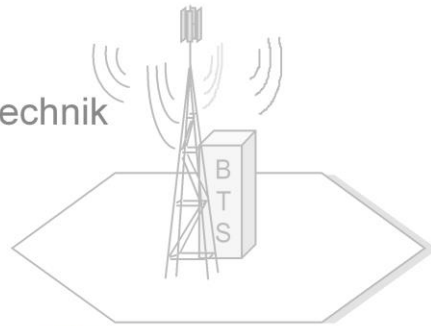**Evolution der öffentlichen Mobilfunknetze (3G/4G)**
Chapter VIII: Supplementary Services

Universität Hannover
Institut für Kommunikationstechnik
Dr.-Ing. Jan Steuer

Literatur

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Evolution of public radio networks

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Outline

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- A supplementary service modifies or supplements a basic Telecommunication service.

Voice telephone services
Packet-switched data transmission services
Circuit-switched data transmission services
Telex services
Telegraph services
Facsimile services
Private leased circuit services

Basic Service

Supplementary Service

Network

Provider

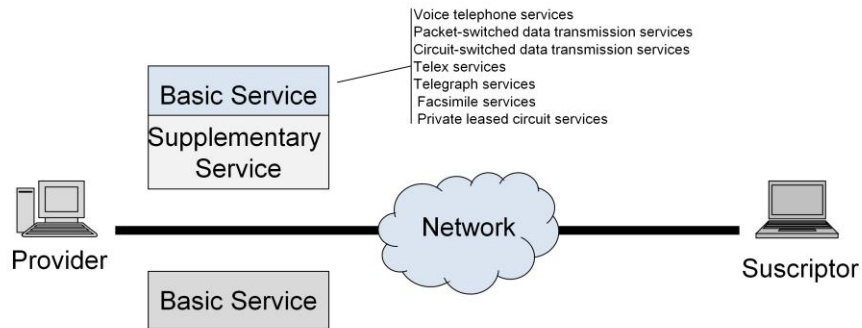Suscriptor

Basic Service

Figure 1.1.

Procedures

Provision
Action to make a service available to a subscriber

Registration
The programming by the service provider or subscriber of information to enable subsequent operation of a service. The programming action involves input of specific supplementary information.

Activation
An action taken by either the service provider, the subscriber or the system to enable a process to run as and when required by the service concerned.

Invocation
An action to invoke the service required, taken by the subscriber (e.g. pressing a specific button) or automatically by the network or terminal as a result of a particular condition.

Normal operation with successful outcome
Description of the normal operation of the service, the normal served subscriber's actions and the system response.

Interaction with other ss
This subclause would identify and define the resolution of special situations when more than one ss is active (new logical situations, decisions, priorities) as they affect subscriber perception of the service.

Withdrawal
An action taken by the service provider to remove an available service from a subscriber's access.

Erasure
The deletion by the service provider, the subscriber or the system of information stored against a particular service by a previous registration(s).

Deactivation
An action taken by either the service provider, the subscriber or the system to terminate the process started at the activation.

Interrogation
The request by the subscriber to the PLMN to provide information about a specific supplementary service. This information can be requested by a: status check, data check, data request.

Exceptional operation or unsuccessful outcome
Abnormal situations not described in "normal operation with successful outcome". Procedures on time-out, unexpected signalling response and other such events would be defined.

Interworking considerations
Identification of subscriber perceptions when a call exits from an PLMN to another network.

Unstructured SS Operations
Provide capabilities that can either be used as part of operator specified services.

enhanced Multi-Level Precedence and Pre-emption eMLP

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- Enhanced Multi-Level Precedence and Pre-emption provides different levels of precedence for call set-up and for call continuity in case of handover.
- Two parts:
  - precedence
  - pre-emption
- Provides 7 different levels of precedence for call set-up and for call continuity in case of handover

  A (highest, for network internal use, e.g. emergency call).
  B (for network internal use or, optionally, for subscription).
  0 (for subscription).
  1 (for subscription).
  2 (for subscription).
  3 (for subscription).
  4 (lowest, for subscription).

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Outline

1. Introduction

    1.1. Concept

    1.2. Procedures

    1.3. Optional password

2. Supplementary Services
3. References
4. PoC

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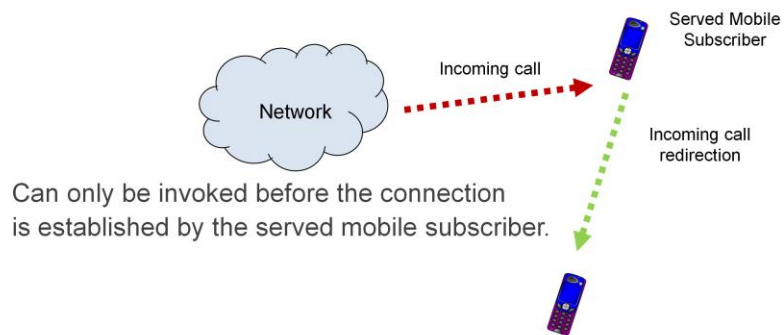
Call Deflection CD

Enables the served mobile subscriber to respond to an incoming call offered by the network by requesting redirection of this call to another number specified in the response.

Network

Incoming call

Served Mobile Subscriber

Incoming call redirection

Can only be invoked before the connection is established by the served mobile subscriber.

Line Identification

- Services which don't require additional processes of signalling for basic call.
- Calling Line Identification Presentation **(CLIP)**
- Calling Line Identification Restriction **(CLIR)**
- Connected Line Identification Presentation **(COLP)**
- Connected Line Identification Restriction **(COLR)**

Call Offering

- Services are based on call routing procedures require some additional specific procedures.
- Call forwarding unconditional **(CFU)**
- Call forwarding on mobile subscriber busy **(CFB)**
- Call forwarding on no reply **(CFNR)**
- Call forwarding on mobile subscriber not reachable

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- Services are based on call finish procedures.

- **Call Waiting (CW)**
  - Permits a mobile subscriber to be notified of an incoming call whilst the traffic channel is not available for the incoming call.
  - The subscriber can either accept, reject, or ignore the incoming call.

- **Call Hold (HOLD)**
  - Service allows a served mobile subscriber to interrupt communication on an existing active call and then subsequently, re-establish communication.

active call

Network

Served Mobile
Subscriber

Notified of incoming call
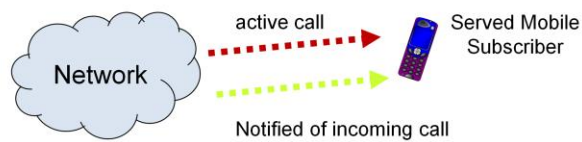
- Provides a mobile subscriber with the ability to have a multi-connection call, i.e. a simultaneous communication with more than one party.
- **Precondition:** the served mobile subscriber is in control of one active call and one call on hold, both calls having been answered.
- Once a multiParty call is active, remote parties may be added, disconnected or separated.
- **Notification** shall be sent towards:
  - the served mobile subscriber and all the remote parties in a multiParty call at the invocation of this Supplementary Service.
  - all remote parties every time a new party is added to the multiParty call.

- *The maximum number of remote parties is 5.*

- Enables subscribers, connected to a PLMN and possibly also other networks, to form closed user groups (CUGs) to and from which access is restricted.
- A specific user may be a member of one or more CUGs.
- Members of a specific CUG can communicate among each other but not, in general, with users outside the group.
- CUG members can have additional:
  - capabilities that allow them to originate calls outside the group, and/ or to receive calls from outside the group.
  - restrictions that prevent them from originating calls to other members of the CUG, or from receiving calls from other members of the CUG.

User-to-User UUS (I)

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- Allows the transfer of UUInformation to a remote subscriber over the signalling channel in association with a call to this subscriber.
- 3 different services:
  - **Service 1 (UUS1):** transfer of UUI embedded within Call Control messages.
  - **Service 2 (UUS2):** transfer of UUI with a specific User-to-user message after the served subscriber has received an address complete indication.
  - **Service 3 (UUS3):** transfer of UUI with a specific User-to-user message during an active call.

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Advice of Charge AoC

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- AoCI (Information)
  - This supplementary service provides the MS with the information to produce an estimate of the cost of the service used.

- AoCC (Charging)
  - This service provides the means by which the MS may indicate the charge that will be made for the use of telecommunication services.

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Call Restriction

- Allows the possibility for a mobile subscriber to have barring of certain categories of outgoing or incoming calls at the mobile subscribers access.
- Includes two supplementary services:
  - barring of outgoing calls
  - barring of incoming calls

- Categories of calls to be barred
  - all outgoing calls (BAOC)
  - outgoing international calls (BOIC)
  - outgoing international calls except those directed to the home PLMN country (BOIC-exHC)
  - all incoming calls (BAIC)
  - incoming calls when roaming outside the home PLMN country (BAIC-roam)

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Explicit Call Transfer ECT

- Enables the served mobile subscriber (subscriber A) who has two calls, each of which can be an incoming or outgoing call, to <u>connect the other parties in the two calls</u> and release the served mobile subscribers own connection.

- Prior to transfer, the connection shall have been established on the call between subscriber A and subscriber B. On the call between subscriber A and subscriber C, either the connection shall have been established prior to transfer, or, as a network option, transfer can occur while subscriber C is being informed of the call.

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Completion of Calls to Busy Subscriber (CCBS)

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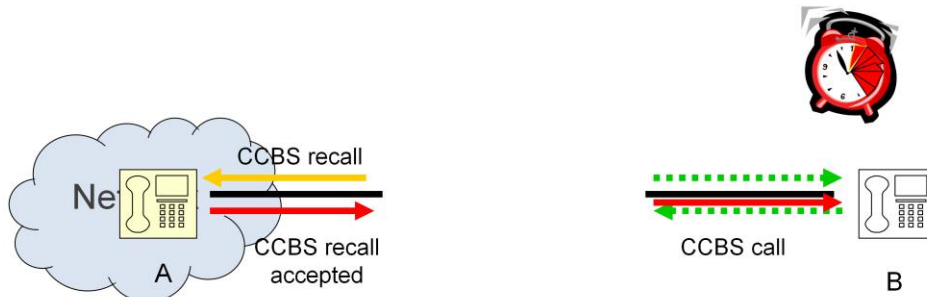
Figure 2.2. CCBS

- **Name Identity:**
  - Name of the mobile subscriber for the purpose of calling name presentation.
  - Max. 80 ch.
- **Calling Party:**
  - originating party.
- **Called Party:**
  - terminating party
  - The CNAP service is provided to the called party.
- **Calling Name Information:**
  - includes either the calling name identity or an indication of privacy or unavailability.

- **CNAP (Calling Name Presentation):** enables the called party to receive the calling name information of the calling party.

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- Enables a mobile subscriber to have <u>several simultaneous Circuit switched calls</u>, each call using its own dedicated bearer.
- Only one CS bearer can used for speech at any one times.
- Speech call:
  - TS11 (Telephony)
  - TS12 (Emergency Calls)
  - TS61 (Alternate speech/fax)
- If the bearer capability information is not available, the basic service cannot be deduced and the network shall handle the call as telephony.

- Compatibility with Future Releases

Multicall Configuration

When having
one active
CS call and
one held call
on the same
bearer.
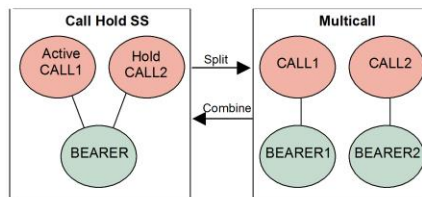
When having
two calls
(multicall) on
the separate
bearers.

Figure 2.3. Multicall configuration

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