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**Specification for Priority in Preferential
Telecommunications over IPCom2 Networks**

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Summary

NOTE: This document is identical to SCTE 173-4 2010 except for informative components which may have been updated such as the title page, NOTICE text, headers and footers. No normative changes have been made to this document.

This standard is one of a series of Standards to enable support for preferential telecommunication services over IP-Cablecom2 networks. It defines the specifications for priority for preferential telecommunication services over IP-Cablecom2 networks. These specifications satisfy the requirements defined in SCTE 173-1 2010. The essential aspects of preferential telecommunications over IP-Cablecom2 can be grouped into two areas: prioritization and authentication. This Standard provides specifications for prioritization only. Prioritization may be utilized for premium services and for emergency services in IP-Cablecom2 that may require preferential treatment (e.g., telecommunications for disaster relief and the emergency telecommunications service).

The implementation of priority and authentication is necessary for the support of preferential telecommunications services in IP-Cablecom networks. This Standard only covers technical aspects for achieving prioritized treatment in IP-Cablecom2 networks.

Introduction

Emergency and disaster communications for authorized users plays a vital role in the health, safety, and welfare of people in all countries. The common thread to facilitate emergency/disaster operations is the utility of assured capabilities for user-friendly preferential telecommunication services that may be realized by technical solutions and/or administrative policy. The IP-Cablecom2 infrastructure offers an important resource for assured emergency/disaster telecommunications.

Emergency and disaster situations can impact telecommunication infrastructures. Typical impacts may include congestion overload and the need to re-deploy or extend communications capabilities beyond that covered by existing infrastructures. Even when telecommunications infrastructures are not damaged by these situations, demand for telecommunication resources soar during such events. Therefore, priority mechanisms are needed so that limited bandwidth resources can be allocated to authorized emergency workers during emergency and disaster situations.

Generally, when prioritized or preferential treatment of telecommunication capabilities are offered, users of the associated service or services will be authenticated and authorized. Whether authentication and authorization are required or not is a national decision. However, without authentication and authorization, preferential treatment capabilities may be subject to abuse by non-authorized individuals.

This Standard provides specifications stemming from the requirements of SCTE 173-1 2010 for mechanisms to provide priority in IP-Cablecom2 networks in support of preferential/prioritized treatment to services that need or benefit from such treatment.

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Specification for priority in preferential telecommunications over IP_Cablecom2 networks

1 Scope

This Standard is one of a series of Standards to enable support for preferential telecommunication services over IP_Cablecom networks. These specifications do not apply to ordinary emergency calls such as people calling the police, the fire department, ambulances, etc.

Aspects of preferential telecommunications include provisions for authentication and priority (special handling). The objective of this Standard is to provide an initial set of priority specifications for preferential telecommunications within IP_Cablecom2 networks according to the framework described in [SCTE 173-2]. This Standard defines two options for introducing the priority header during signalling. This Standard defines specifications for capabilities which, when implemented, should help support preferential telecommunication services.

NOTE – Pre-emption specifications and authorization specifications are outside the scope of this Standard and are considered to be national matters.

2. References

2.1 SCTE References

The following documents contain provisions, which, through reference in this text, constitute provisions of this standard. At the time of subcommittee approval, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

[ANSI/SCTE 159-1] IP_Cablecom Multimedia Part 1: Multimedia Applications and Service

[SCTE 173-1] Requirements for preferential telecommunications over IP_Cablecom networks

[SCTE 173-2] Framework for implementing preferential telecommunications in IP_Cablecom and IP_Cablecom2 networks

2.2 Other References

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

[IETF RFC 4412] IETF RFC 4412 (2006), *Communications Resource Priority for the Session Initiation Protocol (SIP)*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 assured capabilities [SCTE 173-1]: Capabilities providing high confidence or certainty that critical telecommunications are available and perform reliably.

3.1.2 authentication [SCTE 173-1]: The act or method used to verify a claimed identity

3.1.3 authorization [SCTE 173-1]: The act of determining if a particular privilege, such as access to telecommunications resources, can be granted to the presenter of a particular credential.

3.1.4 emergency situation [SCTE 173-1]: A situation, of serious nature, that develops suddenly and unexpectedly. Extensive immediate important efforts, facilitated by telecommunications, may be required to restore a state of normality to avoid further risk to people or property. If this situation escalates, it may become a crisis and/or disaster.

3.1.5 international emergency situation [SCTE 173-1]: An emergency situation, across international boundaries, that affects more than one country.

3.1.6 label [SCTE 173-1]: An identifier occurring within or attached to data elements. In the context of preferential telecommunications it is an indication of priority. This identifier can be used as a mapping mechanism between different network priority levels.

3.1.7 policy [SCTE 173-1]: Rules (or methods) for allocating telecommunications network resources among types of traffic that may be differentiated by labels.

3.1.8 preferential [SCTE 173-1]: A capability offering advantage over regular capabilities.

3.1.9 priority treatment capabilities [SCTE 173-1]: Capabilities that provide premium access to, and/or use of telecommunications network resources.

4 Abbreviations and acronyms

This Standard uses the following abbreviations:

CM	Cable Modem
CMTS	Cable Modem Termination System
COPS	Common Open Policy Service (defined in [b-IETF RFC 2748])
CSCF	Call Session Control Function
DSA	Dynamic Service Add
DSCP	Differentiated Services Code Point
MTA	Media Terminal Adapter
P-CSCF	Proxy Call Session Control Function
PCRF	Policy Control and Charging Rules Function
PIN	Personal Identification Number
PRACK	Provisional Response ACKnowledgement
PSTN	Public Switched Telephone Network
R-P	Resource Priority
RTP	Real-time Transport Protocol
UA	User Agent

5 Conventions

None.

6 Priority in IP_{Cablecom}2

Prioritization entails obtaining a higher probability for completing a call or session. This capability should exist on the access link and it must also be propagated throughout all relevant network entities to provide, as much as possible, end-to-end preferential treatment.

The framework standard [ANSI/SCTE 173-2] defines three aspects related to priority: the labelling, signalling and enabling mechanisms. The following clauses contain the specifications for the signalling and an enabling mechanism. As stated in the framework, placing the priority label in the data packets transmitted using RTP is not available. As a result, this Standard addresses only the requirements for signalling and enabling mechanisms. Several alternative methods are defined, which include the following:

- defining a new per hop behaviour for preferential traffic,
- a new shim layer protocol over IP,
- marking an application layer packet, and
- allocating a Diffserv code point, MPLS label, Ethernet Class of Service or other priority markings to label the packets associated with particular messages.

6.1 Priority signalling in IP_{Cablecom}2

The framework identifies the use of Resource-Priority and Accept-Resource-Priority headers defined in [IETF RFC 4412] to signal the priority in SIP request and response messages. [IETF RFC 4412] defines the term RP actor. This term refers to all entities that act upon the Resource-Priority header. These entities are the SIP proxies and the SIP user agents (UAs). In IP_{Cablecom}2, the SIP proxies are collectively called CSCF (call session control function). The UAs are the end points that initiate and receive a session: they are respectively the SIP UAC (user agent client) and SIP UAS (user agent server). These will both be referred to as the SIP UA.

There are two options for handling the R-P header. In the first option, the SIP UA shall include the R-P header, as described in section 4.7.1 of [IETF RFC 4412], in the request messages when requesting sessions in support of preferential telecommunication services. In the second option, a proxy CSCF shall generate and insert an appropriate R-P header based upon the information received in the session set-up request. The requirements to be supported by the functional entities in IP_{Cablecom}2 networks are included in clause 7.

The R-P header syntax, as defined by [IETF RFC 4412], requires defining a namespace, values for priority levels, an algorithm to be used by the RP actors and new response (error) codes relevant for this namespace. The namespace definition must be registered with IANA.

[IETF RFC 4412] defines two algorithms for providing priority even though the new namespace definition may specify other algorithms. The two algorithms defined by the RFC are preemption and priority queuing.

Appendix I illustrates the components required for a namespace definition according to [IETF RFC 4412]. Annexes A to E identify the namespace specific to each ITU region.

6.2 Priority-enabling mechanisms in IP_{Cablecom}2

Appendix II of [b-ITU-T J.360] and [ANSI/SCTE 159-1] define interfaces to set up policies and control for enabling QoS to support resource management for new services, including those that require preferential treatment. Even though QoS is not meant to imply priority, one of the considerations for the QoS architecture in IP_{Cablecom}2 networks is prioritization for sessions. [ANSI/SCTE 159-1]-specified COPS interfaces between the application manager, the policy server and CMTS may be used to perform resource management and admission control. Expanding on the COPS-defined objects, a new object called GateSpec is defined. The GateSpec object specifies a session class ID with several subfields to set priority and enable preemption of lower priority