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Information technology — Telecommunications and information exchange between systems — Next Generation Corporate Networks (NGCN) — Identification and routing

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 12861 was prepared by Ecma International (as ECMA TR/96) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Introduction

This Technical Report 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. This particular Technical Report discusses issues related to user identities and routing and builds upon concepts introduced in ISO/IEC TR 12860.

This Technical Report 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 JTC 1, 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.

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Information technology — Telecommunications and information exchange between systems — Next Generation Corporate Networks (NGCN) — Identification and routing

1   Scope

This Technical Report 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) [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.

This particular Technical Report discusses session level user identification and routing. It uses terminology and concepts developed in ISO/IEC TR 12860. It identifies a number of requirements impacting NGN standardisation and concerning deployment of enterprise networks.

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

2   Normative references

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

[1]   ISO/IEC 11571:1998, *Information technology — Telecommunications and information exchange between systems — Private Integrated Services Networks — Addressing*

[2]   ECMA TR/86, *Corporate Telecommunication Networks — User Identification in a SIP/QSIG Environment*

[3]   ISO/IEC TR 12860:2009, *Information technology — Telecommunications and information exchange between systems — Next Generation Corporate Networks (NGCN) — General*

[4]   IETF RFC 3261, *SIP: Session Initiation Protocol*

[5]   IETF RFC 3263, *Session Initiation Protocol (SIP): Locating SIP Servers*

[6]   IETF RFC 3323, *A Privacy Mechanism for the Session Initiation Protocol (SIP)*

[7]   IETF RFC 3325, *Private Extensions to the Session Initiation Protocol (SIP) for Asserted Identity within Trusted Networks*

[8] IETF RFC 3327, *Session Initiation Protocol (SIP) Extension Header Field for Registering Non-Adjacent Contacts*

[9] IETF RFC 3608, *Session Initiation Protocol (SIP) Extension Header Field for Service Route Discovery During Registration*

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

[11] IETF RFC 3966, *The tel URI for Telephone Numbers*

[12] IETF RFC 4474, *Enhancements for Authenticated Identity Management in the Session Initiation Protocol (SIP)*

[13] IETF RFC 4916, *Connected Identity in the Session Initiation Protocol (SIP)*

[14] IETF RFC 4967, *Dial String Parameter for the Session Initiation Protocol Uniform Resource Identifier*

[15] IETF RFC 5031, *A Uniform Resource Name (URN) for Emergency and Other Well-Known Services*

[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 this Technical Report, 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.

[17] ITU-T Rec. E.164, *The international public telecommunication numbering plan*

[18] ITU-T Rec. H.350, *Directory services architecture for multimedia conferencing*

3   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1   External definitions

This Technical Report uses the following terms defined in ISO/IEC TR 12860:

- 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

This Technical Report uses the following terms defined in ISO/IEC 11571 [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   Abbreviated terms

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
NGCN	Next Generation Corporate Network
NGN	Next Generation Network
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 [3]. In particular, that document describes use of the Session Initiation Protocol (SIP) [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 [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.

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6 Identified entities

ISO/IEC TR 12861:2009

Identifiers are needed for entities involved in communication within an enterprise network. For the purposes of this Technical Report, 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 this Technical Report 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 this Technical Report.

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 [4]. For the purposes of this 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 this 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 [17]) or a private number (in accordance with a private numbering plan [1]), e.g.:

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 [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. This Technical Report 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.

This Technical Report refers to SIP URIs containing the user=phone parameter and a telephone-subscriber string as number-based SIP URIs.