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PART II

Recommendations E.230 to E.277

OPERATIONAL PROVISIONS RELATING TO CHARGING AND ACCOUNTING IN

THE INTERNATIONAL TELEPHONE SERVICE

MONTAGE: PAGE 276 = PAGE BLANCHE

SECTION 1

CHARGING (DETERMINATION OF COLLECTION CHARGES) IN THE INTERNATIONAL TELEPHONE SERVICE

Recommendation E.230

CHARGEABLE DURATION OF CALLS

1 International operators should allow no tolerance in their assessment of the chargeable duration of calls.

2 Metering devices controlled by operators should be rapid in action and have the utmost accuracy.

3 In the automatic service (and, in the case of station calls, in the manual and semiautomatic service) the chargeable duration should begin from the receipt of the answer signal from the called station (see the definitions in Recommendation E.100), since the existence of an unchargeable call period , however short, might lead to misuse of the service for the transmission of short messages without payment.

The chargeable duration ends when the caller gives the clear-forward signal or, if the caller has not replaced the receiver, when the call is cleared down by an operator in the performance of her duties in manual or semiautomatic working, or as a result of a clearing signal from the called party when an exchange clears the connection. In the latter case, the chargeable duration ends with some slight delay following receipt of the clearing signal from the called party

4 It is unnecessary to inform the person making an international call of the exact moment at which the charging begins.

5 An Administration should not give its operators instructions to advise subscribers of successive charging periods unless a prior agreement to this effect has been reached with the other Administrations.

6 Nevertheless, if some Administrations consider it desirable to indicate to callers the expiry of each charging period, an automatic device, or one controlled by the operator at the originating international exchange, can be used for this purpose, on condition that this indication is regarded merely as an advice which is not binding on the Administration as regards charging.

Recommendation E.231

CHARGING IN AUTOMATIC SERVICE FOR CALLS TERMINATING ON SPECIAL SERVICESif FOR SUSPENDED, CANCELLED

OR TRANSFERRED SUBSCRIBERS

It is desirable for calls terminating on special services for suspended, cancelled or transferred subscribers in the international automatic service to receive the same treatment in different countries.

The CCITT considers that no charge should be made for these calls.

Note — As far as all the signalling systems involved in a given connection for any of the possible relations allow the transmission of the ‘‘no-charge’’ information , the answer signal should not be withheld. Nevertheless such a situation will not exist on a worldwide basis for a long period to come. Therefore it is appropriate, for the time being, to suppress the sending of the answer signal on the international circuits for calls towards these special services. It should also be noted that according to Recommendation Q.118, such calls will be cleared upon expiry of a certain fixed time-out.

Recommendation E.232

CHARGING FOR CALLS TO SUBSCRIBER’S STATION CONNECTED EITHER TO THE ABSENT SUBSCRIBER’S SERVICE OR TO A

DEVICE SUBSTITUTING A SUBSCRIBER IN HIS ABSENCE

1 When a subscriber’s line is connected to the absent subscriber’s service or to a device which answers the telephone in the subscriber’s absence (and may possibly record a message or exchange data) the absent subscriber’s service or the device is assumed to be equivalent to a person answering for the subscriber at the latter’s express wish. The call shall therefore be set up and charged in the normal manner.

1.1 *Station calls*

For station calls, charging takes effect on receipt of an answer:

— from the absent subscriber’s service, or

— from a device substituting a subscriber in his absence.

1.2 *Personal calls*

The caller is informed that the line is connected to the absent subscriber’s service or to a device substituting the called party in his absence. If he accepts the call he is charged on the basis of duration and the special charge for a personal call is levied. If he does not accept the call, no charge is levied.

2 This Recommendation applies to manual, semiautomatic and automatic services.

SECTION 2

PROCEDURES FOR REMUNERATION OF ADMINISTRATIONS

FOR FACILITIES MADE AVAILABLE

Recommendation E.250

NEW SYSTEM FOR ACCOUNTING IN INTERNATIONAL TELEPHONY

The complete text of this Recommendation is contained in
Recommendation D.150.

Recommendation E.251

OLD SYSTEM FOR ACCOUNTING IN INTERNATIONAL TELEPHONY

The complete text of this Recommendation is contained in
Recommendation D.151.

Recommendation E.252

MODE OF APPLICATION OF THE FLAT-RATE PRICE PROCEDURE SET FORTH IN RECOMMENDATIONS D.67 AND D.150 FOR REMUNERATION OF

FACILITIES MADE AVAILABLE TO THE ADMINISTRATIONS OF OTHER COUNTRIES

The complete text of this Recommendation is contained in
Recommendation D.160.

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SECTION 3

MEASURING AND RECORDING CALL DURATIONS

FOR ACCOUNTING PURPOSES

Recommendation E.260

BASIC TECHNICAL PROBLEMS CONCERNING THE MEASUREMENT AND RECORDING OF CALL DURATIONS

1 Recording call duration

1.1 Technically *call duration* is the interval that elapses between:

— the moment when the clear condition is detected at the point where the recording of the call duration takes place, and

— the moment when the clear condition (clear forward signal) is detected at the same point.

It follows that the apparatus used to record call duration of automatic calls must be capable of detecting the two moments mentioned above and of measuring the interval between them.

1.2 When an Administration using a simplified signalling system has recourse to recording holding times for the establishment of international accounts, it is necessary to have a conversion factor making it possible to obtain the call duration from the holding time this conversion factor requires fairly close observation. The ratio of holding time to call duration may not be the same for all the circuits of a single group, so that a fairly large number of circuits must be observed in order to

find a reliable conversion factor. Moreover, the holding time also depends on the availability of switching equipment in the incoming country, as well as the reaction of subscribers when they hear ringing tone, busy tone, etc.; the holding time for a given call duration may thus be extremely variable

2 Discrimination between automatic and semiautomatic calls

Since different accounting procedures are used for automatic and semiautomatic calls, the recording apparatus must be capable of distinguishing between these two types of calls and must record the call duration of automatic calls only.

Discrimination can be effected by one of the following methods:

a) by connecting the measuring apparatus to a point in the exchange through which only automatic traffic is routed;

In Recommendation D.150, § 4.1.4 [1] holding time is not recommended because of the wide variations between chargeable time and holding time in different relations and in different call types, which makes the use of holding time inappropriate for remunerating Administrations of countries of destination.

b) by recording call durations only for calls containing the *discriminating* digit 0 used in automatic working (see the Recommendation Q.104 cited in [2]).

Method b) may be particularly useful when both automatic and semiautomatic calls originate at exchanges within the national network and are routed to the outgoing international exchange over a common group of circuits.

3 Omission of international transit traffic from the records of call duration

All records of call duration will be taken in the outgoing country and will relate to calls originating in that country. It will therefore be necessary, in an international exchange which routes both terminal and international transit traffic, to exclude the call duration of international transit calls passing through the exchange.

It will be difficult to discriminate between originated calls and transit calls on the outgoing international circuits and it may therefore be necessary to segregate this traffic within the exchange and connect the recording apparatus at a point in the exchange where transit traffic is not encountered.

4 Discrimination according to destination

4.1 The records of call durations obtained by the recording apparatus must be related to particular countries of destination and, if required, to the charging areas of the country of destination; the recording apparatus should therefore be capable of identifying the destination of a call and of associating the measured call duration with this destination.

Note — For drawing up international accounts (apart from frontier relations) it is not necessary to know the origin of the call or the charging zone from which it comes. The differences in shares resulting from different outgoing charging zones in a given country are kept by that country.

4.2 *Incoming country constituting a single charging zone*

Where the recording apparatus is connected to a circuit group carrying only terminal traffic, no discrimination is required. Where, however, a circuit group carries traffic to more than one country, discrimination between these countries must be effected from an examination of the international code for the country and/or the type of seizing signal (terminal or transit) which is sent over the international circuits.

4.3 *Incoming country consisting of several charging zones*

If the accounting procedure agreed between two countries demands the production of separate records of call durations for calls made to each charging zone in an incoming country, the recording apparatus must be arranged to discriminate between the calls to the different charging zones according to the first one or first two digits of the called station's national (significant) number (see Recommendation E.163).

4.4 *Special frontier arrangements*

To take account of the special system of charging for frontier relations (reduced charges between neighbouring frontier zones), special steps will have to be taken to discriminate between automatic calls in frontier relations and other automatic calls. This discrimination will be made every time that frontier traffic is routed wholly or partly (overflow) by long-distance international circuits having devices for measuring call duration.

This discrimination will in general necessitate:

a) further analysis of the national (significant) number of the called subscriber than the one which is quoted in Recommendation E.163, and

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See the definition of the national (significant) number in Recommendation E.160.

b) the determination of the origin of the call, since frontier charges depend on the distance between the outgoing and the incoming frontier zones

5 Discrimination according to route and destination

In general there will be little difficulty in determining the route taken by a call on leaving the outgoing international exchange. If the recording apparatus is connected to the international circuits, then of course the recordings obtained will be appropriate to the route in question. If, however, the recording apparatus is connected to a point in the exchange remote from the outgoing circuits and the call to a particular country has the choice of more than one route, then information in respect of the actual route taken by the call must be supplied to the recording apparatus.

6 Distribution of traffic in an international exchange for the purpose of measuring call durations

By way of example, Figure 1/E.260 is given hereafter showing how traffic should be distributed in an international exchange so as to take account of the provisions above.

Figure 1/E.260 p. 342

The traffic passing through the international exchange is divided into the following four groups, as shown on the figure:

i) international transit traffic;

ii) automatic traffic (originated locally);

iii) semiautomatic traffic (originated locally);

iv) combined automatic and semiautomatic traffic from provincial exchanges.

These groups would employ independent groups of link circuits and registers. Only group ii) and possibly group iv) would be involved in measuring call duration.

The following auxiliary equipment is envisaged:

a) for each link circuit in groups ii) and iv), a selecting device capable of dealing with every possible combination of route/country or *charging zone* destination;

b) for each link circuit in group iv), a device to take care of the discrimination between semiautomatic and automatic traffic;

c) for registers in groups ii) and iv), equipment for analyzing country codes and if necessary an appropriate number of digits of the national (significant) number of the called subscriber in order to discriminate between charging zones (see Recommendation E.163, § 1.2);

d) for registers in group iv), a device to recognize the discriminating digit 0 used for automatic working;

e) a means of recording the call duration for each combination of route/country or charging zone destination.

References

[1] CCITT Recommendation *New system for accounting in international telephony* , Rec. D.150, § 4.1.4.

[2] CCITT Recommendation *Language digit or discrimination digit* , Rec. Q.104, § 1.4.2.

Recommendation E.261

DEVICES FOR MEASURING AND RECORDING CALL DURATIONS

There are three main methods used for measuring call duration:

1 Use of apparatus of the type which meters the quantity of electricity (ampere-hour meter or coulomb-meter)

This type of meter is permanently connected to the circuits or equipment under observation; for the measurements in question, the current strength in the meter is at all times proportional to the number of circuits or units of equipment in the speech position. With this type of apparatus the accuracy of the measurements depends on:

a) errors in the meter (shunt included) itself; in any case, in the absence of special arrangements, the accuracy of the latter

is not so good for intensities which are only a small fraction of the nominal intensity for which the apparatus is designed;

b) the accuracy and possibly the variations with time of the resistors inserted in the circuits to be observed;

c) the ohmic resistance of the connections between the measuring equipment and the circuits to be observed;

d) voltage variations in the supply battery used.

Obviously, the longer the period of observation, the greater are the chances that partial compensations will occur between the various causes of error. With such apparatus it seems unlikely that more than a 2% accuracy of measurements can be obtained for measurements made over an adequate period of time which includes hours of varying load;

measurements made only at times when there is very little traffic might involve a considerably greater error.

2 Use of pulse-counting meters

With this method, the circuits or equipment under observation are connected, for the duration of a call, to pulse-counting meters which receive pulses from a common timing mechanism at suitable intervals, for example every six seconds. The call duration is deduced from the meter readings.

3 Use of a device for periodically scanning circuits or equipment

These devices can be based on either the conventional type of equipment (relays, crossbar switch, etc.) or some form of electronic equipment.

4 Degree of accuracy of methods 2 and 3

With the two last-named methods, the degree of accuracy of measurements depends on:

— the average call duration and the statistical distribution of call durations;

— the number of calls observed;

— the interval between the sending of pulses (method 2) or the scanning interval (method 3).

It is also possible to assess mathematically, as a function of these factors, the anticipated degree of accuracy. Errors may also arise from the operation of the meter in method 3, or from accidental variations in the pulsing or scanning interval.

There is no doubt that if the number of calls observed is sufficiently high it is possible, using these methods and without reducing the pulse-sending interval or the scanning interval to such a small value that operation difficulties would arise with classic-type apparatus, to obtain greater accuracy than could be obtained with the method described in § 1 above.

5 Fault indication

It is recommended that provision should be made for indicating faults in the measuring and recording device. There are two possibilities:

a) to design the measuring and recording apparatus so that there is a permanent check on its operation, with an alarm system to indicate faults;

b) to provide special equipment to make a routine check of the operation of the measuring equipment.

6 Equipment design

The design of equipment for measuring and recording call durations is left to Administrations. Some information will be found in Annex A.

ANNEX A

(to Recommendation E.261)

Measuring call duration

A.1 The technique to be adopted for recording call durations of automatic traffic will depend on the accounting arrangements agreed between Administrations and particularly on whether recordings are to be made:

— by country of destination alone;

— by route and country of destination;

— by route, country of destination and charging zone.

In all cases it will be necessary to discriminate between automatic and semiautomatic traffic and possibly transit traffic.

A.2 Assuming that it is possible to identify automatic calls on the outgoing international circuit and that the circuits carry only terminal traffic, the measurement of call durations could be effected by connecting a measuring and recording device to each international circuit. The disadvantage of this scheme is the large number of recorders to be provided and read daily.

A single recorder could be made to serve a group of international circuits by arranging for the recorder to be connected to each circuit of a group in turn, say every six seconds, and for the recorder to operate each time that an international circuit in the answered condition is encountered. The recorder would then show the total call duration of the circuit group.

A.3 Where transit routings are involved and the recordings are required on the basis of route and country of destination, separate totals of call durations will be required for each country served by the route in question. In other words, it will be necessary to determine the destination of each call and record the call duration on the appropriate recorder.

This may be found to be a complicated process and it may be more convenient to connect the recorder at a point remote from the international circuit, for example at the register access relay set, where information in respect of the destination and routing of the call can be obtained from the outgoing international register. Figure A-1/E.261 illustrates an arrangement in which the selector A is positioned under the control of the register to connect the appropriate route and destination recorder to the register access relay set.

The recorder could be an ampere-hour meter or it could consist of a meter and a selector arranged to scan all the register access relay sets which have been connected to this particular route and destination recorder.

Figure A-1/E.261 p. 343

A.4 A similar arrangement to Figure A-1/E.261 can be employed where recordings are required on the basis of route, country of destination and charging zone. The additional complications introduced in determining the charging zone mainly concern the outgoing register but it should be noted that a greater number of separate call duration recorders will then be needed.

A.5 The number of recorders or separate records of call durations is equal to the summation, for all destinations, of the product of number of routes by number of charging zones for each country of destination. The capacity of selector A in Figure A-1/E.261 must be sufficient to permit access to any recorder and the economics of this scheme will be determined by the number of separate recordings required and the total volume of international traffic originated at the exchange concerned.

A.6 For a large number of separate recordings, Administrations might consider whether it would be cheaper to use electronic methods for recording call durations. In this connection Administrations might take into account the possible future introduction of cheap rates which could double the number of separate records required.

SECTION 4

ESTABLISHMENT AND EXCHANGE OF INTERNATIONAL ACCOUNTS

Recommendation E.270

MONTHLY TELEPHONE AND TELEX ACCOUNTS

The complete text of this Recommendation is contained in Recommendation D.170.

Recommendation E.275

TRANSMISSION IN ENCODED FORM OF MONTHLY INTERNATIONAL ACCOUNTING INFORMATION

The complete text of this Recommendation is contained in Recommendation D.190.

Recommendation E.276

TRANSMISSION IN ENCODED FORM OF TELEPHONE REVERSED CHARGE BILLING AND ACCOUNTING INFORMATION

The complete text of this Recommendation is contained in Recommendation D.176.

Recommendation E.277

CONVENTIONAL TRANSMISSION OF INFORMATION NECESSARY FOR THE COLLECTION OF CHARGES AND THE ACCOUNTING

REGARDING COLLECT AND CREDIT CARD CALLS

The complete text of this Recommendation is contained in Recommendation D.174.

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PARTE III

Recommendations E.300 to E.323

UTILIZATION OF THE INTERNATIONAL TELEPHONE NETWORK FOR

NON-TELEPHONY APPLICATIONS

MONTAGE: PAGE 290 = PAGE BLANCHE

SECTION 1

GENERAL

Recommendation E.300

SPECIAL USES OF CIRCUITS NORMALLY EMPLOYED FOR AUTOMATIC TELEPHONE TRAFFIC

The CCITT

considering

(a) that special services exist which occasionally require the provision of telephone circuits for uses such as:

— reserve circuits for VF telegraphy ,

— circuits for phototelegraph transmissions ,

— control circuits for programme transmissions ,

— leased circuits (other than permanent full-time leases);

(b) that the international telephone service is becoming more and more automatic, and that only a few manual circuits will be kept to form a reserve network;

(c) that it is therefore necessary to provide automatic circuits for special uses other than telephony;

(d) that telephone circuits assigned for special uses must, when needed, be made available to the special services as rapidly as possible;

(e) that it must be guaranteed that, after the circuits have been used for a special purpose, they will be returned to the telephone service without delay;

(f) that the switching of circuits for special purposes should not disturb the operation of telephone service.

recommends

that the following provisions be observed:

1 In an international telephone relation, the number of automatic circuits assigned for special purposes should be in reasonable proportion to the total number of circuits, so that their occupation will not hamper the flow of automatic telephone traffic.

2 Circuits to be used for special purposes should be passed at the outgoing and incoming ends through transfer panels on which the wanted circuit is disconnected manually from the telephone equipment and connected to the terminal of the special service concerned.

Alternatively, circuits assigned for special uses should be fitted, in the telephone equipment, with a device for automatic switching to the transfer panel of the special service, the operation being commanded by the latter. (This method is preferable because with the first method a telephone call could be interrupted if proper care is not exercised.)

3 The switching operations should take place under the control of the outgoing international maintenance centre (IMC). The IMC may delay or limit the provision of telephone circuits for other purposes, particularly when restrictions are imposed on the telephone traffic.

4 The following arrangements should be followed when special connections are set up and cleared:

a) The occupation of a telephone circuit for a special purpose should be marked on the transfer panel at the outgoing end; conversely, if such a circuit is in fact engaged, it must be marked busy in the telephone switching equipment.

b) A circuit assigned to a special use may not be taken for the service in question if a telephone call is in progress. However, arrangements should be made to ensure that the circuit cannot be engaged by another telephone call when the call is over *(preliminary blocking)* .

c) The circuits in a group of telephone circuits that are reserved for special uses should be last-choice circuits, to reduce the risk of finding them busy when required.

d) When a circuit is free, the supervisor in charge of the transfer panel at the outgoing end takes the necessary steps to withdraw the circuit from the telephone service. The responsible supervisor at the incoming end is then asked to make the necessary operations if the telephone equipment is not disconnectable by remote control.

e) While awaiting notification from the incoming end of completion of transfer to the special service, the outgoing supervisor tests the connection before making it available for its new functions.

f) The same procedure is followed at the outgoing end when the circuit is restored to the telephone service. To prevent a subsequent telephone call from being ineffective, care must be taken to clear the special call at the incoming end first.

5 Bookings of leased circuits or order lines for programme transmissions are arranged in advance and are not urgent. The delays required by the connection of two circuits in tandem when a connection is operated entirely in automatic transit give rise to no particular difficulties.

6 Where telegraph systems are concerned, the primary requirement is rapid replacement of the faulty VF bearer circuit. In view of the delay which would occur in employing two separate links to form a reserve circuit, it appears that in relations in which automatic transit switching is the normal method of operation, a direct circuit should be retained.

Such a direct circuit could be manual or automatic. An automatic circuit would normally be used to carry the telephone traffic. It should be noted that this will then be used as a first-choice route and will thus carry the heaviest load. The risk of finding it busy, when needed, will therefore be at its maximum.

In such circumstances, preliminary blocking of the wanted circuit should be effected (see § 4b) above). As long as the equipment is unable to perform this operation it will be preferable to keep one manual direct circuit.

7 The delay in establishing phototelegraph calls via an international phototelegraph position transit centre (transit IPP) is not so critical. In this case, application of Recommendation E.320 will speed up the placing of two circuits end to end at the transit centre to establish the connection, and it will not be necessary to keep direct circuits in relations where automatic switching is the method normally used for telephone calls in transit.

8 The same circuit should not be assigned to more than one special service, so that the various transfer panels for such services may be placed separate from one another should the terminal country so wish.

Recommendation E.301

IMPACT OF NON-VOICE APPLICATIONS ON THE TELEPHONE NETWORK

1 Introduction

The present telephone network is capable of providing a bearer service for a range of non-voice service applications. These include:

— data (analogue coded),

— facsimile,

— phototelegraphy,

— VF telegraphy.

VF telegraphy is not carried on the public switched telephone network (PSTN). Furthermore, phototelegraphy calls use telephone circuits removed from normal service, as set out in Recommendation E.320. For calls on the PSTN therefore, only data and facsimile services are considered below.

Special considerations may need to be given to the suitability of the telephone network to carry these services because of their particular characteristics which differ from those of voice traffic in the following ways:

a) the transmission of these services is characterized by a continuous power loading, compared to the syllabic bursts found in speech;

b) non-voice traffic often has a 24-hour traffic profile different from voice traffic, but similar to other non-voice services such as telex;

c) call holding times are often significantly shorter than voice traffic.

While ISDN will be based on the concepts developed for the telephone network and may evolve by progressively incorporating additional functions and network features, the transition from existing networks to comprehensive ISDNs may require a period of time. On the understanding that non-voice application on the present telephone network demonstrates the provision of pre-ISDN bearer services, this Recommendation provides an analysis of some of the problems which may be encountered in the existing telephone network during the PSTN to ISDN transition period and suggests a number of solutions for these problems.

2 Signalling and transmission considerations

2.1 *Signalling*

Non-voice service signals can interfere with telephone circuit signalling systems and vice versa.

Data or facsimile signals can interfere with signalling systems which use in-band line signalling such as Signalling Systems No. 4, No. 5 and R1. Thus such non-voice calls should use the standardized systems set out in the Series V and T Recommendations since these are designed to prevent interference with the standard signalling systems, either by avoiding the particular signalling frequencies or by operating the guard circuit of the signalling receiver.

Despite the safeguards mentioned above, it may sometimes happen that the signalling receiver is momentarily operated by the carried service signal. In this case the splitting device in the signalling receiver will operate and cause a short discontinuity in the received service signal.

2.2 *Transmission*

2.2.1 *Interference to transmission systems*

If the proportion of non-voice calls is large, it can increase the overall power loading in a transmission assembly (group or supergroup). This can cause distortion in the group of signals and/or the operation of power limiters which can adversely affect other calls or services in the same transmission assembly.

In order to economize on the provision of international voice channels, some international transmission systems may be fitted with speech interpolation systems , such as TASI (time assignments speech interpolation). Circuit gains are realized by exploiting the silent period normally existing during speech conversations. Continuous non-voice service signals will cause the continuous operation of the speech detectors and give rise to permanent association of the telephone circuit

to the transmission channel. This in turn increases the probability of noticeable speech clipping and in severe cases the occurrence of freeze-out where no channel is available. Thus the quality of speech on parallel voice calls can be affected, resulting in a need to reduce the gain advantage of the speech interpolation system.

Information on speech interpolation systems can be found in Supplement No. 2 of Fascicle VI.1.

2.2.2 *Interference by transmission systems*

It may be the case that ordinary speech channels do not provide an adequate transmission path for some types of non-voice service, resulting in an unacceptable error performance, or in the worst case not allowing any service at all.

Echo suppressors will not allow the transmission of duplex data unless the tone-disabling signal is first applied and immediately followed by the service signal.

Some types of transmission systems do not support higher speed data transmission. In particular, adaptive differential pulse code

modulation (ADPCM) specified in Recommendation G.721 uses a 32 kbit/s coding technique for the speech channel and may not support higher data speeds, e.g. 9600 bit/s.

2.3 *Potential solutions*

If the transmission of non-voice services on the telephone network is found to cause problems due to the above issue, the Administrations concerned should take the following actions:

2.3.1 It should be established for each bilateral relationship what commercial and regulatory arrangements exist which recognize the need to provide for non-voice services within prescribed quality of service parameters.

2.3.2 If it is decided by the Administrations concerned that certain services must be supported, then two approaches can be taken:

a) only transmission systems allowing reliable performance for non-voice services are used;

b) separate routings are established for the whole or part of the networks, where unreliable transmission would otherwise occur.

2.3.3 In case b) above, it is necessary to know when subscribers are initiating non-voice calls. There are three methods for achieving this:

i) the subscriber line is known to be one originating only non-voice calls, e.g. it is a facsimile terminal;

ii) the subscriber sends some form of service indication to the network, identifying a non-voice call request (e.g. Recommendation E.131);

iii) the subscriber dials or selects a particular prefix before the international (or national) number requesting a non-voice service call.

If these indications are directly available at the exchange where the separate routing is selected, then path selection need only combine this indication with the dialled digits. In other cases it is necessary for a suitable signalling system to be employed to carry this indication forward to the special selection point. This may be done using signalling systems including special call categories. In particular, a call category ‘‘data call’’ is provided in Signalling Systems R2, No. 6 and No. 7, also No. 5 by bilateral agreement. The separate routing may be continued throughout the network using either ‘‘path of entry’’ indications at the exchanges concerned or the special call category signals within the signalling system. Such special arrangements for non-voice calls may have an impact on charging rates.

3 Traffic profiles

On international routes the peaks of voice and non-voice traffic may occur at different times due to, for example, different time zones. Some typical traffic profiles are described in Annex A. This difference has implications when calculating the gain of speech interpolation systems such as TASI and DSI (digital speech interpolation). The gain is basically the ratio of the number of telephone circuits, 8those connected with the telephone switching system), to the number of bearer circuits (those connected to the transmission facilities).

The number of required telephone circuits is designed to meet the busy-hour traffic volume, and the number of required bearer circuits is calculated from the total number of circuits required for voice and non-voice traffic. As a result, there is a possibility that the peak time of required telephone circuits and bearer circuits may appear at different hours.

Therefore the number of required telephone circuits with speech interpolation systems and bearer circuits needs to be dimensioned considering the 24-hour traffic profiles of both voice and non-voice.

4 Special provisions for end-to-end digital connectivity

4.1 Within IDNs it is possible to transport data on an end-to-end basis using the digital bit stream rather than analogue modulated signals. When ISDN features are implemented, the requirements of both voice and non-voice services will be met. Interim arrangements may exist before the ISDN however, that allow the provision of end-to-end digital connectivity for transmission of digital data.

Compared to the call set-up principles for voice calls, the following arrangements need to be applied:

i) only compatible digital circuits must be selected, e.g. all circuits use transparent 64 kbit/s transmission;

ii) all digital speech processing (DSI) systems (e.g., CME, DSI, ADPCM) must be disabled or bypassed in the data transmission phase;

iii) any μ-law to A-law convertors must be disabled or bypassed in the data transmission phase;

iv) all echo suppressors or cancellors must be disabled or bypassed in the data transmission phase;

v) digital transmission attenuation pads must not be used;

vi) network and access signalling may be either in-band or out-of-band;

vii) Recommendation E.164 numbering plan applies.

4.2 Details for these arrangements are for further study. In order that these arrangements may be provided from the originating network to the destination network, the signalling system applied should have the capability to convey such non-voice service requests; for example, in the case of TUP of the Signalling System No. 7, at least such as additional function must be implemented among Administrations concerned in order to convey the customer request for ‘‘unrestricted bearer capability’’ to the transit and destination networks. It should be also noted that terminal compatibility cannot be negotiated between the originating terminal and destination terminal within the

capability of TUP. In this case, therefore, the subscriber can only communicate with the destination number which, he knows in advance, is accommodating a compatible non-voice terminal.

Recommendation E.164 encompasses E.163.

ANNEX A
(to Recommendation E.301)

Teletraffic characteristics of non-voice traffic

A.1 *Mean call duration*

There can be a significant difference in call duration between voice and non-voice traffic. For example, the mean call duration of non-voice traffic is three minutes in most cases, while the average call holding time for voice traffic can range between 6-9 minutes.

A.2 *24-hour traffic profile*

The 24-hour non-voice traffic profiles measured are in general alignment with business activities. The traffic peak appears at the end of office hours in the originating country, which is similar to the profiles of telex and record-type telecommunication services in non-attended mode of

operation. The calculated profiles according to the hour(s) of time difference (i.e., R = 0, 1, 2, | | |, 12) are shown in Figure A-1/E.301, together with the examples of measured 24-hour profile of the mixed voice and non-voice traffic in Figure A-2/E.301. In cases where the countries have a significant time difference , the both-way traffic (sum of outgoing and incoming traffic) has two traffic peaks, corresponding to the end of the business hours in each country.

Voice communication is only possible when calling and called parties are present at both ends and therefore, generally align with the schedule of human activities. Thus, peak hours of voice and non-voice traffic may differ. In Figure A-2/E.301, countries A and B have similar peak hours for both traffic streams while country C has two peaks, one (earlier) for voice and the other for non-voice. This can contribute to flattening the traffic profile thus making more efficient use of the circuit group. It should also be noted that non-voice traffic may sharpen the peak of the profile in case of short overlapping of business hours between two countries. This may affect the dimensioning of the network and require additional circuits to cover only a short period of time.

It is therefore important that countries measure and understand the traffic on their routes so that efficient dimensioning of the network can be undertaken.

Figure A-1/E.301, p. 3

Figure A-2/E.301, p. 4

MONTAGE: PAGE 298 = BLANCHE

SECTION 2

PHOTOTELEGRAPHY

Recommendation E.320

SPEEDING UP THE ESTABLISHMENT AND CLEARING OF PHOTOTELEGRAPH CALLS

When international phototelegraph calls are sent over telephone circuits, the total time of occupation of the circuit often greatly exceeds the duration of the phototelegraph call itself.

It is also important that telephone circuits should be held for as short a time as possible.

The CCITT therefore recommends to Administrations to bear the following directives in mind whenever it is technically practicable:

1 Telephone circuits intended for phototelegraph transmissions should, at terminal repeater stations, pass through panels at the international phototelegraph position (IPP) enabling these circuits to be disconnected from the telephone service equipment and interconnected or connected to phototelegraph stations calls are in progress call is over *(preliminary blocking)* .

2 The calling phototelegraph position must be ready to call the corresponding phototelegraph position over the telephone circuit as soon as it notes that the chosen circuit has been cleared. The calling signal should automatically disconnect the telephone equipment from the circuit at the called end. The circuit is thus immediately available for the establishment of a phototelegraph call

3 If the called phototelegraph position has to be obtained through a transit phototelegraph position, the procedure outlined above is applied successively to the two circuits which are to be interconnected.

4 The same signal (see § 2 above) can also be used to invite the incoming, and possibly the transit, IPP to enter the line:

— if there are difficulties, or

— to signal the end of transmission.

Note — The calling frequency f_2 used for phototelegraphy should be different from that used for telephone signalling f_1. In the case of automatic or semiautomatic telephone circuits, frequency 500/20 Hz will be adopted as the signalling f_2 frequency for phototelegraphy.

At the time agreed upon with the telephone service, if such a previous agreement is considered to be necessary by the telephone operating services.

Recommendation E.323

RULES FOR PHOTOTELEGRAPH COMMUNICATIONS SET UP

OVER CIRCUITS NORMALLY USED FOR TELEPHONE TRAFFIC

The complete text of this Recommendation is contained in Recommendation F.82.

PART IV

Recommendations E.330 to E.333

ISDN PROVISIONS CONCERNING USERS

MONTAGE: PAGE 302 = PAGE BLANCHE

Recommendation E.330

USER CONTROL OF ISDN-SUPPORTED SERVICES

Introduction

1 This Recommendation describes the general aspects of user control of ISDN-supported services. In particular, access to the services and handling of communication sessions are treated.

A service is defined as in Recommendation I.112, § 2.2.

A communication session is a session between two or more telecommunication parties in which unidirectional or bidirectional communication takes place. This Recommendation primarily concerns sessions where one or more people are involved.

2 This Recommendation does not describe how to proceed in the services themselves; in fact, this Recommendation has been set up to be as service-independent as possible.

2 In stating and recommending user procedures it is important to have global information about terminal capabilities. This Recommendation, however, is drafted as terminal-independent as possible. It contains fundamental principles of user interfaces as far as these are relevant to user access to the ISDN, and does not specify terminal requirements.

The CCITT,

considering

(a) that the ISDN will make available new services for customers and Administrations;

(b) that the changeover from the present networks to the ISDN will be gradual;

(c) that, from a user's point of view, private networks and public networks offer some similar services and also services that one or the other does not provide;

(d) that certain services have specific user procedures and their own methods of presenting information to the user;

(e) that users may benefit from uniformity in user procedures for selecting a service and for starting, switching between, and ending communications;

(f) that information from the telecommunication system to the user can be sent in the form of tones, verbal announcements, or visual indications on a display;

(g) that the use of terminals containing a visual display is becoming more and more common in telecommunication applications;

(h) that the ISDN offer users the possibility of handling two or more connections simultaneously;

(i) that handling connections simultaneously may be difficult for the user;

(j) that information presentation to the user should be based on human factors considerations;

(k) that terminals may be distinguishable into dedicated (service-specific) terminals and terminals with which several teleservices can be offered,

recommends

(1) that the methods with which communication sessions are selected, started, switched between each other and ended, should, where appropriate, make allowance for different levels of user experience;

(2) that, when a similar capability using similar terminals is offered through a private network and a public network, user procedures should be similar;

(3) that, where a terminal supports ‘‘higher level’’ procedures and has the same function keys used for lower-level procedures in other terminals, then these lower-level procedures should still be operable, to achieve the functionality reached by higher-level procedures.

(4) that, on more advanced telecommunication terminals, however, other input mechanisms, having similar functions to those controlled by the function keys mentioned in (3), may replace these function keys;

(5) that, for voice and non-voice services, procedures should be similar for analogous supplementary services when terminals with similar capabilities are used;

(6) that tones, verbal announcements and visual indications, which are used in the existing networks should not be changed in the ISDN as long as their functions remain the same;

(7) that ending a communication session can be accomplished from either end, except for emergency services;

(8) that it is preferred to give information to users at either end of a communication path by means of an auditory or visual indication when the communication is on hold;

(9) that in those cases where starting or switching between communication sessions is not possible or may result in a deterioration of the existing communication session(s), appropriate auditory or visual indication should be given to the user;

(10) that when two or more communication sessions are handled at the same time on the same telecommunication terminal and the user uses a stop procedure valid for all communication sessions, it is preferred to give the user the opportunity to select which session or sessions are to be terminated.

Recommendation E.333

MAN-MACHINE INTERFACE

The text of this Recommendation is contained in Recommendation Z.323. Recommendation Z.323, § 2.5, *User guidance* , contains useful information on help and guidance applicable to the more complex kind of service that may be mediated by an ISDN.

‘‘Higher level’’ and ‘‘lower level’’ refer here to the degree to which the capabilities of a terminal facilitate its use. For example, a terminal with only digits and a star and a square (see Recommendation E.161) may be able to achieve the same functions through lower-level procedures as a better equipped terminal with, for example, dedicated function buttons, in addition to its dial, where higher-level, more convenient procedures could be used.

See Recommendation E.184.

Further study is required to determine whether or not a communication session which was put on hold becomes active as soon as the present communication session is ended by the user and, if so, whether this is the communication session which was put on hold first or last. This subject should also be dealt with in the next study period.