

**Telecommunications and Internet converged Services and  
Protocols for Advanced Networking (TISPAN);  
Requirements and usage of E.164 numbers in NGN and NGCN**

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## Foreword

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

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## Introduction

NGN is intended to provide an efficient, secure and trustworthy numbering, naming and addressing environment for users, network operators and service providers. Evolution to NGN will ensure that the sovereignty of ITU Member States with regard to numbering plan is fully maintained, as described in ITU-T Recommendation E.164 [2].

The present document is aligned with the definitions, based on recent ITU-T Recommendation E.101 [1], and provides requirements and related solutions (i.e. formats and coding) for E.164 number used as NGN's and NGCN's Identifier for both IMS and not-IMS based on ETSI/3GPP standards.

The present document looks at the description of the different E.164 numbers and requirements for numbering, naming and addressing in NGN and NGCN contexts considering that the existing dialling procedures (using TE) will be kept.

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# 1 Scope

The present document provides an alignment of definitions on E.164 numbers, based on ITU-T Recommendation E.101 [1]. It provides requirements and describes the manner the numbers will be used within NGN and NGCN environments. Naming issues related to NGCN are out of the scope for the moment. The support of national-only numbers is a national matter and is not addressed in the present document. The document deals with "geographic country codes" (i.e. geographic areas or groups of countries) and their associated dialling plans, not with the international E.164 numbering plan as a whole. Non geographic country codes (such as country codes for networks) are not addressed in the present document.

Clause 7 defines the normative statements for numbering use in NGN.

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# 2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

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## 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ITU-T Recommendation 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 Recommendation".
- [2] ITU-T Recommendation E.164 (2010): "The international public telecommunication numbering plan".
- [3] ITU-T Recommendation E.123 (2001): "Notation for national and international telephone numbers, e-mail addresses and Web addresses".
- [4] ITU-T Recommendation Q.3401 (2007): "NGN NNI signalling profile (protocol set 1)".
- [5] ITU-T Recommendation Q.3402 (2008): "NGN UNI signalling profile (protocol set 1)".
- [6] ETSI TS 184 006: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Interconnection and Routing requirements related to Numbering and Naming for NGNs; NAR Interconnect".
- [7] ETSI TS 124 229(V8.7.0): "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; 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 8.7.0)".
- [8] ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) Stage 2 (3GPP TS 23.228)".
- [9] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

- [10] ETSI TS 182 024: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Hosted Enterprise Services; Architecture, functional description and signalling".
- [11] IETF RFC 3966: "The tel URI for Telephone Numbers".
- [12] IETF RFC 3261: "SIP: Session Initiation Protocol".
- [13] IETF RFC 4967: "Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier".

## 2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TR 184 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Naming/Numbering Address Resolution (NAR)".
- [i.2] IETF RFC 1034: "Domain Names - Concepts and Facilities".
- [i.3] IETF RFC 1035: "Domain Names - Implementation and Specification".

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ITU-T Recommendation E.101 [1] and the following apply:

**national-only number:** As defined in ITU-T Recommendation E.101 [1].

**global number:** International E.164 number as defined in ITU-T Recommendation E.101 [1] and described in RFC 3966 [11].

**local number:** National E.164 number or a national-only number as defined in ITU-T Recommendation E.101 [1] and described in RFC 3966 [11].

**tel URI:** As defined in RFC 3966 [11].

**SIP URI:** As defined in RFC 3261 [12] and reflected also in clause 4.2 TS 124 229 [7].

### 3.2 Abbreviations

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

CC	Country Code
CSCF	Call Session Control Function
DDI	Direct-Dial-In
ENUM	Telephone Number Mapping
GSM	Global System for Mobile Communications
I-ENUM	Infrastructure ENUM
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Services Digital Networks
N(S)N	National (Significant) Number
NAR	Naming and Addressing Resolution
NDC	National Destination Code
NGCN	Next Generation Corporate Network

NGN	Next Generation Network
NNI	Network-Network-Interface
NPA	Numbering Plan Administrator
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
SIP	Session Initiation Protocol
SIPS	SIP Secure
SN	Subscriber Number
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
UNI	User-Network-Interface
URI	Uniform Resource Identifier

## 4 Structure of Numbers

Each country defines its own national numbering and the national dialling plan, based on ITU-T Recommendation E.164 [2], as well as the prefixes and how the national formats (i.e. the local and national level) are used.

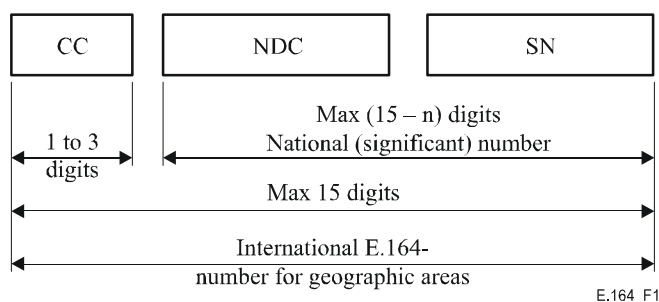
Subscribers in other countries are always reached by dialling the international prefix and the international E.164 number.

International E.164 numbers are numbers based on ITU-T Recommendation E.164 [2] 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 [2]. The maximum number of digits for the E.164 number is 15 excluding the international prefix. International E.164 numbers are presently used in five different structures and these are described in detail in E.164 [2]:

- International E.164-number for geographic areas.
- International E.164-number for global services.
- International E.164-number for Networks.
- International E.164-number for Groups of Countries.
- International E.164-number for Trials.

The structure of the international E.164 number for geographic areas, as an example, is shown below taken from ITU-T Recommendation E.164 [2]:



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 E.164-number for geographic areas.

**Figure 1: International E.164 number structure for geographic areas**

An E.164 number of the own country can be used in different formats by the users and operators, the ones corresponding to: international level, national level and local level. Which of these formats are usable is dependant on the national E.164 numbering plan and the dialling plan.

The following three notes describe the different formats which are national specifics:

NOTE 1: International level:

Some networks allow to dial the national E.164 numbers of the own country in the international format by using the international prefix.

NOTE 2 National level:

On the national level the number is used in the national (significant) number [N(S)N] format, i.e. the National Destination Code (NDC) and the Subscriber Number (SN), possibly together with the national (trunk) prefix.

NOTE 3 Local level (Subscriber number):

In some national dialling plans, using an open dialling plan, a user may also dial an E.164 number in the local format. This means dialling just the subscriber number (SN) without any national destination code.

This dialling procedure might not be applicable in some countries and networks, using closed dialling plans. In this case, there is always an NDC required to access other national E.164 numbers in the same area.

Countries with a closed dialling plan do not have a local format. This may also be the case for certain networks (mostly mobile networks). In some countries with a closed dialling plan there is no NDC required to be dialled.

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## 5 E.164 numbers formats and coding used in NGNs

### 5.1 General

From the technical point of view, an ETSI's NGN is an IP-based network with control/service and transport layers and SIP signalling. E.164 numbers can be used to identify the users and service entities.

From the signalling protocol point of view, E.164 numbers are conveyed using tel URI and/or SIP URI formats and coding (see [4], [5] and [7]). As a consequence, for routing purpose, tel URI and SIP URI have to be mapped to appropriate IP addresses, associated to control/service functional entities, for communication establishing. In the ETSI's NGN context, both tel URI and SIP URI are to be considered the "naming" schemes and SIP coding for E.164 numbers.

The basic coding for E.164 numbers in SIP are the following:

- **tel:** <telephone-subscriber>

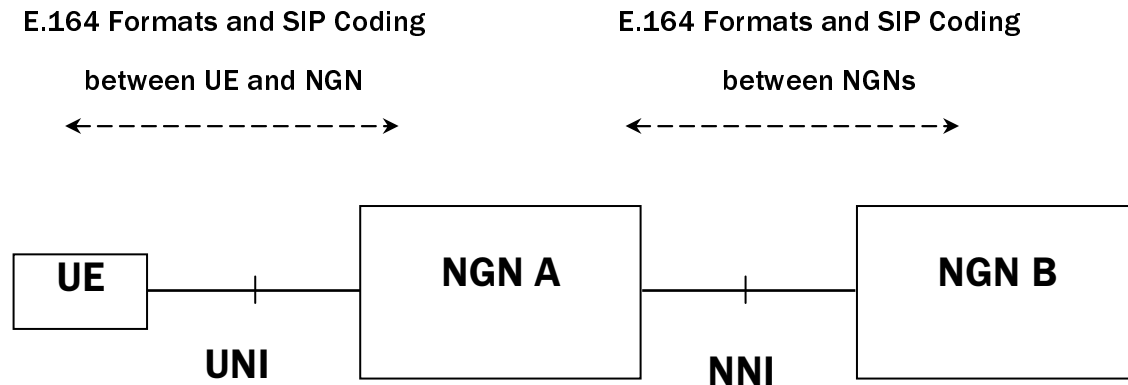
for the purpose of the present document the <telephone-subscriber> is addressed by a "global number" or "local number".

- **sip:** <user info>@<domain>;user=phone

For the purpose of the present document the <user info> is an E.164 number. The <domain> shall be a string that identifies the operator serving the end user identified by the E.164 number on a contractual basis, following the rules on Internet domain names for the domain administration (see [i.2] and [i.3]).

Figure 2 describes the basic scenario that shows the exchange of E.164 format information at UNI and NNI in ETSI NGN functional architecture [9].





**Figure 2: E.164 formats and SIP coding in NGN**

The basic formats which can be used at the UNI are the following:

- International E.164 number: when the E.164 number is used in the international format, defined in Figure 1 (CC+NDC+SN), tel URI and SIP URI shall use the "global" coding defined in [11].
- National E.164 number: tel URI and SIP URI shall use the "local" coding defined in [11].
- Subscriber Number: tel URI and SIP URI shall use the "local" coding defined in [11].

For interconnection between NGNs (NNI) there exist two distinct cases:

- National interconnection – interconnection between operator networks belonging to the same country;
- International interconnection – interconnection between operator networks belonging to different countries.

"The "global" number coding for E.164 numbers shall be used at the national and international NNI. The number format coding of the national interconnection NNI has also to take in account national requirements that are partially covered in the document. Based on a national common agreement by Numbering Plan Administrator (NPA) for national NNI other number coding formats (in particular local number coding) for E.164 numbers can be used."

## 5.2 International E.164 number format

### 5.2.1 Use of International E.164 number

An international E.164 number is a globally unique public identity of a subscriber or a service entity independent of technologies and service context, for instance NGNs, PSTNs or PLMNs, etc. The use of international E.164 numbers is mandatory at international interfaces between networks.

In case a number is delivered at NGN UNI, the NAR [i.1] translation function, realized inside the operator's domain, shall resolve such a number into a SIP URI or a tel URI coding, which enables the use of other steps of routing process, also for interconnection scenarios.

In case a number is delivered at the PSTN/ISDN or PLMN UNI, no new requirements are provided on PSTN/ISDN and, in the case of interworking with NGN, the numbering translation function at appropriate border gateways and interworking functional entities will provide tel URI or SIP URI coding on SIP. See the following clauses for normative requirements.

The basic numbering format for interconnection of international NGN networks shall be compliant to the Q.3401 Recommendation [4] and compliant to the following coding:

- tel: +<country code><national E.164 number>
- sip: +<country code><national E.164 number>@<operator-domain>;user=phone

NOTE 1: The "user=phone" parameter is a SIP URI parameter used coherently with [7].

Both tel URI and SIP URI shall be adopted for the coding of international E.164 numbers for the international interconnection [6].

The operator-domain naming component identifies the operator serving the end user identified by the E.164 number on a contractual basis.

In principle, both Originating and Terminating party identifiers shall be provided at interconnection NNI. They shall be coded in the SIP-header "P-Asserted-Identity" and in the "Request-URI", respectively.

NOTE 2: The "P-Asserted-Identity" SIP header can be omitted in case of a not trusted relationship between networks.

E.164 number identifiers based on tel URI and SIP URI codings are handled to address NAR [i.1] for routing process and routable SIP URI determination [7], based on I-ENUM, as described in clause 4.3.5 of TS 123 228 [8], or on another translation mechanism or existing solutions.

## 5.2.2 Use of dialled digits for International E.164 number

In order to use international E.164 numbers, a user may be required to first enter the international prefix defined by the national or private dialling plan or another indication ("+" character) to indicate the format of the number.

According to ITU-T Recommendation E.164 [2] it is recommended to use "00" as the international prefix, but some countries use a different international prefix.

In ITU-T Recommendation E.123 [3] the "+" character is used as symbol for such international prefix. For dialling, if "+" character is used, it corresponds to the international prefix used in the applicable dialling plan.

Also in RFC 3966 [11] the "+" character identifies the global number format (equivalent to international format basing on ITU-T terminology) and ITU-T Recommendation E.123 [3] meaning applies.

## 5.3 Use of National E.164 number format

The E.164 numbers in the national format are used for communications inside a country only. In addition the subscriber number format, if present in the specific national numbering plan, can be used for communications inside national local areas (for instance inside a district). The support of the subscriber number is a national matter; this format may be supported at NGN UNI, if it is required by national E.164 numbering and dialling plans.

ETSI's NGN shall be compatible with national E.164 numbering plans and shall implement the necessary functionality using NAR numbering translation functions.

Certain national numbering plans use only the national E.164 number format for any national communications, also inside local areas (for instance inside districts). In this case NDC does not exist.

Other national numbering plans use both national and subscriber number formats. In this case a national (trunk) prefix exists.

The structure of a national E.164 number is defined by ITU-T Recommendation E.164 [2] and typically consists of an area code and a subscriber number and, if it is required by the dialling plan, a national (trunk) prefix can be used.

When it is defined in a specific national numbering plan coherently with ITU-T Recommendation E.164 [2], the subscriber number is unique only within a local area (generally inside a district). It becomes unique at the national level by inserting an appropriate area code in front of the subscriber number.

If E.164 numbers in the national format need to be converted to international E.164 numbers, the ITU-T associated country code shall be inserted in front of the national E.164 number. As stated in ITU-T Recommendation E.164 [2] national and international prefix are never part of the number and they are only defined in the national dialling plan.

The formats and the codings for national interconnection sum up to:

1. tel: <national E.164 number>;phone-context=+<country code>
2. sip: <national E.164 number>;phone-context=+<country code>@<operator-domain>;user=phone

NOTE 1: The "user=phone" parameter is used coherently with [7].

NOTE 2: The "phone-context" is a tel URI parameter which is used coherently with [7]. The actual routing of the call will be done basing upon the "national E.164 number" coding in a tel URI format, or basing upon the "national E.164 number" coding and the "operator domain" in a SIP URI format.

Or

3. tel: +<country code><national E.164 number>

4. sip: +<country code><national E.164 number>@<operator-domain>;user=phone

NOTE 3: The "user=phone" parameter is used coherently with [7].

It is required that:

- The operator-domain name, coherently with Internet domain names administrative rules, identifies the operator serving the end user identified by the E.164 number on a contractual basis.

NOTE 4: In certain cases on a bilateral agreement, e.g. when a transit network is used, the operator-domain can also be the domain of the transit network.

- The value of <country code> shall be the ITU-T associated country code.
- Both tel URI and SIP URI shall be adopted for the coding of national E.164 numbers at national interconnection. After numbering and addressing resolution through NAR functionalities, routable SIP-URI coding applies, and tel URI is mainly used to indicate to next hop network that further NAR numbering and addressing resolution is to be applied to identify final destination of the ongoing session/communication [i.1].

NOTE 5: The support of E.164 international and national formats at national NNI is a national matter.

In principle, both Originating and Terminating party identifiers shall be provided at interconnection NNI. They shall be coded in the SIP-header "P-Asserted-Identity" and in the "Request-URI", respectively.

NOTE 6: The "P-Asserted-Identity" SIP header can be omitted in case of a not trusted relationship between networks.

National Interconnection NGN may support also routing number formats, as a national option, included in both tel URI and SIP URI codings.

The tel URI and SIP URI codings shall support the routing number formats [6].

## 5.4 Use of dialled digits for the determination of valid coding formats for E.164 number

### 5.4.1 Format of the Request URI at UNI

The following UE capabilities are considered to determine the coding for the Request URI at UNI with regard to E.164 number format:

- UE without dial string processing capabilities, that is the UE does not perform any analysis of the dialled string: in this case the dialled string is forwarded to the network at UNI using a tel URI or SIP URI, to be processed by the network. The URI content is in the RFC 3966 [11] local number format unless a "+" sign has been received in which case the RFC 3966 [11] global format is used. This is the "preferred" UE behaviour to assure global compatibility with networks in different countries.
- UE with dial string processing capabilities, that is the UE is able to perform sufficient dialled string analysis, based also on possible explicit indication from the user regarding used number formats: in this case the UE recognizes the dialled number on the basis of national numbering plan rules and encodes the corresponding E.164 number in SIP, using tel URI or SIP URI, with the correct SIP header numbering format (i.e. local or global value, etc.). The UE shall remove prefix or escape codes for private network, following the national numbering and dialling plan rules.

NOTE 1: If the UE detects that a local (private or public) dialling plan is being used, it may decide to send the dial string unchanged to the network or the UE may decide to alter it to comply with the national numbering plan (e.g. to remove all the dial string elements used for local numbering detection).

The coding formats sent by the UE at the UNI in the case of called party identifier are the following:

- If the output coding from the UE is a tel URI then:
  - UE without dial string processing capabilities: tel URI includes dialled digits and a phone-context provisioned at registration or by the operator. The required Request URI codings that may be supported are the following:
    - tel: <dialled digits>;phone-context=<operator-provisioned-context>
  - UE with dial string processing capabilities and tel URI coding: the output is always a valid E.164 number and the required Request URI codings are the following:
    - In case of international E.164 number:
      - tel: +<CC><National E.164 number> (global format)
    - In case of national E.164 number:
      - tel: <National E.164 number>;phone-context=<context-value> (local format)

NOTE 2: The <context-value> can be the string "+<CC>" where <CC> corresponds to the country where the UE is located or has a subscription or can be a value determined as specified in TS 124 229 [7], clause 5.1.2A.1.5 when the UE is connected to an IMS.

Tel: +<CC><National E.164 number> (global format).

- In case of E.164 subscriber number:
  - tel: <SN> (local format);phone-context=<context-value>

where <CC> corresponds to the value of the ITU-T country code of the country where the UE is located or has a subscription.

NOTE 3: The <context-value> can be the string "+<CC><NDC>" where <CC> corresponds to the country where the UE is located or has a subscription or can be a value determined as specified in TS 124 229 [7], clause 5.1.2A.1.5 when the UE is connected to an IMS.

- If the output coding from the UE is a SIP URI:
  - UE without dial string processing capabilities: SIP URI coding contains the dialled digits, the phone context, the domain name of the originating operator or service provider and the user parameter "user=dialstring" [13]. The value of phone context and the home domain are provisioned at least at registration.
    - Sip: <dialled digits>;phone-context=<operator-specific-context>@<operator-domain>;user=dialstring
  - UE with dial string processing capabilities:
    - In case of international E.164 number, the required Request URI coding is the following:
      - sip: +<CC><National E.164 number>@<operator-domain>;user=phone
    - In case of national E.164 number:
      - sip: <National E.164 number>;phone-context=<context-value>@<operator-domain>;user=phone (local format)
      - sip: +<CC><National E.164 number>@<operator-domain>;user=phone (global format)

with <CC> corresponding to the ITU-T country code of the country where the UE is located or has a subscription.

NOTE 4: The <context-value> can be the string "+<CC>" where <CC> corresponds to the country where the UE is located or has a subscription or can be a value determined as specified in TS 124 229 [7], clause 5.1.2A.1.5 when the UE is connected to an IMS.

- In case of dialling an E.164 subscriber number:

sip: <SN>;phone-context=<context-value>@<operator-domain>;user=phone (local format)

NOTE 5: The <context-value> can be the string "+<CC><NDC>" where <CC> corresponds to the country where the UE is located or has a subscription or can be a value determined as specified in TS 124 229 [7], clause 5.1.2A.1.5 when the UE is connected to an IMS.

In the case of Originating party identifier, the UE can be able to forward an E.164 number at UNI corresponding to the user subscription. When the UE forwards at UNI an Originating identifier, the UE uses tel URI or SIP URI coding, adhering to previously defined formats and codings. It is the task of the network at UNI to verify the received Originating identifier (if any), through appropriate screening functions, and to certify Originating identifier to be forwarded through the own network and towards other interconnected networks.

There may be an UE sending URI without global context, such a case is not foreseen in RFC 3966 [11]. Based on operator policy, and national choices, in such cases the NGN has to add the phone-context. How to add the phone context is out of scope of this specification.

## 5.4.2 Processing of the Request URI received over the UNI

The dialled digits carried on in the SIP Request URI at NGN UNI must be analysed using appropriate numbering analysis functions according to the national dialling plan rules.

The processing of the Request URI is accomplished through the following steps:

1. Analysis of incoming digits and, if they are present, phone-context parameters.
2. If a local number is used and the <CC> value of the phone-context parameter is recognized as not being equal to the ITU-T associated country code of the originating country, the call/session is considered an "International call/session", otherwise a "National call/session". If a global number is used and <CC> value is recognized as being equal to the ITU-T associated country code of the originating country, then the call/session is considered a "National call/session"; if not, then it is an "International call/session".
3. Look up the number in the own databases to determine, both for tel URI and SIP URI:
  - 3.1 If the number is served by the own network of the operator domain, then the Request URI corresponds to the own domain (operator domain) and the user parameter is set to "user=phone".  
The output is a Routable SIP URI [6] and [7].
  - 3.2 If the number is served by another network, numbering and addressing resolution functionality is applied to determine an appropriate routable SIP URI (see [6]) towards next hop network or to the final destination.

## 5.5 Numbering and Addressing Resolution function for E.164 numbers

Numbering and Addressing Resolution functions for tel URI and SIP URI are provided by TS 184 006 [6] and other NGN standards and specifications. NAR functions are in the responsibility of control function (CSCF), also located in Border Gateway functionalities in the case of inter-operators communication sessions. Different implementations of translation functions can be realized by operators, based on Naming and Addressing Resolution (NAR) process described in [i.1].

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## 6 E.164 numbers in NGCN

### 6.1 General

Private/corporate numbers may exist for example at an NGCN within a company. These companies have their own private numbering plan and dialling plan. Normally, these numbers may be accessed from the public NGN using direct-dial-in (DDI) numbers. Typically these DDI numbers are E.164 numbers [2] where the first digits belong to the international and national E.164 numbering plan and the last digits correspond to the private numbering plan. This however does not apply to all private/corporate networks.

In most of these private/corporate networks also the NGN can be accessed. To do so, a prefix (for instance "0" or "9") is defined. This prefix provides access to the national or international formats E.164 numbers.

Private networks have to comply for their external communications with the rules of national and international E.164 numbering plans and no specific requirements are imposed by ETSI NGN.

A private numbering plan is in principle defined to be used inside the private networks.

As a general rule, only a private numbering plan integrated inside national E.164 numbering plan (i.e. direct dialling in) guarantees to be reachable by other national and international public networks.

If NGCNs have their own (proxy) control function entity, it is assumed that numbers are delivered to the public NGN domain in a format coherent with national numbering plan rules.

If an NGCN is handled through public NGN functions [10], the hosting NGN has to manage any private dialling plan. Appropriate SIP protocol coding for private calling and called identifiers, that guarantees to separate private numbering from public E.164 numbering plans, shall be used; specific SIP protocol coding could be defined but it is out of the scope of the present document.

### 6.2 Use of E.164 numbers in the NGCN

NGCN users are identified by one or more of the following identifiers:

- number based:
  - E.164 number
  - private number: out of the scope of the present document, but described in Annex A
  - name based (using aliases): out of the scope of present document.

Number based identifiers can appear in form of SIP(S) URIs or of tel URIs. Since all considerations here for SIP URIs apply equally to SIPS URIs, only SIP URIs and tel URIs are discussed in the rest of the present document.

Number based SIP URIs where the user part represents a telephone subscriber string has global significance irrespective of the host part. This fact has led to the domain name being largely neglected when inspecting such a SIP URI, and modifying the domain name has become common practice in such circumstances. In the NGCN context this applies to E.164 number based SIP URIs and to those containing private numbers that are formatted as telephone subscriber string.

The considerations below distinguish between URIs with an enterprise's own domain name and URIs where the domain name is that of the enterprise's trunking NGN provider.

Table 1 summarizes the examples of usage of E.164 number formats in a NGCN.

Table 1

Case	Identifier	SIP URI	TEL URI
<b>1</b>	<b>E.164 number</b>		
1a	Private enterprise domain	sip: <National number (including DDI digits)>;phone-context=+<CC>@example.com;user=phone	tel: <National/ E.164 number>;phone-context=+<CC> or +<CC><NDC>
1b	Public NGN	sip: <National E.164 number>;phone-context=+<CC>@<operator-domain>;user=phone	
1c	Private enterprise domain	sip: <international E.164 number>@example.com;user=phone	tel: +<international E.164 number>
1d	Public NGN	sip: <international E.164 number>@<operator-domain>;user=phone	

The formats and coding rules for E.164 numbers are defined in clauses 5.4.1 and 5.4.2.

## 7 Numbering normative statements

The normative statements for numbering in ETSI NGN are:

- 1) E.164 numbering plan, being neutral with respect to the technologies and services, is the public numbering plan also for NGN:
  - "The "global" number coding for E.164 numbers shall be used at the national and international NNI. The number format coding of the national interconnection NNI has also to take in account national requirements that are partially covered in the document. Based on a national common agreement by Numbering Plan Administrator (NPA) for national NNI other number coding formats (in particular local number coding) for E.164 numbers can be used."
  - NGN shall allow access to private/corporate networks using E.164 compatible numbering plans.
- 2) NGN shall support the internal functionality to differentiate alphanumeric identifiers, belonging to a recognized public naming scheme, that happen to be consisting of only digits from those which are numbers (e.g. E.164 numbers) and should be treated as necessary in routing procedures.
- 3) In some service scenarios, e.g. interworking with PSTN/ISDN, the NGN shall support multimedia communication establishment (in both the originating and terminating case) using E.164 numbering with suited Numbering and Addressing Resolution (NAR) functions, including I-ENUM system or other equivalent Data Base based solutions where appropriate.
- 4) Originating and Terminating party identifiers shall be provided at interconnection NNI. They shall be coded in the SIP-header "P-Asserted-Identity" and in the "Request-URI", respectively.  
Note: The "P-Asserted-Identity" SIP header can be omitted in case of a not trusted relationship between networks.
- 5) If SIP URI coding is received on the NNI, then appropriate NAR resolution functionality may be applied by the network to determine the Routable SIP URI [6].  
If tel URI coding is received on the NNI, then appropriate NAR resolution functionality shall be applied by the network to determine the Routable SIP URI [6].
- 6) If SIP URI or tel URI coding is received on the UNI, it shall always be verified and handled for routing and charging purposes by network control functions. An appropriate NAR resolution functionality shall be applied by the network to determine the Routable SIP URI [6].
- 7) The SIP parameter "user=dialstring" [13] coding can be used only at UNI. At interconnection NNI it shall not be used.

## Annex A (informative): Use of private numbers in the NGCN

A private numbering plan that does not overlap with an E.164 numbering plan can only be used inside a corporate network. Private numbers may appear at an NGN interface in the following two cases:

- **business trunking**, where the NGN provides connectivity between NGCN sites; in this case private numbers are transparent to the NGN, there is no need to understand them;
- **hosted enterprise network**, where the NGN provides private network services, including private numbering, to a company; in this case the use of private numbers is restricted to the hosted enterprise application, and the NGN has to prevent their use in any other context.

In any case private numbers that appear in a SIP or tel URI can be distinguished from other (e.g. E.164) numbers by means of a domain name or a phone context identifying the enterprise that owns that private numbering plan.

Table A.1 summarizes the examples of usage of private identifier formats in a NGCN.

**Table A.1**

Case	Identifier	SIP URI	TEL URI
<b>1</b>	<b>Private number</b>		
1a	Using private network functionalities.	Sip: <dialled string>;phone-context=<enterprise number>@example.com;user=dialstring  sip: <private number>;phone-context=<enterprise number>@example.com;user=phone sip: <dialled string>;phone-context=example.com @example.com;user=dialstring sip: <private number>; phone-context=example.com @example.com;user=phone sip:< dialled string or private number>@example.com	tel: <dialled string or private number>; phone-context=<enterprise number> tel: <dialled string or private number>;phone-context=example.com
1b	Using public NGN functionalities.	Sip: <dialled string >;phone-context=<enterprise number>@<operator-domain>;user=dialstring  sip: <private number>;phone-context=<enterprise number>@<operator-domain>;user=phone sip: <dialled string >;phone-context= <a href="#">example.com@&lt;operator-domain&gt;;user=dialstring</a> sip: <private number>;phone-context= <a href="#">example.com@&lt;operator-domain&gt;;user=phone</a>	
Definitions: <dialled string>: the string of digits dialled by the user <private number>: a number of the private numbering plan <enterprise number>: the (international) E.164 number assigned to the NGCN			



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## Annex B (informative): Bibliography

ETSI TS 184 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Identifiers (IDs) for NGN".

ETSI ES 283 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 [3GPP TS 24.229 [Release 7], modified]".

ETSI TR 184 005 (V1.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Types of numbers used in an NGN environment".

ETSI TR 180 000: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Terminology".

ETSI TS 129 165: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Inter-IMS Network to Network Interface (NNI) (3GPP TS 29.165)".

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## History

<b>Document history</b>		
V3.1.1	February 2011	Publication