



ABF format specification for the Single IMSI Wholesale Billing Interface

Version 1.0

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1 Introduction

1.1 Overview

This document defines the logical and physical data that must be transferred between DSP and ARP when used CSV data format. Format name is ABF (Alternative Billing Format). It additionally contains all the validation rules that can be applied.

1.2 Scope

This Document defines, in full, the format and validation of CSV files that can be used between DSP and ARP.

1.3 Definitions

Term	Description
Calls	All call events defined for the applicable format (for example TAP, NRTRDE)

1.4 Abbreviations

Term	Description
ABF	Alternative Billing Format
APN	Access Point Name
ARP	Alternative Roaming Provider
CR	Carriage Return
CSV	Comma Separated Values
DSP	Domestic Service Provider
GPRS	General Packet Radio Service
HPMN	Home Public Mobile Network
LF	Line Feed
MMS	Multimedia Messaging Service
MOC	Mobile Originated Call
MTC	Mobile Terminated Call
NRTRDE	Near Real Time Roaming Data Exchange
PRD	Permanent Reference Document
RAP	Returned Account Procedure
Sender	Sender of the data
SMS	Short Message Service
TAP	Transferred Account Procedure
USSD	Unstructured Supplementary Service Data
UTC	Universal Time Co-ordinated
VPMN	Visited Public Mobile Network

1.5 References

Ref	Doc Number	Title
[1]	CSV-1203	"CSV File Format Specification". Available at http://mastpoint.curzonnassau.com/csv-1203/
[2]	GSMA PRD TD.13	TADIG Code Naming Conventions
[3]	GSMA PRD TD.28	File Transfer Methods
[4]	RFC 4180	"Common Format and MIME Type for Comma-Separated Values Files", Y. Shafranovich, October 2005. Available at http://tools.ietf.org/html/rfc4180
[5]	RFC 2119	"Key words for use in RFCs to Indicate Requirement Levels", S. Bradner, March 1997. Available at http://www.ietf.org/rfc/rfc2119.txt

1.6 Conventions

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 [5].

2 Deviations from the document "WS Billing Required Data Items" requirements

- Added SS event record type.
- No separate record types for "Batch Control" and "Audit Control" were created. Information from "Batch Control" and "Audit Control" was moved to file name. This was done for the following reasons:
 - a. CSV format requires that all records have the same number of fields throughout the file.
 - b. Standard utilities importing CSV files to databases require the same column fields to have the same data type (string, number, timestamp) throughout the file.
 - c. Standard utilities exporting database table to CSV file will produce records with the same column fields number and type throughout the file.
 - d. Putting header and trailer information to this field structure is a complicated task.
 - e. Having only call records in CSV file bodies will allow the creation or reading of CSV files from/to database with one line of code using standard utilities. Having header and trailer in CSV files will require program custom field by field parsing.
 - f. Having header and trailer will require the handling of additional error situations.
 - g. Header in CSV files usually means first line of the file containing list of fields' names which could be confusing.
- Call-back should be presented by two records MTC and MOC.
- MMS is charged as data within the GPRS record.

3 CSV Format Specification

3.1 Main Principles of Development

Main principles of the CSV format development are:

- Format should be as simple as possible.

- Format should give the possibility to transmit call data between DSP and ARP databases by the most simple and efficient way. In simple cases existing database utilities could be used to generate and import CSV files without any programming.
- Current TAP specification will be used as the base for the first version of the CSV format and the TAP data dictionary will be imported with small changes.

3.2 Physical Specifications

CSV is ideal format for the exchange of structured homogeneous tabular data. In order to ensure compatibility with most CSV file processing systems – the following rules should be strictly executed. The rules are based on RFC4180 [4] and CSV-1203 [1].

- File extension is .csv.
- US-ASCII character set must be used.
- Records must be ended with CR+LF or LF.
- Each record within CSV file must contain the same number of field columns.
- Field separator is comma.
- A field column must not have leading or trailing whitespace.
- The header record must not be used.
- Trailer records must not be used.
- If a field's payload contains one or more commas or double-quotes, then it must be delimited by a pair of double-quotes.
- If a field's payload contains a double-quote character, it must be represented by two consecutive double-quotes.
- Field's payload must not contain characters CR and LF, even delimited by a pair of double-quotes.
- Double-quote protection should not be applied where it is not required.
- Decimal symbol for numeric data is decimal point. Example correct: 3.14159, wrong: 3,14159.
- Digit grouping symbols must not be used. Example correct: 1234567.89, wrong: 1,234,567.89.
- Leading zeros should be displayed. Example correct: 0.7, wrong: .7.
- Timestamp format for usage in file body is YYYY-MM-DDThh:mm:ss±hhmm. Where time range: 00:00:00 to 23:59:59. UTC offset range: -13:00 to +14:00.
- Timestamp format for usage in file name is YYYYMMDDhhmmss±hhmm. Different format used because symbol ':' is reserved for special use in some Operating systems. Where time range: 000000 to 235959. UTC offset range: -1300 to +1400.
- Charge and tax values must contain no more than 6 decimal places. Example correct: 9.123456, wrong: 9.1234567.

3.3 Physical transfer methods

Physical transfer methods are discussed in TD.28 [3]. It is recommended to send ABF files using the FTP protocol over a secure VPN tunnel. It is recommended that FTP transfer type should be set to binary.

3.4 CSV data fields per record type

This section lists the CSV data fields per record type.

No	Field Name	MOC	MTC	GPRS	SS
1	Call type	O	I	G	S
2	Serving Network	TADIG Code			
3	Source File Identification	Source File Identification			
4	Subscriber Identification Type	I – IMSI, M – MSISDN, P – Public User ID			
5	Subscriber Identification	IMSI or MSISDN or Public User ID			
6	Number or APN	Called Number	Calling Number	APN NI	
7	Dialled Digits or APN	Dialled Digits		APN OI	
8	Call Time (including UTC offset)	Call Event Start Timestamp			
9	Total Call Event Duration	Total Call Event Duration			
10	Partial Type Indicator			Partial Type Indicator	
11	PDP Context Start Timestamp			PDP Context Start Timestamp	
12	Data Volume Incoming			Data Volume Incoming	
13	Data Volume Outgoing			Data Volume Outgoing	
14	Basic Service Code (TS/BS)	Basic Service Code	Basic Service Code	Basic Service Code	Basic Service Code
15	Supplementary Service Code	Suppl. Service Code			Suppl. Service Code
16	Cause for Termination	Cause for Termination			
17	Charge (excluding tax)	Charge			
18	Tax Value	Tax Value			
19	Call Reference	Call Reference	Call Reference	Charging Id	Call Reference
20	CAMEL Service Key	CAMEL Service Key			

No	Field Name	MOC	MTC	GPRS	SS
21	CAMEL Destination Number or APN	CAMEL Destination Number		APN NI (CAMEL)	
22	CAMEL APN OI			APN OI (CAMEL)	
23	Operator Specific Information	Operator Specific Information			

Table 1: CSV Data Fields per Record Type

Notes:

- Fields order selected to ease file reading by a human.
- Messaging Event and Mobile Session could be identified using values at “Basic Service Code” field – ME1, ME2, MS1, MS2 and MS3.
LTE usage could be identified using value LTE at GPRS record “Basic Service Code” field.

3.5 Version Control Principles

Format specification updates should be done by adding new fields at the end of the records.

Operators, who are not compliant with the new version, will ignore extra fields at the end of the records.

Parties who want to implement private format extension on a bilateral level are advised to use the Operator Specific Information field. Information could be passed as a list of parameters pn=pv separated by blanks. Where pn - parameter name, pv – parameter value. Example of Operator Specific Information field population – “Seq=00123 Rec=32”.

3.6 File Naming Convention

CSV files must follow the following file naming convention:

CD_XXXXX_YYYYY_seq_transfer_available_vers_currency_charge_tax_ncalls.csv

where

CD or TD	CD identifies the file as containing chargeable data, TD – identifies the file as containing test data
XXXXX	contains the Sender TADIG Code in uppercase (5 positions)
YYYYY	contains the Recipient TADIG Code in uppercase (5 positions)
seq	contains the Sequence Number (5 positions)
transfer	contains Transfer Cut Off Timestamp in format YYYYMMDDhhmmss±hhmm
available	contains File Available Timestamp in format YYYYMMDDhhmmss±hhmm
vers	contains the Specification Version Number
currency	contains the Local Currency (ISO 4217)
charge	contains the Total Charge
tax	contains the Total Tax Value
ncalls	contains the Call Event Details Count
.csv	file extension

Example:

CD_LVALM_ARP01_00001_20130321112000+0300_20130321112000+0300_1_EUR_3.38_0_7.csv

4 Data Dictionary

The data dictionary gives a full listing of all data items within the Alternative Billing Format (ABF).

In addition to providing descriptions, derivations and values where appropriate for all groups and items, it describes conditionality and validation in detail.

4.1 File Name Elements

Element	Description	Error Code	Context	Severity Level	Validation Description
Call Events Count	<p>This item contains a count of the number of call events in the file.</p> <p>If Call Events Count is equal to 0 then it is a Notification file. A Notification file is sent where the transfer mechanism is electronic file transfer and there is no data available for transfer.</p> <p><i>Conditionality:</i> Mandatory.</p> <p><i>Values:</i> >= 0</p>	CNT1	File Name	Fatal	Syntax error.
		CNT2	File Name	Fatal	Value out of range.
		CNT3	File Name	Fatal	Missing.
		CNT5	File Name	Fatal	Value does not match the count of Call Events. Note that any rejected Call Events must be included for the purposes of this validation.
File Available Timestamp	<p>The date and time at which the file was made available to the Recipient. Note: Where the Sender uses an agent for file transfer, this is the date and time the agent makes the file available to the Recipient or the Recipient's agent.</p> <p>Physically this will normally be the timestamp when the file transfer commenced to the Recipient, i.e. start of push, however on some systems this will be the timestamp when the file was made available to be pulled.</p> <p>The time is given in the local time of the Sender PMN. There must be a UTC Time Offset associated with the item. Note: Where the Sender uses an agent for file transfer, the Timestamp and the UTC Time Offset could be that of the</p>	AVL1	File Name	Fatal	Syntax error.
		AVL3	File Name	Fatal	Missing.
		AVL5	File Name	Fatal	Timestamp is more than one hour after the file received time at the Recipient. Note: The tolerance of one hour has been introduced as it cannot be guaranteed that Sender and Recipient system clocks are synchronised, in particular around daylight saving (wintertime/summertime) changes.

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>agent.</p> <p>Note that where a file is being resubmitted, for example where the file contained a fatal error on earlier submission, this timestamp must not contain the original timestamp, i.e. the item contains the timestamp when the file was made available on resubmission.</p> <p><i>Conditionality:</i> Mandatory</p> <p><i>Format:</i> YYYYMMDDhhmmss±hhmm</p>				
File Sequence Number	<p>A unique reference which identifies each Data Interchange sent by one PMN to another, specific, PMN.</p> <p>The sequence commences at 1 and is incremented by one for each subsequent Data Interchange sent by the Sender PMN to a particular Recipient PMN.</p> <p>Separate sequence numbering must be used for Test Data and Chargeable Data. Having reached the maximum value (99999) the number must recycle to 1.</p> <p>Note that in the case of retransmission for any reason this number is not incremented.</p> <p>Note that where the file sequence number is being reused with a file already received and successfully processed and the content of the two files is different, then the received file is to be considered as 'invalid reused sequence number' and an error message should be generated. Where the content of the two files is the same then the file is to be considered as a 'copy' of the original file and should be ignored (i.e. not rejected).</p>	SEQ1	File Name	Fatal	Syntax error.
		SEQ2	File Name	Fatal	Value out of range.
		SEQ3	File Name	Fatal	Missing.
		SEQ5	File Name	Fatal	<p>File sequence number of the received file has already been received and successfully processed and the file is not a copy of the original file.</p> <p>Note: This error can also be raised if the original file details are not available (for example DCH migration scenario).</p>

Element	Description	Error Code	Context	Severity Level	Validation Description								
	<i>Conditionality:</i> Mandatory. <i>Range:</i> 00001 – 99999 for Test Data 00001 – 99999 for Chargeable Data												
Local Currency	Contains the Currency Code which identifies the currency used to price the calls and/or events. This currency has to be the one used in the Sender's IOT. Local Currency may or may not be the same as the Sender's country local currency. <i>Derivation:</i> ISO 4217 Currency Codes standard. <i>Conditionality:</i> Mandatory. <i>Example:</i> <table><tr><td>Currency Code</td><td>Currency Name</td></tr><tr><td>AUD</td><td>Australian Dollars</td></tr><tr><td>CLP</td><td>Chilean Pesetas</td></tr><tr><td>GBP</td><td>Pounds Sterling</td></tr></table>	Currency Code	Currency Name	AUD	Australian Dollars	CLP	Chilean Pesetas	GBP	Pounds Sterling	LCR3	File Name	Fatal	Missing.
		Currency Code	Currency Name										
AUD	Australian Dollars												
CLP	Chilean Pesetas												
GBP	Pounds Sterling												
		LCR4	File Name	Fatal	Value not as specified in the Sender's Inter Operator Tariff (IOT).								
Recipient	A TADIG code uniquely identifies the file recipient. <i>Derivation:</i> GSM Association PRD TD.13 [2]. <i>Conditionality:</i> Mandatory. <i>Examples:</i> GBRCN GBRVF DEUD1 DEUD2	RCP2	File Name	Fatal	Value out of range.								
		RCP3	File Name	Fatal	Missing.								

Element	Description	Error Code	Context	Severity Level	Validation Description
	Note: These codes must be in uppercase (as defined in TD.13 [2]).				
Sender	<p>A TADIG code uniquely identifies the file sender.</p> <p>The full list of codes in use is given in TADIG PRD TD.13 [2].</p> <p><i>Conditionality:</i> Mandatory.</p> <p><i>Example content:</i> GBRCN GBRVF DEUD1 DEUD2</p> <p>Note: These codes must be in uppercase (as defined in TD.13 [2]).</p>	<p>SND2</p> <p>SND3</p>	<p>File Name</p> <p>File Name</p>	<p>Fatal</p> <p>Fatal</p>	<p>Value out of range.</p> <p>Missing</p>
Specification Version Number	<p>To enable a PMN to encode and/or read a file it is necessary to uniquely identify the format. This is achieved through the Specification Version Number.</p> <p><i>Conditionality:</i> Mandatory.</p> <p><i>Value:</i> 1</p>	<p>VER1</p> <p>VER2</p> <p>VER3</p>	<p>File Name</p> <p>File Name</p> <p>File Name</p>	<p>Fatal</p> <p>Fatal</p> <p>Fatal</p>	<p>Syntax error.</p> <p>Value out of range.</p> <p>Missing.</p>
Total Charge	<p>The sum of all the charges.</p> <p>The Total Charge must not contain a negative value.</p> <p>Note that charges from records with severe errors must also be included where possible.</p> <p><i>Conditionality:</i></p>	<p>TCH1</p> <p>TCH2</p> <p>TCH3</p> <p>TCH5</p>	<p>File Name</p> <p>File Name</p> <p>File Name</p> <p>File Name</p>	<p>Fatal</p> <p>Fatal</p> <p>Fatal</p> <p>Fatal</p>	<p>Syntax error.</p> <p>Value out of range.</p> <p>Missing.</p> <p>Value does not match the calculated sum of charges from file records.</p>

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>Mandatory.</p> <p>Values:</p> <p>> or = 0 (zero)</p>				
Total Tax Value	The sum of the Tax Values contained in the batch.	TTX1	File Name	Fatal	Syntax error.
	The Total Tax Value must not contain a negative value.	TTX2	File Name	Fatal	Value out of range.
	This is present for audit purposes only.	TTX3	File Name	Fatal	Missing.
	<p>Note that taxes from records with severe errors should also be included where possible.</p> <p>Conditionality:</p> <p>Mandatory.</p> <p>Values:</p> <p>> or = 0 (zero)</p>	TTX5	File Name	Fatal	Value does not match the calculated sum of taxes from file records.
Transfer Cut Off Timestamp	<p>The timestamp used to select calls for transfer. All call records available prior to the timestamp are transferred. This gives an indication to the recipient as to how 'up-to-date' the information is.</p> <p>Where the timestamp is present within an empty file it is nominal showing that no data available for transfer is being held by the Sender PMN with a Charging Timestamp prior to this.</p> <p>The time is given in the local time of the Sender PMN. There must be a UTC Time Offset associated with the item.</p> <p>Conditionality:</p> <p>Mandatory.</p> <p>Format:</p> <p>YYYYMMDDhhmmss±hhmm</p>	TCO1	File Name	Fatal	Syntax error.
		TCO3	File Name	Fatal	Missing.

Table 2: File Name Elements

4.2 File Content Elements

Element	Description	Error Code	Context	Severity Level	Validation Description
Access Point Name NI	<p>The Network Identifier part of the Access Point Name (APN) in dot notation.</p> <p><i>Derivation:</i> In the case of GPRS usage without CAMEL invocation: The actual connected APN NI as defined in PS Domain Charging – see Annex C. Pre GSM Release '98 from the GSM item AccessPointName (see <i>conditionality</i> note below).</p> <p>In case of GPRS usage with CAMEL invocation: The actual connected APN NI as modified by the CSE in APN NI field as defined in PS Domain Charging – see Annex C.</p> <p>In the case of Wi-Fi usage this element must contain the Venue Class where available, otherwise defaults to 0 (zero).</p> <p><i>Conditionality:</i> Mandatory within GPRS record.</p> <p>Networks which have not yet upgraded to at least GSM Release '98 do not yet support the separation of the APN into the Network Identifier and Operator Identifier parts and, therefore, must populate a concatenation of both parts within this item.</p> <p><i>Values:</i> This field is encoded as a string comprising of up to 63 characters. The actual contents are for further study.</p>	ANI1	GPRS	Severe	Syntax error.
		ANI3	GPRS	Severe	Missing.
		ANI5	GPRS	Severe	APN is EUInternet and session is not home routed. Note: This error cannot be raised when Access Point Name NI (CAMEL) is present.
Access Point Name NI (CAMEL)	The Network Identifier part of the Access Point Name (APN) in dot notation. Populated in case of GPRS usage with CAMEL invocation.	ANC1	GPRS	Severe	Syntax error.
		ANC5	GPRS	Severe	APN is EUInternet and session is not

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p><i>Derivation:</i> In case of GPRS usage with CAMEL invocation: The original APN NI before modification by the CSE in CAMEL APN NI field available within CAMEL Information as defined in PS Domain Charging – see Annex C.</p> <p>In the case of Wi-Fi usage this element must contain the Venue Class where available, otherwise defaults to 0 (zero).</p> <p><i>Conditionality:</i> Mandatory within GPRS record.</p> <p>Networks which have not yet upgraded to at least GSM Release '98 do not yet support the separation of the APN into the Network Identifier and Operator Identifier parts and, therefore, must populate a concatenation of both parts within this item.</p> <p><i>Values:</i> This field is encoded as a string comprising of up to 63 characters. The actual contents are for further study.</p>				home routed.
Access Point Name OI	<p>The Operator Identifier part of the Access Point Name (APN) in dot notation.</p> <p><i>Derivation:</i> In the case of GPRS usage without CAMEL invocation: The actual connected APN OI as defined in PS Domain Charging – see Annex C. Pre GSM Release '98 from the GSM item AccessPointName (see <i>conditionality</i> note below). From GSM Release '98 to 3GPP Release 7 from the GSM item AccessPointNameOI (see <i>conditionality</i> note below). From 3GPP Release 8 from the GSM item P-GW PLMN Identifier (see <i>conditionality</i> note below).</p>	AOI1	GPRS	Severe	Syntax error. .

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>In the case of GPRS usage with CAMEL invocation: The actual connected APN OI as modified by CSE in APN OI field as defined in PS Domain Charging – see Annex C.</p> <p><i>Conditionality:</i> Mandatory where the GPRS Call represents an SGSN or S-GW ticket or an assembled SGSN/GGSN or S-GW/P-GW ticket. This item is only available within networks which have upgraded to at least GSM Release '98 and not available for Wi-Fi usage.</p> <p><i>Values:</i> This field is encoded as a string comprising of up to 37 characters. The actual contents are for further study.</p>				
Access Point Name OI (CAMEL)	<p>The Operator Identifier part of the Access Point Name (APN) in dot notation. Populated in the case of GPRS usage with CAMEL invocation.</p> <p><i>Derivation:</i> The original APN OI field available within CAMEL Information as defined in PS Domain Charging – see Annex C.</p> <p><i>Conditionality:</i> This item is only available within networks which have upgraded to at least GSM Release '98 and not available for Wi-Fi usage.</p> <p><i>Values:</i> This field is encoded as a string comprising of up to 37 characters. The actual contents are for further study.</p>				
Basic Service Code	Basic Service Code uniquely defines TeleService, Bearer Service, Messaging Event Service, Mobile Session Service	BSV2	MOC MTC	Severe	Value out of range. Note: Values 021 and MS2 are only

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>and LTE usage at GPRS sessions.</p> <p>TeleService and Bearer Service Codes, identifiable by the description 'All', should only be used where details of the specific services affected are not available.</p> <p>Note that compound TeleService codes can only occur in call independent supplementary service operations.</p> <p>Note that compound Bearer Service codes can only occur in conjunction with HSCSD usage or call independent supplementary service operations.</p> <p>Note that codes 27 & 37 (General Data A/Synchronous Service) are used where a data rate greater than 9600bps is used, the data rate used is not identifiable/specified on the network CDRs.</p> <p><i>Derivation:</i> GSM items TeleServiceCode and BearerServiceCode (See Annex C – CS Domain Charging).</p> <p>TeleService code is derived by taking the MAP encoding (See Annex C – Teleservice Codes) and translating bits 8-5 into a 'hex' character and bits 4-1 into a second 'hex' character.</p> <p><i>Derivation:</i> BearerService code is derived by taking the MAP encoding as specified for BearerServiceCode (See Annex C – CS Domain Charging) and translating bits 7-4 into a 'hex' character and bits 3-1 into a second 'hex' character.</p> <p><i>Conditionality:</i> Must be present where the type of service used was a teleservice or bearer service.</p>	BSV3	GPRS MOC MTC	Severe	<p>allowed for MTC. Values 022 and MS1 are only allowed for MOC.</p> <p>Missing.</p>

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p><i>Tele Service Values (prefix 0 added to identify Tele Service):</i></p> <p>000 All teleservices 010 All Speech transmission services 011 Telephony 012 Emergency calls 020 All SMS Services 021 Short Message MT/PP 022 Short Message MO/PP 060 All Fax Services 061 Facsimile Group 3 & alternative speech 062 Automatic Facsimile Group 3 063 Automatic Facsimile Group 4 070 All data teleservices (compound) 080 All teleservices except SMS (compound) 090 All voice group call services 091 Voice group call 092 Voice broadcast call</p> <p><i>Bearer Service Values (prefix 1 added to identify Bearer Service):</i></p> <p>100 All Bearer Services 120 All Data Circuit Asynchronous Services 121 Duplex Asynch. 300bps data circuit 122 Duplex Asynch. 1200bps data circuit 123 Duplex Asynch. 1200/75bps data circuit 124 Duplex Asynch. 2400bps data circuit 125 Duplex Asynch. 4800bps data circuit 126 Duplex Asynch. 9600bps data circuit 127 General Data Circuit Asynchronous Service 130 All Data Circuit Synchronous Services 132 Duplex Synch. 1200bps data circuit 134 Duplex Synch. 2400bps data circuit 135 Duplex Synch. 4800bps data circuit 136 Duplex Synch. 9600bps data circuit</p>				

Element	Description	Error Code	Context	Severity Level	Validation Description
	137 General Data Circuit Synchronous Service 140 All Dedicated PAD Access Services 141 Duplex Asynch. 300bps PAD access 142 Duplex Asynch. 1200bps PAD access 143 Duplex Asynch. 1200/75bps PAD access 144 Duplex Asynch. 2400bps PAD access 145 Duplex Asynch. 4800bps PAD access 146 Duplex Asynch. 9600bps PAD access 147 General PAD Access Service 150 All Dedicated Packet Access Services 154 Duplex Synch. 2400bps PAD access 155 Duplex Synch. 4800bps PAD access 156 Duplex Synch. 9600bps PAD access 157 General Packet Access Service 160 All Alternat Speech/Asynchronous Services 170 All Alternate Speech/Synchronous Services 180 All Speech followed by Data Asynchronous Services 190 All Speech followed by Data Synchronous Services 1A0 All Data Circuit Asynchronous Services (compound) 1B0 All Data Circuit Synchronous Services (compound) 1C0 All Asynchronous Services (compound) 1D0 All Synchronous Services (compound) <i>Messaging Event Service Values:</i> ME1 MO SMS over IP (IMS based SMS) ME2 MT SMS over IP (IMS based SMS) <i>Mobile Session Service Values:</i> MS1 MO Voice over LTE MS2 MT Voice over LTE MS3 Emergency call over LTE <i>LTE usage identification:</i>				

Element	Description	Error Code	Context	Severity Level	Validation Description
	LTE GPRS session over LTE				
Call Event Start Timestamp	<p>The timestamp gives the start of the call event.</p> <p>The time is given in the local time of the Sender PMN (or Serving Network where this is not the Sender). There must be a UTC Time Offset associated with the timestamp.</p> <p>Note that local time is the local time at the location of the chargeable subscriber. Where the location is not available, as in some call forwarding scenarios, this will be a notional 'network local time'.</p> <p>Note that this timestamp is the event start time as provided by the network. This will be either the call answer time or the channel seizure time.</p> <p>If charging is from call answer time then this item can be populated with either call answer time or channel seizure time.</p> <p>If charging is from channel seizure time then Call Event Start Timestamp must be populated with channel seizure time.</p> <p>In the case of an intermediate or last partial record of the same GPRS Call (GPRS Context) the timestamp must be populated with the record start time and not the context start timestamp (see item PDP Context Start Timestamp for identification of GPRS context start time in each partial record).</p> <p><i>Derivation:</i> GSM item answerTime or seizureTime (See Annex C – CS Domain Charging and PS Domain Charging). This will</p>	TIM1	Calls	Severe	Syntax error.
		TIM3	Calls	Severe	Missing
		TIM5	Calls	Severe	Call older than 40 calendar days or than allowed by bilateral agreement. Call age is calculated as difference between the call completion time or, where the call/event has no duration, the timestamp associated with the call/event and the File Available Timestamp normalized to use the same time basis (for example UTC).

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>normally be the equivalent of the start of charging or, where the call event is non chargeable, the equivalent point.</p> <p>IMS item Service Delivery Start Time Stamp (See Annex C – IMS Domain Charging)</p> <p>For Wi-Fi usage item event-timestamp (RFC 2869) in UTC time.</p> <p><i>Conditionality:</i> Mandatory within MOC MTC GPRS SS</p> <p><i>Example:</i> > PDP Context activated at 2009-07-08T23:50:00+00:00 > Two partials raised on TAP (cut across midnight) First partial: Call Event Start Timestamp = PDP Context Start Timestamp = 2009-07-08T23:50:00 Second partial: Call Event Start Timestamp = 2009-07-09T00:00:00+00:00 PDP Context Start Timestamp = 2009-07-08T23:50:00+00:00</p>				
Call Reference	<p>The identifier distinguishes between transactions on the same mobile station. For SMS and Voice over LTE - Event Reference to be used.</p> <p><i>Derivation:</i> GSM item CallReference (See Annex C – CS Domain Charging).</p> <p>GSM item Message Reference (see Annex C – CS Domain Charging) for SMS over circuit switched.</p>	REF1	MOC MTC SS	Severe	Syntax error.

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>GSM item Message Reference (See Annex C – PS Domain Charging) for SMS over GPRS.</p> <p>IMS item IMS Charging Identifier (See Annex C - IMS Charging Domain) for SMS and Voice over LTE.</p> <p><i>Conditionality:</i> Must be present when available.</p>				
Call Type	The type of record.	CTP2	Calls	Severe	Value out of range.
		CTP3	Calls	Severe	Missing.
	<i>Conditionality:</i> Mandatory	CTP4	Calls	Severe	Call type, call destination or call service is not as agreed.
	<i>Values:</i> <div><div>O</div>MOC record</div> <div><div>I</div>MTC record</div> <div><div>G</div>GPRS record</div> <div><div>S</div>SS record</div>	CTP5	Calls	Severe	Duplicated record
	<i>Validation rules for duplicated records:</i> MOC Subscriber Identification, Call Event Start Time, Called Number, Service Code and Total Call Duration match call record already processed and the call reference is identical in both call records. If Called Number is not present Dialed Digits must be used. MTC Subscriber Identification, Call Event Start Time, Calling Number, Service Code and Total Call Duration match call				

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>record already processed and the Call Reference is identical in both call records.</p> <p>GPRS</p> <p>Subscriber Identification, Charging Id and Call Event Start Time match call record already processed.</p> <p>SS</p> <p>Subscriber Identification, Charging Timestamp, Supplementary Service Code and Action match call record already processed and the Call Reference is identical in both call records.</p>				
Called Number	<p>The called number is the international representation of the destination and contains different information depending on the call scenario:</p> <p>Circuit Switched MO Call initiated by the roamer: The international representation of the number dialled by the roamer in establishing the call</p> <p>Circuit Switched MO Call initiated as a result of an incoming call and invocation of conditional call forwarding: The international representation of the number to which the call is forwarded</p> <p>SMS MO: The international representation of the SMSC address used</p> <p>The called number must always start with the valid country code as listed in E.164 "Assigned Country Codes" (spare and reserved codes are not valid, except the reserved code 970 for Palestine which is valid), and contain only numeric digits. All other characters must be removed.</p> <p>In the following cases it is acceptable for the Called Number (if present) to contain only the country code:</p> <p>Short code call: Only country code, or country code followed by short code</p>	CDN1	MOC	Severe	Syntax error and call does not represent an emergency call (Basic Service code is 012 or MS3).
		CDN2	MOC	Severe	Value out of range or number does not start with a valid country code as listed in E.164 "Assigned Country Codes", and either CAMEL Destination Number or Dialled Digits is not present. Note: Spare and reserved codes are NOT valid country codes, with the exception of reserved code 970 for Palestine which is valid.
		CDN3	MOC	Severe	Missing and call does not represent an emergency call (Basic Service code is 012 or MS3).

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>Emergency call: Only country code, or country code followed by the emergency service access code</p> <p>Unsuccessful call attempt: Only country code, or full number starting with the country code</p> <p>Specially routed call (for example using '*' or '#'): Only country code</p> <p>In all other cases the Called Number must contain the full long number as defined by E.164 "International public telecommunication number structure.</p> <p><i>Derivation:</i> Derived from GSM item CalledNumber (See Annex C – CS Domain Charging) but it is represented in TAP in International format, i.e. the number begins with the Country Code.</p> <p><i>Conditionality:</i> Must be present except for one of the following: use of the basic service emergency call unsuccessful call attempt when the call destination has been modified by CAMEL (CAMEL Destination Number is present)</p> <p>If Called Number is not present then, in case of unsuccessful call attempt or CAMEL destination modification, item Dialed Digits must be filled in.</p> <p>In the case of SMS-MO usage this field must always be present.</p> <p><i>Values:</i> Each digit is numeric (0-9)</p>				
Calling Number	The calling number is the number from which the call was originated in the case of mobile terminated calls. For SMS MT this item must contain the SMSC MSISDN. It is represented in international format, i.e. the number begins with the country				

Element	Description	Error Code	Context	Severity Level	Validation Description
	code. <i>Derivation:</i> GSM item CallingNumber (See Annex C – CS Domain Charging). <i>Conditionality:</i> Must be present where available. <i>Values:</i> Each digit is numeric (0 – 9)				
CAMEL Destination Number	The destination number returned by the CAMEL server to the interrogating (visited) MSC. <i>Derivation:</i> Derived from GSM item CalledNumber (See Annex C – CS Domain Charging and (for SMS over PS only) PS Domain Charging) but it is represented in International format, i.e. the number must start with a valid Country Code for the routed destination. <i>Conditionality:</i> Mandatory where Called Number not present. <i>Values:</i> Each digit is numeric (0-9) or contains 'A' (representing *) or contains 'B' (representing #) or contains 'C' (representing a) or contains 'D' (representing b) or contains 'E' (representing c)	CDN1 CDN2 CDN5	MOC MOC MOC	Severe Severe Severe	Syntax error. Value out of range or number does not start with a valid country code as listed in E.164 "Assigned Country Codes". Note: Spare and reserved codes are NOT valid country codes with the exception of reserved code 970 for Palestine which is valid. CAMEL Destination Number different from what the Home CAMEL Server returned. Note: The Sender may need to insert a country code in front of what the Home CAMEL Server returned.
CAMEL Service Key	The identification of the CAMEL service logic to be applied to the IN subscriber. <i>Derivation:</i>				

Element	Description	Error Code	Context	Severity Level	Validation Description										
	<p>GSM item ServiceKey (See Annex C – CS Domain Charging and PS Domain Charging).</p> <p><i>Conditionality:</i> Mandatory when CAMEL service used.</p> <p><i>Range:</i> 0 – 2147483647 (derived from 0 to 2^31)</p>														
Cause For Termination	<p>Indicates the reason for termination of the call where that reason is anything other than normal.</p> <p><i>Derivation:</i> GSM items CauseForTerm and CauseForRecClosing(See Annex C – CS Domain Charging and PS Domain Charging).</p> <p>For Wi-Fi usage mapped from acct-terminate-cause (RFC 2866).</p> <p>For Voice over LTE network usage, IMS item CauseForRecordClosing (see Annex C - IMS Domain Charging)</p> <p><i>Conditionality:</i> Must be present within MOC, MTC and GPRS where the call release is abnormal, see values below. Where the cause for termination is normal release, i.e. value 0, then the item is not present.</p> <p><i>Values:</i></p> <table><tr><td>1</td><td>Unsuccessful Service Delivery</td></tr><tr><td>3</td><td>Unsuccessful call attempt</td></tr><tr><td>4</td><td>Stable call abnormal termination</td></tr><tr><td>5</td><td>CAMEL initiated call release/Management intervention</td></tr><tr><td>20</td><td>Management intervention</td></tr></table>	1	Unsuccessful Service Delivery	3	Unsuccessful call attempt	4	Stable call abnormal termination	5	CAMEL initiated call release/Management intervention	20	Management intervention	CFT1	MOC MTC GPRS	Severe	Syntax error.
	1	Unsuccessful Service Delivery													
3	Unsuccessful call attempt														
4	Stable call abnormal termination														
5	CAMEL initiated call release/Management intervention														
20	Management intervention														
		CFT2	MOC MTC GPRS	Severe	Value out of range.										

Element	Description	Error Code	Context	Severity Level	Validation Description																											
	<div>21 Intra SGSN intersystem change</div> <div>24 SGSN PLMNIDS change</div> <p>Values 4, 5 (CAMEL initiated call release), 20, 21 and 24 are valid within a GPRS Call context only where the call did not terminate normally. Where partial GPRS Calls are generated then only the last partial can contain a cause for termination where appropriate.</p> <p>Values 3, 4 and 5 (CAMEL initiated call release) are valid within a MOC/MTC only where the call did not terminate normally.</p> <p>Values 4 and 20 are valid within a Wi-Fi context only where the call did not terminate normally. Where partial GPRS Calls for Wi-Fi usage are generated then only the last partial can contain a cause for termination where appropriate.</p> <p>Values 1 and 5 (Management intervention) are valid for Voice over LTE only where the session did not terminate normally.</p> <p>Note: Only the values as defined above are valid in TAP. There are other valid 3GPP values (listed in Annex C), however, they are not valid in TAP.</p> <p>Following is a mapping between the RFC2866 Acct-Termination-Cause values and Cause for Termination values:</p> <table><tr><th>Cause For Termination Values</th><th>RFC2866 Values</th><th>RFC2866 Short Description</th></tr><tr><td><not present></td><td>1</td><td>User Request</td></tr><tr><td>4</td><td>2</td><td>Lost Carrier</td></tr><tr><td>4</td><td>3</td><td>Lost Service</td></tr><tr><td>4</td><td>4</td><td>Idle Timeout</td></tr><tr><td>4</td><td>5</td><td>Session Timeout</td></tr><tr><td>20</td><td>6</td><td>Admin Reset</td></tr><tr><td>20</td><td>7</td><td>Admin Reboot</td></tr><tr><td>4</td><td>8</td><td>Port Error</td></tr></table>	Cause For Termination Values	RFC2866 Values	RFC2866 Short Description	<not present>	1	User Request	4	2	Lost Carrier	4	3	Lost Service	4	4	Idle Timeout	4	5	Session Timeout	20	6	Admin Reset	20	7	Admin Reboot	4	8	Port Error				
Cause For Termination Values	RFC2866 Values	RFC2866 Short Description																														
<not present>	1	User Request																														
4	2	Lost Carrier																														
4	3	Lost Service																														
4	4	Idle Timeout																														
4	5	Session Timeout																														
20	6	Admin Reset																														
20	7	Admin Reboot																														
4	8	Port Error																														

Element	Description	Error Code	Context	Severity Level	Validation Description
	4 9 NAS Error 4 10 NAS Request 4 11 NAS Reboot 4 12 Port Unneeded 4 13 Port Preempted 4 14 Port Suspended 4 15 Service Unavailable 4 16 Callback 4 17 User Error <not present> 18 Host Request				
Charge	<p>The charge in local currency before any tax is added (if applicable).</p> <p>The Charge must not contain a negative value.</p> <p><i>Charge calculation and validation principles:</i> Charge calculation has to be precise. Charge calculation must be done with maximum computer capability. Intermediate rounding is not allowed. Only final charge could be rounded. It is recommended to round up to 6 fractional digits. Charge tolerance must be not more than half of smallest fractional position provided in the charge. Examples:</p> <p>Charge: 1.2345 Allowed tolerance: ± 0.00005 Charge: 1.23456 Allowed tolerance: ± 0.000005</p> <p>If in case of national regulation or technical inability the Sender cannot fulfil these charge calculation rules, the Sender must inform the Recipient about the actual charge calculation procedure to ensure the possibility to validate the charge with the tolerance allowed above.</p> <p><i>Conditionality:</i> Mandatory</p>	CHG1 CHG2 CHG3 CHG4	Calls Calls Calls Calls	Severe Severe Severe Severe	Syntax error. Value out of range. Missing Charge not in line with agreement.

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p><i>Values:</i></p> <p>> or = 0 (zero)</p>				
Charging ID	<p>A charging identifier which can be used to identify all records produced in SSGN(s) and GGSN or in S-GW(s) and P-GW involved in a single PDP context.</p> <p>For Wi-Fi usage this item is unique as a Wi-Fi record always represents a complete Wi-Fi session.</p> <p><i>Derivation:</i> GSM item ChargingID (PS Domain Charging – see Annex C).</p> <p>For Wi-Fi the derivation is at the discretion of the Sender. Note that Charging Id must remain unique during a significant amount of time.</p> <p><i>Conditionality:</i> Mandatory</p> <p><i>Range:</i> 0 – 4294967295 (derived from 0 to 2³²-1)</p>	<p>CID1</p> <p>CID2</p> <p>CID3</p>	<p>GPRS</p> <p>GPRS</p> <p>GPRS</p>	<p>Severe</p> <p>Severe</p> <p>Severe</p>	<p>Syntax error.</p> <p>Value out of range.</p> <p>Missing</p>
Data Volume Incoming	<p>The Data Volume Incoming identifies the number of incoming octets (bytes).</p> <p><i>Derivation:</i> GSM item dataVolumeGPRSDownlink (PS Domain Charging – see Annex C). For Wi-Fi usage items Acct-Input-Octets (RFC 2866) and Acct-Input-Gigawords (RFC 2869) converted into octets.</p> <p><i>Conditionality:</i> Mandatory.</p> <p><i>Values:</i></p>	<p>DVI1</p> <p>DVI2</p> <p>DVI3</p>	<p>GPRS</p> <p>GPRS</p> <p>GPRS</p>	<p>Severe</p> <p>Severe</p> <p>Severe</p>	<p>Syntax error.</p> <p>Value out of range.</p> <p>Missing.</p>

Element	Description	Error Code	Context	Severity Level	Validation Description
	> or = 0 (zero)				
Data Volume Outgoing	<p>The Data VolumeOutgoing identifies the number of outgoing octets (bytes).</p> <p><i>Derivation:</i> GSM item dataVolumeGPRSUplink (PS Domain Charging – see Annex C). For Wi-Fi usage items Acct-Output-Octets (RFC 2866) and Acct-Output-Gigawords (RFC 2869) converted into octets.</p> <p><i>Conditionality:</i> Mandatory.</p> <p><i>Values:</i> > or = 0 (zero)</p>	<p>DVO1</p> <p>DVO2</p> <p>DVOI3</p>	<p>GPRS</p> <p>GPRS</p> <p>GPRS</p>	<p>Severe</p> <p>Severe</p> <p>Severe</p>	<p>Syntax error.</p> <p>Value out of range.</p> <p>Missing.</p>
Dialled Digits	<p>The Dialled Digits item contains the actual digits as dialled by the subscriber, i.e. unmodified, in establishing a call. This will contain '+' and '#' where appropriate.</p> <p>The Dialled Digits item should contain everything the subscriber has entered before the send button is pushed (for example, pre-entered menu selections for voicemail).</p> <p>For emergency calls operators may optionally insert the digits '112' or their national emergency number into the Dialled Digits.</p> <p><i>Conditionality:</i> Must be present when available.</p> <p>If Called Number is not present then, in the case of either unsuccessful call attempt or CAMEL call with presence of CAMEL Destination Number, Dialled Digits must be present.</p> <p>If Dialled Digits is not available then Called Number must be</p>	<p>DIA1</p>	<p>MOC</p>	<p>Severe</p>	<p>Syntax error.</p>

Element	Description	Error Code	Context	Severity Level	Validation Description						
	<p>present.</p> <p><i>Values:</i> Each digit is numeric (0-9) or contains '+', '*' or '#'</p> <p>Note that the network may translate a dialled * to A and a dialled # to B. Where this is done then TAP must contain the original values of * or # as actually dialled by the subscriber.</p>										
Operator Specific Information	<p>This is an optional item which will contain information which has been bilaterally agreed.</p> <p>The content of the item is defined by bilateral agreement and may vary according to the context.</p> <p><i>Optionality:</i> On discretion of sender.</p>										
Partial Type Indicator	<p>The Partial Type Indicator identifies the first and last partials in a sequence.</p> <p><i>Conditionality:</i> Must be present within GPRS records where the Call Event Detail represents a partial.</p> <p>Not present for Wi-Fi usage as there are no partial records for Wi-Fi sessions.</p> <p><i>Values:</i></p> <table><tr><td>F</td><td>first partial</td></tr><tr><td>I</td><td>intermediate partial</td></tr><tr><td>L</td><td>last partial</td></tr></table>	F	first partial	I	intermediate partial	L	last partial	PTI2	GPRS	Severe	Value out of range.
F	first partial										
I	intermediate partial										
L	last partial										
PDP Context Start Timestamp	<p>The timestamp gives the start of the PDP context in the case where the Call Event Details (GPRS Call) represents an intermediate or last partial of a PDP context.</p>										

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>The time is given in the local time of the Sender PMN (or Serving Network where this is not the Sender). There must be a UTC Time Offset associated with the timestamp.</p> <p>Note: The local time is the local time at the location of the chargeable subscriber. Where the location is not available, as in some call forwarding scenarios, this will be a notional 'network local time'.</p> <p><i>Optionality:</i> Operators may decide not to supply this information (normally this will be because it is not available from the billing system).</p> <p><i>Conditionality:</i> Must be present within GPRS record where available and Partial Type Indicator is present identifying the GPRS Call as either an intermediate or last partial (subject to optionality).</p>				
Serving Network	<p>A unique identifier used to determine the network where the call event was originally created. This would be a TADIG PMN code (see TADIG PRD TD.13 [2])</p> <p><i>Conditionality:</i> Mandatory.</p>	<p>SVN2</p> <p>SVN3</p>	<p>Calls</p> <p>Calls</p>	<p>Severe</p> <p>Severe</p>	<p>Value out of range.</p> <p>Missing.</p>
Source File Identification	<p>A reference which allows the record to be tracked back to the source file or multiple source files. Source files could be identified by TAP sequence number, file name or file id. Identification may contain multiple source file references – original TAP file sequence, MNO to MVNO file name and DSP to ARP file id.</p> <p>In case of multiple source files – references should be separated by blank and newest file reference should be at the beginning of the string.</p> <p><i>Conditionality:</i></p>				

Element	Description	Error Code	Context	Severity Level	Validation Description
	Mandatory if received in source file, otherwise at the discretion of the sender.				
Subscriber Identification	<p>The subscriber identification as defined by Subscriber Identification Type.</p> <p>IMSI</p> <p>It must be full IMSI (not only MCC+MNC) which uniquely identifies the subscriber who has used the network and is liable for any charges that may be incurred.</p> <p><i>Derivation:</i> GSM item servedIMSI (See Annex C – CS Domain Charging and PS Domain Charging).</p> <p>MSISDN</p> <p>The Mobile Subscriber ISDN number. It is represented in international format, i.e. the number begins with the country code.</p> <p><i>Derivation:</i> GSM item MSISDN (See Annex C – CS Domain Charging and PS Domain Charging).</p> <p>Public User ID</p> <p>An address identifying the subscriber, either in the form of a SIP URI or TEL URI.</p> <p><i>Derivation:</i> IMS item SubscriptionID (See Annex C – IMS Domain Charging)</p>	SID1	Calls	Severe	Syntax error.
		SID3	Calls	Severe	Missing.
		SID4	Calls	Severe	Referenced subscriber does not belong to recipient at the corresponding call event date.

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p><i>Examples:</i> sip:alice@atlanta.com sip:alice:secretword@atlanta.com;transport=tcp sips:alice@atlanta.com?subject=project%20x&priority=urgent sip:+1-212-555-1212:1234@gateway.com;user=phone sips:1212@gateway.com sip:alice@192.0.2.4 sip:atlanta.com;method=REGISTER?to=alice%40atlanta.com sip:alice;day=tuesday@atlanta.com</p> <p><i>Subscriber Identification conditionality:</i> Mandatory.</p>				
Subscriber Identification Type	The type of subscriber identification.	SIT2	Calls	Severe	Value out of range.
	<i>Conditionality:</i> Mandatory	SIT3	Calls	Severe	Missing.
	<i>Values:</i> <div><div>I</div><div>IMSI</div><div>M</div><div>MSISDN</div><div>P</div><div>Public User ID</div></div>				
Supplementary Service Code	A code which uniquely defines the supplementary service, a group of supplementary services, or a USSD message. It is combined with an Action Code. The Action Code qualifies the way in which the supplementary service is used.	SSV2	SS	Severe	Value out of range. (Including invalid or non transferable Supplementary Service Code and Action code combination)
	<i>Derivation for Supplementary Service:</i> GSM items SupplementaryServiceCode and SS ActionType (See Annex C – CS Domain Charging). The code is derived by taking the MAP encoding (See Annex C – Supplementary Service Codes) and translating bits 8-5 into a 'hex' character and bits 4-1 into a second 'hex' character.	SSV3	SS	Severe	Missing.
	<i>Conditionality:</i>	SSV5	MOC	Severe	Value 'FF'.

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>Mandatory within SS records. Mandatory within MOC records where a supplementary service has been used in conjunction with the call unless supplied in a separate SS record.</p> <p><i>Supplementary Service Codes Values:</i></p> <p>00 All supplementary services 10 All line identification services 11 Calling number identification presentation 12 Calling number identification restriction 13 Connected number identification presentation 14 Connected number identification restriction 18 All name identification SS 19 Calling name presentation 20 All call forwarding 21 Call forwarding unconditional 24 Call deflection 28 All conditional Call Forwarding 29 Call forwarding on mobile subscriber busy 2A Call forwarding on no reply 2B Call forwarding on subscriber not reachable 30 All call offering services 31 Call transfer 40 All call completion services 41 Call waiting 42 Call hold 43 Completion of calls to busy subscribers – origination side 44 Completion of calls to busy subscribers – destination side 45 Multicall 50 All multi party services 51 Multi party service 60 All community of interest services 61 Closed user groups 70 All charging supplement services 71 Advice of charge (information)</p>				

Element	Description	Error Code	Context	Severity Level	Validation Description																								
	<div>72 Advice of charge (charging)</div> <div>80 All additional info transfer services</div> <div>81 UUS1 user to user signalling</div> <div>82 UUS2 user to user signalling</div> <div>83 UUS3 user to user signalling</div> <div>90 All call barring</div> <div>91 All Barring of outgoing Call Services</div> <div>92 Barring of all outgoing calls</div> <div>93 Barring of all outgoing international calls</div> <div>94 Barring of all OG international except HPMN</div> <div>99 All Barring of incoming Call Services</div> <div>9A Barring of all incoming calls</div> <div>9B Barring of all IC calls when outside HPMN</div> <div>FF USSD Message</div> <div>Action Codes Values:</div> <table><tr><td>0</td><td>Registration</td><td>SS only</td></tr><tr><td>1</td><td>Erase</td><td>SS only</td></tr><tr><td>2</td><td>Activation</td><td>SS only</td></tr><tr><td>3</td><td>Deactivation</td><td>SS only</td></tr><tr><td>4</td><td>Interrogation</td><td>SS only</td></tr><tr><td>5</td><td>Invocation</td><td>SS only</td></tr><tr><td>6</td><td>Registration of Password</td><td>SS only</td></tr><tr><td>7</td><td>USSD Invocation</td><td>USSD only</td></tr></table> <div>Examples:</div> <div>2A5 – Invocation of call forwarding on no reply</div> <div>292 – Activation of call forwarding on mobile subscriber busy</div>	0	Registration	SS only	1	Erase	SS only	2	Activation	SS only	3	Deactivation	SS only	4	Interrogation	SS only	5	Invocation	SS only	6	Registration of Password	SS only	7	USSD Invocation	USSD only				
0	Registration	SS only																											
1	Erase	SS only																											
2	Activation	SS only																											
3	Deactivation	SS only																											
4	Interrogation	SS only																											
5	Invocation	SS only																											
6	Registration of Password	SS only																											
7	USSD Invocation	USSD only																											
Tax Value	The actual value.	TAX1	Calls	Severe	Syntax error.																								
	The Tax Value must be of a value greater than or equal to zero.	TAX2	Calls	Severe	Value out of range.																								
	Conditionality:	TAX3	Calls	Severe	Missing.																								

Element	Description	Error Code	Context	Severity Level	Validation Description
	<p>Mandatory.</p> <p>Values:</p> <p style="padding-left: 40px;">>= 0 (zero)</p>	TAX4	Calls	Severe	Tax Value is not in line with the agreement at the corresponding call event date.
Total Call Event Duration	<p>The item contains the actual total duration of a call event as a number of seconds.</p> <p>The Total Call Event Duration must always contain the call duration calculated from the call end time (channel release) minus the Call Event Start Timestamp.</p> <p>The item is used, in conjunction with the Call Event Start Timestamp (and UTC Time Offset) to calculate the call event end time. This is needed for ageing calculations and validation against the File Available Timestamp.</p> <p>Conditionality:</p> <p style="padding-left: 40px;">Mandatory within</p> <p style="padding-left: 80px;">MOC</p> <p style="padding-left: 80px;">MTC</p> <p style="padding-left: 80px;">GPRS</p> <p>Values:</p> <p style="padding-left: 40px;">>= 0 (zero)</p> <p>Note: for SMS calls the value must be 0 (zero).</p>	DUR1	MOC MTC GPRS	Severe	Syntax error.
		DUR2	MOC MTC GPRS	Severe	Value out of range
		DUR3	MOC MTC GPRS	Severe	Missing.
		DUR5	MOC MTC	Severe	Total Call Event Duration is greater than 0 (zero) for SMS call.

Table 3: File Content Elements

5 Error Handling Procedure

5.1 General Rules

ARP should communicate errors to DSP by email.

Charging errors should be handled by issuing credit notes. Records with charging errors should not be stopped.

Relaxed rules should be applied during validation:

- Leading and trailing whitespace should be ignored.
- Fields not relevant to validated record type should be ignored.
- Extra fields at the end of the records should be ignored.

5.2 Error Codes

Error codes consist of two parts: a three letter abbreviation of element name and an error number for the element. Error numbers from 1 to 4 are used for following types of errors:

- 1 – Syntax error
- 2 – Value out of range
- 3 – Missing
- 4 – Value is not as agreed

Annex A Supplementary Services

The following table contains the relevant combinations of Service Codes and Actions.

For the purposes of the table a notation is used as follows:

‘-’ An invalid combination of Service Code and Action (as defined by 3GPP TS 22.004)

‘Y’ A valid and relevant combination of Service Code and Action which must be transferred

‘O’ A valid and relevant combination of Service Code and Action which optionally can be transferred in the TAP for customer care purposes

‘N’ A valid and relevant combination of Service Code and Action which must not be transferred

Supplementary Service		Action						
		Registration	Erasure	Activation	Deactivation	Interrogation	Invocation	Password
		0	1	2	3	4	5	6
00	All supplementary services	-	-	-	-	-	-	O
10	All line identification service	-	-	-	-	-	-	-
11	Calling number identification presentation	-	-	-	-	N	O	-
12	Calling number identification restriction	-	-	O	-	N	N	-
13	Connected number identification presentation	-	-	-	-	N	N	-
14	Connected number identification restriction	-	-	N	-	N	N	-
18	All name identification SS	-	-	-	-	N	N	-
19	Calling name presentation	-	-	-	-	N	O	-
20	All call forwarding	O	O	O	O	-	-	-
21	Call forwarding unconditional	O	O	O	O	N	-	-
24	Call deflection	-	-	-	-	-	O	-
28	All conditional call forwarding	O	O	O	O	-	-	-
29	Call forwarding on mobile subscriber busy	O	O	O	O	N	Y	-
2A	Call forwarding on no reply	O	O	O	O	N	Y	-
2B	Call forwarding on subscriber not reachable	O	O	O	O	N	Y	-
30	All call offering services	-	-	-	-	-	-	-
31	Call transfer	-	-	-	-	-	O	-
40	All call completion services	-	-	-	-	-	-	-
41	Call waiting	-	-	O	O	N	N	-
42	Call hold	-	-	-	-	-	O	-
43	Completion of calls to busy subscribers – origination side	-	O	O	O	N	O	-
44	Completion of calls to busy subscribers – destination side	-	O	O	O	N	O	-
45	Multicall	N	-	-	-	N	O	-
50	All multi party services	-	-	-	-	-	-	-
51	Multi party service	-	-	-	-	-	O	-
60	All community of interest services	-	-	-	-	-	-	-
61	Closed user groups	-	-	-	-	-	O	-
70	All charging supplementary services	-	-	-	-	-	-	-
71	Advice of charge – information	-	-	-	-	-	O	-
72	Advice of charge – charging	-	-	-	-	-	O	-
80	All additional info transfer services	-	-	-	-	-	-	-

Supplementary Service		Action						
		Registration	Erasure	Activation	Deactivation	Interrogation	Invocation	Password
		0	1	2	3	4	5	6
81	UUS1 user to user signalling	-	-	O	O	-	O	-
82	UUS2 user to user signalling	-	-	O	O	-	O	-
83	UUS3 user to user signalling	-	-	O	O	-	O	-
90	All call barring	O	-	-	O	-	-	N
91	All barring of outgoing call services	-	-	-	O	-	-	-
92	Barring of all outgoing calls	-	O	O	O	N	-	-
93	Barring of all outgoing international calls	-	O	O	O	N	-	-
94	Barring of all outgoing international except HPMN	-	O	O	O	N	-	-
99	All barring of incoming call services	-	-	-	O	-	-	-
9A	Barring of all incoming calls	-	O	O	O	N	-	-
9B	Barring of all IC calls when outside HPMN	-	O	O	O	N	-	-

Table 4: Supplementary Services

Annex B Changes from Previous Specification Version Number

This section lists the changes from previous Specification Version Number.

Description	Originator	Specification Version	Comments

Table 5: Changes from Previous Specification Version Number

Annex C Description of 3GPP Releases and Specifications

C.1 Charging Specifications

The table below provides a description of the development of 3GPP releases and the corresponding charging specifications applicable to every GSM/3GPP release.

Note: All 3GPP specifications (including the old GSM specifications previously maintained by ETSI) can be found on the 3GPP ftp site: <http://www.3gpp.org/ftp/Specs/archive/>.

	Phase 2 and Release 96	Releases 97, 98	Releases 99, 4	Release 5	Releases 6, 7, 8, 9, 10, 11
CS domain charging	TS 12.05	TS 12.05	TS 32.005	TS 32.205	TS 32.298
PS domain charging		TS 12.15	TS 32.015	TS 32.215	TS 32.298
IMS domain charging				TS 32.225	TS 32.298
SMS Charging					TS 32.298 & 32.274
LCS charging					TS 32.298

Table 6: Charging Specifications

Annex D Step by Step Procedure How to Upload Example ABF File into Database Table

This annex will illustrate how records from example ABF files could be uploaded into a database table. This annex is intended as a help for Developers. It does not set any requirements or obligations.

As a database was used Microsoft SQL Server 2008 R2 SP2 Express edition installed on Windows 7 PC. This database could be downloaded free of charge from the Microsoft website.

The following steps are required:

- Download and install Microsoft SQL Server 2008 R2 SP2 Express edition on your PC.
- Store example ABF file into directory c:\tmp.
- Run SQL Management Studio (installed with SQL Server).
- Create database TempDb.
- Create table calls in TempDb
- Upload example ABF file to calls table.
- View uploaded records from calls table.

In order to install SQL Server Express database - run installation file (in the example case it was SQLEXPRESS_x86_ENU.exe), select new installation and accept default settings throughout the installation.

Put example ABF file CD_LVALM_ARP01_00001_20130321112000+0300_20130321112000+0300_1_EUR_3.338_0_7.csv into directory c:\tmp.

Run SQL Management Studio. Press New Query button (upper left corner) and enter SQL commands to execute following steps (commands are in bold).

Enter and execute following commands to create database TestDb:

USE master

GO

CREATE DATABASE TestDb

GO

Enter and execute following commands to create table calls in TestDb database:

USE [TestDb]

GO

CREATE TABLE [calls](

```
[Call_Type] [char](1) NOT NULL,  
[Serv_Netw] [char](5) NOT NULL,  
[Source_File] [varchar](100) NULL,  
[Subscr_Id_Type] [char](1) NOT NULL,  
[Subscr_Id] [varchar](100) NOT NULL,  
[Number_or_APN] [varchar](63) NULL,  
[Diall_Dig] [varchar](50) NULL,  
[Call_Time] [datetimeoffset](7) NOT NULL,  
[Tot_Duration] [bigint] NULL,  
[Part_Ind] [char](1) NULL,  
[PDP_Cont_Time] [datetimeoffset](7) NULL,  
[Data_Vol_Inc] [bigint] NULL,  
[Data_Vol_Out] [bigint] NULL,  
[Basic_Serv_Code] [char](3) NULL,  
[Suppl_Serv_Code] [char](3) NULL,  
[Cause_for_Term] [int] NULL,  
[Charge] [decimal](18, 6) NULL,  
[Tax_Value] [decimal](18, 6) NULL,  
[Call_Ref] [bigint] NULL,  
[CAMEL_Serv_Key] [int] NULL,  
[CAMEL_Dest_Number] [varchar](63) NULL,  
[CAMEL_APN_OI] [varchar](37) NULL,  
[Op_Spec_Inf] [varchar](MAX) NULL,  
) ON [PRIMARY]  
GO
```

Enter and execute following commands to upload test file CD_LVALM_ARP01_00001_
20130321112000+0300_20130321112000+0300_1_EUR_3.338_0_7.csv into table calls:

```
BULK INSERT [TestDb].[dbo].[calls] FROM  
'C:\tmp\CD_LVALM_ARP01_00001_20130321112000+0300_20130321112000+0300_1_E  
UR_3.338_0_7.csv' WITH (FIELDTERMINATOR = ',', ROWTERMINATOR = '\n')
```

```
GO
```

Enter and execute following commands to view records uploaded from example file:

```
SELECT * FROM [TestDb].[dbo].[calls]
```

```
GO
```

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