

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Types of numbers used in an NGN environment

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Reference

DTR/TISPAN-04010-NGN

Keywords

addressing, name, ID

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Contents

Intellectual Property Rights	4
Foreword.....	4
Introduction	4
1 Scope	5
2 References	5
2.1 Informative references.....	5
3 Definitions and abbreviations.....	6
3.1 Definitions	6
3.2 Abbreviations	9
4 Introduction	9
5 Description of the different types of numbers	10
5.1 International E.164 numbers	10
5.2 E.164 numbers in the national formats.....	11
5.3 Non-E.164 numbers.....	12
6 Requirements for numbering, naming and addressing	12
6.1 Numbering.....	12
7 Treatment of numbers in the User Agent in UEs	13
7.1 Simple UA not capable of using a dialling plan	13
7.2 Treatment of emergency numbers and other service numbers	13
7.3 Treatment of dialling plans in the UA	14
7.4 Direct input of E.164 numbers	14
8 Treatment of E.164 numbers in ETSI NGNs.....	14
8.1 General treatment	14
8.2 Treatment of International E.164 numbers.....	14
8.3 Treatment of dialled digits.....	15
8.4 Treatment of E.164 numbers in the national formats	15
8.5 Treatment of E.164 numbers in private/corporate formats.....	15
Annex A: Discussion of non-E.164 numbers in ETSI NGNs.....	17
A.1 Short codes and special purpose numbers	18
A.2 Location dependent numbers.....	18
A.3 Other non-E.164 numbers from the ITU-T Recommendation E.164 [1]	19
A.3.1 International special purpose numbers used nationally	19
A.3.2 Network-specific numbers.....	19
A.3.3 National (significant) numbers with excessive length.....	19
A.3.4 Prefixes used for Carrier Selection.....	19
A.3.5 Private/corporate numbers in a private numbering plan.....	19
History	20

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

Introduction

The present document covers aspects how international E.164 numbers and E.164 numbers in the national formats should be treated in ETSI TISPAN NGNs. The present document also identifies further work how non-E.164 numbers should be treated.

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1 Scope

The present document describes the public identifiers, in the numeric format, used in NGNs: international E.164 numbers, E.164 numbers in the national formats and different types of non-E.164 numbers.

It describes the processing of dialled digits to achieve these numbers and the usage of all these kinds of numbers. For E.164 numbers also the processing to a target name in an NGN environment for further name/number to address translation is explained. The processing (treatment) of non-E.164 numbers is FFS but some initial discussion could be found in annex A.

2 References

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2.1 Informative references

- [1] ITU-T Recommendation E.164 (2005): "The international public telecommunication numbering plan".
- [2] ETSI TS 184 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Identifiers (IDs) for NGN".
- [3] IETF RFC 3966: "The tel URI for Telephone Numbers".
- [4] ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); IP Multimedia Subsystem (IMS); Stage 2 (3GPP TS 23.228)".
- [5] IETF Internet-Draft: "A Uniform Resource Name (URN) for Emergency and Other Well-Known Services", draft-ietf-ecrit-service-urn-07, work in progress (<http://www.ietf.org/internet-drafts/draft-ietf-ecrit-service-urn-07.txt>).
- [6] IETF Internet-Draft: "LoST: A Location-to-Service Translation Protocol", draft-ietf-ecrit-lost-06.txt, work in progress (<http://www.ietf.org/internet-drafts/draft-ietf-ecrit-lost-06.txt>).
- [7] ITU-T Recommendation Y.2201 (2007): "NGN release 1 requirements".

- [8] IETF RFC 4967: "Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier".
- [9] ITU-T Recommendation E.191 (2000): "B-ISDN addressing".
- [10] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Internet Protocol (IP) multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229 version 7.9.0 Release 7)".
- [11] ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); Numbering, Addressing and Identification (3GPP TS 23.003)".
- [12] IETF RFC 3406: "Uniform Resource Names (URN) Namespace Definition Mechanisms".
- [13] IETF RFC 3261: "SIP: Session Initiation Protocol".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

area code: combination of the national (trunk) prefix and the trunk code (TC) that identifies a specific geographic part/numbering area of the national E.164 numbering plan.

closed dialling plan: dialling plan where the national (significant) numbers [N(S)N] are used when dialling geographic numbers

dialling plan [1]: string or combination of decimal digits, symbols, and additional information that defines the method by which the numbering plan is used. A dialling plan includes the use of prefixes, suffixes, and additional information, supplemental to the numbering plan, required to complete the call.

global number: number defined in RFC 3966 [3] in the format of an international E.164 number

emergency services: legally recognized service, reached via a national emergency number (e.g. 112), that provides immediate and rapid assistance in situations where there is a direct risk to life or limb, individual or public health or safety, to private or public property, or the environment but not necessarily limited to these situations

international E.164 number [1]: string of decimal digits that, for a geographic country code, uniquely identifies a subscriber or a point where a service is provided. For the case of a global service code, it identifies the subscriber of the service. For Networks, it identifies a subscriber of the Network.

An international E.164 number can act in the "role" of both a name and an address. Portability is reducing a number's role as an address. Numbers are increasingly acting in the role of a name only.

The number, which includes the country code and subsequent digits, but not the international prefix, contains the information necessary to route the call to this termination point on a public network (it may also contain the supplementary information necessary to forward it on a private network).

NOTE: It is sometimes referred to as an "international number", "international public telecommunication number" or "E.164 number".

international prefix [1]: digit or combination of digits used to indicate that the number following is an international E.164-number

local number: number defined in RFC 3966 [3] which is anything that is not a global number and with the context defined. It can be E.164 numbers in the national formats or non-E.164 numbers.

location dependent number: number that is routed through networks on the basis of calling party location

MSISDN: mobile E.164 number used by the calling party to establish a call to the end user

national destination code (NDC [1]): nationally optional code field, within the international public telecommunication numbering plan (hereafter referred to as the "international E.164-numbering plan"), which - combined with the Subscriber's Number (SN) - will constitute the national (significant) number of the international E.164-number for geographic areas. 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) identifying a numbering area within a country (or group of countries included in one integrated numbering plan or a specific geographic area) and/or network/services.

national (significant) number [1]: that portion of the international E.164 number that follows the country code for geographic areas. The national (significant) number consists of the National Destination Code (NDC) followed by the Subscriber Number (SN). The function and format of the N(S)N is nationally determined.

national (trunk) prefix [1]: digit or combination of digits used 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.

non-E.164 number: any number, defined inside national E.164 numbering plan, which does not conform to the structure of international E.164 numbers as defined in ITU-T Recommendation E.164 [1] and is only used and meaningful in the national dialling plan and is not reachable from abroad

NOTE: An explanation of non-E.164 numbers is in ITU-T Recommendation E.164 [1] in annex A.8.

number [9]: number is a string of decimal digits

numbering plan: plan that specifies the format and structure of the numbers used within telecommunication networks. The numbers in the plan can either have uniform length or variable length or include both numbers of uniform and variable length.

E.164 numbering plan: E.164 numbering plan specifies the format and structure of the numbers. It typically consists of decimal (and hexadecimal) digits segmented into groups in order to identify specific elements used for identification, routing and charging capabilities, e.g. to identify countries, national destinations, and subscribers. An E.164 numbering plan does not include prefixes, suffixes and additional information required to complete the call. The national E.164 numbering plan is the national implementation of the international E.164 numbering plan (sometimes called the international public telecommunication numbering plan).

open dialling plan: dialling plan where both numbers on the local level (subscriber numbers (SN) without area code) and numbers on the national level are used when dialling geographic numbers

prefix [1]: prefix is an indicator consisting of one or more digits, that allows the selection of different types of number formats, networks and/or services

private numbering plan (PNP): numbering plan that specifies the format and structure of the numbers used within an organizations private/corporate/enterprise telecommunication network. PNPs may be wholly separate from the E.164 numbering plan or may overlap with it e.g. in the case of DDI.

Public Safety Answering Point (PSAP): physical location where emergency calls are received under the responsibility of a public authority

NOTE: Within the present document, it is assumed, unless stated otherwise, that PSAPs support the receipt of emergency calls over IP, using appropriate application layer protocols such as SIP for call signalling and RTP for media.

PSAP URI: SIP AoR pointing to a PSAP

public identifier: a series of digits, characters and symbols used in public networks to identify uniquely subscriber(s), user(s), network element(s), function(s) or network entity(ies) providing services/applications.

(emergency) service identifier: (emergency) service identifier describes the (emergency) service, independent of the user interface mechanism, the signalling protocol that is used to reach the service, or the caller's geographic location

NOTE: It is a protocol constant and used within the mapping and signalling protocols. An example is the service URN [5].

service URN: implementation of a service identifier, which can be applied to both emergency and non-emergency contexts, e.g. urn:service:sos or urn:service:counseling

short code [2]: string of digits in the national E.164 numbering plan as defined by the national Numbering Plan administrator which can be used as a complete dialling sequence on public networks to access a specific type of service/network

NOTE: The short code is a non-E.164 number and its length does not exceed five digits, in exceptional cases six digits. An example is the emergency number 112 used in the EU.

SIP Address-of-Record: Address-Of-Record (AOR) is a SIP or SIPS URI that points to a domain with a location service that can map the URI to another URI where the user might be available. Typically, the location service is populated through registrations. An AOR is frequently thought of as the "public address" of the user.

SIP[S] URI: type of Uniform Resource Identifier that identifies a communication resource in SIP. A SIP URI usually contains a user name and a host name and is similar in format to an email address. A SIP URI contains sufficient information to initiate and maintain a communication session with the communication resource. A communications resource could be e.g. user of an online service, a mailbox on a messaging system or PSTN number at a gateway service. Any resource described by a SIP URI can be "upgraded" to a SIPS URI by just changing the scheme, if it is desired to communicate with that resource securely.

subscriber number (SN) [1]: portion of the international E.164-number that identifies a subscriber in a network or numbering area

tel URI [2]: representation of an international E.164 number or another number with the context defined (e.g. private number, short code)

NOTE: RFC 3966 [3], which defines the use of the tel URI, also uses the term "local number", but uses it in a totally different way from E.164. RFC 3966 [3] recognizes:

- "Global number" - which always start with +CC.
- "Local number" - which is anything that is not a "global number".

Thus what E.164 refers to as national numbers, "local numbers" and short codes (as well as other types such as private numbers) would all be treated by RFC 3966 [3] as "local numbers". In the case of "local numbers", RFC 3966 [3] uses a context qualifier to distinguish the type of number.

In the context of the present document, the term "local number" will be used in the E.164 sense and international/national format issues has to be defined in the SIP context.

Trunk Code (TC) [1]: digit or combination of digits, not including the national (trunk) prefix, identifying the numbering area within a country (or group of countries included in one integrated numbering plan or a specific geographic area)

The trunk code has to be used before the called subscriber's number when the calling and called subscribers are in different numbering areas. The trunk code is a particular application of NDC.

User Agent (UA): user agent is the client application used with a particular network protocol. In SIP, IMS and TISPN NGN it is defined as a logical entity that can act as both a user agent client and user agent server.

NOTE: UA may be implemented both in UE and in proxies/servers (e.g. a Back-to-Back User Agents (B2BUA) or Application Servers). In the present document only UAs implemented in UEs are discussed.

User Agent Client (UAC): user agent client is a logical entity that creates a new request, and then uses the client transaction state machinery to send it

NOTE: The role of UAC lasts only for the duration of that transaction. In other words, if a piece of software initiates a request, it acts as a UAC for the duration of that transaction. If it receives a request later, it assumes the role of a user agent server for the processing of that transaction.

User Agent Server (UAS): user agent server is a logical entity that generates a response to a SIP request

NOTE: The response accepts, rejects, or redirects the request. This role lasts only for the duration of that transaction. In other words, if a piece of software responds to a request, it acts as a UAS for the duration of that transaction. If it generates a request later, it assumes the role of a user agent client for the processing of that transaction.

User Equipment (UE): the UE in UMTS (3G) mobile systems is the name given to the User Equipment

NOTE: This roughly corresponds to the Mobile Station (MS) in GSM systems. The UE can be, for example, a handheld phone. Alternatively it can be another device such as a card in a laptop computer.

3.2 Abbreviations

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

AOR	Address-Of-Record
AS	Application Server
CAC	Carrier Access Code
CC	Country Code
CIC	Carrier Identification Code
DB	Data base
DDI	Direct-Dial-In
ECRIT	Emergency Context Resolution with Internet Technologies
ENUM	Telephone Number Mapping
GEOPRIV	GEOgraphic location/PRIVacy
GPS	Global Positioning System
I-ENUM	Infrastructure ENUM
IP-CAN	IP-Connectivity Access Network
LoST	Location to Service Translation Protocol
N(S)N	National (Significant) Number
NANP	North American Numbering Plan
NAR	Naming and Addressing Resolution
NDC	Destination Code
NGCN	Next Generation Corporate Networks
NGN	Next Generation Networks
NP	Number Portability
PNP	Private Numbering Plan
PSAP	Public Safety Answering Point
PSI	Public Service Identity
PUI	Personal User Identity
SCP	Service Control Point
S-CSCF	Serving-Call Session Control Function
SIP-AOR	SIP Address-of-Record
SN	Subscriber Number
TC	Trunk Code
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
UE	User Equipment
URI	Universal Resource Identifier
URN	Uniform Resource Names

4 Introduction

Naming/numbering Address resolution within NGN networks needs to take account of different types of numbers. The requirements concerning naming/numbering/addressing are further explained along with specific treatments of numbers within ETSI NGNs.

Processing of numbers to obtain connection to the terminating point consists of three sub-functions as mainly shown in figure 1:

- 1) The processing of dialled digits - The input of this sub-function are the dialled digits, the output is a target name, which may either be a tel URI or a service URN. The present document is dealing mainly with these issues.
- 2) The target name/number to address translation to find a SIP URI. This can be done with I-ENUM, LoST, or other translation function.
- 3) Route determination to find the target hostname. This can be done by routing tables or DNS.

If the route is determined and the target is in another service provider an interconnection to the other provider is required.

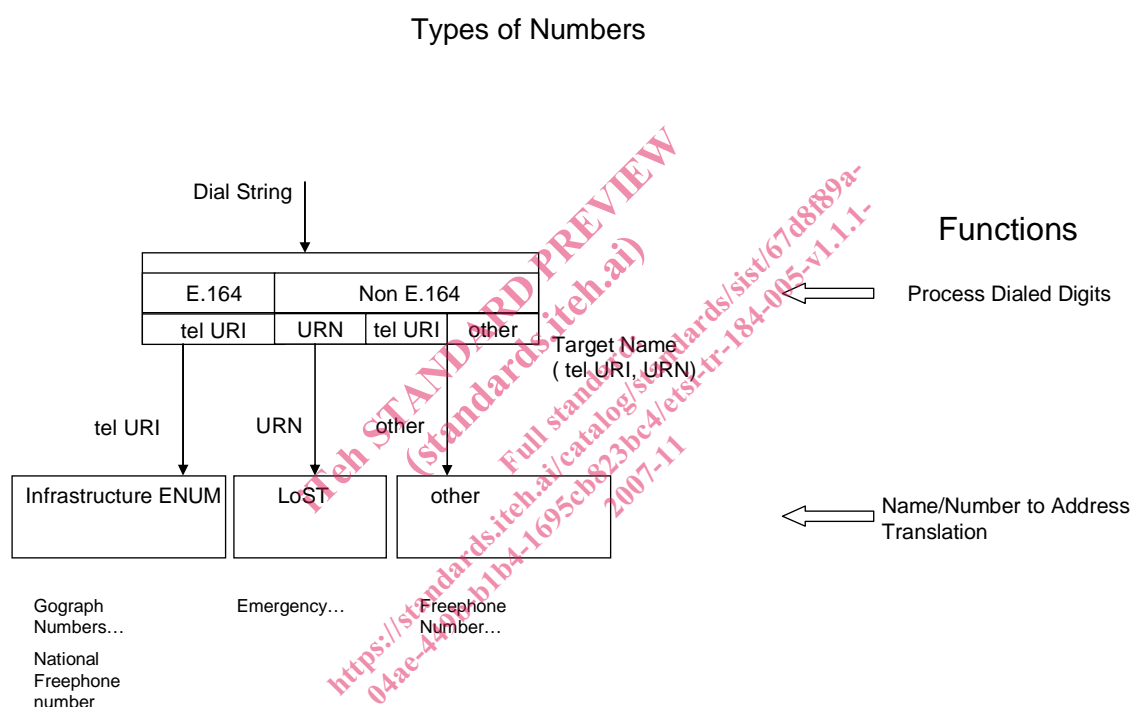


Figure 1

The processing (treatment) of non-E.164 numbers is out of scope for the present document but some initial discussion could be found in annex A.

5 Description of the different types of numbers

5.1 International E.164 numbers

International E.164 numbers are numbers based on ITU-T recommendation E.164 [1] and are used in different network environments like PSTN, ISDN, and PLMNs based on GSM and UMTS, and are also used in NGNs as public identifiers. The international E.164 number uniquely identifies a subscriber or a point where a service is provided and satisfies the three characteristics of structure, number length and uniqueness as specified in E.164 [1]. The maximum number of digits for the E.164 number is 15 excluding the international prefix. International E.164 numbers are presently used in four different structures and these are described in detail in E.164 [1]:

- International E.164-number for geographic areas.