Setting Up a Cortex Watchdog using a small module timer

Principle:

Ordinarily Cortex is designed to help you create a system watchdog using the more functional timers available in either the IPD or DFP(MFP) modules. Preferably it will use the IPD module since this has the capability to perform a power cycle reset of the modules rather than just issue a reset command. However it is also possible to manually program a system watchdog which utilises the simple cyclic timers available on most small modules which possess analogue signal functions, such as LTS, LTH, PLH etc. In such modules a simple timer is associated with each analogue function. So for example an LTH module will possess 3 such timers. In this example we will focus on utilising a timer in an LTH module. Although the programming is to some extent module specific the example may be used to guide creation of a watchdog on other types of small module (but not DFP/MFP) which possesses a temperature function.
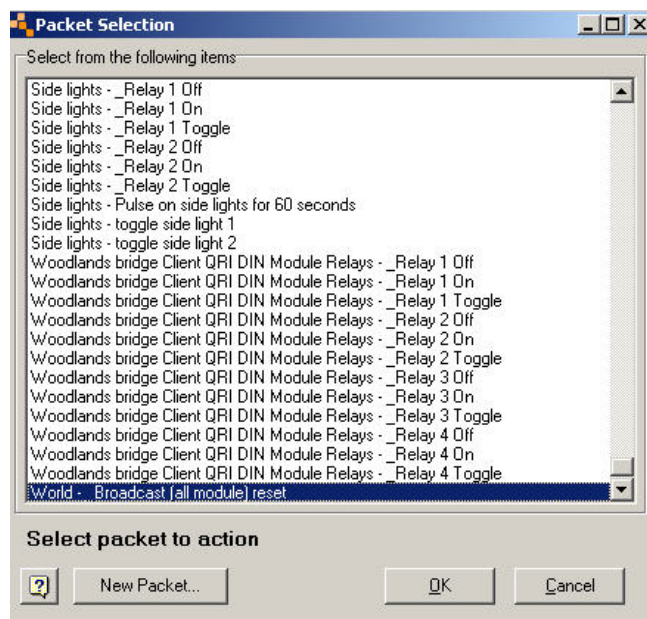
The principle of operation is that we will create a Reflex in the LTH module which is triggered by its temperature associated timer (i.e when the timer counts down to 0). The Reflex consists of a network bound packet of broadcast type containing a reset command (in other words will tell all module to reset), followed by a self addressed packet to reset the LTH module itself. Now on an LTH module the timer by default is not enabled and neither is the execution of User Defined Responses (user Reflexes). So we will set up a Macro in Cortex which will first prime the timer with a countdown value (watchdog period) and then enable the timer and its ability to trigger a Reflex. This macro will be executed by Cortex after initialisation is complete. This is achieved via a connection from the relevant world object to the macro. In the scheduler we will set up an item to regularly transmit timer refresh – typically 3 times per watchdog period (to ensure that any delays do not cause nuisance watchdog triggering)

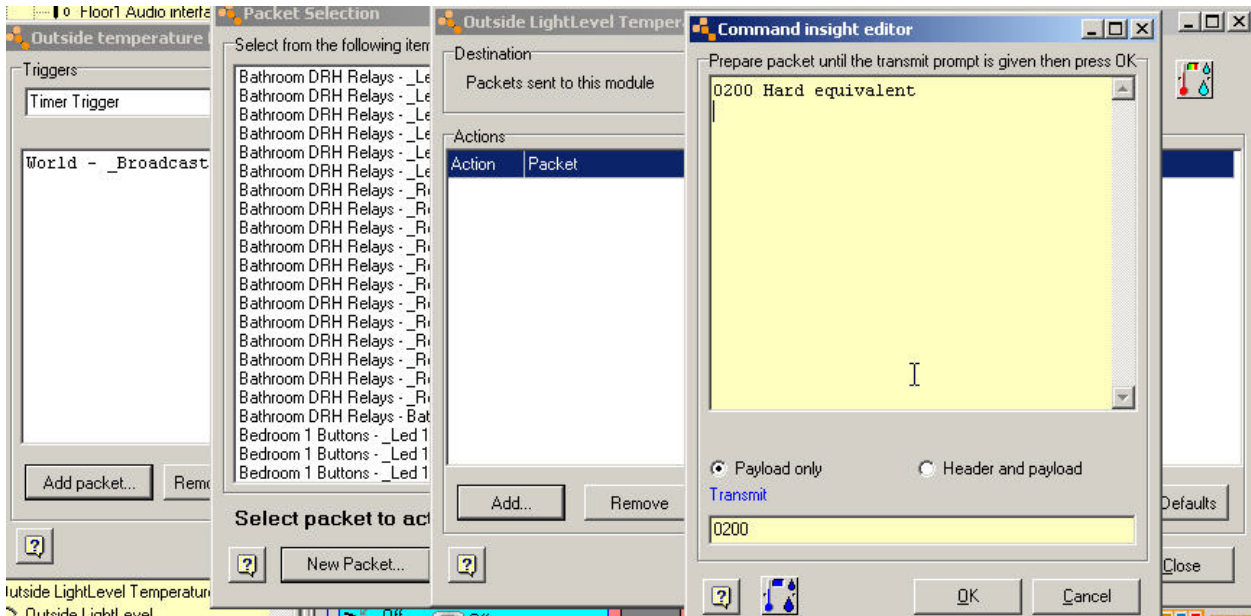Reflex Programming:

Ensure network is stopped first.

Right click on the LTH temperature sub object and then click on Reflex.. to get to the Reflex programming menu for that object:

Now click on the Vector Setup button and navigate to the Timer Trigger menu. From there the objective is to add the two Reflex packets. The first packet to add should already exist in the Cortex generated list of Reflex packets. Click on Add Packet... and then in the selection list you should find the World – Broadcast (all module) reset packet towards the bottom.
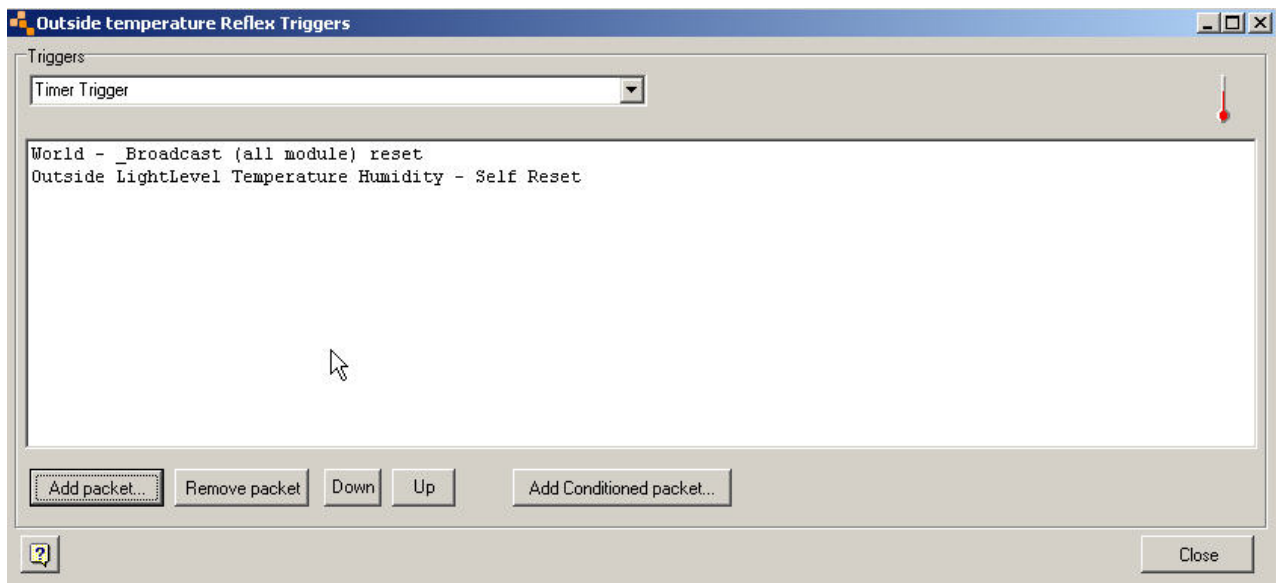
Add this packet. Next you will need to add the LTH self reset packet. It is unlikely that this will already exist so you will have to create it. Click on Add Packet ... and this time in the packet selection menu click on New Packet..

In the next menu first select the Destination to be the LTH module (using the selection drop down list). Next click on Add which will bring up the packet editor. Since this packet is to be self addressed choose Payload only, then in the editing line enter 0200 followed by <Transmit> or hit Enter. Give this packet a name such as 'Self Reset'. Cortex will append this to the module name when it creates the full packet selection name.

Close the windows until you are back to the Timer trigger menu and click on Add packet.. This will bring up the Packet selection list again and this time you should be able to find the LTH self reset packet – remember it will start with the name of the LTH module. Add this packet as illustrated below.

Close the Timer trigger menu and the general Temperature Reflex menu. Now right click on the parent LTH object and click on Reflex .. Then click on Program this node. Wait until programming complete message comes up. This completes the module Reflex programming.

Cortex Programming:

Create a new Macro object. In the Macro you will need to Append two 'Transmit network packet' items.

Click on Append and select Transmit network packet
The packet content of the first entry (to be last in Macro) should be of the form:

FA90xxyy440012071028
where xxyy should be the ID of your LTH module (see parent object properties menu).

This packet enables the timer and the ability to execute user Reflexes

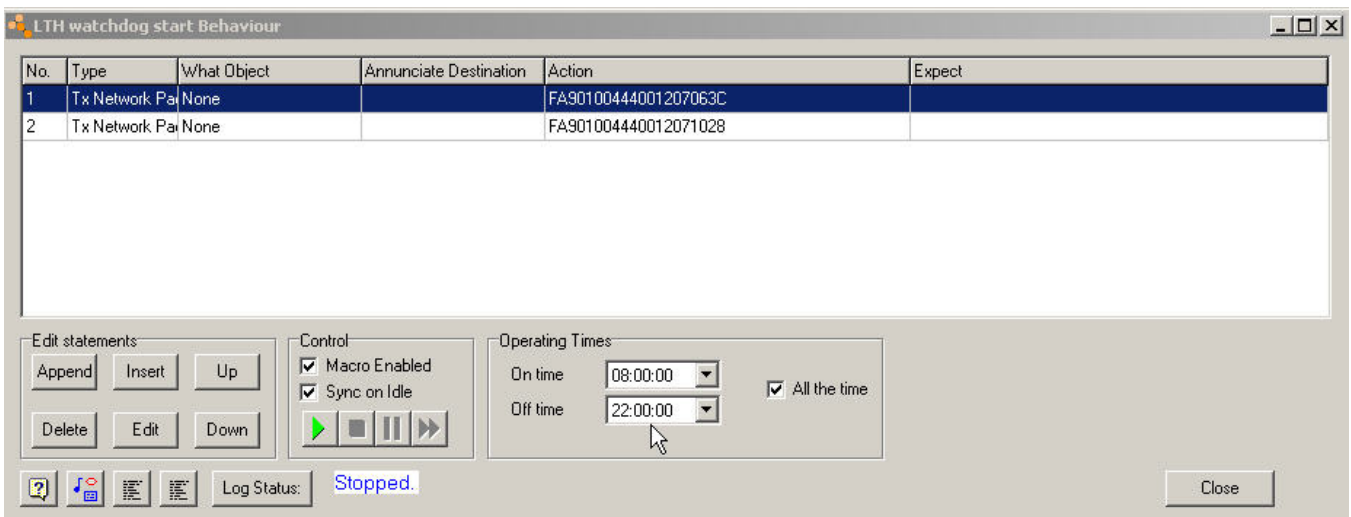Click on Append and select Transmit network packet
The packet content for this entry should be of the form:

FA90xxyy44001207063C
where xxyy should be the ID of your LTH module (see parent object properties menu).

This packet primes the timer. The value at the end of the packet is the period, expressed as a hexadecimal value. If the top bit of this byte is set then the lower 7 bits are interpreted as minutes. If the top bit is not set then interpreted as seconds. So for example 04 = 4 seconds, 84 = 4 minutes. There is some overlap but it is better to use seconds in the case of 1-2 minute timings. In the above example 3C is decimal 60 meaning the watchdog period is 60 seconds (1 minute, but don't use 81 instead). The macro should now look like below. It is not a good idea to use too short a watchdog period as this will need more regular refreshing (= more network traffic) and may be more prone to nuisance tripping if there are any delays in Cortex. 60 seconds is probably a reasonable duration.

Note that in the example below the module ID was 1004. Make sure you use the ID relevant to your own module.

This macro must be started using the World object 'On Initialise Complete' connection. In other words such when Cortex starts up the network it will at the end of doing so prime the timer and enable its Reflex capability. Conversely when Cortex shuts down the network it will disable the timer Reflex function – this latter part is an automatic part of the Cortex shutdown process and does not need any manual programming.

Finally we need to create a Cortex scheduler item to refresh the watchdog timer at regular intervals whilst the network is running. This has to be done using a packet of the same form as the timer primer in the above macro.

Below is an example of such an entry with a refresh period of 20s. Ensure the packet uses your particular LTH module ID.

Event Scheduler Item Edit ☒

What to do ?
○ Nothing   ○ Send Message   ○ Trigger Object   ⦿ Send Network Packet

Event Name
Give the Event a meaningfull name   `LTH wdog refresh`

Destination
Where `All` ▾

Date
On what day is the event to happen   `On Specific day(s) in the week` ▾   Day(s) of the week `Everyday` ▾

Timing

Event Start Time
Start `00:00:00`   `Now`

Repeat
☑

Event Repetition
Duration `23:59:59`   or End Time `23:59:59`   Repetition Rate `00:00:20`

Display Message Duration
Duration `01:00:00`   or End Time `01:00:00`   Days `0` ⬍ ⬆

Optional Display Message Appointment Date and Time
Time `17:46:16`

Action
Packet to be sent   `FA90100444001207063C`

`Test Event`   Scheduler Value `1` ⬍

Condition
Condition for the event to occur   `None` ▾

⁇   `Close`

Having completed the above programming you may proceed to test the process. Run the network as normal then either hit the network pause button and wait for >1 minute to see if the network modules are reset (this will be evident in log window) or alternatively unplug the USB cable from the PCU and again wait for > 1 minute.