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RSVP Policy Control Criteria PIB

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Status of this Memo

Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC-2119].

Abstract

This draft describes the use of COPS-PR for support of a PDP provisioning a PEP with RSVP policy control criteria and defines a RSVP policy control criteria PIB for this purpose. The RSVPCC-PIB described in the document is provided for definition of policies that are currently defined by the outsourcing model [2749]. It is designed to be scalable and flexible as well as extensible for accommodating future policy criteria.

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1. Introduction

The RSVP Policy Control Criteria PIB defines the policy criteria used to authorize an RSVP reservation request. The policy criteria defined by this PIB are enforced by the RSVP enabled Policy Enforcement Point (PEP). These are provisioned by the Policy Decision Point (PDP) rather than outsourced to the PDP.

Policy control is an important processing component described in RSVP [2205]. While admission control evaluates the resources available at the RSVP enabled interface, it does not determine if the requested reservation is allowed. Policy control determines whether the policy is allowed (or authorized.) It may base the decision on multiple factors including application identification, policy authentication preemption rules and service level agreements.

Two basic models are defined for prescribing policy to a network enforcement device using COPS [2748]. First, there is an outsourcing mechanism for policy control where the network device requests a policy decision from an external policy server[2749]. This mechanism can be used in conjunction with a local decision policy scheme that outsources information to the PDP for confirmation of the locally made decision [2753]. There also exists a policy configuration mechanism that does not require the network device to outsource all policy decisions. The device is provisioned with decision policy using Policy Information Bases (PIB) that define the policies to be enforced by the PEP. [3084.]

Currently there is no PIB defining RSVP policy control criteria to be conveyed by the provisioning model. Provisioned policy control criteria are useful in topologies where large numbers of signaling flows are transiting a set of well know boundary devices. The sheer volume and nature of the application generating RSVP signals (such as with VoIP) may make outsourcing policy impractical at some boundary devices. The use of local policy control criteria is an attractive alternative to going off-board to another policy device for all PATH and RESV messages and their associated contexts (Incoming / Allocation / Outgoing), which reduces the response time of policy control, the amount of policy control traffic on the network, and overall QoS setup time for the application.

Reliance on a network operator to manually provision the policy criteria locally per device is not a scalable solution. It is labor-intensive, time-consuming as well as error prone and it limits the flexibility of policy control. The automated provisioning of RSVP criteria by the PDP expands the uses of QoS reservation policy to dynamic, high volume QoS sensitive applications.

2 General Concepts

2.1 Overview

This document defines a RSVP Policy Control Criteria PIB. The RSVP Policy Control Criteria PIB provides the policy classes describing the criteria for RSVP policy control to the PEP so it does not need to outsource decisions for all RSVP signals.

Together with the PIB defined in this document, COPS-PR is used to push RSVP related policy control criteria from a PDP to a PEP. Thus the RSVP policy control criteria are installed on the PEP a priori of the affected RSVP signals and enables making policy control decisions for the RSVP messages locally at the PEP.

The use of provisioned policy criteria does not prohibit the outsourcing of policy decisions. The outsourcing and provisioned policy approaches may be used in combination with each other as defined by the following three processing models:

- Make local decisions AND outsource each request to the PDP for confirmation as described in [2753].
- Make local decisions and outsource ONLY IF no relevant local policy is found.
- Take local decisions only. Do not outsource.

Feedback must be provided to the PDP about the usage of policy at the PEP. The PEP monitors, tracks and provides periodic accounting type reports to the PDP.

2.2 Normal Operation

When a PEP is initialized, a COPS session connection is established for SUBJECT_CATEGORY RSVP-PCC between the PEP and PDP. The PEP issues the request for initial configuration describing its basic PIB policy capabilities per [POLFRWK.] The policy classes supported by the PEP are indicated with the PRCSupportTable instances. The PEP also describes the policy model capability associated with that interface using an instance of the RSVPPccCapTable.

The Policy Decision Point determines the appropriate policy information to supply the PEP and responds with a decision install. The PEP confirms the success or failure of the configuration decision with a report.

The failover operation of the PEP and PDP is described in [3084.]

2.3 RSVP Policy Processing Models with local policy criteria

The policy control processing follows one of three possible models:

- The first model is the LDP model described in [2753]. The installed policy criteria are used to make a Local Decision. If the local

policy approves the reservation request the RSVP message continues its normal processing. The LDP then confirms the decision with the PDP by issuing a request with the LPDP Decision Object. The PDP then issues a final decision, which is enforced by the PEP. The

outsourcing of the request to the PDP is accomplished via the COPS-RSVP connection [2753.]

- The second model is where the PEP performs policy control by approving a reservation request based on installed policy criteria. In the event that no policy exists for the reservation request, the PEP then outsources the request to the PDP. The PDP then decides to approve or deny the request [2749]. In other words, when a PEP receives a RSVP message, it first queries Local RSVP policy control criteria. If no policy exists for the request the PEP uses COPS-RSVP to query the PDP for outsourcing policy decisions. Note that the PEP may send periodic reports to the PDP informing it of factors that affect decision-making at the PDP e.g. the resource usage etc. In the case that a request is outsourced to a PDP, all pending allocation usage reports should be sent prior to issuing the request. This helps the PDP maintain an accurate picture of resource availability at the PEP while making decisions.

- The third model is where the PEP relies entirely upon the provisioned policy control criteria for its policy control decision-making. If no policies are found for a policy request of a RSVP session, the RSVP session should be rejected. No COPS-RSVP connection between the PEP and PDP is required in this third model when the policy control criteria is local and there is no outsourcing operation.

2.4 Session Classification and Reservation Styles

The IP filters, frwkIPFilterTable, described in [POLFRWK] are used to associate the authorization (or enforcement) policy with a RSVP session. These filter instances provide the ability to identify the flow 5-tuple: source address, source port, destination address, destination port and protocol id. The RSVP Sender_Template Class, FilterSpec Class and Session Class can be classified using the frwkIPFilterTable. The 5-tuple filter instances may be defined using a wildcard value for the attribute, which accommodates classification policies for the RSVP Fixed Filter, Shared Explicit and Wildcard reservation styles. The frwkIPFilterTable attribute, frwkIPFilterDSCP attribute should contain a wildcard value and must be ignored with regards to the authorization policy.

3 PIB Summary

The PIB defines the policy control criteria using several types of Policy Rule Classes (PRC). These are the PCC capability policy, the PCC mode policy, filter policy, authorization policies, Intsrv over Diffserv policies, linkage policy and usage policy. The PCC capability specifies the local policy models that the device

supports. The PCC mode defines the local policy model that the PDP is directing the PEP to use. The filter policy identifies the flows that have authorization policy. The authorization policy defines the enforcement rules. The Intsrv over Diffserv policies define the interworking rules. The linkage policy associates the filter policy

with an authorization policy. The usage policy provides feedback to the PDP according to what the PEP has monitored and recorded via an accounting type report.

3.1 Capabilities Table - policyControlCapsTable

This table provides a single instance describing the RSVP local decision policy models or modes that the PEP is capable of supporting. The three modes have been previously described in section 2.3.

3.2 Policy Mode Table û pccModeTable

This table contains a single instance that specifies the RSVP local decision policy model that the PDP is directing the PEP to use. This mode must be compatible with the capabilities indicated by the PEP.

3.3 PCC Linkage Table - pccLinkTable

This table defines the association between the filter policy and the authorization policy. The PCC Linkage Class references the filter PRID as well as the PRID of the authorization policy class. It links the two instances. (The PRID is the Object Identifier constructed with the PRC and the instance id as the last sub-identifier.) Note that the same filter may have multiple authorization policies. For example a filter may have a Traffic Specifier policy, a Rate Specifier policy and Preemption policy that should be used as policy criteria for determining if the flow is allowed.

There is future work needed to explore the optimization of the association of filters with authorization policies.

3.4 Authorization Policy Tables

The Authorization tables contain the enforcement policy classes that determine whether the RSVP reservation is allowed. These policy classes describe the Integrated Services Controlled Load and Guaranteed Services, [2210,2211,2212,2215], the identity authorization user and authorization application policies [2752], and the preemption policies [2751.] The policy classes included in this group are:

3.4.1 Traffic Specifier (Tspec) Policies Table

Identifies the Integrated Service type and defines the transmission rate of the traffic flow with that Integrated Service type.

3.4.2 RSPEC Limits Table

Defines the requested service rate from the network related with

Guaranteed Services.

3.4.3 Identification Authentication Data Policy Elements Table

Defines means to securely identify the owner or application making the reservation request.

3.4.4 Priority Preemption Policy Elements Table

Defines the relative order of importance of the requested flow and permits the preemption of lesser important flows to allow higher priority flows admission.

3.5 Integrated Services over Differentiated Services Policy Tables

These tables describe the interworking rules for Integrated Services over Diffserv Services. The interworking provisioning rules are based on the model where Intsrv is in the control plane and Diffserv is in the data plane as introduced in [2998] and then further discussed in [EdgeAdmCtl]

3.5.1 Intsrv to Diffserv Interworking Function Table

This table defines the specific attributes used for the interworking between the RSVP process in the control plane and the Differentiated Services in the data plane. This is used by the Packet Classification and Packet Schedule process for classifying and marking the traffic flow with the appropriate Differentiated Service Code Point and policing the flow. .

3.5.2 Admission Control Virtual Pool Table

This table defines the virtual pool that is mapped to the Differentiated Services resource allocated to Intsrv traffic. It specifies the Intsrv Service Type, maximum capacity available to the Intsrv admission control process, reservation acceptance status and the associated boundary router logical interface if applicable.

3.5.3 Edge Point Identification Table

This table is used to identify the receiver domain. The entries define the addresses that are receivers with respect to the router. Admission control performs the upstream resource check when the RSVP Session Object matches one of these address ranges.

3.5 Policy Control Criteria Usage Tables

3.5.1 Policy Control Criteria Allocated Table

This usage table records the traffic specifications allocated to a successful session and provides feedback to the PDP via the accounting type report.

3.5.2 Policy Control Criteria Session Stats Table

The usage table records the start time and end time of a session. The start time is based on the successful allocation of the resources for

a reservation and the end time is associated with the termination of the session and its policy.

3.5.3 Virtual Pool Usage Table

The virtual pool usage table tracks the current total of resources consumed by the Intsrv flows for a given virtual pool.

3.6 Example

Authorization policies are defined in terms of TRAFFIC SPECIFIER and RSPEC characteristics as well as Integrated Services type i.e. Controlled Load or Guaranteed Services. Additional criteria such as Policy Authentication and Priority Preemption can also be specified.

An example policy control criteria scenario is as follows. The SenderTemplate and Filterspec are compared against the policy control criteria filters by the PEP. The filter is associated with a set of authorization rules with the linkage policies. For example, policy control criteria could establish authorization for the Gold and Silver VoIP services. The Gold VoIP could be defined as allowing a guaranteed service request, within a traffic specifier and rspec limit, with a high preemption priority and high preemption defending priority. A Silver VoIP could be defined as granting a controlled load service request, within a traffic specifier and rspec limit, with a moderate preemption priority and low preemption defending priority. The PEP records the traffic specifications requested by the session and the session statistics. It reports these back to the PDP on a periodic basis determined by the accounting interval defined in the feedback linkage policy [FEEDBKFRPIB].

4 The RSVP Policy Control Criteria PIB Module

```
RSVP-PCC-PIB PIB-DEFINITIONS ::= BEGIN

IMPORTS
     Unsigned32, Unsigned64, Integer32, MODULE-IDENTITY
             FROM COPS-PR-SPPI
     InstanceID, ReferenceID, Prid, TagID
             FROM COPS-PR-SPPI-TC
     InetAddress, InetAddressType
             FROM SNMPv2-TC
     Role, RoleCombination
             FROM POLICY-DEVICE-AUX-MIB
     OBJECT-GROUP
             FROM SNMPv2-CONF
     MessageSize, BitRate, BurstSize
             FROM INTEGRATED-SERVICES-MIB
```

```
        FrwkIpFilterTable
                FROM FRAMEWORK-PIB;
```

```
RsvpPccPib  MODULE-IDENTITY  SUBJECT-CATEGORY { RSVP-PCC(tbd) }
        LAST-UPDATED "200011131600Z"
        ORGANIZATION "IETF-RAP-WG"
        CONTACT-INFO "
                    Diana Rawlins
                     901 International Parkway
                     Richardson, TX 75081
                     Email: Diana.Rawlins@wcom.com
                     Phone +1 972 729 1044

                     Lei Yao
                     22001 Loudoun County Parkway
                     Ashburn, VA 20147
                     Email: Lei.yao@wcom.com
                     Phone: +1 703 886 1830

                     Richard McClain
                     901 International Parkway
                     Richardson, TX 75081
                     Email: Richard.McClain@wcom.com
                     Phone: +1 972 729 1094

                     Amol Kulkarni
                     JF3-206
                     2111 NE 25th Ave
                     Hillsboro, Oregon 97124
                     Email: amol.kulkarni@intel.com
                   Phone: +1 503 712 1168 "

        DESCRIPTION
                "A PIB module containing the policy control
                classes that are required for support of
                pushing policy control from the PDP to PEPs."

        ::= { tbd }

   --
   -- The root OID for PRCs in the RSVP Policy Control Criteria PIB
   --

   rsvpPccBaseClasses
                OBJECT IDENTIFIER ::= { RsvpPccPib 1 }

   --
   -- Textual Conventions
   --

   --
   -- Policy Control Capabilities Table
```

```
   --

   policyControlCapsTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF PolicyControlCapsEntry
```

```
        PIB-ACCESS      notify, 3
        STATUS          current
        DESCRIPTION
                " The policy control capability in terms of the policy
                  control mode supported by the device."

        ::= { rsvpPccBaseClasses 1 }

   policyControlCapsEntry OBJECT-TYPE
        SYNTAX  PolicyControlCapsEntry
        STATUS  current
        DESCRIPTION
                " The instance defining the policy control mode."

        PIB-INDEX { policyControlCapsPccId }

        ::= { policyControlCapsTable 1 }


   PolicyControlCapsEntry ::= SEQUENCE {
        policyControlCapsPccId          InstanceId,
        policyControlCapsMode           BITS
   }

   policyControlCapsPccId OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                "An arbitrary integer index that uniquely identifies
                an instance of the PolicyControlCaps class."

        ::= { policyControlCapsEntry 1 }

   policyControlCapsMode OBJECT-TYPE
        SYNTAX  BITS {
                        CONFIRM_ALL(0),
                        LOCAL_IF_AVAILABLE(1),
                        LOCAL_ONLY(2)
                }
        STATUS  current
        DESCRIPTION
                "The policy control criteria mode of the device. The
                 device may support any combination of modes.
                 The valid bit values are:
                 (0)Local Decision Policy which makes decision and
                  then outsources confirmation to the PDP
                 (1)local control and if no policy control criteria
                  is available locally, then outsource decision to PDP
                 (2)local policy control only."
```

```
        ::= { policyControlCapsEntry 2}

   --
```

```
   -- Policy Control Criteria Mode Table
   --

      pccModeTable OBJECT-TYPE

           SYNTAX  SEQUENCE OF PccModeEntry
           PIB-ACCESS      notify,3
           STATUS  current
           DESCRIPTION
                   " The policy control mode designated by the PDP."


           ::= { rsvpPccBaseClasses 2 }

      pccModeEntry OBJECT-TYPE
           SYNTAX  PccModeEntry
           STATUS  current
           DESCRIPTION
                   "  The instance defining the PDP designated mode of
                     policy control."

           PIB-INDEX { pccModeId }

           ::= { pccModeTable 1 }


      PccModeEntry ::= SEQUENCE {
           pccModeId          InstanceId,
           pccModeMode        INTEGER
      }

      pccModeId OBJECT-TYPE
           SYNTAX  InstanceId
           STATUS  current
           DESCRIPTION
                   "An arbitrary integer index that uniquely identifies
                    an instance of the pccModeTable class."

           ::= { pccModeEntry 1 }

      pccModeMode OBJECT-TYPE
           SYNTAX  INTEGER {
                           CONFIRM_ALL(1),
                           LOCAL_IF_AVAILABLE(2),
                           LOCAL_ONLY(3)
                   }
           STATUS  current
           DESCRIPTION
                   "The policy criteria control mode to be used by the
```

device.
The valid enumeration values are:
(1)Local Decision Policy which makes decision and
then outsources confirmation to the PDP

```
                  (2)local control and if no policy control criteria
                 is available locally, then outsource decision to PDP
                  (3)local policy control only."

         ::= { pccModeEntry 2}

   --
   -- Policy Control Criteria Linkage Table
   --

   pccLinkTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF PccLinkEntry
        PIB-ACCESS      install-notify, 4
        STATUS  current
        DESCRIPTION
                " This table defines the association between
                  the filter, frwkIpFilterTable instance and
                  the authorization policy instance"

        ::= { rsvpPccBaseClasses 3 }

   pccLinkEntry OBJECT-TYPE
        SYNTAX  PccLinkEntry
        STATUS  current
        DESCRIPTION
                " An entry links the filter and the authorization
                  policy."

        PIB-INDEX { pccLinkPccId }
        UNIQUENESS {
                     pccLinkFilterRefId,
                     pccLinkPolicyPrid }

        ::= { pccLinkTable 1 }


   PccLinkEntry::= SEQUENCE {
        pccLinkPccId                          InstanceId,
        pccLinkFilterRefId                    ReferenceId,
        pccLinkPolicyPrid                     Prid
        }

   pccLinkPccId OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                " An arbitrary integer index that uniquely
                  identifies an instance of the PccLink class. "
```

```
    ::= { pccLinkEntry 1 }

  pccLinkFilterRefId OBJECT-TYPE
```

```
        SYNTAX  ReferenceId
        STATUS  current
        DESCRIPTION
                " References an instance of FrwkIPFilterTable. "
      ::= { pccLinkEntry 2 }


   pccLinkPolicy OBJECT-TYPE
        SYNTAX  Prid
        STATUS  current
        DESCRIPTION
                " Specifies the specific PRID of the PRC and instance of
                 authorization policy associated with this filter."

      ::= { pccLinkEntry 3 }

   --
   -- Traffic Specifier Policies Table
   --

   trafficSpecifierPolicyTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF TrafficSpecifierPolicyEntry
        PIB-ACCESS      install-notify, 7
        STATUS          current
        DESCRIPTION
                "This table defines the Traffic specifier policy control
                characteristics that can be used to determine
                SENDER_TSPEC, Controlled-Load or Guaranteed Services
                policies."

        ::= { rsvpPccBaseClasses 4 }

   trafficSpecifierPolicyEntry OBJECT-TYPE
        SYNTAX  TrafficSpecifierPolicyEntry
        STATUS  current
        DESCRIPTION
                " An entry describes a specific limits for a T-SPEC
                  policy. "

        PIB-INDEX { trafficSpecifierPolicyId }
        UNIQUENESS {trafficSpecifierPolicyIntService,
                    trafficSpecifierPolicyBucketRate,
                    trafficSpecifierPolicyBucketSize,
                    trafficSpecifierPolicyPeakRate,
                    trafficSpecifierPolicyMinPolicedUnit,
                    trafficSpecifierPolicyMaxPacketSize }

        ::= { trafficSpecifierPoliciesTable 1 }
```

```
   TrafficSpecifierPolicyEntry ::= SEQUENCE {
        trafficSpecifierPolicyId                    InstanceId,
        trafficSpecifierPolicyIntService            Integer32,
```

```
        trafficSpecifierPolicyBucketRate                BitRate,
        trafficSpecifierPolicyBucketSize                Unsigned32,
        trafficSpecifierPolicyPeakRate                  BurstRate,
        trafficSpecifierPolicyMinPolicedUnit            MessageSize,
        trafficSpecifierPolicyMaxPacketSize             MessageSize

    }



    trafficSpecifierPolicyId OBJECT-TYPE
         SYNTAX  InstanceId
         STATUS  current
         DESCRIPTION
                 "An arbitrary integer index that uniquely identifies an
                 instance of the TrafficSpecifierPolicy class."

         ::= { trafficSpecifierPolicyEntry 1 }


    trafficSpecifierPolicyIntService OBJECT-TYPE
         SYNTAX  Integer32
         STATUS  current
         DESCRIPTION
                 " The traffic specifier policy is applied
                   to the flow of this Integrated Service type.ö
    ::= { pccDiffservMarkerEntry 2 }

    trafficSpecifierPolicyBucketRate OBJECT-TYPE
         SYNTAX  BitRate
         STATUS  current
         DESCRIPTION
                 " 'r' bytes per second, the token bucket rate. "

         ::= { trafficSpecifierPolicyEntry 3 }


    trafficSpecifierPolicyBucketSize OBJECT-TYPE
         SYNTAX  Unsigned32
         STATUS  current
         DESCRIPTION
                 " 'b' bucket depth in bytes, the token bucket size. "

         ::= { trafficSpecifierPolicyEntry 4 }


    trafficSpecifierPolicyPeakRate OBJECT-TYPE
         SYNTAX  BurstSize
         STATUS  current
```

```
        DESCRIPTION
                " 'p' peak traffic data rate in bytes. "

        ::= { trafficSpecifierPolicyEntry 5 }
```

```
   trafficSpecifierPolicyMinPolicedUnit OBJECT-TYPE
        SYNTAX  MessageSize
        STATUS  current
        DESCRIPTION
                " 'm' minimum policed unit: size in bytes
                of application data and all IP and greater
                level (UDP, RTP, TCP, etc.) headers. "

        ::= { trafficSpecifierPolicyEntry 6 }


   trafficSpecifierPolicyMaxPacketSize OBJECT-TYPE
        SYNTAX  MessageSize
        STATUS  current
        DESCRIPTION
                " 'M' maximum packet size: biggest packet
                that conforms to traffic specification. "

        ::= { trafficSpecifierPolicyEntry 7 }

   --
   -- RSPEC Limits Table
   --

   rspecLimitsTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF RspecLimitsEntry
        PIB-ACCESS      install-notify, 4
        STATUS  current
        DESCRIPTION
                "This table defines the RSPEC policy control
                characteristics that are applied  to Integrated
                Services Guaranteed Service."

        ::= { rsvpPccBaseClasses 5 }

   rspecLimitsEntry OBJECT-TYPE
        SYNTAX  RspecLimitsEntry
        STATUS  current
        DESCRIPTION
                " An entry that defines specific Rate and Slack
                  limits for a Guaranteed Service resource request "

        EXTENDS { trafficSpecifierPolicyTable }
        UNIQUENESS { rspecLimitRate,
                     rspecLimitsSlackTerm }

        ::= { rspecLimitsTable 1 }
```

```
   RspecLimitsEntry ::= SEQUENCE {
        RspecLimitsId                   InstanceId,
```

```
        rspecLimitsRate                 BitRate,
        rspecLimitsSlackTerm            Unsigned32
    }


    rspecLimitsId OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                "An arbitrary integer index that uniquely identifies an
                instance of the rspecLimits class."

        ::= { rspecLimitsEntry 1 }

    rspecLimitsRate OBJECT-TYPE
        SYNTAX  BitRate
        STATUS  current
        DESCRIPTION
                " 'R' - Rate. Must be greater than or equal to 'r', rate
                  for the flow "

        ::= { rspecLimitsEntry 2 }

    rspecLimitsSlackTerm OBJECT-TYPE
        SYNTAX  Unsigned32
        STATUS  current
        DESCRIPTION
                " 'S' - Slack Term. Defines in microseconds the
                  difference between desired delay and the delay
                  attained with the reservation level of R"

        ::= { rspecLimitsEntry 3 }

    --
    -- Authentication Data Policy Element Table
    --

    authDataPolicyElementTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF AuthDataPolicyElementEntry
        PIB-ACCESS      install-notify, 6
        STATUS          current
        DESCRIPTION
                "This table specifies policy control to identify and
                authenticate the owner making resource request."

        ::= { rsvpPccBaseClasses 6 }

    authDataPolicyElementEntry OBJECT-TYPE
        SYNTAX  AuthDataPolicyElementEntry
```

```
        STATUS  current
        DESCRIPTION
                "  An entry defines the specific authentication
                   identify used to grant permission for the
```

```
                  reservation request."

       PIB-INDEX { authDataPolicyElementPccId }
       UNIQUENESS {
                    authDataPolicyElementPolicySetId,
                    authDataPolicyElementPolicyIdentity,
                    authDataPolicyElementPolicyAuthAttrType,
                    authDataPolicyElementPolicyAuthAttrSubType
      }

       ::= { authDataPolicyElementTable 1 }


   AuthDataPolicyElementEntry::= SEQUENCE {
       AuthDataPolicyElementPccId                      InstanceID,
       AuthDataPolicyElementPolicySetId                TagID,
       authDataPolicyElementPolicyIdentity             INTEGER,
       authDataPolicyElementPolicyAuthAttrType         INTEGER,
       authDataPolicyElementPolicyAuthAttrSubType      INTEGER
       }

   authDataPolicyElementPccId OBJECT-TYPE
       SYNTAX  InstanceID
       STATUS  current
       DESCRIPTION
               "An arbitrary integer index that uniquely identifies
                an instance of the AuthDataPolicyElement class."

       ::= { authDataPolicyElementEntry 1 }


   authDataPolicyElementPolicySetId OBJECT-TYPE
       SYNTAX  TagID
       STATUS  current
       DESCRIPTION
               " This associates a set of authentication attributes."

       ::= { authDataPolicyElementEntry 2 }



   authDataPolicyElementPolicyIdentity OBJECT-TYPE
       SYNTAX  INTEGER{
                       AUTH_USER(1),
                       AUTH_APP(2)
               }
       STATUS  current
       DESCRIPTION
               " Identifies the Policy Set Element via enumeration
```

```
                values:
                      (2) AUTH_USER
                      (3) AUTH_APP  "
```

```
        ::= { authDataPolicyElementEntry 3 }


   authDataPolicyElementPolicyAuthAttrType OBJECT-TYPE
        SYNTAX  INTEGER {
                        POLICY_LOCATOR(1),
                        CREDENTIAL(2),
                        DIGITAL_SIGNATURE(3),
                        POLICY_ERROR_object(4)
                }
        STATUS  current
        DESCRIPTION
                " Enumeration values:
                  (1) POLICY_LOCATOR (valid for both AUTH_USER  and
                      AUTH_APP)
                  (2) CREDENTIAL (valid for both AUTH_USER and
                      AUTH_APP)
                  (3) DIGITAL_SIGNATURE
                  (4) POLICY_ERROR_OBJECT  "

        ::= { authDataPolicyElementEntry 4 }

   authDataPolicyElementPolicyAuthAttrSubType OBJECT-TYPE
        SYNTAX  INTEGER {
                        NO_TYPE(0),
                        ASCII_DN(1),
                        UNICODE_DN(2),
                        ASCII_DN_ENCRYPT(3),
                        UNICODE_DN_ENCRYPT(4),
                        ASCII_ID(5),
                        UNICODE_ID(6),
                        KERBEROS_TKT(7),
                        X509_CERT(8),
                        PGP_CERT(9),
                        NO_MORE_INFO(10),
                        UNSUPPORTED_CRED_TYPE(11),
                        INSUFFICIENT_PRIVS(12),
                        EXPIRED_CREDENTIAL(13),
                        IDENTITY_CHANGED(14)
                }
        STATUS  current
        DESCRIPTION
                " For POLICY_LOCATOR valid enumeration values are:
                       (1)  ASCII_DN (valid for both AUTH_USER and
                            AUTH_APP)
                       (2)  UNICODE_DN (valid for both AUTH_USER and
                            AUTH_APP)
                        (3) ASCII_DN_ENCRYPT
```

(4) UNICODE_DN_ENCRYPT

For CREDENTIAL valid enumeration values are:

(5) ASCII_ID (valid for both AUTH_USER and AUTH_APP)

```
                        (6)  UNICODE_ID (valid for both AUTH_USER and
                             AUTH_APP)
                         (7) KERBEROS_TKT
                         (8) X509_V3_CERT
                         (9) PGP_CERT

                  For DIGITAL_SIGNATURE:
                         Sub-Type set to 0

                  For POLICY_ERROR_OBJECT valid enumeration values are:
                         (10) ERROR_NO_MORE_INFO
                         (11) UNSUPPORTED_CREDENTIAL_TYPE
                         (12) INSUFFICIENT_PRIVILEGES
                         (13) EXPIRED_CREDENTIAL
                         (14) IDENTITY_CHANGED "

       ::= { authDataPolicyElementEntry 5 }


   --
   -- Priority Preemption Policy Element Table
   --

   priorityPreemptionPolicyElementTable OBJECT-TYPE
        SYNTAX  SEQUENCE OF PriorityPreemptionPolicyElementEntry
        PIB-ACCESS      install-notify,5
        STATUS          current
        DESCRIPTION
                "This table defines policy control for priority
                 preemption."

        ::= { rsvpPccBaseClasses 7 }


   priorityPreemptionPolicyElementEntry OBJECT-TYPE
        SYNTAX  PriorityPreemptionPolicyElementEntry
        STATUS  current
        DESCRIPTION
                " An entry defines the specific preemption priority to
                  admit the flow and the defending priority. "

        PIB-INDEX {  priorityPreemptionPolicyElementPccId }
        UNIQUENESS {
                     priorityPreemptionPolicyElementMergeStrategy,
                     priorityPreemptionPolicyElementPreemptionPriority,
                     priorityPreemptionPolicyElementDefendingPriority
          }

        ::= { priorityPreemptionPolicyElementTable 1 }
```

```
   PriorityPreemptionPolicyElementEntry ::= SEQUENCE {
        priorityPreemptionPolicyElementPccId            InstanceId,
```

```
        priorityPreemptionPolicyElementMergeStrategy       INTEGER,
        priorityPreemptionPolicyElementPreemptionPriority  INTEGER,
        priorityPreemptionPolicyElementDefendingPriority   INTEGER
    }

    priorityPreemptionPolicyElementPccId OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                "An arbitrary integer index that uniquely identifies
                 an instance of the PriorityPreemptionPolicyElement
                 class."

        ::= { priorityPreemptionPolicyElementEntry 1 }


    priorityPreemptionPolicyElementMergeStrategy OBJECT-TYPE
        SYNTAX  INTEGER {
                        HIGHEST_QOS(1),
                        HIGHEST_PRIORITY(2),
                        ERROR_ON_MERGE(3)
                }
        STATUS  current
        DESCRIPTION
                " Defines the merging strategy for the flow. The
                  Enum values are:
                  (1)  take priority of highest QoS
                  (2)  take highest priority
                  (3)  force an error on heterogeneous merge"

        ::= { priorityPreemptionPolicyElementEntry 2 }


    priorityPreemptionPolicyElementPreemptionPriority OBJECT-TYPE
        SYNTAX  INTEGER
        STATUS  current
        DESCRIPTION
                " Defines the value of the new reservation that is
                  compared against the defending priorities of existing
                  flows. A higher value represents a higher priority."

        ::= { priorityPreemptionPolicyElementEntry 3 }


    priorityPreemptionPolicyElementDefendingPriority OBJECT-TYPE
        SYNTAX  INTEGER
        STATUS  current
        DESCRIPTION
                " The value defined for an existing flow to defend its
```

```
                priority against a new reservation seeking admission.
                The higher value represents higher priority."

        ::= { priorityPreemptionPolicyElementEntry 4 }
```

```
   --
   --Intsrv to Diffserv Interworking Function Table
   --

   pccIwfTable OBJECT TYPE
        SYNTAX SEQUENCE OF PccIwfEntry
        PIB-ACCESS      Install
        STATUS          current
        DESCRIPTION
                  ôThis table defines the attributes used for the
                   interworking between the RSVP process in the
                   control plane and Differentiated Services in the
                   data plane.ö

        ::= {rsvpPccBaseClasses  8}

   pccIwfEntry OBJECT TYPE
        SYNTAX          PccIwfEntry
        STATUS          current
        DESCRIPTION
                   ôDefines the attributes for Intsrv and Diffserv
                    interworking.ö
        PIB-INDEX {pccIwfId}

        ::= {pccIwfTable 1}

   PccIwfEntry  ::= SEQUENCE {
        pccIwfId           InstanceID,
        pccIwfIntSrvClass  Integer 32,
        pccIwfDSCP         Integer 32,
        pccIwfOutOfProfile Integer 32,
        pccIwfRemarkvalue  Integer 32,
        pccIwfScheduler    Integer 32
        }

   pccIwfId OBJECT-TYPE
         SYNTAX  InstanceId
         STATUS  current
         DESCRIPTION
                  ôThis is the unique identifier of the iwfTable
                   entry.ö
        ::= { pccIwfEntry 1}

   pccIwfIntSrvClass OBJECT-TYPE
         SYNTAX  Integer 32
         STATUS  current
         DESCRIPTION
                  ôThe value of the Intsrv Class associated with
```

```
                the attributes of this specific interworking function
                entry. It must have a corresponding bit set in
                pccACPoolISClass.ö
        ::= { pccIwfEntry 2}
```

```
   pccIwfDSCP  OBJECT-TYPE
         SYNTAX Integer 32
         STATUS current
         DESCRIPTION
                  ôThe Value of the DSCP to assign the data stream
                   for the session with the IntSrv class type
                   matching the value of the pccIwfIntSrvClass.
                   Value range is 0 û 63.ö
         ::= { pccIwfEntry 3}

   pccIwfOutOfProfile
         SYNTAX Integer 32
         STATUS current
         DESCRIPTION
                  ôThis indicates the behavior when the data stream
                   is out of profile. This value overrides any other
                   configured profile such as that defined in the
                   MeterTableEntry. The value of 0 indicates that
                   this attribute is ignored for this entry. A value
                   of 1 indications the out of profile packet is
                   dropped. A value of 2 indicates the out of profile
                   packet DSCP is remarked with the value
                   pccIwfRemarkValue.ö
         ::= {pccIwfEntry 4}
   pccIwfRemark
         SYNTAX Integer 32
         STATUS current
         DESCRIPTION
                  ôThis is the value of the DSCP to remark an out of
                   profile packet. This value is only used if the
                   pccIwfOutOfProfile has a value of 2.ö
           ::= {pccIwfEntry 5}
    pccIwfScheduler
         SYNTAX Integer 32
         STATUS current
         DESCRIPTION
                  ôThis is the value that identifies the scheduler
                   to be used  by the data streams of sessions with an
                   IntSrv class matching the value of the attribute
                  pccIwfIntSrClass.ö
          ::= {pccIwfEntry 5}


   --
   --Admission Control Virtual Pool Table
   --
```

```
   pccACVirPoolTable OBJECT TYPE
        SYNTAX SEQUENCE OF PccACVirPoolEntry
        PIB-ACCESS      Install
        STATUS          current
        DESCRIPTION
```

```
                ôThis table defines the virtual pool used by the RSVP
   process during admission contro. ö

        ::= {rsvpPccBaseClasses  9}

   pccACVirPoolEntry OBJECT TYPE
        SYNTAX          PccACVirPoolEntry
        STATUS          current
        DESCRIPTION
                   ôDefines the attributes for the Intsrv virtual pool.ö
        PIB-INDEX {pccACVirPoolId}

        ::= {pccACVirPoolTable 1}

   PccACVirPoolEntry  ::= SEQUENCE {
        pccACVirPoolId           InstanceID,
        pccACVirPoolInterface    SNMP string,
        pccACVirPoolDirection     Integer32,
        pccACVirPoolIntSrvClass   BITS,
        pccACVirPoolMaxAbsRate    Unsigned32,
        pccACVirPoolAcceptResv    Integer32
        }

   pccACVirPoolId OBJECT-TYPE
         SYNTAX  InstanceId
         STATUS  current
         DESCRIPTION
                  ôThis is the unique identifier of the pccACVirPool
                   entry.ö
        ::= { pccACVirPoolEntry 1}

   pccACVirPoolInterface OBJECT-TYPE
         SYNTAX  SNMP string
         STATUS  current
         DESCRIPTION
                  ôThe SNMP string identifies the logical interface
                   associated with the Admission Control Virtual
                   Pool entry.ö
         ::= { pccACVirPoolEntry 2}

   pccACVirPoolDirection  OBJECT-TYPE
         SYNTAX Integer32
         STATUS current
         DESCRIPTION
                   ôThis attribute indicates the relationship of the
                    traffic stream to the interface. The traffic
                    stream is either inbound (1) or outbound (2). An
                    upstream virtual pool has an inbound Direction
```

```
                    and a downstream virtual pool has a Direction of
                    outbound.ö
          ::= { pccACVirPoolEntry 3}

   pccACVirPoolIntSrvClass  OBJECT-TYPE
```

```
        SYNTAX BITS
        STATUS current
        DESCRIPTION
                ôThe bit string indicates the IntSrv class or
                 classes that have resources allocated from this
                 virtual pool by admission control.
                 Value range is 0 û 63.ö
        ::= { pccACVirPoolEntry 4}

   pccACVirPoolMaxAbsRate
        SYNTAX Unsigned32
        STATUS current
        DESCRIPTION
                ôThis is the maximum absolute rate in kilobits
                 that this pool may allocate to the IntSrv
                 sessions defined by the
                 pccACVirtPoolIntSrvClass.ö
        ::= {pccACVirPoolEntry 5}

   pccACVirPoolAcceptResv
        SYNTAX Integer 32
        STATUS current
        DESCRIPTION
                ôThis value indicates whether the RSVP admission
                 control is to accept RSVP RESV request for the
                 IntSrv flows belonging to the IntSrv classes
                 defined by pccACVirPoolIntSrvClass.ö
          ::= {pccACVirPoolEntry 6}


   --
   --Edge Point Identification Table
   --

   pccEdgeTable OBJECT TYPE
        SYNTAX SEQUENCE OF PccEdgeEntry
        PIB-ACCESS      Install
        STATUS          current
        DESCRIPTION
                ôThis table defines the attributes used to identify
                 the receiver domain. Admission control performs the
                 upstream resource check when the RSVP Session Object
                 matches one of the entries in this table.ö

        ::= {rsvpPccBaseClasses  10}

   pccEdgeEntry OBJECT TYPE
        SYNTAX          PccEdgeEntry
```

```
        STATUS          current
        DESCRIPTION
                   ôDefines the attributes for identifying the
                    receiver domain edge that invokes upstream
                    Admission control in addition to downstream
```

```
                    Admission control.ö
          PIB-INDEX {pccEdgeId}

          ::= {pccEdgeTable 1}

   PccEdgeEntry  ::= SEQUENCE {
          pccEdgeId           InstanceID,
          pccAddrType         INET Address Type,
          pccEdgeAddr         INET Address,
          pccEdgeMask         Unsigned 32,
          }

   pccEdgeId OBJECT-TYPE
          SYNTAX  InstanceId
          STATUS  current
          DESCRIPTION
                   ôThis is the unique identifier of the pccEdgeTable
                    entry.ö
          ::= { pccEdgeEntry 1}

   pccEdgeAddrType OBJECT-TYPE
          SYNTAX    INET Address
          STATUS    current
          DESCRIPTION
                   ôThis is the enumerated value specifying the type
                    of address (IPv4 or Ipv6) as defined in RFC 2851.ö
          ::= { pccEdgeEntry 2}

   pccEdgeAddr OBJECT-TYPE
          SYNTAX  INET Address
          STATUS  current
          DESCRIPTION
                   ôWhen the value of this address matches the RSVP
                    Session Object Destination Address, it indicates
                    a that the session receiver is downstream and that
                    the upstream admission control should be performed.ö
          ::= { pccEdgeEntry 3}

   pccEdgeAddrMask OBJECT-TYPE
          SYNTAX  unsigned 32
          STATUS  current
          DESCRIPTION
                   ôThe length of the mask for matching th eaddress.ö
          ::= { pccEdgeEntry 4}


   --
   -- The Policy Control Criteria Session Statistics usage
   --
```

```
   pccSessionStatsUsageTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF PccSessionStatsUsageEntry
        PIB-ACCESS      report
```

```
        STATUS          current
        DESCRIPTION
                "This class defines the session statistics. It contains
                the PRID of the linkage instance associating the
                selection criteria instance with the usage instance."

        ::= {rsvpPccBaseClasses  11}

   pccSessionStatsUsageEntry OBJECT-TYPE
        SYNTAX          PccSessionStatsUsageEntry
        STATUS          current
        DESCRIPTION
                "Defines the attributes the PEP is to monitor,
                 record and report."
        PIB-INDEX {pccSessionStatsUsageId}


        ::= {pccSessionStatsUsageTable 1}

   PccSessionStatsUsageEntry ::= SEQUENCE {
         pccSessionStatsUsageId          InstanceID,
         pccSessionStatsUsageStart       ExtUTCTime,
         pccSessionStatsUsageEnd         ExtUTCTime
     }

   pccSessionStatsUsageId          OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                "An arbitrary integer index that uniquely identifies an
                 instance of the pccSessionStatsUsage class."

        ::= { pccSessionStatsUsageEntry 1 }

   pccSessionStatsUsageStart OBJECT-TYPE
        SYNTAX   ExtUTCTime
        STATUS       current
        DESCRIPTION
                   "The timestamp when the reservation was successfully
                    allocated."

        ::= { pccSessionStatsUsageEntry 2}

   pccSessionStatsUsageEnd OBJECT-TYPE
        SYNTAX   ExtUTCTime
        STATUS       current
        DESCRIPTION
                   "The timestamp when the reservation was ended. This
                    could be due to reservation tear down, an error or
```

```
                    time out condition"

        ::= { pccSessionSatsUsageEntry 3}
```

```
   -- The Policy Control Criteria Allocated Usage Table
   --

   pccAllocatedUsageTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF PccAllocatedUsageEntry
        PIB-ACCESS      report
        STATUS          current
        DESCRIPTION
                "This class records the traffic specification allocated
                to a session. It contains the PRID of the linkage
                instance associating the selection criteria instance
                with the usage instance."

        ::= {rsvpPccBaseClasses  12}

   pccAllocatedUsageEntry OBJECT-TYPE
        SYNTAX          PccAllocatedUsageEntry
        STATUS          current
        DESCRIPTION
                "Defines the attributes the PEP is to monitor, record
                 and report."
        PIB-INDEX {pccAllocatedUsageId}

        ::= { pccAllocatedUsageTable 1}

   PccAllocatedUsageEntry  ::= SEQUENCE {
        pccAllocatedUsageId                        InstanceId,
        pccAllocatedIntsrvClass                    Integer32,
        pccAllocatedUsageBucketRate                BitRate,
        pccAllocatedUsageBucketSize                Unsigned32,
        pccAllocatedUsagePeakRate                  BurstRate,
        pccAllocatedUsageMinPolicedUnit            MessageSize,
        pccAllocatedUsageMaxPacketSize             MessageSize
        pccAllocatedUsageLimitsRate                BitRate,
        pccAllocatedUsageSlackTerm                 Unsigned32
   }


   pccAllocatedUsageId OBJECT-TYPE
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                "An arbitrary integer index that uniquely identifies an
                 instance of the PpcAllocatedUsage class."

        ::= { pccAllocatedUsageEntry 1 }

   pccAllocatedIntsrvClass OBJECT-TYPE
```

```
        SYNTAX Integer32
        STATUS current
        DESCRIPTION
                ôThe Intsrv Class associated with the session.ö
```

```
        ::= { pccAllocatedUsageEntry 2 }

   pccAllocatedUsageBucketRate OBJECT-TYPE
        SYNTAX  BitRate
        STATUS  current
        DESCRIPTION
                " 'r' bytes per second, the token bucket rate. "

        ::= { pccAllocatedUsageEntry 3 }


   pccAllocatedUsageBucketSize OBJECT-TYPE
        SYNTAX  Unsigned32
        STATUS  current
        DESCRIPTION
                " 'b' bucket depth in bytes, the token bucket size. "

        ::= { pccAllocatedUsageEntry 4 }


   pccAllocatedUsagePeakRate OBJECT-TYPE
        SYNTAX  BurstSize
        STATUS  current
        DESCRIPTION
                " 'p' peak traffic data rate in bytes. "

        ::= { pccAllocatedUsageEntry 5 }


   pccAllocatedUsageMinPolicedUnit OBJECT-TYPE
        SYNTAX  MessageSize
        STATUS  current
        DESCRIPTION
                " 'm' minimum policed unit - size in bytes of
                  application data and all IP and greater level (UDP,
                  RTP, TCP, etc.) headers. "

        ::= { pccAllocatedUsageEntry 6 }


   pccAllocatedUsageMaxPacketSize OBJECT-TYPE
        SYNTAX  MessageSize
        STATUS  current
        DESCRIPTION
                " 'M' maximum packet size - biggest packet that conforms
                  to traffic specification. "
        ::= { pccAllocatedUsageEntry 7 }
```

```
   pccAllocatedUsageLimitsRate OBJECT-TYPE
        SYNTAX  BitRate
        STATUS  current
```

```
        DESCRIPTION
                " Limit Rate. Must be greater than or equal to rate for
                  the flow "

        ::= { pccAllocatedUsageEntry 8 }



   pccAllocatedUsageSlackTerm OBJECT-TYPE
        SYNTAX  Unsigned32
        STATUS  current
        DESCRIPTION
                " 'S' - Slack Term. Defines in microseconds the
                  difference between desired delay and the delay
                  attained with the reservation level of R"



        ::= { pccAllocatedUsageEntry 9 }

   --
   --Virtual Pool Usage Table
   --

   pccPoolUsageTable OBJECT TYPE
        SYNTAX SEQUENCE OF PccPoolUsageEntry
        PIB-ACCESS      Install
        STATUS          current
        DESCRIPTION
                  ôThis table tracks and reports the current total
                   of resources consumed by Intsrv flows for a
                   specific virtual pool.ö

        ::= {rsvpPccBaseClasses  13}

   pccPoolUsageEntry OBJECT TYPE
        SYNTAX          PcPoolUsageEntry
        STATUS          current
        DESCRIPTION
                    ôDefines the attributes for tracking the current
                     total of resources used by Intsrv flows for a
                     virtual pool.ö
        PIB-INDEX {pccPoolUsageId}

        ::= {pccPoolUsageTable 1}

   PccPoolUsageEntry  ::= SEQUENCE {
        pccPoolUsageId           InstanceID,
        pccPoolUsagePoolId        PRID,
```

```
        pccPoolUsageAbsRateInUse Unsigned32
        }

   pccPoolUsageId OBJECT-TYPE
```

```
        SYNTAX  InstanceId
        STATUS  current
        DESCRIPTION
                ôThis is the unique identifier of the
                 pccPoolUsage Table entry.ö
       ::= { pcPoolUsageEntry 1}

   pccPoolUsagePoolId OBJECT-TYPE
        SYNTAX  PRID
        STATUS  current
        DESCRIPTION
                ôThis is the prid of the pccACVirPoolTable entry
                 that is being tracked.ö
       ::= { pcPoolUsageEntry 2}

   pccPoolUsageAbsRateInUse OBJECT-TYPE
        SYNTAX    Unsigned32
        STATUS    current
        DESCRIPTION
                ôThis is the current total of resources used
                 by Intsrv flows for the virtual pool identified
                 by the pccPoolUsagePoolId.ö
       ::= { pccPoolUsageEntry 3}

   pccPoolUsgeAbsRateInUseThreshold OBJECT-TYPE
        SYNTAX    Unsigned32
        STATUS    current
        DESCRIPTION
                ô This value is associated with the
                  pccPoolUsageAbsRateInUse and defines the feedback
                  threshold for this usage that results in the
                  instance being reported to the PDP. This value is
                  only used if the linkage entry is set to thresholdö
        ::= { pccPoolUsageEntry 4 }

   END
```

5 Security Considerations

"..The use of IPSEC between the PDP and the PEP, as described in [2748], provides the necessary protection against security threats. However, even if the network itself is secure, there is no control as to who on the secure network is allowed to "Install/Notify" (read/change/create/delete) the PRIs in this PIB. It is then a customer/user responsibility to ensure that the PEP/PDP giving access to an instance of this PIB, is properly configured to give access to the PRIs only to those principals (users) that have legitimate

rights to indeed "Install" or "Notify" (change/create/ delete) them "
[POLFRWK]

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8 References

[2748] Boyle, J., Cohen, R., Durham, D., Herzog, S., Rajan, R., and A. Sastry, "The COPS (Common Open Policy Service) Protocol" RFC 2748, January 2000.

[3084] K. Chan, D. Durham, S. Gai, S. Herzog, K. McCloghrie, F. Reichmeyer, J. Seligson, A. Smith, R. Yavatkar, "COPS Usage for Policy Provisioning," RFC 3084, March 2001.

[SPPI] K. McCloghrie, et.al., "Structure of Policy Provisioning Information," draft-ietf-rap-sppi-02.txt, October 2000.

[POLFRWK] M. Fine, K. McCloghrie, J. Seligson, K. Chan, S. Hahn, A. Smith, F. Reichmeyer "Framework Policy Information Base", Internet Draft, November 2000

[FEEDBKFRPIB] D. Rawlins, A. Kulkarni, K. Chan, D. Dutt, " Framework of COPS-PR Policy Information Base for Accounting Usage", draft-ietf-rap-feedback-fr-pib-01.txt, November 2001

[2749] Herzog, S., Boyle J., Cohen, R., Durham, D., Rajan, R., Sastry, A., "COPS usage for RSVP" RFC 2749, January 2000

[2750] Herzog, S., "COPS Extensions for Policy Control" RFC 2750, January 2000.

[2751] Herzog, S., "Signal Priority Preemption Policy Element" RFC 2751, January 2000.

[2752] Yadav, S., Yavatkar, R., Pabbati, R., Ford, P., Moore, T. Herzog, S. "Identity Representation for RSVP" RFC 2752, January 2000.

[2753] Yavatkar, R., Pendarakis, D., Guerin, R., "A Framework for Policy-based Admission Control" RFC 2753, January 2000.

[2872] Bernet, Y., Pabbati, R., "Application and Sub Application Identity Policy Element for Use with RSVP" RFC 2872, June 2000.

[2205] Braden, R., Zhang, L., Berson, S., Herzog, S., Jamin, S., "Resource ReSerVation Protocol (RSVP)" RFC2205, September 1997.

[2210] Wroclawski, J., "The Use of RSVP with IETF Integrated Services", RFC2210, September 1997.

[2211] Wroclawski, J., "Specification of the Controlled-Load Network Element Service", RFC2211, September 1997.

[2212] Shenker, S., Partridge, C., Guerin, R., "Specification of Guaranteed Quality of Service", RFC2212, September 1997.

[2215] Shenker, S., Wroclawski, J.," General Characterization Parameters for Integrated Service Network Elements", RFC2215, September 1997.

[2998] Bernet, Y., et al, ôIntegrated Services over Diffserv Networksö, RFC 2998, November 2000.

[EdgeAdmCtl] D. Rawlins, L. Yao, D. McDysan, ôEdge Based Admission Control with Class Based Resource Managementö, draft-rawlins-admctl-ds-mgt-00.txt, November 2001.