

**Telecommunications and Internet Converged  
Services and Protocols for Advanced Networking (TISPAN);  
SIP Transfer of Charging Information**

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Reference

DTS/TISPAN-03113-NGN-R2

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## Foreword

This Technical Report (TR) has been produced by {ETSI Technical Committee|ETSI Project|<other>} <long techbody> (<short techbody>).

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# 1 Scope

The present document specifies the Stage 3 of the real-time transfer of charging information between a Charge Determination Point (CDP) and a Charge Generation Point (CGP) by means of the Session Initiation Protocol (SIP).

Stage 3 identifies the protocol procedures and switching functions needed to support a feature.

The present document is applicable to an environment where different operators are working together. It is also applicable to a single network operator environment.

Whether the present document is applicable to a national environment and/or can be used for inter-network purposes depends on regulatory demands and/or bilateral agreements. It should be noted that there are network requirements and signalling limitations that are not covered because they are outside the scope of the present document. Examples of these are as follows:

- the on-line provided advice of charge information may not accurately reflect the correct charging rate due to discount rates, special charging arrangements, etc.; it is out of scope to ensure alignment of this information;
- complaint handling between network operators in case of incorrect advice of charge information;
- explicit encryption or special security mechanisms.

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## 2 References

For the purposes of this Technical Report (TS), the following references apply:

- [1] ETSI EN 300 356-1 (V3.2.2): "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP) version 3 for the international interface; Part 1: Basic services [ITU-T Recommendations Q.761 to Q.764 (1997), modified]".
- [2] IETF RFC 2976. "The SIP INFO Method"
- [3] IETF RFC 4006: "Diameter Credit-Control Application"
- [4] ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Endorsement of "IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 (Release 6)" for NGN Release 1".
- [5] ISO 4217: "International Organization for Standardization; Type Currency Code List"

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## 3 Definitions, symbols and abbreviations

### 3.1 Definitions

For the purposes of the present document, additionally to the terms and definitions given in ETSI TS 181 002 [1] the following terms and definitions apply:

**absolute time:** time of the day representing GMT

**add-on charge:** single additional charge which does not change the current tariff. An add-on charge can either be metered in non-monetary units (e.g. meter-pulse) or in monetary-units (e.g. currency).

**charge:** number of charge units (for the usage of a chargeable event (telecommunication service))

**Charge Determination Point:** The Charge Determination Point (CDP) determines which tariff/add-on charge should be applied, and inserts the charging information to the appropriate SIP requests or responses. Example of a CDP is a SIP AS at the visited IMS network providing the premium rate service.

**Charge Generation Point:** The Charge Generation Point (CGP) receives the charging information that was added by a CDP and transferred in the appropriate SIP requests or responses.

Example of a CGP is an originating SIP AS at the home IMS network for advice of charge purposes.

**Editor's note:** a definition of what is meant with the term 'charge information' in the scope of this specification is needed.

**charge unit:** base element for the charging process, expressed in non-monetary or monetary units.

**chargeable event:** An activity utilising telecommunications network infrastructure and related services for user to user communication (e.g. a single call, a data communication session or a short message), or for user to network communication (e.g. service profile administration), or for inter-network communication (e.g. transferring calls, signalling, or short messages), or for mobility (e.g. roaming or inter-system handover), which the network operator wants to charge for. The cost of a chargeable event may cover the cost of sending, transporting, delivery and storage. The cost of call related signalling may also be included.

**charged party:** user involved in a chargeable event that has to pay parts or the whole charges of the chargeable event, or a third party paying the charges caused by one or all users involved in the chargeable event, or a network operator.

**charging:** function whereby information related to a chargeable event is formatted and transferred in order to make it possible to determine usage for which the charged party may be billed.

**offline charging:** A charging process where charging information does not affect, in real time, the service rendered.

**online charging:** A charging process where charging information can affect, in real time, the service rendered and therefore directly interacts with the session/service control.

**Online Charging Function:** The Online Charging Function (OCF) receives charging events from the CTF. It then uses the information contained in the charging events for online charging purposes.

**real-time:** Time, typically in number of seconds, to perform the on-line mechanism used for fraud control and cost control.

**subtariff:** within a tariff sequence, a charge unit per time unit

NOTE: Each subtariff has an individual duration and an individual charge unit.

**tariff:** set of parameters defining the network utilization charges for the use of a particular bearer / session / service. A tariff can either be metered in non-monetary units (e.g. meter-pulse) or in monetary units (e.g. currency). NOTE: Relationship between tariff and charge units (charging) should be clarified

NOTE: A tariff consists of a tariff sequence.

**tariff determination instance:** particular charging-related process with a corresponding communication between a charge determination point and a charge registration/charge generation point

**tariff sequence:** list of consecutive subtariffs which has to be applied for the charging of the communication event

NOTE: The subtariffs are applied at the start of the communication event and are applied consecutively according to the list of the subtariffs. The last subtariff may have an unlimited duration.

## 3.1 Abbreviations

This Recommendation uses the following abbreviations:

AOC	Advice of Charge
AS	Application Server
AS-O	Originating Application Server
AS-T	Terminating Application server
CB	Communication Barring
CCBS	Completion of Communication to Busy Subscriber.
CD	Communication Deflection
CFB	Communication Forwarding Busy
CFNRd	Communication Forwarding Not Registered
CFNL	Communication Forwarding on No Logged-in
CFNRy	Communication Forwarding No Reply
CFU	Communication Forwarding Unconditional
CN	Core Network
CONF	CONFerence calling
CS	Circuit Switched
CUG	Closed User Group
CW	Communication Waiting
HOLD	Communication Hold
IM	IP Multimedia
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Service Data Network
MCID	Malicious Communication IDentification
MPTY	MultiParty
MMS	Multimedia Messaging Service
MPTY	Multi Party Service
NGN	Next Generation Network
OCF	Online Charging Function
OIP	Originating Identification Presentation
OIR	Originating Identification Restriction
PLMN	Public Land Mobile Network
PSTN	Public Switch Telephone Network
QoS	Quality of Service
SIP	Session Initiation Protocol
TIP	Terminating Identification Presentation
TIR	Terminating Identification Restriction
UE	User Equipment

AE	Application Entity
AEI	Application Entity Instance
ALS	Application Layer Structure
AOC-E	Advice Of Charge at the End of the communication
<b>AOCRG</b>	<b>Add-On ChaRGing information</b>
AP	Application Process
APM	APplication transport Mechanism
ASE	Application Service Element
ATII	Application Transport Instruction Indicators
BER	Basic Encoding Rules
<b>CCP</b>	<b>Connection Control Point</b>
CDP	Charge Determination Point
CDR	Call Data Record
CGP	Charge Generation Point
CRGA	ChaRGing Acknowledgement information
<b>CRGT</b>	<b>ChaRGing Tariff information</b>
CRI	Charging Reference Identifier
CRP	Charge Registration Point
GMT	Greenwich Mean Time
ID	IDentification
ISUP	ISDN User Part
MTP	Message Transfer Part
NI	Network Interface
<b>OLE</b>	<b>Originating Line Exchange</b>
OSI	Open System Interconnection
SACF	Single Association Control Function

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## 4 SIP Transfer of Charging Information

### 4.1 Description

#### 4.1.1 General description

The present document specifies the procedures for the realtime transfer of charging information in SIP between a Charge Determination Point (CDP) and a Charge Generation Point (CGP). CDP is a point that determines which tariff/add-on charge should be applied and inserts the charging information to the appropriate SIP requests or responses, whereas the CGP is a point that receives the charging information that was added by a CDP.

Example of CDP is a SIP AS at the visited IMS network providing the premium rate service. Example of the CGP is the originating SIP AS at the home IMS network for advice of charge purposes.

The functionality is needed to support the charging of value added services that are charged by the operator of the originating end user, the home IMS operator, in case the operator of the originating end user has no knowledge about the charging information related to these value-added services.

A charge determination and charge generation point of the communication may be located within the network of one operator (single network operator environment) or may be located in different networks of different operators (multi-operator environment).

The configuration of several charge determination points for one communication is possible. It is assumed that there is only one CGP for the communication.

The transferred charging information represents direct charging information (no pointers to charging data), either in monetary (e.g. currency) units or non-monetary (e.g. meter-pulse) units.

The following functionality is provided:

- i) apply a communication attempt charge for unsuccessful communications;
  - ii) apply a communication setup charge (once) at start of charging;
  - iii) apply an initial communication tariff at start of charging and an (optional) next tariff at an absolute time during the communication;
- Editor's note: all the subsequent tariffs for the communication shall be sent at the beginning of the communication.
- iv) change immediately the current tariff;
  - v) apply immediately an add-on charge (either a number of non-monetary units or an amount of monetary units) during the communication. This add-on charge is additive and does not change the tariff in force;
  - vi) acknowledge the received charging information;
  - vii) differentiation as to whether the charging information is to be used for advice of charge purposes only, or for subscriber charging purposes (which would also allow it to be used for advice of charge purposes);
  - viii) perform validation (e.g. check range of parameters, check whether a request from a certain network operator can be accepted);
  - ix) apply a "one time charge" (i.e. non-periodic charge/flat rate) as a minimum communication charge at start of charging;

#### 4.1.2 Network provider option

To be completed.

## 4.2 Coding requirements

CDP and CGP shall support the INFO method according to RFC 2976 [2] in support of SIP Transfer of Charging Information.

CDP and CGP shall support multipart MIME content.

The SIP Transfer of Charging Information XML schema is defined in Annex C. The Charging Information XML schema shall be transported as a SIP MIME body. The MIME type for the Charging Information is "application/vnd.etsi.sci+xml". Any SIP message that transports a body with Charging Information shall identify the payload as MIME type "application/vnd.etsi.sci+xml".

## 4.3 Functional requirements

### 4.3.1 Overall requirements

a) It is assumed that only one CDP is available.

b) Sending of next tariff information

A determination point shall not send next tariff information with a switch-over time that is more than 23 hours and 45 minutes after the current time.

c) Format of the Charging Information

All information issued for the same communication has to be in the same format, i.e. monetary or non-monetary. This needs bilateral agreements between the network operators concerned.

If non-monetary formats are used, the corresponding monetary value of a non-monetary unit needs bilateral agreements between the network operators concerned.

### 4.3.2 Procedures at a Charge Determination Point

#### 4.3.2.1 Procedures during communication set-up

##### 4.3.2.1.1 Tariff indication

When a Charge Determination Point has determined that:

- the tariff which has to be activated immediately at start of charging; and/or
- the next tariff which has to be activated at an absolute switch-over time; and/or
- the absolute switch-over time (GMT),

has to be transmitted to the charge generation point, the application process shall issue the Tariff indication.

A Tariff indication may be re-issued during communication set-up phase (i.e. at any time up to the dialog confirmation), replacing previously issued information.

If the tariff is time dependent, then the next tariff and the absolute time at which the current tariff has to be replaced by this next tariff shall be sent. It can be sent together with the current tariff in the initial Tariff indication. The next tariff and the tariff switch-over time shall always be sent together.

The current tariff and the next tariff have the same tariff parameter structure, i.e. a Communication Attempt charge, a Communication Setup charge and a Communication charge (up to a maximum of 10 communication subtariffs).

The tariff format used for the communication is indicated by the first Tariff indication and shall not be changed during the communication.

The following subclauses specify the procedures for some specific cases.

#### 4.3.2.1.2 Communication attempt charge

The Communication Attempt charge is a direct charge, to be charged only for unsuccessful communications.

If a communication attempt charge is relevant to the communication, the Communication Attempt charge information shall be included in the Tariff indication.

To cover the scenario in the generation point where the received absolute switch-over time has already been reached at the receipt of the Tariff indication or just before start of charging, the Communication Attempt charge shall also be sent in the first Next Tariff parameter.

In case of **monetary**-format, the charge amount is indicated by a currency factor multiplied by a currency scale.

In case of **non-monetary** format, the charge amount is indicated by a number of meter-pulse units.

**Editor's note: The format of the parameters shall use the existing format used in IMS charging. The same comment applies for all the following subclauses.**

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#### 4.3.2.1.3 Communication set-up charge

The Communication Setup charge is a direct charge, to be charged once at start of charging.

If Communication Setup charge is relevant to the communication, the Communication Setup charge information shall be included in the first Tariff indication.

To cover the scenario in the generation point where the received absolute switch-over time has already been reached at the receipt of the Tariff indication or just before start of charging, the Communication Setup charge shall also be sent in the first Next Tariff parameter.

In the case of monetary-format, the charge amount is indicated by a currency factor multiplied with a currency scale.

In the case of non-monetary-format the charge amount is indicated by a number of meter-pulse units.

#### 4.3.2.1.4 Communication charge

The Communication charge is a direct charge, to be applied at start of charging.

If Communication charge is relevant, this information shall be included in the first Tariff indication and before start of charging.

##### a) Non-monetary-format

In case of non-monetary-format, the charge amount is indicated by a number of meter-pulse units to be applied per time unit. The Communication charge is free when its value is zero.

##### b) Monetary-format

In case of monetary-format, the charge amount per time unit is indicated by a currency factor multiplied by a currency scale. The communication charging is free of charge when the product is zero.

**NOTE:** With the currency-format only one fixed time unit is used. This fixed time unit is one second, according to RFC 4006 [3].

#### c) Communication charge sequence

The communication charge may be a sequence of up to 10 communication subtariffs. Except for the last subtariff, each subtariff shall be limited by its tariff duration. The last (or single) subtariff of the sequence may be either unlimited (tariff duration = 0) or limited.

At expiry of the tariff duration timer of the last (single) communication subtariff of the communication charge sequence, the following options are possible:

- the communication charge sequence is re-applied; or
- the communication charge sequence is not re-applied.

The chosen option is indicated in the tariffControlIndicators.

If a communication charge sequence is relevant to the communication, the complete sequence shall be provided.

#### d) Absolute switch-over time

The absolute switch-over time is the time at which the current tariff has to be replaced by the next tariff.

The next tariff and the tariff switch-over time shall always be provided together.

#### e) Minimum Communication Charge at Start of Charging

To apply a minimum communication charge in case of non-monetary format, the first subtariff of the sequence is defined with N pulses, a duration which corresponds to the required duration and a time interval equal to zero.

To apply a minimum communication charge in case of monetary format, the first subtariff is defined with N currency units and a duration which corresponds to the required duration. A flag in CommunicationChargeCurrency (subTariffControl) indicates whether the tariff is a "one time charge" for the minimum communication charge or not.

### 4.3.2.2 Procedures after start of charging

The following subclauses and clause 4.3.2.3 specify the procedures for some specific cases.

#### 4.3.2.2.1 Change current tariff

The current tariff can be changed by issuing a Tariff indication with the new current tariff.

#### 4.3.2.2.2 Add-on charging information

If a charge determination point determines that a certain amount of charge has to be added, the application process issue an Add-on-charge indication. The current tariff is not changed.

An Add-on-charge indication is allowed after start of charging only.

The charge is either in non-monetary format or in monetary format.

The add-on charge in non-monetary-format is a number of meter-pulse units. The add-on charge in monetary format is indicated by the currency factor multiplied by the currency scale.

#### 4.3.2.3 Subsequent Tariff indications

In addition to the first Tariff indication, the application process in a determination point issues subsequent Tariff indication during the communication in the following cases:

- a) The current tariff is changed. A Tariff indication with the new current tariff  $t$  has to be issued immediately.
- b) The next tariff and its tariff switch-over time was not issued at communication setup. This exceptional case occurs when the switch-over time was more than 23 hours and 45 minutes after the moment the communication is set-up. A Tariff indication with the next tariff and the corresponding switchover time has to be issued at least before the switchover time.

#### 4.3.2.4 Acknowledgement and timer Tcrga

On issuing of a Tariff indication or Add-on-charge indication, the application process in a charge determination point shall start the timer Tcrga awaiting the Tariff response or Add-on-charge response, respectively, representing the acknowledgement. On receipt of the acknowledgement, i.e. the Tariff response or Add-on-charge response, the timer Tcrga shall be cancelled.

If Tcrga is still running, awaiting the acknowledgement to a previous Tariff indication or Add-on-charge indication, a new Tariff indication or Add-on-charge indication shall not be issued until an acknowledgement has been received or Tcrga expires.

NOTE: In the AS of a charge determination point, there may be a need to delay the sending of the INVITE request until the acknowledgement to a Tariff indication on the incoming leg of the communication has been received.

Editor's note: Further investigation is needed which SIP messages can transport the charging information and the acknowledgements.

#### 4.3.2.5 Advice of charge/subscriber charging

The "Charging Control Indicator" information has to be included in the Tariff or Add-on-charge indication. Value "advice of charge" is provided if the charging information shall be used for advice of charge purposes only. Value "subscriber charging" is provided if the charging information shall be used for subscriber charging purposes and may also be used for advice of charge purposes.

#### 4.3.2.6 Exceptional procedures

- On expiry of timer Tcrga (e.g. the CGP has not received or could not process the Tariff Indication or Add-on-Charge Indication); or
- on receipt of a Tariff response or Add-on-charge response with the indication "not accepted";

a charge determination point shall either release the communication or continue the communication (network provider option).

Editor's note: the acknowledgement of charging information is FFS.

### 4.3.3 Procedures at the charge generation point

The following general rule applies: Currently stored information related to one network operator is replaced by information related to this operator received subsequently.

#### 4.3.3.1 Procedures during communication set-up

##### 4.3.3.1.1 Tariff indication

The receipt of the Tariff indication indicates:

- the tariff which has to be activated immediately at start of charging; or
- the next tariff which has to be activated at an absolute switch-over time; or
- the absolute switch-over time.

A Tariff indication may be received more than once during communication set-up phase (i.e. at any time up to the dialog confirmation), replacing previously received information.

If the tariff is time dependent, then the next tariff and the absolute time at which the current tariff has to be replaced by this next tariff will be received. They can be received together with the current tariff in the initial Tariff indication.

The current tariff and the next tariff have the same tariff parameter structure, i.e. a Communication Attempt charge, a Communication Setup charge and a Communication charge (up to a maximum of 10 communication subtariffs). The tariff parameters have either the non-monetary format or the monetary format. The tariff-format used for the communication is indicated by the first Tariff indication and shall not be changed during the communication.

Validation shall be performed (e.g. check of range of parameters, check of network identification).

The following subclauses specify the procedures for some specific cases.

#### 4.3.3.1.2 Communication attempt charge

The Communication Attempt charge is a direct charge, to be charged only for unsuccessful communications.

If a communication attempt charge is relevant to the communication, the Communication Attempt charge information shall be included in the Tariff indication.

In the case of monetary-format, the charge amount is indicated by a currency factor multiplied by a currency scale. The communication attempt charging shall not be performed if the product is zero or the parameter is not present.

In the case of non-monetary-format, the charge amount is indicated by a number of meter-pulse units. The communication attempt charging shall not be performed if the value is zero or the parameter is not present.

#### 4.3.3.1.3 Communication setup charge

The Communication Setup charge is a direct charge, to be charged once at start of charging.

If a communication setup charge is relevant to the communication, the Communication Setup charge information is included in the first Tariff indication.

In the case of monetary-format, the charge amount is indicated by a currency factor multiplied with a currency scale. The Communication Setup charging shall not be performed when the product is zero or the parameter is not present.

In the case of non-monetary-format the charge amount is indicated by a number of meter-pulse units. The Communication Setup charge shall not be performed when the number is zero or the parameter is not present.

#### 4.3.3.1.4 Communication charge

The Communication charge is a direct charge, to be applied at start of charging.

As part of the Current Tariff, the Communication Tariff is applied immediately at start of charging.

As part of the Next Tariff, the Communication Tariff is applied at the absolute time indicated by the absolute switch-over time parameter. The switch procedure is a network matter.

If the absolute switch-over time given in the Tariff indication is already passed, then the communication charge of the next tariff instead of the current tariff shall immediately be applied (see also clause 4.3.1 b).

##### a) Non-monetary-format

In case of non-monetary-format, the charge amount is indicated by a number of meter-pulse units to be applied per time unit. The communication is free of charge when its value is zero.

##### b) Monetary-format

In case of monetary-format, the charge amount per time unit is indicated by a currency factor multiplied by a currency scale. The communication is free of charge when the product is zero.

NOTE: With the currency-format only one fixed time unit is used. This fixed time unit is one second, according to RFC 4006 [3].

##### c) Communication charge sequence

The communication charge may be a sequence of up to 10 communication subtariffs. Except for the last subtariff, each subtariff shall be limited by its tariff duration. The last (or single) subtariff of the sent sequence may be either unlimited (tariff duration = 0) or limited.

Initially, charging shall use the first subtariff. At expiry of the tariff duration timer, the subsequent subtariff shall be applied.

At expiry of the tariff duration timer of the last (single) communication subtariff of the communication charge sequence, the following options are possible:

- the communication charge sequence is re-applied; or
- the communication charge sequence is not re-applied.

The option to be applied is indicated in the tariffControlIndicators.

If a communication charge sequence is relevant to the communication, the complete sequence shall be provided.

When the communication charge sequence is not re-applied, the following network provider option exists: either the communication continues "free of charge" or the communication is released.

#### d) Absolute switch-over time

The absolute switch-over time is the time at which the current tariff has to be replaced by the next tariff. In a multi-operator environment, the procedures of how the subtariffs of the next tariff are applied are subject of bilateral or multilateral agreements.

#### e) Minimum communication charge at start of charging

To apply a minimum communication charge in case of pulse format, the first subtariff of the sequence shall be defined with N pulses, a duration which corresponds to the required duration and a time interval equal to zero.

To apply a minimum communication charge in case of currency format, the first subtariff shall be defined with N currency units and a duration which corresponds to the required duration. A flag in CommunicationChargeCurrency (subTariffControl) indicates whether the tariff is a "one time charge" for the minimum communication charge or not.

### 4.3.3.2 Procedures after start of charge

If the Communication Setup charge is applied, all following received Communication Attempts and Communication Setup charges shall be ignored.

The following subclauses and clause 4.3.2.4 specify the procedures for some specific cases.

#### 4.3.2.2.1 Change current tariff

##### a) On receipt of the Tariff indication with the new tariff, the current tariff shall be changed

After successful validation (e.g. check of range of parameters, check of network identification), the new current tariff shall immediately be applied to the communication according to the following two tariff change procedures:

- tariff change without restart of the charging process (see b));
- tariff change with restart of the charging process (see c)).

Which immediate tariff change procedure shall be used is indicated in the ChargingContolIndicators by "immediateChangeOfActuallyAppliedTariff": value 1 means "with restart", value 0 means "without restart".

##### b) Tariff Change without restart of the charging process

The charging process for the actual communication shall be continued with the new current tariff. I.e. the tariff change procedure is the same as the one which is performed at a tariff switchover from the current to the next tariff. This means that:

- at the change of a tariff sequence, the new applied subtariff of the new tariff sequence is retrieved via the elapsed communication duration;
- at the change of a non-periodic tariff, the new non-periodic tariff is not applied (no double counting);
- the new communication attempt and communication setup charge are not applied.

c) Tariff Change with restart of the charging process

The charging process with the actual current tariff shall be closed and restarted with the new current tariff. This means that:

- at the change of a tariff sequence, the charging process restarts with the first communication subtariff of the new tariff sequence;
- at the change of a non-periodic tariff, the new non-periodic tariff is applied;
- the new communication attempt and communication setup charge are not applied.

d) In a multi-operator environment, the procedures of how the subtariffs of the next tariff are applied are subject of bilateral or multilateral agreements.

#### 4.3.2.2.2 Add-on charging information

On receipt of the Add-on-charge indication, the given amount of charge has to be added. The current tariff shall not be changed.

An Add-on-charge indication is allowed after start of charging only.

The charge is either in non-monetary format or in monetary format.

The add-on charge in non-monetary-format is a number of meter-pulse units. The add-on charge in monetary format is indicated by the currency factor multiplied by the currency scale.

#### 4.3.3.3 Subsequent Tariff indications

In addition to the first Tariff indication, subsequent Tariff indications during the communication may be received in the following cases:

- a) The current tariff has to be changed. A Tariff indication with the new current tariff together with the next tariff and its switch-over time will be received.
- b) The next tariff and its tariff switch-over time was not received at communication setup. A Tariff indication with the next tariff and the corresponding switchover time will be received before the switchover time.

#### 4.3.3.4 Acknowledgement

Editor's note: the acknowledgement of charging information is FFS.

On receipt of a Tariff indication, a Tariff response shall be issued.

On receipt of an Add-on-charge indication, an Add-on-charge response shall be issued.

The Tariff or Add-on-charge response, respectively, shall contain the acceptance indication "accepted" or "not accepted".

#### 4.3.3.5 Advice of charge/subscriber charging

The "Charging Control Indicator" information is included in the Tariff or Add-on-charge indication. Value "advice of charge" is provided if the charging information is to be used for advice of charge purposes only. Value "subscriber charging" is provided if the charging information is to be used for subscriber charging purposes and may also be used for advice of charge purposes.

#### 4.3.3.6 Exceptional procedures

- a) A Tariff indication shall be negatively acknowledged by issuing a Tariff response with "tariff not accepted" in the following cases:
- the "charging control indicator" is not present; or
  - only the "charging control indicator" is present; or
  - a current tariff parameter is not present in the first Tariff indication; or
  - a next tariff parameter is present and the tariff switchover time parameter is not present; or
  - a tariff switchover time parameter is present and the next tariff is not present; or
  - a Tariff indication is received with tariff format (non-monetary or monetary) other than the one received initially (either in an initial Tariff indication or in an initial Add-on-charge indication); or
  - the received tariff parameter value is unrecognized; or
  - the maximum number of allowed network operators which may send charging-related information (identified by NetworkIdentification up to "network") is exceeded; or
  - the destinationIdentification is not allocated; or
  - the pair of identifiers (originationIdentification/destinationIdentification) is incorrect; or
  - on receipt of an unrecognized value of "network" (in NetworkIdentification); or
  - on receipt of a recognized value of "network" (in NetworkIdentification) but there is no bilateral agreement.

- b) An Add-on-charge indication shall be negatively acknowledged by issuing a Add-on-charge response with "add-on charge not accepted" in the following cases:
- the parameter charge control indicator is not present; or
  - the parameter add-on charge is not present; or
  - an Add-on-charge indication is received with another tariff format (pulse or currency) than the one received initially (either in an initial Tariff indication or in an initial Add-on-charge indication); or
  - the received add-on charge parameter value is unrecognized; or
  - the Add-on-charge indication is received before start of charging; or
  - the maximum number of allowed network operators (identified by NetworkIdentification up to "network") is exceeded; or
  - the destinationIdentification is not allocated; or
  - the pair of identifiers (originationIdentification/destinationIdentification) is incorrect; or
  - on receipt of an unrecognized value of "network" (in NetworkIdentification); or
  - on receipt of a recognized value of "network" (in NetworkIdentification) but there is no bilateral agreement.

#### 4.3.3.7 Error procedures

To be completed.

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#### 4.3.4 Handling of identifiers

The initial indication, i.e. either a Tariff indication or a Add-on-charge indication, issued by the application process in a charge determination point shall contain the originationIdentification A.

The initial acknowledgement (i.e. the first Tariff/Add-on-charge response) to this initial (Tariff/Add-on-charge) indication (with originationIdentification and without destinationIdentification) issued by the application process in the generation point shall contain the originationIdentification B and the destinationIdentification A in order to allow mapping between the sending and receiving direction.

The destinationIdentification A equals the originationIdentification A, and the destinationIdentification B equals the originationIdentification B.

All subsequent Tariff and Add-on-charge indications associated with the same tariff determination instance contain the originationIdentification A and destinationIdentification B. All subsequent Tariff and Add-on-charge responses associated with the same tariff determination instance shall contain the originationIdentification B and destinationIdentification A.

## 4.4 Signalling requirements

### 4.4.1 General

When sending Charging information, CDP or CGP shall encode this information according to the XML-schema defined in Annex C. In addition, for this MIME body the AS shall set the Content-Type header to "vnd.etsi.sci+xml" and set the Content-Disposition to "render" with the "handling" parameter set to "optional".

Editor's note: the setting of the content-type parameters is a working assumption and is FFS.

In the case the Charging information is transported in a message that is forwarded by CDP or CGP that contains already a content body, CDP respectively CGP shall generate a multipart/mixed MIME body containing two sub-parts:

- one with the Charging information; the Content-Type and Content-Disposition of this sub-part should be coded as specified for non-multipart bodies;
- one with the received body; headers describing the content of the received SIP message (e.g. Content-type) should be moved into the headers of the this subpart.

## 4.4.2 Procedures during communication set-up

### 4.4.2.1 Procedures at the CDP

When an INVITE request is received, the CDP may either (network operator option) operate as a SIP proxy as specified in subclause 5.7.4 of ETSI ES 283 003 [2] and in RFC 3262 [5] and include the Charging information in the content body of a reliable 1xx provisional response, or operate as a routing B2BUA as specified in subclause 5.7.5 of ETSI ES 283 003 [2] and include the Charging information in the content body of a 200 OK response forwarded by the CDP.

Editor's note: It is FFS if the CDP can also operate in a Proxy mode when it includes the charging information in 200 OK responses.

### 4.4.2.2 Procedures at the CGP

To be completed.

## 4.4.3 Procedures after start of charging

### 4.4.3.1 Procedures at the CDP

The CDP shall operate as a routing B2BUA as specified in subclause 5.7.5 of ETSI TS 283 003 [2] and may send Charging information at any moment during the active phase of the communication. When sending the Charging information, the CDP shall include the Charging information in the content body of a mid-dialog request or mid-dialog response forwarded by the CDP or of an INFO request generated by the CDP.

### 4.4.3.2 Procedures at the CGP

To be completed.

## 4.5 Interaction with other services

Not applicable.

## 4.6 Interactions with other networks

### 4.6.1 Interaction with PSTN/ISDN

To be completed.

### 4.6.2 Interaction with PSTN/ISDN Emulation

For Further Study.

### 4.6.3 Interaction with external IP networks

The procedures of ES 283 003 [4] shall apply.

## 4.7 Parameter values (timers)

Editor's note: the acknowledgement of charging information is FFS.

**Timer Tcrga:** The duration the Charge Determination Point will wait for a Tariff response or an Add-on-charge response after having sent a Tariff indication or an Add-on-charge indication to the Charge Generation Point.

The value shall be 6 s to 15 s.

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## Annex <A> (informative): Signalling Flows

NOTE: The UNI AOC messages (to the left of the CGP) are out of scope of the present document and are showed for explanation reasons.

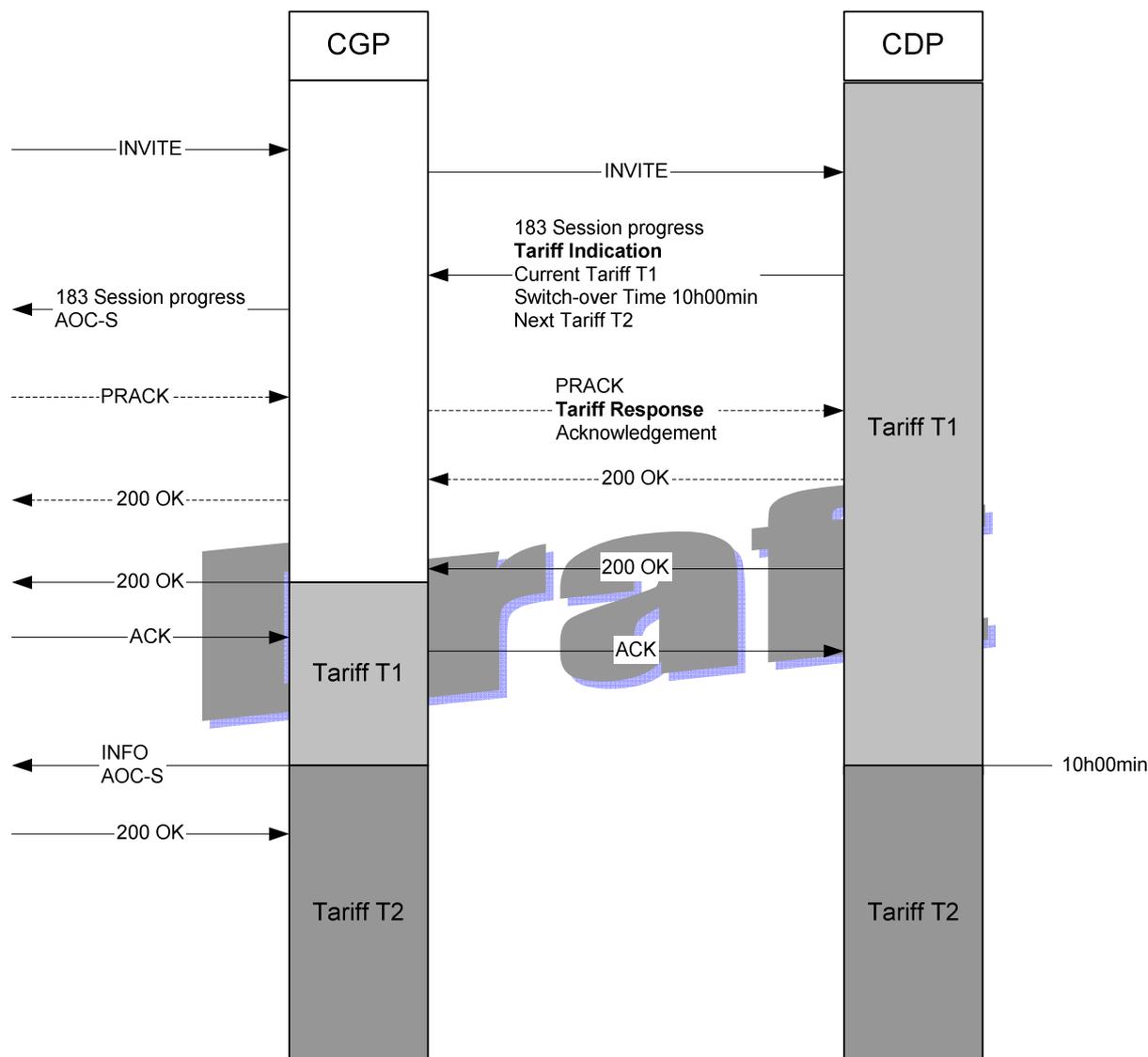


Fig. 1: Transfer of Tariff information during communication set-up

Figure 1 gives an example for transfer of tariff information during the communication set-up phase. When an INVITE request is received, the CDP includes the Charging information in the content body of a reliable 1xx provisional response, in this example the 183 Session progress response. The tariff information includes the current tariff T1, the next tariff T2, and the absolute switch-over time 10 h and 00 min.

The CGP applies T1 when the dialog is confirmed after the reception of the 200 OK. At 10 h and 00 min the CGP switches to T2.

To be completed.

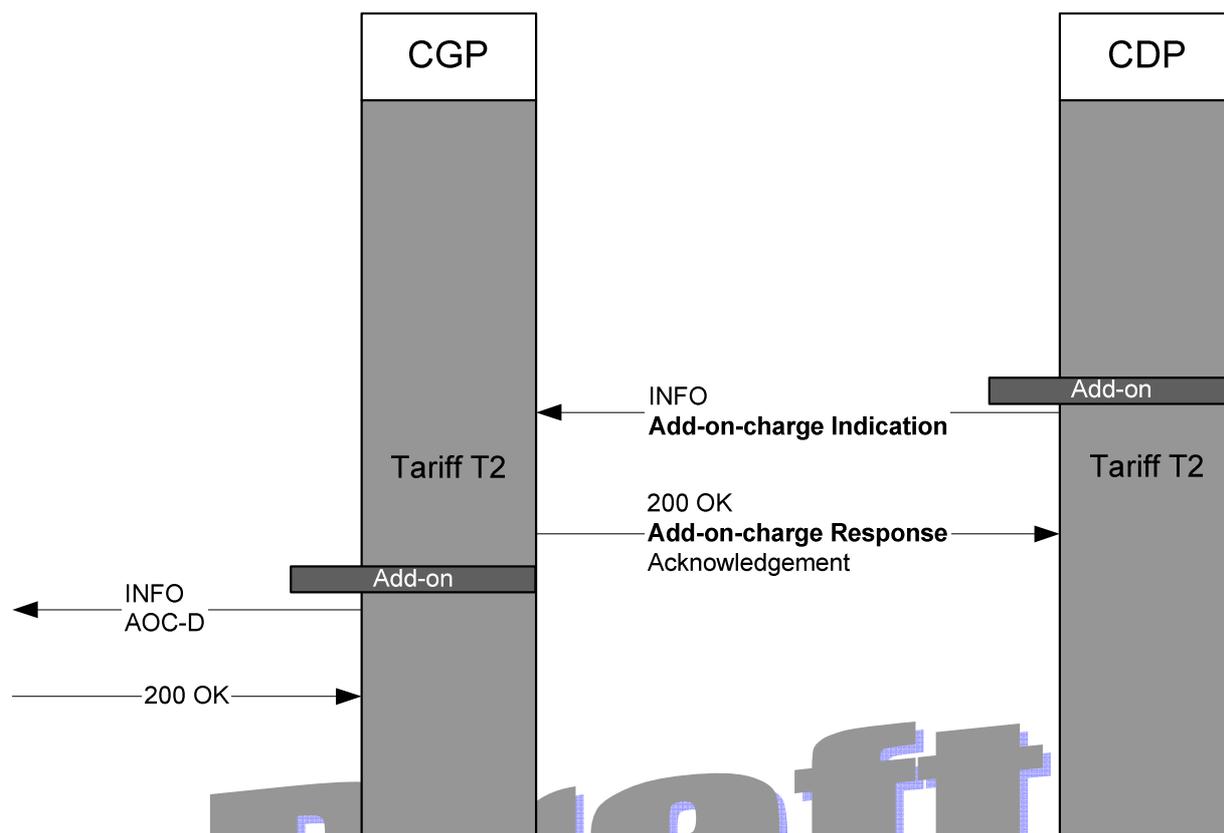


Fig. 2: Transfer of Add-on-charge information

Figure 2 gives an example for transfer of add-on-charge information after start of charging. The CDP includes the Charging information in the content body of an INFO request.

After the reception of the INFO request the CGP applies the add-on charge.

To be completed.

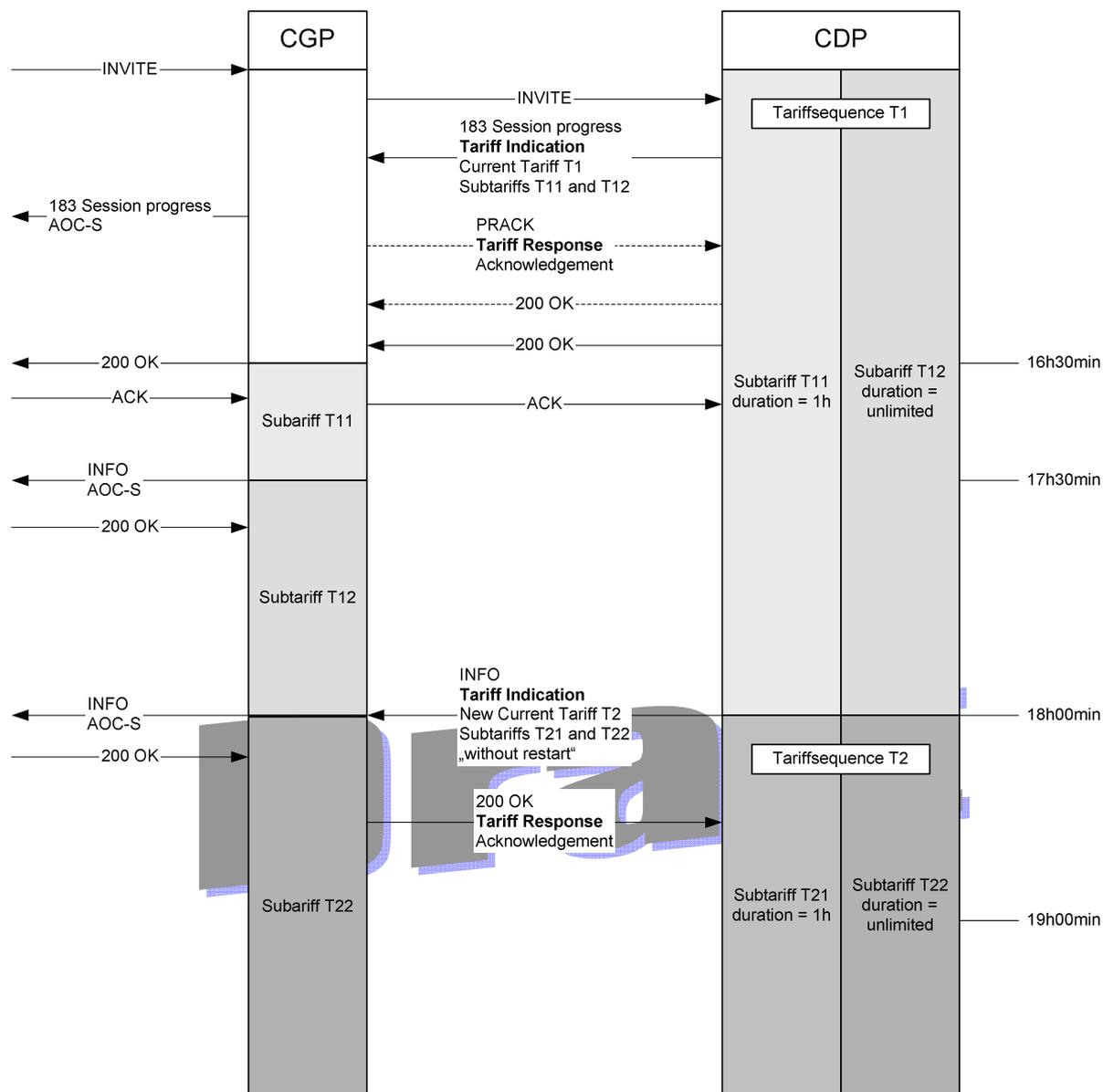


Fig. 3: Immediate tariff change without restart of the charging instance

Figure 3 gives an example for an immediate tariff change without a restart of the charging instance. After start of charging, the CDP includes the Charging information in the content body of an INFO request. The tariff information includes the new current tariff T2, which is a tariff sequence with the sub-tariffs T21 (duration 1 h) and T22 (duration unlimited), and the indication that no restart shall be applied.

After the reception of the INFO request the CGP applies T22, because T22 is valid 1 hour and 30 minutes after communication start.

To be completed.

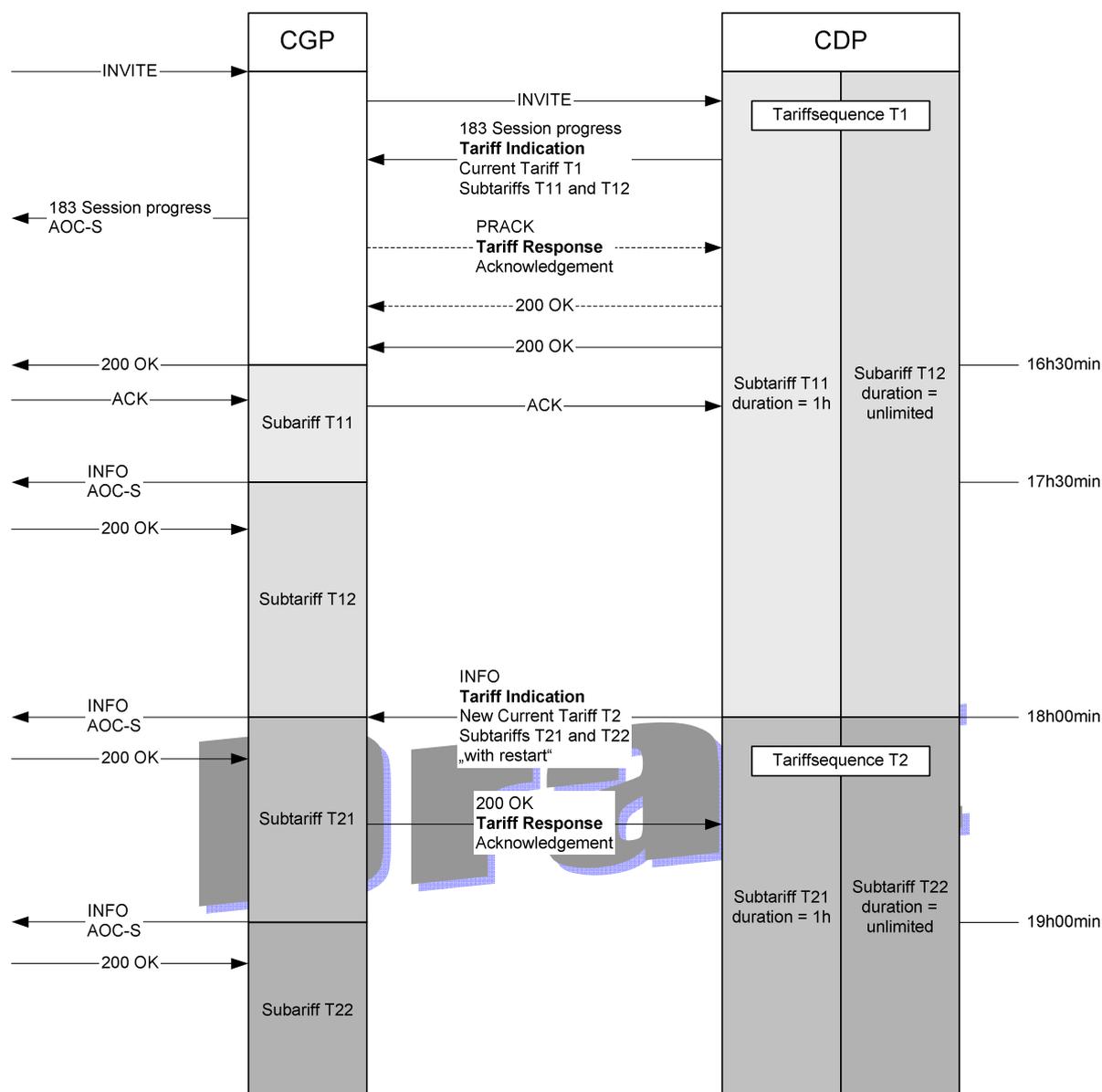


Fig. 4: Immediate tariff change with restart of the charging instance

Figure 4 gives an example for an immediate tariff change with a restart of the charging instance. After start of charging, the CDP includes the Charging information in the content body of an INFO request. The tariff information includes the new current tariff T2, which is a tariff sequence with the sub-tariffs T21 (duration 1 h) and T22 (duration unlimited), and the indication that a restart shall be applied.

After the reception of the INFO request the CGP restarts the charging instance and applies T21 for 1 hour, and then switches to T22.

To be completed.

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## Annex <B> (informative): SIP Transfer of Charging Information parameters

### B.1 General

This Annex describes the parameters needed to transport SIP NNI charging information.

### B.2 NNI Charging information

For SIP Transfer of Charging Information the regarding SIP messages shall be able to transport the following basic information:

- Charging Message Type, see B.2.1
- Charging Acknowledgement Information, see B.2.2
- Add On Charging Information, see B.2.3
- Charging Tariff Information, see B.2.4

#### B.2.1 Charging Message Type

The following Charging Message Types shall be applicable:

- crgt     Charging Tariff Information,
- aocrg    Add On Charging Information,
- crga     Charging Acknowledgement Information,

#### B.2.2 Charging Acknowledgement Information

**Editor's note: the acknowledgement of charging information is FFS.**

Charging Acknowledgement Information shall contain the following elements:

- Acknowledgement Indicators, see B.2.2.1, and
- Origination Identification, see B.3.1.1, and
- Destination Identification, see B.3.1.2

##### B.2.2.1 Acknowledgement Indicators

The Acknowledgement Indicators shall contain 1 up to 8 Accepted elements, see B.2.2.1.1.

#### B.2.2.1.1 Accepted

The Accepted element shall be coded as

- 0: not accepted, or
- 1: accepted

### B.2.3 Add On Charging Information

Add On Charging information is used to add an amount of charge for the communication and does not alter the current tariff. The Destination Identification is not available in an initial AddOnChargingInformation message, in all subsequent ones it is included. In the message the add-on charge has either the pulse or currency format.

Add On Charging Information shall contain the following elements:

- Charging Control Indicators, see B.3.2.1, and
- Add On Charge, see B.2.3.1, and
- Origination Identification, see B.3.1.1, and
- Destination Identification, see B.3.1.2, and
- Currency, see B.3.2.2

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#### B.2.3.1 Add On Charge

Add On Charge shall contain the following elements:

- Add On Charge Currency, see B.2.3.1.1, or
- Add On Charge Pulse, see B.2.3.1.2

##### B.2.3.1.1 Add On Charge Currency

The Add On Charge Currency element shall be coded as Currency Factor Scale type, see B.3.2.3.

##### B.2.3.1.2 Add On Charge Pulse

The Add On Charge Pulse element shall be coded as Pulse Units type, see B.3.2.4

### B.2.4 Charging Tariff Information

This information is used to transfer explicit tariff data to the originating subscribers network and the charge registration AS during communication set-up and also in the active phase of a communication. The Destination Identification is not available in an initial Charging Tariff Information, in all subsequent ones it is included.

Charging Tariff Information shall contain the following elements:

- Charging Control Indicators, see B.3.2.1, and
- Charging Tariff, see B.2.4.1, and
- Origination Identification, see B.3.1.1, and
- Destination Identification, see B.3.2, and
- Currency, see B.3.2.2

### B.2.4.1 Charging Tariff

The Charging Tariff shall contain the following elements

- Tariff Currency, see B.2.4.1.1, or
- Tariff Pulse, see B.2.4.1.2

#### B.2.4.1.1 Tariff Currency

The Tariff Currency shall contain the following elements:

- Current Tariff Currency (optional), see B.2.4.1.1.1, and
- Tariff Switch Currency (optional), see B.2.4.1.1.2

##### B.2.4.1.1.1 Current Tariff Currency

The Current Tariff Currency shall be coded as Communication Charge Currency type, see B.3.2.5.

##### B.2.4.1.1.2 Tariff Switch Currency

The Tariff Switch Currency shall be coded as Tariff Switch Currency type, see B.2.4.1.1.2.1.

###### B.2.4.1.1.2.1 Tariff Switch Currency

Tariff Switch Currency shall contain the following elements:

- Next Tariff Currency, see B.2.4.1.1.2.1.1, and
- Tariff Switchover Time, see B.2.4.1.1.2.1.2

###### B.2.4.1.1.2.1.1 Next Tariff Currency

Next Tariff Currency shall be coded as Tariff Currency Format type, see B.2.4.1.1.2.1.1.1.

###### B.2.4.1.1.2.1.1.1 Tariff Currency Format type

The Tariff Currency Format type shall contain the following elements:

- Communication Charge Sequence Currency (optional), see B.3.2.5, and

- Tariff Control Indicators, see B.3.2.6, and
- Call Attempt Charge Currency (optional), see B.3.2.7, and,
- Call Setup Charge Currency (optional), see B.3.2.8

#### B.2.4.1.1.2.1.1.1 Communication Charge Sequence Currency

The communication charge sequence currency is a direct charge in currency per time unit. Only one fixed time unit is used. This time unit has to be agreed between all cooperating networks, e.g. one second. Being fixed, the time unit is not transferred.

The Communication Charge Sequence Currency shall contain a sequence with 1 up to 4 elements coded as Communication Charge Currency, see B.3.2.5.

#### B.2.4.1.1.2.1.2 Tariff Switchover Time

Tariff Switchover Time shall be coded as Tariff Switchover Time type, see B.3.2.6

#### B.2.4.1.2 Tariff Pulse

The Tariff Pulse shall contain the following elements:

- Current Tariff Pulse (optional), see B.2.4.1.2.1, and
- Tariff Switch Pulse (optional), see B.2.4.1.2.2.

##### B.2.4.1.2.1 Current Tariff Pulse

Current Tariff Pulse shall be coded as Tariff Pulse Format type, see B.3.2.11.

##### B.2.4.1.2.2 Tariff Switch Pulse

Tariff Switch Pulse shall be coded as Tariff Switch Pulse type, see B.2.4.1.2.2.1

###### B.2.4.1.2.2.1 Tariff Switch Pulse Type

The Tariff Switch Pulse type shall contain the following elements:

- Next Tariff Pulse, see B.2.4.1.2.2.1.1, and
- Tariff Switchover Time, see B.2.4.1.2.2.1.2.

###### B.2.4.1.2.2.1.1 Next Tariff Pulse

Next Tariff Pulse shall be coded as Tariff Pulse Format type, see B.3.2.11, and

###### B.2.4.1.2.2.1.2 Tariff Switchover Time

Tariff Switchover Time shall be coded as Tariff Switchover Time type, see B.3.2.9

## B.3 Common information elements/types

### B.3.1 Identification

#### B.3.1.1 Origination Identification

The Origination Identification shall be expressed as Charging Reference Identification, see B.3.1.3.

#### B.3.1.2 Destination Identification

The Destination Identification shall be expressed as Charging Reference Identification, see B.3.1.3.

#### B.3.1.3 Charging Reference Identification

Charging Reference Identification shall contain the following elements:

- Network Identification, see B.3.1.4, and
- Reference ID, see B.3.1.5

#### B.3.1.4 Network Identification

For the Network Identification the following structure of the Network Identification values shall be used:

-- {itu-t (0) administration (2) <national regulation authority> (x) network (y) element identification (z)}

-- The value for x is the value of the national regulation authority, the value for y is under the control of the national regulation authority concerned, the value for z is under the control of the network concerned.

#### B.3.1.5 Reference ID

The Reference ID element shall have INTEGER values from 0..4294967295 (maximum value  $2^{32} - 1$ )

#### B.3.1.6 Network Operators

Network Operators shall be coded as Network Identification, see B.3.1.4

### B.3.2 Charging

#### B.3.2.1 Charging Control Indicators

The Charging Control Indicators shall contain 1 up to 8 bit-strings with the following elements:

- Subscriber Charge, see B.3.2.1.1, and
- Immediate Change Of Actually Applied Tariff, see B.3.2.1.2, and
- Delay Until Start, see B.3.2.1.3, and

#### B.3.2.1.1 Subscriber Charge

The Subscriber Charge element shall be coded as follows:

- 0 - advice-of-charge: charging information only to be used by the advice of charge service.
- 1 - subscriber-charge: charging information to be used by the subscriber charging program.

#### B.3.2.1.2 Immediate Change Of Actually Applied Tariff

The Immediate Change Of Actually Applied Tariff element shall be coded as follows:

- 0 - immediate tariff change without restart
- 1 - immediate tariff change with restart

It is only used to change the actually applied tariff.

#### B.3.2.1.3 Delay Until Start

The Delay Until Start element shall be coded as follows:

- 0 - start tariffing, if it is not already started, without waiting for the 'start' signal
- 1 - delay start of tariffing up to the receipt of the 'start' signal

#### B.3.2.2 Currency

The currency element shall be coded according to ISO 4217.

#### B.3.2.3 Currency Factor Scale

The charge amount is indicated by the currency factor multiplied with the currency scale. "no charge" indicates Currency Factor Scale has the value 0.

Currency Factor Scale shall contain the following elements:

- Currency Factor, see B.3.2.3.1, and
- Currency Scale, see B.3.2.3.2

##### B.3.2.3.1 Currency Factor

The Currency Factor shall have INTEGER values from 0 to 999999. Value 0 indicates "no charge" and is the default-value.

#### B.3.2.3.2 Currency Scale

The Currency Scale shall have INTEGER values from -7 to 3. The actual value for Currency Scale is given by  $10^x$ , where x is the value of the Currency Scale. The default value is 'no Scale'.

The coding of CurrencyScale is as follows, all other values are spare:

-- -7 (249): 0,0000001

-- -6 (250): 0,000001

-- -5 (251): 0,00001

-- -4 (252): 0,0001

-- -3 (253): 0,001

-- -2 (254): 0,01

-- -1 (255): 0,1

-- 0 : 1

-- 1 : 10

-- 2 : 100

-- 3 : 1000

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#### B.3.2.4 Pulse Units type

Pulse Units is binary coded and has the value range from 0 to 255

#### B.3.2.5 Communication Charge Currency type

Communication Charge Currency shall contain the following elements:

- Currency Factor Scale, see B.3.2.3, and
- Tariff Duration, see B.3.2.5.1, and
- Sub Tariff Control, see B.3.2.5.2

##### B.3.2.5.1 Tariff Duration

Tariff Duration shall be coded as Tariff Duration type, see B.3.2.12, and

##### B.3.2.5.2 Sub Tariff Control

Sub Tariff Control shall be coded as Sub Tariff Control type, see B.3.2.13.

#### B.3.2.6 Tariff Control Indicators

The Tariff Control Indicators shall contain a bit-string of 1 up to 8 non-cyclic Tariff elements.

The coding of the non-cyclic Tariff is as follows:

- 0: Cyclic tariff ( at expiration of the tariff duration of the last communication tariff of the communication charge sequence, the communication charge sequence is re-applied)
- 1: Non-cyclic tariff ( at expiration of the tariff duration of the last communication tariff of the communication charge sequence, do not re-apply the communication charge sequence)

### B.3.2.7 Call Attempt Charge Currency

The call attempt charge is a direct charge, to be charged only for unsuccessful calls.

The Call Attempt Charge Currency shall be coded as Currency Factor Scale, see B.3.2.3.

### B.3.2.8 Call Setup Charge Currency

The call set-up charge is a direct charge, to be charged once at start of charging.

The Call Setup Charge Currency shall be coded as Currency Factor Scale, see B.3.2.3.

### B.3.2.9 Tariff Switchover Time type

This time is the absolute time at which the next tariff has to become active. It is represented in steps of 15 minutes.

The Tariff Switchover Time shall be coded as:

- 0 : spare
- 1 : 0 hour 15 minutes
- 2 : 0 hour 30 minutes
- 3 : 0 hour 45 minutes
- 4 : 1 hour 0 minutes
- ..
- 96 : 24 hours 0 minutes
- 97-255 : spare

### B.3.2.10 Communication Charge Pulse type

Communication Charge Pulse shall contain the following elements:

- Pulse Units, see B.3.2.10.1, and
- Charge Unit Time Interval, see B.3.2.10.2, and
- Tariff Duration, see B.3.2.10.3

#### B.3.2.10.1 Pulse Units

Pulse Units shall be coded as Pulse Units type, see B.3.2.4.

### B.3.2.10.2 Charge Unit Time Interval

Charge Unit Time Interval shall be coded as Charge Unit Time Interval type, see B.3.2.14.

### B.3.2.10.3 Tariff Duration

Tariff Duration shall be coded as Tariff Duration type, see B.3.2.12.

### B.3.2.11 Tariff Pulse Format type

Tariff Pulse Format shall contain the following elements:

- Communication Charge Sequence Pulse (optional), see B.3.2.11.1, and
- Tariff Control Indicators, see B.3.2.6, and
- Call Attempt Charge Pulse (optional), see B.3.2.11.2, and
- Call Setup Charge Pulse (optional), see B.3.2.11.3

The communication charges are meter-pulse units, which are to be applied per charge unit time interval. The call attempt pulse units are to be charged only for unsuccessful calls. The call set-up pulse units are to be charged once at start of charging.

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#### B.3.2.11.1 Communication Charge Sequence Pulse

The Communication Charge Sequence Pulse shall contain a sequence of 1 up to 4 elements coded as Communication Charge Pulse, see B.3.2.10.

#### B.3.2.11.2 Call Attempt Charge Pulse

Call Attempt Charge Pulse shall be coded as Pulse Units, see B.3.2.4,

#### B.3.2.11.3 Call Setup Charge Pulse

Call Setup Charge Pulse shall be coded as Pulse Units, see B.3.2.4

### B.3.2.12 Tariff Duration Type

The duration indicates for how long time the communication charge component is valid. Expiration of the tariff duration timer leads to the activation of the next communication charge (if present). In the case where there is no next communication charge in the communication charge sequence, the action to be performed is indicated by the Tariff Control Indicators.

Tariff Duration shall have a INTEGER values form 0 to 36000.

Tariff Duration identifies with 0 unlimited duration and else in seconds unit.

- 0 = unlimited
- 1 = 1 second
- 2 = 2 seconds
- ...
- 36000 = 10 hours

### B.3.2.13 Sub Tariff Control type

Sub Tariff Control shall contain 1 up to 8 One Time Charge elements. The coding of the One Time Charge element is as follows:

- 0 – Periodic charge
- 1 – One time charge

### B.3.2.14 Charge Unit Time Interval type

The Charge Unit Time Interval is binary coded and has the value range from 0 to 35997. It begins with 200 milliseconds and then in steps of 50 milliseconds.

- the LSBit is the least significant bit of the first octet
- the MSBit is the most significant bit of the last octet
- the coding of the ChargeUnitTimeInterval is the following:
  - 0 : no periodic metering
  - 1 : 200 msec
  - 2 : 250 msec
  - ..
  - 35997 : 30 minutes
- All other values are spare.

## Annex <C> (normative)

### SIP Transfer of Charging Information XML Schema under discussion:

```

<?xml version="1.0" encoding="UTF-8"?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns="http://uri.etsi.org/ngn/params/xml/simservs/sci"
targetNamespace="http://uri.etsi.org/ngn/params/xml/simservs/sci" elementFormDefault="qualified">

  <xs:annotation>
    <xs:documentation>XML Schema Definition for the NNI AOC information</xs:documentation>
  </xs:annotation>

  <!--Definition of simple types-->

  <xs:simpleType name="bitType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-1]"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="EightBitType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1]"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="SixteenBitType">
    <xs:restriction base="xs:string">
      <xs:pattern value="[0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1][0-1]"/>
    </xs:restriction>
  </xs:simpleType>

  <xs:simpleType name="NetworkIdType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="0"/>
      <xs:enumeration value="2"/>
      <xs:enumeration value="x"/>
      <xs:enumeration value="y"/>
      <xs:enumeration value="z"/>
    </xs:restriction>

```

```

</xs:simpleType>
<xs:simpleType name="CurrencyType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="EUR"/>
    <xs:enumeration value="USD"/>
    <!--The currency shall be coded according to ISO 4217-->
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="CurrencyFactorType">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="999999"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="CurrencyScaleType">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="-7"/>
    <xs:maxInclusive value="3"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TariffDurationType">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="36000"/>
  </xs:restriction>
</xs:simpleType>
<!--Definition of complex types-->
<xs:complexType name="TariffSwitchPulseType">
  <xs:sequence>
    <xs:element name="nextTariffPulse" type="TariffPulseFormatType"/>
    <xs:element name="tariffSwitchOverTime" type="EightBitType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CommunicationChargePulseType">
  <xs:sequence>

```

```

<xs:element name="pulseUnits" type="EightBitType"/>
<xs:element name="chargeUnitTimeInterval" type="SixteenBitType"/>
<xs:element name="tariffDuration" type="TariffDurationType"/>
</xs:sequence>
</xs:complexType>
<xs:complexType name="TariffPulseFormatType">
  <xs:sequence>
    <xs:element name="communicationChargeSequencePulse" type="CommunicationChargePulseType"/>
    <xs:element name="tariffControlIndicators" type="bitType"/>
    <xs:element name="callAttemptChargePulse" type="EightBitType"/>
    <xs:element name="callSetupChargePulse" type="EightBitType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="CommunicationChargeCurrencyType">
  <xs:sequence>
    <xs:element name="currencyFactorScale" type="CurrencyFactorScaleType"/>
    <xs:element name="tariffDuration" type="TariffDurationType"/>
    <xs:element name="subTariffControl" type="bitType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffSwitchCurrencyType">
  <xs:sequence>
    <xs:element name="nextTariffCurrency" type="TariffCurrencyFormatType"/>
    <xs:element name="tariffSwitchOverTime" type="EightBitType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffCurrencyFormatType">
  <xs:sequence>
    <xs:element name="communicationChargeSequenceCurrency"
type="CommunicationChargeCurrencyType"/>
    <xs:element name="tariffControlIndicators" type="bitType"/>
    <xs:element name="callAttemptChargeCurrency" type="CurrencyScaleType"/>
    <xs:element name="callSetupChargeCurrency" type="CurrencyScaleType"/>
  </xs:sequence>
</xs:complexType>

```

```

<xs:complexType name="CurrencyFactorScaleType">
  <xs:sequence>
    <xs:element name="currencyFactor" type="CurrencyFactorType"/>
    <xs:element name="currencyScale" type="CurrencyScaleType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffPulseType">
  <xs:sequence>
    <xs:element name="currentTariffPulse" type="TariffPulseFormatType"/>
    <xs:element name="tariffSwitchPulse" type="TariffSwitchPulseType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="TariffCurrencyType">
  <xs:sequence>
    <xs:element name="currentTariffCurrency" type="TariffCurrencyFormatType"/>
    <xs:element name="tariffSwitchCurrency" type="TariffSwitchCurrencyType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ChargingControlIndicatorsType">
  <xs:sequence>
    <xs:element name="subscriberCharge" type="bitType"/>
    <xs:element name="immediateChangeOfActuallyAppliedTariff" type="bitType"/>
    <xs:element name="delayUntilStart" type="bitType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="NetworkIdentificationType">
  <xs:sequence>
    <xs:element name="networkIdentification" type="NetworkIdType"/>
    <xs:element name="referenceID" type="xs:nonNegativeInteger"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ChargingReferenceIdentificationType">
  <xs:sequence>
    <xs:element name="networkIdentification" type="NetworkIdentificationType"/>
    <xs:element name="referenceID" type="xs:nonNegativeInteger"/>
  </xs:sequence>

```

```

</xs:sequence>
</xs:complexType>
<xs:complexType name="ChargingTariffInformationType">
  <xs:sequence>
    <xs:element name="chargingControlIndicators" type="ChargingControlIndicatorsType"/>
    <xs:element name="chargingTariff">
      <xs:complexType>
        <xs:choice>
          <xs:element name="tariffCurrency" type="TariffCurrencyType"/>
          <xs:element name="tariffPulse" type="TariffPulseType"/>
        </xs:choice>
      </xs:complexType>
    </xs:element>
    <xs:element name="originationIdentification" type="ChargingReferenceIdentificationType"/>
    <xs:element name="destinationIdentification" type="ChargingReferenceIdentificationType"/>
    <xs:element name="currency" type="CurrencyType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="AddOnChargingInformationType">
  <xs:sequence>
    <xs:element name="chargingControlIndicators" type="ChargingControlIndicatorsType"/>
    <xs:element name="addOnCharge">
      <xs:complexType>
        <xs:choice>
          <xs:element name="addOnChargeCurrency" type="CurrencyFactorScaleType"/>
          <xs:element name="addOnChargePulse" type="EightBitType"/>
        </xs:choice>
      </xs:complexType>
    </xs:element>
    <xs:element name="originationIdentification" type="ChargingReferenceIdentificationType"/>
    <xs:element name="destinationIdentification" type="ChargingReferenceIdentificationType"/>
    <xs:element name="currency" type="CurrencyType"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="ChargingAcknowledgmentInformationType">

```

```
<xs:sequence>
  <xs:element name="acknowledgementIndicators" type="bitType"/>
  <xs:element name="originationIdentification" type="ChargingReferenceIdentificationType"/>
  <xs:element name="destinationIdentification" type="ChargingReferenceIdentificationType"/>
</xs:sequence>
</xs:complexType>
<!--Definition of document structure-->
<xs:element name="messageType">
  <xs:complexType>
    <xs:choice>
      <xs:element name="crgt" type="ChargingTariffInformationType"/>
      <xs:element name="aocrg" type="AddOnChargingInformationType"/>
      <xs:element name="crga" type="ChargingAcknowledgmentInformationType"/>
    </xs:choice>
  </xs:complexType>
</xs:element>
</xs:schema>
```

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## Annex <N> (informative): Bibliography

*As Technical Reports are by definition informative deliverable, all the references are mentioned in clause 2 (see clause 12.1 of EDRs).*

**Draft**

## History

<b>Document history</b>		
<Version>	<Date>	<Milestone>
V0.0.1	March 2007	1 <sup>st</sup> input, skeleton draft with scope, introduction and general description
V0.0.2	March 2007	Output TISPAN#13bis
V0.0.3	May 2007	Input TISPAN#13ter
V0.0.4	May 2007	Output TISPAN#13ter
V0.0.5	June 2007	Output TISPAN#14bis
V0.0.6	September 2007	Output TISPAN#14ter

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