calledPartyNumber:
This parameter contains the number used to identify the called party in the forward direction, i.e. see Recommendation Q.762.
- callingPartyNumber:
See Q.762 Calling Party Number signalling information.
- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this IE to select SLPs based on the group and for authorization purposes. The network operators can specify that this IE should be used if their particular network has the information available.
- callingPartysCategory:
See Q.762 Calling Party Category signalling information.
- callingPartySubaddress:
See Recommendation Q.931.
- cGEncountered:
See Recommendation Q.1290.
- iPSSPCapabilities:
See Recommendation Q.1290.
- iPAvailable:
See Recommendation Q.1290.
- locationNumber:
This parameter is used to convey the geographical area address for mobility services, see Recommendation Q.762. 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).
- miscsCallInfo:
This parameter 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.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- serviceProfileIdentifier:
See Annex A/Q.932. See 12.10/Q.1224 for population rules for serviceProfileIdentifier.
- terminalType:
See Recommendation Q.1290. Identifies the terminal type so that the SCF can specify, to the SRF, the appropriate type of capability (voice recognition, DTMF, display capability, etc.).
- triggerType:
This parameter indicates to the SCF the particular event which caused the detection of a valid trigger condition.
- cause:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules.

- **componentType:**
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- **component:**
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- **componentCorrelationID:**
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.
- **iSDNAccessRelatedInformation:**
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.
- **iNServiceCompatibilityIndication:**
This parameter contains the identifier for a class of IN services that has been triggered during the call. A class of IN services is defined as IN services which have the same compatibility characteristics.
- **highlayerCompatibility:**
This parameter indicates the type of the high layer compatibility, which will be used to determine the ISDN – teleservice of a connected ISDN terminal. For encoding DSS 1 (Recommendation Q.931) is used. The highlayerCompatibility can also be transported by ISUP within the ATP (see Recommendation Q.763) parameter.
- **serviceInteractionIndicators:**
This parameter contains indicators sent from the SSF to the SCF for control of the network-based services at the originating exchange and the destination exchange.
- **additionalCallingPartyNumber:**
The calling party number provided by the access signalling system of the calling user, e.g. provided by a PBX.
- **forwardCallIndicators:**
This parameter 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.

- bearerCapability:

This parameter indicates the type of the bearer capability connection or the transmission medium requirements to the user. It is a network option to select one of the two parameters to be used:

 - bearerCap:

This parameter contains the value of the DSS 1 Bearer Capability parameter (Recommendation Q.931) in case the SSF is at local exchange level or the value of the ISUP User Service Information parameter (Recommendation Q.763) in case the SSF is at transit exchange level.

The parameter "bearerCapability" shall only be included in the "InitialDP" operation in case the DSS 1 Bearer Capability parameter or the ISUP User Service Information parameter is available at the SSP.

If two values for bearer capability are available at the SSF or if User Service Information and User Service Information Prime are available at the SSF the "bearerCap" shall contain the value of the preferred bearer capability respectively the value of the User Service Information Prime parameter.
 - tmr:

The tmr is encoded as the Transmission Medium Requirement parameter of the ISUP according to Recommendation Q.763.

If two values for transmission medium requirement are available at the SSF or if Transmission Medium Requirement and Transmission Medium Requirement Prime are available at the SSF, the "bearerCap" shall contain the value of the preferred transmission medium requirement respectively the value of the Transmission Medium Requirement Prime parameter.
- eventTypeBCSM:

This parameter indicates the armed BCSM detection point event, resulting in the "InitialDP" operation.
- redirectingPartyID:

This parameter indicates the last directory number the call was redirected from.
- redirectionInformation:

See Q.763 Redirection Information signalling information.
- genericNumbers:

The SSF may inform the SCF about the additional calling party number but also with the called number, the additional connected number, the additional original to called party number, the additional redirecting number and/or the additional redirection number.
- serviceInteractionIndicatorsTwo:

Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- forwardGVNS:

Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.

- **createdCallSegmentAssociation:**
This parameter identifies for the SCF unambiguously the CSA instance in the SSF under SCF control. This CSA identifier assigned by the SSF may be used to associate different CSA instances in the SSF.
- **USIServiceIndicator:**
It indicates the Service Logic requesting the Monitoring of an UTSI information element. It is used as a Monitoring criteria at the SSF level. It also provides the correlation with the RequestReportUTSI operation.
- **USIInformation:**
This parameter conveys information provided by the User dedicated to the Service Logic. It is transparent at the SSF level.

17.64.2 Invoking entity (SSF)

17.64.2.1 Normal procedure

SSF Precondition:

- 1) An event fulfilling the criteria for the DP being executed has been detected.
- 2) Call gapping and SS7 overload are not in effect for the call, and the call is not to be filtered.

SSF Postcondition:

- 1) A control relationship has been established if the DP was armed as a TDP-R. The SSF FSM moves to the State "Waiting for Instructions".
- 2) The SSF FSM remains in the State "Idle" if the DP was armed as a TDP-N.

Following a trigger detection (due to the DP criteria assigned being met) related to an armed TDP in the BCSM caused by a call origination attempt, the SSF checks if call gapping, SS7 overload or service filtering are not in effect for the related call segment.

If these conditions are met, then the "InitialDP" operation is invoked by the SSF. The address of the SCF the "InitialDP" operation has to be sent to is determined on the base of trigger related data. The SSF provides as many parameters as available. In some cases, some parameters must be available (such as "callingPartyNumber" or "callingPartyCategory"). This is to be handled appropriately by the SSF in its trigger table (to know that such parameters are necessary for some triggering conditions) and in conducting the necessary action to get these parameters if they are not available. (For instance, if non-SS7 signalling is used, it may be possible to request the "callingPartyCategory" from a preceding exchange.)

Otherwise, the call control is given back to the underlying network.

If the DP was armed as a TDP-R, a control relationship is established to the SCF. The SSF application timer T_{SSF} is set when the SSF sends "InitialDP" for requesting instructions from the SCF. It is used to prevent excessive call suspension time.

17.64.2.2 Error handling

If the destination SCF is not accessible then the call is given final treatment.

On expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and the call is given final treatment, e.g. routing to a final announcement.

If the calling party abandons after the sending of "InitialDP", then the SSF aborts the control relationship by means of an abort to TCAP. Note that TCAP will wait until the first response message from the SCF has been received before it sends an abort to the SCF (see also clause 16).

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.64.3 Responding entity (SCF)

17.64.3.1 Normal procedure

SCF Precondition:

- None.

SCF Postcondition:

- An SLPI has been invoked.

On receipt of "InitialDP" operation the SCSM moves from "Idle" to the state "Preparing SSF Instructions", a control relationship to the related SSF is created. A Service Logic Program Instance (SLPI) is invoked for processing the 'InitialDP' operation based on the "serviceKey" parameter. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked.

The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI, i.e. the requested IN service, itself.

17.64.3.2 Error handling

If the "InitialDP" operation is rejected then the SCSM remains in "Idle". The maintenance function is informed and no SLPI is invoked.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.65 InitiateAssociation procedure

17.65.1 General description

This operation is used to allow the SCF to initiate a call unrelated association with the user.

17.65.1.1 Parameters

- calledPartyNumber:
This parameter indicates the target line identity when the SCF initiates the association.

17.65.2 Invoking entity (SCF)

17.65.2.1 Normal procedure

SCF Precondition:

- 1) FSM for CUSF within the SCF is in state N1: "Idle".
- 2) SLPI requests to initiate a call unrelated association with the user.

SCF Postcondition:

- FSM for CUSF within the SCF prepares to send a component to the user and goes to state N2: "Preparing CUSF Instructions".

17.65.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.65.3 Responding entity (CUSF)

17.65.3.1 Normal procedure

CUSF Precondition:

- CUSF-FSM is in state a: "Idle".

CUSF Postcondition:

- CUSF-FSM goes to the state b: "Waiting For Instructions".

The BCUSM is instantiated and suspended at the ActivationReceivedAndAuthorized DP. The CUSF is waiting for subsequent instructions from the SCF.

17.65.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.66 InitiateCallAttempt procedure

17.66.1 General description

This operation is used to request the SSF to create a new call to one call party using the address information provided by the SCF (e.g. wake-up call). An EDP-R must be armed on answer and all the call failure events, in order to have the SCF treat this call appropriately when either of these events is encountered. InitiateCallAttempt can also be used to create additional Call Segments within an existing Call Segment Association of ICA.

If the Service Logic wishes to know the created CSAID, e.g. to be able later on to merge CSs from other CSAs with this one, a CreateCSA operation needs to precede the ICA operation.

17.66.1.1 Parameters

- destinationRoutingAddress:
This parameter contains the called party number towards which the call is to be routed. The destinationRoutingAddress may contain one called party number only for this operation. The encoding of the parameter is defined in Recommendation Q.763.
- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- iSDNAccessRelatedInformation:
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.
- travellingClassMark:
The SCF uses the travellingClassMark parameter to provide essential route selection information to the SSF. The SSF uses this information to populate the outgoing ISUP IAM message, the population and mapping of this parameter is network-operator specific.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network-based services at the originating exchange and the destination exchange.

- **callingPartyNumber:**
This parameter identifies which number shall be regarded as the calling party for the created call. If this parameter is not sent by the SCF, the SSF may supply a network-dependent default value.
- **LegToBeCreated:**
This parameter indicates the LegID to be assigned to the newly created party. When not provided, a default LegID of 1 is assumed ('new CSA' case). In the 'existing CSA' case, this parameter shall be provided by the SCF.
- **NewCallSegment**
This parameter indicates the CS ID to be assigned to the newly created Call Segment. When not provided, a default CSID of 1 is assumed ('new CSA' case). In the 'synchronous' case, this parameter shall be provided by the SCF.
- **iNServiceCompatibilityResponse:**
This parameter is used by the SCF to inform the SSF about the actual services/service features which have been invoked in the SCF.
- **serviceInteractionIndicatorsTwo:**
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network based services, respectively between different IN-based services.

17.66.2 Invoking entity (SCF)

17.66.2.1 Normal procedure

SCF Precondition:

- 1) An SLPI has been invoked.
- 2) An SLPI has determined that an "InitiateCallAttempt" operation should be sent by the SCF.
- 3) The FSM for CSA is "Preparing SSF Instructions" or is in state "SSF Control Idle".

SCF Postcondition:

- 1) A control relationship is established between the SCF and SSF.
- 2) The FSM for CS is in state "Preparing CS Instructions".
- 3) SLPI execution continues.

The FSM for CS moves to state "Preparing SSF Instructions" when the service logic invokes this operation. In order to enable the establishment of a control relationship between the SCF and SSF and to allow the SCF to control the created call appropriately, the SLPI shall monitor for the BCSM event(s) which report the result of the created call setup. This includes DP Analyse_Information or DP Route_Select_Failure, O_Called_Party_Busy, O_No-Answer, and O_Answer. Any other Non-Call_Processing_Instructions may be sent as well. The "InitiateCallAttempt" operation creates a BCSM instance in the SSF but the SSF suspends the call processing of this BCSM. The SLPI shall send a "Continue" operation to request the SSF to route the call to the specified destination. The FSM for CS shall proceed as specified at the procedure for the "Continue" operation.

The above described procedure shall be part of the establishment of the control relationship, i.e. operations up to and including the "Continue" operation shall be sent together in the same message to the SSF.

The SCF shall start a response Timer T_{scf} when the "InitiateCallAttempt" operation is sent. The response Timer shall supervise the confirmation of the dialogue from SSF, the value of T_{scf} shall be equal or less than the network no answer timer.

17.66.2.2 Error handling

On expiration of T_{scf} the SCF shall abort the dialogue, report the abort to the maintenance functions and inform the SLPI on the failure of dialogue establishment. The FSM for CS moves to the Idle state.

Generic error handling for the operation related errors is described in clause 16, the TCAP services which are used for reporting operation errors are described in clause 18.

17.66.3 Responding entity (SSF)

17.66.3.1 Normal procedure

SSF Precondition:

- The FSM for the CSA is in state "Idle" or "Waiting for Instructions".

SSF Postcondition:

- 1) A new originating BCSM has been created, call processing is suspended at DP 1.
- 2) The FSM for CS has moved from "Idle" state to state "Waiting for Instructions".

Upon reception of "InitiateCallAttempt", the SSF creates a new originating BCSM and suspends the call processing of this BCSM at DP 1. All subsequent operations are treated according to their normal procedures.

The properties and capabilities, normally received from or associated to the calling party, required for the call setup shall have a network-dependent default value. If a calling party number is supplied by the SCF, these properties may be dependent on the received calling party number.

17.66.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.67 ManageTriggerData procedure

17.67.1 General description

This operation is used to activate, deactivate or retrieve the status of a trigger detection point linked to a subscriber profile known at a switch, e.g. related to an access line. This operation is used for service logic controlled IN management purposes. The status or a success indication is sent to the SCF as Return Result of this operation.

17.67.1.1 Parameters

- actionIndicator

This parameter indicates the action to be performed, i.e.:

- activate a TDP;
- deactivate a TDP;
- interrogate the current state of the TDP.

- triggerDataIdentifier:
Identifies the TDP and the corresponding subscriber profile that is to be managed:
 - triggerID:
This parameter identifies the TDP-Type.
 - profileIdentifier:
Provides several addressing schemes to identify the line/subscriber profile linked to the TDP.
- access:
Identifies a subscriber access line.
- group:
Identifies a facility group.
- registratorIdentifier:
This parameter indicates the SCF which is to be verified by the SSF against the administrated information associated with the TDP.
- actionPerformed:
This parameter indicates the result of the operation (activated, deactivated, TDP status).

17.67.2 Invoking entity (SCF)

17.67.2.1 Normal procedure

SCF Precondition:

- SLPI detects that trigger data managing actions are to be performed.

SCF Postcondition:

- SCME is in the state "Idle".

If the service logic at the SCF requests the activation, deactivation or status interrogation of trigger data at the SSF, the SCF-FSM sends a ManageTriggerData operation with corresponding ActionIndicator.

If ManageTriggerData has been successfully processed, the ReturnResult indicates the action performed or in case of interrogation the state of the TDP.

17.67.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.67.3 Responding entity (SSF)

17.67.3.1 Normal procedure

SSF Precondition:

- None.

SSF Postcondition:

- SSME-FSM is in the state "Idle".

It is checked whether corresponding TDP and subscriber profile addressed by operation ManageTriggerData exist. If so, the TDP is activated, deactivated or the status is retrieved. The result or an error indication is sent back as ReturnResult of ManageTriggerData to the initiating SCF.

The (de)activation of an already (in)active TDP is not an error case. It will only be indicated that this TDP was already (in)active so that the SCF may provide an appropriate indication to the requesting entity, (e.g. an SMF).

17.67.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.68 MergeCallSegments procedure

17.68.1 General description

This operation is used to request the SSF to merge two associated CSs into a single CS. It (re)establishes the bearer connection between all involved legs. This operation is the inverse of the SplitLeg operation.

In merging the specified "source" CS, the conditions of the leg which the CS has: the armed EDPs, the ApplyChargingReport pending, the EventNotificationCharging pending, and the CallInformationReport pending, are also applied for the same leg after being merged.

17.68.1.1 Parameters

- sourceCallSegment:
This parameter indicates the CS that shall be merged with another CS. After the merge, this CS instance will be deleted.
- targetCallSegment:
This parameter indicates the CS that shall be merged with another CS. After the merge, this CS instance will be kept. When not specified, the source CS shall be merged with the initial CS.

17.68.2 Invoking entity (SCF)

17.68.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined that two call segments shall be merged into a single call segment.

SCF Postcondition:

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

17.68.2.2 Error handling

Generic error handling for the operation related error is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.68.3 Responding entity (SSF)

17.68.3.1 Normal procedure

SSF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) All involved BCSMs in the source CS are in state O/T_Active, O/T_Suspended, O_Alerting, Send_Call or Present_Call PIC or in one of the associated EDPs.
- 3) The SSF FSM of the source CS is in the state "Waiting For Instructions" or "Monitoring".
- 4) Any passive legs in the source CS and the target CS to be merged have the status "joined".
- 5) Only one of the two call segments to be merged (e.g. the target CS) may have an SRF resource connected for user interaction with the call parties (CTR or ETC operation).
- 6) 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 merge the indicated Call Segments. All legs with status "joined" of the source CS are now connected to the Connection Point of the target CS.
- 2) The SSF FSM of the source CS returns to idle state.
- 3) The FSM for the target Call Segment will move to the "Waiting for instructions" state. The remaining BCSM instances within the involved Call Segment will move to the O_/T_MidCall DP. Note that no MidCall EDP will be reported for this case.
- 4) A Return Result is sent immediately after the successful change of the leg configuration is executed, this allows the SCF to be updated with the established connection view and to cater for possible interference problems with signalling events.

17.68.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.69 ModifyEntry procedure

17.69.1 General description

The X.500 "ModifyEntry" operation is used to request the SDF to make one or several modifications to a data object. The modifications concern the attributes and their values of which the object is composed. The type of modifications to perform is given in the operation argument provided by the SCF. The modifications do not concern the values of the attributes used to identify the object (i.e. the object name). For a full description of the ModifyEntry operation, see 11.3/X.511.

17.69.1.1 Parameters

See 11.3.2/X.511 and 11.3.3.3/X.511.

17.69.2 Invoking entity (SCF)

17.69.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound" or "Wait for Subsequent Requests".

SCF Postcondition:

- SCSM: "SDF Bound".

When the SCSM is in the state "Wait for Subsequent Requests" and a need of the service logic to modify information of the SDF exists, an internal event [(e2) Request_to_SDF] occurs. Until the application process indicates, with a delimiter (or a timer expiry), that the operation should be sent, the SCSM remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the SDF in a message containing a Bind argument. The SCSM waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SCSM has moved to state "Idle", the ModifyEntry operation was discarded. In the state "SDF Bound", the response of the ModifyEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the ModifyEntry operation or an error.

When the SCSM is in the state "SDF Bound" and a need of the service logic to modify information of the SDF exists an internal event occurs. This event, called (e6) Request_to_SDF causes a transition to the same state "SDF Bound" and the SCSM waits for the response from the SDF. The reception of the response [(E7) Response_from_SDF] to the ModifyEntry operation previously issued to the SDF causes a transition of the SCF to the same state "SDF Bound". The response from the SDF may be either the result of the ModifyEntry operation or an error.

17.69.2.2 Error handling

Generic error handling for the operation related errors is described in 11.3.4/X.511 and 11.3.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.69.3 Responding entity (SDF)

17.69.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM: "SCF Bound".

When the SDF is in the state "Bind Pending", the external event (E3) Request_from_SCF caused by the reception of a "ModifyEntry" operation from the SCF occurs. The SDF does not proceed to the operation until a Bind operation has been successfully executed. It remains in the same state.

When the SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a "ModifyEntry" operation from the SCF occurs. The SDF waits for the response to the operation.

On the receipt of the event (E7) and before updating the different attributes specified in the operation parameters, the SDF shall take the following actions:

- verify that the object accessed by the request exists;
- verify that the user on behalf of whom the request is performed has sufficient access rights to modify the object for each elementary modifications contained in the operation;
- verify that each attribute or value on which an operation should be performed exists in the object;
- verify that the proposed modifications are compatible with the object class of the object or with the syntax of the attribute.

After the specified actions indicated above are successfully executed for all the modifications requested in the operation, all the modifications for a same attribute take place in the order given in the 'changes' parameter. A result is returned to the SCF. The sending of the result corresponds to the event (e6) Response_to_SCF.

17.69.3.2 Error handling

Generic error handling for the operation related errors is described in 11.3.4/X.511 and 11.3.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.70 MoveCallSegments procedure

17.70.1 General description

This operation 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.

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.

17.70.1.1 Parameters

- targetCallSegmentAssociation:
This parameter indicates the target Call Segment Association into which the moved Call Segment is to be placed.
- callSegments:
 - sourceCallSegment:
This parameter indicates the source Call Segment to be moved.
 - newCallSegment:
This parameter specifies the new CSID of the moved CS.
- legs:
 - sourceLeg:
This parameter specifies a source leg ID from the moved CS.
 - newLeg:
This parameter specifies the new LegID of the source leg.

17.70.2 Invoking entity (SCF)

17.70.2.1 Normal procedure

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.

17.70.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.70.3 Responding entity (SSF)

17.70.3.1 Normal procedure

SSF Precondition:

- 1) A TDP or EDP request has been invoked.
- 2) An appropriate Call Connection View state exists
- 3) In the source CSA if the CS to be moved has a joined controlling leg, then the target CSA must not contain a joined controlling leg.

SSF Postcondition:

- 1) The SSF performs the appropriate call processing actions.
- 2) The appropriate Call Connection View state is determined.
- 3) In the source CSA if the CS to be moved has a joined controlling leg, then the controlling leg status in the remaining CS must transition to surrogate. In the target CSA, the status of the controlling leg in other CSs does not change.

17.70.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.71 MoveLeg procedure

17.71.1 General description

This operation requests the SSF to move the Leg from one CS to another CS with which it is associated.

The effect of MoveLeg for the controlling Leg 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. Only the controlling Leg is moved.

The effect of MoveLeg for the passive Leg is to move the passive Leg and associated BCSM instance from one CS to another CS with which it is associated.

In moving the specified leg, the conditions of the leg: the armed EDPs, the ApplyChargingReport pending, the EventNotificationCharging pending, and the CallInformationReport pending, are also applied for the same leg after it is moved.

17.71.1.1 Parameters

- legIDToMove:
This parameter indicates the Leg that shall be moved.
- targetCallSegment:
This parameter indicates the CS that the leg shall be moved to. After the move, this CS instance will be kept. When not specified, the leg shall be moved to the initial CS.

17.71.2 Invoking entity (SCF)

17.71.2.1 Normal procedure

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.

17.71.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.71.3 Responding entity (SSF)

17.71.3.1 Normal procedure

SSF Precondition:

- 1) A TDP or EDP request has been invoked.
- 2) An appropriate Call Connection View state exists.
- 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 appropriate call processing actions.
- 2) The appropriate Call Connection View state is determined.
- 3) The FSM for the involved Call Segments will move to the "Waiting for instructions" state. The 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.

- 4) A Return Result is sent immediately after the successful change of the leg configuration is executed, this allows the SCF to be updated with the established connection view and to cater for possible interference problems with signalling events.

17.71.3.2 Error handling

Error handling for the operation related errors is described in clause 16, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.72 NetworkCapability procedure

17.72.1 General description

This operation provides the different types of services that are supported for the user involved in the call and in the context of that call, if not already specified in the agreement. It is used by the two interworking networks to agree on a level of service that can be expected for the call.

17.72.1.1 Parameters

- bearerCapabilities:
This parameter (either in the invoke or in the result) contains the list of the bearer services that are available to the user in the context of the call. The list is specific of the user and of the call context.
- highLayerCompatibilities:
This parameter (either in the invoke or in the result) contains the list of the teleservices that are available to the user in the context of the call. The list is specific of the user and of the call context.
- supplementaryServices:
This parameter (either in the invoke or in the result) contains the list of the supplementary services that are available to the user in the context of the call. The list is specific of the user and of the call context.
- securityParameter:
This is an optional parameter that conveys security related information.

17.72.2 Invoking entity (supporting SCF)

17.72.2.1 Normal procedure

SCF Precondition:

- 1) A "handlingInformationRequest" operation has been received and the preparation of a "handlingInformationResult" parameter is pending.
- 2) The need for knowing the level of service to be available to the user has been identified by the SLPI.
- 3) The SCF FSM is in the state "Assisting Mode".

SCF Postcondition:

- The SCF moves to the state "Waiting for Information".

Before sending the "networkCapability" operation, the supporting SCF has received a "handlingInformationRequest" operation containing information about the call, the controlling network and the user. If the information received is not enough, the supporting SCF can build the "networkCapability" operation, by sending the types of services that it expects can be available in the controlling network for the call conditions specified in the earlier operation, and for the given user.

The "networkCapability" operation can take into account the agreements between the network operators, the user's service profile and the call context.

Once the operation has been sent, the SCF FSM moves to the state "Waiting for Information". The SCF waits for the answer from the other SCF.

17.72.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.72.3 Responding entity (controlling SCF)

17.72.3.1 Normal procedure

SCF Precondition:

- 1) A "handlingInformationRequest" operation has been sent.
- 2) The SCF FSM is in the state "Assisting Mode".

SCF Postcondition:

- 1) The SCSM moves to the state "Preparing Additional Information".
- 2) A Return Result is sent in answer.

On receipt of the "networkCapability" operation, the SCF FSM moves to the state "Preparing Information". To prepare its answer the SCF looks at the list of services provided in the argument of the operation and removes the ones that it is not able to provide to the user in the conditions of the call.

17.72.3.2 Error handling

If none of the services specified in the argument of the "networkCapability" operation can be provided by the controlling SCF, it returns to the supporting SCF a "taskRefused" error.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.73 NotificationProvided procedure

17.73.1 General description

This operation is used to report that a call condition previously specified by the supporting SCF or pre-arranged between two network operators was met.

17.73.1.1 Parameters

- notifications:
This parameter contains an indication that a call condition previously expressed by the supporting SCF or pre-arranged between the two operators has been met. It links together the call condition met and some information related to call (if any).
- notificationInformation:
This parameter contains any other kind of information that might be needed to be notified by a specific kind of service logic. Information that can be conveyed has been agreed between network operators when defining the service logic object.
- securityParameter:
This is an optional parameter that conveys security related information.

17.73.2 Invoking entity (controlling SCF)

17.73.2.1 Normal procedure

SCF Precondition:

- 1) The SCF has received a "Request Notification" operation if call conditions at which this operation is sent have not been pre-arranged between two network operators.
- 2) A call condition specified earlier by the supporting SCF or pre-arranged between two network operators has been met.
- 3) The SCF-SCF relationship has been maintained since the "SCF Bind handlingInformationRequest" operation has been sent.
- 4) The SCF FSM is in the state "Assisted Mode".

SCF Postcondition:

- SCF FSM remains in the same state.

If any call resource has been engaged before the "NotificationProvided" operation is sent (e.g. as a result of the "Requested Notification handlingInformationResult" operation), it remains as it is.

If several call conditions as specified by the supporting SCF or as pre-arranged between two network operators have been met, they are reported in sequence to the supporting SCF, which takes the appropriate actions.

17.73.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.73.3 Responding entity (supporting SCF)

17.73.3.1 Normal procedure

SCF Precondition:

- 1) A dialogue between the two SCFs has been previously established.
- 2) The SCF FSM is in the state "Assisting Mode".

SCF Postcondition:

- SCF FSM remains in the same state.

On receipt of the "notificationProvided" operation the SLPI determines whether the call configuration should be modified as a consequence of the received notification information. If the call configuration in the controlling SCF needs to be modified, the supporting SCF prepares instructions to assist the controlling SCF and sends them with a "handlingInformationResult" operation. Otherwise the supporting SCF does not undertake any actions towards the controlling SCF, but the notification can be used in the SLPI (e.g. for charging purposes).

17.73.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.74 OAbandon procedure

17.74.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the O_Abandon DP, or to report an event requested by RequestReportBCSMEvent. Refer to Recommendations Q.1214 and Q.1224 for additional call modelling related semantics.

17.74.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callSegmentID:
See Recommendation Q.1290.
- releaseCause:
Indicates the cause of the abandon.

17.74.2 Invoking entity (SSF)

17.74.2.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Indication received from the Originating BCSM that an originating party has abandoned.
- 3) For a TDP, call gapping or service filtering is not in effect.
- 4) DP criteria have been met.
- 5) For a TDP-R or a TDP-N, there is no existing control relationship.
- 6) For an EDP, there is an existing control relationship and the EDP O_Abandon is armed.

SSF Postcondition:

- 1) For a TDP-R, basic call processing has been suspended and a control relationship has been established.
 - Establishing a control relationship for a single interaction is for further study.
- 2) For a TDP-N, call processing proceeds and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.74.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.74.3 Responding entity (SCF)

17.74.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
 - Establishing a control relationship for a single interaction is for further study.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, and no "CallInformationReport" or "ApplyChargingReport" is requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.74.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.75 OAnswer procedure

17.75.1 General description

This operation is sent from the SSF to the SCF at the O_Answer DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.75.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this parameter to select SLPs based on the group and for authorization purposes. The network operators can specify that this parameter should be used if their particular network has the information available.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.

- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
routeList represents the list of routes which would have been used in order to route the call. The network operators can specify that this parameter should be used if their particular network has the information available.
- travellingClassMark:
As defined in Recommendation Q.1290.

17.75.2 Invoking entity (SSF)

17.75.2.1 Normal procedure

SSF Precondition (TDP and EDP):

- 1) Call origination attempt has been initiated.
- 2) Indication received that the call has been accepted and the terminating party has answered.
- 3) Call gapping or service filtering is not in effect.
- 4) DP criteria are met.
- 5) For a TDP-R, there is no existing control relationship.
- 6) For an EDP-R, there is an existing control relationship and the EDP O_Answer is armed.
- 7) For an EDP-N, there is an existing control or monitoring relationship and the EDP O_Answer is armed.

SSF Postcondition for TDP:

- 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.

SSF Postcondition for EDP:

- 1) The SSF-FSM stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF-FSM moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.
- 3) The SSF-FSM moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.75.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.75.3 Responding entity (SCF)

17.75.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.75.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.76 OCalledPartyBusy procedure

17.76.1 General description

This operation is sent from the SSF to the SCF at the O_Called_Party_Busy DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.76.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this parameter to select SLPs based on the group and for authorization purposes. The network operators can specify that this parameter should be used if their particular network has the information available.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.

- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
routeList represents the route used.
- travellingClassMark:
As defined in Recommendation Q.1290.
- busyCause:
This parameter specifies why the called party was busy.
- prefix:
As defined in Recommendation Q.1290.

17.76.2 Invoking entity (SSF)

17.76.2.1 Normal procedure

SSF Precondition (TDP and EDP):

- 1) Call origination attempt has been initiated.
- 2) Indication received that the terminating party is busy.
- 3) Call gapping or service filtering is not in effect.
- 4) DP criteria have been met (TDP or EDP).
- 5) For a TDP-R, there is no existing control relationship.
- 6) For an EDP-R, there is an existing control relationship and the EDP O_No_Answer is armed.
- 7) For an EDP-N, there is an existing control or monitoring relationship and the EDP O_No_Answer is armed.

SSF Postcondition for TDP:

- 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. Use of TDP-N at this DP implies that there is no further alerting of the called party and that switch based no-answer treatments, as applicable, may be invoked.

SSF Postcondition for EDP:

- 1) The SSF-FSM stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF-FSM moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.
- 3) The SSF-FSM moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.76.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.76.3 Responding entity (SCF)

17.76.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.76.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.77 ODisconnect procedure

17.77.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the O_Disconnect DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.77.1.1 Parameters

- dpSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- serviceInteractionIndicators:
This parameter provides an envelope for exchange of service interaction information.

- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- releaseCause:
Indicates the cause of the disconnect.
- routeList:
See Recommendation Q.1290.
- carrier:
See Recommendation Q.1290.
- connectTime:
Indicates the duration between the received answer indication from the called party side and the release of the connection.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.77.2 Invoking entity (SSF)

17.77.2.1 Normal procedure

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 the terminating party via the terminating BCSM.
- 4) For a TDP, call gapping or service filtering is not in effect.
- 5) DP criteria have been met.
- 6) For a TDP-R or a TDP-N, there is no existing control relationship.
- 7) For an EDP, there is an existing control relationship and the EDP O_Disconnect is armed.

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, call processing proceeds to the O_Null & Authorize Termination Attempt PIC, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.77.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP service which are used for reporting operation errors are described in clause 18.

17.77.3 Responding entity (SCF)

17.77.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.77.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP service which are used for reporting operation errors are described in clause 18.

17.78 OMidCall procedure

17.78.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the O_Midcall DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.78.1.1 Parameters

- dpSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- featureRequestIndicator:
This parameter indicates the type of feature requested.
- carrier:
See Recommendation Q.1290.
- connectTime:
Indicates the duration between the received answer indication from the called party side and the release of the connection.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.78.2 Invoking entity (SSF)

17.78.2.1 Normal procedure

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 an originating party.
- 4) For a TDP, call gapping or service filtering is not in effect.
- 5) DP criteria have been met.
- 6) For a TDP-R or a TDP-N, there is no existing control relationship.
- 7) For an EDP, there is an existing control relationship and the EDP O_Midcall is armed.

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, call processing proceeds to the O_Active PIC, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.78.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.78.3 Responding entity (SCF)

17.78.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.78.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.79 ONoAnswer procedure

17.79.1 General description

This operation is sent from the SSF to the SCF at the O_No_Answer DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.79.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this parameter to select SLPs based on the group and for authorization purposes. The network operators can specify that this parameter should be used if their particular network has the information available.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- prefix:
As defined in Recommendation Q.1290.
- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
routeList represents the route used.
- travellingClassMark:
As defined in Recommendation Q.1290.
- carrier:
As defined in Recommendation Q.1290.

17.79.2 Invoking entity (SSF)

17.79.2.1 Normal procedure

SSF Precondition (TDP and EDP):

- 1) Call origination attempt has been initiated.
- 2) Indication received that the terminating party has not answered within the specified time period.
- 3) Call gapping or service filtering is not in effect.
- 4) DP criteria have been met (TDP or EDP).
- 5) For a TDP-R, there is no existing control relationship.
- 6) For an EDP-R, there is an existing control relationship and the EDP O_No_Answer is armed.
- 7) For an EDP-N, there is an existing control or monitoring relationship and the EDP O_No_Answer is armed.

SSF Postcondition for TDP:

- 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. Use of TDP-N at this DP implies that there is no further alerting of the called party and that switch based no-answer treatments, as applicable, may be invoked.

SSF Postcondition for EDP:

- 1) The SSF-FSM stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF-FSM moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.
- 3) The SSF-FSM moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.79.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.79.3 Responding entity (SCF)

17.79.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.79.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.80 OriginationAttempt procedure

17.80.1 General description

This operation is sent from the SSF to the SCF at the OriginationAttempt DP, after detecting a valid trigger condition.

17.80.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290. The SCF can use this parameter to select SLPs based on the group and for authorization purposes. The network operators can specify that this parameter should be used if their particular network has the information available.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- carrier:
As defined in Recommendation Q.1290.
- travellingClassMark:
As defined in Recommendation Q.1290.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.80.2 Invoking entity (SSF)

17.80.2.1 Normal procedure

SSF Precondition (TDP):

- 1) Call origination attempt has been initiated.
- 2) Call gapping or service filtering is not in effect.
- 3) DP criteria have been met (TDP).
- 4) For a TDP-R, there is no existing control relationship.

SSF Postcondition for TDP:

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

17.80.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.80.3 Responding entity (SCF)

17.80.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

17.80.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.81 OriginationAttemptAuthorized procedure

17.81.1 General description

This operation is sent by the SSF after Authorization for call attempt is complete from BCSM O_Null & Authorize Origination Attempt PIC processing and a TDP has been detected.

17.81.1.1 Parameters

- dpSpecificCommonParameters:
See "AnalysedInformation" procedure.
- dialledDigits:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules for dialledDigits.

- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- travellingClassMark:
See Recommendation Q.1290. Refer to 12.10/Q.1224 for population rules for the travellingClassMark parameter.
- carrier:
See Recommendation Q.1290.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.81.2 Invoking entity (SSF)

17.81.2.1 Normal procedure

SSF Precondition:

- 1) Call processing has progressed through the O_Null & Authorize Origination Attempt PIC of the O-BCSM and the call origination attempt has been authorized.
- 2) Call gapping and SS7 overload are not in effect for the call, and the call is not to be filtered.
- 3) A trigger is armed as a TDP at the Origination_Attempt_Authorized detection point.

SSF Postcondition:

- 1) For TDP-R, a control relationship has been established and the SSF waits for instructions from the SCF.
- 2) For TDP-N, call processing continues at the Collect_Info PIC.

17.81.2.2 Error handling

If the destination SCF is not accessible, then the call is given final treatment (other treatments are for further study). On expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and the call is given final treatment (e.g. routing to a final announcement). If the calling party abandons after the sending of the OriginationAttemptAuthorized operation, then the SSF aborts the control relationship after the first answer message from the SCF has been received: the Transaction ID is held open until T_{SSF} expires.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.81.3 Responding entity (SCF)

17.81.3.1 Normal procedure

SCF Precondition:

- No control relationship exists.

SCF Postcondition:

- 1) An SLPI has been invoked; a control relationship is established for TDP-R.
- 2) For TDP-N: None.

On receipt of the OriginationAttemptAuthorized operation, the SCSM moves from "Idle" state to the state "Preparing SSF Instructions". A control relationship to the related SSF is created. A Service Logic Program Instance (SLPI) is invoked for processing the OriginationAttemptAuthorized operation. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked. The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI (i.e. the requested IN service itself).

17.81.3.2 Error handling

If the OriginationAttemptAuthorized operation is rejected, then the SCSM remains in the same state. The maintenance function is informed and no SLPI is invoked. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.82 OSuspended procedure

17.82.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the O_Suspended DP, or to report an event requested by RequestReportBCSMEvent. Refer to Recommendations Q.1214 and Q.1224 for additional call modelling related semantics.

17.82.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- legID:
See Recommendation Q.1290.

17.82.2 Invoking entity (SSF)

17.82.2.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Indication received from the Originating BCSM that an originating party has suspended.
- 3) For a TDP, call gapping or service filtering is not in effect.
- 4) DP criteria have been met.
- 5) For a TDP-R or a TDP-N, there is no existing control relationship.
- 6) For an EDP, there is an existing control relationship and the EDP O_Suspended is armed.

SSF Postcondition:

- 1) For a TDP-R, basic call processing has been suspended and a control relationship has been established.
NOTE – Establishing a control relationship for a single interaction is for further study.
- 2) For a TDP-N, call processing proceeds and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.82.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.82.3 Responding entity (SCF)

17.82.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, and no "CallInformationReport" or "ApplyChargingReport" is requested; or

The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.82.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.83 PlayAnnouncement procedure

17.83.1 General description

This operation is used for in-band interaction with an analogue user or for interaction with an ISDN user. When used to apply user treatment to the indicated leg, the user treatment can be audible (e.g. in-band tone) or visual (e.g. text displayed).

17.83.1.1 Parameters

– informationToSend:

This parameter indicates an announcement, a tone or display information to be sent to the end user by the SRF.

– inbandInfo:

This parameter specifies the in-band information to be sent.

– messageID:

This parameter indicates the message(s) to be sent, this can be one of the following:

– elementaryMessageID:

This parameter indicates a single announcement.

– text:

This parameter indicates a text to be sent. The text shall be transformed to in-band information (speech) by the SRF. This parameter consists of two subparameters, messageContent and attributes. The attributes of text may consist of items such as language.

– elementaryMessageIDs:

This parameter specifies a sequence of announcements.

– variableMessage:

This specifies an announcement with one or more variable parts.

– numberOfRepetitions:

This parameter indicates the maximum number of times the message shall be sent to the end-user.

– duration:

This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

– interval:

This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is >1.

- tone:
This parameter specifies a tone to be sent to the end-user.
- toneID:
This parameter indicates the tone to be sent.
- duration:
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- displayInformation:
This parameter indicates a text string to be sent to the end-user. This information cannot be received by a PSTN end-user.

NOTE – As the current signalling systems (DSS 1/ISUP) do not provide an indication on whether or not information can be displayed by the user's terminal, in case of user interaction with an ISDN user two consecutive "PlayAnnouncement" operations are sent. The first contains the display information, the second contains the in-band information to be sent to the user. Since the execution of the display information by the SRF should take a limited amount of time, the in-band information will be immediately sent by the SRF to the user, in sequence with the display information.
- disconnectFromIPForbidden:
This parameter indicates whether or not the SRF should be disconnected from the user when all information has been sent.
- requestAnnouncementComplete:
This parameter indicates whether or not a "SpecializedResourceReport" shall be sent to the SCF when all information has been sent.
- connectedParty:
When not present a default CSID of 1 is assumed.
- legID:
This parameter indicates to which party in the call the interaction shall apply while maintaining the speech connection between that leg and any other legs connected to the same CS.
- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment.

17.83.2 Invoking entity (SCF)

17.83.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI detects that information should be sent to the user.
- 2) A connection between the user and a SRF has been established.
- 3) The SCSM-FSM is in the state "User interaction", sub-state "Waiting for Response from the SRF".

SCF Postcondition:

- 1) If "RequestAnnouncementComplete" was set TRUE, the SCSM will stay in sub-state "Waiting for Response from the SRF" and wait for the "SpecializedResourceReport".

- 2) If "RequestAnnouncementComplete" was set FALSE and more information needs to be sent ("DisconnectFromIPForbidden" was set to TRUE), the SCSM will stay in sub-state "Waiting for Response from the SRF".
- 3) If "RequestAnnouncementComplete" was set FALSE and no more information needs to be sent ("DisconnectFromIPForbidden" was set to FALSE), the SCSM will move to the state "Preparing SSF Instructions".

17.83.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.83.3 Responding entity (SRF)

17.83.3.1 Normal procedure

SRF Precondition:

- The SRSM-FSM is in the state "Connected"; or in the state "User Interaction" if the SRF received previously an operation from the SCF.

SRF Postcondition:

- 1) The SRF sends the information to the user as indicated by "informationToSend".
- 2) The SRSM-FSM moves to the state "User Interaction"; or remains in the same state.
- 3) If all information has been sent and "RequestAnnouncementComplete" was set TRUE, the SRSM sends a "SpecializedResourceReport" operation to the SCF.
- 4) If all information has been sent and "disconnectFromIPForbidden" was set FALSE, the SRSM disconnects the SRF from the user.

The announcement sent to the end-user is ended by any of the following conditions:

- if neither "duration" or "numberOfRepetitions" is specified, then the network specific announcement ending conditions shall apply; or
- if "numberOfRepetitions" is specified, when all repetitions have been sent; or
- if duration is specified, when the duration has expired. The announcement is repeated until this condition is met; or
- if "duration" and "numberOfRepetitions" is specified, when one of both conditions is satisfied (whatever comes first).

17.83.3.2 Error handling

If a Cancel operation is received before or during the processing of the operation, then the operation is immediately cancelled and the error "Cancelled" is reported to the invoking entity.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.84 PromptAndCollectUserInformation procedure

17.84.1 General description

This operation is used to interact with a call party in order to collect information.

17.84.1.1 Parameters

- collectedInfo
 - collectedDigits
 - minimumNbOfDigits:

If this parameter is missing, the default value is defined to be 1. The "minimumNbOfDigits" specifies the minimum number of valid digits to be collected.
 - maximumNbOfDigits:

This parameter should always be present and specifies the maximum number of valid digits to be collected. The following applies: "maximumNbOfDigits" > = "minimumNbOfDigits".
 - endOfReplyDigit:

This parameter indicates the digit used to signal the end of input.

In case the "maximumNbOfDigits" = "minimumNbOfDigits", the "endOfReplyDigit" (could be present but) has no further meaning. This parameter can be one or two digits.

In case the "maximumNbOfDigits" > "minimumNbOfDigits" the following applies:

If "endOfReplyDigit" is not present, the end of input is indicated:

 - when the inter-digit timer expires; or
 - when the number of valid digits received equals the "maximumNbOfDigits".

If "endOfReplyDigit" is present, the end of input is indicated:

 - when the inter-digit timer expires; or
 - when the end of reply digit is received; or
 - when the number of valid digits received equals the "maximumNbOfDigits".

When the end of input is attained, the collected digits are sent from SRF to the SCF, including the "endOfReplyDigit" if received by the SRF.

In the case the number of valid digits received is less than the "minimumNbOfDigits" when the inter-digit timer expires or when the end of reply digit is received, the input is specified as being erroneous.
 - cancelDigit:

If this parameter is present, the cancel digit can be entered by the user to request a possible retry. All digits already received by the SRF are discarded and the same "PromptAndCollectInformation" procedure is performed again, thus e.g. the same announcement to request user information is given to the user and information is collected. This parameter can be one or two digits.

If this parameter is not present, the user is not able to request a possible retry.
 - startDigit:

If this parameter is present, the start digit indicates the start of the valid digits to be collected. The digits that are received by the SRF before this start digit is received are discarded and are not considered to be valid. This parameter can be one or two digits.

If this parameter is not present, all received digits are considered to be valid.

- firstDigitTimeout:

If this parameter is present, the first digit should be received by the SRF before the first-digit timer expiration. In case the first digit is not received before first-digit timer expiration, the input is regarded to be erroneous. After receipt of the first valid or non-valid input digit, the corresponding first-digit timer is stopped.

If this parameter is not present, then the SRF uses a default value (network-operator specific) for the first-digit timer in which the first valid or non-valid input digit is received.

If "startDigit" is present, the first-digit timer is stopped after the start digit is received.
- interDigitTimeOut:

If this parameter is present any subsequent valid or non-valid digit should be received by the SRF before the inter-digit timer expires. As a result, the inter-digit timer is reset and restarted.

In case a subsequent valid or non-valid digit is not received before the inter-digit timer expires and the number of received valid digits is less than the "minimumNbOfDigits", the input is regarded to be unsuccessful.

In case a subsequent valid or non-valid digit is not received before the inter-digit timer expires and the number of received valid digits is greater than the "minimumNbOfDigits", and less than or equal to the "maximumNbOfDigits", the input is regarded to be successful.

If the "interDigitTimeOut" is not present, then the SRF uses a default value for the inter-digit time.
- errorTreatment:

This optional parameter defines what specific action should be taken by the SRF in the event of error conditions occurring. The default value is reportErrorToSCF.
- interruptableAnnInd:

This parameter is optional, where the default value is specified being TRUE.

If this parameter is TRUE, the announcement is interrupted after the first valid or non-valid digit is received by the SRF. If the announcement is interrupted, a possible start-digit timer will not apply anymore. However, if the announcement has not been interrupted, a possible start-digit timer is started after the announcement has been finished.

If this parameter is present and explicitly set to FALSE, the announcement will not be interrupted after the first digit is received by the SRF. The received digits during the announcement are discarded and considered to be non-valid. All other specified parameters ("minimumNbOfDigits", "maximumNbOfDigits", "endOfReplyDigit", etc.) do not apply before the announcement has been finished. The possible start-digit timer is started after the announcement has been finished.
- voiceInformation:

This parameter is optional, where the default value is specified being FALSE. If the "voiceInformation" parameter is FALSE, all valid or non-valid digits are entered by DTMF.

If this parameter is present and explicitly set to TRUE, calling user is required to provide all valid or non-valid information by speech. The SRF will perform voice

recognition and translation of the provided information into digits. A possible end of reply digit will also have to be provided by speech.

- voiceBack:

This parameter is optional, where the default value is specified being FALSE. If the "voiceBack" parameter is FALSE, no voice back information is given by the SRF.

If this parameter is present and explicitly set to TRUE, the valid input digits received by the SRF will be announced back to the calling user immediately after the end of input is received. The non-valid input digits will not be announced back to the calling user.

A possible end of reply digit is not voiced back.

- disconnectFromIPForbidden:

This parameter indicates whether the SRF should initiate disconnection to the SSF/CCF after the interaction has been completed. If the parameter is not present or set to TRUE, the SRF shall not initiate disconnection.

- informationToSend:

This parameter indicates an announcement, a tone or display information to be sent to the end user by the SRF.

- inbandInfo:

This parameter specifies the in-band information to be sent.

- messageID:

This parameter indicates the message(s) to be sent, this can be one of the following:

- elementaryMessageID:

This parameter indicates a single announcement.

- text:

This parameter indicates a text to be sent. The text shall be transformed to in-band information (speech) by the SRF. This parameter consists of two subparameters, messageContent and attributes. The attributes of text may consist of items such as language.

- elementaryMessageIDs:

This parameter specifies a sequence of announcements.

- variableMessage:

This parameter specifies an announcement with one or more variable parts.

- numberOfRepetitions:

This parameter indicates the maximum number of times the message shall be sent to the end-user.

- duration:

This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

- interval:

This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is >1.

- tone:
This parameter specifies a tone to be sent to the end-user.
- toneID:
This parameter indicates the tone to be sent.
- duration:
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- displayInformation:
This parameter indicates a text string to be sent to the end-user. This information cannot be received by a PSTN end-user.

NOTE – As the current signalling systems (DSS 1/ISUP) do not provide an indication on whether or not information can be displayed by the user's terminal, in case of user interaction with an ISDN user, the "displayInformation" parameter is not used in the "PromptAndCollectUserInformation" operation. Instead a "PlayAnnouncement" operation containing the "displayInformation" parameter followed by a "PromptAndCollectUserInformation" operation containing in-band information are sent to the user. Since the execution of the displayed information by the SRF should take a limited amount of time, the in-band information will be immediately sent after by the SRF to the user, in sequence with the displayed information.
- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.

Result Parameters:

- digitsResponse:
This parameter contains the information collected from the end-user.

17.84.2 Invoking entity (SCF)

17.84.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI detects that information should be collected from the end-user.
- 2) A connection between the end-user and a SRF has been established.
- 3) The SCSM FSM is in state "User Interaction", sub-state "Waiting for Response from the SRF".

SCF Postcondition:

- 1) The collected information is received from the SRF as response to the "PromptAndCollectUserInformation" operation.
- 2) If the "disconnectFromIPForbidden" was set to FALSE, the SCSM FSM will move to the state "Preparing SSF Instructions".
- 3) Otherwise the SCSM FSM remains in the same state.

The SLPI may continue execution before the response is received from the "PromptAndCollectUserInformation" operation, more than one operation may be sent to the SRF before the response is received. The "disconnectFromIPForbidden" parameter may only be set to FALSE if the "PromptAndCollectUserInformation" operation is the last operation sent to the SRF.

17.84.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, the TCAP services which are used for reporting operation errors are described in clause 18.

17.84.3 Responding entity (SRF)

17.84.3.1 Normal procedure

SRF Precondition:

- The SRSM-FSM is in the state "Connected", or in state "User Interaction" if the SRF received previously an operation from the SCF.

SRF Postcondition:

- 1) The SRF has sent the information to the end-user as indicated by "informationToSend".
- 2) The collected information from the end-user is sent to the SCF as RETURN RESULT of the "PromptAndCollectUserInformation".
- 3) If the "disconnectFromIPForbidden" was set to FALSE, the SRF initiates a bearer channel disconnect to the SSF and the SRSM FSM moves to the state "Idle".
- 4) Otherwise the SRSM FSM moves to the state "User Interaction"; or remains in the same state.

The announcement sent to the end-user is ended by any of the following conditions:

- if neither "duration" nor "numberOfRepetitions" is specified, then the network-specific announcement ending conditions shall apply; or
- if "numberOfRepetitions" is specified, when all repetitions have been sent; or
- if "duration" is specified, when the duration has expired. The announcement is repeated until this condition is met; or
- if "duration" and "numberOfRepetitions" is specified, when one of both conditions is satisfied (whatever comes first).

The above conditions are overruled if the parameter "interruptableAnnInd" is not set to FALSE and the end-user has responded with a digit during the sending of the announcement. In this case the announcement is ended immediately. The above procedures apply only to in-band information and tones sent to the end-user, for "displayInformation" the end conditions are met upon sending, i.e. no interruption can occur.

The parameter "errorTreatment" specifies how the SRF shall treat the error. The default value "reportErrorToSCF" means that the error shall be reported to SCF by means of Return Error with "ImproperCallerResponse". The value "help" indicates that no error shall be reported to SCF but assistance shall be given to the end-user in form of a network-dependent default announcement (which may be dependent on the context, i.e. the send message). The value "repeatPrompt" indicates that no error shall be reported to the SCF but the prompt shall be repeated to the end-user. The last two procedures shall only be done once per "PromptAndCollectUserInformation" operation.

Note on processing "endOfInput"

The receipt of any "endOfInput" condition (e.g. endOfReplyDigit, cancelDigit, firstDigitTimeout, interDigitTimeout) terminates immediately the ongoing input. In other words when, for example, an endOfReplyDigit is received, the receipt of a subsequent cancelDigit will not be processed anymore.

17.84.3.2 Error handling

If a Cancel operation is received before or during the processing of the operation, then the operation is immediately cancelled and the error "Cancelled" is reported to the invoking entity.

Generic error handling for the operation related errors is described in clause 16, the TCAP services which are used for reporting operation errors are described in clause 18.

If any of the parameter restrictions are violated (e.g. minimumNbOfDigits > maximumNbOfDigits), then an operation error has occurred.

17.85 PromptAndReceiveMessage procedure

17.85.1 General description

This operation is used to interact with a call party in order to record information.

17.85.1.1 Parameters

- disconnectFromIPForbidden:
This parameter indicates whether the SRF should initiate disconnection to the SSF/CCF after the interaction has been completed. If the parameter is not present or set to TRUE, the SRF shall not initiate disconnection.
- informationToSend:
This parameter indicates an announcement, a tone or display information to be sent to the end user by the SRF.
 - inbandInfo:
This parameter specifies the in-band information to be sent.
 - messageID:
This parameter indicates the message(s) to be sent, this can be one of the following:
 - elementaryMessageID:
This parameter indicates a single announcement.
 - text:
This parameter indicates a text to be sent. The text shall be transformed to in-band information (speech) by the SRF. This parameter consists of two subparameters, messageContent and attributes. The attributes of text may consist of items such as language.
 - elementaryMessageIDs:
This parameter specifies a sequence of announcements.
 - variableMessage:
This parameter specifies an announcement with one or more variable parts.
 - numberOfRepetitions:
This parameter indicates the maximum number of times the message shall be sent to the end-user.
 - duration:
This parameter indicates the maximum time duration in seconds that the message shall be played/repeated. ZERO indicates endless repetition.

- interval:
This parameter indicates the time interval in seconds between repetitions, i.e. the time between the end of the announcement and the start of the next repetition. This parameter can only be used when the number of repetitions is >1.
- tone:
This parameter specifies a tone to be sent to the end-user.
 - toneID:
This parameter indicates the tone to be sent.
 - duration:
This parameter indicates the time duration in seconds of the tone to be sent. ZERO indicates infinite duration.
- displayInformation:
This parameter indicates a text string to be sent to the end-user. This information cannot be received by a PSTN end-user.

NOTE – As the current signalling systems (DSS 1/ISUP) do not provide an indication on whether or not information can be displayed by the user's terminal, in case of user interaction with an ISDN user, the "displayInformation" parameter is not used in the "PromptAndCollectUserInfo" operation. Instead a "PlayAnnouncement" operation containing the "displayInformation" parameter followed by a "PromptAndReceiveMessage" operation containing in-band information are sent to the user. Since the execution of the displayed information by the SRF should take a limited amount of time, the in-band information will be immediately sent after by the SRF to the user, in sequence with the displayed information.
- subscriberID:
This parameter identifies to the SRF, the subscriber for whom information shall be recorded.
- mailBoxID:
This parameter identifies the mailbox for which information shall be recorded, in case the subscriber owns multiple mailboxes.
- informationToRecord:
 - messageID:
This parameter indicates the identifier that shall be assigned to the recorded message. This option is used when the recording is not intended for a mailbox belonging to a specific subscriber, but a temporary recording, e.g. within the context of 1 call.
 - messageDeletionTimeOut:
This parameter indicates the maximum time duration a message recording shall be stored in the SRF.
 - timeToRecord:
This parameter indicates the maximum allowed time for the recording.

- controlDigits:
 - endOfRecordingDigit:

If this parameter is present, the end of recording digit can be entered by the user in order to mark the end of the recording. This parameter can be one or two digits.
 - cancelDigit:

If this parameter is present, the cancel digit can be entered by the user in order to cancel the ongoing recording. Any information received so far shall be erased. This parameter can be one or two digits.
 - replayDigit:

If this parameter is present, the replay digit can be entered by the user to have the recorded message replayed. This parameter can be one or two digits.
 - restartRecordingDigit:

If this parameter is present, the restart digit can be entered by the user to request a possible retry. All information already received by the SRF is erased and the same "PromptAndReceiveMessage" procedure is performed again, thus for example, the same announcement to request user information is given to the user and information is collected. This parameter can be one or two digits.
 - restartAllowed:

This parameter indicates whether or not a possible restart recording is allowed.
 - replayAllowed:

This parameter indicates whether or not a possible replay of the recording is allowed.
- media:

This parameter indicates the type of media for the recording.
- callSegmentIdentifier:

This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.
- receivedStatus:

This parameter indicates the result of the recording. Three values are distinguished: MessageComplete – the recording was successfully completed. End of recording may be indicated, e.g. by an end of recording digit, voice activity monitoring or by onhook. MessageInterrupted – the user has abandoned the recording, e.g. by going onhook or by pushing the cancel digit. MessageTimeout – the maximum recording time has been exceeded.
- recordedMessageID:

This parameter reports to the SCF the identifier assigned to the recorded message. It is only used, if the MessageID was not assigned by the SCF. This option can be used when the recording is intended for a mailbox belonging to a specific subscriber.
- recordedMessageUnits:

This parameter indicates the amount of resources occupied by the recorded message. This can be expressed in units of time, memory usage, etc.

17.85.2 Invoking entity (SCF)

17.85.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI detects that information should be recorded from the end-user.
- 2) A connection between the end-user and a SRF has been established.
- 3) The SCSM FSM is in state "User Interaction", sub-state "Waiting for Response from the SRF".

SCF Postcondition:

- 1) The identifier of the recorded message is received from the SRF as response to the "PromptAndReceiveMessage" operation.
- 2) If the "disconnectFromIPForbidden" was set to FALSE, the SCSM FSM will move to the state "Preparing SSF Instructions".
- 3) Otherwise the SCSM FSM remains in the same state.

The SLPI may continue execution before the response is received from the "PromptAndReceiveMessage" operation, more than one operation may be sent to the SRF before the response is received. The "disconnectFromIPForbidden" parameter may only be set to FALSE if the "PromptAndReceiveMessage" operation is the last operation sent to the SRF.

17.85.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, the TCAP services which are used for reporting operation errors are described in clause 18.

17.85.3 Responding entity (SRF)

17.85.3.1 Normal procedure

SRF Precondition:

- The SRSF-FSM is in the state "Connected", or in state "User Interaction" if the SRF received previously an operation from the SCF.

SRF Postcondition:

- 1) The SRF has sent the information to the end-user as indicated by "informationToSend".
- 2) After having recorded the message from the end-user, the identifier assigned to the recorded message is sent to the SCF as RETURN RESULT of the "PromptAndReceiveMessage".
- 3) If the "disconnectFromIPForbidden" was set to FALSE, the SRF initiates a bearer channel disconnect to the SSF and the SRSF FSM moves to the state "Idle".
- 4) Otherwise the SRSF FSM moves to the state "User Interaction", or remains in the same state.

The announcement sent to the end-user is ended by any of the following conditions:

- if neither "duration" nor "numberOfRepetitions" is specified, then the network-specific announcement ending conditions shall apply; or
- if "numberOfRepetitions" is specified, when all repetitions have been sent; or
- if "duration" is specified, when the duration has expired. The announcement is repeated until this condition is met; or
- if "duration" and "numberOfRepetitions" is specified, when one of both conditions is satisfied (whatever comes first).

The above procedures apply only to in-band information and tones sent to the end-user, for "displayInformation" the end conditions are met upon sending, i.e. no interruption can occur.

Note on processing "endOfInput"

The receipt of any "endOfInput" condition (e.g. endOfRecordingDigit timeToRecord) terminates immediately the ongoing input. In other words when, for example, an endOfReplyDigit is received, the receipt of a subsequent cancelDigit will not be processed anymore.

17.85.3.2 Error handling

If a Cancel operation is received before or during the processing of the operation then the operation is immediately cancelled and the error "Cancelled" is reported to the invoking entity.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.86 ProvideUserInformation procedure

17.86.1 General description

This operation is used by a supporting SCF to request user information through the help of the SCF controlling the call. The received user information will be used in the supporting SCF to determine the way the call should be handled. The operation provides the means for the controlling SCF to build the operations to prompt the user and collect information from him/her.

The operation result sends back user information to an 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.

17.86.1.1 Parameters

- infoToSend:
This parameter is used to convey the contents of the information passed to the user to request inputs from him/her. This information could be provided to the user with an IP, a display or a simple tone, but the mode of user interaction should be in line with the available modes that might have been provided in the "handlingInformationRequest" operation.
- errorInfo:
This parameter 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" parameter.
- constraints:
This parameter 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.
- actions:
The parameter provides the type of action, either play announcement or playannouncement&collectedigits, to be performed.
- preferredLanguage:
The parameter gives the language that should be preferably used in user interactions. If the preferred language is not available, it is the default language that should be used.

- numberOfAllowedRetries:
The parameter provides the number of retries the user is allowed to make.
- typeOfRequestedInfo:
The parameter provides the type info to be requested to the user.
- securityParameter:
This optional parameter conveys security related information.
- userInformation:
The parameter contains the information collected from the user.

17.86.2 Invoking entity (supporting SCF)

17.86.2.1 Normal procedure

SCF Precondition:

- 1) A "handlingInformationRequest" operation has been received.
- 2) The SLPI has identified the need for more information than what is already available.
- 3) The SCF FSM is in state "Assisting Mode".

SCF Postcondition:

- The SCSM moves to the state "Assisting Mode".

After receiving a "handlingInformationRequest", the supporting SCF was not able to provide call instructions to the controlling SCF, because information known from the user is not available. The supporting SCF then sends a "provideUserInformationRequest" operation. One operation can be used to request several pieces of information.

Once the operation is sent, the supporting SCF moves to the state "Waiting for Additional Information" and awaits from the user information to be sent by the controlling SCF.

On receipt of the "provideUserInformationResult", the SCSM moves from the state "Waiting for Information" to the state "Assisting Mode". The user information received in the operation are used to provide assistance to the controlling SCF so that it can correctly handle the call. Only the supporting SCF knows how to use and to interpret the received information.

When the SCF receives an indication that a user interaction has failed, the SLPI decides upon the follow-up actions and especially, which kind of call instructions should be provided to the controlling SCF. In particular, the SCF can provide a specific user announcement in case of error if not already provided in the "provideUserInformation" operation.

17.86.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.86.3 Responding entity (controlling SCF)

17.86.3.1 Normal procedure

SCF Precondition:

- A "handlingInformationRequest" operation has been sent.

SCF Postcondition:

- The SCF moves to the state "Assisted Mode".

On receipt of the "provideUserInformationRequest" operation the SCSM moves from "Assisted Mode" to the state "Preparing Information". The SCF uses user interaction procedures to receive the requested information from the user (connection of an IP, STUI, etc.).

The information received from the user can be challenged against the constraints provided in the parameters. If a user gives an improper response, a retry of the error message can occur (if allowed).

If several pieces of information are requested from the user, a failure to obtain one of them leads to the end of the user interaction phase or to the request of the next piece of information depending on the user interaction strategy adopted. In the first case only responded pieces are reported back to the supporting SCF, in the second case the failure is reported to the supporting SCF through a "taskRefused" error.

In the state "Preparing Information", the SCF collects information from the user. When all the user interactions have been performed successfully or not, the SCSM moves to the state "Assisted Mode". It sends the "provideUserInformationResult" operation to the supporting SCF. The operation containing information provided by the user and/or indications that the procedures to get information from the user has failed.

When a user fails to correctly provide a piece of information even after the number of retries specified in the "provideUserInformationRequest" operation, it is the user interaction strategy parameter that determines the actions to be performed.

17.86.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.87 Reconnect procedure

17.87.1 General description

This operation requests the SSF 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 operation requests that BCSM processing set the associated timer to the value specified by NotificationDuration, and provide the requested AlertingPattern and/or DisplayInformation to the controlling leg.

17.87.1.1 Parameters

- AlertingPattern:
See Recommendation Q.1290.
- NotificationDuration:
See Recommendation Q.1290.
- DisplayInformation:
See Recommendation Q.1290.
- callSegmentID:
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.87.2 Invoking entity (SCF)

17.87.2.1 Normal procedure

SCF Precondition:

- 1) SSF has received a disconnect indication from a controlling leg².
- 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.

17.87.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.87.3 Responding entity (SSF)

17.87.3.1 Normal procedure

SSF Precondition:

- A TDP or EDP request has been invoked.

SSF Postcondition:

- 1) Call processing resumes.
- 2) SSF sets the reconnect timer to the value specified by NotificationDuration.
- 3) SSF alerts the controlling leg using the indicated AlertingPattern and/or DisplayInformation.
- 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.

17.87.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.88 ReleaseAssociation procedure

17.88.1 General description

This operation is used to release an existing association between the user and the network by the SCF at the phase of preparing CUSF instructions the call unrelated interaction.

² Existing signalling does not support the use of Reconnect for a controlling leg at a transit exchange.

17.88.1.1 Parameters

– Cause:

A number giving an indication to the CUSF about the reason of releasing this specific association. This may be used by CUSF to fill in the 'cause' in the association releasing message.

17.88.2 Invoking entity (SCF)

17.88.2.1 Normal procedure

SCF Precondition:

- 1) FSM for CUSF within the SCF is in the state N2: "Preparing CUSF Instructions".
- 2) SLPI requests to release the association between the user and the network.

SCF Postcondition:

- FSM for CUSF within the SCF moves to state N1: "Idle".

17.88.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.88.3 Responding entity (CUSF)

17.88.3.1 Normal procedure

CUSF Precondition:

- CUSF-FSM is in state b: "Waiting for Instructions".

CUSF Postcondition:

- 1) CUSF releases the association with association release message which may contain previously specified component (by SendComponent) to the user.
- 2) CUSF-FSM moves to state a: "Idle".

17.88.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.89 ReleaseCall procedure

17.89.1 General description

This operation is used by the SCF to tear down an existing call segment or segments at any phase of the call for all parties involved in the relevant call segments. This operation may not be sent to an assisting SSF, except in the case of hand-off procedure.

17.89.1.1 Parameters

– initialCallSegment:

Indicates that the initial Call Segment shall be released.

• releaseCause:

A number giving an indication to the SSF about the reason of releasing this specific call. This may be used by SSF for generating specific tones to the different parties in the call or to fill in the "cause" in the release message.

- associatedCallSegment:
Indicates that the an associated Call Segment shall be released.
 - CallSegment:
This parameter indicates the Call Segment to be released.
 - Cause:
A number giving an indication to the SSF about the reason of releasing this specific call. This may be used by SSF for generating specific tones to the different parties in the call or to fill in the "cause" in the release message.
- allCallSegments:
Indicates that all Call Segments within the Call Segment Association shall be released.
 - Cause:
A number giving an indication to the SSF about the reason of releasing these calls. This may be used by SSF for generating specific tones to the different parties in the call or to fill in the "cause" in the release message.

17.89.2 Invoking entity (SCF)

17.89.2.1 Normal procedure

SCF Precondition:

- State 2.1, "Preparing SSF instructions" or State 2.3, "Waiting for Notification or Request".

SCF Postcondition:

- State 1, "Idle", if neither "CallInformationReport" nor "ApplyChargingReport" has to be received from the SSF. All resources (e.g. queue) related to the call are released by the SCF;
or
State 2.3, "Waiting for Notification or Request" if a "CallInformationReport" or "ApplyChargingReport" still has to be received from the SSF.

17.89.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.89.3 Responding entity (SSF)

17.89.3.1 Normal procedure

SSF Precondition:

- State C, "Waiting for Instructions"; or
State F, "Monitoring".

SSF Postcondition:

- "Idle", state a, after sending any outstanding "CallInformationReport". Possible armed EDPs are ignored. All connections and resources related to the call are released.

17.89.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.90 RemoveEntry procedure

17.90.1 General description

The X.500 "RemoveEntry" operation is used to request the SDF to remove a leaf entry (either a object entry or an alias entry) from the DIT. For a full description of the RemoveEntry operation, see 11.2/X.511.

17.90.1.1 Parameters

See 11.2.2/X.511 and 11.2.3/X.511.

17.90.2 Invoking entity (SCF)

17.90.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound" or "Wait for Subsequent Requests".

SCF Postcondition:

- SCSM: "SDF Bound".

When the SCSM is in the state "Wait for Subsequent Requests" and a need of the service logic to remove an entry from the SDF exists, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter (or a timer expiry) that the operation should be sent, the SCSM remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the SDF in a message containing a Bind argument. The SCSM waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SCSM has moved to state "Idle", the RemoveEntry operation was discarded. In the State "SDF Bound", the response of the RemoveEntry operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the RemoveEntry operation or an error.

When the SCSM is in the state "SDF Bound" and a need of the service logic to remove an entry from the SDF exists, an internal event occurs. This event, called (e6) Request_to_SDF causes a transition to the same state "SDF Bound" and the SCSM waits for the response from the SDF. The reception of the response [(E7) Response_from_SDF] to the RemoveEntry operation previously issued to the SDF causes a transition of the SCF to the same state "SDF Bound". The response from the SDF may be either the result of the RemoveEntry operation or an error.

17.90.2.2 Error handling

Generic error handling for the operation related errors is described in 11.2.4/X.511 and 11.2.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.90.3 Responding entity (SDF)

17.90.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM: "SCF Bound".

When the SDF is in the state "Bind Pending", the external event (E3) Request_from_SCF caused by the reception of a "RemoveEntry" operation from the SCF occurs. The SDF does not proceed to the operation until a Bind operation has been successfully executed. It remains in the same state.

When the SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a "RemoveEntry" operation from the SCF occurs. The SDF waits for the response to the operation.

On the receipt of the event (E7) and before removing the entry item, the SDF takes the following actions:

- verify that the object to be removed exists and is a leaf entry;
- verify that the access rights to remove the entry are sufficient.

After the specified actions indicated above are successfully executed, the entry is removed from the SDF database. A null result is returned to the SCF. The sending of the result corresponds to the event (e6) Response_to_SCF.

17.90.3.2 Error handling

Generic error handling for the operation related errors is described in 11.2.4/X.511 and 11.2.5/X.511, and the TCAP services that are used for reporting operation errors are described in clause 18.

17.91 ReportChargingInformation procedure

17.91.1 General description

The operation reports to an supporting SCF the outcome of the call in terms of charging information, the call being controlled by the controlling SCF. It may be a response to a previously issued "establishChargingRecord" with the "expectedReport" parameter positioned to TRUE or the first operation relating to the charge to the supporting SCF, if it has been pre-arranged. In the latter case, the call-by-call charging related information exchange by establishChargingRecord operation is not necessary, because the charging rate, etc. is predefined and is properly applied to the call in the controlling SCF.

17.91.1.1 Parameters

- uniquecallIdentity:
This parameter is used to indicate the identity of the call that has motivated the use of the operation. There is a one-to-one relationship between this identity, the identity of the service logic program instance that treats the call and the identity of the assisting service logic program instance. This information can be further used to address a specific logic program instance.
- remainingUserCredit:
This parameter contains the user's credit after the call. It is expressed in terms of telecommunication units.
- callRecord:
This parameter contains the call record related to the call. This information consists (at least) of call duration, calling party and called party number.
- accountNumber:
This parameter provides the unique identification of the account to which the cost of the call is registered

17.91.2 Invoking entity (controlling SCF)

17.91.2.1 Normal procedure

SCF Precondition:

- 1) A "establishChargingRecord" operation has been received with the "reportExpected" parameter positioned to TRUE or it has been pre-arranged.
- 2) A call has taken place.
- 3) SCF FSM is in the "Assisted Mode" state.

SCF Postcondition:

- SCF FSM remains in the "Assisted Mode" state.

After a call has taken place and either an "establishChargingRecord" operation has been sent, requesting the charging information to be reported, or it has been pre-arranged, the SCF sends a "reportChargingInformation" operation to report the outcome of the charging procedure that took place for the call. It contains the call identity to know the call it refers to and the user credit after the call.

17.91.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.91.3 Responding entity (supporting SCF)

17.91.3.1 Normal procedure

SCF Precondition:

- 1) The SCF has sent an "establishChargingRecord" operation or it has been pre-arranged.
- 2) SCF FSM is in the "Assisting Mode" state.

SCF Postcondition:

- SCF FSM remains in the "Assisting Mode" state.

On receipt of the "reportChargingInformation" operation, the SCF uses the information to update the user's data and it could also report the information to the management functions for security and billing purposes.

17.91.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.92 ReportUTSI procedure

17.92.1 General description

This operation is used to notify the SCF of an UTSI IE previously requested by the SCF in a *RequestReportUTSI* operation.

This is a class 4 operation.

17.92.1.1 Parameters

– USIInformation:

This parameter conveys information provided by the User dedicated to the Service Logic. It is transparent at the SSF level.

– LegID:

This parameter indicates the party in the call from which the UTSI information element has been received. The legID value is assigned as such:

NOTE – The IN CS-1 definition of this parameter makes assumptions regarding the allocation of LegID values. With the introduction in IN CS-2 of Call Party Handling, these assumptions are no longer appropriate. For IN CS-2, the leg numbering is based on the following principles:

- legID = 1 is the controlling leg and legID = 2 is the passive leg in case the initial call segment created was an originating call segment (CS state 'Originating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers.
- legID = 1 is the passive leg and legID = 2 is the controlling leg (i.e. inverse to the above) in case the initial call segment created was a terminating call segment (CS state 'Terminating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers. For IN CS-1 implementations in the case of a mid call trigger, it was assumed that legID = 2 was assigned to the party not causing the trigger and legID = 1 was assigned to the party causing the trigger.

– USIServiceIndicator:

It indicates the Service Logic requesting the Monitoring of an UTSI information element. It is used as a Monitoring criteria at the SSF level. It also provides the correlation with the RequestReportUTSI operation.

17.92.2 Invoking entity (SSF)

17.92.2.1 Normal procedure

SSF Precondition:

- 1) The SSF FSM is in any state except "Idle".
- 2) The SSF_USI FSM is in the state "Monitoring UTSI IE".

SSF Postcondition:

- 1) The SSF remains in the same state.
- 2) The SSF_USI FSM remains in the same state.

17.92.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.92.3 Responding entity (SCF)

17.92.3.1 Normal procedure

SCF Precondition:

- 1) A control or monitor relationship exists between the SSF and the SCF.
- 2) The SCF_USI FSM is in the state "Monitoring UTSI IE".

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCF_USI FSM remains in the same state.

17.92.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.93 RequestCurrentStatusReport procedure

17.93.1 General description

This operation is used to request the SSF to report the current status (busy or idle) of a particular termination resource.

17.93.1.1 Parameters

- resourceID:
This parameter indicates the physical termination resource for which the SCF is requesting monitoring by the SSF. This parameter is one of lineID, facilityGroupID, facilityGroupMemberID, or trunkGroupID.
- resourceStatus:
This parameter indicates the busy/idle status of the resource.

17.93.2 Invoking entity (SCF)

17.93.2.1 Normal Procedure

SCF Precondition:

- 1) The SLPI has determined that a "Request Current Status Report" operation has to be sent.
- 2) The SCME is in the state "Status Report Idle".

SCF Postcondition:

- The SCME is in the state "Waiting for SSF Response Status Report".

When the SPLI requires the current status of a physical termination resource, the SCF sends "Request Current Status Report" operation to the SSF to request the SSF to determine the status of the specific termination resource. Then the SCME moves to the state "Waiting for SSF Response Status Report" from the state "Status Report Idle". The SCME is returned to the State "Status Report Idle", when the SCF receive a response from the SSF.

Clarification on the use of this operation within or outside the context of a call is not a matter for standardization in IN CS-2.

17.93.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.93.3 Responding entity (SSF)

17.93.3.1 Normal Procedure

SSF Precondition:

- The SSME is in the state "IdleManagement".

SSF Postcondition:

- The SSME is in the state "Idle Management".

On receipt of this operation, the SSF determines the status of specific termination resource and sends ReturnResult of this operation with the result of the status to the SCF. If an error occurs (e.g. the SSF

cannot find the specific termination resource), then the SSF sends `ReturnError` of this operation with the appropriate error type to the SCF.

17.93.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.94 RequestEveryStatusChangeReport procedure

17.94.1 General description

This operation is used to request the SSF start to monitor every change of the busy/idle status of a particular termination.

17.94.1.1 Parameters

- `resourceID`:
This parameter indicates that physical termination resource which is requested by the SCF to be monitored by the SSF. This parameter is one of the `lineID`, `facilityGroupID`, `facilityGroupMemberID`, or `trunkGroupID`.
- `correlationID`:
This parameter is used by the SCF to associate the "StatusReport" from the SSF with the request in the SCF.
- `monitorDuration`:
This parameter indicates the maximum time duration for monitoring in the SSF.

17.94.2 Invoking entity (SCF)

17.94.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI has determined that a "Request Every Status Change Report" operation has to be sent.
- 2) The SCME is in the state "Status Report Idle".

SCF Postcondition:

- The SCME is in the state "Waiting for SSF Response Status Report".

When the SPLI requests to monitor every change of the busy/idle status of a physical termination resource, the SCF sends "Request Every Status Change Report" operation to the SSF to monitor every change of the status of a particular termination resource. Then the SCME is moved to the state "Waiting for SSF Resource Status Report" from the state "Status Report Idle". After this, in the case that The SCF receives `ReturnResult` of this operation, the SCME remains in same state. When the SCF receives `ReturnError` of this operation, the SCME is returned to the state "Status Report Idle".

When the SCF receives a Status Report operation from the SSF, the SCME remains in the state "Waiting for SSF Resource Status Report". Alternatively when the SCF receives a "Status Report" operation with the `monitorCondition` parameter set to "timerExpired" or "cancelled" from SSF, the SCME is returned to the state "Status Report Idle".

Clarification on the use of this operation within or outside the context of a call is for further study.

17.94.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.94.3 Responding entity (SSF)

17.94.3.1 Normal Procedure

SSF Precondition:

- The SSME is in one of the following states:
state ma: "IdleManagement".
state mb: "Non-Call Associated Treatment".

SSF Postcondition:

- The SSME is in one of the following states:
state ma: "IdleManagement".
state mb: "Non-Call Associated Treatment".

On receipt of this operation, the SSF starts to monitor every change of the busy/idle status of a particular termination resource. If an error occurs (e.g. the SSF cannot find the specific termination resource), then the SSF sends ReturnError of this operation with proper error type to the SCF.

The SSF continuously monitors every change of the busy/idle status of a particular termination resource until a timer which is specified by monitorDuration parameter expires. Whenever the SSF finds a change of status, the SSF sends the "Status Report" Operation to the SCF with monitorCondition parameter set to "statusReport". After sending this operation, the SSF should remain in the "Non-Call Associated Treatment" state. If timer expiration occurs, the SSF sends the "StatusReport" Operation to the SCF with monitorCondition parameter set to "timerExpired". Alternatively, when the SSF receives a "Cancel Status Report" operation from the SCF, the SSF sends the "Status Report" Operation to the SCF with monitorCondition parameter set to "Cancelled". After the SSF sends this operation, the SSME should move to the state "IdleManagement" unless there are other processes of Non-Call Associated operation, in which case the SSF should remain in the state "Non-Call AssociatedTreatment".

17.94.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.95 RequestFirstStatusMatchReport procedure

17.95.1 General description

This operation requests the SSF to start monitoring the status of a particular termination resource. When the status has changed to the requested state (busy or idle), it is reported to the SCF.

17.95.1.1 Parameters

- resourceID:
This parameter indicates that physical termination resource which is requested by the SCF to be monitored by the SSF. This parameter is one of the lineID, facilityGroupID, facilityGroupMemberID, or trunkGroupID.

- resourceStatus:
This parameter indicates the status which is requested to detect by SCF of termination resource.
- correlationID:
Used by the SCF for correlation with a previous operation.
- monitorDuration:
This parameter indicates the maximum time duration for monitoring in the SSF.
- bearerCapability:
This parameter indicates the type of bearer capability connection to the user. Refer to 12.10/Q.1224 for population rules for the bearer capability parameter.

17.95.2 Invoking entity (SCF)

17.95.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI has determined that a "Request First Status Match Report" operation has to be sent.
- 2) The SCME is in the state "Status Report Idle".

SCF Postcondition:

- The SCME is in the state "Waiting for SSF Response Status Report".

When the SPLI requests to monitor the status of physical termination resource, the SCF sends "Request First Status Match Report" operation to the SSF to request the SSF start to monitor a specific termination resource. Then the SCME is moved to the state "Waiting for SSF Response Status Report" from the state "Status Report Idle". After this, in the case that the SCF receives ReturnResult of this operation, the SCME remains in the same status. When the SCF receives ReturnError of this operation, the SCME is returned to the state "Status Report Idle".

The SCME is returned to the State "Status Report Idle" when the SCF receives a Status Report operation from the SSF.

Clarification on the use of this operation within or outside the context of a call is for further study.

17.95.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.95.3 Responding entity (SSF)

17.95.3.1 Normal procedure

SSF Precondition:

- The SSME is in one of the following states:
state ma: "IdleManagement".
state mb: "Non-Call Associated Treatment".

SSF Postcondition:

- The SSME is in one of the following states:
state ma: "IdleManagement".
state mb: "Non-Call Associated Treatment".

On receipt of this operation, the SSF starts to monitor the status of particular termination resource, and the SSF sends ReturnResult of this operation to the SCF. If an error occurs (e.g. the SSF cannot find specific termination resource), then the SSF sends ReturnError of this operation with proper error type to the SCF.

The SSF continuously monitors the status of particular termination resource till the status is changed in specific state or timer which is specified by monitorDuration parameter is expired. If the SSF finds the change of status in specific state, the SSF sends "Status Report" operation to the SCF with monitorCondition parameter is set "statusReport". If the timer expiration occurs, the SSF sends "StatusReport" operation to the SCF with monitorCondition parameter is set "timerExpired". Another case, the SSF receives "Cancel Status Report" operation from the SCF, the SSF sends "Status Report" operation to the SCF with monitorCondition parameter is set "Cancelled". After the SSF sends this operation, the SSME should move to the state "IdleManagement" unless there are other processes of Non-Call Associated operation, in which case the SSF should remain in the "Non-Call Associated Treatment".

17.95.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.96 RequestNotification procedure

17.96.1 General description

This operation is used by the supporting SCF to request an event notification to the controlling SCF.

17.96.1.1 Parameters

- Requested Notifications:
This parameter contains a set of call conditions which request the notification from controlling SCF when met.
- securityParameter:
This is an optional parameter conveying security related information.

17.96.2 Invoking entity (supporting SCF)

17.96.2.1 Normal Procedure

SCF Precondition:

- 1) A relationship with the controlling SCF has been established.
- 2) The supporting SCF has previously received a "handlingInformationRequest" operation.
- 3) The SCF FSM is in the state "Assisting Mode".

SCF Postcondition:

- The SCF FSM remains in the same state.

17.96.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.96.3 Responding entity (controlling SCF)

17.96.3.1 Normal procedure

SCF Precondition:

- 1) A "handlingInformationRequest" operation has been sent.
- 2) The SCF FSM is in the state "Assisted Mode".

SCF Postcondition:

- 1) According to the information received, the controlling SCF starts call monitoring functions.
- 2) The SCF FSM remains in the same state.

17.96.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.97 RequestNotificationChargingEvent procedure

17.97.1 General description

This operation is used to instruct the SSF how to manage the charging events which are received from other FEs not under the control of the service logic instance. The operation supports the options to cope with the interactions concerning the charging (refer to II.4/Q.1214, "Charging scenarios"). As several connection configurations may be established during a call, a possibility exists for the RequestNotificationChargingEvent (RNC) operation to be invoked on multiple occasions. For each connection configuration, a RNC may be used several times.

17.97.1.1 Parameters

– Sequence of ChargingEvent:

This parameter contains a list of the charging events and the corresponding monitor types and corresponding legs. For each element in the list, the following information elements are included:

- eventTypeCharging:

This subparameter indicates the charging event type. Its content is network-operator specific, which may be "charge pulses" or "charge messages".

- monitorMode:

This subparameter indicates the monitorMode applicable for the corresponding "eventTypeCharging" subparameter. Monitor may be "interrupted", "notifyAndContinue" or "transparent".

- legID:

This subparameter indicates the leg id of the corresponding event type charging subparameter.

17.97.2 Invoking entity (SCF)

17.97.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined that a "RequestNotificationChargingEvent" has to be sent by the SCF.

SCF Postcondition:

- 1) No FSM state transition.
- 2) SLPI execution may continue.

The SCSM FSM for the CS is in state "Preparing CS Instruction" or is in state "Queueing FSM". This operation is invoked by the SCF if a SLPI results in the instruction of SSF how to cope with the interactions concerning the charging. This causes no SCSM FSM state transition.

17.97.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.97.3 Responding entity (SSF)

17.97.3.1 Normal procedure

SSF Precondition:

- FSM: for CS State "Waiting for Instructions"; or
FSM for CS State "Waiting for End of User Interaction"; or
FSM for CS State "Waiting for End of Temporary Connection"; or
FSM for CS: State "Monitoring"; or
Assisting/Hand-off SSF-FSM State "Waiting for Instructions".

SSF Postcondition:

- No FSM state transition.

On receipt of this operation, the SSF performs actions to cope with the interactions concerning the charging according to the information elements included in the operation. The requested charging event can be caused by:

- a) another SLPI; or
- b) another exchange.

Irrespective of what causes the charging event, the SSF performs one of the following actions on occurrence of the charging event (according the corresponding monitorMode):

Interrupted

Notify the SCF of the charging event using "EventNotificationCharging" operation, do not process the event or propagate the signal. However, call and existing charging processing will not be suspended in the SSF.

NotifyAndContinue

Notify the SCF of the charging event using "EventNotificationCharging", and continue processing the event or signal without waiting for SCF instructions (handled like EDP-N for BCSM events).

Transparent

Do not notify the SCF of the event. This ends the monitoring of a previously requested charging event.

Requested charging events are monitored until ended by a transparent monitor mode (or in the case of charging events) until the end of the connection configuration.

In the case that multiple "RequestNotificationChargingEvent" operations are received for the same connection configuration with the same "eventTypeCharging" and "legID", only the last received "monitorMode" will apply.

17.97.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.98 RequestReportBCSMEvent procedure

17.98.1 General description

This operation 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.

NOTE – If the RequestReportBCSMEvent requests arming of the current DP from which the call processing was suspended, the next occurrence of the DP encountered during BCSM processing will be detected (i.e. not the current one from which the call was suspended).

The detection point arming principle is as follows:

- All events for which filtering applies (abandon, midcall and disconnect) can be armed as well as for the controlling as passive legs depending on what direction (either from the party which is connected to the controlling or passive leg) events have to be captured. As an example the disconnect DP can be armed as well as for the controlling leg and the passive leg, in that case if a release request is received from the user it will be detected by the DisconnectDP armed for the controlling leg, while a release request from the remote parties shall be detected by arming the relevant passive leg DisconnectDP. It should be noted that for the time being no DPs should be armed for the MidCall and Abandon DPs for the passive legs since only requests can happen from the user connected to the controlling leg.
- All events for which no filtering principles apply shall be armed for the passive leg only.

The following default values for the events to be armed apply for the RequestReportBCSMEvent operation:

- The default value for arming shall be the controlling leg for all events for which the filtering principles apply (abandon, midcall, and disconnect).
- The default value for arming shall be the passive leg for all events for which the filtering principles do not apply.

17.98.1.1 Parameters

– bcsmEvents:

This parameter specifies the event or events of which a report is requested.

– eventTypeBCSM:

This parameter specifies the type of event of which a report is requested. Values origAttempt and termAttempt are not valid for the eventTypeBCSM parameter.

- monitorMode:
This parameter indicates how the event should be reported. When the "monitorMode" is "interrupted", the event shall be reported as a request, if the "monitorMode" is "notifyAndContinue", the event shall be reported as a notification, if the "monitorMode" is "transparent", the event shall not be reported.
- legID:
This parameter indicates the party in the call for which the event shall be reported. SCF will use the option "sendingSideID" only.
- sendingSideID:
The following values for "legID" are assumed:
NOTE – The IN CS-1 definition of this parameter makes assumptions regarding the allocation of LegID values. With the introduction in IN CS-2 of Call Party Handling, these assumptions are no longer appropriate. For IN CS-2, the leg numbering is based on the following principles:
 - legID = 1 is the controlling leg and legID = 2 is the passive leg in case the initial call segment created was an originating call segment (CS state 'Originating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers.
 - legID = 1 is the passive leg and legID = 2 is the controlling leg (i.e. inverse to the above) in case the initial call segment created was a terminating call segment (CS state 'Terminating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers. For IN CS-1 implementations in the case of a mid call trigger, it was assumed that legID = 2 was assigned to the party not causing the trigger and legID = 1 was assigned to the party causing the trigger.
- dPSpecificCriteria:
This parameter indicates information specific to the EDP to be armed.
- numberOfDigits:
This parameter indicates the number of digits to be collected by the SSF for the CollectedInfo event. If the indicated number of digits is collected, SSF reports the event to the SCF.
- applicationTimer:
This parameter indicates the application timer for the NoAnswer event. If the user does not answer the call within the allotted time, the SSF reports the event to the SCF. This timer is expected to be shorter than the network no-answer timer.
- midCallControlInfo:
This parameter indicates the specific midcall events, which are requested to be monitored by the CCF/SSF. This parameter also indicates how the detected event needs to be reported in terms of report in monitoring state or always immediate report. When the parameter is not provided, a default of report in monitoring state is applied.
Several midcall events can be required in parallel. It may contain one or more control codes to define the specific events.
- iNServiceControlCodeLow:
This parameter contains a single control code or the lower bound of a control code interval. Value "0" for single control code is used for hook flash for analogue line.

- iNServiceControlCodeHigh:
This parameter contains the upper bound of a control code interval
- midCallReportType
This parameter indicates whether to report the event when the SSF is in either the "monitoring state" only or in any state.
- bcsmeventCorrelationID:
Used by the SCF for correlation with a previous operation.

17.98.2 Invoking entity (SCF)

17.98.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The SLPI has decided that a request for an event report BCSM is needed.
- 3) The SCSM FSM is in the appropriate state to send "RequestReportBCSMEvent".

SCF Postcondition:

- 1) The SCSM FSM remains in the same state.
- 2) SLPI execution continues.
- 3) If all EDPs have been disarmed and neither a CallInformationReport nor an ApplyChargingReport is pending, the control relationship with the concerned SSF is ended. If no other relationship persists, the FSM for CSA shall return to "Idle" state.

17.98.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.98.3 Responding entity (SSF)

17.98.3.1 Normal procedure

SSF Precondition:

- The SSF FSM is in either the state "Waiting for Instructions" or the state "Monitoring".

SSF Postcondition:

- 1) The requested EDPs have been armed as indicated.
- 2) Previously requested events are monitored until ended by a transparent monitor mode, until the end of the call, until the EDPs are detected or until the corresponding leg is released.
- 3) The SSF FSM remains in the same state.
- 4) If all EDPs have been disarmed and no "CallInformationReport" or "ApplyChargingReport" has been requested, the SSF FSM moves to the state "Idle".

17.98.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.99 RequestReportBCUSMEvent procedure

17.99.1 General description

This operation requests the CUSF to report the reception of the ROSE APDU from the user (optionally a ROSE APDU information pattern, e.g. FACILITY IE pattern, is specified as a DP criteria).

17.99.2 Parameters

- BCUSMEvents:
This parameter indicates how and which DP should be reported (DP name and report mode, Notify, Interrupt, or transparent).
- componentType:
This parameter indicates the type of component that will be monitored. For example, return result is used to request the CUSF reporting the result of the previous invocation of an operation from the SCF.
- componentCorrelationID:
In the CUSF and the SCF, this parameter links the invoke ID used by the CUSF and the SCF with the invoke ID that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the CUSF (which will be done by SendComponent) within the SCF.
- monitorDuration:
This parameter indicates how long the CUSF should monitor the specified event.

17.99.3 Invoking entity (SCF)

17.99.3.1 Normal procedure

SCF Precondition:

- 1) SCNSM (FSM for CUSF within the SCF) is in state N2.1: "Preparing CUSF Instructions".
- 2) SLPI requests to monitor the reception of a component form the user.

SCF Postcondition:

- SCNSM remains in the same state N2.1: "Preparing CUSF Instructions".

17.99.3.2 Error handling

If the error will occur within the SCF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.99.4 Responding entity (CUSF)

17.99.4.1 Normal procedure

CUSF Precondition:

- CUSF-FSM is in the state b: "Waiting for Instructions".

CUSF Postcondition [1) or 2)]:

- 1) CUSF starts the monitoring process for the specified event(s) or clearing armed EDP(s).
- 2) CUSF-FSM transits into state c: "Monitoring".
- 3) Requested events are monitored until the EDPs are detected.

17.99.4.2 Error handling

If the error will occur within the CUSF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.100 RequestReportFacilityEvent procedure

17.100.1 General description

This operation requests the SSF to report the reception of the ROSE APDU from the user to the SCF during the BCSM being suspended at a DP. The event to be reported is identified by the componentType (invoke, return result, return error, reject, or any) and componentCorrelationID.

17.100.1.1 Parameters

- componentType:
This parameter indicates the type of component that will be monitored and reported to the SCF. For example, return result is used to request the SSF reporting the result of the previous invocation of an operation to the user by the SendComponent.
- legID:
This parameter indicates what party should be monitored. The legID value assignment rules are the same as for the RequestReportBCSMEvent case. For the leg that represents a remote user may not be specified without proper signalling interwork capability (e.g. ISUP ROSE to DSS 1 ROSE etc.).
- componentCorrelationID:
In the SSF and the SCF, this parameter links the event managed by the SSF and the SCF with the invoke ID that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SSF (which will be done by SendComponent) within the SCF.
- monitorDuration:
This parameter indicates how long the SSF should monitor the specified event. The unit is seconds, and if the event will not be detected during the specified duration, this event will also inform the SCF (see EventReportFacility procedure) to avoid the excess call processing suspension at a DP.

17.100.2 Invoking entity (SCF)

17.100.2.1 Normal procedure

SCF Precondition:

- 1) Relevant operation for the CS has already finished, the FSM for CS is in the state, "Preparing CS Instructions".
- 2) SLPI needs to detect the APDU reception from the user side.

SCF Postcondition:

- Transit to state, "Waiting For Facility Event".

17.100.2.2 Error handling

If the error will occur within the SCF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.100.3 Responding entity (SSF)

17.100.3.1 Normal procedure

SSF Precondition (two alternatives exist):

Case 1: pending request for other componentCorrelationID exists.

- SSF FSM is in state, "Waiting For Facility Event".

Case 2: pending request for other componentCorrelationID does not exist.

- SSF FSM is in state, "Waiting For Instructions".

SSF Postcondition:

- SSF FSM is in state, "Waiting For Facility Event".

17.100.3.2 Error handling

If an error will occur within the SSF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.101 RequestReportUTSI procedure

17.101.1 General description

This operation is used to request the SSF to monitor for the receipt of an UTSI IE with a given *ServiceIndicator* value, then send this UTSI IE back to the SCF when this IE is received.

This is a class 2 operation.

17.101.1.1 Parameters

- LegID:

This parameter indicates the party in the call on which the UTSI Information Element is to be monitored. The LegID is assigned as such:

NOTE – The IN CS-1 definition of this parameter makes assumptions regarding the allocation of LegID values. With the introduction in IN CS-2 of Call Party Handling, these assumptions are no longer appropriate. For IN CS-2, the leg numbering is based on the following principles:

- legID = 1 is the controlling leg and legID = 2 is the passive leg in case the initial call segment created was an originating call segment (CS state 'Originating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers.
- legID = 1 is the passive leg and legID = 2 is the controlling leg (i.e. inverse to the above) in case the initial call segment created was a terminating call segment (CS state 'Terminating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers. For IN CS-1 implementations in the case of a mid call trigger, it was assumed that legID = 2 was assigned to the party not causing the trigger and legID = 1 was assigned to the party causing the trigger.

- USIServiceIndicator:

It indicates the Service Logic requesting the Monitoring of an UTSI information element. It is used as a Monitoring criteria at the SSF level. It also provides the correlation with a subsequent ReportUTSI operation.

- USIMonitorMode:

This parameter indicates if the UTSI IE should be reported. When the "USIMonitorMode" is "monitoringActive" the previously requested UTSI IE (e.g. the UTSI IE with the previously

indicated ServiceIndicator value) is reported as a notification. When the "USIMonitorMode" is "monitoringInactive", the UTSI IE is not (or no more) reported.

17.101.2 Invoking entity (SCF)

17.101.2.1 Normal procedure

SCF Precondition:

- 1) A control or monitor relationship exists between the SSF and the SCF.
- 2) The SLPI has decided that it is necessary to monitor for the receipt of an UTSI IE with a given ServiceIndicator value to precise.
- 3) The SCF_USI FSM is in any state.

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCF_USI FSM moves to the state "Monitoring UTSI" (if the USIMonitorMode is "monitoringActive") or to the state "Idle" (if the USIMonitorMode is "monitoringInactive").

17.101.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.101.3 Responding entity (SSF)

17.101.3.1 Normal procedure

SSF Precondition:

- 1) The SSF FSM is any state except "Idle".
- 2) The SSF_USI FSM is in any state.

SSF Postcondition:

- 1) The SSF FSM remains in the same state.
- 2) The SSF_USI FSM moves to the state "Monitoring UTSI" (if the USIMonitorMode is "monitoringActive") or to the state "Idle" (if the USIMonitorMode is "monitoringInactive").

17.101.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.102 RequestShadowUpdate procedure

17.102.1 General description

The X.500 "shadowing" operations allow information to be copied between two SDFs. The shadowing operations are also used to maintain this copied information. For each shadowing agreement between a pair of SDFs, one SDF is designated as the supplier of copied information and the other SDF is the consumer.

The DSAShadowBind and DSAShadowUnbind operations are used by cooperating SDFs at the beginning and end of a particular period of providing copies. The coordinateShadowUpdate is used by a shadow supplier to indicate the shadowing agreement for which it intends to send updates. The requestShadowUpdate operation is used by the shadow consumer to request updates from the shadow supplier. The updateShadow operation is invoked by the shadow supplier to send copied data

to the shadow consumer. This operation must be preceded first by either a coordinateShadowUpdate or a requestShadowUpdate operation. For a full description of the "shadowing" operations, see Recommendation X.525.

17.102.1.1 Parameters

For the requestShadowUpdate operation, see 11.2/X.525.

17.102.2 Supplier entity (SDF)

17.102.2.1 Normal procedure

17.102.2.1.1 RequestShadowUpdate received by itself

SDF Precondition:

- SDSM-ShM: "SDF Bound".

SDF Postcondition:

- 1) SDSM-ShM: "Wait for Update" in case of success.
- 2) SDSM-ShM: "SDF Bound" in case of failure.

The SDF is initially in the state "SDF Bound". After accepting the external event (E7) Request_for_Shadow_from_Consumer caused by the reception of a "requestShadowUpdate" operation from the consumer SDF, a transition to the state "Wait for RequestShadow Result" occurs. The SDF performs the "requestShadowUpdate" operation according to the contents of the "requestShadowUpdate" argument. Once the SDF has completed the "requestShadowUpdate" operation, the result or error indication is returned to the consumer SDF. The SDF returns to the state "SDF Bound" if the "requestShadowUpdate" fails or to the state "Wait for Update" if the "requestShadowUpdate" is successful.

17.102.2.1.2 DSAShadowBind sent with CoordinateShadowUpdate

17.102.2.1.3 RequestShadowUpdate received with DSAShadowBind

SDF Precondition:

- SDSM-ShM: "Wait for Bind Result".

SDF Postcondition:

- 1) SDSM-ShM: "Wait for Update" in case of success.
- 2) SDSM-ShM: "SDF Bound" in case of failure.

The SDF is initially in the state "Wait for Bind Result" waiting for other operations to be received than the "DSAShadowBind" operation. When receiving the "RequestShadowUpdate" operation, a transition to the same state occurs through the external event (E3) Request_from_Consumer. The SDF performs the "DSAShadowBind" operation and a transition to the state "SDF Bound" occurs through the internal event (e5) SDF_Bind_Success. Since the "RequestShadowUpdate" operation has already been received, a transition to the state "Wait for RequestShadow Result" occurs through the external event (E7) Request_for_Shadow_from_Consumer. Then, the SDF performs the "RequestShadowUpdate" operation according to the contents of the "RequestShadowUpdate" argument. Once the SDF has completed the "RequestShadowUpdate" operation, the result or error indication is returned to the consumer SDF. The SDF returns to the state "SDF Bound" if the "RequestShadowUpdate" fails or to the state "Wait for Update" if the "RequestShadowUpdate" is successful.

17.102.3 Consumer entity (SDF)

17.102.3.1 Normal procedure

17.102.3.1.1 RequestShadowUpdate sent by itself.

SDF Precondition:

- SDSM-ShC: "SDF Bound".

SDF Postcondition:

- 1) SDSM-ShC: "Wait for Update" in case of success.
- 2) SDSM-ShC: "SDF Bound" in case of failure.

When the SDSM-ShC is in the state "SDF Bound" and a need of requesting the shadow to be updated exists, an internal event occurs. This event, called (e9) Shadow_Request_to_Supplier, causes a transition to the state "Wait for RequestShadow Result" and the operation is sent to the supplier SDF. The SDSM-ShC waits for the response from the supplier. The reception of the response [(E12) Request_Shadow_Result] to the "requestShadowUpdate" operation previously issued to the supplier SDF causes a transition to the state "Wait for Update" if the result of the "requestShadowUpdate" operation is positive. Otherwise the reception of an error [(E11) Failed_Shadow_Request] moves back the SDSM-ShC to the state "SDF Bound".

17.102.3.1.2 RequestShadowUpdate sent with DSAShadowBind

SDF Precondition:

- SDSM-ShC: "Wait for Subsequent Requests".

SDF Postcondition:

- 1) SDSM-ShC: "Wait for Update" in case of success.
- 2) SDSM-ShC: "SDF Bound" in case of failure.

When the SDSM-ShC is in the state " Wait for Subsequent Requests " and a need of requesting the shadow to be updated exists, an internal event occurs. This event, called (e2) Request_to_Supplier, causes a transition to the state "Bind with RequestShadow" and the operations are sent to the supplier SDF. The SDSM-ShC waits for the response from the supplier. When the DSAShadowBind is successful, the event (E5) SDF_Bind_Success causes a transition to the state "Wait for RequestShadow Result". The SDSM-ShC then waits for the response from the supplier. The reception of the response [(E12) Request_Shadow_Result] to the "requestShadowUpdate" operation previously issued to the supplier SDF causes a transition to the state "Wait for Update" if the result of the "requestShadowUpdate" operation is positive. Otherwise the reception of an error [(E11) Failed_Shadow_Request] moves the SDSM-ShC to the state "SDF Bound".

17.102.3.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in 18.1.

17.103 ResetTimer procedure

17.103.1 General description

This class 2 operation is used by the SCF to refresh the T_{ssf} application timer, in order to avoid the T_{ssf} time-out at the SSF.

17.103.1.1 Parameters

- timerID:
This parameter has a default value identifying the T_{ssf} timer.
- timerValue:
This parameter specifies the value to which the T_{ssf} is to be set.
- callSegmentID:
This parameter indicates for which CS the timer shall be reset. When not specified, the timer associated with the initial CS is assumed.

17.103.2 Invoking entity (SCF)

17.103.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined by the $T_{\text{scf-ssf}}$ guard timer expiration, that the "ResetTimer" operation has to be sent in order to avoid T_{ssf} time-out at the SSF.

SCF Postcondition:

- The SLPI resets the $T_{\text{scf-ssf}}$ guard timer.

17.103.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.103.3 Responding entity (SSF)

17.103.3.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The FSM for the CS is in the "Waiting for Instruction" state or in the "Waiting for End of User Interaction" state or in the "Waiting for End of Temporary Connection" state.

NOTE – Whether the T_{SSF} is used or not in the state "Waiting for End of User Interaction" or in the state "Waiting for End of Temporary Connection" is network-operator dependent.

SSF Postcondition:

- 1) The T_{ssf} timer has been reset.
- 2) The FSM for the CS remains in the same state.

17.103.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.104 RouteSelectFailure procedure

17.104.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the RouteSelectFailure DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.104.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- dialledDigits:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Recommendation Q.931.
- callingFacilityGroup:
See Recommendation Q.1290.
- callingFacilityGroupMember:
See Recommendation Q.1290.
- failureCause:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- prefix:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules.
- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
See Recommendation Q.1290.
- travellingClassMark:
See Recommendation Q.1290.
- carrier:
See Recommendation Q.1290.

17.104.2 Invoking entity (SSF)

17.104.2.1 Normal procedure

SSF Precondition:

- 1) Call origination attempt has been initiated.
- 2) Called Party Number is available and nature of address determined.

- 3) Call gapping or service filtering is 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 Route_Select_Failure DP, and a control relationship has been established.
- 2) For a TDP-N, basic call processing proceeds at O_Exception, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.104.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.104.3 Responding entity (SCF)

17.104.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.104.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.105 SCFBind procedure

17.105.1 General description

The SCF Bind operation is used to establish relationship between two SCFs. This operation is mandatory and it is sent by a controlling SCF each time it needs to initiate communications with another (supporting) SCF, in order to ensure that the called entity has all facilities to operate on messages to be sent.

17.105.1.1 Parameters

- Agreement ID:
This parameter 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 any regional standard organization. It may also correspond to a service logic bilaterally defined by two cooperation operators. In order to allow the exchange of this information across networks, each agreement should be assigned an object identifier. The AgreementID value is the object identifier value.
- OriginatingSCF Address:
This parameter is the address of the SCF that requests the agreement. The parameter should be absent in a chained operation request which crosses an international internetwork boundary.
- RespondingcalledSCFAddress:
This parameter (in the response) contains the address of the supporting SCF. The parameter should be absent in a chained operation request which crosses an international internetwork boundary.
- Credentials:
This is an optional parameter, placed either in the request or in the response, that conveys security credentials for requiring an authentication process on a per-association basis, with the authentication being done for a user or an invoking entity (controlling SCF).

17.105.1.2 Normal procedure

SCF Precondition:

- 1) The SCF FSM is in state 1, "Idle".
- 2) The 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.
- 3) The SCF knows the address of the SCF being able to provide assistance.

SCF Postcondition:

- The SCF FSM moves to state 2, "Preparing Request for Assistance".

The address of the SCF the "SCF Bind" operation has to be sent to is determined on the base of user-related information.

17.105.1.3 Error handling

If the destination SCF is not accessible, the call is given final treatment which is service logic dependent. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.105.2 Responding entity (supporting SCF)

17.105.2.1 Normal procedure

SCF Precondition:

- The SCF FSM is in state 1, "Idle".

SCF Postcondition:

- 1) An SLPI has been invoked.
- 2) The SCSM moves to state 2, "Processing SCF Bind", from state 1 "Idle".
- 3) If the Bind request is accepted, a positive result is sent to the controlling SCF; if not, it moves back to state 1 "Idle" and a negative result is sent to the controlling SCF. In the first case when the first "handlingInformationRequest" operation is received, SCSM moves to state 3, "Assisting Mode".

17.105.2.2 Error handling

If the "SCF Bind" operation is rejected, the SCSM remains in the state "Idle". The maintenance function is informed and no SLPI is invoked.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.106 scfBind procedure (in the chaining case)

17.106.1 General description

This operation is used to establish a relationship between the two SCFs involved in the chaining.

This is achieved by forwarding the SCFBind Information operation received from the controlling SCF to the chaining terminator supporting SCF.

17.106.1.1 Parameters

- Agreement ID:
This parameter 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 any regional standard organization. It may also correspond to a service logic bilaterally defined by two cooperation operators. In order to allow the exchange of this information across networks, each agreement should be assigned an object identifier. The AgreementID value is the object identifier value.
- OriginatingSCF Address:
This parameter is the address of the SCF that requests the agreement. The parameter should be absent in a chained operation request which crosses an international internetwork boundary.
- RespondingcalledSCFAddress:
This parameter (in the response) contains the address of the supporting SCF. The parameter should be absent in a chained operation request which crosses an international internetwork boundary.
- Credentials:
This is an optional parameter, placed either in the request or in the response, that conveys security credentials for requiring an authentication process on a per-association basis, with the authentication being done for a user or a FE.

17.106.2 Invoking entity (chaining initiator supporting SCF)

17.106.2.1 Normal procedure

SCF Precondition:

- 1) The SCSM-ChI is in state 1, "Idle".
- 2) The chaining initiator supporting SCF has received a "SCFBind" operation from the controlling SCF.

SCF Postcondition:

- The SCSM-ChI moves to the state "Prepare Chained Handling Information Request".

17.106.2.2 Error handling

If the destination SCF is not accessible, the call is given final treatment which is service logic dependent. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.106.3 Responding entity (chaining terminator supporting SCF)

17.106.3.1 Normal procedure

SCF Precondition:

- The SCF FSM is in state 1, "Idle".

SCF Postcondition:

- 1) An SLPI has been invoked.
- 2) The SCSM moves to state "Bind Pending".
- 3) If the Bind request is accepted, a positive result is sent to the controlling SCF; if not, it moves back to state 1 "Idle" and a negative result is sent to the controlling SCF.

17.106.3.2 Error handling

If the "SCF Bind" operation is rejected, the SCSM remains in the state "Idle". The maintenance function is informed and no SLPI is invoked.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.107 SCFUnBind procedure

17.107.1 General description

The SCF Unbind operation is used by controlling SCF to close the relationship with the supporting SCF.

17.107.1.1 Parameters

None.

17.107.2 Invoking entity (controlling SCF)

17.107.2.1 Normal procedure

SCF Precondition:

- The SCF FSM is in state 5, "Preparing SCF Unbind Request".

SCF Postcondition:

- The SCF FSM moves back to state 1, "Idle".

17.107.2.2 Error handling

If the destination SCF is not accessible, the call is given final treatment which is service logic dependent. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.107.3 Responding entity (supporting SCF)

17.107.3.1 Normal procedure

SCF Precondition:

- The SCF FSM is in any state except state 1 "Idle" and state 2 "SCF Bind Pending".

SCF Postcondition:

- The SCSM moves back to state 1, "Idle".

17.107.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.108 scfUnBind procedure (in the chaining case)

17.108.1 General description

The operation is used to close a relationship between the chaining initiator and chaining terminator SCFs.

17.108.1.1 Parameters

None.

17.108.2 Invoking entity (chaining terminator supporting SCF)

17.108.2.1 Normal procedure

SCF Precondition:

- 1) The SCSM-ChI is in the state, "SCF Bound".
- 2) The chaining initiator supporting SCF has realized the need to close the relationship, either autonomously or because of the reception of a SCFUnbind operation from the controlling SCF.

SCF Postcondition:

- The SCSM-ChI moves to the state, "Idle".

17.108.2.2 Error handling

If the destination SCF is not accessible, the call is given final treatment which is service logic dependent. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.108.3 Responding entity (chaining terminator supporting SCF)

17.108.3.1 Normal procedure

SCF Precondition:

- The SCSM-ChT is in the state "SCF Bound".

SCF Postcondition:

- 1) The SCSM-ChT moves to the state "Idle".
- 2) If the SCF Bind operation is accepted and chainedHandlingInformationRequest operation has been received, SCSM-ChT moves to state "SCFBound" and a positive result is sent to chaining initiator supporting SCF; if SCFBind is not accepted, SCSM-ChT moves back to state Idle and a negative result is sent to chaining initiator supporting SCF.

17.108.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.109 ScriptClose procedure

17.109.1 General description

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

17.109.1.1 Parameters

- UIScriptId:
This parameter is used to address the User Interaction script.
- UIScriptSpecificInformation:
This parameter is used to give to the SRF information dependent on the User Interaction script invoked.
- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.

17.109.2 Invoking entity (SCF)

17.109.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI has decided that it is necessary to close an instance of a given User Interaction script.
- 2) The SCSM FSM is in state C3.2.1 "User Interaction", R2 "Controlling SRF", A3 "User Interaction" or H3 "User Interaction".

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCSM FSM remains in the same state.

17.109.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.109.3 Responding entity (SRF)

17.109.3.1 Normal procedure

SRF Precondition:

- 1) The SRF can receive order from the SCF.
- 2) The SRF FSM is in the state "User Interaction". A User Interaction script is executing.

SRF Postcondition:

- 1) The SRF FSM is in the state "Connected".
- 2) The User Interaction script has been terminated and resources used to perform the script execution have been released.
- 3) T_{srf} is started.

17.109.3.2 Error handling

Errors specific to the "SCF to SRF relationship based on the User Interaction script concept" should be added to the current list of errors.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.110 ScriptEvent procedure

17.110.1 General Description

This operation is used 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.).

17.110.1.1 Parameters

- UIScriptId:
This parameter is used to address the User Interaction script.
- UIScriptResultInformation:
This parameter is used to give to the SCF the result of the User Interaction.
- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.
- lastEventIndicator:
This parameter means that the ScriptEvent operation contains the final result of the script execution. If the event is the final one for the UI Script, "TRUE" must be set.

17.110.2 Invoking entity (SRF)

17.110.2.1 Normal procedure

SRF Precondition:

- 1) The SRF can send information to the SCF.

- 2) The SRF FSM is in the state "User Interaction". A User Interaction script has been or is being executed. A condition is reached to send an intermediate or, if execution is completed, the final result.

SRF Postcondition (intermediate result):

- The SRF FSM remains in the same state.

SRF Postcondition (final result, implicit termination):

- 1) Possible data about automatic disconnection of the bearer channel is checked.
- 2) If no such data was present, the SRF FSM transits back to state "Connected". T_{srf} is started.
- 3) If such data was present and indicates "disconnection not allowed", the SRF FSM transits back to state "Connected". T_{srf} is started.
- 4) If such data was present and indicates "disconnection allowed", the SRF initiates bearer channel disconnection. The SRF FSM transits to state "idle".

SRF Postcondition (final result, explicit termination):

- 1) The SRF FSM remains in state "User Interaction".
- 2) T_{srf} is started.
- 3) A ScriptClose operation is awaited.

17.110.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.110.3 Responding entity (SCF)

17.110.3.1 Normal procedure

SCF Precondition:

- 1) The SCF can receive information from the SRF.
- 2) The SCSM FSM is in state C.3.2.1 "User Interaction", R2 "Controlling SRF", A2 "Preparing SSF Instructions", or H2 "Preparing SSF Instructions".

SCF Postcondition (intermediate result):

- 1) SLPI execution continues.
- 2) The SCSM FSM remains in the same state.
- 3) Result data has been passed to the SLPI (which may, for example, decide to send more information via ScriptInformation).

SCF Postcondition (final result, no other instruction to send):

- 1) A ScriptClose may have been sent to explicitly terminate the script dialogue.
- 2) Possible data about automatic SRF disconnection of the bearer channel is checked.
- 3) If no such data was present, the SCSM FSM remains in the same state. SLPI execution continues.
- 4) If such data was present and indicates "disconnection not allowed", the SCSM FSM remains in the same state.
- 5) If such data was present and indicates "disconnection allowed", the SCSM FSM transits back to state C2 "Preparing CS Instructions", R1 "SRF Control Idle", A1 "Assisting SSF Idle" or H2 "Preparing SSF Instructions".

SCF Postcondition (final result, other instruction to send):

- 1) A ScriptClose may have been sent to explicitly terminate the script dialogue.
- 2) The SCSM FSM remains in the same state, SLPI execution continues.

17.110.3.2 Error handling

Errors specific to the "SCF to SRF relationship based on the User Interaction script concept" should be added to the current list of errors.

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.111 ScriptInformation procedure

17.111.1 General description

This operation is used to send to the SRF additional information during the User Interaction script execution.

17.111.1.1 Parameters

- UIScriptId:
This parameter is used to address the User Interaction script.
- UIScriptSpecificInformation:
This parameter is used to give to the SRF information dependent on the User Interaction script invoked.
- callSegmentIdentifier:
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.

17.111.2 Invoking entity (SCF)

17.111.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI has decided that it is necessary to send to the SRF additional information during the User Interaction script execution.
- 2) The SCSM FSM is in state C3.2.1 "User Interaction", R2 "Controlling SRF", A3 "User Interaction" or H3 "User Interaction".

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCSM remains in the same state.
- 3) Further results are awaited.

The SLPI has identified the need to send some call information to the user. This information to the user can be sent in any state of the SCF FSM as long as the dialogue between the two SCFs exists (this excludes the state "Idle"). The "UserInformRequest" operation contains the announcement that should be played to the user and the medium that should be used.

Once the operation has been sent, the SCF FSM remains in the same state and waits for the result.

17.111.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.111.3 Responding entity (controlling SRF)

17.111.3.1 Normal procedure

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.

SCF Precondition:

- A dialogue between the two SCFs has been established.

SCF Postcondition:

- The SCF prepares an answer to the received operation.

On receipt of the "UserInformResult" operation, the SCF remains in the same state and starts a procedure to pass over to the user information it has received. It is free of the procedure it adopts, but it should use the preferred language specified in the operation to give the information to the user. If the default language is not available, the default language should be used.

17.111.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.112 ScriptRun procedure

17.112.1 General description

This operation is used 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.

17.112.1.1 Parameters

- **UIScriptId:**
This parameter is used to address the User Interaction script.
- **UIScriptSpecificInformation:**
This parameter is used to give to the SRF information dependent on the User Interaction script invoked.
- **callSegmentIdentifier:**
This parameter indicates to which call segment the user interaction shall apply, i.e. to all parties connected to the call segment. When not present a default CSID of 1 is assumed.
- **disconnectFromIPForbidden:**
This parameter indicates whether or not the SRF should be disconnected from the user when the user interaction script has been completed.

17.112.2 Invoking entity (SCF)

17.112.2.1 Normal procedure

SCF Precondition:

- 1) The SLPI has decided that it is necessary to run an instance of a given User Interaction script.
- 2) The SCSM FSM is in state C3.2.1 "User Interaction", R2 "Controlling SRF", A3 "User Interaction" or H3 "User Interaction".

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCSM FSM remains in the same state.
- 3) A result is awaited.

17.112.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.112.3 Responding entity (SRF)

17.112.3.1 Normal procedure

SRF Precondition:

- 1) A relationship between the SCF and SRF has been established.
- 2) The SRF FSM is in the state "Connected", or in the state "UserInteraction" if no ScriptRun operation has not been previously sent.

SRF Postcondition (state Connected):

- 1) The SRF FSM is in the state "User Interaction".
- 2) T_{srf} is stopped.
- 3) The User Interaction script is executing.

SRF Postcondition (state User Interaction):

- 1) The SRF FSM is in the state "User Interaction".
- 2) The ScriptRun operation is buffered.

17.112.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

Errors specific to the "SCF to SRF relationship based on the User Interaction script concept" should be added to the current list of errors.

17.113 Search procedure

17.113.1 General description

The X.500 "Search" operation is used to search a portion of the SDF resident DIT for entries of interest and to return selected information from those entries. For a full description of the Search operation, see 10.2/X.511.

17.113.1.1 Parameters

See 10.2.2/X.511 and 10.2.3/X.511.

17.113.2 Invoking entity (SCF)

17.113.2.1 Normal procedure

SCF Precondition:

- SCSM: "SDF Bound" or "Wait for Subsequent Requests".

SCF Postcondition:

- SCSM: "SDF Bound".

When the SCSM is in the state "Wait for Subsequent Requests" and a need of the service logic to search and/or read information of the SDF exists, an internal event [(e2) Request_to_SDF] occurs. Until the application process has not indicated with a delimiter that the operation should be sent, the SCSM remains in the state "Wait for Subsequent Requests" and the operation is not sent. The operation is sent to the SDF in a message containing a Bind argument. The SCSM waits for the response from the SDF. The reception of the response [(E5) Response_from_SDF_with_Bind or (E4) Bind_Error] to the Bind operation previously issued to the SDF causes a transition of the SCF to the state "SDF Bound" or to the state "Idle". When the SCSM has moved to state "Idle", the Search operation was discarded. In the State "SDF Bound", the response of the Search operation [(E7) Response_from_SDF] causes a transition of the SCF to the same state ("SDF Bound"). It may be either the result of the Search operation or an error.

When the SCSM is in the state "SDF Bound" and a need of the service logic to search and/or read information of the SDF exists an internal event occurs. This event, called (e6) Request_to_SDF causes a transition to the same state "SDF Bound" and the SCSM waits for the response from the SDF. The reception of the response [(E7) Response_from_SDF] to the Search operation previously issued to the SDF causes a transition of the SCF to the same state "SDF Bound". The response from the SDF may be either the result of the Search operation or an error.

17.113.2.2 Error handling

Generic error handling for the operation related errors is described in 10.2.4/X.511 and 10.2.5/X.511, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.113.3 Responding entity (SDF)

17.113.3.1 Normal procedure

SDF Precondition:

- SDSM: "SCF Bound" or "Bind Pending".

SDF Postcondition:

- SDSM: "SCF Bound".

When the SDF is in the state "Bind Pending", the external event (E3) Request_from_SCF caused by the reception of a "Search" operation from the SCF occurs. The SDF does not proceed to the operation until a Bind operation has been successfully executed. It remains in the same state.

When the SDF is in the state "SCF Bound", the external event (E7) Request_from_SCF caused by the reception of a "Search" operation from the SCF occurs. The SDF waits for the response to the operation.

On the receipt of the event (E7) and before retrieving the data as specified in the operation parameters, the SDF takes the following actions:

- verify that the objects accessed by the request exists;
- verify that the user on behalf of whom the request is performed has sufficient access rights to access the objects and attributes reached during the execution of the operation;
- verify that attributes on which an operation should be performed exist in the object.

After the specified actions indicated above are successfully executed, the SDF returns all the possible attributes that satisfy the retrieval criteria to the SCF. The sending of the result corresponds to the event (e6) Response_to_SCF.

17.113.3.2 Error handling

Generic error handling for the operation related errors is described in 10.2.4/X.511 and 10.2.5/X.511, and the TCAP services that are used for reporting operating errors are described in clause 18.

17.114 SelectFacility procedure

17.114.1 General description

This operation is sent by the SCF to the SSF and 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 selects 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. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.114.1.1 Parameters

- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- destinationNumberRoutingAddress:
This parameter contains the called party number towards which the call is to be routed. The encoding of the parameter is defined in Recommendation Q.763.
- iSDNAccessRelatedInformation:
This parameter contains (possibly multiple) information elements as per Recommendation Q.931. See Access Transport Parameter signalling information in Recommendations Q.762, Q.763 and Q.931. Refer to 12.10/Q.1224 (Analysed Information) for population rules for ISDN access related information.
- calledFacilityGroup:
See Recommendation Q.1290.
- calledFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- displayInformation:
This parameter indicates a text string to be sent to the end user. This information cannot be received by a PSTN end-user.

- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network-based services at the originating and the destination exchange.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.
- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- correlationID:
This parameter is used by the SCF to associate the "AssistRequestInstructions" operation from the assisting SSF with the Request from the initiating SSF. The "correlationID" is used in the context of a hand-off procedure and only if the correlation id is not embedded in the "destinationRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- scfID:
See Recommendation Q.1290. The scfID is used in the context of a hand-off procedure and only if the SCF id is not embedded in the "destinationNumberRoutingAddress". The network operators have to decide about the actual mapping of this parameter on the used signalling system.
- legToBeCreated:
This parameter indicates the LegID to be assigned to the newly-created party. When not provided, a default LegID of 2 is assumed.
- callSegment:
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.114.2 Invoking entity (SCF)

17.114.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between a SCF and a SSF.
- 2) A SLPI has determined that a "SelectFacility" is to be sent by the SCF.

SCF Postcondition:

- SLPI execution may continue.

In the SCSM FSM state "Preparing SSF Instructions", this operation is invoked by an SCF if the service logic results in the request to a SSF to route a call to a specific destination and to continue call processing at the `Select_Facility_and_Present_Call` PIC. If no event monitoring has been requested and no reports (`CallInformationReport` and `ApplyChargingReport`) have been requested in a previously sent operation, a SCSM FSM transition to the state "Idle" occurs. Otherwise, if event monitoring has been requested or any report (`CallInformationReport` and `ApplyChargingReport`) has been requested, the SCSM FSM transitions to the state "Waiting for Notification or Request".

17.114.2.2 Error handling

If reject or error messages are received, then the SCSM informs the SLPI of the message and remains in the state "Preparing SSF Instructions".

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.114.3 Responding entity (SSF)

17.114.3.1 Normal procedure

SSF Precondition:

- 1) Call termination attempt has been initiated.
- 2) Basic call processing has been suspended at a DP.
- 3) The SSF waits for instructions.

SSF Postcondition:

- 1) The SSF performs call processing action to route the call to the specified destination and applies the appropriate alerting pattern.
- 2) In the T-BCSM, if `SelectFacility` operation comes with facility group member, then call processing shall resume at the `Select_Facility` PIC.
- 3) In the T-BCSM, if `SelectFacility` operation comes with `DestinationNumberRoutingAddress` parameter, then a new implicit O-BCSM shall be created and chained to the T-BCSM. The T-BCSM shall pass the information available (e.g. new number to which the call is to be routed) to the O-BCSM. The call processing shall resume from `Select_Facility` PIC and from `O_Null` PIC in O-BCSM.

17.114.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.115 SelectRoute procedure

17.115.1 General description

This operation requests the SSF to perform the originating basic call processing actions to determine routing information and select routing for a call, based either on call information available at the SSF or on call information provided by the SCF. Based on the routing information provided, the SSF attempts to select a primary route for the call. If the route is busy, the SSF attempts to select an alternative route. The SSF may fail to select a route for the call if all routes are busy.

17.115.1.1 Parameters

- destinationRoutingAddress:
Represents a list of called party numbers (primary and alternates).
- alertingPattern:
See Recommendation Q.1290. It only applies if the network signalling supports this parameter or if SSF is the terminating local exchange for the subscriber.
- correlationID:
Used by the SCF to associate the "AssistRequestInstructions" operation from the assisting SSF with the Request from the initiating SSF. The "correlationID" is used in the context of a hand-off procedure and only if the correlation id is not embedded in the "destinationRoutingAddress".
- iSDNAccessRelatedInformation:
Carries the same information as the protocol element ISUP Access Transport parameter in Recommendation Q.762.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- routeList:
See Recommendation Q.1290.
- scfID:
Used by an assisting SSF to identify which SCF the "destinationRoutingAddress" should be sent to.
- travellingClassMark:
See Recommendation Q.1290
- carrier:
See Recommendation Q.1290. In this message, the carrier selection field is null (00000000) and Carrier ID indicates the carrier to use for the call.
- serviceInteractionIndicators:
This parameter contains indicators sent from the SCF to the SSF for control of the network-based services at the originating and the destination exchange.
- iNServiceCompatibilityResponse:
This parameter is used by the SSF to overwrite the INServiceCompatibilityIndication 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.
- forwardGVNS:
Identifies the originating service provider and provides information about the calling VPN user in terms of a customerID or a GVNS user group. The parameter will also carry routing information for the terminating GVNS network.
- backwardGVNS:
Information sent backward to the originating side about how the VPN call is terminated at the terminating side.

- serviceInteractionIndicatorsTwo:
Indicators which are exchanged between SSP and SCP to resolve interactions between IN-based services and network-based services, respectively between different IN-based services.
- legToBeCreated:
This parameter indicates the LegID to be assigned to the newly-created party. When not provided, a default LegID of 2 is assumed.
- callSegment:
This parameter indicates the CS to which the operation shall apply. When not provided, a default CSID of 1 is assumed.

17.115.2 Invoking entity (SCF)

17.115.2.1 Normal procedure

SCF 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).
- 5) 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.

The SelectRoute message requests the SSF/CCF to resume call origination processing taking into account the address and routing information provided in the message parameters. Call Processing resumes at the Routing & Alerting PIC.

17.115.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.115.3 Responding entity (SSF)

17.115.3.1 Normal procedure

SSF Precondition:

- A TDP or EDP request has been invoked.

SSF Postcondition:

- The SSF performs the call processing actions to select the route.

The SSF/CCF shall resume call processing at the ROUTING & ALERTING PIC and proceed according to the BCSM description to attempt to complete the call over the designated route.

The following additional requirements also apply to the SelectRoute message:

- Alternate route/carrier selection as indicated in the SelectRoute shall proceed until either an idle facility is found or until processing of the call encounters a screening feature which blocks the call. (Network-operator specific.)
- If a route requires a TCM, the value in the TCM parameter shall be used. If a TCM is required and the TCM parameter is not supplied in the SelectRoute, the SSF/CCF shall derive the TCM in accordance with the requirements that apply assuming no IN involvement with the call.

SelectRoute and O_Called_Party_Busy, O_No_Answer

- When the SSF/CCF receives the SelectRoute message in response to an O_Called_Party_Busy message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF shall release any resources that were used to process the call between the ANALYSE_INFORMATION and ROUTING & ALERTING PICs.
 - 2) The SSF/CCF shall resume call processing at the Routing & Alerting PIC, and process the message as described in this procedure description.
 - 3) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)
- When the SelectRoute message is received in response to an O_No_Answer TDP-Request Message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF, if it is providing audible ringing tone to the calling party, shall remove this tone.
 - 2) The SSF/CCF shall release any resources that were used to process the call between the ANALYSE_INFORMATION and ROUTING & ALERTING PICs.
 - 3) The SSF/CCF shall resume call processing at the Routing & Alerting PIC, and process the message as described in this procedure description.
 - 4) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)
- When the SelectRoute message is received in response to an O_No_Answer EDP-Request message, the SSF/CCF shall do the following:
 - 1) The SSF/CCF, if it is providing audible ringing tone to the calling party, shall remove this tone.
 - 2) The SSF/CCF shall resume call processing at the Routing & Alerting PIC, and process the message as described in this Recommendation.
 - 3) If the originating access is DSS 1, then the SSF/CCF shall not send another CALL PROceeding message. (INAP-DSS 1 interworking is for further study.)

SelectRoute with OriginalCalledPartyID

- When the SSF/CCF receives a SelectRoute message that contains the OriginalCalledPartyID parameter, the SSF/CCF shall map the received OriginalCalledPartyID parameter to, for example (ISUP interworking is for further study):
 - 1) the OriginalCalledNumber information element in the Facility information element if the SSF/CCF does not yet have a value for the OriginalCalledNumber AND if the SSF/CCF routes the call to an ISDN line (for Basic rate and Primary rate ISDN signalling);
 - 2) the OriginalCalledNumber parameter in the IAM if the SSF/CCF does not already have a value for the OriginalCalledNumber AND if the SSF/CCF routes the call to an SS7 trunk (for ISDN-UP signalling).

17.115.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.116 SendChargingInformation procedure

17.116.1 General description

This operation is used to instruct the SSF on the charging information to be sent by the SSF. The sending of charging information can either be by charge pulses or signalling or internal if SSF is located in the Local Exchange (LE). In the LE, either charge meter can be updated or a standard call record created. A possibility exists for the SendChargingInformation (SCI) operation to be invoked on multiple occasions. The charging scenario supported by this operation are: 3.2 (refer to Appendix II/Q.1214, "Charging scenarios").

NOTE – The interworking between SSF and PSTN is network-operator specific. This operation has much PSTN/IN interactions.

17.116.1.1 Parameters

- sCIBillingChargingCharacteristics:

This parameter indicates billing and/or charging characteristics. Its content is network-operator specific. Depending on the applied charging scenario, the following information elements can be included (refer to Appendix II/Q.1224, "Charging scenarios"):

 - charge level (scenario 3.2);
 - chargePulses;
 - chargeMessages.
- partyToCharge:

This parameter indicates where the charging information must be sent.

17.116.2 Invoking entity (SCF)

17.116.2.1 Normal procedure

SCF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) An SLPI has determined that a "SendChargingInformation" has to be sent by the SCF.

SCF Postcondition:

- 1) No FSM state transition.
- 2) SLPI execution may continue.

The SCSM FSM is in state "Preparing SSF Instruction" or is in state "Queueing FSM". The SendChargingInformation procedure shall be invoked by the SCF in accordance with the demands of the SLPI for relevant charging information. If appropriate, this information shall be sent back down the call path.

This causes no SCSM FSM state transition.

17.116.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.116.3 Responding entity (SSF)

17.116.3.1 Normal procedure

SSF Precondition:

- FSM: for CS State "Waiting for Instructions"; or
FSM for CS State "Waiting for End of User Interaction"; or
FSM for CS State "Waiting for End of Temporary Connection"; or
FSM for CS State "Monitoring"; or
Assisting/hand-off SSF-FSM State b: "Waiting for Instructions".

SSF Postcondition:

- No FSM state transition.

On receipt of this operation, the SSF performs actions to send the charging information. The sending of charging information can either be by charge pulses or signalling or internal if SSF is located in LE. In the LE, either charge meter can be updated or a standard call record created. The interworking between SSF and PSTN is network-operator specific. This operation has much PSTN/IN interactions.

For instance, by sending an operation "SendChargingInformation", the SCF instructs the SSF to initiate the PSTN/ISDN charging functions according to the given information about the charging level to use.

The charging level can be determined either by one of the following functions:

- a) the SCF; or
- b) the SSF; or
- c) the charging function in a succeeding exchange.

In case the SCF has determined the charging level, the "SendChargingInformation" operation contains the charging level to be applied.

In case the SSF determines the charging level, the "SendChargingInformation" operation contains the parameters to determine the charging level.

If the charging level was determined by the IN (SCF or SSF), the SSF provides the charging level to be applied to the PSTN/ISDN charging functions [cases a) and b)].

In case c) the charging level is determined in a succeeding exchange. The "SendChargingInformation" operation either contains the corresponding parameters indicating this fact or the SSF detects, during trying to determine the charging level based on SCF provided parameters, that the charging level shall be determined in a succeeding exchange. Based on already existing PSTN/ISDN capabilities, the SSF provides the PSTN/ISDN charging functions with the necessary information and backward charge messages shall be transferred down the call path when allowed by the SCF (generated by a succeeding exchange, for example, an international gateway).

In the scenario described above, charging/billing is performed by means of existing mechanisms of the PSTN/ISDN initiated and controlled by the IN.

That means the determination of the charging method – on-line or off-line – and the items to be charged for shall be done in the basic network, just like the charge generation and the charge registration.

17.116.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.117 SendComponent procedure

17.117.1 General description

This operation requests the CUSF to send the specified FACILITY information to the user.

17.117.1.1 Parameters

- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the CUSF and the SCF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SSF (which will be done by ComponentReceived) within the CUSF.
- message:
This parameter distinguishes the message to be used for delivering the component to the user (REL, RELCOMP, FACILITY).
- monitorDuration:
This parameter indicates how long the CUSF should monitor the component transmission result.

17.117.2 Invoking entity (SCF)

17.117.2.1 Normal procedure

SCF Precondition:

- 1) FSM for CUSF within the SCF is in state N2: "Preparing CUSF Instructions".
- 2) SLPI requests to send the component to the user.

SCF Postcondition:

- FSM for CUSF within the SCF prepares to send the component, and remains in the state N2: "Preparing CUSF Instructions" if monitoring is not required or moves to state N2.2: "Waiting for Notification or Request" if monitoring is required.

17.117.2.2 Error handling

If the error will occur within the SCF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.117.3 Responding entity (CUSF)

17.117.3.1 Normal procedure

CUSF Precondition:

- CUSF-FSM is in state b: "Waiting For Instructions".

CUSF Postcondition:

- 1) CUSF sends specified component to the user with the appropriate message, but if the association release message is specified to send the component, it will be cued until the association release request received.
- 2) CUSF-FSM remain in state b: "Waiting For Instructions".

17.117.3.2 Error handling

If the error will occur within the CUSF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.118 SendFacilityInformation procedure

17.118.1 General description

This operation requests the SSF to send the ROSE APDU from the network side to the user during the BCSM being suspended at a DP, or with an appropriate bearer control message after the basic call process being resumed.

17.118.1.1 Parameters

- componentType:
This parameter indicates the type of component that will be used to formulate an APDU.
- legID:
This parameter indicates what party should receive the specified APDU. The legID value assignment rules are the same as for the RequestReportBCSMEEvent case. For the leg that represents a remote user may not be specified without proper signalling interwork capability (e.g. ISUP ROSE to DSS 1 ROSE etc.).

- componentCorrelationID:
In the SSF and the SCF, this parameter links the event managed by the SSF and the SCF with the invoke ID that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SSF within the SCF.
- component:
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID may not be used.
- callProcessingOperationCorrelationID:
This parameter indicates what message should be used to deliver the specified UNI APDU with component. Default is FACILITY and in this case the APDU is delivered during the BCSM suspended at a DP.

17.118.2 Invoking entity (SCF)

17.118.2.1 Normal procedure

SCF Precondition:

- In state "Waiting For Facility Event", if other pending componentCorrelationID exists, or in state, "Preparing CS Instructions".

SCF Postcondition:

- Transit to the substate C2.1.2: "Waiting For Facility Event".

17.118.2.2 Error handling

If an error will occur within the SCF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.118.3 Responding entity (SSF)

17.118.3.1 Normal procedure

SSF Precondition:

Case 1: pending request for componentCorrelationID exists.

- FSM for CS is in state, "Waiting For Facility Event".

Case 2: pending request for componentCorrelationID does not exist.

- FSM for CS is in state "Waiting For Instructions".

SSF Postcondition:

- 1) FSM for CS is in state, "Waiting For Facility Event".
- 2) The SSF monitors the requested event.

17.118.3.2 Error handling

If an error will occur within the SSF, generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.119 SendSTUI procedure

17.119.1 General description

This operation is used to request the SSF to forward an STUI IE with a given ServiceIndicator value to the User.

This is a class 2 operation.

17.119.1.1 Parameters

– USIInformation:

This parameter conveys information provided by the Service Logic dedicated to the user. It is transparent at the SSF level.

– LegID:

This parameter indicates the party in the call to which the STUI information element has to be sent. The legID value is assigned as such:

NOTE – The IN CS-1 definition of this parameter makes assumptions regarding the allocation of LegID values. With the introduction in IN CS-2 of Call Party Handling, these assumptions are no longer appropriate. For IN CS-2, the leg numbering is based on the following principles:

- legID = 1 is the controlling leg and legID = 2 is the passive leg in case the initial call segment created was an originating call segment (CS state 'Originating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers.
- legID = 1 is the passive leg and legID = 2 is the controlling leg (i.e. inverse to the above) in case the initial call segment created was a terminating call segment (CS state 'Terminating setup'). Additional legs can only be created by the SCF, in which case the SCF assigns the leg numbers. For IN CS-1 implementations in the case of a mid call trigger, it was assumed that legID = 2 was assigned to the party not causing the trigger and legID = 1 was assigned to the party causing the trigger.

– USIServiceIndicator:

This parameter indicates the Service Logic which provides the STUI information.

17.119.2 Invoking entity (SCF)

17.119.2.1 Normal procedure

SCF Precondition:

- 1) A control or monitor relationship exists between the SSF and the SCF.
- 2) The SLPI has decided that it is necessary to send to the User an STUI Information.
- 3) The SCF_USI FSM is in any state.

SCF Postcondition:

- 1) SLPI execution continues.
- 2) The SCF_USI FSM remains in the same state.

17.119.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.119.2.2.1 Responding entity (SSF)

17.119.2.2.1.1 Normal procedure

SSF Precondition:

- 1) The SSF FSM is any state except "Idle".
- 2) The SSF_USI FSM is in any state.

SSF Postcondition:

- 1) The SSF FSM remains in the same state.
- 2) The SSF_USI FSM remains in the same state.

On receipt of this operation, the SSF will forward the STUI to the User (identified by the LegID).

17.119.2.3 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.120 ServiceFilteringResponse procedure

17.120.1 General description

This operation is used to report the values of counters specified in a previous sent "ActivateServiceFiltering" operation to the SCF.

17.120.1.1 Parameters

- countersValue:
The parameter contains the count of calls filtered during the filtering period. It is a list of counter identifications and the related values.
- filteringCriteria:
This parameter is used to address the concerned service logic at the SCF.
- responseCondition:
This parameter is used to identify the reason why the ServiceFilteringResponse is sent.
 - intermediate response indicates that service filtering is active, a call is received and the interval timer is expired, or that service filtering is active and the threshold value, "numberOfCalls", is reached.
 - lastResponse indicates that the duration time is expired and service filtering is stopped, or that the stop time is met and service filtering is stopped.

17.120.2 Invoking entity (SSF)

17.120.2.1 Normal procedure

SSF Precondition:

- 1) service filtering is running and the interval time is expired and a call is received; or
- 2) service filtering is running and the threshold value is reached; or

- 3) service filtering has been finished (duration time expired or stop time met); or
- 4) the operation "ActivateServiceFiltering" is received and encounters an active service filtering entity.

SSF Postcondition:

- Service filtering proceeds or is ended depending on the duration time.

The SSF sends the "ServiceFilteringResponse" operation to the SCF. The "filteringCriteria" parameter is provided to enable the addressing of the concerned service logic at the SCF.

Before "ServiceFilteringResponse" is sent, it is checked whether call gapping criteria are met. If so, the "ServiceFilteringResponse" is not sent and the counting continues without resetting the counters. The last "ServiceFilteringResponse" (stop time is met or duration time expired) is sent without checking any call gap criteria.

After sending "ServiceFilteringResponse", the service filtering counters are reset.

If service filtering proceeds after sending "ServiceFilteringResponse" (e.g. interval time expired) the SSME-FSM remains in the state "Non-Call Associated Treatment".

If service filtering is stopped after sending "ServiceFilteringResponse" (duration time expired or stop time is met), then the SSME-FSM moves to the "Idle Management" state. All allocated resources are released, i.e. the SSME-FSM is removed as well.

17.120.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.120.3 Responding entity (SCF)

17.120.3.1 Normal procedure

SCF Precondition:

- 1) Service filtering is running.
- 2) The SCME is in the state "Waiting for Service Filtering Response".

SCF Postcondition:

- The SCME forwards the received counter values to the SLPI.

The operation is handled by the Service Filtering FSM part of the SCF Management Entity (SCME). The SCME passes the received counter values to the SLPI where they are added to previously received counter values.

The "filteringCriteria" parameter as provided in "ServiceFilteringResponse" is used to address the SCME and the concerned service logic instance.

The Service Filtering FSM of the SCME remains in the state "Waiting For SSF Service Filtering Response" until the internal service filtering duration time in the SLPI expires. Then the SLPI informs the SCME about timer expiration. Now the SCME moves to the state "Service Filtering Idle".

17.120.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.121 SpecializedResourceReport procedure

17.121.1 General description

This operation is used as the response to a "PlayAnnouncement" operation when the announcement completed indication is set.

17.121.1.1 Parameters

None.

17.121.2 Invoking entity (SRF)

17.121.2.1 Normal procedure

SRF Precondition:

- 1) The SRSF FSM is in the state "User Interaction".
- 2) A "PlayAnnouncement" operation is being executed for which the parameter "RequestAnnouncementComplete" was set TRUE.
- 3) All information has been sent to the user.

SRF Postcondition:

- 1) The SRSF FSM remains in the same state.
- 2) If the "DisconnectFromIPForbidden" parameter was set FALSE, the SRSF initiates a bearer channel disconnect sequence to the SSF using the applicable bearer channel signalling system after sending the "SpecializedResourceReport" operation to the SCF. The SRSF FSM moves to the state "Idle".

17.121.2.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.121.3 Responding entity (SCF)

17.121.3.1 Normal procedure

SCF Precondition:

- The SCSF FSM is in the state "User Interaction", sub-state "Waiting for response from the SRF".

SCF Postcondition:

- 1) The SCSF FSM remains in the same state.
- 2) If the "SpecializedResourceReport" relates to a "PlayAnnouncement" operation with permission of SRF initiated disconnection, the SCSF FSM moves to the state "Preparing SSF Instructions".

17.121.3.2 Error handling

Operation related error handling is not applicable, due to class 4 operation.

17.122 SplitLeg procedure

17.122.1 General description

This operation is used to request the SSF to separate one party from its Call Segment and place it in a new associated CS. This operation is the inverse of the MergeCallSegments operation.

In splitting the specified leg, the conditions of the leg: the armed EDPs, the ApplyChargingReport pending, the EventNotificationCharging pending, and the CallInformationReport pending, are also applied for the same leg after split.

17.122.1.1 Parameters

- legToBeSplit:
This parameter indicates the party in the call to be split from its Call Segment. See Q.1290 "LegID".
- newCallSegment:
This parameter indicates the CallSegmentID to be assigned to the newly-created Call Segment.

17.122.2 Invoking entity (SCF)

17.122.2.1 Normal procedure

SCF Precondition:

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

17.122.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.122.3 Responding entity (SSF)

17.122.3.1 Normal procedure

SSF Precondition:

- 1) A control relationship exists between the SCF and the SSF.
- 2) The leg to be split has the status "joined". If the SplitLeg is performed for a passive leg, the corresponding controlling leg shall have the status "joined".
- 3) The corresponding BCSM is in state O/T_Active, O/T_Suspended, O_Alerting or Send_Call.
- 4) 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 associated Call Segment.
- 2) The SSF FSM of the new Call Segment moves to the "WaitingForInstructions" 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.

- 4) A Return Result is sent immediately after the successful change of the leg configuration is executed, this allows the SCF to be updated with the established connection view and to cater for possible interference problems with signalling events.

17.122.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.123 StatusReport procedure

17.123.1 General description

This operation is used to notify the result of monitoring that is requested by "RequestFirstStatusMatchReport" or "RequestEveryStatusChangeReport" operation to the SCF.

17.123.1.1 Parameters

- resourceStatus:
This parameter indicates the status of the monitored physical termination source.
- CorrelationID:
Used by the SCF for correlation with a previous operation.
- ResourceID:
This parameter indicates the physical termination resource which was monitored by the SSF. This parameter is one of the lineID, facilityGroupID, facilityGroupMemberID, or trunkGroupID.
- ReportCondition:
Specifies the reason of issuing this operation (normal status report or monitor duration expired).

17.123.2 Invoking entity (SSF)

17.123.2.1 Normal procedure

SSF Precondition:

- The SSME is in the state "Non-Call Associated Treatment".

SSF Postcondition:

- The SSME is in one of the following states:
state ma: "IdleManagement".
state mb: "Non-Call Associated Treatment".

The SSF sends "StatusReport" operation to the SCF, when the following events have occurred:

- The SSF finds the change of status in specific state.
- The SSF received "CancelStatusReportRequest" operation from the SCF.
- The timer expiration has occurred in the SSF.

After the SSF sends this operation, the SSME should move to the state "IdleManagement" unless there are other processes of Non-Call Associated operation, in which case the SSF should remain in the "Non-Call Associated Treatment".

Clarification on the use of this operation within or outside the context of a call is for further study.

17.123.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.123.3 Responding entity (SCF)

17.123.3.1 Normal procedure

SCF Precondition:

- The SCME is in the state "Waiting for SSF Response Status Report".

SCF Postcondition:

- 1) The SCME is in the state "Status Report Idle".
- 2) The SCF notifies SLPI of the result of resource monitoring in the SSF.

On receipt of this operation, the SLPI which is expecting this operation will continue.

17.123.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services used for reporting operation errors are described in clause 18.

17.124 TAnswer procedure

17.124.1 General description

This operation is sent from the SSF to the SCF at the T_Answer DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.124.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.
- calledFacilityGroup:
See Recommendation Q.1290.
- calledFacilityGroupMember:
See Recommendation Q.1290.
- componentType:
This parameter indicates the type of event that is reported to the SCF. For example, Invoke is used to report the invocation of an operation from a user with an association request.
- component.
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.

- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this operation is used to correlate the response from the SCF.

17.124.2 Invoking entity (SSF)

17.124.2.1 Normal procedure

SSF Precondition (TDP):

- 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 is 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 Precondition (EDP):

- 1) For an EDP-R, there is an existing control relationship and the EDP T_Answer is armed.
- 2) For an EDP-N, there is an existing monitoring or control relationship and the EDP T_Answer is armed.

SSF Postcondition (TDP):

- 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_Answer PIC, and no control relationship has been established.

SSF Postcondition (EDP):

- 1) The SSF-FSM stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF-FSM moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.
- 3) The SSF-FSM moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.124.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.124.3 Responding entity (SCF)

17.124.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.124.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.125 TBusy procedure

17.125.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the T_Busy DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.125.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- busyCause:
See Recommendation Q.1290. See 12.10/Q.1224 for population rules.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
This parameter (if available) is the directory number of the last redirecting party.

- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
See Recommendation Q.1290.
- travellingClassMark:
See Recommendation Q.1290.

17.125.2 Invoking entity (SSF)

17.125.2.1 Normal procedure

SSF Precondition:

- 1) Call termination attempt has been initiated.
- 2) Called Party Number is available and nature of address determined.
- 3) Call gapping or service filtering is 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, basic call processing proceeds at T_Exception, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

The SSF has sufficient information available associated with the terminating call portion. The SSF shall detect T_Busy when the terminating access is network-determined user-busy. The conditions that result in the detection of network-determined user-busy depend on the type of terminating access and subscribed services (an analog line access, DSS 1, multiline hunt group, etc.).

17.125.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.125.3 Responding entity (SCF)

17.125.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

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

- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.125.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.126 TDisconnect procedure

17.126.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the T_Disconnect DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.126.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Q.931 Called Party Subaddress.
- calledFacilityGroup:
See Recommendation Q.1290.
- calledFacilityGroupMember:
See Recommendation Q.1290.
- releaseCause:
Indicates the cause of the disconnect.
- connectTime:
Indicates the duration between the received answer indication from the called party side and the release of the connection.
- componentType:
This parameter indicates the type of event that is reported to the SCF. For example, Invoke is used to report the invocation of an operation from a user with an association request.
- component.

Two alternatives are possible and one of which should be chosen:

- Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
- Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.

– componentCorrelationID:

This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this operation is used to correlate the response from the SCF.

17.126.2 Invoking entity (SSF)

17.126.2.1 Normal procedure

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) For a TDP, call gapping or service filtering is not in effect.
- 5) DP criteria have been met.
- 6) For a TDP-R or a TDP-N, there is no existing control relationship.
- 7) For an EDP, there is an existing control relationship and the EDP T_Disconnect is armed.

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, call processing proceeds to the T_Null & Authorize Termination Attempt PIC, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.126.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.126.3 Responding entity (SCF)

17.126.3.1 Normal procedure

SCF Precondition (TDP):

– None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.126.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.127 TerminationAttempt procedure

17.127.1 General description

This operation is sent from the SSF to the SCF at the OriginationAttempt DP, after detecting a valid trigger condition.

17.127.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartyNumber:
See Recommendation Q.762.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
Contains the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.

- routeList:
routeList represents the list of routes which would have been used in order to route the call. The network operators can specify that this IE should be used if their particular network has the information available.
- travellingClassMark:
See Recommendation Q.1290.

17.127.2 Invoking entity (SSF)

17.127.2.1 Normal procedure

SSF Precondition (TDP):

- 1) Call origination attempt has been initiated.
- 2) Call gapping or service filtering is not in effect.
- 3) DP criteria have been met (TDP).
- 4) For a TDP-R, there is no existing control relationship.

SSF Postcondition (TDP):

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

17.127.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.127.3 Responding entity (SCF)

17.127.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

17.127.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.128 TermAttemptAuthorized procedure

17.128.1 General description

This operation is sent from the SSF to the SCF at the TermAttemptAuthorized DP, after detecting a valid trigger condition, or to report an event requested by RequestReportBCSMEvent.

17.128.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
Contains the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- routeList:
routeList represents the list of routes which would have been used in order to route the call. The network operators can specify that this IE should be used if their particular network has the information available.
- travellingClassMark:
See Recommendation Q.1290.

17.128.2 Invoking entity (SSF)

17.128.2.1 Normal procedure

SSF Precondition:

- 1) Incoming call received.
- 2) Authority to route the call to specified terminating resources verified.
- 3) Call gapping or service filtering is not in effect.
- 4) TDP criteria have been met.
- 5) For a TDP-R, there is no existing control relationship.

SSF Postcondition:

- 1) For a TDP-R, basic call processing has been suspended at Term_Attempt_Authorized DP, and a control relationship has been established.
- 2) For a TDP-N, basic call processing proceeds at PIC Select_Facility&Present Call, and no control relationship has been established.

17.128.2.2 Error handling

If the destination SCF is not accessible, then the call is given final treatment (other treatments are for further study). If the calling party abandons after the sending of the TermAttemptAuthorized operation, then the SSF aborts the control relationship after the first answer message from the SCF has been received: the Transaction ID is held open until T_{SSF} expires.

Generic error handling for the operation related errors is described in clause 16, the TCAP services which are used for reporting operation errors are described in clause 18.

17.128.3 Responding entity (SCF)

17.128.3.1 Normal procedure

SCF Precondition:

- 1) For TDP, none.
- 2) EDP case does not apply.

SCF Postcondition:

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

On receipt of the TermAttemptAuthorized operation, the SCSM moves from "Idle" state to the state "Preparing SSF Instructions". A control relationship to the related SSF is created. A Service Logic Program Instance (SLPI) is invoked for processing the TermAttemptAuthorized operation. By means of this control relationship, the SCF may influence the Basic Call Processing in accordance with the service logic invoked. The actions to be performed in the SLPI depend on the parameters conveyed via this operation and the SLPI (i.e. the requested IN service itself).

17.128.3.2 Error handling

If the TermAttemptAuthorized operation is rejected, then the SCSM remains in the same state. The maintenance function is informed and no SLPI is invoked. Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.129 TMidCall procedure

17.129.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the T_Midcall DP, or to report an event requested by RequestReportBCSMEvent. Refer to 4.2.2.2/Q.1224 for additional call modelling related semantics.

17.129.1.1 Parameters

- dpSpecificCommonParameters:
See "AnalysedInformation" procedure.
- callingPartyBusinessGroupID:
See Recommendation Q.1290.
- callingPartySubaddress:
See Q.931 Calling Party Subaddress.
- featureRequestIndicator:
This parameter indicates the type of feature requested.
- carrier:
See Recommendation Q.1290.

- connectTime:
Indicates the duration between the received answer indication from the called party side and the release of the connection.
- componentType:
This parameter indicates the type of component that will be delivered to the user. For example, return result is used to report the result of the previous invocation of an operation from a user.
- component.
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this parameter is used to correlate the response from the SCF.

17.129.2 Invoking entity (SSF)

17.129.2.1 Normal procedure

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 a terminating party.
- 4) For a TDP, call gapping or service filtering is not in effect.
- 5) DP criteria have been met.
- 6) For a TDP-R or a TDP-N, there is no existing control relationship.
- 7) For an EDP, there is an existing control relationship and the EDP T_Midcall is armed.

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, call processing proceeds to the T_Active PIC, and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.129.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.129.3 Responding entity (SCF)

17.129.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.129.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.130 TNoAnswer procedure

17.130.1 General description

This operation is sent from the SSF to the SCF after detecting a valid trigger condition at the T_No_Answer DP, or to report an event requested by RequestReportBCSMEvent.

This operation requests the SSF/CCF to send a T_No_Answer TDP-Request message when it encounters a T_No_Answer trigger.

17.130.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- calledPartyBusinessGroupID:
See Recommendation Q.1290.
- calledPartySubaddress:
See Recommendation Q.931.

- calledFacilityGroup:
See Recommendation Q.1290.
- calledFacilityGroupMember:
See Recommendation Q.1290.
- originalCalledPartyID:
See Q.762 Original Called Number signalling information.
- redirectingPartyID:
Contains the directory number of the last redirecting party.
- redirectionInformation:
See Q.763 Redirection Information signalling information.
- travellingClassMark:
See Recommendation Q.1290.
- componentType:
This parameter indicates the type of event that is reported to the SCF. For example, Invoke is used to report the invocation of an operation from a user with an association request.
- component.
Two alternatives are possible and one of which should be chosen:
 - Case 1: component data type is chosen as OCTETSTRING, it 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. See Recommendation Q.932 for encoding.
 - Case 2: component data type is chosen as EMBEDDED-PDV; in this case componentType and componentCorrelationID shall not be used.
- componentCorrelationID:
This parameter distinguishes the invoke ID in the SSF that is assigned between the user and the network locally. The value indicated in this operation is used to correlate the response from the SCF.

17.130.2 Invoking entity (SSF)

17.130.2.1 Normal procedure

SSF Precondition (TDP):

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

SSF Precondition (EDP):

- 1) For an EDP-R, there is an existing control relationship and the T_No_Answer EDP is armed.
- 2) For an EDP-N, there is an existing control or monitoring relationship and the T_No_Answer EDP is armed.

SSF Postcondition (TDP):

- 1) For a TDP-R, basic call processing has been suspended at T_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.

SSF Postcondition (EDP):

- 1) The SSF-FSM stays in the state "Monitoring" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested.
- 2) The SSF-FSM moves to the state "idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested.
- 3) The SSF-FSM moves to the state "Waiting for Instructions" if the message type was request. Call processing is interrupted.

17.130.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.130.3 Responding entity (SCF)

17.130.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- 1) For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
- 2) The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, no "CallInformationReport" or "ApplyChargingReport" are requested; or
- 3) The SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.130.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.131 TSuspended procedure

17.131.1 General description

This operation is sent by the SSF to the SCF after detecting a valid trigger condition at the T_Suspended DP, or to report an event requested by RequestReportBCSMEvent. Refer to Recommendations Q.1214 and Q.1224 for additional call modelling related semantics.

17.131.1.1 Parameters

- dPSpecificCommonParameters:
See "AnalysedInformation" procedure.
- legID:
See Recommendation Q.1290.

17.131.2 Invoking entity

17.131.2.1 Normal procedure (SSF)

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) For a TDP, call gapping or service filtering is not in effect.
- 5) DP criteria have been met.
- 6) For a TDP-R or a TDP-N, there is no existing control relationship.
- 7) For an EDP, there is an existing control relationship and the EDP T_Suspended is armed.

SSF Postcondition:

- 1) For a TDP-R, basic call processing has been suspended and a control relationship has been established.
NOTE – Establishing a control relationship for a single interaction is for further study.
- 2) For a TDP-N, call processing proceeds and no control relationship has been established.
- 3) For an EDP, as for EventReportBCSM procedure.

17.131.2.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.131.3 Responding entity (SCF)

17.131.3.1 Normal procedure

SCF Precondition (TDP):

- None.

SCF Precondition (EDP):

- 1) For an EDP-R at the SSF, an existing control relationship is in place and an SLPI is running.
- 2) For an EDP-N, an existing monitoring relationship is in place and an SLPI is running.

SCF Postcondition (TDP):

- 1) An SLPI has been invoked.
- 2) For a TDP-R, a control relationship is established, and an SLPI has been invoked.
- 3) For a TDP-R, an SSF instruction is being prepared.
- 4) For a TDP-N, no relationship is established. An SLPI has been invoked, executes and terminates.

SCF Postcondition (EDP):

- For an EDP, the SCSM-FSM stays in the sub-state "Waiting for Notification or Request" if the message type was notification and there are still EDPs armed or a "CallInformationReport" or "ApplyChargingReport" requested; or
The SCSM-FSM moves to the state "Idle" if the message type was notification and there are no more EDPs armed, and no "CallInformationReport"; or
"ApplyChargingReport" is requested, or the SCSM-FSM moves to the state "Preparing SSF Instructions" if the message type was request.

17.131.3.2 Error handling

Generic error handling for the operation related errors is described in clause 16, and the TCAP services which are used for reporting operation errors are described in clause 18.

17.132 UpdateShadow procedure

17.132.1 General description

The X.500 "shadowing" operations allow information to be copied between two SDFs. The shadowing operations are also used to maintain this copied information. For each shadowing agreement between a pair of SDFs, one SDF is designated as the supplier of copied information and the other SDF is the consumer.

The DSAShadowBind and DSAShadowUnbind operations are used by cooperating SDFs at the beginning and end of a particular period of providing copies. The coordinateShadowUpdate is used by a shadow supplier to indicate the shadowing agreement for which it intends to send updates. The requestShadowUpdate operation is used by the shadow consumer to request updates from the shadow supplier. The updateShadow operation is invoked by the shadow supplier to send copied data to the shadow consumer. This operation must be preceded first by either a coordinateShadowUpdate or a requestShadowUpdate operation. For a full description of the "shadowing" operations, see Recommendation X.525.

17.132.1.1 Parameters

UpdateShadow operation, see 11.3/X.525.

17.132.2 Supplier entity (SDF)

17.132.2.1 Normal procedure

17.132.2.1.1 Supplier-initiated updateShadow

17.132.2.1.1.1 updateShadow sent by itself

SDF Precondition:

- SDSM-ShM: "Wait for Update".

SDF Postcondition:

- SDSM-ShM: "Wait for Update".

When the SDSM-ShM is in the state "Wait for Update" and a need of updating the shadow exists, an internal event occurs. This event, called (e21) Shadow_Update_to_Consumer, causes a transition to the state "Wait for Update Confirmation" and the operation is sent to the consumer SDF. The SDSM-ShM waits for the response from the consumer. The reception of the response [(E23) Shadow_Update_Confirmed] to the "updateShadow" operation previously issued to the consumer SDF causes a transition to the state "Wait for Update". The response from the consumer SDF may be either the result of the "updateShadow" operation or an error.

17.132.2.1.1.2 updateShadow sent with DSAShadowBind and CoordinateShadowUpdate

SDF Precondition:

- SDSM-ShM: "Bind with CoordinateShadow".

SDF Postcondition:

- SDSM-ShM: "Wait for Update".

When the SDSM-ShM is in the state " Bind with CoordinateShadow " and a need of updating the shadow exists, an internal event occurs. This event, called (e4) Update_to_Consumer, causes a transition to the state "Bind with CoordinateShadow and Update" and the operation is sent to the consumer SDF with a DSAShadowBind and CoordinateShadowUpdate operation. The SDSM-ShM then waits for the response from the consumer. The reception of the response (E9) SDF_Bind_Success to the previously issued DSAShadowBind causes a transition to the state "Bound with Coordinate Shadow Sent". The SDSM-ShM waits for the response from the consumer to the "coordinateShadowUpdate" operation previously issued to the consumer SDF. The reception of the event [(E10) Shadow_Coordinate_Confirmed] causes a transition to the state "Wait for Update Confirmation". The reception of the response [(E23) Shadow_Update_Confirmed] to the "updateShadow" operation previously issued to the consumer SDF causes a transition to the state "Wait for Update". The response from the consumer SDF may be either the result of the "updateShadow" operation or an error.

17.132.2.1.2 Consumer-initiated updateShadow

17.132.2.1.2.1 UpdateShadow sent by itself

SDF Precondition:

- SDSM-ShM: "Wait for Update".

SDF Postcondition:

- SDSM-ShM: "Wait for Update".

When the SDSM-ShM is in the state "Wait for Update" and a need of updating the shadow exists, an internal event occurs. This event, called (e13) Shadow_Update_to_Consumer, causes a transition to the state "Wait for Update Confirmation" and the operation is sent to the consumer SDF. The SDSM-ShM waits for the response from the consumer. The reception of the response [(E14) Shadow_Update_Confirmed] to the "updateShadow" operation previously issued to the consumer SDF causes a transition to the state "Wait for Update". The response from the consumer SDF may be either the result of the "updateShadow" operation or an error.

17.132.2.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operating errors are described in 18.1.

17.132.3 Consumer entity (SDF)

17.132.3.1 Normal procedure

17.132.3.1.1 Supplier-initiated UpdateShadow

17.132.3.1.1.1 UpdateShadow received by itself

SDF Precondition:

- SDSM-ShC: "Wait for Update".

SDF Postcondition:

- SDSM-ShC: "Wait for Update".

The SDF is initially in the state "Wait for Update". After accepting the external event (E13) Shadow_Update_from_Supplier caused by the reception of a "updateShadow" operation from the supplier SDF, a transition to the state "Wait for Update Confirmation" occurs. The SDF performs the "updateShadow" operation according to the contents of the "updateShadow" argument. Once the SDF has completed the "updateShadow" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "Wait for Update".

17.132.3.1.1.2 UpdateShadow received with DSAShadowBind and CoordinateShadowUpdate

SDF Precondition:

- SDSM-ShC: "Wait for Bind Result".

SDF Postcondition:

- SDSM-ShC: "Wait for Update".

The SDF is initially in the state "Wait for Bind Result" waiting for other operations to be received than the "DSAShadowBind" operation. When receiving the "UpdateShadow" operation after receiving the "CoordinateShadowUpdate" operation, a transition to the same state occurs through the external event (E3) Request_from_Supplier. The SDF performs the "DSAShadowBind" operation and a transition to the state "SDF Bound" occurs through the internal event (e5) SDF_Bind_Success. Since the "CoordinateShadowUpdate" operation has already been received, a transition to the state "Wait for Coordination Result" occurs through the external event (E7) Shadow_Coordinate_from_Supplier. Then, the SDF performs the "CoordinateShadowUpdate" operation and a transition to the state "Wait for Update" occurs through the internal event (e10) Shadow_Coordinate_Confirmed. Since the "UpdateShadow" operation has also already been received, a transition to the state "Wait for Update Confirmation" occurs through the external event (E13) Shadow_Update_from_Supplier. Finally, the SDF performs the "UpdateShadow" operation according to the contents of the "updateShadow" argument. Once the SDF has completed the "updateShadow" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "Wait for Update".

17.132.3.1.2 Consumer-initiated updateShadow

SDF Precondition:

- SDSM-ShC: "Wait for Update".

SDF Postcondition:

- SDSM-ShC: "Wait for Update".

The SDF is initially in the state "Wait for Update". After accepting the external event (E14) Shadow_Update_from_Supplier caused by the reception of a "updateShadow" operation from the supplier SDF, a transition to the state "Wait for Update Confirmation" occurs. The SDF performs the

"updateShadow" operation according to the contents of the "updateShadow" argument. Once the SDF has completed the "updateShadow" operation, the result or error indication is returned to the supplier SDF. The SDF returns to the state "Wait for Update".

17.132.3.2 Error handling

Generic error handling for the shadowing operations related errors is described in clause 12/X.525, and the TCAP services that are used for reporting operation errors are described in 18.1.

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