

**OCF “Fargo” – Update State Transition Diagram for Software Update with the "svv"
Property – Core Technology WG CR 2848**

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11.5.4 Software update Resource

The software update Resource is used to control software updates of the Device.

In ISO/IEC 30118-2:2018 there is already a manual triggered software update mechanism available. The triggering of the Client (manual) software update is achieved via the security Resource Type "oic.r.pstat" by using the appropriate bits in the "tm" Property. The software update triggering results in updates of the "cm" Property in the "oic.r.pstat" Resource Type (see ISO/IEC 30118-2:2018 clause 13.8). The software update Resource adds additional features to the security specified mechanism, like:

- Specify the source to obtain the software package.
- Time scheduled software update actions.
- Status information, especially more info about various error situations.

If the Device implements the software update Resource, it is required to implement the software update behaviour to actually update the software of the Device as indicated by the "oic.r.pstat" "cm" bits as defined in ISO/IEC 30118-2:2018 clause 13.8. Also the security defined software update process shall use the data that is set on the software update Resource like the "purl" Property.

The software update Resource Type is "oic.r.softwareupdate" and is described in Table 1.

Table 1 – Optional software update Resources

Example URI	Resource Type Title	Resource Type ID ("rt" value)	OCF Interfaces	Description	Related Functional Interaction
"/example/oic/swupd"	Software Update	"oic.r.softwareupdate"	"oic.if.rw", "oic.if.baseline"	The Resource exposes Properties to control and monitor the software update mechanism. The Properties exposed by Resource Type "oic.r.softwareupdate" are listed in Table 2.	Device management

Table 2 defines the Properties of the "oic.r.softwareupdate" Resource Type.

Table 2 – "oic.r.softwareupdate" Resource Type definition

Property title	Property name	Value type	Value rule	Unit	Access mode	Mandatory	Description
New version	"nv"	"string"	N/A	N/A	R	No	New available software version.
Package url	"purl"	"string"	URL	N/A	RW	Yes	Source of the software package, might be an HTTPS or a CoAPs URL.
Action	"swupdateaction"	"string"	enum (see Table 4)	N/A	RW	Yes	Scheduled action to do a software update.
State	"swupdatesate"	"string"	enum (see Table 3)	N/A	R	Yes	State of the software update.

Result	"swupdateresult"	"integer"	N/A	N/A	R	Yes	Result of the software update. List of error codes are as defined in Table 5.
Lastupdate	"lastupdate"	"string"	date-time	N/A	R	No	Time of the last software update according to IETF RFC 3339. Initial set on date of manufacturing.
Signage	"signed"	"string"	enum	N/A	R	No	Signage method of the software package, currently the only allowed value is "vendor".
Update time	"update time"	"string"	date-time	N/A	RW	Yes	Scheduled time, according to IETF RFC 3339, to do action which is specified in the "swupdateaction" Property.

The values of the "swupdatestate" Property are described in Table 3.

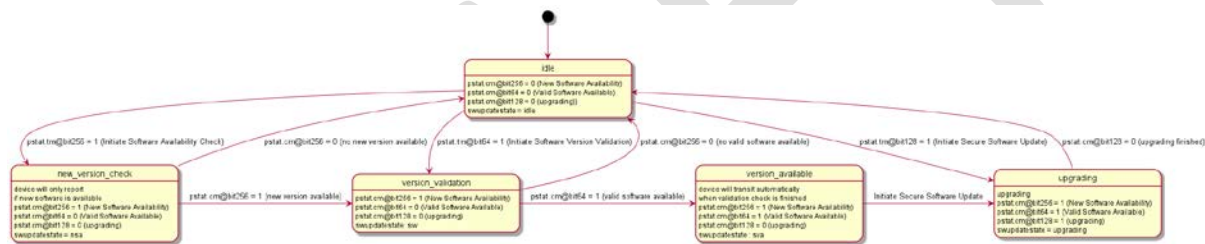
Table 3 State definitions and state transitions of software update Resource

Description	Value of Property "swupdatestate"	equivalent "cm" bit values in "pstat".	Transition allowed from state
Idle, waiting for updates	"idle"	Bit 64 = 0 Bit 128 = 0 Bit 256 = 0	"nsa", "svv", "sva", "upgrading"
New software available (after checking for new software being available on the url indicated by "purl"). This step does not download the new software	"nsa"	Bit 64 = 0 Bit 128 = 0 Bit 256 = 1	"idle", "svv", "sva", "upgrading"
Software version validation (during downloading and checking the software integrity)	"svv"	Bit 64 = 0 Bit 128 = 0 Bit 256 = 1	"idle", "nsa", "sva", "upgrading"
Software version available (The software is downloaded and deemed to be valid)	"sva"	Bit 64 = 1 Bit 128 = 0 Bit 256 = 1	"idle", "nsa", "svv", "upgrading"
Upgrading	"upgrading"	Bit 64 = 1 Bit 128 = 1 Bit 256 = 1	"idle", "nsa", "svv", "sva"

The typical state transitions are described by Figure 1. The state transitions can be triggered manually or by a timed action. The manual state triggers (i.e., "tm" Property of "oic.r.pstat") are described in ISO/IEC 30118-2:2018 clause 13.8. The timed state triggers are managed using the "swupdateaction" and "update time" Properties of the software update Resource to trigger software update actions at some future date and time. The action names for scheduled actions are listed in Table 4. When the "update time" for the timed action is in the past then the update shall not take place, it is implementation dependent if the UPDATE with an "update time" value in the past will give an error on the UPDATE operation.

Table 4 Value definitions for the Property "swupdateaction"

Description	Value of Property "swupdateaction", for scheduled update actions.	Action taken	Equivalent "pstat" "tm" bits.
Nothing scheduled (not applicable).	"idle"	No action	
Initiate software availability check.	"isac"	Check on remote end point if a newer software version is available.	"tm" bit 256.
Initiate software versionValidation.	"isvv"	Downloads and verifies if the software version is valid.	"tm" bit 64.
Initiate secure software update.	"upgrade"	Upgrades the software in the Device. It uses the downloaded and validated software package. If no validated software package is available on the Device, the Device takes the necessary steps to obtain a validated software package, by downloading and verifying the software from the external source.	"tm" bit 128.


Figure 1 – Typical state transitioning diagram for software update

The "purl" Property indicates the URL to obtain the software package from. This URL shall be a fully qualified URL. If the value is an empty string ("") then the Device will use the built in vendor defined URL (see security specification). If a built in URL is not implemented, setting the "purl" Property value to an empty string will result in an error code value of 6 as defined in Table 5.

Table 5 List of codes of the "swupdateresult" Property.

Description	code
Idle.	0
Success, everything went well.	1
Not enough RAM.	2
Not enough Flash.	3

Connection lost.	4
Software validation failure.	5
Invalid URL to receive the software package.	6
Unsupported protocol for download URL.	7
Firmware update failed.	8
Software transport error codes. HTTP result codes when accessing the URL to download the software package.	400-600

Figure 2 depicts a typical update scenario. This scenario is using the observability of "pstat", so that the Client is informed on the changes of the "cm" bit value to track the progress.

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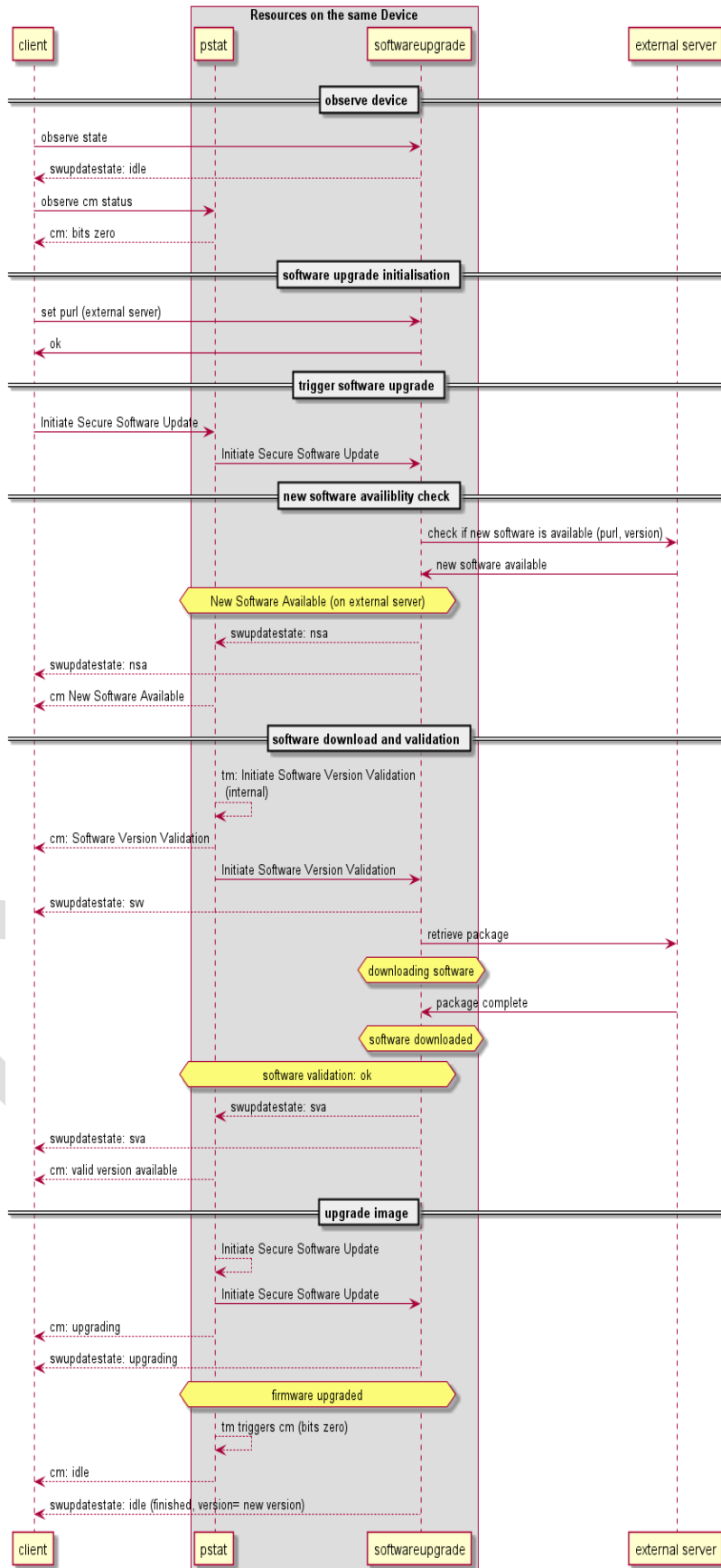


Figure 2 – Typical sequence for none scheduled upgrading software

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