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SERIES Y: GLOBAL INFORMATION INFRA-
STRUCTURE, INTERNET PROTOCOL ASPECTS AND
NEXT-GENERATION NETWORKS

Next Generation Networks – Service aspects: Service
capabilities and service architecture

Next Generation Networks – Emergency telecommunications – Technical considerations

Recommendation ITU-T Y.2205

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Recommendation ITU-T Y.2205

Next Generation Networks – Emergency telecommunications – Technical considerations

Summary

Recommendation ITU-T Y.2205 specifies technical considerations that can optionally be applied within the next generation network (NGN) to enable emergency telecommunications (ET). In addition, this Recommendation also outlines the underlying technical principles involved in supporting ET.

History

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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Introduction

[ITU-T Y.1271] provides the network requirements and capabilities for emergency telecommunications (ET). The realization of priority telecommunications based upon those requirements, as exemplified by authorities coordinating disaster relief using public networks, may result in the creation of new mechanisms and interworking reuse of existing mechanisms. Emergency telecommunications should be given preferential treatment over regular public network services. The term preferential telecommunications is used in some ITU-T Recommendations to include services that require priority treatment. Emergency telecommunications service is one category of services that is considered to have preferential treatment. The two terms, preferential telecommunications and emergency telecommunications are used interchangeably.

Prioritized telecommunications used in emergency situations are not new; circuit-switched networks have supported such systems for years, primarily for voice calls (e.g., [ITU-T E.106]). However, the technical methods used to support these underlying requirements for emergency telecommunications in the NGN environment are evolving. Traditional circuit-switched priority methods do not necessarily apply in NGN due to inherent differences in circuit-switched versus packet-switched telecommunication.

[ITU-T Y.1271] outlines the requirements and capabilities in general and abstract terms. [ITU-T Y.1271] is technology neutral.

Since NGN is based on packet-switched technology, which is fundamentally different from circuit-switched technology, there is a need to consider the technical issues and potential solutions that could be used to effect the realization of emergency telecommunications capabilities in NGN.

This Recommendation specifies technical considerations that may be applied within NGN to enable emergency telecommunications and the underlying principles involved.

Recommendation ITU-T Y.2205

Next Generation Networks – Emergency telecommunications – Technical considerations

1 Scope

This Recommendation specifies technical considerations that can optionally be applied within the next generation network (NGN) to enable emergency telecommunications (ET). In addition, this Recommendation also outlines the underlying technical principles involved in supporting ET. It specifies requirements and capabilities for ET beyond the ones specified in [ITU-T Y.2201] in the context of NGN (as defined in [ITU-T Y.2001] and further outlined in [ITU-T Y.2011]).

Emergency telecommunications (including support of some aspects of early warning (see Figure 1)) include:

- individual-to-authority emergency telecommunications, e.g., calls to emergency service providers;
- authority-to-authority emergency telecommunications;
- authority-to-individual emergency telecommunications, e.g., community notification services.

Appendix I provides additional information for the above listed ET categories.

Some requirements and capabilities for early warning are also specified. Individual-to-authority emergency telecommunications capabilities are not addressed and are outside the scope of this Recommendation.

Some of the technical means described herein could also be used for individual-to-authority or individual-to-individual emergency telecommunications; however, these categories are not addressed in this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

2.1 ITU-T

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|-----------------|--|
| [ITU-T E.106] | Recommendation ITU-T E.106 (2003), <i>International Emergency Preference Scheme (IEPS) for disaster relief operations</i> . |
| [ITU-T E.107] | Recommendation ITU-T E.107 (2007), <i>Emergency Telecommunications Service (ETS) and interconnection framework for national implementations of ETS</i> . |
| [ITU-T G.808.1] | Recommendation ITU-T G.808.1 (2010), <i>Generic protection switching – Linear trail and subnetwork protection</i> . |
| [ITU-T G.841] | Recommendation ITU-T G.841 (1998), <i>Types and characteristics of SDH network protection architectures</i> . |

- [ITU-T G.842] Recommendation ITU-T G.842 (1997), *Interworking of SDH network protection architectures.*
- [ITU-T G.873.1] Recommendation ITU-T G.873.1 (2006), *Optical Transport Network (OTN): Linear protection.*
- [ITU-T G.983.1] Recommendation ITU-T G.983.1 (2005), *Broadband optical access systems based on Passive Optical Networks (PON).*
- [ITU-T G.8031] Recommendation ITU-T G.8031/Y.1342 (2009), *Ethernet linear protection switching.*
- [ITU-T G.8032] Recommendation ITU-T G.8032/Y.1344 (2010), *Ethernet ring protection switching.*
- [ITU-T G.8131] Recommendation ITU-T G.8131/Y.1382 (2007), *Linear protection switching for transport MPLS (MPLS-TP) networks.*
- [ITU-T H.248.1] Recommendation ITU-T H.248.1 (2005), *Gateway control protocol: Version 3.*
- [ITU-T H.248.81] Recommendation ITU-T H.248.81 (2011), *Gateway control protocol: Guidelines on the use of the international emergency preference scheme (IEPS) call indicator and priority indicator in ITU-T H.248 profiles.*
- [ITU-T H.323] Recommendation ITU-T H.323 (2009), *Packet-based multimedia communications systems.*
- [ITU-T H.460.4] Recommendation ITU-T H.460.4 (2007), *Call priority designation and country/international network of call origination identification for H.323 priority calls.*
- [ITU-T I.630] Recommendation ITU-T I.630 (1999), *ATM protection switching.*
- [ITU-T J.260] Recommendation ITU-T J.260 (2005), *Requirements for preferential telecommunications over IP-Cablecom networks.*
- [ITU-T J.261] Recommendation ITU-T J.261 (2009), *Framework for implementing preferential telecommunications in IP-Cablecom and IP-Cablecom2 networks.*
- [ITU-T J.262] Recommendation ITU-T J.262 (2009), *Specifications for authentication in preferential telecommunications over IP-Cablecom2 networks.*
- [ITU-T J.263] Recommendation ITU-T J.263 (2009), *Specification for priority in preferential telecommunications over IP-Cablecom2 networks.*
- [ITU-T Q.812] Recommendation ITU-T Q.812 (2004), *Upper layer protocol profiles for the Q and X interfaces.*
- [ITU-T Q.1741.6] Recommendation ITU-T Q.1741.6 (2009), *IMT-2000 references to Release 8 of GSM-evolved UMTS core network.*
- [ITU-T Q.3303.3] Recommendation ITU-T Q.3303.3 (2008), *Resource control protocol No. 3 – Protocols at the Rw interface between a policy decision physical entity (PD-PE) and a policy enforcement physical entity (PE-PE): Diameter.*
- [ITU-T Q.3321.1] Recommendation ITU-T Q.3321.1 (2010), *Resource control protocol No. 1, version 2 – Protocol at the Rs interface between service control entities and the policy decision physical entity.*
- [ITU-T Q-Sup.57] ITU-T Q-series Recommendations – Supplement 57 (2008), *Signalling requirements to support the emergency telecommunications service (ETS) in IP networks.*

- [ITU-T X.660] Recommendation ITU-T X.660 (2008) | ISO/IEC 9834-1:2008, *Information technology – Open Systems Interconnection – Procedures for the operation of OSI Registration Authorities: General procedures and top arcs of the International Object Identifier tree.*
- [ITU-T X.674] Recommendation ITU-T X.674 (2011), *Procedures for the registration of arcs under the Alerting object identifier arc.*
- [ITU-T X.1303] Recommendation ITU-T X.1303 (2007), *Common alerting protocol (CAP 1.1).*
- [ITU-T Y.110] Recommendation ITU-T Y.110 (1998), *Global Information Infrastructure principles and framework architecture.*
- [ITU-T Y.1271] Recommendation ITU-T Y.1271 (2004), *Framework(s) on network requirements and capabilities to support emergency telecommunications over evolving circuit-switched and packet-switched networks.*
- [ITU-T Y.1541] Recommendation ITU-T Y.1541 (2006), *Network performance objectives for IP-based services.*
- [ITU-T Y.1720] Recommendation ITU-T Y.1720 (2006), *Protection switching for MPLS networks.*
- [ITU-T Y.2001] Recommendation ITU-T Y.2001 (2004), *General overview of NGN.*
- [ITU-T Y.2011] Recommendation ITU-T Y.2011 (2004), *General principles and general reference model for Next Generation Networks.*
- [ITU-T Y.2012] Recommendation ITU-T Y.2012 (2010), *Functional requirements and architecture of next generation networks.*
- [ITU-T Y.2111] Recommendation ITU-T Y.2111 (2008), *Resource and admission control functions in next generation networks.*
- [ITU-T Y.2171] Recommendation ITU-T Y.2171 (2006), *Admission control priority levels in Next Generation Networks.*
- [ITU-T Y.2172] Recommendation ITU-T Y.2172 (2007), *Service restoration priority levels in Next Generation Networks.*
- [ITU-T Y.2201] Recommendation ITU-T Y.2201 (2009), *Requirements and capabilities for ITU-T NGN.*
- [ITU-T Y.2701] Recommendation ITU-T Y.2701 (2007), *Security requirements for NGN release 1.*
- [ITU-T Y.2702] Recommendation ITU-T Y.2702 (2008), *Authentication and authorization requirements for NGN release 1.*
- [ITU-T Y.2704] Recommendation ITU-T Y.2704 (2010), *Security mechanisms and procedures for NGN.*
- [ITU-T Y.2720] Recommendation ITU-T Y.2720 (2009), *NGN identity management framework.*
- [ITU-T Y.2721] Recommendation ITU-T Y.2721 (2010), *NGN identity management requirements and use cases.*
- [ITU-T Y.2722] Recommendation ITU-T Y.2722 (2011), *NGN identity management mechanisms.*

2.2 IETF

- [IETF RFC 2205] IETF RFC 2205 (1997), *Resource ReSerVation Protocol (RSVP) – Version 1 Functional Specification*.
- [IETF RFC 3168] IETF RFC 3168 (2001), *The Addition of Explicit Congestion Notification (ECN) to IP*.
- [IETF RFC 3246] IETF RFC 3246 (2002), *An Expedited Forwarding PHB (Per-Hop Behavior)*.
- [IETF RFC 3261] IETF RFC 3261 (2002), *SIP: Session Initiation Protocol*.
- [IETF RFC 3312] IETF RFC 3312 (2002), *Integration of Resource Management and Session Initiation Protocol (SIP)*.
- [IETF RFC 3588] IETF RFC 3588 (2003), *Diameter Base Protocol*.
- [IETF RFC 4340] IETF RFC 4340 (2006), *Datagram Congestion Control Protocol (DCCP)*.
- [IETF RFC 4412] IETF RFC 4412 (2006), *Communications Resource Priority for the Session Initiation Protocol (SIP)*.
- [IETF RFC 4542] IETF RFC 4542 (2006), *Implementing an Emergency Telecommunications Service (ETS) for Real-Time Services in the Internet Protocol Suite*.
- [IETF RFC 4594] IETF RFC 4594 (2006), *Configuration Guidelines for DiffServ Service Classes*.
- [IETF RFC 5865] IETF RFC 5865 (2010), *A Differentiated Services Code Point (DSCP) for Capacity-Admitted Traffic*.

2.3 ETSI

- [ETSI TS 183 017] ETSI TS 183 017 V3.2.1 (2010), *TISPAN Resource and Admission Control: DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol specification*.

2.4 Broadband Forum

- [BBF TR-058] Broadband Forum TR-058 (2003), *Multi-Service Architecture and Framework Requirements*.
- [BBF TR-059] Broadband Forum TR-059 (2003), *DSL Evolution – Architecture Requirements for the Support of QoS-Enabled IP Services*.
- [BBF TR-101] Broadband Forum TR-101 (2011), *Migration to Ethernet-Based DSL Aggregation*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 alert [ITU-T X.674]: A warning or alarm message concerning an impending danger or problem.

3.1.2 alerting agency [ITU-T X.674]: A national, regional or international entity responsible for the management of alerts.

3.1.3 emergency telecommunications service (ETS) [ITU-T E.107]: A national service providing priority telecommunications to the ETS authorized users in times of disaster and emergencies.

3.1.4 next generation network (NGN) [ITU-T Y.2001]: A packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 emergency telecommunications (ET): ET means any emergency related service that requires special handling from the NGN relative to other services. This includes government authorized emergency services and public safety services.

3.2.2 preferential telecommunications: A category of services for which premium access to, and/or use of telecommunications network resources is provided.

3.2.3 telecommunications for disaster relief (TDR): TDR is an international and national telecommunications capability for purposes of disaster relief. It can make use of international permanent, shared network facilities already in place and operational, temporary network facilities that are provisioned specifically for TDR, or a suitable combination of the two.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

AAA	Authentication, Authorization, and Accounting
AF	Application Function
ANMS	Access Node Management System
APS	Automatic Protection Switching
AQM	Active Queue Management
ASN	Access Service Network
ASN.1	Abstract Syntax Notation One
BNG	Broadband Network Gateway
BS	Base Station
CAC	Call Admission Control
CAP	Common Alerting Protocol
CPE	Customer Premises Equipment
DCCP	Data Congestion Control Protocol
DoS	Denial of Service
DSCP	Diff-Serv Code Points
DSLAM	Digital Subscriber Line Access Multiplexer
EAS	Emergency Alert System
ECN	Explicit Congestion Notification



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EF	Expedited Forwarding
E-MTA	Embedded Multi-Terminal Adapter
ENI	ETS National Implementation
ET	Emergency Telecommunications
ETH	Ethernet Layer Network
ETS	Emergency Telecommunications Service
EW	Early Warning
GETS	Government Emergency Telecommunications Service
IEPS	International Emergency Preference Scheme
IP	Internet Protocol
ISDN	Integrated Services Digital Network
LAN	Local Area Network
LSP	Label Switched Path
MDF	Main Distribution Frame
MMPS	Multimedia Priority Service
MPS	Multimedia Priority Service
MPLS	MultiProtocol Label Switching
MS	Multiplex Section
NID	Network Interface Device
NOAA	National Oceanic and Atmospheric Administration
NGN	Next Generation Network
ODUk	Optical channel Data Unit k
OLT	Optical Line Termination
OMCI	ONT Management and Control Interface
ONT	Optical Network Termination
OTN	Optical Transport Network
P-CSC-FE	Proxy Call Session Control Functional Entity
PCC	Policy and Charging Control
PDP	Policy Decision Point
PEP	Policy Enforcement Point
PF	Policy Function
PHB	Per Hop Behaviour
PIN	Personal Identification Number
PLMN	Public Land Mobile Network
PON	Passive Optical Network
POTS	Plain Old Telephone Service
PSAP	Public Safety Answering Point

PSTN	Public Switched Telephone Network
RACF	Resource and Admission Control Function
RPH	Resource Priority Header
RSVP	Resource ReSerVation Protocol
QoS	Quality of Service
SAME	Specific Area Message Encoding
SCF	Service Control Function
SDH	Synchronous Digital Hierarchy
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SNC	SubNetwork Connection
SNCP	SubNetwork Connection Protection
SS7	Signalling System No.7
TCP	Transmission Control Protocol
TDM	Time Division Multiplexing
TDR	Telecommunications for Disaster Relief
T-MPLS	Transport MPLS
UDP	User Datagram Protocol
UE	User Equipment
UN/ISDR	United Nations International Strategy for Disaster Reduction
USI	Universal Services Interface
VC	Virtual Channel
VLAN	Virtual LAN
VoIP	Voice over IP
VP	Virtual Path
W-CDMA	Wideband Code Division Multiple Access
WPS	Wireless Priority Service
xDSL	Any variant of Digital Subscriber Line
XML	eXtensible Markup Language
XSD	XML Schema Definition

5 Emergency telecommunications (ET) and early warning description

5.1 General

The following terms are used in this Recommendation:

- emergency telecommunications ET
- emergency telecommunications service ETS

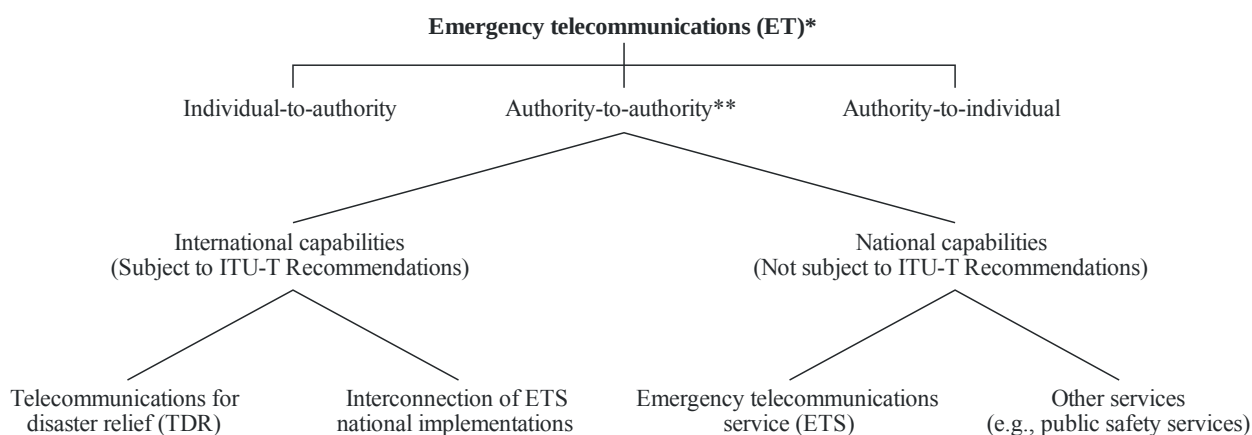
- telecommunications for disaster relief TDR
- early warning EW

It is essential that the different uses of these terms are agreed and understood. To that end, the following terms are used in the following manner:

- ET: The umbrella term for any emergency-related service that requires special handling from the NGN relative to other services.
- ETS: The term is used as defined in [ITU-T E.107].
- TDR: The generic term for a telecommunications capability used for the purposes of disaster relief.
- EW: The generic term for all types of early warning systems, capabilities and services.

This arrangement forms a tree with ET at the root for all activities. The use of terms and their inter-relationships is shown in Figure 1 below.

As noted in the introduction, some ITU-T Recommendations, specifically the ITU-T J.26x-series uses the term preferential telecommunications to include services that require special handling relative to other services. Except in the context of J.26x-series of ITU-T Recommendations, the term preferential telecommunications is not referenced in this Recommendation. The term preferential telecommunications in ITU-T J.26x-series of Recommendations includes ETS, TDR and EW.



* Including some aspects of early warning

** May also apply to authority-to-individual telecommunications

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Figure 1 – Terminological relationship framework for emergency telecommunications

5.2 Emergency telecommunications

Emergency telecommunications (ET) means any emergency-related service that requires special handling from the NGN relative to other services. This includes government authorized emergency services and public safety services. The following are specific example services under the umbrella of emergency telecommunications:

1) Telecommunications for disaster relief (TDR)

TDR is an international and national telecommunications capability for the purpose of disaster relief. It can make use of international permanent, shared network facilities already in place and operational, temporary network facilities that are provisioned specifically for TDR, or a suitable combination of the two.