Quality System
Quality Endorsed Company
ISO 9001 Lic934
Standards Australia

CLIPSAL
INTEGRATED SYSTEMS

## Training Manual

# C-Bus DALI Gateway

Revision Number: V2.0

CE

V2.0 July 2006

# Contents

## Scope

This manual has been designed to provide a C-Bus installer or programmer with skills needed to program the C-Bus DALI Gateway. A fundamental technical background is required.

It is preferred that the installer or programmer has attended a C-Bus Basic Training Course, before using this manual.

To get the most out of this manual, be sure to read all chapters carefully.

## Learning Outcomes

By the end of this manual, you should have an understanding of:

- how to program the DALI Gateway
- how to set up the DALI Gateway for Error Reporting
- how to set up Schedule Plus to Report errors.

# 1.0

# Introduction

The C-Bus DALI Gateway has been updated to include a number of new features, including:

- selectable C-Bus Applications
- configurable mapping of C-Bus Groups to DALI Ballasts, Groups, Scenes and Broadcasts
- monitoring and correction of ballast levels
- mapping of C-Bus Lighting Ramp Rates to DALI
- selectable mapping of some DALI commands to C-Bus
- support for DALI Ballast Status information
- support for C-Bus Error Reporting Application.

These new features are demonstrated in the configuration.

A new DALI Gateway can be identified by its Unit Type, which has been changed to PC_DAL2C. The Unit Type of the original DALI Gateway was PC_DAL2.

The updated unit requires Toolkit Version 1.4.1 or later for full support. Please read the release notes before use.

## 1.1 Hardware

The C-Bus DALI Gateway provides an interface between a C-Bus network and two separate DALI networks.

Each DALI network may have up to 64 DALI units, in addition to the C-Bus DALI Gateway. Typically, these units are ballasts for dimming fluorescent loads.

Each DALI network must include a DALI Power Supply.

## 1.2 Unit Identification

The PC_DAL2C is shipped set to the default DALI Application (95). This can be changed to any lighting style application using Toolkit.

When configuring a DALI Gateway, the first step should always be to set the Application.

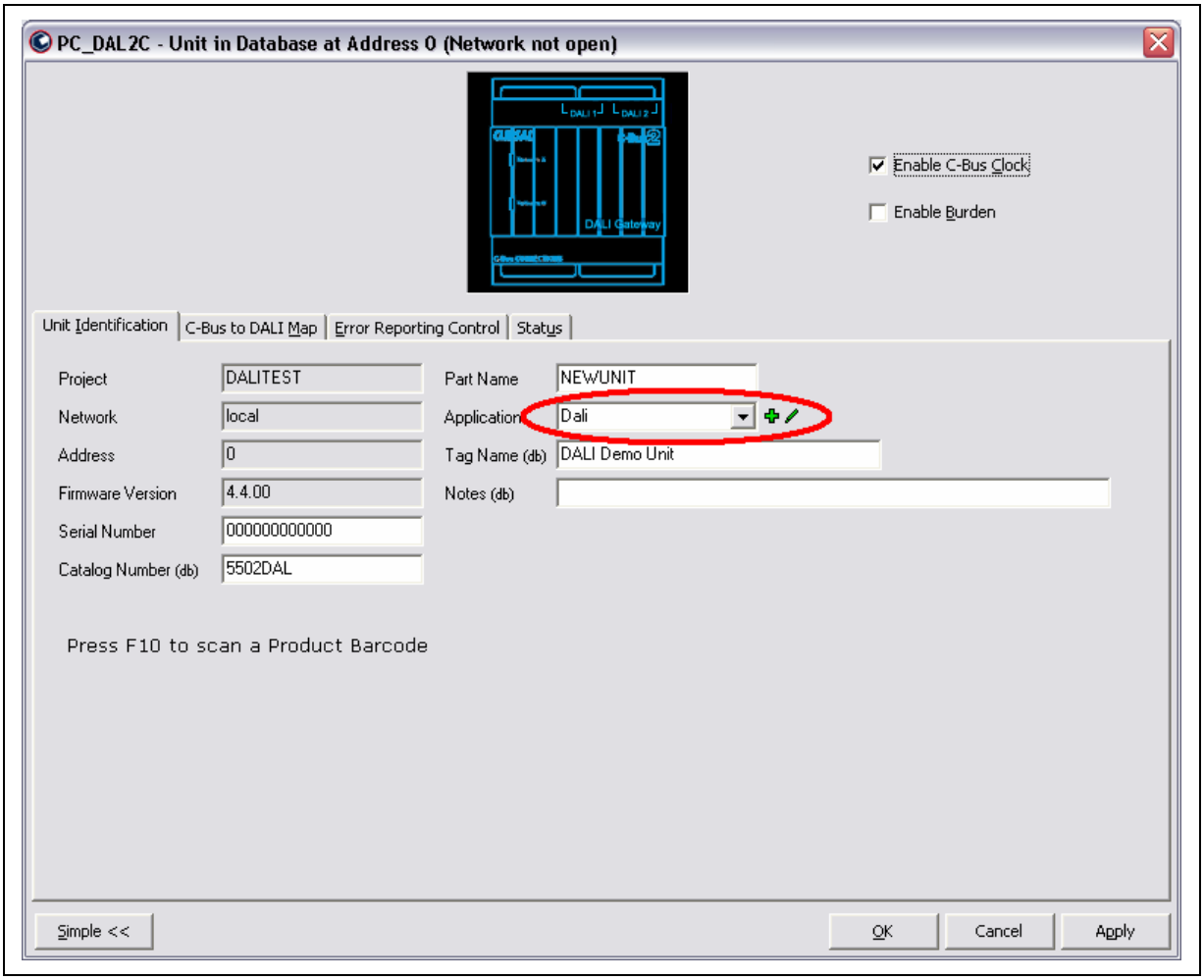



Figure 1: Unit Identification Tab.

For this demonstration, the DALI Application (95) will be used. Any input units used to control loads on the DALI network will also need to use DALI as the primary or secondary application.

## 1.3 C-Bus to DALI Map

The 'C-Bus to DALI Map' tab contains most of the configuration options required for a typical installation. It allows you to:

- Configure mappings from C-Bus to DALI.
- Enable and Disable the mapping of commands from DALI back to C-Bus.
- Enable and Disable Status Correction.
- Enable and Disable the matching of ramp rates.

The 'C-Bus to DALI Map' allows the mapping of C-Bus Group Addresses to a DALI target (on one of the two DALI networks connected to the DALI Gateway). A C-Bus Group Address can be mapped to any of the following DALI targets:

- a single device (DALI Ballast)
- one of the 16 DALI Groups
- one of the 16 DALI Scenes
- DALI Broadcast
- DALI Broadcast Off.

Within the 'C-Bus to DALI Map', C-Bus groups are mapped to DALI by clicking in the 'DALI Action' column (See Figure 2). The desired DALI Unit, Group, Scene or Broadcast can be selected for DALI Network A or B.

C-Bus Groups can be added to the selected Application using the 'New Group' button.

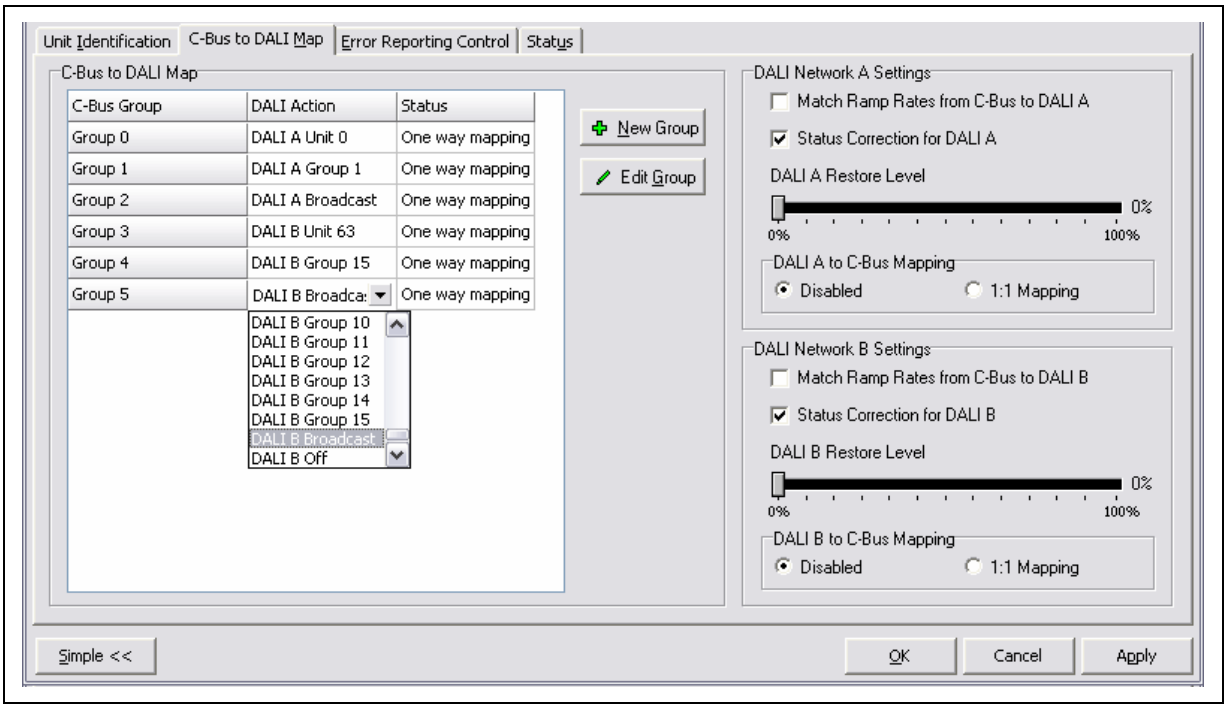



Figure 2: C-Bus to DALI Map

NOTE At this point C-Bus groups cannot be mapped to DALI Scenes as Status Correction is enabled for both networks. To use DALI Scenes, Status Correction must be disabled. (See section 1.3.2)

The Status column shows the extent of mapping between C-Bus and DALI. At this stage all entries show 'One Way Mapping' indicating commands are translated from C-Bus to DALI only, not from DALI back to C-Bus.

NOTE Right clicking on C-Bus Groups lets you edit a group, add a new group, or turn the group On or Off. Toggling groups on and off is useful for testing configuration, but any changes must be saved to the unit first.

### 1.3.1 Matching Ramp Rates

The DALI Gateway is capable of matching ramp rates from C-Bus lighting commands to DALI on a per network basis. It does this by dynamically re-programming the Fade Time parameter of the targeted DALI unit(s). Matching of ramp rates maybe be enabled or disabled for each DALI Network connected to the Gateway.

WARNING Enabling the 'Match Ramp Rates from C-Bus to DALI' option for either DALI network may cause DALI units on that network to have their Fade Time parameter changed. This will effect the configuration of the DALI network.

Table 1 shows the relationship between C-Bus Ramp Rates and DALI Fade Time when matching of ramp rates is enabled.

| C-Bus Ramp Rate (s) | DALI Fade Time (s) |
|---|---|
| Instant | <1 |
| 4 | 4 |
| 8 | 8 |
| 12 | 11 |
| 20 | 22 |
| 30 | 32 |
| 40 | 45 |
| 60 | 64 |
| 90 and above | 90 |

Table 1: C-Bus Ramp Rates to DALI Fade Time matching

Matching of Ramp Rates from C-Bus to DALI can be enabled or disabled for Network A or B by clicking the checkbox in the C-Bus to DALI Map tab.

### 1.3.2 Status Correction

The DALI Gateway supports Status Correction. This ensures any inconsistency in the on/off status between C-Bus and DALI is corrected.

Status Correction can be enabled or disabled for each DALI network using the tick box in the C-Bus to DALI Map tab.

If enabled, the Gateway will:

a. regularly interrogate each ballast on the DALI networks to determine their level;

b. compare the ballast's level to the level it was last set to from C-Bus; and

c. if the ballast is on when it should be off, or off when it should be on, re-send the last level to correct the ballast.

If Status Correction is enabled, the C-Bus DALI Gateway becomes the master of the DALI network. It will override any levels set on the DALI network by other input sources and correct the ballast level to the last level set from C-Bus. As other controllers on the DALI network are not permitted, the DALI Gateway will not map DALI commands back to C-Bus, hence C-Bus to DALI mapping must be disabled.

If control of the DALI network from sources other than the C-Bus DALI Gateway is required, Status Correction should be disabled.

If Status Correction is enabled at start up, the Gateway will set all ballasts to the level of the DALI Network's Restore Level slider.


NOTE DALI Scenes are not compatible with Status Correction. If DALI Scenes are required, Status Correction must be disabled.

### 1.3.3 DALI to C-Bus Map

The DALI Gateway can translate some commands on the DALI network back to C-Bus if Status Correction is disabled. A 1:1 Mapping between C-Bus and DALI can be established. This means if a C-Bus Group is mapped to a particular DALI Target, a DALI command to that Target will be mapped back to the same C-Bus Group.

DALI commands to the following targets may be mapped to C-Bus Group Addresses:

- short address (ballast)
- group
- scene
- broadcast.

Table 2 shows how DALI commands will be translated to C-Bus.

| DALI Command | C-Bus Command |
|---|---|
| Direct Arc Power | Instantaneous Ramp |
| Off | Off |
| Recall Min | Instantaneous Ramp to Level 010 (0Ah) |
| Recall Max | Instantaneous Ramp to Level 248 (F8h) |
| Go To Scene | On |

Table 2: DALI to C-Bus Command Translation.

Mapping of DALI commands back to C-Bus may be enabled or disabled for each DALI network.

If the 'Disabled' option is selected for the DALI to C-Bus Map, commands issued on the DALI network by units other than the C-Bus DALI Gateway will not be translated back to C-Bus. Selecting this option will cause the Status column of the C-Bus to DALI map to show "One way mapping", meaning commands are mapped from C-Bus to DALI only.

If the '1:1 Mapping' option is selected, the DALI to C-Bus map will be configured in the reverse of the C-Bus to DALI map. All entries in the Status column for this network will show 'OK', meaning commands are mapped in both directions.


NOTE

To map commands from DALI to C-Bus, Status Correction must be disabled.

## 1.4 Status

In the Status tab in Figure 3, a table shows the current state of any DALI ballasts on each DALI network. This information is gathered by sending a DALI 'Query Status' command to each ballast.

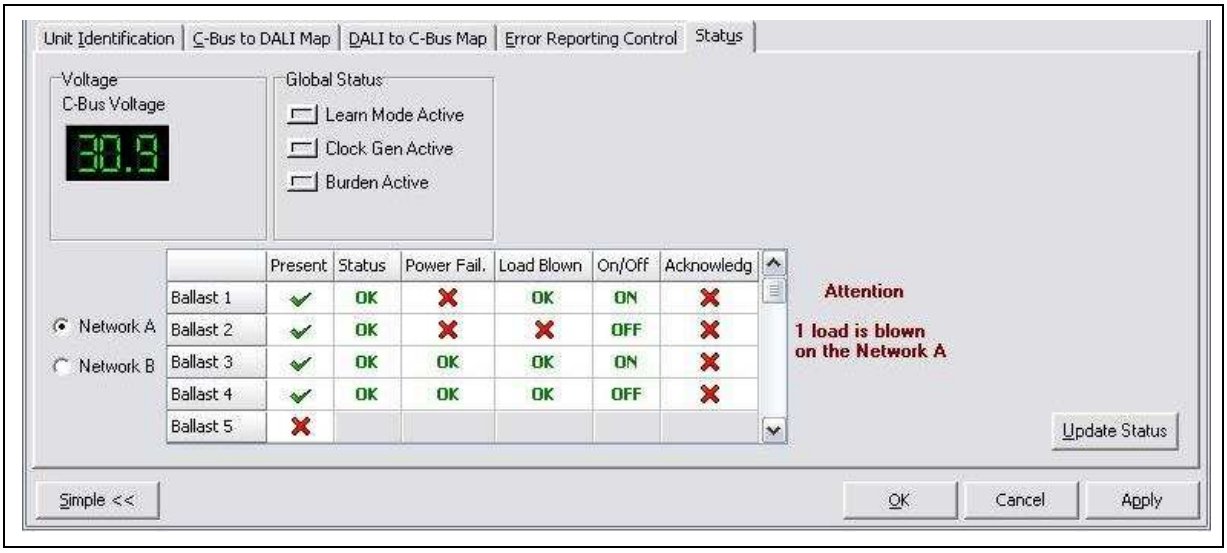



Figure 3: Status Tab.

Table 4 shows the parameters used in the columns of the DALI Status matrix.

| Parameter | Description |
|---|---|
| **Ballast Present** | This indicates the Ballast exists on the DALI network and is responding to Status requests. If a Ballast is shown as not Present, it may mean there is a wiring fault or a problem with the Ballast itself. |
| **Status** | This indicates whether the Ballast is operating normally or has detected an internal error. |
| **Power Failure** | This field indicates if a Ballast has had it's light level set since it was powered on. If not, it will be at it's default turn on level (indicated by a red X). |
| **Load Blown** | A red X indicates the Ballast's load has blown. |
| **On/Off** | This field indicates if the Ballast's load is currently On or Off. |
| **Acknowledged** | This field indicates if a Ballasts Status has been acknowledged via C-Bus. This is used by the C-Bus Error Reporting Application. |

Table 3: Parameter descriptions for the Status tab.

The 'Update Status' button will reload the Status information from the DALI Gateway.

From Figure 3, it can be seen there are:

- four ballasts present on DALI Network A
- all four ballasts are operating normally (Status OK)
- the Power Fail column shows Ballasts 1 and 2 are at their default power on level, while ballasts 3 and 4 have had their light levels set since they were powered on
- the Load Blown column shows Ballast 2 has a damaged load. All other ballasts are OK
- the On/Off column shows Ballasts 1 and 3 have their loads On, Ballasts 2 and 4 are Off
- ballast 5 does not exist on the network, so it shows as Not Present. Ballasts that are damaged or have wiring faults may also appear Not Present.

## 1.5 Error Reporting Control

The 'Error Reporting Control' tab is used for configuring C-Bus Error Reporting. If enabled, the information presented in the Status tab will be transmitted via C-Bus upon any change of state and refreshed periodically. This allows remote devices such as a PC running Schedule Plus to monitor and display the status of DALI ballasts.

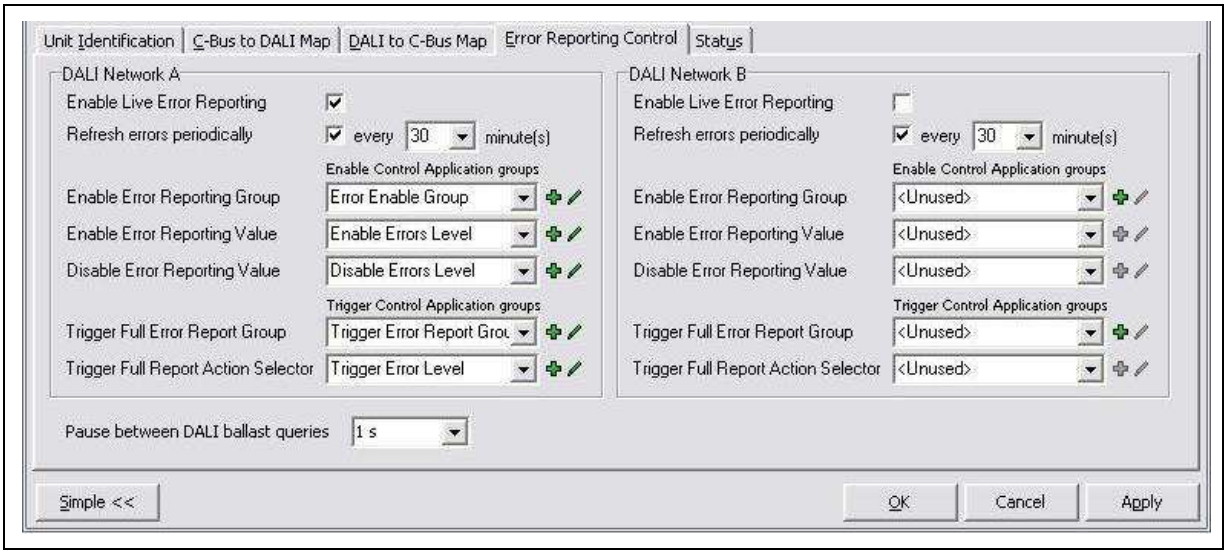



Figure 4: Error Reporting Control Tab.

Figure 4 shows the Error Reporting Configuration for DALI Networks A and B. Network A has been fully configured to provide the highest level of control. Network B shows Error Reporting disabled.

### 1.5.1 Enable Live Error Reporting

The 'Enable Live Error Reporting' check box enables transmission of DALI ballast status information on the C-Bus network. The status will be updated upon any change in a ballasts state. This is the only configuration that is necessary to monitor status information from another unit.

NOTE Unless it is necessary to monitor the status of DALI Ballasts from other than Toolkit, this option should be disabled.

### 1.5.2 Refresh Errors Periodically

The 'Refresh Errors Periodically' setting will cause the status of all DALI ballasts to be transmitted across the C-Bus network after the selected time period.

Regular refreshes ensure devices monitoring Error Reports are kept in sync.

### 1.5.3 Enable Control Application Settings

The three Enable Control Application settings allow Live Error Reporting for DALI Network A to be enabled and disabled upon receipt of a command on the C-Bus Enable Control Application. This makes it possible to enable and disable Error Reporting from another C-Bus device.

Reception of these Enable Control messages has the same effect as ticking or clearing the 'Enable Live Error Reporting' tick box in the Toolkit Unit Interface.

In the example above, Live Error Reporting could be disabled by setting C-Bus Group 'Enable Error Group' to the level 'Disable Errors Level'.

Live Error Reporting could then be enabled by setting C-Bus Group 'Enable Error Group' to the level 'Enable Errors Level'.

These messages must be on the Enable Control Application.

Unless it is necessary to remotely enable or disable Error Reporting, these settings may be left <Unused>.

### 1.5.4 Trigger Control Application Settings

The two Trigger Control Application settings allow a full update of all DALI ballast status information to be triggered in the DALI Gateway. It will transmit all possible 64 ballast's current status upon the receipt of a message setting the C-Bus Group "Trigger Error Report Group" to the level "Trigger Error Level". This message must be on the Trigger Control Application.

Unless it is necessary to remotely trigger a full update of all DALI ballast status information, these settings may be left <Unused>.

### 1.5.5 Pause Between DALI Ballast Queries

The 'Pause Between DALI Ballast Queries' is the time between consecutive status query commands to DALI ballasts. The DALI Gateway must query each of the possible 128 ballasts (2 Networks of up to 64 ballasts each) in turn. This means the maximum possible time taken to detect a problem with a ballast is 128 x the 'Pause Between DALI Ballast Queries'.

The default 'Pause Between DALI Ballast Queries' is 1 second. This ensures any fault with a ballast will be detected within 128 seconds.

# 2.0

# Error Reporting in Schedule Plus

C-Bus Error Reports generated by the DALI Gateway can be received by a PC running Schedule Plus Version 3.5 or later.

Error information can be seen in the Error Manager, which may be accessed by selecting 'Error Manager' from the 'Project' menu, or linking a component to the Special Function 'Error Manager, Show'.

Once connected to C-Bus, the Error Manager will display any Error Reports it receives.


Error Reports are only transmitted by C-Bus units upon a change in state, or at the regular refresh time. To get the Error Manager populated quickly, the Trigger Control Application settings in the DALI Gateway can be configured and the required message sent to start a full transmission of all Errors.

## 2.1 Setup Error Reporting

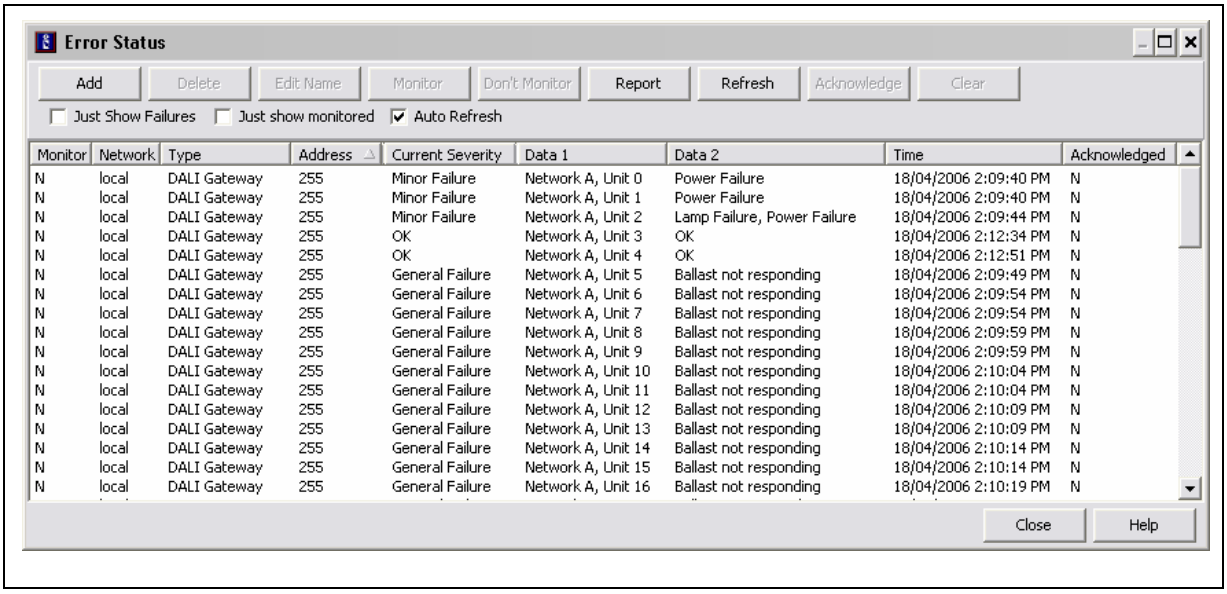
We will now run through a basic example of how the status of Ballasts can be viewed using Schedule Plus. This example assumes Live Error Reporting has been enabled for Network A of the DALI Gateway.

a. Open Schedule Plus and create a new project (or edit an old one).

b. Connect to C-Bus.

c. Select the Error Manager under the Project menu.

Figure 5 shows the Error Manager after the DALI Gateway has been triggered to transmit all error data. The error status of all 64 ballasts for the DALI network is shown at this point, even though only the first 5 actually exist on my network.

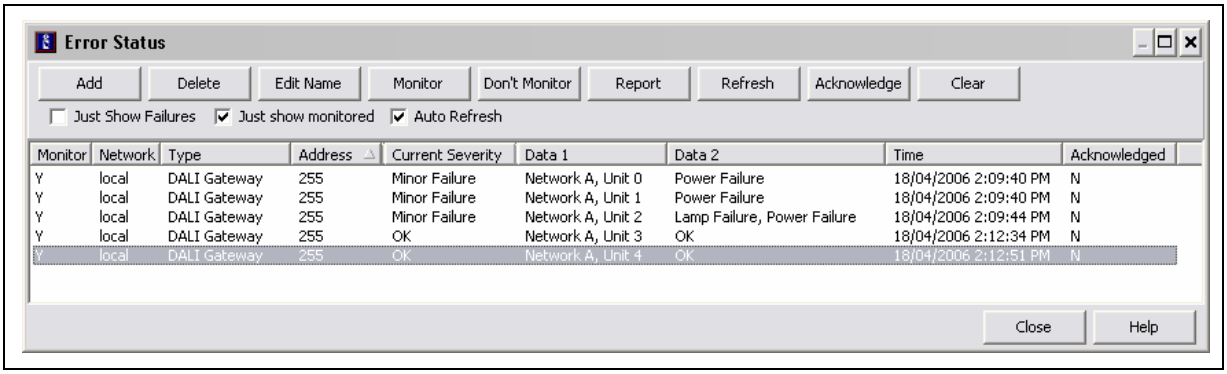



| Monitor | Network | Type | Address | Current Severity | Data 1 | Data 2 | Time | Acknowledged |
|---|---|---|---|---|---|---|---|---|
| N | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 0 | Power Failure | 18/04/2006 2:09:40 PM | N |
| N | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 1 | Power Failure | 18/04/2006 2:09:40 PM | N |
| N | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 2 | Lamp Failure, Power Failure | 18/04/2006 2:09:44 PM | N |
| N | local | DALI Gateway | 255 | OK | Network A, Unit 3 | OK | 18/04/2006 2:12:34 PM | N |
| N | local | DALI Gateway | 255 | OK | Network A, Unit 4 | OK | 18/04/2006 2:12:51 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 5 | Ballast not responding | 18/04/2006 2:09:49 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 6 | Ballast not responding | 18/04/2006 2:09:54 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 7 | Ballast not responding | 18/04/2006 2:09:54 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 8 | Ballast not responding | 18/04/2006 2:09:59 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 9 | Ballast not responding | 18/04/2006 2:09:59 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 10 | Ballast not responding | 18/04/2006 2:10:04 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 11 | Ballast not responding | 18/04/2006 2:10:04 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 12 | Ballast not responding | 18/04/2006 2:10:09 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 13 | Ballast not responding | 18/04/2006 2:10:09 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 14 | Ballast not responding | 18/04/2006 2:10:14 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 15 | Ballast not responding | 18/04/2006 2:10:14 PM | N |
| N | local | DALI Gateway | 255 | General Failure | Network A, Unit 16 | Ballast not responding | 18/04/2006 2:10:19 PM | N |

Figure 5: Error Manager.

To filter out error data for ballasts we are not interested in, select the ballasts that exist and click the 'Monitor' button on the toolbar. If we then select 'Just Show Monitored' we will have a simplified view containing only the 5 ballasts that actually exist.

Figure 6 shows the filtered list of Error Reports.




| Monitor | Network | Type | Address | Current Severity | Data 1 | Data 2 | Time | Acknowledged |
|---|---|---|---|---|---|---|---|---|
| Y | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 0 | Power Failure | 18/04/2006 2:09:40 PM | N |
| Y | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 1 | Power Failure | 18/04/2006 2:09:40 PM | N |
| Y | local | DALI Gateway | 255 | Minor Failure | Network A, Unit 2 | Lamp Failure, Power Failure | 18/04/2006 2:09:44 PM | N |
| Y | local | DALI Gateway | 255 | OK | Network A, Unit 3 | OK | 18/04/2006 2:12:34 PM | N |
| Y | local | DALI Gateway | 255 | OK | Network A, Unit 4 | OK | 18/04/2006 2:12:51 PM | N |

Figure 6: Error Manager - Monitored Event Only.

There are more features to help manage, track and report the status of DALI ballasts, but these are the first basic steps in configuring the system and give an idea of what can be achieved.