Management Information Base for Frame Relay DTEs
Using SMIV2

1. Status of this Memo

This document specifies an Internet standards track protocol for the
Internet community, and requests discussion and suggestions for
improvements. Please refer to the current edition of the "Internet
Official Protocol Standards" (STD 1) for the standardization state
and status of this protocol. Distribution of this memo is unlimited.

2. Abstract

This memo defines a portion of the Management Information Base (MIB)
for use with network management protocols in TCP/IP-based internets.
In particular, it defines objects for managing Frame Relay interfaces
on DTEs.

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3. The SNMPv2 Network Management Framework

The major components of the SNMPv2 Network Management framework are described in the documents listed below.

- **RFC 1902** [1] defines the Structure of Management Information (SMI), the mechanisms used for describing and naming objects for the purpose of management.
- STD 17, **RFC 1213** [2] defines MIB-II, the core set of managed objects (MO) for the Internet suite of protocols.
- **RFC 1905** [3] defines the protocol used for network access to managed objects.

The framework is adaptable/extensible by defining new MIBs to suit the requirements of specific applications/protocols/situations.

Managed objects are accessed via a virtual information store, the MIB. Objects in the MIB are defined using the subset of Abstract Syntax Notation One (ASN.1) defined in the SMI. In particular, each object type is named by an OBJECT IDENTIFIER, which is an administratively assigned name. The object type together with an object instance serves to uniquely identify a specific instantiation of the object. For human convenience, often a textual string, termed the descriptor, is used to refer to the object type.

4. Overview

4.1. Frame Relay Operational Model

For the purposes of understanding this document, Frame Relay is viewed as a multi-access media, not as a group of point-to-point connections. This model proposes that Frame Relay is a single interface to the network (physical connection) with many destinations or neighbors (virtual connections). This view enables a network manager the ability to group all virtual connections with their corresponding physical connection thereby allowing simpler diagnostics and trouble shooting.

With the extension of the interfaces MIB, it is possible to configure frame relay DLCs as individual interfaces and create ifTable entries for each. This is not recommended and is not directly supported by this MIB. Additionally, in the presence of demand circuits creation of individual ifEntries for each is not possible.
Should the user wish to group DLCs together to associate them with a higher layer, or to associate a DLC with an unnumbered point-to-point service, the frame relay DTE MIB provides an entry in the frCircuitEntry record. For example, suppose one were to configure a company proprietary protocol to run above several of the frame relay VCs. The basic layering would look something like the following:

![Protocol Layer Diagram]

A configuration which specified that DLCI 40, 41, and 42 were associated with a proprietary protocol layer, while DLCI 20 and 30 were to run IP directly can now be expressed using a combination of frCircuitIfIndex and frCircuitLogicalIfIndex. In this particular case DLCIs 40, 41, and 42 would use frCircuitIfIndex equal to the frame relay interface level (2) while their frCircuitLogicalIfIndex would indicate the proprietary protocol (3). DLCIs 20 and 30 would have both instances set to the frame relay interface (2).

<table>
<thead>
<tr>
<th>Object</th>
<th>Meaning for Frame Relay Interface</th>
</tr>
</thead>
<tbody>
<tr>
<td>ifDescr</td>
<td>As per DESCRIPTION in RFC 1573.</td>
</tr>
<tr>
<td>ifType</td>
<td>The value allocated for Frame Relay Interfaces - frameRelay (32).</td>
</tr>
<tr>
<td>ifMtu</td>
<td>Set to maximum frame size in octets for this frame relay interface.</td>
</tr>
</tbody>
</table>

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Brown & Baker Standards Track [Page 3]
ifSpeed  The access rate for the frame relay interface. This could be different from the speed of the underlying physical interface, e.g. in a fractional T1 case the access rate could be 384 kbits/s (the value reported in this object) whereas the speed of the underlying interface would be 1.544 Mbits/s (the value reported in the instance of ifSpeed for the ifEntry with type dsl).

ifPhysAddress  The primary address for this interface assigned by the Frame Relay interface provider. An octet string of zero length if no address is used for this interface.

ifAdminStatus  As per DESCRIPTION in RFC 1573.

ifOperStatus  As per DESCRIPTION in RFC 1573.

ifLastChange  As per DESCRIPTION in RFC 1573.

ifInOctets  The number of received octets. This includes not only the information field (user data) but also the frame relay header and CRC.

ifInUcastPkts  The number of frames received on non-multicast DLCIs

ifInDiscards  The number of frames that were successfully received but were discarded because of format errors or because the VC was not known. Format errors, in this case, are any errors which would prevent the system from recognizing the DLCI and placing the error in the frCircuitDiscard category.

ifInErrors  The number of received frames that are discarded, because of an error. Possible errors can be the following: the frame relay frames were too long or were too short, the frames had an invalid or unrecognized DLCI values, or incorrect header values.
ifInUnknownProtos  Number of unknown or unsupported upper layer protocol frames received and discarded.

ifOutOctets  The number of received octets. This includes not only the information field (user data) but also the frame relay header and CRC.

ifOutUcastPkts  The number of frames sent.

ifOutDiscards  The number of frames discarded in the transmit direction.

ifOutErrors  The number of frames discarded in the egress direction, because of errors.

ifName  As per DESCRIPTION in RFC 1573.

ifInMulticastPkts  The number of unerrored frames received on a multicast DLCI.

ifInBroadcastPkts  Always zero (0) as there are no broadcast frames.

ifOutMulticastPkts  The number of frames transmitted over a multicast DLCI.

ifOutBroadcastPkts  Always zero (0) as there are no broadcast frames.

ifHCInOctets  Only required when ifSpeed >= 155 Mbits/s. See details for ifInOctets.

ifHCOutOctets  Only required when ifSpeed >= 155 Mbits/s. See details for ifInOctets.

ifLinkUpDownTrapEnable  As per DESCRIPTION in RFC 1573.

ifHighSpeed  The access rate of the frame relay interface measured in Mbits/s. If the access rate is less than 1 Mbits/s, this object returns 0.

ifPromiscuousMode  Set to false(2).

ifConnectorPresent  Set to false(2).
4.2. Textual Conventions

One new data type is introduced as a textual convention in this MIB document. This textual convention enhances the readability of the specification and can ease comparison with other specifications if appropriate. It should be noted that the introduction of this textual conventions has no effect on either the syntax nor the semantics of any managed objects. The use of this is merely an artifact of the explanatory method used. Objects defined in terms of one of these methods are always encoded by means of the rules that define the primitive type. Hence, no changes to the SMI or the SNMP are necessary to accommodate this textual conventions which is adopted merely for the convenience of readers and writers in pursuit of the elusive goal of clear, concise, and unambiguous MIB documents.

The new data type is DLCI. DLCI refers to the range 0..DLCINumber, and is used to refer to the valid Data Link Connection Indices. DLCINumber is, by definition, the largest possible DLCI value possible under the configured Q.922 Address Format.

4.3. Structure of MIB

The MIB is composed of three groups, one defining the Data Link Connection Management Interface (DLCMI), one describing the Circuits, and a third describing errors.

During normal operation, Frame Relay virtual circuits will be added, deleted and change availability. The occurrence of such changes is of interest to the network manager and therefore, one trap is defined, intended to be corollary to the SNMP "Link Up" and "Link Down" traps.

5. Changes from RFC 1315

Below are listed the changes from the previously published version this document, which was RFC 1315:

- The MIB module was converted from SMIv1 to SMIv2 format. Note: due to this, the table indices have access of "read-only" instead of "not-accessible", which is the typical value for index objects in SMIv2.

- The module name was changed from RFC1315-MIB to FRAME-RELAY-DTE-MIB.

- The textual convention "Index" was dropped from the MIB module and "InterfaceIndex" from the interfaces MIB module, IF-MIB, was used in its place.
RFC 2115
Frame Relay DTE MIB             September 1997

- Objects frDlcmiStatus and frDlcmiRowStatus were added to table frDlcmiTable.
- Added values "itut933A(5)" (from CCITT Q933 Annex A) and "ansiT1617D1994(6)" (from ANSI T1.617a-1994 Annex D) to the enumerations for object frDlcmiState.
- The labels for the enumerated values for object frDlcmiAddressLen were renamed to remove their hyphens as required by SMIv2.
- Added clarification that the "management virtual circuit" (i.e. DLCI 0) is a member of the circuit table.
- Added the following objects to table frCircuitTable: frCircuitMulticast, frCircuitType, frCircuitDiscards, frCircuitReceivedDEs, frCircuitSentDEs, frCircuitLogicalIfIndex, and frCircuitRowStatus.
- The definition of object frCircuitReceivedOctets was clarified as to which octets were counted.
- Added the objects frErrFaults and frErrFaultTime to table frErrTable.
- Added clarification to the values of object frErrType.
- Added size on definition of object frErrData and clarified what data to capture.
- Changed identifier for OID value { frameDelayDTE 4 } from frame-relay-globals to frameRelayTrapControl.
- Added object frTrapMaxRate.
- Created object groups frPortGroup, frCircuitGroup, frTrapGroup, frErrGroup, frPortGroup0, frCircuitGroup0, frTrapGroup0, and frErrGroup0.
- Created notification group frNotificationGroup.
- Created module compliances frCompliance and frCompliance0.
- Added ranges to objects frCircuitCommittedBurst, frCircuitExcessBurst, and frCircuitThroughput.
6. Definitions

FRAME-RELAY-DTE-MIB DEFINITIONS ::= BEGIN

IMPORTS
    MODULE-IDENTITY, OBJECT-TYPE, Counter32,
    Integer32, NOTIFICATION-TYPE FROM SNMPv2-SMI
    TEXTUAL-CONVENTION, RowStatus, TimeStamp FROM SNMPv2-TC
    MODULE-COMPLIANCE, OBJECT-GROUP,
    NOTIFICATION-GROUP FROM SNMPv2-CONF
    transmission FROM RFC1213-MIB
    InterfaceIndex FROM IF-MIB;

-- Frame Relay DTE MIB

frameRelayDTE MODULE-IDENTITY
    LAST-UPDATED "9705010229Z" -- Thu May 1 02:29:46 PDT 1997
    ORGANIZATION "IETF IPLPDN Working Group"
    CONTACT-INFO
        "Caralyn Brown
        Postal: Cadia Networks, Inc.
                1 Corporate Drive
                Andover, Massachusetts 01810
        Tel: +1 508 689 2400 x133
        E-Mail: cbrown@cadia.com"
        Fred Baker
        Postal: Cisco Systems
                519 Lado Drive
                Santa Barbara, California 93111
        Tel: +1 408 526 425
        E-Mail: fred@cisco.com"
    DESCRIPTION
        "The MIB module to describe the use of a Frame Relay
        interface by a DTE."
    REVISION "9705010229Z" -- Thu May 1 02:29:46 PDT 1997
    DESCRIPTION
        "Converted from SMIv1 to SMIv2. (Thus, indices are
        read-only rather than being not-accessible.) Added
        objects and made clarifications based on implementation
        experience."

    REVISION "9204010000Z"
    DESCRIPTION
        "Published as RFC 1315, the initial version of this MIB
        module."
    ::= { transmission 32 }
-- the range of a Data Link Connection Identifier
--
DLCI ::= TEXTUAL-CONVENTION
  STATUS current
  DESCRIPTION
    "The range of DLCI values. Note that this varies by
    interface configuration; normally, interfaces may use
    0..1023, but may be configured to use ranges as large
    as 0..2^23."
  SYNTAX Integer32(0..8388607)

--
-- Data Link Connection Management Interface
--
frDlcmiTable OBJECT-TYPE
  SYNTAX SEQUENCE OF FrDlcmiEntry
  MAX-ACCESS not-accessible
  STATUS current
  DESCRIPTION
    "The Parameters for the Data Link Connection Management
    Interface for the frame relay service on this
    interface."
  REFERENCE
  ::= ( frameRelayDTE 1 )

frDlcmiEntry OBJECT-TYPE
  SYNTAX FrDlcmiEntry
  MAX-ACCESS not-accessible
  STATUS current
  DESCRIPTION
    "The Parameters for a particular Data Link Connection
    Management Interface."
  INDEX { frDlcmiIfIndex }
  ::= { frDlcmiTable 1 }
FrDlcmiEntry ::=  
SEQUENCE {
  frDlcmiIfIndex InterfaceIndex,  
  frDlcmiState INTEGER,  
  frDlcmiAddress INTEGER,  
  frDlcmiAddressLen INTEGER,  
  frDlcmiPollingInterval Integer32,  
  frDlcmiFullEnquiryInterval Integer32,  
  frDlcmiErrorThreshold Integer32,  
  frDlcmiMonitoredEvents Integer32,  
  frDlcmiMaxSupportedVCs DLCI,  
  frDlcmiMulticast INTEGER,  
  frDlcmiStatus INTEGER,  
  frDlcmiRowStatus RowStatus
}

frDlcmiIfIndex OBJECT-TYPE  
SYNTAX InterfaceIndex  
MAX-ACCESS read-only  
STATUS current  
DESCRIPTION "The ifIndex value of the corresponding ifEntry."  
::= ( frDlcmiEntry 1 )

frDlcmiState OBJECT-TYPE  
SYNTAX INTEGER  
  noLmiConfigured (1),  
  lmiRev1 (2),  
  ansiT1617D (3), -- ANSI T1.617 Annex D  
  ansiT1617B (4), -- ANSI T1.617 Annex B  
  itut933A (5), -- CCITT Q933 Annex A  
  ansiT1617D1994 (6) -- ANSI T1.617a-1994 Annex D  
MAX-ACCESS read-create  
STATUS current  
DESCRIPTION "This variable states which Data Link Connection  
Management scheme is active (and by implication, what  
DLCI it uses) on the Frame Relay interface."  
National Standard T1.617a-1994, ITU-T Recommendation  
Q.933 (03/93)."

::= ( frDlcmiEntry 2 )
frDlcmiAddress OBJECT-TYPE
SYNTAX INTEGER {
  q921 (1), -- 13 bit DLCI
  q922March90 (2), -- 11 bit DLCI
  q922November90 (3), -- 10 bit DLCI
  q922 (4) -- Final Standard
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
  "This variable states which address format is in use on
  the Frame Relay interface."
::= { frDlcmiEntry 3 }

frDlcmiAddressLen OBJECT-TYPE
SYNTAX INTEGER {
  twoOctets (2),
  threeOctets (3),
  fourOctets (4)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION
  "This variable states the address length in octets. In
  the case of Q922 format, the length indicates the
  entire length of the address including the control
  portion."
::= { frDlcmiEntry 4 }

frDlcmiPollingInterval OBJECT-TYPE
SYNTAX Integer32 (5..30)
UNITS "seconds"
MAX-ACCESS read-create
STATUS current
DESCRIPTION
  "This is the number of seconds between successive
  status enquiry messages."
REFERENCE
  Timer T391."
DEFVAL { 10 }
::= { frDlcmiEntry 5 }
frDlcmiFullEnquiryInterval OBJECT-TYPE
SYNTAX Integer32 (1..255)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"Number of status enquiry intervals that pass before
issuance of a full status enquiry message."
REFERENCE
Counter N391."
DEFVAL { 6 }
::= { frDlcmiEntry 6 }

frDlcmiErrorThreshold OBJECT-TYPE
SYNTAX Integer32 (1..10)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This is the maximum number of unanswered Status
Enquiries the equipment shall accept before declaring
the interface down."
REFERENCE
"American National Standard T1.617-1991, Section D.5.1
Counter N392."
DEFVAL { 3 }
::= { frDlcmiEntry 7 }

frDlcmiMonitoredEvents OBJECT-TYPE
SYNTAX Integer32 (1..10)
MAX-ACCESS read-create
STATUS current
DESCRIPTION
"This is the number of status polling intervals over
which the error threshold is counted. For example, if
within ‘MonitoredEvents’ number of events the station
receives ‘ErrorThreshold’ number of errors, the
interface is marked as down."
REFERENCE
"American National Standard T1.617-1991, Section D.5.2
Counter N393."
DEFVAL { 4 }
::= { frDlcmiEntry 8 }
frDlcmiMaxSupportedVCs OBJECT-TYPE
SYNTAX   DLCI
MAX-ACCESS   read-create
STATUS   current
DESCRIPTION
"The maximum number of Virtual Circuits allowed for
this interface. Usually dictated by the Frame Relay
network.

In response to a SET, if a value less than zero or
higher than the agent’s maximal capability is
configured, the agent should respond badValue"
::= { frDlcmiEntry 9 }

frDlcmiMulticast OBJECT-TYPE
SYNTAX   INTEGER    {
    nonBroadcast (1),
    broadcast (2)
}
MAX-ACCESS   read-create
STATUS   current
DESCRIPTION
"This indicates whether the Frame Relay interface is
using a multicast service."
::= { frDlcmiEntry 10 }

frDlcmiStatus OBJECT-TYPE
SYNTAX   INTEGER    {
    running      (1),   -- init complete, system running
    fault        (2),   -- error threshold exceeded
    initializing (3)     -- system start up
}
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"This indicates the status of the Frame Relay interface
as determined by the performance of the dlcmi. If no
dlcmi is running, the Frame Relay interface will stay
in the running state indefinitely."
::= { frDlcmiEntry 11 }
frDlcmiRowStatus OBJECT-TYPE
SYNTAX   RowStatus
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
   "SNMP Version 2 Row Status Variable. Writable objects
    in the table may be written in any RowStatus state."
 ::= { frDlcmiEntry 12 }

--
-- A Frame Relay service is a multiplexing service. Data
-- Link Connection Identifiers enumerate virtual circuits
-- (permanent or dynamic) which are layered onto the underlying
-- circuit, represented by ifEntry. Therefore, each of the entries
-- in the Standard MIB’s Interface Table with an IfType of
-- Frame Relay represents a Q.922 interface. Zero or more
-- virtual circuits are layered onto this interface and provide
-- interconnection with various remote destinations.
-- Each such virtual circuit is represented by an entry in the
-- circuit table. The management virtual circuit (i.e. DLCI 0)
-- is a virtual circuit by this definition and will be represented
-- with an entry in the circuit table.

-- Circuit Table

-- The table describing the use of the DLCIs attached to
-- each Frame Relay Interface.

frCircuitTable OBJECT-TYPE
SYNTAX   SEQUENCE OF FrCircuitEntry
MAX-ACCESS not-accessible
STATUS   current
DESCRIPTION
   "A table containing information about specific Data
    Link Connections (DLC) or virtual circuits."
 ::= { frameRelayDTE 2 }
frCircuitEntry OBJECT-TYPE
SYNTAX   FrCircuitEntry
MAX-ACCESS not-accessible
STATUS   current
DESCRIPTION
"The information regarding a single Data Link Connection. Discontinuities in the counters contained in this table are indicated by the value in frCircuitCreationTime."
INDEX { frCircuitIfIndex, frCircuitDlci }
::= { frCircuitTable 1 }

FrCircuitEntry ::= SEQUENCE {
  frCircuitIfIndex                InterfaceIndex,  
  frCircuitDlci                   DLCI,           
  frCircuitState                  INTEGER,        
  frCircuitReceivedFECNs          Counter32,       
  frCircuitReceivedBECNs          Counter32,       
  frCircuitSentFrames             Counter32,       
  frCircuitSentOctets             Counter32,       
  frCircuitReceivedFrames         Counter32,       
  frCircuitReceivedOctets         Counter32,       
  frCircuitCreationTime           TimeStamp,      
  frCircuitLastTimeChange         TimeStamp,      
  frCircuitCommittedBurst         Integer32,      
  frCircuitExcessBurst            Integer32,      
  frCircuitThroughput             Integer32,      
  frCircuitMulticast              INTEGER,        
  frCircuitType                   INTEGER,        
  frCircuitDiscards               Counter32,       
  frCircuitReceivedDEs            Counter32,       
  frCircuitSentDEs                Counter32,       
  frCircuitLogicalIfIndex         InterfaceIndex,  
  frCircuitRowStatus              RowStatus
}

frCircuitIfIndex OBJECT-TYPE
SYNTAX   InterfaceIndex
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The ifIndex Value of the ifEntry this virtual circuit is layered onto."
::= { frCircuitEntry 1 }
frCircuitDlci OBJECT-TYPE
SYNTAX DLCI
MAX-ACCESS read-only
STATUS current
DESCRIPTION "The Data Link Connection Identifier for this virtual circuit."
REFERENCE "American National Standard T1.618-1991, Section 3.3.6"
::= { frCircuitEntry 2 }

frCircuitState OBJECT-TYPE
SYNTAX INTEGER { invalid (1),
active (2),
inactive (3)
}
MAX-ACCESS read-create
STATUS current
DESCRIPTION "Indicates whether the particular virtual circuit is operational. In the absence of a Data Link Connection Management Interface, virtual circuit entries (rows) may be created by setting virtual circuit state to 'active', or deleted by changing Circuit state to 'invalid'.

Whether or not the row actually disappears is left to the implementation, so this object may actually read as 'invalid' for some arbitrary length of time. It is also legal to set the state of a virtual circuit to 'inactive' to temporarily disable a given circuit.

The use of 'invalid' is deprecated in this SNMP Version 2 MIB, in favor of frCircuitRowStatus."
DEFVAL { active }
::= { frCircuitEntry 3 }
frCircuitReceivedFECNs OBJECT-TYPE
SYNTAX  Counter32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"Number of frames received from the network indicating
forward congestion since the virtual circuit was
created. This occurs when the remote DTE sets the FECN
flag, or when a switch in the network enqueues the
frame to a trunk whose transmission queue is
congested."
REFERENCE
"American National Standard T1.618-1991, Section 3.3.3"
::= { frCircuitEntry 4 }

frCircuitReceivedBECNs OBJECT-TYPE
SYNTAX  Counter32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"Number of frames received from the network indicating
backward congestion since the virtual circuit was
created. This occurs when the remote DTE sets the BECN
flag, or when a switch in the network receives the
frame from a trunk whose transmission queue is
congested."
REFERENCE
"American National Standard T1.618-1991, Section 3.3.4"
::= { frCircuitEntry 5 }

frCircuitSentFrames OBJECT-TYPE
SYNTAX  Counter32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"The number of frames sent from this virtual circuit
since it was created."
::= { frCircuitEntry 6 }

frCircuitSentOctets OBJECT-TYPE
SYNTAX  Counter32
MAX-ACCESS read-only
STATUS  current
DESCRIPTION
"The number of octets sent from this virtual circuit since it was created. Octets counted are the full frame relay header and the payload, but do not include the flag characters or CRC."
::= { frCircuitEntry 7 }

frCircuitReceivedFrames OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"Number of frames received over this virtual circuit since it was created."
::= { frCircuitEntry 8 }

frCircuitReceivedOctets OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"Number of octets received over this virtual circuit since it was created. Octets counted include the full frame relay header, but do not include the flag characters or the CRC."
::= { frCircuitEntry 9 }

frCircuitCreationTime OBJECT-TYPE
SYNTAX   TimeStamp
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The value of sysUpTime when the virtual circuit was created, whether by the Data Link Connection Management Interface or by a SetRequest."
::= { frCircuitEntry 10 }
frCircuitLastTimeChange OBJECT-TYPE
SYNTAX   TimeStamp
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
"The value of sysUpTime when last there was a change in
the virtual circuit state"
 ::= { frCircuitEntry 11 }

frCircuitCommittedBurst OBJECT-TYPE
SYNTAX   Integer32(0..2147483647)
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
"This variable indicates the maximum amount of data, in
bits, that the network agrees to transfer under normal
conditions, during the measurement interval."
REFERENCE
6.5.19"
DEFVAL   { 0 }  -- the default indicates no commitment
 ::= { frCircuitEntry 12 }

frCircuitExcessBurst OBJECT-TYPE
SYNTAX   Integer32(0..2147483647)
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
"This variable indicates the maximum amount of
uncommitted data bits that the network will attempt to
deliver over the measurement interval.

By default, if not configured when creating the entry,
the Excess Information Burst Size is set to the value
of ifSpeed."
REFERENCE
6.5.19"
 ::= { frCircuitEntry 13 }

frCircuitThroughput OBJECT-TYPE
SYNTAX   Integer32(0..2147483647)
MAX-ACCESS read-create
STATUS   current
DESCRIPTION
"Throughput is the average number of ‘Frame Relay Information Field’ bits transferred per second across a user network interface in one direction, measured over the measurement interval.

If the configured committed burst rate and throughput are both non-zero, the measurement interval, $T$, is

$$T = \frac{frCircuitCommittedBurst}{frCircuitThroughput}.$$ 

If the configured committed burst rate and throughput are both zero, the measurement interval, $T$, is

$$T = \frac{frCircuitExcessBurst}{ifSpeed}.$$ 

REFERENCE
"American National Standard T1.617-1991, Section 6.5.19"
DEFVAL {0}  -- the default value of Throughput is
-- "no commitment".
 ::= { frCircuitEntry 14 }

frCircuitMulticast OBJECT-TYPE
SYNTAX   INTEGER   {
   unicast   (1),
   oneWay    (2),
   twoWay    (3),
   nWay      (4)
}
MAX-ACCESS   read-create
STATUS   current
DESCRIPTION
"This indicates whether this VC is used as a unicast VC (i.e. not multicast) or the type of multicast service subscribed to"
REFERENCE
"Frame Relay PVC Multicast Service and Protocol Description Implementation: FRF.7 Frame Relay Forum Technical Committe October 21, 1994"
DEFVAL {unicast}
-- the default value of frCircuitMulticast is
-- "unicast" (not a multicast VC).
 ::= { frCircuitEntry 15 }

frCircuitType OBJECT-TYPE
SYNTAX   INTEGER   {
   static  (1),
   dynamic (2)
}
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"Indication of whether the VC was manually created
(static), or dynamically created (dynamic) via the data
link control management interface."
::= { frCircuitEntry 16 }

frCircuitDiscards OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"The number of inbound frames dropped because of format
errors, or because the VC is inactive."
::= { frCircuitEntry 17 }

frCircuitReceivedDEs OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"Number of frames received from the network indicating
that they were eligible for discard since the virtual
circuit was created. This occurs when the remote DTE
sets the DE flag, or when in remote DTE’s switch
detects that the frame was received as Excess Burst
data."
REFERENCE
"American National Standard T1.618-1991, Section 3.3.4"
::= { frCircuitEntry 18 }

frCircuitSentDEs OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"Number of frames sent to the network indicating that
they were eligible for discard since the virtual
circuit was created. This occurs when the local DTE
sets the DE flag, indicating that during Network
congestion situations those frames should be discarded
in preference of other frames sent without the DE bit
set."
REFERENCE
RFC 2115  Frame Relay DTE MIB  September 1997

"American National Standard T1.618-1991, Section 3.3.4"
 ::= { frCircuitEntry 19 }

frCircuitLogicalIfIndex OBJECT-TYPE
 SYNTAX  InterfaceIndex
 MAX-ACCESS read-create
 STATUS  current
 DESCRIPTION
 "Normally the same value as frDlcmiIfIndex, but
different when an implementation associates a virtual
ifEntry with a DLC or set of DLCs in order to associate
higher layer objects such as the ipAddrEntry with a
subset of the virtual circuits on a Frame Relay
interface. The type of such ifEntries is defined by the
higher layer object; for example, if PPP/Frame Relay is
implemented, the ifType of this ifEntry would be PPP.
If it is not so defined, as would be the case with an
ipAddrEntry, it should be of type Other."
 ::= { frCircuitEntry 20 }

frCircuitRowStatus OBJECT-TYPE
 SYNTAX  RowStatus
 MAX-ACCESS read-create
 STATUS  current
 DESCRIPTION
 "This object is used to create a new row or modify or
destroy an existing row in the manner described in the
definition of the RowStatus textual convention.
Writable objects in the table may be written in any
RowStatus state."
 ::= { frCircuitEntry 21 }

--
--  Error Table
--
-- The table describing errors encountered on each Frame
--  Relay Interface.

frErrTable OBJECT-TYPE
 SYNTAX  SEQUENCE OF FrErrEntry
 MAX-ACCESS not-accessible
 STATUS  current
 DESCRIPTION
 "A table containing information about Errors on the
Frame Relay interface. Discontinuities in the counters
contained in this table are the same as apply to the
ifEntry associated with the Interface.
 ::= { frameRelayDTE 3 }

frErrEntry OBJECT-TYPE
 SYNTAX   FrErrEntry
 MAX-ACCESS not-accessible
 STATUS   current
 DESCRIPTION
   "The error information for a single frame relay interface."
 INDEX { frErrIfIndex }
 ::= { frErrTable 1 }

FrErrEntry ::= 
 SEQUENCE {
   frErrIfIndex            InterfaceIndex,
   frErrType               INTEGER,
   frErrData               OCTET STRING,
   frErrTime               TimeStamp,
   frErrFaults             Counter32,
   frErrFaultTime          TimeStamp
 }

frErrIfIndex OBJECT-TYPE
 SYNTAX   InterfaceIndex
 MAX-ACCESS read-only
 STATUS   current
 DESCRIPTION
   "The ifIndex Value of the corresponding ifEntry."
 ::= { frErrEntry 1 }

frErrType OBJECT-TYPE
 SYNTAX   INTEGER   {
   unknownError(1),
   receiveShort(2),
   receiveLong(3),
   illegalAddress(4),
   unknownAddress(5),
   dlcmiProtoErr(6),
   dlcmiUnknownIE(7),
   dlcmiSequenceErr(8),
   dlcmiUnknownRpt(9),
   noErrorSinceReset(10)
 }

Brown & Baker Standards Track [Page 23]
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"The type of error that was last seen on this interface:

receiveShort: frame was not long enough to allow demultiplexing - the address field was incomplete, or for virtual circuits using Multiprotocol over Frame Relay, the protocol identifier was missing or incomplete.

receiveLong: frame exceeded maximum length configured for this interface.

illegalAddress: address field did not match configured format.

unknownAddress: frame received on a virtual circuit which was not active or administratively disabled.

dlcmiProtoErr: unspecified error occurred when attempting to interpret link maintenance frame.

dlcmiUnknownIE: link maintenance frame contained an Information Element type which is not valid for the configured link maintenance protocol.

dlcmiSequenceErr: link maintenance frame contained a sequence number other than the expected value.

dlcmiUnknownRpt: link maintenance frame contained a Report Type Information Element whose value was not valid for the configured link maintenance protocol.

noErrorSinceReset: no errors have been detected since the last cold start or warm start."

::= { frErrEntry 2 }

frErrData OBJECT-TYPE
SYNTAX   OCTET STRING (SIZE(1..1600))
MAX-ACCESS   read-only
STATUS   current
DESCRIPTION
"An octet string containing as much of the error packet as possible. As a minimum, it must contain the Q.922 Address or as much as was delivered. It is desirable to include all header and demultiplexing information."

::= { frErrEntry 3 }
frErrTime OBJECT-TYPE
SYNTAX   TimeStamp
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
   "The value of sysUpTime at which the error was detected."
::= { frErrEntry 4 }

frErrFaults OBJECT-TYPE
SYNTAX   Counter32
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
   "The number of times the interface has gone down since it was initialized."
::= { frErrEntry 5 }

frErrFaultTime OBJECT-TYPE
SYNTAX   TimeStamp
MAX-ACCESS read-only
STATUS   current
DESCRIPTION
   "The value of sysUpTime at the time when the interface was taken down due to excessive errors. Excessive errors is defined as the time when a DLCMI exceeds the frDlcmiErrorThreshold number of errors within frDlcmiMonitoredEvents. See FrDlcmmiEntry for further details."
::= { frErrEntry 6 }

--
-- Frame Relay Trap Control
frameRelayTrapControl OBJECT IDENTIFIER ::= { frameRelayDTE 4 }

-- the following highly unusual OID is as it is for compatibility
-- with RFC 1315, the SNMP V1 predecessor of this document.
frameRelayTraps OBJECT IDENTIFIER ::= { frameRelayDTE 0 }
frTrapState OBJECT-TYPE
SYNTAX INTEGER { enabled(1), disabled(2) }
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This variable indicates whether the system produces
the frDLCIStatusChange trap."
DEFVAL { disabled }
::= { frameRelayTrapControl 1 }

frTrapMaxRate OBJECT-TYPE
SYNTAX Integer32 (0..3600000)
MAX-ACCESS read-write
STATUS current
DESCRIPTION
"This variable indicates the number of milliseconds
that must elapse between trap emissions. If events
occur more rapidly, the implementation may simply fail
to trap, or may queue traps until an appropriate time."
DEFVAL { 0 }        -- no minimum elapsed period is specified
::= { frameRelayTrapControl 2 }

-- Data Link Connection Management Interface Related Traps

frDLCIStatusChange NOTIFICATION-TYPE
OBJECTS { frCircuitState }
STATUS current

DESCRIPTION
"This trap indicates that the indicated Virtual Circuit
has changed state. It has either been created or
invalidated, or has toggled between the active and
inactive states. If, however, the reason for the state
change is due to the DLCMI going down, per-DLCI traps
should not be generated."
::= { frameRelayTraps 1 }

-- conformance information

frConformance OBJECT IDENTIFIER ::= { frameRelayDTE 6 }
frGroups OBJECT IDENTIFIER ::= { frConformance 1 }
frCompliances OBJECT IDENTIFIER ::= { frConformance 2 }

-- compliance statements
frCompliance \MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement "
MODULE -- this module
MANDATORY-GROUPS { frPortGroup, frCircuitGroup }

GROUP frErrGroup
DESCRIPTION "This optional group is used for debugging Frame Relay Systems."

GROUP frTrapGroup
DESCRIPTION "This optional group is used for the management of asynchronous notifications by Frame Relay Systems."

GROUP frNotificationGroup
DESCRIPTION "This optional group defines the asynchronous notifications generated by Frame Relay Systems."

OBJECT frDlcmiRowStatus
MIN-ACCESS read-only
DESCRIPTION "Row creation is not required for the frDlcmiTable."

OBJECT frCircuitRowStatus
MIN-ACCESS read-only
DESCRIPTION "Row creation is not required for the frCircuitTable."

 ::= { frCompliances 1 }

frCompliance0 \MODULE-COMPLIANCE
STATUS current
DESCRIPTION "The compliance statement for objects and the trap defined in RFC 1315."
MODULE -- this module
MANDATORY-GROUPS { frPortGroup0, frCircuitGroup0 }

GROUP frErrGroup0
DESCRIPTION "This optional group is used for debugging Frame Relay Systems."
GROUP       frTrapGroup0
DESCRIPTION  "This optional group is used for the management of
asynchronous notifications by Frame Relay Systems."

GROUP       frNotificationGroup
DESCRIPTION  "This optional group defines the asynchronous
notifications generated by Frame Relay Systems."

 ::= { frCompliances 2 }

-- units of conformance

frPortGroup  OBJECT-GROUP
OBJECTS {
  frDlcmiIfIndex, frDlcmiState, frDlcmiAddress,
  frDlcmiAddressLen, frDlcmiPollingInterval,
  frDlcmiFullEnquiryInterval, frDlcmiErrorThreshold,
  frDlcmiMonitoredEvents, frDlcmiMaxSupportedVCs,
  frDlcmiMulticast, frDlcmiStatus, frDlcmiRowStatus
}
STATUS  current
DESCRIPTION  "The objects necessary to control the Link Management
Interface for a Frame Relay Interface as well as
maintain the error statistics on this interface."
 ::= { frGroups 1 }

frCircuitGroup  OBJECT-GROUP
OBJECTS {
  frCircuitIfIndex, frCircuitDlci, frCircuitState,
  frCircuitReceivedFECNs, frCircuitReceivedBECNs,
  frCircuitSentFrames, frCircuitSentOctets,
  frCircuitReceivedFrames, frCircuitReceivedOctets,
  frCircuitCreationTime, frCircuitLastTimeChange,
  frCircuitCommittedBurst, frCircuitExcessBurst,
  frCircuitThroughput, frCircuitMulticast,
  frCircuitType, frCircuitDiscards,
  frCircuitReceivedDEs, frCircuitSentDEs,
  frCircuitLogicalIfIndex, frCircuitRowStatus
}
STATUS  current
DESCRIPTION  "The objects necessary to control the Virtual Circuits
layered onto a Frame Relay Interface."
 ::= { frGroups 2 }
frTrapGroup  OBJECT-GROUP
OBJECTS { frTrapState, frTrapMaxRate }
STATUS  current
DESCRIPTION
"The objects necessary to control a Frame Relay Interface’s notification messages."
::= { frGroups 3 }

frErrGroup  OBJECT-GROUP
OBJECTS {
  frErrIfIndex, frErrType, frErrData, frErrTime,
  frErrFaults, frErrFaultTime
}
STATUS  current
DESCRIPTION
"Objects designed to assist in debugging Frame Relay Interfaces."
::= { frGroups 4 }

frNotificationGroup  NOTIFICATION-GROUP
NOTIFICATIONS { frDLCIStatusChange }
STATUS  current
DESCRIPTION
"Traps which may be used to enhance event driven management of the interface."
::= { frGroups 5 }

frPortGroup0  OBJECT-GROUP
OBJECTS {
  frDlcmiIfIndex, frDlcmiState, frDlcmiAddress,
  frDlcmiAddressLen, frDlcmiPollingInterval,
  frDlcmiFullEnquiryInterval, frDlcmiErrorThreshold,
  frDlcmiMonitoredEvents, frDlcmiMaxSupportedVCs,
  frDlcmiMulticast
}
STATUS  current
DESCRIPTION
"The objects necessary to control the Link Management Interface for a Frame Relay Interface as well as maintain the error statistics on this interface from RFC 1315."
::= { frGroups 6 }

frCircuitGroup0  OBJECT-GROUP
OBJECTS {
  frCircuitIfIndex, frCircuitDlci, frCircuitState,
  frCircuitReceivedFECNs, frCircuitReceivedBECNs,
  frCircuitSentFrames, frCircuitSentOctets,
frCircuitReceivedFrames, frCircuitReceivedOctets, frCircuitCreationTime, frCircuitLastTimeChange, frCircuitCommittedBurst, frCircuitExcessBurst, frCircuitThroughput

}  
STATUS current  
DESCRIPTION  
"The objects necessary to control the Virtual Circuits layered onto a Frame Relay Interface from RFC 1315."  
::= { frGroups 7 }

frErrGroup0 OBJECT-GROUP  
OBJECTS { frErrIfIndex, frErrType, frErrData, frErrTime  
}  
STATUS current  
DESCRIPTION  
"Objects designed to assist in debugging Frame Relay Interfaces from RFC 1315."  
::= { frGroups 8 }

frTrapGroup0 OBJECT-GROUP  
OBJECTS { frTrapState  
}  
STATUS current  
DESCRIPTION  
"The objects necessary to control a Frame Relay Interface’s notification messages from RFC 1315."  
::= { frGroups 9 }

END

7. Security Issues

Security issues for this MIB are entirely covered by the SNMP Security Architecture, and have not been expanded within the contents of this MIB.

8. Acknowledgments

This document was originally produced by the IP Over Large Public Data Networks (IPLPDN) Working Group, and has since been carried on in the PPP Working Group, sort of. Currently, the Ion Working Group is its host.

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9. Authors’ Addresses

Caralyn Brown
Cadia Networks, Inc.
1 Corporate Drive
Andover, Massachusetts 01810
Telephone: +1 508 689 2400 x133
E-Mail: cbrown@cadia.com

Fred Baker
Cisco Systems
519 Lado Drive
Santa Barbara, California 93111
Telephone +1 408 526 4257
E-Mail: fred@cisco.com

10. References


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