Per Hop Behavior Identification Codes

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Abstract

draft-brim-diffserv-phbid-00.txt

   This document defines a 16 bit encoding mechanism for the identification
    of differentiated services Per Hop Behaviors in protocol messages.

Status of this Memo

Table of Contents:

[1](#). Introduction

   Differentiated Services [RFC 2474, [RFC 2475](#)] introduces the notion of
   Per Hop Behaviors (PHBs) that define how traffic belonging to a
   particular behavior aggregate is treated at an individual network
   node. In IP packet headers, PHBs are not indicated as such; instead
   Differentiated Services Codepoint (DSCP) values are used. There are
   only 64 possible DSCP values, but there is no such limit on the
   number of PHBs. In a given network domain, there is a locally defined
   mapping between DSCP values and PHBs. Standardized PHBs recommend a
   DSCP mapping, but network operators may choose alternative mappings.

   In some cases it is necessary or desirable to identify a particular
   PHB in a protocol message, such as a message negotiating bandwidth
   management or path selection. Examples where work is in progress
   include communication between bandwidth brokers, and MPLS support of
   diffserv.

   In certain cases, what needs to be identified is not an individual
   PHB, but a set of PHBs. One example is a set of PHBs that must follow
   the same physical path to prevent re-ordering. An instance of this
   is the set of three PHBs belonging to a single Assured Forwarding
   class, such as the PHBs AF11, AF12 and AF13 [[Assured](#)].

   This document defines a binary encoding to uniquely identify PHBs
   and/or sets of PHBs in protocol messages. This encoding MUST be used
   when such identification is required.

   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](#). Encoding

   PHBs and sets of PHBs are encoded in an unsigned 16 bit binary field,
   using the same encoding. It is determined by context whether the
   encoding represents a PHB or a set of PHBs.

   The 16 bit field is arranged as follows:

   Case 1: PHBs defined by standards action, as per [[RFC 2474](#)].

   The encoding for a single PHB is the recommended DSCP value for that
   PHB, left-justified in the 16 bit field, with bits 6 through 15 set
   to zero. Note that the recommended DSCP value MUST be used, even if
   the network in question has chosen a different mapping.

   The encoding for a set of PHBs is the numerically smallest of the set
   of encodings for the various PHBs in the set. (Thus for the AF1x
   PHBs, the encoding is that of the AF11 PHB.)

```
    0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
  |        DSCP       | 0   0   0   0   0   0   0   0   0   0 |
  +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
```

Case 2: PHBs not defined by standards action, i.e. experimental or
local use PHBs as allowed by [RFC 2474]. In this case an arbitrary 12
bit PHB identification code, assigned by the IANA, is placed left-
justified in the 16 bit field, and bits 12 through 15 contain the
value 0x1.

A set of non-standard PHBs is identified by a single PHB
identification code.

```
    0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
  |                     PHB id code             | 0   0   0   1 |
  +---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+
```

Bits 12 through 14 are reserved either for expansion of the PHB
identification code, or for other use such as distinguishing PHB
groups from individual PHBs, at some point in the future.

3. IANA Considerations

IANA is requested to create a new assignment registry for "Per-Hop
Behavior Identification Codes", initially allowing values in the
range 0 to 4095 decimal.

Assignment of values in this field require:

  -the identity of the assignee
  -a brief description of the new PHB, with enough detail to
   distinguish it from existing standardized and non-standardized
   PHBs. In the case of a set of PHBs, this description should cover
   all PHBs in the set.
  -a reference to a stable document describing the PHB in detail.

During the first year of existence of this registry, IANA is
requested to refer all requests to the IETF diffserv WG for review.
Subsequently, requests should be reviewed by the IETF Transport Area
Directors or by an expert that they designate.

If the number of assignments begins to approach 4096, the Transport
Area Directors should be alerted.

[4](#). Security considerations

This encoding in itself raises no security issues. However, users of
this encoding should consider that modifying a PHB identification
code may constitute theft or denial of service, so protocols using
this encoding must be adequately protected.

Acknowledgements

Useful comments were made by Francois Le Faucheur and others.

References

[RFC 2119] Key words for use in RFCs to Indicate Requirement Levels,
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[Assured] Assured Forwarding PHB Group, J. Heinanen, F. Baker, W.
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Authors' Addresses

     Scott W. Brim
     146 Honness Lane
     Ithaca, NY 14850
     USA

     E-mail: swb@newbridge.com

     Brian E. Carpenter
     IBM United Kingdom Laboratories
     MP 185, Hursley Park
     Winchester, Hampshire SO21 2JN, UK

     E-mail: brian@hursley.ibm.com

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