

Finnish profile for SIP tariff interworking

Recommendation 217/2026 S



Revision History

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2.0	30.6.2025	Finnish profile for SIP tariff interworking	Liikenne- ja viestintävirasto
2.1	22.1.2026	More signalling flow examples added in 9.1	Liikenne- ja viestintävirasto

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1 About this document

This document describes conventions to be used within SIP tariff transfer between service providers in Finnish environment. This document does not describe how the tariff information is generated or how it is handled within service provider networks, outside of what is necessary to accomplish network interoperability. The SIP tariff transfer described in this recommendation is not intended to be used in SIP-I based interconnection.

Aspects not covered in this document or given reference can be agreed based on bilateral operator agreement.

SIP defined in RFC 3261 and SIP INFO method defined in RFC 6086 section 4 MUST be supported.

2 Introduction

Tariff information transfer over SIP described in this document is defined in 3GPP specification TS 29.658 V18.0.0. This can be used to send information about the price of an ongoing call between two SIP network elements, as ISUP MPM messages have been used in Finnish ISUP networks. SIP INFO message, SIP 200 OK response to INVITE and SIP 1xx provisional responses with XML payload MUST be supported for this purpose. In this document these are generally referred to as SIP tariff message.

The network element that defines and sends the tariff information is referred to as CDP, Charge Determination Point, and the network element that receives and applies the information is referred to as CGP, Charge Generation Point.

There are generally two possible charging methods that can be indicated with SIP tariff:

- Time based charging can be used to indicate the price of call per time unit.
- Onetime charge can be used to indicate the price of a call or a transaction during call.

3 Terminology and definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [RFC 2119].

SIP	Session Initiation Protocol
XML	eXtensible Markup Language
CDP	Charge Determination Point
CGP	Charge Generation Point
ISUP	ISDN User Part
CRGT	ChaRGe Tariff information
AOCRG	Add-On ChaRGe information
CRG	ISUP ChaRGe message
MPM	Metering Pulse Message
CDR	Call Data Record

4 General requirements

The monetary format as described in 3GPP TS 29.658 V18.0.0 MUST be used.

Non-Monetary format is not used.

5 XML parameters

XML schema is shown in annex C of 3GPP TS 29.658 V18.0.0. Operators MUST follow the XML schema on both CDP and CGP.

Below are listed the key parameters and mandatory or recommended parameter values for these. The XML schema includes other parameters in addition to the ones listed below, and they can be used if necessary.

5.1 Key parameters and parameter values

XML version 1.0 and encoding UTF-8 MUST be used.

5.1.1 Message type

Message type is either Crgt OR Aocrg.

Crgt

Crgt MUST be used to indicate time based charging, starting time unit based charging and/or call setup charge. Crgt can be sent at any time during a call.

Aocrg

Aocrg MUST be used to indicate additional onetime charges during call. Aocrg can be sent at any time during a call. At least one crgt message MUST be sent before aocrg message can be sent.

5.1.2 Identification

Network identification and Reference Id MUST be used.

Network Identification

Network Identification MUST be used to indicate the operator and network element generating the tariff information. Format is a national specification and it is constructed as follows: 02 + 358 (country code) + 4 digit operator code of the operator that creates the XML data. With operator codes shorter than 4 digits, the first digits are set as zero (0). Operator code digits may contain numbers 0-9 and letters A-F. ITU-T X.121 or X.660 formats as specified in 3GPP TS 29.658 specification are not used.

Example of Network Identification value for an operator with operator code 54: 023580054

CGP MUST accept any value of Network Identification that does not conflict with 3GPP TS 29.658.

Reference Id

Reference Id MAY be used to indicate the call or tariff case. Format is integer, from 0 to 4 294 967 295.

5.1.3 Currency

EUR MUST be used. Tariff in CRGT or AOCRG messages is without taxes (VAT is 0%).

5.2 Charging principles

One of the tariff scenarios below can be sent at start of the Call:

- Call setup charge (Case 3)
- Call setup charge + time-based charging (Case 3 + Case 1)
- Call setup charge + Charging per starting time unit (Case 3 + Case2)
- Time based charging (Case 1)
- Charging per starting time unit (Case 2)

New Tariff scenarios that MAY be defined and sent several times during the call session:

- New time based charging (Case 1)
- New Charging per starting time unit (Case2)
- Additional Charge during call (Case 4)

In case no tariff scenario has been sent during the call session, zero tariff MUST be sent before Additional Charge (CRGT MUST be sent before AOCRG)

Tariff can be set to zero in beginning or in the middle of the call.

In case of Call queuing:

- In the beginning of the call session / queuing, time-based charging with CRGT (Case 1) MAY be sent with tariff info 0 €
- In beginning of service a time-based tariff with CRGT (Case 1) and/or service setup price (Additional Charge during call tariff) with AOCRG (Case 4) SHALL be sent
- CRGT and AOCRG SHOULD be sent in two different SIP:INFO messages

5.3 Parameters and parameter values based on the tariff case:

Parameters and parameters values for four basic charging cases are described below. These cases SHOULD be supported by all CDP and CGP elements. In addition to these, other charging cases can be supported if necessary.

5.3.1 Case 1 - Time based Charging

This case is used to indicate a time based charge that is given per time unit of a call. According to 3GPP TS 29.658 time based charging MUST be indicated per one second, since the time unit information can't be indicated in SIP tariff message. This means that a calculation must be made to convert the listed price, for example euros per minute, to euros per second. Crgt message type MUST be used.

Mandatory parameters and parameter values are:

Communication Charge Sequence Currency

Currency Factor

Integer from 0 to 999 999

Currency Scale

Integer from -7 (0,0000001) to 3 (1000)

Tariff Duration

Integer from 0 to 36 000, unit seconds. Value 0 MUST be used to indicate unlimited duration, so the given tariff applies for the whole duration of the call or until next tariff message overrides it.

Sub Tariff Control

Value 0 MUST be used to indicate periodic charge. This means that the charge is evenly distributed during the whole Tariff Duration.

Tariff Control Indicators

Value 1 MUST be used to indicate non-cyclic tariff. This means that the tariff is not reapplied after Tariff Duration.

5.3.2 Case 2 Charging per starting time unit

This case is used to indicate a time unit based charge that is given per every starting time unit of a call, for example one minute i.e. 60 seconds. Crgt message type MUST be used.

Mandatory parameters and parameter values are:

Communication Charge Sequence Currency

Currency Factor

Integer from 0 to 999 999

Currency Scale

Integer from -7 (0,0000001) to 3 (1000)

Tariff Duration

Integer from 0 to 36 000, unit seconds. For example value 60 is used to indicate that the current tariff is applied for 60 seconds.

Sub Tariff Control

Value 1 MUST be used to indicate onetime charge per starting time unit. This means that the charge is applied in whole at the beginning of every tariff cycle.

Tariff Control Indicators

Value 0 MUST be used to indicate cyclic tariff. This means that the same tariff case is reapplied after Tariff Duration time, for example 60 seconds

5.3.3 Case 3 - Call Setup Charge

This case is used to indicate a onetime charge given at the start of a call. Start signal in this case is the 200 OK response to INVITE. Call Setup Charge can only be given once for one call. Because of that, Call Setup Charge MUST NOT be indicated in subsequent SIP tariff messages, if several SIP tariff messages are sent during one call. Crgt message type MUST be used.

Mandatory parameters and parameter values are:

Call Setup Charge Currency

Call Setup Charge Currency is used to indicate a charge in euros to be applied at the start of call. It MUST contain the following elements:

Currency Factor

Integer from 0 to 999 999

Currency Scale

Integer from -7 (0,0000001) to 3 (1000)

5.3.4 Case 4 - Additional Charge during call

This case is used to indicate additional charges given during a call. Aocrg message type MUST be used. At least one crgt message MUST be sent before aocrg message can be sent. This means that crgt with value 0 SHOULD be sent when start of the call is free of charge. Several aocrg messages can be sent during one call.

Mandatory parameters and parameter values are:

Add On Charge Currency

Add On Charge Currency is used to indicate additional charge in euros to be applied any time during a call. It MUST contain the following elements:

Currency Factor

Integer from 0 to 999 999

Currency Scale

Integer from -7 (0,0000001) to 3 (1000)

5.4 Other parameters:

These parameters can be used to indicate special handling of tariff information.

Optional parameters and parameter values are:

Immediate Change Of Actually Applied Tariff

Value 1 MUST be used to indicate that a new tariff is immediately applied. This is valid for subsequent tariff indications, where the new tariff information needs to immediately override any previous tariff information.

Delay Until Start

Can be used to indicate whether charging is started immediately (value 0) or after start signal (value 1). Start signal in this case is the 200 OK response to INVITE. If the tariff information is sent in INFO or SIP 200 OK message, this SHOULD be set to 1. If the tariff information is sent in 1xx provisional response, this MUST be set to 1.

6 Guidelines for CDP

6.1 Time based charging

When using time based charging (Communication Charge Sequence), CurrencyFactorScale value MUST be euros (EUR) per one second.

When using time based charging, CurrencyScale value SHOULD be chosen so that CurrencyFactor has a minimum of 4 Digits. In subsequent SIP tariff messages CurrencyFactor value zero (0) can be used to indicate, that the price is set from a value larger than zero to zero.

It is RECOMMENDED to use CurrencyScale value -7, to ensure smallest possible rounding error on backwards calculation in CGP.

Example 1 - Price of call is 0,08 euros per minute

0,08 €/min = 0,0013333 €/sec Equals to:

CurrencyFactor 13333

CurrencyScale -7 (0,0000001)

Rounded result after backwards calculation:

$13333 \times 0,0000001 \times 60 = 0,079998$ (€/min)

Example 2 - Price of call is 2,39 euros per minute

2,39 €/min = 0,0398333 €/sec Equals to:

CurrencyFactor 398333

CurrencyScale -7 (0,0000001)

Rounded result after backwards calculation:

$398333 \times 0,0000001 \times 60 = 2,389998$ (€/min)

6.2 Onetime charge

When using onetime charge (Call Setup Charge or Additional Charge), the CurrencyFactorScale MUST be Euros.

It is RECOMMENDED to use CurrencyScale value -7, to ensure smallest possible rounding error in backwards calculation on CGP.

6.3 General guidelines

CDP MUST ensure that SIP INFO message containing the tariff XML payload will not be sent before the call has been answered with 200 OK response message to INVITE. Tariff XML payload can also be sent in 200 OK response to INVITE. If tariff information needs to be sent before call is answered, it is done by using SIP 1xx message containing tariff XML payload. When 1xx message is used for this purpose, reliability of provisional response MUST be ensured using 100rel / PRACK method.

However, it must be noted that there is a different specification for handling of SIP INFO messages in RFC 6086 and 3GPP specification 29.658. RFC 6086 says "INFO messages are always part of, and share the fate of, an invite dialog usage". This means that INFO message can be sent any time after SIP dialog has been started with SIP INVITE message. On the other hand 3GPP 29.658 says on sections 4.4.2 and 4.4.3 that SIP INFO message can be used "after start of charging".

In Finnish networks the charging is started only after the INVITE has been answered with SIP 200 OK message. According to 3GPP 29.658 before start of charging SIP tariff information may be sent "in the content body of a reliable 1xx provisional response, or in the content body of a 200 OK".

If a 200 OK reply for SIP INFO tariff message, ACK response for 200 OK tariff message or PRACK response for 1XX tariff message is not received, the call MAY be released. Methods and timers defined in SIP protocol specification can be used for retransmission and monitoring of SIP INFO, 1xx and 200 OK messages.

In the case of free queuing or similar delay before start of charging, the CDP MUST NOT send tariff messages before the tariff is applied, unless there is a specific need to send zero price tariff message. In other words, CDP is always responsible for free queuing or other delays before start of charging.

Several crgt messages can be sent during call. The information in the latest crgt message is applied and it overrides information indicated in previous crgt messages, starting from the time the new information is received.

During a call at least one crgt message MUST be sent before any aocrg messages are sent. Several aocrg messages can be sent during one call.

7 Guidelines for CGP

If no Tariff message is received, no additional tariff is applied. Local and mobile network tariffs are applied normally.

SIP INFO message containing the tariff XML payload MUST be responded with 200 OK message.

When receiving call setup charge and time based charge in same SIP tariff message, the call setup charge MUST be applied before the time based charge is applied.

8 Conversion between SIP tariff and ISUP MPM messages

8.1 General guidelines

Operators MUST fulfill requirements of Regulation 31.

It can be bilaterally agreed how to handle error situations where for example the SIP tariff information sent by CDP is not accepted by CGP.

The CGP can include SIP Warning header as defined in RFC 3261 to the 200 OK response of SIP INFO tariff message. All operators MUST accept the Warning header in 200 OK message. Warning code 399 and warning text clearly indicating the cause and/or result of the warning can be used.

Information on fault situations can be logged according to guidelines regulating the logging on traffic data.

8.2 Conversion between SIP tariff and ISUP MPM

SIP tariff based charging in telephony networks does not affect the specifications or conventions concerning the ISUP MPM based charging. However,

as long as both ISUP MPM based charging and SIP tariff based charging co-exist in telephony networks, the conversion between SIP tariff information and ISUP MPM information is required.

8.3 Guidelines for CDP in case of conversion

The charge indicated by ISUP MPM messages is always the multiple of the price of a metering pulse (0,0673 €, 0% VAT). Even though the call prices are a commercial decision that every operator and/or service provider can make, as long as both SIP and ISUP based charging can be used in the same call, it is RECOMMENDED that the charges indicated by SIP tariff message are defined so that the rounding error to the charge indicated by MPM messages is as small as possible.

The information about the used VAT percentage can't be indicated in SIP tariff message. Because of this the charge indicated by SIP tariff MUST be with 0% VAT.

The 3GPP specification on SIP tariff handling gives a possibility to apply very high prices on calls, and therefore operators MAY apply filters that limit the maximum price that is applied. Price limits for individual can be defined on bilateral traffic agreements between operators.

8.4 Guidelines for CGP in case of conversion

When converting the SIP tariff information to ISUP MPM messages, the price of a metering pulse needs to be set in CGP.

When using time based charging with ISUP MPM messages, there are two possibilities for timing of the first MPM message. The first message can be sent either immediately at the beginning of call, or it can be sent at a random time between beginning of call and the calculated MPM message period. The latter method is referred to as "Karlsson method". It is recommended that the default method on CGP for sending first ISUP MPM message is "Karlsson". If the first ISUP MPM message needs to be sent at the beginning of call, it can be indicated in SIP tariff message using the method described in 5.3.2. Tariff duration can be set to wanted ISUP MPM message period.

When doing the backwards calculation of the charge indicated by currency-Factor and currencyScale to generate ISUP MPM messages, the CGP MUST ensure that the price applied is never higher than the price indicated in SIP tariff message. When converting the received tariff information to ISUP MPs (CRG messages), this means the following:

- In time based charging, the CGP MUST round the calculated time interval between consecutive ISUP CRG messages up.

- In charging per starting time unit, call setup charge or additional charge, the CGP MUST round the calculated number of MPs down.

Pricing errors between SIP tariff and ISUP MPM may cause inaccuracy in clearing between operators. How to handle this inaccuracy can be agreed bilaterally between operators when taking the 3GPP tariff in use.

8.5 Conversion from ISUP MPM to SIP tariff

There is a schematic difference in the method how the charging information is indicated with SIP tariff and how it is indicated with ISUP MPM. The SIP tariff information for call setup charge and time based charging can be given in a single SIP tariff message for the whole duration of the call. On ISUP the charge information is based on the cumulated number of MPM messages during call and the price of a call can be reliably calculated only after the call has ended.

Because of this, the conversion from ISUP MPM to SIP tariff can be reliably done only by using aocrg messages, where each ISUP MPM message should immediately result in a corresponding aocrg message on SIP side. The price indicated in aocrg message MUST be the price of a metering pulse multiplied with the number of metering pulses in ISUP MPM message. Here it also needs to be noticed that according to 3GPP SIP tariff specification no aocrg message can be sent during call unless at least one crgt message has been sent.

Another possible method to transfer call pricing information in SIP networks is to use MPM messages over SIP-I. The decision on using either 3GPP tariff or SIP-I can be done bilaterally between operators.

8.6 CDR considerations

Below are listed the 3GPP tariff and SIP parameters that can have influence on the call pricing and on how the tariff is applied. Operators can collect and apply this information as they see necessary.

Time of SIP tariff indication (when the SIP INFO message is sent or received). If several INFO messages are sent during the same call, each INFO message should be noted separately

Call-id header value of the SIP tariff message

Network identification

Time based charge indicated by communicationChargeSequenceCurrency, including the possible cyclic and subtariffs.

Tariff duration

Call Setup Charge

Add On Charge

Delay Until Start

Contents of Warning header from 200 OK reply to SIP tariff INFO message

8.7 Intermediate parties and SIP tariff

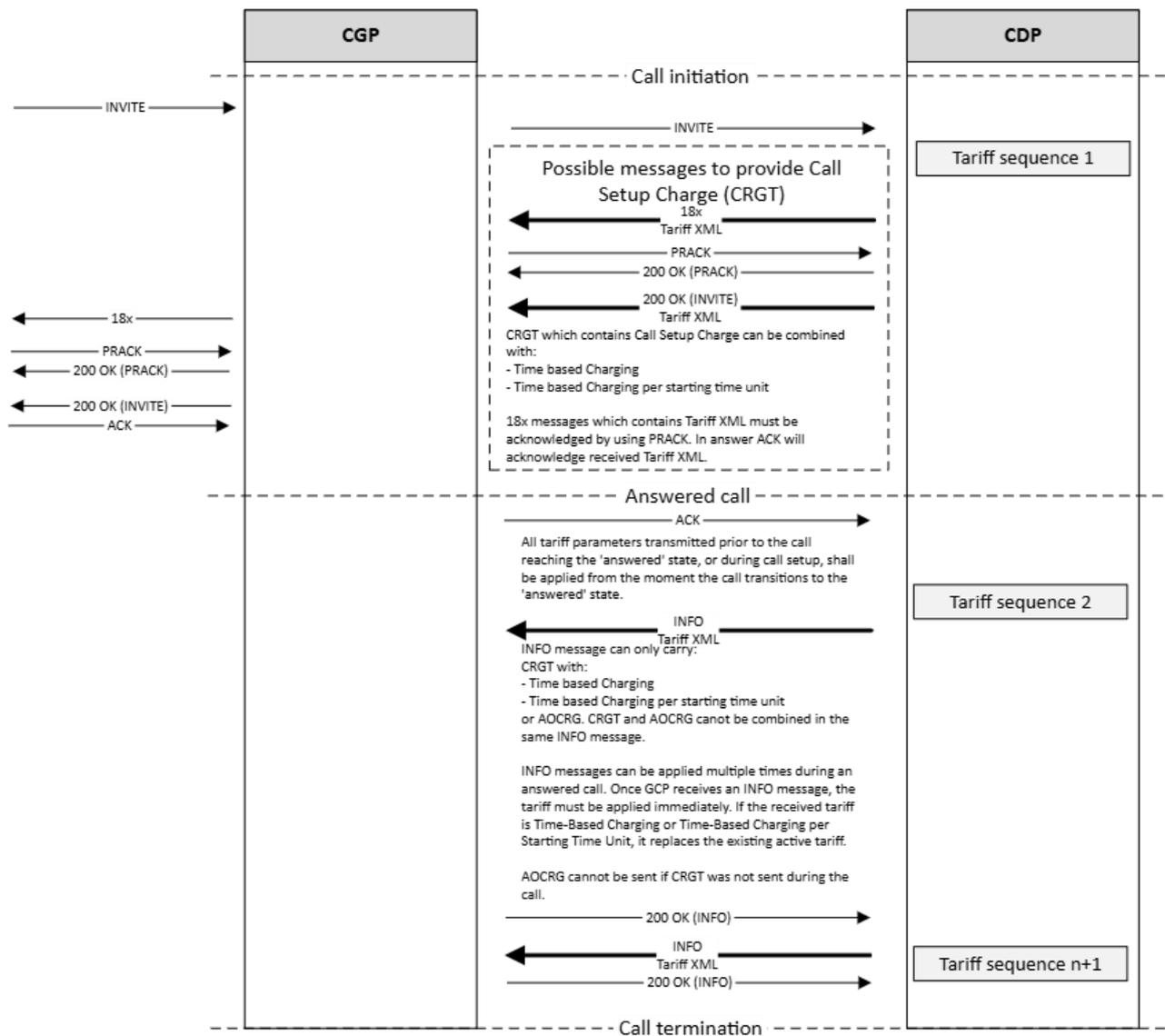
If the tariff information is transferred via several operators, SIP tariff messages can be terminated and recreated by any operator included. This gives the transit operators the possibility to modify the tariff information and for example include their own additional fees.

If the tariff information is modified, the modifying party **MUST** replace the Network identification of the SIP tariff message with their own identification information.

9 Signalling flow and XML examples

9.1 SIP signalling flow examples

Note! These traffic examples contain only mandatory message flows to perform Tariff XML charging but do not contain all mandatory message flows of a full call. It should be noted that 181 Call is Being Forwarded message can not be used to indicate tariff.

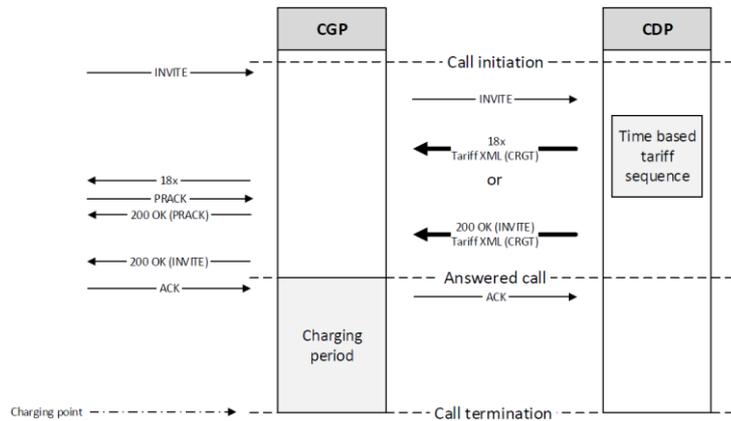


For 18x and 200 OK (INVITE) responses, the UAC MUST send an ACK as defined in [RFC 3261]. For INFO requests, the receiving node MUST respond with 200 OK upon successful receipt and processing.

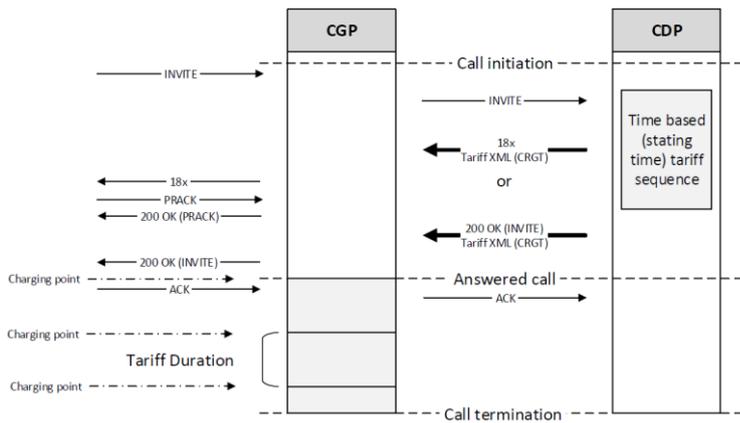
If acknowledgment is not received within the retransmission interval defined by SIP timers, the sender SHOULD retransmit the original message according to SIP transaction rules.

If acknowledgment is not received after the maximum retransmission attempts, the sender MUST terminate the transaction.

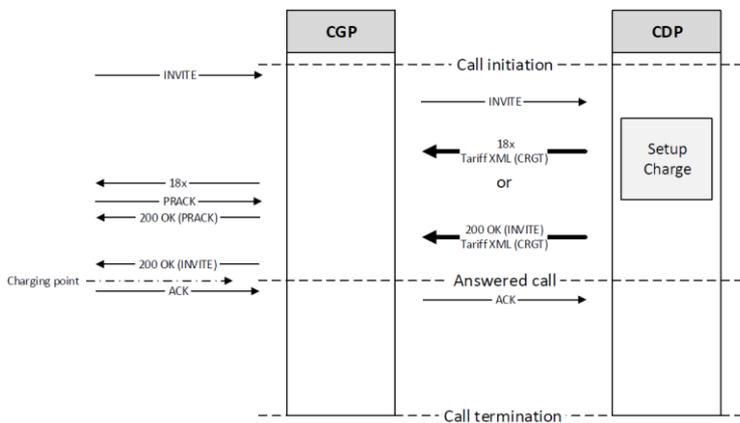
1. Time based charging is active from the beginning of the call until its termination:



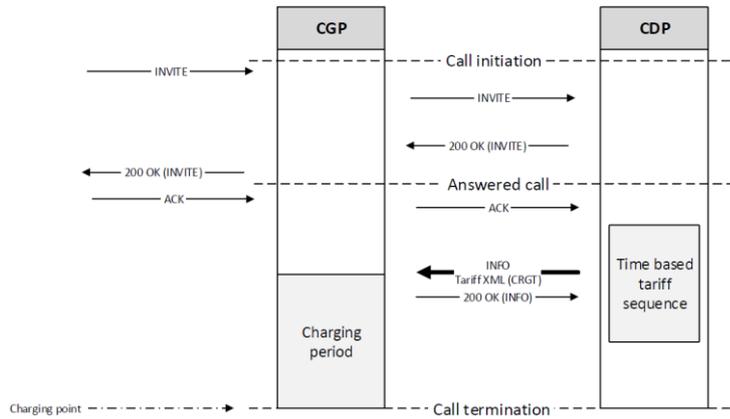
2. Time based charging per starting time unit is calculated at the start of each time interval. If the call is terminated during an ongoing interval, the ongoing interval will be included in the charge:



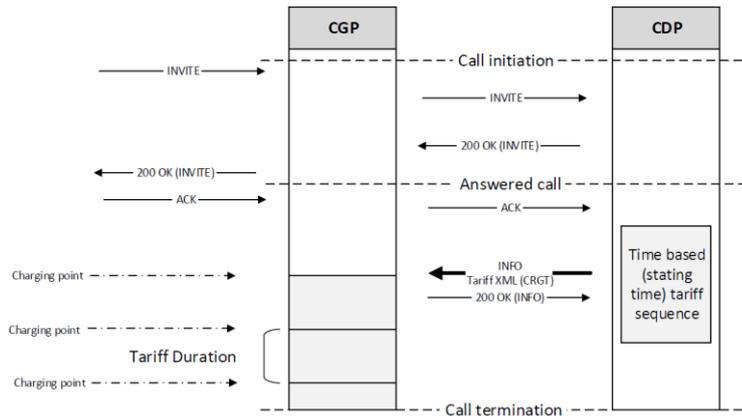
3. Setup Charge will be calculated when call is answered:



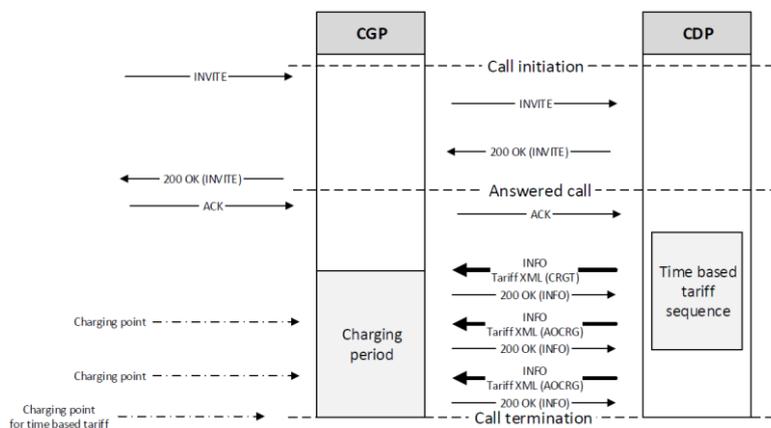
4. Time based charging becomes effective upon receipt of the tariff and remains active until the termination of the call:



5. Time based charging per starting time unit is calculated at the start of each time interval:



6. The AOARG (Add-On Charge) message shall be transmitted only after successful call setup, i.e., post-answer state. Furthermore, AOARG transmission is conditionally dependent on the prior delivery of the CRGT (Charge Rate) tariff information:



The CRGT tariff shall be sent in accordance with the defined signaling procedures outlined in message flow scenarios 1 through 5. AOARG messages are invalid if CRGT has not been previously communicated.

9.2 XML examples

9.2.1 Time based Charging

```
<?xml version="1.0" encoding="UTF-8"?>
<messageType>
<crgt>
<chargingControlIndicators>
<immediateChangeOfActuallyAppliedTariff>1</immediateChangeOfActuallyAppliedTariff>
<delayUntilStart>0</delayUntilStart>
</chargingControlIndicators>
<chargingTariff>
<tariffCurrency>
<currentTariffCurrency>
<communicationChargeSequenceCurrency>
<currencyFactorScale>
<currencyFactor>348333</currencyFactor>
<currencyScale>-7</currencyScale>
</currencyFactorScale>
<tariffDuration>0</tariffDuration>
<subTariffControl>0</subTariffControl>
</communicationChargeSequenceCurrency>
<tariffControlIndicators>1</tariffControlIndicators>
</currentTariffCurrency>
</tariffCurrency>
</chargingTariff>
<originationIdentification> <networkIdentification>023580035</networkIdentification>
<referenceID>0001</referenceID> </originationIdentification>
<currency>EUR</currency>
</crgt>
</messageType>
```

9.2.2 Time based Charging per starting time unit

```

<?xml version="1.0" encoding="UTF-8"?>
<messageType>
<crgt>
<chargingControlIndicators>
<immediateChangeOfActuallyAppliedTariff>1</immediateChangeOfActuallyAppliedTariff>
<delayUntilStart>0</delayUntilStart>
</chargingControlIndicators>
<chargingTariff>
<tariffCurrency>
<currentTariffCurrency>
<communicationChargeSequenceCurrency>
<currencyFactorScale>
<currencyFactor>108333</currencyFactor>
<currencyScale>-7</currencyScale>
</currencyFactorScale>
<tariffDuration>60</tariffDuration>
<subTariffControl>1</subTariffControl>
</communicationChargeSequenceCurrency>
<tariffControlIndicators>0</tariffControlIndicators>
</currentTariffCurrency>
</tariffCurrency>
</chargingTariff>
<originationIdentification> <networkIdentification>023580035</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</crgt>
</messageType>

```

9.2.3 Call Setup Charge

```
<?xml version="1.0" encoding="UTF-8"?>
<messageType>
<crgt>
<chargingControlIndicators>
<immediateChangeOfActuallyAppliedTariff>1</immediateChangeOfActuallyAppliedTariff>
<delayUntilStart>0</delayUntilStart>
</chargingControlIndicators>
<chargingTariff>
<tariffCurrency>
<currentTariffCurrency>
<callSetupChargeCurrency>
<currencyFactor>199</currencyFactor>
<currencyScale>-2</currencyScale>
</callSetupChargeCurrency>
</currentTariffCurrency>
</tariffCurrency>
</chargingTariff>
<originationIdentification>
<networkIdentification>023580035</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</crgt>
</messageType>
```

9.2.4 Additional Charge during call

```
<?xml version="1.0" encoding="UTF-8"?>
<messageType>
<aocrg>
<chargingControlIndicators>
<immediateChangeOfActuallyAppliedTariff>1</immediateChangeOfActuallyAppliedTariff>
<delayUntilStart>0</delayUntilStart>
<chargingControlIndicators>
<addOnCharge>
<addOnChargeCurrency>
<currencyFactor>149</currencyFactor>
<currencyScale>-2</currencyScale>
</addOnChargeCurrency>
<originationIdentification>
<networkIdentification>023580035</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</aocrg>
</messageType>
```

9.2.5 Zero Tariff

```

<?xml version="1.0" encoding="UTF-8"?>
<messageType>
  <crgt>
    <chargingControlIndicators>
      <immediateChangeOfActuallyAppliedTariff> 1 </immediateChangeOfActuallyAp-
pliedTariff>
      <delayUntilStart> 1 </delayUntilStart>
    </chargingControlIndicators>
    <chargingTariff>
      <tariffCurrency>
        <currentTariffCurrency>
          <communicationChargeSequenceCurrency>
            <currencyFactorScale>
              <currencyFactor>0</currencyFactor>
              <currencyScale>0</currencyScale>
            </currencyFactorScale>
            <tariffDuration> 1 </tariffDuration>
            <subTariffControl> 1 </subTariffControl>
          </communicationChargeSequenceCurrency>
          <tariffControlIndicators>0</tariffControlIndicators>
        </currentTariffCurrency>
      </tariffCurrency>
    </chargingTariff>
    <originationIdentification>
      <networkIdentification>023580035</networkIdentification>
      <referenceID> 1 </referenceID>
    </originationIdentification>
    <currency>EUR</currency>
  </crgt>
</messageType>

```

9.2.6 Call Setup Charge with Time based Charging

```

<?xml version="1.0" encoding="UTF-8"?>
<messageType>
  <crgt>
    <chargingControlIndicators>
      <immediateChangeOfActuallyAppliedTariff> 1</immediateChangeOfActuallyAp-
pliedTariff>
      <delayUntilStart> 1</delayUntilStart>
    </chargingControlIndicators>
    <chargingTariff>
      <tariffCurrency>
        <currentTariffCurrency>
          <communicationChargeSequenceCurrency>
            <currencyFactorScale>
              <currencyFactor> 168250</currencyFactor>
              <currencyScale> -7</currencyScale>
            </currencyFactorScale>
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10 References

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Finnish Transport and Communications Agency Traficom

PO Box 320, FI-00059 TRAFICOM

Switchboard: +358 29 534 5000

traficom.fi