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SERIES H: AUDIOVISUAL AND MULTIMEDIA SYSTEMS

Infrastructure of audiovisual services – Communication procedures

## Gateway control protocol: Filter group package and guidelines

Recommendation ITU-T H.248.76

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# Recommendation ITU-T H.248.76

## Gateway control protocol: Filter group package and guidelines


### Summary

Recommendation ITU-T H.248.76 defines the filter group package. Using this package, the media gateway controller (MGC) can create and manage groups of filters, then apply those filter-groups to the media gateway (MG) terminations and streams.

While the filter group package provides the framework for managing filters, it does not provide protocol elements for defining the filters' concrete match conditions and actions. Instead, it relies on using elements from other packages, for example, the packages defined by Recommendation ITU-T H.248.43.



### History

| Edition | Recommendation | Approval | Study Group |
|---|---|---|---|
| 1.0 | ITU-T H.248.76 | 2010-09-13 | 16 |

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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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# Recommendation ITU-T H.248.76

## Gateway control protocol: Filter group package and guidelines

### 1 Scope

This Recommendation defines the filter group package. Using this package, the media gateway controller (MGC) can create and manage groups of filters, then apply those filter-groups to the MG's terminations and streams. The package is especially useful when large groups of related filters are called for, as it allows the MGC to manipulate the individual filters without having to repeat them all in each ITU-T H.248 command.

The filter group package provides protocol elements and procedures for:

– Creating groups of filters.

– Adding and removing filters to and from an existing filter-group.

– Modifying an existing filter.

– Assigning multiple filter-groups to any of the MG's terminations or streams.

– Collecting statistics regarding filters and filter-groups.

The filter group package does not, however, provide any protocol elements covering a filter's concrete match conditions or actions. Instead, the package should be combined with other packages that provide such elements, e.g., the packages defined by [ITU-T H.248.43].

### 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 (2005), *Gateway control protocol: Version 3*, including its Amendment 1 (05/2008) and Amendment 2 (12/2009).

[ITU-T H.248.8] Recommendation ITU-T H.248.8 (2007), *Gateway control protocol: Error code and service change reason description*.

[ITU-T H.248.43] Recommendation ITU-T H.248.43 (2008), *Gateway control protocol: Packages for gate management and gate control*.

### 3 Definitions

#### 3.1 Terms defined elsewhere

This Recommendation uses the following term defined elsewhere:

**3.1.1 filter** [ITU-T H.248.43]: In general: A set of terms and/or criteria used for the purpose of separating or categorizing. This is accomplished via single- or multi-field matching of traffic header and/or payload data. "Filters" are often manipulated and used in network operation and policy.

In an ITU-T H.248 framework: Filters specify the criteria for matching a pattern to distinguish separable classes of traffic. Filters are defined on the basis of H.248 properties, which determine the filter's condition and actions. Typically a filter includes a single action element indicating either an "accept" or "reject" action, with or without statistics recording.

NOTE 1 – The definition is based on [b-IETF RFC 3198] and [b-IETF RFC 3060].

NOTE 2 – This filter definition implies the concept of filter actions as well as filter conditions.

### 3.2 Terms defined in this Recommendation

This Recommendation uses the following terms:

**3.2.1 filter-group context**: An ITU-T H.248 context that defines a group of filters. This filter-group can then be referenced by other terminations or streams.

**3.2.2 filter-group termination**: A termination belonging to a filter-group context. Such a termination defines one filter out of the complete group.

## 4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

MG Media Gateway

MGC Media Gateway Controller

## 5 Conventions

The names of ITU-T H.248 descriptors always have a capitalized first letter, for example, Streams and Local Descriptor.

The names of ITU-T H.248 properties, events, signals, statistics and parameters appear in italics, for example *ReserveValue*.

All error codes appearing in this Recommendation are described in [ITU-T H.248.8].

## 6 Filter Group package

| | |
|---|---|
| Package Name: | Filter Group |
| Package ID: | filtgrp (0x0103) |
| Description: | This package allows the MGC to indicate that a context is being used for defining a group of filters. That filter-group can then be applied to other terminations or streams, e.g., a termination representing a physical interface of the MG.<br><br>This method for describing filter-groups is useful when a large number of filters are needed for a particular filter-group. It allows the creation, modification and deletion of individual filters without the need to repeat all filters in a single command |
| Version: | 1 |
| Extends: | None |

## 6.1 Properties

### 6.1.1 Filtering Context

Property Name: Filtering Context

Property ID: fc (0x0001)

Description: This context level property indicates that the context is being used to define a group of filters (i.e., the context is a filter-group context). Such a context may only contain ephemeral terminations. The setting of the property is valid for the whole lifetime of the context.

Type: Enumeration

Possible values: "FILT" (0x0001): Filter-Group Context

Default: "FILT" (0x0001)

Defined in: ContextAttribute

Characteristics: Read/Write

### 6.1.2 Filter Group Identifier

Property Name: Filter Group Identifier

Property ID: fgid (0x0002)

Description: This property may only be used at the ContextAttribute level in a filter-group context. When used at that level, the property defines the identifier for the filter-group. Only one value shall be assigned, and that value must be unique across the complete MG (or virtual MG).

When used at the TerminationState level, this property indicates the list of filter-groups that shall be applied to the termination. As such, it shall not be used on terminations belonging to a filter-group context.

When used at the stream (i.e., LocalControl) level, this property indicates the list of filter-groups that shall be applied to the stream. As such, it shall not be used on terminations belonging to a filter-group context.

Type: Sub-list of String

Possible values: Any

If no filter-groups are applied to a termination or stream, the property shall include a single empty string. The empty string identifier shall not be assigned to any filter-group context.

Default: A single empty string

Defined in: Local Control, TerminationState or ContextAttribute

Characteristics: Read/Write

### 6.1.3 Relative Filter Order

Property Name: Relative Filter Order

Property ID: rfo (0x0003)

Description: The relative position of the filter defined by the filter-group termination holding this property, compared to the filters of the other terminations within the filter-group context. The filter defined by the termination with the lowest *filtgrp/rfo* number shall be executed first; the filter defined by the termination

with the next-lowest *filtgrp/rfo* shall be executed second, etc. Terminations may not be assigned with identical *filtgrp/rfo* values within the same context.

Type: Unsigned Integer

Possible values: 1 and up

Default: None

Defined in: TerminationState

Characteristics: Read/Write

## 6.2 Events

None.

## 6.3 Signals

None.

## 6.4 Statistics

None.

## 6.5 Error codes

### 6.5.1 Element not allowed in a filter-group context

Error Code #: 481

Name: Element not allowed in a filter-group context

Definition: A filter-group termination may only contain elements (properties/signals/events and statistics) defined by [ITU-T H.248.43], and/or elements defined by other Recommendations that are related to packet filtering, and/or elements declared by other Recommendations as being valid for use in a filter-group context.

A command that would result in other elements being used in such a termination shall be rejected using this error code.

Error Text in the Error Descriptor: –

Comment: –

### 6.5.2 Unknown filter-group

Error Code #: 482

Name: Unknown filter-group

Definition: The filter-group referenced is invalid or unknown. Therefore, the command is disregarded.

Error Text in the ErrorDescriptor: –

Comment: –

## 6.6 Procedures

### 6.6.1 General

The filter group package allows the MGC to gather a collection of filters into a single filter-group. The group is represented using a filter-group context, where each of the context's terminations describes a single filter. The conditions and actions comprising each filter are, in turn, encoded using the properties and statistics of the various packages dealing with gate management and filtering, such as those described in [ITU-T H.248.43]. The MGC can thus manage the filters of a filter-group by adding, modifying or subtracting individual terminations. Properties related to the individual filters shall not be added at the ContextAttribute level.

NOTE – A filter's conditions and actions can be defined using elements outside of [ITU-T H.248.43]; however, such filters are for further study. It is expected that Recommendations defining such elements will have a statement of applicability with regard to the support of the filter group package.

Each filter-group context has a unique identifier, given by a ContextAttribute level *Filter Group Identifier* (*filtgrp/fgid*) property. The MGC can then use that filter-group for processing the packets of another (non filter-group) termination by placing this identifier in the *filtgrp/fgid* property of a TerminationState or LocalControl Descriptor. More than one filter-group can be applied to a termination, by including more than one identifier in the *filtgrp/fgid* property.

### 6.6.2 Filter-group management

#### 6.6.2.1 Generation of filter-groups

The MG builds one filter-group per filter-group context. Each of the context's terminations represents one filter within the group. For example, if there are five terminations in the context, there will be five filters in the filter-group. The conditions and actions associated with each filter are defined by placing applicable filtering-related elements (e.g., those defined in [ITU-T H.248.43]) on the filter-group termination. While the MGC may place those elements at either the stream or termination levels, only one stream may be defined on a filter-group termination. In effect, the complete filter-group is related to a single media stream; therefore, the same *StreamID* shall be used by all terminations within a single filter-group context.

The ordering of filters within a filter-group is determined by the *Relative Filter Order* (*filtgrp/rfo*) property: The filter corresponding to the termination with the lowest *filtgrp/rfo* value (e.g., one) is executed first, followed by the termination with the next-lowest *filtgrp/rfo* value, etc. A *filtgrp/rfo* value shall be assigned at the termination creation time (i.e., the first Add request). The MGC shall not assign the same *filtgrp/rfo* number to more than one termination in a single filter-group context. If the MG detects such an occurrence, it shall respond with error code 473 "Conflicting Property Values".

It is assumed that the MGC is responsible for validating any interactions between the filters in a filter-group. No such validation is expected at the MG.

#### 6.6.2.2 Adding filters

A new filter-group is instantiated when a termination is first Added to a context and the *Filtering Context* ContextAttribute property (*filtgrp/fc*) is set to "FILT". The MGC shall also assign an identifier to the filter-group via the *Filter Group Identity* (*filtgrp/fgid*) property. This identifier allows the filter-group to be referenced by other terminations and streams at a later point in time.

A new filter is inserted to a filter-group by Adding to the corresponding filter-group context a new termination that carries the appropriate filtering-related elements. The value of the *Relative Filter Order* (*filtgrp/rfo*) property at termination creation may result in that filter being inserted at the start, middle or end of the filter-group, depending on how that value compares to the values of the property on the existing terminations.

Filtering-related elements may be applied at both the termination (e.g., TerminationState Descriptor) and stream (e.g., LocalControl Descriptor) level. However, there may only be one stream per filter-group termination. The use of filtering-related properties in the Local and Remote Descriptors is not typical, as such properties usually indicate to which direction (ingress, egress or both) they apply. However, the use of such properties at the Local and Remote Descriptors is not prohibited.

When utilizing properties defined in other Recommendations, attention should be paid to what descriptor shall be used in conjunction with this package. For example, clause 9.1.2 of [ITU-T H.248.43] indicates that the *Internet Protocol Type Mask* property may be used either in the LocalControl or TerminationState Descriptors. However, the use of TerminationState is only allowed on the Root termination. Therefore, it would not be valid to use this property at the TerminationState level in a filter-group termination.

As the terminations in a filter-group context do not relate to actual media streams, the *StreamMode*, *ReserveValue* and *ReserveGroup* properties shall maintain their default values. If the MGC tries to change these properties, or to set properties/signals/events/statistics other than those supported by the MG for filtering, the MG shall reply with error code 481 "Element not allowed in a filter-group context".

#### 6.6.2.3 Modification of filters

A filter may be modified by changing the relevant properties on the filter-group termination representing it. Once modified, the changes to the filter shall be automatically propagated to all terminations and streams referencing the relevant filter-group.

#### 6.6.2.4 Deleting filter-rules and filter-groups

A filter is deleted by subtracting the corresponding termination from the filter-group context. A complete filter-group is destroyed when the filter-group context defining it is destroyed, i.e., when all terminations have been removed from that context.

When an entire filter-group is removed, any terminations/streams that still reference it are left referencing an unknown filter-group identifier. Those terminations/streams shall filter their traffic as if the unknown identifier no longer appears in their *filtgrp/fgid* property. If the MGC subsequently changes the value of *filtgrp/fgid* on those terminations, it shall remove the offending identifier in order to avoid generating an error.

#### 6.6.2.5 Auditing filters

The MGC may audit the filters comprising a particular filter-group by performing a wildcarded AuditValue on all terminations belonging to the corresponding filter-group context. As filter-group terminations may only support filtering-related elements, only information related to the group's filters will be returned by the MG.

#### 6.6.2.6 Locating filter-groups

The MGC may locate the filter-group context corresponding to a specific identifier by issuing an AuditValue command, using wildcard (ALL) as the ContextID, and the known *filtgrp/fgid* value as a ContextAttribute level selection criteria (see clause 7.2.9 of [ITU-T H.248.1]). This procedure can be combined with that of clause 6.6.2.5, allowing the MGC to locate a filter-group and audit its filters using a single command.

### 6.6.3 Assigning filter-groups

The MGC can assign one or more filter-groups to a termination using the *Filter Group Identity* (*filtgrp/fgid*) property of that termination's TerminationState Descriptor. Similarly, filter-groups may be assigned to a stream via the *filtgrp/fgid* property appearing in the LocalControl Descriptor. The ability to set multiple filter-groups to a single termination or stream allows different terminations/streams to share subsets of related filters, thus minimizing the need for duplication.

When multiple filter-groups are assigned to a single termination or stream, they are applied in the order in which they appear in the *filtgrp/fgid* property. Filtered traffic is first checked against the filters of the first group referenced by *filtgrp/fgid*. If the traffic does not match the conditions of any of those filters, it is checked against the second filter-group referenced by *filtgrp/fgid*, etc. Within each group, the traffic is checked against the individual filters according to the value of the *Relative Filter Order* (*filtgrp/rfo*) property. Once the traffic matches a filter, the actions of that filter are applied and the filtering process stops, i.e., further matching is attempted neither against the other filters of the current filter-group nor against those of the next groups.

The MGC may set filtering-related properties directly on the termination or stream referencing the filter-groups. These "termination local" rules shall be treated as another filter, which has a higher priority than the filter-groups referenced by the *filtgrp/fgid* property. Similarly, if the MGC sets the *filtgrp/fgid* property at both the stream and the termination levels, the stream level filter-groups shall be treated as the higher priority ones. Note that this means that if the stream's traffic matches one of the stream level filters, it will not be checked against the filter-groups applied at the termination level.

Any changes to a filter-group (addition, modification or removal of filters) are applied automatically to the terminations/streams referencing it, as soon as those changes are made.

If the MGC requires the removal of one or more filter-groups from a termination or stream, it shall remove the identifier of those groups from the appropriate *filtgrp/fgid* property.

In order to determine which filter-groups are applied to a termination or stream, the MGC can audit (using an AuditValue command) the value of the *filtgrp/fgid* property. The MG shall then respond with the list of filter-group identifiers.

If the MGC refers to an unknown filter-group identifier in a *filtgrp/fgid* property, the MG shall respond with error code 482 "Unknown Filter Group".

### 6.6.4 Statistics

The MG may collect the statistics of filtering-related packages (e.g., those defined by [ITU-T H.248.43]) on filter-group terminations. Additional statistics that are relevant to packet filtering (e.g., the ones defined by [b-ITU-T H.248.61]) may also be supported on such terminations. Statistics on filter-group terminations are only collected at the termination level (i.e., not at the stream level).

When a statistic is enabled on a filter-group termination, its value relates to the use of the corresponding filter across all references to the filter-group. For example, if the Discarded Packets statistic (see clause 7.4.1 of [ITU-T H.248.43]) is enabled on a filter-group termination, its value would record all incoming packets that were dropped by that filter, on all terminations and streams to which it was applied.

Filtering-related statistics may also be collected on a termination or stream that references one or more filter-groups through the *Filter Group Identifier* property. Such a statistic corresponds to all filtering applied to that termination's or stream's traffic. Thus the statistic will relate both to the filter applied by properties installed directly on the termination/stream (if any), as well as to the filters in the filter-groups it references. This is irrespective of whether the statistic is enabled on the terminations of the referenced filter-group contexts.

### 6.6.5 Examples

**Table 1 – Creation of a filter-group**

| ITU-T H.248 encoding (shortened command) | Comments: |
|---|---|
| MEGACO/3 [11.9.19.65]:54321<br>Transaction = 67891 {<br>Context = $ {<br>ContextAttr = {<br>filtgrp/fc = FILT,<br>filtgrp/fgid = "MyFilter"<br>}<br>Add = tid1 {<br>Media {<br>Stream = 1 {<br>LocalControl {<br>gm/saf = ON,<br>gm/sam = "[102.0.*.*]",<br>ifb/fm = DENY,<br>filtgrp/rfo = 3<br>}}}},<br>Add = tid2 {<br>Media {<br>Stream = 1 {<br>LocalControl {<br>gm/saf = ON,<br>gm/sam = "[102.0.0.*]",<br>ifb/fm = PERMIT,<br>filtgrp/rfo = 1<br>}}}}<br>}<br>} | This command requests the creation of a filter-group context with two terminations. Each termination represents one filter within the group.<br>The identifier associated with the new filter-group is "MyFilter".<br>The filter of termination "tid2" will appear first in the filter-group followed by the filter defined by termination "tid1". |

**Table 2 – Assigning a filter to an interface**

| ITU-T H.248 encoding (shortened command) | Comments: |
|---|---|
| MEGACO/3 [11.9.19.65]:54321<br>Transaction = 67892 {<br>Context = 12345 {<br>Modify = interface1 {<br>Media {<br>TerminationState {<br>filtgrp/fgid = ["MyFilter"]<br>}<br>}<br>}<br>}<br>} | This command assigns the filter-group created in Table 1 to the interface1 termination. |

# Bibliography


[b-ITU-T H.248.61] Recommendation ITU-T H.248.61 (2009), *Gateway control protocol: Packages for network level H.248 statistics*.

[b-IETF RFC 3060] IETF RFC 3060 (2001), *Policy Core Information Model – Version 1 Specification*.

[b-IETF RFC 3198] IETF RFC 3198 (2001), *Terminology for Policy-Based Management*.

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