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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Resource control protocols

**Resource control protocol No. 7 – Protocol at
the interface between inter-domain policy
decision physical entities (Ri interface)**

Recommendation ITU-T Q.3307.1

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Recommendation ITU-T Q.3307.1

Resource control protocol No. 7 – Protocol at the interface between inter-domain policy decision physical entities (Ri interface)

Summary

Recommendation ITU-T Q.3307.1 provides stage 3 specification of the Ri interface between policy decision physical entities (PD-PE) in different domains using the Diameter protocol. The functional requirements and the stage 2 specification for the Ri interface are defined in Recommendation ITU-T Y.2111. This Recommendation as well as Recommendation ITU-T Y.2111 supports nomadism.

Source

Recommendation ITU-T Q.3307.1 was approved on 29 June 2009 by ITU-T Study Group 11 (2009-2012) under Recommendation ITU-T A.8 procedures.

Keywords

Diameter, resource control, Ri application.

FOREWORD

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Recommendation ITU-T Q.3307.1

Resource control protocol No. 7 – Protocol at the interface between inter-domain policy decision physical entities (Ri interface)

1 Scope

The protocol specified in this Recommendation is used to support inter-domain PD-PE communication when the service control entity (SCE) is not capable of interacting with the PD-PE in each domain crossed by the media flow.

The Ri interface is used to control session-based policy. Using the protocol specified in this Recommendation, the original PD-PE can:

- provide information to the peer PD-PE to identify media flows and their required QoS resource characteristics (e.g., QoS class, bandwidth, priority);
- provide service priority information to the peer PD-PE to facilitate appropriate priority handling;
- request resource usage information through the peer PD-PE for charging;
- indicate if the media is recommended to be enabled (i.e., gate opened) when resources are reserved;
- indicate if the media is recommended not to be enabled as soon as the resources are reserved, i.e., the original PD-PE can optionally request that the media gate be opened later;
- if a network address and port translation (NAPT) function is required, request address mapping information so it can do any modifications that may be required for application signalling (e.g., SDP); and
- if a path-coupled resource reservation mechanism is used, indicate to the peer PD-PE whether it wishes to be notified when reservations are obtained and released.

When an authorization token mechanism is used, the peer PD-PE may supply the original PD-PE with one or more authorization tokens which the SCE is required to include in the application signalling messages to the customer premises equipment (CPE).

This Recommendation only discusses per session reservation. The functional requirements and the stage 2 specification for this interface are defined in [ITU-T Y.2111]. As indicated in [ITU-T Y.2111], this Recommendation only supports nomadism; other use cases are for further study.

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 Q.3301.1] Recommendation ITU-T Q.3301.1 (2007), *Resource control protocol No. 1 – Protocol at the Rs interface between service control entities and the policy decision physical entity*.

- [ITU-T Q.3303.1] Recommendation ITU-T Q.3303.1 (2007), *Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and Policy Enforcement Physical Entity (PE-PE): COPS alternative.*
- [ITU-T Y.110] Recommendation ITU-T Y.110 (1998), *Global Information Infrastructure principles and framework architecture.*
- [ITU-T Y.2111] Recommendation ITU-T Y.2111 (2008), *Resource and admission control functions in next generation networks.*
- [ETSI TS 129 209] ETSI TS 129 209 V6.7.0 (2007), *Universal Mobile Telecommunications System (UMTS); Policy control over Gq interface (3GPP TS 29.209 version 6.7.0 Release 6).*
- [ETSI TS 129 329] ETSI TS 129 329 V8.3.0 (2009), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Sh interface based on the Diameter protocol.*
- [ETSI TS 133 210] ETSI TS 133 210 V8.2.0 (2009), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); 3G security; Network Domain Security (NDS); IP network layer security (3GPP TS 33.210 version 8.2.0 Release 8).*
- [ETSI TS 183 017] ETSI TS 183 017 V2.3.1 (2008), *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: DIAMETER protocol for session- based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol Specification.*
- [ETSI ES 283 026] ETSI ES 283 026 V2.4.1 (2008), *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.*
- [ETSI ES 283 034] ETSI ES 283 034 V2.2.0 (2008), *Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol.*
- [IETF RFC 2960] IETF RFC 2960 (2000), *Stream Control Transmission Protocol.*
- [IETF RFC 3309] IETF RFC 3309 (2002), *Stream Control Transmission Protocol (SCTP) Checksum Change.*
- [IETF RFC 3588] IETF RFC 3588 (2003), *Diameter Base Protocol.*
- [IETF RFC 4005] IETF RFC 4005 (2005), *Diameter Network Access Server Application.*

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 gate [ITU-T Y.2111]: A construct used to enable or disable the forwarding of IP packets based on the policy decision. A gate is identified by the classifier (e.g., IPv4 5-tuple) and direction of a media flow or a group of media flows that are in conformance to the same set of policy decisions.

3.1.2 policy decision physical entity (PD-PE) [ITU-T Q.3303.1]: The PD-PE is an implemented instance of the policy decision functional entity (PD-FE) as defined in [ITU-T Y.2111].

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 attribute-value pair (AVP): An attribute-value pair corresponds to an information element in a Diameter message (see [IETF RFC 3588]).

3.2.2 domain: A collection of physical or functional entities which are owned and operated by a player and can include entities from more than one role. The extent of a domain is defined by a useful context and one player can have more than one domain.

3.2.3 originating policy decision physical entity (PD-PE): A PD-PE in an originating domain which triggers QoS resource requests to a peer PD-PE.

NOTE – "The originating PD-PE" is an implemented instance of the "original PD-FE" described in [ITU-T Y.2111].

3.2.4 peer policy decision physical entity (PD-PE): A PD-PE in the interconnected domain which receives QoS resource requests from an originating PD-PE.

3.2.5 stateful operation: An operation in which a peer PD-PE stores a Session-Id value received in an AA-Request message.

3.2.6 stateless operation: An operation in which a peer PD-PE does not store a Session-Id received in an AA-Request message.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AAA	AA-Answer
AAR	AA-Request
AVP	Attribute-Value Pair
CEA	Capability Exchange Answer
CER	Capability Exchange Request
CGPE-PE	Customer premises network Gateway Policy Enforcement Physical Entity
CPE	Customer Premises Equipment
CPN	Customer Premises Network
GPRS	General Packet Radio Service
IP-CAN	Internet Protocol Connectivity Access Network
IPSec	Internet Protocol Security
NACE	Network Attachment Control Entity
NACF	Network Attachment Control Function
NAPT	Network Address and Port Translation
NAT	Network Address Translation
PD-PE	Policy Decision Physical Entity
PE-PE	Policy Enforcement Physical Entity
QoS	Quality of Service

RACF	Resource and Admission Control Functions
RAC-PE	Resource and Admission Control Physical Entity
RAR	Re-Auth-Request
SCE	Service Control Entity
SDI	Session Description Information
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SLA	Service Level Agreement
TRC-PE	Transport Resource Control Physical Entity
TRE-PE	Transport Resource Enforcement Physical Entity
UE	User Equipment

5 Conventions

There are no specific conventions within this Recommendation.

6 Ri interface

6.1 Overview

The RI reference point interface is defined in [ITU-T Y.2111] and is used for service-based policy set-up information between the originating and peer PD-PEs for inter-domain communication. Through the Ri, an originating PD-PE triggers admission control in the interconnected domain by forwarding originating PD-PE requests. Also through the Ri, the interconnected domain communicates its admission control results back to the originating domain. Requests and results are per-session reservation or per-aggregate reservation.

Figure 6-1, which shows the generic resource and admission control functional architecture in NGN, is a replica of Figure 5 of [ITU-T Y.2111] with:

- "service control functions" being replaced by "service control entity" (SCE);
- "network attachment control functions" being replaced by "network attachment control entity (NACE)";
- "CGPE-FE" being replaced by "CGPE-PE";
- "PD-FE" being replaced by "PD-PE";
- "TRC-FE" being replaced by "TRC-PE";
- "TRE-FE" being replaced by "TRE-PE";
- "PE-FE" being replaced by "PE-PE"; and
- "RACF" being replaced by "RAC-PE".