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SERIES E: OVERALL NETWORK OPERATION, TELEPHONE SERVICE, SERVICE OPERATION AND HUMAN FACTORS

International operation – Numbering plan of the international telephone service

The international public telecommunication numbering plan

Recommendation ITU-T E.164

Telcom Ventures Exhibit No. 2024
Samsung Elec. v. Telcom Ventures LLC
IPR2025-00973, U.S. Patent No. 9,462,411

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Recommendation ITU-T E.164

The international public telecommunication numbering plan

Summary

Recommendation ITU-T E.164 provides the number structure and functionality for the five categories of numbers used for international public telecommunication: geographic areas, global services, Networks, groups of countries (GoC) and resources for trials. For each of the categories, it details the components of the numbering structure and the digit analysis required to successfully route the calls. Annex A provides additional information on the structure and function of international public telecommunication numbers (hereafter referred to as "international ITU-T E.164-numbers"). Annex B provides information on network identification, service parameters, calling/connected line identity, dialling procedures and addressing for geographic-based ISDN calls. Specific ITU-T E.164-based applications, which differ in usage, are defined in separate ITU-T Recommendations.

History

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2.0	ITU-T E.164/I.331/Q.11 bis	1988-11-25	
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4.1	ITU-T E.164 Suppl. 2	1998-11-13	2
4.2	ITU-T E.164 Suppl. 3	2002-05-16	2
4.3	ITU-T E.164 Suppl. 4	2003-05-02	2
4.4	ITU-T E.164 Suppl. 5	2008-05-15	2
5.0	ITU-T E.164	2005-02-24	2
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6.1	ITU-T E.164 Suppl. 1	1998-03-09	2
6.2	ITU-T E.164 Suppl. 2	2009-11-24	2
6.3	ITU-T E.164 Suppl. 3	2004-05-28	2
6.4	ITU-T E.164 Suppl. 3 Amd. 1	2009-11-24	2
6.5	ITU-T E.164 Suppl. 4	2004-05-28	2
6.6	ITU-T E.164 Suppl. 4 Amd. 1	2009-11-24	2
6.7	ITU-T E.164 Suppl. 5	2009-11-24	2

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FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

INTELLECTUAL PROPERTY RIGHTS

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Recommendation ITU-T E.164

The international public telecommunication numbering plan

1 Introduction

The rapid advances in telecommunication technology coupled with increased diversification of customer demands served by a number of different types of dedicated public switched networks (fixed and mobile telephone, data, etc.) have created a need to provide a uniform customer access to the multitude of network structures (i.e., circuit, packet, IP-based, etc.). Implementation of these network architectures is ongoing in a number of countries and eventually these will be able to carry the full range of existing and new services.

To provide a broad base for these new arrangements, numbering has been kept compatible with that originally established for international telephone service.

2 Scope

This Recommendation provides the number structure and functionality for the five categories of numbers used for international public telecommunication: geographic areas, global services, networks, groups of countries (GoC) and resources for trials. For each of the categories, it details the components of the numbering structure and the digit analysis required to successfully route the calls. Annex A provides additional information on the structure and function of international public telecommunication numbers (hereafter referred to as "international ITU-T E.164-numbers"). Annex B provides information on network identification, service parameters, calling/connected line identity, dialling procedures and addressing for geographic-based ISDN calls. Specific ITU-T E.164-based applications, which differ in usage, are defined in separate ITU-T Recommendations, e.g., [ITU-T E.168], Application of E.164 numbering plan for UPT.

3 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

[ITU-T E.101] Recommendation ITU-T E.101 (2009), *Definitions of terms used for identifiers (names, numbers, addresses and other identifiers) for public telecommunication services and networks in the E-series Recommendations*.

[ITU-T E.123] Recommendation ITU-T E.123 (2001), *Notation for national and international telephone numbers, e-mail addresses and web addresses*.

[ITU-T E.129] Recommendation ITU-T E.129 (2002), *Presentation of national numbering plans*.

[ITU-T E.131] Recommendation ITU-T E.131 (1988), *Subscriber control procedures for supplementary telephone services*.

[ITU-T E.164.1] Recommendation ITU-T E.164.1 (2005), *Criteria and procedures for the reservation, assignment and reclamation of E.164 country codes and associated identification codes (ICs)*.

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[ITU-T E.164.2] Recommendation ITU-T E.164.2 (2001), *E.164 numbering resources for trials*.

[ITU-T E.164.3] Recommendation ITU-T E.164.3 (2001), *Principles, criteria and procedures for the assignment and reclamation of E.164 country codes and associated identification codes for groups of countries*.

[ITU-T E.166] Recommendation ITU-T E.166/X.122 (1998), *Numbering plan interworking for the E.164 and X.121 numbering plans*.

[ITU-T E.168] Recommendation ITU-T E.168 (2002), *Application of E.164 numbering plan for UPT*.

[ITU-T E.169] Recommendation ITU-T E.169 (2002), *Application of Recommendation E.164 numbering plan for universal international numbers for international telecommunications services using country codes for global services*.

[ITU-T E.169.1] Recommendation ITU-T E.169.1 (2001), *Application of Recommendation E.164 numbering plan for universal international freephone numbers for international freephone service*.

[ITU-T E.169.2] Recommendation ITU-T E.169.2 (2000), *Application of Recommendation E.164 numbering plan for universal international premium rate numbers for the international premium rate service*.

[ITU-T E.169.3] Recommendation ITU-T E.169.3 (2000), *Application of Recommendation E.164 numbering plan for universal international shared cost numbers for international shared cost service*.

[ITU-T E.190] Recommendation ITU-T E.190 (1997), *Principles and responsibilities for the management, assignment and reclamation of E-series international numbering resources*.

[ITU-T E.191] Recommendation ITU-T E.191 (2000), *B-ISDN addressing*.

[ITU-T E.213] Recommendation ITU-T E.213 (1988), *Telephone and ISDN numbering plan for land mobile stations in public land mobile networks (PLMN)*.

[ITU-T E.214] Recommendation ITU-T E.214 (2005), *Structure of the land mobile global title for the signalling connection control part (SCCP)*.

[ITU-T E.331] Recommendation ITU-T E.331 (1991), *Minimum user-terminal interface for a human user entering address information into an ISDN terminal*.

[WTSA Res.20] ITU WTSA (Florianopolis, 2004) *Resolution 20, Procedures for allocation and management of international telecommunication numbering, naming, addressing and identification resources*.

[ETSI ETS 300 738] ETSI ETS 300 738 ed.1 (1997-06), *Human Factors (HF); Minimum Man-Machine Interface (MMI) to public network based supplementary services*.

[ETSI TS 100 907] ETSI TS 100 907 V7.1.0 (1999-08), *Digital cellular telecommunications system (Phase 2+) (GSM); Man-Machine Interface (MMI) of the Mobile Station (MS) (GSM 02.30 version 7.1.0 Release 1998)*.

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4 Definitions

Within the integrated service environment, the terms used for all networks and services must be compatible and consistent. The following definitions can be found in [ITU-T E.101].

"Address, "dialling plan", "international prefix", "international public telecommunication number", "name", "national (significant) number", "national trunk prefix", "national destination code", "numbering plan", "prefix", "subscriber number" and "trunk code".

This Recommendation defines the following terms.

4.1 country code (CC) for geographic areas

The combination of one, two or three digits identifying a specific country, countries in an integrated numbering plan, or a specific geographic area.

4.2 country code (CC) for global services

A 3-digit country code used to identify the global service.

4.3 country code (CC) for groups of countries

A shared 3-digit country code used in combination with a group identification code to identify a group of countries.

4.4 country code (CC) for networks

A shared 3-digit country code used in combination with an identification code to identify an international Network.

4.5 country code (CC) for trials

A shared 3-digit country code used in combination with a 3-digit trial identification code to identify a trial.

4.6 destination network (DN) code

An optional code field within the international ITU-T 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).

4.7 global service

A service defined by ITU-T, provisioned on the public switched network, to which ITU-T has assigned a specific country code to enable the provision of that international service between two or more countries and/or integrated numbering plans.

4.8 global subscriber number (GSN)

The portion of the international ITU-T E.164-number that identifies a subscriber for a particular global service.

4.9 group identification code (GIC)

A one-digit identification code assigned to a group of countries.

4.10 group identification code administrator (GICA)

The organization entrusted by the assignee with the administration and management of the numbering resources behind a specific CC+GIC.

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4.11 groups of countries (GoC)

Several ITU- or UN-recognized countries sharing the same CC+GIC.

4.12 identification code (IC)

The code subsequent to a country code for Networks that uniquely identifies an international Network.

4.13 Network

Internationally interconnected physical nodes and operational systems operated and maintained by one or more ROAs to provide public telecommunications services. Private networks are not included in this definition. Note that the use of capital "N" in Networks indicates that this definition applies.

4.14 trial identification codes

Three-digit identification codes that uniquely identify international public correspondence service trial participants.

4.15 trials

The temporary implementation of a proposed new international public correspondence service for the purpose of determining its technical, operational, and business viability.

5 Abbreviations

This Recommendation uses the following abbreviations:

CC	Country Code
CCITT	International Telegraph and Telephone Consultative Committee
CDLI	Called Line Identity
CLI	Calling Line Identity
COLI	Connected Line Identity
DN	Destination Network
GoC	Groups of Countries
GIC	Group Identification Code
GICA	Group Identification Code Administrator
GSN	Global Subscriber Number
IC	Identification Code
ISDN	Integrated Services Digital Network
ITU	International Telecommunication Union
ITU-T	International Telecommunication Union – Telecommunication Standardization Sector
NDC	National Destination Code
NPI	Numbering Plan Identifier
N(S)N	National (Significant) Number
NT2	Network Termination 2
PSTN	Public Switched Telephone Network

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ROA	Recognized Operating Agency
SA	Sub-Address
SN	Subscriber Number
TC	Trunk Code
TIC	Trial Identification Code
TON	Type of Number
TSB	Telecommunication Standardization Bureau
UIFN	Universal International Freephone Number

6 International ITU-T E.164-number structure

This clause identifies five different structures for the international ITU-T E.164-number:

- International ITU-T E.164-number for geographic areas.
- International ITU-T E.164-number for global services.
- International ITU-T E.164-number for Networks.
- International ITU-T E.164-number for groups of countries.
- International ITU-T E.164-number for trials.

6.1 International ITU-T E.164-number length

ITU-T recommends that the maximum number of digits for the international geographic, global services, Network and groups of countries applications should be 15 (excluding the international prefix). Administrations are invited to do their utmost to limit the digits to be dialled to the degree possible consistent with the service needs.

6.2 Structure of the international ITU-T E.164-number

The international ITU-T E.164-number is composed of a variable number of decimal digits arranged in specific code fields. The international ITU-T E.164-number code fields are the country code (CC) and remaining fields are specific to the use being made of the international ITU-T E.164 number as shown in Figures 1 to 5.

A numbering plan does not include prefixes, suffixes, and additional information required to complete a call.

6.2.1 The international ITU-T E.164-number for geographic areas is composed of decimal digits arranged in two code fields: the country code (CC) and the national (significant) number N(S)N. The national (significant) number may be further subdivided into national destination code and subscriber number fields, according to national requirements, and is explained further in clause 7.2. This further subdivision is outside the scope of this Recommendation (see clause 7.4).

Figure 1 shows the international ITU-T E.164-number structure for geographic areas.

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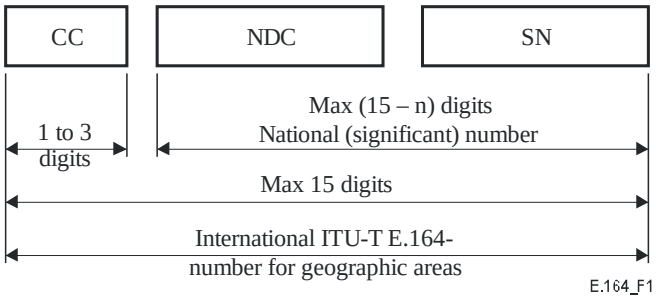


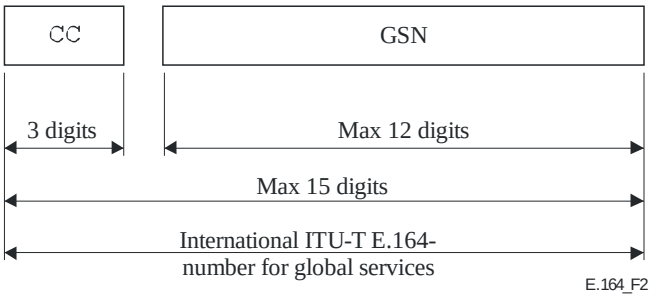
CC Country Code for geographic area
NDC National Destination Code
SN Subscriber Number
n Number of digits in the country code

NOTE – National and international prefixes are not part of the international ITU-T E.164-number for geographic areas.

Figure 1 – International ITU-T E.164-number structure for geographic areas

6.2.2 The international ITU-T E.164-number for global services (Figure 2) is composed of decimal digits arranged in two fields. The international service number code fields are the 3-digit country code for global services and the global subscriber number (GSN) that can vary depending on the specific service.

Figure 2 shows the international ITU-T E.164-number structure for global services. The use of this format is service specific and is dependent on the numbering requirements as detailed in the appropriate Recommendation, e.g., [ITU-T E.169], Application of Recommendation E.164 numbering plan for universal international numbers for international telecommunications services using country codes for global services.



CC Country Code for global services
GSN Global Subscriber Number

NOTE – National and international prefixes are not part of the international ITU-T E.164-number for global services.

Figure 2 – International ITU-T E.164-number structure for global services

6.2.3 The international ITU-T E.164-number for Networks (Figure 3) is composed of decimal digits arranged in three code fields. The code fields are the three-digit country code (CC) for Networks field, the IC field, which varies in length from one to four digits, and the subscriber number (SN), which can be up to 15 digits minus the number of digits in the CC and IC fields.

Figure 3 shows the international ITU-T E.164-number for Networks.

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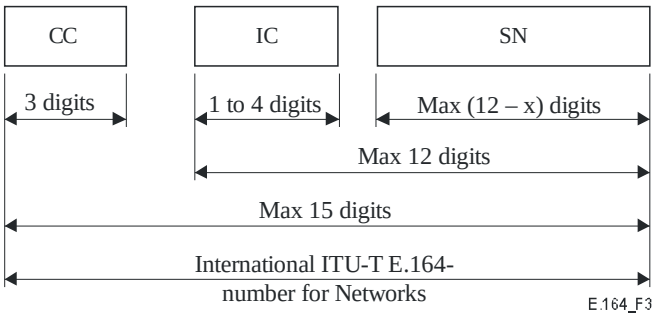


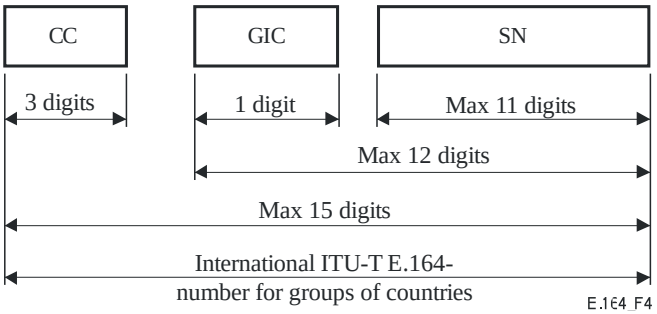
CC Country Code for Networks
IC Identification Code
SN Subscriber Number
x Number of digits in Identification Code

NOTE – National and international prefixes are not part of the international ITU-T E.164-number for Networks.

Figure 3 – International ITU-T E.164-number structure for Networks

6.2.4 The international ITU-T E.164-number for groups of countries (Figure 4) is composed of decimal digits arranged in three code fields. The code fields are the three-digit country code (CC) for groups of countries field, the group identification code (GIC) field, which is fixed at one digit, and the subscriber number (SN) field which can be up to 15 digits minus the number of digits in the CC and GIC fields.

Figure 4 shows the international ITU-T E.164-number for groups of countries.



CC Country Code for Groups of Countries
GIC Group Identification Code
SN Subscriber Number

NOTE – National prefixes are not part of the international ITU-T E.164-number for groups of countries.

Figure 4 – International ITU-T E.164-number structure for groups of countries

6.2.5 The international ITU-T E.164 number for Trials (Figure 5) is composed of decimal digits arranged in two mandatory and one optional code fields. The code fields are the three-digit country code (CC) for trials and a one-digit trial identification code (TIC) field. An additional, optional subscriber number field may be deployed which can be up to 15 digits minus the number of digits in the CC and TIC fields.

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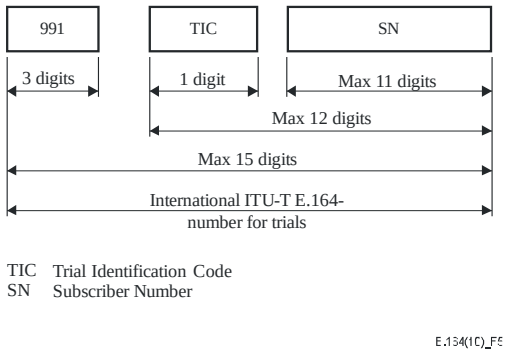

NOTE – National prefixes are not part of the international ITU-T E.164-number for Trials.

Figure 5 – International ITU-T E.164-number structure for Trials

6.3 Assignment of country codes (CCs)

6.3.1 Country codes may be assigned to either geographic areas, global services, Networks or groups of countries.

6.3.2 The status of country codes for geographic areas, global services, Networks and groups of countries is published periodically by TSB.

6.3.3 All spare country codes will be assigned on a three-digit basis.

6.3.4 The assignment and reservation of country codes shall follow the criteria and procedures, as defined in [ITU-T E.164.1], for geographic areas, global services and Networks; in [ITU-T E.164.3] for groups of countries.

6.3.5 The CC for trials (i.e., 991) has already been allocated and is not considered further.

6.4 Assignment of identification codes, group identification codes and trial identification codes

6.4.1 The list of assigned and reserved identification codes with their associated country codes is published periodically by TSB.

6.4.2 The assignment and reservation of identification codes shall follow the criteria and procedures, as defined in [ITU-T E.164.1], or [ITU-T E.164.2], or [ITU-T E.164.3] as appropriate.

7 International ITU-T E.164-number for geographic areas

Principles, criteria and procedures for the assignment of international ITU-T E.164-numbers for geographic areas may be found in [ITU-T E.190], and [ITU-T E.164.1].

7.1 Country code for geographic areas

The country code is used to select the destination country[1] (i.e., the country where the identified subscriber is registered or the country containing a point where the service is provided) and varies in length from 1 to 3 digits.

[1] Whenever the term "country", "destination country" or "originating country" is used in this clause, it identifies a specific country, a group of countries in an integrated numbering plan or a specific geographical area.

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7.2 National (significant) number

7.2.1 ITU-T recommends that the maximum number of digits of the national (significant) number, N(S)N, should be equal to 15 – *n*, where *n* is the number of digits of the country code.

7.2.2 The N(S)N is used to select the destination subscriber (in clause 7, the term "subscriber" means a human subscriber or a point where a service is provided). In selecting the destination subscriber, however, it may be necessary to select a destination network. To accomplish this selection, the N(S)N code field comprises a national destination code (NDC) followed by the subscriber's number (SN). The NDC and SN may be inseparably connected in some national applications to form a single composite dialling sequence.

7.2.3 The NDC field, if used, 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);

c) any combination of destination network (DN) code and trunk code (TC).

The NDCs of a geographic country code may consist of one of the above structures or others as defined by national numbering plan administrators.

NOTE – The sequences DN-TC and TC-DN are a national matter. The various NDC options (TC/DN) are reflected in Figure 6.

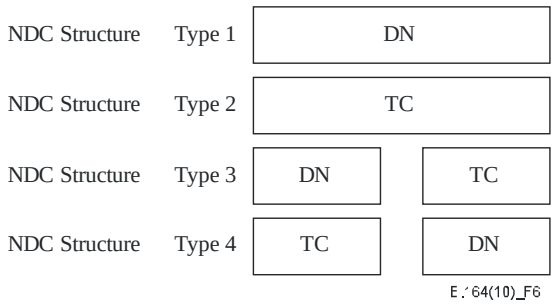

Figure 6 – Options for NDC structure

7.2.4 The SN varies in length depending on the requirements of the destination country.

7.2.5 Where appropriate, identification of a specific network within the destination country shall be through the use of a NDC incorporated into the international ITU-T E.164-number.

7.3 Prefixes

7.3.1 Applications

Prefixes are not part of the international ITU-T E.164-number and are not signalled over international boundaries. It is a national matter to decide whether prefixes can be signalled between domestic networks.

Prefixes can also be used for carrier network and service selection nationally.

7.3.2 National (trunk) prefix

The national (trunk) prefix is not included in N(S)N. Accordingly, in the international service, the national (trunk) prefix of the country of destination must not be dialled.

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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 dialling plan, which is then not the N(S)N. A careful distinction must therefore be made between such national definition or practice and the ITU-T definition, which is internationally valid. In order to avoid misunderstanding, the ITU-T definition includes the word "significant" between brackets, reading as follows: "national (significant) number".

It is recommended by ITU-T that the national numbering plan administrator of countries that have not yet adopted a trunk prefix for access to their national automatic trunk network 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 N(S)N.

The reasons for this recommendation are:

– to provide the maximum degree of standardization of the national (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;
– 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.

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

The use and printing of symbols and separators in national and international ITU-T E.164-numbers are detailed in [ITU-T E.123].

7.4 National numbering plan

7.4.1 Characteristics of a national numbering plan

Each national numbering plan administrator should give the most careful consideration to the preparation of a national numbering plan for its own network. This plan should be designed:

a) to allow generous provision for future growth in the number of subscribers and services to the national system;
b) with the consideration that the national network will ultimately be accessible to subscribers in other countries by means of international dialling procedures;
c) so that subscribers would always be called by either the same N(S)N or SN, a national matter, regardless of where the call originated from within the national numbering plan.

The numbering plan will be based on and evolve from the existing numbering plans applicable to national and international public telephone networks.

Where multiple destinations (e.g., ROAs or operators) serve the called party's geographical area, the national numbering plan in the country of destination shall provide for discrimination between these ROAs or operators.

The ten-digit decimal character set 0-9 is used throughout the numbering plan format including the 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 international number.

An integrated numbering plan shall include an unambiguous identification of a particular country. In addition, the number will identify networks within these countries, if required.

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7.4.2 Notification of national numbering changes

National numbering plan administrators should advise ITU-T, on a non-binding informational basis, of significant national numbering plan changes well in advance of the event, so that this information can be published by TSB. It is recommended that this notification be submitted at least 2 years in advance to ensure formal and timely information to the widest possible distribution.

National numbering plan administrators are encouraged to inform other national numbering plan administrators of significant national numbering plan changes well in advance of its implementation. [ITU-T E.129] provides a standardized method for presenting the national numbering plans of all countries (i.e., each country's national implementation of the international ITU-T E.164-numbering plan) as well as a method by which this information (and changes to this information) is made available to all interested parties.

7.5 Digit analysis

7.5.1 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 ITU-T E.164-number. The length of 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.

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

– four digits of the N(S)N in the case of a country with a three-digit country code;

– five digits of the N(S)N in the case of a country with a two-digit country code;

– six digits of the N(S)N in the case of a country with a one-digit country code.

7.5.3 The national numbering plan of a country should be such that digit analysis for incoming international calls need not exceed established limits applicable to the N(S)N but allows:

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

b) distinctions for charging in those countries where distinctions are applicable.

8 International ITU-T E.164-number for global services

The numbering plan for global services is service specific. Each use of an ITU-T E.164 country code for a global service needs to comply with numbering assignment principles, as specified in [ITU-T E.190], as identified for the specific service, and the criteria and procedures, as specified in [ITU-T E.164.1]. Refer to the appropriate numbering Recommendation for documentation regarding the numbering scheme and any service specific principles, e.g., [ITU-T E.168], Application of E.164 numbering plan for UPT.

The international ITU-T E.164-number for global services is composed of the 3-digit country code applied for the global service and the global subscriber number (GSN). The maximum length is 15 digits (see Figure 2).

8.1 Country code for global services

The country code for a global service is used to identify the global service and is three digits in length.

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8.2 Global subscriber number

The global subscriber number (GSN) consists of the digits following the country code for the global service. The structure and functionality of these digits is application dependent and will be addressed in the appropriate global service numbering Recommendations, e.g., [ITU-T E.169], Application of Recommendation E.164 numbering plan for universal international numbers for international telecommunications services using country codes for global services.

8.3 Digit analysis

Digit analysis for global services is service specific. In order to determine the specific global service, and the call routing and charging, the digit analysis should not exceed seven digits, e.g., three-digit CC + 4 digits of N(S)N. Refer to the appropriate ITU-T numbering Recommendation for documentation regarding the number analysis requirements for the specific global service.

8.4 Evolution path to an international ITU-T E.164-number for global services

The development of a numbering plan for a global service should consider the possibility for the subscribers, who already have a number for the same comparable domestic service, to evolve their domestic subscriber number (SN) to the global subscriber number (GSN).

It is assumed that ITU-T recognized global services would be location independent.

If in the implementation of the global service there are duplicate numbering requests and there are no service specific resolution procedures, then the duplicate request procedures should be invoked, as defined in [ITU-T E.169], Application of Recommendation E.164 numbering plan for universal international numbers for international telecommunications services using country codes for global services.

9 International ITU-T E.164-number for Networks

Principles, criteria and procedures for the assignment of international ITU-T E.164-numbers for international Networks may be found in [ITU-T E.164.1] and [ITU-T E.190].

International ITU-T E.164-numbers used by Networks consist of three parts: a shared three-digit ITU-T E.164 country code for Networks, an identification code, and a subscriber number (see Figure 3). The maximum length of international ITU-T E.164-numbers used by Networks is fifteen (15) digits.

9.1 Country code for Networks

These digits are the first three digits of international ITU-T E.164-numbers for Networks. A country code for Networks is a shared combination of three digits and is used in combination with the identification code to identify Networks.

9.2 Identification code

An identification code (IC) is a combination of one to four digits used for identification of Networks. These digits follow the shared country code field within international ITU-T E.164-numbers for Networks.

9.3 Subscriber numbers

Subscriber numbers are the remaining digits that follow the shared country code and the IC. The structure and functionality is determined by the operator. The maximum length of the subscriber number is 15 minus the total of the CC and IC digits. The minimum length of the subscriber number is:

– nine digits with a one-digit IC;

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– eight digits with a two-digit IC;
– seven digits with a three-digit IC;
– six digits with a four-digit IC.

Additionally, resources shorter in length than the required minimum number of digits are authorized following the CC + IC, on condition that the quantity of these resources is limited to 10% of the total capacity of the numbering resources for Networks determined by the operator.

9.4 Digit analysis

For calls utilizing the international ITU-T E.164-number for Networks, the maximum number of digits to be analysed is seven, which includes the three digits of the ITU-T E.164 country code, the identification code, and the initial significant digits (if any) of the subscriber number. A minimum of the 3-digit country code and IC must always be analysed to determine the appropriate routing and charging.

10 International ITU-T E.164-number for groups of countries

Principles, criteria and procedures for the assignment of international ITU-T E.164-numbers for groups of countries may be found in [ITU-T E.164.3] and [ITU-T E.190].

International ITU-T E.164-numbers used by groups of countries consist of three fields: a shared three-digit ITU-T E.164 country code for groups of countries; a one-digit group identification code; and a subscriber number to a maximum length of eleven digits (see Figure 4). The maximum length of international ITU-T E.164-number used by groups of countries is 15 digits.

10.1 Country code for groups of countries

These are the first three digits of international ITU-T E.164-number for groups of countries. A country code for groups of countries is a shared (i.e., shared between GoCs) three-digit CC used in combination with a single-digit GIC to uniquely identify a group of countries.

10.2 Group identification code

A group identification code (GIC) is a single-digit code used to uniquely identify a group of countries. The GIC immediately follows the shared country code field within the international ITU-T E.164-number for groups of countries.

10.3 Subscriber numbers

Subscriber numbers (SN) are the digits (to a maximum of eleven) which follow the CC + GIC fields and are used to identify individual subscribers or a point where a service is provided with the GoC. The minimum length of the subscriber number is nine digits, although a maximum of 10% of the total capacity of the numbering resources following the CC + GIC determined by the GoC is authorized to be shorter than nine digits in length. The structure and functionality of subscriber numbers is determined by the GoC and are administered and managed by the group identification code administrator (GICA).

10.4 Digit analysis

The maximum number of digits to be analysed for the processing of calls to international ITU-T E.164-numbers for groups of countries is seven. This includes the CC field (three-digit) plus the GIC field (one-digit) plus the first three digits of the subscriber number (SN). A minimum of four digits (i.e., CC + GIC) must always be analysed to determine the appropriate routing and charging.

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11 International ITU-T E.164-numbering resources for Trials

An ITU-T E.164 country code (i.e., 991) has been allocated to enable the conduct of trials of new international public correspondence services. Additionally, a three-digit trial identification code (TIC) field will be used in conjunction with the shared country code to uniquely designate trial numbers and participants. Details pertaining to the use of and the restrictions associated with this resource are contained in [ITU-T E.164.2].

12 International prefix

It is recommended by ITU-T that national numbering plan administrators that have not yet introduced automatic international operation, or national numbering plan administrators and international operators that are, for various reasons, defining or revising their numbering plans, adopt an international prefix (a code for access to the international automatic network) composed of the two digits 00[2].

In accordance with [ITU-T E.123], the symbol "+" is recommended to indicate that an international prefix is required.

13 Recommendation history

Recommendation ITU-T E.29, first issued in 1960 and subsequently revised. The first version was a renumbering of CCIF no. 26.

Recommendation ITU-T E.161, first issued in 1964, was a renumbering of Recommendation ITU-T E.29. It was subsequently revised several times.

Recommendation ITU-T E.163, first published in 1980, was the result of removing the number-related content from the 1976 version of Recommendation ITU-T E.161 and moving it to the new Recommendation ITU-T E.163.

Recommendation ITU-T E.163 was withdrawn and its content merged with Recommendation ITU-T E.164 in 1991 (see below).

Recommendation ITU-T E.164, first issued 1984.

Recommendation ITU-T E.164, second issue 1988.

Recommendation ITU-T E.164, third issue 1991 – merged with Recommendation ITU-T E.163

Recommendation ITU-T E.164, fourth issue 1997 – incorporates Recommendations ITU-T E.160 and E.162.

Recommendation ITU-T E.164, fifth issue 2005.

Recommendation ITU-T E.164, sixth issue 2010.

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[2] Where there is a requirement for further discrimination between international operators and/or the different network services they provide, the method for accommodating this need is a national matter.

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Annex A

Clarification and explanation of the structure and function of international ITU-T E.164-numbers

(This annex forms an integral part of this Recommendation)

A.1 Scope

A.1.1 International ITU-T E.164-numbers are the basis for global addressing in fixed and mobile terminal networks. These numbering resources uniquely identify user-network interfaces, e.g., PSTN/ISDN, mobile terminals, and individuals utilizing specific global services, e.g., universal international freephone numbers (UIFNs). Most of the services/subscribers can be addressed directly, but in cases where indirect addressing is used, number translation is required, e.g., for UIFNs.

A.1.2 This annex provides clarification and explanation to the structure and functionality of international ITU-T E.164-numbers. These structures/functions are independent of the technical arrangement to record, charge or route the calls.

A.2 Structure

A.2.1 The international ITU-T E.164-number, which is the foundation of the hierarchy, consists of the country code plus the necessary additional elements (NDC + SN, GSN, IC + SN, or GIC+SN). The international ITU-T E.164-number exists only at the international level, i.e., the CC and GSN are combined to form a single dialling sequence.

A.2.2 In countries where NDC and SN are combined to form a single dialling sequence or where the NDC does not exist, the local and national levels are integrated and there is no difference between the subscriber number and the national (significant) number.

A.2.3 International ITU-T E.164-numbers have hierarchical structures as shown in Figure A.1.

A.2.4 When in the local level, typically the use of a national (trunk) prefix provides access to the national level, and the use of an international prefix provides access to the international level.

A.2.5 Numbers that only exist in the local, intraNetwork and/or national level are not considered international ITU-T E.164-numbers.

A.3 Number length

A.3.1 International ITU-T E.164-number for geographic areas

A.3.1.1 International ITU-T E.164-numbers for geographic areas have a maximum length of 15 digits.

A.3.1.2 The maximum length of national (significant) numbers is 15 digits minus the length of the country code.

A.3.1.3 The maximum length of subscriber numbers is 15 digits minus the length of the country code and the national destination code.

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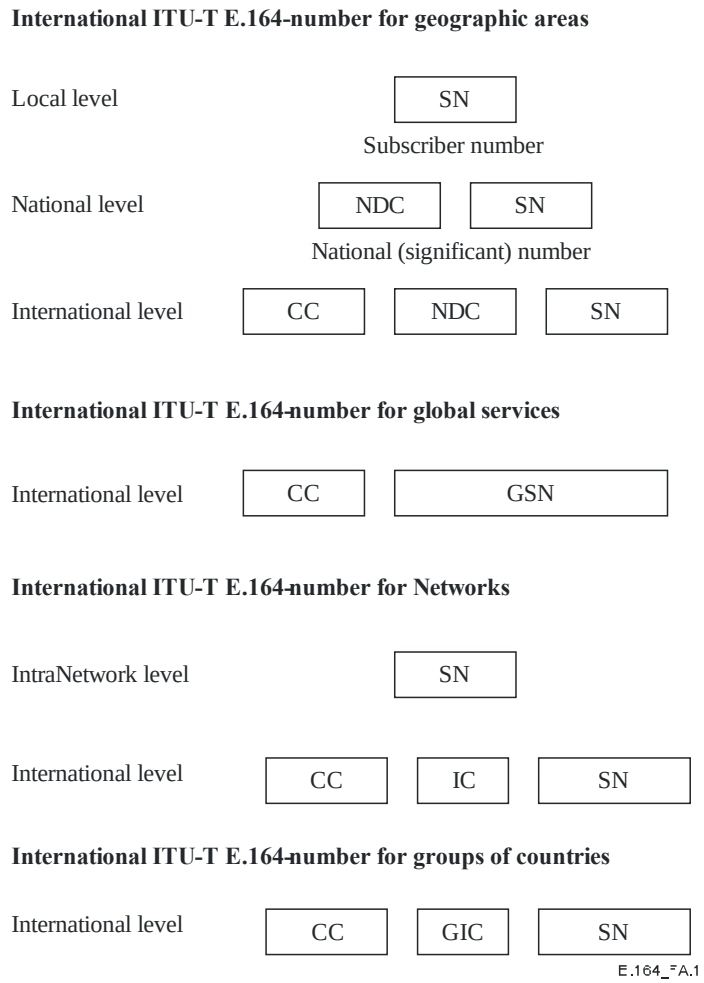

NDC National Destination Code
CC Country Code
IC Identification Code
SN Subscriber Number
GSN Global Subscriber Number
GIC Group Identification Code

NOTE – IntraNetwork level is used when calling and called parties are within the same network.

Figure A.1 – Hierarchical structures of international ITU-T E.164-numbers

A.3.2 International ITU-T E.164-number for global services

The maximum length of a global subscriber number is 12 digits, since the country code assigned to global services is always three digits in length.

A.3.3 International ITU-T E.164-number for Networks

The maximum length of the combined identification code and subscriber number is 12 digits, since the country code for Networks is always three digits in length.

A.3.4 International ITU-T E.164-number for groups of countries

The maximum length of a subscriber number is 11 digits since the country code for groups of countries is always three digits in length and the group identification code is fixed at one digit.

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A.3.5 Summary of number length

Table A.1 summarizes the maximum number length on each level for the four categories of international ITU-T E.164-numbers.

Table A.1 – Maximum number length

Level	Geographic areas	Global services	Networks	Groups of Countries
Local	15 minus (number of digits in CC + NDC)	NA	NA	NA
National	15 minus (number of digits in CC)	NA	NA	NA
IntraNetwork	NA	NA	15 minus (number of digits in CC + IC)	NA
International	15	15	15	15
NA Not Applicable				

A.4 Unique identification of international ITU-T E.164-number for geographic areas

A.4.1 An international ITU-T E.164-number for geographic areas uniquely identifies a subscriber within a geographical area locally, nationally and internationally, i.e., dialling the subscriber number locally, the national (significant) number nationally and the international ITU-T E.164-number internationally always provides identification of the same subscriber.

A.4.2 The national (significant) number provides unique identification of one subscriber irrespective of where the call is generated from within the country or geographical area characterized by CC.

A.4.3 The subscriber number provides unique identification of one subscriber irrespective of where the call is generated from within a local area identified by NDC, where applicable. The subscriber number is a complete number and, therefore, cannot be separated.

A.4.4 Use of prefixes to distinguish the national (significant) number and the international number from the subscriber number does not alter the uniqueness of international ITU-T E.164-numbers.

A.5 Unique identification of international ITU-T E.164-number for global services

The international ITU-T E.164-number for global services uniquely identifies subscribers only at the international level. The international ITU-T E.164-number for global services is a complete number, and, therefore, cannot be separated.

A.6 Unique identification of international ITU-T E.164-number for Networks

For illustrative purposes only, it is assumed that intraNetwork dialling is by subscriber number.

A.6.1 An international ITU-T E.164-number for Networks uniquely identifies a subscriber within a Network, and internationally, i.e., dialling the subscriber number and the international ITU-T E.164-number, always provides identification of the same subscriber.

A.6.2 The subscriber number provides unique identification of one subscriber irrespective of where the call is generated from within the Network identified by CC + IC. The subscriber number is a complete number and, therefore, cannot be separated.

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A.6.3 Use of an international prefix to distinguish the subscriber number and the international ITU-T E.164-number for Networks does not alter the uniqueness of international ITU-T E.164-numbers.

A.7 Unique identification of international ITU-T E.164-number for groups of countries

The international ITU-T E.164-number for groups of countries uniquely identifies subscribers only at the international level. The international number for groups of countries is a complete number, and, therefore, cannot be separated.

A.8 Non-ITU-T E.164 numbers

A.8.1 Any number for geographical areas, global services, networks or groups of countries which does not conform to the structure, length and uniqueness as defined in this annex or in the main body of this Recommendation is not an international ITU-T E.164-number.

A.8.2 Non-ITU-T E.164 numbers may not be passed across any network boundaries without a specific bilateral agreement.

A.8.3 Listed below are some examples of non-ITU-T E.164 numbers from the first category of numbers. These examples are not exhaustive.

A.8.3.1 Local special purpose numbers

For example, local special purpose numbers (LSPNs) are numbers with significantly fewer digits than subscriber numbers, and which are valid for a specific purpose only, within a limited part of the same NDC area.

The LSPNs are part of a hierarchical structure with three levels as follows:

– Local level: LSPN.

– IntraNetwork level: NDC + LSPN.

– International level: CC + NDC + LSPN.

Since LSPNs are significantly shorter than the subscriber numbers, they are within the limits of Table A.1.

If LSPNs and NDC + LSPN terminate at the same service, then LSPN would be an international ITU-T E.164-number, but this is not the case in this example. In our example the LSPN terminates at, for instance, two different services within the NDC area, depending upon from where the calling user is located. LSPN and NDC + LSPN are ambiguous and therefore not international ITU-T E.164-numbers.

A.8.3.2 International special purpose numbers used nationally

In this example, the international special purpose numbers (ISPNs) are numbers with significantly fewer digits than ordinary subscriber numbers, and which only exist in an international format within the country which provides it. The digits of ISPN are identical to the leading digits of one or more subscriber numbers.

Nationally, the ISPNs exist only at the international level as follows:

– International level: CC + NDC + ISPN.

Since ISPNs are significantly shorter than the subscriber numbers, they are within the limits of Table A.1.

Nationally the CC + NDC + ISPN could terminate at a service center. As the digits of ISPN are identical to the leading digits of a subscriber number, all incoming international calls to the service center will fail because the CC + NDC + ISPN and the leading digits of CC + NDC + SN are ambiguous, and therefore not international ITU-T E.164-numbers.

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A.8.3.3 Network-specific numbers

In this example, network-specific numbers are numbers that belong to subscribers connected to one network operator in a country with more than one operator, but where the network operator demands that the calling user dials some additional digits.

The network-specific numbers have a hierarchical structure with 3 levels as follows:

– Local level: SN.

– National level: NDC + SN.

– International level: CC + AD + NDC + SN (see Note).

NOTE – ADs (additional digits) are the network operator identification digits that would have to be added by the calling users abroad to remove ambiguity and reach a particular subscriber in specific national network.

The network-specific number does not fit in the hierarchical structure because it consists of more than the country code plus the national (significant) number. AD is not part of the national (significant) number, but may be part of a national prefix used to distinguish the national (significant) numbers from the subscriber numbers.

The numbers are not unique because NDC + SN and CC + NDC + SN lead to two different subscribers.

Network-specific numbers that are manipulated in this way are not international ITU-T E.164-numbers.

A.8.3.4 National (significant) numbers with excessive length

In this example, the national (significant) numbers (NDC + SN) as used nationally have differing lengths, and the longest national (significant) numbers violate the maximum given in Table A.1.

The numbers have a hierarchical structure as follows. The structure is independent of the number length.

– Local level: SN.

– National level: NDC + SN.

– International level: CC + NDC + SN.

Some of the national (significant) numbers (NDC + SN) and international numbers (CC + NDC + SN) are longer than the maximum given in Table A.1. These numbers are not international ITU-T E.164-numbers. The most significant part of the national (significant) numbers, truncated to the limits given in Table A.1, are international ITU-T E.164-numbers provided that they are unique.

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Annex B

Application of international ITU-T E.164-numbers for ISDN

(This annex forms an integral part of this Recommendation)

B.1 Scope

This annex describes the application of international ITU-T E.164-numbers to ISDN numbering and addressing. Additional numbering and addressing requirements are covered in separate Recommendations, e.g., B-ISDN is contained in [ITU-T E.191].

B.2 ISDN numbers

Numbering for ISDN is an integral part of the international ITU-T E.164-numbering plan.

The ISDN number is an application of international ITU-T E.164-numbering for geographic areas and for international networks, to the ISDN user-network interface/network termination.

B.3 Addressing

B.3.1 Identification

Identification within a subscriber's installation of a point beyond the ISDN boundary requires the transfer of address information from the public network to the subscriber's equipment. Two cases can apply:

– identification by an ISDN number;

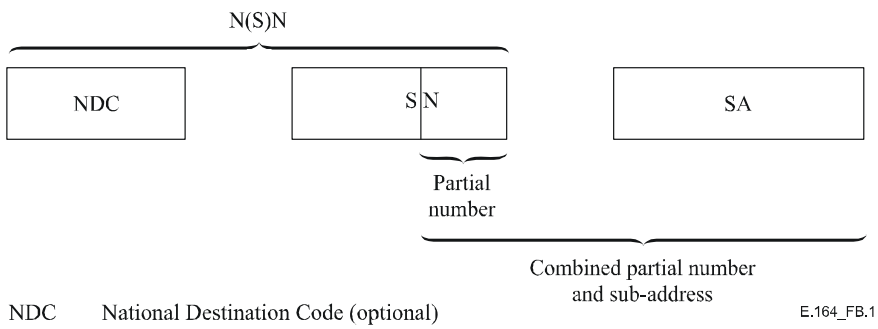
– identification by an ISDN number plus additional address information.

B.3.2 Addressing by an ISDN number

When selecting a destination in the subscriber installation, digits forming the end of the ISDN subscriber number are transferred to the called subscriber's installation as a partial number (see Figure B.1). The number of digits used depends upon the requirements of the called subscriber's equipment and the capacity of the numbering plan used.

In instances where a partial number is utilized, e.g., network termination 2 (NT2), the number will be used in the context of the direct-dialling-in supplementary service.

If the subscriber's installation consists of terminal equipment only, the transferred digits will be used in the context of the multiple-subscriber-number supplementary service.



NDC National Destination Code (optional)
N(S)N National (Significant) Number
SA Sub-Address
SN Subscriber Number

NOTE – The multiple-subscriber-number is not covered in the diagram.

Figure B.1 – Addressing by an ISDN number

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B.3.3 Sub-addressing (network address extension)

Sub-addressing provides an additional addressing capacity outside the ISDN numbering plan but constitutes an intrinsic part of the ISDN addressing capabilities. The sub-address is a sequence of digits, following the ISDN number. The maximum length should be 20 octets (40 digits). As shown in Figure B.1, the sub-address may follow the ISDN number and form the ISDN 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.

B.3.4 Combination of addressing and sub-addressing

Sub-addressing may be used separately or in combination with a partial number (see Figure B.1).

B.4 Dialling procedures

B.4.1 The subscriber dialling procedures for local, national and international calls shall be in accordance with clause 7. However, subscriber's control procedures for supplementary services is defined in [ITU-T E.131] (for Europe, also see [ETSI ETS 300 738] and [ETSI TS 001 907]) or in separate Recommendations for each service.

B.4.2 ISDN subscribers will always be called by the same subscriber number, irrespective of where in the public 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.

B.4.3 The addressing procedures for calls using sub-addressing are described in clause B.3.

B.5 Network identification

B.5.1 Geographic areas

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 country code;

– the international ITU-T E.164-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 clause 7.5;

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

B.5.2 Networks

In all cases when Network codes are assigned, they are supplemented with identification codes (ICs) which uniquely identify each international Network.

Digit analysis of the CC + IC provides the required network identification.

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B.6 Service parameters

The ISDN number by itself will not identify the particular nature of the service, which is derived from particular signalling parameters that are not part of the numbering plan. For example, for ISDN calls, in addition to a number and possible prefix, there is a requirement to provide a choice of bearer capability in the signalling protocol. One number can therefore facilitate access to more than one service.

B.7 Calling/connected line identity

Calling/connected line identity (CLI/COLI) is address information that is passed across the network to provide supplementary services such as calling (or connected) line identification presentation. The format of the CLI and COLI for international calls should be the full international ITU-T E.164-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 sub-address may be associated with the CLI/COLI. However, in a country where network-specific numbers are utilized for identifying customers or network services, it remains a national matter. When implemented, the NPI (numbering plan identifier) TON (type of number) mechanism should define the numbering status of the calling/connected line. The authorization to pass CLI/COLI across an international boundary is a national matter.

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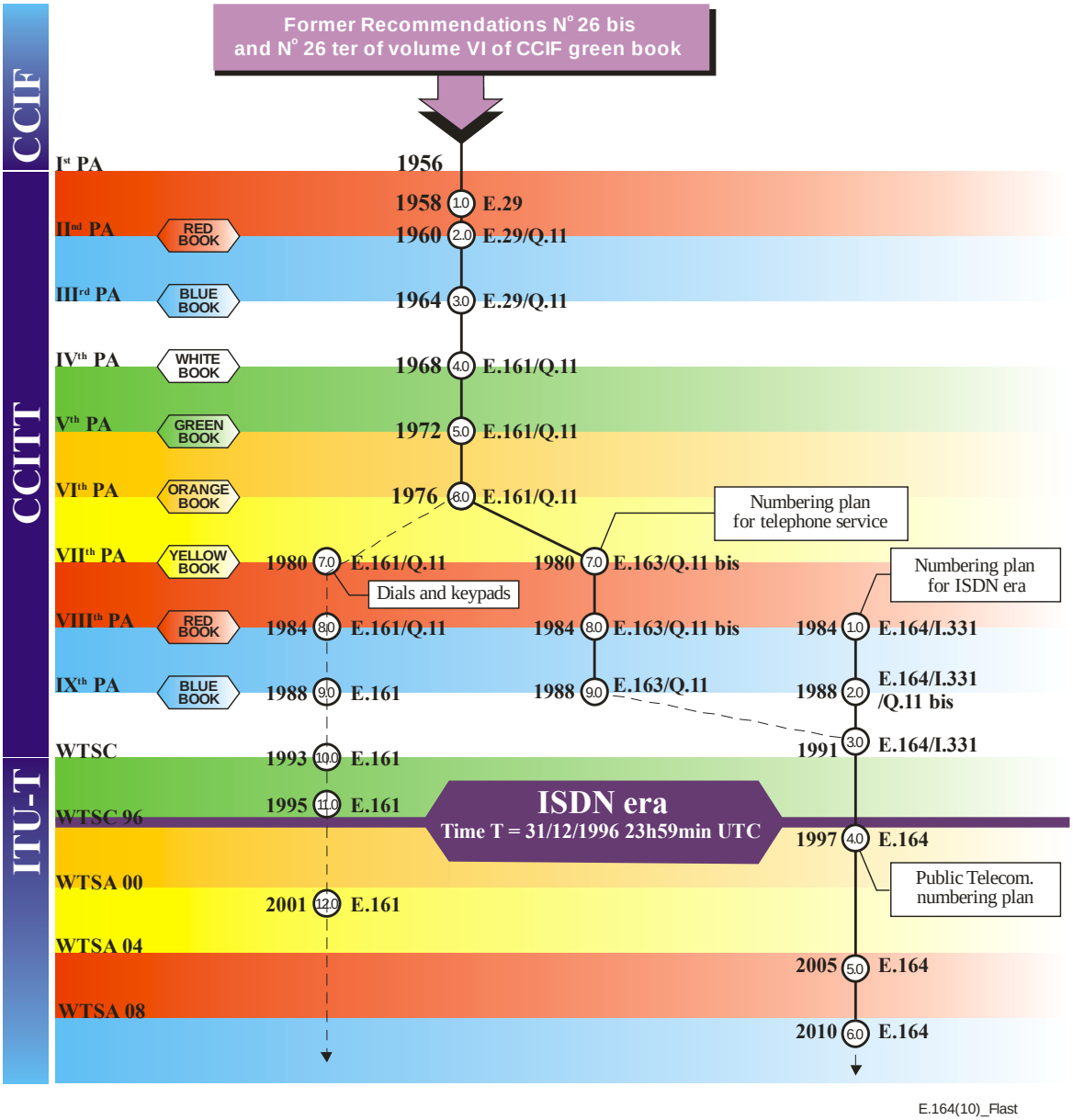

E.164 evolution history

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