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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication procedures

Gateway control protocol: Detailed congestion reporting package

Recommendation ITU-T H.248.32

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Gateway control protocol: Detailed congestion reporting package

Summary

This Recommendation defines a package that allows the media gateway (MG) to report the current state of its resource usage to the media gateway controller (MGC). The MGC can, according to its own capabilities, customize the set of resources reported as well as when the reports are provided. The resources that can be reported may be in the form of general resources and/or individual resources, and can represent either hardware or software resources. Based on the resource usage report received from the MG, the MGC may take corrective action to improve the efficiency of the whole system (e.g., re-route calls, reduce possible message intensive audits, throttle calls, etc.).

In general, the precise definition of the following resources is left to implementation. The resources whose usage may be reported with this package include:

- General Resources of the MG. This includes any resource that impacts the operation of the MG. For example, combined resources including memory and processor occupancy could be reported using this resource type.

- Digital Signal Processor (DSP) resources. These are resources that provide a variety of functionality for various packetized voice formats, echo cancellation, voice activity detection (VAD), comfort nose generation (CNG), jitter removal, tone generation/detection, etc.

- Internet Protocol (IP) resources that transport packets on an IP packet network. For example, this resource could describe the hardware used to provide terminations with the media address type of IP4 or IP6.

- Asynchronous Transfer Mode (ATM) resources that transport packets on an ATM packet network. For example, this resource could describe the hardware used to provide terminations with the media network type of ATM.

- Other resources mutually recognized by the MG and MGC. These resources are referred to as **extension resources** within this Recommendation.

The MGC can customize the reporting of the MG's resource usage. The MGC can enable reporting for only those resources upon which it is capable of taking meaningful action. The MGC can also determine at what threshold level(s) the MG sends reports. The threshold levels are specified as a percentage of the resource used. The number of levels reported is also selectable.

The reporting of different resource shortages will allow the MGC to take different preventive actions.

This revision incorporates a correction to the Extension Resource text identities.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T H.248.32	2005-01-08	16
2.0	ITU-T H.248.32	2013-03-16	16

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at http://www.itu.int/ITU-T/ipr/.

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Gateway control protocol: Detailed congestion reporting package

1   Scope

This Recommendation defines a package that allows the media gateway (MG) to report its resource usage to the media gateway controller (MGC), and based on that report, the MGC may take corrective action to improve the efficiency of the whole system. The specific preventive action that the MGC takes in response to receiving a resource usage report is beyond the scope of this Recommendation. The support of this Recommendation 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]   Recommendation ITU-T H.248.1 (2013), *Gateway control protocol: Version 3*.

3   Definitions

This Recommendation defines the following term:

3.1   extension resources: Extension resources provide a way to extend this package. They represent media gateway resources, beyond those explicitly listed in this package, whose meanings are mutually understood (or recognized) by both the MG and the MGC.

4   Abbreviations

This Recommendation uses the following abbreviations:

ATM   Asynchronous Transfer Mode

CNG   Comfort Noise Generation

CPU   Central Processing Unit

DSP   Digital Signal Processor

IP   Internet Protocol

MG   Media Gateway

MGC   Media Gateway Controller

VAD   Voice Activity Detection

VMG   Virtual Media Gateway

VoATM   Voice Over ATM

VoIP   Voice Over Internet Protocol

5 Detailed congestion reporting package

Package name: Detailed Congestion Reporting

Package ID: dcr (0x0092)

Description: This package allows the MG to report its resource usage and the MGC based on that report to treat different types of calls differently and potentially re-route calls. This package is realized on the ROOT termination.

Version: 1

Extends: None

5.1 Properties

5.1.1 Resources definitions

Property name: General Resources

Property ID: gen (0x0001)

Description: Current usage level for general resources

Type: Integer

Possible values: Non negative percentage

Default: None

Defined in: TerminationState

Characteristics: Read

The other properties of this package are defined in exactly the same way. Table 1 includes parameter names and parameter IDs. Note that each resource is defined as both a parameter and an enumeration.

Table 1 – Resource names

Resource name	PropertyID/enumerationvalue	
	Text identifier	Binary identifier
General resources	gen	0x0001
DSP resources	dsp	0x0002
IP resources	ip	0x0003
ATM resources	atm	0x0004
Reserved		0x0005 – 0x0020
Extension resource 1	ext1	0x0021
Extension resource 2	ext2	0x0022
	…	
Extension resource 32	ext32	0x0040

5.2   Events

5.2.1   Congestion report

Event name: Resource utilization reporting event

Event ID: conrep (0x0001)

Description: This event reports the current state of resource utilization within the media gateway. The event is reported either when a threshold is crossed or periodically. Periodic reporting may be provided in the absence of any change in threshold level if the optional report interval is specified.

5.2.1.1   EventsDescriptor parameters

5.2.1.1.1   Resource name

Parameter name: Resource Name

Parameter ID: eresname (0x0001)

Description: The names of the resources that are to be reported using this request ID.

Type: Sub-list of Enumeration

Optional: No

Possible values: See Table 1

Default: None

5.2.1.1.2   Reporting thresholds

Parameter name: Reporting Thresholds

Parameter ID: rptthresh (0x0002)

Description: Sets the reporting thresholds for the resources listed in eresname. The reporting thresholds are specified as a percentage. The list of thresholds consists of a concatenation of thresholds for each resource. Each resource shall begin with a threshold of 0, indicating that a new resource is being specified. For example, the integer list "0 90 95 0 50 60 70" defines two sets of thresholds that correspond to the first two resources named in eresname: the first being 90% and 95%, and the second being 50%, 60% and 70%. If only a single set of thresholds is specified, then it applies to all the resources listed in eresname.

Type: Sub-list of integer

Optional: No

Possible values: Non negative percentage

Default: None

5.2.1.1.3   Report interval

Parameter name: Report Interval

Property ID: rptint (0x0003)

Description: The periodic reporting interval in seconds for the resource usage information. A setting of 0 means that no periodic reporting is done.

Periodic reporting is done in the absence of any change in threshold level.

Type: Integer

Optional: Yes

Possible values: Non negative number of seconds

Default: 0

5.2.1.2 ObservedEventsDescriptor parameters

5.2.1.2.1 Resource name

Parameter name: Resource Name

Parameter ID: oeresname (0x0001)

Description: The names of the resources that are being reported.

Type: Sub-list of Enumeration

Optional: No

Possible values: See Table 1

Default: None

5.2.1.2.2 Resource usage

Parameter name: Resource Usage

ParameterID: resuse (0x0002)

Description: The current usage level of the resources listed in oeresname.

Type: Sub-list of Integer

Optional: No

Possible values: Non negative percentage

Default: None

5.3 Signals

None.

5.4 Statistics

None.

5.5 Error codes

None.

5.6 Procedures

When this package is implemented, the MGC may enable events to report general resource utilization within the MG (for example, CPU utilization) and/or individual resource utilization within the MG (for example, IP/ATM resources, DSP resources, etc.).

The MGC can also direct the MG, through the specification of a list of threshold levels, at what percentage values to report the resource usage. The threshold levels can be set individually for each resource. It is left to the MG to determine the meaning of general, DSP, IP and ATM resources used for calculating the level of the percentage used. For example, the MGC could request that the MG

provide a report every time general resources utilization exceeds 50%, 80%, and 90% and also when the DSP resources utilization exceeds 70% and 99%. Once the event is enabled, the gateway is expected to report the corresponding resource usage observed any time a threshold is crossed (either escalating, or descending). As an option, it is possible for the MG to report a percent usage greater than 100%. For example, this might occur when the MG suddenly loses resource capacity and as a result moves affected traffic to the remaining resources but, in doing so, is now processing traffic above its estimated capacity. By informing the MGC of an usage >100%, the MG allows the MGC to reduce load on the MG.

Resource usage levels are reported through events. The event is reported when a threshold is crossed or periodically. Periodic reporting is provided in the absence of any change in threshold level if the optional report interval is specified. Hysteresis should be employed within the MG to avoid a flood of messages when the resource usage oscillates across a threshold level. It is left to the implementation to decide how such a hysteresis would be implemented.

This package makes use of collections of associated lists for enabling and reporting events. When enabling an event, the resource's position in the **eresname** list determines the associated threshold levels in the **rptthresh** list. Likewise for reporting an event, the resource's position in the **oeresname** list determines its usage level in the **resuse** list. For example, if resource "dsp" is the second item in the **oeresname** list, then its current level of usage will be the second item in the **resuse** list.

The MGC can audit for the properties in this package to determine the resources that the MG is prepared to monitor. It is left to the implementation to decide how the MGC translates the specific percentage numbers of resources received from the MG into concrete action(s). On a media gateway with mixed VoIP and VoATM services, different resource congestion will lead to different preventive actions based on local policies employed on the MGC. For example, if the MG is experiencing general congestion, the MGC may try to slow down the setup of new calls, and may completely block low priority calls. On the other hand, if the IP network is congested, the MGC may try to reduce the number of VoIP calls while this will have no impact on VoATM calls that do not make use of the affected IP resources.

By allowing the MG to provide more detailed information on resource utilization, the MGC can be more intelligent in its control of its MGs during periods of resource congestion.

The package can also be used with virtual media gateways (VMGs). When the MG implements virtual media gateways, the resources in the MG can be considered either dedicated to a VMG or pooled between all VMGs. The resources that are dedicated to a VMG are available to be reported only to the controlling MGC. The resources that are pooled across all VMGs are available to be reported to all the controlling MGCs (see Figure 1).
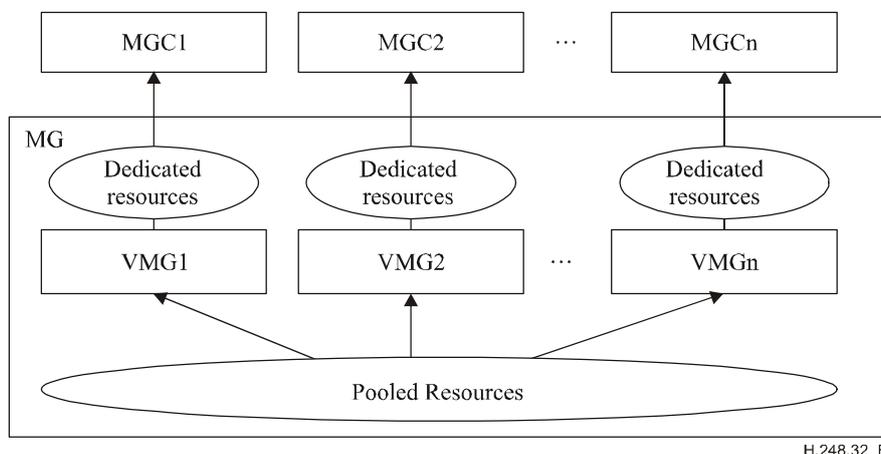

Figure 1 – Resources in VMGs

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