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SECTION 7

TONES FOR USE IN NATIONAL |
SIGNALLING SYSTEMS

Recommendation E.180

TECHNICAL CHARACTERISTICS OF TONES

FOR THE TELEPHONE SERVICE

1 General

Administrations are reminded of the advantages of standardizing audible tones as far as possible so that subscribers and operators may quickly recognize any tone transmitted of whatever origin

Guidance on the application of tones and recorded announcements in various situations is given in Recommendation E.182.

In considering the degree of standardization, the CCITT took account of the nature of the various tones already in use. It was also considered that Administrations introducing new tones would find it helpful to know the preferred limits of cadence frequency and level.

Limits for tone cadences and frequencies are set forth below, all working tolerances being included in the limits.

Besides the limits applying to specifications, limits have been laid down for application to existing exchanges.

These latter limits are herein called *accepted* limits, while those for new equipment are called *recommended* limits.

The present Recommendation covers the case where audible tones are applied within the network. However, the same frequencies and cadences are to be applied if, in the ISDN, the audible tones are generated at the terminal equipment.

2 Electrical levels for tones

For international purposes, the levels of the ringing tone , the busy tone , the congestion tone , the special information tone and the warning tone have to be defined at a zero relative level point at the incoming (in the traffic direction) end of the international circuit.

The level of tones so defined must have a nominal value of —10 dBm0. The recommended limits should be not more than —5 dBm0 nor less than —15 dBm0 measured with continuous tone.

This Recommendation is also included in the Series Q Recommendations under the number Q.35 (Fascicle VI.1)

See Supplement No. 2 at the end of this fascicle for particular values of tone cadences and frequencies in actual use.

Recommendation E.181 specifies the information which could be given to users to facilitate recognition of foreign tones.

For the special information tone, a difference in level of 3 dB is tolerable between any two of the three frequencies which make up the tone.

For the power level of the dial tone the point of reference is the local exchange, where the subscriber line is connected. In the existing networks the absolute power at the 2-wire access in the direction towards the subscriber station is normally in the range of —10 dBm ± | dB. However, with respect to interference with multifrequency pushbutton (MFPB) receivers dial tone levels higher than —10 dBm should be avoided.

Note — The relative level of local exchanges in an analogue network is not fixed. For digital local exchanges the relative levels are given in Recommendation Q.517. A preferred level range of digital tone generators is —8 dBm0 to —3 dBm0 corresponding with the above level range at the output of local exchanges.

3 Acoustical levels for tones

When tones are generated by a source within a network, e.g., by a telephone exchange, the power level as perceived by the user will be influenced by the characteristics of the subscriber's line and the equipment between the source and the user's ear.

Furthermore, tones can be generated within the user's equipment, triggered by signals from the exchange. In these circumstances it is necessary to define the tone level in terms of the preferred range of sound pressure levels as heard by the listener.

Research has shown that the preferred listening level for information tones is substantially independent of room noise, circuit noise and tone cadence, but does vary over a range of tone frequencies. Figure 1/E.180 shows the recommended sound pressure levels, with upper and lower limits of the recommended range, over a range of tone frequencies, based on these experiments.

Figure 1/E.180, p.332

It is emphasized that there is no one-to-one relationship between electrical and acoustical power levels on various parameters such as the characteristics of the user's equipment.

It should be noted that the recommended sound pressure levels apply only to the most common situation of a user listening via a telephone handset, held reasonably close to the ear so that normal ‘‘ear coupling loss’’ values apply.

When using a loudspeaking telephone or a headset, the preferred sound pressure level is generally lower than the recommended levels.

4 Dial tone

4.1 It is recommended that dial tone should be a continuous tone.

4.2 It is recommended that dial tone should be:

— *either* a single frequency tone in the range 400-450 Hz,

— *or* a combined tone composed of up to three frequencies, with at least one frequency in each of the ranges 340-425 Hz and 400-450 Hz. The difference between any two frequencies should be at least 25 Hz.

4.3 Recognizing the local nature of ‘‘normal’’ use of dial tone, as well as the technical and economic consequences and consequences on customer habits of changes in dial tone, the full range of existing dial tones, including non-continuous tones as in Supplement No. 2 at the end of this fascicle, are considered acceptable. However, when adopting a new single frequency dial tone, Administrations are recommended to use 425 Hz.

4.4 Where digital tone generation is applied, the frequencies for dial tone should be the same as those recommended for analogue generated tones (see Annex A).

4.5 In order to prevent interference of harmonics or spurious components of the dial tone with the frequencies recommended for pushbutton telephone sets in Recommendation Q.23 and the MFPB signal reception specified in Recommendation Q.24, the maximum permissible power level of harmonics or quantizing noise of the dial tone has to be limited in a suitable way, depending on the specific characteristics of the implementations of the dial tone generator and the MFPB receivers within the same exchange. Examples of such limitations for the dial tone generator are given in Annex B.

Note — In cases of digital generation of the dial tone, the quantizing noise is composed of a number of spectral lines which depend on the number of samples in the generating pattern. In order to reduce the amplitude of the quantizing components, the number of samples should be chosen sufficiently high, thus spreading the quantizing distortion power more evenly over the whole spectrum.

5 Ringing tone

5.1 Ringing tone is a slow period tone, in which the tone period is shorter than the silent period.

The *recommended* limits for the tone period (including tolerances) are from 0.67 to 1.5 seconds. For existing exchanges, the *accepted* upper limit for the tone period is 2.5 seconds.

The *recommended* limits for the silent period separating two tone periods are 3 to 5 seconds. For existing exchanges, the *accepted* upper limit is 6 seconds.

The first tone period should start as soon as possible after the called subscriber’s line has been found.

Figure 2/E.180 shows the recommended and accepted limits for the ringing tone periods.

Figure 2/E.180 p. 333

5.2 The ringing tone cadence should be similar to the cadence used for applying ringing current to the called subscriber’s telephone set, but these two cadences need not be synchronized. The electrical parameters of the ringing current must be evaluated by the Administration concerned to prevent shock hazard.

5.3 The recommended frequency for the ringing tone is between 400 and 450 Hz. The accepted frequency should be not less than 340 Hz, nor more than 500 Hz. Frequencies between 450 and 500 Hz in the accepted frequency range should, however, be avoided. Administrations adopting a new single frequency ringing tone are recommended to use 425 Hz.

The ringing tone frequency may be modulated by a frequency between 16 and 100 Hz, but such modulation is not recommended for new equipment. If the accepted frequency is more than 475 Hz, no modulation by a lower frequency is allowed.

5.4 Where digital tone generation is applied, the frequency for ringing tone should be the same as that recommended for analogue generated tones (see Annex A).

6 Busy tone and congestion tone

6.1 The (subscriber) busy tone and the (equipment or circuit group) congestion tone are *quick* period tones in which the tone period is theoretically equal to the silent period complete cycle (tone period E + silent period S) should be between 300 and 1100 milliseconds.

The ratio E/S of the tone period to the silent period should be between 0.67 and 1.5 (*recommended* values).

For existing exchanges, or for tones to be used in a special way, it is *accepted* that the tone period may be up to 500 milliseconds shorter than the silent period ($E \geq S$ — 500 milliseconds). In no circumstances should the tone period be shorter than 100 milliseconds.

Figure 3/E.180 shows the recommended and the accepted areas for the busy tone and the congestion tone periods.

Figure 3/E.180, p. 334

6.2 The busy tone (of the called subscriber) and the congestion tone (of switching equipment or circuit groups) can be identical or almost identical, providing that this does not create any serious problems for the network and does not cause the subscriber to become confused. However, a distinction between these two tones is desirable:

— to allow Administrations to assess the quality of service,

— for the convenience of experienced subscribers.

6.3 Where a distinct congestion tone is used, it is recommended that:

a) the same *frequency* | should be used for the busy tone and the congestion tone;

b) the busy tone should have a slower cadence than the congestion tone, but both cadences should be within the limits mentioned in § 5.1 above.

6.4 The *recommended* | frequency for the busy tone and for the congestion tone must be between 400 and 450 Hz. The *accepted* frequency must not be less than 340 nor more than 500 Hz. Frequencies between 450 and 500 Hz in the accepted frequency range should, however, be avoided. Administrations adopting a new single frequency for busy and congestion tones are recommended to use 425 Hz.

6.5 Where digital tone generation is applied, the frequency for busy and congestion tones should be the same as that recommended for analogue generated tones (see Annex A).

7 Special information tone

7.1 The special information tone is provided for all cases in which neither the busy nor the congestion tone can give the required information to the calling subscriber in the case of call failure. There are three ways in which it may be used:

a) when in special cases no provision is made for recourse either to a recorded announcement or to an operator, the equipment at the point which the calls have reached must:

1) *either* | connect the special information tone to the call,

2) *or* | preferably, if technically available, send an appropriate backward signal such that connection to the special information tone will be made by equipment which is nearer to the caller;

b) when the call is connected to a recorded voice machine; the tone is then given during the silent intervals between transmissions of the announcement;

c) under arrangements made at manual positions serving lines which have been abnormally routed so that by operating a key the operators may send the special information signal when, for example, the calling subscriber fails to understand the operator.

When the special information tone is applied with or without a recorded announcement, it should be recognized that customers may refer to an operator if they fail to understand the meaning of the recorded announcement and/or the special information tone.

7.2 The special information tone has a tone period theoretically equal in length to the silent period.

Tone period — The tone period consists of three successive tone signals, each lasting for 330 ± 70 milli seconds. Between these tone signals there may be a gap of up to 30 milliseconds.

Silent period — This lasts for 1000 ± 250 milliseconds.

7.3 The frequencies used for the three tone signals are: 950 ± 50 Hz; 1400 ± 50 Hz; 1800 ± 50 Hz, sent in that order.

8 Warning tone to indicate that a conversation is being recorded

Where a conversation is being recorded at a subscriber’s station, it is recommended that the Administration require the use of a warning tone to indicate that the conversation is being recorded. When such a tone is applied, it is recommended that:

a) it consists of a 350-500 ms pulse every 15 ± 3 seconds of recording time, and

b) the frequency of the tone should be 1400 Hz ± 1.5%.

9 Payphone recognition tone

9.1 Where Administrations see the necessity of application of a payphone recognition tone in order to allow operators to recognise that a call originates at a payphone station or that the called number belongs to a payphone station it is recommended to use a payphone recognition tone.

The application of the tone will depend on the operational requirements of individual Administrations, e.g., in some cases the tone will only be required on an incoming call to the payphone, whilst in others there may be a requirement for the tone to be present on originating calls and throughout the period of the call.

9.2 The tone is a combination of two frequencies f_1 and f_2 in the range:

f_1: 1100-1750 Hz

f_2: 750-1450 Hz

with the ratio: f_1/f_2 = 1.2 to 1.5

and with a cadence (frequency sequence) as follows:

f_1 on 200 ms, silence 200 ms, f_2 on 200 ms, silence 2 | (one cycle is therefore 2.6 |).

9.3 *Duration and level*

9.3.1 A principal purpose of the payphone recognition tone in international telephony is to identify a called station as a payphone where the possibility exists of attempted fraud on a collect call. For this purpose the tone must be produced as soon as a payphone answers a call, it must be clearly audible to an operator, and it must cease before it can seriously interfere with conversation.

When the tone is used on an incoming call to payphone, it should have, in addition to those characteristics defined in § 9.2, a duration of 5 complete cycles (13 |).

9.3.2 If the tone is used to identify payphones which are originating calls, its duration is not specified.

9.3.3 The specification in § 9.3.1 applies only to the first five cycles of the tone when the payphone is the receiving station.

For use throughout a call or during conversation, the level and duration of the tone have to meet two contradictory requirements:

— the public exchange operator should be able to detect and recognise the tone in the presence of the highest expected levels of speech;

— the tone should not interfere unduly with normal conversation.

Experience of customer reaction to the tone requires that the time during which the tone is applied should be as short as possible, subject to operational requirements. Similarly the level of the tone should be as low as possible and significantly lower than the recommended levels for other tones (e.g., —20 dBm at the payphone output). The duration of the tone and the level at which it is applied are interdependent factors, the shorter the duration the higher the level and vice versa. (Further studies on the recommended levels and duration will be carried out.)

10 Call waiting tone

10.1 The call waiting tone is used to advise a subscriber who is engaged on a call that another subscriber is attempting to call.

10.2 The tone is intended to be sufficiently alerting to succeed in its purpose without interfering with existing conversation.

10.3 The *recommend* specification of the tone is one or more cycles defined by a frequency f in the range:

f | 400 to 450 Hz

and with a cadence (frequency sequence) as follows:

a) *f* on 300 to 500 ms, silence 8 to 10 s (*f* = 300 ms is preferable to the longer tone since the ongoing conversation would be interrupted for a briefer interval); or

b) *f* on 100 to 200 ms, silence 100 to 200 ms, *f* on 100 to 200 ms (the total to be no more than 500 ms); 8 to 10 | silence.

Other tones may be *acceptable* .

10.4 The second and subsequent cycles may be at a lower level than the initial one.

10.5 Where the tone continues for more than one cycle, it should preferably cease when it is no longer possible to accept the waiting call.

11 Caller waiting tone

11.1 This tone advises a caller that a called station, though busy, has a call waiting service active.

11.2 It is intended that, if this tone is not correctly interpreted by subscribers, it be misinterpreted as the ringing tone.

11.3 To dissuade a caller from waiting indefinitely, the tone may cease 30 seconds after it starts and may be replaced by busy tone, or an Administration may decide to disconnect the calling station.

11.4 The caller waiting tone consists of a ringing tone followed, after a silent interval of 0 to 200 ms, by one of the following:

a) the tone defined in § 10.3 |)

b) the pair of tones defined in § 10.3 |)

c) another call waiting tone in use by an Administration, provided that it can be appended to each sounded part of the ringing tone.

11.5 The caller waiting tone, as defined in § 11.4, should be distinguishably different from the ringing tone when directly compared with it.

12 Machine recognition of tones

The CCITT appreciates the value of machine recognition of tones for the purpose of service observations, maintenance, testing or for the collection of statistics where equivalent electrical signals do not exist. However, the CCITT considered, at Mar del Plata in 1968, that such machine recognition should not be a substitute for electrical signals. Where machine recognition of audible tones is to be introduced, the tone frequencies and cadences must be within close limits of precision.

For dial tone, ringing tone, busy and congestion tones a working frequency tolerance of ± | % should be met.

Note — The figure of 1% is taken as a compromise out of several national specifications which vary between ± | .5% and ± | .5%. (See also Supplement No. 3.)

ANNEX A

(to Recommendation E.180)

Digital generation of tones

The practice of several Administrations and equipment designers for digital generation of tones is known to deviate largely:

— in the frequency chosen within the recommended range;

— in the power level which varies with the national application;

— in the mechanism of generation of tones and signal frequencies where, in part, the same equipment is used.

The specification of this time needs further study.

Therefore, it was found difficult to standardize on a fixed number of samples with a coded bit-stream, which represents one frequency with one distinct power level.

On the other hand there is no necessity for standardizing digital generated tones in a more stringent way than analogue generated tones for the following reasons:

— It is to the interest of Administrations that subscribers should not be confused by hearing different tones for the same purpose within their national networks. Consequently the practice already in use for analogue generated tones should be maintained for reasons associated with the human factor.

— The advantages that can be achieved by standardizing the code words for the tones in order to allow automatic recognition of tones by monitoring the bit stream seem to be so small that they do not justify a stringent restriction on all possible methods for digital generation of any frequency allocated with any level.

— For a long period of time a mixture of analogue and digital networks will exist. Thus, machine recognition of tones will have to be performed also with analogue receivers.

However, when Administrations have full freedom to make new decisions about tones in future networks, especially with respect to an all-digital network, they may consider a preferred solution for the digital generation of dial tone, busy tone, congestion tone and ringing tone having a uniform frequency of 425 Hz, as recommended by CCITT.

ANNEX B

(to Recommendation E.180)

Examples for limitation of spurious components of the dial tone

with respect to interference with the frequencies recommended for pushbutton telephone sets in Recommendation Q.23

B.1 *Method A* | (used by ATT)

The total distortion power should be at least 33 dB less than the dial tone power, and the distortion power in any 100 Hz band above 500 Hz should be at least 40 dB less than the dial tone power.

B.2 *Method B* | (used by the Federal Republic of Germany)

In the frequency range from 500 to 2000 Hz [i.e., the range of multifrequency pushbutton (MFPB) frequencies] the distortion power in any 100 Hz band should be at least 40 dB below the dial tone power. In addition, in the frequency range above 2000 Hz up to 4000 Hz the total distortion power should be at least 25 dB below the dial tone power.

Recommendation E.181

CUSTOMER RECOGNITION OF FOREIGN TONES

1 In order to facilitate recognition of foreign ringing and busy tones by a subscriber dialling an automatic international call, the information given to subscribers should:

This Recommendation is also included in the Series Q Recommendations under the number Q.36.

1) emphasize that a slow repetition rate of the tone means ‘‘ringing’’ whereas a rapid repetition rate means ‘‘busy’’;

2) indicate that in some countries the ringing tone may be heard as a sequence of two short tones, pause, two more short tones, pause, and so on.

In addition, it may be useful for the purpose of educating subscribers:

— to provide auditory samples of such tones by tape recording or other means, or

— to include detailed descriptions of tones in directories.

2 Modern international signalling systems are capable of exchanging signals corresponding to indications normally given to subscribers by means of audible tones (busy, congestion, ringing, etc.). Administrations are encouraged to arrange their networks so that these information signals can be sent between countries in order that they can be recognized and converted into tones or announcements as near to the calling subscriber as practical. This procedure could significantly reduce the language problems arising from the growing use of recorded announcements

Note — This Recommendation is complementary to Recommendation E.180 on the standardization of tones in the international telephone network. Whilst standardization is of primary importance, telephone users need information to assist them in recognizing foreign tones until such time as standardization is complete.

This is the purpose of § 1 of the present Recommendation which, as extensive human factor experiments show, should greatly reduce subscriber confusion.

The measure mentioned in § 2 does not eliminate the need for tone standardization as well, but can reduce customer difficulties in cases where standardization may be impractical for a long period but sophisticated exchanges arrangements are available.

Recommendation E.182

APPLICATION OF TONES AND RECORDED ANNOUNCEMENTS | IN TELEPHONE SERVICES

Introduction

1 This Recommendation gives the responses that telephone networks should provide to subscribers in the operation of both basic and supplementary telephone services. Three levels of response may be given:

— preferred responses based solely upon subscriber requirements;

— accepted responses to be used where technical or economic reasons inhibit the use of preferred responses;

— exceptional responses to be used where severe technical or economic constraints prevent the use of preferred or accepted responses.

2 It has not been possible in some cases to state a universally applicable preference between recorded announcements and tones. The factors influencing such a choice vary widely between Administrations in their relative importance. Some features which make recorded announcements attractive are:

— They can reduce the level of calls to operators thus saving considerable expense.

— From a human factors point of view the use of an excessive number of different tones can be confusing to the user. Recorded announcements give an opportunity to present a far greater spectrum of information.

— They can impart more detailed and specific information than tones.

— They can have less chance of being misunderstood than tones in situations encountered infrequently.

Nevertheless recorded announcements have certain drawbacks also:

— They require more time to convey simple information than a tone indication would.

— They are meaningless to people who do not understand the language used. This fact may make their application in multilingual countries impractical.

— Technical and economic constraints might inhibit their use in some networks.

— Subscribers might not always listen long enough to distinguish between different announcements.

3 In this Recommendation, where no preference is stated between alternative responses, individual Administrations should evaluate the situation in their own networks taking the above factors into account. Additional CCITT studies will be undertaken to better evaluate the relative merits of tones and recorded announcements.

4 A list of tones and announcements used as indications to telephone subscribers is given in Annex A.

The CCITT,

considering

(a) that subscribers set up telephone calls and control supplementary telephone services by means of an interchange of information between the subscriber and the telephone system;

(b) that information sent by the subscriber to the exchange is standardized in several CCITT Recommendations, e.g., Recommendation E.163 for country codes;

(c) that information from the telephone system to the subscriber can be sent in the form of tones or recorded announcements;

(d) that the technical characteristics of the dial tone, the ringing tone, the busy tone, the congestion tone, the special information tone and the warning tone are specified in Recommendation E.180 and that the specification of other tones is studied by the CCITT;

(e) that a certain tone or recorded announcement should unambiguously indicate the desired subscriber action without requiring subscriber knowledge of the operation of the telephone system;

(f) that a standardized application of tones and recorded announcements will improve subscriber performance and will lead to a more efficient use of the telephone network;

(g) that for normal telephone calls and supplementary telephone services an identical application of tones and recorded announcements is desirable;

(h) that it is easy to implement standardization of the application of tones and recorded announcements for new supplementary telephone services, but this is more difficult for existing telephone systems and should be regarded as a long-term objective;

(i) that to avoid abuse of the transfer charge service it is desirable that an operator should be advised when connecting calls to a payphone ;

(j) that only tones and announcements are covered in this Recommendation although it can be seen that in some cases a visual indication may be an alternative;

recommends

(1) that this Recommendation shall apply to all telephone services and telephone networks. PABXs should, with certain indicated exceptions, use the same tones as the network in the country in which it is located;

(2) that all tones and recorded announcements should be given as soon as the information received by the telephone network is sufficient to decide which tone or recorded announcement applies, unless there is an established subscriber need for the indication to be given later;

(3) that when a subscriber should wait for a network reaction, no tones or announcement should be given. This condition applies during, e.g., dial-tone delay and post-dialling delay. Exceptionally when a post-dialling delay on an outgoing international automatic call occurs that is likely to cause a subscriber to abandon the call, an appropriate announcement or a *comfort tone* may be used if it has been shown to reduce premature abandonment;

(4) that when a subscriber should start dialling, a *dial tone* should be given. At PABXs this tone may be different from that at the public exchange and in this case the tone is named *PABX internal dial tone* ;

(5) that when a subscriber should start dialling and a special condition applies to his line, a *special dial tone* may be given. This condition applies, for example, during activated diversion of calls to another number;

(6) that, except for PABXs and supplementary services, a second dial tone should not be used and a second application of dial tone should also be avoided;

(7) that when a subscriber should wait until the called party answers and no special condition applies to the line, a *ringing tone* should be given;

(8) that when the called number is busy and no special condition applies to the called line, a *busy tone* should be given to the calling subscriber;

(9) that when a special condition of either ‘‘ call waiting ´call diversion ´the special condition. The responses should therefore be either a *specific recorded announcement* or *caller waiting tone* or *ringing tone* . In PABXs a *special ringing tone* may be used for the ‘‘call waiting’’ service.

In the case of ‘‘call diversion’’, if an announcement is given, it is necessary to give the announcement before the call is diverted. This especially applies if additional call charges have to be paid by the calling party.

(10) that a subscriber should be informed when the network has accepted a control order for a supplementary service, e.g., activation, deactivation, registration, erasure. The responses to be given should be either a *specific recorded announcement* , e.g., ‘‘alarm call booked for 7.18’’, a *general positive recorded announcement* , e.g. ‘‘order executed’’ or a *positive indication tone* ;

(11) that a subscriber — after having applied a valid *interrogation order* for a supplementary service — should be informed by the network whether the service is activated or not (status check) or, if the information dialled is identical to the stored information (data check) or, specifically what information is stored (data request).

If a status check or data check applies, the responses to be given should be:

— either a *positive* or *negative general recorded announcement* e.g., ‘‘service (not) active’’ or ‘‘information dialled (not) identical to information stored’’,

— or an appropriate *positive indication tone* ,

— or an appropriate *negative indication tone* .

If a data request applies, the response should be a *specific recorded announcement* e.g. ‘‘alarm call booked for 7.18, 9.30 and 12.35’’ or ‘‘no alarm call booked’’.

(12) that a busy subscriber, having the service ‘‘call waiting’’ activated, should be informed that an incoming call is waiting. The response is *call waiting tone* ;

(13) that when the called number cannot be reached or a control order for activation, registration, deactivation, interrogation, or erasure for a supplementary service cannot be executed by the network in one attempt, due to ‘‘short-term system nonavailability’’ but a repeated attempt within a short time may be successful, a *congestion tone* should be given. This condition applies, for example, if short-term congestion of switching equipment, circuits or memory storage capacity occurs;

(14) that when the called number cannot be reached or a control order for a supplementary service cannot be executed in one attempt due to ‘‘recognized long-term nonavailability’’ and a repeated attempt would have no or small probability of success for a longer period of time (e.g., a few hours), the preferred response is a *specific recorded announcement* , e.g., ‘‘the called number is not obtainable because of a network fault, please call again after (1) hour’’. Alternatively, a *general recorded announcement* or *special information tone* may be used.

This condition applies when:

— a number is out of order for technical reasons;

— where switching equipment or circuits or memory storage capacity will not be available for at least a few hours.

(15) that when the called number cannot be reached in one attempt because of an unresolved condition of the called number due to administrative reasons, the preferred response is a *specific recorded announcement* e.g., ‘‘the number has been changed, the new number is 12345’’. Alternatively, *a general recorded announcement* or *special information tone* may be used.

This condition applies when:

— a number is out of order for administrative reasons;

— a number is not yet connected;

— a number has changed.

(16) that when the information dialled by the subscriber, for set-up of an ordinary telephone call or to order a supplementary service, is not valid or cannot be accepted by the network from that particular line and the subscriber should check his information and/or his instructions before making a new attempt:

— the preferred response is a *specific recorded announcement* , e.g., ‘‘In international dialling to this country the trunk prefix 0 should be deleted’’;

— the accepted response is a general negative announcement, e.g., ‘‘You have dialled incorrect information, please consult your instructions’’. For PABXs a *negative indication tone* may be used;

— the exceptional response is a special information tone.

This condition applies when the number dialled:

— is non-existing,

— is barred for calls from a particular line,

— contains an incorrect prefix,

— is a control order for a service which is not provided to the particular line.

(17) that when it is desirable to inform the subscriber to continue dialling during the ordering of a supplementary service in the conversational mode, the response to be given should be either a *specific recorded announcement* followed by the appropriate dial tone, or a *second dial tone* ;

(18) that an indication should be given when a payphone user is required to make a payment during a call. The response to be given should be either a *specific recorded announcement* or a *pay tone* ;

(19) that an indication should be given to a public network operator when handling a call from or to a payphone, and that where a tone is used:

— the preferred response is *payphone recognition tone* .

(20) that when a subscriber is asked to speak so as to be recorded by a recording machine, a tone should be given to inform him when to begin to speak; the response to be used is the *record tone* ;

(21) that when the privacy of a conversation on a call cannot be ensured, e.g., because of the intrusion of an operator, the preferred response is the *intrusion tone* given to both subscribers;

(22) that when the privacy of a conversation on a call cannot be ensured, e.g., because of the presence of a recording machine, the preferred response is the *warning tone* ;

(23) that all the above-mentioned tones should be different.

ANNEX A
(to Recommendation E.182)

List of
tones and announcements used as indications to telephone subscribers

Note — This annex is provided to explain the terms in Recommendation E.182 and some related terms. It is not a definitive list and additional refinement will be undertaken as part of future studies.

A.1 *Basic terms*

A.1.1 **audible indication**

F: indication audible

S: indicaci´on audible

An audible indication is understood to be a sound composed of frequencies within the range 300-3400 Hz which is used to inform the user about the state of a telephone call or supplementary service.

A.1.2 **tone**

F: tonalit´e

S: tono

A tone is an audible indication comprising a small number of discrete frequencies, but excluding speech.

A.1.3 **recorded announcement**

F: annonce enregistr´ee

S: anuncio grabado

An audible indication in the form of speech.

A.1.4 **call information**

F: information d'appel

S: informaci´on de llamada

Call information includes normal address information, control codes for supplementary services, and other information dialled or keyed by the subscriber.

A.2 *Tones*

A.2.1 **dial tone**

F: tonalit´e de num´erotation

S: tono de invitaci´on a marcar

A tone advising that the exchange is ready to receive call information and inviting the user to start sending call information.

A.2.2 **PABX internal dial tone**

F: tonalit´e interne de num´erotation des commutateurs priv´es

S: tono de invitaci´on a marcar interno de centralitas privadas autom´aticas conectadas a la red p´ublica (tono de marcar interno de centralita privada autom´atica, CPA)

A tone advising that the PABX is ready to receive call information and inviting the user to start sending call information.

A.2.3 **special dial tone**

F: tonalit´e sp´eciale de num´erotation

S: tono especial de invitaci´on a marcar

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.

A.2.4 **second dial tone**

F: seconde tonalit´e de num´erotation

S: segundo tono de invitaci´on a marcar

A tone advising the caller that the network has accepted the call information already sent and asking the caller to provide more information.

A.2.5 **ringing tone**

F: tonalit´e de retour d'appel

S: tono de llamada

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.

A.2.6 **busy tone**

F: tonalit´e d’occupation

S: tono de ocupado

A tone advising the caller that the telephone number is busy.

A.2.7 **congestion tone**

F: tonalit´e d’encombrement

S: tono de congesti´on

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.

A.2.8 **special information tone**

F: tonalit´e sp´eciale d’information

S: tono especial de informaci´on

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.

A.2.9 **warning tone**

F: tonalit´e d’avertissement

S: tono de aviso

A tone warning participants in a call that privacy of a conversation cannot be ensured where a recording machine is being used.

A.2.10 **intrusion tone**

F: tonalit´e d’intrusion

S: tono de intervenci´on

A tone advising participants during a call that the privacy of the conversation has been breached, e.g. by the intervention of an operator.

A.2.11 **call waiting tone**

F: tonalit´e d’appel en attente

S: tono de indicaci´on de llamada en espera

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.

A.2.12 **pay tone**

F: tonalit´e de paiement

S: tono de pago

A tone advising users of a payphone that a payment is required.

A.2.13 **payphone recognition tone**

F: tonalit´e d'identification de publiphone

S: tono de identificaci´on de tel´efono de previo pago

A tone advising a public exchange operator that the termination to or from which connection is sought is identified as a payphone.

A.2.14 **comfort tone**

F: tonalité de file d’attente

S: tono de paciencia

A tone advising that the call is being processed and that the caller should wait.

A.2.15 **tone on hold**

F: tonalité de garde

S: tono de retención

A tone used to reassure a calling subscriber who has been placed on ‘‘hold’’ by a subscriber with PBX or other facilities.

A.2.16 **record tone**

F: tonalité d’enregistrement

S: tono de grabación

A tone generated by automatic answering equipment to inform the calling subscriber when to begin a message which will be recorded.

A.2.17 **caller waiting tone**

F: tonalité de demandeur en attente

S: tono de indicación de llamada en espera para el llamande

A tone advising a caller that a called station, though busy, has a call waiting service active.

A.2.18 **positive indication tone**

F: tonalité d’indication positive

S: tono de indicación positivo

A tone telling a subscriber controlling a supplementary service that the control procedure has been successfully completed and accepted.

A.2.19 **negative indication tone**

F: tonalité d’indication negative

S: tono de indicación negativo

A tone advising a subscriber that the request for service cannot be accepted.

A.3 *Recorded announcements*

A.3.1 **general recorded announcement**

F: annonce enregistrée générale

S: anuncio grabado general

A recorded announcement giving general information about a call attempt or control order.

A.3.2 **general positive recorded announcement**

F: annonce enregistr´ee g´en´erale positive

S: anuncio grabado general positivo

A recorded announcement given to the user of a supplementary service to advise that the request has been accepted.

Example

‘‘Your order has been executed.’’

A.3.3 **general negative recorded announcement**

F: annonce enregistr´ee g´en´erale negative

S: anuncio grabado general negativo

A recorded announcement given to the user of a supplementary service to advise that the request cannot be executed or that the call cannot be completed.

Examples

‘‘Your order cannot be executed.’’

‘‘Your call cannot be completed at this time.’’

‘‘Please try again.’’

A.3.4 **specific recorded announcement**

F: annonce enregistr´ee sp´ecifique

S: anuncio grabado espec´ifico

A recorded announcement giving specific information about a call attempt or control order.

A.3.5 **specific positive recorded announcement without supplementary information**

F: annonce enregistr´ee sp´ecifique positive sans information suppl´ementaire

S: anuncio grabado espec´ifio positivo sin informaci´on suplementaria

A recorded announcement indicating to the user that the request for a particular supplementary service has been accepted.

Example

‘‘The call barring service is now in operation.’’

A.3.6 **specific negative recorded announcement without supplementary information**

F: annonce enregistr´ee sp´ecifique n´egative sans information suppl´ementaire

S: anuncio grabado específico negativo sin información suplementaria

A recorded announcement indicating to the user that the request for a particular supplementary service cannot be executed or that the call cannot be completed.

Examples

‘‘Your order for call transfer cannot be executed.’’

‘‘The called number is not obtainable because of a network fault.’’

A.3.7 **specific positive recorded announcement with supplementary information**

F: annonce enregistrée spécifique positive avec information supplémentaire

S: anuncio grabado específico positivo con información suplementaria

A recorded announcement complete with the supplementary information received indicating to the user that a certain condition is being established.

Example

‘‘An alarm call is booked for 06.30.’’

Recommendation E.183

GUIDING PRINCIPLES FOR TELEPHONE ANNOUNCEMENTS

1 Introduction

Recorded announcements are of great value in the setting up of a call or supplementary service.

Administrations will need to use an announcement system which makes the announcements in real time and which permits the inclusion of specific information relating to a particular call or situation. This can be done by storing words or parts of words which can be appropriately assembled to make up the required announcements. These are called ‘‘concatenated-word’’ announcements

Another approach is to use truly synthetic speech (synthesis-by-rule), generated in real time, to produce announcements as required. This avoids the need to store representations of utterances by a natural speaker, and has the advantage of total flexibility in the announcement that can be produced.

2 Content of announcements

2.1 Announcements should not commence with a significant word.

2.2 Ideally only one piece of information should be conveyed in an instructional announcement , but for practical purposes a maximum of three is recommended.

2.3 Repetition of important items of information is advisable. Announcements such as acknowledgement messages and error messages should be produced twice. However, guidance announcements which ask for input from the user should normally be produced only once.

2.4 Announcements should be phrased in a polite manner.

2.5 Announcements should be concise. This requirement is especially important for guidance announcements.

2.6 In many languages, simple affirmative sentences are most easily understood and should be used where possible, rather than negative and passive sentences. The use of negatives can sometimes be helpful, however, when emphasizing a point (e.g., as in ‘‘Do not . | | ’’).

2.7 If applicable, the order in which procedural guidance is presented should correspond to the order in which actions are required to be executed (e.g., ‘‘Please press the ## button and then replace the receiver’’, rather than ‘‘Before replacing the receiver, please press the ## button).

2.8 If an action and its consequence are described, the consequence should be stated first, then the action (e.g., ‘‘To receive this message, please press the ## button’’, rather than ‘‘Please press the ## button to receive the message’’).

2.9 Where necessary, announcements should be given in more than one language.

2.10 Jargon should be avoided.

2.11 When several words or phrases could be used to convey the same idea (e.g., handset/receiver, hang-up/clear-down, etc.), one should be selected and used throughout.

3 Timing of announcements

3.1 Announcements should start at the beginning for each customer receiving them.

3.2 The speech rate should not exceed normal conversation speed. For example, normal speech rate for the English language is 150 to 200 words or 300 to 500 syllables per minute.

3.3 Attention should be given to the distribution of pauses within announcements, in order to allow listeners to digest items of information.

3.4 If an announcement is repeated once, the pause between the original announcement and its repetition should be about 2 seconds. Where announcements are required to be repeated more than once the pause between announcements may be extended (for instance 5 to 10 seconds).

3.5 The use of pauses within telephone numbers or items of information that have to be remembered or written down is recommended (for instance 500 to 1000 msec within a digit sequence).

Telephone numbers should be grouped with groups of two to four digits according to the custom.

4 Speech quality

4.1 Announcements should not sound as if they have finished when they have not, nor should they sound as if they continue when they have finished.

4.2 The speech quality of announcements should be assessed by listeners' subjective judgements from the user's end. The quality should refer to the whole system, including effects of transmission. A measuring method that can be used is the listening opinion test described in Volume V, Supplement 2.

5 Tones after announcements

5.1 After guidance announcements which ask for input from the user an indication to proceed should be given (in some cases dial tone will be appropriate).

5.2 When the user is required to replace the receiver following an announcement, congestion tone may be used.

6 Concatenated-word announcements

Problems which are peculiar to concatenated-word speech are described in the following paragraphs:

6.1 *Fluency problems*

The fluency of an announcement is influenced by the duration of the stored speech segment (for instance 1/16 second), and by the location of words within a segment or segments. Fluency may also be influenced by the insertion of additional silent segments between segments of speech. An iterative procedure of vocabulary editing and listening to the results until it is judged acceptable is recommended. Human factor tests need to be included in the iterative procedure. Experiments should be held with the typical users.

6.2 *Intonation problems*

Problems arise because speech is required to sound natural. Ideally only one version of each word would be assembled from segments held in store, as this would be the easiest and cheapest method of providing a range of announcements. However, the intonation pattern of a word may need to vary depending on the position of the word within a sentence.

For example:

a) ‘‘All calls to XXXX are being *diverted* ’’.

The stress on the word ‘‘diverted’’ falls towards the end of the word.

b) ‘‘Your call to Dr. Smith is being ‘‘diverted’’ to Dr. Jones’’.

The pitch of the word ‘‘diverted’’ is neutral.

6.3 *Presentation of numerical information*

Numerical information, and in particular telephone numbers, can be more easily remembered if spoken in a familiar manner. This may necessitate different rules for different countries, and may be influenced by such things as numbering plan and custom. (For example, a 3 or 4 digit area code separated by a pause from a 5 or 6 digit local number. The number 7230 could be spoken as ‘‘seven, two, three, oh’’ or ‘‘seventy-two, thirty’’ or ‘‘seven, two, three, zero’’).

In many languages, three intonation patterns are required for telephone numbers, a neutral pattern for the body of the number, a continuant pattern for the end of an intermediate block (rising pitch), and a terminator for the end of the number (falling pitch). Number strings are more easily remembered if spoken with a rhythm based on the perceptual centres of utterances (e.g., digits), rather than with one based on the start of the utterance period.

The final determinant of what is required in a particular case depends upon the iterative procedure of listening, editing and judging previously mentioned.

6.4 *Update problems*

Problems may arise when an announcement has to be changed such that a word or words have to be either rerecorded or recorded for the first time. There may be difficulty in obtaining the original speaker, and even if the original speaker is available the voice may differ from the original recording, either temporarily (e.g., by a head cold) or permanently (e.g., through ageing). This can mean that the entire vocabulary has to be recorded again, or alternatively an announcement of degraded quality may be accepted as an expedient solution. Wherever possible, problems of this sort should be anticipated, and recordings made of a larger vocabulary than is to be used immediately.

7 Tones and announcements for use in telephone services

The problems associated with ‘‘concatenated-word’’ systems outlined above are avoided by the use of truly synthetic speech generated by rule. These rules translate a specification of what utterance is to be generated into acoustic output. If appropriate rules are found, this method can potentially generate high quality speech, and such features as speed of delivery, duration of pauses, and stress and pitch changes can be readily specified. One approach to the development of such systems starts with the use of natural speech analysis as the source for generating rule parameters, and leads on to the derivation of general rules to convert any message into speech output.

Rule-generated synthetic speech is currently on the threshold of full functional equivalence with that produced by waveform storage methods, such as word concatenation. However, even highly intelligible synthetic speech sounds unnatural and it may not be as acceptable to users as ‘‘concatenated-words’’ announcements, at least in the immediate future.

8 Preferred listening levels for announcements

The preferred listening level is —10 dBPa ± | dB measured at the customer’s ear.

Recommendation E.184

INDICATIONS TO USERS OF ISDN TERMINALS

1 Introduction

1.1 Recommendations E.180 to E.184 deal with tones and other indications to users of the telephone service. This Recommendation covers the related but perhaps different requirements of the ISDN.

1.2 A person’s ability to learn, distinguish between, and remember different tones representing abstract conditions is limited (to about four to six tones). Users are frequently confused by unfamiliar tones encountered through travel or international communication. Section 2 of this Recommendation advises against the use of new tones in order to avoid introducing user difficulties.

1.3 Where indications originate from a network (as proposed to a distant terminal), two situations may exist between the origin of the indications and the user of an ISDN terminal:

a) ISDN signalling is used throughout

b) In-band signalling is used in some parts of the connection.

1.4 Considering that information is sent to an ISDN terminal on a D-channel, and that the terminal may transform it into perceptible form, choices exist as to the most appropriate way of passing indications on to the user (e.g., by means of a display or by tones).

The desirability of translating various ISDN indications, the situations governing such choices, and the relationships of these to terminal capability (particularly display capability), are subjects for further study.

2 Indications in an all-ISDN communication path

2.1 It is recommended that no new tone (i.e., tones not in use in the PSTN) be generated by an ISDN terminal.

2.2 Tones are recommended where an auditory method other than ‘‘speech’’ or announcements is chosen as the method for a terminal to translate received D-channel ISDN information for a user. Such tones should be those used in the PSTN in the country where the terminal is situated (Recommendation E.180).

2.3 It is recommended that where a terminal translates ISDN signalling to tones, such tones should be used with meanings analogous to their meanings in the PSTN.

2.4 It is recommended that the use of tones should be restricted to indicating the functions equivalent to the tones used in the PSTN and listed in Recommendation E.182, § A.2. In some cases, notably dial tone, ringing tone, and busy tone, these tones may be the best indicators even when other methods can be provided by a terminal.

3 Indications when ISDN is interworking with another network

Given that no tone recognition is likely to be provided by any network element for translating a tone into an ISDN signal for relaying to a terminal, it is recommended that any audible indication arising from a non-ISDN network be passed through an auditory channel to the ISDN terminal.

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