VLCB Versatile Layout Control Bus

CBUS Differences Information Sheet

Version 1.3, March 2025

0.1 Table of Contents

0.2 Document History

Date	Changed by	Summary of changes
18th October 2022	Ian Hogg M.5144	Initial document
14 March 2023	Ian Hogg M.5144	Latest update
14 April 2023	Ian Hogg M.5144	Changed name to VLCB
25 April 2023	Ian Hogg M.5144	Improved descriptions of changes.
15 May 2023	Ian Hogg M.5144	Added change for service discovery flag, Bit #6 of module flags parameter
28 Feb 2024	Ian Hogg M.5144	Updated to reflect latest changes in specification documents
Release 1		
10 March 2025	Ian Hogg M.5144	Included FCU-compatibility mode. BOOTM is now supported by VLCB.
16 July 2025	Ian Hogg M.5144	Removed duplicated documentation section.

1 Introduction

This document attempts to collate the differences between VLCB and CBUS(™). Although every effort is made to ensure that all the differences are captured here it is possible that changes made in the VLCB Minimum Node Specification (MNS) and the VLCB Profiles are not reflected within this document. In the case of any discrepancies the VLCB specifications take precedence over this information document.

It is hoped that this document can serve as a useful reference for module developers when upgrading modules from CBUS to VLCB.

2 Changes

2.1 Module versions

CBUS expresses a module version as being a major version number, a minor version letter and a BETA number. VLCB changes the meaning of the BETA number to be a build number. Therefore VLCB has no direct indication of test/released version

2.2 SLiM

VLCB has removed SLiM from the minimum node specification.

SLiM may be added in the future as an optional service.

There is no longer a requirement for a green SLiM LED.

2.3 Push button and LEDs

VLCB supports greater flexibility to show mode and status, not just mandating yellow/green LEDs. E.g. Character displays are now possible.

VLCB permits additional ways of requesting a node number, not just holding a push button. E.g. a terminal command line is now possible.

Use has been defined when the push button is held down during power up. This permits entry into an application’s test functionality and also to perform a factory reset of the module.

2.4 Mode changes

VLCB introduces a MODE opcode to allow programmatically changing module states. This includes existing Learn mode and Boot modes and new modes such as Heartbeat and EventAck.

Modules should continue to support NNLRN, NNULN opcodes for backwards compatibility with CBUS.

2.5 CAN Priority

CBUS assigns a message priority for each opcode. CBUS also implements a priority ratcheting to increase priority if the message fails to be sent.

VLCB assigns a message priority to each opcode to ensure well-behaved message handling but does not support the priority ratcheting mechanism.

2.6 Message length checking

If a module identifies that a message targeted to itself does not have the expected message length then the VLCB modules shall respond with GRSP(Invalid command).

CBUS does not specify a response and module implementations generally do not check the message length which can lead to unexpected behaviour.

2.7 Module Flags parameter, Bit 6

Bit #6 of the module flags parameter #8 has been allocated to indicate whether the module supports VLCB functionality. CBUS leaves the bit unassigned with a value of 0 so when set this bit can be used to indicate that the module is VLCB compliant.

The Module Flags value is also present in the PNN response to QNN.

2.8 NNRSM

The reset to manufacturer defaults opcode sets NVs to default values, clears the events and restores any default events, clears the module's node number and sets mode to Uninitialised.

The CBUS version of NNRSM retained the node number and mode.

3. New Functionality

3.1 Service concept to aid documentation

The concept of Services has been introduced. This allows clear division of functionality and facilitates different modules to have different functionality.

Diagnostic data and Error response codes are also scoped by the service number so that a global list of diagnostic codes and error codes are not required.

Profile flags are no longer used for the purpose of indicating module functionality but kept for backwards compatibility.

3.2 MNS: Service discovery

A module may be interrogated to find the set of services supported by a module using the RQSD request. A module shall respond with an ESD message or a set of SD messages.

The use of Service discovery is recommended over any indications of functionality provided by module parameters.

A module developer may request a new service number (Service#) using the service request process.

Services may define additional opcodes or reuse existing opcodes using the opcode request process. They may also define additional error codes and diagnostic information without additional approval.

3.3 MNS: Diagnostics

VLCB adds a multitude of diagnostic data. Each service supports its own set of diagnostic parameters. The diagnostic values may be returned for a service using the RDGN request. The value is contained in the DGN response.

CBUS contains no diagnostics.

3.4 MNS: Module Heartbeat

VLCB specifies that modules will generate a regular HEARTB message, CBUS defines no such message or requirement.

The regular heartbeat message may be enabled or disabled by using the MODE opcode to toggle Heartbeat mode.

The HEARTB message includes a module status byte which is zero under normal conditions otherwise is a time based calculation of error conditions.

3.5 FCU-Compatibility Mode

VLCB mandates a facility whereby any extension or change which adversely affects the operation of FCU is by default disabled. The new VLCB behaviour can be enabled by turning off the FCU-Compatibility mode. Upon power up modules assume FCU-Compatibility mode until instructed to allow VLCB extensions.

3.6 NVRD #0

VLCB allows requesting a read of NV#0 which will return a sequence of messages returning a NVANS message for each NV.

This is new functionality and not supported or used by CBUS.

3.7 Set NV with Read

VLCB specifies a new opcode to allow a NV to be set and then return the value actually written to the NV. This allows for situations where there are constraints on the NV value.

3.8 Event Acknowledge

The VLCB Event Acknowledgement service provides a capability for a module to acknowledge a consumed event with the ENACK opcode. The ENACK message includes the module's NN, event opcode and event NN:EN. This is useful for debugging events.

CBUS does not support Event Acknowledge.

3.9 REQEV #0

VLCB allows requesting a read of EV#0 will return an EVANS message of EV#0 containing the number of EVs followed by an EVANS message for each of the EV values.

This is new functionality and not supported or used by CBUS.

This functionality is disabled by default but can be enabled by clearing the FCU-Compatibility mode.

3.10 REVAL #0

VLCB allows requesting a read of EV#0 will return an NEVAL message of EV#0 containing the number of EVs followed by an NEVAL message for each of the EV values.

This is new functionality and not supported or used by CBUS.

This functionality is disabled by default but can be enabled by clearing the FCU-Compatibility mode.

3.11 RQNPN #0

VLCB allows requesting a read of param #0 will return an PARAN message of param #0 containing the number of parameters followed by a PARAN message for each of the param values.

This is new functionality and not supported or used by CBUS.

This functionality is disabled by default but can be enabled by clearing the FCU-Compatibility mode.

3.12 GRSP

CBUS modules respond with a variety of messages to indicate success or error: ACK, NAK, WRACK, CMDERR these have been consolidated into a single GRSP response message.

VLCB Modules are now required to respond to requests with a GRSP message to indicate OK or a specific error. This allows service specific responses to be defined without conflict with other services.

Modules are required to also respond with WRACK and CMDERR for backwards compatibility with CBUS.

3.13 Auto self canid mandated

VLCB mandates auto CANID self enumeration and auto CANID conflict resolution. This prevents multiple modules having the same CANID which causes CAN networking issues.

4 Other Requirements

4.1 Mandated testing and Conformance Test Kit

Modules must confirm that they conform to the VLCB specification. There is the intention of supplying a conformance test kit to facilitate this process.

4.2 Improved module documentation

A VLCB module must document its I/O, power supply requirements and NV/EV usage. User documentation for the module must also be provided.

CBUS has no requirements for documentation.

5 Clarifications

5.1 Events with Data

CBUS does not specify if modules taught to handle ACON/ACOF/ASON/ASOF events should also handle events with data. VLCB specifies:

a) 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)
b) If a module handles events with no data then it can optionally handle events with data in the same way only if documented.

5.2 Event Actions

VLCB states that modules need to provide actions for Start of Day, if applicable. This ensures that all necessary VLCB modules handle SoD.

CBUS has no such requirement.

5.3 AREQ/ASRQ

VLCB mandates the support of AREQ and ASRQ requests if it supports Event Producer functionality.

5.4 ASRQ

VLCB specifies that a module shall respond to a ASRQ (request event) if the specified NN matches its node number OR the specified NN is zero.

CBUS does not clarify this behaviour and actually has no requirement that ASRQ is supported by the module.

6 Opcode changes

6.1 Removals - no longer required

- ACK
- NACK
- HLT
- BON

6.2 Deprecated - Used for CBUS compatibility

6.2.1 WRACK

WRACK is no longer required. Modules should respond with GRSP(OK) instead. Since some CBUS management software awaits for a WRACK then VLCB modules should temporarily return a WRACK followed by a GRSP(OK). VLCB management software should ignore the WRACK response.

6.2.2 CMDERR

VLCB modules are specified to use GRSP to indicate an error condition; however for backwards compatibility for CBUS management software VLCB modules should temporarily send both CMDERR and GRSP.

6.2.3 NNLRN

VLCB has replaced NNLRN with MODE in order to request that a module enters Learn mode. It is recommended that NNLRN should continue to be supported for a time in order to maintain backwards compatibility with CBUS management software.

6.2.4 NNULN

VLCB has replaced NNULN with MODE in order to request that a module exitsLearn mode. It is recommended that NNULN should continue to be supported for a time in order to maintain backwards compatibility with CBUS management software.

6.2.5 ENUM

VLCB modules are mandated to support CAN ID self enumeration and CAN ID conflict resolution. The ENUM opcode is no longer required and VLCB modules should ignore the ENUM request.

6.2.6 CANID

VLCB modules are mandated to support CAN ID self enumeration and CAN ID conflict resolution. The CANID opcode is no longer desired and VLCB modules should ignore the CANID request.

6.2.7 NVSET

The NVSET command has been superseded by VLCB NVSETRD. It is recommended that NVSET should continue to be supported for a time in order to maintain backwards compatibility with CBUS management software.

6.3 Additions

- GRSP - General response to configuration messages
- MODE - Change module operating mode
- NVSETRD - Set NV with Read
- HEARTB - Module heartbeat
- RDGN / DGN - Diagnostics
- RQSD / SD/ ESD - Service discovery
- ENACK - Event acknowledge