          Delay-Tolerant Networking Bundle Protocol IANA Registries

Abstract

   The Delay-Tolerant Networking (DTN) Research Group research group has
   defined many protocols such as the Bundle Protocol and Licklider
   Transmission Protocol. The specifications of these protocols contain
   fields that are subject to a registry. For the purpose of its
   research work, the group created ad hoc registries. As the
   specifications are stable and have multiple interoperable
   implementations, the group would like to hand off the registries to
   IANA for official custody. This document describes the actions
   executed by IANA.

Status of This Memo

   This document is not an Internet Standards Track specification; it is
   published for informational purposes.

   This document is a product of the Internet Research Task Force
   (IRTF). The IRTF publishes the results of Internet-related research
   and development activities. These results might not be suitable for
   deployment. This RFC represents the consensus of the Delay-Tolerant
   Network Research Group of the Internet Research Task Force (IRTF).
   Documents approved for publication by the IRSG are not a candidate
   for any level of Internet Standard; see Section 2 of RFC 5741.

   Information about the current status of this document, any errata,
   and how to provide feedback on it may be obtained at
   http://www.rfc-editor.org/info/rfc6255.

Table of Contents

1. Introduction

   The DTNRG research group has defined many protocols relevant to the
   DTN architecture [RFC4838] such as the Bundle Protocol [RFC5050] and
   Licklider Transmission Protocol [RFC5326]. The specifications of
   these protocols contain fields that are subject to a registry. For
   the purpose of its research work, the group created ad hoc registries
   (http://www.dtnrg.org/wiki/AssignedNamesAndNumbers). As the
   specifications are stable and have multiple interoperable
   implementations, the group would like to hand off the registries to
   IANA for official custody. This document describes the actions
   executed by IANA.

2. Treatment of Flag Fields Encoded Using SDNVs

   The DTN protocols use several extensible bit flag fields that are
   encoded as Self-Delimiting Numeric Values (SDNVs) as defined in
   Section 4.1 of [RFC5050]. For these fields, the registry specifies
   the allocation and usage of bit positions within the unencoded field.
   The SDNV encoding treats the ensemble of bits in the unencoded value
   as a numeric value to be encoded on transmission and decoded on
   reception as described in [RFC5050].

   Processing of SDNV-encoded flags is discussed in [RFC6256].

   Section 4.1 of [RFC5050] specifies that implementations are not
   required to handle SDNVs with more than 64 bits in their unencoded
   value. Accordingly, SDNV-encoded flag fields should be limited to 64
   bit positions.

IANA registry policies and wording used in this document are
described in [RFC5226].

3. Bundle Protocol

The Bundle Protocol (BP) [RFC5050] has fields requiring a registry
managed by IANA.

3.1. Bundle Block Types

The Bundle Protocol has a Bundle Block Type code field (Section
4.5.2) [RFC5050]. An IANA registry has been set up as follows.

The registration policy for this registry is:

   0-191: Specification Required

   192-255: Private or experimental use. No assignment by IANA.

The Value range is: unsigned 8-bit integer.

                    Bundle Block Type Registry

   +--------------+-------------------------------+---------------+
   | Value | Description | Reference |
   +--------------+-------------------------------+---------------+
0	Reserved	This document
1	Bundle Payload Block	[RFC5050]
2-191	Unassigned	
192-255	Private and/or Experimental Use	[RFC5050]
   +--------------+-------------------------------+---------------+

The value "0" was not defined in any document or in the ad hoc
registry. As per consensus by the DTNRG research group, it is
reserved per this document.

3.2. Primary Bundle Protocol Version

The Bundle Protocol has a version field (see Section 4.5.1 of
[RFC5050]). An IANA registry has been set up as follows.

The registration policy for this registry is: RFC Required

The Value range is: unsigned 8-bit integer.

                    Primary Bundle Protocol Version Registry

```
              +-------+-------------+---------------+
              | Value | Description | Reference     |
              +-------+-------------+---------------+
              |   0-5 | Reserved    | This document |
              |     6 | Assigned    | [RFC5050]     |
              | 7-255 | Unassigned  |               |
              +-------+-------------+---------------+
```

   The value "0-5" was not defined in any document or in the ad hoc
   registry. As per consensus by the DTNRG research group, it is
   reserved per this document.

3.3. Bundle Processing Control Flags

   The Bundle Protocol has a Bundle Processing Control Flags field (see
   Section 4.2 of [RFC5050]) encoded as an SDNV (see Section 2). An
   IANA registry has been set up as follows.

   The registration policy for this registry is: Specification Required

   The Value range is: Variable length. Maximum number of flag bit
   positions: 64

Bundle Processing Control Flags Registry

```
+-------------------+------------------------------+-----------+
|      Bit Position | Description                  | Reference |
|     (right to left) |                            |           |
+-------------------+------------------------------+-----------+
|                 0 | Bundle is a fragment         | [RFC5050] |
|                 1 | Application data unit is an  | [RFC5050] |
|                   | administrative record        |           |
|                 2 | Bundle must not be fragmented| [RFC5050] |
|                 3 | Custody transfer is requested| [RFC5050] |
|                 4 | Destination endpoint is a    | [RFC5050] |
|                   | singleton                    |           |
|                 5 | Acknowledgement by application| [RFC5050]|
|                   | is requested                 |           |
|                 6 | Reserved                     | [RFC5050] |
|               7-8 | Class of service: priority   | [RFC5050] |
|              9-13 | Class of service: reserved   | [RFC5050] |
|                14 | Request reporting of bundle  | [RFC5050] |
|                   | reception                    |           |
|                15 | Request reporting of custody | [RFC5050] |
|                   | acceptance                   |           |
|                16 | Request reporting of bundle  | [RFC5050] |
|                   | forwarding                   |           |
|                17 | Request reporting of bundle  | [RFC5050] |
|                   | delivery                     |           |
|                18 | Request reporting of bundle  | [RFC5050] |
|                   | deletion                     |           |
|                19 | Reserved                     | [RFC5050] |
|                20 | Reserved                     | [RFC5050] |
|             21-63 | Unassigned                   |           |
+-------------------+------------------------------+-----------+
```

3.4. Block Processing Control Flags

   The Bundle Protocol has a Block Processing Control Flags field (see
   Section 4.3 of [RFC5050]). An IANA registry has been set up as
   follows.

   The registration policy for this registry is: Specification Required

   The Value range is: Variable length. Maximum number of flag bit
   positions: 64

Block Processing Control Flags Registry

```
+-------------------+-------------------------------+----------+
|     Bit Position  | Description                   | Reference|
|    (right to left)|                               |          |
+-------------------+-------------------------------+----------+
|                 0 | Block must be replicated in   | [RFC5050]|
|                   | every fragment                |          |
|                 1 | Transmit status report if block| [RFC5050]|
|                   | can't be processed            |          |
|                 2 | Delete bundle if block can't be| [RFC5050]|
|                   | processed                     |          |
|                 3 | Last block                    | [RFC5050]|
|                 4 | Discard block if it can't be  | [RFC5050]|
|                   | processed                     |          |
|                 5 | Block was forwarded without   | [RFC5050]|
|                   | being processed               |          |
|                 6 | Block contains an EID-reference| [RFC5050]|
|                   | field                         |          |
|              7-63 | Unassigned                    |          |
+-------------------+-------------------------------+----------+
```

3.5. Bundle Status Report Flags

   The Bundle Protocol has a Status Report Status Flag field (see
   Section 6.1.1 of [RFC5050]). An IANA registry has been set up as
   follows.

   The registration policy for this registry is: RFC Required

   The Value range is: 8 bits.

Bundle Status Report Flags Registry

```
+----------+----------------------------------------+---------------+
|   Value  | Description                            | Reference     |
+----------+----------------------------------------+---------------+
| 00000000 | Reserved                               | This document |
| 00000001 | Reporting node received bundle         | [RFC5050]     |
| 00000010 | Reporting node accepted custody of     | [RFC5050]     |
|          | bundle                                 |               |
| 00000100 | Reporting node forwarded the bundle    | [RFC5050]     |
| 00001000 | Reporting node delivered the bundle    | [RFC5050]     |
| 00010000 | Reporting node deleted the bundle      | [RFC5050]     |
| 00100000 | Unassigned                             |               |
| 01000000 | Unassigned                             |               |
| 10000000 | Unassigned                             |               |
+----------+----------------------------------------+---------------+
```

The value "00000000" was not defined in any document or in the ad hoc
registry. As per consensus by the DTNRG research group, it is
reserved per this document.

3.6. Bundle Status Report Reason Codes

The Bundle Protocol has a Bundle Status Report Reason Codes field
(see Section 6.1.1 of [RFC5050]). An IANA registry has been set up
as follows.

The registration policy for this registry is: Specification Required

The Value range is: unsigned 8-bit integer.

                Bundle Status Report Reason Codes Registry

```
+-------+--------------------------------------------+---------------+
| Value | Description                                | Reference     |
+-------+--------------------------------------------+---------------+
|     0 | No additional information                  | [RFC5050]     |
|     1 | Lifetime expired                           | [RFC5050]     |
|     2 | Forwarded over unidirectional link         | [RFC5050]     |
|     3 | Transmission canceled                      | [RFC5050]     |
|     4 | Depleted storage                           | [RFC5050]     |
|     5 | Destination endpoint ID unintelligible     | [RFC5050]     |
|     6 | No known route to destination from here    | [RFC5050]     |
|     7 | No timely contact with next node on route  | [RFC5050]     |
|     8 | Block unintelligible                       | [RFC5050]     |
| 9-254 | Unassigned                                 |               |
|   255 | Reserved                                   | This document |
+-------+--------------------------------------------+---------------+
```

The value "255" was not defined in any document or in the ad hoc
registry. As per consensus by the DTNRG research group, it is
reserved per this document.

3.7. Bundle Custody Signal Reason Codes

The Bundle Protocol has a Bundle Custody Signal Reason Codes field
(see Section 6.1.2 of [RFC5050]). An IANA registry has been set up
as follows.

The registration policy for this registry is: Specification Required

The Value range is: unsigned 7-bit integer.

Bundle Custody Signal Reason Codes Registry

```
+--------------+----------------------------------+-------------+
|        Value | Description                      | Reference   |
+--------------+----------------------------------+-------------+
|            0 | No additional information        | [RFC5050]   |
|          1-2 | Unassigned                       |             |
|            3 | Redundant reception (reception   | [RFC5050]   |
|              | by a node that is a custodial    |             |
|              | node for this bundle)            |             |
|            4 | Depleted storage                 | [RFC5050]   |
|            5 | Destination endpoint ID          | [RFC5050]   |
|              | unintelligible                   |             |
|            6 | No known route to destination    | [RFC5050]   |
|              | from here                        |             |
|            7 | No timely contact with next node | [RFC5050]   |
|              | on route                         |             |
|            8 | Block unintelligible             | [RFC5050]   |
|        9-126 | Unassigned                       |             |
|          127 | Reserved                         | This        |
|              |                                  | document    |
+--------------+----------------------------------+-------------+
```

   The value "127" was not defined in any document or in the ad hoc
   registry. As per consensus by the DTNRG research group, it is
   reserved per this document.

4. Security Considerations

   This document requests the creation of registries managed by IANA.
   There are no security issues involved. Refer to the Security
   Considerations section of the referenced protocols.

5. IANA Considerations

   IANA has created the registries as described in the previous
   sections.

6. Acknowledgements

   The editor would like to thank the following people who have provided
   comments and suggestions to this document, in no specific order:
   Stephen Farrell, Daniel Ellard, Scott Burleigh, Keith Scott, and
   Elwyn Davies.

7. References

7.1. Normative References

   [RFC5050] Scott, K. and S. Burleigh, "Bundle Protocol
              Specification", RFC 5050, November 2007.

   [RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an
              IANA Considerations Section in RFCs", BCP 26, RFC 5226,
              May 2008.

7.2. Informative References

   [RFC4838] Cerf, V., Burleigh, S., Hooke, A., Torgerson, L., Durst,
              R., Scott, K., Fall, K., and H. Weiss, "Delay-Tolerant
              Networking Architecture", RFC 4838, April 2007.

   [RFC5326] Ramadas, M., Burleigh, S., and S. Farrell, "Licklider
              Transmission Protocol - Specification", RFC 5326,
              September 2008.

   [RFC6256] Eddy, W. and E. Davies, "Using Self-Delimiting Numeric
              Values in Protocols", RFC 6256, May 2011.

Author's Address

   Marc Blanchet
   Viagenie
   2875 boul. Laurier, suite D2-630
   Quebec, QC G1V 2M2
   Canada

   EMail: Marc.Blanchet@viagenie.ca
   URI: http://viagenie.ca