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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Resource control protocols

**Resource control protocol no. 4 (rcp4) –
Protocols at the Rc interface between a
transport resource control physical entity
(TRC-PE) and a transport physical entity (T-PE):
COPS alternative**

ITU-T Recommendation Q.3304.1

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ITU-T Recommendation Q.3304.1

Resource control protocol no. 4 (rcp4) – Protocols at the Rc interface between a transport resource control physical entity (TRC-PE) and a transport physical entity (T-PE): COPS alternative

Summary

ITU-T Recommendation Q.3304.1 provides the Stage 3 technical specifications for a protocol variant which uses COPS to satisfy the requirements for information transfer across the Rc reference point, as defined in clause 8.3 of ITU-T Recommendation Y.2111. This protocol allows a Transport resource control physical entity (TRC-PE) to collect network topology and resource status information from elements of an access or a core network.

The COPS protocol is defined in IETF RFC 2748.

Source

ITU-T Recommendation Q.3304.1 was approved on 29 October 2007 by ITU-T Study Group 11 (2005-2008) under the ITU-T Recommendation A.8 procedure.

FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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ITU-T Recommendation Q.3304.1

Resource control protocol no. 4 (rcp4) – Protocols at the Rc interface between a transport resource control physical entity (TRC-PE) and a transport physical entity (T-PE): COPS alternative

1 Scope

This Recommendation provides the Stage 3 technical specifications for a protocol satisfying the requirements for information transfer across the Rc reference point, as defined in clause 8.3 of [ITU-T Y.2111]. This protocol allows a Transport resource control physical entity (TRC-PE) to collect network topology and resource status information from elements of an access or a core network.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T Q.3300] ITU-T Recommendation Q.3300 (draft), *Architectural framework for the Q.33xx series of Recommendations*.
- [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 2578] IETF RFC 2578 (1999), *Structure of Management Information Version 2 (SMIv2)*.
- [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 3318] IETF RFC 3318 (2003), *Framework Policy Information Base*.
- [IETF RFC 4001] IETF RFC 4001 (2005), *Textual Conventions for Internet Network Addresses*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

- 3.1.1 client handle:** [IETF RFC 2748].
- 3.1.2 policy information base (PIB):** [IETF RFC 3084].
- 3.1.3 transport resource control physical entity (TRC-PE):** [ITU-T Q.3300].
- 3.1.4 transport physical entity (T-PE):** [ITU-T Q.3300].

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 session: As defined in [b-ITU-T Q-Sup.27], a temporary relationship among a group of objects that are assigned to collectively fulfill a task for a period of time. A session has a state that may change during its lifetime. The session represents an abstract, simplified view of the management and usage of the objects and their shared information. As used in this Recommendation, the term refers to a COPS signalling relationship established between the TRC-PE acting as a COPS policy decision point (PDP) and the T-PE acting as a COPS policy enforcement point (PEP).

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations:

COPS	Common Open Policy Service
COPS-PR	COPS usage for policy provisioning
DEC	COPS DECision message
DEC Install	COPS DECision Install message
DEC Remove	COPS DECision Remove message
DRE	Data Relay Entity
MPLS	Multi Protocol Label Switching
PDP	Policy Decision Point
PEP	Policy Enforcement Point
PIB	Policy Information Base
PRC	Provisioning Class
PRI	PRovisioning Instance
QoS	Quality of Service
REQ	COPS REQuest message
RPT	COPS RePorT state message
T-PE	Transport Physical Entity
TRC-PE	Transport Resource Control Physical Entity
VSWITCH	Virtual SWITCHing

5 Protocol

This variant of the Rc Stage 3 definition uses the COPS protocol, and in particular the COPS-PR procedures and data models defined in [IETF RFC 3084].

The COPS protocol is a request/response protocol intended to operate in the client/server mode. The T-PE serves as the policy enforcement point (PEP) while the client and the TRC-PE serve as the policy decision point (PDP) and server, respectively.

COPS implementations supporting this Recommendation shall support the COPS client type 0x800d (ITUT-RcPIB), which is defined in Annex A.

6 Procedures

6.1 Establishment of the COPS session

The T-PE shall initiate a TCP connection and open a COPS session with the TRC-PE as described in [IETF RFC 2748]. To establish an Rc session, the T-PE shall send a Client-Open message with the client identifier 0x800d (ITUT-RcPIB). The TRC-PE shall respond with a Client-Accept message for that client type. State synchronization may proceed as described in clauses 2.5 of [IETF RFC 2748] and 3.1 of [IETF RFC 3084]. The client handle within the REQ message is of local significance to the T-PE. This Recommendation does not specify use of a ClientSI object within the Client-Accept message.

6.2 COPS session maintenance and termination

The T-PE and TRC-PE shall use the Keep-Alive procedures defined in [IETF RFC 2748] to ensure the continued availability of the COPS session. The session shall be terminated only by the loss of availability of one of the peers through failure or management action.

6.3 Provision of policy by the TRC-PE

The TRC-PE shall provide policy to the T-PE to indicate what information the TRC-PE wishes to acquire, using the contents of Named Decision objects within COPS-PR DEC messages. A DEC message must be returned in response to a REQ message from the T-PE. The TRC-PE may also send further DEC messages as required to modify previously set policy or collect additional information on a one-time basis.

Details are provided in clause A.2.

6.4 Generation of reports by the T-PE

The T-PE shall provide information to the TRC-PE as determined by the policy installed by the DEC messages it receives. This information is provided within instances of the Named ClientSI object within COPS Report-State (RPT) messages.

Again, details are given in clause A.2.

7 Application of policy information base (PIB)

7.1 Role of PIB

The policy information base (PIB) provides a means to interwork between different product vendors. The PIB defines a collection of provisioning classes (PRC) which can be used by COPS to request or pass 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 the PIB. So, a PIB is just like a virtual database of the PRC.

This clause defines a PIB within which part of the data definitions are inherited from other PIBs, including the PIBs in [IETF RFC 3159], [IETF RFC 3318], and [IETF RFC 4001].

7.2 Encoding of PIB

ASN.1 BER shall be used to encode the provisioning instance identifier (PRID) and policy data as described in clause 2.2.1 of [IETF RFC 3084].

7.3 Definition of PIB

See clauses A.1 and A.3 for details.

8 Reference to functional architecture

8.1 ITU-T Recommendation Y.2111

The protocol defined in this Recommendation operates across the Rc reference point as defined in [ITU-T Y.2111]. This reference point is shown in Figure 8-1 (Figure 5 of [ITU-T Y.2111]).

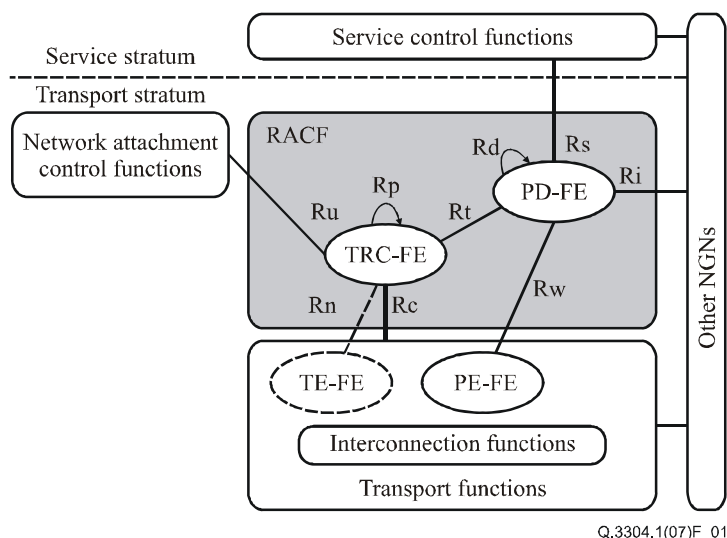


Figure 8-1 – Position of the Rc reference point within the RACF architecture

9 Security considerations

There might be several possible security threats at the Rc interface, such as denial of service, message disclosure by unauthorized snooping, and unauthorized message creation and modification.

In general, an attacker can surreptitiously intercept information, attempt to create unauthorized information, and/or send modified, reordered information.

There might be a risk that an attacker can impersonate a COPS server and illicitly acquire and tamper with the information. Even though the information is encrypted, a reply attack might be possible.

The COPS protocol specification [IETF RFC 2748] requires all implementations to support use of an Integrity object to prevent third-party tampering with the messages. This Integrity object consists of an HMAC digest over the contents of the message. Its use requires a shared secret (key) available to the client and server.

Deployments which use the Integrity object are required to have a means to manage the exchange of keys. However, the Integrity object does not resolve all of the threats identified above, and in particular does not provide confidentiality.

Annex A

Policy information base

(This annex forms an integral part of this Recommendation)

A.1 Static description of the PIB

The ITUT-RcPIB consists of six provisioning classes (PRCs) grouped into larger classes. The RcResourceInfoClasses group contains four PRCs:

- RcMPLSLabelTable, which provides a linked list of MPLS label objects;
- RcMPLSInfoTable, which provides the following information for individual label switched paths (LSPs):
 - active/inactive status;
 - by reference, the label value;
 - next-hop IP address;
- RcDreInterfaceTable, which provides the active/inactive status and interface name for interfaces on non-MPLS data relay entities (e.g., VSwitches);
- RcResourceManageTable, which the TRC-PE uses to request status reports.

The second major group of PRCs is the RcServiceReportClasses group. This group may be expanded in the future, but at the moment contains only a single sub-group, RcServiceReportClasses. RcServiceReportClasses contains two PRCs:

- RcStateReportTable, which indicates the success or failure of a particular query and may provide diagnostic information in the case of failure;
- RcOverloadReportTable, which can be used to indicate that the T-PE is overloaded or has recovered from overload.

A.2 Usage

To query the status of a specific MPLS LSP, the TRC-PE places an RcResourceManageTable entry instance into a DEC install request, with the value of the RcResourceManageContent attribute pointing to a specific entry of the RcMPLSInfoTable. In response, the T-PE generates a RPT message into which it places:

- an RcStateReportTable entry instance indicating whether the query was processed successfully;
- in the case of success:
 - the RcMPLSInfoTable entry instance to which the RcResourceManageTable entry instance pointed, with the appropriate values filled in;
 - except where the status of the RcMPLSInfoTable entry instance was "not exist", the RcMPLSLabelTable entry instance to which the RcMPLSInfoMPLSLabel attribute points, giving the value of the path label;
 - in the case where the previous query failed because of overload, an RcOverloadReportTable entry instance indicating recovery;
- in the case of failure where the failure is due to overload of the T-PE, an RcOverloadReportTable entry instance indicating overload.

To acquire the status of every MPLS path supported by the T-PE, the TRC-PE should begin by requesting the status of the RcMPLSInfoTable entry with instance value equal to 1. This entry may or may not exist, as indicated by the returned RcMPLSInfoMPLSStatus attribute value. If it does

not exist, the value of the RcMPLSInfoNext attribute returned by the T-PE shall point to the first valid RcMPLSInfoTable entry instance, thus giving the TRC-PE a starting point for walking through the complete table.

Similar operations apply to the retrieval of status for Data relay entity interfaces.

A.3 Rc Policy information base

```

ITU-T-RcPIB  PIB-DEFINITIONS ::= BEGIN

    IMPORTS
        Unsigned32, Integer32, MODULE-IDENTITY,
        MODULE-COMPLIANCE, OBJECT-TYPE, OBJECT-GROUP
            FROM COPS-PR-SPPI                -- Defined in [IETF RFC 3159]
        InstanceId, Prid
            FROM COPS-PR-SPPI-TC            -- Defined in [IETF RFC 3159]
        zeroDotZero
            FROM SNMPv2-SMI                -- [IETF RFC 2578]

        InetAddress, InetAddressType,
        InetAddressPrefixLength
            FROM INET-ADDRESS-MIB;          -- Defined in [IETF RFC 4001]

    iTUT-RcPIB MODULE-IDENTITY
        SUBJECT-CATEGORIES { ITUT-Rc(0x800D) } -- ITU-T Rc COPS Client Type

        LAST-UPDATED "200709170000Z"
        ORGANIZATION "ITU-T Study Group 11"
        CONTACT-INFO
            "XUE LiLi
            Huawei Technology Co. Ltd.
            E-mail: xuelili@huawei.com"

        DESCRIPTION
            "A PIB module containing the set of provisioning
            classes that are required for support of policies for
            Rc Cops interface"
        REVISION "200709170000Z"
        DESCRIPTION
            "The Rc PIB for Rec. Q.3304.1 version 1"

        ::= { 0.0.17.3304.127.1.2.0 }
            -- itu-t(0) recommendation(0) q(17) q3304(3304) hyphen(127) <...>(1)
            -- pib(2) version1 (0)

    rcResourceInfoClasses          OBJECT IDENTIFIER ::= { iTUT-RcPIB 1}
    rcServiceEventClasses          OBJECT IDENTIFIER ::= { iTUT-RcPIB 2}
    rcServiceReportClasses         OBJECT IDENTIFIER ::= { rcServiceEventClasses 1}

    -----
    -- RcMPLSLabelTable Table
    -- Lsp Label PRC
    rcMPLSLabelTable OBJECT-TYPE
        SYNTAX          SEQUENCE OF RcMPLSLabelEntry
        PIB-ACCESS       install
        STATUS           current
        DESCRIPTION
            "This table represents the Rc label."
        ::= { rcResourceInfoClasses 1 }

    rcMPLSLabelEntry OBJECT-TYPE
        SYNTAX          RcMPLSLabelEntry
        STATUS           current

```

```

DESCRIPTION
    "LSP"
    PIB-INDEX { rcMPLSLabelPrid }
    UNIQUENESS { }
    ::= { rcMPLSLabelTable 1 }

```

```

RcMPLSLabelEntry ::= SEQUENCE {
    rcMPLSLabelPrid          InstanceId,
    rcMPLSLabelValue        Unsigned32,
    rcMPLSLabelNext         Prid
}

```

```

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

```

```

rcMPLSLabelValue OBJECT-TYPE
    SYNTAX      Unsigned32
    STATUS      current
    DESCRIPTION
        "The label value for this path"
    ::= { rcMPLSLabelEntry 2 }

```

```

rcMPLSLabelNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the next of a list RcMPLSLabel instance.
        A value of zeroDotZero indicates end of the list. "
    DEFVAL { zeroDotZero }
    ::= { rcMPLSLabelEntry 3 }

```

```

-----
-- This table is used for MPLS query or report
--

```

```

rcMPLSInfoTable OBJECT-TYPE
    SYNTAX      SEQUENCE OF RcMPLSInfoEntry
    PIB-ACCESS   install
    STATUS      current
    DESCRIPTION
        "This table represents the Rc Query Label."
    ::= { rcResourceInfoClasses 2}

```

```

rcMPLSInfoEntry OBJECT-TYPE
    SYNTAX      RcMPLSInfoEntry
    STATUS      current
    DESCRIPTION
        "LSP state"
    PIB-INDEX { rcMPLSInfoPrid }
    UNIQUENESS { }
    ::= { rcMPLSInfoTable 1 }

```

```

RcMPLSInfoEntry ::= SEQUENCE {
    rcMPLSInfoPrid          InstanceId,
    rcMPLSInfoMPLSStatus   Integer32,
    rcMPLSInfoMPLSLabel    Prid,
    rcMPLSInfoCnIpAddrType InetAddressType,
    rcMPLSInfoCnIpAddr     InetAddress,
    rcMPLSInfoNext         Prid
}

```

```

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

```

```

rcMPLSInfoMPLSStatus OBJECT-TYPE
    SYNTAX      Integer32 {
                                active (0),
                                inactive (1),
                                notExist (0xFF) }
    STATUS      current
    DESCRIPTION
        "The label status, describe the status of LSP label."
    ::= { rcMPLSInfoEntry 2 }

```

```

rcMPLSInfoMPLSLabel OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the RcMPLSLabelValue of the
        RcMPLSlabel class."
    ::= { rcMPLSInfoEntry 3 }

```

```

rcMPLSInfoCnIpAddrType OBJECT-TYPE
    SYNTAX      InetAddressType
    STATUS      current
    DESCRIPTION
        "Cn IP address type."
    ::= { rcMPLSInfoEntry 4 }

```

```

rcMPLSInfoCnIpAddr OBJECT-TYPE
    SYNTAX      InetAddress
    STATUS      current
    DESCRIPTION
        ""
    ::= { rcMPLSInfoEntry 5 }

```

```

rcMPLSInfoNext OBJECT-TYPE
    SYNTAX      Prid
    STATUS      current
    DESCRIPTION
        "References the next of a list RcMPLSInfo instances.
        A value of zeroDotZero indicates end of the list."
    DEFVAL { zeroDotZero }
    ::= { rcMPLSInfoEntry 6 }

```

```

-----
-- Dre interface PRC

```

```

rcDreInterfaceTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RcDreInterfaceEntry
    PIB-ACCESS      install
    STATUS          current
    DESCRIPTION
        "This table represents the Rc Dre Interface."
    ::= { rcResourceInfoClasses 3 }

```

```

rcDreInterfaceEntry OBJECT-TYPE
    SYNTAX          RcDreInterfaceEntry
    STATUS          current
    DESCRIPTION     "Dre Interface"
    PIB-INDEX { rcDreInterfacePrid }
    UNIQUENESS { }
    ::= { rcDreInterfaceTable 1 }

```

```

RcDreInterfaceEntry ::= SEQUENCE {
    rcDreInterfacePrid      InstanceId,
    rcDreInterfaceStatus   Integer32,
    rcDreInterfaceName     OCTET STRING(SIZE (0..67)),
    rcDreInterfaceNext     Prid
}

```

```

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

```

```

rcDreInterfaceStatus OBJECT-TYPE
    SYNTAX          Integer32 {
                                active (0),
                                inactive (1),
                                notExist(0xFF) }
    STATUS          current
    DESCRIPTION     "The Dre interface status"
    ::= { rcDreInterfaceEntry 2 }

```

```

rcDreInterfaceName OBJECT-TYPE
    SYNTAX          OCTET STRING(SIZE (0..67))
    STATUS          current
    DESCRIPTION     "The Interface Name."
    ::= { rcDreInterfaceEntry 3 }

```

```

rcDreInterfaceNext OBJECT-TYPE
    SYNTAX          Prid
    STATUS          current
    DESCRIPTION
        "References the next of a list RcDreInterface class.
        A value of zeroDotZero indicates end of the list."
    DEFVAL { zeroDotZero }
    ::= { rcDreInterfaceEntry 4 }

```

```

-----
--
-- Rc Resource Query Table
--
rcResourceManageTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RcResourceManageEntry
    PIB-ACCESS      install
    STATUS          current
    DESCRIPTION
        "This table represents the Rc Resource Query."
    ::= { rcResourceInfoClasses 4 }

rcResourceManageEntry OBJECT-TYPE
    SYNTAX          RcResourceManageEntry
    STATUS          current
    DESCRIPTION
        "An instance of the RcResourceManage class"
    PIB-INDEX { rcResourceManagePrid }
    UNIQUENESS { }
    ::= { rcResourceManageTable 1 }

RcResourceManageEntry ::= SEQUENCE {
    rcResourceManagePrid          InstanceId,
    rcResourceManageContent      Prid
}

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

rcResourceManageContent OBJECT-TYPE
    SYNTAX          Prid
    STATUS          current
    DESCRIPTION
        "Reference the instances of RcResourceInfoClasses, can be used
        to query or report the resource state ."
    ::= { rcResourceManageEntry 2 }

-----

-- Rc DecResult Report Table
--
rcStateReportTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RcStateReportEntry
    PIB-ACCESS      notify
    STATUS          current
    DESCRIPTION
        "The Rc Decision Result Report PRC."
    ::= { rcServiceReportClasses 1 }

```



```

rcStateReportEntry OBJECT-TYPE
    SYNTAX          RcStateReportEntry
    STATUS          current
    DESCRIPTION
        "An instance of the RcStateReport class."
    PIB-INDEX { rcStateReportPrid }
    UNIQUENESS { }
    ::= { rcStateReportTable 1 }

RcStateReportEntry ::= SEQUENCE {
    rcStateReportPrid          InstanceId,
    rcStateReportStatus        Integer32,
    rcStateReportDetails       Prid
}

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

rcStateReportStatus OBJECT-TYPE
    SYNTAX          Integer32 {
                        success (1),
                        failure (2),
                        usage   (3) }
    STATUS          current
    DESCRIPTION
        "When Status is:
            success: Indicates the successful implementation of the
                      decision.
                      RcStateReportDetails:
                        References nothing otherwise (contains the value
                        zeroDotZero).
            Failure: Indicates the failure of implementing the decision.
                      RcStateReportDetails 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.
            Usage:   RcStateReportDetails references an instance of
                      frwkBasePibClasses class."
    ::= { rcStateReportEntry 2 }

rcStateReportDetails OBJECT-TYPE
    SYNTAX          Prid
    STATUS          current
    DESCRIPTION
        "May reference an instance of frwkBasePibClasses(frwkErrorTable)
        or may have the value of zeroDotZero depending on the value of
        RcStateReportStatus."
    ::= { rcStateReportEntry 3 }

-----

--
-- Rc Overload Report Table
--
rcOverloadReportTable OBJECT-TYPE
    SYNTAX          SEQUENCE OF RcOverloadReportEntry

```

```

    PIB-ACCESS      install
    STATUS          current
    DESCRIPTION
        "This table represents the Rc overload information."
    ::= { rcServiceReportClasses 2 }

```

```

rcOverloadReportEntry OBJECT-TYPE
    SYNTAX          RcOverloadReportEntry
    STATUS          current
    DESCRIPTION
        "Overload information"
    PIB-INDEX { rcOverloadReportPrid }
    UNIQUENESS { }
    ::= { rcOverloadReportTable 1 }

```

```

RcOverloadReportEntry ::= SEQUENCE {
    rcOverloadReportPrid          InstanceId,
    rcOverloadReportStatus       Integer32
}

```

```

rcOverloadReportPrid OBJECT-TYPE
    SYNTAX          InstanceId
    STATUS          current
    DESCRIPTION
        "An arbitrary integer index that uniquely identifies an
        instance of the Report Overload class."
    ::= { rcOverloadReportEntry 1 }

```

```

rcOverloadReportStatus OBJECT-TYPE
    SYNTAX          Integer32 {
                        overload(0),
                        recover(1)
                    }
    STATUS          current
    DESCRIPTION
        "Overload status."
    ::= { rcOverloadReportEntry 2 }

```

END

Bibliography

- [b-ITU-T Q-Sup.27] ITU-T Q-series Recommendations – Supplement 27 (1999), *Technical Report – Overview of Signalling and Protocol Framework for an Emerging Environment (SPFEE)*.

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