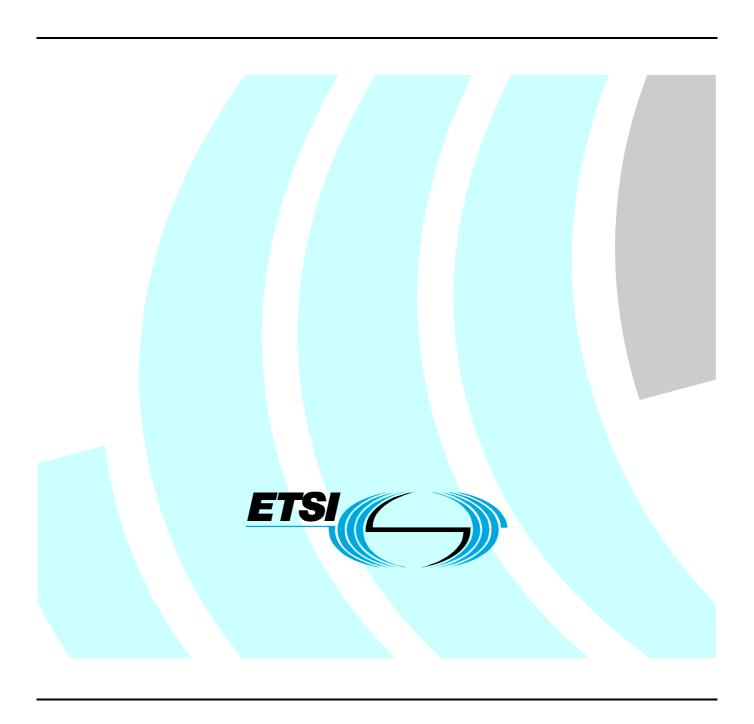# ETSI TS 183 067 V2.1.1 (2009-04)

Technical Specification

Telecommunications and Internet Converged Services and Protocols for Advanced Networks (TISPAN); Mapping of multicast transport control protocols to Re - stage 3

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

1 Scope

The present document describes the signalling behaviour of the transport functions BTF & RCEF for the listed multicast transport control protocols (IGMP, MLD), and provides a mapping between these transport control protocols and TISPAN RACS Re interface as specified in TS 183 060 Release 2 [1].

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1] ETSI TS 183 060 (V2.1.1): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Subsystem (RACS); Re interface based on the DIAMETER protocol".

[2] IETF RFC 3376: "Internet Group Management Protocol, Version 3".

[3] IETF RFC 2236: "Internet Group Management Protocol, Version 2".

[4] IETF RFC 3810: "Multicast Listener Discovery Version 2 (MLDv2) for IPv6".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

termination point: element acting as the neighbouring multicast router receiving and handling IGMP/MLD request from the UE

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

A-RACF	Access-Resource and Admission Control Function
BTF	Basic Transport Functions
CAC	Connection Admission Control
IGMP	Internet Group Management Protocol
IPTV	Internet Protocol TeleVision
MLD	Multicast Listener Discovery
RACS	Resource and Admission Control Subsystem
RCEF	Resource Control Enforcement Function
UE	User Equipment

4 Overview

4.1 Overview of multicast transport control protocol to Re mapping

PULL mode for multicast applies in two cases:

- PULL mode case 1: When it applies below the termination point in the access segment, the PULL mode is used to request resources for a channel in the access network and/or to indicate that the resources associated to a channel can be released as the channel is left. This is per user and can be combined with the PUSH mode at session initiation to allow the A-RACF to download the permitted multicast flow for that user to the RCEF.

- PULL mode case 2: When it applies beyond the termination point, the PULL mode is used to request shared resources to transport a multicast flow corresponding to a channel that has been requested by one or more users.

Figure 4.1 shows a generic scenario for both cases of PULL mode. Transport processing nodes comprises one or several BTFs and one or several RCEFs that may be co localized.
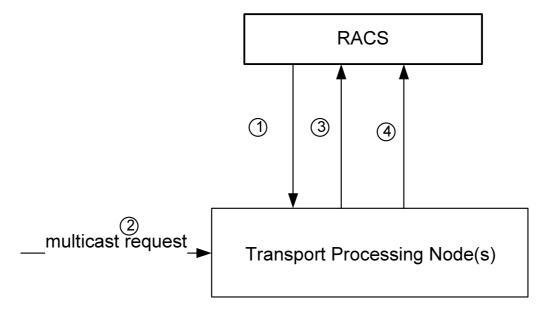
Figure 4.1: A generic scenario for both cases of PULL mode

1)   Upon session activation, the RACS downloads the policy rules in the RCEF in charge of enforcing policies applicable to the access segment. This corresponds e.g. to the list of subscribed channels in case of IPTV service activation. For each policy, bandwidth is set to zero, this will force the transport processing node to trigger the PULL mode.

2)   The BTF receives a multicast request. This message may contain IGMP/MLD "leave" and/or "join" requests.

3)   The BTF requests CAC towards the RCEF. The RCEF checks that the requested channel corresponds to an existing policy-rule. If not, it ignores the request and the user will not receive the channel. If a policy-rule exists, and if PULL mode applies below the termination point, the RCEF sends a CC-Request to the RACS based on parameters received in the multicast request. It has therefore to indicate to the RACS that the UE wants to leave a particular channel and/or wants to join another one. If enough resource is available to join the requested channel, the RACS answers positively to the RCEF.

4)   If the step 3 is successful, the BTF forwards the request to the RCEF dealing with resource beyond the termination point. If PULL mode applies beyond the termination point, the RCEF sends a CC-Request to the RACS based on parameters received in the multicast request. It does not have to check any policy-rule previously downloaded because this request is not linked to any user's rights. The RACS can determine if enough resource is available in the aggregation segment. If this is the case, the RACS answers positively to the RCEF.

5 Behaviours of the transport functions for multicast

5.1 PULL mode: case 1

On reception of an IGMPv3/MLDv2 request, the BTF communicates the request to the RCEF. If the type is set to 0x22 "v3 Membership Report" in case of IGMPv3 or to 143 "Version 2 Multicast Listener Report" in case of MLDv2, the RCEF shall take the following actions for each Group/multicast Records present in the request:

- If Record Type indicates ALLOW_NEW_SOURCE with INCLUDE filter mode or CHANGE_TO_EXCLUDE_MODE with no "Source address" fields, the RCEF shall check for each multicast address/source address pair if it corresponds to an existing policy rule. If not, the RCEF shall ignore the request for that pair. If this is the case, the RCEF shall consider that the UE wants to join the corresponding multicast flow and shall send a CC-Request applying the mapping defined in clause 6.1 for IGMPv3/MLDv2.

- If Record Type indicates BLOCK_OLD_SOURCE or CHANGE_TO_INCLUDE_MODE with an empty source list, the RCEF shall consider that the UE wants to leave the corresponding multicast flow and shall send a CC-Request applying the mapping defined in clause 6.1 for IGMPv3/MLDv2.

On reception of an IGMPv2 request, the BTF communicates the request to the RCEF.

If the type is set to 0x16 "v2 Membership Report", the RCEF shall consider that the UE wants to join the corresponding multicast flow and shall take the following actions:

- If the multicast address indicated in the Group Address parameter corresponds to an existing policy rule, the RCEF shall consider that the UE wants to join the corresponding multicast flow and shall send a CC-Request applying the mapping defined in clause 6.1 for IGMPv2.

- If not, the RCEF shall ignore the request for that pair.

If the type is set to 0x17 "Leave Group", the RCEF shall consider that the UE wants to leave the corresponding multicast flow and shall send a CC-Request applying the mapping defined in clause 6.1 for IGMPv2.

On receipt of a CC-Answer, the RCEF shall behave as defined in TS 183 060 [1].

For each Policy-Rule-Install AVP that corresponds to a previously reported Policy-Update-Request in the CC-Request, the RCEF shall update the Max-Requested-Bandwidth-DL for the corresponding policy based on the value received from the A-RACF. If the value is set to zero, the BTF shall not forward the corresponding multicast flow.

5.2 PULL mode: case 2

On reception of an IGMPv3/MLDv2 request, the BTF communicates the request to the RCEF. If the type is set to 0x22 "v3 Membership Report" in case of IGMPv3 or to 143 "Version 2 Multicast Listener Report" in case of MLDv2, the RCEF shall take the following actions for each Group/multicast Records present in the request:

- If Record Type indicates ALLOW_NEW_SOURCE with INCLUDE filter mode or CHANGE_TO_EXCLUDE_MODE with no "Source address" fields, the RCEF shall check for each multicast address/source address pair if the corresponding multicast flow is already received. If it is the case, the RCEF shall ignore the request for that pair. If not, the RCEF shall send a CC-Request applying the mapping defined in clause 6.2 for IGMPv3/MLDv2.

- If Record Type indicates BLOCK_OLD_SOURCE or CHANGE_TO_INCLUDE_MODE with an empty source list, the RCEF shall check if other UE are still requesting the corresponding multicast flow. If not, the RCEF may send a CC-Request applying the mapping defined in clause 6.2 for IGMPv3/MLDv2.

NOTE: The way the transport functions know that a channel is not required by any other UEs is based on Membership Query mechanisms as defined in RFC 3376 [2] (IGMPv3) and RFC 2236 [3] (IGMPv2) and based on Membership Listener query mechanisms as defined in RFC 3810 [4] (MLDv2).

On reception of an IGMPv2 request, BTF communicates the request to the RCEF.

If the type is set to 0x16 "v2 Membership Report", the RCEF shall check if the requested multicast address indicated in the Group Address parameter is already received. If it is the case, the RCEF shall ignore the request. If not, the RCEF shall send a CC-Request applying the mapping defined in clause 6.2 for IGMPv2.

If the type is set to 0x17 "Leave Group", the RCEF shall consider that the UE wants to leave the corresponding multicast flow and shall check if other UEs are still requesting the corresponding multicast flow. If not, the RCEF may send a CC-Request applying the mapping defined in clause 6.2 for IGMPv2.

On receipt of a CC-Answer, the RCEF shall behave as defined in TS 183 060 Rel-2 [1].

For each Policy-Rule-Install AVP that corresponds to a previously reported Flow-Description, the RCEF shall create the corresponding policy. The transport function shall forward the corresponding multicast flow applying QoS parameters defined in the Policy-Rule-Install AVP. For any previously reported Flow-Description that does not receive any corresponding Policy-Rule-Install AVP, the BTF shall not forward the corresponding multicast flow.

6   Multicast to Re parameters mapping

6.1   PULL mode: case 1

When the RCEF sends a CCR for PULL mode case 1, it shall use the mapping defined in table 6.1.1 for IGMPv3/MLDv2 request.

Table 6.1.1: Rules for derivation of CCR AVPs from IGMPv3/MLDv2 requests for PULL mode case 1

CCR AVPs	Derivation from IGMPv3/MLDv2 Parameters
CC-Request-Type	It shall be set to UPDATE_REQUEST.
Event-Trigger	It shall be set to RESOURCES_MODIFICATION.

Policy-Update-Request	For each multicast/source address:
	• Policy-rule-Name shall be set to the corresponding policy rule name for that pair.
	• Policy_rule_status shall be set to ACTIVE.
	• if Record Type indicates ALLOW_NEW_SOURCE with INCLUDE filter mode or CHANGE_TO_EXCLUDE_MODE with no "Source address" fields:
	  o Max-Requested-Bandwidth-UL shall be set to zero.
	  o Max-Requested-Bandwidth-DL shall be set to FFFFFFFF.
	• if Record Type indicates BLOCK_OLD_SOURCE or CHANGE_TO_INCLUDE_MODE with an empty source list:
	  o Max-Requested-Bandwidth-UL shall be set to zero.
	  o Max-Requested-Bandwidth-DL shall be set to zero.

When the RCEF sends a CCR for PULL mode case 1, it shall use the mapping defined in table 6.1.2 for IGMPv2 request.

Table 6.1.2: Rules for derivation of CCR AVPs from IGMPv2 requests for PULL mode case 1

CCR AVPs	Derivation from IGMPv2 Parameters
CC-Request-Type	It shall be set to UPDATE_REQUEST.
Event-Trigger	It shall be set to RESOURCES_MODIFICATION.

Policy-Update-Request	• Policy-rule-Name shall be set to the corresponding policy rule name for that group address indicated in the request.
	• Policy_rule_status shall be set to ACTIVE.
	• If the type is set to 0x16 "v2 Membership Report":
	  o Max-Requested-Bandwidth-UL shall be set to zero.
	  o Max-Requested-Bandwidth-DL shall be set to FFFFFFFF.
	• If the type is set to 0x17 "Leave Group":
	  o Max-Requested-Bandwidth-UL shall be set to zero.
	  o Max-Requested-Bandwidth-DL shall be set to zero.

6.2 PULL mode: case 2

When the RCEF sends a CCR for PULL mode case 2, it shall use the mapping defined in table 6.2.1 for IGMPv3/MLDv2 request.

Table 6.2.1: Rules for derivation of CCR AVPs from IGMPv3/MLDv2 requests for PULL mode case 2

CCR AVPs	Derivation from IGMPv3/MLDv2 Parameters
CC-Request-Type	It shall be set to UPDATE_REQUEST.
Framed-IP address	It shall set to termination point IP address.
Physical-Access-Id	It shall not be present.
Logical-Access-Id	It shall not be present.
User-Name	It shall not be present.
Called-station-ID	It shall not be present.
Event-Trigger	It shall be set to RESOURCES_MODIFICATION.
Policy-rule-Report	If the flow is already received, for each multicast/source address: • Policy-rule-Name shall be set to the corresponding policy rule name for that pair. • If Record Type indicates BLOCK_OLD_SOURCE or CHANGE_TO_INCLUDE_MODE with an empty source list, Policy-Rule-status shall be set to INACTIVE.
Flow-Description	If the flow is not already received, for each multicast/source address: • Direction shall be set to "in". • Destination address shall be set to the "multicast address". • Source address shall be set to the Source address if present. • Source and Destination port shall not be supplied.

When the RCEF sends a CCR for PULL mode case 2, it shall use the mapping defined in table 6.2.2 for IGMPv2 request.

Table 6.2.2: Rules for derivation of CCR AVPs from IGMPv2 requests for PULL mode case 2

CCR AVPs	Derivation from IGMPv2 Parameters
CC-Request-Type	It shall be set to UPDATE_REQUEST.
Event-Trigger	It shall be set to RESOURCES_MODIFICATION.
Policy-rule-Report	If the flow is already received: • Policy-rule-Name shall be set to the corresponding policy rule name for the Group Address indicated in the request. • If the type is set to 0x17 "Leave Group" Policy-Rule-status shall be set to INACTIVE.
Flow-Description	If the flow is not already received: • Direction shall be set to "in". • Destination address shall be set to the Group Address parameter. • Source address shall not be supplied. • Source and Destination port shall not be supplied.

History

Document history		
V2.1.1	April 2009	Publication