INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Q.1236

(12/99)

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

SERIES Q: SWITCHING AND SIGNALLING

Intelligent Network

Intelligent Network Capability Set 3 – Management Information Model Requirements and Methodology

ITU-T Recommendation Q.1236

(Previously CCITT Recommendation)

ITU-T Q-SERIES RECOMMENDATIONS

SWITCHING AND SIGNALLING

SIGNALLING IN THE INTERNATIONAL MANUAL SERVICE	Q.1–Q.3
INTERNATIONAL AUTOMATIC AND SEMI-AUTOMATIC WORKING	Q.4–Q.59
FUNCTIONS AND INFORMATION FLOWS FOR SERVICES IN THE ISDN	Q.60–Q.99
CLAUSES APPLICABLE TO ITU-T STANDARD SYSTEMS	Q.100–Q.119
SPECIFICATIONS OF SIGNALLING SYSTEMS No. 4 AND No. 5	Q.120–Q.249
SPECIFICATIONS OF SIGNALLING SYSTEM No. 6	Q.250–Q.309
SPECIFICATIONS OF SIGNALLING SYSTEM R1	Q.310–Q.399
SPECIFICATIONS OF SIGNALLING SYSTEM R2	Q.400–Q.499
DIGITAL EXCHANGES	Q.500–Q.599
INTERWORKING OF SIGNALLING SYSTEMS	Q.600–Q.699
SPECIFICATIONS OF SIGNALLING SYSTEM No. 7	Q.700–Q.849
DIGITAL SUBSCRIBER SIGNALLING SYSTEM No. 1	Q.850–Q.999
PUBLIC LAND MOBILE NETWORK	Q.1000–Q.1099
INTERWORKING WITH SATELLITE MOBILE SYSTEMS	Q.1100–Q.1199
INTELLIGENT NETWORK	**Q.1200–Q.1699**
SIGNALLING REQUIREMENTS AND PROTOCOLS FOR IMT-2000	Q.1700–Q.1799
BROADBAND ISDN	Q.2000–Q.2999

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

ITU-T RECOMMENDATION Q.1236

INTELLIGENT NETWORK CAPABILITY SET 3 – MANAGEMENT INFORMATION MODEL REQUIREMENTS AND METHODOLOGY

Summary

Intelligent Network Capability Set 3 (IN CS-3) is the third standardized stage of the Intelligent Network (IN) as an architectural concept for the creation and provision of services, including telecommunication services, service management services and service creation services. This Recommendation addresses IN CS-3 management based upon a sub-set of the IN CS-3 INAP. It describes the techniques to be used in providing the management requirements for the IN SSF Interface Information Model, the IN SMF-SCF functional decomposition and the applied methodology to develop the management requirements for any IN functional entity (FE).

Source

ITU-T Recommendation Q.1236 was prepared by ITU-T Study Group 11 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on 3 December 1999.

Keywords

IN CS-3, IN Management, SSF.

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. The ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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

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

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

NOTE

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

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

CONTENTS

Recommendation Q.1236

INTELLIGENT NETWORK CAPABILITY SET 3 – MANAGEMENT INFORMATION MODEL REQUIREMENTS AND METHODOLOGY

(Geneva, 1999)

1 Scope

This Recommendation addresses IN CS-3 management based upon a sub-set of the IN CS-3 INAP. It describes the techniques to be used in providing the management requirements for the IN SSF Interface Information Model, the IN SMF-SCF functional decomposition and the applied methodology to develop the management requirements for any IN functional entity (FE).

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

– ITU-T Recommendation M.3010 (1996), *Principles for a Telecommunications management network*.

– ITU-T Recommendation M.3020 (1995), *TMN interface specification methodology*.

– ITU-T Recommendation Q.752 (1997), *Monitoring and measurements for Signalling System No. 7 networks*.

– ITU-T Recommendation Q.1224 (1997), *Distributed functional plane for Intelligent Network Capability Set 2*.

– ITU-T Recommendation Q.1228 (1997), *Interface Recommendation for Intelligent Network Capability Set 2*.

3 Abbreviations

This Recommendation uses the following abbreviations:

BCSM	Basic call state model
CCF	Call Control Function
CMIP	Common Management Interface Protocol
CMISE	Common Management Interface Service element
CS	Capability Set
DFP	Distributed Functional Plane
EDP	Event detection point
FE	Functional entity
FIM	Feature interaction manager

IN	Intelligent Network
INAP	Intelligent Network Application Part
IP	Intelligent Peripheral
OR	Operational Requirement
PIC	Point In Call
SAP	Service Access Point
SCF	Service Control Function
SDF	Service Data Function
SIB	Service Independent Building Block
SLP	Service Logic Program
SMF	Service Management Function
SRF	Service Resource Function
SS7	Signalling System number 7
SSF	Service Switching Function
TDP	Trigger Detection Point
TMN	Telecommunications Management Network

4 General

The following subclauses address IN CS-3 management. IN CS-3 management has concentrated mainly upon the management of the SSF. Management of the SCF (see clause 6) provides the functional decomposition needed to develop management requirements and the management information model of an SCF. The methodology used in the definition of the SMF-SSF interface should be used to develop the SCF management requirements and the SCF management information model.

The text builds upon Annex C/Q.1224, where the foundation for IN management was made. The Management specification is based upon a sub-set of IN CS-3. The methodology for the specification of management for IN FEs has been repeated here for clarity.

These subclauses consider only stages 1 and 2 of the following methodology. Stage 3 (Information models and Object specifications) can be found in Recommendation Q.1831.1.

The approach used to provide the specifications for management of the SSF is divided into three steps (see Figure 1):

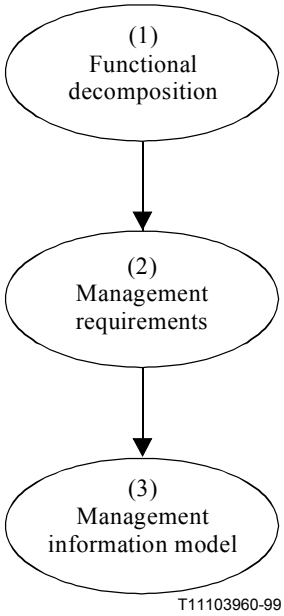

Figure 1/Q.1236 – Overview of the approach

It should be noted that this form of technical approach can be used to define the management specification of each IN functional entity, i.e. the SSF, SCF, SRF and SDF.

In the following subclauses, these steps will be described in more detail.

5 SMF-SSF/CCF Interface

5.1 SSF functional decomposition

5.1.1 Rationale

In order to come to the specification of a management information model of an SSF, it should first of all be clear **what** is to be managed. Therefore, it is necessary to establish a common understanding of the functionality of an SSF. The basis for such a common understanding can be provided by a functional decomposition of the SSF functionality. This functional decomposition based on the definition of the SSF as given in the Distributed Functional Model for IN CS-3 in Q.1231. The purpose of the functional decomposition is to:

- provide the basis for the common understanding of the SSF basic functionality (the target of the management study);
- provide a basis for the identification of management requirements and management modelling;
- improve the readability of the Recommendation.

This functional decomposition could be compared with the computational viewpoint in Open Distributed Processing (ODP). It is more or less in the form of an identification of (computational) objects in the SSF.

Note that this functional decomposition is one of many possible decompositions. It is possible for other SSF functionality to exist, which may impact the management information model.

5.1.2 Method

The method used to come to the functional decomposition of the SSF contains the following steps:

[1.1] **Analyse SSF functionality**

Within the Distributed Functional Plane architecture, the SSF and its relationships with other IN-FEs are described. Based on this description an initial functional decomposition of the SSF, i.e. a "SSF sub-entities model", can be made.

[1.2] **Analyse and select INAP procedures**

In the Physical Plane specifications, the information flow exchange between the IN-FEs is described in detail. Identify which of the operations involve the SSF. Describe DFP scenarios for these operations.

[1.3] **Pick scenario**

Choose a scenario that has not yet been mapped.

[1.4] **Correct/extend model**

For the chosen scenario, identify the required data and functions in the SSF and try to map these to the identified SSF sub-entities.

If the mapping can be made, detail and validate the decomposition by considering the detailed operations and parameters in the DFP scenarios. Check also whether specific functionality has already been studied elsewhere, such as charging or routing. If this is the case, try to harmonize/reuse these.

If a mapping cannot be made, the functional decomposition should be adapted to allow the mapping.

[1.5] **Next Scenario**

If all identified scenarios have been mapped, and the model appears complete (i.e. all SSF functions and data relevant for management seems to be identified sufficiently well), this model can be used as the basis for the requirements capture.

If there are any scenarios left that have to be mapped, repeat steps [1.3] to [1.5]. (See Figure 2.)

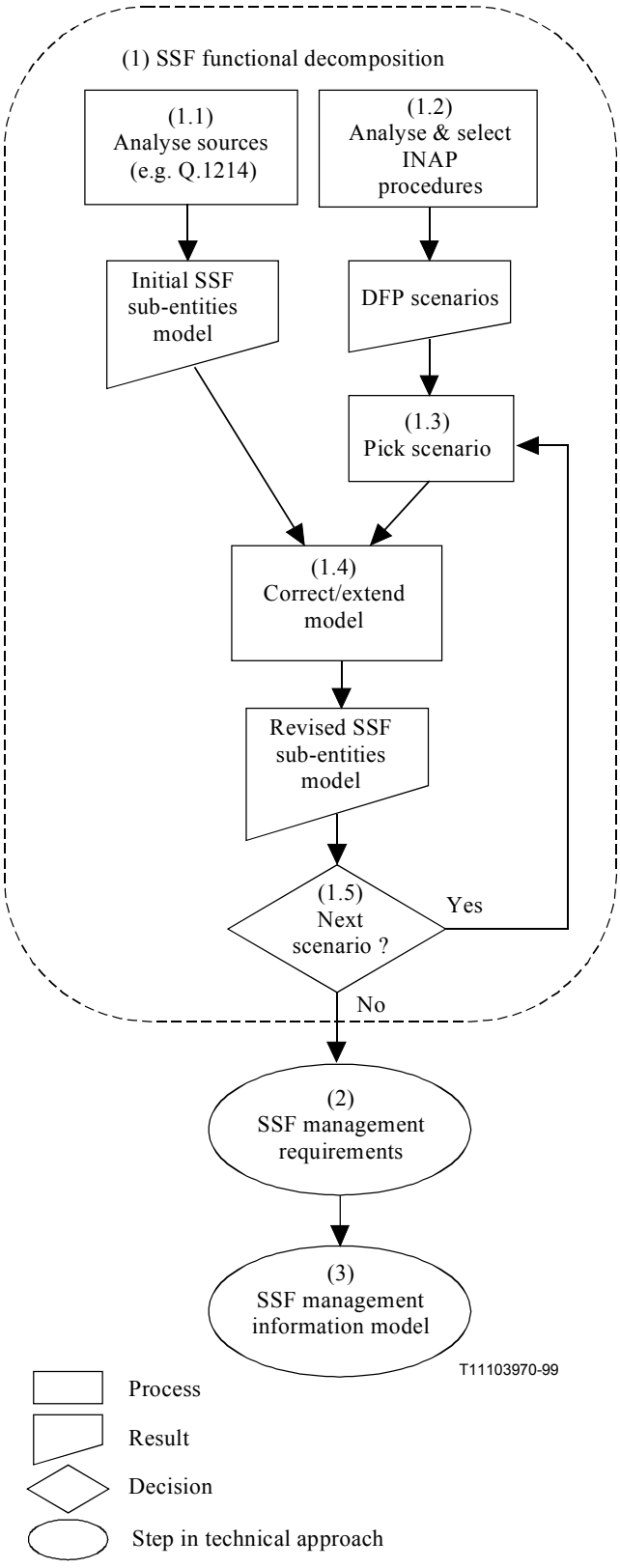

Figure 2/Q.1236 – Method for SSF Functional decomposition related to the overall approach

5.2 SSF management requirements

5.2.1 Rationale

For each SSF sub-entity as identified in the SSF functional decomposition, one should analyse which part of the identified functionality and data should be subject to management (bottom-up). In order

to put these management requirements into perspective, and to check whether they are really required from an operational perspective, they should be related to real (or envisioned) operational requirements. It should be possible to map each operational requirement – at least partly – to operations on the data and functions of the SSF sub-entities. The operational requirements and the management activities that are derived in this sub process are completely arbitrary. These steps are only taken to categorize the management requirements. The only goal is to identify the resulting management operations on SSF data.

5.2.2 Method

In the process of SSF Management requirements capture, the following terminology is used:

- *operational requirement*: a description of a management process that an IN operator would be needing for its business;
- *management functions*: set of management (TMN) operations upon one or more data entities.

In this requirements capture phase, the following steps are identified:

a) Identify operational requirements:

The operational requirements are the basis for the top-down approach to derive the SSF management requirements. To identify these operational requirements, use can be made of the experience of operational staff in managing IN structured networks; the DFP scenarios identified in step 1.2 can be used as a starting point in this analysis.

To fulfil an operational requirement, one or more "management activities" need to be performed (a many to many containment relationship). The description of the operational requirements and the list of the containing management activities is recorded in an "operational requirement template".

b) Identify management functions:

The management activities are the basic functions required to fulfil the operational requirements. Certain (and may be most) management activities will be found relevant for a number of operational requirements. To fulfil a management activity, one or more management operations on SSF data need to be performed (a many to many containment relationship). The description of the management activities and the list of the containing management operations is recorded in a "management function template".

c) Identify management operations on SSF data:

The identification of the SSF data is based on the SSF sub-entity model provided in step 1.4. From this, it can be derived what management operations on data are *possible* (bottom-up). From step 2.2 it can be derived what management operations on data are *required* (to satisfy the operational management requirements). So this function performs a cross-checking between the top-down and the bottom-up requirements. From this, a conclusion has to be drawn on the SSF data that is really required to be managed. The "management operations on data" are formulated here as Create, Read and Update operations on the data elements identified in the SSF sub-entities. A fairly detailed description of the data elements and the operations should be provided, so that a straightforward mapping to actual specifications can be made.

The analysis of the operational requirements, the management functions and the management operations on data in SSF sub-entities will influence each other and the results will evolve in an iterative manner.

When the description of the management requirements is stable, the next step of providing the specifications for management of an SSF can be started.

This methodology for deriving the management requirements is depicted in Figure 3.

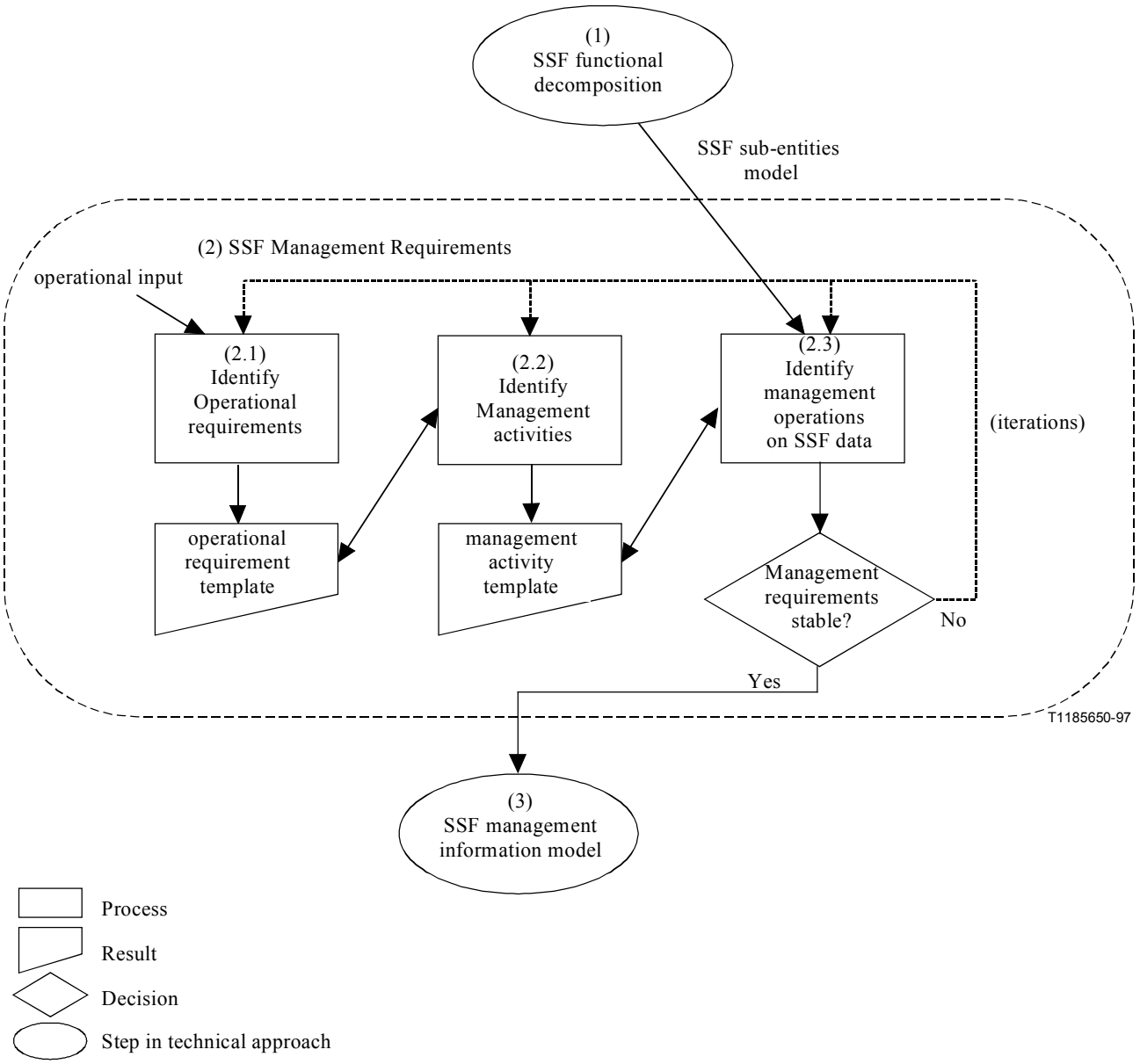

Figure 3/Q.1236 – Method for capturing SSF management requirements related to the overall approach

5.3 SSF management information model

The management information model is the final step in the modelling process. It builds upon and uses the information provided by the functional decomposition and management requirements in the previous subclauses. The result is the specification of managed objects and shared management knowledge making up the Q3 information model.

- Define relation with other models.
- Define containment tree for the SSF.
- Identify the entities that will be subject to management and identify these as potential MOs.
- Study other documents that have specified MOs for overlapping functionality.
- Give a detailed description of the data to be managed.
- Define the methodology and format of the specifications.
- Provide the specifications.

5.3.1 SSF scenarios

The basic process in defining the management requirements for the SSF is to analyse specific scenarios. These scenarios are based upon the INAP operations possible on the SSF-SCF interface. Each operation has a specific effect on the individual SSF sub-functional entities. The effects on the entities are documented and it is from this that the Management Requirement and Functions are formed. An example functional decomposition of the SSF/CCF can be found in Figure 4.

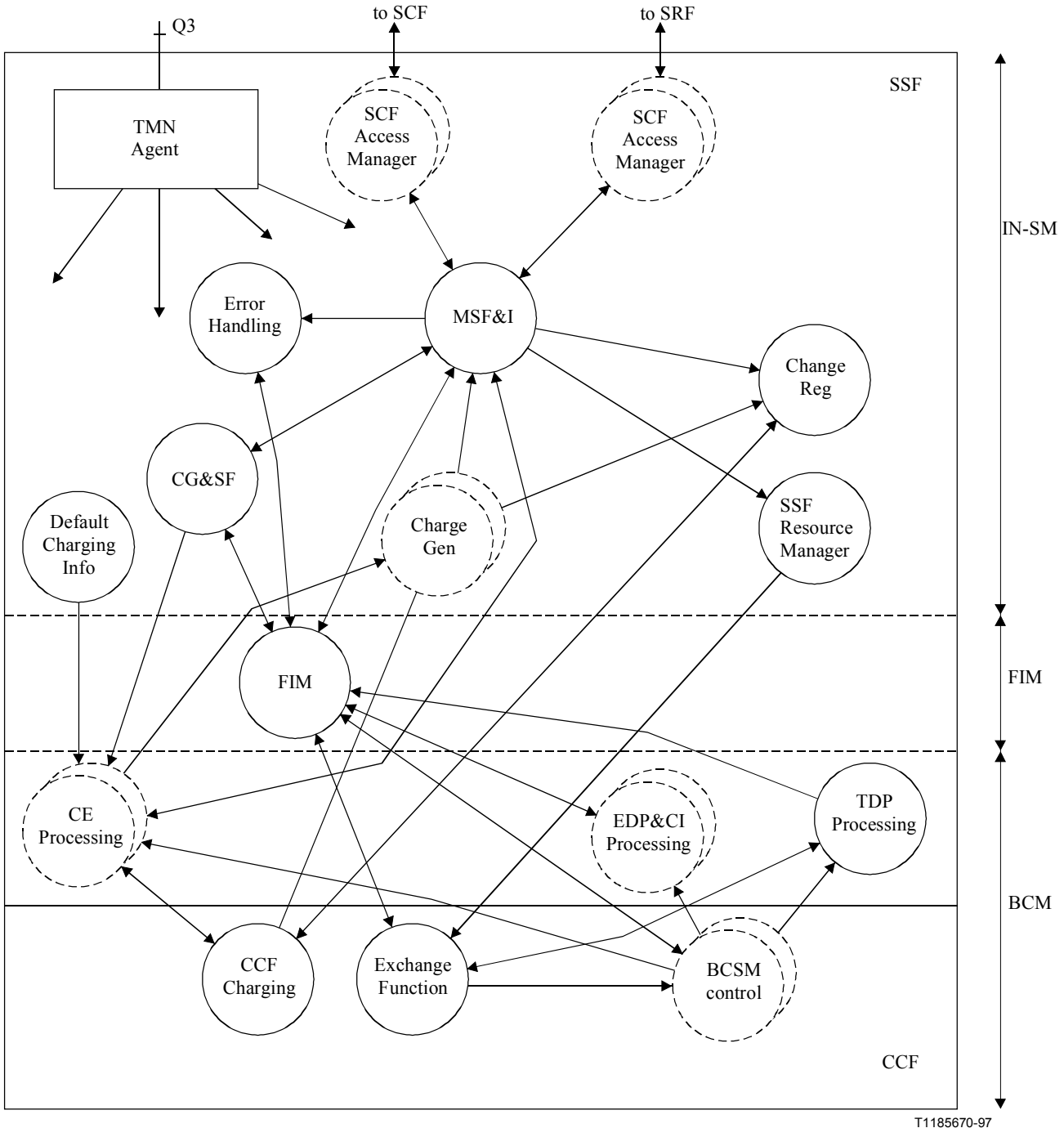

Figure 4/Q.1236 – Example SSF/CCF functional decomposition

5.3.2 SSF management requirements and management functions

5.3.2.1 Introduction

This subclause contains a description of requirements identified for management of the SSF functionality.

Each requirement is identified by its name followed by a brief description. The requirements are then broken down into a number of "Functions". Each function in turn is described in a separate template, again with a brief description but followed this time with a list of management operations which effectively map, in our case to CMIP operations.

5.3.2.2 SSF management requirements and functions

5.3.2.2.1 Operational Requirement (OR1)

Name

Configure triggering and event reporting of IN-based service feature control.

Description

Configure trigger detection points within basic call processing and associate it with requests for service feature control.

Activities

- A1: Configure trigger detection point.
- A2: Configure service feature control information.
- A3: Configure SCF access.
- A4: Configure event reporting capabilities.
- A5: Read trigger data.

i) Management Function (OR1-A1)

Name

Configure trigger detection point.

Description

Configure relationship of trigger detection points with basic call processing.

Management operations on data

- IN trigger (CREATE):

  An IN trigger is defined by a trigger detection point category and the triggering mode (related to the point in call where triggering might occur). IN triggering may be dependent on trigger criteria that are modifiable by administration. A (detected) IN trigger activates a service feature control.

  An IN trigger will be in general related to service type specific management (i.e. it will be installed during deployment of a service logic and de-installed, when removing associated service logic; actors: service provider, network operator). However it might be used to activate more then one service logic and it may be used also in some cases only for a customer specific service control instance.

  Besides network element management the configuration of an IN trigger may involve interaction between the network operator and the service provider.

- Trigger Criteria (CREATE/UPDATE/DELETE):

  Trigger criteria may be derived from a digit string, cause value, specific origin, feature activation or nature of address. The triggers may be combined into complex logical conditions using AND, OR, NOT operations. Trigger Criteria may be used by an IN trigger or they may be directly part of digit analysis when triggering TDPs ("Analysed Info").

- Line based trigger base (CREATE):

  A line trigger base may be attached to a customer line or trunk group or Centrex Group. For example, a line based trigger may be associated to a single directory number, a group of directory numbers, a specific access channel related to a PBX-subscriber, a special supplementary service related to a customer profile (e.g. triggering only if the customer is reached with teleservice "fax").

  For one line object there is at most one line trigger base. All IN triggers are associated to a specific line using the same trigger base. There may be several line triggers bearing the same IN trigger.

  A line object may be attached to only one line trigger base for the terminating side of the BCSM and/or only one line trigger base for the originating side of the BCSM. Line trigger bases can be deactivated temporarily.

  Line trigger bases will in general only service instance specific (not service type specific). I.e. management of them will happen in the service life cycle in the phases "service instance provisioning", "activation activities" and "service instance withdrawal" (actors: service provider, service subscriber, service user, network operator).

  Besides network element management, the configuration of a line trigger base may involve interaction between the network operator, service provider, service user.

- Office based trigger base (CREATE):

  An analysed info trigger is an example of an office based trigger base which may be attached to call routing items (e.g. specific digit string, access code, national destination). It is always associated to the TDP ("Analysed Info") or triggers encountered after digit analysis in call processing (e.g. route select failure). Therefore, it might directly activate a service feature control. But triggering because of analysed information may also be dependent on further trigger criteria.

  A routing object can be attached to only one analysed info trigger base. The trigger base may be temporarily deactivated.

  Triggering because of digit analysis is always "office based", i.e. relates to service types. This kind of triggers are therefore created during service deployment, modified by service type related control activities and deleted during removal of service logic and service data from network elements (actors: service provider, network operator).

  Besides network element management the configuration of an analysed info trigger base may involve interaction between the network operator and the service provider.

- Customer/trunk group/private facility/digit analysis object:

  Objects of this kind may or may not be attached to trigger bases.

- Escape Conditions (CREATE/UPDATE/DELETE):

  Criteria related to call data that result in a return to normal call processing while processing an IN trigger.

ii) Management Function (OR1-A2)

Name

Configure service feature control.

Description

Configure access to service feature control or exit from it.

Management operations on data

- IN service name (CREATE):

  Identifies the service logic in an abstract manner (service key). The service feature control may be activated by a IN trigger including triggers resulting from digit analysis and will use an SCF access to get instructions for controlling the service.

  A service feature control is in general managed service type specific. That is, it is created during service deployment, modified during service type related control activities and deleted during service removal (actors: service provider, network operator).

  Besides network element management the configuration of an IN service feature control may involve interaction between the network operator and the service provider.

- Processing instructions (CREATE/UPDATE/DELETE):

  Criteria related to call data that result in a reject of the service control access and lead to an exception handling. For example "an IN service is not allowed to influence calling line charging".

- Service activation state (CREATE/UPDATE):

  Information, whether IN control for the service feature is possible or not at the moment.

- Exception handling (CREATE/UPDATE)

  a) Exceptions which occur during triggering.

  b) Exceptions which occur after triggering.

  Both of these cases refer to Information about how (and in which state) to proceed call processing (e.g. play an announcement).

- Mapping of SCF routing information onto CCF routing objects (CREATE/UPDATE).

- A service feature control will use a specific SCF access and a specific IN application protocol ASE.

- Customization of a Service type in the SSF:

  This function may be done on several levels:

  a) set properties of the service feature control (like processing instructions, used application protocols, etc.);

  b) assign different IN triggers to the service feature control that may activate it (thereby defining different possible conditions on which the service may be triggered by different customers);

  c) assign line trigger bases associated to specific customer lines or trunks to the IN triggers defined before or assign a digit analysis output to the service feature control (thereby relating the IN service control to actual telecommunication resources).

  This customization may also be realized by assigning a Provisioning Profile to a service subscriber. Depending on the selected provisioning profile, different IN triggers, SCF accesses, announcements, etc. are selected for one service feature control. The provisioning profile may be located in the SMF, the SCF or SSF (or distributed between them).

- Service Compatibility Indicators (CREATE/UPDATE/DELETE):

  This includes setting the "service compatibility indicator" associated with the IN trigger and identifying the list of other "IN service compatibility indicators" that are not compatible with the trigger being managed.

iii) Management Function (OR1-A3)

Name

Configure SCF access.

Description

Configure IN application protocol specifics and SCF address data on a per service basis[1].

Management operations on data

- Selection of the Optional Parameter (CREATE/DELETE):

  Determines which of the optional parameters of the InitialDP may be sent for a specific IN application protocol and its application context (if according information can be found in the call data) or should be sent (and has to be determined if it cannot be found in the call data).

- SCF access (CREATE):

  Each SSF may communicate with a number of SCFs dependent on where individual service logic is located; this also includes configuring the SCF address and allocating the INAP version number.

- INAP ASE (CREATE):

  A service feature control uses for its control activities an INAP ASE restricted by a specific application context which defines which operations of the protocol can be received or sent. This represents the allocation of one or more INAP ASEs to an application context.

  The configuration of SCF accesses and IN application protocols is independent of the management of services. Its actor is in general the network operator. An INAP ASE is part of the SCF-SSF Application Entity used within an network element. There may be several INAP ASEs within one SCF-SSF AEs. Another part of the SCF-SSF AEs are the TCAP ASEs. In case of protocol errors, the SCF-SSF AE may use fallback protocols instead of those originally chosen. Also there may be an INAP/ISUP Inter-working ASE (determining, for example, if an optional parameter received via ISUP messages can be overwritten by according parameters from INAP).

- A service feature control uses either signalling point code based addressing or global title translation to invoke associations with service control points.

iv) Management Function (OR1-A4)

Name

Configure event reporting capabilities.

Description

Configure call processing capabilities for reporting BCSM events to IN-based service feature control.

---

[1] The value of the T_{SSF} timer may depend on the application and may need to be examined when configuring the SCF access.

Management operations on data

- Reference to service feature and EDP category (CREATE).
- Causes (CREATE/UPDATE/DELETE):

  Mapping of causes to BCSM events (busy, noAnswer, routeSelectFailure, disconnect).
- Feature activation (CREATE/UPDATE/DELETE):

  Mapping of feature activation to BCSM events (midCall).
- Application timer (CREATE/UPDATE/DELETE):

  Default value for noAnswer timer.
- Number of digits (CREATE/UPDATE/DELETE):

  Default value for triggering "collected information".

v) Management Function (OR1-A5)

Name

Read trigger data.

Description

It should be possible to retrieve information about the trigger base, the activation state of the trigger, the trigger criteria and the association to service feature controls.

Management Operations on Data

- Trigger base (READ):

  It should be possible for trigger based objects (customer lines, trunk groups, code points, Centrex groups, etc.) to get all attached triggers. This may be all triggers or only those of a specific trigger category. In particular it should be possible to get information about the activation or deactivation of this attachment.
- IN trigger (READ):

  It should be possible to get information about the trigger criteria of a specific IN trigger and to determine the associated service feature control.
- Service feature control (READ):

  It should be possible to retrieve all of the information related to a specific service Id. It should also be possible to get information about the SCF access and the SSF/SCF application protocol used by the service feature control.

5.3.2.2.2 Operational Requirement (OR2a-d)

Call Gapping

This requirement is separated into four parts a-d, the same nomenclature is used as for other Operational Requirements.

5.3.2.2.2.1 Operational Requirement (OR2a)

Name

Start Call Gapping.

Description

This operation is issued in order to start Call gapping from the SMF.

Activities

- Configure call gapping.

i) Management Function (OR2a-A1)

Name

Configure call gapping.

Description

This function performs all necessary configuration for SMF controlled call gapping. If the parameter gapTreatment is omitted, the default values are used.

Note that stopping and removing call gapping is done by setting gapInterval to "0" for a specific value of gapCriteria.

Management operations on data

- gapCriteria (CREATE, UPDATE, DELETE):
  Specifies which calls are to be gapped.
- gapIndicators:
  - duration (CREATE, UPDATE, DELETE).
  - gapInterval [CREATE, UPDATE, (DELETE)].

  Specifies how the gapping is to be applied.
- controlType (CREATE, UPDATE, DELETE):
  Specifies the reason why gapping is invoked.
- gapTreatment (CREATE, UPDATE, DELETE):
  Specifies how gapped calls are to be treated.

5.3.2.2.2.2 Operational Requirement (OR2b)

Name

Stop Call Gapping.

Description

This operation is issued in order to stop Call gapping from the SMF.

Activities

- Configure call gapping (only gapIndicators and gapCriteria are mandatory).

i) Management Function (OR2b-A1)

Name

Configure call gapping.

Description

This function performs all necessary configuration for SMF controlled call gapping. If the parameter gapTreatment is omitted, the default values are used.

Note that stopping and removing call gapping is done by setting gapInterval to "0" for a specific value of gapCriteria.

5.3.2.2.2.3 Operational Requirement (OR2c)

Name

Read current gapping criteria.

Description

Reads parameters for ongoing call gapping, if any.

Activities

- Read current gapping criteria.

i) Management Function (OR2c-A1)

Name

Read current gapping criteria.

Description

Reads parameters for ongoing call gapping, if any.

Management operations on data

- gapCriteria (READ).
- gapIndicators:
  - duration (READ).
  - gapInterval (READ).
- controlType (READ).
- gapTreatment (READ).

5.3.2.2.2.4 Operational Requirement (OR2d)

Name

Configure default call gapping values.

Description

This operation configures all parameters, that are optional in the CallGap operation sent from the SCF (the gapTreatment parameter).

Activities

- Set default treatment of calls subject to gapping.

i) Management Function (OR2d-A1)

Name

Set default treatment of calls subject to gapping.

Description

This function set the default values for gapTreatment for use with SCF initiated call gapping. The gapTreatment is optional in the CallGap operation.

Also default charging should be defined, as the CallGap operation does not provide any charging information.

Management operations on data

- gapTreatment (CREATE, UPDATE):
  Specifies how gapped calls are to be treated.
- default charging (CREATE, UPDATE – in the Default Charging sub-entity).

5.3.2.2.3 Operational Requirements (OR3)

Name

Configure SSF-relaying capabilities.

Description

Handling information about the possibilities of relaying SCF/SRF-control at an SSF.

Activities

- Configure SRF resource availability.

i) Management Function (OR3-A1)

Name

Configure SRF resource availability.

Description

Handling information about the availability of SRF resources at the SSF.

Management operations on data

- IP Available (UPDATE):
  Indicates the availability of a SRF resource.
- IP/SSP Capabilities (UPDATE):
  Description of SRF resources available at the SSF.

5.3.2.2.4 Operational Requirements (OR4)

Name

Configure SRF assisting.

Description

Configure handling of assist requests for SCF/SRF-relaying in the initiating and assisting SSF.

Activities

- Configure establishment of temporary connection.
- Configure trigger detection point.
- Configure assist treatment.

i) Management Function (OR4-A1)

Name

Configure establishment of temporary connection.

Description

Configure handling of assist relationship establishments in the initiating SSF.

Management operations on data

- Supervision timer for "waiting for end of temporary connection" (UPDATE):
  This timer is resident within the initiating SSF and monitors the relationship with the assisting SSFs.

ii) Management Function (OR4-A2)

Name

Configure trigger detection point in assisting SSF.

Description

Configure trigger detection point within basic call processing and associate it with an assist treatment.

Management operations on data

- IN Trigger detection point (CREATE):

  A TDP may be associated to an assist treatment.
- Trigger criteria (CREATE/UPDATE/DELETE):

  Indicates which criteria are used to describe that an assist request instruction shall be invoked (as opposed to an InitialDP).

  Trigger criteria may be derived from a digit string, cause value, specific origin, feature activation or nature of address. The triggers may be combined into complex logical conditions using AND, OR, NOT operations. Trigger Criteria may be used by an IN trigger or they may be directly part of digit analysis when triggering TDPs ("Analysed Info").

iii) Management Function (OR4-A3)

Name

Configure assist treatment.

Description

Configure handling of assist requests in an assisting SSF.

Management operations on data

- SRF availability (UPDATE):

  Information about the availability of the requested SRFs at the assisting SSF.
- SRF/SSF capabilities (UPDATE):

  Information about the capabilities of the SRF resources available at the assisting SSF.
- Mapping of digit strings to correlation ID (UPDATE):

  This operation enables the mapping of digits string with the correlation Id within an assisting relationship.
- Mapping of digit strings to SCF ID (UPDATE):

  This associates a particular assist request to an SCF access.

5.3.2.2.5 Operational Requirement (OR5a-b)

This requirement is separated into two parts a-b, the same nomenclature is used as for other operational requirements.

5.3.2.2.5.1 Operational Requirement (OR5a)

Name

Configure service filtering.

Description

This operation configures all default parameters in service filtering.

Activities

- Set default duration.

i) Management Function (OR5a-A1)

Name

Set default duration.

Description

This function sets the default duration of service filtering for an active service filtering operation.

Management operations on data

- filteringTimeOut duration (CREATE, UPDATE):
  Defines the maximum duration of the filtering if value is –2 (network specific duration).

5.3.2.2.5.2 Operational Requirement (OR5b)

Name

Read service filtering.

Description

This operation reads all pending and ongoing service filterings.

Activities

- Read ongoing filterings.

i) Management Function (OR5b-A1)

Name

Read current filterings and status.

Description

This function reads all ongoing and pending service filterings and defined counters values.

Management operations on data

- filteredCallTreatment:
  Specifies how filtered calls are to be treated.
- ssfBillingChargingCharacteristics (READ).
- informationToSend (READ):
  This defines the information that is sent to the end user when filtering is applied to that user.
- maxNumbersOfCounters (READ):
  This defines the maximum value to which the counter may reach for a particular service filtering.
- releaseCause (READ):
  This defines the release cause value that is associated with the message sent back to the user.
- filteringCharacteristics (READ):
  Defines the severity of the filtering to be applied and the point in time when the service filtering report will be sent.
- filteringTimeOut (READ):
  Defines the maximum duration of the filtering.

- filteringCriteria (READ):

  Used to specify those calls that are to be filtered out.
- startTime (READ):

  Defines when the filtering is to start.
- CountersValue (READ):

  Contains the count of calls filtered during the filtering period.

5.3.2.2.6 Operational Requirement (OR6)

Name

Configure a set of originating call set-up data for SCF initiated call.

Description

This operation configures the properties and capabilities required for a call set-up initiated from the SCF. It will be network dependent default originating call data to be defined, normally received or associated with the calling party number.

At least one mandatory set of call set-up data shall be defined. More than one set may optionally be defined. This should be done in case the option conditional selection of originating call set-up data is used.

If the parameter calling party number is not received from SCF, the mandatory defined default set (set 1) of originating call set-up data values are used.

This operation allows, in case a calling party number is supplied by the SCF, that these properties may be dependent on the received calling party number.

If a received calling party number does not match the criteria for conditional selection of a specific set of originating call set-up data values, the mandatory defined default set (set 1) of originating call set-up data values are used.

Activities

- Set default originating call set-up information.
- Read a set of default originating call set-up information.
- Retrieve Usage Log.

i) Management Function (OR6-A1)

Name

Set default originating call set-up information.

Description

This function defines one complete set of default originating call set-up data values needed to perform a SCF initiated call set-up upon receipt of an InitiateCallAttempt operation.

The call set-up data set is identified by the default defined calling party number.

This function allows dependent on calling party number the selection of a default originating call set-up information set. More than one set of originating call set-up information values may be defined to allow conditional selection of properties dependent on received calling party number from the SCF.

Management operations on data

- Set Calling Party Number (CREATE, UPDATE, DELETE):

  Value: Refer to ITU-T Q.763 for encoding.

- Set Calling Party's Category (CREATE, UPDATE, DELETE):
  Value: Refer to ITU-T Q.763 for encoding.
- Set Forward Call Indicators:
  Values: Refer to ITU-T Q.763 for encoding:
  - national/International call indicator (CREATE, UPDATE, DELETE);
  - end-to-end method indicator (CREATE, UPDATE, DELETE);
  - inter-working indicator (CREATE, UPDATE, DELETE);
  - end-to-end information indicator (CREATE, UPDATE, DELETE);
  - ISDN user part indicator (CREATE, UPDATE, DELETE);
  - ISDN user part preference indicator (CREATE, UPDATE, DELETE);
  - ISDN originating access indicator (CREATE, UPDATE, DELETE);
  - SCCP method indicator (CREATE, UPDATE, DELETE).
- Nature of connection indicators:
  - satellite indicator (CREATE, UPDATE, DELETE);
  - continuity check indicator (CREATE, UPDATE, DELETE);
  - echo control device indicator (CREATE, UPDATE, DELETE);
  - bearer service (transmission medium) (CREATE, UPDATE, DELETE).

ii) Management Function (OR6-A2)

Name

Read a set of default originating call set-up information.

Description

Read the default originating call set-up information needed to perform a call set-up upon receipt of an InitiateCallAttempt operation, if any.

Management operations on data

- Calling Party Number (READ).
- Calling Party's Category (READ).
- Forward Call Indicators:
  - national/International call indicator (READ);
  - end-to-end method indicator (READ);
  - inter-working indicator (READ);
  - end-to-end information indicator (READ);
  - ISDN user part indicator (READ);
  - ISDN user part preference indicator (READ);
  - ISDN originating access indicator (READ);
  - SCCP method indicator (READ).
- Nature of connection indicators:
  - satellite indicator (READ);
  - continuity check indicator (READ);
  - echo control device indicator (READ).
- Bearer service (transmission medium) (READ).

iii) Management Function (OR6-A3)

Name

Retrieve Usage Log.

Description

Retrieve the usage records stored in the Usage Log.

This function can periodically be used to collect all the usage records generated over a certain period of time.

Management operations on data

- Usage Log (READ).

5.3.2.2.7 Operational Requirement (OR7)[2]

Name

Configure Error handling.

Description

This operation configures the SSF to handle error situation.

Activities

- Configure InitialDP error handling.
- Configure ApplyCharging error handling.
- Configure Timer expiration (T_{SSF}) handling.

i) Management Function (OR7-A1)

Name

Configure InitialDP error handling.

Description

This function defines the handling of operational related errors after an InitialDP has failed. For each error response from the SCF, the network operator has to decide which default treatment applies.

Management operations on data

- Initial DP failure (CREATE, UPDATE).

Some possibilities are listed as examples:

– MissingCustomerRecord results in a release cause (optionally play announcement) being applied and call is released.

– MissingParameter, SystemFailure, TaskRefused, UnexpectedDataValue, UnexpectedParameter: This results in a release cause (optionally play announcement) being applied and the network operator may choose to release or maintain the call.

---

[2] The activities described in this requirement are examples only, and it should be noted that use of this management capability may conflict with management of the triggers (e.g. setting of the exception handling).

ii) Management Function (OR7-A2)

Name

Configure ApplyCharging error handling.

Description

This function defines the handling of operational related errors after an ApplyCharging has failed. For each error response from the SCF, the network operator has to decide which default treatment applies. Some possibilities are listed as examples.

For each error procedure, the actual management action is listed in brackets.

Management operations on data

- MissingParameter: Maintain/release call (CREATE, UPDATE).
- ParameterOutOfRange: Maintain/release call (CREATE, UPDATE).
- SystemFailure: Maintain/release call (CREATE, UPDATE).
- TaskRefused: Maintain/release call (CREATE, UPDATE).
- UnexpectedComponentSequence: Maintain/release call (CREATE, UPDATE).
- UnexpectedDataValue: Maintain/release call (CREATE, UPDATE).
- UnexpectedParameter: Maintain/release call (CREATE, UPDATE).

iii) Management Function (OR7-A3)

Name

Configure T_{SSF} expiration Handling.

Description

This function defines handling of expiration of the T_{SSF} timer. Criteria for continuing/interrupting the ongoing call has to be defined and stored in the Service Feature Manager, handling of the interrupted call is to be defined and stored in the Error handling sub-entity.

Management operations on data

- Define default bearer connection (CREATE, UPDATE).
- Define criteria for continuing/interrupting the call. (CREATE, UPDATE).

5.3.2.2.8 Operational Requirement (OR8)

Name

Configure IN Charging.

Description

It should be possible to configure the charging to be used for IN calls. This may consist of providing the default values to be used in case certain parameters are not specified by INAP messages, configuring the log to be used to store usage records, configuring the reporting of usage records (instead of logging), etc.

Activities

- Configure Default Charging settings.
- Configure Usage Reporting.
- Configure Usage Log.

i) Management Function (OR8-A1)

Name

Configure Default Charging Settings.

Description

Configure the default charging information.

Management operations on data

- charge units (READ, UPDATE):
  Units of usage to be used in the metering process.
- notification layout (READ, UPDATE):
  Defines a usage layout for the usage notification.

ii) Management Function (OR8-A2)

Name

Configure Usage Reporting.

Description

Configure the settings of the Usage Reporting (in Default Charging Info).

Management operations on data

- Filter parameters (READ, UPDATE):
  Defines the parameters for applied filters.

iii) Management Function (OR8-A3)

Name

Configure Usage Log.

Description

Configure the settings of the Usage Log.

Management operations on data

- Usage Log Settings (READ, UPDATE).

5.3.2.2.9 Operational Requirement (OR9)

Name

Monitor originating call set-up information.

Description

This operation reads the defined properties and capabilities required for a call set-up initiated from the SCF, if any defined.

One or more SCF originating call set-up information may be read.

Activities

- Monitor current Recording/Reporting Trigger settings.
- Monitor current usage.

i) Management Function (OR9-A1)

Name

Monitor Current Recording/Reporting Trigger Settings.

Description

Read the current values of the recording trigger and reporting trigger data.

This function can be used to detect erroneous recording or reporting trigger settings through INAP operations.

Management operations on data

- recording trigger (READ).
- set of reporting triggers (READ).

ii) Management Function (OR9-A2)

Name

Monitor Current Usage.

Description

Read the current usage for a specific call.

This function can be used to detect calls that show irregular usage patterns, e.g. in case of fraudulent calls to premium rate subscribers.

Management operations on data

- Usage Info (READ).

5.3.2.2.10 Operational Requirement (OR10a-c)

Measurements

This requirement is separated into three parts a-c, the same nomenclature is used as for other Operational Requirements.

5.3.2.2.10.1 Operational Requirement (OR10a)

Name

Start INAP Measurement counters.

Description

This operation is used in order to start INAP Measurement. The counters required for the SSF to handle INAP measurements for the SSF-SCF (INAP) interface are activated.

Applicable counters related to INAP measurements provided by the SSF has to be defined. These counters, associated with the establishment or terminating of a SSF-SCF relationship are to provide INAP measurements useful to design network configuration and detect errors.

One or more INAP Measurement counters may be started.

All counters in the SSF for INAP Measurements are optional (i.e. may not be provided). If a counter is available, the initial default status value is "Non-Active" (Stopped).

When a counter is started the initial counter value is set to zero.

Functions

- Configure INAP Measurement counters.

i) Management Function (OR10a-A1)

Name

Configure INAP Measurement counters.

Description

Configure the settings of the INAP Measurements counters.

This function can be used to activate or deactivate an INAP Measurement counter.

The IN Measurement counter is categorized by a counter "category" used to:

a) identify the counter (defined at CREATE); and

b) indicate its status (Active/Non-active).

The status may be updated, i.e. set to "non-Active"/"Active" (stop/start counting).

The stepping of the counter occurs each time when the defined measuring point for the counter is encountered and the status is set to "Active".

When a counter is stopped (UPDATE) the status is set to "Non-Active". When the counter is started again the status is set to "Active" and the counter value is zero. A defined counter may also be removed (DELETE).

Management operations on data

Set of Predefined optional INAP Measurement Counters (the following are examples):

- TC Message Initiation Attempt (CREATE/UPDATE/DELETE). This counter is incremented by one at the begin of each attempt to open a dialogue to the SCF or from the SCF. A Counter may be defined to count all attempts, but a counter may also be defined for each of the following conditions.
- TC Message initiated with InitialDP sent by the SSF (CREATE/UPDATE/DELETE).
- TC Message initiated with AssistRequestInstructions sent by the SSF (CREATE/UPDATE/DELETE).
- **TC Message** Initiated with ServiceFilteringResponse from the SSF.
- TC Message with InitiateCallAttempt received from the SCF (CREATE/UPDATE/DELETE).
- TC Message initiated with CallGap sent by the SCF (CREATE/UPDATE/DELETE).
- TC Message initiated with ActivateServiceFiltering sent by the SCF (CREATE/UPDATE/DELETE).
- TC Message congestion (CREATE/UPDATE/DELETE). This counter is incremented by one each time a dialogue to SCF cannot be opened, i.e. at unsuccessful attempt to open a dialogue. The opening may fail due to SSP overload or SSF lack of resources.
- TC- Message not accepted (CREATE/UPDATE/DELETE). This counter is incremented by one each time a SSF initiated dialogue attempt is rejected, e.g. when TC message is not accepted by lower layer protocol.
- SSF initiated Dialogues processed (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF has sent a TC-Begin message successfully.
- SCF initiated Dialogues processed (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF has received a TC_Begin message successfully (e.g. with InitiateCallAttempt, CallGap, ActivateServiceFiltering).
- Error/Reject Messages sent by SSF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF sends a TC_U_ERR_REQ or TC_U_REJ_REQ.

- Error/Reject Messages from SCF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF receives a TC_U_ERR, TC_U_REJ or TC_R_REJ.
- Timeout on SCF response (CREATE/UPDATE/DELETE). This counter is incremented by one each time the T_{SSF} timer expires in the SSF.
- TC Message aborted by SCF or remote TC (CREATE/UPDATE/DELETE). This counter is incremented by one each time a TC_U_Abort is received in SSF.
- TC Message aborted by SSF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF aborts the dialogue, except if caused by "Time-out on response" (i.e. if T_{SSF} expires).
- TC Message in progress (CREATE/UPDATE/DELETE). Traffic level measurement on number of current ongoing dialogues, i.e. the current number of dialogues in progress is measured.

  This counter is incremented by one:

  – each time the SSF has sent a TC-Begin message;

  – each time the SSF receives a TC_Begin message (e.g. with InitiateCallAttempt, CallGap, ActivateServiceFiltering).

  This counter is decremented by one:

  – each time a dialogue is ended (e.g. TC-End received, dialogue aborted, Error/reject message received, Pre-arranged End).

5.3.2.2.10.2 Operational Requirement (OR10b)

Name

Stop INAP Measurement counter.

Description

This operation is used in order to stop ongoing INAP Measurement. The counters required for the SSF to handle INAP measurements for the SSF-SCF (INAP) interface are deactivated (Status Non-Active).

One or more INAP Measurement counters may be stopped.

All counters in the SSF for INAP Measurements are optional, i.e. may not be available.

Functions

- Configure INAP Measurement counters.

i) Management Function (OR10b-A1)

Name

Configure INAP Measurement counters.

Description

Configure the settings of the INAP Measurements counters.

This function can be used to activate or deactivate an INAP Measurement counter.

INAP Measurement Counter:

The IN Measurement counter is categorized by a counter "category" used to:

a) identify the counter (defined at CREATE); and

b) indicate its status (Active/Non-active).

The status may be updated, i.e. set to "non-Active"/"Active" (stop/start counting).

The stepping of the counter occurs each time when the defined measuring point for the counter is encountered and the status is set to "Active". When a counter is stopped (UPDATE), the status is set to "Non-Active". When the counter is started again, the status is set to "Active" and the counter value is zero. A defined counter may also be removed (DELETE).

Management operations on data

Set of Predefined optional INAP Measurement Counters (the following are examples):

- TC Message Initiation Attempt (CREATE/UPDATE/DELETE). This counter is incremented by one at the begin of each attempt to open a dialogue to the SCF or from the SCF. A Counter may be defined to count all attempts, but a counter may also be defined for each of the following conditions.
- TC Message initiated with InitialDP from the SSF (CREATE/UPDATE/DELETE).
- TC Message initiated with AssistRequestInstructions from the SSF (CREATE/UPDATE/DELETE).
- **TC Message** Initiated with ServiceFilteringResponse from the SCF (CREATE/UPDATE/DELETE).
- TC Message with InitiateCallAttempt from the SCF (CREATE/UPDATE/DELETE).
- TC Message initiated with CallGap from the SCF (CREATE/UPDATE/DELETE).
- TC Message initiated with ServiceFiltering from the SCF (CREATE/UPDATE/DELETE).
- TC Message congestion (CREATE/UPDATE/DELETE). This counter is incremented by one each time a dialogue to SCF cannot be opened, i.e. at unsuccessful attempt to open a dialogue. The opening may fail due to SSP overload or SSF lack of resources.
- TC- Message not accepted (CREATE/UPDATE/DELETE). This counter is incremented by one each time a SSF initiated dialogue attempt is rejected, e.g. when TC message is not accepted by lower layer protocol.
- SSF initiated Dialogues processed (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF has sent a TC-Begin message successfully.
- SCF initiated Dialogues processed (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF has received a TC_Begin message successfully (e.g. with InitiateCallAttempt, CallGap, ActivateServiceFiltering).
- Error/Reject Messages sent by SSF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF sends a TC_U_ERR_REQ or TC_U_REJ_REQ.
- Error/Reject Messages from SCF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF receives a TC_U_ERR, TC_U_REJ or TC_R_REJ.
- Timeout on SCF response (CREATE/UPDATE/DELETE). This counter is incremented by one each time the T_{SSF} timer expires in the SSF.
- TC Message aborted by SCF or remote TC (CREATE/UPDATE/DELETE). This counter is incremented by one each time a TC_U_Abort is received in SSF.
- TC Message aborted by SSF (CREATE/UPDATE/DELETE). This counter is incremented by one each time the SSF aborts the dialogue, except if caused by "Time-out on response" (i.e. if T_{SSF} expires).
- TC Message in progress (CREATE/UPDATE/DELETE), Traffic level measurement on number of current ongoing dialogues, i.e. the current number of dialogues in progress is measured.

This counter is incremented by one:

– each time the SSF has sent a TC-Begin message;

– each time the SSF receives a TC_Begin message (e.g. with InitiateCallAttempt, CallGap, ActivateServiceFiltering).

This counter is decremented by one:

– each time a dialogue is ended (e.g. TC-End received, dialogue aborted, Error/reject message received, Pre-arranged End).

5.3.2.2.10.3 Operational Requirement (OR10c)

Name

Read current INAP Measurement counters.

Description

This operation reads the counter values of ongoing INAP Measurements.

The value of indicated counter is read. More than one counter may be specified, i.e. read one counter, a set of counters or all counters.

Functions

- Read current INAP Measurement counter value.

i) Management Function (OR10c-A1)

Name

Read current INAP Measurement Counter value.

Description

Read one or more INAP Measurements counter values, if any active counter.

Management operations on data

INAP Measurement counters:

The IN Measurement counter is categorized by a counter "category" used to:

a) identify the counter (defined at CREATE); and

b) indicate its status (Active/Non-active).

The status may be updated, i.e. set to "non-Active"/"Active" (stop/start counting).

The stepping of the counter occurs each time when the defined measuring point for the counter is encountered and the status is set to "Active".

When a counter is stopped (UPDATE), the status is set to "Non-Active". When the counter is started again, the status is set to "Active" and the counter value is zero. A defined counter may also be removed (DELETE).

- Dialogue Initiation Attempt counter (READ).
- TC Message initiated with InitialDP from the SSF (READ).
- TC Message initiated with AssistRequestInstructions from the SSF (READ).
- TC Message Initiated with ServiceFilteringResponse from the SCF (READ).
- TC Message initiated with InitiateCallAttempt from the SCF (READ).
- TC Message initiated with CallGap from the SCF (READ).
- TC Message initiated with ServiceFiltering from the SSF (READ).

- TC Message congestion (READ).
- TC Message not accepted (READ).
- SSF initiated Dialogues processed (READ).
- SCF initiated Dialogues processed (READ).
- Error/Reject Messages sent by SSF (READ).
- Error/Reject Messages from SCF (READ).
- Timeout on SCF response (READ).
- TC Message aborted by SCF or remote TC (READ).
- TC Message aborted by SSF (READ).
- TC Message in progress (READ).

5.4 IN Management relationship with SS7 Management (Q.751)

This subclause describes how the SSF manager can obtain the required information about the SS7 Network from the SS7 Manager.

5.4.1 Introduction

An Intelligent Network may use the Signalling System No. 7 (SS7) network to communicate between its physical entities. For this reason the SMF may need to access information relating to the SSF's ability to route messages over the SS7 network to the SCF and SRF.

The SS7 network may be used by many other networks besides the IN (e.g. PSTN, ISDN, GSM). For performance reasons, it is not recommended that every individual management system of these networks reads the same information from the SS7 network elements. If the SMF requires SS7 related information, it can obtain it from the SS7 Manager either via a q Reference Point or via an x Reference Point. Via the same Reference Points, the SMF may request configuration changes from the SS7 Manager. For the purpose of modelling the information to be transferred between the SMF and the SS7 Manager, the Managed Objects defined in Q.751.1 (MTP) and Q.751.2 (SCCP) are reused. It is left to the network operator to restrict the management capabilities of the SMF (e.g. to allow only GET operations). The Functional Unit Negotiation mechanism may be used for this purpose. See Figure 5.

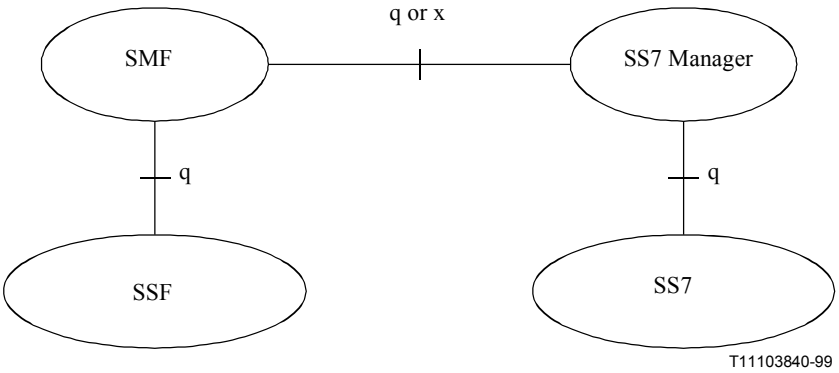

Figure 5/Q.1236

5.4.2 MTP related information

The following Managed Objects defined in Recommendation Q.751.1 are used for the transfer of MTP related formation between the SSF Manager and the SS7 Manager:

- mtpSignPoint:

  (Holds the management information about the Local Signalling Point where the SSF resides.)
- signRouteSetNePart:

  (Holds the information about the Destination Signalling Points which can be reached from the Local Signalling Point.)

5.4.3 SCCP related information

The following Managed Objects defined in Q.751.2 are used for the transfer of SCCP related information between the SSF Manager and the SS7 Manager:

- sccpAccessPoint:

  (Holds the information about the SCCP Subsystems.)
- gtTranslator:

  (Defines the selection of a Global Title Rule for the translation of a Global Title. Points to a Managed Object gtRule.)
- gtRule:

  (Defines the Global Title Translation, Points to an SCCP Entity Set.)
- sccpEntitySet:

  (Points to one or two SCCP Access Points.)
- gtConversionRule:

  (Defines how a Global Title shall be translated into a new Global Title.)

5.4.4 Comparison between Traffic Management and IN Management

Recommendation M.3200 defines a number of management services, amongst them Traffic Management and Management of Intelligent Networks.

Part of IN Management covers the area of Traffic Management which is to enable as many calls as possible to be successfully completed.

Figure 6 shows this point.

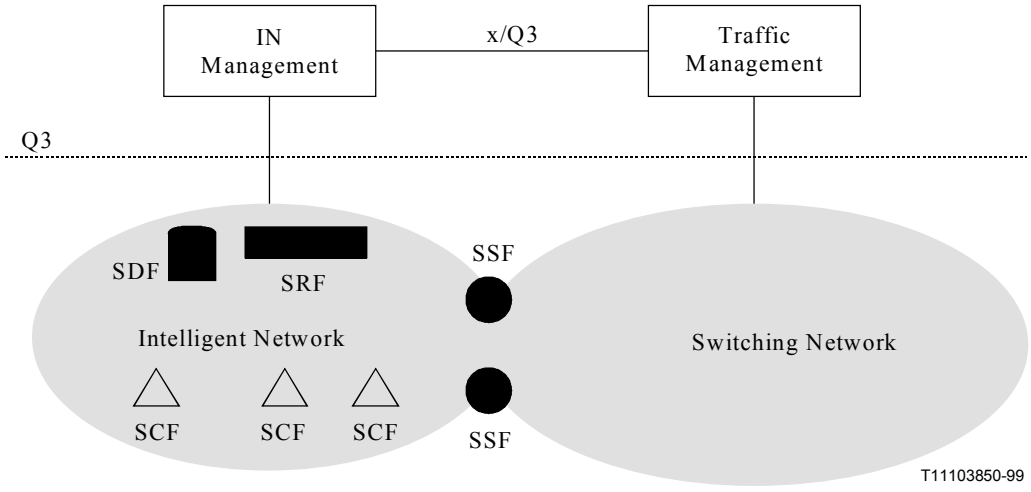

Figure 6/Q.1236

In respect to all calls requiring IN treatment, the Traffic Management functions ensure connection to a "useable" SSF whenever possible. Within the SSF, the routing mechanism will form the relations between the switched network and the IN network.

Processing of the call within the IN from trigger detection to selection of an outgoing route is the responsibility of Intelligent Network Management.

Any information, that one manager should require from the network for which it is not responsible, should be provided on the management interface between the managers.

6 SMF-SCF relationship

This relationship manages the entities/components and data related to the SCF. The entities/components include:

– the Service Logic Execution Manager;

– the Service Logic Selection/Interaction Manager;

– the Service Logic Processing Program Instance;

– the SCF Data Access Manager;

– the Resource Manager;

– the SLP Manager.

This relationship performs:

- **Configuration Management Functions**

  SLP Configuration

  – The SMF should be able to introduce new SLPs along with the corresponding service key and revision number, and likewise be able to remove an SLP identified by its service key.

  – When instructed by the SMF to remove an SLP the SCF should prevent the creation of new call instances of the SLP.

  – Support any active call instances of the SLP as long as they exist.

  – Notify the SMF on removal of the SLP after all the active call instances of the SLP have terminated.

  Updating the Service Configuration data

  – Within the SCF resides information about the location and capabilities of resources in the network (SSF, SRF) accessible to the SCF. To maintain consistency across SCFs this information should be modified at the SMF, and the modifications broadcast to the SCFs affected. Modifications to the service configuration data would be done via interaction with the SCF Data Access Manager.

  – This interface would be used both when new resources are added or removed and also in real time during fault conditions.

  Configuration verification

  The SMF should be able to determine the current configuration of the SCF at any time. This may be facilitated by the use of a version number associated with the SLPs stored in the SCF.

- **Fault Management Functions**

  Reporting of Alarms and Operations measurements

  Alarms and logs can be generated within a service instance in the SLP.

  – Additional non-service specific alarms and logs may also be generated under instruction from the SMF (as the result of specific timers and counters).

  – These Alarms and logs can be stored locally until collected by the SMF or be sent immediately to the SMF.

  – The SMF is responsible for collating, filtering and redistributing these alarms and logs.

- **Screening Management Functions**

  Configuration of Screening Profiles

  The SMF shall be able to:

  – define an INAP screening profile;

  – modify an INAP screening profile;

  – remove an INAP screening profile;

  – delete an INAP screening profile.

  Provisioning of Screening Profiles

  The SMF shall be able to:

  – attach an INAP screening profile to a destination;

  – detach an INAP screening profile from a destination.

  Configuration verification

  The SMF shall be able to determine the current configuration of screening profiles in the SCF. This information includes the screening profiles, screening profile details, destinations attached to a screening profile.

- **Performance Management Functions**

  Call Gapping

  When a SCF invokes call gapping to protect its resources in an overload situation, the SMF is notified. The SMF uses this information to adjust the engineering of the network such that overload occurs less frequently.

  Updating Service configuration data

  The SMF will use the update service configuration data facilities to control network configuration in the result of resource failure or congestion within the network.

  Traffic measurements

  The following traffic measurements should be available to the SMF from the SCF:

  – number of operations from SSF;

  – number of operations from SSF completed;

  – number of operations from SRF;

  – number of operations from SRF completed.

- **Testing functions**

  Initiate the testing of newly developed services and collation of test results

  – When an SMF deploys an SLP to an SCF, a set of test vectors for the SLP is included.

  – The SMF should be able to instruct the SCF to run the test vectors for an SLP.

  – The SCF runs the test vectors for the SLP on request and reports the results back to the SMF.

Logic tracing

The SCF should provide the functions to enable the tracing of the execution of a Service Logic Program and the results passed back to the SMF, for example: breakpoints and manipulation of data within an SLP.

- **Security Management Functions**

  Interface Functions

  – The security management functions provide the functionality needed for secure access to the functions of the SCF. This functionality should apply security procedures to ensure data confidentiality, origin authentication and data integrity.

  – The selection of active features is determined by the nature of the interaction.

  Security Control Functions

  The provision of security features for network interfaces does not automatically guarantee network integrity, rather they provide the tools which can be used by the IN management functions to control and manage access to the network. The following features are required:

  – logging of invalid access attempts and generation of alarms;

  – activation and deactivation of appropriate security features in each FE to enable correct interface operation;

  – distribution of security-related information.

APPENDIX I

Management scenarios for service switching function

I.1 SSF scenarios

This appendix lists some of the management scenarios that were used to specify the Management Requirement and Management function templates. They are based upon a functional breakdown of an SSF, an example of which can be found in Appendix I/Q.1224. Some of the sub-entities used in this functional breakdown differ slightly from Appendix I/Q.1224, these being:

- INAP SAP (Service Access Point) instead of MSF&I (Message Formulation and interpretation).
- SFM (Service Feature Manager) instead of FIM (Feature Interaction Manager).

The scenarios are provided for completeness and for information purposes only.

For the elaboration of the scenarios, the following working assumptions hold:

i) in the SSF only the concept of "logical" service key is used;

ii) the mapping from service key to SLP location in a specific SCF is a matter for the SCF, this mapping will **not** be modelled in the SSF;

iii) no alternative routing and load sharing mechanisms will be defined in the SSF; SCCP will be kept responsible for the actual routing and load sharing (mapping of the global title to DPCs);

iv) the SCF access manager will be responsible for mapping of the service key to the appropriate address information needed to establish the connection between SSF and SCF. The address information will depend on the physical configuration. For a connection between SSF and SCF, this may either be Global Title (GT) or Destination Point Code (DPC) with or without a Sub-System Number (SSN). In case of a direct connection [e.g. SCF or Service Node (SN) or Adjunct (AD)], the connection type is proprietary

(e.g. TCP/IP based). As a result of this, this Recommendation will not support call gapping per SSF-SCF pair; for this to be achievable, two options were identified:

a) wait for SCCP to provide mechanisms for this;

b) declare this the responsibility of traffic management (TMN network management layer);

- Note that the scenarios contained here were based upon IN CS-1 and the CS-2 Call model.

I.2 Basic IN Call scenarios

Related INAP operations:

- Connect.
- Continue.
- EventReportBCSM.
- InitialDP.
- ReleaseCall.
- RequestReportBCSMEvent.

I.2.1 Introduction

The "Basic Call Process" (BCP) scenarios are based on the stage 2 description of the BASIC CALL PROCESS SIB for IN CS-1. The BCP SIB provides the IN based service control with access to special CCF/SSF call processing capabilities in the following areas:

- call set-up capabilities.
- call party handling capabilities.
- call initiation capabilities.
- call clearing capabilities.
- event reporting capabilities.

This BCP capabilities can be invoked by the CCF/SSF or the SCF:

- The CCF/SSF invokes BCP capabilities when it detects a Trigger Detection Point (TDP) during basic call processing.
- The SCF invokes BCP capabilities when it sends an Initiate Call Attempt information flow.

In this subclause the SSF/CCF based triggering of IN service control and the remaining BCP capabilities are examined in regard to management requirements.

I.2.2 Triggering of IN service control

I.2.2.1 DFP description

At specific points in call, defined by the Basic Call State Model (BCSM), trigger conditions are checked by the CCF/SSF. If a TDP is detected, the SSF sends an Initial DP information flow to the SCF. TDPs may be armed in request mode (TDP-R) or in notification mode (TDP-N). For a TDP-R, the Initial DP establishes a control relationship between the SCF and the SSF, enabling the SCF to return instructions to the SSF. For a TDP-N no control relationship is established. See Figure I.1.

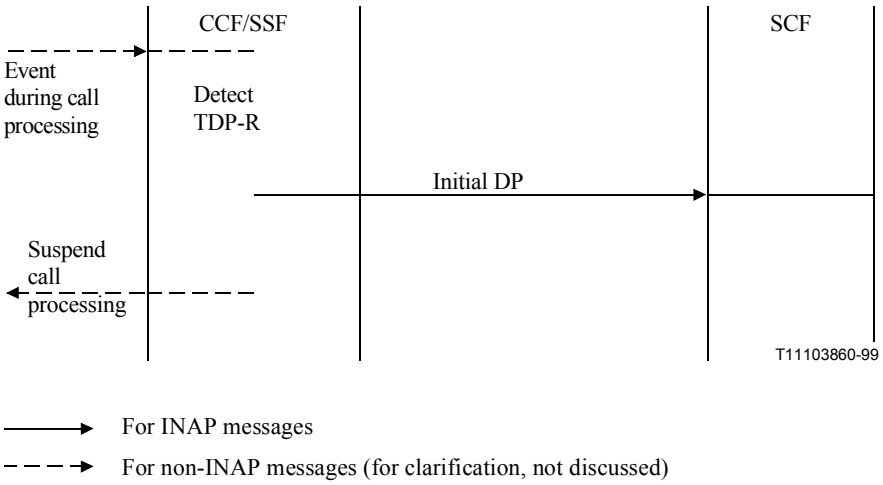

Figure I.1/Q.1236

In case the SSF detects a TDP-R, the CCF instructs the basic call processing to go into a waiting state (suspend call processing) until the SCF starts an information flow that includes instructions how to proceed. These instructions use the BCP capabilities of the CCF to influence further call processing.

I.2.2.2 SSF Model mapping

See Figure I.2.

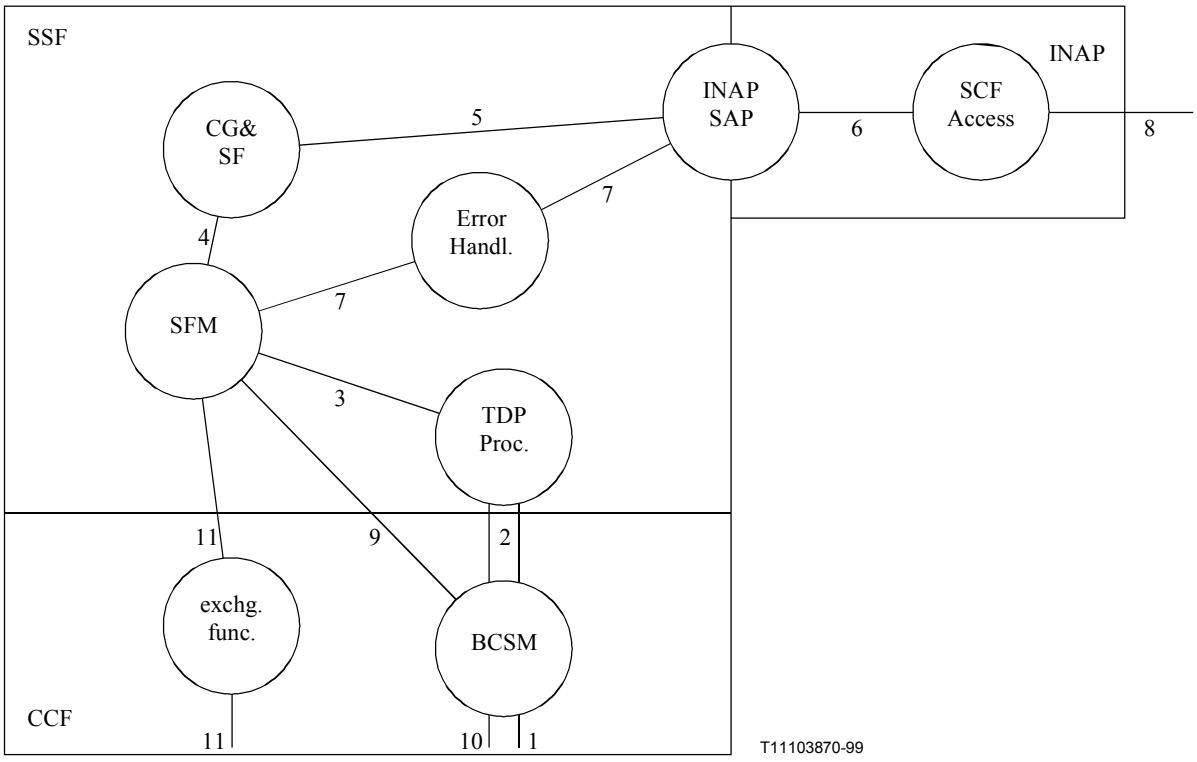

Figure I.2/Q.1236

1) Basic call processing maps a normal call processing event to an event of the BCSM model and delivers call related information as requested by the BCSM.

2) The information about the point in call of the BCSM and the call related information are delivered to the "TDP processing" entity. This entity either triggers IN control UNCONDITIONAL or CONDITIONAL on the basis of TRIGGER CRITERIA. In case no IN control is triggered or TDP-N is triggered, the BCSM control is instructed to continue call processing without IN control (10).

3) The detected TDP category and mode is delivered to the SFM together with the call related information. The SFM decides whether there is an IN based service feature control associated to the TDP and call information. If so, it decides whether some of the call information deactivate IN triggering (e.g. an escape code was dialled) or if the service feature was deactivated (by SSF management). If the service feature is active, the SFM requests the sending of an Initial DP information flow from the INAP SAP. If there is no service feature or if the service feature is deactivated, the SFM instructs the BCSM control how to proceed.

4) The information elements of the Initial DP information flow are delivered to the INAP SAP via the CallGap & Service-Filtering Entity. If the call is to be gapped or filtered, the SFM is informed and has to decide how to proceed with the call.

5) If there is no gapping or filtering, the InitialDP is delivered to the INAP SAP. The address data for the sending of the Initial DP are determined and the transaction to the related SCF is started.

6) If no SCF fulfilling the Initial DP information flow request is reachable, this is notified to the error handling.

7) Error handling determines the reason for failure of sending the InitialDP (e.g. time-out of SSF-timer) and notifies this to the SFM. The SFM decides how to proceed with the call.

8) If a SSF/SCF transaction is possible, transfer the Initial DP information flow.

9) If no service feature is related to the triggering, if the service feature is deactivated or if no related SCF was reachable, the SFM instructs the BCSM control to proceed with the call processing. This may be:

   a) proceed with the call processing at a specific point in call (e.g. delete escape code from called party number and start at point in call "collected information" again);

   b) exception handling with a specific cause.

10) Restart call processing at the indicated point in call. If the call is to be abandoned, a specific intercept handling may be necessary.

11) A service feature may require the sending of optional parameters in the Initial DP that is not included in the call data received. Therefore the SFM may request resending of some feature information elements.

I.2.2.3 Description of the impacted sub-entities

I.2.2.3.1 BCSM control

Description of functionality

- Check if internal event at an internal state maps to a point in call of the BCSM model.
- Transfer call related information between call processing and IN related information elements.
- Start TDP processing.
- Restart call processing at specified points in call.

Description of data

None.

I.2.2.3.2 TDP processing

Description of functionality

- Unconditional triggering: If the TDP processing is called at a specific point in call by the BCSM for a specific customer (line), private facility (e.g. Centrex group), trunk group, IN call control is triggered without any further check of conditions.
- Conditional triggering: If the TDP processing is called at a specific point in call by the BCSM, IN call control is triggered because of specific (call data related) criteria. Conditional triggering can be customer, trunk group, private facility or office (e.g. code point) based.
- Inform the SFM about a triggered TDP and transfer call data.
- Determine TDP-mode (notify/request) and inform BCSM control about continuation/suspension of call processing.

Description of data

- Customer/trunk group/private-facility/office based association of a TDP to a BCSM point in call.
- Customer/trunk group/private-facility/office based association of trigger criteria to a TDP.
- Mode of TDP (notification or request mode).

In the following, a set of TDP/TDP-criteria combinations is described. The tables represent only a minimal set of requirements. More combinations than those listed are conceivable.

I.2.2.3.2.1 Unconditional Triggering

TDP-category	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18
Line based	x	x	x	x	x	x	–	–	x	–	x	x	x	–	–	x	–
Trunk group based	x	x	x	x	x	x	–	–	x	–	x	x	x	–	–	x	–
Private facility based	x	x	x	x	x	x	–	–	x	–	x	x	x	–	–	x	–

x applicable

– not applicable

NOTE – In CS-2, also unconditional triggering for DP8 (O_MID_CALL) is allowed.

I.2.2.3.2.2 Conditional Triggering

The following trigger criteria are conceivable (minimal set of criteria):

1) Digit strings: A single digit combination (analysis can be based on the complete number of received digits or can be based on a predefined number of digits starting from the most significant digit of the received information) or a combination of several digits linked with OR. A single digit combination may be also negated with NOT.
2) Number of digits: Count of the dialled digits.
3) Causes: A single release cause or a range of causes.
4) Specific Origins: A digit string specifying the whole or a part of the calling party number or location number, or a wildcard.
5) Nature of address: Only special traffic shall be triggered (e.g. national, international).

6) Feature activation: signalling specific service feature activation (e.g. via ISDN D-channel signalling, DTMF in-band signalling).

7) Combination of the aforementioned criteria (AND, OR, NOT).

Line/private-facility based conditional triggering is conceivable for the following TDP-categories:

TDP-category	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18
Digit strings			x	x													
Number of digits		x															
Cause values				x								x	x				
Specific origins											x	x	x				
Nature of address			x														
Feature activation																	
Combinations			x	x								x	x				
x applicable blank not applicable																	

Office based conditional triggering is conceivable for the following TDP-categories:

TDP-category	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18
Digit strings			x									x	x				
Number of digits				x													
Cause values				x								x					
Specific origins			x	x							x	x	x				
Nature of address			x														
Feature activation																	
Combinations			x	x								x	x				
x applicable blank not applicable																	

Trunk group based conditional triggering is conceivable for the following TDP-categories:

TDP-category	1	2	3	4	5	6	7	8	9	10	12	13	14	15	16	17	18
Digit strings			x	x								x	x				
Number of digits		x										x	x				
Cause values				x								x	x				
Specific origins	x	x		x							x	x	x				
Nature of address			x														
Feature activation																	
Combinations			x	x								x	x				
x applicable blank not applicable																	

I.2.2.3.3 SFM

Description of functionality

- Associate trigger data to service feature (service key).
- Check escape conditions for the service feature (no IN call control for the specific call data).
- Check feature interaction conditions for the service feature.
- Check if service is deactivated.
- Give advice to BCSM for call processing continuation.
- Determine optional parameters to be sent in Initial DP. Eventually request further information from exchange functionality.
- Request INAP SAP to send Initial DP information flow with data necessary for the service feature.
- Check if call gapping or service filtering was encountered.

Description of data

- Mapping of trigger data to service keys.
- Escape conditions for service feature processing.
- Feature interaction allowed/forbidden.
- Service feature activate/deactivate.
- Instructions for call continuation or exception handling.
- List of optional parameters of Initial DP needed for the service feature.
- Reference to an application context identifier for the INAP SAP.
- Reference to a specific set of SCF accesses.

I.2.2.3.4 SCF Access Manager

Description of functionality

- Control the transaction to a specific SCF.
- Notify SFM via INAP SAP of success/failure of Initial DP transmittal.

Description of data

- Address information of SCF and SSF.

I.2.2.3.5 INAP SAP

Interface between SSF and INAP protocol stack. The only data are global parameters of the INAP protocol. For example, it will contain a list of possible application contexts and their ASE definitions. If the Initial DP delivered by the SFM does not confirm the application context requested by the SFM, rejection will be notified to the SFM.

I.2.3 Call Set-up Capabilities

I.2.3.1 DFP description

After triggering of IN-service control via a TDP-R, a control relationship exists between SCF and SSF. After the Initial DP or some event report, the SLPI in the SCF may demand a call set-up from the CCF/SSF via the information flows CONTINUE or CONNECT. After receiving CONTINUE, the CCF/SSF instructs the basic call processing to continue at the point where it was interrupted after IN triggering. In the case of CONNECT, parameters like destinationRoutingAddress or route-list

determine the further call set-up. In case only a destinationRoutingAddress is received, the call processing is resumed at PIC 3 (Analyse Info, i.e. start digit analysis again), if a Route-list parameter is received, the call processing is resumed at PIC 4 (routing and alerting). See Figure I.3.

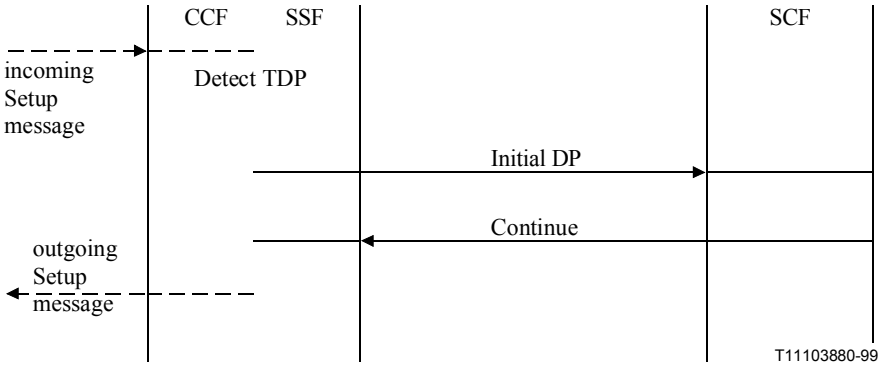

Figure I.3/Q.1236

I.2.3.2 SSF Model Mapping

See Figure I.4.

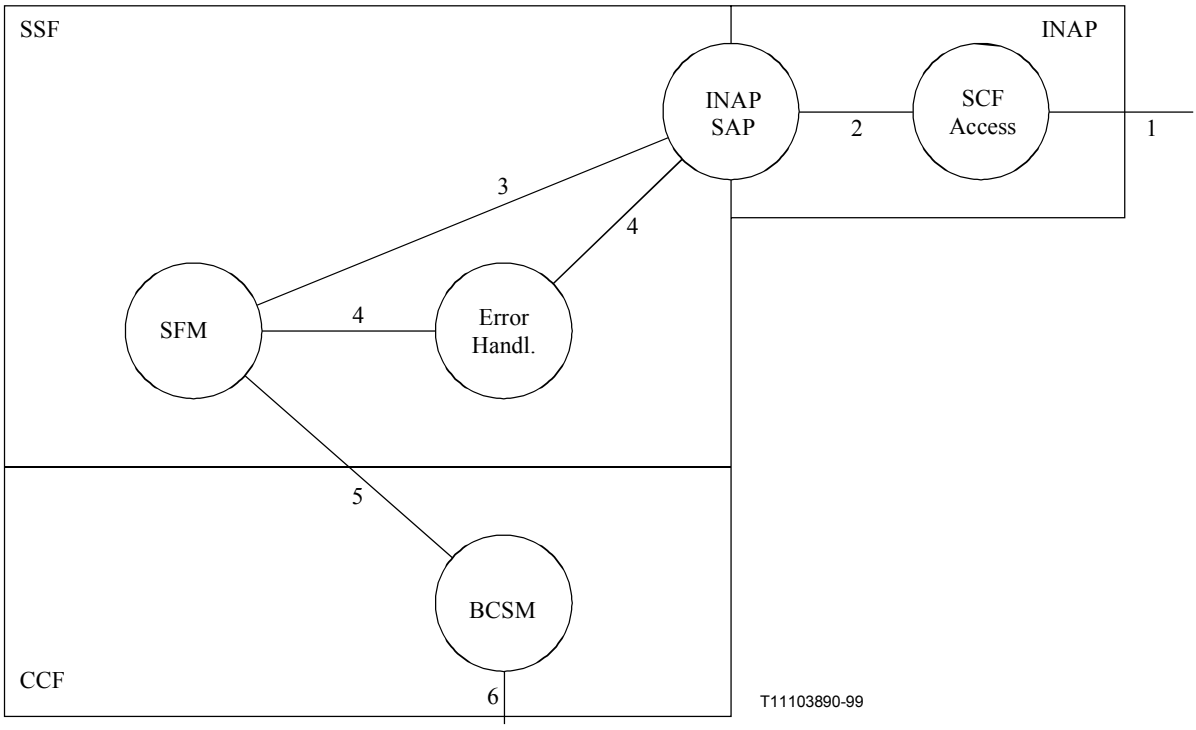

Figure I.4/Q.1236

1) The Connect/Continue information flow is received from the SCF by the SCF access manager. If some error condition is detected (e.g. MissingParameter) this is reported to the SCF.

2) The Connect/Continue information flow is protocol checked by the INAP SAP and decoded. If an error occurs, this is reported to the SCF access manager.

3) If the information flow is correct and decoded, it is delivered to the SFM.

4) The SFM instructs the BCSM control-instance that is related to the control process to continue call processing at PIC 3 or PIC 4, delivering the necessary information for call setup.

5) The BCSM maps the CONNECT parameters onto the call data and resumes the call processing in the state indicated by the SFM.

I.2.3.3 Description of the impacted sub-entities

I.2.3.3.1 SFM

Description of functionality

- Decide at which PIC the call setup has to be continued by basic call processing.
- Deliver parameters of CONNECT to BCSM related to the service control process.
- Decide what to do if CONNECT/CONTINUE information flow was not correct (e.g. exception handling).
- Plausibility check of parameters (e.g. redirectionInformation is not allowed without redirectingPartyId). Again this may lead to exception handling.

Description of data

Exception handling procedure.

NOTE – No implicit EDP-arming is assumed up to and including IN CS-3.

I.2.3.3.2 BCSM control

Description of functionality

- Inform basic call processing to resume at states corresponding to PIC 3 or PIC 4.
- Mapping of CONNECT parameters to internal call data representation.

Description of data

Mapping to call data and states is internal and in general not an object of management.

No new functionality and data are involved for error handling, INAP SAP and SCF access manager.

I.2.3.4 Management Requirements

No management requirements can be detected in regard to call setup capabilities besides management of possible exception handling and Route-list-mapping.

Exception handling (e.g. call setup also if SCF is not answering) is already described within the function "configure service feature control".

I.2.4 Event Report Capabilities

I.2.4.1 DFP description

If a control relationship exists between SSF and SCF and call processing was suspended (e.g. because of IN triggering), the SCF can send an information flow RequestReportBCSMEvent. This request has to contain an event detection point specifying an event in the BCSM, a monitor mode (request/notification) and the legId (calling or called party). It also may contain some event specific criteria (e.g. No-Answer-timer). If call processing is resumed (after CONTINUE or CONNECT) and the specified event is detected by the BCSM, this is reported to the SCF via the information flow EventReportBCSM. In case of an EDP-R the call processing is suspended, waiting for new instructions from the SCF. In case of an EDP-N call processing is continued immediately

after reporting the event to the SCF. For example, in the case of EDP-R for DP5 (Busy), call processing will be suspended after disconnecting the called party but holding the calling party and resumed after a CONNECT is received with a new destinationRoutingAddress. See Figure I.5.

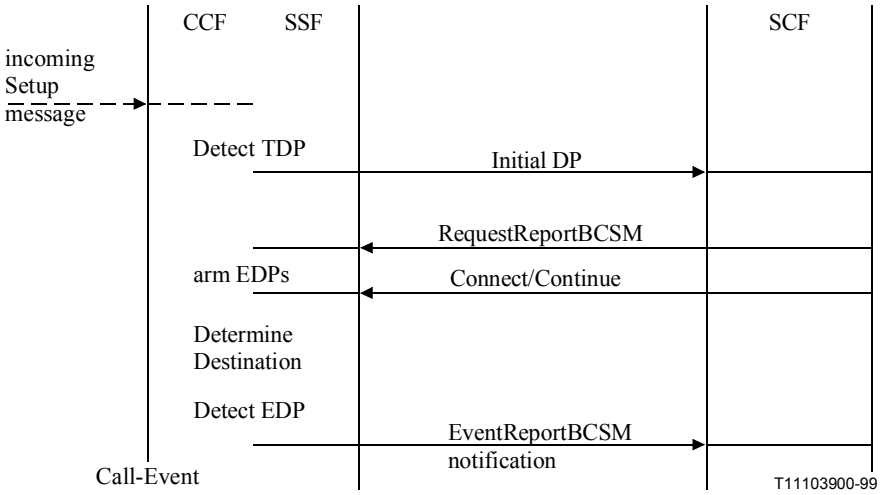

Figure I.5/Q.1236

I.2.4.2 SSF Model Mapping

See Figure I.6.

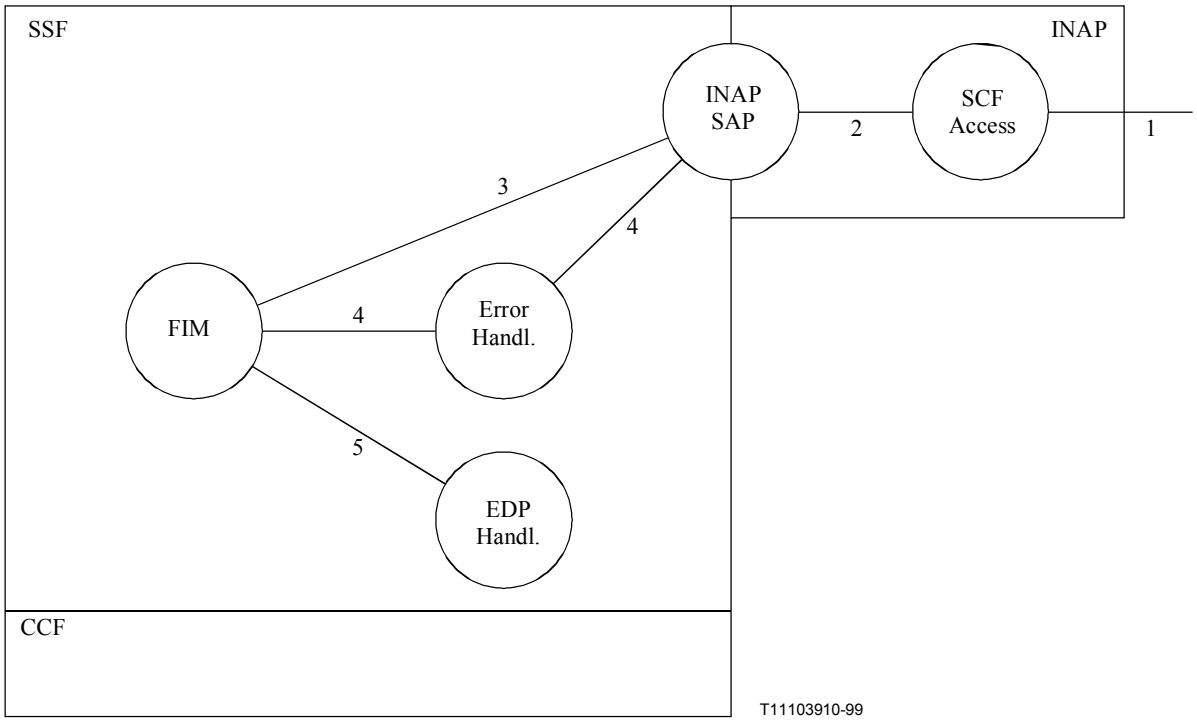

Figure I.6/Q.1236

RequestReportBCSMEvent

1) The RequestReportBCSMEvent information flow is received from the SSF by the SCF access manager. If some error condition is detected (e.g. MissingParameter), this is reported to the SCF.

2) The information flow is protocol checked by the INAP SAP and decoded. If an error occurs, this is reported to the SCF access manager and to the error handling.

3) If the information flow is correct and decoded, it is delivered to the SFM.

4) The SFM instructs the EDP handling to arm an EDP with bcsmEventType, mode, legId and dPSpecificCriteria as requested in the RequestReportBCSMEvent and associates it with the service control process.

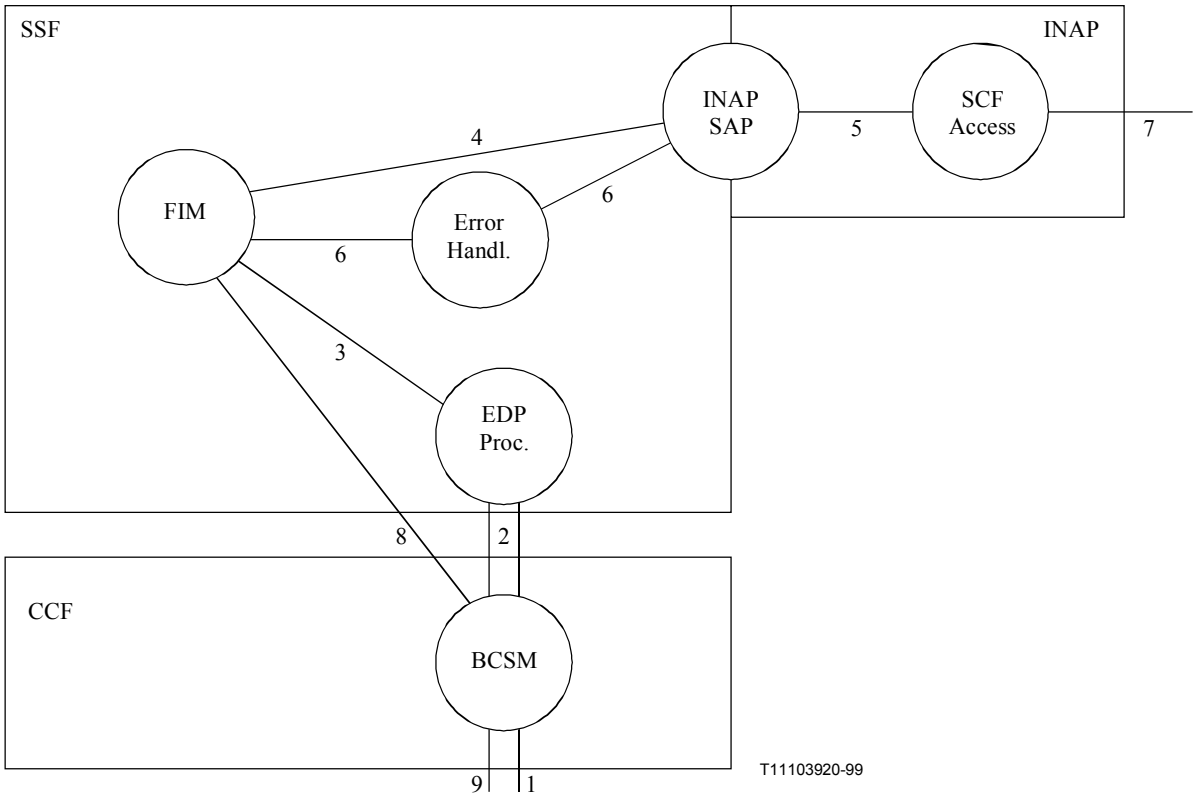

Figure I.7/Q.1236

EventReportBCSM

1) During basic call processing, events that happen in specific states may be mapped by the BCSM entity to an EDP in the BCSM. If this is successful, the event is delivered to the EDP processing.

2) a) if it is an event "Address complete" and EDP-6 (NoAnswer) is armed, then the No-Answer-Timer (parameter dPSpecificCriteria from RequestReportBCSMEvent) is delivered to the BCSM and started;

   b) for other events or if the No-Answer-Timer expires, this is notified to the SFM (service control process related to EDP).

   In case of an EDP-N, the BCSM is instructed to continue call processing.

3) The SFM assigns the event report to an existing service control and delivers it to the INAP SAP.

4) The address data for the sending of the Initial DP are determined and the transaction to the related SCF is started.

5) If the EventReportBCSM information flow request is not successful, this is notified to the error handling.

6) Error handling determines the reason for failure of sending the information flow and notifies this to the SFM. The SFM decides how to proceed with the call.

7) If a SSF/SCF control relation is still active, transfer the EventReportBCSM information flow.

8) If no service feature control is related to the EDP, or if the transaction was not successful, or if there was call gapping, the SFM instructs the BCSM to proceed with the call processing (e.g. exception handling with a specific cause).

9) Continue call processing at the indicated point in call. If the call is to be abandoned, a specific intercept handling may be necessary.

I.2.4.3 Description of the impacted SSF entities

I.2.4.3.1 BCSM

Description of functionality

- Mapping of call processing events to BCSM events.
- Starting of application timer.
- Resume call processing.

Description of data

- Mapping of causes to BCSM events (Busy, RouteSelectFailure, No Answer).
- Mapping of feature activation to BCSM events (Mid Call).

I.2.4.3.2 EDP Handling

Description of functionality

- Check if application timer has to be started by BCSM.
- Check if EDP is armed and in which mode, check DP specific criteria.
- Inform BCSM of call continuation in case of notification mode.
- Send event report to service control process related to EDP.

Description of data

- Default value of NoAnswer timer.
- Default value of digits to collect number (for EDP-2).

I.2.4.3.3 SFM

Description of functionality

- Determine service control process and relay event report to the SCF related to this process. If no service control process can be determined, an error handling has to be performed.
- Determine precedence of detection points.

Description of data

None.

There are no new descriptions related to INAP SAP, SCF Access Manager, Error Handling.

I.2.5 Call party handling capabilities

The call party handling capabilities are an aspect of IN CS-2 and CS-3. This capability can be invoked using the InitiateCallAttempt operation issued by the SCF. The only other capability associated with CPH that is of interest to us is the Rerouting capability. After a release event related to the called party, the line from the calling party to the SSF is on hold, whilst waiting for new instructions from the IN service control. After reporting the event (busy, noAnswer, disconnect) to the SCF via an EventReportBCSM, the call can be rerouted by the SCF to a new direction by sending an information flow CONNECT from the SCF.

No management requirements are associated to the rerouting capability, other than the handling of the Route-list.

I.2.6 Release call capabilities

If a service control relationship is established and the CCF call processing is suspended, a basic call release event can be produced by sending a RELEASE information flow by the SCF. In case of mid call event detection, this can be used to release the called party and to reroute the call to a new direction (follow on during call).

No management requirements are associated to the release call capability.

I.3 Call Gapping and Service Filtering scenarios

Related INAP operations:

- CallGap.
- ActivateServiceFiltering.
- ServiceFilteringResponse.

Call Gapping may be activated by SCF or by OSF, and is initiated by the network. The main purpose of this functionality is to give some management functionality on the information flow between the IN functional entities, i.e. SSF-SCF. When the SCF detects nodal congestion, the SCF sends a *CallGap* request to the SSF. The request is sent within an existing control relationship as a part of another response of a SSF query and is not to be answered by the SSF. Call Gapping initiated by OSF has a higher priority than SCP initiated Call Gapping.

The possible clash between traffic management through a management interface and traffic management through a signalling (INAP) interface should be resolved (prevented) at the Network Management level.

Service Filtering is activated from SCF at SLP processing when using the LIMIT SIB in the service. Service Filtering is subscriber initiated and the main purpose with this functionality is to allow a given subscriber to add a certain treatment to calls in a specific time period.

I.3.1 Introduction

I.3.1.1 Call Gapping

Call Gapping is network initiated, and related to nodal congestion. Therefore, Call Gapping does not apply for the service as such. In Q.1224, "gapped" calls are treated as specified in "gapTreatment". One has the possibility to give announcements and messages among others.

I.3.1.2 Service Filtering

Service Filtering is activated from SCF at SLP processing when using the LIMIT SIB in the service. Service Filtering is subscriber initiated. The facility is part of one's service, and has nothing to do with network protection. The Service filtering applies to IN calls that require the assistance of

SCF IN functions (SLPs), i.e. applies to all TDPs that are used during the call establishment. Activation/deactivation of service filtering is done by the subscriber, who requires to give calls a special treatment. When "filtered", the calls are provided treatment for specific duration and specific intervals (announcements, release, etc.).

I.3.2 DFP description

I.3.2.1 Call Gapping

Call Gapping may be initiated by the SCF or by OSF. In the first case, the maintenance functionality in the SCF detects nodal overload and requests for Call Gapping with the *CallGap* operation.

When Call Gapping is initiated, the parameter *gapCriteria* indicates the criteria that must be met to activate Call Gapping; these criteria are servicekey, called address, a combination of these or a combination of servicekey and calling address.

I.3.2.2 Service Filtering

Service Filtering is activated with INAP operation ActivateServiceFiltering, and SSF answers with ServiceFilteringResponse.

The SCF (LIMIT SIB) issues an ActivateServiceFiltering request containing the filteredCallTreatment, filteringCharacteristics, filteringCriteria, filteringTimeout and startTime to the SSF.

The ServiceFilteringResponse, with parameters CountersValue and optionally filteringCriteria, is sent in the following circumstances:

- The Service Filtering is running, the interval time (in the filteringCharacteristics) is expired and a new call is received that matches the filteringCriteria. The Service Filtering for this filteringCriteria continues to be active after the new call is allowed to communicate to the SCP.
- The Service Filtering is running and the threshold value (numberOfCalls in filtering-Characteristics) is reached. The numberOfCalls threshold is reset and the ServiceFiltering continues to be active.
- The Service Filtering is completed, duration time is expired or stop time is reached, (duration, stop time in filteringTimeOut). The service filtering for this filteringCriteria is stopped.
- The Service Filtering is running and a new ActivateServiceFiltering request is received with the same filteringCharacteristics. The Service Filtering for this filteringCriteria proceeds with the new set of Service Filtering attributes.

NOTE – Every time a ServiceFiltering response is sent, all the counters related to ServiceFiltering are reset.

I.3.3 SSF Model mapping

This subclause provides a mapping from the Call Gapping and Service Filtering scenarios described to the SSF sub-entities in the model. The mapping is split into three scenarios, a scenario mapping information flow at activation of Call Gapping/Service filtering, a scenario showing information flow when a given call is gapped/filtered and a scenario showing the information flow when service filtering is removed.

I.3.3.1 Mapping of activation onto SSF model

Figure I.8 describes how to map activation of call gapping and service filtering onto the SSF model.

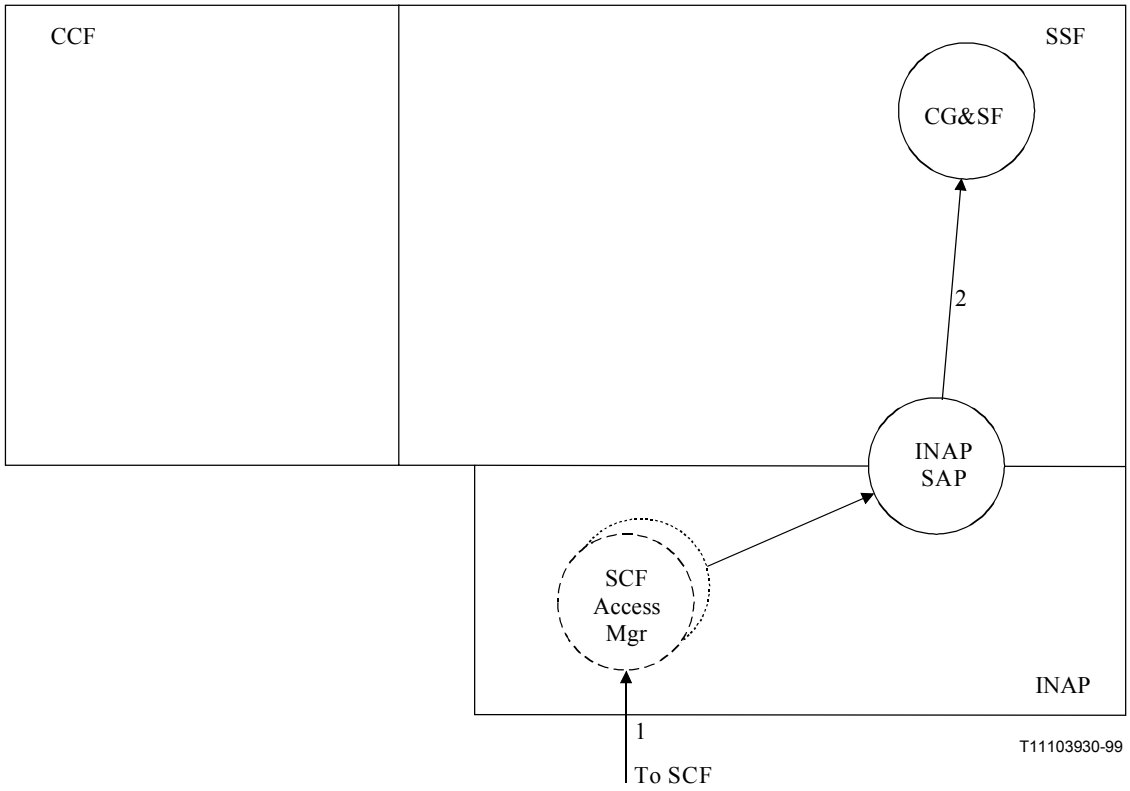

Figure I.8/Q.1236

1) The SCF Access Manager receives the CallGap or the ActivateServiceFiltering request from the SCF, and passes it to INAP SAP for translation.

2) The INAP SAP passes the information elements to the Call Gapping & Service filtering sub-entity, where gapping or filtering is performed according to the parameters.

I.3.3.2 Mapping of a gapped/filtered call onto SSF model

Figure I.9 shows the information flow of a given gapped or filtered call onto the SSF model.

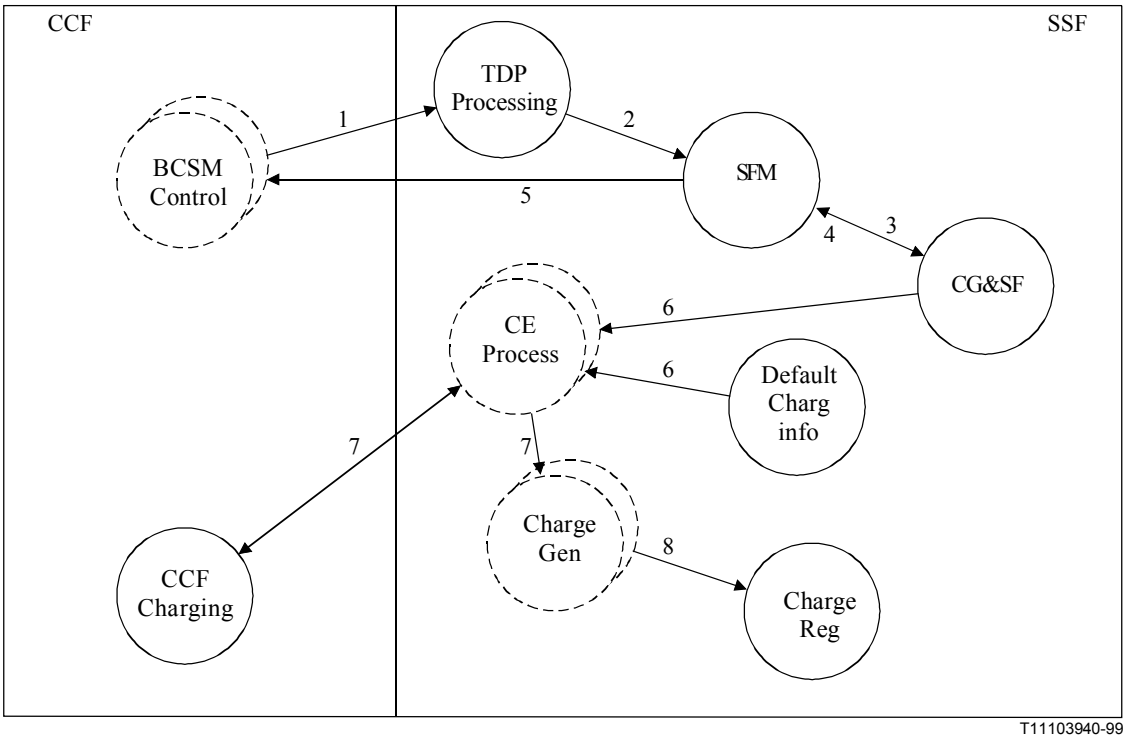

Figure I.9/Q.1236

1) At a specific time in a call, defined by the Basic Call State Model, trigger conditions are checked.
2) When a trigger condition is met, the Service Feature Manager determines whether the call is an IN call or not. If so, the Service Feature Manager passes the call to the CG&SF sub-entity.
3) In the CG&SF sub-entity, the call is checked whether it should be gapped or filtered. The actual checking is done based on the gapCriteria parameters received with the CallGap operation or based on the filterCriteria received with the ActivateServiceFiltering operation. If gapping/filtering criteria is met, parameters gapIndicators or filteringCharacteristics determine whether this certain call should be handled by the SCF or handled according to the parameters gapTreatment of filteredCallTreatment.
4) If the call is handled according to gapTreatment or filteredCallTreatment, any further information needed for the BCSM Control to set up a bearer connection to the device indicated by gapTreatment or filteredCallTreatment parameters if fetched from the CG&SF entity and the information is passed to the Service Feature Manager.
5) And further on to the BCSM Control, where the bearer connection is set up.
6) At the same time, a new instance of the CE Processing sub-entity is created in order to provide charging of the call. The information in the sfBillingChargingCharacteristics is passed to the instance. In the call gapping case, the Default Charging info provides the information needed in order to charge the call as the CallGap operation contains no information on charging.

7) A charge generation sub-entity is instantiated to generate the charge for the call. The charge generation might be dependent on the CCF charging of the call.

8) The charge is registered at the Charge Registration sub-entity.

I.3.3.3 Mapping of gapping/filtering response onto SSF model

When call gapping stops, determined by the gapIndicators, no response is sent to the SCF. When the service filtering stops, a ServiceFilteringResponse is sent to the SCF. The mapping of the information flow is shown in Figure I.10.

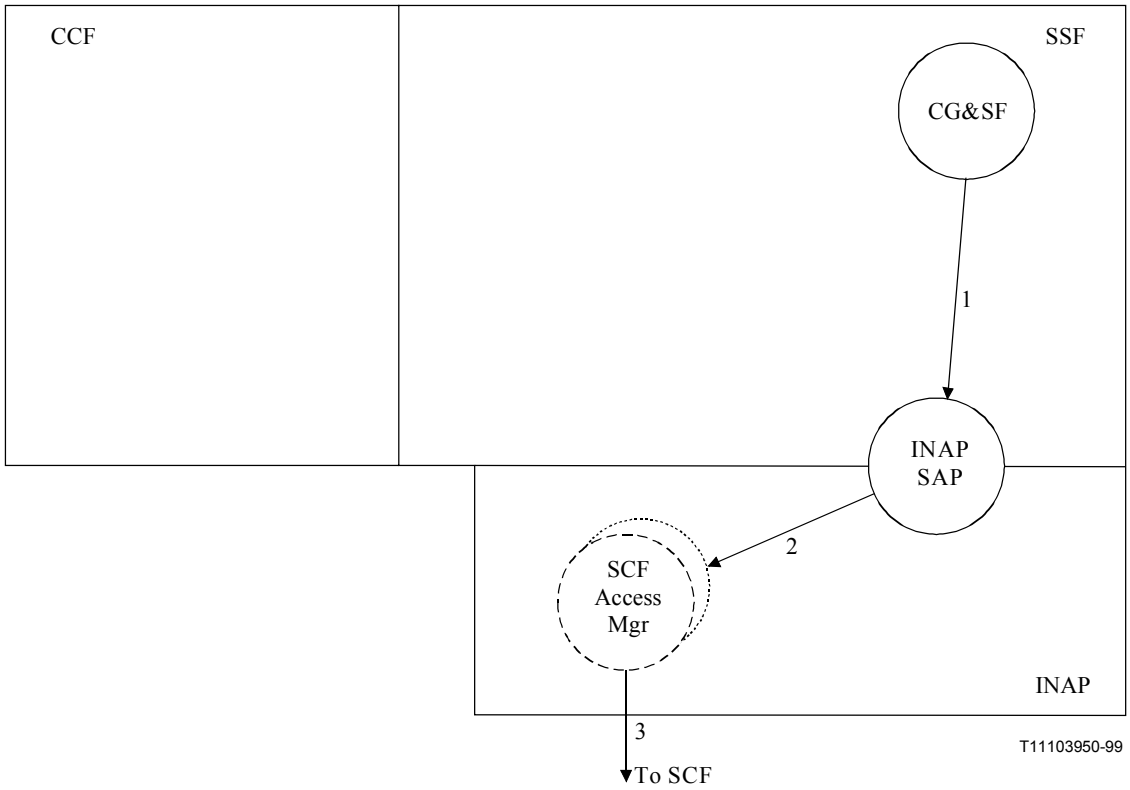

Figure I.10/Q.1236

1) The service filtering has ended, and the CG&SF passes the values of the associated counters (and optionally the filteringCriteria) to the INAP SAP.

2) The INAP SAP formulates the ServiceFilteringResponse operation and passes it to the SCF Access Manager instance that is responsible for the communication with the originating SCF.

3) The SCF Access Manager sends the INAP operation.

I.3.4 Description of the impacted SSF sub-entities

In the SSF model, the CG&SF perform the call gapping and service filtering functionality in the SSF. Upon receipt of the request for an IN service invocation from the Service Feature Manager, this sub-entity checks whether Call Gapping and/or Service Filtering conditions are met and based on stored parameters it decides whether to pass the call to the SCF for further execution or to apply a bearer connection.

Call Gapping and Service Filtering can be activated on a range of calling line numbers, a single directory number or a servicekey. The administration of these criteria is totally independent of the trigger criteria defined at the trigger detection point.

Call Gapping

The following parameters are stored in the CG&SF sub-entity.

Parameter	M/O	Description
gapCriteria, choice of: – calledAddressValue – gapOnService – calledAddressAndService – callingAddressAndService	M	Defines what to gap on
gapIndicators – duration – gapInterval	M	Indicates how gapping should be performed: – duration specifies the total time interval in seconds during which call gapping for the specific gap criteria will be active ("0" is remove gapping, "–1" is infinite duration, "–2" is network specific) – specifies the minimum time interval in milliseconds between calls being allowed through ("0" = no gap, "1" = gap all)
controlType, choice of: – sCPOverloaded – manuallyInitiated – destinationOverload	O	Indicates how call gapping was activated: – when call gapping is initiated by SCP after detecting congestion – when initiated by OSF – for further study
gapTreatment, one or both of: – informationToSend – releaseCause	O	Defines how gapped calls should be treated: – messageID, numberOfRepetitions, duration, interval – the call is released

Service Filtering

The following parameters are stored in the Call Gapping and Service Filtering sub-entity:

Parameter	M/O	Description
filteredCallTreatment – informationToSend – maxNumberOfCounters – releaseCause	M	Specifies how filtered calls are treated: – specifies the bearer connection to be set up for a filtered call – specifies the maximum number of counters for filter – specifies the cause value used for call release
filteringCharacteristics, choice of: – interval – numberOfCalls	M	Specifies how filtering should be performed: – specifies the time interval between each call, that is passed to the SCF – specifies the number of calls, that are filtered before a call is passed to the SCF
filteringTimeOut, choice of – duration – stopTime	M	Specifies the duration of the filtering: – value setable by SCP and by management (default duration – to be provided by management if value is –2) – in format YYMMDDHHMMSS, BCD coded
filteringCriteria – serviceKey – dialled number – calling party number	M(O)	Specifies the criteria for filtering. The parameter is optional inside the context of a specific call, but mandatory outside a specific call context
StartTime	O	Specifies the start time of service filtering. When omitted, filtering starts immediately
CountersValue	M	The ServiceFilteringResponse carries this information to the SCF when the operation is sent

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression: definitions, symbols, classification
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Overall network operation, telephone service, service operation and human factors
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media, digital systems and networks
Series H	Audiovisual and multimedia systems
Series I	Integrated services digital network
Series J	Transmission of television, sound programme and other multimedia signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	TMN and network maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits
Series N	Maintenance: international sound programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality, telephone installations, local line networks
Series Q	**Switching and signalling**
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminals for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communications
Series Y	Global information infrastructure
Series Z	Languages and general software aspects for telecommunication systems

18102

Printed in Switzerland
Geneva, 2000