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SECTION 5

NUMBERING PLAN OF THE INTERNATIONAL TELEPHONE SERVICE

Recommendation E.160

DEFINITIONS RELATING TO NATIONAL AND INTERNATIONAL NUMBERING PLANS

1 prefix

F: pr´efixe

S: prefijo

A prefix is an indicator consisting of one or more digits, that allows the selection of different types of number formats (e.g., local, national or international), transit networks and/or the service.

Prefixes are not part of the number and are not signalled over internetwork or international boundaries.

Note — When prefixes are used, they are always entered by the user or automatic calling equipment.

2 international prefix

F: pr´efixe international

S: prefijo internacional

The combination of digits to be dialled by a calling subscriber making a call to a subscriber in another country to obtain access to the automatic outgoing international equipment.

Example:

00 in Switzerland.

Note 1 — In some countries two or more international prefixes may be used:

— to reach different groups of countries;

— to obtain different classes of call (e.g., station call or personal call).

In the first case the use of two or more international prefixes allows the use of different groups of switching equipment and the use of *abbreviated* dialling (i.e., shorter country codes) for the calls to a defined group of countries (see the definition, *country code* in § 5).

Note 2 — Where several countries are included in one integrated numbering plan, the international prefix is not used on a call from one of these countries to another.

3 national (trunk) prefix

F: préfixe (interurbain) national

S: prefijo (interurbano) nacional

A digit or combination of digits to be dialled by a calling subscriber, making a call to a subscriber in his own country but outside his own numbering area. It provides access to the automatic outgoing trunk equipment.

Examples:

and 0 in Belgium, Italy, Japan, Netherlands, Switzerland, United Kingdom;

1 and 0 in Canada and in the USA;

and 9 in Finland and Spain;

and 16 in France.

Note — In the case where several countries are included in one integrated numbering plan, the national (trunk) prefix is also used for calls from one of these countries to another.

4 escape code

F: code d'échappement

S: código de escape

An escape code is an indicator consisting of one or more digits which is defined in a given numbering plan and is used to indicate that the digits that follow are from a specific numbering plan which is different from the given numbering plan.

For example, escape codes are currently used within the X.121 numbering plan to interwork with E.164 (ISDN) and F.69 (Telex) numbering plans.

An escape code can be carried forward through the originating network and can be carried across internetwork and international boundaries. Therefore the digits used for escape codes should be standardized.

5 country code

F: indicatif de pays

S: indicativo de país

The combination of one, two or three digits characterizing the called country.

Examples:

7 USSR;

54 Argentina;

591 Bolivia.

Note 1 — In the case where a country uses different international prefixes, abbreviated dialling can be used. In this case, for calls to one country of a defined group of countries, a regional country code, composed of fewer digits than the normal country code, may be used.

Examples:

For traffic between Latin American countries, the following regional country codes might be used:

1 Argentina;

2 Brazil;

3 Chile, etc.

Note 2 — In the case where several countries are included in one integrated numbering plan, no country code need be dialled for the traffic from one of these countries to another. For access by other countries, these countries:

— may be included under one common country code, or

— may have separate country codes,

always keeping in mind the necessity to avoid exceeding the recommended maximum number of digits in the international number.

6 trunk code

F: indicatif interurbain

S: indicativo interurbano

A digit or combination of digits [not including the national (trunk) prefix] characterizing the called numbering area within a country (or group of countries included in one integrated numbering plan).

The trunk code has to be dialled before the called subscriber's number where the calling and called subscribers are in different numbering areas.

The trunk code varies from one country to another and is composed of:

a) Either a *regional code* | indicating the geographical zone to which the called subscriber belongs and within which subscribers can call one another by their subscriber numbers.

Examples:

In France:

Paris area (Departments of Seine, Yvelines, Seine-et-Marne, Oise, etc.): trunk code 1,

Nice area (Department of Alpes-Maritimes): trunk code 93;

In Belgium:

Bruxelles area: trunk code 2,

Namur area: trunk code 81;

In the Federal Republic of Germany and the Netherlands:

the geographical area defined above corresponds in general to the local network:

D"usseldorf local network: trunk code 211,

Amsterdam local network: trunk code 20;

In the United Kingdom:

this definition applies to certain networks such as that of London, for which the trunk code is 1;

In Canada and the USA:

the geographical area defined above corresponds to a *Numbering Plan Area* (NPA):

Montr´eal area: NPA code 514,

New York City area: NPA code 212;

b) Or a *numbering area code* | followed by an exchange code when the directory entry of the called subscriber does not include the exchange code;

Examples:

In certain areas of the United Kingdom:

Truro (group centre): trunk code 872,

Perranporth (in the Truro group): trunk code 872 57.

7 subscriber number

F: num´ero d’abonn´e

S: n´umero de abonado

The number to be dialled or called to reach a subscriber in the same local network or numbering area.

This number is the one usually listed in the directory against the name of the subscriber.

Care should be taken not to use the term ‘‘local number’’ instead of ‘‘subscriber number’’.

8 national (significant) number

F: num´ero national (significatif)

S: n´umero nacional (significativo)

The number to be dialled following the national (trunk) prefix to obtain a subscriber in the same country (or group of countries included in one integrated numbering plan) but outside the same local network or numbering area.

The national (significant) number consists of the trunk code followed by the subscriber number.

It should be noted that, in some countries, it is customary to consider *for national purposes* | that the national (trunk) prefix is included in the national number [which is then not the national (significant) number]. A careful distinction must therefore be made between such national definition or practice and the CCITT definition, which is internationally valid. In order to avoid misunderstanding, the CCITT definition includes the word ‘‘significant’’ between brackets, reading as follows: ‘‘national (significant) number’’.

Examples:

Subscriber	*National (significant) number*
123 | 5 | 7 in Bruxelles	2 | 23 | 5 | 7
12 | 4 | 6 in D"usseldorf	211 | 12 | 4 | 6
870 | 2 | 4 in Montr´eal	514 | 70 | 2 | 4
| 2 | 4 in Perranporth	872 | 57 | 2 | 4
248 | 5 | 7 in London	1 | 48 | 5 | 7

Note — Where several countries are included in one integrated numbering plan, only the national (significant) number is to be dialled after the national (trunk) prefix on calls from one of these countries to another.

9 international number

F: num´ero international

S: n´umero internacional

The number to be dialled following the international prefix to obtain a subscriber in another country.

The international number consists of the country code of the required country followed by the national (significant) number of the called subscriber.

Examples:

Subscriber	*International number*
123 | 5 | 7 in Bruxelles	32 | 2 | 23 | 5 | 7
12 | 4 | 6 in D"usseldorf	49 | 11 | 12 | 4 | 6
870 | 2 | 4 in Montr´eal	1 | 14 | 70 | 2 | 4
| 2 | 4 in Perranporth	44 | 72 | 57 | 2 | 4
248 | 5 | 7 in London	44 | 1 | 48 | 5 | 7

Note — Where several countries are included in one integrated numbering plan, the international number is not used on calls from one of these countries to another. (See the note to Definition No. 8.)

10 national destination code (NDC)

F: indicatif national de destination (IND)

S: indicativo nacional de destino (IND)

A code field, within the E.164 numbering plan, which combined with the subscriber's number (SN) will constitute the national (significant) number of the international ISDN number. The NDC will have a network and/or trunk code selection function.

The NDC can be a decimal digit or a combination of decimal digits (not including any prefix) characterizing a numbering area within a country (or group of countries included in one integrated numbering plan).

The NDC has to be inserted before the called subscriber's number when the calling and called parties are located in different number areas.

NDC assignments are a national responsibility and therefore the NDC structure varies from one country to another. It may take a trunk code format or serve for selection of a destination network.

The NDC can in some instances, provide a combination of both the above functions.

11 destination network (DN) code

F: indicatif de r´eseau de destination (RD)

S: indicativo de red de destino (RD)

An optional code field within the E.164 numbering plan which identifies the destination network serving the destination subscriber. It performs the destination network selection function of the NDC. In some instances it can be combined with a trunk code to form the NDC. The DN code can be a decimal digit or a combination of decimal digits (not including any prefix).

Recommendation E.161

ARRANGEMENT OF FIGURES, LETTERS AND SYMBOLS ON TELEPHONES AND OTHER DEVICES THAT CAN BE USED

FOR GAINING ACCESS TO A TELEPHONE NETWORK

1 Use of figures and letters in telephone numbers

1.1 For the automatic international service, it is preferable that the national numbering plan should not involve the use of letters (associated with figures). The use of letters in national number plans may, however, be necessary for national reasons. For example, countries using letters in their subscriber numbers will naturally use them in their national numbering.

1.2 For the automatic international service to countries using letters in telephone numbers, it would be helpful, in a country where letters are not used:

a) to include in the directory a table for converting into figures the letter codes of exhanges in countries with which an automatic service is available;

b) to supply, at the time of opening this automatic service, a booklet of instructions containing the conversion table to the main subscribers to the international service.

1.3 It would also be desirable, in countries with letters in the telephone numbers, that subscribers with considerable international traffic should be asked to show on their letterheads, below their national telephone number, the international number with figures only. (See Recommendation E.123.)

2 Rotary dials (see Figure 1/E.161)

2.1 For countries which have not yet adopted any specific type of dial, the figures on the dial should be arranged in the following order: 1, 2, 3, . | | , 0.

2.2 The dial shown in Figure 1/E.161 uses the arrangement of letters and figures employed by some European Administrations. It may be convenient that the dials or pushbotton sets used by international operators for semiautomatic operating in Europe have this arrangement of letters and figures.

Note - On the North American dials and keysets, the digit 0 is not associated with letters O and Q but with the word *operator* , the letter O being associated with digit 6.

Figure 1/E.161, p.

3 Pushbuttons or keys

3.1 *10 pushbuttons*

3.1.1 *Arrangement and numbering*

The standard arrangement and numbering for pushbuttons corresponding to the digits 1 to 0 is as shown below:

1 2 3

4 5 6

7 8 9

0

Extensive research has shown that this arrangement leads to shorter entry times and lower error rates than other arrangements

Where a need exists within an Administration for a 2 × 5 array or a 5 × 2 array for use on special telephone apparatus, the arrays should be as shown below:

1 2

1 2 3 4 5   3 4

6 7 8 9 0   5 6

7 8

9 0

An annotated list of literature references is available in the article cited in [1].

Note — User dialling performance on these special arrays is slightly inferior to that on the standard array given above.

In view of the fact that purely numerical numbering plans are now recommended and that the association of letters to digits is not the same in different countries , it is not desirable to standardize letter symbols for the pushbuttons corresponding to each of the digits. In cases where a mixed letter-and-digit dialling system is still in use in a country, the letters associated with the figures in the dialling system of the country concerned may, of course, be included on the corresponding pushbuttons of this country's telephone sets (see Figure 2/E.161).

Figure 2/E.161, p.

The preferred and recommended arrangement for the keys of a separate numeric keypad on a multi-functional terminal used both for the entry of telephone number information and data is the standard arrangement shown at the beginning of this section.

Exceptionally, for devices intended to be used principally for data entry but which may sometimes be used to enter telephone number information, the arrangment whereby the first and the third row of the standard CCITT arrangement are interchanged may be used

Also exceptionally, telephone number information may be input from the row of numeric keys,

1 2 3 4 5 6 7 8 9 0

of an alpha-numeric keyboard.

3.1.2 *Symbols*

The symbols for these buttons are the digits 1 to 0 as indicated in the arrangements of § 3.1.1 above. These buttons are to be known as button 1, button 2, etc.

3.2 *12 pushbuttons*

3.2.1 *Arrangement*

Thus, for example, on the North American dials and keysets, the digit 0 is not associated with letter O and Q but with the word *operator* , the letter O being associated with the digit 6.

The corresponding ISO standard can be found in ISO Draft Proposal 9995, entitled: ''Keyboard Layouts for Text and Office Systems''.

For 12 pushbuttons the standard arrangement shown in § 3.1.1 above is extended by two additional buttons, one to the left and the other to the right of the button 0, thus making a pattern of four horizontal rows of three buttons each forming a 4×3 array.

Two buttons may also be added to the 5×2 array shown in § 3.1.1 above. These should be located below and in line with buttons 9 and 0, thus making a 6×2 array.

3.2.2 *Symbols*

On the 4×3 array, the symbol on the button which is immediately to the left of the button 0 (on the 6×2 array, the corresponding button is located below 9, and on the 2×6 array to the right of button 5) and which, according to Recommendation Q.23, is used to transmit the frequency pair 941 Hz, should have a shape easily identified as the general shape shown in Figure 3/E.161.

Figure 3/E.161, p.

The symbol will be known as the *star* | or the equivalent term in other languages.

On the 4×3 array, the symbol on the button which is immediately to the right of the button 0 (in the 6×2 array, the corresponding button is located below the button 0) and which, according to Recommendation Q.23, is used to transmit the frequency pair 941 Hz and 1477 Hz, should conform in shape to the specifications given in Figures 4/E.161 or 5/E.161. This symbol shall consist of four lines of equal length (b), forming two pairs of parallel lines. One pair is horizontal while the other is vertical or inclined to the right at an angle α of 80 | (de as shown in Figure 5/E.161. It will be seen that two pairs of parallel lines overlap. The ratio a/b, where a is the overlap, shall be between 0.08 and 0.18.

Figure 4-5/E.161, p.

The preferred values are:

No information is available at the present time as to which of these values would be preferred in other continents.

— in Europe

$\alpha = 90$ | (de with $a/b = 0.08$

— in North America

$\alpha = 80$ | (de with a/b | close to the upper limit of 0.18.

The symbol will be known as the *square* | or the most commonly used equivalent term in other languages

In some countries an alternative term (e.g., ‘‘number sign’’) may be necessary for this purpose, unless further investigation indicates that ‘‘square’’ is suitable for the customer.

The additional buttons with these symbols will be placed as shown below:

Standard 4 × 3 array 6 × 2 array 2 × 6 array **1 2 3 1 2 1 2 3 4 5 * 4 5 6 3 4 | 7 8 9 0 | # 7 8 9**
5 6 | 0 | # 7 8 9 0 | | #

3.3 *Dual mode and engraving*

Dual mode and engraving of the buttons * and ## are acceptable on telephones and on multi-functional terminals.

3.4 *Design of symbols*

Symbol size and the line thickness should be appropriate to provide optimal recognition.

3.5 *Use of colours*

The question of standardization of pushbutton and symbol colour for international purposes is still not settled. In the meantime, colours different from the digit buttons and symbols should not be used.

3.6 *Position of figures, letters and symbols on push-button sets*

In all push-button dials, the figures, letters and symbols should be unambiguously associated with the corresponding buttons, preferably, if adequate space is available, by being on the faces of the buttons themselves.

4 Additional pushbuttons for use on telephones

4.1 *General*

For purposes other than dialling, additional pushbuttons may be required on a telephone. For example, a telephone may have a pushbutton to recall during an active call, control logic (e.g., a register) or an operator, or to effect the transfer of an active call to another station. To prevent subscriber confusion it may be desirable that the symbols used on those pushbuttons which have identical functions be standardized.

4.2 *Specific recommendations*

4.2.1 *Register recall pushbutton*

For the recall of a register during an active call the following methods are possible:

— a switchhook flash,

— a depression of one of the pushbuttons of the normal 10 or 12 button array,

— a depression of another pushbutton specially provided for this purpose — the register recall pushbutton.

From the human factors viewpoint the depression of a pushbutton for register recall seems to be preferable to the use of a switchhook flash.

If a special register recall pushbutton is used, this pushbutton should be designated with the symbol R (capital) on or next to the pushbutton. The pushbutton should be clearly distinguishable and spatially separated from the standard 12-pushbutton array.

This symbol is recommended because:

a) it symbolizes the term ‘‘Recall’’ in a number of languages;

b) studies have shown that it is subject to minimal auditory and visual confusion;

c) it avoids the difficulties inherent in specific technical terms for any lay subscribers.

The exact position, shape and colour of the button should not be standardized at the present time. Such standardization would inhibit design innovation and be unnecessarily restrictive.

Note — Description of a 16-pushbutton layout has been deleted from this Recommendation owing to lack of use of this arrangement. Reference to 16 pushbutton sets can be found in the CCITT *Red Book* , Fascicle II.2, Recommendation E.161, § 3.3 and Annex A.

Reference

[1] *The layout of digits on push-button telephones* — a review of the literature. *TELE* , No. 1, 1982 (copies available at the Library of the Swedish Telecommunication Headquarters, S-12386 FARSTA).

Recommendation E.163

NUMBERING PLAN FOR THE INTERNATIONAL TELEPHONE SERVICE

Introduction

This Recommendation describes the numbering plan for the International Telephone Service. Recommendation E.164 describes the numbering plan for the ISDN era. It is for each Administration to choose the method of application from the two Recommendations which would provide the optimum approach to meeting their future national numbering plan needs. Evolution between the plans is for further study. However, for new equipment, it is recommended that E.164 be adopted.

1 National numbering plan

1.1 Each telephone Administration should give the most careful consideration to the preparation of a *national numbering plan* for its own network. This plan should be designed so that a subscriber is always called by the same number in the trunk service. It should be applicable to all incoming international calls.

Administrations are strongly urged to advise the ITU or CCITT of national numbering plan changes well in advance of the event, so that this information can be published in the ITU *Operational Bulletin* .

This Recommendation is also included in the Series Q Recommendations under the number Q.11.
See the CCITT manual cited in [1] for a comprehensive study of national numbering plans from the national point of view.

1.2 *Number analysis*

1.2.1 The national numbering plan of a country should be such that an analysis of a minimum number of digits of the national (significant) number (see definitions in Recommendation E.160):

a) gives routing that reflects economic and other appropriate network factors;

b) indicates the charging area in those countries where there are several.

1.2.2 In the case of a country with a two- or three-digit country code, not more than two digits of the national (significant) number need be analyzed for these purposes.

In the case of a country with a one-digit country code, not more than the three digits of the national (significant) number need be analyzed for these purposes.

1.2.3 In the case where an integrated numbering plan covers a group of countries, the digit analysis specified in § 1.2.2 should also determine the country of destination.

1.2.4 For the requirements relating to frontier traffic, see Recommendation D.390 R [2].

2 Limitation of the number of digits to be dialled by subscribers

2.1 *International number*

The CCITT recommended in 1964 that the number of digits to be dialled by subscribers in the automatic international service should not be more than 12 (excluding the international prefix). It is emphasized that this is the maximum number of digits and Administrations are invited to do their utmost to limit the digits to be dialled to the smallest possible number.

2.2 *National (significant) number*

Noting that:

a) the international number (excluding the international prefix) consists of the country code followed by the national (significant) number;

b) the smallest possible number of digits to be dialled in the automatic international service is achieved by limiting the number of digits of the country code and/or of the national (significant) number;

c) in some countries where telephony is already developed to an advanced stage, the national numbering plans in force enable the number of digits of the international number to be limited to less than 12;

d) some other countries which drew up their national numbering plans some time before 1964 have taken steps to ensure that the number of digits of the international number will not exceed 12 and may even be less;

the CCITT recommends that the number of digits of the national (significant) number should be equal to a maximum of $12 - n$, where n is the number of digits of the country code.

3 Digit capacity of international registers

The CCITT considers it advisable to recommend that the digit capacity of registers dealing with international traffic should allow for future conditions that may arise, but not possible to specify at the present time. In this regard, registers dealing with international traffic should have a digit capacity, or a capacity that can be expanded, to cater for more than the maximum 12-digit international number envisaged at present. The increase in the number of digits above 12 is left as a matter of decision to be taken by individual Administrations. However, for new applications a minimum digit capacity of 15 digits is recommended (see Recommendation E.164). Administrations are recommended, when making such a decision, to take account of the new applications likely to be introduced in the international service, and which are now being studied by the CCITT.

4 Prefixes and codes

See definitions in Recommendation E.160.

4.1 *International prefix*

It is recommended by the CCITT that the Administrations of countries that have not yet introduced automatic international operation, or Administrations that are, for various reasons, revising their numbering plans should adopt an international prefix (a code for access to the international automatic network) composed of the two digits 00.

The reasons for this recommendation are:

— to provide a maximum degree of standardization such that dialling is made as easy as possible for a person travelling in different countries (many countries already use the code 00),

— to minimize the number of digits to be dialled in automatic international operation,

— to simplify, for a future time when the use of the international prefix might have become a universal international standard, the format for writing an international telephone number.

4.2 *Country code* ’

4.2.1 Country codes will be used:

— in semi-automatic operation, to route calls to the required country when the calls are transit calls or when, on the outgoing positions, there is common dialling access to all the outgoing routes;

— in automatic operation.

4.2.2 A list of country codes was prepared by the CCITT within the framework of a worldwide automatic telephone numbering plan.

This list was set up according to the following principles:

a) The number of digits of the country code is one, two or three according to the foreseeable telephonic and demographic development of the country concerned.

b) The nine digits from 1 to 9 have been allocated as the country code or as the first digit of the country code. These digits define *world numbering zones* .

c) In the case of Europe, owing to the large number of countries requiring two-digit codes, the two digits 3 and 4 have been allocated as the first digit of the country codes.

4.2.3 The list of country codes already assigned is given in Annex A.

4.3 *Assignment of country codes*

4.3.1 The existing world numbering plan should be maintained and codes presently assigned should not be changed, unless consolidation of an existing numbered area yields an advantage in terms of code usage.

4.3.2 All spare country codes will be assigned on a 3-digit basis, as detailed in Annex B. The list of spare country codes for the international semiautomatic and automatic service is given in Annex C.

4.3.3 In the case where all the country codes in a world numbering zone have been assigned and an additional code is required in that zone, a spare country code from another world numbering zone can be used in accordance with the following rules:

4.3.3.1 Preference should be given to the assignment of a spare country code from an adjacent world numbering zone.

4.3.3.2 If spare codes are not available from an adjacent world numbering zone, assignments will be made from the zones with the most spare codes.

A ‘‘country code’’ may be assigned either to an individual country or to a geographical area.

4.4 *Codes for new international services*

The introduction of some international services requires the allocation of a country code. In such cases, the assignment of a country code will be determined by the rules detailed in Annex B.

4.5 *Trunk prefix*

4.5.1 The *national (significant) number* | (see definition 8 of Recommendation E.160) does not include the trunk prefix. Accordingly, in the international service, the trunk prefix of the country of destination must not be dialled.

It should be noted that, in some countries, it is customary to consider *for national purposes* | that the trunk prefix is included in the national number [which is then not the national (significant) number]. A careful distinction must therefore be made between such national definition or practice and the CCITT definition, which is internationally valid. In order to avoid misunderstanding, the CCITT definition includes the word ‘‘significant’’ between brackets, reading as follows: ‘‘national (significant) number’’.

4.5.2 It is recommended by the CCITT that the Administrations of countries that have not yet adopted a trunk prefix for access to their national automatic trunk network should adopt a prefix composed of a single digit, preferably 0. Irrespective of what digit is adopted as a trunk prefix, this digit should be precluded from being used also as a first digit of the trunk codes.

The reasons for this recommendation are:

— to provide the maximum degree of standardization of the trunk prefixes used in different countries, so that dialling is made as easy as possible for a person travelling from one country to another,

— to minimize the number of digits to be dialled in the automatic national service,

— to reduce user problems which arise because of the requirement, in automatic international operation, that the trunk prefix of the country of destination must not be dialled.

4.5.3 In the automatic international service, following the international prefix and country code of the called country, the caller should dial the national (significant) number of the called subscriber (i.e. without dialling the trunk prefix).

4.5.4 The use and printing of symbols and separators in national and international telephone numbers is detailed in Recommendation E.123.

4.6 *Use of zero as an escape code*

The use of the digit ‘‘0’’ (zero) as an escape code for numbering plan interworking is described in Recommendation E.166.

ANNEX A
(to Recommendation E.163)

List of country codes incorporating amendments proposed

by the World Plan Committee, 1988

World numbering ZONE 1

2 col

Anguilla 1 | ua)

Canada 1 | ua)

United States of America, including

Puerto Rico and the Virgin Islands 1 | ua)

Jamaica	1 | ua)
Barbados	1 | ua)
Antigua and Barbuda	1 | ua)
Cayman Islands	1 | ua)
British Virgin Islands	1 | ua)
Bermuda	1 | ua)
Bahamas (Commonwealth of the)	1 | ua)
Dominican Republic	1 | ua)
Grenada	1 | ua)
Montserrat	1 | ua)
Saint Kitts and Nevis	1 | ua)
Saint Lucia	1 | ua)
Saint Vincent and the Grenadines	1 | ua)
Turks and Caicos (Islands)	1 | ua)

a) Integrated numbering area.

World numbering ZONE 2

2 col

Egypt (Arab Republic of)	20
Morocco (Kingdom of)	21 | ua)
Algeria (People’s Democratic Republic of)	21 | ua)
Tunisia	21 | ua)
Libya (Socialist People’s Libyan Arab Jamahiriya)	21 | ua)
Gambia (Republic of the)	220
Senegal (Republic of)	221
Mauritania (Islamic Republic of)	222
Mali (Republic of)	223
Guinea (Republic of)	224
C | te d’Ivoire (Republic of)	225
Burkina Faso	226
Niger (Republic of the)	227
Togolese Republic	228
Benin (People’s Republic of)	229
Mauritius	230
Liberia (Republic of)	231
Sierra Leone	232
Ghana	233
Nigeria (Federal Republic of)	234
Chad (Republic of)	235
Central African Republic	236
Cameroon (Republic of)	237
Cape Verde (Republic of)	238
Sao Tome and Principe Democratic Republic of)	239
Equatorial Guinea (Republic of)	240
Gabonese Republic	241

Aruba	297
Faroe Islands (Denmark)	298
Greenland (Denmark)	299

Spare codes

280, 281, 282, 283, 284, 285, 286, 287, 288, 289

290, 291, 292, 293, 294,

a) *Integrated numbering area with subdivisions:*

— Morocco: 210, 211, 212 (212 in service);

— Algeria: 213, 214, 215;

— Tunisia: 216, 217;

— Libya: 218, 219.

World numbering ZONES 3 and 4

2 col

Greece	30
Netherlands (Kingdom of the)	31
Belgium	32
France	33 | ua)
Monaco	33 | ua)
Spain	34
Gibraltar	350
Portugal	351
Luxembourg	352
Ireland	353
Iceland	354
Albania (Socialist People’s Republic of)	355
Malta (Republic of)	356
Cyprus (Republic of)	357
Finland	358
Bulgaria (People’s Republic of)	359

a) Integrated numbering plan.

Hungarian People’s Republic	36
German Democratic Republic	37
Yugoslavia (Socialist Federal Republic of)	38
Italy	39
Romania (Socialist Republic of)	40
Switzerland (Confederation of)	41[a]
Liechtenstein (Principality of)	41[a]
Czechoslovak Socialist Republic	42
Austria	43
United Kingdom of Great Britain and Northern Ireland	44
Denmark	45
Sweden	46
Norway	47
Poland (People’s Republic of)	48
Germany (Federal Republic of)	49

BLANC

a) Integrated numbering plan.

World numbering ZONE 5

2 col

Falkland Islands (Malvinas)	500
Belize	501
Guatemala (Republic of)	502
El Salvador (Republic of)	503
Honduras (Republic of)	504
Nicaragua	505
Costa Rica	506
Panama (Republic of)	507
St. Pierre and Miquelon (French Department of)	508
Haiti (Republic of)	509
Peru	51
Mexico	52
Cuba	53
Argentine Republic	54
Brazil (Federative Republic of)	55
Chile	56
Colombia (Republic of)	57
Venezuela (Republic of)	58
Guadeloupe (French Department of)	590
Bolivia (Republic of)	591
Guyana	592
Ecuador	593
Guiana (French Department of)	594
Paraguay (Republic of)	595
Martinique (French Department of)	596
Suriname (Republic of)	597
Uruguay (Eastern Republic of)	598
Netherlands Antilles	599

World numbering ZONE 6

2 col

Malaysia	60
Australia	61
Indonesia (Republic of)	62
Philippines (Republic of the)	63
New Zealand	64
Singapore (Republic of)	65
Thailand	66
Mariana Islands	670
Guam	671
Australian External Territories	672
Brunei Darussalam	673
Nauru (Republic of)	674
Papua New Guinea	675
Tonga (Kingdom of)	676
Solomon Islands	677
Vanuatu (Republic of)	678
Fiji	679
Palau	680
Wallis and Futuna Islands	681
Cook Islands	682
Niue Island	683
American Samoa	684
Western Samoa (Independent State of)	685
Kiribati (Republic of)	686
New Caledonia and Dependencies	687
Tuvalu	688
French Polynesia	689
Tokelan	690
F.S. of Micronesia	691
Marshall Islands	692
Spare codes	693, 694, 695, 696, 697, 698, 699

World numbering ZONE 7

Union of Soviet Socialist Republics 7

World numbering ZONE 8

2 col

Japan	81
Korea (Republic of)	82
Viet Nam (Socialist Republic of)	84
Democratic People's Republic of Korea	850
Hong-Kong	852
Macao	853
Democratic Kampuchea	855
Lao People's Democratic Republic	856
China (People's Republic of)	86 | ua)
Maritime Mobile Service	87 | ub)
Bangladesh (People's Republic of)	880 | uc)
Spare codes	800, 801, 802, 803, 804, 805, 806, 807, 808, 809

830, 831, 832, 833, 834, 835, 836, 837, 838, 839

851, 854, 857, 858, 859

890, 891, 892, 893, 894, 895, 896, 897, 898, 899

a) Within this national code, the Telecommunications Administration of the People's Republic of China has notified that the code 866 has been allocated to the province of Taiwan. (Reference: Notification No. 1157 of 10 December 1980.)

b) The country code 87 is reserved for the Maritime Mobile Service. The following three digit country codes are assigned: 871 INMARSAT (Atlantic), 872 INMARSAT (Pacific), 873 INMARSAT (Indian Ocean).

c) The remaining combinations in series 88 will not be allocated until the stock of spare 3-digit codes for the region is exhausted.

World numbering ZONE 9

2 col

Turkey	90
India (Republic of)	91
Pakistan (Islamic Republic of)	92
Afghanistan (Democratic Republic of)	93
Sri Lanka (Democratic Socialist Republic of)	94
Burma (Socialist Republic of the Union of)	95
Maldives (Republic of)	960
Lebanon	961
Jordan (Hashemite Kingdom of)	962
Syrian Arab Republic	963
Iraq (Republic of)	964
Kuwait (State of)	965
Saudi Arabia (Kingdom of)	966
Yemen Arab Republic	967
Oman (Sultanate of)	968
Yemen (People's Democratic Republic of)	969
United Arab Emirates | ua)	971
Israel (State of)	972
Bahrain (State of)	973
Qatar (State of)	974
Kingdom of Bhutan	975
Mongolian People's Republic	976
Nepal	977
Iran	98
Spare codes	970, 978, 979

990, 991, 992, 993, 994, 995, 996, 997, 998, 999

a) E.A.U: Abu Dhabi, Ajman, Dubai, Fujeirah, Ras Al Khaimah, Sharjah, Umm Al Qaiwain.

ANNEX B

(to Recommendation E.163)

Rules for the
assignment of spare country codes

The rules listed in this annex are provided as a basis for the most effective utilization of the spare country codes.

B.1 Single isolated 3-digit codes should be assigned prior to the assignment of any 3-digit code which is part of a series of more than two consecutive 3-digit codes.

B.2 The assignment of spare codes of a zone, both within that zone and also to another zone, will take place as follows:

a) When assigning a code to a country in the same zone:

start with the lowest numbered 3-digit codes in ascending order, e.g. 670, 680, . | |

b) When assigning a code to a country in another zone:

start with the highest numbered 3-digit codes in descending order, e.g. 688, 685, . | |

c) Within code 87 reserved for the Maritime Mobile Service a third digit will be assigned to codes used for maritime satellite ocean area systems, with the restriction that codes 878 and 879 may not be touched because they are reserved for national purposes.

B.3 Country codes for new international services or for the automation of some existing services should be taken from the world numbering zone with the most spare codes.

ANNEX C
(to Recommendation E.163)

List of spare country codes for the international

semiautomatic and automatic service

Spare codes |

280, 281, 282, 283, 284, 285, 286, 287, 288, 289

290, 291, 292, 293, 294,

693, 694, 695, 696, 697, 698, 699

800, 801, 802, 803, 804, 805, 806, 807, 808, 809

830, 831, 832, 833, 834, 835, 836, 837, 838, 839

851, 854, 857, 858, 859

890, 891, 892, 893, 894, 895, 896, 897, 898, 899

970, 978, 979

990, 991, 992, 993, 994, 995, 996, 997, 998, 999

References

[1] CCITT manual *National telephone networks for the automatic service* , ITU, Geneva, 1964, 1968, 1978.

[2] CCITT Recommendation *Accounting system in the international automatic telephone service* , Rec. D.390 R.

Recommendation E.164

NUMBERING PLAN FOR THE ISDN ERA

1 Introduction

The rapid advances in telecommunications technology coupled with increased diversification of customer demands served by a number of different types of dedicated public switched networks (telephone, telex, data, etc.) have created a need to provide a uniform customer access and network structure. Such a structure is called the Integrated Services Digital Network (ISDN). Implementation of ISDNs have begun in a number of countries and eventually these will carry all existing and new services.

To facilitate ISDN evolution internationally, this Recommendation defines the numbering arrangements for an ISDN. The timetable for implementation of this numbering plan is described in Recommendation E.165.

This Recommendation appears in the Series I Recommendations as Recommendation I.331 (Fascicle III.8).

2 Definitions

Within the integrated service environment, the terms used for all networks and services must be compatible and consistent. A list of terms and their definitions relating to numbering are contained in Recommendation E.160.

3 ISDN numbering plan principles

3.1 *General*

The ISDN numbering and addressing principles are described in Recommendation I.330. The ISDN numbering plan will be based on and evolve from the existing numbering plans applicable to national and international public telephone networks.

In view of the evolutionary nature of ISDN, the international numbering plan should provide for substantial capacity to accommodate future network requirements.

Country or geographical area.
Where multiple destinations (i.e., RPOAs/networks) serve the called party’s geographic area, the national ISDN numbering arrangement in the country of destination shall provide for discrimination between these RPOAs/networks. The procedure for discrimination between multiple transit-RPOAs/networks is not considered to be a destination address requirement and shall therefore be excluded from the ISDN numbering arrangements.

Before the ISDN numbering arrangement attains global penetration, it must allow for interworking between the ISDN and other public networks. Such arrangements are discussed in Recommendation E.166. Interworking with private networks shall also be taken into account. The definition of private networks and the methods of interworking are for further study and will be covered in future Series E Recommendations.

The 10 digit decimal character set 0-9 is used throughout the ISDN numbering plan format including subscriber number, national (significant) number and the country code.

Prefixes and other information concerned with identifying selection procedures or network service parameters (such as quality of service or transit delay) do not form part of the ISDN number.

The ISDN numbering plan shall include an unambiguous identification of a particular country networks and/or ISDNs within these countries , if required. In doing so, it shall retain the integrity of the telephone country code as defined in Recommendations E.160 and E.163.

3.2 *Structure of the international ISDN number*

The international ISDN number is composed of a variable length of decimal digits arranged in specific code fields. The international ISDN number code fields are the country code (CC) and the national (significant) number.

The country code (CC) is used to select the destination country and varies in length as outlined in Recommendation E.163.

The national (significant) number N(S)N is used to select the destination subscriber. In selecting the destination subscriber, however, it may be necessary to select a destination network. To accomplish this selection, the national (significant) number N(S)N code field comprises a national destination code (NDC) followed by the subscribers number (SN).

The NDC field will be variable in length depending upon the requirements of the destination country. Each NDC may have one of the following structures:

a) a Destination Network (DN) code, which can be used to select a destination network serving the destination subscribers;

b) a Trunk Code (TC), the format of which is defined in Recommendation E.160;

c) any combination of Destination Network (DN) code and Trunk Code (TC).

The NDCs of an Administration may consist of any of the above structures.

Note — The sequences DN-TC and TC-DN are a national matter. This is a subject for further study.

The subscriber's number (SN) varies in length depending on the requirements of the destination country and is in accordance with Recommendation E.160.

Figure 1/E.164 shows the number structure.

Where appropriate, identification of an ISDN within the destination country shall be through the use of a national destination code (NDC) incorporated in the ISDN number.

Figure 1/E.164, p.

3.3 *Number length*

The international number may be of variable length. The maximum number length shall be 15 digits. However, some Administrations may wish to increase their register capacity to 16 or 17 digits. The decision on register capacity is left as a matter to be taken by individual Administrations.

The length does not include prefixes, language digit , address delimiters (e.g., end of pulsing signals, etc.) since these items are not considered as part of the international ISDN number.

3.4 *Number analysis*

In order to determine:

— the country of destination,

— the most appropriate network routing,

— the proper charging,

the originating country must analyse a number of digits of the international number. The national destination code (NDC) increases the potential requirement for number analysis because it provides for a combination of either a trunk code (TC) and/or a network identification function. Careful consideration should be given to the preparation of the national destination code (NDC) assignments.

On international calls the number analysis performed at the originating country need not be more than the country code and:

— three digits of the NSN in the case of a country with a three digit country code,

— four digits of the NSN in the case of a country with a two digit country code,

— five digits of the NSN in the case of a country with a one digit country code.

(Translation beyond this requirement could be arranged by bilateral agreement if required, e.g., countries assigned a 1 digit country code may require analysis of up to 6 digits beyond the country code.)

4 Number allocation principles

The assignment of country codes is administered by the CCITT, while NSN (NDC plus SN) code assignments are a national responsibility.

ISDN subscriber numbers may be allocated from the range of subscriber numbers available in the local ISDN exchange. These will be assigned to customers who subscribe only to the telephone service, customers with one or more data services and customers with a mixture of telephony and data services.

Subscribers equipped with basic access (the definition of ISDN basic access is given in the Series I Recommendations) should normally be allocated one unique number.

5 Network identification

In countries served by more than one ISDN and/or Public Switched Telephone Network (PSTN) the network identification of each is a national matter.

Network identification within the national (significant) number shall be such that:

— in a country all destination ISDN and PSTN networks shall operate under a single Recommendation E.163 country code,

— the international number maximum length of 15 digits shall not be exceeded, nor shall it be necessary for the number of digits for number analysis to exceed that specified in § 3.4,

— provision of network identification is not mandatory for countries using a single integrated numbering plan arrangement for their ISDNs and PSTNs.

6 Service identification

The ISDN number by itself will not identify the particular nature of the service, type of connection or quality of service required. An indication of parameters describing the service required by the calling terminal will be included in a service identifier in the signalling information. This service identifier is not considered to be part of the numbering plan.

7 Calling/called line identity

Calling/called line identity (CLI/CDLI) is address information which is passed across the network to provide supplementary services such as calling (or called) line identification presentation. The format of the CLI and CDLI for international calls should be the full international number, i.e., Country Code (CC), National Destination Code (NDC) and Subscriber Number (SN). No other information, such as prefixes or symbols (e.g. ‘‘+’’), should be included, although a subaddress may be associated with the CLI/CDLI.

8 Dialling procedures

This termiminology needs further study.

The subscriber dialling procedures for local, national and international calls shall be in accordance with Recommendation E.163. However, subscribers’ control procedures for supplementary services will be as defined in Recommendation E.131 or in separate Recommendations for each service.

ISDN subscribers will always be called by the same subscriber number irrespective of where in the network the call originates. For calls in the same numbering area or local network the subscriber number alone is dialled. For national calls between numbering areas or local networks the subscriber number may be preceded by the national prefix and the national destination code.

The addressing procedures for calls using sub-addressing are described in § 11.

9 Prefixes

The use of prefixes shall be in accordance with Recommendations E.160, E.163 and E.166. Where necessary, prefixes can also be used for network and service selection.

10 Escape code

The use of the digit ''0'' as an escape code for numbering plan interworking is described in Recommendation E.166.

11 Address information

Identification within a subscriber's installation of a point beyond that defined by the ISDN number requires the transfer of address information from the public network to the subscriber's equipment. The following methods apply:

11.1 *Direct dialling-in*

With direct-dialling-in (DDI) the last few digits forming the end of the ISDN subscriber number are transferred to the called subscriber's installation (see Figure 2/E.164). The number of digits used varies and depends upon the requirements of the called subscriber's equipment and the capacity of the numbering plan used.

ISDN subscriber numbers used for DDI may be those published in the public directory.

Figure 2/E.164, p.

11.2 *Sub-addressing (network address extension)*

Sub-addressing provides a separate additional addressing capacity outside the ISDN numbering plan but constitutes an intrinsic part of the ISDN addressing capabilities. As shown in Figure 2/E.164, up to 20 octets (or 40 digits) may follow the ISDN number and form the ISDN sub-address, which is transferred to the equipment at the subscriber's premises.

When required, the sub-address is sent by the calling party within the call set-up procedure and is passed transparently through the network as a separate entity from both the ISDN number and user-to-user information. Sub-address information is not required to be processed within the public network.

Sub-addressing procedures are the subject of a separate Recommendation.

11.3 *Combination of sub-addressing and direct dialling-in*

Sub-addressing may be used separately or in combination with DDI (see Figure 2/E.164).

11.4 *Address delimiters*

DDI address information may contain an ‘‘end of address’’ (e.g., ST) delimiter. In the case of sub-addressing, an ‘‘end of subscriber number/beginning of sub-address’’ delimiter and the ‘‘end of address’’ delimiter are required.

(The use of an address delimiter at the end of an ISDN address is for further study.)

Recommendation E.165

TIMETABLE FOR COORDINATED IMPLEMENTATION OF THE FULL CAPABILITY OF THE NUMBERING PLAN FOR THE ISDN ERA (RECOMMENDATION E.164)

1 Introduction

Recommendation I.330 describes ISDN numbering and addressing principles, while Recommendation E.164 describes the numbering plan for the ISDN era. Recommendation E.164 also identifies the need for interworking arrangements between ISDN and present dedicated networks.

This Recommendation sets a specific time (Time *T*), after which all ISDNs and PSTNs can use the full capability of Recommendation E.164, ‘‘Numbering plan for the ISDN era’’, and identifies the numbering requirements on ISDNs and on dedicated networks intending to interwork with ISDNs, before and after Time *T* .

Among the significant principles which form the basis for this Recommendation, the following are considered especially useful for ready reference:

— An E.163/E.164 telephony subscriber may become an ISDN subscriber without a number change.

— Numbers according to Recommendation E.164 apply to both PSTN and ISDN subscribers in the ISDN era. A mixture of PSTN and ISDN terminations on the same exchange is allowed.

— E.164 numbering arrangements may be used to distinguish between ISDN and PSTN subscribers. This is not necessary but is allowed, provided that possible effects on routing and digit analysis remain within the limits of Recommendation E.164.

2 Application and evolution of Time T

ISDNs are expected to interwork with dedicated networks. However, due to the different addressing capabilities between the ISDN and existing numbering plans, some temporary constraints need to be imposed on the number length and digit analysis required to access the user network interfaces of the ISDNs before Time *T* .

2.1 *Numbering constraints before Time T*

2.1.1 *ISDNs interworking with dedicated networks*

To allow numbering plan interworking with dedicated networks before Time *T* , an ISDN will not assign international E.164 numbers longer than 12 digits to its user network interfaces capable of receiving calls from dedicated networks.

In addition, for ISDNs and PSTNs, digit analysis as defined in Recommendation E.163 will apply.

2.1.2 *ISDNs which do not interwork with dedicated networks*

These ISDNs are allowed to assign numbers to user network interfaces according to the full capability of the numbering plan for the ISDN era.

Digit analysis according to Recommendation E.164 may be required to access user network interfaces connected to these networks.

2.2 *Evolution after Time t*

After Time *T* , ISDNs and PSTNs can make use of the full capability of E.164 numbers to identify their user network interfaces and terminals respectively. In addition, for routing purposes, the ISDNs and PSTNs conforming to Recommendation E.164 must be capable of analysing the ISDN international number to the extent required in that Recommendation.

Note — Digit analysis for other dedicated networks is for further study.

3 Date of Time T

The date for Time *T* has been set for 31 December 1996 at 23h59m Coordinated Universal Time UTC).

4 Network requirements at Time T

ISDNs and PSTNs supporting number length and digit analysis as described in Recommendation E.164 are said to be ‘‘E.164-conforming’’ networks.

All ISDNs must be E.164-conforming networks. Functions associated with E-164-conforming networks are:

a) for calls originated within such a network, provision for carrying E.164 numbers of up to 15 digits to interfacing networks;

b) comparable treatment for transit calls;

c) capability for conducting digit analysis for ISDNs and PSTNs as indicated in Recommendation E.164;

d) screening to ensure that, taking into account agreements between the networks concerned, no transit calls are offered to non-conforming networks incapable of handling number lengths as defined in Recommendation E.164;

e) provision of interim procedures, such as two-stage selection, for internal network sources, e.g., local exchanges, not equipped to handle 15 digits, so that all internal network sources can originate calls to all E.164 addresses.

Note 1 — Other requirements on conforming networks are for further study. Non-conforming networks may seek bilateral agreements with conforming networks, or adopt intra-network procedures to provide means by which subscribers of the non-conforming networks may originate calls to subscribers connected to ISDNs and PSTNs requiring a number length or analysis in excess of the capabilities of the non-conforming network.

Note 2 — Limitations of non-conforming networks and interworking procedures are for further study.

Recommendation E.166

NUMBERING PLAN INTERWORKING IN THE ISDN ERA

1 Introduction

1.1 Numbering plan interworking is a fundamental requirement for successful completion of calls routed between networks using different numbering plans, e.g., calls routed between an ISDN using the Recommendation E.164

numbering plan and a public data network (PDN) using the X.121 numbering plan.

1.2 This Recommendation is one of a set of CCITT Recommendations that address numbering plan interworking procedures for calls between terminals connected to an ISDN and terminals connected to a dedicated network. The term ‘‘dedicated network’’ in the context of this Recommendation includes: public switched telephone network (PSTN), packet switched public data network (PSPDN), circuit switched public data network (CSPDN) and telex network.

1.3 This Recommendation is related to and is compatible with the following Recommendations:

— Rec. E.160: Definitions relating to national and international numbering plans

— Rec. E.163: Numbering plan for the international telephone service

— Rec. E.164: Numbering plan for the ISDN era

— Rec. E.165: Timetable for coordinated implementation of the full capability of the numbering plan for the ISDN era

— Rec. F.69: Plan for telex destination codes

— Rec. I.330: ISDN numbering and addressing principles

— Rec. I.332: Numbering principles for interworking between ISDNs and dedicated networks with different numbering plans

— Rec. Q.931: ISDN user-network interface layer 3 specification

— Rec. Q.761-Q.764: Signalling System No. 7 — ISDN User Part

— Rec. U.202: Requirements to be met in providing telex service within the ISDN

— Rec. X.121: International numbering plan for public data networks

— Rec. X.122: Numbering plan interworking between a packet switched public data network (PSPDN) and an integrated services digital network (ISDN) or public switched telephone network (PSTN) in the short-term

2 Scope

2.1 The scope and application of this Recommendation includes the following numbering plan interworking and address signalling scenarios indicated in Figure 1/E.166, i.e., interworking for calls from an ISDN terminal to:

a) an ISDN terminal on another ISDN to provide an ISDN service as defined in the I-200 Series of Recommendations;

b) a voice terminal on a PSTN, for voice services;

c) a data terminal on a PSTN, for voice-band data services;

d) a data terminal on a PSPDN, for packet switched data services;

e) a data terminal on a CSPDN, for circuit switched data services;

f) a telex terminal on a telex network, for telex services defined in Recommendation F.60.

2.2 The term ‘‘ISDN terminal’’ is used here in a generic sense, i.e., an integrated terminal that can support one or more services as per the I-200 Series Recommendations using the Q.931 protocol, and may include the services provided by the dedicated networks under cases b) to f) above. This functionality may be provided by using appropriate existing terminals with terminal adaptors (TA) supporting requisite protocols, e.g., an X.25 terminal with a TA supporting protocol defined by Recommendation X.31/I.462 for packet switched data services.

2.3 The following interworking cases need to be considered, based on the terminal/TA combinations on the originating and destination networks:

a) calls from a speech terminal on ISDN to:

— a speech terminal on another ISDN,

— a voice terminal on a PSTN.

b) calls from an X.25 terminal on an ISDN to:

— an X.25 terminal on another ISDN,

— an X.25 terminal on a PSPDN,

— an X.25 terminal on a PSTN,

— an X.25 terminal on a CSPDN,

— a telex terminal on a telex network.

Figure 1/E.166, p.8

c) calls from an X.21 terminal on an ISDN to:

— an X.21 terminal on another ISDN,

— an X.21 terminal on a CSPDN.

d) calls from a voice-band data terminal on an ISDN to:

— a voice-band data terminal on another ISDN,

— a voice-band data terminal on a PSTN.

e) calls from a telex terminal on an ISDN to:

— a telex terminal on a telex network.

2.4 The primary focus of this Recommendation is to specify the numbering plan interworking and/or address signalling methods for:

- calls originated in an ISDN for terminals on another ISDN, or terminals on a dedicated network, and
- calls originated in a PSTN for terminals on an ISDN.

This Recommendation complements other CCITT Recommendations (e.g., Recommendation X.122) which focus on numbering plan interworking for calls originated from terminals on dedicated networks (other than PSTN) and which are intended for compatible terminals on an ISDN.

2.5 For the purposes of this Recommendation, ISDNs can, where appropriate, be assumed to provide both ISDN and PSTN access. In this case, the originating ISDN will generally be unable to differentiate between the two types of access in the terminating network based on the called E.164 number.

It is the responsibility of the terminating network to establish appropriate bilateral arrangements to ensure successful interworking to serve both its ISDN and PSTN customers.

3 Interworking arrangements

3.1 To allow an ISDN subscriber to set up calls intended for completion on other networks, the following two basic methods are available:

3.1.1 *Single stage method*

Interworking by using single stage dialling (or equivalent) is achieved by an arrangement where the calling party accesses a different type of network by selecting a numbering plan indicator, e.g., NPI (numbering plan identifier in Recommendation Q.931) or an escape code consisting of one or more digits (see Recommendation E.160 for definition of escape code), which determines the type of destination network (i.e., its numbering plan). The NPI and/or escape code is then followed by the address of the called terminal on the destination network. The originating network provides the necessary intelligence to route the call to the appropriate interworking function (IWF), to ensure delivery of the call to the destination network.

3.1.2 *Two-stage method*

The two-stage selection method of interworking is an arrangement wherein the first stage of selection establishes a connection from the calling subscriber's terminal to an IWF associated with a point-of-presence of, or gateway to, the desired destination network or an appropriate transit network. To gain access to the IWF, the calling subscriber uses selection procedures assigned to the IWF within the originating network, i.e., the IWF is assigned a number from the numbering plan of the originating network.

When the first connection has been established, the IWF sends a response to the calling terminal. Upon receipt of this response, the calling subscriber is required to input, as a second stage of selection, the address information of the called terminal in the destination network. This second called address information is passed transparently through the originating network and the IWF to the receiving equipment on the destination network. Having received the second address, conforming to the numbering plan of the destination network, the destination network will establish a connection from the IWF to the called terminal, thus completing the connection from the originating terminal to the destination terminal.

3.2 The choice of the numbering plan interworking arrangement should ensure that the impact on the user is minimized and there is no requirement for complex selection procedures. Single-stage methods are therefore recommended for numbering plan interworking between ISDN and dedicated networks. Solutions adopted to achieve this interworking arrangement for short-term and long-term applications are covered in subsequent sections. The short-term and long-term are time frames related to Time *T* as specified in Recommendation E.165.

3.3 Special situations in which two-stage interworking arrangements may apply and corresponding partitioning of responsibilities between originating, transit and destination networks are for further study.

3.4 It is recognized that some Administrations may not be able to offer interworking capability for international traffic. Bilateral arrangements may therefore be required to provide interworking capability. Because of administrative difficulties, interworking should not be performed across the international boundary, unless no other interworking possibilities exist.

3.5 Some networks may select other interworking arrangements, such as operator assistance, to complete the call. The need to standardize such interworking arrangements is for further study.

4 Interworking evolution

4.1 The recommended long-term numbering plan interworking solution is based on the NPI/TON field in the ISDN call set-up message as defined in Recommendation Q.931. The NPI element is the numbering plan identifier (e.g., Recommendation E.164/E.163, X.121, F.69), whereas the TON indicates the type of number (e.g., local, national, international). This NPI/TON field will be carried as part of the call set-up message to the originating exchange, which will use this information to route the call. The NPI element will also be available within the network as part of the address message in S.S. No. 7 ISUP.

4.2 The network capabilities in terms of digit storage, digit analysis and signalling protocols to implement the NPI-based interworking solutions on a global basis will not be available in the short term. Thus, a single-stage method for numbering plan interworking in the short term, and a timetable for planned evolution to the NPI/TON-based, long-term solution have been proposed (see Recommendation E.165).

4.3 The short-term, single-stage interworking arrangements will use prefixes and escape codes to indicate the type of number and numbering plan of the destination network, respectively. Definitions of prefixes and escape codes are contained in Recommendation E.160. As indicated in Recommendation E.160, prefixes are not part of the number and are not signalled over internetwork or international boundaries so that they are not subject to international standards. Escape codes, however, may be carried forward through the originating network and across internetwork and international boundaries. Therefore, the values of escape codes need to be standardized.

Table A-1/E.166 summarizes the escape codes recommended by CCITT for numbering plan interworking. Note that escape codes for interworking between ISDNs and PSTNs are not required because the PSTN numbering plan (Recommendation E.163) is a subset of the numbering plan for the ISDN era. (Recommendation E.164).

There may be cases when a standardized escape code is numerically equal to a prefix already in use in the network. In such cases, an optional network-specific digit(s) other than the standardized escape code may be used, and the translation from the optional-network-specific digit(s) to the standardized escape code is performed by the network.

To facilitate short-term interworking (using escape codes) between ISDNs and existing dedicated networks, Recommendation E.165 specifies that the international numbers assigned to ISDN user-network interfaces will be restricted to a maximum of twelve digits till Time *T* . Time *T* is specified in Recommendation E.165. After time *T* , ISDNs can implement the full capability of the ISDN numbering plan (Recommendation E.164). Recommendation E.165, and the date specified for time *T* , provide guidelines for evolution towards full ISDN numbering and numbering plan interworking capabilities.

4.4 The numbering plan interworking solutions in this Recommendation are categorized as short-term (pre-Time *T* , using escape codes) and long-term (post- Time *T* , using NPI/TON). It is however envisaged that, based on their individual network evolution plans, some Administrations will implement the NPI/TON-based inter working solutions prior to Time *T* . Introduction of NPI/TON-based interworking in a given network prior to Time *T* should not impose any specific requirements on networks not supporting NPI/TON for interworking, unless bilaterally agreed.

4.5 The man-machine interface procedures used with ISDN terminals to indicate the appropriate NPI and TON are for further study.

5 Representative interworking scenarios

5.1 This section provides single-stage interworking solutions for a number of representative interworking scenarios. The scenarios presented are not exhaustive.

5.2 It is assumed that all ISDNs and ISDN terminals will support the NPI/TON feature from their inception and that a NPI/TON equivalent feature will be available in PDNs by Time *T* , if not earlier.

5.3 The interworking scenarios presented in this section assume that the called and calling numbers represent international number formats in the appropriate numbering plans. Partitioning of the international number for local and national calls and the associated prefixes are a national matter and are not indicated in the interworking solutions.

5.4 The interworking cases addressed in Figures 2/E.166 to 11/E.166 are indicated by the boxes with numbers in the matrix of Table 1/E.166, where the numbers in the boxes refer to the appropriate Figures (2/E.166 to 11/E.166). Other numbering plan interworking scenarios are for further study.

H.T. [T1.166]

TABLE 1/E.166

Matrix of interworking cases and the figures in which they are shown

Networks	Terminals	ISDN				
		ISDN	V Series	Rec. X.25	Rec. X.21	Telex
ISDN	ISDN Telex	2	V Series	Rec. X.25	6, 10	Rec. X.21
	Voice	3	V Series	4	Rec. X.25	5
	Rec. X.25	7, 11				
	Rec. X.21	8				
	Telex	9				

Table 1/E.166 [T1.166], p.

5.5 The following abbreviations are used in Figures 2/E.166 to 11/E.166 which contain short-term and long-term interworking solutions for representative configurations:

Cd Called number

Cg Calling number

IWF Interworking function

PH Packet handler

M Modem

NPI/TON Numbering plan identifier/Type of number feature as defined in Recommendation Q.931

CRP Call request packet in Recommendation X.25

TA Terminal adapter

Note — As stated in Recommendation X.25, presence of the calling number, i.e., address (Cg) in the call request packet (CRP) is not mandatory. However, even when it is given by the calling terminal, this does not preclude the network from checking and possibly modifying this information, e.g., for security reasons.

5.6 Interworking solutions in the reverse direction, i.e., dedicated networks to ISDN, are also indicated in Figures 2/E.166 to 11/E.166. However, except for PSTN to ISDN calls, these may also be the subject of complementary CCITT Recommendations (e.g., Recommendation X.122).

Figure 2/E.166, p.10

Figure 3/E.166, p.11

Figure 4/E.166, p.12

Figure 5/E.166, p.13

Figure 6/E.166, p.14

Figure 7/E.166, p.15

Figure 8/E.166, p.16

Figure 9/E.166, p.17

Figure 10/E.166, p.18

Figure 11/E.166, p.

5.7 The location of the IWF and PH symbols in the diagrams does not imply a fixed position in the network or place any limitations on their functionalities.

ANNEX A
(to Recommendation E.166)

Escape codes for numbering plan interworking

Table A-1/E.166 summarizes the escape codes that are recommended for interworking between different CCITT-defined numbering plans referred to in this Recommendation.

H.T. [T2.166]
TABLE A-1/E.166
Recommended escape codes for numbering plan interworking

From	To	Escape code	Remarks
ISDN (Rec. E.164)	PSPDN (Rec. X.121)	‘0’	Note 1
ISDN (Rec. E.164) Need for an escape code is for further study }	CSPDN (Rec. X.121)	—	{
PDN (Rec. X.121)	ISDN (Rec. E.164)	‘0’	Note 2
Telex (Rec. F.69) Need for an escape code is for further study }	ISDN (Rec. E.164)	—	{

Note 1 — Use of escape code digit ‘0’ for ISDN to PSPDN numbering plan interworking is restricted to packet data calls originated from an X.25 DTE on an ISDN using an X.31 TA and are a short-term (up to time *T* defined in Recommendation E.165) measure.

Note 2 — Under certain implementation, escape code digit ‘9’ may also be used (see Recommendation X.121).

Tableau A-1/E.166 [T2.166], p.20

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ANNEX B

(to Recommendation E.166)

Additional short-term numbering plan interworking scenarios

for
packet-data services

The following scenarios may be used in special circumstances in the short term:

Figure B-1/E.166, p.21

Figure B-2/E.166, p.22

Recommendation E.167

ISDN NETWORK IDENTIFICATION CODES

1 General

This Recommendation presents the interim structure for the ISDN Network Identification Code (INIC) that is used to identify an ISDN network in Closed User Group (CUGs) and in certain X.75 utilities. The interim INIC does not form any part of an E.164 number.

The structure of a permanent INIC has not been agreed, and is for urgent further study.

2 Usage

2.1 *Closed user groups*

The format of the Interlock Code (IC) in Signalling System No. 7 is based on the format defined in Recommendation X.180 concerning closed user group utilities and used in Recommendation X.75, i. e., a 32 bit code divided into two parts. Part A is 16 bits and is coded to identify a 4 digit number, and Part B is coded as a 16 bit equivalent of a decimal number.

Part A will consist of an interim INIC [or a Data Network Identification Code (DNIC)] to identify the individual ISDN (or PDN) that is responsible for administering the closed user group (CUG). Part A of the IC contains space for a string of 4 decimal digits. The interim INIC thus is a string of 4 digits beginning with a digit that distinguishes interim INICs from any DNIC.

2.2 *X.75 utilities*

The interim INIC can be used to identify an ISDN in the TNIC (Transit Network Identification Code) and CNIC (Clearing Network Identification Code) CUG utilities of the X.75 protocol.

3 Format of the interim ISDN network identification code

3.1 *Definition*

The **interim INIC** is a string of 4 digits. Each different string of digits may be used to identify an individual ISDN. The first digit I distinguishes the INIC from a DNIC. This digit is followed by the country code from the E.163/E.164 numbering plan which has a length of one, two or three digits (see Recommendation E.163). The E.163/E.164 country code is followed by enough additional digits, X, to make the total length of the INIC 4 digits. The format is shown in Table 1/E.167.

H.T. [T1.167]

TABLE 1/E.167

Format of the interim INIC

I is the initial digit, C is a digit of the country code
and X is an additional digit

Country code	INIC Format
One digit	ICXX
Two digits	ICCX
Three digits	ICCC

Table 1/E.167 [T1.167], p.

3.2 *Digit I*

The digit I may be 0 or 9. The use of the digits 8 and 1 as the digit I requires further study.

3.3 *Additional digits*

Each additional digit is a digit in the range 0 to 9.

3.4 *Other formats*

The formats 00XX and 90XX could provide for 200 additional INICs not associated with specific country codes. These are for further study.

3.5 *Administration*

Each unique combination of digit I, country code, and additional digit(s) can identify a different ISDN, or part of an ISDN.

The Administration to which the country code has been assigned is responsible for administering the digit I and the additional digit(s).

Within each country, it is suggested that the INICs beginning with the digit I = 0 be assigned first, followed by INICs beginning with the digit I = 9.

3.6 *Duration of the interim definition*

The interim INIC is for immediate use. Its use will continue until a permanent definition has been agreed to, and a period beyond that to allow a transition to the use of the permanent definition.

4 Further usage

While other uses of the interim INIC are possible, proponents of such use are strongly urged to consider that their implementation should be easily adaptable to the permanent format of the INIC.

5 Format of the permanent ISDN network identification code

The definition of the permanent format of the INIC is for urgent further study.

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