

**Human Factors (HF);
European harmonization of network generated tones;
Part 2: Listing and analysis of European, World and
Standardized tones**



European Telecommunications Standards Institute

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Foreword

This Technical Report (TR) has been produced by the ETSI Technical Committee Human Factors (HF).

The present document is part 2 of a multipart TR covering the European harmonization of network generated information tones, as identified below:

Part 1: "A review and recommendations";

Part 2: "Listing and analysis of European, World and Standardized tones".

The intended users of the present document include:

Table 1: Intended users and potential benefits

	User	TR used for	Potential benefit
1	Manufacturers, network operators, and other developers and providers of telecommunications networks and services.	Allocation and specification of network generated tones and their technical characteristics.	Improved usability through harmonized application of tones in networks.
2	Designers and users of networks and telecommunications services.	Ensuring conformance with meaning and characteristics for individual tones for existing and new services.	Improved usability through easier identification and verification of tones and their meaning.
3	ETSI Technical Committees End-users.	Development and upgrading of network services.	Improved usability of national and international services by ensuring consistency with user needs.

1 Scope

The present document is the second part of a Technical Report (TR) that reports the results of a project carried out under the CEC Mandate [1] to study and investigate the potential harmonization of telephone information tones generated by public networks.

This second part provides detailed lists and analyses of reported current European and World network service tones, and compares them with existing international standards.

2 References

References may be made to:

- a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or
- b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or
- c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or
- d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] CEC Mandate BC-T-308 (02/94): "Specification of characteristics of a harmonized set of telephone tones generated by public networks".
- [2] BS 6305: (1992): "Specification for general requirements for apparatus for connection to public switched telephone networks run by certain public telecommunications operators" BSI, London.
- [3] CEPT Recommendation T/SF 23 (Vienna 1982): "Définitions et caractéristiques audibles des tonalités et des annonces parlées" (Definitions and audible characteristics of tones and spoken announcements).
- [4] CEPT Recommendation T/CS 20-15 (Innsbruck 1981): "Tones and announcements".
- [5] ETR 131 (1994): "Terminal Equipment (TE): An investigation into the need for standardization in stored voice services".
- [6] ETR 187 (1995): "Recommendation of characteristics of telephone service tone when locally generated in telephony terminals".
- [7] ETR 294 (1996): "Radio Equipment and Systems (RES); Trans-European Trunked RAdio (TETRA); Voice and Data (V+D) and Direct Mode Operation (DMO); Mobile Station (MS) Man Machine Interface (MMI)".
- [8] ETR 329 (1996): "Guidelines for procedures and announcements in Stored Voice Services (SVS) and Universal Personal Telecommunication (UPT)".
- [9] ETS 300 085 (1990): "Integrated Services Digital Network (ISDN); 3,1 kHz telephony teleservice, Attachment requirements for handset terminals (Candidate NET 33)".
- [10] ETS 300 245-7: "ISDN Technical characteristics of telephony terminals; Part 7: Locally generated information tones".
- [11] GSM 02.40: "European digital cellular telecommunications system (Phase 2); Procedures for call progress indications (also known as ETS 300 512)". Second edition, August 1995.

- [12] Gagliardi, D: "Report on the audible tones in the telephone service in the EC countries". Report from contract 48159, DGXIII, European Commission, Brussels, April 1993.
- [13] ISO/IEC 13714 (1995): "User Interface to Telephone-based Services: Voice Messaging Applications".
- [14] CCITT Recommendation E.180: "Technical characteristics of tones for the telephone service".
- [15] CCITT Recommendation E.182: "Application of tones and recorded announcements in telephone services".
- [16] ITU-T Recommendation E.180 Supplement 2 (Series E) (01/94): "Various tones used in national networks".
- [17] prETS 300 295 2nd final draft, July 1994: "Human Factors (HF); Specification of characteristics of telephone service tones when locally generated in telephony terminals" (prETS 300 295 [17] was rejected at the public vote. The reference is included for the record).
- [18] I-ETS 300 400: "Integrated Services Digital Network (ISDN); Telephony Service, Payphones".
- [19] prETS 300 738: "Minimum Man-Machine Interface (MMI) to public network based supplementary services".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the following definitions apply (in the case of tones, they are defined as in CCITT Recommendation E.182 [15], or source referenced):

acceptance tone: A tone reported by one or more non-European countries (no specific function description is reported).

announcement (also referred to as voice announcement): An audible indication in the form of speech, utilized for information, instructions and guidance in the telephone service (see also ETR 131 [5]).

audible indication: An audible indication is understood to be a sound composed of frequencies within the range 300-3 400 Hz which is used to inform the user about the state of a telephone call or supplementary service (from CCITT Recommendation E.182 [15]).

busy tone: A tone advising the caller that the telephone is busy (from CCITT Recommendation E.182 [15]).

cadence: The pattern of sound/silence in a tone which gives it a characteristic rhythm.

call waiting tone: A tone advising the user of the call waiting supplementary service who is engaged on a call that someone is attempting to call his number (from CCITT Recommendation E.182 [15]).

caller waiting tone: A tone advising a caller that a called station, though busy, has a call waiting service active (from CCITT Recommendation E.182 [15]).

comfort tone: A tone advising that the call is being processed and that the caller should wait (from CCITT Recommendation E.182 [15]).

conference tone: A short burst tone reported by Slovakia (no specific function description is reported but it may be used to signal the start of a conference service).

confirmation tone: A tone used in some exchanges in place of an announcement to indicate that an interrogated service is active (from BS 6305 [2]).

congestion tone: A tone advising the caller that the groups of lines or switching equipment necessary for the setting-up of the required call or for the use of a specific service are temporarily engaged (from CCITT Recommendation E.182 [15]).

connection tone: A tone reported by Slovakia and similar in characteristics and maybe similar in meaning to the French, Polish and Irish Route/Comfort tone.

dial tone: A tone advising that the exchange is ready to receive call information and inviting the user to start sending call information (from CCITT Recommendation E.182 [15]).

discriminability: The characteristics of a tone which allows a human user to recognize one tone from another, by for example, frequency or cadence.

end of three party service tone: A tone reported by one or more non-European countries (no specific function description is reported).

executive override tone: A tone reported by one or more non-European countries (no specific function description is reported).

facilities tone: A tone reported by one or more non-European countries (no specific function description is reported).

frequency: The characteristic of a telephone tone which determines its pitch, expressed in hertz.

function acknowledge tone: A tone reported by one or more non-European countries (no specific function description is reported).

holding tone: A tone assumed to have the same meaning as "tone on hold".

identification tone: A tone reported by one or more non-European countries (no specific function description is reported).

intercept tone: (Also known as intercept treatment tone). A tone indicating that the call cannot be completed by the switching system (c.f. number unobtainable tone).

intrusion tone: A tone during a call advising participants in the call that the privacy of the conversation has been breached, e.g. by intervention of an operator (from CCITT Recommendation E.182 [15]).

line lockout tone: A tone reported by one or more non-European countries (no specific function description is reported).

negative indication tone: A tone telling a subscriber that the request for service cannot be accepted (from CCITT Recommendation E.182 [15]).

nominal value: The stated target figure for a given parameter, may be expanded by a tolerance to include an envelope of values equally spread around the nominal value. The distribution of values should reflect a normal curve with high kurtosis.

notify tone: A tone reported by one or more non-European countries (no specific function description is reported).

number unobtainable tone: (Also known as connection not admitted indication). A tone indicating that the number dialled has not been recognized by the network as valid (ITU-T do not define a tone with this title, but their definition of "special information tone" includes the condition to be indicated, CCITT Recommendation E.182 [15]).

offering tone: A tone reported by Hungary and Slovakia (no specific function description is reported).

on/off ratio: The quotient of the total time a tone is on during one cadence pattern, divided by the total time of the intervening silences. A tone with a cadence of 0,5 s on and 0,5 s off (usually shown as **0,5** - 0,5) has an on/off ratio of 1. A tone with a cadence of **0,05** - 0,5 has an on/off ratio of 0,1. Therefore on/off ratios <1 are mostly silence with short bursts of tone, and on/off ratios >1 are mostly tone with short bursts of silence (in duty cycle terms - low vs. high duty cycle, as opposed to short vs. long which is equivalent to period).

operator intervening tone: See Warning tone - Operator Intervening and Intrusion tone.

pay tone: A tone advising users of a payphone that a payment is required (from CCITT Recommendation E.182 [15]).

payphone recognition tone: A tone advising a public exchange operator that the termination to or from which connection is sought is identified as a payphone (from CCITT Recommendation E.182 [15]).

period: The total length of time required to complete one cadence pattern.

permanent signal tone: A tone reported by one or more non-European countries (no specific function description is reported).

positive indication tone: A tone telling a subscriber controlling a supplementary service that a control procedure has been successfully completed and accepted (from CCITT Recommendation E.182 [15]).

pre-emption tone: The purpose of this tone is to tell the calling and called party that their call is being disconnected due to a higher priority call demanding the communication channel. This is a new tone that should be required by any multilevel precedence and pre-emption supplementary service.

queue tone: A tone indicating that the call has been put in a queue and is subject to charging (from CEPT Recommendation T/SF 23 [3]) also a tone reported by Finland (no specific function description is reported).

re-order tone: A tone reported by one or more non-European countries (see clause 5, no specific function description is reported).

recall dial tone: (Also known as stutter dial tone and transfer dial tone). A modified dial tone indicating that an operating feature is activated that requires presentation of a second dial tone (one having the same meaning as "special dial tone").

record tone: A tone generated by a voice messaging system or by automatic answering equipment to inform the calling user when to start talking in order to record a message (see also CCITT Recommendation E.182 [15] and ISO/IEC 13714 [13]).

refusal tone: A tone reported by one or more non-European countries (no specific function description is reported).

rhythm: The subjective effect, or perception, of cadence.

ringing tone: A tone advising the caller that a connection has been made and that a calling signal is being applied to a telephone number or service point (from CCITT Recommendation E.182 [15]).

route tone: A tone assumed to have the same meaning as "comfort tone".

search tone: A tone reported by one or more non-European countries (no specific function description is reported).

second dial tone: A tone advising the caller that the network has accepted the call information already sent and asking the caller to provide more information (from CCITT Recommendation E.182 [15]).

service activated tone: A tone reported by one or more non-European countries (no specific function description is reported) (similar to positive indication?).

special dial tone: A tone advising that the exchange is ready to receive call information and inviting the user to start sending call information, at the same time reminding the user that special conditions apply to the termination from which the call is being made (from CCITT Recommendation E.182 [15]).

Special Information Tone (SIT): A tone advising the caller that the called number cannot be reached for reasons other than "subscriber busy" or "congestion". The tone may also be used in conjunction with recorded announcements to signify that what the caller is about to hear is a recording. It should always be used to precede all call failure announcements. (from CCITT Recommendation E.182 [15]).

terminal: A device connected to a network providing the man machine interface to that network, through which a user makes use of telecommunications services.

test number tone: A tone reported by one or more non-European countries (no specific function description is reported).

tolerance: The acceptable variation or margin of error around a nominal value for a given parameter.

tone on hold: A tone used to reassure a calling user who has been placed on "hold" by a subscriber with the Hold supplementary service, PBX or other facilities (see CCITT Recommendation E.182 [15]).

tone: A tone is an audible indication comprising a small number of discrete frequencies, but excluding speech (from CCITT Recommendation E.182 [15]). Examples are dial tone or special announcement tone (see separate definition for each tone).

valid tone: Used in Greece on their radio paging network, it has the same characteristics as their positive indication tone.

warning tone (end of period): A tone reported by one or more non-European countries (no specific function description is reported).

warning tone (time limit barring): A tone used for the supplementary service "Time Limit Barring" to indicate end of call time reported by one European country (see clause 4).

warning tone - operator intervening: Wording used in ITU-T Recommendation E.180 Supplement 2 (Series E) [16], assumed to have the same meaning as "intrusion tone".

warning tone: A tone warning participants in a call that the privacy of a conversation cannot be ensured where a recording machine is being used (from CCITT Recommendation E.182 [15]).

3.2 Symbols

For the purposes of the present document, the following symbols apply:

/	Used within the frequency descriptions in the tone tables to signify a sequence of frequencies e.g. 950/1 400/1 800 equates to a burst of 950 Hz followed by a burst of 1 400 Hz followed by a burst of 1 800 Hz.
//	Sometimes used within the frequency descriptions in the tone tables to signify an alternative frequency may be used on some exchanges, e.g. 400//450 equates to a tone of 400 Hz is used in some exchanges and of 450 Hz in other exchanges.
+	Used within the frequency descriptions in the tone tables to signify a combination of frequencies e.g. 375 + 450 equates to a dual frequency tone with both frequencies given simultaneously.
±	Used within the frequency descriptions in the standards tone tables to signify a tolerance in relation to a nominal frequency, e.g. 425 ± 15 Hz (see tolerance in subclause 3.1).
×	Used within the frequency descriptions in the tone tables to signify that the first frequency is modulated by the second.
?	Used within the tables to signify that the information is given as recorded in ITU-T Recommendation E.180 Supplement 2 (Series E) [16] but is thought possibly to be erroneous.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ADSI	Analogue Display Services Interface
CEC	Commission of the European Communities
CCITT	Consultative Committee on International Telegraphy and Telephony
CCIR	Centre for Communications Interface Research (University of Edinburgh)
CEPT	Conférence des Administrations Européennes des Postes et Télécommunications
DG	Directorate General (or Director General)
DTMF	Dual Tone Multiple Frequency
EU	European Union
EPROM	Electrically Programmable Read Only Memory
GSM	Global System for Mobile communications
HF	Human Factors
IEC	International Electrotechnical Commission
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ITU-T	International Telecommunications Union - Telecommunications Standardization Sector
MMI	Man Machine Interface
ONP	Open Network Provision
PABX	Private Automatic Branch eXchange
PIN	Personal Identity Number
PSN	People with Special Needs
PSTN	Public Switched Telephone Network
PUI	Personal User Identity

Qu.	Question (within an ITU-T Study period)
SIM	Subscriber Identification Module
SIT	Special Information Tone
SVS	Stored Voice Service
SWAT	Signal, Wait, Abort, Talk
TC-HF	Technical Committee Human Factors
TE	Terminal Equipment
TETRA	TErrestrial Trunked RAdio
UPT	Universal Personal Telecommunications

4 Analysis of current European network service tones

4.1 Introduction

4.1.1 Data sources

This analysis is based on the ITU-T Recommendation E.180 Supplement 2 (Series E) [16]. The original data was collected in July 1991 and March 1992 in response to the CCITT Circular Letter No.98.

The list of European countries used for the tables in clause 4.3 is based on the ETSI list of National Standardization Organizations (NSO) to which ETSI relates. For some of the analysis this list has been subdivided to reflect those countries that are EU members.

Table 2: EU vs. Non EU Countries within ETSI

European Union Countries	Non European Union Countries
Austria	Albania
Belgium	Bulgaria
Denmark	CI Jersey
Finland	Croatia
France	Cyprus
Germany	Czech Republic
Greece	Estonia
Ireland	Faroe Islands
Italy	Gibraltar
Luxembourg	Hungary
Netherlands	Iceland
Portugal	Lithuania
Spain	Malta
Sweden	Norway
United Kingdom	Poland
	Romania
	Russia
	Slovakia
	Slovenia
	Switzerland
	Turkey
	Yugoslavia

See clause 5 for an analysis of the service tones reported used in the rest of the world (non-Europe). See clause 6 for a summary of the characteristics of service tones defined within International and European Standards.

The analysis is divided into three sets. Set 1 and 2 reflect the relative "preference for standardization" weighting given in the CEC Mandate [1] to ETSI. Set 3 lists the other reported tones used in the various countries. Where a country reports a number of different tone characteristics for the same basic tone function these are indicated in the tables as Country X1, Country X2, Country X3, etc. For example see Bulgaria 1 and 2 in table 4.1.

Where there are several operators in one country providing basic teleservices within the same network type (PSTN, ISDN, PLMN, etc.) no data was found which identified any differences in the function or characteristics of tones used by the different operators. However differences do exist between different networks. For example, between tones provided in GSM mobile terminals and the tones provided on the local PSTN network.

Set 1: Dial, Ring, Busy, Special Information (including Number Unobtainable), Call Waiting, Pay tones;

Set 2: Special Dial, Positive Indication, Congestion, Intrusion (including Warning Operator, Intervening) tones;

Set 3: Second Dial, Payphone Recognition, Negative Indication, Route, Offering, Recall Dial, Holding, Valid, Queue, Record, Confirmation, Intercept, Connection, Conference tones.

4.1.2 Sources of error in the reported tones used

4.1.2.1 Detectable errors

Where there was an omission or potential error detected in the ITU-T material, additional information was sought from specific network sources e.g. Norway, Sweden, UK, or direct from Gagliardi's report [12], or from ETS 300 085 [9] (re-locally generated tones). Where possible this additional material was used to verify the true situation. Where no alternative source is quoted the source used was the ITU document.

For example, the Dial tones reported for Portugal and Greece were:

Table 3: An example of some of the conflict found in the data sources

	Cadence (s)	Frequency (Hz)
Portugal 1 (ITU)	Continuous	400 or 425
Portugal 2 (Gagliardi)	Continuous	400
Portugal 3 (ETS 300 085 [9])	Continuous	425
Greece 1 (ITU)	0,2 - 0,3 - 0,7 - 0,8	425 or 450
Greece 2 (ETS 300 085 [9])	0,2 - 0,8 - 0,7 - 0,3	425 or 450

Clearly the reported frequency for Portugal requires further checking, both 400 Hz and 425 Hz may be in current use, 400 Hz may be in the process of being phased out. On the other hand, the reported cadences for Greece suggest that there may be two distinct Dial tones.

Unfortunately each of the individual sources used was shown to have some degree of error. It is hoped that by cross checking with individual network operators and between the source documents the errors in the tables presented in clause 4 have been minimized. Where the conflict has not been satisfactorily resolved, the conflicting sources are quoted. For example, see Ireland 1 and 2 in table 4.1.

4.1.2.2 Undetectable errors

The analysis of the tones reported to be used in each country is dependent on the interpretation given to the definition which applies to any tone. For the core set of tones (Dial, Ring, and Busy) most European countries appear to adhere to the ITU-T (formerly CCITT) Recommendations. However beyond these three there is an increased potential for confusion. Indeed, for any reported tone there may be three sources of error:

- the tones appear to be reported with respect to their perceived "official" name and function rather than with respect to their actual functional usage. That is for some tones the official definition does not reflect the actual telecommunications "function" the tone is used to convey; e.g. Special Information Tone (SIT) is defined to report network situations which prevent completion of the call, but in practice it is often used for a broad range of situations, both negative and positive. See also subclause 4.3 Intrusion tone;
- a single tone is used to inform the user of differing telecommunications "functions"; e.g. Busy tone is sometimes used to mean Subscriber Busy, Supplementary Service Negative tone, Network Congestion, etc;
- the basic characteristics of the tone, its frequency/ies and/or cadence, may vary within the normal tolerances, or may exceed these.

4.1.3 Comparison of European network service tones with the existing standards

Within the tables presented in clause 4.2 the opportunity is taken to show a comparison between the characteristics of the reported tone with the characteristics specified in the existing standards. Three comparisons are made:

- against CCITT Recommendation E.180 [14], shown by the grey scale in the left most column;
- against CEPT Recommendation T/SF 23 [3], shown by the grey scale in the cadence column;
- against recommendations included in ETR 187 [6], ETS 300 245-7 [10], and GSM 02.40 [11], shown by the grey scale in the period column.

Those reported tones that are in compliance with the standard i.e. meet all the required characteristics are shaded darkest (20 % shading). The lighter shading (5 %) is used to indicate two types of "near misses". These are:

- tones that are probably in compliance, but where the country may report they also use an alternative frequency (perhaps on some older exchanges);
- tones that are not strictly in compliance but which are very close and certainly within the stated tolerances limits, e.g. where a country reports a nominal frequency of 420 Hz when the specification states 425 Hz with a tolerance of 3,5 % (i.e. approx. ± 15 Hz). Where a country reports a nominal value on the limit of the stated tolerance this has been regarded as non-compliant.

4.2 European Set 1:

Dial, Ring, Busy, Special Information (including number unobtainable), Call Waiting and Pay tones.

4.2.1 European Dial tones

Functional definition

The auditory indication to be presented to a user to indicate that a network connection is available and ready to receive call information and inviting the user to start sending call or service related information (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.1: European Dial tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	None reported			Malta
1	0,33 - 0,33 - 0,66 - 0,66	1,98	425	Czech Republic, Slovakia
2	0,2 - 0,2 - 0,6 - 1,0	2	425	Italy
3	0,7 - 0,8 - 0,2 - 0,3	2	425	Slovenia, Yugoslavia
4	0,2 - 0,3 - 0,7 - 0,8	2	425	Croatia
5	0,2 - 0,3 - 0,7 - 0,8	2	425 or 450	Greece 1 (ITU)
6	0,2 - 0,8 - 0,7 - 0,3	2	425 or 450	Greece 2 (ETS 300 085 [9])
7	0,25 - 0,3 - 0,7 - 0,8	2,05	425	Bulgaria 1
8	0,25 - 0,75 - 0,75 - 1,0	2,75	425	Bulgaria 2
9	Continuous		350 + 400	Gibraltar
10	Continuous		350 + 440	United Kingdom
11	Continuous		350 + 450	CI Jersey, Cyprus
12	Continuous		400 or 425	Portugal 1 (ITU)
13	Continuous		400	Portugal 2 (Gagliardi)
14	Continuous		400 or 425 or 450	Ireland 1 (ITU)
15	Continuous		400 or 450	Ireland 2 (Gagliardi)
16	Continuous		400 or 450	Romania
17	Continuous		420 or 450	Austria
18	Continuous		425	Albania, Denmark, Estonia, Faroe Islands, Finland, Hungary, Iceland, Lithuania, Poland, Portugal 3 (ETS 300 085 [9]), Russia, Spain, Sweden, Switzerland, Norway
19	Continuous		425 or 450	Belgium, Germany, Luxembourg, Netherlands
20	Continuous		440	France
21	Continuous		450	Turkey

4.2.2 European Ringing tones

Functional definition

The auditory indication to be presented to a user to indicate that a connection has been made and that an alerting signal is being applied to the called terminal or service (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.2: European Ringing tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,4 - 0,2 - 0,4 - 2,0	3	400 or 450 or 425 × 25	Ireland 1
2	0,4 - 0,2 - 0,4 - 2,0	3	400 × 25	Cyprus 2
3	0,4 - 0,2 - 0,4 - 2,0	3	400 + 450	Gibraltar, CI Jersey
4	0,4 - 0,2 - 0,4 - 2,0	3	400 + 450 or 450 × 25 or 425 × 16 ² /3	United Kingdom, Malta
5	0,4 - 0,2 - 0,4 - 2,0	3	425	Ireland 2 (Gagliardi)
6	0,8 - 3,2	4	425	Lithuania, Russia 1
7	1,0 - 3,0	4	400 or 450	Norway 2
8	1,0 - 3,0	4	425	Cyprus 1
9	1,0 - 3,0	4	425 or 450	Belgium
10	1,5 - 3,0	4,5	425	Spain,
11	1,83 - 3,0	4,83	425	Bulgaria 3
12	1,2 - 3,7	4,9	425	Hungary
13	1,0 - 4,0	5	425	Albania, Bulgaria 2, Croatia, Czech Republic, Denmark, Estonia, Faroe Islands, Finland, Italy, Luxembourg 1, Norway 1, Poland, Russia 2, Slovakia, Slovenia, Yugoslavia 2
14	1,0 - 4,0	5	425 or 450	Germany 5 (Gagliardi), Greece, Netherlands
15	1,0 - 4,0	5	425 or 500	Switzerland
16	1,0 - 4,0	5	450	Luxembourg 2 (Gagliardi)
17	1,5 - 3,5	5	440	France
18	1,2 - 4,7	5,9	425	Iceland
19	1,0 - 5,0	6	400 or 425	Portugal
20	1,0 - 5,0	6	420 or 450	Austria
21	1,0 - 5,0	6	425	Sweden 1
22	1,0 - 5,0	6	425 or 450	Germany 3
23	2,0 - 4,0	6	400 × 16 or 450 × 25	Romania
24	2,0 - 4,0	6	450	Turkey
25	0,25 - 4,0 - 1,0 - 4,0	9,25	425 or 450	Germany 1
26	0,5 - 4,0 - 1,0 - 4,0	9,5	425 or 450	Germany 2
27	1,0 - 9,0	10	400	Sweden 2
28	1,0 - 9,0	10	425	Bulgaria 1
29	1,0 - 9,0	10	450	Germany 4
30	1,0 - 9,0	10	450 × 25	Yugoslavia 1

4.2.3 European Busy tones

Functional definition

The auditory indication to be presented to a user to indicate that a connection has been made but that the called party is busy and inviting the user to abort the call or to invoke a supplementary service, e.g. Call Completion on Busy Subscriber (CCBS) (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.3: European Busy tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country or Network
1	0,15 - 0,20	0,35	133 or 425	Romania
2	0,2 - 0,2	0,4	425	Spain
3	0,25 - 0,25	0,5	425	Bulgaria 1, Denmark 2 (ITU), Faroe Islands, Iceland, Sweden, Switzerland 2
4	0,25 - 0,25	0,5	425 or 450	Netherlands 2
5	0,2 - 0,4	0,6	400 or 450	Norway 2
6	0,2 - 0,4	0,6	425	Yugoslavia 2
7	0,3 - 0,3	0,6	425	Albania, Estonia, Finland, Hungary
8	0,3 - 0,3	0,6	425 or 450	Greece
9	0,3 - 0,3	0,6	450	Austria 2
10	0,15 - 0,475	0,625	425 or 450	Germany 2
11	0,33 - 0,33	0,66	425	Slovakia
12	0,333 - 0,333	0,666	425	Czech Republic
13	0,2 - 0,5	0,7	425	Bulgaria 3
14	0,375 - 0,375	0,75	400	Gibraltar, Malta, United Kingdom, CI Jersey
15	0,4 - 0,4	0,8	420	Austria 1
16	0,4 - 0,4	0,8	425	Lithuania, Russia
17	0,45 - 0,45	0,9	425	Denmark 1 (Gagliardi)
18	0,48 - 0,48	0,96	425	Luxembourg 1 (Gagliardi)
19	0,48 - 0,48	0,96	425 or 450	Germany 1 (Gagliardi)
20	0,5 - 0,5	1	400 or 425	Portugal
21	0,5 - 0,5	1	425	Bulgaria 2, Croatia, Cyprus, Ireland, Italy 1 (Gagliardi), Norway 1, Poland, Slovenia, Switzerland 1, Yugoslavia 1
22	0,5 - 0,5	1	425 or 450	Belgium, Luxembourg 2, Netherlands 1
23	0,5 - 0,5	1	440	France
2	0,5 - 0,5	1	450	Turkey
25	0,5 - 0,5	1	500	Switzerland 3 (Pabx)

4.2.4 European Special Information Tones (SIT)

Functional definition

No functional definition is offered, as there is evidence of conflict within the functions assigned to Special Information Tone (SIT).

The "official" definition would read: The auditory indication to be presented to a user to indicate that a connection cannot be made for some reason other than subscriber busy or short term network congestion. The calling party is invited to abort the call and to seek further information with respect to the called party before trying again (this definition is consistent with CCITT Recommendation E.182 [15]).

This definition is coherent with the definition which may be applied for a Number Unobtainable tone.

CCITT Recommendation E.182 [15] also states that: "The tone may also be used in conjunction with recorded announcements, to signify that what the caller is about to hear is a recording. It should be used to precede all call failure announcements". This implies that the SIT may also be used to introduce announcements that are presented for reasons other than call failure.

Table 4.4: European Special Information Tones (SIT)

	Cadence (s)	Period (s)	Frequency (Hz)	Country or Network
			None reported	Albania, Cyprus, Gibraltar, Iceland, Lithuania, Malta, Romania
1	$3 \times (0,33 - 2 \times 0,03) - 0,0$	1,05	950/1 400/1 800	United Kingdom 1
2	$3 \times (0,05 - 0,2) - 0,6 - 0,2$	1,35	400	Sweden 2
3	$3 \times 0,33 - 1,0$	1,99	900/1 350/1 800	Portugal
4	$3 \times 0,33 - 1,0$	1,99	950/1 380/1 860	Belgium
5	$3 \times 0,333 - 1,0$	1,999	950/1 400/1 600?	Slovenia
6	$3 \times (0,33 - 2 \times 0,03) - 1,0$	2,05	950/1 400/1 800	Czech Republic, France, Russia, Slovakia, Spain
7	$3 \times 0,333 - 1,0$	1,999	950/1 400/1 800	Austria, Bulgaria, Croatia, Denmark, Estonia, Finland, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Switzerland, Turkey United Kingdom 2, Yugoslavia
8	$3 \times 0,33 - 1,0$ (+ announcement)	1,999	950/1 400/1 800	Sweden 1

Table 4.5: European Number Unobtainable tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country or Network
			None reported	Albania, Belgium, Czech Republic, Finland, France, Germany, Hungary, Italy, Lithuania, Luxembourg, Netherlands, Norway, Poland, Russia, Slovakia, Slovenia, Switzerland, Yugoslavia
1	Continuous		400	CI Jersey, Gibraltar, Malta, United Kingdom
2	Continuous		450	Greece (radio paging)
3			Recorded Announcement	Iceland
4	$0,2 - 0,2$	0,4	400 or 425	Portugal
5	$0,2 - 0,2$	0,4	450	Turkey
6	$6 \times (0,033 - 0,03) - 0,1 - 0,03$	0,478	400 or 450	Romania
7	$0,2 - 0,2 - 0,2 - 0,6$	1,2	425	Spain
8	$3 \times 0,33 - 1,0$	1,99	950/1 400/1 800	Austria, Bulgaria, Croatia, Denmark, Faroe Islands
9	$3 \times 0,33 - 1,0$ (+ announcement)	1,999	950/1 400/1 800	Sweden
10	$2,5 - 0,5$	3,0	425	Cyprus
11	$6,0 - 1,0$	7,0	400 or 425	Ireland
NOTE: Only Austria, Bulgaria, Croatia, Denmark, Faroe Islands, and Sweden, report using SIT for their Number Unobtainable tone.				

4.2.5 European Call Waiting tones

Functional definition

The auditory indication to be presented to a user during a call to indicate that a new call is arriving and that call control options (e.g. put call 1 on hold and speak to call 2, reject call 2, etc.) should apply. The indication is presented when the supplementary service Call Waiting is active and a new call invokes the service (this definition is consistent with CCITT Recommendation E.182 [15]).

Clarification is clearly required between Call Waiting (the B-Party Indication) and Caller Waiting (the A-Party Indication).

Table 4.6: European Waiting tones - unreported Call or Caller, except where stated

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None defined	Albania, Bulgaria, Ireland, Luxembourg, Malta, Romania, Slovenia, Switzerland, Yugoslavia
1	0,3 - 0,3	0,6	425 + 450	Hungary
2	0,2 - 0,6	0,8	425	Spain 1
3	0,8 (once only)	0,8	821	Denmark
4	0,2 - 0,5 - 0,2 (only once)	0,9	425	Sweden (Call Waiting)
5	0,5 - 0,5 - 0,25 to be verified 0,5 - 0,25 repeated?	1,25	350 + 450 or 450	Turkey
6	0,04 - 1,95	1,99	420	Austria
7	3 × 0,333 - 1,0	1,999	950/1 400/1 800	Estonia, Lithuania
8	0,1 - 2 to 5 s	2,1 - 7,1	400	United Kingdom 1
9	0,1 - 2,5 - 0,1	2,7	400	CI Jersey
10	0,1 - 3,0	3,1	400	Gibraltar
11	0,175 - 0,175 - 0,175 - 3,5	7,175	425	Spain 2
12	0,175 - 0,175 - 0,175 - 3,5	7,175	1 400	Belgium (Call Waiting)
13	0,15 - 0,15 - 0,15 - 4,0	4,45	425	Poland
14	1,0 - 0,17 - 0,33 - 3,5	5	425	Czech Rep. (Caller Waiting), Slovakia (Caller Waiting)
15	0,2 - 5,0	5,2	425	Russia (Call and Caller Waiting)
16	0,33 - 5,0	5,33	425	Cyprus
17	0,2 - 0,2 - 0,2 - 5,0	5,6	425	Germany, Portugal
18	0,2 - 0,6 - 0,2 - 5,0	6	425	Iceland
19	0,25 - 0,25 - 0,25 - 0,25 - 0,25 - 5,0	6,25	400	United Kingdom 2
20	0,3 - 8,0	8,3	425	Croatia
21	0,15 - 0,15 - 0,15 - 8,0	8,45	425	Finland
22	0,33 - 9,0	9,33	425	Czech Republic (Call Waiting), Slovakia (Call Waiting)
23	0,5 - 9,5	10	425 or 450	Netherlands
24	0,3 - 10,0 0,3	10,6	440	France (Call Waiting)
25	0,2 - 0,6 - 0,2 - 10,0	11	425	Norway
26	0,4 - 0,1 - 0,25 - 0,1 - 0,15 - 15,0	16	425	Italy (Call Waiting)
27	0,3 - 10,0 - 0,3 - 10,0	20,6	425	Greece

4.2.6 European Pay tones

Functional definition

The auditory indication to be presented to a user of a payphone during a call to indicate that any existing credit is about to expire and that an additional payment is required (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.7: European Pay tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country or Network
			None defined	Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Finland, France, Germany, Gibraltar, Greece, Hungary, Iceland, Lithuania, Luxembourg, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Switzerland, Turkey, Yugoslavia
1	0,125 - 0,125	0,25	400	United Kingdom, CI Jersey
2	0,125 - 0,125	0,25	800	Ireland
3	0,15 - 0,15	0,3	400	Malta
4	0,2 - 0,2 - 0,2 - 3,6 (2 cycles)	4,2	941	Sweden
5	0,2 - 0,2 - 0,2 - 3,6 (3 cycles)	4,2	940	Denmark 2
6	1,0 Single burst	1,0	425	Italy
7	3 × 0,22 - 1,0	1,66	950/1 400/1 800	Denmark 1
8	A 1-2 s burst given 15-20 s before paid time expires	2,0	770 or 850 or 950	Netherlands
9	1,0 - 1,0 - 1,0 - 1,0 - 1,0 (20 s before time expires)	5,0	1 400	Russia
NOTE: ITU-T and terminal standards do not define any characteristics for a Pay tone.				

4.3 European Set 2:

Special Dial, Positive Indication, Congestion, Intrusion (including Warning, Operator Intervening) tones.

4.3.1 European Special Dial tones

Functional definition

The auditory indication to be presented to a user to indicate that a network connection is available and ready to receive call information and inviting the user to start sending call or service related information, and at the same time reminding the user that special conditions apply (e.g. a Call Forwarding Supplementary Service is active) to the termination from which the call is being made (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.8: European Special Dial tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None reported	Albania, Bulgaria, Cyprus, Czech Republic, Gibraltar, Ireland, Lithuania Luxembourg, Malta, Poland, Romania, Russia, Slovenia, Switzerland, Yugoslavia
1	0,12 - 0,12 (375) + Continuous (425)		375 + 425	Denmark
2	Continuous		330 + 440	France
3	Continuous		350 + 375 + 400	Hungary
4	Continuous		380 + 420	Austria
5	Continuous		400 + 425	Germany
6	Continuous		425	Italy
7	Continuous (440) with 0,75 - 0,75 (350)		440 + 350	United Kingdom 2
8	0,32 - 0,02	0,34	425	Sweden
9	0,4 - 0,04	0,44	425	Iceland
10	0,5 - 0,05	0,55	425 or 450	Netherlands
11	0,65 - 0,025	0,675	425	Finland
12	0,2 - 0,3 - 0,7 - 0,8	0,7	400/425?	Greece 1
13	0,4 - 0,4	0,8	425	Croatia
14	0,4 - 0,4	0,8	470/425?	Norway
15	1,0 - 0,1	1,1	425	Spain
16	1,0 - 0,2	1,2	425	Portugal
17	1,0 - 0,25	1,25	425 or 450	Belgium
18	1,0 - 0,25	1,25	450	Turkey
19	0,75 - 0,75	1,5	440 + 350	United Kingdom 1
20	0,2 - 0,3 - 0,7 - 0,8	2,0	425/450?	Greece 2
21	3 × (0,165 - 0,165) - 0,660 - 0,660	2,31	425	Czech Republic, Slovakia

NOTE: ITU-T and terminal standards do not define any characteristics for a Special Dial tone.

4.3.2 European Positive Indication tones

Functional definition

The auditory indication intended to be presented to a user to indicate that a control procedure, controlling a supplementary service, has been successfully completed and accepted. For example, in response to a Call Forwarding activation command (this definition is consistent with CCITT Recommendation E.182 [15]).

NOTE: prETS 300 738 [19] implies that a positive indication tone is not adequate feedback for most supplementary services. For example a Call Forwarding activation should give an announcement, confirming that Call Forwarding is now switched on and stating the number to which calls will now be forwarded.

Table 4.9: European Positive Indication tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None reported	Albania, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, Germany, Gibraltar, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, Yugoslavia
1	0,04 - 0,04	0,08	425 or 450	Belgium
2	0,1 - 0,1 - 0,1 - 0,7	1,0	450	Greece
3	1,0 - 0,2 + announcement	1,2	300 + 420	Hungary
4	3 × 0,333 - 1,0	1,999	950/1 400/1 800	Norway
5	1,0 - 5,0	6,0	380 + 420	Austria
6	Continuous		425	Croatia, Russia
7	Continuous		425 or 450	Netherlands
8	Continuous		440	France
NOTE: There were no ITU, CEPT or ETSI recommendations for the characteristics of a positive indication tone, see also the note above re prETS 300 738 [19].				

4.3.3 European Congestion tones

Functional definition

The auditory indication to be presented to a user to indicate that some part of the network required for the successful setting up of the requested call or for the use of a specific service is temporarily engaged, and inviting the user to abort the call (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.10: European Congestion tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country or Network
			None reported	France, Hungary, Ireland, Lithuania, Romania, Yugoslavia
1	0,2	0,2	400	United Kingdom 2 (Special)
2	0,15 - 0,15	0,3	425	Albania, Greece
3	0,3	0,3	1 004	United Kingdom 3 (Special)
4	0,165 - 0,165	0,33	425	Czech Republic, Slovakia
5	0,167 - 0,167	0,334	425 or 450	Belgium
6	0,2 - 0,2	0,4	400	Portugal 1
7	0,2 - 0,2	0,4	420	Austria 1
8	0,2 - 0,2	0,4	425	Estonia, Finland, Italy, Norway 2, Portugal 2, Russia, Slovenia, Switzerland
9	0,24 - 0,24	0,48	425	Luxembourg 1, Germany 1
10	0,25 - 0,25	0,5	425	Bulgaria 1, Croatia, Cyprus, Denmark, Faroe Islands, Iceland, Norway 1
11	0,25 - 0,25	0,5	425 or 450	Luxembourg 2, Netherlands
12	0,3 - 0,3	0,6	450	Austria 2
13	0,15 - 0,475	0,625	425 or 450	Germany 2
14	0,2 - 0,5	0,7	425	Bulgaria 3
15	0,25 - 0,75	1,0	425	Sweden
16	0,5 - 0,5	1,0	425	Bulgaria 2, Poland
17	0,4 - 0,35 - 0,225 - 0,525	1,5	400	Gibraltar, Malta, United Kingdom 1, CI Jersey
18	0,2 - 0,2 - 0,2 - 0,2 - 0,2 - 0,6	1,6	425	Spain
19	3 × (0,2 - 0,2) - 0,6 - 0,2	2,0	450	Turkey

4.3.4 European Intrusion tones

Functional definition

The auditory indication to be presented to a user during a call to indicate that the privacy of the conversation can no longer be assured. For example, because of intervention of the operator (this definition is consistent with CCITT Recommendation E.182 [15]).

NOTE 1: Intrusion tone should not be confused with Warning tone or Conference tone. Warning tone should indicate that the call is being recorded; Conference tone should confirm a conferee has joined the conversation within a conference call.

Table 4.11: European Intrusion tones reported as Intrusion tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None reported	Albania, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Finland, France, Germany, Gibraltar, Hungary, Iceland, Ireland, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, United Kingdom, Yugoslavia
1	0,05 - 0,5	0,55	150	Denmark
2	4 × (0,2) - 0,0	0,8	1 250/900/800/1 000	Netherlands
3	0,15 - 0,25 - 0,15 - 1,45	2,0	425 or 450	Greece
4	0,15 - 0,25 - 0,15 - 1,45	2,0	450	Luxembourg
5	0,2 - 0,2 - 0,2 - 1,4	2,0	425	Italy
6	0,25 - 0,25 - 0,25 - 1,25	2,0	425	Russia
7	2,0	2,0	1 400 ± 50	Norway

NOTE: ITU-T and terminal standards do not define any characteristics for a Intrusion tone.

Table 4.12: European Intrusion tones reported as - Warning, Operator Intervening tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None reported	Albania, Belgium, France, Gibraltar, Greece, Iceland, Ireland, Italy, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Switzerland, United Kingdom, Yugoslavia
1	0,05 - 0,5	0,55	150	Denmark
2	0,2 - 0,2 - 0,6 - 0,2	1,2	450	Turkey
3	0,1 - 1,5	1,6	1 400	Sweden
4	0,15 - 0,25 - 0,15 - 1,15	1,7	425	Bulgaria 1
5	0,2 - 0,3 - 0,2 - 1,3	2,0	425	Estonia, Finland
6	0,2 - 0,3 - 0,7 - 0,8	2,0	425	Croatia
7	0,24 - 0,24 - 0,24 - 1,28	2,0	425 or 450	Germany
8	0,25 - 0,25 - 0,25 - 1,25	2,0	425 or 450	Luxembourg
9	0,2 - 0,3 - 0,2 - 1,5	2,2	425	Bulgaria 2
10	0,3 - 0,3 - 0,3 - 1,5	2,4	425	Hungary
11	0,33 - 0,33 - 0,33 - 1,5	2,49	425	Czech Republic
12	0,15 - 0,15 - 0,15 - 1,95	2,4	420 or 450	Austria
13	0,4 - 5,0	5,4	1 400	Spain
14	0,5 - 14,0	14,5	1 400	Cyprus

NOTE: ITU-T and terminal standards do not define any characteristics for a Intrusion tone.

NOTE 2: Only Denmark appears to use the same tone for the "two definitions" of Intrusion tone, i.e. is the same in tables 4.11 and 4.12.

4.4 European Set 3:

Other tones reported.

4.4.1 European Payphone Recognition tones

Functional definition

The auditory indication to be presented to a network operator to indicate that the terminal, to or from which a connection is sought, is a payphone (this definition is consistent with CCITT Recommendation E.182 [15]).

NOTE: As network operation and service provision become more distinctly separate entities, there may be additional pressures for harmonization of tones indicating network oriented information like Payphone Recognition tone.

Table 4.13: European Payphone Recognition tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
				Albania, Belgium, Bulgaria, Czech Republic, Finland, France, Gibraltar, Greece, Italy, Lithuania, Malta, Netherlands, Poland, Romania, Russia, Slovakia, Slovenia, Yugoslavia
1	3 × (0,068 - 0,068)	0,34	1 638/1 206/943	Cyprus
2	0,05 - 1,28	1,33	1 600	Spain 1
3	0,05 - 0,05 - 0,05 - 1,55	1,7	1 600	Spain 2
4	0,05 - 0,05 - 0,05 - 0,05 - 0,05 - 1,55	1,8	1 600	Spain 3
5	0,2 - 0,2 - 0,2 - 2,0	2,6	800/1 200	Switzerland 1
6	0,2 - 0,2 - 0,2 - 2,0	2,6	1 100 + 1 750/750 + 1 450	Ireland, Luxembourg, Switzerland 2
7	0,2 - 0,2 - 0,2 - 2,0	2,6	1 100/750	Hungary
8	0,2 - 0,2 - 0,2 - 2,0	2,6	1 200/800	United Kingdom
9	0,2 - 0,2 - 0,2 - 2,0 (4 cycles)	2,6	1 206/850	Croatia
10	0,2 - 0,2 - 0,2 - 2,0	2,6	1 336/1 633	Austria
11	0,2 - 0,2 - 0,2 - 2,0	2,6	1 477 + 941/1 400 + 950	Denmark
12	0,2 - 0,2 - 0,2 - 2,0 (4 cycles)	2,6	1 477/941	Norway
13	0,2 - 0,2 - 0,2 - 2,0	2,6	1 477/941	Portugal
14	0,2 - 0,2 - 0,2 - 2,0	2,6	1 633/1 209	Iceland
15	0,2 - 0,2 - 0,2 - 2,0 (5 cycles)	2,6	1 633/1 336	Germany 1
16	0,2 - 0,2 - 0,2 - 2,0 (5 cycles)	2,6	1 645 + 857/1 215 + 935	Germany 4
17	0,2 - 0,2 - 0,2 - 2,0 (11 cycles)	2,6	1 477/941	Sweden
18	0,25 - 0,25 - 0,25 - 2,0	2,75	1 000/1 200 or 1 000/1 330	Turkey
19	2,2 - 0,2 - 0,2 - 0,2 (6 cycles)	2,8	1 336/1 024	Germany 3
20	0,2 - 0,2 - 0,2 - 2,2 (5 cycles)	2,8	1 366/1 024	Germany 2

4.4.2 European Negative Indication tones

Functional definition

The auditory indication intended to be presented to a user to indicate that a request for service cannot be accepted (this definition is consistent with CCITT Recommendation E.182 [15]).

In practice it is also used to indicate that a control procedure, controlling a supplementary service, has NOT been successfully completed, i.e. the converse to Positive Indication tone. For example, in response to a call forwarding activation command, to signify that the call forwarding command failed and that call will not be forwarded.

NOTE: prETS 300 738 [19] implies that a Negative Indication tone is not adequate feedback for most supplementary services. For example, when a Call Forwarding activation fails it would be helpful to the user to know why, e.g. the command had the wrong syntax, the target number was unrecognized, etc.

Table 4.14: European Negative Indication tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,0625 - 0,0625	0,125	425 or 450	Netherlands
2	0,2 - 0,2 + announcement	0,4	300 + 420	Hungary
3	0,25 - 0,25	0,5	425	Croatia
4	0,4 - 0,4	0,8	380 + 420	Austria
5	(3 × 0,33 - 2 × 0,03) - 1,0	2,05	950/1 400/1 800	Russia

4.4.3 European Second Dial tones

Functional definition

The auditory indication to be presented to a user to indicate that a network has accepted the call information already sent and is inviting the user to start sending more call or service related information (this definition is consistent with CCITT Recommendation E.182 [15]).

Table 4.15: European Second Dial tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	3 × 0,333	0,999	900/1 020/1 140	Belgium
2	Continuous		330 + 440	France
3	Continuous		425	Sweden
4	Continuous		425 or 450	Netherlands
5	Continuous		425 + 350	Poland
6	Continuous		600	Spain (International)
7	Continuous		1 111	United Kingdom (access to Mercury)

Table 4.16: European Other Dial tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	2 × (0,2 - 0,3) - 0,2 - 0,8	2?	425	Finland (Pabx)
	Continuous		425	Czech Republic (Centrex), Slovakia (Centrex)
	Continuous		500	Switzerland (Pabx)

4.4.4 European infrequently reported tones

Table 4.17: European Route tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,05 - 0,05	1,0	425	Poland
2	0,05 - 0,05	1,0	440	France (see note)
3	0,06 - 0,06	1,2	425	Ireland

NOTE: France, at least, discontinued using this tone during 4th quarter 1996.

Table 4.18: European Offering tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,3 - 0,3 - 0,3 - 1,5	2,4	425	Hungary
2	0,33 - 0,33 - 0,33 - 1,5	2,49	425	Slovakia

NOTE: May be the same as Route tone.

Table 4.19: European Warning tones

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,24 - 0,24 - 0,24 - 1,28	2,0	425 or 450	Germany
2	0,4 - 5,0	5,4	1 400	Spain
3	0,4 - 15,0	15,4	1 400	Russia
NOTE: Assumed to be used to indicate that a call is being recorded, i.e. coherent with the ITU-T definition of Warning tone.				

Table 4.20: European Recall Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	Continuous		420	Austria
NOTE: Assumed to have the same meaning as Special Dial tone				

Table 4.21: European Holding tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,5 - 0,5	1,0	900	Greece
NOTE: Assumed to have the same meaning as ITU-T definition for tone on Hold.				

Table 4.22: European Valid tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,1 - 0,1 - 0,1 - 0,7	1,0	450	Greece (Radio paging)
NOTE: Assumed to have the same meaning as Positive Indication tone, but within a Paging context.				

Table 4.23: European Queue tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,65 - 0,325 - 0,325 - 0,3 - 1,3 - 2,6	5,5	950/950/1 400	Finland
NOTE: Assumed to have a similar meaning as ITU-T definition for Caller Waiting tone.				

Table 4.24: European reported as Record tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,45 - 15,0	15,45	1 400	Switzerland
NOTE: May be Record tone as defined by ITU-T and ISO/IEC, but because of the repetition in the cadence may more accurately be a Warning tone (i.e. recording in progress).				

Table 4.25: European Confirmation tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,04 - 0,04	0,08	450	Turkey
NOTE: Assumed to have the same meaning as Positive Indication tone.				

Table 4.26: European Intercept tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,25 - 0,25 (No repetition)	0,5	1 190/1 280	Luxembourg
NOTE: No additional information on this tones use.				

Table 4.27: European Connection tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,05 - 0,05	0,1	1 400	Czech Republic (called Switching tone), Slovakia

NOTE: Assumed to be used when a call is being put through to a third party.

Table 4.28: European Conference tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,66	0,66	425	Czech Republic, Slovakia

NOTE: Assumed to mean a new Conferee is or has joined.

Table 4.29: European Incomplete Conference tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,3~1,5 (single burst)		425	Russia

NOTE: Conferee fails to join at beginning or leaves before end of conference.

Table 4.30: European Message Waiting Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,1 - 0,1 - 0,1 - 0,1 - 0,1 - 0,5	1,0	425	Italy

NOTE: This is a new tone introduced to support Voice Mail and similar messaging services. It is a special case of Special Dial tone.

Table 4.31: European Warning tone - at time limit barring

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	2,0 - 5,0 - Continuous	7,0	425	Sweden

NOTE: Used for the supplementary service "Time Limit Barring" to indicate end of call time.

Table 4.32: European Warning tone - three party conference

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
	0,35 - 15,0	15,35	1 400	Sweden

NOTE: Used for the supplementary service "3-Party Conference" as a reminder that this is a conference call (Similar in meaning to ITU-T's Intrusion tone).

4.5 Comparison of tone characteristics and coding dimensions used in European tones

Spreadsheet analysis of the complete set of tones reported in use in Europe enabled some basic graphical analysis of the use of a tones characteristics as a coding dimension. For example, in the simplest terms, CCITT Recommendation E.180 [14] recommends that the difference between busy and congestion should be the speed of the cadence. Congestion tones should have a faster rhythm than busy tones. In this case the speed of the cadence is being used to code the information telling the user why the call attempt has to be aborted.

Working from the Human Factors model proposed in part 1 (see figure 8, part 1), it seemed appropriate to consider whether European tones already have a tendency to use certain characteristics for segregating the tone groups. If such a tendency did exist it should be possible to see similarities between tone in the same SWAT group, i.e. Signal tones, should be different to Wait, Abort or Talk tones.

4.5.1 Frequency

Looking first at the use a frequency as a coding dimension, the arbitrary decision was taken that tones below 500 Hz could be considered low and tones above this threshold as high. Figure 1 compares the high and low tones against each of the SWAT categories. Clearly there is little difference between the categories, which is not so surprising as most of the reported tones are based on 400 - 450 Hz. Where higher frequency tones are used these tend to be for either the abort (especially for SIT) or talk category (probably Pay tone).

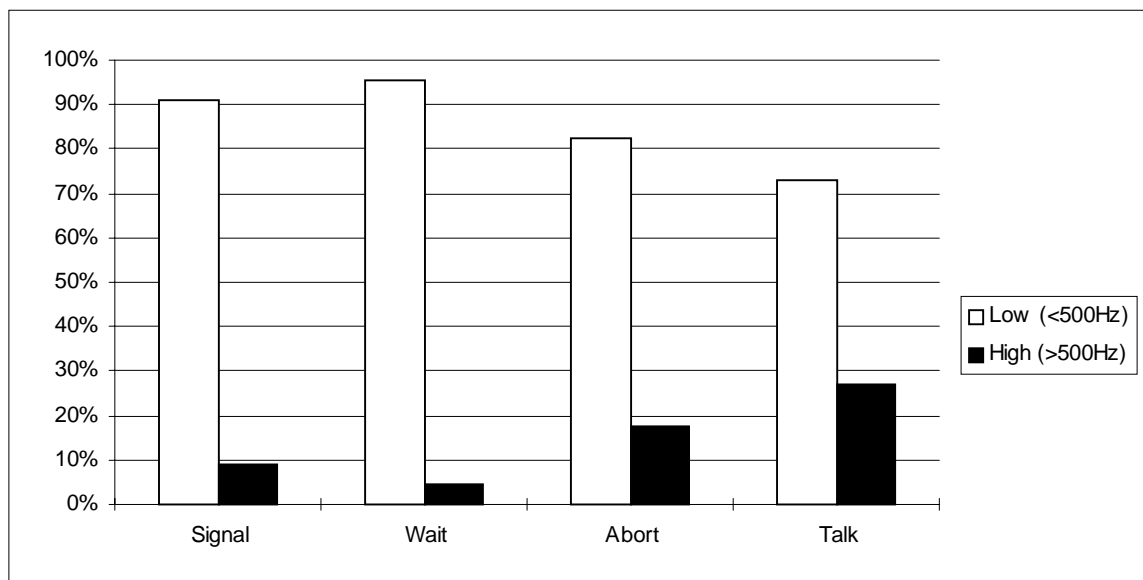


Figure 1: Use of high and low frequency as a coding dimension

4.5.1 Period, or length of cadence

The next simple comparison was the length of a single cadence, i.e. the period of the tone pattern. Again some arbitrary decisions were made for grouping these into: short (less than 1,1 s), medium (1,2 - 2,9 s), long (3,0 - 20,0 s) and continuous. Clearly there is a bias shown in figure 2. Continuous tones are used predominantly for the signal category of tones, the tone continues until signalling is initiated. Even more clearly short cadences are used within the abort category, these tend to imply urgency, and this again is not unexpected. Interestingly, though is the fact that longer cadences are used in both the wait and talk categories. However this is quickly accounted for when it is realized that a long period includes, short bursts of tones and long silences, as well as medium bursts of tone followed by medium silences. The data is not telling the whole story.

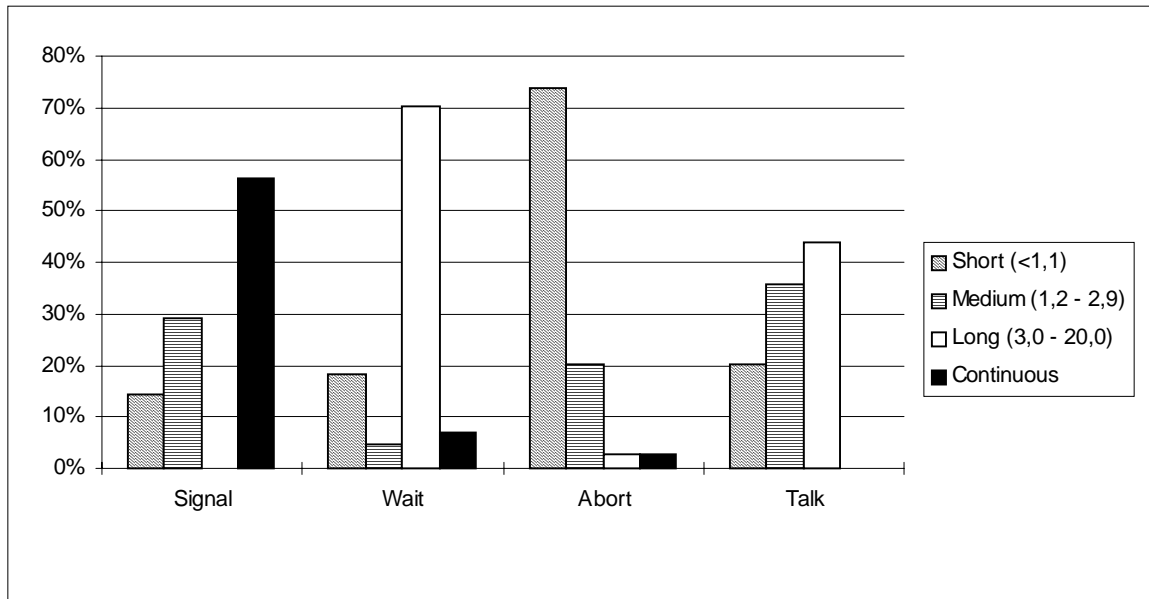


Figure 2: Use of cadence period length as a coding dimension

4.5.3 Complexity of cadence

The third area of interest was the degree of complexity in the tone. The arbitrary decision was made that tones could be categorized as simple (a single on and a single off within the cadence, typically with the on/off of equal length) or complex (more than one burst of tone in a cadence, or varying lengths of tones and silences within a cadence) or continuous (as its name suggests). Figure 3 shows that simple tones are used frequently in the signal, wait and abort categories. Whereas continuous tones are used almost exclusively in the signal category, and complex tones are used most in the talk category. But again this is not the whole story, as simple or complex tones may have long or short periods and may be high or low frequency.

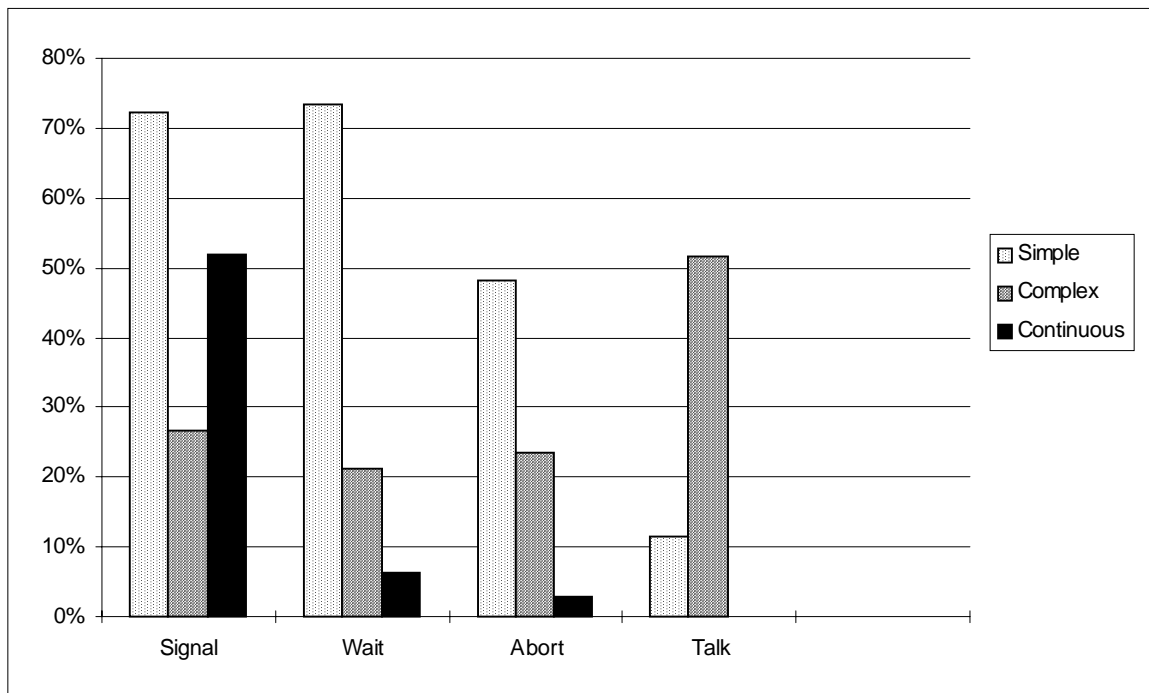


Figure 3: Use of cadence pattern complexity as a coding dimension

4.5.4 On/off ratios

The final tone characteristic to be explored was the on/off ratio. This was calculated from the total time a tone was sounding, divided by the total time of the silence, during a single cadence. Thus the typical busy tone of 0,5 on and 0,5 off would have an on/off ratio of 1; and the typical Dial tone of 1,0 on 4,0 off would have an on/off ratio of 0,25. From a visual inspection of the resulting data it was decided to subdivide these into nine groupings:

single burst;

<0,1;

0,1 - 0,19;

0,2 - 0,29;

0,3 - 0,49;

0,5 - 0,999;

1;

>1;

continuous.

Figure 4 shows the results, and there are almost four clear peaks, one for each category. For the signal category the peak is caused by the continuous tones, with a reasonable proportion of on/off ratios above 0,5, and almost nothing below except the odd single burst tone. For the abort category, the peak is clearly on/off ratios of 1. Whereas for the talk category not unexpectedly the peak on/off ratios are very short typically <0,1 (i.e. very short burst of tone with long silences, to minimize the interruption of the speech). The least well defined category is the wait category. There is a clear peak between on/off ratios 0,2 - 0,49, but there is a spread also from 0,1 - 1,0.

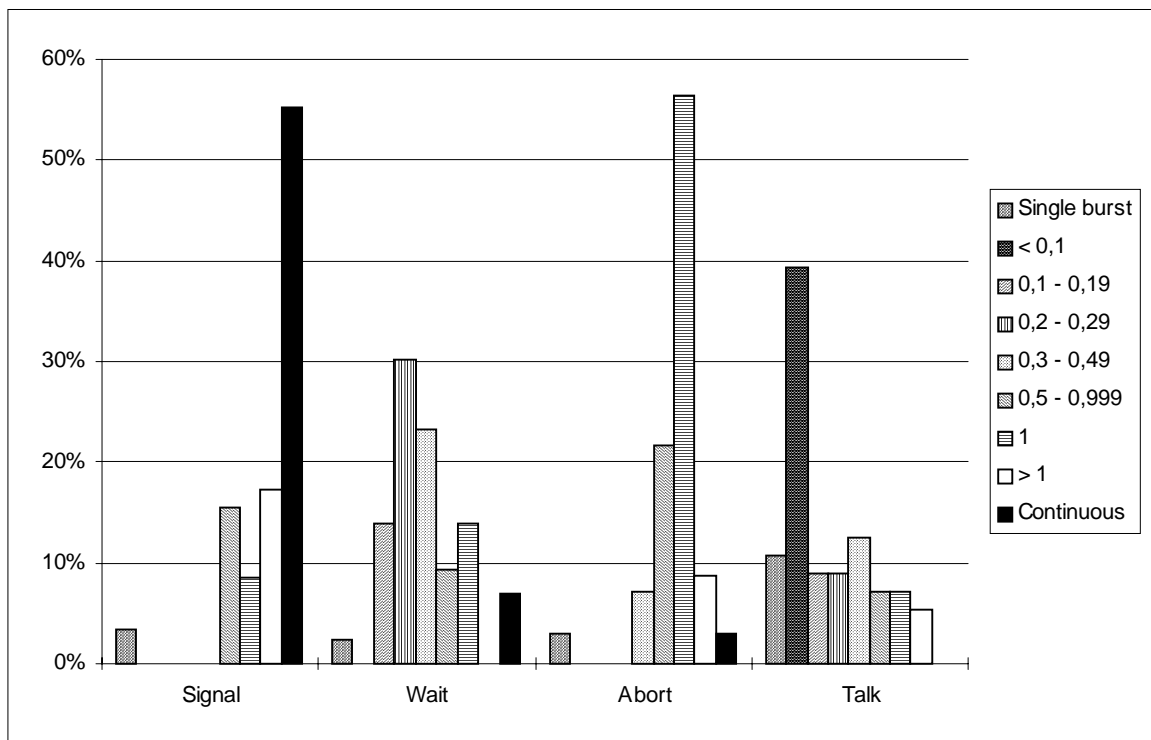


Figure 4: Use of on/off ratio as a coding dimension

The same data can be perhaps more dramatically represented in three dimensions, where the peaks show the clear differences between the categories, in figure 5.

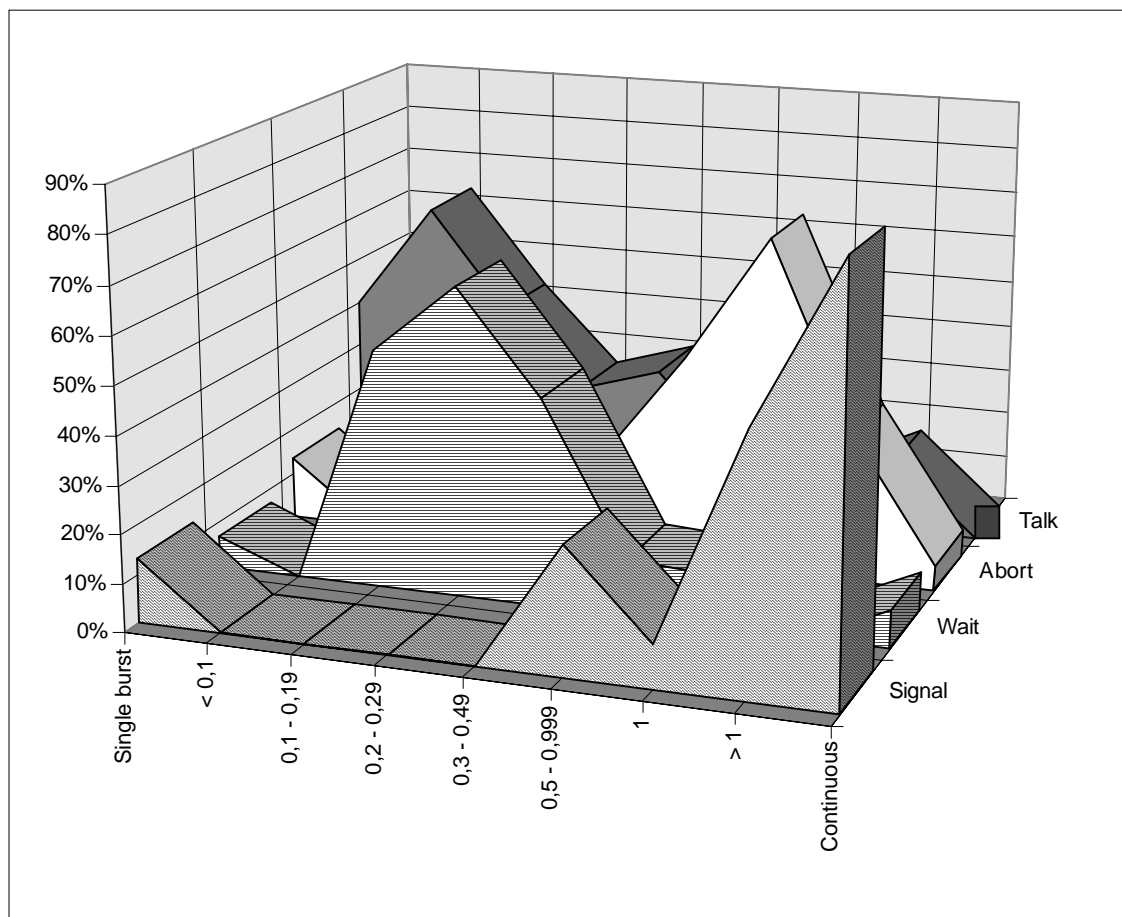


Figure 5: Looking at on/off ratio as a coding dimension from another angle

These five figures have been used to explore how far the European tones reported can be said to reflect the SWAT categories, and to consider which characteristics of the tones are being used (if any) for coding tones into these categories. Obviously if there are coding dimensions already in use, then any development of the model should build on these, if at all possible.

This brief analysis has shown that there are coding dimensions in use and that these are predominantly, but not exclusively, based on the on/off ratio. However it also demonstrates that there are clear opportunities for exploring other coding dimensions, most notably the use of higher frequencies, and more complex cadences. This point is also developed in part 1 clause 7.

5 Analysis of reported rest of World tones (non-European)

5.1 Introduction

This analysis is based solely on the ITU-T Recommendation E.180 Supplement 2 (Series E) (01/94) [16]. The original data was collected in July 1991 and March 1992 in response to the CCITT Circular Letter No.98.

The analysis is divided into the same three sets used in clause 4. Sets 1 and 2 reflect the relative "preference for standardization" weighting given in the CEC's mandate to ETSI [1]. Set 3 presents the other tones listed. In detail these are:

Set 1: Dial, Ring, Busy, Special Information, Call Waiting, Pay tones;

Set 2: Special Dial, Positive Indication, Congestion, Intrusion tones;

Set 3: Acceptance tone, Comfort tone, Confirmation tone, End of Three Party Service tone, Executive Override tone, Facilities tone, Function Acknowledge tone, Holding tone, Identification tone, Intercept tone, Line Lockout tone, Negative Indication tone, Notify tone, Number Unobtainable tone, Offering tone, Payphone Recognition tone, Permanent Signal tone, Pre-emption tone, Re-order tone, Recall Dial tone, Record tone, Refusal tone, Route tone, Search tone, Second Dial tone, Service Activated tone (Positive Indication?), Test Number tone, Warning tone (end of period), Warning tone (Operator Intervening).

5.2 The rest of World tone tables

5.2.1 World Set 1:

Dial, Ringing, Busy, Special Information, Call Waiting, Pay tones.

5.2.1.1 World Dial tones

Table 5.1: Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
			None defined	Algeria, Bahamas, Belarus, Benin, Egypt, Grenada, Guinea, Iraq, Kyrgyzstan, Lebanon, Madagascar, Moldova, Mozambique, Pakistan, Paraguay, Puerto Rico, Tajikistan
1	0,0166 - 0,0166	0,033	33	Dominica Rep. 2
2	0,2 - 0,2	0,4	400	Philippines 2
3	0,25 - 0,25	0,5	400	Japan 2 (Pabx)
4	0,4 - 0,04	0,44	425	Tunisia 2
5	0,6 - 1,0 - 0,2 - 0,2	2,0	425	San Marino
6	0,7 - 0,8 - 0,2 - 0,3	2,0	450	Uruguay 2
7	0,75 - 0,75 - 0,25 - 0,25	2,0	425	Cuba 2
8	0,975 - 0,05	1,025	425	Brazil 2 (Pabx)
9	1,3 - 0,3 - 0,2 - 0,5	2,3	360/400	Guyana
10	15,0 (Continuous for 15 s?)		425	Ecuador
11	15,0 (Continuous for 15 s?)		440	Gabon 1
12	Continuous		154	Australia 2 (Pabx)
13	Continuous		33	Nauru 2 (Pabx)
14	Continuous		33 1/3	Fiji 2 (Pabx)
15	Continuous		33 or 50	Fiji 1
16	Continuous		33 or 50	Uganda
17	Continuous		33 or 50 or 400 × 25	India
18	Continuous		330 × 440?	Bahrain
19	Continuous		350 + 440	Anguilla, Barbados, Bermuda, Botswana, British Virgin Islands, Dominica (Commonwealth of), Falkland Island, Hong Kong, Jamaica, Korea (Rep. of), Montserrat, Qatar, S. Helena, S. Vincent and the Grenadines, S.-Kitts-and-Nevis, Seychelles, Trinidad and Tobago, Turks and Caicos Islands, United Arab Emirates
20	Continuous		350 + 440 (reported as 350/440)	Antigua and Barbuda, Diego Garcia, Ascension
21	Continuous		350 + 440 or 600 × 120	Canada, United States of America
22	Continuous		350/450?	Burkina Faso 2
23	Continuous		400	Angola, Chile, Ghana, Japan 1, Nauru 1, New Zealand, Solomon, Zimbabwe
24	Continuous		400 +25	Bhutan
25	Continuous		400 or 425 or 440	Israel
26	Continuous		400 or 425 or 450	Nigeria

Continued

Table 5.1 (concluded): Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
27	Continuous		400 × 33	South Africa
28	Continuous		400 × 50	Brunei Darussalam
29	Continuous		400 × 50 or 400	Thailand
30	Continuous		400/50	Maldives
31	Continuous		420 × 40 or 400 + 440	Jordan
32	Continuous		425	Argentina, Aruba, Brazil 1, Burkina Faso 1, Burundi, Cayman Islands, Central African Republic, Comoros, Costa Rica, Côte D'Ivoire, Djibouti, El Salvador, Ethiopia, Gambia, Indonesia, Iran, Kiribati, Kuwait, Lao P.D.R., Liberia, Macau, Malawi, Malaysia, Mali, Mauritania, Mauritius, Mexico, Morocco, Nepal, Oman, Panama, S. Lucia, Sao Tome and Principe, Saudi Arabia, Singapore, Sri Lanka, Suriname, Tunisia 1, Turkmenistan, Uruguay 1, Vanuatu, Western Samoa, Gabon 2
33	Continuous		425 or 400 × 25 or 350 + 440	Papua New Guinea
34	Continuous		425 or 450	Sierra Leone
35	Continuous		425 or 50	Kenya, Zambia
36	Continuous		425 × 25	Australia 1
37	Continuous		440	Cameroon, Honduras, Niger, Rwanda, Senegal
38	Continuous		440 or 330 + 440	French Polynesia, Guadeloupe (French Dep.), Guiana (French Dep.), Martinique (French Dep.), Mayotte, New Caledonia, Reunion (French Dep.), S. Pierre and Miquelon, Wallis and Futuna
39	Continuous		440 × 33	Nambia
40	Continuous		445 or 425	Greenland
41	Continuous		450	China, Syria
42	Continuous		50	Dominica Rep. 1, Swaziland, Tanzania
43	Continuous		600 × 120 or 425	Cuba 1, Philippines 1

5.2.1.2 World Ringing tones

Table 5.2: Ringing tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,2 - 0,2	0,4	440/480?	Burkina Faso 2
2	0,2 - 0,4	0,6	400 + 450	S. Vincent and the Grenadines
3	0,25 - 0,5 - 0,25 - 2,0	3,0	133 + 17 or 400 + 17 or 400 + 450	Uganda
4	0,375 - 0,25 - 0,375 - 2,0	3,0	425	S. Lucia
5	0,375 - 0,25 - 0,375 - 2,0	3,0	425 × 25	Western Samoa
6	0,4 - 0,2	0,6	400 + 450	Falkland Islands, S. Helena, Solomon
7	0,4 - 0,2	0,6	425	Sri Lanka
8	0,4 - 0,2	0,6	450	Guinea
9	0,4 - 0,2 - 0,4 - 2,0	3,0	133 or 400 × 25	India 2
10	0,4 - 0,2 - 0,4 - 2,0	3,0	133 × 16 2/3 or 400 × 25	Fiji 1

Continued

Table 5.2 (continued): Ringing tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
11	0,4 - 0,2 - 0,4 - 2,0	3,0	400	Maldives
12	0,4 - 0,2 - 0,4 - 2,0	3,0	400 or 133	Jamaica 4, Malawi 2
13	0,4 - 0,2 - 0,4 - 2,0	3,0	400 or 450	Botswana
14	0,4 - 0,2 - 0,4 - 2,0	3,0	400 × 17	Australia
15	0,4 - 0,2 - 0,4 - 2,0	3,0	400 × 33	Nambia, South Africa
16	0,4 - 0,2 - 0,4 - 2,0	3,0	400 × 450? or 133 × 16 2/3	Vanuatu 2
17	0,4 - 0,2 - 0,4 - 2,0	3,0	400 × 450? or 400 × 33	Zimbabwe
18	0,4 - 0,2 - 0,4 - 2,0	3,0	400 + 16 2/3	Jordan 2, Pakistan 2
19	0,4 - 0,2 - 0,4 - 2,0	3,0	400 + 450	New Zealand, Qatar 2
20	0,4 - 0,2 - 0,4 - 2,0	3,0	400 + 450 or 425	United Arab Emirates
21	0,4 - 0,2 - 0,4 - 2,0	3,0	425	Kiribati, Malaysia, Oman, Seychelles
22	0,4 - 0,2 - 0,4 - 2,0	3,0	425 or 400 × 25 or 400 × 16 2/3 or 400 + 450 or 410 × 20	Papua New Guinea
23	0,4 - 0,2 - 0,4 - 2,0	3,0	425 × 24	Singapore
24	0,4 - 0,2 - 0,4 - 2,0	3,0	425 × 25	Nauru 2 (Pabx)
25	0,4 - 0,2 - 0,4 - 2,0	3,0	440 or 450	Bahrain
26	0,4 - 0,2 - 0,4 - 2,2	3,2	400 or 450	Dominican Rep.
27	0,4 - 0,2 - 0,4 - 2,2	3,2	400 + 450	Qatar 1
28	0,4 - 0,2 - 0,4 - 2,6	3,6	400 × 25	India 1
29	0,4 - 0,2 - 0,4 - 2,6	3,6	400 + 25	Bhutan
30	0,4 - 0,2 - 0,4 - 3,0	4,0	440 + 480	Hong Kong
31	0,4 - 0,2 - 0,4 - 4,0	5,0	400	Swaziland
32	0,4 - 0,2 - 0,4 - 2,0	3,0	400 × 16 2/3	Fiji 2 (Pabx)
33	0,4 - 0,3 - 0,4 - 2,0	3,1	400 + 450	Brunei Darussalam
34	0,4 - 4,0	4,4	25	Turkmenistan
35	0,5 - 4,0 - 2,0 - 4,0	10,5	440	Honduras
36	0,8 - 3,2	4,0	425	Belarus, Kyrgyzstan, Moldova, Tajikistan
37	1,0 - 10,0	11,0	450	Philippines 1
38	1,0 - 2,0	3,0	400	Tanzania 2
39	1,0 - 2,0	3,0	400 × 16	Japan 1
40	1,0 - 2,0	3,0	400 × 20	Japan 2 (Pabx)
41	1,0 - 2,0	3,0	420 × 40	Cuba 3
42	1,0 - 2,0	3,0	440 + 480	Korea (Rep. of)
43	1,0 - 3,0	4,0	400	Chile, Kuwait 2
44	1,0 - 3,0	4,0	400 or 425 or 440	Israel
45	1,0 - 3,0	4,0	440 + 480	Canada 2 (Pabx), United States of America 3 (Pabx)
46	1,0 - 3,0	4,0	440 + 480	
47	1,0 - 3,0	4,0	440/480?	Ascension, Diego Garcia
48	1,0 - 3,0	4,0	450 or 50	Syria 2
49	1,0 - 4,0	5,0	400	Ghana, Nauru 1, Thailand
50	1,0 - 4,0	5,0	425	Argentina, Aruba, Brazil, Burkina Faso 1, Cayman Islands, Cuba 2, Ethiopia, Gambia, Indonesia, Iran, Kuwait 1, Lao P.D.R., Macau, Malawi 1, Mauritius, Mexico, Paraguay, San Marino, Uruguay, Vanuatu 1, Zambia
51	1,0 - 4,0	5,0	425 or 450	Liberia, Sierra Leone
52	1,0 - 4,0	5,0	425 or 475	Syria 1
53	1,0 - 4,0	5,0	425 + 480	Philippines 2
54	1,0 - 4,0	5,0	440 + 480	Jamaica 3
55	1,0 - 4,0	5,0	445 or 425	Greenland

Continued

Table 5.2 (concluded): Ringing tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
56	1,0 - 4,0	5,0	450	China, Pakistan 1
57	1,0 - 4,0 - 1,0 - 2,0 - 1,0 - 5,0 - 0,4 - 0,2	14,6	425	Kenya
58	1,0 - 5,0	6,0	25	Angola
59	1,0 - 5,0	6,0	400	Mozambique
60	1,0 - 5,0	6,0	425	Sao Tome and Principe
61	1,1 - 3,1	4,2	425	Nepal
62	1,2 - 4,4	5,6	435	Lebanon
63	1,2 - 4,6	5,8	425	Costa Rica, Saudi Arabia, Tunisia
64	1,2 - 4,65	5,85	425	Ecuador
65	1,2 - 4,8	6,0	420 × 40 or 440 + 400	Jordan 1
66	1,2 - 5,0	6,2	425	El Salvador
67	1,20 - 4,65	5,85	425	Panama
68	1,5 - 3,0	4,5	440	Gabon 1
69	1,5 - 3,5	5,0	25 or 50	Algeria
70	1,5 - 3,5	5,0	425	Djibouti, Gabon 2, Mauritania
71	1,5 - 3,5	5,0	440	Benin, French Polynesia, Guadeloupe (French Dep.), Guiana (French Dep.), Martinique (French Dep.), Mayotte, New Caledonia, Reunion (French Dep.), S. Pierre and Miquelon, Wallis and Futuna
72	1,5 - 4,5	6,0	440 + 480	Jamaica 2
73	1,66 - 3,33	4,99	25	Madagascar
74	1,66 - 3,33	4,99	425	Morocco
75	1,66 - 3,33	4,99	50 or 425 × 50	Côte D'Ivoire
76	1,7 - 3,3	5,0	400	Senegal
77	1,7 - 3,3	5,0	425	Burundi, Central African Republic, Mali
78	1,7 - 3,3	5,0	440	Cameroon, Niger, Rwanda
79	1,71 - 3,31	5,02	425	Comoros
80	1,75 - 3,25	5,0	425	Guyana
81	15,0 - 0,5	15,5	425	Suriname
82	2,0 - 1,0	3,0	425 × 50	Egypt
83	2,0 - 4,0	6,0	400 or 425 or 450	Nigeria
84	2,0 - 4,0	6,0	420 × 40	United States of America 2 (Old)
85	2,0 - 4,0	6,0	440 × 480?	Jamaica 1
86	2,0 - 4,0	6,0	440 + 480	Anguilla, Barbados, Bermuda, British Virgin Islands, Canada 1, Dominica (Commonwealth of), Grenada, Montserrat, S.-Kitts-and-Nevis, Trinidad and Tobago, Turks and Caicos Islands, United States of America 1
87	2,0 - 4,0	6,0	440 + 480 or 440 + 620 or 480 + 620	Cuba 1
88	2,0 - 4,0	6,0	440/480?	Antigua and Barbuda
89	2,0 - 4,0	6,0	440/480? or 420/20 or 400	Bahamas
90	Continuous		400	Iraq, Tanzania 1

5.2.1.3 World Busy tones

Table 5.3: Busy tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1			None defined	Benin
2	0,2 - 0,2	0,4	425	San Marino
3	0,2 - 0,2	0,4	450	Guinea
4	0,25 - 0,25	0,5	400	Ghana, Namibia 3
5	0,25 - 0,25	0,5	425	Brazil, Mexico, Nepal, Tunisia 1
6	0,25 - 0,25	0,5	445 or 425	Greenland
7	0,25 - 0,25	0,5	450	Burundi
8	0,3 - 0,2	0,5	425	Argentina
9	0,3 - 0,3	0,6	425	Costa Rica
10	0,32 - 4,65	4,97	425	Panama
11	0,33 - 0,33	0,66	425	Ecuador
12	0,333 - 0,333	0,666	425	El Salvador
13	0,333 - 0,333	0,666	450	Thailand 2
14	0,35 - 0,35	0,7	450	China
15	0,375 - 0,375	0,75	400	Australia, Bahrain, Botswana, Brunei Darussalam, Dominican Rep. 2, Falkland Islands, Fiji 2 (Pabx), Qatar 2, S. Helena, S. Vincent and the Grenadines, Tanzania 2, Uganda 2, Vantuatou 3, Zimbabwe
16	0,375 - 0,375	0,75	400 or 425	United Arab Emirates
17	0,375 - 0,375	0,75	425	Seychelles, Nauru 2 (Pabx)
18	0,375 - 0,375	0,75	425 or 400	Papua New Guinea
19	0,4 - 0,2	0,6	435	Lebanon
20	0,4 - 0,2	0,6	450	Philippines 2
21	0,4 - 0,333	0,733	400	Malawi 3
22	0,4 - 0,4	0,8	400	Swaziland 2
23	0,4 - 0,4	0,8	425	Belarus, Ethiopia, Kyrgyzstan, Moldova, Tajikistan, Turkmenistan
24	0,4 - 0,675 - 0,13 - 0,17	1,375	450	Pakistan 2
25	0,44 - 0,49	0,93	450	Syria 2
26	0,5 - 0,5	1,0	400	Angola, Chile, Japan, Maldives, Mozambique, Namibia 2, Nauru 1, New Zealand, Nigeria, Solomon, South Africa, Swaziland 1, Thailand 1
27	0,5 - 0,5	1,0	400 or 425 or 440	Israel
28	0,5 - 0,5	1,0	420 × 40 or 440 + 400	Jordan 2
29	0,5 - 0,5	1,0	425	Aruba, Burkina Faso 1, Cayman Islands, Central African Republic, Comoros, Côte D'Ivoire, Djibouti, Gabon 2, Gambia, Guyana, Indonesia, Iran, Kiribati, Kuwait, Liberia, Macau, Malaysia, Mali, Mauritania, Morocco, Oman, S. Lucia, Sao Tome and Principe, Saudi Arabia, Suriname, Uruguay, Vantuatou 2, Zambia

Continued

Table 5.3 (concluded): Busy tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
30	0,5 - 0,5	1,0	425 or 450	Sierra Leone
31	0,5 - 0,5	1,0	440	Cameroon, French Polynesia, Gabon 1, Guadeloupe (French Dep.), Guiana (French Dep.), Honduras, Martinique (French Dep.), Mayotte, New Caledonia, Niger, Reunion (French Dep.), Rwanda, S. Pierre and Miquelon, Senegal, Wallis and Futuna
32	0,5 - 0,5	1,0	450	Algeria, Madagascar, Syria 1
33	0,5 - 0,5	1,0	460 + 620	Grenada
34	0,5 - 0,5	1,0	480 + 620	Anguilla, Barbados, Bermuda, British Virgin Islands, Canada, Dominica (Commonwealth of), Hong Kong, Jamaica 2, Korea (Rep. of), Montserrat, S.-Kitts-and-Nevis, Trinidad and Tobago, Turks and Caicos Islands, United States of America 1
35	0,5 - 0,5	1,0	480/620?	Burkina Faso 2
36	0,5 - 0,5	1,0	480/620?	Antigua and Barbuda, Ascension
37	0,5 - 0,5	1,0	480/620/420? or 400	Bahamas
38	0,5 - 0,5	1,0	525	Malawi 2
39	0,5 - 0,5	1,0	600 × 120	United States of America 2
40	0,5 - 0,5	1,0	600 × 120 or 425	Philippines 1
41	0,5 - 0,5	1,0	600 × 120 or 620 + 480 or 425	Cuba
42	0,5 - 0,5 - 0,4 - 0,2	1,6	425	Kenya
43	0,6 - 0,6	1,2	400	Bhutan, India 2
44	0,75 - 0,75	1,5	400	Fiji 1, India 1, Jamaica 1, Jordan 1, Malawi 1, Namibia 1, Pakistan 1, Tanzania 1, Uganda 1, Vanuatu 1
45	0,75 - 0,75	1,5	425	Mauritius, Singapore, Sri Lanka
46	0,8 - 0,8	1,6	400	Dominican Rep. 1
47	0,8 - 0,8	1,6	400 or 450	Qatar 1
48	1,0 - 1,0	2,0	400	Iraq
49	1,0 - 1,0	2,0	425	Lao P.D.R., Paraguay
50	1,0 - 4,0	5,0	425 × 50	Egypt
51	Continuous		950	Tunisia 2 (special)
52	Interrupted at 60 ipm		480/620?	Diego Garcia

5.2.1.4 World Special Information and Number Unobtainable tones

Table 5.4: Special Information Tone (SIT)

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1	0,2	400	Japan
2	0,33 - 0,03	0,36	950/1 400/1 800	Vanuatu
3	0,33 - 0,33 - 0,33 - 0,33 - 0,33 - 0,33	1,98	950/1 400/1 800	Egypt
4	0,35 - 0,30 - 0,35 - 1,0	2,0	900/1 380/1 860	Gabon
5	0,4 - 0,04	0,44	425	Panama
6	0,4 - 0,04	0,44	450	China 1
7	0,4 - 10,0	10,4	950	China 2
8	0,5 - 0,5	1,0	150/450	Burundi
9	0,2 - 1,5	1,7	400 or 33	Nigeria
10	(3 × 0,3 - 2 × 0,03) - 1,0	1,99	950/1 400/1 800	French Polynesia, Guadeloupe (French Dep.), Guiana (French Dep.), Martinique (French Dep.), Mayotte, New Caledonia, Reunion (French Dep.), S. Pierre and Miquelon, Wallis and Futuna
11	3 × 0,33	0,99	950/1 400/1 800	United States of America
12	(3 × 0,33 - 0,05 - 0,03) - 1,0	2,07	900/1 400/1 800	Mali
13	3 × 0,33 - 1,0	1,99	950/1 400/1 800	Anguilla, Aruba, British Virgin Islands, Dominica (Commonwealth of), Falkland Islands, Iran, Montserrat, S.-Kitts-and-Nevis, Suriname, Turks and Caicos Islands
14	3 × 0,33 - 1,01	2,0	950/1 400/1 800	Papua New Guinea
15	(3 × 0,33 - 2 × 0,03) - 1,0	2,05	950/1 400/1 800	Cuba, Indonesia, Syria
16	3 × 0,333 - 1,0	1,999	950/1 400/1 800	Chile, Ethiopia, Rwanda, South Africa, Uruguay, Zambia
17	3 × 0,333 - 1,0 + announcement	1,999	975/1 400/1 800	Israel
18	3 × 1,0 - 1,0	4,0	900/1 400/1 800	Malaysia
19	Continuous		425 + 330	S. Lucia

Table 5.5: Number Unobtainable

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,075 - 0,1		400	Solomon
2	0,075 - 0,1 - 0,075 - 0,1 - 0,075 - 0,4		400	Ghana
3	0,2 - 0,1 - 0,2 - 1,5		450	Korea (Rep. of)
4	0,2 - 0,2		400	Angola
5	0,2 - 0,2		400	Mozambique
6	0,2 - 0,2		425	Sao Tome and Principe
7	0,2 - 0,3		425	Oman
8	0,25 - 0,25		480 + 620	Anguilla
9	0,25 - 0,25		480/620	Ascension
10	0,25 - 0,25		480 + 620	British Virgin Islands
11	0,25 - 0,25		425	Cayman Islands
12	0,25 - 0,25		480 + 620	Dominica (Commonwealth of)
13	0,25 - 0,25		425	Kiribati
14	0,25 - 0,25		480 + 620	Montserrat
15	0,25 - 0,25		600 × 120	Philippines

Continued

Table 5.5 (continued): Number Unobtainable

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
16	0,25 - 0,25		480 + 620	S.-Kitts-and-Nevis
17	0,25 - 0,25		480 + 620	Turks and Caicos Islands
18	0,25 - 0,5		425	Nepal
19	0,33 - 0,03		950 or 450/150	Sierra Leone
20	0,4 - 0,12 - 2 × (0,12 - 0,12)		520	Cuba
21	0,4 - 0,4		425	Kyrgyzstan
22	0,5 (for six seconds)		200 or 400	Bermuda
23	0,5 - 0,5		425	Central African Rep.
24	0,6 - 0,2 - 3 × (0,2 - 0,2)		425	Liberia
25	0,75 - 0,25 - 0,25 - 0,25		425	Brazil
26	0,75 - 0,25 - 0,25 - 0,25		400	Nauru
27	0,8 - 4,0		425	Turkmenistan
28	0,9 - 0,2 - 2 × (0,25 - 0,2)		450	Syria
29	2,0 - 0,5		425	Indonesia
30	2,0 - 0,5		425	Paraguay
31	2,5 - 0,5		400	Australia
32	2,5 - 0,5		400	Fiji 1
	2,5 - 0,5		400	Fiji 2(Pabx)
33	2,5 - 0,5		600 × 120 or 540 + 660	Jordan
34	2,5 - 0,5		425	Lao P.D.R.
35	2,5 - 0,5		400	Malawi
36	2,5 - 0,5		425	Malaysia
37	2,5 - 0,5		400	Namibia
38	2,5 - 0,5		425 or 400	Papua New Guinea
39	2,5 - 0,5		425	Singapore
40	2,5 - 0,5		400	South Africa
41	2,5 - 0,5		400	Tanzania
42	2,5 - 0,5		400	Zimbabwe
43	3 × (0,1 - 0,1) - 0,4 - 0,4		450	China
44	3 × (0,75 - 0,1) - 0,75 - 0,4		400	New Zealand
45	3 × 0,33 - 1,0		950/1 400/1 800	Aruba
46	3 × 0,33 - 1,0		950/1 400/1 800	Greenland 1
	0,25 - 0,25		425	Greenland 2
47	3 × 0,33 - 1,0		950/140/1 800	Kenya 1
	Continuous		400	Kenya 2
48	3 × 0,33 - 1,0		950/1 400/1 800	Zambia
49	3 × 0,333 - 1,0		975/1 400/1 800	Israel
	+ announcement			
50	3,0 - 0,5		400	Jamaica
51	4,8 - 0,2		400	Swaziland
52	5,5 - 0,5		450	Nigeria
53	6 × (0,1 - 0,9) - 0,3 - 0,7		400	Thailand
54	Continuous		400	Bahrain
55	Continuous		400	Bhutan
56	Continuous		400	Botswana
57	Continuous		400	Brunei Darussalam
58	Continuous		400	Dominican Rep.
59	Continuous		400	Falkland Islands
60	Continuous		480 + 620	Hong Kong
61	Continuous		400	India 1
	2,5 - 0,5		400	India 2
62	Continuous		400	Kuwait
63	Continuous		400	Maldives
64	Continuous		400	Qatar
65	Continuous		400	S. Helena

Continued

Table 5.5 (concluded): Number Unobtainable

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
66	Continuous		425	Seychelles
67	Continuous		400	Sri Lanka
68	Continuous 2,5 - 0,5		400 400	Uganda 1 Uganda 2
69	Continuous		400 or 425	United Arab Emirates
70	Continuous		400	Vanuatu
71	Interrupted at 120 ipm		480/620?	Diego Garcia
72	Recorded announcement			Antigua and Barbuda
73	Recorded announcement			Panama
74	Recorded announcement			S. Lucia
75	Recorded announcement			Western Samoa

5.2.1.5 World Call and Caller Waiting tones

Table 5.6: Waiting tone - undefined Call or Caller, except where stated

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,04 - 10,0 - 0,04 - 20,0 - 0,04 - 20,0	50,12	425	Papua New Guinea
2	0,05 - 1,0	1,05	425	Brazil
3	0,1 - 0,1 - 0,1 - 1,0	1,3	440	Japan - Waiting I
4	0,1 - 0,1 - 0,1 - 4,7	5,0	425/525	Australia
5	0,125 - 0,125	0,25	450	Madagascar
6	0,15 - 0,25 - 0,15 - 1,45	2,0	400	Nigeria - Operator intervening
7	0,15 - 10,0 - 0,15 (once only)	10,3	400 or 440	Israel - Waiting
8	0,2 - 0,2	0,4	425	S. Lucia
9	0,2 - 0,2 - 0,2 - 10,0	10,6	425	Iran
10	0,2 - 0,2 - 0,2 - 4,4	5,0	425	Aruba, Uruguay
11	0,2 - 0,2 - 0,2 - 4,5	5,1	425	Sri Lanka
12	0,2 - 0,6	0,8	425	Ecuador, Ethiopia, Macau
13	0,2 - 0,6 - 0,2 - 4,0	5,0	425	Saudi Arabia
14	0,2 - 1,0	1,2	425	Botswana
15	0,25 - 0,25 - 0,25 - 3,25	4,0	350 + 440	Korea (Rep. of)
16	0,25 - 0,25 - 0,25 - 3,25	4,0	400	New Zealand 2
17	0,3 - 0,2 - 0,3 - 3,2	4,0	425	Singapore
18	0,3 - 1,0	1,3	425	Oman
19	0,3 - 10,0	10,3	425	Argentina - Call Waiting, Vanuatu
20	0,3 - 10,0	10,3	440	Trinidad and Tobago, United States of America (Pabx)
21	0,4 - 0,2 - 0,4 - 2,0	3,0	425	Kiribati
22	0,4 - 0,2 - 0,4 - 4,0	5,0	425	Argentina - Waiting
23	0,4 - 0,4	0,8	425	Lao P.D.R.
24	0,4 - 4,0	4,4	450	China
25	0,5	0,5	400 × 25	Brunei Darussalam
26	0,5	0,5	400 + 450	New Zealand 1
27	0,5 - 0,0~4,0 - 0,05 - 0,45 - 0,05 - 3,45 - 0,05 - 0,45 - 0,05 - 3,45	8,5 ~ 12,5	400 × 16/400	Japan - Call Waiting
28	0,5 - 0,25	0,75	400	Bhutan
29	0,5 - 0,3 - 0,2 - 0,3 - 0,2 - 3,0	4,5	400	Ghana

Continued

Table 5.6 (concluded): Waiting tone - undefined Call or Caller, except where stated

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
30	0,5 - 0,5	1,0	400 + 450/400?	Solomon
31	0,5 - 0,5	1,0	900 + 1 300	Chile
32	0,5 - 0,5 - 0,2 - 2,7	3,9	440	Honduras
33	0,5 - 0,5 - 0,5 - 2,5	4,0	400 × 16/400	Japan - Waiting II
34	0,5 - 10,0 - 0,5 (once only)	11,0	480	Antigua and Barbuda
35	0,5 - 18,0	18,5	480	Guyana
36	0,5 - 2 × (0,3 - 0,2) - 3,0	4,5	420 × 40 or 400 + 440	Jordan
37	0,65 - 0,325 - 0,125 - 1,3 - 2,6	5,0	950/950/1 400	Paraguay
38	1 × (0,5 - 10,0 - 0,5)	11,0	440	Anguilla, British Virgin Islands, Dominica (Commonwealth of), Montserrat, S.-Kitts-and-Nevis, Turks and Caicos Islands
39	1,0 (one burst)	1,0	425	Sierra Leone
40	1,0 - 10,0	11,0	400	Maldives
41	1,0 - 10,0 - 0,5 - 0,25 - 0,5 - 10,0 - 0,5 - 0,25	23,0	425	Malaysia
42	1,0 - 5,0	6,0	400	Angola
43	1,5 - 1,5	3,0	523/659	Zimbabwe
44	2 bursts 10,0 s apart	11,0?	440	Bermuda
45	2 × (0,1 - 0,1) - 0,6 - 3,0	4,0	400 or 440	Israel - Call Waiting
46	2,0 - 4,0	6,0	425	Nigeria - Waiting
47	3 × (0,2 - 3,0) - 0,2	9,8	523/659	New Zealand 3
48	3 × (0,25 - 0,25) - 0,25 - 7,25	9,0	400 × 33 1/3	South Africa
49	3 × (0,5 - 0,5) - 8,0	9,5	440	Hong Kong
50	3 × 0,333 - 1,0	1,999	950/1 400/1 800	Tajikistan
51	Continuous		425	Kenya

5.2.1.6 World Pay tones

Table 5.7: Pay tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1 - 0,1 - 0,1 - 0,1 (only once)	0,5	900	Malaysia
2	0,125 - 0,125	0,25	400	Namibia, S. Helena
3	0,15 - 0,15	0,3	12 000?	Central African Republic
4	0,2 - 1,8	2,0	900	South Africa
5	0,2 - 2,0	2,2	852	Solomon
6	0,25 - 0,25	0,5	900	Brunei Darussalam 1 (pip tone?)
7	0,25 - 0,25	0,5	900	Swaziland
8	0,5	0,5	250	Japan 2
9	0,624 - 4,376	5,0	400	Brunei Darussalam 2 (end of period)
10	0,75	0,75	300	Brazil
11	1,0	1,0	250	Japan 1
12	3 × 0,22 - 1,0	1,66	950/1 400/1 800	Greenland
13	Continuous		12 000?	Sao Tome and Principe

5.2.2 World Set 2:

Special Dial, Positive Indication, Congestion, Intrusion tones.

5.2.2.1 World Special Dial tones

Table 5.8: Special Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,25 - 0,25 - 0,25 - 0,25 - 2,0	3,0	425	Malaysia
2	0,4 - 0,04	0,44	425	Kuwait, Lao P.D.R., Mali, Papua New Guinea, Vanuatu
3	1,0 - 0,25	1,25	400	Israel
4	1,8 - 0,2	2,0	425	Macau
5	4 × (0,25 - 0,25) - Continuous	2,0 - Cont.	400 × 33 1/3	South Africa
6	Continuous		400 + 425	Philippines
7	Continuous		1 000	Brunei Darussalam - transmission

5.2.2.2 World Positive Indication tones

Table 5.9: Positive Indication tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,125 - 0,125 - 0,125 - 0,625	1,0	400	Japan
2	0,25 - 0,25 - 0,25 - 0,25	1,0	700/1 100	South Africa
3	2 × (0,1 - 0,2) - 0,1 - 1,3	2,0	425	Uruguay
4	3 × 0,333 - 1,0	1,999	950/1 400/1 800	Paraguay

5.2.2.3 World Congestion tones

Table 5.10: Congestion tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1	0,2	400	Solomon
2	0,167 - 0,167	0,34	425	Tunisia
3	0,175 - 0,175	0,35	425	Nepal
4	0,2 - 0,2	0,4	400	Chile
5	0,2 - 0,2	0,4	425	Sierra Leone
6	0,2 - 0,2 - 0,4 - 0,35 - 0,225 - 0,525	1,9	425	Kenya
7	0,2 - 0,3	0,5	480 + 620	Jamaica 2
8	0,25 - 0,25	0,5	400	Maldives
9	0,25 - 0,25	0,5	400	Namibia, Nigeria, South Africa, New Zealand 2
10	0,25 - 0,25	0,5	400 + 440	Jordan 2
11	0,25 - 0,25	0,5	425	Aruba, Botswana, Cayman Islands, Indonesia, Iran, Macau, Malaysia, Mexico, S. Lucia, Singapore, Sri Lanka, Suriname, Uruguay, Zambia
12	0,25 - 0,25	0,5	440	Honduras
13	0,25 - 0,25	0,5	445 or 425	Greenland

Continued

Table 5.10 (concluded): Congestion tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
14	0,25 - 0,25	0,5	480 + 620	Anguilla, Barbados, Bermuda, British Virgin Islands, Canada, Dominica (Commonwealth of), Hong Kong, Montserrat, S.-Kitts-and-Nevis, Turks and Caicos Islands, United States of America 1
15	0,25 - 0,25	0,5	480/620?	Antigua and Barbuda
16	0,25 - 0,25	0,5	600 × 120	Cuba, United States of America 2
17	0,25 - 0,25	0,5	600 × 120 or 480 + 620	Philippines
18	0,3 - 0,2	0,5	480 + 620	Jamaica 1, Korea (Rep. of)
19	0,3 - 0,4	0,7	425	Argentina
20	0,32 - 4,65	4,97	425	Panama
21	0,33 - 0,33	0,66	425	Ecuador
22	0,375 - 0,375	0,75	400	Australia, Bahrain 2, Brunei Darussalam, Dominican Rep. 2
23	0,375 - 0,375	0,75	425	Lao P.D.R., Nauru (Pabx)
24	0,375 - 0,375	0,75	425 or 400	Papua New Guinea
25	0,4 - 0,35	0,75	400	S. Helena
26	0,4 - 0,35 - 0,225 - 0,525	1,5	400	Bahrain 1, Qatar, Falkland Islands, S. Vincent and the Grenadines
27	0,4 - 0,35 - 0,225 - 0,525	1,5	400 or 425	United Arab Emirates
28	0,4 - 0,35 - 0,225 - 0,525	1,5	425	Seychelles
29	0,4 - 0,4	0,8	425	Kyrgyzstan, Moldova, Turkmenistan
30	0,5 - 0,5	1,0	400	Angola, Ghana, Japan
31	0,5 - 0,5	1,0	420 × 40	Jordan 1
32	0,5 - 0,5	1,0	425	Central African Rep., Guyana, Kiribati, Kuwait, Oman
33	0,5 - 0,5	1,0	440	Niger
34	0,5 - 0,5	1,0	450	Egypt
35	0,5 - 0,5	1,0	900	New Zealand 1
36	0,7 - 0,7	1,4	450	China
37	0,8 - 0,8	1,6	400	Dominican Rep. 1
38	2 × (0,2 - 0,23) - 0,2 - 0,92	1,98	450	Syria
39	2,4 - 2,4	4,8	480/620?	Burkina Faso
40	recorded announcement			Grenada, Western Samoa

5.2.2.4 World Intrusion tones

Including those reported as warning - operator intervening.

Table 5.11: Intrusion tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 4,9	5,0	425	Zambia
2	0,2 - 0,2 - 0,2 - 0,6	1,2	450	China
3	0,5 - 0,2	0,7	425	Ethiopia
4	0,5 - 0,2 - 0,2 - 0,2	1,1	425	Kuwait
5	0,5 - 0,2 - 0,2 - 0,2	1,1	425	Saudi Arabia
6	0,5 - 0,5	1,0	450	Egypt

Table 5.12: Warning tone (Operator intervening?)

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,2 - 0,2 - 0,65 - 0,2		450	Anguilla
2	5 × 0,1 - 1,9		1 400	Argentina
3	0,8 - 6,0 - 0,2 - 6,0 - 0,2		440	Ascension
4	1,0 - 15,0 - 0,36 - 15,0		425 or 525	Australia
5	0,16 - 2,0		425	Botswana
6	0,2 - 0,2 - 0,65 - 0,2		450	British Virgin Islands
7	0,25 - 2,0		400	Brunei Darussalam
8	0,5 - 15,0		1 400	Chile
9	0,2 - 0,2 - 0,65 - 0,2		450	Dominica (Commonwealth of)
10	0,1 - 0,1		1 000	Falkland Islands
11	0,5 - 0,17 - 0,17 - 0,17		400	Fiji
12	0,2 - 0,2 - 0,2 - 1,4		425	Kenya
13	2 × (0,5 - 0,5 - 1,5)		392/494/587	Korea (Rep. of)
14	1,0 - 1,5 - 0,4 - 1,5		425	Kuwait
15	0,5 - 0,2 - 0,2 - 0,2		425	Malaysia
16	0,5 - 0,17 - 0,17 - 0,17		425	Mexico
17	0,2 - 0,2 - 0,65 - 0,2		450	Montserrat
18	0,5 - 0,17 - 0,17 - 0,17		425	Oman
19	0,18 - 0,18 - 0,5 - 0,18		425	Panama
20	0,5 - 11,5		1 400	Papua New Guinea
21	0,15 - 0,25 - 0,15 - 1,45		425	Paraguay
22	0,2 - 0,2 - 0,65 - 0,2		450	S.-Kitts-and-Nevis
23	0,1 - 4,9		425	S. Lucia
24	0,125 - 0,125		425	Singapore
25	0,15 - 0,25 - 0,15 - 1,45		400	South Africa
26	1,0		800	Thailand
27	0,2 - 0,2 - 0,65 - 0,2		450	Turks and Caicos Islands
28	2,0 - 10,0 - 0,5 - 10,0 1,5 - 8,0 - 0,5 - 8,0		440 440	United States of America United States of America 2 (Pabx)
29	0,15 - 0,25 - 0,15 - 1,45		425	Uruguay

5.2.3 World Set 3:

Other tones are reported used. These include:

Acceptance tone, see table 5.13

Comfort tone, see table 5.14

Confirmation tone, see table 5.15

End of Three Party Service tone, see table 5.16

Executive Override tone, see table 5.17

Facilities tone, see table 5.18

Function Acknowledge tone, see table 5.19

Holding tone, see table 5.20

Identification tone, see table 5.21

Intercept tone, see table 5.22

Line Lockout tone, see table 5.23

Negative Indication tone, see table 5.24

Notify tone, see table 5.25

Offering tone, see table 5.26

Payphone Recognition tone, see table 5.27

Permanent Signal tone, see table 5.28

Pre-emption tone, see table 5.29

Recall Dial tone, see table 5.30

Record tone, see table 5.31

Refusal tone, see table 5.32

Re-order tone, see table 5.33

Route tone, see table 5.34

Search tone, see table 5.35

Second Dial tone, see table 5.36

Service Activated tone (Positive Indication?), see table 5.37

Test Number tone, see table 5.38

Warning tone (end of period), see table 5.39

Table 5.13: Acceptance tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	Continuous		425	Kuwait
2	Continuous		950	Mali
3	Continuous		425	Saudi Arabia
4	Continuous		950	Vanuatu

Table 5.14: Comfort tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,65 - 0,325 - 0,325 - 1,3 - 2,6		950/950/1 400	South Africa

Table 5.15: Confirmation tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1 - 0,3 - 0,3		400 × 24	Brunei Darussalam
2	0,15 - 0,15 - 0,3 (only once) 0,04 - 0,04		400 or 440 400	Israel 1 Israel 2
3	20 × (0,125 - 0,125) - Continuous		400	Jordan
4	3 × 0,1 - 2 × 0,1		350 + 440	Canada (Pabx)
5	3 × 0,1 - 2 × 0,1		350 + 440	United States of America (Pabx)
6	Continuous		950	Lao P.D.R.

Table 5.16: End of Three Party Service tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	3 × 0,33 (single burst)	0,99	950/1 400/1 800	Argentina

Table 5.17: Executive Override tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,02 - 1,0		750	Brazil
2	3,0		440	Canada (Pabx)
3	3,0		440	United States of America (Pabx)

Table 5.18: Facilities tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	Continuous		425	Australia

Table 5.19: Function Acknowledge tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1 - 0,1 - 2,0		425	Brazil
2	2,0 - 0,4 - 0,2 - 0,4		440 + 450	New Zealand

Table 5.20: Holding tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,05 - 2,0		400	Israel
2	0,5 - 0,5 - 0,5 - 0,25		400	Ghana
3	0,5 - 0,5 - 0,5 - 0,25		420 × 40 or 400 + 440	Jordan
4	0,5 - 0,5 - 0,5 - 0,25		400/400 + 450	New Zealand
5	0,5 - 2,5		400 × 24	Brunei Darussalam
6	0,65 - 0,325 - 0,325 - 1,3 - 2,6		950/950/1 400	Iran
7	0,65 - 0,325 - 0,325 - 1,3 - 2,6		950/950/1 400	Nigeria

Table 5.21: Identification tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,6 - 2,0 - 0,6 - 2,0		800/1 200	Chile

Table 5.22: Intercept tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,05 - 0,05		450 or 425 + 475	Bahrain
2	0,125 - 0,25 - 0,125 - 1,5		350 + 440	Korea (Rep. of)
3	0,25 - 0,25		440/620	Canada (Pabx)
4	0,25 - 0,25		440/620	United States of America
5	0,25 - 2,0		425	Singapore
6	3 × 0,333 - 1,0		950/1 400/1 800	Kuwait
7	3, × 0,333 - 1,0		950/1 400/1 800	Macau

Table 5.23: Line Lockout tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,48 - 0,48		425	Oman
2	0,5 - 0,5		425	Kuwait
3	0,5 - 0,5		425	Malaysia

Table 5.24: Negative Indication tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,5 - 0,5		425	Uruguay

Table 5.25: Notify tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	3 × 0,2 - 2 × 0,2		900	South Africa

Table 5.26: Offering tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1		526	Australia
2	0,15 - 0,25 - 0,15 - 1,45		425	Iran
3	0,2 - 0,2 - 0,2 - 0,6		450	Bhutan
4	0,5 - 0,5 - 0,5 - 1,0		425	Indonesia
5	2 × (0,17 - 0,83) - 0,51 - 0,49		400	Thailand

Table 5.27: Payphone Recognition tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	Anguilla
2	0,075 - 0,15 - 0,075 - 2,7		1 100 + 1 750/750 + 1 450	Australia
3	0,125 - 1,5		816/1 209	Bahrain
4	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Benin
5	0,07 - 2,0		1 600	Botswana
6	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	British Virgin Islands
7	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Chile
8	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	Dominica (Commonwealth of)
9	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Egypt
10	0,2 - 0,2 - 0,2 - 2,0		1 200/800	Indonesia
11	0,2 - 0,2 - 0,2 - 2,0		1 209/452	Israel
12	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Macau
13	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	Montserrat
14	0,125 - 1,5		770/1 209	Namibia
15	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	New Zealand
16	0,2 - 0,2 - 0,2 - 2,0 (four cycles)		1 209/852	Papua New Guinea 1
	0,2 - 0,2 - 0,2 - 2,0 (two cycles)		1 336/941	Papua New Guinea 2
	0,075 - 0,15 - 0,075 - 2,7 (two cycles)		900	Papua New Guinea 3
17	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Puerto Rico
18	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	S.-Kitts-and-Nevis
19	0,2 - 0,2 - 0,2 - 2,0		1 600/1 200	Saudi Arabia
20	0,2 - 0,2 - 0,2 - 2,0		1 206/832d	Singapore
21	0,125 - 1,5		770/1 209	South Africa
22	2,0 - 2,0		1 100 + 1 750/750 + 1 450	Swaziland 1
	0,2 - 0,2 - 0,2 - 2,0			Swaziland 2
23	0,2 - 0,2 - 0,2 - 2,0		1 600/1 143	Turks and Caicos Islands
24	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Zambia
25	0,2 - 0,2 - 0,2 - 2,0		1 100 + 1 750/750 + 1 450	Zimbabwe

Table 5.28: Permanent Signal tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	Continuous		1 400	Iran

Table 5.29: Pre-emption tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,1 - 0,1 (three bursts)		1 400	Iran

Table 5.30: Recall Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	3 × (0,1 - 0,1) - Continuous		350 + 440	Anguilla
2	Continuous		350/440	Antigua and Barbuda
3	3 × (0,1 - 0,1) - Continuous		350 + 440	Barbados
4	3 × (0,1 - 0,1) - Continuous		350 + 440	British Virgin Islands
5	0,1 - 0,1		350 + 440	Canada (Pabx)
6	3 × (0,1 - 0,1) - Continuous		350 + 440	Dominica (Commonwealth of)
7	3 × (0,1 - 0,1) + Continuous		350 + 440	Hong Kong
8	Continuous		425	Iran
9	0,4 - 0,2 - 0,4 - 1,5		133	Iraq
10	3 × (0,1 - 0,1) + Continuous		400 or 440	Israel
11	Continuous		350 + 440	Japan
12	1,0 - 4,0 1,0 - 2,0		400 or 450 400 or 450	Korea (Rep. of) 1 Korea (Rep. of) 2
13	3 × (0,1 - 0,1) - Continuous		350 + 440	Montserrat
14	Continuous		33	Nauru (Pabx)
15	Continuous		400 or 425	Nigeria
16	3 × (0,1 - 0,1) - Continuous		350 + 440	S.-Kitts-and-Nevis
17	Continuous		425	Saudi Arabia
18	Continuous		450	Syria
19	3 × (0,1 - 0,1) - Continuous		350 + 440	Turks and Caicos Islands
20	3 × (0,1 - 0,1) - Continuous		350 + 440	United States of America

Table 5.31: Record tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,425 - 14,525		1 400	Australia
2	0,25 - 0,25		480 + 620	Jamaica
3	0,5 - 15,0		1 400	United States of America

Table 5.32: Refusal tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,6 - 0,6		425	Kuwait
2	0,6 - 0,6		425	Saudi Arabia

Table 5.33: Re-order tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,3 - 0,2 0,2 - 0,3		480 + 620 480 + 620	Trinidad and Tobago 1 Trinidad and Tobago 2

Table 5.34: Route tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,06 - 0,06		425	Bahrain
2	0,05 - 0,05		425	Burkina Faso 1
	0,04 - 0,04		425	Burkina Faso 2
3	0,5 - 0,5		425	Burundi
4	0,05 - 0,05		440	Cameroon
5	0,05 - 0,05		425	Central African Rep.
6	0,05 - 0,05		425	Comoros
7	0,05 - 0,05		425	Cote D'Ivoire
8	0,05 - 0,05		425	Djibouti
9	0,05 - 0,05		440	French Polynesia
10	0,05 - 0,05		440	Gabon 1
	0,05 - 0,05		425	Gabon 2
11	0,05 - 0,05		440	Guadeloupe (French Dep.)
12	0,05 - 0,05		440	Guiana (French Dep.)
13	0,05 - 0,04		425	Mali
14	0,05 - 0,05		440	Martinique (French Dep.)
15	0,05 - 0,05		425	Mauritania
16	0,05 - 0,05		425	Mauritius
17	0,05 - 0,05		440	Mayotte
18	0,05 - 0,05		425	Morocco
19	0,05 - 0,05		440	New Caledonia
20	0,05 - 0,05		440	Niger
21	0,05 - 0,05		440	Reunion (French Dep.)
22	0,05 - 0,05		440	Rwanda
23	0,05 - 0,05		425	S. Lucia
24	0,05 - 0,05		440	S. Pierre and Miquelon
25	0,05 - 0,05		440	Senegal
26	0,05 - 0,05		425	Sri Lanka
27	0,4 - 0,4		25	Turkmenistan
28	0,05 - 0,05		425	Vanuatu
29	0,05 - 0,05		440	Wallis and Futuna

Table 5.35: Search tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	0,01 - 1,0		1 004	Israel

Table 5.36: Second Dial tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	Continuous		350/440?	Antigua and Barbuda
2	$2 \times (1,0 - 1,0)$ - Continuous		350 + 440	Barbados
3	Continuous		330 or 440	Cameroon
4	Continuous		425 + 330	Central African Rep.
5	Continuous		330 + 440	Chile
6	Continuous		450	China
7	Continuous		850	Comoros
8	Continuous Continuous		425 + 330 1 050	Cuba 1 Cuba 2
9	7,0		440 + 330	Gabon
10	Continuous		445 or 425	Greenland
11	0,135 - 0,135		440	Honduras
12	Continuous		400/425?	Iran
13	$3 \times (0,1 - 0,1)$ + Continuous		400 or 440	Israel
14	0,125 - 0,125 0,125 - 0,125 0,15 - 0,15		400 440 400	Japan 1 Japan 2 Japan 3
15	1,0 - 0,2 - 0,75 - 0,75		425	Kenya
16	Continuous		425	Malaysia
17	Continuous		425 + 330	Mali
18	0,5 - 0,5 - 0,5 - 0,3 - 0,2		660/440/590/740	Morocco
19	Continuous		330 or 440	Niger
20	Continuous		425	Nigeria
21	Continuous		425	Oman
22	Continuous		340	Rwanda
23	Continuous		425	S. Lucia
24	Continuous		440 + 330	Senegal
25	0,65 - 0,03		425	Sri Lanka
26	Continuous		425	Turkmenistan
27	Continuous		$400 \times 450?$ or 400×33	Zimbabwe

Table 5.37: Service Activated tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	1,0 - 0,25		425	Argentina

Table 5.38: Test Number tone

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	Continuous		1 004	Antigua and Barbuda

Table 5.39: Warning tone (end of period)

	Cadence (s)	Period (s)	Frequency (Hz)	Country/ies
1	2,0		800	Chile

6 Comparison of Standardized tones

6.1 Introduction

A comparison is made between the characteristics of telecommunications service tones defined in International and European Standards. These include ITU-T (formerly CCITT) Recommendations, ETSI Standards and Technical Reports, GSM Standards, the proposed TETRA Standards and CEPT Recommendations.

Standards for network generated tones:

CCITT Recommendation E.180 [14] - Applies principally to network tones - PSTN and ISDN.

CEPT Recommendation T/SF 23 [3] - Applies to networks, public and private, analogue or digital. CEPT Definitions reflect/replicate ITU-T definitions.

CEPT Recommendation T/CS 20-15 [4] - Slightly refines the earlier CEPT T/SF recommendations.

Standards for Terminally Generated Tones:

ETS 300 245-7 [10] - Applies specifically to tones generated by ISDN terminals in response to network signals. It includes the tones presented in ETR 187 [6].

ETR 187 [6] - Recommends the same set of tones as prETS 300 245-7 with one minor change to call waiting.

GSM 02.40 [11]- Applies specifically to phase 1 and 2 GSM terminals.

ETR 294 - TETRA [7] - Intended to apply to the proposed phase 1 Tetra terminals.

NOTE 1: Definitions for GSM tones are cross referenced to CEPT Recommendation T/CS 20-15 [4] and CEPT Recommendation T/SF 23 [3]. These are given in French in T/SF 23, but are principally the same as the ITU-T definitions.

NOTE 2: The duration (number of cycles) of GSM tones given by the Mobile Station (MS) is an implementation option. However, in all cases when an MS tone is being generated the MS should still accept new inputs, and be able to return immediately to the idle state and be available to originate/receive calls, i.e. the tones can be over-ridden.

Standards for Service Generated tones:

ISO/IEC 13174 [13] - Includes a recommended chime (two or more sequential frequencies) as a prompting Record tone specifically for Voice Mail applications.

6.2 The standards tone tables

6.2.1 Standards Set 1:

Dial, Ringing, Busy, Special Information, Call Waiting, and Pay tones.

6.2.1.1 Standard Dial tones

Table 6.1: International standards for network generated Dial tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	Continuous	Single f, range 400 - 450 Combined, up to 3f (1f range 340-425, 2f range 400-450)	Continuous cadence at single frequency of 425 ± 15 Hz
CEPT Recommendation T/SF 23 [3]	Continuous	400-450	
CEPT Recommendation T/CS 20-15 [4]	Continuous	425 ± 15	

Table 6.2: International standards for terminal generated Dial tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	Continuous or National tones	425 or National tones
ETR 187 (General) [6]	Continuous	425
GSM 02.40 (Dial tone is not normally required, but if it is provided) [11]	N/A Continuous	N/A 425 ± 15
ETR 294 (TETRA - no characteristics defined) [7]	N/A	N/A

6.2.1.2 Standard Ringing tones

Table 6.3: International standards for network generated Ringing tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	Slow period (tone<silence) tone range 0,67-1,5 silence range 3,0 - 5,0 1st tone starts a.s.a.p.	prefer 425 rec. range 400-450 accept range 340-500 avoid 450-500	Cadence 1,0 - 4,0 at single frequency of 425 ± 15 Hz
CEPT Recommendation T/SF 23 [3]	(0,75-1,25) - (4,0-5,0)	400-450	
CEPT Recommendation T/CS 20-15 [4]	1,0 - 4,0	425 ± 15	

Table 6.4: International standards for terminal generated Ringing tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	1,0 - 4,0 or National tones	425 or National tones
ETR 187 (General) [6]	1,0 - 4,0	425
GSM 02.40 (Ringing tone is not normally required, mobile station presents network tone, but if it is provided) [11]	N/A 1,0 - 4,0	N/A 425±15
ETR 294 (TETRA - name and function defined) [7]	No characteristics defined	No characteristics defined

6.2.1.3 Busy tone

Table 6.5: International standards for network generated Busy tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	Quick period (tone=silence) total period 0,3-1,1 ratio tone/silence 0,67-1,5 tone > 0,1 Slower than Congestion	Single f, prefer 425 rec. range 400-450 accept range 340-500 avoid 450-500	Use 425 for Busy and Congestion and keep to recommended cadence ranges
CEPT Recommendation T/SF 23 [3]	(0,4-0,5) - (0,4-0,5)	400-450	
CEPT Recommendation T/CS 20-15 [4]	0,5 - 0,5	425 ± 15	

Table 6.6: International standards for terminal generated Busy tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	0,5 - 0,5 or National tones	425 or National tones
ETR 187 (General) [6]	0,5 - 0,5	425
GSM 02.40 [11]	0,5 - 0,5	425±15
ETR 294 (TETRA - tone and function defined (renamed Called Number Busy) [7]	No characteristics defined	No characteristics defined

6.2.1.4 Standard Special Information Tones (SIT)

This tone is also intended to be used to indicate Number Unobtainable.

Table 6.7: International standards for network generated SIT

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	3 × 0,33 ± 70 - 1,0 ± 0,25	950 ± 50/1 400 ± 50/1 800 ± 50	Keep to recommended range
CEPT Recommendation T/SF 23 [3]	3 × (0,26-0,4) - 1,0	900-1 000/1 350-1 450/1 750-1 850	
CEPT Recommendation T/CS 20-15 [4]	3 × 0,333 - 1	950/1 400/1 800	

Table 6.8: International standards for terminal generated SIT

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	3 × 0,333 - 1	950/1 400/1 800
ETR 187 (General) [6]	3 × 0,333 - 1	950/1 400/1 800
GSM 02.40 [11] Also used to indicate Error, Number Unobtainable & Authentication Failure	3 × 0,333 - 1	950/1 400/1 800
ETR 294 TETRA [7]	None given	None given

6.2.1.5 Standard Call Waiting tones

Table 6.9: International standards for network generated Call Waiting tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	(0,3-0,5) - (8,0-10,0) or (0,1-0,2) - (0,1-0,2) - (0,1-0,2) - (8,0-10,0) repeated, cycles cease at time-out	range 400-450	None given
CEPT Recommendation T/SF 23 [3]	(0,1-0,25) - (0,1-0,25) - (0,1-0,25) - (2,0-5,0)	400-450	None given
CEPT Recommendation T/CS 20-15 [4]	None given	None given	None given

Table 6.10: International standards for terminal generated Call Waiting tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10]	0,2 - 0,6 - 0,2 - 3,0 (repeated once, i.e. 2 cycles only)	425
ETR 187 [6]	0,2 - 0,6 - 0,2 - 3,0 (may be repeated once only)	425
GSM 02.40 [11]	0,2 - 0,6 - 0,2 - 3,0 - 0,2 - 0,6 - 0,2 (1 cycle, alternative tones are acceptable but not preferred)	425±15
ETR 294 (TETRA) [7]	None given	None given

NOTE: TETRA systems may well require a Call Waiting tone and one may be defined in due course.

6.2.1.6 Standard Pay tones

Table 6.11: International standards for network generated Pay tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	None given	None given	None given
CEPT Recommendation T/SF 23 [3]	(0,1-0,5) - (0,1-0,5) (0,1-0,5) - (0,1-0,5) - (0,1-0,5) - (3,0-4,5)	900-1 100 or 900-1 100	None given
CEPT Recommendation T/CS 20-15 [4]	None given	None given	None given

Table 6.12: International standards for terminal generated Pay tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	None given	None given
ETR 187 (General) [6]	None given	None given
GSM 02.40 [11]	None given	None given
ETR 294 (TETRA) [7]	N/A	N/A

NOTE: ETS 300 400 [18] for ISDN payphones does not define a pay tone but does give loudness values and testing requirements for any tones presented.

6.2.2 Standards Set 2:

Special Dial, Positive Indication, Congestion and Intrusion tones.

6.2.2.1 Standard Special Dial tones

Table 6.13: International standards for network generated Special Dial tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	None given	None given	None given
CEPT Recommendation T/SF 23 [3]	Continuous + 0,75 - 0,75	(437-452)+(348-352)	
CEPT Recommendation T/CS 20-15 [4]	None given	None given	None given

Table 6.14: International standards for terminal generated Special Dial tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	None given	None given
ETR 187 (General) [6]	None given	None given
GSM 02.40 [11]	None given	None given
ETR 294 (TETRA) [7]	N/A	N/A

6.2.2.2 Standard Positive Indication tones

ITU-T, CEPT nor ETSI did not define the characteristics for a positive indication tone. CCITT Recommendation E.182 [15] and ETR 294 (TETRA) [7] both define the tone and its function. ETR 294 renames the tone "Acceptance tone".

Supplementary service providers should be aware that prETS 300 738 [19] implies that a single tone is insufficient feedback for most supplementary service commands.

6.2.2.3 Standard Congestion tones

Table 6.15: International standards for network generated Congestion tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	Quick period (tone=silence) total period 0,3-1,1 ratio tone/silence 0,67-1,5 tone > 0,1 Faster than Busy	prefer 425 rec. range 400-450 accept range 340-500 avoid 450-500	Use 425 for Busy and Congestion and keep to recommended cadence ranges
CEPT Recommendation T/SF 23 [3]	(0,2-0,25) - (0,2-0,25)	400-450	
CEPT Recommendation T/CS 20-15 [4]	0,2 - 0,2	425 ± 15	

Table 6.16: International standards for terminal generated Congestion tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	0,2 - 0,2	425
ETR 187 (General) [6]	0,2 - 0,2	425
GSM 02.40 [11]	0,2 - 0,2	425 ± 15
ETR 294 (TETRA) tone and function defined (renamed Network Busy tone) [7]	No characteristics defined	No characteristics defined

6.2.2.4 Standard Intrusion tones

Table 6.17: International standards for network generated Intrusion tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	None given	None given	
CEPT Recommendation T/SF 23 [3]	(0,1-0,2) - (1,0-2,0) (0,2-0,3) - (0,2-0,3) - (0,2-0,3) - (1,2-1,4)	1 350-1 450 or 400-450	
CEPT Recommendation T/CS 20-15 [4]	None given	None given	

Table 6.18: International standards for terminal generated Intrusion tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 (ISDN Terminals) [10]	None given	None given
ETR 187 (General) [6]	None given	None given
GSM 02.40 [11]	None given	None given
ETR 294 (TETRA) [7]	None given	None given

6.2.3 Standards Set 3:

Other Standardized tones: Caller Waiting, Negative Indication, Routeing, Warning, Radio Path Acknowledgement, Radio Path Not Available, Error/Authentication Failure, Record tones.

6.2.3.1 Standard Caller Waiting tones

Table 6.19: International standards for network generated Caller Waiting tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	Ring tone followed after a short silence (0-0,2 s) by call waiting tone, either: a) tone 0,3-0,5 silence 8,0-10,0 or b) tone 0,1-0,2 - silence 0,1-0,2 - tone 0,1-0,2 - silence 8,0-10,0 c) another call waiting tone	400 - 450	
CEPT Recommendation T/SF 23 [3]	None given	None given	
CEPT Recommendation T/CS 20-15 [4]	None given	None given	

Table 6.20: International standards for terminal generated Caller Waiting tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 [10] (ISDN Terminals)	None given	None given
ETR 187 (General) [6]	Ring cadence (1,0 - 4,0) until time-out then Busy (0,5 - 0,5)	425
GSM 02.40 [11]	None given	None given
ETR 294 (TETRA) tone and function defined (renamed Call Queuing tone) [7]	No characteristics defined	No characteristics defined

6.2.3.2 Standard Negative Indication tones

ITU-T, CEPT nor ETSI did not define the characteristics for a negative indication tone. CCITT Recommendation E.182 [15] and ETR 294 (TETRA) [7] both define the tone and its function. ETR 294 renames the tone "Rejection tone".

Supplementary service providers should be aware that prETS 300 738 [19] implies that a single tone is insufficient feedback for most supplementary service commands.

6.2.3.3 Standard Routeing tones

ITU-T, CEPT nor ETSI did not define the characteristics for a routeing tone. CCITT Recommendation E.182 [15] and ETR 294 (TETRA) [7] both define the tone and its function. ETR 294 renames the tone "Call Progressing tone". However, as major networks are now reconsidering the value of the tone, it may be appropriate for Tetra to re-evaluate its requirement.

6.2.3.4 Standard Warning tones

This tone is intended to indicate that a user's privacy may be compromised because recording is in progress. This tone is not intended to follow a record tone which is intended as a distinct prompt to the user to leave (i.e. record) a message.

Table 6.21: International standards for network generated Warning tones

Network generated tones			
Source	Cadence (s)	Frequency (Hz)	Preference for any update of equipment
CCITT Recommendation E.180 [14]	tone range 0,35-0,5 repeated every 15,0 ± 3,0 s of recording time	1 400 ± 1,5 %	
CEPT Recommendation T/SF 23 [3]	(0,35-0,5) - (12,0-18,0)	1 350-1 450	
CEPT Recommendation T/CS 20-15 [4]	0,4 - 15,0	1 400 ± 50	

Table 6.22: International standards for terminal generated Warning tones

Terminal generated tones		
Source	Cadence (s)	Frequency (Hz)
ETS 300 245-7 (ISDN Terminals) [10]	0,5 - 15,0	1 400
ETR 187 (General) [6]	0,5 - 15,0	1 400
GSM 02.40 [11]		
ETR 294 (TETRA) [7]		

6.2.3.5 Three GSM standard Specific tones

Table 6.23: International standards for terminal generated Radio Path Acknowledgement tone

Standard	Frequency (Hz)	Cadence (s)
GSM 02.40 [11]	425 ± 15	0,2 (single burst)

Table 6.24: International standards for terminal generated Radio Path Not Available tone

Standard	Frequency (Hz)	Cadence (s)
GSM	425 ± 15	0,2 - 0,2 (3 cycles)

Table 6.25: International standards for terminal generated Error/Authentication Failure tone

Standard	Frequency (Hz)	Cadence (s)
GSM 02.40 [11]	950/1 400/1 800	0,33 - 0,33 - 0,33 - 1,0

6.2.3.6 One standard Service Specific tone

Table 6.26: International standards for "service" Generated Record tone

Standard	Frequency (Hz)	Cadence (s)
ISO/IEC 13174 "Voice Mail" [13]	500/620	0,15 - 0,075 -,0,15

History

Document history		
V1.1.1	May 1997	Publication