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Amendment 1

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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN – Resource control protocols

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

Amendment 1

Recommendation ITU-T Q.3307.1 (2009) – Amendment 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)

Amendment 1

Summary

Amendment 1 to Recommendation ITU-T Q.3307.1 specifies additions of two attribute value pairs (AVPs) which are Restoration-Indication AVP and Downgraded-Indication AVP. The addition requires to modify the initial reservation procedures (i.e., clauses 7.2.1 and 7.2.2) and to add new AVP information (i.e., clause 10.4) of ITU-T Q.3307.1.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Q.3307.1	2009-06-29	11
1.1	ITU-T Q.3307.1 (2009) Amd. 1	2012-03-29	11

FOREWORD

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

Amendment 1

1) Clause 2, References

Revise reference to ITU-T Y.2111 as shown below:

[ITU-T Y.2111] Recommendation ITU-T Y.2111 (201108), *Resource and admission control functions in next generation networks*.

2) Clause 7, Procedures

Additions of the restoration and the QoS downgrade indication steps in the initial reservation and session modification procedures

2a) Modify clause 7.2.1 as indicated:

7.2.1 Procedures at the originating PD-PE

The originating PD-PE performs admission control based on requirements from the SCE of the originating domain. The originating PD-PE is required to request an authorization for the session from the peer PD-PE by sending an AA-Request (AAR) message. This AAR message is required to contain a new Session-Id.

The AAR may contain an Authorization-Lifetime AVP as an indication of the maximum lifetime that it is requesting.

The AAR can optionally include an Auth-Session-State AVP as an indication of the originating PD-PE's preference for stateful or stateless operation.

The originating PD-PE may include the Operation-Indication AVP to indicate whether the peer PD-PE must perform NAPT control and network address translation (NAT) traversal functions or QoS resource reservation or both after receiving the AAR.

The originating PD-PE is required to include the corresponding Media-Component-Description AVP(s) into the message, if the session description information (SDI) is already available. The originating PD-PE can optionally include the Flow-Grouping AVP(s) to request a particular grouping for IP flows described within the service description. This is distributed to the forwarding plane.

When providing a given Media-Component-Description AVP in the initial AAR, the originating PD-PE can optionally request the peer PD-PE to commit the requested resources by setting the Flow-Status AVP to the value ENABLED, ENABLED-UPLINK or ENABLED-DOWNLINK. Alternatively, the originating PD-PE can optionally perform this in two phases using separate reserve and commit operations. If commitment is done in two phases, the Flow-Status AVP value of the initial AAR is required to be set to DISABLED.

If, based on local configuration data, the originating PD-PE determines that address translation needs to occur on the user plane (e.g., the PE-PE implements NAT, or NAPT, or hosted NAPT procedure) the following action is performed. After the originating PD-PE receives an SDI that is associated with the endpoint served by it, the originating PD-PE is required to include the Binding-Information AVP with the Input-List AVP.

The originating PD-PE can optionally include the SDP-Direction AVP along with the Binding-Information AVP to indicate whether the address set in the Output-list AVP is expected to be received in the AA-Answer (AAA) in either of the following:

– originating core network; or

– peer core network.

If required (e.g., in cases where the served endpoint is behind a hosted-NAPT), the originating PD-PE can optionally include the Latching-Indication AVP set to "LATCH".

Based on local configuration data, the originating PD-PE can optionally include the TLM-PE-Identifier AVP in AAR to indicate the TLM-PE related to the user.

For the purpose of QoS profile correlation in a peer PD-PE lying within an access network, the originating PD-PE is required to include within the AAR a correlation identifier in the form of:

– the User-Name AVP or;

– the Globally-Unique-IP-Address AVP.

The User-Name AVP is defined in [IETF RFC 3588]. The Globally-Unique-IP-Address AVP is defined in [ETSI ES 283 034].

The originating PD-PE can optionally specify the Reservation-Priority AVP in the AAR and/or within a Media-Component-Description AVP of the AAR.

The originating PD-PE can optionally specify the Specific-Action AVP in the AAR with the events it wants to be informed.

The originating PD-PE may contain the Restoration-Indication AVP within a Media-Component-Description AVP in the AAR to indicate whether the QoS of a request can be restored or not.

The originating PD-PE may contain the Downgraded-Indication AVP within a Media-Component-Description AVP in the AAR to indicate whether the QoS of a request has been downgraded or not.

The originating PD-PE is required to examine the content of any Auth-Session-State AVP it receives in the AAA message. If such an AVP is present and indicates stateful operation, the originating PD-PE is required to include the same Session-Id value in subsequent messages relating to this session as it is placed in the initial AAR.

If a received Auth-Session-State AVP indicates stateless operation, the originating PD-PE is required to store the value of the Class AVP(s) which are present in the AAA message. The originating PD-PE is required to include the stored Class AVP(s) in any message it sends to the peer PD-PE related to the same session.

The originating PD-PE is required to store the contents of the Binding-Output-List AVP received within the Binding-Information AVP contained in the AAA message for future use.

The action of the originating PD-PE is a matter of policy when it does not receive the AAA, or when the AAA arrives after an internal timer has expired, or when the AAA arrives with an indication different from DIAMETER_SUCCESS.

2b) Modify clause 7.2.2 as indicated:

7.2.2 Procedures at peer PD-PE

The peer PD-PE can optionally honour the preference indicated in the Auth-Session-State AVP, or can optionally make an independent decision based on local policy (whether or not it has received an Auth-Session-State AVP). If an Auth-Session-State AVP was present in the initial AAR or if the peer PD-PE chooses stateless operation for the current session, the peer PD-PE is required to return an Auth-Session-State AVP in the AAA to indicate its decision.

In stateful operation, the peer PD-PE stores the Session-Id value received in the AAR. The same Session-Id value will be present in subsequent commands relating to this session, as described in [IETF RFC 3588]. The peer PD-PE can optionally use the received Session-Id values to locate the session context information in order to act on the commands.

In stateless operation, the peer PD-PE does not store the received Session-Id. Instead, it generates, one or more Class AVPs based on local policy data (possibly the contents of the AAR and of messages received over other interfaces). The one or more Class AVPs will contain the information needed for the peer PD-PE to reconstruct its state when it receives additional messages relating to the same user session. This information can optionally include:

– a unique string identifying the session corresponding to the initial AAR;

– the address(es) of the TRC-PE(s) involved in the session;

– the address of the PE-PE involved in the session.

The Class AVP(s) is required to be returned to the originating PD-PE in the AAA message. The peer PD-PE also forwards equivalent state-preserving tokens to the TRC-PE(s) and PE-PE when it communicates with them. Then the peer PD-PE receives those tokens back again in messages from TRC-PE(s) and PE-PE.

The peer PD-PE can optionally acquire user profile information from the TLM-FE in the NACE according to the TLM-PE-Identifier AVP if present.

If the Operation-Indication AVP is present, the peer PD-PE may use it to determine whether the initial AAR is for:

– NAT control only:

  In NAT control only, peer PD-PE is required to exercise NAPT control and NAT traversal function control at the PE-PE based on the information indicated by the Binding-Information AVP and optionally SDP-Direction AVP.

– QoS resource reservation only:

  In QoS resource reservation only, peer PD-PE is required to perform QoS resource reservation based on the information indicated by the Resource-Reservation-Mode AVP and media information.

– QoS resource reservation and NAT control:

  In QoS resource reservation and NAT control, peer PD-PE shall perform both of the actions requested.

If the Resource-Reservation-Mode AVP is present, the peer PD-PE is required to use it to determine whether the initial AAR is for:

– authorization only (pull mode);

– authorization and reservation (push mode, first phase of two-phase operation); or

– authorization, reservation and commitment (push mode, single-phase operation).

The operation indicated by the Resource-Reservation-Mode AVP applies to all IP flows identified by the AAR message. If the Resource-Reservation-Mode AVP is not consistent with the Flow-Status AVP for individual components and sub-components, the request is recommended to be rejected.

A request for authorization only (pull mode) cannot be indicated in the absence of the Resource-Reservation-Mode AVP. However, the peer PD-PE can infer a request for authorization from the AAR message. This is done without involvement of the originating PD-PE if Flow-Status AVP for a given media component or sub-component is set to DISABLED (3). Peer PD-PE also can infer a request for authorization if Flow-Status AVP is set to any variant of ENABLED (0), (1), or (2).

The peer PD-PE is required to use the contents of the AAR in order to enforce any functions needed over the Rt and Rw interfaces whenever it recognizes that policy enforcement functions are requested on the transport plane and based on the contents of an AAR and possibly on configuration data.

If the AAR contains the Media-Component-Description AVP(s) the peer PD-PE is required to trigger the Resource Reservation procedure towards the TRC-PE. If the AAR contains Flow-Grouping AVP(s), the peer PD-PE is required to only authorize the QoS whenever the IP flows are distributed to the forwarding plane in a way that is allowed by the Flow-Grouping AVP(s).

Additionally, based on the contents of the AAR (e.g., the AAR may contain AVPs such as Service-Class) and the local policies, the peer PD-PE can optionally request opening or closing of a gate.

If the AAR contains the Restoration-Indication AVP indicating that the QoS of the request can be restored, the peer PD-PE is recommended to check the resources availability. If there are sufficient resources, the QoS of this session will be restored.

If the AAR contains the Downgraded-Indication AVP indicating that the QoS of the request has been downgraded and if there are sufficient resources in the visited network, the peer PD-PE is recommended to retrieve the originating QoS of the session, rather than the current downgraded QoS.

The peer PD-PE is required to wait for the result of the above interaction(s) (i.e., interactions described in sub-clause 7.2.2 and up to this point in the text) before returning, in a single AAA message, the result of those interactions to the originating PD-PE. The AAA message is required to be sent only after all actions taken upon the Rt and/or Rw interfaces are achieved. The contents of the AAA message are required to be derived as follows:

– If the Resource Reservation procedure succeeds and if the requested binding information was received via the Rw interface, the AAA message sent by the peer PD-PE to the originating PD-PE is required to contain the allocated token in the Authorization-Token AVP (in pull mode).
– If the Resource Reservation procedure fails (i.e., the peer PD-PE receives a reservation failure notification via the Rt interface), the peer PD-PE is required to return the Experimental-Result-Code AVP with the value INSUFFICIENT_RESOURCES in the AAA message.
– If the Resource Reservation procedure succeeds but the peer PD-PE did not succeed in getting a binding via the Rw interface, the peer PD-PE is required to return the Experimental-Result-Code AVP with the value BINDING_FAILURE in the AAA message. Additionally, the peer PD-PE is required to release any associated requested resources through the Rt interface.

2c) Modify clause 7.3.1 as indicated:

7.3 Session modification

7.3.1 Procedures at the originating PD-PE

During the session modification, the originating PD-PE is required to send an updated SDI to the peer PD-PE. The updated SDI is created based on exchanges within the SCE session signalling. The originating PD-PE does this by sending the AAR message, with an existing Session-Id, containing the Media-Component-Description AVP(s) which contains the updated service information. The originating PD-PE can optionally include the Flow-Grouping AVP(s) to request a particular grouping for IP flows described within the service description. This is distributed to the forwarding plane.

The originating PD-PE may perform the following operations:

– Add a new IP flow within an existing media component: provide a new Media-Sub-Component AVP within the corresponding Media-Component-Description AVP.

– Add a new IP flow within a new media component: provide a new Media-Component-Description AVP.

– Modify a media component: update the corresponding Media-Component-Description AVP (e.g., increase or decrease the allocated bandwidth).

– Modify an existing IP flow within a media component: update the corresponding Media-Sub-Component AVP.

– Modify the commitment status: change the Flow-Status AVP of the corresponding Media-Component-Description AVP and/or Media-Sub-Component AVP to one of the values ENABLED-UPLINK (0), ENABLED-DOWNLINK (1) or ENABLED (2), according to the direction in which the resources are to be committed.

– Release a media component: provide the corresponding Media-Component-Description AVP with the Flow-Status AVP set to the value REMOVED (4).

– Release an IP flow within a media component: provide the corresponding Media-Sub-Component AVP with the Flow-Status AVP set to the value REMOVED (4).

– Refresh a soft-state: provide an Authorization-Lifetime AVP in the AAR as an indication of the maximum lifetime that it is requesting.

<u>The originating PD-PE may contain the Restoration-Indication AVP within a Media-Component-Description AVP in the AAR to indicate whether the QoS of a request can be restored or not.</u>

<u>The originating PD-PE may contain the Downgraded-Indication AVP within a Media-Component-Description AVP in the AAR to indicate whether the QoS of a request has been downgraded or not.</u>

The originating PD-PE can optionally request the peer PD-PE to revoke the commitment of requested resources by setting the Flow-Status AVP to the value DISABLED.

It is required that the Reservation-Priority AVP associated with a reservation request or a media component is not modified if present.

If an updated SDI pointing towards the endpoint served by the originating PD-PE is available, and if it determines that address translation needs to occur on the user plane (e.g., the PE-PE implements NAT or NAPT or hosted NAPT procedures), the originating PD-PE is required to include the Binding-Information AVP with the Binding-Input-List AVP set based on the received SDI.

If required (e.g., in cases where the served endpoint is behind a hosted NAPT), the originating PD-PE can optionally include the Latching-Indication AVP set to "RELATCH".

The originating PD-PE is required to store for future use the contents of the Binding-Output-List AVP received within the Binding-Information AVP contained in the AAA message.

The behaviour when the originating PD-PE does not receive the AAA message, or when it arrives after the originating PD-PE timer has expired, or when it arrives with an indication different from DIAMETER_SUCCESS, is a matter of local policies.

2d) Modify clause 7.3.2 as indicated:

7.3.2 Procedures at the peer PD-PE

The peer PD-PE may receive the AAR message from the originating PD-PE with modified service information. Based on the contents of the AAR message, the peer PD-PE is required to coordinate any required modifications to the existing resource reservation over the Rt interface and/or to existing enabled policy enforcement settings. The peer PD-PE is required to acknowledge the session modification by issuing an AAA message back to the originating PD-PE only after all actions taken through Rt and/or Rw interfaces are completed.

Depending on the value of the Flow-Status AVP received from the originating PD-PE, the peer PD-PE is required to interpret the session modification as a commitment of requested resources or as a removal of the commitment of requested resources.

If the AAR contains the Restoration-Indication AVP indicating that the QoS of the request can be restored, the peer PD-PE is recommended to check the resources availability. If there are sufficient resources, the QoS of this session will be restored.

If the AAR contains the Downgraded-Indication AVP indicating that the QoS of the request has been downgraded and if there are sufficient resources in the visited network, the peer PD-PE is recommended to retrieve the originating QoS of the session, rather than the current downgraded QoS.

Once the peer PD-PE recognizes, based on the contents of the AAR and possibly on configuration data, that policy enforcement functions are requested on the transport plane, the peer PD-PE is required to use the contents of the AAR message in order to enforce any functions needed over the Rw interface.

3) Clause 10.4.10, Media-Component-Description AVP

Additions of new AVPs which are Restoration-Indication AVP and Downgraded-Indication AVP

Modify clause 10.4.10 as indicated:

10.4.10 Media-Component-Description AVP

The Media-Component-Description AVP (AVP code 517) is of type Grouped, and contains service information for a single media component within an originating PD-PE session. The content can optionally be based on the SDI exchanged between the SCE and the SCE client in the user equipment (UE). The information may be used by the server to determine authorized QoS and IP flow classifiers for bearer authorization and charging rule selection.

Within one Diameter message, a single IP flow is prohibited to be described by more than one Media-Component-Description AVP.

Bandwidth information and Flow-Status information provided within the Media-Component-Description AVP applies to all those IP flows within the media component, for which no corresponding information is being provided within Media-Sub-Component AVP(s). If bandwidth is explicitly allocated for RTCP flows associated with the media component, it is required to always

be done at the component rather than the sub-component level, through use of the RS-bandwidth and RR-bandwidth AVPs.

In stateless operation, the Media-Component-Description is required to be present in every AAR message sent by the originating PD-PE until it wishes to terminate the session. With this qualification, if in stateful operation a Media-Component-Description AVP is not supplied, or if in stateful or stateless operation optional AVP(s) within a Media-Component-Description AVP are omitted, but corresponding information has been provided in previous Diameter messages, the previous information for the corresponding IP flow(s) remains valid.

All IP flows within a Media-Component-Description AVP are permanently disabled by supplying a Flow Status AVP with value "REMOVED". The peer PD-PE can optionally delete corresponding filters and state information.

AVP format:

```
Media-Component-Description ::= < AVP Header: 517 10415>
       { Media-Component-Number } ; Ordinal number of the media comp.
         *[ Media-Sub-Component ] ; Set of flows for one flow identifier
       [ AF-Application-Identifier ]
       [ Media-Type ]
       [ Max-Requested-Bandwidth-UL ]
       [ Max-Requested-Bandwidth-DL ]
       [ Flow-Status ]
       [ RS-Bandwidth ]
       [ RR-Bandwidth ]
       [ Reservation-Class]
       [ Reservation-Priority]
       [ QoS-Downgradable ]
       [ Restoration-Indication ]
       [ Downgraded-Indication ]
       [ Transport-Class ]
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