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Finnish profile for SIP tariff interworking

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1 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
SIP	Session Initiation Protocol
ISUP	ISDN User Part
CRGT	ChaRGe Tariff information
AOCRG	Add-On ChaRGe information
MPM	Metering Pulse Message
CDR	Call Data Record

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2 References

[RFC 2119] Key words for use in RFCs to Indicate Requirement Levels, <https://datatracker.ietf.org/doc/rfc2119/>

[RFC 3261] SIP: Session Initiation Protocol, <https://datatracker.ietf.org/doc/rfc3261/>

[RFC 4028] Session Timers in the Session Initiation Protocol (SIP), <https://datatracker.ietf.org/doc/rfc4028/>

[RFC 6086] Session Initiation Protocol (SIP) INFO Method and Package Framework, <https://datatracker.ietf.org/doc/rfc6086/>

[RFC 3023] XML Media Types, <https://datatracker.ietf.org/doc/rfc3023/>

[3GPP TS 29.658 V12.0.0] SIP Transfer of IP Multimedia Service Tariff Information; Protocol specification (Release 12), <http://www.3gpp.org/DynaReport/29658.htm>

3 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.

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

Every MUST in this document is a strict requirement.

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

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4 Introduction

Tariff information transfer over SIP described in this document is defined in 3GPP specification TS 29.658 V12.0.0. 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 with XML payload MUST be supported for this purpose. Other methods described in the 3GPP specification MAY also be supported. If using other methods than SIP INFO, the XML payload can be sent and received before the call is answered. 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.

5 General requirements

The monetary format as described in 3GPP TS 29.658 V12.0.0 MUST be used. Non-Monetary format is not used.

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6 XML parameters

XML schema is shown in annex C of 3GPP TS 29.658 V12.0.0. 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.

6.1 Key parameters and parameter values

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

6.1.1 Message type

Message type is either Crgt OR Aocrg.

Crgt

Crgt MUST be used to indicate time 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.

6.1.2 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.

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Reference Id

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

6.1.3 Currency

EUR MUST be used.

6.2 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.

6.2.1 Case 1 - Time based Charging

This case is used to indicate a time based charge that is given per time unit of a call, for example one minute. 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 call.

Sub Tariff Control

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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.

6.2.2 Case 2 - Time based Charging per starting time unit

This case is used to indicate a time based charge that is given per every starting time unit of a call, for example one minute. 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. 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. 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.

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6.2.3 Case 3 - Call Setup Charge

This case is used to indicate a onetime charge given at the start of a call. 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. Call setup charge and communication charge can be included in the same SIP INFO message.

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)

6.2.4 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. 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)

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6.3 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 delay in seconds before start of charging.

7 Guidelines for CDP

7.1 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 MUST 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)

Rounding error in backwards calculation:

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

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

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

CurrencyFactor 398333

CurrencyScale -7 (0,0000001)

Rounding error in backwards calculation:

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

7.2 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.

7.3 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 message to INVITE.

If a 200 OK reply for SIP INFO 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 and 200 OK messages.

CDP SHOULD NOT send the first SIP tariff message during a call with CurrencyFactor value zero (0).

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. 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.

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8 Guidelines for CGP

If no SIP INFO 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.

IF CGP receives several consecutive crgt messages containing the tariff XML payload referring to same call, it MUST use the information received in the latest INFO message. As an exception, Call Setup Charge MUST NOT be applied more than once per one call.

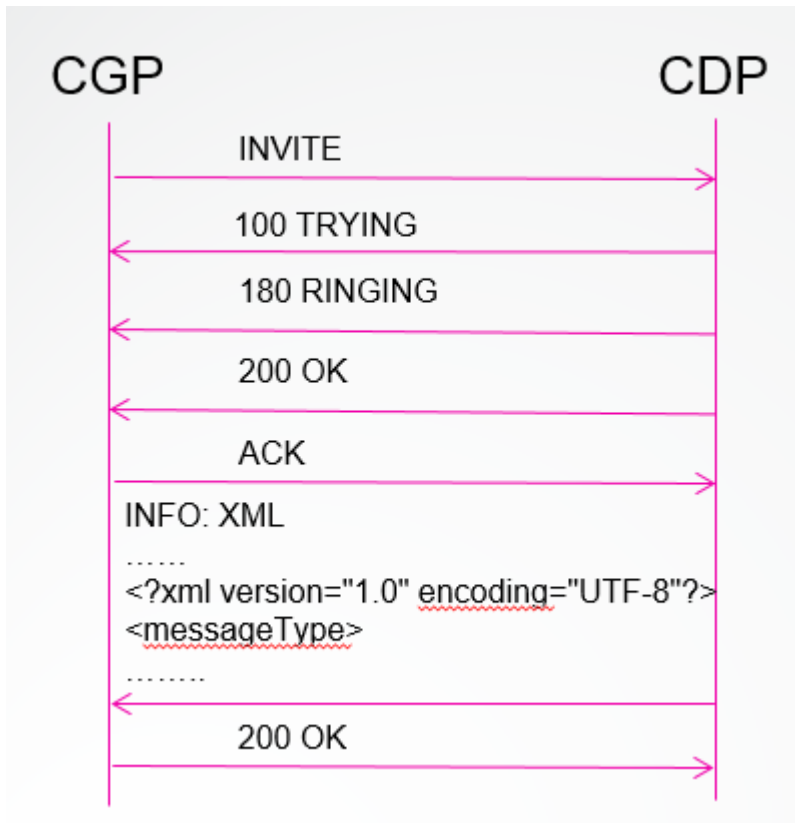
9 Applying the SIP tariff information

Applying the information indicated in SIP tariff messages is outside the scope of this document.

Some further aspects on possible applications and converting SIP tariff to ISUP MPM messages are looked into in the attachment.

10 Signalling flow and XML examples

10.1 SIP signalling flow example



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10.2 XML examples

10.2.1 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>023580035FF</networkIdentification>
<referenceID>0001</referenceID> </originationIdentification>
<currency>EUR</currency>
</crgt>
</messageType>
```

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10.2.2 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>023580035FF</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</crgt>
</messageType>
```

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10.2.3 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>023580035FF</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</crgt> </messageType>
```

10.2.4 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>023580035FF</networkIdentification>
<referenceID>0001</referenceID>
</originationIdentification>
<currency>EUR</currency>
</aocrg>
</messageType>
```