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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS
Infrastructure of audiovisual services – Communication
procedures

**Gateway control protocol: Multi-level
precedence and pre-emption package**

ITU-T Recommendation H.248.44



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ITU-T Recommendation H.248.44

Gateway control protocol: Multi-level precedence and pre-emption package

Summary

This Recommendation defines a package to provide signals and procedures necessary to realize multi-level precedence and pre-emption applications under H.248. While bandwidth and overload control, as well as judicious use of the Priority and Emergency ContextAttributes go a long way toward achieving these goals, existing systems also utilize tonal signals to inform end-users about the nature of the traffic, whether their current call is being pre-empted and whether or not their origination is being treated as priority traffic. These systems find a wide range of applications, including military command and control, government priority traffic and many disaster recovery and relief efforts. Priority traffic control and pre-emption are especially important in the time span immediately following a disaster when communications resources may be scarce.

Source

ITU-T Recommendation H.248.44 was approved on 13 January 2007 by ITU-T Study Group 16 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation H.248.44

Gateway control protocol: Multi-level precedence and pre-emption package

1 Scope

This Recommendation defines a package that provides signals for use with precedence features, such as those used by military, government and disaster recovery applications. The support of this package is optional.

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; 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.

[ITU-T H.248.1] ITU-T Recommendation H.248.1 (2005), *Gateway control protocol: Version 3*.

3 Definitions

This Recommendation defines the following terms:

3.1 precedence: The assignment of a priority level to a call.

3.2 pre-emption: The seizing of resources which are in use by a call of a lower precedence by a higher level precedence call in the absence of idle resources.

4 Abbreviations

This Recommendation uses the following abbreviations:

eMLPP enhanced Multi-level Precedence and Pre-emption Service

IEPS International Emergency Preference Scheme

MG Media Gateway

MGC Media Gateway Controller

MLPP Multi-level Precedence and Pre-emption

5 Conventions

None.

6 Multi-level Precedence and Pre-emption Package

Package Name: Multi-level Precedence and Pre-emption Package

Package ID: prectn (0x009f)

Description: This package defines signals and procedures for use with precedence and pre-emption features, such as those used by military, government and disaster recovery applications.

Version: 1

Extends: None

6.1 Properties

None.

6.2 Events

None.

6.3 Signals

6.3.1 Preset Conference Notification Tone

Signal Name: Preset Conference Notification Tone

Signal ID: preconf (0x0001)

Description: Generate preset conference notification tone, indicating that some conferees have not yet entered the conference. The physical characteristic of preset conference notification tone is available in the gateway.

Signal Type: Brief

Duration: Provisioned

Additional parameters: None

6.3.2 Preset Conference Precedence Notification Tone

Signal Name: Preset Conference Precedence Notification Tone

Signal ID: pcprec (0x0002)

Description: Generate preset conference precedence notification tone, which is a provisionable alternative to the preset conference notification tone. The physical characteristic of preset conference precedence notification tone is available in the gateway.

Signal Type: Brief

Duration: Provisioned

Additional parameters: None

6.3.3 Precedence ringing tone

Signal Name: Precedence Ringing Tone

Signal ID: precrt (0x0003)

Description: Generate precedence ringing tone, indicating that the call has importance above that of normal calls. The physical characteristic of precedence ringing tone is available in the gateway.

Signal Type: TimeOut

Duration: Provisioned

Additional parameters: None

6.3.4 Pre-emption tone

Signal Name:	Pre-emption Tone
Signal ID:	preempt (0x0004)
Description:	Generate pre-emption tone, indicating that the call is being pre-empted for traffic of higher importance. The physical characteristic of pre-emption tone is available in the gateway.
Signal Type:	Brief
Duration:	Provisioned
Additional parameters:	None

6.4 Statistics

None.

6.5 Procedures

[ITU-T H.248.1] defines the Priority ContextAttribute as an integer taking a value 0-15, with 15 being the highest and 0 being the lowest priority. It also defines two ContextAttributes, Emergency and IEPS, which allow the MGC to mark a context as being used for the purposes of emergency or IEPS calls, respectively.

To date, there has been no formal definition of what a particular priority value means, or what the impact of the Emergency or IEPS ContextAttributes are on the priority value. [ITU-T H.248.11] makes use of priority to help in ameliorating overflow at the MG, but no indication as to what a particular priority value really means has been documented.

In the function of MLPP, particular calls are defined as being more important than other calls and are designated with named levels. These vary from network to network and from application to application. Table 1 provides several defined priority schemas. This does not imply any linkage between different schemas and is only provided as an informal survey of different priority schemas and their definitions. Please see the appropriate definition specifications to determine interaction requirements for a particular schema.

Table 1 – Existing priority schemas and algorithms

Priority	DSN/I.255.3	DRSN	Q.735.3	ETS	WPS	eMLPP
Highest  Lowest	Flash-Override	Flash-Override-Override (Note 1)	0	0	0	A (Note 2)
	Flash	Flash-Override	1	1	1	B (Note 2)
	Immediate	Flash	2	2	2	0
	Priority	Immediate	3	3	3	1
	Routine	Priority	4	4	4	2
		Routine				3
					4	
MLPP policy	Pre-emption	Pre-emption	Pre-emption	Priority Queuing	Priority Queuing	Both
NOTE 1 – Flash-Override-Override displaces existing calls, but once established becomes a Flash-Override call for the purposes of future pre-emptive calls. NOTE 2 – A and B are only used on the local switch. For interswitch calls, A and B are treated as 0.						

In addition to these, one has to consider the possibility that a provider has defined a "less-than-routine" call service level. This could be a lesser guaranteed level of service in exchange for reduced tariffs, for example. While not common in the PSTN today, it is possible in H.248 networks and has to be considered in the scope of the priority discussion overall.

In order to account for all these schemas, it is difficult to classify a particular schema as more or less important as another schema. Largely, these schemas operate on different networks (military or government networks, as opposed to the PSTN for example) and there is no need to identify how a particular schema aligns with another schema.

In terms of H.248, pre-emption is the act of forcibly removing terminations in order to free up facilities for another higher-precedence call. This allows the seizing of call/bearer resources which are in use by a call of a lower precedence by a higher level precedence call in the absence of idle resources.

Ultimately, the decision that a particular call is more important than another is the domain of the MGC. The Priority, IEPS and Emergency ContextAttributes are useful in allowing the MG to decide which calls to accept and which to reject in the case of overload control. Further, it allows the MG to perform dynamic resource allocation to ensure that a particular portion of its resources are available to handle higher priority calls that may come later. The priority designation and MLPP functionality are handled completely within the MGC, and any indication to the MG is secondary to the actual execution of the MLPP functions.

As indicated in Table 1, there are two common algorithms, namely, pre-emption and priority queuing. It is conceivable that both algorithms could be present in the same network. The algorithms are presented here for informational purposes:

Pre-emption

Schemas using a pre-emption policy may disrupt an existing call to make room for a higher-priority incoming call. Since calls may require different amounts of bandwidth or a different number of circuits, a single higher-priority call may displace more than one lower-priority call.

Priority queuing

In a priority queuing policy, calls that find no available resources are queued to the queue assigned to the priority value. Unless otherwise specified, calls are queued in first-come, first-served order. Each priority value may have its own queue, or several priority values may share a single queue. If a resource becomes available, the MGC reattempts the call from the highest-priority non-empty queue according to the queue service policy. For first-come, first-served policies, the call from that queue that has been waiting the longest is served. Each queue can hold a finite number of pending calls. If the per-priority-value queue for newly arriving calls is full, the MGC may deny handling for the call immediately.

In addition, a priority queuing policy may impose a waiting time-limit for each priority class, whereby setup times that exceed a specified waiting time are ejected from the queue and the call is deemed to have failed.

Finally, the MGC may impose a global queue size limit summed across all queues and drop waiting lower-priority calls attempts. This does not imply pre-emption, since the call was not previously established.

Bibliography

- [b-ITU-T H.460.14] ITU-T Recommendation H.460.14 (2004), *Support for Multi-Level Precedence and Preemption (MLPP) within H.323 systems.*
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- [b-ETSI TS 124.067] ETSI TS 124.067 (2005), *Enhanced Multi-Level Precedence and Preemption service (eMLPP) – Stage 3.*
- [b-IETF RFC 4411] IETF RFC 4411 (2006), *Extending the Session Initiation Protocol (SIP) Reason Header for Preemption Events.*
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