

# ETSI TS 183 060 V3.1.1 (2010-03)

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*Technical Specification*

**Telecommunications and Internet converged Services and  
Protocols for Advanced Networking (TISPAN);  
Resource and Admission Control Subsystem (RACS);  
Re interface based on the DIAMETER protocol**

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## Reference

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**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

---

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
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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).

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# 1 Scope

The present document defines a specification based on DIAMETER for use at the Re Reference Point between the TISPAN NGN Generic-Resource Admission Control Function (x-RACF) and the Resource Control Enforcement Function (RCEF).

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 DIAMETER. Where this is not possible, extensions to DIAMETER are defined within the present document.

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# 2 References

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

- For a specific reference, subsequent revisions do not apply.
- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:
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  - for informative references.

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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

## 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 ES 282 003 (V3.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS): Functional Architecture".
- [2] IETF RFC 2960: "Stream Control Transmission Protocol".
- [3] IETF RFC 3588: "Diameter Base Protocol".
- [4] IETF RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change".
- [5] IETF RFC 3554: "On the Use of Stream Control Transmission Protocol (SCTP) with IPsec".
- [6] ITU-T NGN-GSI/DOC - 127 : "ITU-Telecommunication Standardization Sector, Draft Recommendation Q.rcp3.3 - Diameter Alternative Version 0.2.0".
- [7] ETSI TS 129 212: "Universal Mobile Telecommunications System (UMTS); LTE; Policy and charging control over Gx reference point (3GPP TS 29.212)".
- [8] IETF RFC 4006 (2005): "Diameter Credit-Control Application".
- [9] ETSI TS 129 209: "Universal Mobile Telecommunications System (UMTS); Policy control over Gq interface (3GPP TS 29.209 version 6.7.0 Release 6)".

- [10] IETF RFC 4005 (2005): "Diameter Network Access Server Application".
- [11] IANA Private Enterprise Numbers.
- NOTE: See <http://www.iana.org/assignments/enterprise-numbers>
- [12] ETSI TS 183 026 (V3.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control; Protocol for QoS reservation information exchange between the Service Policy Decision Function (SPDF) and the Access Resource and Admission Control Function (A-RACF). In the Resource and Protocol specification".
- [13] IETF RFC 5431 (2009): "Diameter ITU-T Rw Policy Enforcement Interface Application".
- [14] ETSI TS 129 207: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Policy control over Go interface (3GPP TS 29.207)".

## 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.

- [i.1] ITU-T Recommendation Q.3303.3: "Protocol at the interface between the policy decision physical entity (PD-PE) and the policy enforcement physical entity (PE-PE) (Rw interface): Diameter".
- [i.2] ETSI TS 129 210: "Universal Mobile Telecommunications System (UMTS); Charging rule provisioning over Gx interface (3GPP TS 29.210)".

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## 3 Definitions and abbreviations

### 3.1 Definitions

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

**activation:** operation of binding a Policy-Rule to a Transport Resource based on the transport resource classifier

**Attribute-Value Pair (AVP):** corresponds to an Information Element in a DIAMETER message

NOTE: See RFC 3588 [3].

**Deactivation:** operation of unbinding a Policy-Rule to a Transport Resource

**dynamic policy rule:** subcategory of policy rules in which the ownership belongs to the x-RACF and any installation/modification/removal of the policy are performed using Re interface

**explicit event subscription:** model for Event Subscription in which the x-RACF explicitly subscribes for the notification of particular event(s)

**implicit event subscription:** model for Event Subscription in which the list of event(s) that needs to be reported to the x-RACF is configured on the RCEF

**installation:** operation of providing a new, non-existing, Policy-Rule to the RCEF

**modification:** operation of modifying an existing Policy-Rule(s), providing a new Policy-Rule(s), or removing an existing Policy-Rule associated with a Transport Resource

**policy rule:** QoS Policy which defines how the data traffic should be handled by the RCEF, including:

- data traffic classification definition;
- traffic forwarding definition based on the classification;
- traffic statistics generation definition based on the classification.

**provisioned policy rule:** subcategory of policy rules in which the ownership belongs to the provisioning system and any installation/modification/removal of the policy can only be triggered by the provisioned system

**removal:** operation of removing an existing policy-rule in the RCEF

**transport resource:** network element on which a policy rule needs to be activated

**transport resource classifier:** parameter or set of parameters identifying a given Transport Resource

## 3.2 Abbreviations

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

ABNF	Augmented Backus-Naur Form
AF	Application Function
A-RACF	Access-Resource and Admission Control Function
AVP	Attribute-Value Pair
BGF	Border Gateway Function
BTF	Basic Transport Functions
CCA	Credit-Control Answer
CCR	Credit-Control Request
CEA	Capabilities-Exchange-Answer
CER	Capabilities-Exchange-Request
CLF	Connectivity session Location and repository Function
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
NASS	Network Attachment Sub-System
PIA	Policy-Install-Answer
PIR	Policy-Install-Request
RACF	Resource and Admission Control Function
RACS	Resource and Admission Control Subsystem
RCEF	Resource Control Enforcement Function
RFC	Request For Comments
SCTP	Stream Control Transport Protocol
SPDF	Service-based Policy Decision Function
x-RACF	Generic-Resource and Admission Control Function

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## 4 Overview

The Resource Control Enforcement Function (RCEF) defined in ES 282 003 [1] performs policy enforcement functions under control of the x-RACF.

The RCEF main functions are:

- Enforcement of the policies defined by the access provider.
- Opening and closing of gates in order to allow only authorized traffic to flow; marks IP packets in accordance with the filtering criteria received from the x-RACF.
- Policing of upstream and downstream traffic to ensure that the traffic remains within the authorized limits.

The traffic policies are provided by the x-RACF to the RCEF through the Re reference point.



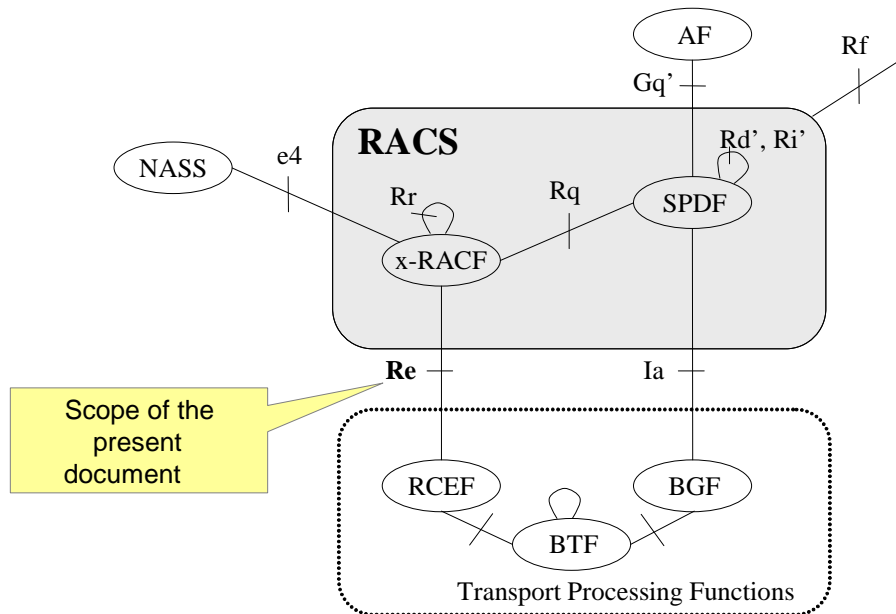


Figure 1: RACS Reference Model

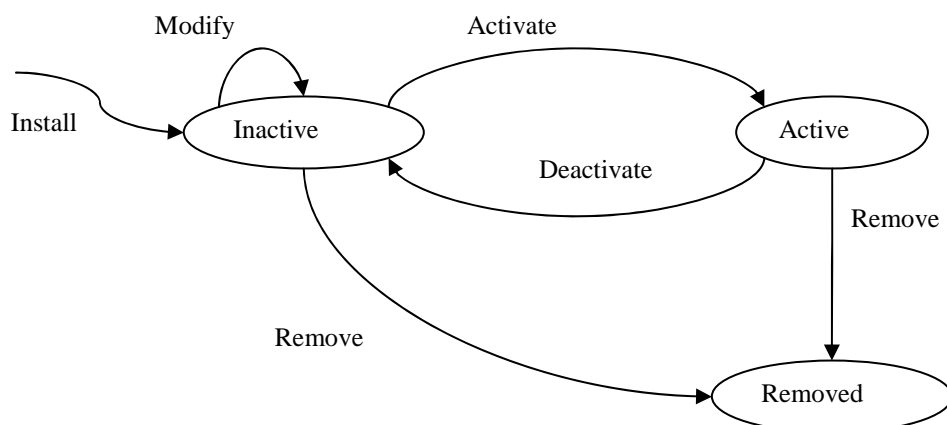
## 5 Procedure descriptions

### 5.1 General

The following clauses describe the realization of the functional procedures of the Re Reference Point (defined in the RACS specification ES 282 003 [1]) using the Diameter commands described in clause 7.1. This involves describing a mapping between the Information Elements defined in the RACS specification (ES 282 003 [1]) and DIAMETER AVPs. Procedures across the Re Reference Point can be divided into two categories:

- X-RACF initiated procedures (push mode): Policy operations are initiated by x-RACF. X-RACF decides on the appropriate traffic policies and activates those in RCEF.
- RCEF initiated procedures (pull mode): Policy operations are initiated by RCEF. In response to a request from RCEF, x-RACF shall decide on and activate the appropriate traffic policies in RCEF.

Figure 2 illustrates the policy-rule life cycle for provisioned type of policy-rules and various states the policy-rule may go through.



NOTE 1: Install/Modify/remove transitions may be initiated by the provisioning systems or the network element management system. The details of such interface are outside the scope of the present document.

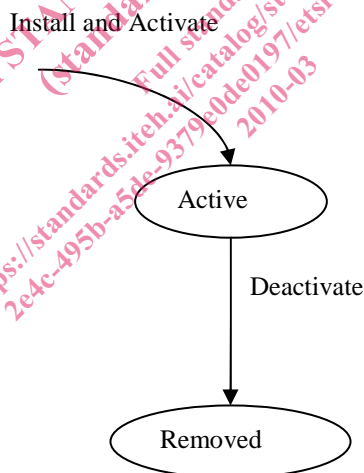
NOTE 2: Activate/Deactivate transitions are initiated using the Re interface.

NOTE 3: The activation operation may result in applying quality of service (QoS) parameters and procedures defined in the policy rule to the transport resource.

NOTE 4: The deactivation process results in unbinding a policy from the network transport resource.

**Figure 2: Policy rule life cycle (Provisioned)**

Figure 3 illustrates the policy-rule life cycle for Dynamic type of policy-rules and varies states it may go through.



NOTE 1: Dynamic policy-rule can only exist on the RCEF if and only if it is associated with a transport resource through the interaction between x-RACF and RCEF.

NOTE 2: "Deactivate" a policy rule can be a result of:

- Modifying transport resource applied policy-rules. For detail on modification, see clause 5.2.1.3.
- Terminating the transport resources session.

NOTE 3: The activation operation may result in applying quality of service (QoS) parameters and procedures defined in the policy rule to the transport resource.

**Figure 3: Policy rule life cycle [Dynamic]**

## 5.2 X-RACF initiated procedures

### 5.2.1 Procedures at the x-RACF

#### 5.2.1.1 High level description

The x-RACF is the DIAMETER Server.

The policy operations that the x-RACF may support include the installation, activation, modification, deactivation and removal of Policy Rules on the RCEF:

- In order to activate one or several Policy Rules, or to Install and Activate one or several Policy Rules, the x-RACF sends an initial Policy-Install-Request (PIR) Command containing at least one Policy Rule to the RCEF. The PI-Request-Type AVP contains the value INITIAL\_REQUEST. Each Policy Rule is described in the Policy-Rule-Install AVP. The Policy-Rule-Install AVP shall contain a Policy-Rule-Definition AVP. At least one Transport Resource Classifier shall be included in the Policy-Rule-Definition AVP, in order to indicate the Transport Resource Classifier(s) associated with the Policy Rule(s).
- In order to modify Policy Rule(s) previously activated on a given Transport Resource, the x-RACF sends a PIR Command with the PI-Request-Type AVP set to the value UPDATE\_REQUEST. During the Modification procedure, a Policy Rule previously activated for the Transport Resource may be modified or deactivated and removed (uninstalled).
- In order to deactivate and remove all Policy Rule(s) previously activated for given Transport Resource Classifier(s), the x-RACF sends a PIR Command to the RCEF, with the PI-Request-Type AVP set to TERMINATION\_REQUEST. The Termination Request shall contain the Transport Resource Classifier(s).

The x-RACF may query the RCEF for the currently activated Policy Rules:

- Query of the supported Policy Rules.
- Query of the list of Policy Rules associated with a given Transport Resource.
- Query of the details of particular Policy Rules associated with a given Transport Resource.

#### 5.2.1.2 Initial Policy Installation Request

The Initial Policy Installation Request is a PIR command with the PI-Request-Type AVP set to INITIAL\_REQUEST.

The x-RACF shall include the Auth-Session-State AVP with the value NO\_STATE\_MAINTAINED (1) [3] to indicate implicitly terminated sessions.

The x-RACF may include one or several Event-Trigger AVP(s) in order to subscribe to the notification of particular event(s).

The Policy-Rule-Install AVP is used to describe the Policy Rule(s). The x-RACF shall include at least one Policy-Rule-Install AVP in the Initial PIR:

- In order to install and activate a new Policy Rule, the Policy-Rule-Definition AVP shall be used:
  - Policy-Rule-Name AVP shall be included in the Policy-Rule-Definition AVP.
  - The Flow-Status AVP shall be included in the Policy-Rule-Definition AVP. The value shall be set to ENABLED-UPLINK (0) or ENABLED-DOWNLINK (1) in order to request the activation of the corresponding Policy Rule:
    - ENABLED-UPLINK shall be used to describe a Policy Rule relative to the outgoing direction on the RCEF.
    - ENABLED-DOWNLINK shall be used to describe a Policy Rule relative to the incoming direction on the RCEF.

- If Policy Rules for each direction need to be specified, several Policy-Rule-Definition AVPs will be included.
- The QoS-Information AVP may be included in the Policy-Rule-Definition AVP:
  - The Max-Requested-Bandwidth-UL AVP and Traffic-Descriptor-UL AVP may be included in order to describe the bandwidth profile of a Policy-Rule-Definition AVP with a Flow-Status equal to ENABLED-UPLINK.
  - The Max-Requested-Bandwidth-DL AVP and Traffic-Descriptor-DL AVP may be included in order to describe the bandwidth profile of a Policy-Rule-Definition AVP with a Flow-Status equal to ENABLED-DOWNLINK.
  - The ToS-Traffic-Class AVP may be included in order to associate the Policy Rule with a Traffic Class:
    - The same ToS-Traffic-Class is associated with both the uplink and the downlink directions when both directions are used.
- The Reporting-Level may be included in the Policy-Rule-Definition AVP.
- The Precedence AVP shall be included in the Policy-Rule-Definition AVP.
- In order to activate a specific Policy Rule predefined at the RCEF, Policy-Rule-Name AVP shall be used as a reference for that Policy Rule.
- In order to activate a group of Policy Rules predefined at the RCEF, the Policy-Rule-Base-Name AVP may be used.

In order to identify the Transport Resources to which the Policy Rule applies, the x-RACF shall include at least one of the following Transport Resource Classifiers within the Policy-Rule-Definition AVP:

- Logical-Access-Id AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular Logical-Access-Id.
- Physical-Access-Id AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular bearer resource upon which the Policies should be enforced.
- Framed-IP-Address AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular IP Session.
  - The Address-Realm AVP may be added if the Framed-IP-Address AVP is also included, in order to associate the Policy-Rule-Definition AVP(s) with a particular Globally Unique IP Address.
- Called-Station-Id AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular Transport Resource on the RCEF.
- The User-Name AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular End User.
- Zero, one or several Flow-Description AVP(s) may be included in the Policy-Rule-Definition AVP, in order to associate a given Policy Rule with IP Flows.
- ToS-Traffic-Class AVP in order to associate the Policy-Rule-Definition AVP(s) with a particular Traffic Class.
- The x-RACF may include one or several of these Transport Resource Classifiers.
  - In case several Transport Resource Classifiers are included, they shall match with each others.