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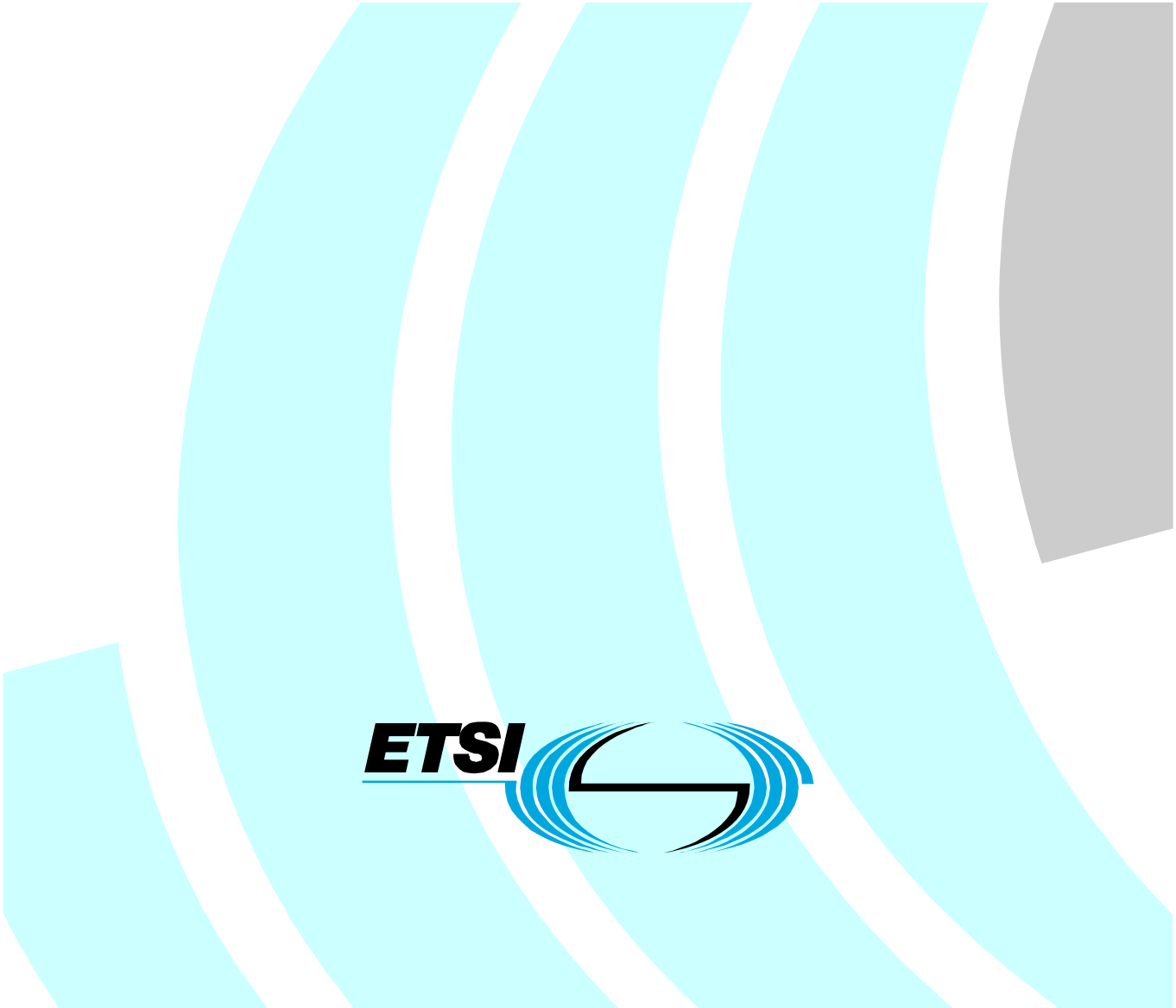
Technical Report

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS); Rr interface based on the ANCP protocol



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Foreword

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

1 Scope

The present document provides a report on the study of the applicability of the ANCP protocol to the Rr interface between Generic Resource Admission Control Function (x-RACF) instances.

Whenever it is possible the present document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of ANCP. Where this is not possible, extensions to ANCP are defined within the present document.

2 References

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2.1 Normative references

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Not applicable.

2.2 Informative references

[i.1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".

[i.2] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS): Functional Architecture".

3 Abbreviations

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

AN	Access Node
ANCP	Access Node Control Protocol
IETF	Internet Engineering Task Force
NAS	Network Access Server
RACS	Resource and Admission Control Sub-System

x-RACF Generic Resource Admission Control Function

4 Overview

The present document describes the ANCP protocol for the RACS Rr interface. The Rr interface is used for QoS resource reservation between x-RACF instances of RACS within a single administrative domain. The functional requirements and the stage 2 specifications of the Rr interface are contained in ES 282 001 [i.1] and ES 282 003 [i.2].

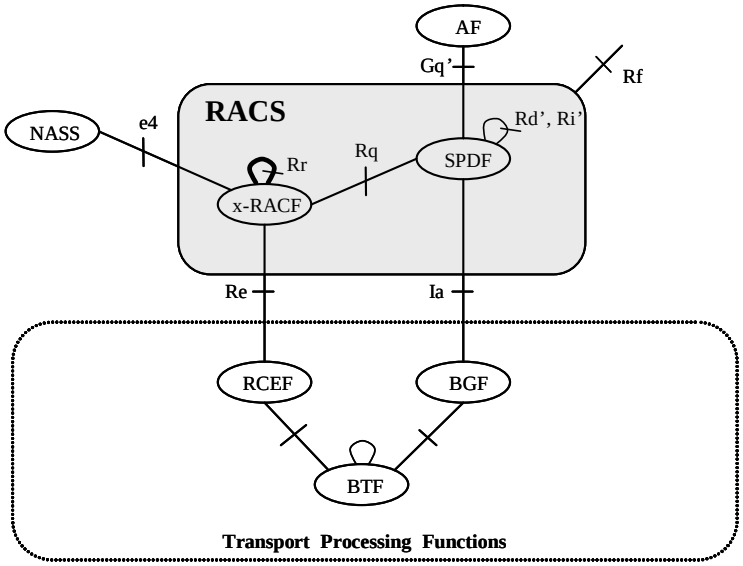

Figure 4.1: Rr interface

5 Scenarios of ANCP for the Rr Interface

5.1 Compound Protocol Scenario of ANCP for the Rr Interface

Figure 5.1 illustrates a scenario where the ANCP could be applicable for the Rr interface. In this scenario, there are three types of network entities, the standalone RACS, the IP edge (i.e. NAS in IETF) and the access node. The top-tier x-RACF is deployed on a standalone RACS device, while the lower-tier x-RACF is deployed on the access node. The RACS supports the Diameter protocol but not the ANCP protocol with the IP Edge. The access node supports the ANCP protocol but not the Diameter protocol with the IP Edge. Therefore, the top-tier x-RACF and the lower-tier x-RACF do not interact directly with each other using a common protocol. They always interact with each other indirectly via an intermediate network entity, i.e. the IP Edge, using both Diameter and ANCP protocols.

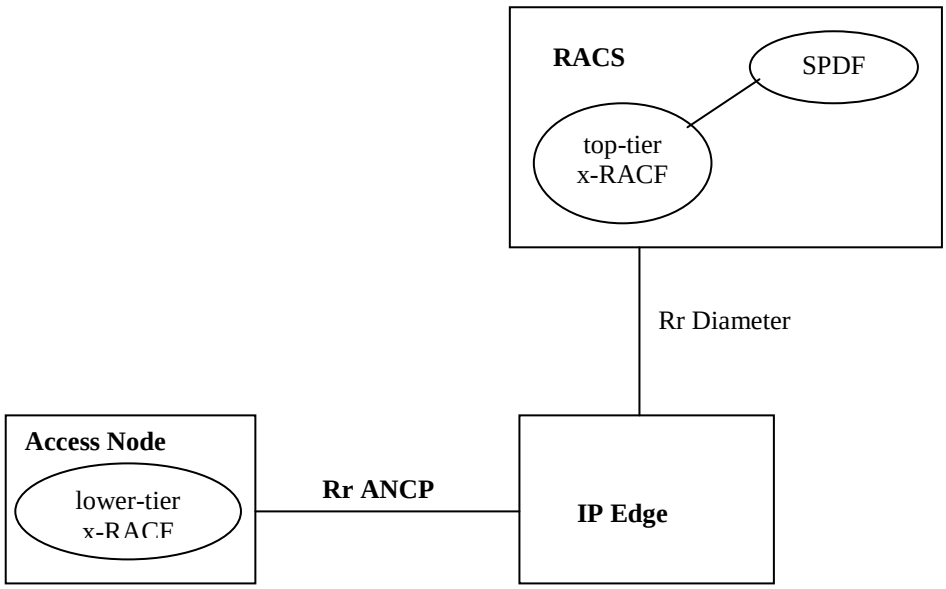

Figure 5.1: A Scenario of ANCP Applicable for the Rr Interface

In this scenario, the top-tier x-RACF manages one part of the bandwidth of the access segment and performs admission control for unicast flows, while the lower-tier x-RACF manages the other part of the bandwidth of the access segment and performs admission control for multicast flows.

When the bandwidth managed by the top-tier x-RACF of the access segment is sufficient for a new unicast request, the top-tier x-RACF performs the admission control without interaction with the low-tier x-RACF. When the bandwidth managed by the top-tier x-RACF of the access segment is insufficient for a new unicast request, the top-tier x-RACF will send a request to the low-tier x-RACF to ask for more bandwidth for unicast flows:

- If the low-tier x-RACF has sufficient free bandwidth, it will grant the requested amount of bandwidth to be managed by the top-tier x-RACF. After this interaction, the part of the bandwidth managed by the lower-tier x-RACF has been decreased and meanwhile the other part of he bandwidth managed by the top-tier x-RACF has been increased. Then the top-tier x-RACF can have sufficient bandwidth to meet the unicast request.

- If the low-tier x-RACF has insufficient free bandwidth, it will refuse to grant the amount of bandwidth to be managed by the top-tier x-RACF. Then the top-tier x-RACF will refuse the unicast request because of insufficient bandwidth.

When the bandwidth managed by the lower-tier x-RACF of the access segment is sufficient for a new multicast request, the lower-tier x-RACF performs the admission control without interaction with the top-tier x-RACF. When the bandwidth managed by the lower-tier x-RACF of the access segment is insufficient for a new multicast request, the lower-tier x-RACF will send a request to the top-tier x-RACF to ask for more bandwidth for multicast flows:

- If the top-tier x-RACF has sufficient free bandwidth, it will grant the requested amount of bandwidth to be managed by the lower-tier x-RACF. After this interaction, the part of the bandwidth managed by the top-tier x-RACF has been decreased and meanwhile the other part of the bandwidth managed by the lower-tier x-RACF has been increased. Then the lower-tier x-RACF can have sufficient bandwidth to meet the multicast request.
- If the top-tier x-RACF has insufficient free bandwidth, it will refuse to grant the amount of bandwidth to be managed by the lower-tier x-RACF. Then the lower-tier x-RACF will refuse the multicast request because of insufficient bandwidth.

6 Procedure descriptions

6.1 General

In the present document, the RACS acts as the delegating x-RACF as well as the SPDF and is responsible for the admission control for unicast services, while the AN acts as the delegated x-RACF and is responsible for the admission control for multicast services. IP Edge acts as an intermediate entity between the delegating x-RACF and the delegated x-RACF. The ANCP protocol operates between the IP Edge and AN, and supports the delegated model of the Rr reference point.

6.2 Procedures on the Rr interface

6.2.1 Provisioning of delegated bandwidth

The procedure of provisioning of delegated bandwidth is illustrated in figure 6.1. This procedure is triggered during the user's network attachment phase. The RACS also reuse this procedure to synchronize the delegated bandwidth with the AN.

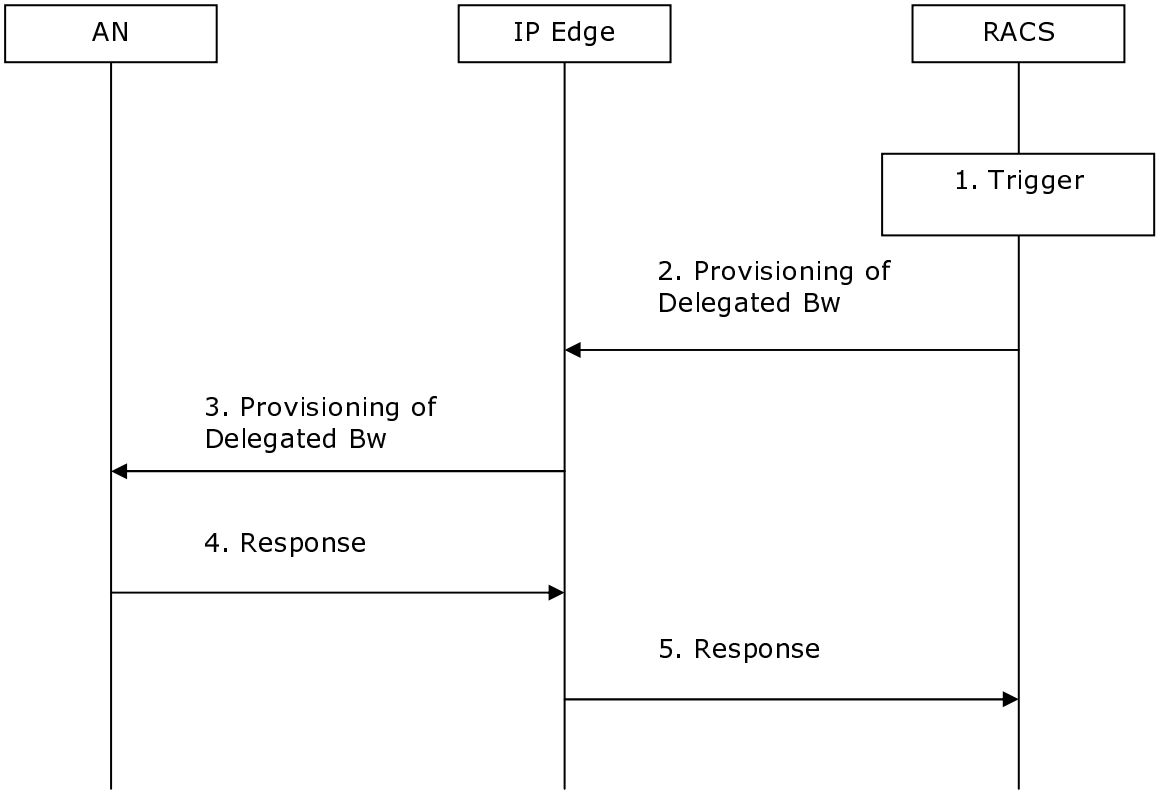

Figure 6.1: Provisioning of delegated bandwidth

1) During the network attachment phase, the CLF notifies the RACS of the event that the user is online. The RACS obtains or decides the initial delegated bandwidth for the user's multicast services based on for example the local configuration on the RACS.

2) The RACS sends to IP Edge a message containing the provisioning data of the delegated bandwidth for the user's multicast services.

3) The IP Edge sends to AN an ANCP message containing the provisioning data of the delegated bandwidth for the user's multicast services.

4) The AN saves the delegated bandwidth for the user's multicast services for future use and sends an ANCP response to the IP Edge.

5) The IP Edge sends a response to the RACS.

6.2.2 Increase of delegated bandwidth

The procedure of increase of delegated bandwidth is illustrated in figure 6.2. This procedure is triggered by the AN when there is not sufficient delegated bandwidth for multicast services.

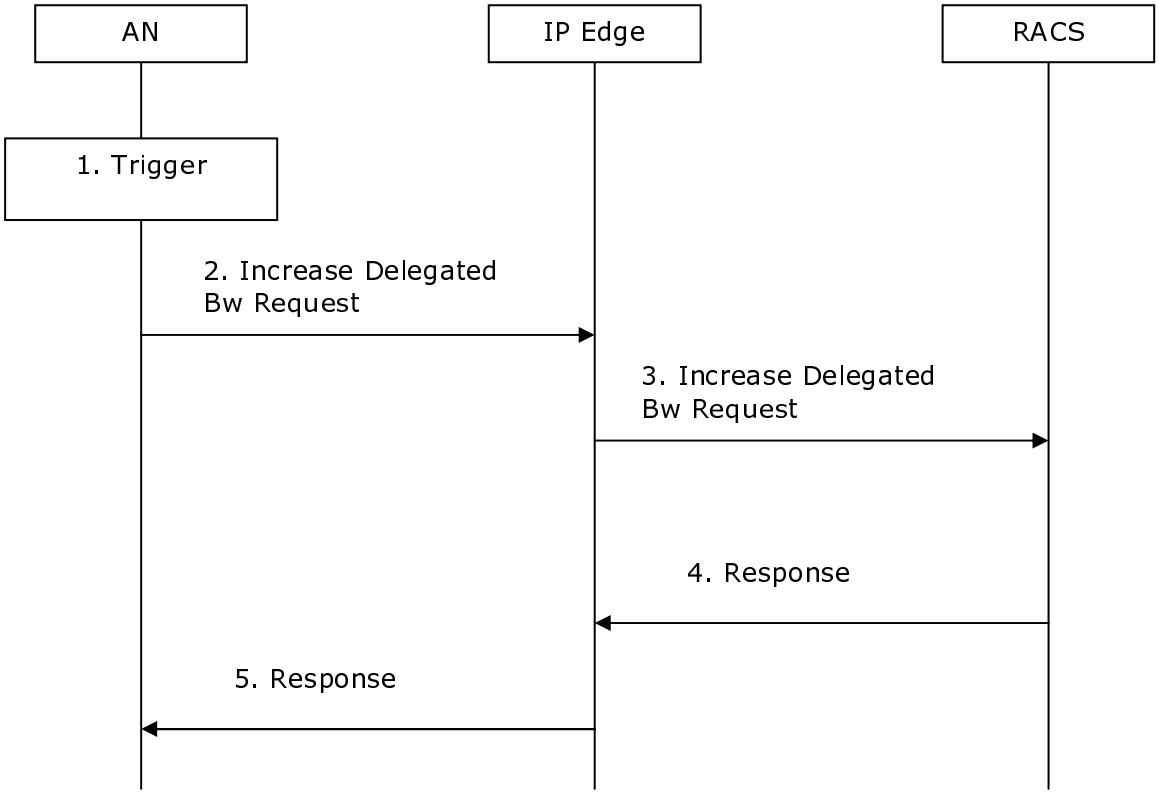

Figure 6.2: Increase of delegated bandwidth

1) The procedure of increase of delegated bandwidth is triggered by the AN when there is not sufficient delegated bandwidth for a new multicast request. The AN decides to ask for more delegated bandwidth to meet the requirement of the new multicast request.

2) The AN sends to the IP Edge an ANCP message to increase the delegated bandwidth.

3) The IP Edge sends to the RACS a message to increase the delegated bandwidth.

4) The RACS checks whether it can increase the delegated bandwidth or not without affecting the admitted unicast services, and sends to the IP Edge a response accordingly.

5) The IP Edge sends an ANCP response to the AN. If an amount of sufficient delegated bandwidth is increased, the AN admits the multicast request. Otherwise, the AN rejects the multicast request.

6.2.3 Decrease of delegated bandwidth

The procedure of decrease of delegated bandwidth is illustrated in figure 6.3. This procedure is triggered by the RACS when there is not sufficient bandwidth for unicast services.

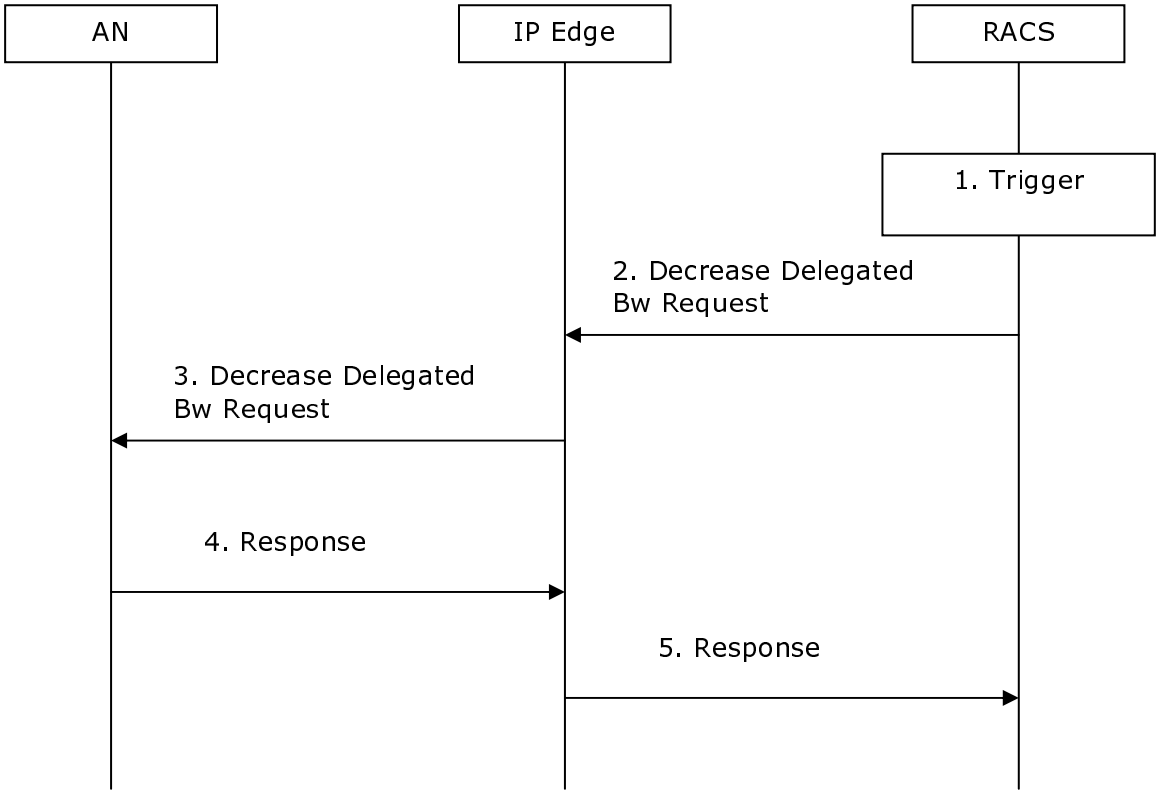

Figure 6.3: Decrease of delegated bandwidth

1) The procedure of decrease of delegated bandwidth is triggered by the RACS when there is not sufficient bandwidth for a new unicast request. The RACS decides to get sufficient amount of delegated bandwidth back to its own control to meet the requirement of the new unicast request, which leads to the procedure of decrease of delegated bandwidth.

2) The RACS sends to the IP Edge a message to decrease the delegated bandwidth.

3) The IP Edge sends to the AN an ANCP message to decrease the delegated bandwidth.

4) The AN checks whether it can decrease the delegated bandwidth or not without affecting the admitted multicast services, and sends to the IP Edge a ANCP response accordingly.

5) The IP Edge sends an response to the RACS. If an amount of sufficient delegated bandwidth is decreased, the RACS gets sufficient bandwidth for unicast services and then admits the unicast request. Otherwise, the RACS rejects the unicast request.

6.2.4 Query of delegated bandwidth

The procedure of query of delegated bandwidth is illustrated in figure 6.4. This procedure is triggered by the AN.

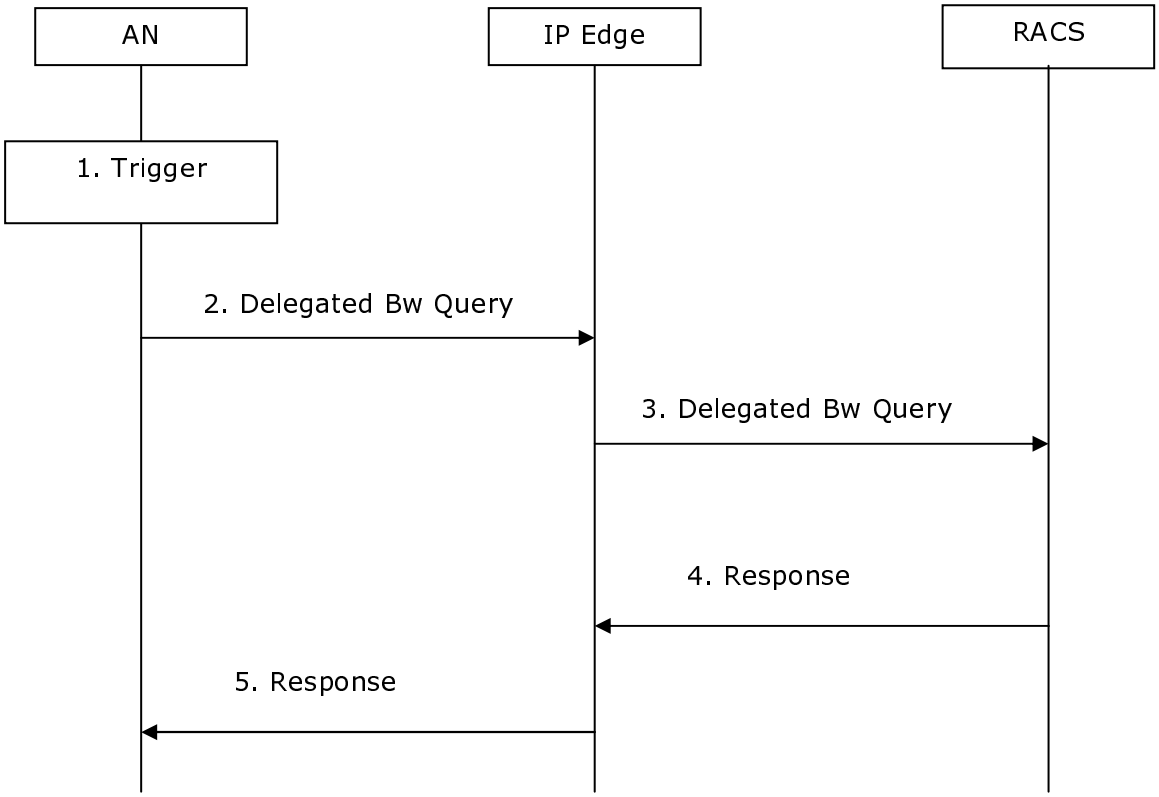

Figure 6.4: Query of delegated bandwidth triggered by the AN

1) When the AN detects that there is possibility that the AN and the RACS holds different data of delegated bandwidth (e.g. when it fails to receive a response to the increase of delegated bandwidth request for a sufficient long period after the request was sent), the AN can decide to trigger the procedure of query of delegated bandwidth.

2) The AN sends an ANCP message to the IP Edge to query the delegated bandwidth.

3) The IP Edge sends a message to the RACS to query the delegated bandwidth.

4) The RACS sends to the IP Edge a response with the data of delegated bandwidth.

5) The IP Edge sends to the AN a response with the data of delegated bandwidth. The AN updates its data of delegated bandwidth based on the response.

7 ANCP application

NOTE 1: The ANCP application for the Rr interface is not described in the present document, pending completion of work and RFC publication by the IETF.

NOTE 2: A mapping between the TISPAN RACS refernce configuration and the use of ANCP requires to be defined.

8 General Conclusion

The present document shows that ANCP is applicable for the delegated model of the Rr interface. The Functional Entity responsible for converting the ANCP to Diameter inside the IP-Edge needs to be identified in ES 282 001 [i.1].

History

Document history		
V3.1.1	August 2009	Publication