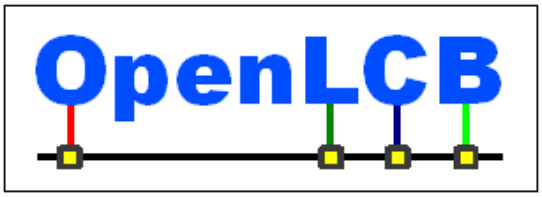

OpenLCB Standard	
Unique Identifiers	
Feb 14, 2015	In Review

1 Introduction (Informative)

This standard describes the format and allocation of OpenLCB 48-bit Unique Identifiers. It is not specific to any wire protocol.

2 Intended Use

Many OpenLCB protocols rely on each node having a Node ID, and those Node IDs being absolutely unique between nodes. OpenLCB defines 48-bit unique identifiers for this purpose. Unique Identifiers are also used to ensure that Event Identifiers are uniquely specified. This Standard is intended to ensure these Unique Identifiers are available. It applies to all OpenLCB uses of 48-bit Unique Identifiers, including as Node Identifiers.

3 References and Context (Informative)

This specification is in the context of the following OpenLCB Standards:

- The OpenLCB Message Network Standard, which defines the basic messages and how they interact. Higher-level protocols are based on this message network, but are defined elsewhere.
- The OpenLCB Event Identification Standard, which defines the well-known Events Identifiers.

4 Format

An OpenLCB unique identifier (Unique ID) shall be six bytes of eight bits each.

The order of bytes in an OpenLCB unique Identifier shall be considered significant. The most-significant byte shall be transmitted first during communication operations. The most-significant byte shall be written first (left-most in Western format) in any human-readable representation. Within the tables below, byte 1 is considered the most-significant byte, while byte 6 is considered the least significant byte.

An OpenLCB Unique Identifier shall include one or more 1 bits.

Every OpenLCB node shall have a Unique Identifier to use as a Node Identifier (Node ID).

5 Allocation (Normative)

Unique identifiers shall be allocated using one of the mechanisms in this section. When additional allocation methods are defined, the Unique Identifiers defined by those additional

methods shall only provide allocation ranges that do no overlap with existing allocation ranges. Ranges that are not explicitly allocated are reserved for future use unless otherwise noted within this document.

5.1 Overview

Unique Identifiers are allocated in groups starting with the most significant byte as the macro group assignment.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
00	*	*	*	*	*	OpenLCB	Reserved, leading zero indicates uninitialized or non-standard Node ID
01	*	*	*	*	*	OpenLCB	Reserved for well-known global identifiers
02	*	*	*	*	*	OpenLCB	Manufacturer Specific Assignments
03	*	*	*	*	*	OpenLCB	Self-assigning groups space
04	*	*	*	*	*	OpenLCB	Individual Unique Identifiers allocated by automatic requests
05	*	*	*	*	*	OpenLCB	Specifically assigned ranges
06	*	*	*	*	*	OpenLCB	Locomotive control systems (deprecated, may be reassigned in the future)
07	*	*	*	*	*	OpenLCB	(tentative) RFID and NFC messages as events
08	*	*	*	*	*	OpenLCB	Temporary individually Unique Identifiers leased by automatic requests
FF	*	*	*	*	*	OpenLCB	Reserved, indicates an error (example: reset non-volatile memory)

5.2 Reserved Leading Zero

A value of zero in the most significant byte of the unique identifier indicates uninitialized or non-standard Node ID.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
00	00	00	00	00	00	OpenLCB	Convenient value for “no valid Node ID assigned”

5.3 Well-Known Global Identifiers

OpenLCB defines specific well-known identification numbers and number ranges for specific uses. The details of these ranges are defined in in either the Event Identifiers Standard or another Standard.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
01	01	00	00	00	00	OpenLCB	Reserved for well-known Event Identifiers. See Event Identifiers Standard.
01	01	01	00	Node ID		MERG	Reserved for CBUS-defined Event Identifiers (ON state). See Event Identifiers Standard.
01	01	01	01	Node ID		MERG	Reserved for CBUS-defined Event Identifiers (OFF state). See Event Identifiers Standard.
01	01	01	*	Node ID		MERG	Reserved for CBUS-defined future expansion.
01	63	*	*	*	*	OpenLCB	XpressNet translation
01	81	*	*	*	*	OpenLCB	LocoNet translation
01	EE	*	*	*	*	OpenLCB	DCC Translation

5.4 Manufacture Specific

Manufacturers shall ensure uniqueness for identifiers they assign.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
02	01	DCC ID	Self-Assigned			DCC Manufacturer	Manufactures who have been assigned a DCC Manufacturer ID code may, but are not required to, use this range. These IDs are defined within the NMRA standard “S-9.2.2 Appendix A, DCC Manufacture ID Codes”
02	01	0D	Self-Assigned			DIY	Do-It-Yourself (shared unmanaged space, not recommended for individual use)
02	01	12	Self-Assigned			JMRI	JMRI (for use in software solutions)
02	01	A5	*	Node ID		MERG	MERG Node ID translation
02	01	EE	*	*	*	NMRA	NMRA Reserved (for extended manufacture ID numbers)

5.5 Self-Assigning Groups

These Unique Identifiers are assigned in association with an outside organizations unique identification scheme. The outside organization is responsible for assigning a globally unique identifier that maps into the OpenLCB Unique Identifier space designated in the table below. Future definition of ranges for additional groups will use unique values in Byte 2.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
03	00	Membership Number			*	NMRA	NMRA members may, but are not required to, use their NMRA membership number to self-assign Unique Identifiers. The least significant byte is self-assigned.
03	04	Membership Number			*	MERG	MERG members may, but are not required to, use their MERG membership number to self-assign Unique Identifiers. The least significant byte is self-assigned.
03	08	Layout ID		Node ID		MERG	CBUS – for mapping existing modules, using the Layout ID defined by CBUS

5.6 Assigned by Software at Runtime

A program running in a computer with an IP address must not use that address to directly formulate a unique identifier. The program may use an IP connection to request a unique identifier from openlcb.org, or from another organization that is distributing unique identifiers from a range designated to it.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
04	00	00	Sequentially Assigned Values			OpenLCB	Allocated through OpenLCB.org
04	00	*	Sequentially Assigned Values			OpenLCB	Reserved for OpenLCB.org future expansion

5.7 Specifically Assigned by Request

55 These ranges are assigned by the OpenLCB organization. Periodically, but not on a predetermined schedule, this document will be updated with any additionally assigned ranges. The OpenLCB organization reserves the right to allocate additional Unique Identifiers out of this pool without updating this document, and a comprehensive list of specifically assigned Unique Identifiers is maintained in real-time on the OpenLCB Organization web site. In the unlikely event that the OpenLCB organization website is in conflict with the latest officially adopted version of this document, the document represents the true allocation.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
05	01	00	00	*	*	OpenLCB	8-bit assigned ranges. Byte 5 is designated by the OpenLCB group and byte 6 is self-assigned.
05	01	01	01	01	*	David Harris	Byte 6 is self-assigned.
05	01	01	01	02	*	Alex Shepherd	Byte 6 is self-assigned.
05	01	01	01	03	*	Bob Jacobson	Byte 6 is self-assigned.
05	01	01	01	04	*	SPCoast	For experimental and prototyp efforts. Byte 6 is self-assigned.
05	01	01	01	05	*	Greg Oberfield	Byte 6 is self-assigned.
05	01	01	01	06	*	TCH Technology	Byte 6 is self-assigned.
05	01	01	01	07	*	Mustangpeak	Byte 6 is self-assigned.
05	01	01	01	08	*	Tom Andersen	Byte 6 is self-assigned.
05	01	01	01	09	*	Railflyer Technologies Inc.	Byte 6 is self-assigned.
05	01	01	01	0A	*	Telecom Paristech	Byte 6 is self-assigned.
05	01	01	01	0B	*	Geoffrey Crick	Byte 6 is self-assigned.
05	01	01	01	0C	*	Private	Private layout. Byte 6 is self-assigned.
05	01	01	01	0D	*	Jan Hnsen	Byte 6 is self-assigned.
05	01	01	01	0E	*	Digital Train Lab	Byte 6 is self-assigned.
05	01	01	01	0F	*	Renato Conca	Byte 6 is self-assigned.
05	01	01	01	10	*	Emanuele Zampieri	Byte 6 is self-assigned.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
05	01	01	01	11	*	MicROCZEK	Byte 6 is self-assigned.
05	01	01	01	12	*	Mikael Sundin	Byte 6 is self-assigned.
05	01	01	01	13	*	Luc Bos	Byte 6 is self-assigned.
05	01	01	01	14	*	Balazs Racz	Byte 6 is self-assigned.
05	01	01	01	15	*	Texas Western Railroad Association	Byte 6 is self-assigned.
05	01	01	01	16	*	Yuriy Gorvitovskiy	Byte 6 is self-assigned.
05	01	01	01	17	*	Mustangpeak	Byte 6 is self-assigned.
05	01	01	01	18	*	OpenMRN	OpenMRN open source OpenLCB implementation demo applications. Byte 6 is self-assigned.
05	02	OpenLCB Assigned		Self-Assigned		OpenLCB	16-bit assigned ranges.
05	02	1	2	Self-Assigned		Railstars	
05	03	*	Self-Assigned			OpenLCB	24-bit assigned ranges. Byte 3 is designated by the OpenLCB group and bytes 4 through 6 are self-assigned.

5.8 Locomotive Control Systems

This Unique identifier range (starting with a most significant byte value of 0x06) was originally allocated for locomotive control systems. These allocations are no longer valid, because locomotive control is being implemented differently than originally conceived. For historical reasons, the values are displayed here. Do not use these Unique Identifiers for any reason, as their use has been deprecated, and they may be re-designated for another purpose in the future.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
06	00	*	*	*	*	OpenLCB	DC system

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
06	01	*	*	*	*	OpenLCB	DCC operated
06	02	*	*	*	*	OpenLCB	TMCC operated
06	03	*	*	*	*	OpenLCB	Marklin/Motorola system
06	04	*	*	*	*	OpenLCB	MTH DCS

5.9 RFID and NFC

The RFID Unique Identifiers space is reserved for further standardization in the future. Do not use this space before contacting the OpenLCB organization first.

5.10 Temporary Assigned by Software at Runtime

A program running in a computer with an IP address must not use that address to directly formulate a unique identifier. Furthermore, a program may dynamically allocate nodes who need a Unique Identifier assigned to them. The program may use an IP connection, or another unspecified method, to request a unique identifier from openlcb.org, or from another organization that is distributing unique identifiers from a range designated to it.

These Unique Identifiers are assigned on a leased basis. A temporary (leased) Unique Identifier server will issue a Unique Identifier that is valid for a designated period of time. When the lease period is up, the Unique Identifier server may re-issue the same Unique Identifier to another node as needed. The Unique Identifier server and client can periodically negotiate an extension of the lease indefinitely.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
08	00	00	Sequentially Assigned Values			OpenLCB	Allocated through OpenLCB.org
08	00	*	Sequentially Assigned Values			OpenLCB	Reserved for OpenLCB.org future expansion
08	01	DCC ID	Self-Assigned			DCC Manufacturer	Manufactures who have been assigned a DCC Manufacturer ID code may, but are not required to, use this range. These IDs are defined within the the NMRA standard “S-9.2.2 Appendix A, DCC Manufacture ID Codes”

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
08	02	00	Self-Assigned			Private	Private Layout. Use with Caution.

5.11 Reserved Unique Identifiers

80 All other unique identifiers not specifically discussed in this Standard shall not be used until the Standard is revised to permit their use. Additionally, the following table identifies Unique Identifiers that shall be reserved indefinitely.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Organization	Comment
00	*	*	*	*	*	OpenLCB	Shall not be used at any point.
FF	*	*	*	*	*	OpenLCB	Shall not be used at any point.

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