C-Bus Application Messages & Behaviour

Chapter 34 – Error Reporting

Document Number: C-BUS-APP/34
Issue: 3.1
Date: 26 June 2008

Comments on this document should be addressed to:

Engineering Manager
Clipsal Integrated Systems
PO Box 103 Hindmarsh
South Australia 5007

TABLE OF CONTENTS

34 Error Reporting Application 4
34.1 Application ID 4
34.2 Definitions 4
34.3 Description 4
34.3.1 Overview 4
34.3.2 Terminology for Error Reporting 4
34.3.3 Reporting 5
34.3.4 Example 5
34.4 Document Convention 6
34.5 Data Conventions and Device Requirements 6
34.5.1 Error Monitoring Devices 6
34.5.2 Refresh and Network Bandwidth 6
34.5.3 Triggered Error Refresh 7
34.5.4 Error Reporting Modes 7
34.5.5 Network Variables 9
34.5.6 Error Data 1 & 2 Network Variables 10
34.6 Error Reporting Application Message Structure 11
34.7 Operations 14
34.7.1 Transmitting an Error Report 14
34.7.2 Acknowledging an Error Report 14
34.7.3 Updating the Most Severe Error 16
34.7.4 Clearing the Most Severe Error 16
34.7.5 Clearing All Latched Errors 17
34.7.6 Changing Mode 17
34.8 Message Priority 18
34.9 Inter-Network Routing 18
34.9.1 Concatenated Commands 18
34.10 Programming of Devices 18
34.10.1 Required Parameters 19
34.11 Status Reporting 19
34.12 Limitations 19
34.13 Message Examples 20
34.13.1 All OK 20
34.13.2 Minor Failure 20
34.13.3 General Failure which gets Acknowledged 20
34.13.4 Latched Extreme Failure which gets Cleared 21
34.14 Notes 22
34.15 Appendix A – System Categories, Severities & Error Data 23

CHANGE HISTORY

Version	Author	Changes
1	MvdB	Original
1.1	MvdB	Remove term 'Error Reporting Device' for clarity.
1.2	ND	Add information to appendix for Universal Dimmer
2.0	MvdB	Add 'Latched Shortcut' bit to command. Update Latched Error behavior to incorporate shortcut Update 'Unit Number' to 'Unit Address' Error Reporting Enabled by default Update Use Case Example Invert 'Ballast Present' bit for DALI
2.1	MvdB	Invert Latched Shortcut Flag Tidy up examples to use new format of Latched Shortcut Flag
2.2	MvdB	Replace 'Latched Flag' and 'Latched Shortcut Flag' with 'Latched Flag' and 'Current Flag' Reword for clarity Update Examples Add Required Parameters section
2.3	MvdB	Fix Typo's Define state of Current Flag during Clear of Latched Errors Expand on network routing requirements Expand on concatenation of commands
2.4	AGQ	Update the System Type to include the conventions used for their allocation. Add protocol version field.
2.5	AGQ	Added more description of the latched and current error flag bits, differentiating by header byte as to what they mean.
2.6	AGQ	Remove current error flag, adds no value. Clarify use of the message version field.
2.7	AGQ	Correction to description about clearing latched error
2.8	AGQ	Clarify that turning off latching clears memory of latched errors
3.0	AGQ	Major rewrite with changes to terminology, addition of ACK and CLEAR messages.
3.1	MvdB	Change default Mode to Error Reporting Disabled Define default Device ID of $FF Add note to Ack Example

34 ERROR REPORTING APPLICATION

34.1 Application ID

$CE

Note that to ensure consistent operation of C-Bus networks, this Application ID shall not be reassigned.

34.2 Definitions

Monitored Event	An event or value that is watched to determine the presence or absence of a failure. A Monitored Event may be a Channel of an Output unit, the status of communications with a network on the other side of a Gateway, etc.
Error Monitoring Device	A device that directly watches Monitored Events and transmits their status to a C-Bus network.
Error Receiving Device	A device that accepts error information from a C-Bus network but does not watch Monitored Events directly.
Most Recent Error	The error condition which occurred the shortest time ago.
Most Severe Error	The error condition with the highest severity which has ever been seen by an Error Monitoring Device (OR since that Most Severe Error was cleared).

34.3 Description

The C-Bus Error Reporting Application is used to report, acknowledge and manage error information detected or generated by C-Bus devices.

34.3.1 Overview

C-Bus devices may monitor and detect error conditions, and report those conditions using the C-Bus Error Reporting Application.

The reports contain information on the source, severity and nature of the error or fault condition. Events may be reported as OK if the Monitored Event is operating normally.

Devices that receive Error Reporting Application messages act upon the information in whatever manner is appropriate. This may include publishing information for a user, logging errors, sounding alarms etc. These devices may also acknowledge an error, and clear the history of severe errors in devices that support this.

34.3.2 Terminology for Error Reporting

The C-Bus Error Reporting application makes frequent references to:

a. An ***Error Monitoring Device*** – this is some device which looks for fault or error conditions and reports them when they are observed. The report is made over the C-Bus network.

   Typical examples of Error Monitoring Devices are a relay, a dimmer, and the C-Bus DALI Gateway.

b. An ***Error Receiving Device***, which is a device that accepts error information from a C-Bus network (and transmitted by an Error Monitoring Device).

The Error Receiving Device does not watch for fault or error conditions directly.

Normal, Error Receiving Devices have some method of reporting to a human operator and might be used, for example, to show that some form of maintenance activity is needed.

Typical Examples are Clipsal Schedule Plus, or a Building Management System.

34.3.3 Reporting

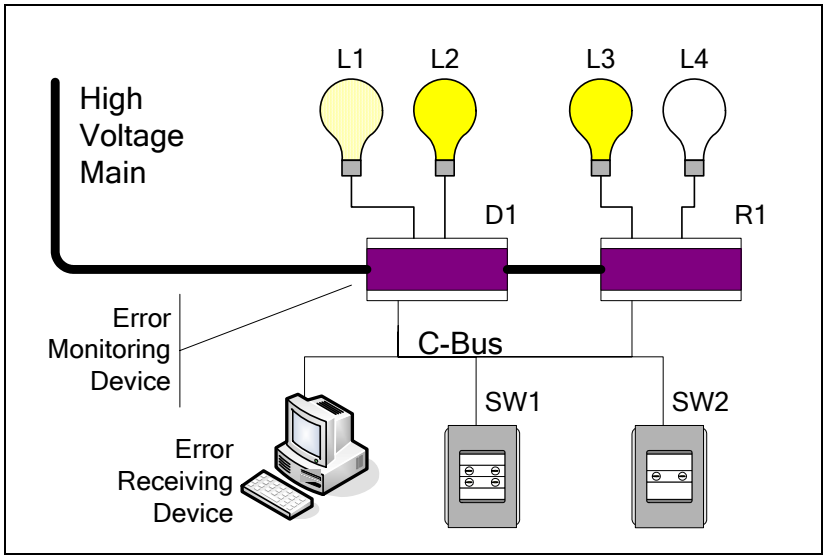
Error Monitoring Devices using the C-Bus Error Reporting Application are required to transmit updates for their monitored events when the monitored event changes.

For example, when if the state of the mains (line) power changes from Present to Absent, a device monitoring the mains power will report a power failure. When the power is restored some time later, the device will report that the state is OK.

Error Monitoring Devices also transmit the state of their monitored events periodically, even if there has been no change. And the device can also be triggered to command an update of their monitored events on demand.

34.3.4 Example

A typical use for the C-Bus Error Reporting application could be to supervise the operation of a C-Bus dimmer:



34.4 Document Convention

Numbers are shown in decimal (base ten) with no other special prefixes or indications.

Binary numbers (base 2) are shown with the prefix %.

Hexadecimal numbers (base 16) are shown with the prefix $.

Example: 157 = %10011101 = $9D

34.5 Data Conventions and Device Requirements

34.5.1 Error Monitoring Devices

Units that directly watch the status of an event and transmit error conditions via the C-Bus Error Reporting Application are called Error Monitoring Devices. The event watched is normally used to detect and notify some abnormal condition.

Error Monitoring Devices can:

a. Monitor the Error Status of multiple internal or external events;

b. Be configured to broadcast live error reports whenever a Monitored Event's status changes (this Error Reporting may also be disabled);

c. Refresh the status of all Monitored Events at regular intervals via C-Bus;

d. Upon request, provide a complete update of the status of all Monitored Events;

e. Optionally, remember (Latch) and transmit the most severe previous error state of a Monitored Event in order to catch transient (temporary) errors;

f. Accept commands from the C-Bus network to acknowledge errors; and

g. Accept commands from the C-Bus network to clear the remembered most severe (Latched) Error a unit has seen.

There is no limit to the number of events a device can monitor.

34.5.2 Refresh and Network Bandwidth

Error Monitoring Devices must refresh the Error Status over the C-Bus network at regular intervals.

Device Requirements:

Error Monitoring Devices shall includes a Refresh Interval that is configurable over C-Bus. The interval must be in the range 1 to 60 minutes. The default refresh Interval should be approximately 30 minutes.[1]

Error Monitoring Devices that transmit multiple error report messages (irrespective of their cause) shall separated those messages by at least five seconds to ensure the C-Bus network is not overloaded.

[1] Clipsal PRO+, Universal and Architectural dimmers can select one of 8 possible intervals: 20, 40 and 80 seconds and 2.7, 5.3, 10.5, 21 and 42 minutes.

34.5.3 Triggered Error Refresh

Error Monitoring Devices must transmit their error status over C-Bus when they receive a suitable Trigger.

Device Requirements:

Upon receipt of a configurable Trigger Group and Action Selector (on the C-Bus Trigger Control Application) an Error Monitoring Device shall transmit the status of all its Monitored Events.

If Error Reporting is 'On without Latching' the error reports shall only include the Most Recent Errors.

If Error Reporting is 'On with Latching' then the error reports shall include the Most Recent Errors and the Most Severe Errors.

Individual commands shall be separated by at least two seconds to ensure the C-Bus network is not congested.

After triggering a refresh, the refresh timer shall be reset to ensure the regular refresh interval elapses before the next refresh is automatically transmitted.

34.5.4 Error Reporting Modes

Error Monitoring Devices may support up to 3 Error Reporting Modes. These are:

0: Error Reporting Off

1: Error Reporting On without Latching of Most Severe Errors

2: Error Reporting On with Latching of Most Severe Errors (Optional)

Device Requirements:

Each Error Monitoring Device shall have a configurable non-volatile parameter for the Error Reporting Mode. This parameter shall be readable and writable via C-Bus.

When shipped, devices that support C-Bus Error Reporting shall have the Error Reporting Mode set to Mode 0: Error Reporting Off.

Each Error Monitoring Device shall have a single configurable Enable Group (on the C-Bus Enable Control Application) and a separate Enable Level for each supported Error Reporting Mode, in order to allow each Mode to be selected via the Enable Control Application.

The Error Monitoring Device shall select one of the three Error Reporting Modes corresponding to a received and matching Enable Group and Enable Level over the C-Bus network.

34.5.4.1 Mode: Error Reporting Off

In this Mode, Error Monitoring Devices:

a. Do not broadcast errors to C-Bus;

b. Do no not latch a Most Severe Error condition;

c. Do not listen to the Error Reporting Application. Consequently, the Acknowledge and Clear Latched Error commands are ignored; and

d. DO issue error reports if triggered to do so with a Triggered Error Refresh.

For all practical purposes, when in this mode, the error reporting capabilities of the Error Reporting Device are inactive.

Note: In mode 0, error reports can still be triggered, so that polled operation is still possible, but only with most recent errors being reported. Polling the error conditions, whilst possible, is not recommended.

34.5.4.2 Mode: Error Reporting On without Latching of Most Severe Errors

In this Mode, Error Monitoring Devices:

a. Watch the current status of all of their Monitored Events;

b. Immediately report to the C-Bus network any change in a Monitored Event's status, including returning to OK;

c. Allow only two (2) possible states for a Monitored Event: either OK or Error (with an associated Severity);

d. Issue error reports if triggered to do so with a Triggered Error Refresh; and

e. Allow errors to be Acknowledged.

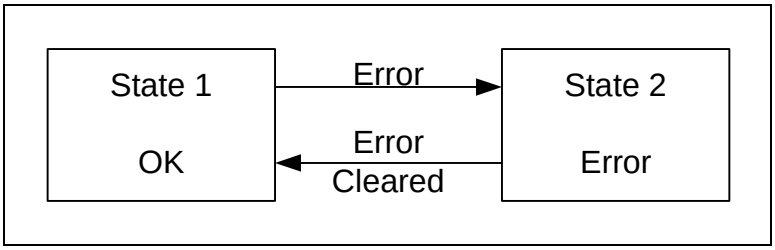


Figure 34-1 Error Sates without Latching of Most Severe Errors

In this mode, an Error Reporting Device always transmits the Most Recent Error condition it has detected, and this is the only error it will ever report.

34.5.4.3 Mode: Error Reporting On with Latching of Most Severe Errors

An Error Monitoring Device may optionally support the storage and transmission of one or more Most Severe Errors in addition to the Most Recent Error.

In this Mode, Error Monitoring Devices:

a. Watch the current state of all of their Monitored Events;

b. Immediately report to the C-Bus network as a Most Recent Error, any change in a Monitored Event's status, including returning to OK;

c. Remember, update, and transmit on change the Most Severe Error to have occurred for each Monitored Event;

d. Issue error reports if triggered to do so with a Triggered Error Refresh;

e. Allow errors to be Acknowledged; and

f. Allow the Latched Most Severe Errors to be cleared.

34.5.5 Network Variables

This application utilises a common set of data known as Network Variables. This data set characterises the behaviour and state of the C-Bus Error Reporting Application.

Network Variables are available to all devices on the system and are accessed and modified by the set of C-Bus commands defined in this document.

Error Reporting Application Network Variables are arranged into a hierarchy, as shown in Figure 34-2.

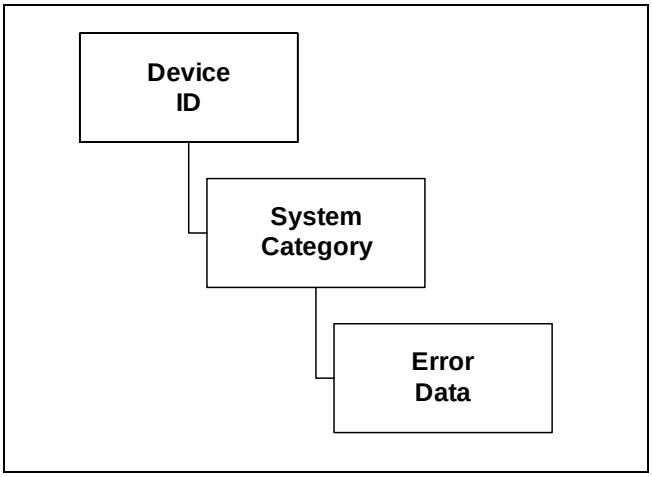


Figure 34-2 Network Variable Hierarchy

34.5.5.1 Device ID Network Variable

The Device ID[2] is an 8-bit value used to differentiate between physical Error Monitoring Devices.

This value must be unique for all devices on the same network.

The Device ID should only be set by the configuration software, which must ensure a unique value is used. This can default to the Unit Address – but subsequently it should only be changed by an explicit operation of the installer.

When shipped, devices that support C-Bus Error Reporting shall have the Device ID set to $FF

[2] Older Error Monitoring Devices that transmit using the $05 header will transmit their Unit Address in the Device ID field.

34.5.5.2 System Category Network Variable

The System Category is a 10-bit value that identifies the class of device and service from which an Error Report is being generated.

A single physical device may generate and respond to multiple System Category messages, if appropriate.

The System Category defines the contents and meaning of the Error_Data_1 and Error_Data_2 bytes.

Every valid System Category and the corresponding Error Data bytes are defined in Appendix A.

New System Categories and Error Data definitions shall be only be created and allocated by Clipsal Australia.

34.5.6 Error Data 1 & 2 Network Variables

The two Error Data bytes are dependent on the System Category. These bytes will contain additional information such as the Monitored Event on which the error occurred and the type of error.

Example:

System Category = DALI

Error Data 1 = Ballast Number

Error Data 2 = Failure Code

Error Data bytes are defined in Appendix A for each valid System Category.

34.6 Error Reporting Application Message Structure

C-Bus Error Reporting Application commands are always exactly 6 bytes long, comprising a header followed by 5 bytes of data. The message format is shown in Figure 34-3:

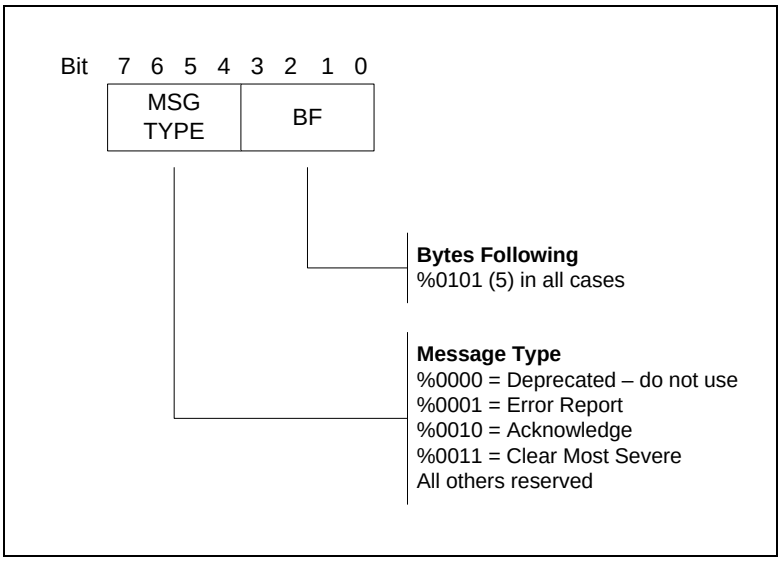
Byte 0	Byte 1	Byte 2				Byte 3	Byte 4	Byte 5
Cmd Hdr	System Category	Most Recent	Acknowledge	Most Severe	Severity	Device ID	Error Data 1	Error Data 2
8 bits	10 bits	1 bit	1 bit	1 bit	3 bits	8 bits	8 bits	8 bits

Figure 34-3 Error Report Command Structure

Fields in the message have the following meanings.

Command Header

The command header is a single byte which encodes the number of bytes following, and the message meaning:



The Message Type portion of the header is used to determine the action to be taken with the bytes that follow.

A Header value of $05 is a special case indicating a deprecated but compatible version of the protocol.

Differences between Header $05 and Header $15

Some older Error Monitoring Devices will transmit a header of $05. Those devices always:

a. Report their Unit Address in the Device ID field; and

b. Transmit only Most Recent Errors but with the Most Recent bit being ***either*** 0 or 1.

c. The Most Severe bit will be transmitted as 0.

Device Requirement:

All Error Monitoring Devices must accept a Header of $05 and use this as an alternate method of Acknowledging an error condition.

System Category

The System Category is a network variable appropriate to the device type, function, and error being reported by the device.

System Categories are defined in Appendix A.

Most Recent

This bit is set if the error being reported or Acknowledged is the Most Recent Error.

Acknowledge

From an Error Reporting Device: This bit is set if the error has been acknowledged, and clear otherwise.

From an Error Monitoring Device: This bit is set if the error is *being* acknowledged (in a message with header $05 or $25).

Most Severe

This bit is set if the error being reported or Acknowledged is the Most Severe Error, and will be clear otherwise.

A device that does not support latched Most Severe Errors will never report with this bit set.

Legal combinations of the *Most Recent* and *Most Severe* error bits are:

Most Recent	Most Severe	Meaning
0	0	Invalid Condition (Ignore the entire message)
0	1	This message is a Most Severe Error
1	0	This message is a Most Recent Error
1	1	This single message conveys both the Most Recent and Most Severe error as both are the same

If the message header is $05, the Most Severe bit should be ignored. It might set or cleared.

Severity

The Severity is a 3-bit value that indicates the seriousness of an error. Valid Severity codes and their meanings are:

Severity	Binary	Meaning	Description / Purpose
0	%000	All OK	An Error Severity of 'All OK' is a shortcut used to indicate that ***all Monitored Events*** watched by an Error Monitoring Device are OK. If any Monitored Event being watched by a device is not OK, then the status of all Monitored Events must be reported on an individual basis. Examples: All ballasts watched by a DALI Gateway 'OK' All channels of an Output Unit are 'OK'
1	%001	OK	An Error Severity of 'OK' is used to indicate that the status of an individual Monitored Event being watched by an Error Monitoring Device is currently within normal operating conditions. A severity of OK *does not imply* anything about any other Monitored Event in the device originating the error report. Examples: Temperature within boundaries. DALI Ballast reports no problems.
2	%010	Minor Failure	An Error Severity of 'Minor Failure' is used to indicate a warning or low priority error for an individual Monitored Event being watched by an Error Monitoring Device. Examples: Temperature within 2 degrees of upper limit. Lamp Failure reported by DALI Ballast. C-Bus dimmer lost mains power

Severity	Binary	Meaning	Description / Purpose
3	%011	General Failure	An Error Severity of 'General Failure' is used to indicate an error for an individual Monitored Event being watched by an Error Monitoring Device. Examples: Temperature exceeded upper limit. DALI Ballast not responding.
4	%100	Extreme Failure	An Error Severity of 'Extreme Failure' is used to indicate a catastrophic or dangerous failure for an individual Monitored Event being watched by an Error Monitoring Device[3]. Examples: Temperate exceeded Flash Point: The roof is on fire!
5, 6, 7	%101 %110 %111	Reserved	Reserved, not to be used

Device ID

The Device ID is a network variable. It is a unique number programmed into the Error Monitoring device at the time of its installation, and is used to identify and locate the physical equipment item. It may be the C-Bus Unit Address, but need not be.

Error Data 1 and 2

Permitted values for Error Data 1 & 2 are determined by the System Category and the Monitored Event. Legal values for Error Data 1 & 2 are defined in Appendix A.

34.7 Operations

34.7.1 Transmitting an Error Report

An Error Monitoring Device transmits error reports using the defined message structure and a Header of $15.

34.7.2 Acknowledging an Error Report

An Error Receiving Device performs acknowledgement. Any Error Receiving Device may acknowledge an Error Report via the C-Bus network.

[3] This error severity is not used in C-Bus PRO+ or Universal dimmers.

Device Requirements:

After an Error Report has been acknowledged, any timed re-transmissions of that error by an Error Monitoring Device shall have the Acknowledged Flag set.

If a Most Recent or Most Severe Error changes state, the Error Monitoring Device shall clear its Acknowledge state.

Error Monitoring Devices in Mode 0 'Error Reporting Off' must ignore Acknowledge commands.

There are two methods of acknowledging an Error:

Deprecated Method

This method applies for Error Reports received by an Error Receiving Device with a Header of $05 or $15.

> *For Error Reports received by an Error Receiving Device with a header of $15, this method can be used, but support may be removed at any time without prior notice. The following "Preferred Method" should be used instead.*

These errors are Acknowledged by re-transmitting the message with the Acknowledged bit set.

An Error Monitoring Device considers an Error Report acknowledged if it receives from the C-Bus network an Error Report with:

a. System Category matching its own;

b. Unit Address (for message header $05) or Device ID (for message header $15) matching its own; and

c. Acknowledged Flag set

Preferred Method

This method applies for Error Reports received by the Error Receiving Device with a Header of $15.

The Error Receiving Device can transmit an Error Reporting message with a Header of $25.

Error Monitoring Devices will examine such message and use it to Acknowledge an error only if:

a. the Most Recent bit is set and the received System Category, Severity, Error Data and Device ID fields match those fields for the Most Recent error in that device; and / or

b. the Most Severe bit is set and the received System Category, Severity, Device ID, and Error Data fields match those fields for the Most Severe error in that device.

The state of the Acknowledge bit is *ignored* by Error Monitoring Devices when they receive a message with header $25.

If neither the Most Recent, nor Most Severe bits are set in an Acknowledge message, then the Error Monitoring Device will discard the message.

34.7.3 Updating the Most Severe Error

If an Error Monitoring Device detects a new error with a higher severity than that of its currently recorded Most Severe Error, it shall:

a. Update the Most Severe Error to the new error condition and severity; and

b. Transmit the Most Severe Error into the C-Bus network immediately upon change.

The Most Severe Error is also refreshed to the C-Bus network at regular intervals. This includes transmission of an OK if no Most Severe Error has been seen and latched.

34.7.4 Clearing the Most Severe Error

An Error Monitoring Device will clear the currently recorded Most Severe Error upon receipt of a Clear Most Severe command from the C-Bus Network, which has:

a. System Category matching its own;

b. Device ID (for message header $15) matching its own;

c. The Most Severe bit set; and

d. Error Data 1 and 2 matching a previously broadcast Most Severre Error.

When a Clear Most Severe Error command is received and accepted for processing, the Error Monitoring Device shall:

a. set the Most Severe Error to the same state as the Most Recent Error; and then

b. transmit the Most Recent and Most Severe Errors into the C-Bus network (even if the errors have severity OK).

Clearing of a Most Severe Error may only occur via a received C-Bus command. An Error Monitoring Device may not, of itself, downgrade the severity of its own Most Severe Errors.

Figure 34-4 shows several possible changes of state when a Most Severe Error is cleared. In this example, Error E2 Severity > Error E1 Severity.

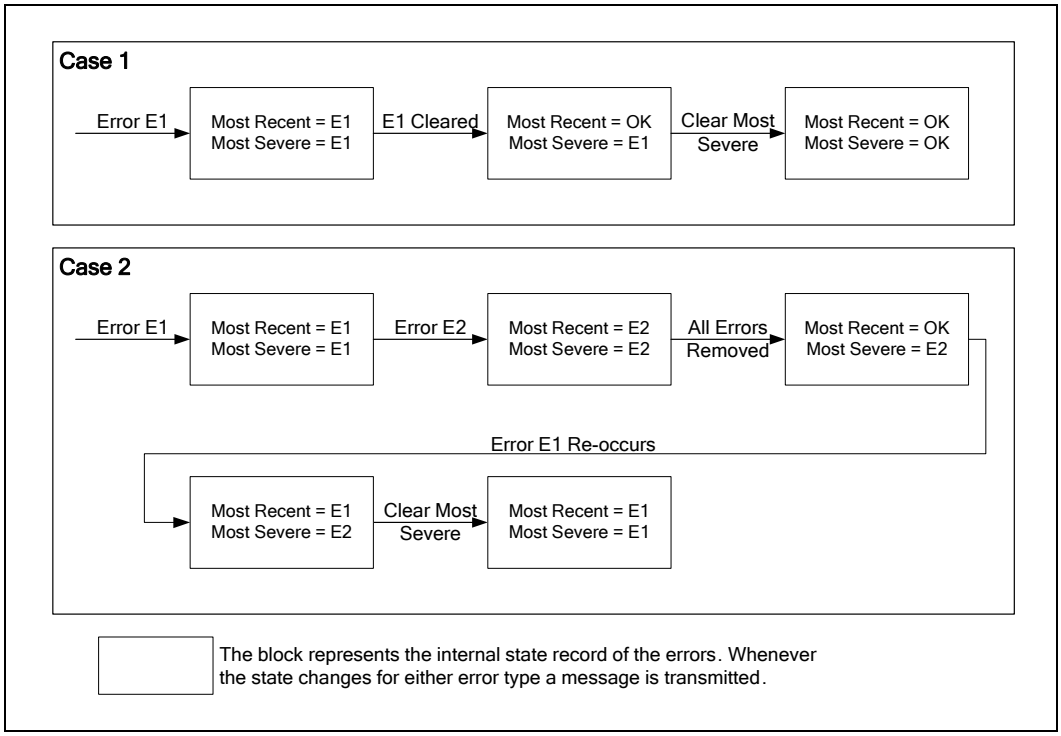


Figure 34-4 Clearing Most Severe Errors

34.7.5 Clearing All Latched Errors

Device Requirement:

All Latched Errors in an Error Monitoring Device shall be clearable upon receipt of a configurable Trigger Group and Action Selector on the Trigger Control Application.

34.7.6 Changing Mode

Device Requirement:

When an Error Monitoring Device has its Error Reporting Mode changed , any memory of the Most Severe Error in the device shall be cleared.

34.8 Message Priority

Error Reporting Application messages shall initially be transmitted as Class 4 (low priority) SAL commands.

This requires a message header of $05.

34.9 Inter-Network Routing

Error Monitoring Devices never generate Error Reporting messages routed through bridges. All SAL messages are transmitted to the Local Network only. To extend range or node capacity, two adjacent networks can be linked by a bridge in “Application Connect” mode, which makes the bridge appear transparent.

Error Monitoring Devices shall be capable of receiving Error Reports (for Acknowledging Errors and Clearing Latched Errors) from across up to 6 network bridges.

Error Receiving Devices shall be capable of receiving Error Reports routed across up to 6 network bridges. They shall also be capable of transmitting Error Reports across up to 6 network bridges in order to Acknowledge or Clear the Latched Error of a report with the maximum network routing.

34.9.1 Concatenated Commands

A C-Bus device may transmit and receive a message containing more bytes than a single command. This permits a single C-Bus transmission to contain multiple commands for a single Application.

Where possible, an Error Monitoring Device shall concatenate up to two Error Reports into one C-Bus message in order to reduce network traffic. A concatenated command shall not contain more than two Error Reports, as the command would exceed the maximum size if worst case network routing were used.

Devices using C-Bus Error Reporting Application messages must process all received bytes. This may be achieved by placing the received bytes in a buffer, and using the following simple algorithm, or any other algorithm that is functionally equivalent:

```
WHILE the buffer contains bytes LOOP
    The first byte defines the command header and argument
    count (refer section 34.6).
    Process the first (command) byte and its arguments
    Once processed, remove the command and argument bytes
    from the buffer
END LOOP
```

34.10 Programming of Devices

C-Bus devices that transmit Error Reporting Application messages should have some means of programming the Trigger Group, Action Selectors, Enable Group and Enable Levels to which they respond, and the various responses they can generate.

This programming may be performed using:

a. Some kind of C-Bus data load facility;

b. Panel programming buttons or keys;

c. Listening for C-Bus network traffic as part of a dedicated learn function;

d. A direct connection from a programming device (for example, a PC); or

e. Some other technique at the discretion of device manufacturer.

34.10.1 Required Parameters

The following parameters are required by Error Monitoring Devices:

- Mode
- Enable Group
- Enable Level – Mode 0[4]
- Enable Level – Mode 1
- Enable Level – Mode 2*
- Trigger Group
- Action Selector – Triggered Error Refresh
- Action selector – Clear All Latched Errors*
- Refresh Time

* Only required if Error Reporting with latching of Most Severe Errors is supported.

34.11 Status Reporting

MMI's are not supported on the Error Reporting Application due to the incompatibility with the command structure.

34.12 Limitations

None.

[4] It is acceptable for the Enable Levels to be fixed (hard coded) in the device design. For example, Clipsal Universal, PRO+ and Architectural dimmers have the following pre-defined values: Mode 0: value 0, Mode 1: value 1, and Mode 2: Value 2.

34.13 Message Examples

These examples assume that a device is transmitting error reports. This device interfaces to C-Bus using the C-Bus Serial Interface, which is described in more detail in C-BUS-SIUG.

34.13.1 All OK

Mode = 1 – Most Severe Disabled

An Air Conditioner of System Category = %1111 1111 00 and Device ID = $DE has no errors to report. Hence, Severity is All OK and there is no Error Data:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%1111 1111 00	%1	%0	%0	%000	$DE	$00	$00

Command: \05CE0015FF20DE0000

34.13.2 Minor Failure

Mode = 2 – Most Severe Enabled

A Hovercraft with System Category = %1000 1000 00 and Device ID = $67 reports a Minor Failure (%010) on Fan $21 (Error Data 1 = $21) caused by Blade 4 (Error Data 2= $B4). Most Severe reporting is enabled and the Most Severe Error is the same as the Most Recent Error

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%1000 1000 00	%1	%0	%1	%010	$67	$21	$B4

Command: \05CE0015882A6721B4

34.13.3 General Failure which gets Acknowledged

Mode = 1 – Most Severe Disabled

A C-Bus Power Supply with System Category = %1001 0000 00 and Device ID = $42 reports a General Failure (%011) with monkey $66 (Error Data 1 = $66) only running at 33% (Error Data 2= $33). Most Severe reporting is disabled:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%1001 0000 00	%1	%0	%0	%011	$42	$66	$33

Command: \05CE00159023426633

An operator acknowledges the previous General Failure.

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$25	%1001 0000 00	%1	%1	%0	%011	$42	$66	$33

Command: \05CE00259033426633

Note: Ack Flag is ignored when $25 header is used.

34.13.4 Latched Extreme Failure which gets Cleared

Mode = 2 – Most Severe Enabled

A Nuclear Reactor with System Category = %0110 1001 11 and Device ID = $FE reports Ultra-cooler turbine 1 (Error Data 1 = $01) is currently OK (%001), but there is a Most Severe Extreme Failure (%100) where Ultra-cooler turbine 1 (Error Data 1 = $01) has overheated and ejected 2 puffs of smoke (Error Data 2= $02). A Most Recent error is reported, then the Most Severe Error is reported:

Most Recent Error:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%0110 1001 11	%1	%0	%0	%001	$FE	$01	$00

Command: \05CE001569E1FE0100

Most Severe Error:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%0110 1001 11	%0	%0	%1	%100	$FE	$01	$02

Command: \05CE001569CCFE0102

An operator clears the Most Severe Error:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$35	%0110 1001 11	%0	%0	%1	%001	$FE	$01	$02

Command: \05CE003569C9FE0102

The reactor transmits the new error data, which indicates the most recent (and most severe) errors are OK:

Header	System Category	Most Recent	Ack Flag	Most Severe	Error Severity	Device ID	Error Data 1	Error Data 2
$15	%0110 1001 11	%1	%0	%1	%001	$FE	$01	$00

Command: \05CE001569E9FE0100

34.14 Notes

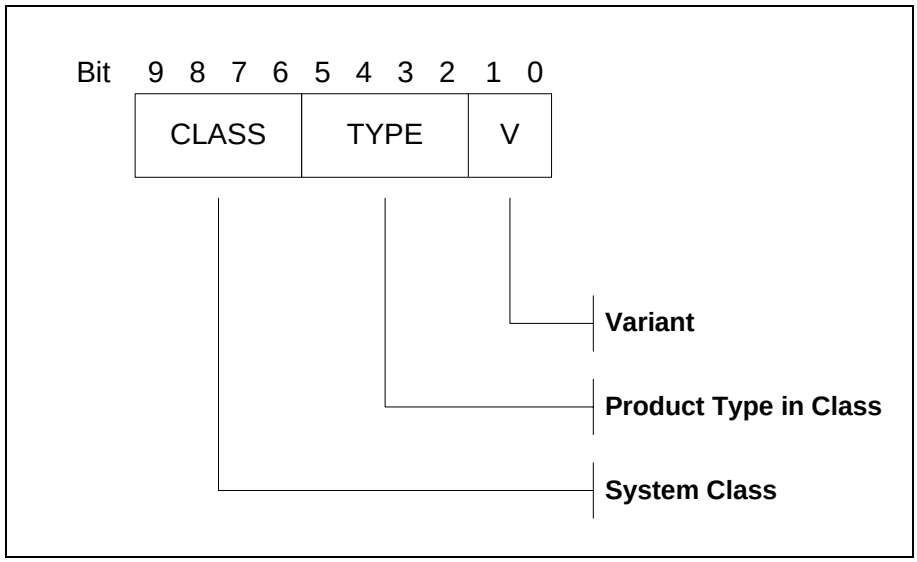
None.

34.15 Appendix A – System Categories, Severities & Error Data

As new products support Error Reporting, they must be assigned unique System Categories and registered in these tables.

Allocation of System Category

The System Category is a 10 bit number which is broken into the following fields:



The following System Category ***Classes*** are allocated:

Class	Purpose / Meaning
%0000 (0)	- reserved -
%0001 (1)	- reserved -
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	- reserved -
%0101 (5)	Input Units
%0110 (6)	- reserved -
%0111 (7)	- reserved -
%1000 (8)	- reserved -
%1001 (9)	Support Units
%1010 (10)	- reserved -
%1011 (11)	Building Management Systems
%1100 (12)	- reserved -
%1101 (13)	Output Units
%1110 (14)	- reserved -
%1111 (15)	Climate Controllers

The following ***Product Types*** in the *INPUT UNITS Class* are allocated:

Product Type	Purpose / Meaning
%0000 (0)	Key Units
%0001 (1)	Telecommand and Remote Entry
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	- reserved -
%0101 (5)	- reserved -
%0110 (6)	- reserved -
%0111 (7)	- reserved -
%1000 (8)	- reserved -
%1001 (9)	- reserved -
%1010 (10)	- reserved -
%1011 (11)	- reserved -
%1100 (12)	- reserved -
%1101 (13)	- reserved -
%1110 (14)	- reserved -
%1111 (15)	- reserved -

The following ***Product Types*** in the *SUPPORT UNITS Class* are allocated:

Product Type	Purpose / Meaning
%0000 (0)	Power Supplies
%0001 (1)	- reserved -
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	- reserved -
%0101 (5)	- reserved -
%0110 (6)	- reserved -
%0111 (7)	- reserved -
%1000 (8)	- reserved -
%1001 (9)	- reserved -
%1010 (10)	- reserved -
%1011 (11)	- reserved -
%1100 (12)	- reserved -
%1101 (13)	- reserved -
%1110 (14)	- reserved -
%1111 (15)	- reserved -

The following ***Product Types*** in the *BUILDING MANAGEMENT SYSTEMS Class* are allocated:

Product Type	Purpose / Meaning
%0000 (0)	BMS Diagnostic Reporting
%0001 (1)	- reserved -
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	- reserved -
%0101 (5)	- reserved -
%0110 (6)	- reserved -
%0111 (7)	- reserved -
%1000 (8)	- reserved -
%1001 (9)	- reserved -
%1010 (10)	- reserved -
%1011 (11)	- reserved -
%1100 (12)	- reserved -
%1101 (13)	- reserved -
%1110 (14)	- reserved -
%1111 (15)	- reserved -

The following ***Product Types*** in the *OUTPUT UNITS Class* are allocated:

Product Type	Purpose / Meaning
%0000 (0)	LE Monoblock Dimmers
%0001 (1)	TE Monoblock Dimmers
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	Relays and other On/Off Switching Devices
%0101 (5)	- reserved -
%0110 (6)	PWM Dimmers (includes LED control)
%0111 (7)	Sinewave Monoblock Dimmers
%1000 (8)	- reserved -
%1001 (9)	- reserved -
%1010 (10)	DALI, DSI and other ballast control Gateways
%1011 (11)	Modular Dimmers
%1100 (12)	- reserved -
%1101 (13)	Universal Monoblock Dimmers
%1110 (14)	Device Controllers (IR, RS-232, etc)
%1111 (15)	- reserved -

The following ***Product Types*** in the *CLIMATE CONTROLLERS Class* are allocated:

Product Type	Purpose / Meaning
%0000 (0)	Air Conditioning System
%0001 (1)	- reserved -
%0010 (2)	- reserved -
%0011 (3)	- reserved -
%0100 (4)	- reserved -
%0101 (5)	- reserved -
%0110 (6)	- reserved -
%0111 (7)	- reserved -
%1000 (8)	- reserved -
%1001 (9)	- reserved -
%1010 (10)	- reserved -
%1011 (11)	- reserved -
%1100 (12)	Global Warming Modulator
%1101 (13)	- reserved -
%1110 (14)	- reserved -
%1111 (15)	- reserved -

Use of the VARIANT field in the System Category

The VARIANT field is to be set to %00. It is reserved for possible future expansion.

Allocation of Error Data 1 and Error Data 2

For each combination of System Class and Product Type, a fixed meaning is assigned to the bytes Error Data 1 and Error Data2.

In each case, the Error Meanings have an associate severity which must be used in the Error Report.

The following tables define these meanings.

If a System Class / Product Type combination does not appear in the definitions below then it has not been determined. Contact Clipsal for an allocation and definition.

No deviation from these meanings is permitted.

It is acceptable for a device to generate LESS than the full range of error data conditions if this is appropriate for that device. For example, a DSI gateway may not be capable of reporting a ballast is not present, in which case it will simply never generate such a condition.

System Class and Product Type	Input Units: Key Units
System Category Number	%0101 0000 00 Chosen to read $50 in error reports
Error Data 1	TBD
Error Data 2	TBD

System Class and Product Type	Input Units: Telecommand and Remote Entry
System Category Number	%0101 0001 00 Chosen to read $51 in error reports
Error Data 1	TBD
Error Data 2	TBD

System Class and Product Type	Building Management Systems: BMS Diagnostic Reports
System Category Number	%1011 0000 00 Chosen to read $B0 in error reports
Error Data 1	TBD
Error Data 2	TBD

System Class and Product Type	Output Units: LE Monoblock Dimmers, TE Monoblock Dimmers, Universal Monoblock Dimmers
System Category Number	%1101 1101 00 (LE Monoblock dimmers) %1101 0000 00 (TE Monoblock dimmers) %1101 0001 00 (Universal Monoblock dimmers) Chosen to read $D0, D1 and $DD in error reports
Error Data 1	Bit 7-0 = Channel Number
Error Data 2	Bits 2-0: Error Code 000: OK 001: No Power on Channel (Severity Minor) 010: Over Temperature (Severity Minor) 011: Over Current (Severity General) 100: Control communication error (Severity General) 101: Status communication error (Severity General) 110: Reserved (Severity General) 111: No hardware (Severity General) Bits 7-3: Reserved - do not use

System Class and Product Type	Output Units: Relays and other On/Off Switching Devices
System Category Number	%1101 0100 00 Chosen to read $D4 in error reports
Error Data 1	Bit 7-0 = Channel Number
Error Data 2	Bits 3-0: Error Code 0000: OK 0001: No Power on Channel (Severity Minor) 0010: Over Temperature (Severity Minor) 0011: Over Current (Severity General) 0111: Under Current / Load Failure (Severity Minor) All others Reserved Bits 7-4: Reserved - do not use

System Class and Product Type	Output Units: PWM Dimmers
System Category Number	%1101 0110 00 Chosen to read $D6 in error reports
Error Data 1	Bit 7-0 = Channel Number
Error Data 2	Bits 3-0: Error Code ***All TBD*** Bits 7-4: Reserved - do not use

System Class and Product Type	Output Units: Sinewave Dimmers
System Category Number	%1101 0110 00 Chosen to read $D7 in error reports
Error Data 1	Bit 7-0 = Channel Number
Error Data 2	Bits 3-0: Error Code ***All TBD*** Bits 7-4: Reserved - do not use

System Class and Product Type	Output Units: DALI, DSI and ballast control Gateways
System Category Number	%1101 1010 00 Chosen to read $DA in error reports
Error Data 1	Bit 7-0 = Channel Number $00-3F = Network A Channels $00-3F $40-7F = Network B Channels $00-3F
Error Data 2	If multiple conditions are reported by setting more than 1 bit, the severity field of the Error message transmitted must be the HIGHEST severity of the conditions being reported as active. Bit 0: Ballast Failure (Severity General) 0 = Ballast OK 1 = Ballast Failure (comms error) Bit 1: Lamp Failure (Severity Minor) 0 = Lamp OK 1 = Lamp Failure (Lamp blown) Bit 2: Lamp Power (Severity OK) 0 = Lamp Off 1 = Lamp On Bit 3: Power Failure (Severity Minor) 0 = Command received since power on 1 = No lighting command received since power on Bit 4: Unused Bit 5: Unused Bit 6: Unused Bit 7: Ballast Present (Severity General) 0 = Ballast Responding 1 = Ballast not responding (or doesn't exist)

System Class and Product Type	Output Units: Modular Dimmers
System Category Number	%1101 1011 00 Chosen to read $DB in error reports
Error Data 1	Bit 7-0 = Channel Number
Error Data 2	Bits 3-0: Error Code 0000: OK 0001: No Power on Channel (Severity Minor) 0010: Over Temperature (Severity Minor) 0011: Over Current (Severity General) 0100: Control communication error (Severity General) 0101: Status communication error (Severity General) 0110: Ballast Controller failure (Severity Minor) 0111: No hardware (Severity General) 1000 .. 1111: Reserved Bits 7-4: Reserved - do not use

System Class and Product Type	Output Units: Device Controllers (IR, RS-232, etc)
System Category Number	%1101 1110 00 Chosen to read $DE in error reports
Error Data 1	TBD
Error Data 2	TBD