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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Resource control protocols

**Resource control protocol No. 3 – Protocol at
the interface between a Policy Decision Physical
Entity (PD-PE) and a Policy Enforcement
Physical Entity (PE-PE): COPS alternative**

ITU-T Recommendation Q.3303.1

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ITU-T Recommendation Q.3303.1

Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE): COPS alternative

Summary

ITU-T Recommendation Q.3303.1 specifies the resource control protocol No. 3 (rcp3) COPS profile at the Rw interface, i.e., between the Policy Decision Physical Entity (PD-PE) and the Policy Enforcement Physical Entity (PE-PE) in the Resource and Admission Control Function block. This protocol profile allows the final admission policy decisions to be installed (either push or pull mode) to a PE-PE from a PD-PE, supports resource control for both fixed and mobile networks and supports the NAPT Control and NAT Traversal at PE-PEs as needed. It satisfies the requirements for information flows across the Rw reference point as specified in clause 8.2 of ITU-T Rec. Y.2111.

Source

ITU-T Recommendation Q.3303.1 was approved on 6 August 2007 by ITU-T Study Group 11 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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ITU-T Recommendation Q.3303.1

Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE): COPS alternative

1 Scope

This Recommendation provides the Stage 3 technical specifications for the COPS profile at the interface between the policy decision physical entity (PD-PE) and the policy enforcement physical entity (PE-PE). The functional requirements and the stage 2 specifications for this interface are contained in clause 8.2 of [ITU-T Y.2111]. This protocol profile allows the final admission decisions to be installed (either push or pull mode) to PE-PE from PD-PE, supports the resource control for both fixed and mobile networks and supports the NAPT control and NAT traversal at PE-PE as needed.

This Recommendation provides resource control procedure, protocol profile, message and the definition and application of the policy information base.

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 Y.2012] ITU-T Recommendation Y.2012 (2006), *Functional requirements and architecture of the NGN release 1*.
- [ITU-T Y.2111] ITU-T Recommendation Y.2111 (2006), *Resource and admission control functions in Next Generation Networks*.
- [IETF RFC 2748] IETF RFC 2748 (2000), *The COPS (Common Open Policy Service) Protocol*.
- [IETF RFC 3084] IETF RFC 3084 (2001), *COPS Usage for Policy Provisioning (COPS-PR)*.
- [IETF RFC 3159] IETF RFC 3159 (2001), *Structure of Policy Provisioning Information (SPPI)*.
- [IETF RFC 3291] IETF RFC 3291 (2002), *Textual Conventions for Internet Network Addresses*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the term "client handle" from [IETF RFC 2748] and the term "policy information base" from [IETF RFC 3084].

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 COPS connection: The term "connection" is used in this Recommendation to refer to a COPS signalling relationship established between the PD-PE acting as a COPS policy decision point (PDP) and the PE-PE acting as a COPS policy enforcement point (PEP).

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

3.2.3 policy enforcement physical entity (PE-PE): The PE-PE is an implemented instance of the policy enforcement functional entity (PE-FE) as defined in [ITU-T Y.2111].

3.2.4 flow ID: It is an identifier for the individual media flow within a session.

NOTE – Usually, the flow ID is created by the PD-PE.

3.2.5 flow information: It describes the features of the media flow (e.g., filter and filter status) as specified in clause 9.3.

3.2.6 traffic information: It describes the features of the media flow (e.g., peak bandwidth, average bandwidth, and max package length) as specified in clause 9.4.

3.2.7 label stack: Label stack is used to record the MPLS network path for the bearer network designed with the MPLS technology. The information contained in the stack is the labels through a path; LIFO algorithm is used.

3.2.8 connection information: It describes the core network ingress/egress path information at the PE-PE for a media flow (e.g., label stack or VLAN Id as specified in clause 9.5).

3.2.9 user priority: User priority is classified into eight grades in this Recommendation.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

CAR	Committed Access Rate
COPS	Common Open Policy Service
COPS-PR	COPS usage for Policy Provisioning
CPE	Customer Premises Equipment
CPERR	PRC Class Provisioning Error
DEC	Decision
DEC Install	Decision Install message
DEC Remove	Decision Remove
Diff-Serv	Differentiated Services
DSCP	Differentiated Services Code Point
EPD	Encoded Provisioning Instance Data
GPERR	Global Provisioning Error
GPRS	General Packet Radio Service
IP	Internet Protocol
LIFO	Last In First Out
LSP	Label Switched Path

MAC	Media Access Control
MPLS	Multi-Protocol Label Switching
NACE	Network Attachment Control Entity
NAPT	Network Address Port Translation
NAT	Network Address Translation
PDP	Policy Decision Point
PD-PE	Policy Decision Physical Entity
PEP	Policy Enforcement Point
PE-PE	Policy Enforcement Physical Entity
PIB	Policy Information Base
PRC	Provisioning Class
PRID	Provisioning Instance Identifier
QinQ	802.1Q in 802.1Q
QoS	Quality of Service
REQ	REQuest message
RPT	RePorT state message
RTCP	RTP Control Protocol
RTP	Real Time Protocol
SCE	Service Control Entity
SPPI	Structure of Policy Provisioning Information
TRC-PE	Transport Resource Control Physical Entity
UDP	User Datagram Protocol
UE	User Equipment
UMTS	Universal Mobile Telecommunications System
VLAN	Virtual Local Area Network

5 Conventions

None.

6 Resource control procedures

6.1 SCE-requested resource control procedures

6.1.1 Procedures at the PD-PE

6.1.1.1 Session initiation

6.1.1.1.1 Transport subscription profile verification

The PD-PE shall verify the transport subscription profile received from the NACE using the globally unique IP address information or transport user identifier as the index.

The PD-PE shall derive the QoS class, reservation priority, and maximum uplink/downlink bandwidth based on the Resource Requestor Identifier, Resource Request Priority and Media Profile of the Resource Initiation Request received from the SCE, and verify the transport subscription profile to which the request applies for each IP media flow. In this verification process the derived parameters shall match the information obtained from NACE. If the transport subscription profile does not contain any data, the PD-PE shall apply a default profile to the request.

6.1.1.1.2 Transport resource detection and admission

The PD-PE shall request the TRC-PE for transport resource availability detection and an admission decision and shall utilize the result of resource admission decision for the policy decision.

6.1.1.1.3 Initial policy decisions

The PD-PE shall make initial policy decisions for all IP media flows conveyed by the Resource Initiation Request from the SCE based on all information, including:

- service information received from the SCE;
- transport subscription profile;
- service-based network policies;
- transport resource availability and admission decision information received from the TRC-PE.

An initial request can be admitted by the PD-PE for all IP media flows in the session, if all conditions are satisfied. If the request is admitted, the PD-PE shall send a Resource Initiation Response back to the SCE and include a successful Resource Request Result code. Otherwise, the PD-PE may include the available resource information in the Resource Initiation Response if the reason of failed authorization is the insufficient resource.

The PD-PE will process simultaneous requests from SCE based on the priority level specified in the Resource Request Priority, which is also sent to the PE-PE. If the Resource Request Priority is not specified, the requested priority is set to the default value.

The PD-PE will create a group of provisioning instances for each IP media flow in the session and request installation in the PE-PE by issuing a DEC message to the PE-PE. The details of the DEC message is described in clause 8.2. The PD-PE is notified that the decision has been carried out successfully, or failed, in the PE-PE.

In addition, the policy decisions shall contain the following information:

- *IP media flow description*

The PD-PE shall derive the uplink and downlink packet classifiers from the IP addresses and port numbers for uplink and downlink IP flows provided by the SCE. The PD-PE shall not modify the address and port information received from the SCE.
- *QoS information*

The QoS information (consisting of maximum QoS class and bandwidth requirements, etc.) for IP media flows is extracted from the Media Profile received from the SCE, e.g., from the Type of Service, Media Priority, bandwidth and Resource Requestor Identifier.

The PD-PE may select the QoS class that is the highest class applicable for the media. The PD-PE shall use the same QoS class for both the uplink and the downlink directions when both directions are used. The selection of network class is also dependent on network policies.

The PD-PE shall authorize the contained bandwidth value in the Resource Initiation Request received from the SCE according to network policies, transport subscription profile and resource availability. By default, the bandwidth value contains all overhead from the IP layer and the upper layers, e.g., IP, UDP, RTP and RTP payload by default.

– *Resource control actions*

Based on the Flow Status in the Resource Initiation Request received from the SCE, the PD-PE shall decide resource control actions, either Reservation only or ReservationandCommitment together.

The Reservation only action requests the PE-PE to enforce the initial policy decisions (e.g., reserve the authorized bandwidth) without passing the packets. It is used when the *RwFlowInfoFilterStatus* attribute of *RwFlowInfoEntry* is "closed". The ReservationandCommitment action requests the PE-PE to enforce the initial policy decisions (e.g., reserve the authorized bandwidth) and pass the packets. It is used when the *RwFlowInfoFilterStatus* attribute of *RwFlowInfoEntry* is "open".

The *RwFlowInfoEntry* instance in the DEC message indicates the resource control action for each individual IP media flow or group of IP media flows if needed and applicable.

– *Path selection information*

The PD-PE locates core networks that are involved to offer the requested QoS resource and the PE-PE instances that are involved to enforce the final admission decisions based on the information including service information received from the SCE, access information from NACE, and service-based network policies involved in the PD-PE. The path between ingress and egress points is selected by the TRC-PE. The PD-PE may send the path selection information for a media flow received from TRC-FE to ingress and egress PE-PEs in a DEC message.

Path selection information is based on the bear network technology. It will be the information of LSP if MPLS is employed; else it will be the VLAN ID information.

– *NAT traversal and NATP information*

In order to request the address latching and address translation operations in the PE-PE, when hosted NAT traversal is detected by the SCE, the PD-PE will include in the information sent to the PE-PE the type of NAT and/or latching indication, together with the address information of each flow terminated in the access and core network.

– *Firewall working mode selection information*

Based on the service information provided by the SCE, the PD-PE shall facilitate the appropriate dynamic firewall working mode selection. The PD-PE push the dynamic firewall working mode selection for a media flow to the PE-PE on the *Rw* interface. Four packet inspection modes could be identified (static packet filtering, dynamic packet filtering, stateful inspection, deep packet inspection). The PE-PE shall inspect and drop packets based on security policy rules and gates which are received from the PD-PE.

6.1.1.2 Session modification

Upon receipt of the Resource Modification Request from the SCE with modified service information or local triggers due to network policies, configuration and conditions, the PD-PE shall perform the transport subscription verification and transport resource detection and admission, and update the policy decision as described in clauses 6.1.1.1.1 to 6.1.1.1.3 for all new/modified media components, based on the state information stored locally.

The updated policy decision is sent to the PE-PE using a DEC message with an existing Client Handle, which contains the install decisions.

Depending on the value of the Flow Status received from the SCE, the PD-PE shall interpret the session modification as one of following:

- 1) modification of requested resources;
- 2) commitment of requested resources;
- 3) removal of requested resources.

The modification of requested resources may request the addition of IP media flows or the modification of the attributes of existing IP media flows (e.g., bandwidth and/or the lifetime of a resource control session in case of soft-state reservation) without passing through the packets (i.e., the gate is closed). When an IP media flow is put on hold, the PD-PE shall retain all session state information and may send the request to the PE-PE for closing the gate. The possible RTCP gate shall be left open to keep the connection alive. The commitment of requested resources may request the allocation/activation of previously reserved resources and/or of additional requested resources (e.g., new media components) and open the gates for all related IP media flows. The removal of requested resources may request the revocation of previously committed and/or reserved resources and close the gates for all related IP media flows.

The corresponding resource control actions shall be included in the updated policy decision according to above modification requests.

6.1.1.3 Session termination

The session termination may be initiated by the PD-PE upon receipt of a termination request from the SCE or triggered by pre-defined static policies inside the PD-PE.

Upon receipt of the Resource Release Request from the SCE, the PD-PE shall release all relevant resources and provisioning instance and send a Remove DEC message with the Decision Flag set to Push-State to the PE-PE in order to revoke any transport plane functions enforced over the Rw interface in the PE-PE as a result of this session.

When session termination is triggered by local policies and conditions, the PD-PE shall release all relevant resources and session state and send an Abort Resource Request to the SCE and delete the request state in the way described in clause 7.2.2 when the request state is originally created by PD-PE, or in section 3.2 of [IETF RFC 3084] when the request state is originally created by PE-PE.

6.1.1.4 Event notification

Based on the Event Notification Indication received from the Rs interface, the PD-PE will send a set of event notification indications to request the PE-PE to notify the event when it happens. The event is specified by the RwEventIndicatorGroup in ITU-T Rw PIB, which includes such event notification as:

- charging correlation exchange (1);
- indication of loss of bearer (2);
- indication of recovery of bearer (3);
- indication of release of bearer (4);
- device overload (5);
- device recover from overload (6).

Extra events can be added.

6.1.2 Procedures at the PE-PE

6.1.2.1 Session initiation

Upon receipt of a DEC message from the PD-PE, the PE-PE shall map them into its local QoS mechanisms, install the initial policing decision and inform the PD-PE if the policy data is installed (Report-Type = 'Success') or not (Report-Type = 'Failure').

When the RwFlowInfoFilterStatus attribute is set to the value "close" in the DEC message, the PE-PE shall install the initial policy decisions without any commitment operations and the gates shall be closed for the related IP media flow. When the RwFlowInfoFilterStatus attribute is set to the value "open" in the initial DEC Install message, the PE-PE shall commit the requested resources

and open the gates for the related IP media flow using the packet filters defined in the `RwFlowInfoFilter` attribute.

When the `RwFlowBasedDecInfoNatAction` attribute is not valued `zeroDotZero`, the PE-PE shall populate the address translation information to `RwFlowDescSingleFlowGroup` and include them in the RPT message to the PD-PE.

The PE-PE shall inspect and drop packets based on security policy rules and gates which are indicated in `RwSingleFlowInfoFirewallmodeIndication` attribute received from the PD-PE.

6.1.2.2 Session modification

Upon receipt of a DEC message with an existing Client Handle from the PD-PE and when the Command-Code in the Decision Flags is "install", the PE-PE will re-install the policy decision. When the Command-Code in the Decision Flags is "install" and the PRID in Named Decision Data object is an existing one, the PE-PE will re-install and update the policy decision.

The PE-PE may perform the following operations:

- Install policy decision for a new IP media flow without committing the requested resources if the `RwFlowInfoFilterStatus` attribute is set to close.
- Install policy decision and commit the requested resources for a new IP media flow if the `RwFlowInfoFilterStatus` attribute is set to open.
- Modify policy decision for an existing IP media flow without committing the requested resources if the `RwFlowInfoFilterStatus` attribute is set to close (e.g., increase or decrease the allocated bandwidth, but the RTCP gate may remain the opening status).
- Modify policy decision and commit the requested resources for an existing IP media flow if the `RwFlowInfoFilterStatus` attribute is set to open (e.g., open the gates with modified bandwidth).
- Commit the requested resources for an existing IP media flow if the `RwFlowInfoFilterStatus` attribute is set to close (e.g., open the gates with reserved bandwidth).
- Revoke the installed policy decisions and release the committed or reserved resources for all related IP media flows which are not included in `RwFlowbasedDecInfoGroup`.

The PE-PE may also disable the commitment of requested resources by closing the gate but retaining the session state information and transport resources if the `RwFlowInfoFilterStatus` attribute is set to close for a prior enabled IP media flow.

6.1.2.3 Session termination

If the session termination is initiated by the PD-PE, upon receipt of Resource Release Request from SCE, the PE-PE shall disable the relevant gates and release the network resource.

6.1.2.4 Event notification

The PE-PE may send a notification to a PD-PE if the event specified by the `RwEventIndicatorGroup` occurs.

When the event notification is unsolicited, it is sent to the PD-PE through a RPT message.

6.1.2.5 Policy enforcement operations

6.1.2.5.1 QoS mapping

When QoS information (e.g., QoS class, peak bandwidth of UL and DL) is received from the PD-PE, the PE-PE shall perform the mapping between the network QoS and the transport QoS by the translation/mapping function, which maps the generic QoS class into the transport QoS class for a specific network technology (e.g., translation into UMTS QoS class for GPRS access networks, or

translation into DiffServ code point for DS-TE enabled MPLS). The mapping rules are subject to relevant standards and to the network operator's local policy (e.g., the table for UMTS QoS mapping). Typically, the mapping rules can be preconfigured in the PE-PE and may be updated via the policy provisioning system or via the Rw interface as needed.

The PE-PE shall decide on a transport bearer to carry the requested traffic based on the matching transport QoS class.

In addition, the PE-PE shall make a selection of an existing transport bearer to allocate the resource for corresponding IP media flows or make a decision to create a new transport bearer for the corresponding IP media flows based on the matching QoS class.

6.1.2.5.2 Gate operation

The policy decision to open or close the gate shall lead to the enabling or disabling of the passage for corresponding IP packets. When the gate is closed, all packets of the related IP flows shall be dropped; when the gate is opened, the packets of the related IP flows are allowed to pass through. The `RwFlowInfoFilterStatus` attribute in the DEC message indicates the resource control action for each individual IP media flow or group of IP media flows if needed and applicable.

Upon receipt of DEC message from the PD-PE for the initiation or modification of a policy decision, the PE-PE shall perform the gate operation for each IP media flow:

- Open the gate for IP flows specified in `RwFlowInfoFilter` if the `RwFlowInfoFilterStatus` attribute is set to open.
- Close the gate if the `RwFlowInfoFilterStatus` attribute is set to close, but the possible RTCP gate may be kept opened.
- Close all relevant gates including the RTCP gate if the Command-Code in the Decision Flags is "remove".

6.1.2.5.3 User plane operation

The PE-PE shall enforce the policy decision of resource control-based "gating" functionality according to additional information received from the PD-PE.

When the policy decision is installed and activated, the PE-PE shall evaluate the packets against IP media flow filters provided by the PD-PE or predefined in static policy rules for all transport bearers in the order of the precedence of the policy decisions or predefined static policy rules.

When a packet matches an IP media flow filter, the policy decisions for that filter shall be applied, such as:

- bandwidth allocation/policing information provided by `RwFlowDirDescFluxInfo` attribute;
- packet marking/remarking information provided by `RwFlowDirDescInfo` attribute;
- NAPT translation and address latching/translation information provided by `RwSingleFlowInfoFlowTermination`, `RwSingleFlowInfoAddressRealm`, `RwSingleFlowInfoLatchingIndication` attributes;
- firewall working mode information provided by `RwSingleFlowInfoFirewallmodeIndication` attribute.

The IP packets shall be transported within the specific transport bearer (e.g., a VLAN, LSP) where the selected policy decision is mapped.

The IP packets that do not match any IP media flow filters provided by the policy decisions shall be silently discarded.

6.2 UE-requested resource control procedures

6.2.1 Procedures at the PD-PE

6.2.1.1 Initial reservation

When the UE requests a transport resource via the transport signalling, the Pull mode shall be employed in support of resource control procedures.

On receipt of a Request from the PE-PE with a new Client Handle, the PD-PE shall send a Resource Action Request to the SCE to retrieve the service information of the flow if the SCE previously requested the QoS initial authorization related to the flow.

The PD-PE shall perform the binding operation to establish the association between the Request and the pre-authorized resource control session or pre-configured policy based on the binding information provided by the request. Detailed bearer binding mechanisms are described in clause 6.2.1.5.

If the request is authorized, the PD-PE should perform the relevant operations described in clauses 6.1.1.1.1 and 6.1.1.1.2. Only when all conditions are satisfied, will the PD-PE create a group of provisioning instances for each IP media flow or each user requested by the PE-PE and send a DEC message with the initial policy decisions and the same Client Handle specified in the REQ message to the PE-PE.

The PD-PE is notified that the decision has been carried out successfully, or failed, in the PE-PE.

6.2.1.2 Session modification

Upon receipt of the Request with an existing Client Handle, the PD-PE shall perform the same reservation procedure as described in clause 6.2.1.1, including a Resource Action Request to the SCE if necessary, the binding operation, transport subscription profile verification and transport resource detection and admission. As a response, the PD-PE shall send a DEC message to the PE-PE with the policy decision for new or modified IP media flows including IP media flow descriptions, QoS information, path selection information and NAT traversal/NAPT information.

Additionally, the PD-PE shall be able to push down updated policy decisions triggered by the SCE or local policies without explicit request of the PE-PE in the Pull mode. The relevant procedures are the same as session modification of Push mode described in clause 6.1.1.2.

Depending on the value of the Flow Status received from the SCE or the RwFlowInfoEntry from the PE-PE through the AA-Request or Request, the PD-PE shall interpret the session modification as one of following:

- 1) modification of requested resources;
- 2) commitment of requested resources;
- 3) removal of requested resources.

The detailed procedures are described in clause 6.1.1.2. For certain access networks, such as GPRS, alternative approaches may be used such as those described in ETSI TS 129 212.

6.2.1.3 Session termination

Upon receipt of a DRQ message from the PE-PE, the PD-PE shall release all relevant resources and session state and notify the termination of this session to the SCE.

6.2.1.4 Event notification

The detailed procedures are described in clause 6.1.1.4.

6.2.1.5 Binding operations

Upon receipt of a Request, the PD-PE shall perform the binding operation to identify the pre-authorized resource control session along with policy decisions. The PD-PE may compare the flow identifier conveyed by the request from the PE-PE with the pre-authorized flow filter information stored in the PD-PE. If more than one flow identifier is included, the PD-PE shall also verify that the media components identified by the flow identifiers are allowed to be transferred in the same UE transport session. The PD-PE may also utilize information such as the user identification, globally unique IP address, etc., to acquire the corresponding policy.

The flow identifier can be provided by the `RwFlowInfoFilter` instance of Request, which includes the source/destination IP addresses and port numbers.

The pre-authorized flow filter in the PD-PE is obtained from the Media Profile of the Resource Initiation Request received from the SCE during the initial authorization.

6.2.2 Procedures at the PE-PE

6.2.2.1 Session initiation

Upon receipt of an initial transport signalling message from the UE for establishing a new UE transport session, the PE-PE shall send a Request message with a new Client Handle.

The PE-PE shall provide flow identifiers to allow the PD-PE to identify the policy decisions to be applied; in addition, it may provide other information such as user identification, the physical and/or logical connection of the access transport network to which the CPE is attached.

6.2.2.2 Session modification

Upon receipt of a transport signalling message from the UE to modify an existing UE transport session, the PE-PE shall send a Request message to the PD-PE with an existing Client Handle.

6.2.2.3 Session termination

When the request state is no longer needed, for example when an interface goes down or when the last transport bearer or IP media flow within an UE transport session is being terminated, the PE-PE shall send a DRQ message with a proper Reason object to inform the PD-PE that the request state specified by the Client Handle is to be deleted.

6.2.2.4 Event notification

The detailed procedures are described in clause 6.1.2.4.

6.2.2.5 Policy enforcement operations

The detailed procedures are described in clause 6.1.2.5.

In addition, the PE-PE may make local decisions based on stored policy decision information of an active UE transport session, when the UE requests for an UE transport session modification via the transport signalling message.

6.2.2.6 Binding operations

The binding operations are performed by the PE-PE to identify the correct PD-PE and subsequently to allow policy decision information to be requested from the PD-PE.

The PE-PE shall determine the IP address of the corresponding PD-PE from information in the transport signalling message received from the UE. The information may include flow identifier or other information such as the user identification, globally unique IP address, etc.

7 Protocol profile specification

7.1 Protocol support

The Rw interface shall conform to the IETF COPS framework as a requirement and guideline for Stage 3 work, and shall also conform to the COPS-PR procedures and data models defined in [IETF RFC 3084].

This Recommendation makes use of a modified version of the COPS protocol specified in [IETF RFC 2748] and [IETF RFC 3084]. The modification is described below. Unless explicitly indicated, the procedures and data models defined in [IETF RFC 3084] are unmodified. The COPS protocol supports a client/server interface between the PD-PE and the PE-PE. The PE-PE serves as a PEP and a Client, and the PD-PE serves as a PDP and a Server.

COPS implementations supporting this Recommendation shall support the COPS client type 0x800c (ITUT-RwPIB) and shall support the PIB defined in Annex A.

7.2 Modifications to COPS-PR

In order to implement push mode operation more efficiently for the ITUT-RwPIB client type, this Recommendation provides a means whereby the PD-PE can create a new state and can also associate that state with a new Client Handle value, both within the same message. The PD-PE can also delete state and corresponding Client Handle values in a COPS DEC message.

A mechanism to assign the client handle in the PD-PE and the PE-PE is required to avoid collisions.

These modifications are implemented by means of new Decision Flag values in the COPS DEC message, as follows:

- The flag value 0x03 is referred to as the "Request-Prefix" flag;
- The flag value 0x04 is referred to as the "Push-State" flag.

7.2.1 Creating new state in push mode

An Install Decision with the Decision Flag set to Push-State and a Client Handle value requests the PE-PE to associate a request state with that Client Handle value as if the PE-PE had explicitly identified it in an REQ message. The Client Handle value concerned must not be one which is currently active at the PD-PE. It is permissible although not recommended to reuse a value which was active in the past but which has been explicitly removed. An aging period in the order of minutes is recommended before reuse of a deactivated Client Handle value.

The DEC message containing the Push-State flag may contain a Named Decision Data object defining state to be associated with the given Client Handle value. The effect of sending such a DEC message is equivalent to the effect of sending a DEC with Request-State set, receiving a REQ with a new Client Handle value, and sending another DEC to install the Named Decision Data. The message sequences for creation of new state in push mode is shown in Figure 1.

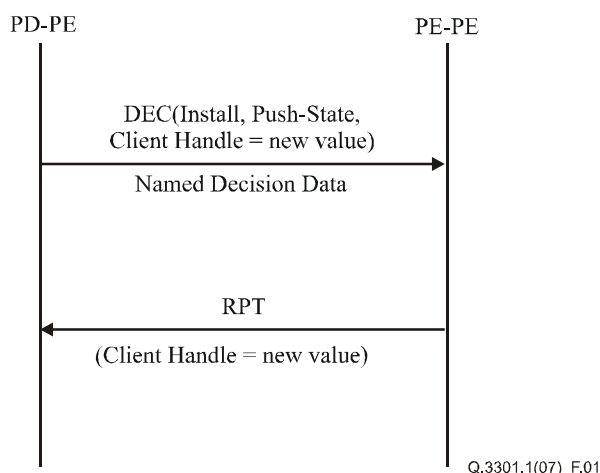


Figure 1 – Message sequences for creation of new state in push mode

7.2.2 Delete State in push mode

A Remove Decision with the Decision Flag set to Push-State and a Client Handle value which is originally created by the PD-PE commands the PE-PE to delete the state as identified by the Client Handle value. The PE-PE would delete the associated state and responds with a Report State message to the PD-PE to inform the result of the implementation. Upon receipt of a Remove Decision with the Decision Flag set to Push-State and a Client Handle which is new or originally created by itself, the PE-PE should report an error.

The message sequences for delete state in push mode is shown in Figure 2.

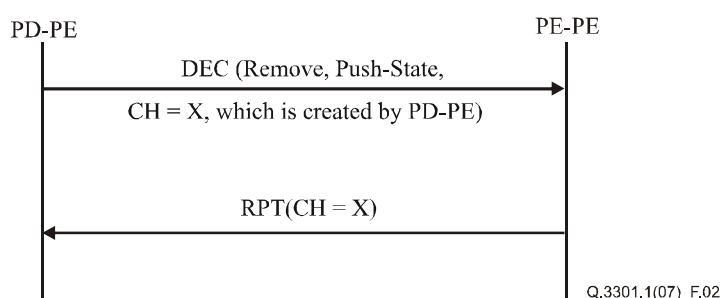


Figure 2 – Message sequences for delete state in push mode

7.2.3 Client Handle collision solution

To avoid possible collisions between the Client Handle values allocated by the PE-PE in pull mode and the PD-PE in push mode, it is recommended that all the Client Handle values allocated by a PD-PE be a sequence of complete Client Handle values with a prefix. The prefix can be pre-configured by network operators or allocated dynamically through message interaction by the PE-PE.

When using pre-configuration, the network operator may pre-configure the identifiers such as IP address, hostname or domain name of the PD-PE and PE-PE as the prefix of their allocated Client Handle values.

When using dynamic allocation, the PD-PE can request a prefix from the PE-PE. An Install Decision with the Request-Prefix flag set in the COPS Decision Flags object will cause the PE-PE to issue a new Request with a new Client Handle, similarly to the way it responds to a Request-State flag (see section 3.2 of [IETF RFC 3084]). However, the Client Handle is actually a prefix

which the PD-PE may use to generate a sequence of complete Client Handle values which are guaranteed to be unique at the PE-PE.

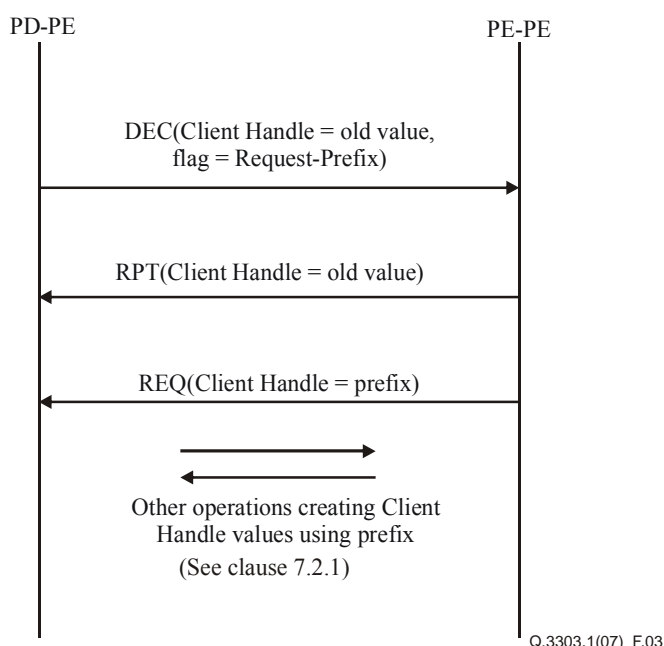


Figure 3 – Messages exchanged to create and delete a Client Handle prefix

The complete sequence of messages exchanged during the life cycle of a sequence is shown in Figure 3. The initial DEC message requesting the prefix uses a Client Handle value created by an earlier REQ (e.g., during session start-up). As always in COPS, the PE-PE first returns an RPT message responding to the DEC, using the earlier Client Handle value. Then, the PE-PE sends an REQ with the desired prefix value. The PD-PE would create a new state associated with a Client Handle value equal to the prefix value concatenated with some sequence of octets xyz, in the manner described in clause 7.2.1.

7.3 COPS basic message

All the messages and the format specified in [IETF RFC 3084] are to be applied at the Rw interface. The Client Open, Client Accept, Client Close, Keep Alive, Synchronize State Request and Synchronize State Complete messages are used for setting up and maintaining the connection and synchronization of the request state between the PD-PE and the PE-PE.

The Request (REQ), Delete Request State (DRQ), Decision Install (DEC Install) and Decision Remove (DEC Remove), Report State (RPT) messages supported by the COPS layer for Rw interface are used for the policy control operations.

8 Rw message description

8.1 Request (REQ PE-PE→PD-PE)

The REQ message is sent by the PE-PE to the PD-PE to request configuration decision.

During state synchronization, the REQ message is generated and sent to the PD-PE in response to the receipt of a Synchronize State Request (SSQ) message from the PD-PE as described in section 3.1 of [IETF RFC 3084].

The PE-PE may send the information such as the physical and/or logical connection of the access transport network to which the CPE is attached (e.g., IP and MAC address of the CPE, User Id, and

other physical information) to assist the PD-PE in deciding what types of policy the PE-PE can or should install and enforce. The information is described in *RwReqInfoGroup* in the ITU-T *Rw* PIB and is carried in the Named *ClientSI* object of a *REQ* message.

8.2 Decision (DEC PD-PE→PE-PE)

The PD-PE can push the final admission decisions to the PE-PE, request NAT information or query event notification from the PE-PE using *install* operation.

All the above information is carried in the Named *Decision Data* object and is described by the following PRCs:

- *Flow-based policy*

The *RwFlowbasedDecInfoGroup* together with *RwNatActionGroup*, *RwAppChrgInfoGroup*, *RwEventIndicatorGroup* and *RwFlowDescGroup* are used for this purpose. It includes the following information:

- Resource Request Priority: described by *RwFlowBasedDecInfoRequestPriority* attribute;
- Type of NAT: described by *RwFlowBasedDecInfoNatAction* attribute;
- Charging ID of application layer: described by *RwFlowBasedDecAppChrgIds* attribute;
- Event notification indication: described by *RwFlowBasedDecInfoEventIndicator* attribute;
- Description of groups of the media flow within a session: described by *RwFlowBasedDecInfoFlowDesc* attribute.

The individual media flow is described by *RwFlowDescGroup* together with *RwFlowFirewallModeIndicationGroup*, *RwSingleFlowInfoGroup*, *RwFlowDirDescGroup*, *RwFlowInfoGroup*, *RwFilterGroup*, *RwFluxInfoGroup*, *RwVSWITCHFluxInfoGroup*, *RwMPLSConnectInfoGroup*, *RwMPLSLabelGroup*, *RwVSWITCHConnectInfoGroup*, *RwFlowTerminationGroup*, *RwFlowAddressRealmGroup* and *RwFlowLatchingIndicationGroup*, including the following information:

- Flow ID: described by the *RwSingleFlowInfoFlowId* attribute;
- Dynamic firewall working mode: described by the *RwSingleFlowInfoFirewallModeIndication* attribute;
- Flow information such as flow direction, the standard 5-tuple, gate status and service type: described by the *RwFlowInfoGroup*;
- Bandwidth and traffic descriptor (uplink and/or downlink): described by the *RwFlowDirDescFluxInfo* attribute;
- Path selection information (such as LSP or VLANId): described by the *RwFlowDescConnectInfo* attribute.

The PE-PE can create and store the binds of media flow and path selection information to route media flows.

When the PD-PE requests the PE-PE to implement NAT for the groups of media flow, the control information may include:

- Termination indicator: indicating which side a media flow is terminated (access or core network) for the PE-PE, and is described by the *RwSingleFlowInfoFlowTermination* attribute;
- Address realm: described by the *RwSingleFlowInfoAddressRealm* attribute;
- Latching indication: described by the *RwSingleFlowInfoLatchingIndication* attribute.

- *User-based policy*

The `RwUserBasedDecInfoGroup` together with the `RwNetworClassGroup` and the `RwDirFluxGroup` are used for this purpose. It includes the following information:

- User identifier: described by the `RwUserBasedDecInfoUserId` attribute;
- Network Class of Service: described by the `RwUserBasedDecInfoNetworkClass` attribute;
- Bandwidth and traffic descriptor (uplink and/or downlink): described by the `RwDirFluxGroup`.

In push mode, the `RwDecCapGroup` is used for providing the following PD-PE capabilities and limitations in the configuration DEC message:

- Indication of the maximum number of Flow identifiers:
The PD-PE may notify the PE-PE how many Flow identifiers the PD-PE is able to send with an install DEC message.
- Indication of the maximum number of application charging identifiers:
The PD-PE may notify the PE-PE how many application charging IDs the PD-PE is able to send with an install DEC message.

The PD-PE can also command the PE-PE to delete an existing request state in the way described in clause 7.2.2 when the request state is originally created by PD-PE, or in section 3.2 of [IETF RFC 3084] when the request state is originally created by the PE-PE.

8.3 Report State (RPT PE-PE→PD-PE)

The RPT message is used to report processing result or resource status from the PE-PE to the PD-PE. After the PE-PE finishes processing service messages, the processing result will be reported to the PD-PE. There are two scenarios related to the sending of an RPT message: one is a response to any kind of DEC message (such as install and remove); the other is an unsolicited report to the PD-PE when the PE-PE detects an event for which it is required to notify the PD-PE. In these messages there will be a Flag in the message header; the Flag will be set to 1, and 0 respectively.

The information is carried in the Named ClientSI object and is described by the following PRCs:

- NAT response:
The `RwStateReportGroup` together with `RwFlowDescGroup`, `RwSingleFlowInfoGroup`, `RwFlowTerminationGroup`, `RwFlowAddressRealmGroup`, `RwFlowDirDescGroup`, `RwFlowInfoGroup` and `RwFilterGroup` are used for this purpose.
Named ClientSI object will contain one or more GPERR object, ErrorPRID object, CPERR object, PRID and EPD object.
- Bearer charging ID:
The `RwStateReportGroup` together with `RwRprtBearChrgInfoGroup` are used to provide bearer charging information.
- Event notification:
The `RwStateReportGroup` together with `RwEventIndicatorGroup` are used to provide event notification to the PD-PE.

This Recommendation requires that the standard COPS-PR error-handling mechanism and error objects, such as GPERR object, ErrorPRID object and CPERR object be applied.

8.4 Delete Request State (DRQ PE-PE→PD-PE)

When the PE-PE informs the PD-PE via a DRQ message that the state identified by the client handle is no longer available/relevant, the corresponding state shall also be removed at the PD-PE.

The DRQ message includes the reason why the request state was deleted.

9 Resource management

9.1 Client Handle

When a new request state is created (User requests online or PD-PE installs a configuration for a user in push mode), the PE-PE or PD-PE distributes a new Client Handle and ensures the uniqueness in a COPS connection. It is carried in Client Handle object, uniquely identifying one user and then used by subsequent request, decision, and report messages to reference the same user's request state. In subsequent service handling, users exchange information with the same Client Handle. After the user service is finished, the user will delete the Client Handle.

During the synchronization process, new Client Handles are not distributed; however, existing Client Handles are requested again.

9.2 FlowID

Flow ID is used to identify the media flow user requests. Each session may contain multiple media flows, and each media flow is identified by a unique Flow ID. Usually, flow IDs are created by PD-PEs.

9.3 Flow information

Flow information is included in policy installation messages. The characteristics of user service flow include the following information:

- Direction;
- Filter:
 - Address type;
 - IP addresses;
 - Ports;
 - Protocol number;
 - DSCP;
- Filter status;
- Service type.

9.4 Traffic information

Traffic information is included in policy installation messages. The characteristics of the traffic information include the following and shall also address the uplink traffic information and the downlink traffic information.

- Bandwidth unit;
- Peak bandwidth;
- Average bandwidth;
- Max package length.

The following traffic information may be additionally provided when the bearer network employs non-MPLS technology:

- Direction;
- Base traffic information;
- Flow priority;

- CAR flag;
- Broadcast bae flag;
- Path backup flag.

9.5 Connection information

The connection information is included in installation information. Since the network employs different technology, it may have different descriptions.

9.5.1 Bearer network employing MPLS technology

It includes the following information:

- Maximum transport unit in the path;
- Label stack (Maximum with 16 labels).

9.5.2 Bearer network employing non-MPLS technology

For non-MPLS-based systems which use the Diffserv model of QoS, such as LAN and IP, the following information should be included in the installation information.

- Source interface address information;
- Source VlanID;
- Source VlanID QinQ;
- Destination interface address information;
- DestinationVlanID;
- Destination VlanID QinQ.

10 Application of policy information base (PIB)

10.1 Role of PIB

Policy information base (PIB) provides a solution to interworking between different production vendors. PIB defines a collection of provisioning classes (PRC) which can be accessed by COPS and provides the data instances (PRIs) for any given data structure (PRC). Instances of the policy classes (PRIs) are each identified by a provisioning instance identifier (PRID) in PIB. So, PIB is just like a virtual database of the PRC.

A PIB is defined and it inherits part of the data definitions from other PIBs, including the PIB in [IETF RFC 3159], [IETF RFC 3291], IETF RFC 3318.

10.2 Encoding of PIB

Adopt ASN.1 BER to encode the provisioning instance identifier (PRID) and Policy data as described in section 2.2.1 of [IETF RFC 3084].

10.3 Definition of PIB

PIB is based on the IP network of QoS guaranteed; see Annex A for detailed information.

11 Security considerations

The security mechanisms described in COPS [IETF RFC 2748] and COPS-PR [IETF RFC 3084] should be reused in this Recommendation.

Annex A

Rw policy information base

(This annex forms an integral part of this Recommendation)

```
ITUT-RwPib PIB-DEFINITIONS ::= BEGIN

IMPORTS
    Unsigned32,
    Integer32,
    MODULE-IDENTITY,
    MODULE-COMPLIANCE,
    OBJECT-TYPE,
    OBJECT-GROUP
FROM COPS-PR-SPPI -- Defined in RFC 3159

    InstanceId,
    Prid
FROM COPS-PR-SPPI-TC -- Defined in RFC 3159

    DscpOrAny
FROM DIFFSERV-DSCP-TC -- Defined in RFC 3289

    zeroDotZero
FROM SNMPv2-SMI

    InetAddress,
    InetAddressType,
    InetAddressPrefixLength,
    InetPortNumber
FROM INET-ADDRESS-MIB; -- Defined in RFC 3291

iTUT-RwPib MODULE-IDENTITY
    SUBJECT-CATEGORIES { Rw(0x800c) } -- ITU-T Rw COPS Client Type
    LAST-UPDATED "200511100000Z"
    ORGANIZATION "ITU-T Study Group 11"
    CONTACT-INFO "xuheyuan@mail.ritt.com.cn"
    DESCRIPTION
        "A PIB module containing the set of provisioning
         classes that are required for support of policies for
         RW Cops interface"
    REVISION "200511100000Z"
    DESCRIPTION
        "The ITU-T RW PIB for Rec. Q.3303.1 version 1"
::= { 0.0.17.3303.127.1.2.0 }
-- itu-t(0) recommendation(0) q(17) q3303(3303) hyphen(127) (1) pib(2)
version1(0)

--
-- The root OID for PRCs in the ITU-T Rw PIB
--

rwCapabilityClasses      OBJECT IDENTIFIER ::= { iTUT-RwPib 1}
rwEventInfoClasses       OBJECT IDENTIFIER ::= { iTUT-RwPib 2}
rwServiceInfoClasses     OBJECT IDENTIFIER ::= { iTUT-RwPib 3}
rwReqInfoClasses         OBJECT IDENTIFIER ::= { iTUT-RwPib 4}
rwDecInfoClasses         OBJECT IDENTIFIER ::= { iTUT-RwPib 5}
rwReportClasses          OBJECT IDENTIFIER ::= { iTUT-RwPib 6}
rwConformance            OBJECT IDENTIFIER ::= { iTUT-RwPib 7}
```



```

-----
-- Capability and Limitation Policy Rule Classes

-- Rw Decision Capability Table
--
rwDecCapTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RwDecCapEntry
    PIB-ACCESS      notify
    STATUS          current
    DESCRIPTION
        "PRC from PD-PE to PE-PE carried by DEC during initial capability
negotiation, indicating the PD-PE's capability."
    ::= { rwCapabilityClasses 1 }

rwDecCapEntry OBJECT-TYPE
    SYNTAX          RwDecCapEntry
    STATUS          current
    DESCRIPTION
        "An instance of the RwDecCap class identifies a specific PRC and
associated attributes as supported by the device."
    PIB-INDEX { RwDecCapPrid }
    UNIQUENESS { }
    ::= { rwDecCapTable 1 }

RwDecCapEntry ::= SEQUENCE {
    rwDecCapPrid      InstanceId,
    rwDecCapAppChrgIds Unsigned32,
    rwDecCapFlowIds   Unsigned32
}

rwDecCapPrid OBJECT-TYPE
    SYNTAX          InstanceId
    STATUS          current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwDecCap class."
    ::= { rwDecCapEntry 1 }

rwDecCapAppChrgIds OBJECT-TYPE
    SYNTAX          Unsigned32
    STATUS          current
    DESCRIPTION
        "Indication of the maximum number of Application Charging Id possible
in a single Dec message.
The value of zero indicates limit is not specified."
    DEFVAL { 0 }
    ::= { rwDecCapEntry 2 }

rwDecCapFlowIds OBJECT-TYPE
    SYNTAX          Unsigned32
    STATUS          current
    DESCRIPTION
        "Indication of the maximum number of Flow Id possible in a single Dec
message.
The value of zero indicates limit is not specified."
    DEFVAL { 0 }
    ::= { rwDecCapEntry 3 }

-----

-- Rw Decision Capability Acknowledge Table
--
rwDecCapACKTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RwDecCapACKEntry

```

```

        PIB-ACCESS      install
        STATUS          current
        DESCRIPTION
            "PRC from PD-PE to PE-PE carried by COPS-PR RPT messages indicating
            the result of the capability negotiation."
        ::= { rwCapabilityClasses 2 }

rwDecCapACKEntry OBJECT-TYPE
    SYNTAX      RwDecCapACKEntry
    STATUS      current
    DESCRIPTION
        "An instance of the RwDecCapACK class sent by the PE-PE to the PD-PE."
    PIB-INDEX { RwDecCapACKPrid }
    UNIQUENESS { }
    ::= { rwDecCapACKTable 1 }

RwDecCapACKEntry ::= SEQUENCE {
    rwDecCapACKPrid      InstanceId,
    rwDecCapACKEnable    INTEGER,
    rwDecCapACKChrgIds   Unsigned32,
    rwDecCapACKFlowIds   Unsigned32
}

rwDecCapACKPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
        this class."
    ::= { rwDecCapACKEntry 1 }

rwDecCapACKEnable OBJECT-TYPE
    SYNTAX      INTEGER {
                    enable(1),
                    disable(2)
                }
    STATUS      current
    DESCRIPTION
        "Controls the usage of PD-PE capability negotiation."
    DEFVAL { enable }
    ::= { rwDecCapACKEntry 2 }

rwDecCapACKChrgIds OBJECT-TYPE
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "Indication of the maximum number of Application Charging Id in a DEC
        message which is acceptable to PE-PE.
        The value of zero indicates limit is not specified."
    DEFVAL { 0 }
    ::= { rwDecCapACKEntry 3 }

rwDecCapACKFlowIds OBJECT-TYPE
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "Indication of the maximum number of Flow Id in a DEC message which is
        acceptable to PE-PE.
        The value of zero indicates limit is not specified."

    DEFVAL { 0 }
    ::= { rwDecCapACKEntry 4 }

```

```

--
-- Rw Event Info Classes
--
-- Rw Event Notification Indication Table

rwEventIndicatorTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwEventIndicatorEntry
    PIB-ACCESS   install-notify
    STATUS       current
    DESCRIPTION
        "PRC representing event notification indicator. In COPS-PR install
        decision object and sent by PD-PE to PE-PE indicate the PD-PE requests the PE-PE
        to provide a notification at the transport event. In PRT message and sent by PE-
        PE to PD-PE indicate the PE-PE report the transport event to PD-PE. "
    ::= { rwEventInfoClasses 1 }

rwEventIndicatorEntry OBJECT-TYPE
    SYNTAX      RwEventIndicatorEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Event Indicator Table describing a transport event.
        Each entry is referenced by RwDecInfoEventIndicator."
    PIB-INDEX { RwEventIndicatorPrid }
    UNIQUENESS { }
    ::= { rwEventIndicatorTable 1 }

RwEventIndicatorEntry ::= SEQUENCE {
    rwEventIndicatorPrid      InstanceId,
    rwEventIndicator          Integer32,
    rwEventIndicatorNext      Prid
}

rwEventIndicatorPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwEventIndicator class."
    ::= { rwEventIndicatorEntry 1 }

rwEventIndicator OBJECT-TYPE
    SYNTAX      Integer32{
        chargingCorrelationExchange (1),
        indicationOfLossOfBearer(2),
        indicationOfRecoveryOfBearer(3),
        indicationOfReleaseOfBearer(4),
        deviceoverload (5),
        devicerecoverfromoverload(6)
    }
    STATUS       current
    DESCRIPTION
        "An integer indicating the query and notification of a transport
        event."
    ::= { rwEventIndicatorEntry 2 }

rwEventIndicatorNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS       current
    DESCRIPTION
        "References the next of a list of RwEventIndicator instances. A value
        of zeroDotZero indicates this is the last of a list of RwEventIndicator
        instances."
    DEFVAL { zeroDotZero }
    ::= { rwEventIndicatorEntry 3 }

```

```
-- Rw Service Info Classes
```

```
--
```

```
-- RW Flow Desc Table
```

```
--
```

```
rwFlowDescTable OBJECT-TYPE
```

```
    SYNTAX      SEQUENCE OF RwFlowDescEntry
```

```
    PIB-ACCESS   install-notify
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "PRC representing the information of flows involved in a session.
```

```
        Referenced by the RwFlowBasedDecInfoFlowDesc and RwFlowDescNext.."
```

```
::= { rwServiceInfoClasses 1 }
```

```
rwFlowDescEntry OBJECT-TYPE
```

```
    SYNTAX      RwFlowDescEntry
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "An entry in the Flow Desc Table describing the information of a list  
flows.
```

```
        It is referenced by RwFlowBasedDecInfoFlowDesc and RwFlowDescNext. It  
may be carried by COPS-PR Install decision from PD-PE to PE-PE, or by COPS-PR  
RPT responding to the NAT request from PD-PE."
```

```
    PIB-INDEX { RwFlowDescPrid }
```

```
    UNIQUENESS { }
```

```
::= { rwFlowDescTable 1 }
```

```
RwFlowDescEntry ::= SEQUENCE {
```

```
    rwFlowDescPrid          InstanceId,
```

```
    rwFlowDescSingleFlowInfo Prid,
```

```
    rwFlowDescConnectInfo   Prid,
```

```
    rwFlowDescNext          Prid
```

```
}
```

```
rwFlowDescPrid OBJECT-TYPE
```

```
    SYNTAX      InstanceId
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "An arbitrary integer index that uniquely identifies an instance of  
the RwFlowDesc class."
```

```
::= { rwFlowDescEntry 1 }
```

```
rwFlowDescSingleFlowInfo OBJECT-TYPE
```

```
    SYNTAX      Prid
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "An arbitrary integer index that references the first of a list of  
RwSingleFlowInfo Instances. In COPS-PR install decision and RPT of responding to  
the NAT request from PD-PE. There is at least one RwSingleFlowDesc Instance in  
the COPS-PR install decision."
```

```
::= { rwFlowDescEntry 2 }
```

```
rwFlowDescConnectInfo OBJECT-TYPE
```

```
    SYNTAX      Prid
```

```
    STATUS      current
```

```
    DESCRIPTION
```

```
        "An arbitrary integer index that uniquely identifies  
an instance of the RwMPLSConnectionInfo or RwVSWITCHConnectInfo. A value of  
zeroDotZero indicates there is no Flow Connection Information included. It is  
not required in the COPS-PR RPT message responding to the NAT request from PD-  
PE."
```

```

        DEFVAL { zeroDotZero }
::= { rwFlowDescEntry 3 }

rwFlowDescNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the next of a list of RwFlowDesc instances. A value of
        zeroDotZero indicates this is the last of a list of RwFlowDesc instances."
        DEFVAL { zeroDotZero }
::= { rwFlowDescEntry 4 }

-----

--
-- Rw Single Flow Info Table
--

rwSingleFlowInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwSingleFlowInfoEntry
    PIB-ACCESS   install-notify
    STATUS      current
    DESCRIPTION
        "PRC representing the information of flow, which is identified with a
        Flow ID."
::= { rwServiceInfoClasses 2 }

rwSingleFlowInfoEntry OBJECT-TYPE
    SYNTAX      RwSingleFlowInfoEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Single Flow Info Table describing the information of
        a flow.

        It is referenced by RwFlowDescSingleFlowInfo. There should be two
        entries when the NAT is implemented, one for the access side flow and the other
        for core side flow. Otherwise, one entry for each flow."
        PIB-INDEX { RwSingleFlowInfoPrid }
        UNIQUENESS { }
::= { rwSingleFlowInfoTable 1 }

RwSingleFlowInfoEntry ::= SEQUENCE {
    rwSingleFlowInfoPrid          InstanceId,
    rwSingleFlowInfoFlowId       Integer32,
    rwSingleFlowInfoFlowTermination Prid,
    rwSingleFlowInfoAddressRealm Prid,
    rwSingleFlowInfoLatchingIndication Prid,
    rwSingleFlowInfoFirewallModeIndication Prid,
    rwSingleFlowInfoFlowDirDesc  Prid
}

rwSingleFlowInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwSingleFlowInfo entry."
::= { rwSingleFlowInfoEntry 1 }

rwSingleFlowInfoFlowId OBJECT-TYPE
    SYNTAX      Integer32
    STATUS      current
    DESCRIPTION
        "The FlowId itself."

```

```

::= { rwSingleFlowInfoEntry 2 }

rwSingleFlowInfoFlowTermination OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
        RwFlowTermination. A value of zeroDotZero indicates there are no NAT
        implementation in the PE-PE."
    DEFVAL { zeroDotZero }
::= { rwSingleFlowInfoEntry 3 }

rwSingleFlowInfoAddressRealm OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
        RwFlowAddressRealm. A value of zeroDotZero indicates there are no Address Realm
        information associated with this Single Flow Info."
    DEFVAL { zeroDotZero }
::= { rwSingleFlowInfoEntry 4 }

rwSingleFlowInfoLatchingIndication OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
        RwFlowLatchingIndication. A value of zeroDotZero indicates there are no Latching
        Indication information associated with this Single Flow Info."
    DEFVAL { zeroDotZero }
::= { rwSingleFlowInfoEntry 5 }

rwSingleFlowInfoFirewallModeIndication OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
        RwFlowFirewallModeIndication. A value of zeroDotZero indicates the default
        firewall working mode will be applied."
    DEFVAL { zeroDotZero }
::= { rwSingleFlowInfoEntry 6 }

rwSingleFlowInfoFlowDirDesc OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the first of a list of RwFlowDirDesc associated with this
        instance of Single Flow Info. There is one RwFlowDirDesc instance per
        direction(uplink or downlink)."
::= { rwSingleFlowInfoEntry 7 }

-----
--
--
-- Rw Flow Termination Table
--

rwFlowTerminationTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowTerminationEntry
    PIB-ACCESS   install-notify
    STATUS      current
    DESCRIPTION
        "PRC representing the side(access or core network) of the flow, which
        is identified with a Flow ID."
::= { rwServiceInfoClasses 3 }

```

```

rwFlowTerminationEntry OBJECT-TYPE
    SYNTAX      RwFlowTerminationEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Flow Termination Table describing the side
information of a flow.
        It is referenced by RwSingleFlowInfoFlowTermination."
    PIB-INDEX { RwFlowTerminationPrid }
    UNIQUENESS { }
::= { rwFlowTerminationTable 1 }

RwFlowTerminationEntry ::= SEQUENCE {
    rwFlowTerminationPrid      InstanceId,
    rwFlowTermination          Integer32,
}

rwFlowTerminationPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
the RwFlowTermination entry."
::= { rwFlowTerminationEntry 1 }

rwFlowTermination OBJECT-TYPE
    SYNTAX      Integer32{
        access (0),
        core (1) }
    STATUS      current
    DESCRIPTION
        "An integer indicating the side of the flow is terminated."
::= { rwFlowTerminationEntry 2 }

-----
--
-- Rw Flow Address Realm Table
--

rwFlowAddressRealmTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowAddressRealmEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the address realm of the flow's IP address."
::= { rwServiceInfoClasses 4 }

rwFlowAddressRealmEntry OBJECT-TYPE
    SYNTAX      RwFlowAddressRealmEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Flow Address Realm Table describing the realm
information of a flow's source and destination address.
        It is referenced by RwSingleFlowInfoAddressRealm."
    PIB-INDEX { RwFlowAddressRealmPrid }
    UNIQUENESS { }
::= { rwFlowAddressRealmTable 1 }

RwFlowAddressRealmEntry ::= SEQUENCE {
    rwFlowAddressRealmPrid      InstanceId,
    rwFlowAddressRealm          OCTET STRING,
}

```

```

rwFlowAddressRealmPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwFlowAddressRealm entry."
    ::= { rwFlowAddressRealmEntry 1 }

rwFlowAddressRealm OBJECT-TYPE
    SYNTAX      OCTET STRING
    STATUS      current
    DESCRIPTION
        "Indicates the address realm of the flow's source and destination
address."
    ::= { rwFlowAddressRealmEntry 2 }

-----
--
-- Rw Flow Latching Indication Table
--

rwFlowLatchingIndicationTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowLatchingIndicationEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the firewell indication of the flow, which is
identified with a Flow ID."
    ::= { rwServiceInfoClasses 5 }

rwFlowLatchingIndicationEntry OBJECT-TYPE
    SYNTAX      RwFlowLatchingIndicationEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Flow Latching Indication Table describing the
latching information of a flow.
        It is referenced by RwSingleFlowInfoLatchingIndication."
    PIB-INDEX { RwFlowLatchingIndicationPrid }
    UNIQUENESS { }
    ::= { rwFlowLatchingIndicationTable 1 }

RwFlowLatchingIndicationEntry ::= SEQUENCE {
    rwFlowLatchingIndicationPrid      InstanceId,
    rwFlowLatchingIndication          Integer32,
}

rwFlowLatchingIndicationPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwFlowLatchingIndication entry."
    ::= { rwFlowLatchingIndicationEntry 1 }

rwFlowLatchingIndication OBJECT-TYPE
    SYNTAX      Integer32{
        latching(0),
        relatching(1) }
    STATUS      current
    DESCRIPTION
        "Indicates the latch action of the flow in the PE-PE."
    ::= { rwFlowLatchingIndicationEntry 2 }

-----

```



```

-- Rw Flow Firewall working mode Indication Table
--
rwFlowFirewallModeIndicationTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowFirewallModeIndicationEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing the firewall mode indication of the flow, which is
        identified with a Flow ID."
    ::= { rwServiceInfoClasses 6}

rwFlowFirewallModeIndicationEntry OBJECT-TYPE
    SYNTAX      RwFlowFirewallModeIndicationEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Flow Firewall Mode Indication Table describing the
        information for dynamic firewall working mode selection.
        It is referenced by RwSingleFlowInfoFirewallModeIndication."
    PIB-INDEX { RwFlowFirewallModeIndicationPrid }
    UNIQUENESS { }
    ::= { rwFlowFirewallModeIndicationTable 1 }

RwFlowFirewallModeIndicationEntry ::= SEQUENCE {
    rwFlowFirewallModeIndicationPrid InstanceId,
    rwFlowFirewallModeIndication      Integer32
}

rwFlowFirewallModeIndicationPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwFlowFirewallModeIndication entry."
    ::= { rwFlowFirewallModeIndicationEntry 1 }

rwFlowFirewallModeIndication OBJECT-TYPE
    SYNTAX      Integer32{
        staticPacketFiltering(0),
        dynamicPacketFiltering(1),
        statefulInspection(2),
        deepPacketInspection(3) }
    STATUS       current
    DESCRIPTION
        "Indicates the information for dynamic firewall working mode
        selection."
    DEFVAL { 0 }
    ::= { rwFlowFirewallModeIndicationEntry 2 }

-----
--
-- Rw Flow Direction Description Table
--

rwFlowDirDescTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowDirDescEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing the information of flow in the direction of uplink
        and/or downlink."
    ::= { rwServiceInfoClasses 7}

```

```

rwFlowDirDescEntry OBJECT-TYPE
    SYNTAX      RwFlowDirDescEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Flow Dec Table describing the information of a flow.
        It is referenced by RwSingleFlowInfoFlowDirDesc and RwFlowDirDescNext."
        PIB-INDEX { RwFlowDirDescPrid }
        UNIQUENESS { }
    ::= { rwFlowDirDescTable 1 }

RwFlowDirDescEntry ::= SEQUENCE {
    rwFlowDirDescPrid      InstanceId,
    rwFlowDirDescInfo      Prid,
    rwFlowDirDescFluxInfo  Prid,
    rwFlowDirDescNext      Prid
}

rwFlowDirDescPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwFlowDirDesc entry."
    ::= { rwFlowDirDescEntry 1 }

rwFlowDirDescInfo OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that references the RwFlowInfo Instances."
    ::= { rwFlowDirDescEntry 2 }

rwFlowDirDescFluxInfo OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that references the RwFluxInfo Instances."
    ::= { rwFlowDirDescEntry 3 }

rwFlowDirDescNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the next of a list of RwFlowDirDesc instances. A value of
        zeroDotZero indicates this is the last of a list of RwFlowDirDesc instances."
        DEFVAL { zeroDotZero }
    ::= { rwFlowDirDescEntry 4 }

-----
--
-- Rw FlowInfo Table
--

rwFlowInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowInfoEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the information of flow in the direction of uplink
        or downlink."
    ::= { rwServiceInfoClasses 8 }

```

```

rwFlowInfoEntry OBJECT-TYPE
    SYNTAX      RwFlowInfoEntry
    STATUS      current
    DESCRIPTION
        "An entry in the Flow Info Table describing the information of a flow
in the direction of uplink or downlink.
        It is referenced by RwFlowDirDec."
    PIB-INDEX { RwFlowInfoPrid }
    UNIQUENESS { }
 ::= { rwFlowInfoTable 1 }

RwFlowInfoEntry ::= SEQUENCE {
    rwFlowInfoPrid          InstanceId,
    rwFlowInfoDirection    INTEGER,
    rwFlowInfoFilter        Prid,
    rwFlowInfoFilterStatus  INTEGER,
    rwFlowInfoServiceType  INTEGER
}

rwFlowInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwFlowInfo."
 ::= { rwFlowInfoEntry 1 }

rwFlowInfoDirection OBJECT-TYPE
    SYNTAX      INTEGER {
        uplink      (1),
        downlink    (2)
    }
    STATUS      current
    DESCRIPTION
        "Indicates the direction the flow."
 ::= { rwFlowInfoEntry 2 }

rwFlowInfoFilter OBJECT-TYPE      -- filter
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References an entry of RwFilterTable
that describes the applicable classification filter.
        A value of zeroDotZero indicates no filter is
used with this RwFlowInfoTable."
 ::= { rwFlowInfoEntry 3 }

rwFlowInfoFilterStatus OBJECT-TYPE      -- filter status
    SYNTAX      INTEGER {
        close(0),
        open(1)
    }
    STATUS      current
    DESCRIPTION
        "Indicates if this gate will allow traffic to flow."
    DEFVAL { open }
 ::= { rwFlowInfoEntry 4 }

rwFlowInfoServiceType OBJECT-TYPE      -- service type
    SYNTAX      INTEGER {
        audio(1),
        video(2)
    }
    STATUS      current

```

```

        DESCRIPTION
            "service type"
:::= { rwFlowInfoEntry 5 }

-----

-- Rw Filter Table
--

rwFilterTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFilterEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "The Filter class. A packet has to match all fields in an Filter.
        Wildcards may be specified for those fields that are not relevant."
:::= { rwServiceInfoClasses 9 }

rwFilterEntry OBJECT-TYPE
    SYNTAX      RwFilterEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Filter Table describing the information of a filter."
    PIB-INDEX { RwFilterPrid }
    UNIQUENESS { }
:::= { rwFilterTable 1 }

RwFilterEntry ::= SEQUENCE {
    rwFilterPrid                InstanceId,
    rwFilterDstAddrType          InetAddressType,
    rwFilterDstAddr              InetAddress,
    rwFilterDstPrefixLength      InetAddressPrefixLength,
    rwFilterSrcAddrType          InetAddressType,
    rwFilterSrcAddr              InetAddress,
    rwFilterSrcPrefixLength      InetAddressPrefixLength,
    rwFilterDscp                 DscpOrAny,
    rwFilterProtocol             Unsigned32,
    rwFilterDstL4PortMin         InetPortNumber,
    rwFilterDstL4PortMax         InetPortNumber,
    rwFilterSrcL4PortMin         InetPortNumber,
    rwFilterSrcL4PortMax         InetPortNumber
}

rwFilterPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the Rw Filter class."
:::= { rwFilterEntry 1 }

rwFilterDstAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    STATUS       current
    DESCRIPTION
        "The address type enumeration value to specify the type of
        the packet's destination IP address."
    REFERENCE
        "Textual Conventions for Internet Network Addresses.
        RFC 3291."
:::= { rwFilterEntry 2 }

rwFilterDstAddr OBJECT-TYPE
    SYNTAX      InetAddress

```

```

STATUS    current
DESCRIPTION
    "The IP address to match against the packet's destination IP address.
    If the address type is 'ipv4', 'ipv6', 'ipv4z' or 'ipv6z' then, the attribute
    RwFilterDstPrefixLength indicates the number of bits that are relevant."
REFERENCE
    "Textual Conventions for Internet Network Addresses.
    RFC 3291."
::= { rwFilterEntry 3 }

```

```

rwFilterDstPrefixLength OBJECT-TYPE
    SYNTAX      InetAddressPrefixLength
    STATUS      current
    DESCRIPTION
        "The length of a mask for the matching of the destination
        IP address. This attribute is interpreted only if the
        InetAddressType is 'ipv4', 'ipv4z', 'ipv6' or 'ipv6z'.
        Masks are constructed by setting bits in sequence from the
        most-significant bit downwards for RwFilterDstPrefixLength bits length. All
        other bits in the mask, up to the number needed to fill the length of
        the address RwFilterDstAddr are cleared to zero. A zero
        bit in the mask then means that the corresponding bit in
        the address always matches.

```

In IPv4 addresses, a length of 0 indicates a match of any address; a length of 32 indicates a match of a single host address, and a length between 0 and 32 indicates the use of a CIDR Prefix. IPv6 is similar, except that prefix lengths range from 0..128."

```

REFERENCE
    "Textual Conventions for Internet Network Addresses.
    RFC 3291."
DEFVAL { 0 }
::= { rwFilterEntry 4 }

```

```

rwFilterSrcAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    STATUS      current
    DESCRIPTION
        "The address type enumeration value to specify the type of
        the packet's source IP address."
REFERENCE
    "Textual Conventions for Internet Network Addresses.
    RFC 3291."
::= { rwFilterEntry 5 }

```

```

rwFilterSrcAddr OBJECT-TYPE
    SYNTAX      InetAddress
    STATUS      current
    DESCRIPTION
        "The IP address to match against the packet's source IP address. If
        the address type is 'ipv4', 'ipv6', 'ipv4z' or 'ipv6z' then, the attribute
        RwFilterSrcPrefixLength indicates the number of bits that are relevant."
REFERENCE
    "Textual Conventions for Internet Network Addresses.
    RFC 3291."
::= { rwFilterEntry 6 }

```

```

rwFilterSrcPrefixLength OBJECT-TYPE
    SYNTAX      InetAddressPrefixLength
    STATUS      current

```

DESCRIPTION

"The length of a mask for the matching of the source IP address. This attribute is interpreted only if the InetAddressType is 'ipv4', 'ipv4z', 'ipv6' or 'ipv6z'. Masks are constructed by setting bits in sequence from the most-significant bit downwards for RwFilterSrcPrefixLength bits length. All other bits in the mask, up to the number needed to fill the length of the address RwFilterDstAddr are cleared to zero. A zero bit in the mask then means that the corresponding bit in the address always matches.

In IPv4 addresses, a length of 0 indicates a match of any address; a length of 32 indicates a match of a single host address, and a length between 0 and 32 indicates the use of a CIDR Prefix. IPv6 is similar, except that prefix lengths range from 0..128."

REFERENCE

"Textual Conventions for Internet Network Addresses.
RFC 3291."

DEFVAL { 0 }

::= { rwFilterEntry 7 }

rwFilterDscp OBJECT-TYPE

SYNTAX DscpOrAny

STATUS current

DESCRIPTION

"The value that the DSCP in the packet can have and match this filter. A value of -1 indicates that a specific DSCP value has not been defined and thus all DSCP values are considered a match."

REFERENCE

"Management Information Base for the Differentiated Services Architecture. RFC 3289."

DEFVAL { -1 }

::= { rwFilterEntry 8 }

rwFilterProtocol OBJECT-TYPE

SYNTAX Unsigned32 (0..255)

STATUS current

DESCRIPTION

"The layer-4 protocol Id to match against the IPv4 protocol number or the IPv6 Next-Header number in the packet. A value of 255 means match all. Note the protocol number of 255 is reserved by IANA, and Next-Header number of 0 is used in IPv6."

DEFVAL { 255 }

::= { rwFilterEntry 9 }

rwFilterDstL4PortMin OBJECT-TYPE

SYNTAX InetPortNumber

STATUS current

DESCRIPTION

"The minimum value that the packet's layer 4 destination port number can have and match this filter. This value must be equal to or lesser than the value specified for this filter in RwFilterDstL4PortMax.

COPS-PR error code 'attrValueInvalid' must be returned if the RwFilterDstL4PortMin is greater than RwFilterDstL4PortMax"

```

REFERENCE
    "COPS Usage for Policy Provisioning. RFC 3084, error
    codes section 4.5."
DEFVAL { 0 }

::= { rwFilterEntry 10 }

rwFilterDstL4PortMax OBJECT-TYPE
    SYNTAX      InetPortNumber
    STATUS      current
    DESCRIPTION
        "The maximum value that the packet's layer 4 destination
        port number can have and match this filter. This value must
        be equal to or greater than the value specified for this
        filter in RwFilterDstL4PortMin.

        COPS-PR error code 'attrValueInvalid' must be returned if
        the RwFilterDstL4PortMax is less than
        RwFilterDstL4PortMin"
    REFERENCE
        "COPS Usage for Policy Provisioning. RFC 3084, error
        codes section 4.5."
    DEFVAL { 65535 }
::= { rwFilterEntry 11 }

rwFilterSrcL4PortMin OBJECT-TYPE
    SYNTAX      InetPortNumber
    STATUS      current
    DESCRIPTION
        "The minimum value that the packet's layer 4 source port
        number can have and match this filter. This value must
        be equal to or lesser than the value specified for this
        filter in RwFilterSrcL4PortMax.

        COPS-PR error code 'attrValueInvalid' must be returned if
        the RwFilterSrcL4PortMin is greated than
        RwFilterSrcL4PortMax"
    REFERENCE
        "COPS Usage for Policy Provisioning. RFC 3084, error
        codes section 4.5."
    DEFVAL { 0 }
::= { rwFilterEntry 12 }

rwFilterSrcL4PortMax OBJECT-TYPE
    SYNTAX      InetPortNumber
    STATUS      current
    DESCRIPTION
        "The maximum value that the packet's layer 4 source port
        number can have and match this filter. This value must be
        equal to or greater than the value specified for this filter
        in RwFilterSrcL4PortMin.

        COPS-PR error code 'attrValueInvalid' must be returned if
        the RwFilterSrcL4PortMax is less than
        RwFilterSrcL4PortMin"
    REFERENCE
        "COPS Usage for Policy Provisioning. RFC 3084, error codes
        section 4.5."
    DEFVAL { 65535 }
::= { rwFilterEntry 13 }
-----
--
-- RW Flux Info Table
--

```

```

rwFluxInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFluxInfoEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing the bandwidth information."
 ::= { rwServiceInfoClasses 10 }

rwFluxInfoEntry OBJECT-TYPE
    SYNTAX      RwFluxInfoEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Flux Info Table describing the bandwidth
         information of a flow in the direction of uplink or downlink.
         It is referenced by RwFlowDirDec, RwVSWITCHFluxInfoBaseFluxInfo and
         RwUserbasedDecInfo."
    PIB-INDEX { RwFluxInfoPrId }
    UNIQUENESS { }
 ::= { rwFluxInfoTable 1 }

RwFluxInfoEntry ::= SEQUENCE {
    rwFluxInfoPrId                InstanceId,
    rwFluxInfoBandwidthUnit        INTEGER,
    rwFluxInfoPeakBandwidth        Unsigned32,
    rwFluxInfoAverageBandwidth     Unsigned32,
    rwFluxInfoMaxPktLength         Unsigned32

}

rwFluxInfoPrId OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
         instance of the Rw Flux class."
 ::= { rwFluxInfoEntry 1 }

rwFluxInfoBandwidthUnit OBJECT-TYPE -- bandwidth unit
    SYNTAX      INTEGER {
        bps (1),
        kbps (2),
        mbps (3)
    }
    STATUS       current
    DESCRIPTION
        "Indication of the unit of measure for RwFluxPeakBandwidth and
         RwFluxAverageBandwidth, in bits per second, kilo bits per second,
         or mega bits per second."
 ::= { rwFluxInfoEntry 2 }

rwFluxInfoPeakBandwidth OBJECT-TYPE -- peak bandwidth
    SYNTAX      Unsigned32
    STATUS       current
    DESCRIPTION
        "The Flux peak bandwidth."
 ::= { rwFluxInfoEntry 3 }

rwFluxInfoAverageBandwidth OBJECT-TYPE -- average bandwidth
    SYNTAX      Unsigned32
    STATUS       current
    DESCRIPTION
        "The Flux average bandwidth."
 ::= { rwFluxInfoEntry 4 }

```



```

rwFluxInfoMaxPktLength OBJECT-TYPE          -- Max package length
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "The Flux max packet length."
::= { rwFluxInfoEntry 5 }

-----
--
-- RW VSWITCH Flux Table
--

rwVSWITCHFluxInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwVSWITCHFluxInfoEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION " PRC representing the flux information."
::= { rwServiceInfoClasses 11 }

rwVSWITCHFluxInfoEntry OBJECT-TYPE
    SYNTAX      RwVSWITCHFluxInfoEntry
    STATUS      current
    DESCRIPTION
        "An entry in the VSWITCH Flux Info Table describing the flux
information of a flow in the direction of uplink or downlink.
        It is referenced by RwFlowDirDec."
    PIB-INDEX { RwVSWITCHFluxInfoPrid }
    UNIQUENESS { }
::= { rwVSWITCHFluxInfoTable 1 }

RwVSWITCHFluxInfoEntry ::= SEQUENCE {
    rwVSWITCHFluxInfoPrid          InstanceId,
    rwVSWITCHFluxInfoBaseFluxInfo  Prid,
    rwVSWITCHFluxInfoFlowPriority  INTEGER,
    rwVSWITCHFluxInfoCarFlag       INTEGER,
    rwVSWITCHFluxInfoBroadcastBateFlag  INTEGER,
    rwVSWITCHFluxInfoPathBackupFlag  INTEGER,
}

rwVSWITCHFluxInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the Rw VSWITCH Flux class."
::= { rwVSWITCHFluxInfoEntry 1 }

rwVSWITCHFluxInfoBaseFluxInfo OBJECT-TYPE -- base traffic information
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the instances of the RwFluxInfoTable,
contains the basic bandwidth information "
::= { rwVSWITCHFluxInfoEntry 2 }

rwVSWITCHFluxInfoFlowPriority OBJECT-TYPE -- flow Priority
    SYNTAX      INTEGER
    STATUS      current
    DESCRIPTION
        "Indication of the flow's priority.
        Can be divided by 8. level 0 - 7"
::= { rwVSWITCHFluxInfoEntry 3 }

```

```

rwVSWITCHFluxInfoCarFlag OBJECT-TYPE      -- car flag
    SYNTAX      INTEGER
    STATUS      current
    DESCRIPTION
        "Indicates whether the route will do car."
 ::= { rwVSWITCHFluxInfoEntry 4 }

rwVSWITCHFluxInfoBroadcastBateFlag OBJECT-TYPE -- broadcast bate flag
    SYNTAX      INTEGER
    STATUS      current
    DESCRIPTION
        "The flag indicates the bate of broadcast, if true,
        make car."
 ::= { rwVSWITCHFluxInfoEntry 5 }

rwVSWITCHFluxInfoPathBackupFlag OBJECT-TYPE      -- Path backup flag
    SYNTAX      INTEGER
    STATUS      current
    DESCRIPTION
        "The flag indicates whether there is backup path."
 ::= { rwVSWITCHFluxInfoEntry 6 }

-----
-- Path Selection Information in the core network
--
-- MPLS Connection Table
--

rwMPLSConnectInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwMPLSConnectInfoEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the MPLS LSP information."
 ::= { rwServiceInfoClasses 12 }

rwMPLSConnectInfoEntry OBJECT-TYPE
    SYNTAX      RwMPLSConnectInfoEntry
    STATUS      current
    DESCRIPTION
        "An entry in the MPLS Connection Table describing the MPLS LSP
        information.
        It is referenced by RwFlowDescConnectInfo."
    PIB-INDEX { RwMPLSConnectInfoPrid }
    UNIQUENESS { }
 ::= { rwMPLSConnectInfoTable 1 }

RwMPLSConnectInfoEntry ::= SEQUENCE {
    rwMPLSConnectInfoPrid      InstanceId,
    rwMPLSConnectInfoPathMTU   Unsigned32,
    rwMPLSConnectInfoMPLSStack Prid
}

rwMPLSConnectInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the Rw Connection Info class."
 ::= { rwMPLSConnectInfoEntry 1 }

```

```

rwMPLSConnectInfoPathMTU OBJECT-TYPE -- Maximum transport unit in the path
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "The MTU in the path."
 ::= { rwMPLSConnectInfoEntry 2 }

rwMPLSConnectInfoMPLSStack OBJECT-TYPE -- label stack
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the first of a list of Rw MPLS Label.

        A value of zeroDotZero indicates an empty list which is an error
condition."
    DEFVAL { zeroDotZero }
 ::= { rwMPLSConnectInfoEntry 3 }

-----
--
-- Rw MPLS Label Table
--

rwMPLSLabelTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwMPLSLabelEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the MPLS label stack."
 ::= { rwServiceInfoClasses 13 }

rwMPLSLabelEntry OBJECT-TYPE
    SYNTAX      RwMPLSLabelEntry
    STATUS      current
    DESCRIPTION
        "An entry in the MPLS Label Table describing the MPLS label stack.
        It is referenced by RwMPLSConnectInfoMPLSStack."
    PIB-INDEX { RwMPLSLabelPrid }
    UNIQUENESS { }
 ::= { rwMPLSLabelTable 1 }

RwMPLSLabelEntry ::= SEQUENCE {
    rwMPLSLabelPrid          InstanceId,
    rwMPLSLabelValue         Prid,
    rwMPLSLabelNext          Prid
}

rwMPLSLabelPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the Rw label class."
 ::= { rwMPLSLabelEntry 1 }

rwMPLSLabelValue OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "The label value, reference the frwkILabelMarkerTable in RFC 3318."
 ::= { rwMPLSLabelEntry 2 }

rwMPLSLabelNext OBJECT-TYPE
    SYNTAX      Prid

```

```

        STATUS      current
        DESCRIPTION
            "References the next RwLabelEntry of a list RwLabel
            class."
        DEFVAL { zeroDotZero }
::= { rwMPLSLabelEntry 3 }

-----
-- VSwitch Connection Table
--

rwVSWITCHConnectInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwVSWITCHConnectInfoEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "PRC representing the information of the VSWITCH connection."
::= { rwServiceInfoClasses 14 }

rwVSWITCHConnectInfoEntry OBJECT-TYPE
    SYNTAX      RwVSWITCHConnectInfoEntry
    STATUS      current
    DESCRIPTION
        "An entry in the MPLS Connection Table describing the information of
        the VSWITCH connection.
        It is referenced by RwFlowDescConnectInfo."
    PIB-INDEX { RwVSWITCHConnectInfoPrid }
    UNIQUENESS { }
::= { rwVSWITCHConnectInfoTable 1 }

RwVSWITCHConnectInfoEntry ::= SEQUENCE {
    rwVSWITCHConnectInfoPrid          InstanceId,
    rwVSWITCHConnectInfoSrcIFName     OCTET STRING,
    rwVSWITCHConnectInfoSrcVlanID     Unsigned32,
    rwVSWITCHConnectInfoSrcVlanIDQinQ Unsigned32,
    rwVSWITCHConnectInfoDstIFName     OCTET STRING,
    rwVSWITCHConnectInfoDstVlanID     Unsigned32,
    rwVSWITCHConnectInfoDstVlanIDQinQ Unsigned32

}

rwVSWITCHConnectInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the Rw VSWITCH Connection Info class."
::= { rwVSWITCHConnectInfoEntry 1 }

rwVSWITCHConnectInfoSrcIFName OBJECT-TYPE
-- source interface address information
    SYNTAX      OCTET STRING
    STATUS      current
    DESCRIPTION
        "Source Interface Name."
::= { rwVSWITCHConnectInfoEntry 2 }

rwVSWITCHConnectInfoSrcVlanID OBJECT-TYPE      -- source VlanID
    SYNTAX      Unsigned32(0..64535)
    STATUS      current
    DESCRIPTION
        "Source VlanID."
::= { rwVSWITCHConnectInfoEntry 3 }

```

```

rwVSWITCHConnectInfoSrcVlanIDQinQ OBJECT-TYPE -- source VlanID QinQ
    SYNTAX      Unsigned32(0..64535)
    STATUS      current
    DESCRIPTION
        "It is the normal 802.1Q when the value is illegal or invalid.
        If the value is valid, it is the QinQ, the value is inner
        VlanID and RwVSWITCHConnectInfoSrcVlanID is the outer VlanID."
 ::= { rwVSWITCHConnectInfoEntry 4 }

rwVSWITCHConnectInfoDstIFName OBJECT-TYPE
    -- destination interface address information
    SYNTAX      OCTET STRING
    STATUS      current
    DESCRIPTION
        "Dest Interface Name."
 ::= { rwVSWITCHConnectInfoEntry 5 }

rwVSWITCHConnectInfoDstVlanID OBJECT-TYPE -- destination VlanID
    SYNTAX      Unsigned32(0..64535)
    STATUS      current
    DESCRIPTION
        "Dest VlanID."
 ::= { rwVSWITCHConnectInfoEntry 6 }

rwVSWITCHConnectInfoDstVlanIDQinQ OBJECT-TYPE -- destination VlanID QinQ
    SYNTAX      Unsigned32(0..64535)
    STATUS      current
    DESCRIPTION
        "It is the normal 802.1Q VlanID if the value is illegal or invalid.
        Otherwise, it is the QinQ VlanID and identifies the inner VlanID."
 ::= { rwVSWITCHConnectInfoEntry 7 }

-----
--
--
-- Rw Request Info Classes
--
--
-- Rw Request Info Table
--

rwReqInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwReqInfoEntry
    PIB-ACCESS  notify
    STATUS      current
    DESCRIPTION
        "PRC from PE-PE to PD-PE, indicating the physical and/or logical
        connection of the access transport network that the CPE is attached to,
        requesting user-based policy."
 ::= { rwReqInfoClasses 1 }

rwReqInfoEntry OBJECT-TYPE
    SYNTAX      RwReqInfoEntry
    STATUS      current
    DESCRIPTION
        "An instance of the RwReqInfo class sent by PE-PE to PD-PE."
    PIB-INDEX { RwReqInfoPrid }
    UNIQUENESS { }
 ::= { rwReqInfoTable 1 }

RwReqInfoEntry ::= SEQUENCE {
    rwReqInfoPrid          InstanceId,
    rwReqInfoIPAddrType    InetAddressType,
    rwReqInfoIPAddress     InetAddress,
    rwReqInfoUserId        OCTET STRING,

```

```

        rwReqInfoMacAddr      OCTET STRING,
        rwReqInfoPhyInfo      OCTET STRING,
        rwReqBindingTokenRefPrid Prid
    }

rwReqInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwReqInfo entry."
    ::= { rwReqInfoEntry 1 }

rwReqInfoIPAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    STATUS      current
    DESCRIPTION
        "The address type enumeration value to specify the type of the CPE's
        IP address(Ipv4, Ipv6 or DNS etc). "
    ::= { rwReqInfoEntry 2 }

rwReqInfoIPAddress OBJECT-TYPE
    SYNTAX      InetAddress
    STATUS      current
    DESCRIPTION
        "CPE's Ip Address."
    ::= { rwReqInfoEntry 3 }

rwReqInfoUserId OBJECT-TYPE
    SYNTAX      OCTET STRING(SIZE (0..67))
    STATUS      current
    DESCRIPTION
        "User ID uniquely identifies the CPE, in a format consistent with the
        NAI specification."
    ::= { rwReqInfoEntry 4 }

rwReqInfoMacAddr OBJECT-TYPE
    SYNTAX      OCTET STRING(SIZE (0..16))
    STATUS      current
    DESCRIPTION
        "CPE's Mac Address. "
    ::= { rwReqInfoEntry 5 }

rwReqInfoPhyInfo OBJECT-TYPE
    SYNTAX      OCTET STRING(SIZE (0..63))
    STATUS      current
    DESCRIPTION
        "CPE's physics infomation."
    ::= { rwReqInfoEntry 6 }

rwReqBindingTokenRefPrid OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "This shall be used for pull mode supporting Authorization token for
        binding purposes. This shall refer to instance of RwReqBindingToken class. Value
        zeroDotZero shall refer to absence of authorization token and this value could
        be used when different mechanisms other than authorization token are used for
        binding purposes in pull mode."
        DEFVAL { zeroDotZero }
    ::= { rwReqInfoEntry 7 }

```

```

--
-- Rw Binding Token Table
--

rwReqBindingTokenTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwReqBindingTokenEntry
    PIB-ACCESS   notify
    STATUS       current
    DESCRIPTION
        "PRC from PE-PE to PD-PE, containing the authorization token which is used for
pull scenario using this authorization token as binding mechanism."
    ::= { rwReqInfoClasses 2 }

rwReqBindingTokenEntry OBJECT-TYPE
    SYNTAX      RwReqBindingTokenEntry
    STATUS       current
    DESCRIPTION
        "An instance of the RwReqBinding class sent by PE-PE to PD-PE."
    PIB-INDEX { RwReqBindingTokenPrid }
    UNIQUENESS { }
    ::= { rwReqBindingTokenTable 1 }

RwReqBindingTokenEntry ::= SEQUENCE {
    rwReqBindingTokenPrid      InstanceId,
    rwReqBindingTokenValue     OCTET STRING
}

rwReqBindingTokenPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwReqBindingToken entry."
    ::= { rwReqBindingTokenEntry 1 }

rwReqBindingTokenValue OBJECT-TYPE
    SYNTAX      OCTET STRING
    STATUS       current
    DESCRIPTION
        "Contains authorization token for pull mode binding purposes."
    ::= { rwReqBindingTokenEntry 2 }

-----
-- Rw Decision Info classes
--

-- Rw Flow-based Decision Information Table
--

rwFlowBasedDecInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwFlowBasedDecInfoEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC from PD-PE to PE-PE carried by COPS-PR Install decision,
providing flow-based policy and/or NAT request."
    ::= { rwDecInfoClasses 1 }

rwFlowBasedDecInfoEntry OBJECT-TYPE
    SYNTAX      RwFlowBasedDecInfoEntry
    STATUS       current
    DESCRIPTION
        "An instance of the RwFlowBasedDecInfo class sent by PD-PE to
PE-PE, carrying the QoS policy and/or NAT request."
    PIB-INDEX { RwFlowBasedDecInfoPrid }
    UNIQUENESS { }

```

```
::= { rwFlowBasedDecInfoTable 1 }
```

```
RwFlowBasedDecInfoEntry ::= SEQUENCE {  
    rwFlowBasedDecInfoPrid          InstanceId,  
    rwFlowBasedDecInfoRequestPriority Integer32,  
    rwFlowBasedDecInfoFlowDesc      Prid,  
    rwFlowBasedDecInfoNatAction      Prid,  
    rwFlowBasedDecInfoEventIndicator Prid,  
    rwFlowBasedDecAppChrgIds         Prid  
}
```

rwFlowBasedDecInfoPrid OBJECT-TYPE

SYNTAX InstanceId

STATUS current

DESCRIPTION

"An arbitrary integer index that uniquely identifies an instance of the RwFlowBasedDecInfo Entry."

```
::= { rwFlowBasedDecInfoEntry 1 }
```

rwFlowBasedDecInfoRequestPriority OBJECT-TYPE

SYNTAX Integer32(0-7)

STATUS current

DESCRIPTION

"The indication of the importance of a resource control request. It can be used for processing simultaneous requests by PE-PE based on the priority level. 0 is the lowest level of priority by default."

DEFVAL { 0 }

```
::= { rwFlowBasedDecInfoEntry 2 }
```

rwFlowBasedDecInfoFlowDesc OBJECT-TYPE

SYNTAX Prid

STATUS current

DESCRIPTION

"References the first of a list of RwFlowDesc associated with this instance of RwFlowBasedDecInfo."

A value of zeroDotZero indicates an empty list which is an error condition."

```
::= { rwFlowBasedDecInfoEntry 3 }
```

rwFlowBasedDecInfoNatAction OBJECT-TYPE

SYNTAX Prid

STATUS current

DESCRIPTION

"An arbitrary integer index that references the first of a list of RwNatAction Instances."

References the first of a list of RwNatAction class instances that are associated with this decision.

A value of zeroDotZero indicates there are no RwNatAction class instance associated with this decision."

```
::= { rwFlowBasedDecInfoEntry 4 }
```

rwFlowBasedDecInfoEventIndicator OBJECT-TYPE

SYNTAX Prid

STATUS current

DESCRIPTION

"An arbitrary integer that uniquely identifies an instance of the RwEventIndicator Entry."

```
::= { rwFlowBasedDecInfoEntry 5 }
```

rwFlowBasedDecAppChrgIds OBJECT-TYPE

SYNTAX Prid

STATUS current

DESCRIPTION

"An arbitrary integer index that uniquely identifies an instance of the RwAppChrgInfo."

There should be one Application Charging ID for each session identified by a Client Handle value. A value of zeroDotZero indicates an empty list and there is no Application Charging Info associated with this Decision."

```

    DEFVAL { zeroDotZero }
::= { rwFlowBasedDecInfoEntry 6 }

```

```

-----
--
-- Rw NAT action Table
--

```

```

rwNatActionTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwNatActionEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing NAT Action information. Sent by PD-PE to indicate
        which type of NAT is requested in PE-PE. In a COPS-PR install decision object."
::= { rwDecInfoClasses 2 }

```

```

rwNatActionEntry OBJECT-TYPE
    SYNTAX      RwNatActionEntry
    STATUS       current
    DESCRIPTION
        "An entry in the NAT Action Table describing a single NAT type.
        Each entry is referenced by RwDecInfoNatAction or RwNatActionNext."
    PIB-INDEX { RwNatActionPrid }
    UNIQUENESS { }
::= { rwNatActionTable 1 }

```

```

RwNatActionEntry ::= SEQUENCE {
    rwNatActionPrid      InstanceId,
    rwNatAction          Integer32,
    rwNatActionNext      Prid,
}

```

```

rwNatActionPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwNatAction class."
::= { rwNatActionEntry 1 }

```

```

rwNatAction OBJECT-TYPE
    SYNTAX      Integer32{
        addressTranslation(1),
        portTranslation(2),
        protocolTranslation(3)
    }
    STATUS       current
    DESCRIPTION
        "The basic type of NAT which the PD-PE requests the PE-PE to perform."
::= { rwNatActionEntry 2 }

```

```

rwNatActionNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS       current
    DESCRIPTION
        "References the next RwNatActionEntry of a list of NatAction. There
        should be one NAT action on this list for each service install in the COPS-PR
        install decision. A value of zeroDotZero indicates the end of the list of NAT
        action."
::= { rwNatActionEntry 3 }

```

```

-----
--
-- Rw Application Charging Information Table
--

rwAppChrgInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwAppChrgInfoEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "Represents Application Charging Info."
    ::= { rwDecInfoClasses 3 }

rwAppChrgInfoEntry OBJECT-TYPE
    SYNTAX      RwAppChrgInfoEntry
    STATUS       current
    DESCRIPTION
        "An entry in the App Chrg Info Table describing the Application
        charging Info.
        It is referenced by RwFlowBasedDecAppChrgIds."
    PIB-INDEX { RwAppChrgInfoPrInfo }
    UNIQUENESS { }
    ::= { rwAppChrgInfoTable 1 }

RwAppChrgInfoEntry ::= SEQUENCE {
    rwAppChrgInfoPrInfo      InstanceId,
    rwAppChrgInfoValue       OCTET STRING
}

rwAppChrgInfoPrInfo OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwAppChrgInfo class."
    ::= { rwAppChrgInfoEntry 1 }

rwAppChrgInfoValue OBJECT-TYPE
    SYNTAX      OCTET STRING
    STATUS       current
    DESCRIPTION
        "The Application charging Id."
    ::= { rwAppChrgInfoEntry 2 }

-----
--
-- Rw User-based Decision Information Table
--

rwUserBasedDecInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwUserBasedDecInfoEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC from PD-PE to PE-PE carried by COPS-PR install decision,
        provision user-based policy."
    ::= { rwDecInfoClasses 4 }

rwUserBasedDecInfoEntry OBJECT-TYPE
    SYNTAX      RwUserBasedDecInfoEntry
    STATUS       current

```

```

        DESCRIPTION
            "An entry in the User based Dec Info Table describing the policy
information."
        PIB-INDEX { RwUserBasedDecInfoPrid }
        UNIQUENESS { }
::= { rwUserBasedDecInfoTable 1 }

RwUserBasedDecInfoEntry ::= SEQUENCE {
    rwUserBasedDecInfoPrid          InstanceId,
    rwUserBasedDecInfoUserId        Unsigned32,
    rwUserBasedDecInfoPolicyId      Unsigned32,
    rwUserBasedDecInfoNetworkClass  Prid,
    rwUserBasedDecInfoDirFlux       Prid
}

rwUserBasedDecInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwUserBasedDecInfo class."
::= { rwUserBasedDecInfoEntry 1 }

rwUserBasedDecInfoUserId OBJECT-TYPE
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "User ID uniquely identifies the user for which
the policy is applied."
::= { rwUserBasedDecInfoEntry 2 }

rwUserBasedDecInfoPolicyId OBJECT-TYPE
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "PolicyID is the handle of one policy. The PolicyID is
assigned by PDP. Since there can be a many-to-many relationship
between PDP and PEP, the PolicyID allocated by different PDPs
cannot be guaranteed to be unique across network. So PEP can use IP
address of the PDP along with PolicyID to uniquely identify a
dedicated policy."
::= { rwUserBasedDecInfoEntry 3 }

rwUserBasedDecInfoNetworkClass OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
the NetworkClass. A value of zeroDotZero indicates the default network service
class."
    DEFVAL { zeroDotZero }
::= { rwUserBasedDecInfoEntry 4 }

rwUserBasedDecInfoDirFlux OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
the RwDirFlux. A value of zeroDotZero indicates the default bandwidth."
    DEFVAL { zeroDotZero }
::= { rwUserBasedDecInfoEntry 5 }

-----
-- Rw Network Class Table

```

```

--
rwNetworkClassTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwNetworkClassEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing network service class subscribed by a CPE sent by
        PD-PE to PE-PE. In a COPS-PR install decision object."
    ::= { rwDecInfoClasses 5 }

rwNetworkClassEntry OBJECT-TYPE
    SYNTAX      RwNetworkClassEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Network Class Table describing network service class
        subscribed by a CPE.
        Referenced by RwUserBasedDecInfoNetworkClass."
    PIB-INDEX { RwNetworkClassPrid }
    UNIQUENESS { }
    ::= { rwNetworkClassTable 1 }

RwNetworkClassEntry ::= SEQUENCE {
    rwNetworkClassPrid InstanceId,
    rwNetworkClass      OCTET STRING
}

rwNetworkClassPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the RwNetworkClass."
    ::= { rwNetworkClassEntry 1 }

rwNetworkClass OBJECT-TYPE
    SYNTAX      OCTET STRING
    STATUS       current
    DESCRIPTION
        "The network service class subscribed by a CPE (e.g., Premium, Gold,
        Silver, and Regular)."
    ::= { rwNetworkClassEntry 2 }

-----
--
-- Rw Dir Flux Table
--

rwDirFluxTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwDirFluxEntry
    PIB-ACCESS   install
    STATUS       current
    DESCRIPTION
        "PRC representing uplink and/or downlink bandwidth information, sent
        by PD-PE to PE-PE. In a COPS-PR install decision object."
    ::= { rwDecInfoClasses 6 }

rwDirFluxEntry OBJECT-TYPE
    SYNTAX      RwDirFluxEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Direction Flux Table describing uplink and/or
        downlink bandwidth information subscribed by a CPE.
        Referenced by RwUserBasedDecInfoDirFlux."
    PIB-INDEX { RwDirFluxPrid }

```

```

    UNIQUENESS { }
::= { rwDirFluxTable 1 }

RwDirFluxEntry ::= SEQUENCE {
    rwDirFluxPrid          InstanceId,
    rwDirFluxDirection    Integer32,
    rwDirFluxInfo          Prid,
    rwDirFluxNext          Prid
}

rwDirFluxPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
the RwDirFlux."
::= { rwDirFluxEntry 1 }

rwDirFluxDirection OBJECT-TYPE
    SYNTAX      Integer32 {
        uplink(1),
        downlink(2)
    }
    STATUS      current
    DESCRIPTION
        "Indicates the direction of the flow."
::= { rwDirFluxEntry 2 }

rwDirFluxInfo OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        " An arbitrary integer index that references the RwFluxInfo
Instances."
::= { rwDirFluxEntry 3 }

rwDirFluxNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the next RwDirFluxEntry. There should be at most two
Directional Flux per COPS-PR install decision. A value of zeroDotZero indicates
the end of the list of DirFlux."
::= { rwDirFluxEntry 4 }

-----
-- Rw Report Classes

-- Rw State Report Table
--

rwStateReportTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwStateReportEntry
    PIB-ACCESS   notify
    STATUS      current
    DESCRIPTION
        "PRCs from PE-PE to PD-PE carried by the COPS-PR RPT message, carrying the
Decision enforcement result or the notification of transport event."
::= { rwReportClasses 1 }

rwStateReportEntry OBJECT-TYPE
    SYNTAX      RwStateReportEntry
    STATUS      current

```

```

DESCRIPTION
    "An entry in the State Report Table describing the Decision
enforcement result or the notification of transport event."
    PIB-INDEX { RwStateReportPrid }
    UNIQUENESS { }
::= { rwStateReportTable 1 }

RwStateReportEntry ::= SEQUENCE {
    rwStateReportPrid          InstanceId,
    rwStateReportStatus        INTEGER,
    rwStateReportDetails        Prid,
    rwStateReportNATInfoFlowDesc Prid
}

rwStateReportPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS      current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
instance of the RwDecResultRpt class."
::= { rwStateReportEntry 1 }

rwStateReportStatus OBJECT-TYPE
    SYNTAX      INTEGER {
                                success (1),
                                failure (2),
                                event (3) }
    STATUS      current
    DESCRIPTION
        "When Status is:
success: Indicates the successful implementation of the
decision.
RwStateReportDetails:
References an instance of RwRprrBearChrgInfo for the successful session; or
References nothing otherwise (contains the value zeroDotZero).
    Failure: Indicates the failure of implementing the decision.
    RwStateReportDetails may reference an Error object,
    or may have the value zeroDotZero when no error
    object is needed, in which case COPS and COPS-PR
    error codes and error objects are sufficient.
    Event:    RwStateReportDetails references an instance of
    RwEventIndicator."
::= { rwStateReportEntry 2 }

rwStateReportDetails OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "May reference an instance of RwRprrBearChrgInfo, RwEventIndicator, or
may have the value of zeroDotZero depending on the value of
RwStateReportStatus."
::= { rwStateReportEntry 3 }

rwStateReportNATInfoFlowDesc OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "Refers to an instance of RwFlowDesc class. This attribute shall refer
to this PRC only if NAT information is requested by PD-PE otherwise this
attribute shall hold value zeroDotzero."
    DEFVAL { zeroDotZero }
::= { rwStateReportEntry 4 }
-----
--

```

```

-- Rw report Bearer charging information Table
--

rwRprtBearChrgInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RwRprtBearChrgInfoEntry
    PIB-ACCESS   notify
    STATUS       current
    DESCRIPTION
        "PRC representing the bearer charging information"
 ::= { rwReportClasses 2 }

rwRprtBearChrgInfoEntry OBJECT-TYPE
    SYNTAX      RwRprtBearChrgInfoEntry
    STATUS       current
    DESCRIPTION
        "An entry in the Rprt Bearer Chrg Info Table describing the
information of the bearer Charging Identifier and PE-PE address.
        It is referenced by RwStateReportDetails."
    PIB-INDEX { RwRprtBearChrgInfoPrid }
    UNIQUENESS { }
 ::= { rwRprtBearChrgInfoTable 1 }

RwRprtBearChrgInfoEntry ::= SEQUENCE {
    rwRprtBearChrgInfoPrid      InstanceId,
    rwRprtBearChrgInfoAddrType  InetAddressType,
    rwRprtBearChrgInfoAddr      InetAddress,
    rwRprtBearChrgInfoChrgId    OCTET STRING
}

rwRprtBearChrgInfoPrid OBJECT-TYPE
    SYNTAX      InstanceId
    STATUS       current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an instance of
the RwRprtBearChrgInfo class."
 ::= { rwRprtBearChrgInfoEntry 1 }

rwRprtBearChrgInfoAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    STATUS       current
    DESCRIPTION
        "The address type enumeration value to specify the type of the
charging device's IP address."
 ::= { rwRprtBearChrgInfoEntry 2 }

rwRprtBearChrgInfoAddr OBJECT-TYPE
    SYNTAX      InetAddress
    STATUS       current
    DESCRIPTION
        "Contains the IP Address of the device providing the bearer charging
Id."
 ::= { rwRprtBearChrgInfoEntry 3 }

rwRprtBearChrgInfoChrgId OBJECT-TYPE
    SYNTAX      OCTET STRING
    STATUS       current
    DESCRIPTION
        "The bearer Charging ID related to the session."
 ::= { rwRprtBearChrgInfoEntry 4 }

-----
--
-- Conformance Section
--

```

```

rwCompliances OBJECT IDENTIFIER ::= { rwConformance 1 }
rwGroups       OBJECT IDENTIFIER ::= { rwConformance 2 }

rwCompliance MODULE-COMPLIANCE
    STATUS current
    DESCRIPTION
        "Describes the requirements for conformance to the ITUTRwPIB."
    MODULE FRAMEWORK-PIB -- Defined in RFC 3318
        MANDATORY-GROUPS {
            frwkPrcSupportGroup,
            frwkILabelMarkerGroup
        }
    MODULE RW-PIB -- this module
        MANDATORY-GROUPS {
            rwDecCapGroup,
            rwDecCapACKGroup,
            rwEventIndicatorGroup,
            rwFlowDescGroup,
            rwSingleFlowInfoGroup,
            rwFlowTerminationGroup,
            rwFlowAddressRealmGroup,
            rwFlowLatchingIndicationGroup,
            rwFlowFirewallModeIndicationGroup,
            rwFlowDirDescGroup,
            rwFlowInfoGroup,
            rwFilterGroup,
            rwFluxInfoGroup,
            rwVSWITCHFluxInfoGroup,
            rwMPLSConnectInfoGroup,
            rwMPLSLabelGroup,
            rwVSWITCHConnectInfoGroup,
            rwReqInfoGroup,
            rwReqBindingTokenGroup,
            rwFlowbasedDecInfoGroup,
            rwNatActionGroup,
            rwAppChrgInfoGroup,
            rwUserBasedDecInfoGroup,
            rwNetworClassGroup,
            rwDirFluxGroup,
            rwStateReportGroup,
            rwRpvtBearChrgInfoGroup}
::= { rwCompliances 1 }

rwDecCapGroup OBJECT-GROUP
    OBJECTS {
        RwDecCapAppChrgIds,
        RwDecCapFlowIds
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the Decision
capabilities."
::= { rwGroups 1 }

rwDecCapACKGroup OBJECT-GROUP
    OBJECTS {
        RwDecCapACKEnable,
        RwDecCapACKChrgIds,
        RwDecCapACKFlowIds
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe capabilities which
PE-PE is acceptable."

```



```

::= { rwGroups 2 }

rwEventIndicatorGroup OBJECT-GROUP
    OBJECTS {
        rwEventIndicator,
        rwEventIndicatornext
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the query and
notification of a transport event."
    ::= { rwGroups 3 }

rwFlowDescGroup OBJECT-GROUP
    OBJECTS {
        rwFlowDescSingleFlowInfo,
        rwFlowDescConnectInfo,
        rwFlowDescNext
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information of a
list of flows in a session."
    ::= { rwGroups 4 }

rwSingleFlowInfoGroup OBJECT-GROUP
    OBJECTS {
        rwSingleFlowInfoFlowId,
        rwSingleFlowInfoFlowTermination,
        rwSingleFlowInfoAddressRealm,
        rwSingleFlowInfoLatchingIndication,
        rwSingleFlowInfoFirewallmodeIndication,
        rwSingleFlowInfoFlowDirDesc
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information of a
flow, including QoS information, NAT information and path selection
information, etc."
    ::= { rwGroups 5 }

rwFlowTerminationGroup OBJECT-GROUP
    OBJECTS {
        rwFlowTermination
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the side information
of a flow (access or core)."
    ::= { rwGroups 6 }

rwFlowAddressRealmGroup OBJECT-GROUP
    OBJECTS {
        rwFlowAddressRealmAddressRealm
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the realm
information of a flow's source and destination address."
    ::= { rwGroups 7 }

rwFlowLatchingIndicationGroup OBJECT-GROUP
    OBJECTS {
        rwFlowLatchingIndicationLatchingIndication

```

```

    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the latching
information of a flow (latching or relatch).".
    ::= { rwGroups 8 }

rwFlowFirewallModeIndicationGroup OBJECT-GROUP
    OBJECTS {
        rwFlowFirewallModeIndication
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information for
dynamic firewall working mode selection."
    ::= { rwGroups 9 }

rwFlowDirDescGroup OBJECT-GROUP
    OBJECTS {
        rwFlowDirDescInfo,
        rwFlowDirDescFluxInfo,
        rwFlowDirDescNext
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the Qos and NAT
information of flow."
    ::= { rwGroups 10 }

rwFlowInfoGroup OBJECT-GROUP
    OBJECTS {
        rwFlowInfoDirection,
        rwFlowInfoFilter,
        rwFlowInfoFilterStatus,
        rwFlowInfoServiceType
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the filter
information of a flow."
    ::= { rwGroups 11 }

rwFilterGroup OBJECT-GROUP
    OBJECTS {
        rwFilterDstAddrType,
        rwFilterDstAddr,
        rwFilterDstPrefixLength,
        rwFilterSrcAddrType,
        rwFilterSrcAddr,
        rwFilterSrcPrefixLength,
        rwFilterDscp,
        rwFilterProtocol,
        rwFilterDstL4PortMin,
        rwFilterDstL4PortMax,
        rwFilterSrcL4PortMin,
        rwFilterSrcL4PortMax
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information of a
filter."
    ::= { rwGroups 12 }

rwFluxInfoGroup OBJECT-GROUP

```

```

OBJECTS {
    rwFluxInfoBandwidthUnit,
    rwFluxInfoPeakBandwidth,
    rwFluxInfoAverageBandwidth,
    rwFluxInfoMaxPktLength
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the bandwidth
information."
::= { rwGroups 13 }

rwVSWITCHFluxInfoGroup OBJECT-GROUP
OBJECTS {
    rwVSWITCHFluxInfoBaseFluxInfo,
    rwVSWITCHFluxInfoFlowPriority,
    rwVSWITCHFluxInfoCarFlag,
    rwVSWITCHFluxInfoBroadcastBateFlag,
    rwVSWITCHFluxInfoPathBackupFlag
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the flux information
of a flow."
::= { rwGroups 14 }

rwMPLSConnectInfoGroup OBJECT-GROUP
OBJECTS {
    rwMPLSConnectInfoPathMTU,
    rwMPLSConnectInfoMPLSStack
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the MPLS LSP
information."
::= { rwGroups 15 }

rwMPLSLabelGroup OBJECT-GROUP
OBJECTS {
    rwMPLSLabelValue,
    rwMPLSLabelNext
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the MPLS label
stack."
::= { rwGroups 16 }

rwVSWITCHConnectInfoGroup OBJECT-GROUP
OBJECTS {
    rwVSWITCHConnectInfoSrcIFName,
    rwVSWITCHConnectInfoSrcVlanID,
    rwVSWITCHConnectInfoSrcVlanIDQinQ,
    rwVSWITCHConnectInfoDstIFName,
    rwVSWITCHConnectInfoDstVlanID,
    rwVSWITCHConnectInfoDstVlanIDQinQ
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the information of
the VSWITCH connection."
::= { rwGroups 17 }

```

```

rwReqInfoGroup OBJECT-GROUP
    OBJECTS {
        rwReqInfoIPAddrType,
        rwReqInfoIPAddress,
        rwReqInfoUserId,
        rwReqInfoMacAddr,
        rwReqInfoPhyInfo
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the physical and/or
logical connection of the access transport network that the CPE is attached to."
::= { rwGroups 18 }

rwReqBindingTokenGroup OBJECT-GROUP
    OBJECTS {
        rwReqBindingTokenValue
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the authorization
token which is used for pull scenario using this authorization token as binding
mechanism."
::= { rwGroups 19 }

rwFlowbasedDecInfoGroup OBJECT-GROUP
    OBJECTS {
        rwFlowBasedDecInfoRequestPriority,
        rwFlowBasedDecInfoFlowDesc,
        rwFlowBasedDecInfoNatAction,
        rwFlowBasedDecInfoEventIndicator,
        rwFlowBasedDecAppChrgIds
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information QoS
policy and/or NAT request."
::= { rwGroups 20 }

rwNatActionGroup OBJECT-GROUP
    OBJECTS {
        rwNatAction,
        rwNatActionNext
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the NAT type."
::= { rwGroups 21 }

rwAppChrgInfoGroup OBJECT-GROUP
    OBJECTS {
        rwAppChrgInfoValue
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the Application
charging Info."
::= { rwGroups 22 }

rwUserBasedDecInfoGroup OBJECT-GROUP

```

```

OBJECTS {
    rwUserBasedDecInfoUserId,
    rwUserBasedDecInfoPolicyId,
    rwUserBasedDecInfoNetworkClass,
    rwUserBasedDecInfoDirFlux
}
STATUS current
DESCRIPTION
    "This Group defines the PIB Objects that describe the user-based
policy."
::= { rwGroups 23 }

rwNetworClassGroup OBJECT-GROUP
    OBJECTS {
        rwNetworkClass
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe network service
class subscribed by a CPE."
::= { rwGroups 24 }

rwDirFluxGroup OBJECT-GROUP
    OBJECTS {
        rwDirFluxDirection,
        rwDirFluxInfo,
        rwDirFluxNext
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe uplink and/or
downlink bandwidth information subscribed by a CPE."
::= { rwGroups 25 }

rwStateReportGroup OBJECT-GROUP
    OBJECTS {
        rwStateReportStatus,
        rwStateReportDetails
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the Decision
enforcement result or the notification of transport event."
::= { rwGroups 26 }

rwRpRtBearChrgInfoGroup OBJECT-GROUP
    OBJECTS {
        rwRpRtBearChrgInfoAddrType,
        rwRpRtBearChrgInfoAddr,
        rwRpRtBearChrgInfoChrgId
    }
    STATUS current
    DESCRIPTION
        "This Group defines the PIB Objects that describe the information of
the bearer Charging Identifier and PE-PE address."
::= { rwGroups 27 }

END

```

Appendix I

Rw stage 2 message to COPS message mapping

(This appendix does not form an integral part of this Recommendation)

Rw stage 2 message	Source	Destination	COPS message name	Abbreviation
Resource Initiation Request	PD-PE	PE-PE	Decision	DEC
Resource Initiation Response	PE-PE	PD-PE	Report State	RPT
Resource Modification Request	PD-PE	PE-PE	Decision	DEC
Resource Modification Response	PE-PE	PD-PE	Report State	RPT
Resource Action Request	PE-PE	PD-PE	Request	REQ
Resource Action Response	PD-PE	PE-PE	Decision	DEC
Resource Notification	PE-PE	PD-PE	Report State	RPT
Resource Decision Request	PE-PE	PD-PE	Request	REQ
Resource Decision Response	PD-PE	PE-PE	Decision	DEC
Resource Release Request	PD-PE	PE-PE	Decision	DEC
Resource Release Response	PE-PE	PD-PE	Report State	RPT
Abort Resource Request	PE-PE	PD-PE	Delete Request State	DRQ
Abort Resource Response	PD-PE	PE-PE	–	– (No response to DRQ in COPS)

Appendix II

Rw stage 2 message parameters to COPS object-PIB-PRC-Attribute mapping

(This appendix does not form an integral part of this Recommendation)

Rw stage 2 message parameter	Object/PIB-PRC-Attribute
PD-FE Identifier	
Resource Control Session Identifier	Client Handle(Object)
Resource Requestor Identifier	
Resource Request Priority	RwDecInfoClasses – RwFlowbasedDecInfoTable – RwFlowBasedDecInfoRequestPriority
Reservation Holding Time	–
Resource Control Session Information	–
Dynamic firewall working mode	RwServiceInfoClasses – RwFlowFirewallModeIndicationTable – RwFlowFirewallModeIndication
Charging correlation information	RwDecInfoClasses – RwAppChrgInfoTable – RwAppChrgInfoValue RwReportClasses – RwRprtBearChrgInfoTable – RwRprtBearChrgInfoChrgId
Media Profile	RwServiceInfoClasses – RwFlowDescTable
Media Number	RwServiceInfoClasses – RwFlowDescTable (Position of the current PRID in the list)
Network Class of Service	RwDecInfoClasses – RwNetworClassTable – RwNetworkClass
Media Priority	RwDecInfoClasses – RwFlowbasedDecInfoTable – RwFlowBasedDecInfoRequestPriority
Path Selection Information	RwServiceInfoClasses – RwMPLSConnectInfoTable/ RwVSWITCHConnectInfoTable
Media Flow Description	RwServiceInfoClasses – RwSingleFlowInfoTable
Flow direction	RwServiceInfoClasses – RwFlowInfoTable – RwFlowInfoDirection
Flow Number	RwServiceInfoClasses – RwSingleFlowInfoTable – RwSingleFlowInfoFlowId
Gate Status	RwServiceInfoClasses – RwFlowInfoTable – RwFlowInfoFilterStatus
Protocol Version	RwServiceInfoClasses – RwFilterTable- RwFilterDstAddrType/RwFilterSrcAddrType
IP Addresses	RwServiceInfoClasses – RwFilterTable – RwFilterDstAddr/RwFilterSrcAddr
Ports	RwServiceInfoClasses – RwFilterTable – RwFilterDstL4PortMin/RwFilterDstL4PortMax/ RwFilterSrcL4PortMin/RwFilterSrcL4PortMax
Protocol Number	RwServiceInfoClasses – RwFilterTable – RwFilterProtocol

Rw stage 2 message parameter	Object/PIB-PRC-Attribute
Bandwidth	RwServiceInfoClasses – RwFluxInfoTable – RwFluxInfoPeakBandwidth/ RwFluxInfoAverageBandwidth
IP QoS handling class	RwServiceInfoClasses – RwFilterTable – RwFilterDscp
Traffic Descriptor	RwServiceInfoClasses – RwFluxInfoTable/ RwVSWITCHFluxInfoTable
Physical Connection Identifier	RwReqInfoClasses – RwReqInfoTable
Logical Connection Identifier	–
Resource Reservation Mode	–
Event Notification Indication	RwEventInfoClasses – RwEventIndicatorTable – RwEventIndicator
Resource Information Indicator	RwEventInfoClasses – RwEventIndicatorTable – RwEventIndicator
Transport Loss Indicator	RwEventInfoClasses – RwEventIndicatorTable – RwEventIndicator(Value=Indication_of loss of bearer)
Transport Recovery Indicator	RwEventInfoClasses – RwEventIndicatorTable – RwEventIndicator(Value=Indication of recovery of bearer)
Transport Release Indicator	RwEventInfoClasses – RwEventIndicatorTable – RwEventIndicator(Value=Indication of Release of bearer)
NAPT control and NAT traversal	RwDecInfoClasses – RwNatActionTable
Address Binding Information Request	RwServiceInfoClasses – RwFlowInfoTable – RwFlowInfoFilter
Address Translation Command	RwDecInfoClasses – RwNatActionTable – RwNatAction
Address Binding Information Response	RwServiceInfoClasses – RwFlowInfoTable – RwFlowInfoFilter
Resource Request Result	RwReportClasses – RwStateReportTable – RwStateReportStatus or Report-Type(Object)
Authorization Token	RwReqInfoClasses – RwReqBindingTokenTable – RwReqBindingTokenValue
Timestamp	–
Reason	Reason(Object)

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