ETSI TR 102 634 V1.1.1 (2008-11)

Technical Report

Coporate Networks (NGCN)
Next Generation Corporate Networks (NGCN) - Identification and Routing

Reference

DTR/ECMA-00353

Keywords

ID, IP, SIP

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:
http://www.etsi.org

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at
http://portal.etsi.org/tb/status/status.asp

If you find errors in the present document, please send your comment to one of the following services:
http://portal.etsi.org/chaircor/ETSI_support.asp

Contents

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: *"Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards"*, which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (http://webapp.etsi.org/IPR/home.asp).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

This Technical Report (TR) has been produced by ECMA on behalf of its members and those of the European Telecommunications Standards Institute (ETSI).

Introduction

The present document is one of a series of ECMA publications that explore IP-based enterprise communication involving Corporate telecommunication Networks (CNs) (also known as enterprise networks) and in particular Next Generation Corporate Networks (NGCN). The series particularly focuses on inter-domain communication, including communication between parts of the same enterprise, between enterprises and between enterprises and carriers. The present document discusses issues related to user identities and routing and builds upon concepts introduced in ECMA TR/95.

The present document is based upon the practical experience of ECMA member companies and the results of their active and continuous participation in the work of ISO/IEC JTC1, ITU-T, ETSI, IETF and other international and national standardization bodies. It represents a pragmatic and widely based consensus. In particular, ECMA acknowledges valuable input from experts in ETSI TISPAN.

1 Scope

The present document is one of a series of publications that provides an overview of IP-based enterprise communication involving Corporate telecommunication Networks (CNs) (also known as enterprise networks) and in particular Next Generation Corporate Networks (NGCN). The series particularly focuses on session level communication based on the Session Initiation Protocol (SIP) [i.4], with an emphasis on inter-domain communication. This includes communication between parts of the same enterprise (on dedicated infrastructures and/or hosted), between enterprises and between enterprises and public networks. Particular consideration is given to Next Generation Networks (NGN) as public networks and as providers of hosted enterprise capabilities. Key technical issues are investigated, current standardisation work and gaps in this area are identified, and a number of requirements are stated. Among other uses, this series of publications can act as a reference for other standardisation bodies working in this field, including ETSI TISPAN, 3GPP, IETF and ITU-T.

The present document discusses session level user identification and routing. It uses terminology and concepts developed in TR/NGCN-General [i.3]. It identifies a number of requirements impacting NGN standardisation and concerning deployment of enterprise networks.

The scope of the present document is limited to communications with a real-time element, including but not limited to voice, video, real-time text and instant messaging.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;
  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

Not applicable.

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1] ECMA-155: "Private Integrated Services Networks - Addressing".

[i.2] ECMA TR/86: "Corporate Telecommunication Networks - User Identification in a QSIG/SIP Environment".

[i.3] ECMA TR/95: "Next Generation Corporate Networks (NGCN) - General".

[i.4] IETF RFC 3261: "SIP: Session Initiation Protocol".

[i.5] IETF RFC 3263: "Session Initiation Protocol (SIP): Locating SIP Servers".

[i.6] IETF RFC 3323: "A Privacy Mechanism for the Session Initiation Protocol (SIP)".

[i.7] IETF RFC 3325: "Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks".

[i.8] IETF RFC 3327: "Session Initiation Protocol (SIP) Extension Header Field for Registering Non-Adjacent Contacts".

[i.9] IETF RFC 3608: "Session Initiation Protocol (SIP) Extension Header Field for Service Route Discovery During Registration".

[i.10] IETF RFC 3761: "The E.164 to Uniform Resource Identifiers (URI) Dynamic Delegation Discovery System (DDDS) Application (ENUM)".

[i.11] IETF RFC 3966: "The tel URI for Telephone Numbers".

[i.12] IETF RFC 4474: "Enhancements for Identity Management in the Session Initiation Protocol (SIP)".

[i.13] IETF RFC 4916: "Connected Identity in the Session Initiation Protocol (SIP)".

[i.14] IETF RFC 4967:"Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier".

[i.15] IETF RFC 5031:"A Uniform Resource Name (URN) for Emergency and Other Well-Known Services".

[i.16] IETF draft-ietf-sip-gruu-15 "Obtaining and Using Globally Routable User Agent (UA) URIs (GRUU) in the Session Initiation Protocol (SIP)".

NOTE: At the time of publication of the present document, the IETF had approved draft-ietf-sip-gruu-15 as a standards track RFC but had not published the RFC and had not allocated an RFC number. If the draft is no longer available, readers should look for the RFC with the same title.

[i.17] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".

[i.18] ITU-T Recommendation H.350: "Directory services architecture for multimedia conferencing".

3 Definitions

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

3.1 External definitions

The present document uses the following terms defined in ECMA TR/95 [i.3]:

- Domain
- Enterprise network
- Home server
- Next Generation Corporate Network (NGCN)
- Next Generation Network (NGN)
- Private network traffic
- Public network traffic
- Roaming
- Roaming hub
- SIP intermediary

The present document uses the following terms defined in ECMA-155 [i.1]:

- Numbering plan
- Private numbering plan

3.2 Other definitions

3.2.1 Number-based SIP URI

A SIP or SIPS URI that contains a user=phone parameter, denoting the presence of a telephone number in telephone-subscriber format in the user part.

NOTE: The telephone number can be an E.164 number or a private number.

3.2.2 Home number-based SIP URI

A number-based SIP URI for a user in which the domain part identifies the domain that provides home server (registrar and proxy) functionality for that user.

3.2.3 Transient number-based SIP URI

A number-based SIP URI for a user in which the domain part does not identify the domain that provides home server (registrar and proxy) functionality for that user.

NOTE: Transient number-based SIP URIs are aliases for the home number-based SIP URI for the telephone number concerned. Typically they are used during the routing of a SIP request. The domain part might, for example, contain the domain of an NGN that supports the enterprise concerned, rather than the enterprise itself.

3.2.4 Telephone number

A numeric identifier that conforms to the numbering plan of a circuit-switched network.

4 Abbreviations

AoR	Address of Record
B2BUA	Back-to-Back UA
DNS	Domain Name System
GRUU	Globally Routable UA URI
IMS	IP Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Services Digital Network
NAT	Network Address Translation
NGCN	Next Generation Corporate Network
NGN	Next Generation Network
PDA	Personal Digital Assistant
PSTN	Public Switched Telephone Network
SIP	Session Initiation Protocol
UA	User Agent
URI	Universal Resource Identifier
URN	Universal Resource Name

5 Background

General concepts of NGCNs are discussed in [i.3]. In particular, that document describes use of the Session Initiation Protocol (SIP) [i.4] for session level communications within enterprise networks and with other domains. It focuses on enterprise networks based on enterprise infrastructure (NGCN), but also covers hosting on other networks, in particular NGNs, using the same infrastructure that supports public networks.

A major consideration for SIP-based communications is identification of the users involved and routing based on such identifiers. When one user initiates a communications session, that user needs to identify the user with which the session is to be established, and the network needs to establish the session to that user or to a nominated alternative. The second user often needs to receive the identity of the first user (the calling user) for various purposes. Likewise the first user often needs to receive the identity of the user to which the communication session is eventually established, which might not be the user to which establishment was originally requested.

SIP provides various forms of identifiers for users. These have already been discussed in ECMA TR/86 [i.2], primarily for the purpose of interworking with circuit-switched enterprise networks based on the QSIG signalling protocol. However, the topic needs to be examined from the broader perspective of NGCNs and their SIP-based operation with other domains.

6 Identified entities

Identifiers are needed for entities involved in communication within an enterprise network. For the purposes of the present document, the most important identified entity is a user. A user's identifier is used for several purposes, including:

- indicating the user with which a communication is to be established;
- identifying a user already participating in a communication (e.g. the identity of the calling user or the identity of the user who has responded to a communication request);
- charging.

Although in many cases a user identifier, or an Address of Record (AoR), can identify a single human user, often it can indicate something else, e.g.:

- a role or function performed by a single human user (e.g. director of finance), this identifier remaining the same even though the occupant of the role might change;
- a group of human users (e.g. a department or function);
- a service or function performed by an automaton (e.g. voicemail or conferencing service).

A user identifier does not explicitly identify a particular device (e.g. terminal, server). In particular cases there may be a one-to-one relationship between device and user, but in many cases this will not be so:

- a user can have more than one device (e.g. a user with a PC, a fixed phone and a mobile phone or PDA; a service replicated on a number of servers);
- a device can support more than one user (e.g. two or more users sharing a telephone; a server supporting two or more services).

Unless otherwise stated, the term identifier is used in the present document is to mean a user identifier.

Identifiers are also required to identify entities other than users.

One example is for device identification. Device identifiers are generally used for purposes different from those for which user identifiers are used, e.g.:

- to ensure that a follow on communication reaches the same device as a previous communication;
- to identify a device for diagnostic purposes.

Another example is service identification, e.g. emergency services.

Yet another example is session or call identification, e.g. the IP Multimedia Subsystem (IMS) Charging Identifier (ICID).

Some uses of identifiers require the receiver of an identifier to obtain evidence of authenticity, i.e. to authenticate the identifier. Methods of authenticating identifiers are outside the scope of the present document.

7 Types of identifier

7.1 SIP, SIPS and TEL URIs as user identifiers (AoRs)

For session level communications based on SIP, identifiers are in the form of Universal Resource Identifiers (URIs). For most purposes this means SIP (or SIPS) URIs of the form sip:user@example.com, where "example.com" is the domain part and identifies a domain in accordance with the domain name system (DNS) and "user" is the user part and identifies a particular user within that domain. Also parameters can be present. SIP and SIPS URI formats are defined in RFC 3261 [i.4]. For the purposes of the present document, considerations for SIPS URIs (which denote certain security requirements for accessing the resource) are identical to those for SIP URIs, and therefore SIPS URIs are not explicitly mentioned in the remainder of the present document.

When a SIP URI is used as an AoR, in present day deployments the user part is usually in the form of a telephone number, either an E.164 number (in accordance with the E.164 number plan [i.17]) or a private number (in accordance with a private numbering plan [i.1]).

EXAMPLE:

- sip: +4321098765@example.com;user=phone
- sip:1234;phone-context=+411234@example.com;user=phone
- sip:1234;phone-context=switzerland.example.com@example.com;user=phone

The first example is a fully qualified E.164 number. The remaining examples represent private numbers.

In these examples the user part is formatted as what is defined as a telephone-subscriber string in RFC 3966 [i.11] for use in a TEL URI, and is in fact fully qualified (globally unique). This is denoted by the presence of the user=phone parameter. RFC 3261 recommends the inclusion of the user=phone parameter when the user part contains a telephone number in telephone-subscriber format. The present document strongly endorses that recommendation.

REQUIREMENT E1: Enterprises shall include the user=phone parameter in SIP URIs in which the user part is a telephone-subscriber string.

The present document refers to SIP URIs containing the user=phone parameter and a telephone-subscriber string as number-based SIP URIs.

Another example found in practice is:

- sip:1234@example.com;user=phone

In this example the user part is not formatted as a telephone-subscriber string and is not globally unique, but is unique within the context of the domain part. Although perhaps not intended by the authors of RFC 3261, it is found in practice and therefore should be handled if received. This format should not be used, particularly as it may cause problems interworking with NGN (for both private network traffic and public network traffic). This is because within NGN the presence of user=phone is often used as an indication that the user part can be treated as a telephone-subscriber string, which in this case it cannot because of the lack of a phone-context parameter.

REQUIREMENT E2: Enterprises shall avoid using URIs in which the user=phone parameter is present but the user part does not contain a telephone-subscriber string.

Yet another example found in practice is:

- sip:1234@example.com

The user part in this example, whilst it is not marked as being a telephone number, very often is a telephone number. URIs formatted in this way should be treated as email style identifiers, since they rely on the domain part to make them globally unique.

The advantage of a number-based SIP URI is that the number can be used in legacy networks to reach the enterprise user or to identify the enterprise user as a caller. ECMA TR/86 [i.2] discusses this matter extensively for interworking between SIP and QSIG. The same advantage applies when an enterprise network interworks with other networks using SIP (public networks or other enterprise networks) if those networks might in turn interwork with legacy networks. Other forms of user part (referred to here as email style) have limitations when it comes to interworking. However, forms that reflect the name of the user have obvious attractions from a usability perspective.

EXAMPLE:

- sip:john@example.com

Internally an enterprise network can use email-style SIP URIs (i.e. URIs that do not contain a telephone number), but may need to map to telephone number forms for inter-domain use or when interworking with legacy networks.

To be reachable directly from the public telephone network (PSTN/ISDN) a user must be identifiable by an E.164 number. Users not identifiable by an E.164 number are still reachable internally by means of a private number or other form of SIP URI, and can be reached indirectly from the public telephone network (e.g. via an attendant). Such users may also be directly reachable from other SIP networks where the caller is able to enter a SIP URI. In some countries the availability of E.164 numbers is such that it is impracticable or too costly to assign one per user.

Often within an enterprise all SIP URIs identifying users will have the same value in the domain part (i.e. example.com in the examples above). This allows identifiers to be portable within the enterprise (e.g. between different departments or between different geographic locations). Some enterprises will use sub-domains of their top level domain (e.g. domain1.example.com and domain2.example.com) in SIP URIs, or even different top level domains, particularly as a result of a merger or the desire to promote different brand names.