



Event Consumer Service Specification

Service# 5 Consumer

Version 0.99B

Compatible with CBUS ® 4.0 Rev 8j

VLCB Event Consumer Service Specification

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Document History

Date	Changed by	Summary of changes	Service version
20th January 2023	Ian Hogg M.5144	Initial document	1
14 April 2023	Ian Hogg M.5144	Changed name to VLCB	1

1 Introduction

This document describes the service related to Event Consumer service and its use within VLCB. This is an optional service, which may be added to the MNS.

Please refer to the Event Teaching Service documentation for a description of the VLCB Event model.

While this service is described as a separate service, practically it can be implemented as a single library combined with the other event services. Since the event services have very similar needs, with facilities to characterise the events as producer, consumer, or both. In addition, Learning is intimately related to the definition, storage, and search functions included with Events; it is practical to implement them together.

1.1 Dependencies on other services

The Consumer service depends upon the mandatory Minimum Node Service.

If a module is designed to only consume events then the Producer service does not need to be used by the module.

If a module is designed to handle only default events then the Event Teach service is not required.

2 Interrogating module event state

A module's event state may be interrogated through the following processes.

2.1 Event Status and Response Messages

A module shall be capable of returning the current ON/OFF state of a producer or consumer event using the AREQ or ASRQ request. The module shall respond with the ON/OFF state of the event by sending ARON/AROF or ARSON/ARSOF as appropriate.

2.2 Start of Day

A Producer module shall be able to be configured to respond to an event designated for "Start of Day" (SoD). The module shall respond with the ON/OFF state for all of its configured events, both consumer and producer, via ACON/OFF and ASON/OFF messages.

As a result, the module may produce a large number of events, and therefore the module must ensure that these events do not cause stress on other modules on the bus. The pace of messages should be slow enough to allow other modules to react, and possibly produce events in turn, before the next event is sent. 10 ms should be sufficient.

3 Additional Event Messages with Data

There is a set of Event-messages that carry additional data, these are:

- ACON1 / ACON2 / ACON3 Accessory ON-Long-event with 1 / 2 / 3 added bytes, respectively
- ACOF1 / ACOF2 / ACOF3 Accessory OFF-Long-event with 1 / 2 / 3 added bytes, respectively
- ASON1 / ASON2 / ASON3 Accessory ON-Short-event with 1 / 2 / 3 added bytes, respectively
- ASOF1 / ASOF2 / ASOF3 Accessory OFF-Short-event with 1 / 2 / 3 added bytes, respectively

Note that ACDAT, RQDAT and ARDAT are not events and are not included within the Event services.

If a module has been taught an event and requires associated data and that module receives the event without data then it should send a GRSP error (of some kind)

If a module handles events with no data then it can optionally handle events with data in the same way. The module's documentation must explain the module's behaviour in this respect..

4 Processing of events

As stated in the introduction, for events to be useful, two or more nodes have to agree on the meaning of a particular specific-event-number. This is done by 'teaching' the nodes to use the same specific-event-number so that the producer can send it on a specific change of state, and the consumers can use it to perform some resulting action.

5 Default Events

Modules may implement automatic configuration of events (default events) which can make a module easier to configure and use. Default events would be implemented as automatic configuration of EVs based upon a module's manufacturer's configuration, configuration of NVs or configuration of other events.

Default events behave in the same way as user configured events, it is only the way in which they come into existence which is different.

Default events must be reported by an Event query and if the module supports the Teach service they must be able to be deleted or reconfigured.

6 Power-on behaviour

Once modules have restored the state of inputs, outputs and events modules shall be able to respond to AREQ/ASRQ requests and SoD events to return the current state of their events.

7 Special Event Behaviour

It can be useful to use a normal short event to perform special actions across the layout. Therefore it should be possible to configure a consumed event for these actions. The exact EV configuration is not specified and is left to the module designer.

Unless these are defined to be default events the special event behaviour requires the Teach service to be implemented by the module.

7.1 Consumed Start of Day

As described in section [4.2 Start of Day](#) a module with the Producer service must also support the consumption of an event which triggers a series of events to indicate the state of every event configured to be produced. The EV configuration used to configure the consumed SoD event should be taken into account when designing the EV usage.

7.2 Consumed End of Day

If events' status are saved in non-volatile memory the module designer should take care to reduce memory (EEPROM) wear. Wear leveling techniques must be considered.

An End of Day event technique can also be used to not write every event state change to the non-volatile memory but instead keep state in RAM and only perform a write to non-volatile memory just before power-down i.e. at end of day.

Modules should consider implementing the ability to produce/consume an EoD event to flush state from RAM to non-volatile storage.

The EV configuration used to configure the consumed EoD event should be taken into account when designing the EV usage.

A module must document whether it supports an End of Day event.

7.3 Consumed General Stop

As a safety mechanism VLCB modules which provide outputs should support a General Stop consumed event in order to turn off outputs under emergency conditions.

Modules should put outputs into a safe state, digital outputs should power down drivers or put outputs into a high impedance state. Motor drivers should brake outputs and servo drivers should stop movement and stop pulses.

For example an operator noticing that a screwdriver left in a turntable well could hit the GSTOP button to send the General Stop event and cause the turntable to stop rotating and therefore prevent damage.

7.4 Consuming Own Events

If a module supports both production and consumption of events i.e. supports both the Producer service and the Consumer service then it **must** be able to consume its own produced events.

8 Opcode Summary

Refer to the VLCB Opcode Specification document for details of the opcodes.

Opcode	Use by Consumer	Use by Producer
ACON{1,2,3}	Consumed by a module to perform an ON action as defined by the EVs of the event NN:EN.	Sent by a module to indicate that something ON has happened within the module as defined by the event's EVs.
ACOF{1,2,3}	Consumed by a module to perform an OFF action as defined by the EVs of the event NN:EN.	Sent by a module to indicate that something OFF has happened within the module as defined by the event's EVs.
ASON{1,2,3}	Consumed by a module to perform an ON action as defined by the EVs of the event EN. The Node Number in the event is ignored.	Sent by a module to indicate that something ON has happened within the module as defined by the event's EVs.
ASOF{1,2,3}	Consumed by a module to perform an OFF action as defined by the event's EVs of the event EN. The Node Number in the event is ignored.	Sent by a module to indicate that something OFF has happened within the module as defined by the event's EVs.

Request to Module	Module's Response	Use/meaning
AREQ	ARON	Used to request the current event status of the event NN:EN.
	AROF	Used to request the current event status of the event NN:EN.
ASRQ	ARSON	Used to request the current event status of the event EN.

	ARSOF	Used to request the current event status of the event EN.
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9 Service specific Modes

None.

10 Service Specific Status Codes

The following additional GRSP status codes are specified by the Event services.

Service	Code	Short Name	Comment
Consumer	255	EN_DATA	Event with Data error

11 Service Specific Diagnostic Data

11.1 Diagnostic Codes

0x01: return the number of events consumed and acted upon since power up.

11.2 Diagnostic Payload Data Return

The following RDGN diagnostic data numbers are specified by the Event services.

Diagnostic Code	Diagnostic Byte1	Diagnostic Byte2	Comment
0x01	Count Hi	Count Lo	Count of number of events consumed since power on

12 Service Specific Automatic Power-up Tests

No service specific power-up tests are specified by the Event Consumer service.

13 Service Documentation

Modules implementing any of the Event services must provide full documentation. In particular the following are required:

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Documentation for any default Consumed default events.

Documentation must include information for Start of Day and whether End of Day is supported.

Details of the EV usage.

14 Service Data

14.1 Parameters

The following parameters are associated with events and are to be provided.

Address	Param#	Name	Usage	VLCB should set these values
0x828	8.0	Consumer	Indicates if the module is able to be configured for consumed events.	Set if the Consumer service used.

14.2 ESD data bytes

Data1 = unused, set to 0

Data2 = unused, set to 0

Data3 = unused, set to 0