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Zlite telekomunikacijske in internetne storitve ter protokoli za napredno omreženje (TISPAN) - Podsistem za krmiljenje vira in pristopa (RACS) - Funkcijska arhitektura

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN) - Resource and Admission Control Sub-System (RACS) - Functional Architecture

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Foreword

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

The present document describes the architecture of the Resource and Admission Control Sub-System (RACS) identified in the overall TISPAN NGN architecture.

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1 Scope

The present document describes the functional architecture for the Resource and Admission Control Sub-System (RACS), in TISPAN NGN Release 2, in line with the service requirements described in TS 181 005 [1] and with the QoS Requirements described in TS 181 018 [13]. Moreover, it further indicates high level stage 2 requirements in order to allow the description of its functional operation.

The functional architecture and system description developed in the present document is based on the Release 2 requirements for RACS developed in ES 282 001 [2].

RACS is the TISPAN NGN Sub-System responsible for the implementation of policy-based transport control features, by using procedures and mechanisms that handle resource reservation and admission control for both unicast and multicast traffic in access and core networks.

Besides acting as a Resource Control Framework, RACS also includes support for controlling Network Address Translation (NAT) at the edge of networks and for assisting in remote NAT traversal.

Furthermore, RACS also covers aspects related to the derivation, modification, and installation of traffic policies, end to end quality of service, transport-level charging and overload control.

Hereinafter, the restrictions applicable to some RACS NGN topics for the present document are listed:

- the CPN requirements impact will not be handled;
- only single access and single core domains will be handled;
- the interconnection between domains through the Ri' interdomain reference point is limited to scenarios involving only wholesale and roaming between two domains;
- the e2e QoS handling is limited to scenarios involving only wholesale and roaming between two domains;
- other QoS handling aspects, e.g. QoS monitoring and QoS reporting, are covered only in an informative annex;
- the Metro topic aspects are covered in informative annex D; and
- the multicast topic is limited to scenarios involving only a single domain.

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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 181 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Services and Capabilities Requirements".

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

[3] IETF RFC 3312: "Integration of Resource Management and Session Initiation Protocol (SIP)".

[4] IETF RFC 2475: "An Architecture for Differentiated Services".

[5] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".

[6] ETSI TR 180 000: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Terminology".

[7] ETSI TS 123 107: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Quality of Service (QoS) concept and architecture (3GPP TS 23.107)".

[8] ITU-T Recommendation Y.1541: "Network performance objectives for IP-based services".

[9] IETF RFC 3198: "Terminology for Policy-Based Management".

[10] IETF RFC 2753: "A Framework for Policy-based Admission Control".

[11] DSL-Forum: "DSL Policy Control Framework (PCF)", Draft Working Text WT-134.

[12] Damianou, N. et. al.: "The Ponder policy based Management toolkit", August 2002.

[13] ETSI TS 181 018: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements for QoS in a NGN".

[14] ETSI TS 187 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN SECurity (SEC); Requirements".

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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.

[15] ETSI TS 182 027: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IPTV Architecture; IPTV functions supported by the IMS subsystem".

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TR 180 000 [6] and the following apply:

access network policies: policies which are used to make decisions for resource admission control and are designed to derive the traffic policies to be enforced by the A-RACF

NOTE: Access network policies are constructed using Conditions and Actions that are specifically supported by A-RACFs. An example would be a policy which checks the condition that resources are available and the action to reserve the resource.

Application Function (AF): functional entity that offers applications the control of IP bearer resources when required

NOTE: The AF is capable of communicating with the RACS to transfer dynamic QoS-related service information.

application session: end-to-end user session, which is setup by an AF (using SIP or another protocol) and requires one or more resource reservations to take place

NOTE: An application session may involve one, two or more end users.

BGF service: traffic flow function performed by the BGF Functional Entity on media flows and/or the allocation of BGF resources

DiffServ: DiffServ networks classify packets into one of a small number of aggregated flows or "classes", based on the DiffServ code point (DSCP) in the packet's IP header

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gate: operates on a unidirectional flow of packets, i.e. in either the upstream or downstream direction

NOTE: A gate consists of a packet classifier, and a gate status (open/closed). When a gate is open, the packets in the flow are accepted. When a gate is closed, all of the packets in the flow are dropped.

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"Last mile" access network segment: comprises the functional elements that enable communication between a CPN and an Access Node

local A-RACF policies: specific Access network policies that are currently active on an A-RACF (may be a subset of all access network policies)

NOTE: Local A-RACF policies are instances of Access network policies.

local SPDF policies: specific Service based policies that are currently active on an SPDF (may be a subset of all service based policies)

NOTE: Local SPDF policies are instances of Service based policies.

media flow: uni-directional media stream of a particular type, which is specified by two endpoint identifiers, bandwidth and class of service

NAT: generic term for Network Address Translation that includes NAT-PT and NA(P)T

overbooking admission control: situation whereby the A-RACF considers that different AF-sessions can reserve the same resources bearing in mind that these resources cannot be committed to more than one AF-session at a time

NOTE: This enables optimal resource management in certain service conditions (e.g. Call Hold, Communication waiting).

Path-coupled Signaling: A mode of signaling where the signaling messages follow a path that is tied to the data packets. Signaling messages are routed only through the nodes that are in the data path.

policy: set of rules which govern the choices in behaviour of a system and that are comprised of conditions and actions, where conditions are evaluated when triggered by an event

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NOTE 1: See annex B for further details.

NOTE 2: The content of policies is outside of the scope of the present document.

QoS classes: As defined in ITU-T Recommendation Y.1541 [8] and TS 123 107 [7].

QoS "Push" model: model where the RACS "pushes" traffic policies to the transport functions to enforce its policy decisions

NOTE: In this model, the CPN does not itself support native application independent QoS procedures.

QoS "Pull" model: model where, upon request from the transport processing functions, the RACS provides traffic policies to the transport processing functions

NOTE: The request from the transport processing functions may itself, for example, be triggered by path-coupled requests coming from user equipment and/or transport network elements.

resource: allocatable physical network capability

NOTE 1: A resource can be characterized by a set of parameters, including, but not limited to; memory bandwidth forwarding capacity, scheduling capacity, or other.

NOTE 2: Description and measurement metric of a resource is technology dependent.

resource identifier: single key or group of keys used to refer to a resource

NOTE: Resource identifiers can be can be the same as or derived from Layer-1 keys (e.g. physical port or reference point), Layer-2 keys (e.g. Ethernet VLAN ID), or Layer-3 keys (e.g. IP-address).

resource reservation session: set of one or more media flows, which are reserved for a period of time in order to execute an application session

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NOTE: A resource reservation session may be uni-directional or bi-directional.

service based policies: policies designed to be enforced by an SPDF

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NOTE: Service based policies are constructed using Conditions and Actions that are specifically supported by SPDFs. An example would be a policy in which a condition is the type of service required and the action to request the service from either the A-RACF or BGF.

traffic policies: policies for which the execution trigger is the arrival of a data packet, and for which the action(s) constitutes some form of processing of this packet before it is forwarded to another device, are known as traffic policies

xDSL: type of access network supported by the NGN, based on the different flavours of the xDSL technology, that have their resources controlled by RACS

3.2 Abbreviations

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

ACP	Admission Control Process
ACSR	Authorization based on Contents of the Service Request
AF	Application Function
A-RACF	Access-Resource and Admission Control Function
ASP	Application Service Provider
BC	Broadcast Channel
BGF	Border Gateway Function
BGS	Border Gateway Services
BTF	Basic Transport Functions
C-BGF	Core Border Gateway Function
CCI	Charging Correlation Information
CLF	Connectivity session Location and repository Function
CMFE	Coordination of Messages between FEs
CND	Customer Network Device
CoD	Channel on Demand