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Licklider Transmission Protocol (LTP), Compressed Bundle Header Encoding (CBHE), and Bundle Protocol IANA Registries  
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## Abstract

The DTNRG research group has defined the experimental Licklider Transmission Protocol (LTP) [[RFC5326](#)] and the Compressed Bundle Header Encoding (CBHE) [[RFC6260](#)] mechanism for the 'ipn' URI scheme. Finally, [RFC5050](#) [[RFC5050](#)] defines values for the Bundle Administrative Record Type. All of these describe fields that are subject to a registry. For the purpose of its research work, the group has 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 needed to be executed by IANA.

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## **1. Introduction**

The DTNRG research group has defined the Licklider Transmission Protocol (LTP)[[RFC5326](#)]. LTP contains certain fields that are subject to a registry. For the purpose of its research work, the group has 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 needed to be executed by IANA [[RFC5226](#)].

The Compressed Bundle Header Encoding (CBHE) [[RFC6260](#)] specification defines the concepts of Node Number and Service Number in the 'ipn' URI scheme. In this document we request formation of an IANA registry for the Node Number field in the 'ipn' scheme.

Because of its association with space communication and the Consultative Committee on Space Data Systems [[CCSDS](#)], a portion of the CBHE Node Number space and a corresponding portion of the LTP Engine ID space is delegated by this document to the CCSDS Space Assigned Numbers Authority [[SANA](#)]. SANA functions similarly to IANA in that it maintains registries of managed values, with a focus on values used by protocols used by CCSDS member agencies.

## **2. Licklider Transmission Protocol**

The Licklider Transmission Protocol has fields requiring registries managed by IANA. This document requests the creation of the three registries in this section and that they be associated with the other registries for the Licklider Transmission protocol.

### **2.1. LTP Cancel Segment Reason Codes**

[Section 3.2.4 of \[RFC5326\]](#) defines the reason codes that may be present in Cancel Segments in the LTP protocol.

The registration policy for this registry is: RFC Required

The initial values(as defined by [RFC5326](#)) for the LTP Cancel Segment Reason Codes registry shall be:

## LTP Cancel Segment Reason Codes Registry

Value	Description	Reference
0	Client service canceled session	<a href="#">[RFC5326]</a>
1	Unreachable client service	<a href="#">[RFC5326]</a>
2	Retransmission limit exceeded	<a href="#">[RFC5326]</a>
3	Miscolored data received	<a href="#">[RFC5326]</a>
4	System error caused termination	<a href="#">[RFC5326]</a>
5	Retransmission limit exceeded	<a href="#">[RFC5326]</a>
0x06-0xFF	Unassigned	This document

**2.2. LTP Engine ID**

The Licklider Transmission Protocol has an LTP Engine ID field ([section 2 of \[RFC5326\]](#)). An IANA registry shall be set up as follows.

The registration policy for this registry is:

- 1 -- (2\*\*14)-1 Expert review required. The designated experts for the review are the chairs of the IRTF DTN Research Group (dtnrg) if the dtnrg is extant, or as determined by the IRSG.
- (2\*\*14) -- (2\*\*21)-1 Allocated to the Space Assigned Numbers Authority ([\[SANA\]](#)) for use by Consultative Committee for Space Data Systems (CCSDS) missions.
- (2\*\*21) -- (2\*\*28)-1 Private or experimental use. No assignment by IANA.
- (2\*\*28) -- (2\*\*42)-1 First-come, First-Served basis for requests for less than or equal to 2\*\*14 values to a single entity or organization. Expert review for requests of more than 2\*\*14 values to a single entity or organization. The designated experts for the review are the chairs of the IRTF DTN Research Group (dtnrg) if the dtnrg is extant, or as determined by the IRSG.

The LTP Engine ID is expressed as a Self-Delimiting Numeric Value (SDNV) in the LTP protocol and no maximum is specified in the protocol definition. SDNVs are described in [Section 4.1](#) of the Bundle Protocol in [\[RFC5050\]](#) and are also described in the stand-alone document [\[RFC6256\]](#). The initial values for the LTP Engine Numbers registry shall be:



## LTP Engine Numbers Registry

Value	Description	Reference
0	Reserved	This document
1--(2**14)-1	Unassigned	This document
(2**14)--(2**21)-1	Allocated to CCSDS (SANA)	This document
(2**21)--(2**28)-1	Private/Experimental Use	This document
(2**28)--(2**42)-1	Unassigned	This document
>=(2**42)	Reserved	This document

**2.3. LTP Client Service ID**

The Licklider Transmission Protocol has a client service ID number field ([section 3.2.1 of \[RFC5326\]](#)). An IANA registry shall be set up as follows.

The registration policy for this registry is:

4 -- (2\*\*14)-1 Allocated to the Space Assigned Numbers Authority ([SANA]) for use by Consultative Committee for Space Data Systems (CCSDS) missions.

2\*\*14 -- 32,767 Private or experimental use; no assignment by IANA.

>= 32,768 Expert review required. The designated experts for the review are the chairs of the IRTF DTN Research Group (dtnrg) if the dtnrg is extant, or as determined by the IRSG.

The LTP Client Service ID is expressed as a Self-Delimiting Numeric Value (SDNV) in the LTP protocol and no maximum value is specified in the protocol definition. The initial values for the LTP Client Service Identifiers registry shall be:

## LTP Client Service Identifiers Registry

Value	Description	Reference
0	Reserved	[RFC5326]
1	Bundle Protocol	This document
2	LTP Service Data Aggregation	This document
3	CCSDS File Delivery Service	This document
4--(2**14)-1	Allocated to CCSDS (SANA)	This document
(2**14)--32,767	Private / Experimental Use	This document
>=32,768	Unassigned	This document

### 3. Compressed Bundle Header Encoding

The CBHE specification defines concepts of 'Node Number' and 'Service Number' that require registries managed by IANA.

#### 3.1. CBHE Node Numbers

The CBHE specification defines a Node Number (node-nbr) field ([section 2.1 of \[RFC6260\]](#)). An IANA registry shall be set up as follows.

The registration policy for this registry is:

- 1 -- (2\*\*14)-1 Allocatable by IANA; expert review required. The designated experts for the review are the chairs of the IRTF DTN Research Group (dtnrg) if the dtnrg is extant, or as determined by the IRSG.
- (2\*\*14) -- (2\*\*21)-1 Allocated to the Space Assigned Numbers Authority ([SANA]) for use by Consultative Committee for Space Data Systems (CCSDS) missions.
- (2\*\*21) -- (2\*\*28)-1 Private or experimental use. No assignment by IANA.
- (2\*\*28) -- (2\*\*42)-1 Allocatable by IANA on a First-come, First-Served basis for requests for less than or equal to 2\*\*14 values to a single entity or organization. Expert review for requests of more than 2\*\*14 values to a single entity or organization. The designated experts for the review are the chairs of the IRTF DTN Research Group (dtnrg) if the dtnrg is extant, or as determined by the IRSG.





$\geq (2^{42})$  Reserved

The CBHE Node Number is expressed as a Self-Delimiting Numeric Value (SDNV) in the CBHE specification. Allowable values for the Node Number range from 1 --  $(2^{64})-1$ . The initial values for the CBHE Node Number registry shall be:

CBHE Node Number Registry

Value	Description	Reference
0	Reserved	This document
1-- $(2^{14})-1$	Unassigned	This document
$(2^{14})--(2^{21})-1$	Allocated to CCSDS (SANA)	This document
$(2^{21})--(2^{28})-1$	Private/Experimental Use	This document
$(2^{28})--(2^{42})-1$	Unassigned	This document
$\geq (2^{42})$	Reserved	This document

### 3.2. CBHE Service Numbers

The Compressed Bundle Header Encoding specification defines a Service Number (service-nbr) field ([section 2.1 of \[RFC6260\]](#)). An IANA registry shall be set up as follows.

The registration policy for this registry is:

0-63 RFC Required

64-127 Allocated to the Space Assigned Numbers Authority ([\[SANA\]](#)) for use by Consultative Committee for Space Data Systems (CCSDS) missions.

128 -  $2^{16}-1$  Specification Required

$\geq 2^{16}$  Private / Experimental Use

The CBHE Service Number is expressed as a Self-Delimiting Numeric Value (SDNV) in the CBHE specification. Allowable values for the Node Number range from 1 --  $(2^{64})-1$ . The initial values for the CBHE Node Number registry shall be:

## CBHE Service Number Registry

Value	Description	Reference
0	Bundle Protocol Administrative Record	[RFC6260]
1	CCSDS File Delivery Service	[CFDP]
2-63	Unassigned	This document
64-127	Allocated to CCSDS (SANA)	This document
128 - 2**16-1	Unassigned	This document
>=2**16	Private/Experimental Use	This document

#### 4. Bundle Administrative Record Types

[Section 6.1](#) of the Bundle Protocol specification[RFC5050] specifies a 4-bit Administrative Record type code. An IANA registry shall be set up as follows to manage these record types. This document requests the addition of an additional registry titled 'Bundle Administrative Record Type' be added to the list of registries associated with the Bundle Protocol.

The registration policy for this registry is:RFC required

The initial values for the Bundle Administrative Record Type registry shall be:

## Bundle Protocol Administrative Record Type Registry

Value	Description	Reference
0	Reserved	This document
1	Bundle status report	[RFC5050]
2	Custody signal	[RFC5050]
3-15	Unassigned	This document



## **5. 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 [[RFC5326](#)] for security issues with the LTP protocol.

## **6. IANA Considerations**

IANA is requested to create the registries as described in Sections 2, 3, and 4 of this document.

## **7. Acknowledgements**

The editors would like to thank the following people, in no specific order: Scott Burleigh, Stephen Farrell.

## **8. References**

### **8.1. Normative References**

- [CFDP] Consultative Committee for Space Data Systems (<http://www.ccsds.org>), "CCSDS File Delivery Protocol Version 4 (CCSDS 727.0-B-4)", January 2007.
- [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.
- [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.
- [RFC6260] Burleigh, S., "Compressed Bundle Header Encoding (CBHE)", [RFC 6260](#), May 2011.

## **8.2. Informative References**

[CCSDS] "The Consultative Committee for Space Data Systems,  
<http://www.ccsds.org>".

[SANA] "The CCSDS SANA Registry page at <http://sanaregistry.org>".

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