

## Introduction - Schedules

A RAPIX *Schedule* is an action performed on a pre-defined day, at a pre-defined time. RAPIX devices support a variety of options for the day, time and action.

Typical uses for schedules include:

- Ensuring lights are on at a certain time of the day when an area needs to be used.
- Ensuring lights are off at a certain time of the day when an area will not be used.
- Setting lighting colour according to the time of day.
- Changing the behaviour of motion sensors or buttons according to the time of day.

Schedules can also be disabled temporarily using various means if required.

This Application Note describes the different types of schedules and the available options.

Examples and screen pictures in this Application Note use the RAPIX Integrator software. The RAPIX Addressing software can also create eHub schedules but cannot create Zone Controller schedules.

## Devices that can run Schedules

### ***eHub***

eHub schedules are stored within an eHub and are run by the eHub. They are intended for use with small sites that do not have a RAPIX Zone Controller.

It is possible to have several eHubs on the same line, each storing different schedules. This can increase the number of schedules available on a DALI line.

### ***Zone Controller***

Zone Controller schedules are stored within the Zone Controllers and are run by the Zone Controllers. They have more options available for day and time rules and are recommended for larger sites.

### Comparison

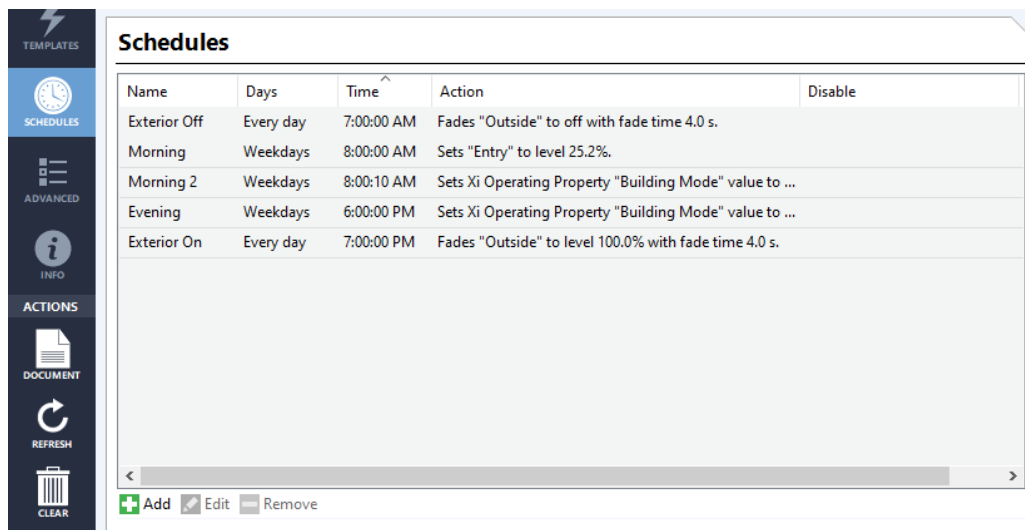
The differences between the eHub and Zone Controller schedules are shown in the table below:

	eHub Schedules	Zone Controller Schedules
Maximum number of schedules	8 per eHub	No Limit
<b>Site Size</b>		
Small? (single DALI Line, no Zone Controller)	Yes	No
Medium? (a few DALI Lines, one Zone Controller)	Yes	Yes
Large? (multiple Zone Controllers)	Not recommended	Yes
<b>Schedule Days</b>		
Any combination of days of week?	Yes	Yes
Day of month?	No	Yes
Same day every year?	No	Yes
Once only?	No	Yes
Repeat cycle?	No	Yes
Range of days?	No	Yes
<b>Schedule Time</b>		
Adjusts for daylight saving?	Yes	Yes
Fixed time?	Yes	Yes
Sunrise/sunset plus offset?	No	Yes
<b>Schedule Actions</b>		
Number of events per schedule	1	No limit
Set Zone level?	Yes	Yes
Set Zone colour?	Yes (using colour scenes)	Yes
Set Scene?	Yes	Yes
Set Xi Operating Property?	Yes	Yes
Set Xi Flag?	Yes	Yes
Complex/custom actions?	Yes (using templates)	No
Optional catch-up on power-up?	Yes	Yes
Optional catch-up when re-enabled?	(single option)	Yes
<b>Schedule Disable Rules</b>		
Zone level?	No	Yes
Xi Scene state?	No	Yes
Xi Operating Property?	No	Yes
Xi Flag?	Yes	Yes
Manual (permanent)?	No	Yes

## Creating A Schedule

### eHub

eHub schedules are created using the eHub editor, and require eHub firmware version 3.0 or later. The schedule tab of the eHub editor shows a list of the schedules in the eHub:

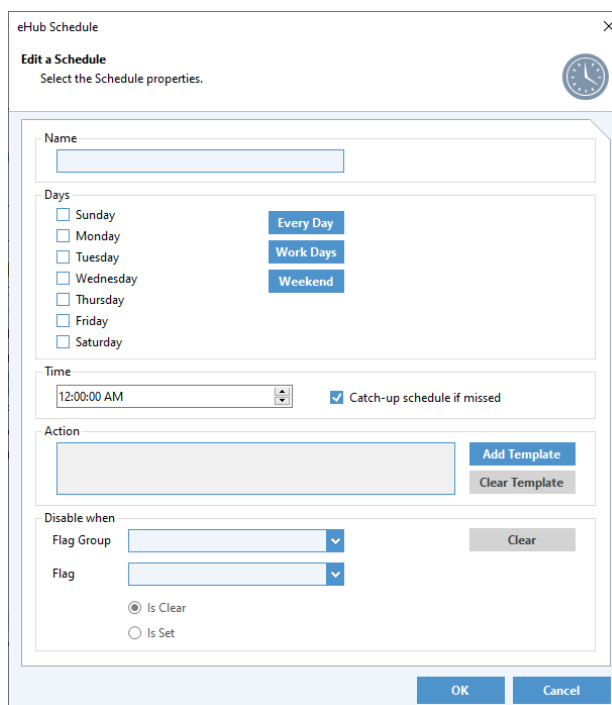


Name	Days	Time	Action	Disable
Exterior Off	Every day	7:00:00 AM	Fades "Outside" to off with fade time 4.0 s.	
Morning	Weekdays	8:00:00 AM	Sets "Entry" to level 25.2%.	
Morning 2	Weekdays	8:00:10 AM	Sets Xi Operating Property "Building Mode" value to ...	
Evening	Weekdays	6:00:00 PM	Sets Xi Operating Property "Building Mode" value to ...	
Exterior On	Every day	7:00:00 PM	Fades "Outside" to level 100.0% with fade time 4.0 s.	

At the bottom of the table are buttons: + Add, Edit, Remove.

*The eHub Schedules list*

To add a schedule, click on the **Add** button. The schedule details can then be edited:



**eHub Schedule**

**Edit a Schedule**  
Select the Schedule properties.

Name:

Days: ☐ Sunday ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

Time:  ☒ Catch-up schedule if missed

Action:

Disable when:

Flag Group:

Flag:

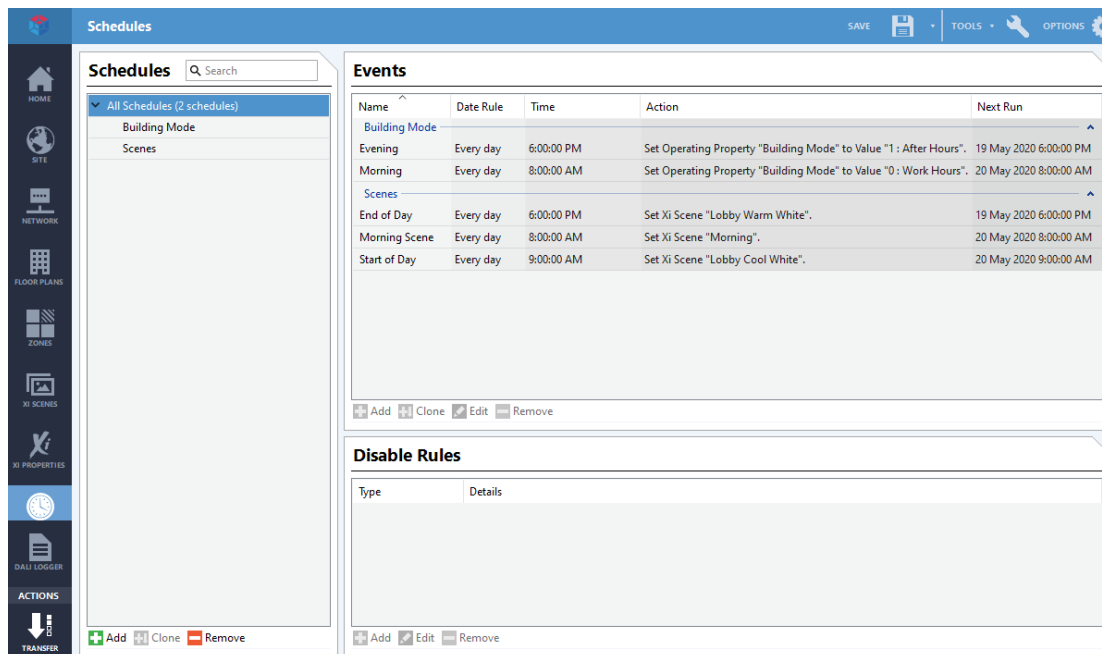
☒ Is Clear ☐ Is Set

*The eHub Schedule form*

The action for an eHub schedule is performed with a template. Click on the **Add Template** button to select the template to use, then edit the template properties as required.

## Zone Controller

Zone Controller schedules are managed using the schedules tab:

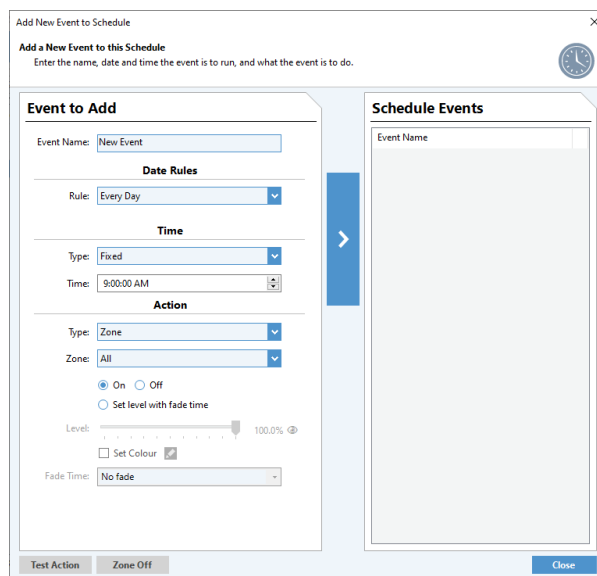


*The Schedules tab*

A Zone Controller schedule can have multiple events. Related events can be grouped together for convenience.

To add a new schedule:

1. Click on the schedule **Add** button (at the bottom of the schedule list)
2. Enter a name for the schedule
3. Click the Event **Add** button to add a new event



*The New Schedule Event form*

4. Enter a name for the event
5. Select the day(s) for the event
6. Select the time for the event
7. Select the action for the event
8. Click on the blue > button to add the event to the schedule
9. Repeat steps 4 to 8 as required
10. Click on **Close** when complete

## Schedule Disabling

Schedules can be disabled through a variety of means (see comparison table for which are supported):

- Zone level;
- Xi Scene state;
- Xi Operating Property value;
- Xi Flag state.

Typical uses for disabling schedules include:

- Public holidays, or other changes to the normal routine;
- Preventing lighting changes during events, functions or performances.

The disable rules are created in the respective editors.

The schedule disable condition can be set by:

- A button press; or
- A sensor event (for example, motion in an area, or a light level changing); or
- A scheduled event (a schedule can disable a set of other schedules for a period of time, usually many days).

Zone Controller schedules can have multiple disable rules. The schedule will be disabled if any of the disable rule conditions are set.

## Schedule Execution

### ***eHub Schedules***

When a schedule event is due, the eHub checks to see whether it has been disabled, and if not, executes the schedule action.

On start-up, the eHub executes any schedules with the "catch-up" option selected if they were due earlier in the day. This is used to handle power failures. At the end of the schedule catch-up process, the RAPIX system should be in the state it would normally be in at that time of the day.

A similar process is applied when a schedule with catch-up is enabled. If a schedule was skipped earlier in the day due to being disabled, it will be executed when it gets re-enabled.

If the eHub is performing catch-up for more than one schedule, they will be executed in the order they are listed in the eHub.

### ***Zone Controller Schedules***

The Zone Controllers arbitrate to agree on a "Master" which is responsible for running the scheduler.

If the networking infrastructure fails and Zone Controllers cannot communicate with each other, each Zone Controller will become a local Master and will run the schedules.

When a schedule event is due, the Zone Controller checks to see whether it has been disabled, and if not, executes the schedule action.

A schedule event that occurs around the time of a daylight-saving change will always be executed exactly once.

On start-up, the Zone Controller executes any schedules with the "Catch-up on Power-up" option selected. This is used to handle power failures. At the end of the schedule catch-up process, the RAPIX system should be in the state it would normally be in at that time of the day.

When a schedule changes from disabled to enabled, the Zone Controller executes any schedules with the "Catch-up when Enabled" option selected. This is used to bring the system back to the normal state after schedules have been overridden (disabled) for some purpose.

The Zone Controller schedule catch-up process works as follows. Within each schedule that needs to be caught-up, the Zone Controller finds the most recent event (if any) within the last 24 hours. All the catch-up events (one for each schedule) are then executed in order of the time when they were due.

## **Time Synchronisation**

Schedules require an accurate time source for reliable operation.

### ***Network Time and Internet Time Services***

Zone Controllers and eHubs can be configured to use Network Time Protocol (NTP) to get the precise time. For both products:

- an ethernet connection is required to receive time from an NTP source; and
- the local time zone and NTP source (IP address) need to be selected.

On most corporate IT networks, the NTP server address can be entered as a local Windows or Linux server. For example, by default a Windows Server computer can supply time updates to a Zone Controller or eHub using NTP.

The eHub also supports reception of broadcast time updates over Ethernet (Broadcast NTP). This is not commonly used and is only suitable for small or medium size local networks. Most office networks would be satisfactory. Ozuno has an NTP broadcast program available that can run on any Windows PC or Windows Server. This program is a free download from the Ozuno web site.

### ***RAPIX Xi Time communicated over DALI***

An eHub can receive time updates over DALI using RAPIX Xi time commands.

RAPIX Xi DALI time is transmitted by:

- Zone Controllers, if they have NTP synchronisation; or
- eHubs, if they have NTP synchronisation.

If multiple Zone Controllers and eHubs are all on the same DALI line and all have NTP synchronisation, then some selection and priority rules are used:

- All devices (Zone Controllers and eHubs) will select between themselves to elect a master, and only that master will transmit time updates over DALI.
- In the event the time master fails, a new time master will be automatically elected.
- If a Zone Controller and eHub are on the same DALI line and both have an NTP connection, the eHub will always defer to the Zone Controller and accept time updates from it instead of using the NTP time source. If the Zone Controller is removed, the eHub will switch to using its NTP time source.

**If several eHubs are on the same DALI line, only one of them needs to be connected to ethernet and configured for NTP. The other eHubs will receive time updates from the eHub that has the NTP connection.**

### ***Time Synchronisation Guide for eHub***

The Ehub can obtain time from:

- Ethernet: set the eHub to use an NTP server; or
- Ethernet: set the eHub to use NTP broadcast and run an NTP broadcast program on a server; or
- DALI: available from a Zone Controller; or
- DALI: available from another eHub (which uses Ethernet)

The DALI line must have at least one device that uses Ethernet to obtain time.

If using NTP:

- Set the NTP server IP address to the address of an IT system server at the site; OR
- Look up the NTP server IP address used by the customer internet provider and use that; OR
- Install an NTP broadcast program on an IT server and set the eHub to use broadcast NTP.

If a device on the DALI line (an eHub or a Zone Controller) already has an ethernet connection and is set up to use NTP:

- Set other eHubs to accept time updates over DALI.

## Change History

Rev	Date	Updated By	Comment
1	2 Jun 2020	DS	First Release
2	12 June 2020	AQ	Clarification about time sources for eHub.
3	25 Aug 2020	DS	Added details of Zone Controller schedule catch-up
4	26 Aug 2020	DS	More details of schedule catch-up process.

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