GoFlex HEMS

HEMS parameter configuration to maintain flexibility offering and implementation

Document	Parameter configuration to maintain flexibility offering and implementation
Version	2.0
Type	project documentation - GoFlex
Date	5.4.2019

Version history

Version	Date	Comment
/	Before 27.2.2019	Unversioned, first proposal, from/to/max FO length/cyc/cyc dur/cyc fin dl
v1	4.3.2019	Document header, footer and title given. Revision of proposal, according to skype meeting and wrap-up mail (27.2.19 Papageorgiou Ioannis), added parameter max no requsts/day
V2	5.4.2019	Added parameter Suspend time, device switch, example 4 (demonstrating cyclic device operation)

Configuration options

Each device, attached to HEMS, has the following configuration options:

From and **To** parameters define a period of a day, in which HEMS will offer that device. If parameter From is higher than To then HEMS will not offer that device between From and To but in any other times. See examples below.

Max duration of a flex offer parameter limits the length of a flex offer / demand schedule. Demand schedule cannot be longer than 225 minutes (15 time steps, one time step is 15 minutes long).

Max number of requests per day parameter limits maximum number of demand schedules per day. If a counter of yet accepted demandSchedules is equal to that setting, no more flex-offers is given for that device until next day – and consequently no demandSchedule for that device will be received/implemented. That parameter also enables/disables flex offering with setting the parameter value to 0.

Suspend time is minimum time after the demand schedule execution the device will not be offered. That parameter takes into account home appliances, for which it is not expected to be switched off for longer time (eg. fridge).

Device switch is used to support device switching on or off, on only or off only. If **on or off** selected, xEMS is allowed to offer device switching on or off. If **on only**, xEMS is allowed to offer only device switching on. If **off only**, xEMS is allowed to offer only device switching off.

Device operation cyclic parameter define a device as a cyclic device. Possible values are **yes** or **no**. If device is cyclic, than HEMS system will prevent switching it off during operation cycle. If cyclic, the next two parameters have to be specified further.

Cycle duration parameter specifies the time in minutes, required to finish that cycle, if device operation is defined as cyclic.

Cycle finish deadline parameter specifies the time of a day, the device cycle should be finished.

1. From: _____ [time of a day]
2. To: _____ [time of a day]
3. Max flex offer length: _____ [minutes]
4. Max number of requests per day: _____ [number]
5. Suspend time: _____ [minutes].
6. Device switch. Select option **a)** or **b)** or **c)** - radio button (one possible selection only):
    a) Offer switch ON or OFF: _____
    b) Offer switch OFF only: _____
    c) Offer switch ON only: _____
7. Device operation cyclic: _____ [Y/N]
    a. Cycle duration: _____ [minutes]
    b. Cycle finish deadline: _____ [time of a day]

Configuration examples

Example 1

Device will be offered between 10:00 and 15:00 every day for maximum length of 90 minutes a day. Since device is not cyclic, the 4a and 4b parameters are not required.

1. From: __10:00__ [time of a day]

2. To: __15:00__ [time of a day]
3. Max flex offer length: __90___ [minutes]
4. Max number of requests per day: __2___ [number]
5. Suspend time: __/__ [minutes].
6. Device switch. Select option **a)** or **b)** or **c)** - radio button (one possible selection only):
    a) Offer switch ON or OFF: _true___
    b) Offer switch OFF only: _____
    c) Offer switch ON only: _____
7. Device operation cyclic: ___N___ [Y/N]
    a. Cycle duration: _____ [minutes]
    b. Cycle finish deadline: _____ [time of a day]

00:00					09:45	**10:00**	10:15	10:30	...				...	**14:45**	15:00	15:15						23:45
		FLEX OFFER DISABLED							**FLEX OFFER ENABLED**								**FLEX OFFER DISABLED**					

Example 2

Device will be offered any other time, except between 10:00 and 15:00 every day for maximum length of 90 minutes a day. After execution of demand schedule finishes, there will pass at least 30 minutes, before new flex offer will be sent for the device. Since the device is not cyclic, the 4a and 4b parameters are not required.

1. From: __15:00__ [time of a day]
2. To: __10:00__ [time of a day]
3. Max flex offer length: __90___ [minutes]
4. Max number of requests per day: _____ [number]
5. Suspend time: __30_ [minutes].
6. Select option **a** or **b** or **c** - radio button (only one possible selection):
    a) Offer switch ON or OFF: _true___
    b) Offer switch OFF only: _____
    c) Offer switch ON only: _____
7. Device operation cyclic: ___N___ [Y/N]
    a. Cycle duration: _____ [minutes]
    b. Cycle finish deadline: _____ [time of a day]

00:00					09:45	**10:00**	10:15	10:30	...				...	**14:45**	15:00	15:15						23:45
		FLEX OFFER ENABLED							**FLEX OFFER DISABLED**								**FLEX OFFER ENABLED**					

Example 4

Cyclic device with program (cycle) duration of 2 hours (e.g. washing machine). User prepare laundry at 10:20 and require that the device finishes operation until 16:00.

1. From: __/__ [time of a day]
2. To: __/__ [time of a day]
3. Max flex offer length: __/___ [minutes]
4. Max number of requests per day: __/___ [number]
5. Time after demand schedule execution, the device must not been offered: __/__ [minutes].
6. Device switch. Select option **a)** or **b)** or **c)** - radio button (one possible selection only):
    a) Offer switch ON or OFF: _/___
    b) Offer switch OFF only: _____
    c) Offer switch ON only: _____

7. Device operation cyclic: ___Y___ [Y/N]
    a. Cycle duration: __120__ [minutes]
    b. Cycle finish deadline: _16:00_ [time of a day]

The following scenario is assumed:

1. User prepares the device for operation and starts the device at **10:20** (press play on washing machine).
2. User uses web user interface, allocate appropriate device and enters the cycle duration (120 minutes) and cycle finish deadline parameter as 16:00 and clicks the button **Start**.
3. Start button is a signal for xEMS that the device is prepared for operation. xEMS immediately switches off the device.
4. xEMS computes the default schedule start as:
    defaultScheduleStart = 10:30
    xEMS take the two parameters:
    cycle duration = 120 minutes
    cycle finish deadline = 16:00
    xEMS checks the truth of the following statement:
    defaultScheduleStart + 2 x cycle duration + 15 < cycle finish deadline

    If statement is **FALSE**, it doesn't offer the device, but switches it on and let it operate and finish the job. If **TRUE**, xEMS prepares flex offer, where the default schedule will start the device at the beginning of the next 15 min interval (that is 10:30) for the interval length of 120 minutes. Adaptation potential min represent the device operation between 10:30 and 12:30, adaptation potential max represent that the device will not operate. Following are the three options:
    a. FOA doesn't reply the *demand schedule*. xEMS implement default schedule for that device.
    b. FOA reply with *default schedule* accepted (adaptation potential min). xEMS implement default schedule for that device.
    c. FOA reply with *demand schedule* (adaptation potential max) – so it requests not to start the operation in next interval of 120 minutes.

    Option a) and b) means that the device will finish the job as default schedule. Option c) represent device operation shifting in time.

5. After 120 minutes - that is - at 12:30 item 4. repeats, with the following parameters:
    defaultScheduleStart = 12:45
    cycle duration = 120 minutes
    cycle finish deadline = 16:00

    Since the statement ***defaultScheduleStart + 2 x cycle duration + 15 < cycle finish deadline*** returns **FALSE**, xEMS switches on the device and let it finish the job.

00:00		09:45	**10:00**	10:15	10:30	…		12:30	…	**14:45**	15:00		16:00		23:45
				Start pressed, first offer send	Device switched on if FOA requests			Device switched on **in any case**					**Cycle finish deadline**		
					Statement = TRUE			Statement = FALSE							

Note: if the *cyclic finish deadline* is 18:00, then the statement returns **TRUE.** xEMS prepare new flex offer where the default schedule will start the device at the beginning of the next 15 min interval (that is 12:45) for the interval length of 120 minutes. Adaptation potential min represent the device operation between 12:45 and 14:45, adaptation potential max represent that the device will not operate between 12:45 and 14:45.