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

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
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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.

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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
      LAST-UPDATED "200402030000Z" -- February 3, 2004
      ORGANIZATION "ADSLMIB Working Group"
      CONTACT-INFO "WG-email:  adslmib@ietf.org
            Info:        https://www1.ietf.org/mailman/listinfo/adslmib

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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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          of this MIB module is part of RFC 3705: see the RFC
          itself for full legal notices."

          REVISION "200402030000Z" -- February 3, 2004
          DESCRIPTION "Initial version, published as RFC 3705."

          ::= { mib-2 107 }

   HCPerfValidIntervals ::= TEXTUAL-CONVENTION
      STATUS   current
      DESCRIPTION
         "The number of near end intervals for which data was
```

```
                  collected.  The value of an object with an
                  HCPerfValidIntervals 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)

      HCPerfInvalidIntervals ::= TEXTUAL-CONVENTION
          STATUS  current
          DESCRIPTION
              "The number of near end intervals for which no data is
              available.  The value of an object with an
              HCPerfInvalidIntervals 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)

      HCPerfTimeElapsed ::= 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)

      HCPerfIntervalThreshold ::= 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)

      HCPerfCurrentCount ::= 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 HCPerfCurrentCount 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 HCPerfCurrentCount 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

 HCPerfIntervalCount ::= 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 HCPerfIntervalCount syntax.

              Let Y be an object with HCPerfCurrentCount syntax.
              Let Z be an object with HCPerfTotalCount 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 >= 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 HCPerfIntervalCount 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

    HCPerfTotalCount ::= 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 HCPerfTotalCount 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

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5. References

5.1. Normative References

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          Requirement Levels", BCP 14, RFC 2119, March 1997.

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5.2. Informative References

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             Interface Type", RFC 2496, January 1999.

   [RFC3592] Tesink, K., "Definitions of Managed Objects for the
             Synchronous Optical Network/Synchronous Digital Hierarchy
             (SONET/SDH) Interface Type", RFC 3592, November 2003.

   [RFC2662] Bathrick, G. and F. Ly, "Definitions of Managed Objects for
             the ADSL Lines", RFC 2662, August 1999.

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             Conventions for Additional High Capacity Data Types", RFC
             2856, June 2000.

   [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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Acknowledgement