



OpenLCB Standard	
OpenLCB-CAN Event Transport	
Jan 19, 2013	Preliminary

1 Introduction (Informative)

This specification describes the protocol for transporting OpenLCB events across the OpenLCB network.

2 Intended Use (Informative)

- 5 Transporting events provides general and flexible messaging between nodes, following the principles of the Producer-Consumer model. The information is carried by an event ID (number), which in of itself does not have any explicit information. Instead the event ID is assigned by the user to one specific concept, such as a specific lighting configuration, or a more abstract concept, such as the “start of the day” or “global stop”. That concept can then be
- 10 implemented by cooperative action between nodes that “produce” the event by sending messages, and nodes that “consume” the event by receiving messages and acting up them. This document defines that interaction between produces and consumers in terms of OpenLCB messages.

3 References and Context (Normative)

- 15 This specification is in the context of the following OpenLCB-CAN Specifications:
- 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 Message Network Standard defines the Initialized node state which is referenced here.
 - 20 • The OpenLCB Event Identifiers Standard, which defines the format and content of Event Identifiers (Event IDs) including the class of Well-Known Event IDs and Automatically-Routed Event IDs.

4 Message Formats (Normative)

- 25 In the following, “EventID Range” in the Data Content field refers to a range of EventID values specified through a compare-under-mask operation. The low bit of the field defines the sign of the mask: a 1 least-significant bit indicates the mask is represented by 1 bits, and similar for a 0 LSB. The mask is made up of adjacent identical bits. If the lowest bit is a '0', then all low order contiguous '0' bits will form a mask, while if the lowest bit is a '1', then the low order contiguous '1' bits will form the mask. The remaining upper bits determine the range prefix. To determine
- 30 whether an Event ID “E” lies within the range “R”, compute:

$\text{inRange} = ((E \& \sim \text{mask}) == (R \& \sim \text{mask}))$

4.1 Producer/Consumer Event Report (PCER)

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Producer/Consumer Event Report	N	Y	N	0x05B4	0x195B,4sss	EventID

35 4.2 Identify Consumer

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Identify Consumer	N	Y	Y	0x08F4	0x198F,4sss	Event ID

4.3 Consumer Identified

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Consumer Identified	N	Y	N	0x04C4	0x194C,4sss	Event ID
				0x04C5	0x194C,5sss	
				0x04C7	0x194C,7sss	

40 This message has three sub-forms, which carry the status of the identified consumer. They are, respectively:

- Currently valid – the internal state of the consumer & associated devices is known to be same as if it had just consumed this event
- Currently invalid – the internal state of the consumer & associated devices is known to not be the same as it had just consumed this event
- 45 • Currently unknown – the consumer cannot determine whether either of the previous conditions is true

4.4 Consumer Range Identified

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Consumer Range Identified	N	Y	N	0x04A4	0x194A,4sss	EventID Range

50 Nodes shall not emit Consumer Range Identified messages where more than 50% of the event IDs included in the range are not consumed by the node.

4.5 Identify Producer

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Identify Producer	N	Y	Y	0x0914	0x1991,4sss	Event ID

4.6 Producer Identified

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Producer Identified	N	Y	N	0x0544	0x1954,4sss	Event ID
				0x0545	0x1954,5sss	
				0x0547	0x1954,7sss	

55 This message has three sub-forms, which carry the status of the identified producer. They are, respectively:

- Currently valid – the internal state of the producer & associated devices is known to that which would cause them to produce the event
- Currently invalid – the internal state of the producer & associated devices is known to not be the same as that which would cause them to produce the event
- Currently unknown – the producer cannot determine whether either of the previous conditions is true

4.7 Producer Range Identified

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Producer Identified Range	N	Y	N	0x0524	0x1952,4sss	EventID Range

- 65 Nodes shall not emit Producer Range Identified messages where more than 50% of the event IDs included in the range are not produced by the node.

4.8 Identify Events

Name	Dest ID	Event ID	Simple Node	Common MTI	CAN format	Data Content
Identify Events	N	N	Y	0x0970	0x1997,0sss	
	Y	N		0x0968	0x1996,8sss fddd	

5 States (Normative)

- 70 Each consumer and producer of each event has two possible states: “Unadvertised” and “Advertised”.

When the node hosting the producer or consumer is not in Initialized state, the consumer or producer shall be in and remain in Unadvertised state.

A producer or consumer of a specific event moves to Advertised state when either of the following happens:

- 75
- The producer or consumer sends a Producer Identified or Consumer Identified, respectively, message containing the Event ID.
 - The producer or consumer sends a Producer Range Identified or Consumer Range Identified, respectively, message where the indicated range contains the Event ID.

The messages defined by this Standard may only be sent when the sending node is in Initialized state.

- 80 Producer/Consumer Event Report messages may only be sent when the associated producer is in Advertised state.

6 Interactions (Normative)

After each transition to transitions to Initialized State and before sending a Producer/Consumer Event Report (PCER) message producing a specific Event ID outside the automatically-routed Event ID range, a node shall emit a Producer Identified or Producer Range Identified message identifying that Event ID.

To ensure receipt of PCER messages, a node consuming a specific Event ID outside the automatically-routed Event ID shall emit a Consumer Identified or Consumer Range Identified message identifying that Event ID.

6.1 Event Transfer

To produce an event, the node containing the producer emits a PCER message containing the related Event ID. The OpenLCB message network transports that message to all attached nodes, except as described in the next paragraph. Nodes containing consumers shall check for a match between the message Event ID and their consumers. If a match is found, the consumer shall perform any local operations configured into it. If a match is not found, the consumer shall not perform any local operations.

Equipment that transports PCER messages shall transport them to all connected nodes from which the equipment has received a Consumer Identified or Consumer Range Identified for the reported event ID. Equipment that transports PCER messages shall transport all PCER messages containing Event IDs in the automatically-routed range to all connected nodes. Equipment that transports PCER messages may, but is not required to, omit transporting PCER messages with Event ID outside the automatically-routed range to nodes from which the equipment has not received a Consumer Identified or Consumer Range Identified for the reported event ID.

6.2 Event Enquiry

Upon receipt of either an unaddressed (global) Identify Events message or an addressed Identify Events message addressed to the node, a node shall reply with Producer Identified and/or Producer Range Identified messages covering all non-automatically-routed event IDs produced by the node, and Consumer Identified and/or Consumer Range Identified messages covering all non-automatically-routed event IDs consumed by the node.

In response to an unaddressed (global) Identify Events message or an addressed Identify Events message address to the node, a node may but is not required to include Producer Identified and/or Producer Range Identified messages covering automatically-routed event IDs produced by the node, and Consumer Identified and/or Consumer Range Identified messages covering automatically-routed event IDs consumed by the node.

6.3 Producer Enquiry

Upon receipt of an Identify Producer message, a node shall reply with Producer Identified and/or Producer Range Identified messages covering all non-automatically-routed event IDs produced by the node.

120 In response to an Identify Producer message, a node may but is not required to include Producer
Identified and/or Producer Range Identified messages covering automatically-routed event IDs
produced by the node.

6.4 Consumer Enquiry

125 Upon receipt of an Identify Consumer message, a node shall reply with Consumer Identified and/or
Consumer Range Identified messages covering all non-automatically-routed event IDs consumed by
the node.

In response to an Identify Consumer message, a node may but is not required to include Consumer
Identified and/or Consumer Range Identified messages covering automatically-routed event IDs
consumed by the node.

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