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**xDSL multi-pair bonding using Time-Division Inverse Multiplexing
(G.Bond/TDIM) MIB
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Abstract

This document defines Management Information Base (MIB) module for use with network management protocols in TCP/IP based internets. This document proposes an extension to the G.Bond MIB module with a set of objects for managing multi-pair bonded xDSL interfaces using Time-Division Inverse Multiplexing (TDIM), defined in ITU-T recommendation G.998.3.

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1. Introduction

The Multi-pair bonding using time-division inverse multiplexing (TDIM), a.k.a. G.Bond/TDIM, is specified in ITU-T G.998.3 recommendation [[G.998.3](#)], which defines a method for bonding (or aggregating) of multiple xDSL lines into a single bi-directional logical link carrying a mix of various traffic streams, e.g. Ethernet, Asynchronous Transfer Mode (ATM), Time-Division Multiplexing (TDM).

The MIB module, defined in this document, provides G.Bond/TDIM specific objects for the management of G.998.3 bonded interfaces, extending the common bonding objects specified in GBOND-MIB [[I-D.ietf-adslmib-gbond-mib](#)] module.

2. The Internet-Standard Management Framework

For a detailed overview of the documents that describe the current Internet-Standard Management Framework, please refer to [section 7 of RFC 3410](#) [[RFC3410](#)].

Managed objects are accessed via a virtual information store, termed the Management Information Base or MIB. MIB objects are generally accessed through the Simple Network Management Protocol (SNMP). Objects in the MIB are defined using the mechanisms defined in the Structure of Management Information (SMI). This memo specifies a MIB module that is compliant to the SMIV2, which is described in STD 58, [RFC 2578](#) [[RFC2578](#)], STD 58, [RFC 2579](#) [[RFC2579](#)] and STD 58, [RFC 2580](#) [[RFC2580](#)].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC 2119](#) [[RFC2119](#)].

3. The DSL Forum Management Framework for xDSL Bonding

This document makes use of the DSL Forum technical report Management Framework for xDSL Bonding [[WT-159](#)], defining a management model and a hierarchy of management objects for the bonded xDSL interfaces.

4. Relationship to other MIB modules

This section outlines the relationship of the MIB modules defined in this document with other MIB modules described in the relevant RFCs. Specifically, the following MIB modules are discussed: Interfaces Group MIB (IF-MIB) and G.Bond MIB (GBOND-MIB).

[4.1.](#) Relationship to Interfaces Group MIB module

A G.Bond/TDIM port is a private case of a Bonded multi-pair xDSL interface and as such is managed using generic interface management objects defined in the IF-MIB [[RFC2863](#)]. In particular an interface index (ifIndex) is used to index instances of G.Bond/TDIM ports in a system.

[4.2.](#) Relationship to G.Bond MIB module

GBOND-MIB [[I-D.ietf-adslmib-gbond-mib](#)] module defines management objects common for all Bonded multi-pair xDSL interfaces. In particular it describes the bonding management, port and channel configuration, initialization sequence etc.

Both GBOND-MIB and GBOND-TDIM-MIB modules are REQUIRED to manage a G.Bond/TDIM port.

[4.3.](#) Relationship to Other MIB modules

_EdNote: Add here services layering model and MIBs for ATM, Ethernet and TDM services. _

[5.](#) MIB Structure

[5.1.](#) Overview

_EdNote: TBC... _

[5.2.](#) Protection Configuration

G.Bond/TDIM specification allows an optional Forward Error Correction (FEC) and Interleaver block, which, if supported and enabled, provides a degree of protection against micro-interruptions, alien noise, and even individual Bonding Channel Entity (BCE) failures, a.k.a. cut-line protection.

Management objects in the gBondTdimPortConfTable can be used to configure and query the FEC and Interleaver function of the G.Bond/TDIM port.

[5.3.](#) Service Configuration

Unlike the other two xDSL Multi-Pair Bonding schemes (G.Bond/ATM and G.Bond/Ethernet), which send the information required for reassembly of the fragmented data along with the data, G.Bond/TDIM is a synchronous scheme, requiring both ends to know the data distribution tables before any actual data transfer can happen.

Management objects in the gBondTdimServiceTable can be used to configure and query the configuration of services transported via the G.Bond/TDIM link. The services may be configured when the link is down prior to the link's initialization. The sum of all the services' bandwidth SHOULD be less or equal to the target data rate of the bonded link. Note that G.Bond/TDIM links are symmetrical, i.e. their upstream data rate equals to the downstream data rate.

5.3.1. Management of TDM Services

G.Bond/TDIM protocol provides an ability to map TDM services into the TDIM bonded link directly, without any additional overhead. It addresses only structure-agnostic TDM transport, disregarding any structure that may be imposed on these streams, in particular the structure imposed by the standard TDM framing [G.704].

_EdNote: Describe service allocation + connection with IfIndex of the service ports, prioritization and notifications. Should we allow dynamic service assignment while the G.Bond/TDIM link is up? Think about Performance Monitoring for services. Think about common things between G.Bond/TDIM and PWE3, may be there's a potential for reuse, see PW-*-MIB modules in

<http://www.ietf.org/html.charters/pwe3-charter.html> _

5.4. Mapping of ITU-T G.998.3 Managed Objects

This section contains the mapping between relevant managed objects (attributes) defined in [G.998.3] and managed objects defined in this document.

+-----+-----+		+-----+
G.998.3 Managed Object		Corresponding SNMP Object
+-----+-----+		+-----+
oGroup		
+-----+-----+		+-----+
aFECSupported		gBondTdimFecSupported
+-----+-----+		+-----+
aFECAdminState		gBondTdimFecAdminState
+-----+-----+		+-----+
aFECWordSize		gBondTdimFecWordSize
+-----+-----+		+-----+
aFECRedundancySize		gBondTdimFecRedundancySize
+-----+-----+		+-----+
aFECInterleaverType		gBondTdimFecInterleaverType
+-----+-----+		+-----+
aFECInterleaverDepth		gBondTdimFecInterleaverDepth
+-----+-----+		+-----+
aFECWordSize		gBondTdimFecMaxWordSize
+-----+-----+		+-----+
aFECRedundancySize		gBondTdimFecMaxRedundancySize
+-----+-----+		+-----+
aFECInterleaverType		gBondTdimFecInterleaverTypeSupported
+-----+-----+		+-----+
aFECInterleaverDepth		gBondTdimFecMaxInterleaverDepth
+-----+-----+		+-----+
aCRC4Errors		gBondTdimCrc4Errors
+-----+-----+		+-----+
aCRC6Errors		gBondTdimCrc6Errors
+-----+-----+		+-----+
aCRC8Errors		gBondTdimCrc8Errors
+-----+-----+		+-----+
oService		
+-----+-----+		+-----+
aServiceID		gBondTdimServiceIndex
+-----+-----+		+-----+
aServiceType		gBondTdimServiceType
+-----+-----+		+-----+
aServiceSize		gBondTdimServiceSize
+-----+-----+		+-----+
TBC...		TBC...
+-----+-----+		+-----+

Table 1: Mapping of G.998.3 Managed Objects

_EdNote: Finish the table and remove TBC... _

5.5. Mapping of DSL Forum WT-159 Managed Objects

This section contains the mapping between relevant managed objects (attributes) defined in [WT-159] and managed objects defined in this document.

+-----+-----+	
WT-159 Managed Object	Corresponding SNMP Object
+-----+-----+	
aServiceIfIdx	gBondTdimServiceIfIdx
+-----+-----+	
TBC...	TBC...
+-----+-----+	

Table 2: Mapping of WT-159 Managed Objects

_EdNote: Finish the table and remove TBC... make sure aServiceIfIdx is in WT-159. _

6. G.Bond/TDIM MIB Definitions

GBOND-TDIM-MIB DEFINITIONS ::= BEGIN

IMPORTS

MODULE-IDENTITY, OBJECT-TYPE, NOTIFICATION-TYPE,
Unsigned32, Counter32

FROM SNMPv2-SMI -- RFC 2578

TEXTUAL-CONVENTION, TruthValue

FROM SNMPv2-TC -- RFC 2579

MODULE-COMPLIANCE, OBJECT-GROUP, NOTIFICATION-GROUP

FROM SNMPv2-CONF -- RFC 2580

ifIndex, InterfaceIndex

FROM IF-MIB -- RFC 2863

gBondMIB

FROM GBOND-MIB -- RFC YYYY

-- EdNote: Replace YYYY with the actual RFC number &

-- remove this note

;

gBondTdimMIB MODULE-IDENTITY

LAST-UPDATED "200704290000Z" -- April 29, 2007

ORGANIZATION "IETF ADSL MIB Working Group"

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DESCRIPTION

"The objects in this MIB module are used to manage the multi-pair bonded xDSL Interfaces using time-division inverse multiplexing (TDIM), defined in ITU-T recommendation G.998.3 (G.Bond/TDIM).

This MIB module MUST be used in conjunction with GBOND-MIB module, common to all G.Bond technologies.

The following references are used throughout this MIB module:

[G.998.3] refers to:

ITU-T Recommendation G.998.1: 'Multi-pair bonding using time-division inverse multiplexing', January 2005.

[WT-159] refers to:

DSL Forum Technical Report: 'Management Framework for xDSL Bonding', January 2007.

Naming Conventions:

BCE - Bonding Channel Entity

CO - Central Office
CPE - Customer Premises Equipment
GBS - Generic Bonding Sublayer
SNR - Signal to Noise Ratio

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REVISION "200704290000Z" -- April 29, 2007
DESCRIPTION "Initial version, published as RFC XXXX."

-- EdNote: Replace XXXX with the actual RFC number &
-- remove this note

::= { gBondMIB 3 }

-- Sections of the module
-- Structured as recommended by [RFC 4181, Appendix D](#)

gBondTdimObjects OBJECT IDENTIFIER ::= { gBondTdimMIB 1 }

gBondTdimConformance OBJECT IDENTIFIER ::= { gBondTdimMIB 2 }

-- Groups in the module

gBondTdimPort OBJECT IDENTIFIER ::= { gBondTdimObjects 1 }

-- Textual Conventions

GBondTdimServiceIndex ::= TEXTUAL-CONVENTION

 DISPLAY-HINT "d"

 STATUS current

 DESCRIPTION

 "A unique value, greater than zero, for each Service defined in the managed G.Bond TDIM port, showing its relative position inside the G.Bond/TDIM frame.

 It is RECOMMENDED that values are assigned contiguously starting from 1. The value for each Service MUST remain constant at least from one re-initialization of the entity's network management system to the next re-initialization."

 SYNTAX Unsigned32 (1..60)

-- Port Notifications Group

gBondTdimPortNotifications OBJECT IDENTIFIER
 ::= { gBondTdimPort 0 }

gBondTdimServiceUp NOTIFICATION-TYPE

OBJECTS {

-- ifIndex is not needed here since we are under specific GBS

gBondTdimServiceIfIdx,

gBondTdimServiceOperState

}

STATUS current

DESCRIPTION

"This notification indicates that a service indicated by the gBondTdimServiceIfIdx in a particular G.Bond TDIM port' is passing traffic.

This notification MAY be send for the G.Bond TDIM port, while the port is Up, when the gBondTdimServiceOperState object has left the Down state.

Generation of this notification is controlled by the gBondTdimServiceUpDownEnable object."

::= { gBondTdimPortNotifications 1 }

gBondTdimServiceDown NOTIFICATION-TYPE

OBJECTS {

-- ifIndex is not needed here since we are under specific GBS

gBondTdimServiceIfIdx,

gBondTdimServiceOperState

}

STATUS current

DESCRIPTION

"This notification indicates that a service indicated by the gBondTdimServiceIfIdx in a particular G.Bond TDIM port' has stopped passing the traffic.

This notification MAY be send for the G.Bond TDIM port, while the port is Up, when the gBondTdimServiceOperState object has entered the Down state.

Generation of this notification is controlled by the gBondTdimServiceUpDownEnable object."

::= { gBondTdimPortNotifications 2 }

-- G.Bond TDIM Port group

gBondTdimPortConfTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondTdimPortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Configuration of G.Bond TDIM ports. Entries in

this table MUST be maintained in a persistent manner"
 ::= { gBondTdimPort 1 }

gBondTdimPortConfEntry OBJECT-TYPE

SYNTAX GBondTdimPortConfEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond TDIM Port Configuration table.
Each entry represents an G.Bond TDIM port indexed by the
ifIndex. Additional configuration parameters are available
via the gBondPortConfEntry of GBOND-MIB.
Note that an G.Bond TDIM port runs on top of a single or
multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

::= { gBondTdimPortConfTable 1 }

GBondTdimPortConfEntry ::=

SEQUENCE {

gBondTdimFecAdminState TruthValue,

gBondTdimFecWordSize Unsigned32,

gBondTdimFecRedundancySize Unsigned32,

gBondTdimFecInterleaverType INTEGER,

gBondTdimFecInterleaverDepth Unsigned32,

gBondTdimServiceUpDownEnable TruthValue

}

gBondTdimFecAdminState OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A desired state of the OPTIONAL Forward Error Correction
(FEC) function of the G.Bond TDIM port.

A value of 'false' indicates that the FEC function is
disabled. A value of 'true' indicates that the FEC SHALL be
enabled, if supported by the G.Bond TDIM port, as indicated
by the gBondTdimFecSupported object.

For the GBS-R ports, the value of this object cannot be
changed directly. This value may be changed as a result of
writing operation on the gBondTdimFecSupported object of a
remote GBS-C.

Modifications of this object MUST be performed when the link
is Down.

Attempts to change this object MUST be rejected (in case of

SNMP with the error inconsistentValue), if the link is Up or Initializing or if it is an GBS-R.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aFECAdminState"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-X"

::= { gBondTdimPortConfEntry 1 }

gBondTdimFecWordSize OBJECT-TYPE

SYNTAX Unsigned32(0|20..255)

UNITS "octets"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A FEC code word size in octets for the G.Bond TDIM ports supporting FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of zero SHALL be returned if the FEC is disabled (via gBondTdimFecAdminState) or not supported.

Changing of the FEC code word size MUST be performed when the FEC enabled link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue), if the link is Up or Initializing or the FEC function is disabled/not supported.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aFECWordSize"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XI"

::= { gBondTdimPortConfEntry 2 }

gBondTdimFecRedundancySize OBJECT-TYPE

SYNTAX Unsigned32(0|2|4|8|16|20)

UNITS "octets"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"A FEC redundancy word size in octets for the G.Bond TDIM ports supporting FEC function.

This object is read-write for the GBS-C ports and read-only

for the GBS-R.

A value of zero SHALL be returned if the FEC is disabled (via gBondTdimFecAdminState) or not supported.

Changing of the FEC redundancy word size MUST be performed when the FEC enabled link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue), if the link is Up or Initializing or the FEC function is disabled/not supported.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aFECRedundancySize"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XII"

::= { gBondTdimPortConfEntry 3 }

gBondTdimFecInterleaverType OBJECT-TYPE

SYNTAX INTEGER {

none(0),

block(1),

convolution(2)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An Interleaver type for the G.Bond TDIM ports supporting FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of none(0) SHALL be returned if the FEC is disabled (via gBondTdimFecAdminState) or not supported.

Changing of the Interleaver type MUST be performed when the FEC enabled link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue), if the link is Up or Initializing or the FEC function is disabled/not supported.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aFECInterleaverType"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XIII"

::= { gBondTdimPortConfEntry 4 }

gBondTdimFecInterleaverDepth OBJECT-TYPE

SYNTAX Unsigned32(0|1|2|3|4|6|8|12|16|24|32|48|96)

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"An Interleaver Depth for the G.Bond TDIM ports supporting FEC function.

This object is read-write for the GBS-C ports and read-only for the GBS-R.

A value of zero SHALL be returned if the FEC is disabled (via gBondTdimFecAdminState) or not supported.

Changing of the Interleaver Depth MUST be performed when the FEC enabled link is Down. Attempts to change this object MUST be rejected (In case of SNMP with the error inconsistentValue), if the link is Up or Initializing or the FEC function is disabled/not supported.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aFECInterleaverDepth"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XIV"

::= { gBondTdimPortConfEntry 5 }

gBondTdimServiceUpDownEnable OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Indicates whether gBondTdimServiceUp and gBondTdimServiceDown notifications should be generated for this interface.

Value of true(1) indicates that the notifications are enabled.
Value of false(2) indicates that the notifications are disabled.

This object MUST be maintained in a persistent manner."

::= { gBondTdimPortConfEntry 6 }

gBondTdimPortCapabilityTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondTdimPortCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"Table for Capabilities of G.Bond TDIM ports. Entries in this table MUST be maintained in a persistent manner"

```
::= { gBondTdimPort 2 }
```

gBondTdimPortCapabilityEntry OBJECT-TYPE

SYNTAX GBondTdimPortCapabilityEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond TDIM port Capability table. Each entry represents an G.Bond TDIM port indexed by the ifIndex. Additional capabilities are available via the gBondPortCapabilityEntry of GBOND-MIB. Note that a G.Bond TDIM port runs on top of a single or multiple BCE port(s), which are also indexed by ifIndex."

INDEX { ifIndex }

```
::= { gBondTdimPortCapabilityTable 1 }
```

GBondTdimPortCapabilityEntry ::=

SEQUENCE {

gBondTdimFecSupported TruthValue,
gBondTdimFecMaxWordSize Unsigned32,
gBondTdimFecMaxRedundancySize Unsigned32,
gBondTdimFecInterleaverTypeSupported INTEGER,
gBondTdimFecMaxInterleaverDepth Unsigned32

}

gBondTdimFecSupported OBJECT-TYPE

SYNTAX TruthValue

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"FEC and Interleaver Capability of the G.Bond/TDIM port. This object has a value of true(1) when the port supports the FEC and Interleaver function. A value of false(2) is returned when the port does not support the FEC and Interleaver function."

This object maps to the G.998.3 attribute aFECSupported."

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-VI"

```
::= { gBondTdimPortCapabilityEntry 1 }
```

gBondTdimFecMaxWordSize OBJECT-TYPE

SYNTAX Unsigned32(0|20..255)

UNITS "octets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A Maximum supported FEC code word size in octets for the G.Bond TDIM ports with FEC function.

A value of zero SHALL be returned if the FEC is not supported.

This object partially maps to G.998.3 attribute aFECWordSize"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XI"

::= { gBondTdimPortCapabilityEntry 2 }

gBondTdimFecMaxRedundancySize OBJECT-TYPE

SYNTAX Unsigned32(0|2|4|8|16|20)

UNITS "octets"

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A Maximum supported FEC redundancy word size in octets for the G.Bond TDIM ports with FEC function.

A value of zero SHALL be returned if the FEC is not supported.

This object partially maps to G.998.3 attribute aFECRedundancySize"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XII"

::= { gBondTdimPortCapabilityEntry 3 }

gBondTdimFecInterleaverTypeSupported OBJECT-TYPE

SYNTAX INTEGER {

none(0),

block(1),

convolution(2),

blockConvolution(3)

}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"Supported Interleaver types for the G.Bond TDIM ports with FEC function.

Possible values are:

- none - the port does not support interleaving
- block - the port supports Block Interleaver
- convolution - the port supports Convolution Interleaver
- blockConvolution - the port supports both Block and Convolution Interleaver

This object partially maps to G.998.3 attribute
aFECInterleaverType"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XIII"

::= { gBondTdimPortCapabilityEntry 4 }

gBondTdimFecMaxInterleaverDepth OBJECT-TYPE

SYNTAX Unsigned32(0|1|2|3|4|6|8|12|16|24|32|48|96)

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"A Maximum Interleaver Depth for the G.Bond TDIM ports with
FEC function.

A value of zero SHALL be returned if the Interleaver is not
supported.

This object partially maps to G.998.3 attribute
aFECInterleaverDepth"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-XIV"

::= { gBondTdimPortCapabilityEntry 5 }

gBondTdimPortStatusTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondTdimPortStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"This table provides overall status information of G.Bond
TDIM ports, complementing the generic status information from
the ifTable of IF-MIB and gBondFltStatus of GBOND-MIB.
Additional status information about connected BCEs is
available from the relevant line MIBs

This table contains live data from the equipcent. As such,
it is NOT persistent."

::= { gBondTdimPort 3 }

gBondTdimPortStatusEntry OBJECT-TYPE

SYNTAX GBondTdimPortStatusEntry

MAX-ACCESS not-accessible

STATUS current

DESCRIPTION

"An entry in the G.Bond TDIM port Status table.
Each entry represents a G.Bond TDIM port indexed by the
ifIndex.

Note that an G.Bond GBS port runs on top of a single

or multiple BCE port(s), which are also indexed by ifIndex."
INDEX { ifIndex }
 ::= { gBondTdimPortStatusTable 1 }

GBondTdimPortStatusEntry ::=

```
SEQUENCE {  
    gBondTdimCrc4Errors          Counter32,  
    gBondTdimCrc6Errors          Counter32,  
    gBondTdimCrc8Errors          Counter32,  
    gBondTdimFltStatus           BITS  
}
```

gBondTdimCrc4Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-4 errors (frame header error) on all pairs in the G.Bond TDIM port. Simultaneous errors on M lines SHOULD be counted M times.

This object maps to G.998.3 attribute aCRC4Errors.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime, defined in IF-MIB."

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-VII"

::= { gBondTdimPortStatusEntry 1 }

gBondTdimCrc6Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-6 errors (super-frame error) on all pairs in the G.Bond TDIM port. Simultaneous errors on M lines SHOULD be counted 1 time.

This object maps to G.998.3 attribute aCRC6Errors.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime, defined in IF-MIB."

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-VIII"


```
::= { gBondTdimPortStatusEntry 2 }
```

gBondTdimCrc8Errors OBJECT-TYPE

SYNTAX Counter32

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"The total number of CRC-8 errors (event/message error) on all pairs in the G.Bond TDIM port. Simultaneous errors on M lines SHOULD be counted M times.

This object maps to G.998.3 attribute aCRC8Errors.

Discontinuities in the value of this counter can occur at re-initialization of the management system, and at other times as indicated by the value of ifCounterDiscontinuityTime, defined in IF-MIB."

REFERENCE

"[[G.998.3](#)] [Appendix II](#), B-IX"

```
::= { gBondTdimPortStatusEntry 3 }
```

gBondTdimFltStatus OBJECT-TYPE

SYNTAX BITS {
 serviceDown(0),
 wrongConfig(1)
}

MAX-ACCESS read-only

STATUS current

DESCRIPTION

"G.Bond TDIM port Fault Status. This is a bitmap of possible conditions. The various bit positions are:

- | | |
|-------------|----------------------------------------------------------------------------------------------|
| serviceDown | - at least one of the services defined for this aggregation group is down (due to low rate). |
| wrongConfig | - at least one BCE at the remote GBS-R is already connected to another GBS. |

This object is intended to supplement ifOperStatus object in IF-MIB and gBondFltStatus in GBOND-MIB."

REFERENCE

"G.998.3 [Section 6.3](#);

IF-MIB, ifOperStatus; GBOND-MIB, gBondFltStatus"

```
::= { gBondTdimPortStatusEntry 4 }
```

gBondTdimServiceTable OBJECT-TYPE

SYNTAX SEQUENCE OF GBondTdimServiceEntry

MAX-ACCESS not-accessible

STATUS current
DESCRIPTION
"Table of Services in G.Bond TDIM ports.
Entries in this table MUST be maintained in a persistent
manner"
::= { gBondTdimPort 4 }

gBondTdimServiceEntry OBJECT-TYPE
SYNTAX GBondTdimServiceEntry
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"An entry in the G.Bond TDIM Port Service table, containing
the management information applicable to a particular Service
in a G.Bond TDIM port, indexed by the gBondTdimServiceIdx."
INDEX { gBondTdimServiceIdx }
::= { gBondTdimServiceTable 1 }

GBondTdimServiceEntry ::=

SEQUENCE {	
gBondTdimServiceIdx	GBondTdimServiceIndex,
gBondTdimServiceIfIdx	InterfaceIndex,
gBondTdimServiceType	INTEGER,
gBondTdimServiceSize	Unsigned32,
gBondTdimServiceOperState	INTEGER
}	

gBondTdimServiceIdx OBJECT-TYPE
SYNTAX GBondTdimServiceIndex
MAX-ACCESS not-accessible
STATUS current
DESCRIPTION
"G.Bond TDIM Service index - a unique index associated with
a particular service entry, indicating relative placement of
the service inside the G.Bond/TDIM frame.

There can be up to 60 services defined over TDIM bonded
facility. Services with lower indices have higher priority in
case of bandwidth degradation.

This objects maps to G.998.3 attribute aServiceID."
REFERENCE
"[[G.998.3](#)] [Appendix II](#), C-I"
::= { gBondTdimServiceEntry 1 }

gBondTdimServiceIfIdx OBJECT-TYPE
SYNTAX InterfaceIndex
MAX-ACCESS read-write

STATUS current

DESCRIPTION

"This is a unique index within the ifTable. It represents the interface index of a service to be transmitted over the G.Bond/TDIM service instance.

This objects maps to WT-159 attribute aServiceIfIndex."

REFERENCE

"[[WT-159](#)] ZZZ"

-- EdNote: update WT-159 and replace ZZZ and aServiceIfIndex
-- with exact references

::= { gBondTdimServiceEntry 2 }

gBondTdimServiceType OBJECT-TYPE

SYNTAX INTEGER {

ds1(0),
e1(1),
nxds0(2),
nxex0(3),
ds3(4),
e3(5),
clock(6),
ethernet(7),
atm(8),
gfpNoFCS(9),
gfp(10)

}

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"G.Bond TDIM Service Type.

Possible values are:

ds1	- Clear Channel DS1 (synchronous)
e1	- Clear Channel E1 (synchronous)
nxds0	- Fractional DS1 (synchronous)
nxex0	- Fractional E1 (synchronous)
ds3	- DS3 (synchronous)
e3	- E3 (synchronous)
clock	- Clock transfer (synchronous)
ethernet	- Ethernet (asynchronous)
atm	- ATM (asynchronous)
gfpNoFCS	- GFP encapsulated without FCS (asynchronous)
gfp	- GFP encapsulated with FCS (asynchronous)

For the GBS-R ports, the value of this object cannot be changed directly. This value may be changed as a result of writing operation on the gBondTdimServiceType object of a

remote GBS-C.

Modifications of this object MUST be performed when the link is Down.

Attempts to change this object MUST be rejected (in case of SNMP with the error inconsistentValue), if the link is Up or Initializing or if it is an GBS-R.

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aServiceType"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), C-II"

::= { gBondTdimServiceEntry 3 }

gBondTdimServiceSize OBJECT-TYPE

SYNTAX Unsigned32(0|20..255)

UNITS "octets"

MAX-ACCESS read-write

STATUS current

DESCRIPTION

"Service size in octets per bonding sub-block for a specific service identified by gBondTdimServiceIdx.

For TDM (synchronous) services with variable size e.g. fractional DS1/E1 - this object represents the number of DS0/E0 channels.

For asynchronous services (Ethernet, ATM, GFPnoFCS or GFP) - this object represents max. number of octets.

A GET operation returns current value.

A SET operation, allowed on GBS-C only when the link is Down, changes the service size to the indicated value. If the link is not down or the service type is fixed rate TDM service (gBondTdimServiceType is NxDS0, NxEO, DS1, E1, DS3, E3 or Clock), the operation MUST be rejected (in case of SNMP with the error inconsistentValue).

This object MUST be maintained in a persistent manner.

This object maps to G.998.3 attribute aServiceSize"

REFERENCE

"[[G.998.3](#)] [Appendix II](#), C-III"

::= { gBondTdimServiceEntry 4 }

gBondTdimServiceOperState OBJECT-TYPE

SYNTAX INTEGER {

up(1),


```
        down(2)
    }
    MAX-ACCESS    read-only
    STATUS        current
    DESCRIPTION
        "G.Bond TDIM Service Operation State.

        Possible values are:
            up          - Service is up passing traffic.
            down        - Service is down, due to a variety of
                          reasons, e.g. G.Bond TDIM port is
                          down, current link bandwidth is too
                          low to support a particular service,
                          etc."

    REFERENCE
        "[G.998.3] 10.2.3"
    ::= { gBondTdimServiceEntry 5 }

--
-- Conformance Statements
--

gBondTdimGroups      OBJECT IDENTIFIER
    ::= { gBondTdimConformance 1 }

gBondTdimCompliances OBJECT IDENTIFIER
    ::= { gBondTdimConformance 2 }

-- Object Groups

gBondTdimBasicGroup OBJECT-GROUP
    OBJECTS {
        gBondTdimCrc4Errors,
        gBondTdimCrc6Errors,
        gBondTdimCrc8Errors,
        gBondTdimFecSupported,
        gBondTdimServiceIfIdx,
        gBondTdimServiceType,
        gBondTdimServiceSize,
        gBondTdimServiceOperState,
        gBondTdimServiceUpDownEnable,
        gBondTdimFltStatus
    }
    STATUS        current
    DESCRIPTION
        "A collection of objects representing management information
        for G.Bond TDIM ports."
```



```
::= { gBondTdimGroups 1 }
```

```
gBondTdimFecGroup OBJECT-GROUP
```

```
OBJECTS {
```

```
    gBondTdimFecSupported,  
    gBondTdimFecAdminState,  
    gBondTdimFecWordSize,  
    gBondTdimFecRedundancySize,  
    gBondTdimFecInterleaverType,  
    gBondTdimFecInterleaverDepth,  
    gBondTdimFecMaxWordSize,  
    gBondTdimFecMaxRedundancySize,  
    gBondTdimFecInterleaverTypeSupported,  
    gBondTdimFecMaxInterleaverDepth
```

```
}
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "A collection of objects supporting OPTIONAL Forward Error  
    Correction (FEC) and Interleaver function in G.Bond TDIM  
    ports."
```

```
::= { gBondTdimGroups 2 }
```

```
gBondTdimAlarmConfGroup OBJECT-GROUP
```

```
OBJECTS {
```

```
    gBondTdimServiceUpDownEnable
```

```
}
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "A collection of objects required for configuration of alarm  
    thresholds and notifications in G.Bond TDIM ports."
```

```
::= { gBondTdimGroups 3 }
```

```
gBondTdimNotificationGroup NOTIFICATION-GROUP
```

```
NOTIFICATIONS {
```

```
    gBondTdimServiceUp,  
    gBondTdimServiceDown
```

```
}
```

```
STATUS      current
```

```
DESCRIPTION
```

```
    "This group supports notifications of significant conditions  
    associated with G.Bond TDIM ports."
```

```
::= { gBondTdimGroups 4 }
```

```
-- Compliance Statements
```

```
gBondTdimCompliance MODULE-COMPLIANCE
```

```
STATUS      current
```

```
DESCRIPTION
```


"The compliance statement for G.Bond TDIM interfaces.
Compliance with the following external compliance statements
is REQUIRED:

MIB Module	Compliance Statement
-----	-----
IF-MIB	ifCompliance3
GBOND-MIB	gBondCompliance"

```

MODULE -- this module
  MANDATORY-GROUPS {
    gBondTdimBasicGroup,
    gBondTdimAlarmConfGroup,
    gBondTdimNotificationGroup
  }

  GROUP          gBondTdimFecGroup
  DESCRIPTION
    "Support for this group is only required for implementations
    supporting G.Bond FEC and Interleaver function."

  ::= { gBondTdimCompliances 1 }
END

```

7. Security Considerations

There is a number of managed objects defined in the GBOND-TDIM-MIB module that have a MAX-ACCESS clause of read-write or read-create. Most objects are writeable only when the link is Down. Writing to these objects can have potentially disruptive effects on network operation, for example:

- o Changing of gBondTdimServiceTable configuration parameters (e.g. gBondTdimServiceType or gBondTdimServiceSize) MAY lead to a potential service impairment, for example a TDM service would be dropped if there's not enough actual bandwidth on the bonded link to support this service.
- o Changing of gBondTdimPortConfTable configuration parameters (e.g. gBondTdimFecAdminState) MAY lead to anything from link quality and rate degradation to a complete link initialization failure.

The user of the GBOND-TDIM-MIB module must therefore be aware that support for SET operations in a non-secure environment without proper protection can have a negative effect on network operations.

The readable objects in the GBOND-TDIM-MIB module (i.e., those with

MAX-ACCESS other than not-accessible) may be considered sensitive in some environments since, collectively, they provide information about the performance of network interfaces and can reveal some aspects of their configuration.

In such environments it is important to control also GET and NOTIFY access to these objects and possibly even to encrypt their values when sending them over the network via SNMP.

SNMP versions prior to SNMPv3 did not include adequate security. Even if the network itself is secure (for example by using IPsec), even then, there is no control as to who on the secure network is allowed to access and GET/SET (read/change/create/delete) the objects in this MIB module.

It is RECOMMENDED that implementers consider the security features as provided by the SNMPv3 framework (see [\[RFC3410\]](#), [section 8](#)), including full support for the SNMPv3 cryptographic mechanisms (for authentication and privacy).

Further, deployment of SNMP versions prior to SNMPv3 is NOT RECOMMENDED. Instead, it is RECOMMENDED to deploy SNMPv3 and to enable cryptographic security. It is then a customer/operator responsibility to ensure that the SNMP entity giving access to an instance of this MIB module is properly configured to give access to the objects only to those principals (users) that have legitimate rights to indeed GET or SET (change/create/delete) them.

8. IANA Considerations

A new IANAifType value of g9983 SHALL be defined by the IANA [\[1\]](#) in the IANAifType-MIB module [\[IANAifType-MIB\]](#), before this document is published as an RFC.

9. Acknowledgments

This document was produced by the IETF ADSL MIB Working Group [\[2\]](#).

10. References

10.1. Normative References

- | | |
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URIs

- [1] <<http://www.iana.org/>>
- [2] <<http://www.ietf.org/html.charters/adslmib-charter.html>>

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