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

Technologies de l'information — Téléinformatique — Réseaux d'entreprise de prochaine génération (NGCN) — Appels d'urgence

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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 16167 was prepared by Ecma International (as ECMA TR/101) 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.

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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 emergency calls from an enterprise user to a public or enterprise emergency response centre. It builds upon concepts introduced in ISO/IEC TR 12860.

Various regional and national bodies address emergency communications, mainly with an emphasis on public telecommunications. In particular, in the United States work is carried out by the National Emergency Number Association (NENA). In Europe, ETSI EMTEL (Special Committee on Emergency Communications) plays a coordinating role, liaising with external bodies (e.g., in the European Commission, CEPT, CEN and CENELEC) as well as overseeing work done by other ETSI Technical Bodies (e.g., TISPAN). This Technical Report focuses on emergency calls as they impact enterprise networks, and therefore is intended to complement the work of those other bodies.

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 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.

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

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) [6], 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.

This particular Technical Report discusses issues related to emergency calls from an enterprise user to a public or enterprise emergency response centre (ERC) using SIP within the NGCN. It uses terminology and concepts developed in ISO/IEC TR 12860 [1]. It identifies a number of requirements impacting NGN standardisation and concerning deployment of enterprise networks.

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The scope of this Technical Report is limited to calls from an enterprise user to an authority, where the authority is represented by a public or a private ERC. This includes the special case where a private ERC acts as an enterprise user in making an emergency call to a public ERC. Authority to authority calls, authority to enterprise user calls and enterprise user to enterprise user calls within the context of an emergency are out of scope.

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This Technical Report focuses on emergency calls within a SIP-based NGCN using geographic location information to indicate the whereabouts of the caller. Emergency calls can originate from devices connected to the NGCN via various access technologies, e.g., SIP over fixed or wireless LAN (Local Area Network), TDM (Time Division Multiplex) networks, DECT (Digital Enhanced Cordless Telephone) networks, PMR (Private Mobile Radio) networks, PLMN (Public Land Mobile Network) etc.. ERCs are assumed to be reachable either directly using SIP or via a gateway to some legacy technology (e.g., TDM). Furthermore, ERCs are assumed to be reachable either directly from the NGCN or via a public network accessed from the NGCN using SIP. In the latter case, the NGCN might identify the ERC and instruct the public network to route to the ERC, or alternatively the NGCN might leave the public network to identify the ERC, based on the location of the caller. In all cases the NGCN is assumed to deliver the location of the caller to the ERC, gateway or public network in order to provide appropriate information to the call taker at the ERC.

The handling of incoming emergency calls at an ERC, even when the ERC is provided within an NGCN, is outside the scope of this Technical Report. This includes the case where a public ERC is provided within an NGCN and hence the NGCN can receive emergency calls from public networks. This also includes the case where a private ERC is provided within an NGCN and can receive emergency calls from other enterprise networks.

Different territories have different regulations impacting emergency calls, together with national or regional standards in support of these regulations. This Technical Report takes a general approach, which should be largely applicable to any territory. However, detailed differences might apply in some territories, e.g., country- or region-specific dial strings such as 911 and 112 used to identify emergency calls to a public ERC.

The scope of this Technical Report is limited to emergency communications with a real-time element, including but not limited to voice, video, real-time text and instant messaging. The focus, however, is on voice, which in the majority of situations is likely to be the most effective medium for emergency calls. However, it is

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recognised that some users with special needs will require other modes of communication (e.g., real-time text, fax), as discussed in Annex B of [30]. The focus is also on calls in which the caller is a human user. There may also be applications where automatic sensors can make similar emergency calls (subject to regulation), but the special needs of such applications are not considered.

2 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 TR 12860, Information technology — Telecommunications and information exchange between systems — Next Generation Corporate Networks (NGCN) — General

[2] ISO/IEC TR 16166, Information technology — Telecommunications and information exchange between systems — Next Generation Corporate Networks (NGCN) — Security of session-based communications

[3] ISO/IEC 18051, Information technology — Telecommunications and information exchange between systems — Services for Computer Supported Telecommunications Applications (CSTA) Phase III

[4] ANSI/TIA-1057, Link Layer Discovery Protocol - Media Endpoint Discovery

[5] IEEE 802.1ab, Station and Media Access Control Connectivity Discovery

[6] IETF RFC 3261, SIP: Session Initiation Protocol

[7] IETF RFC 3265, Session Initiation Protocol (SIP) - Specific Event Notification

[8] IETF RFC 3825, Dynamic Host Configuration Protocol Option for Coordinate-based Location Configuration Information

[9] IETF RFC 3856, A Presence Event Package for the Session Initiation Protocol (SIP)

[10] IETF RFC 3859, Common Profile for Presence (CPP)

[11] IETF RFC 3863, Presence Information Data Format (PIDF)

[12] IETF RFC 4119, A Presence-based GEOPRIV Location Object Format

[13] IETF RFC 4412, Communications Resource Priority for the Session Initiation Protocol (SIP)

[14] IETF RFC 4776, Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information

[15] IETF RFC 5012, Requirements for Emergency Context Resolution with Internet Technologies

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

[17] IETF RFC 5139, Revised Civic Location Format for Presence Information Data Format Location Object (PIDF-LO)

[18] IETF RFC 5222, LoST: A Location-to-Service Translation Protocol

[19] IETF RFC 5223, Discovering Location-to-Service Translation (LoST) Servers Using the Dynamic Host Configuration Protocol (DHCP)

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[20] IETF RFC 5491, GEOPRIV Presence Information Data Format Location Object (PIDF-LO) Usage Clarification, Considerations, and Recommendations

[21] IETF RFC 5627, Obtaining and Using Globally Routable User Agent URIs (GRUU) in the Session Initiation Protocol (SIP)

[22] IETF draft-ietf-ecrit-framework-10, Framework for Emergency Calling using Internet Multimedia

NOTE At the time of publication of this Technical Report, the IETF had not completed the approval process for this draft and had not allocated an RFC number. If the draft (or a later version) is no longer available, readers should look for the RFC with the same title.

[23] IETF draft-ietf-ecrit-phonebcp-14, Best Current Practice for Communications Services in support of Emergency Calling

NOTE At the time of publication of this Technical Report, the IETF had not completed the approval process for this draft and had not allocated an RFC number. If the draft (or a later version) is no longer available, readers should look for the RFC with the same title.

[24] IETF draft-ietf-geopriv-http-location-delivery-16, HTTP Enabled Location Delivery (HELD)

NOTE At the time of publication of this Technical Report, the IETF had approved this draft 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.

[25] IETF draft-ietf-geopriv-lis-discovery-15, Discovering the Local Location Information Server (LIS)

NOTE At the time of publication of this Technical Report, the IETF had not completed the approval process for this draft and had not allocated an RFC number. If the draft (or a later version) is no longer available, readers should look for the RFC with the same title.

[26] IETF draft-ietf-sipcore-location-conveyance-02, Location Conveyance for the Session Initiation Protocol

NOTE At the time of publication of this Technical Report, the IETF had not completed the approval process for this draft and had not allocated an RFC number. If the draft (or a later version) is no longer available, readers should look for the RFC with the same title.

[27] NENA 08-001, National Emergency Number Association (NENA) Architecture for Enhanced 9-1-1 Services (i2)

[28] 3GPP TS 22.101, 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Service Aspects; Service Principles

[29] 3GPP TS 23.167, 3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; IP Multimedia Subsystem (IMS) emergency sessions

[30] ETSI TR 102 180, Basis of requirements for communication of individuals with authorities/organizations in case of distress (Emergency call handling)

[31] ETSI TS 102 424, Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority

[32] ETSI TS 102 650, Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Analysis of Location Information Standards produced by various SDOs

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[33] ETSI TS 102 660, Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Signalling Requirements and Signalling Architecture for supporting the various location information protocols for Emergency Service on a NGN

[34] ITU-T Recommendation Y.2205, Next Generation Networks - Emergency Telecommunications - Technical considerations

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 [1]:

- Domain
- Enterprise network
- Next Generation Corporate Network (NGCN)
- Next Generation Network (NGN)
- Private network traffic
- SIP intermediary

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3.2 Other definitions

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3.2.1
Authority
organisation mandated to receive and respond to reports from individuals of emergency situations involving danger to person or property

3.2.2
Emergency call
call from an enterprise user to a private authority or public authority for the purpose of reporting an emergency situation involving danger to person or property

3.2.3
Emergency response centre (ERC)
answering point established by an authority for the purpose of accepting and responding to emergency calls

3.2.4
Location (geographic location)
geographic position of an entity, in the form of either geospatial coordinates or a civic address

NOTE A civic address can extend to internal landmarks within a site, e.g., building number floor number, room number.

3.2.5
Location information
location or information from which a location can be derived

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3.2.6
Private authority
authority mandated by one or more enterprises to receive and respond to reports of emergency situations from enterprise users

3.2.7
Private ERC
ERC established by a private authority for accepting and responding to emergency calls from users of one or more enterprise networks

3.2.8
Public authority
authority mandated to receive and respond to reports of emergency situations from the general public (including enterprises)

3.2.9
Public ERC
ERC established by a public authority for accepting and responding to emergency calls from the general public (including enterprises)

3.2.10
Public safety answering point (PSAP)
public ERC

NOTE The term PSAP is defined by the IETF in RFC 5012 [15]. The definition above is used in this Technical Report to stress the difference between a PSAP and a private ERC.

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3.2.11
Return call
call from an ERC to a caller or device that recently made an emergency call

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3.2.12
Verification call
call from an ERC to a person or device that can assist in verifying conditions reported during a recent emergency call

NOTE Verification calls are frequently used when emergency calls have been made by sensor devices. For example, a verification call could be to another device in the vicinity, such as a camera.

4 Abbreviations

A-GPS	Assisted GPS
AOR	Address Of Record
ALI	Automatic Location Identification
CSTA	Computer Supported Telecommunications Applications
DHCP	Dynamic Host Configuration Protocol
DoS	Denial of Service
ECRIT	Emergency Context Resolution with Internet Technologies
ELIN	Emergency Location Identification Number
ERC	Emergency Response Centre
GPS	Global Positioning System
HELD	HTTP Enabled Location Discovery
HTTP	Hyper-Text Transfer Protocol

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IMS	IP Multimedia Subsystem
IP	Internet Protocol
LAN	Local Area Network
LbyR	Location by Reference
LbyV	Location by Value
LCP	Location Configuration Protocol
LIS	Location Information Service
LLDP	Link Layer Discovery Protocol
LLDP-MED	LLDP Media Endpoint Discovery
LoST	Location-to-Service Translation
NAT	Network Address Translator
NGCN	Next Generation Corporate Network
NGN	Next Generation Network
PAI	P-Asserted-Identity
PIDF	Presence Information Data Format
PIDF-LO	PIDF Location Object
PLMN	Public Land Mobile Network
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
SIM	Subscriber Identity Module
SIP	Session Initiation Protocol
TDM	Time Division Multiplex
TLS	Transport Layer Security
UA	User Agent
UAC	User Agent Client
UAS	User Agent Server
URI	Universal Resource Identifier
URN	Universal Resource Name
VoIP	Voice over IP
VPN	Virtual Private Network
WLAN	Wireless LAN

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5 Background

General concepts of NGCNs are discussed in ISO/IEC TR 12860 [1]. In particular, that document describes use of the Session Initiation Protocol (SIP) [6] 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.

One important use of session level communications is for making an emergency call from an enterprise user to an authority for the purpose of reporting an emergency situation involving danger to person or property. The authority responds typically by dispatching appropriate resources to deal with the situation, perhaps first

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having taken steps to verify the situation. The authority concerned can be a private authority, dealing with emergency situations involving enterprise personnel or property, or can be a public authority, perhaps established by local or national government and having jurisdiction throughout a fixed geographic area or entire country. A private authority will be concerned only with emergencies arising on premises of the enterprise(s) concerned and perhaps off-premises emergencies involving enterprise personnel or property (e.g., company vehicles). Hence a private authority only handles calls from users of one or more enterprises. On the other hand, public authorities will be concerned with emergencies arising anywhere within the geographic area concerned and will handle emergency calls from the general public, including from enterprises when the emergency is not to be handled by an enterprise authority.

An authority responsible for emergency calls will establish an emergency response centre (ERC) for accepting and responding to emergency calls. A private authority will establish a private ERC accessible from the enterprise network(s) concerned, whereas a public authority will establish a public safety answering point (PSAP) reachable from public networks. Emergency calls from enterprise users to ERCs are analogous to citizen to authority calls in public telecommunications. When the ERC is a PSAP, an emergency call from an enterprise user is indeed a citizen to authority call.

Figure 1 shows an example of an emergency call from an enterprise user to a PSAP.

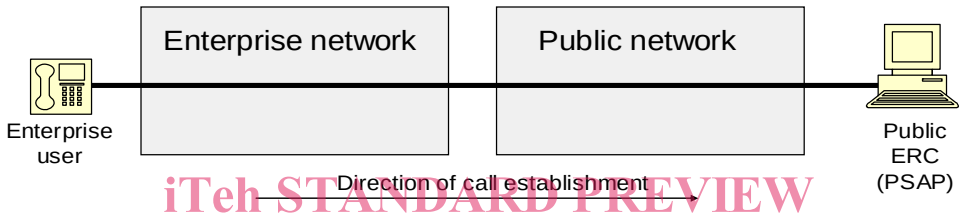

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Figure 1 — Example of an emergency call from an enterprise user to a PSAP

Figure 2 shows an example of an emergency call from an enterprise user to a private ERC accessible from the enterprise network.

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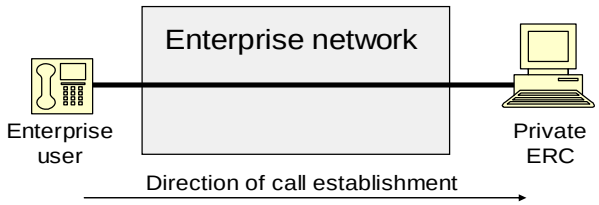

Figure 2 — Example of an emergency call from an enterprise user to a private ERC

A private ERC will typically cover only one or a limited number of sites, and is unlikely to cover sites in different countries. Thus a large enterprise might have several private ERCs. Not all enterprises will operate their own ERCs, and those that do might operate ERCs only for large or specialised campuses, and not for smaller sites. For example, a chemical factory or airport might operate its own private ERC, which might be better equipped than a PSAP for dispatching specialist units for dealing with the most likely emergencies. Also a very large but non-specialised campus might operate its own private ERC, which might be better equipped in terms of local knowledge, local evacuation procedures or local medical or fire-fighting equipment that can reach the scene of the emergency more quickly. Similarly a hotel might have local procedures and limited equipment for fire fighting, for example. A private ERC might not handle all types of emergency, some being deferred by the ERC to a PSAP. An enterprise user might even be allowed to select between calling the private ERC or calling a PSAP. Smaller enterprises, and smaller outposts of large enterprises (e.g., local sales offices) are far less likely to operate their own ERCs.

Furthermore, a single private authority might be responsible for receiving and responding to emergency calls from a number of enterprises. One example is a business park or office block occupied by a number of enterprises and providing a common private ERC. Another example is a hosting organisation that provides communications infrastructure for a number of tenants, together with a common private ERC. Logically, each

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