# ETSI TS 123 086 V6.1.0 (2005-12)

*Technical Specification*

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Advice of Charge (AoC) Supplementary Service;
Stage 2
(3GPP TS 23.086 version 6.1.0 Release 6)**

Reference
RTS/TSGC-0423086v610

Keywords
GSM, UMTS

***ETSI***

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

***Important notice***

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

***Copyright Notification***

# Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

# Foreword

This Technical Specification (TS) has been produced by ETSI 3rd Generation Partnership Project (3GPP).

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under http://webapp.etsi.org/key/queryform.asp .

# Contents

# Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document defines the stage 2 of the Advice of Charge (AoC) supplementary services within the 3GPP system.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

# 0 Scope

The present document gives the stage 2 description of the Advice of Charge (AoC) supplementary services.

The charging supplementary services currently defined are:

- Advice of Charge (Information) (AoCI) (clause 1);
- Advice of Charge (Charging) (AoCC) (clause 2).

## 0.1 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: " Vocabulary for 3GPP Specifications ".

[2] 3GPP TS 22.024: "Description of Charge Advice Information (CAI)".

[3] 3GPP TS 22.086: "Advice of Charge (AoC) Supplementary Services; Stage 1".

[4] 3GPP TS 23.011: "Technical Realization of Supplementary Services - General Aspects".

## 0.2 Abbreviations

Abbreviations used in the present document are listed in 3GPP TR 21.905 [1].

# 1 Advice of Charge (Information) (AoCI)

## 1.1 Advice of Charge (Information) MSC SDL diagram

The SDL diagram for the Advice of Charge (Information) supplementary service within the MSC is given in figure 1.1.

NOTE 1: AoC (Information) is not applicable to emergency calls.

NOTE 2: The request of generation of the Charge Advice Information (CAI) applies to AoC initiation or charge modification.

## 1.2 Advice of Charge (Information) mobile equipment SDL diagram

The SDL diagram for the Advice of Charge (Information) supplementary service within the mobile equipment is given in figure 1.2. This SDL indicates when charging calculations are started, amended and stopped, within the mobile equipment. The mobile equipment should start charging calculations as soon as possible after receiving the charging information. Charging calculations should be amended by the mobile equipment in accordance with GSM 02.24.

NOTE: The point at which the charging calculations are amended can occur before or after sending the AoC Acknowledge.

Charging calculations are stopped when the call ends for any reason.

The reception of the CAI shall be acknowledged only if the MS supports the AoCI functionality specified in GSM 02.24 and GSM 02.86, however the network does not action this acknowledgement in the AoC (Information) case.

## 1.3 Advice of Charge (Information) information flow diagram

The Advice of Charge (Information) information flow diagrams are shown in figure 1.3.

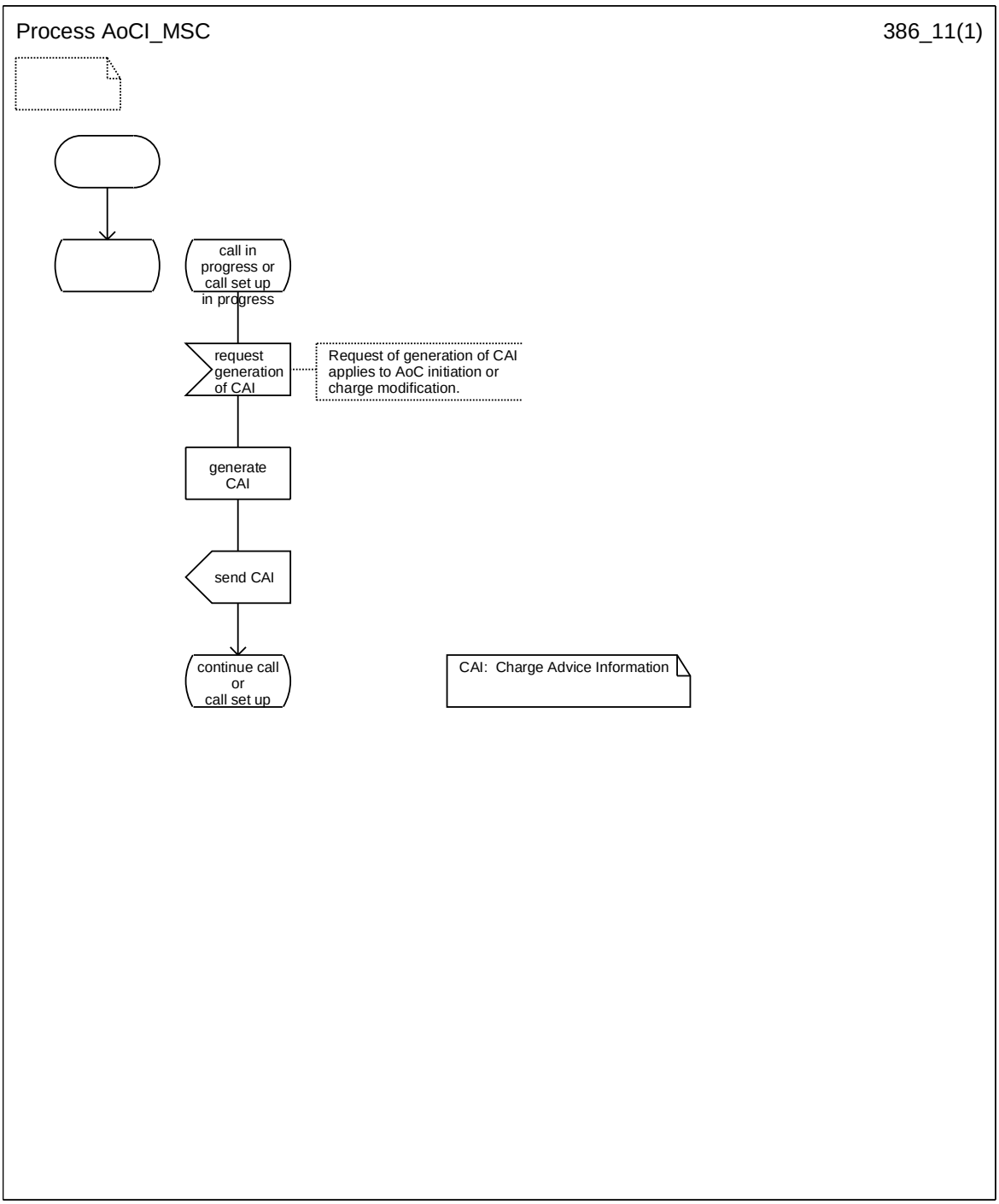


**Figure 1.1: SDL diagram of advice of charge (information) in the MSC**

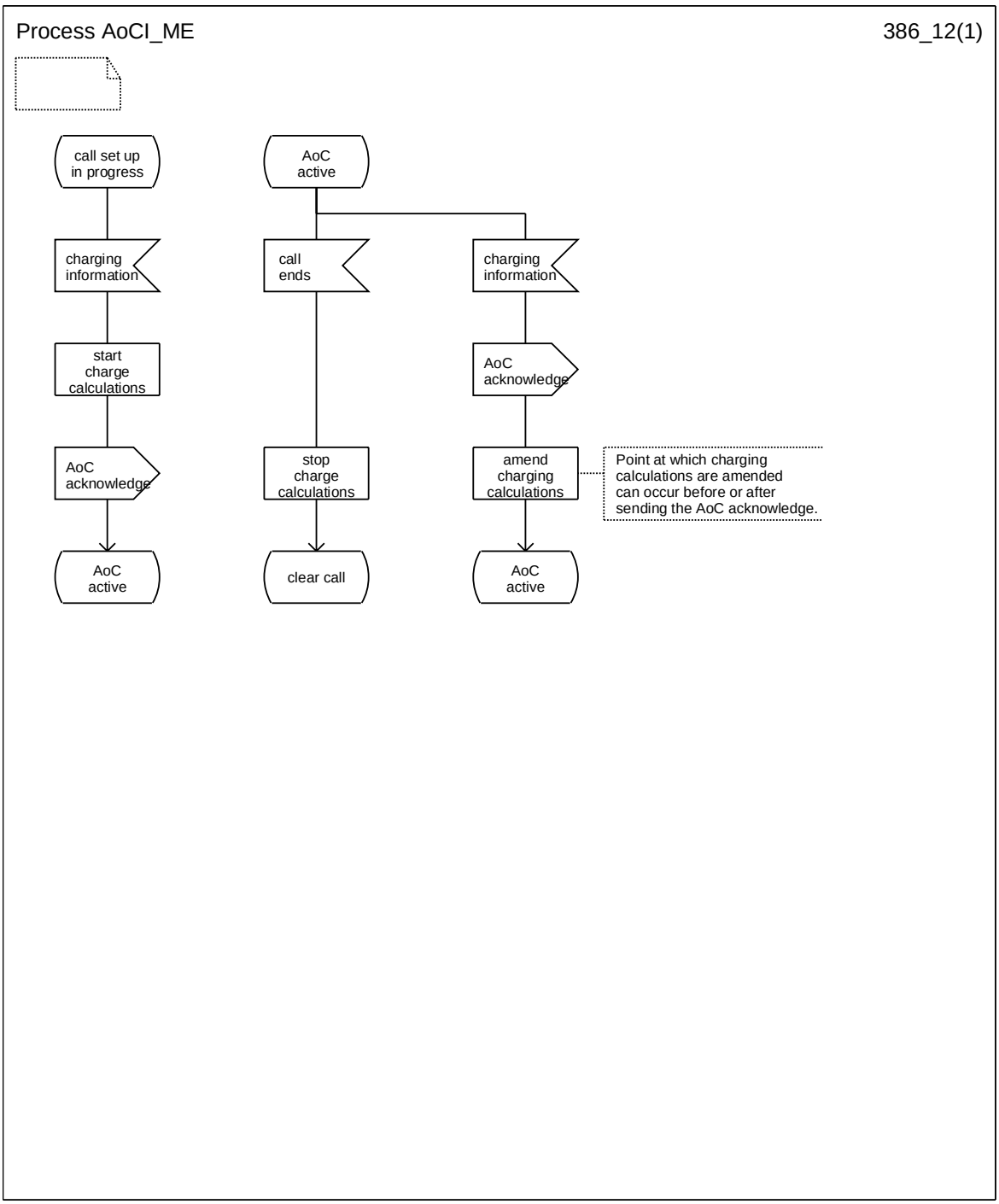


**Figure 1.2: SDL diagram of advice of charge (information) in the mobile equipment**

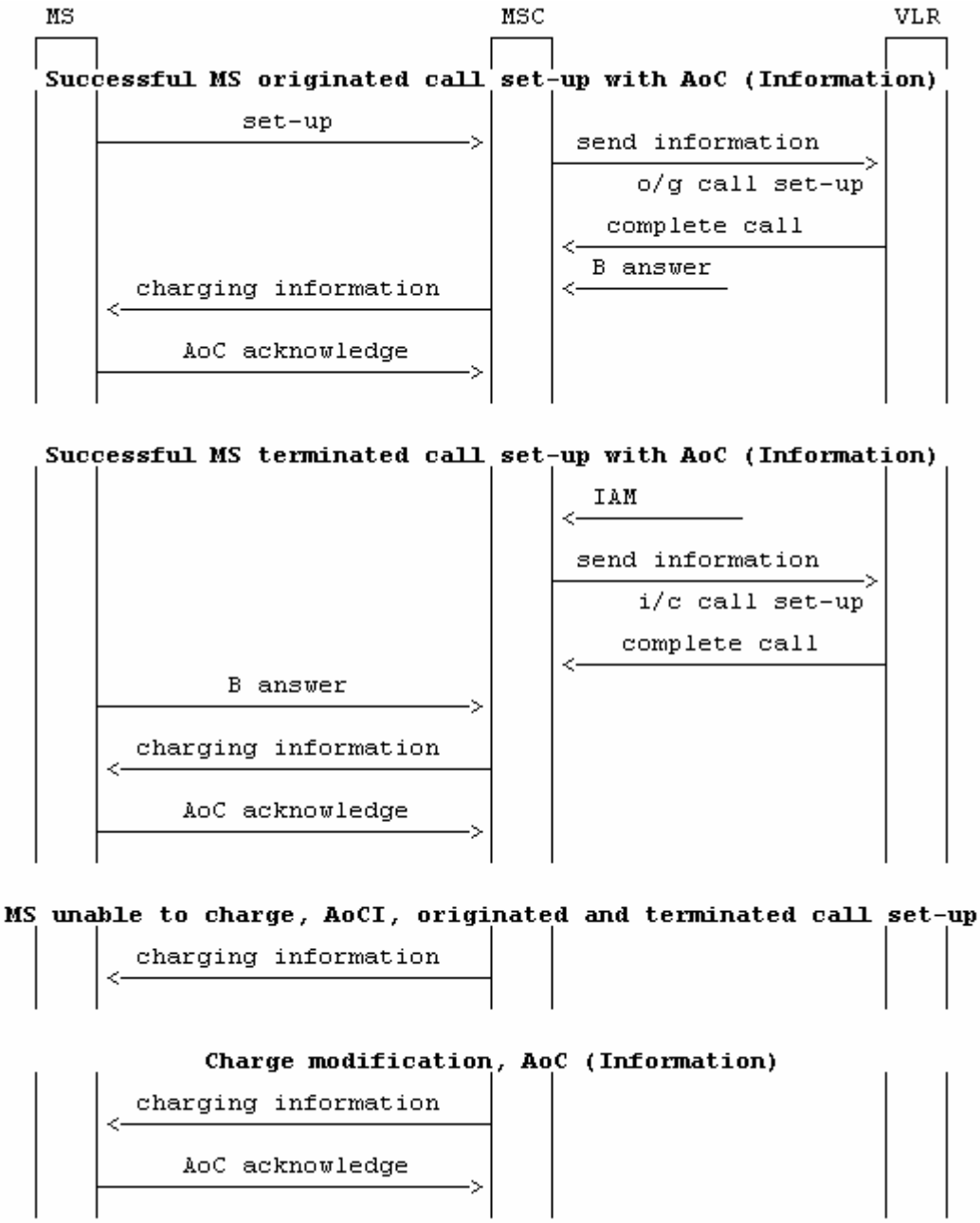


**Figure 1.3: Information flow for Advice of Charge (Information)**

## 1.4 Information stored in the HLR

AoCI may have the following logical states (refer to GSM 03.11 for an explanation of the notation):

| **Provisioning State** | **Registration State** | **Activation State** | **HLR Induction State** |
|---|---|---|---|
| (Not Provisioned, | Not Applicable, | Not Active, | Not Induced) |
| (Provisioned, | Not Applicable, | Active and Operative, | Not Induced) |

The HLR shall store the logical state of AoCI (which shall be one of the valid states listed above) on a per subscriber basis.

## 1.5 State transition model

The following figure shows the successful cases of transition between the applicable logic states of AoCI. The state changes are caused by actions of the service provider.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence they are not shown in the diagram.

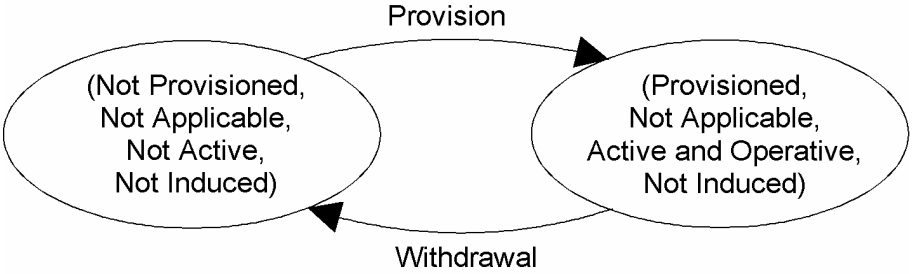


**Figure 1.4: State transition model for AoCI**

## 1.6 Transfer of Information from HLR to VLR

If the provisioning state for AoCI is "Provisioned" then when the served subscriber registers on a VLR the HLR shall send that VLR information about the logical state of AoCI.

If the logical state of AoCI is changed while a subscriber is registered on a VLR, then the HLR shall inform the VLR of the new logical state of AoCI.

## 1.7 Information stored in the VLR

For the supplementary service AoCI the VLR shall store the service state information received from the HLR.

## 1.8 Handover

Handover will have no impact on AoC control procedure.

# 2 Advice of Charge (Charging) (AoCC)

## 2.1 Advice of Charge (Charging) MSC SDL diagram

The SDL diagram for the Advice of Charge (Charging) supplementary service within the MSC is given in figure 2.1. At invocation of the Advice of Charge (Charging) supplementary service the network shall send the "Charging" MS the CAI. The network shall allow the call to proceed whilst waiting for an acknowledgement of the CAI. The waiting period is governed by Timer T(AoC). On expiry of T(AoC) the network shall initiate call clearing.

NOTE 1: AoC (Charging) is not applicable to emergency calls.

NOTE 2: The request of generation of CAI applies to AoC initiation or charge modification.

## 2.2 Advice of Charge (Charging) mobile equipment SDL diagram

The SDL diagram for the Advice of Charge (Charging) supplementary service within the mobile equipment is given in figure 2.2. The SDL indicates when charging calculations are started, amended and stopped, within the mobile equipment. The mobile equipment should start charging calculations as soon as possible after receiving the charging information. Charging calculations should be emended by the mobile equipment in accordance with GSM 02.24.

NOTE: The point at which charging calculations are amended can occur before or after sending the AoC Acknowledge.

Charging calculations are stopped when the call ends for any reason.

The reception of the CAI shall be acknowledged only if the MS supports the AoCC functionality specified in GSM 02.24 and GSM 02.86.

For mobile originated calls, the MS shall prevent a call set-up attempt if the ACM value is equal to or greater than ACMmax.

For mobile terminated calls, a call set-up attempt shall be allowed even if the ACM value is equal to or greater than ACMmax. In this case, when the MS detects that this is a chargeable call and that the ACM value is equal to or greater than ACMmax then the call shall be released.

During an active call, when the MS detects that ACM is equal to or greater than ACMmax then the MS shall release the call.

## 2.3 Advice of Charge (Charging) information flow diagram

The Advice of Charge (Charging) information flow diagrams are shown in figure 2.3.

## 2.4 AoCC subscriber roaming requirements

When an AoCC subscriber first roams into an MSC area not supporting AoCC, or the subscription is given to him while he is roaming in an MSC area not supporting AoCC the following applies:

The HLR shall indicate to the VLR that roaming is restricted in this MSC area due to unsupported feature, and it prevents further mobile terminated traffic. In this case the MS is not reachable.

When entering an AoCC supporting area the AoCC related roaming restriction shall be removed in the HLR.

When AoCC is withdrawn the AoCC related roaming restriction shall be removed in the HLR and VLR. This is independent from roaming restrictions due to other reasons.

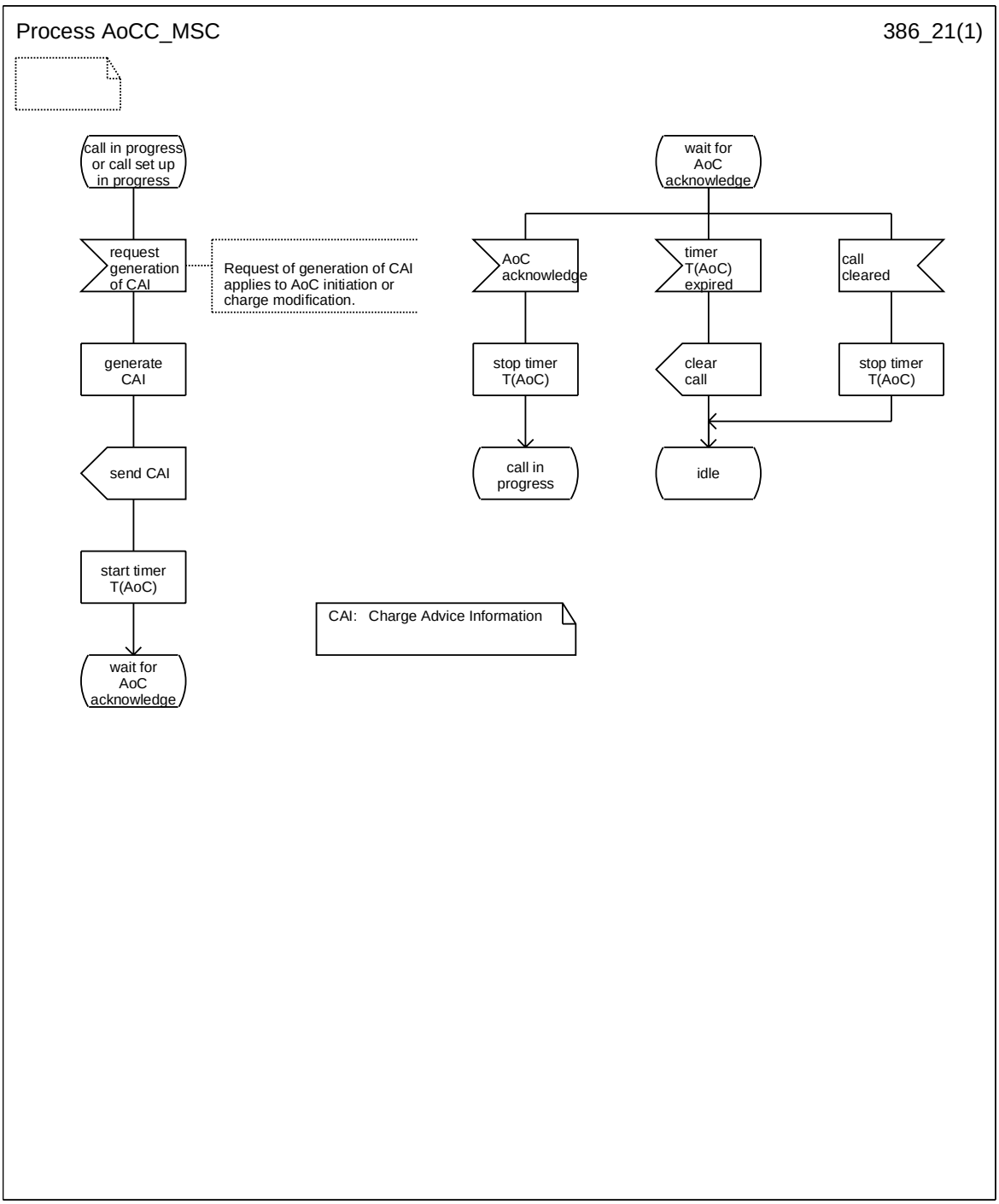


**Figure 2.1: SDL diagram of advice of charge (charging) in the MSC**

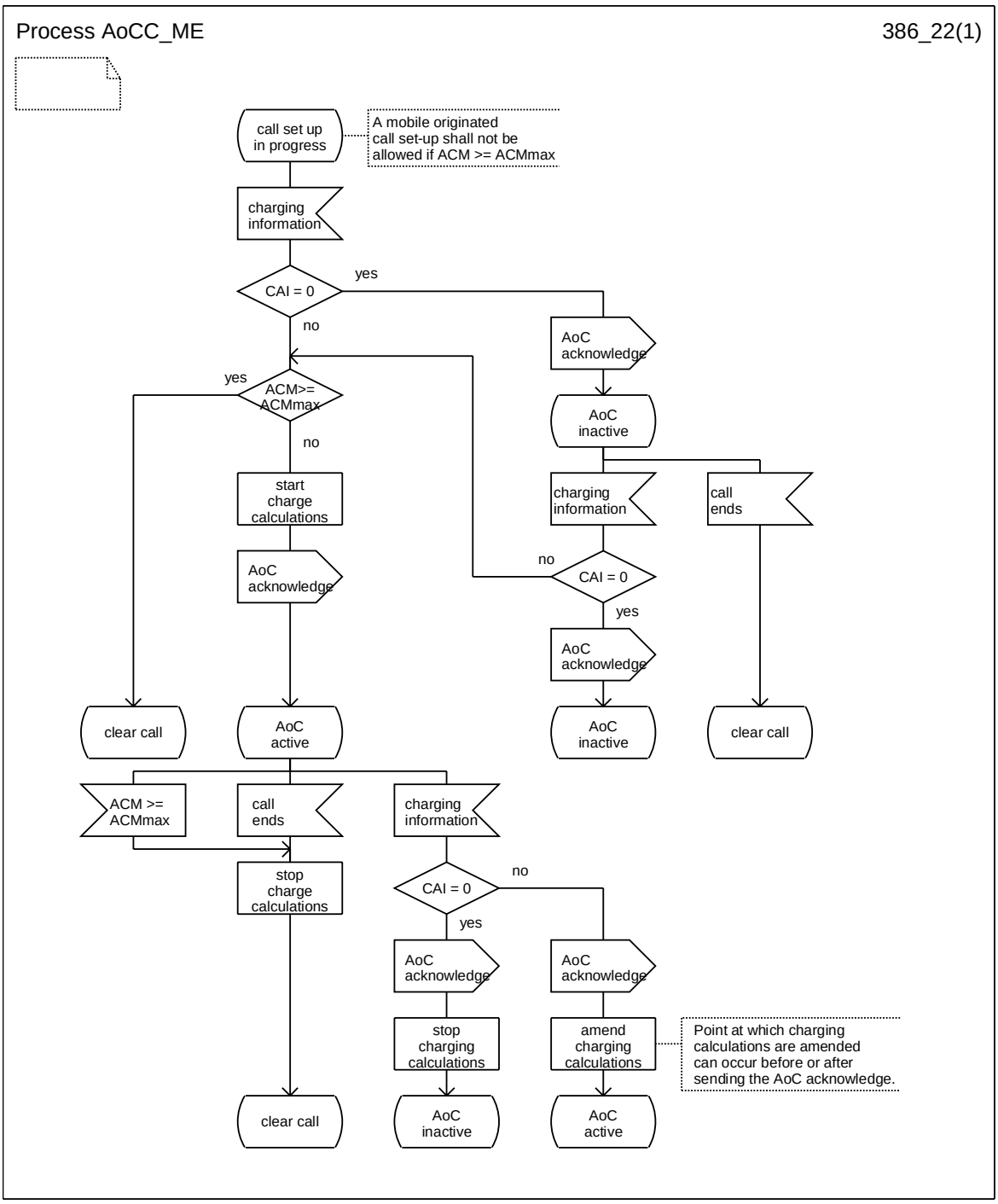


**Figure 2.2: SDL diagram of advice of charge (charging) in the mobile equipment**

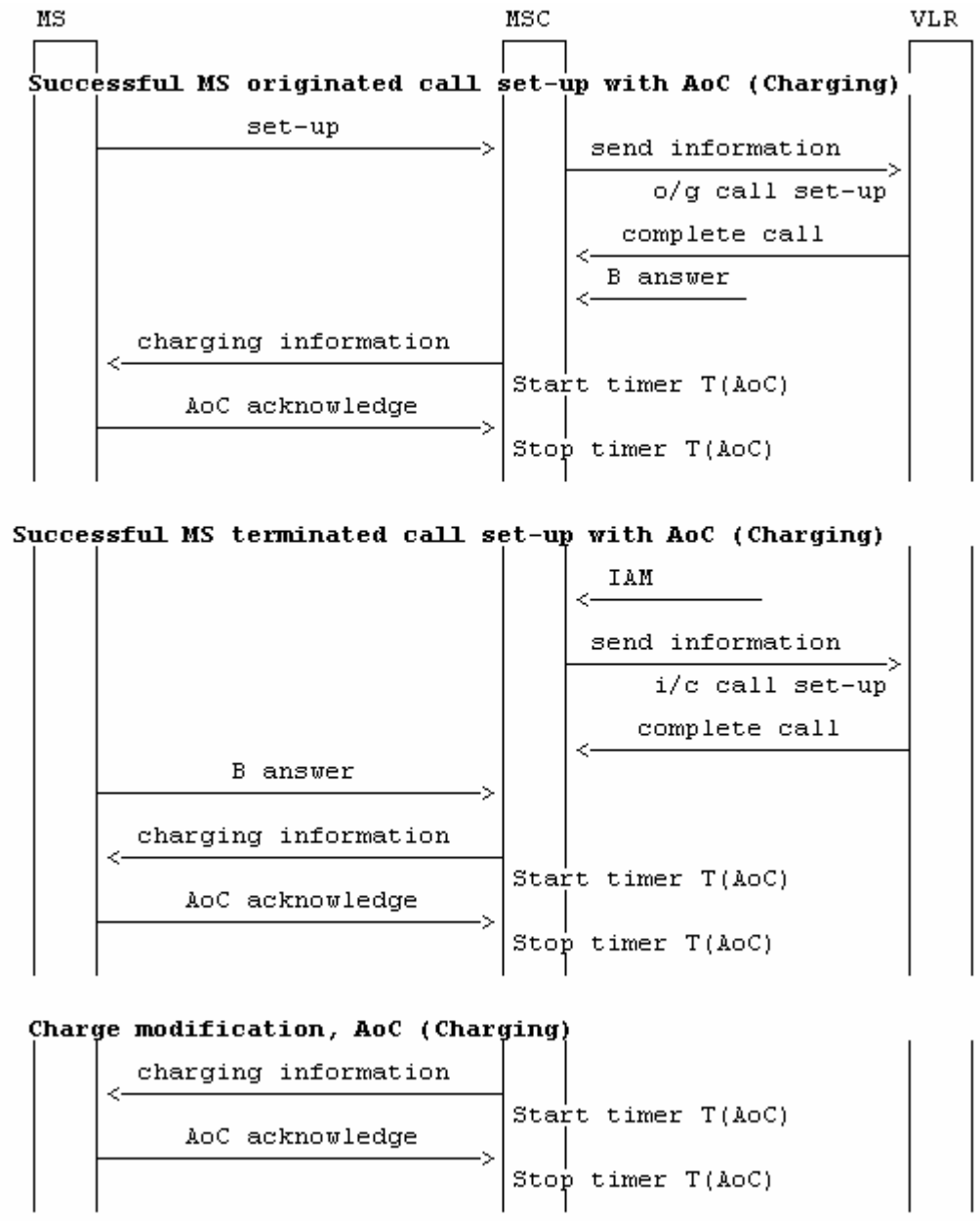


**Figure 2.3 (sheet 1 of 2): Information flow for Advice of Charge (Charging)**

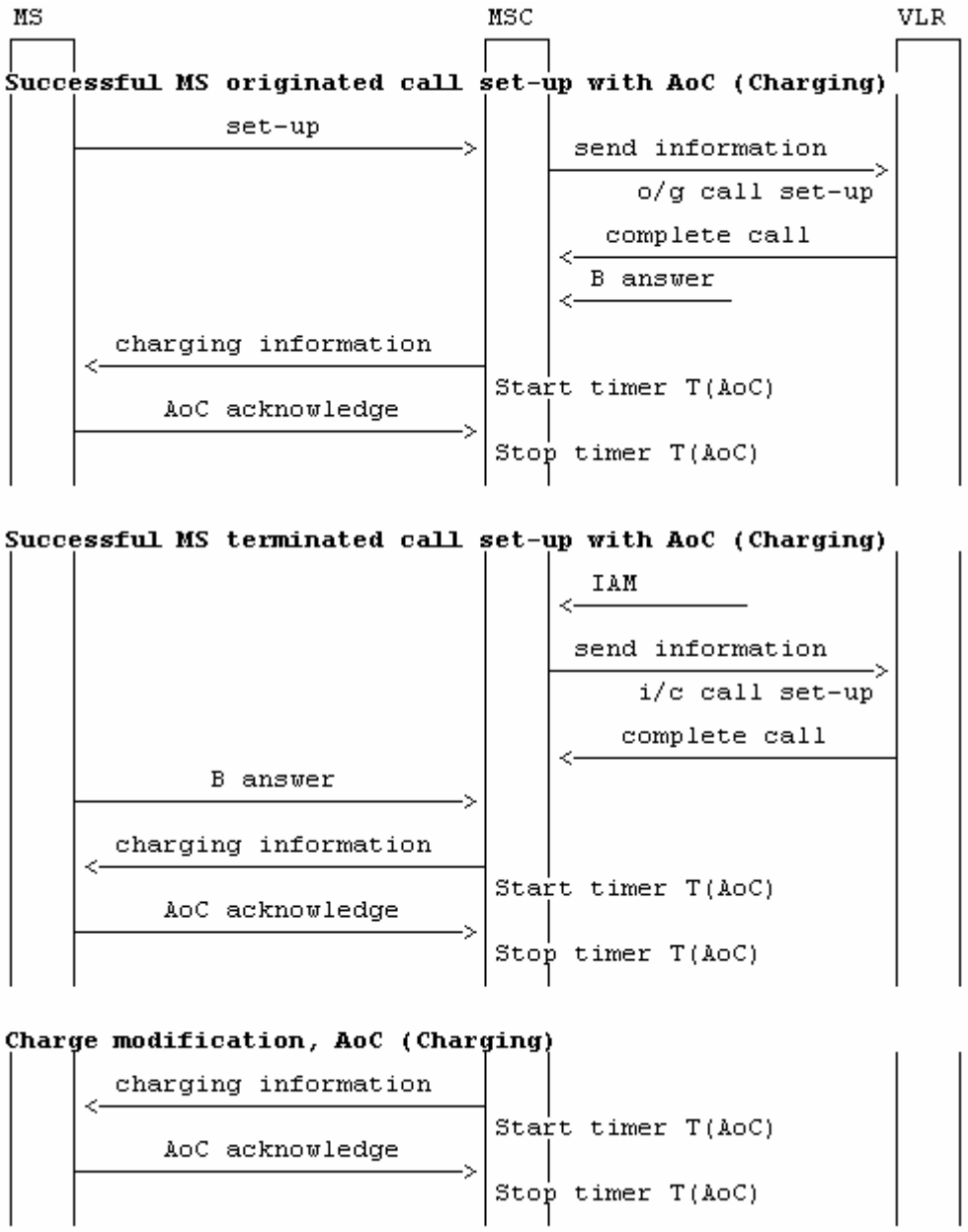


**Figure 2.3 (sheet 2 of 2): Information flow for Advice of Charge (Charging)**

## 2.5 Information stored in the HLR

AoCC may have the following logical states (refer to GSM 03.11 for an explanation of the notation):

| **Provisioning State** | **Registration State** | **Activation State** | **HLR Induction State** |
|---|---|---|---|
| (Not Provisioned, | Not Applicable, | Not Active, | Not Induced) |
| (Provisioned, | Not Applicable, | Active and Operative, | Not Induced) |

The HLR shall store the logical state of AoCC (which shall be one of the valid states listed above) on a per subscriber basis.

## 2.6 State transition model

The following figure shows the successful cases of transition between the applicable logic states of AoCC. The state changes are caused by actions of the service provider.

Note that error cases are not shown in the diagram as they normally do not cause a state change. Additionally, some successful requests may not cause a state change. Hence they are not shown in the diagram.

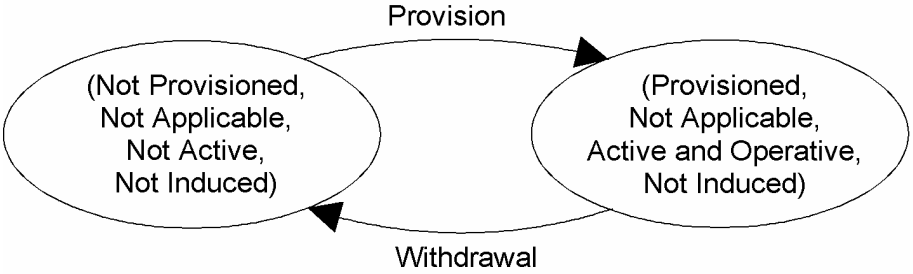


**Figure 2.4: State transition model for AoCC**

## 2.7 Transfer of Information from HLR to VLR

If the provisioning state for AoCC is "Provisioned" then when the served subscriber registers on a VLR the HLR shall send that VLR information about the logical state of AoCC.

If the logical state of AoCC is changed while a subscriber is registered on a VLR, then the HLR shall inform the VLR of the new logical state of AoCC.

## 2.8 Information stored in the VLR

For the supplementary service AoCC the VLR shall store the service state information received from the HLR.

## 2.9 Handover

Handover will have no impact on AoC control procedure.

# Annex A (normative): Information stored in the MSC

The MSC shall have access to the following tables to enable the call handling function to generate the Charge Advice Information (CAI), see GSM 02.24. The table will give the CAI element values corresponding to service request, call destination, type of day and the time of day.

- Units per interval table (e1 values);
- Seconds per internal table (e2 values);
- Scaling factor table (e3 values);
- Unit increment table (e4 values);
- Units per data interval table (e5 values);
- Segments per data interval table (e6 values);
- Initial seconds per time interval table (e7 values).

# Annex B (informative): Change history

| Change history | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **TSG CN#** | **Spec** | **Old Ver** | **CR** | **Rev** | **Phase** | **Cat** | **New Ver** | **Subject/Comment** |
| Apr 1999 | GSM 03.86 | 6.0.0 | | | R97 | | | Transferred to 3GPP CN1 |
| CN#03 | 23.086 | | | | R99 | | 3.0.0 | Approved at CN#03 |
| | 23.086 | 3.0.0 | | | R99 | | 3.0.1 | Reference list updated from 2G to 3G |
| CN#09 | 23.086 | 3.0.1 | 001 | 1 | R99 | F | 3.1.0 | SDL refresh |
| CN#11 | 23.086 | 3.1.0 | | | Rel-4 | | 4.0.0 | Release 4 after CN#11 |
| CN#16 | 23.086 | 4.0.0 | | | Rel-5 | | 5.0.0 | Release 5 after CN#16 |
| CN#26 | 23.086 | 5.0.0 | | | Rel-6 | | 6.0.0 | Release 6 after CN#26 |
| CT#30 | 23.086 | 6.0.0 | 0002 | | Rel-6 | | 6.1.0 | Incorrect References |

# History

| Document history | | |
|---|---|---|
| V6.0.0 | December 2004 | Publication |
| V6.1.0 | December 2005 | Publication |
| | | |
| | | |
| | | |