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## High Capacity Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals

### Status of this Memo

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### Abstract

This document presents a set of High Capacity Textual Conventions for use in MIB modules which require performance history based upon 15 minute intervals. The Textual Conventions defined in this document extend the conventions presented in RFC 3593 to 64 bit resolution using the conventions presented in RFC 2856.

### Table of Contents

1. The Internet-Standard Management Framework . . . . .	2
2. Overview . . . . .	2
3. Definitions. . . . .	3
4. Intellectual Property Statement. . . . .	8
5. References . . . . .	8
5.1. Normative References . . . . .	8
5.2. Informative References . . . . .	9
6. Security Considerations. . . . .	10
7. Acknowledgements . . . . .	10
8. Authors' Addresses . . . . .	10
9. Full Copyright Statement . . . . .	11

## 1. 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 [RFC2119].

## 2. Overview

In cases where a manager must obtain performance history data about the behavior of equipment it manages, several strategies can be followed in the design of a MIB module that represents the managed equipment, including:

- The agent counts events on a continuous basis and, whenever desired, the manager obtains the value of the event counter and adjusts its understanding of the history of events at the agent.
- The agent allocates events to 'buckets' where each bucket represents an interval of time.

Telecommunications equipment often makes use of the latter strategy. For such equipment the standard practice is that history data is maintained by the agent in terms of 15-minute intervals [T1.231].

MIB modules for collecting performance history based on 15-minute intervals have been defined for the DS1/E1 [RFC2495], DS3/E3 [RFC2496], SONET/SDH [RFC3592], ADSL [RFC2662], HDLS2 and SHDSL [RFC3276] interface types. These MIB modules use a common set of textual conventions defined in [RFC3593].

A need has arisen to define 64-bit versions of the textual conventions in [RFC3593]. Ideally, these high-capacity textual conventions would be based on a Gauge64 or Unsigned64 data type, but unfortunately no such types exist in SMIV2. The next best choice would be to base them on the CounterBasedGauge64 textual convention

presented in [RFC2856], but that is not possible either since SMIV2 allows only base types to be used in defining textual conventions. Therefore, the textual conventions presented in this memo are based directly on the Counter64 type, like those in [RFC2856]. They are subject to the following limitations:

- The MAX-ACCESS of objects defined using these textual conventions must be read-only, because the MAX-ACCESS of the underlying Counter64 type is read-only.
- No sub-range can be specified in object definitions using these textual conventions, because sub-ranges are not allowed on Counter64 objects.
- No DEFVAL clause can be specified in object definitions using these textual conventions, because DEFVALs are not allowed on Counter64 objects.
- Objects defined using these textual conventions cannot be used in an INDEX clause, because there is no INDEX clause mapping defined for objects of type Counter64.

Use of the textual conventions presented in this memo assumes the following:

- The agent supports 15 minute based history counters.
- The agent is capable of keeping a history of 96 intervals of 15 minute performance data.
- The agent may optionally support performance data aggregating the history intervals.
- The agent will keep separate tables for the current interval, the history intervals, and the total aggregates.

### 3. Definitions

```
HC-PerfHist-TC-MIB DEFINITIONS ::= BEGIN
```

```
IMPORTS
```

```
    MODULE-IDENTITY,  
    Counter64,  
    Unsigned32,  
    Integer32,  
    mib-2                FROM SNMPv2-SMI  
    TEXTUAL-CONVENTION   FROM SNMPv2-TC;
```

## hcPerfHistTCMIB MODULE-IDENTITY

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## DESCRIPTION

"This MIB Module provides Textual Conventions to be used by systems supporting 15 minute based performance history counts that require high-capacity counts.

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REVISION "200402030000Z" -- February 3, 2004

DESCRIPTION "Initial version, published as RFC 3705."

::= { mib-2 107 }

HCPperfValidIntervals ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The number of near end intervals for which data was

collected. The value of an object with an HCPperfValidIntervals syntax will be 96 unless the measurement was (re-)started within the last 1440 minutes, in which case the value will be the number of complete 15 minute intervals for which the agent has at least some data. In certain cases (e.g., in the case where the agent is a proxy) it is possible that some intervals are unavailable. In this case, this interval is the maximum interval number for which data is available."

SYNTAX Integer32 (0..96)

HCPperfInvalidIntervals ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The number of near end intervals for which no data is available. The value of an object with an HCPperfInvalidIntervals syntax will typically be zero except in cases where the data for some intervals are not available (e.g., in proxy situations)."

SYNTAX Integer32 (0..96)

HCPperfTimeElapsed ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"The number of seconds that have elapsed since the beginning of the current measurement period. If, for some reason, such as an adjustment in the system's time-of-day clock or the addition of a leap second, the duration of the current interval exceeds the maximum value, the agent will return the maximum value.

For 15 minute intervals, the range is limited to (0..899).

For 24 hour intervals, the range is limited to (0..86399)."

SYNTAX Integer32 (0..86399)

HCPperfIntervalThreshold ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"This convention defines a range of values that may be set in a fault threshold alarm control. As the number of seconds in a 15-minute interval numbers at most 900, objects of this type may have a range of 0...900, where the value of 0 disables the alarm."

SYNTAX Unsigned32 (0..900)

HCPperfCurrentCount ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A gauge associated with a performance measurement in a current 15 minute measurement interval. The value of an object with an HCPperfCurrentCount syntax starts from zero and is increased when associated events occur, until the end of the 15 minute interval. At that time the value of the gauge is stored in the first 15 minute history interval, and the gauge is restarted at zero. In the case where the agent has no valid data available for the current interval, the corresponding object instance is not available and upon a retrieval request a corresponding error message shall be returned to indicate that this instance does not exist.

This count represents a non-negative integer, which may increase or decrease, but shall never exceed  $2^{64}-1$  (18446744073709551615 decimal), nor fall below 0. The value of an object with HCPperfCurrentCount syntax assumes its maximum value whenever the underlying count exceeds  $2^{64}-1$ . If the underlying count subsequently decreases below  $2^{64}-1$  (due, e.g., to a retroactive adjustment as a result of entering or exiting unavailable time), then the object's value also decreases.

Note that this TC is not strictly supported in SMIV2, because the 'always increasing' and 'counter wrap' semantics associated with the Counter64 base type are not preserved. It is possible that management applications which rely solely upon the (Counter64) ASN.1 tag to determine object semantics will mistakenly operate upon objects of this type as they would for Counter64 objects.

This textual convention represents a limited and short-term solution, and may be deprecated as a long term solution is defined and deployed to replace it."

SYNTAX Counter64

HCPperfIntervalCount ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A gauge associated with a performance measurement in a previous 15 minute measurement interval. In the case where the agent has no valid data available for a particular interval, the corresponding object instance is not available and upon a retrieval request a corresponding error message shall be returned to indicate that this instance does not exist.

Let X be an object with HCPperfIntervalCount syntax.

Let Y be an object with HCPperfCurrentCount syntax.  
 Let Z be an object with HCPperfTotalCount syntax.  
 Then, in a system supporting a history of n intervals with X(1) and X(n) the most and least recent intervals respectively, the following applies at the end of a 15 minute interval:

- discard the value of X(n)
- the value of X(i) becomes that of X(i-1)  
   for  $n \geq i > 1$
- the value of X(1) becomes that of Y.
- the value of Z, if supported, is adjusted.

This count represents a non-negative integer, which may increase or decrease, but shall never exceed  $2^{64}-1$  (18446744073709551615 decimal), nor fall below 0. The value of an object with HCPperfIntervalCount syntax assumes its maximum value whenever the underlying count exceeds  $2^{64}-1$ . If the underlying count subsequently decreases below  $2^{64}-1$  (due, e.g., to a retroactive adjustment as a result of entering or exiting unavailable time), then the value of the object also decreases.

Note that this TC is not strictly supported in SMIV2, because the 'always increasing' and 'counter wrap' semantics associated with the Counter64 base type are not preserved. It is possible that management applications which rely solely upon the (Counter64) ASN.1 tag to determine object semantics will mistakenly operate upon objects of this type as they would for Counter64 objects.

This textual convention represents a limited and short-term solution, and may be deprecated as a long term solution is defined and deployed to replace it."

SYNTAX Counter64

HCPperfTotalCount ::= TEXTUAL-CONVENTION

STATUS current

DESCRIPTION

"A gauge representing the aggregate of previous valid 15 minute measurement intervals. Intervals for which no valid data was available are not counted.

This count represents a non-negative integer, which may increase or decrease, but shall never exceed  $2^{64}-1$  (18446744073709551615 decimal), nor fall below 0. The value of an object with HCPperfTotalCount syntax assumes its maximum value whenever the underlying count

exceeds  $2^{64}-1$ . If the underlying count subsequently decreases below  $2^{64}-1$  (due, e.g., to a retroactive adjustment as a result of entering or exiting unavailable time), then the object's value also decreases.

Note that this TC is not strictly supported in SMIV2, because the 'always increasing' and 'counter wrap' semantics associated with the Counter64 base type are not preserved. It is possible that management applications which rely solely upon the (Counter64) ASN.1 tag to determine object semantics will mistakenly operate upon objects of this type as they would for Counter64 objects.

This textual convention represents a limited and short-term solution, and may be deprecated as a long term solution is defined and deployed to replace it."

SYNTAX Counter64

END

#### 4. Intellectual Property Statement

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#### 5. References

##### 5.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.



- [RFC2578] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Structure of Management Information Version 2 (SMIv2)", STD 58, RFC 2578, April 1999.
- [RFC2579] McCloghrie, K., Perkins, D., Schoenwaelder, J., Case, J., Rose, M. and S. Waldbusser, "Textual Conventions for SMIv2", STD 58, RFC 2579, April 1999.
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## 5.2. Informative References

- [RFC3410] Case, J., Mundy, R., Partain, D. and B. Stewart, "Introduction and Applicability Statements for Internet-Standard Management Framework", RFC 3410, December 2002.
- [T1.231] American National Standard for Telecommunications - Digital Hierarchy - Layer 1 In-Service Digital Transmission Performance Monitoring, ANSI T1.231-1997, September 1997.
- [RFC2026] Bradner, S., "The Internet Standards Process -- Revision 3", BCP 9, RFC 2026, October 1996.
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- [RFC3592] Tesink, K., "Definitions of Managed Objects for the Synchronous Optical Network/Synchronous Digital Hierarchy (SONET/SDH) Interface Type", RFC 3592, November 2003.
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- [RFC3276] Ray, B. and R. Abbi, "Definitions of Managed Objects for High Bit-rate DSL - 2nd Generation (HDSL2) and Single-Pair High-Speed Digital Subscriber Line (SHDSL) Lines", RFC 3276, May 2002.

[RFC3593] Tesink, K., "Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals", RFC 3593, November 2003.

## 6. Security Considerations

This module does not define any management objects. Instead, it defines a set of textual conventions which may be used by other MIB modules to define management objects.

Meaningful security considerations can only be written in the MIB modules that define management objects. This document has therefore no impact on the security of the Internet.

## 7. Acknowledgements

This document borrows tremendously from [RFC3593] and [RFC2856]. As such, any credit for the text found within should be fully attributed to the authors of those documents.

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