

Self-describing, interoperable and configurable Things

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RWE Lemonbeat

Thread

Home Automation Application

RFC 6690

RFC 768, RFC 5346, RFC 4279,
RFC 4492

RFC 1058, RFC 2080

6LowPAN(IPv6)
RFC 4944, RFC 4861, RFC 4862,
RFC 6282, RFC 6775

IEEE 802.15.4 (2006)

Application layer

COAP & other

UDP + DTLS

Distance Vector Routing

IP

MAC
(including MAC security)

Physical Radio (PHY)

Lemonbeat

Generic IoT application layer

RFC 6690, RFC 7252, RFC 5905

RFC 768, RFC 5346, RFC 4279,
RFC 4492, RFC 793, RFC 5246

RFC 1058, RFC 2080

RFC 791, RFC 792, RFC 2460,
RFC 2461, RFC 2462, RFC 2463,
optional compression

RFC 5170, RFC 5342, Frequency
Agility, AES CCM, MTU up to 2kB

Sub GHz 2GFSK@100kb/s

Selfdescribing XML/EXI
encoded services,
Device description,
Value description,
Configurable distributed
state machines,
Actions,
Timers,
Calendar events,
Firmware update,
...

3 general types of services

- Informative self description
 - for semantic information and representation of information
- Configuration
 - for orchestration and interaction of multiple devices (based on distributed timed automata)
- Events
 - for interoperable device communication

Informative Services

- Device Information
 - Expandable list of device properties
 - Numbers
 - Strings
 - BLOBs

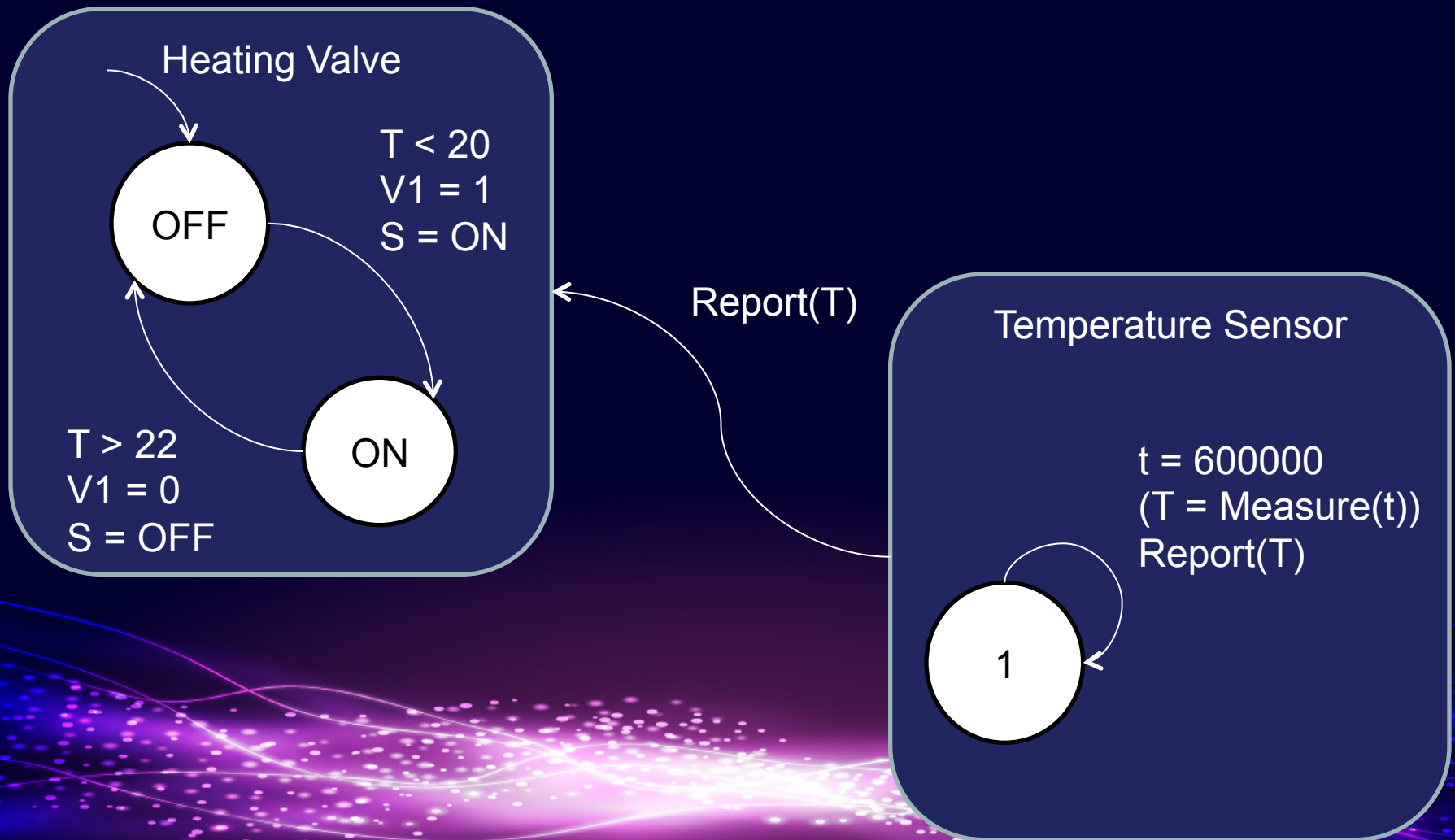
Informative Services

- Value Information
 - 3 Types of Values
 - Numbers
 - Range, stepsize
 - Strings
 - Length, Allowed strings
 - HEXBinary
 - Length
 - IDs, Type, Unit (in SI), Access (R/W)

Informative Services

- Status
 - Log level
 - Information
 - Debug
 - Status

Interoperable devices



Event Service

- Value
 - Numbers
 - Strings
 - BLOBS
 - Optimized for size
 - Timestamped
 - Virtual values

Configuration Services

- Partners
 - URI encoded information of other Things
- Actions
 - Timers
 - Send report
 - Send “set value”
 - Request report

Configuration Services

- Calculations
 - Left hand side, right hand side
 - Comparisons ($>$, $<$, $>=$, $<=$, $==$)
 - Computations ($+$, $-$, $*$, $/$, $\%$)
- Statemachines
 - Multiple statemachines possible
 - Conditional transactions

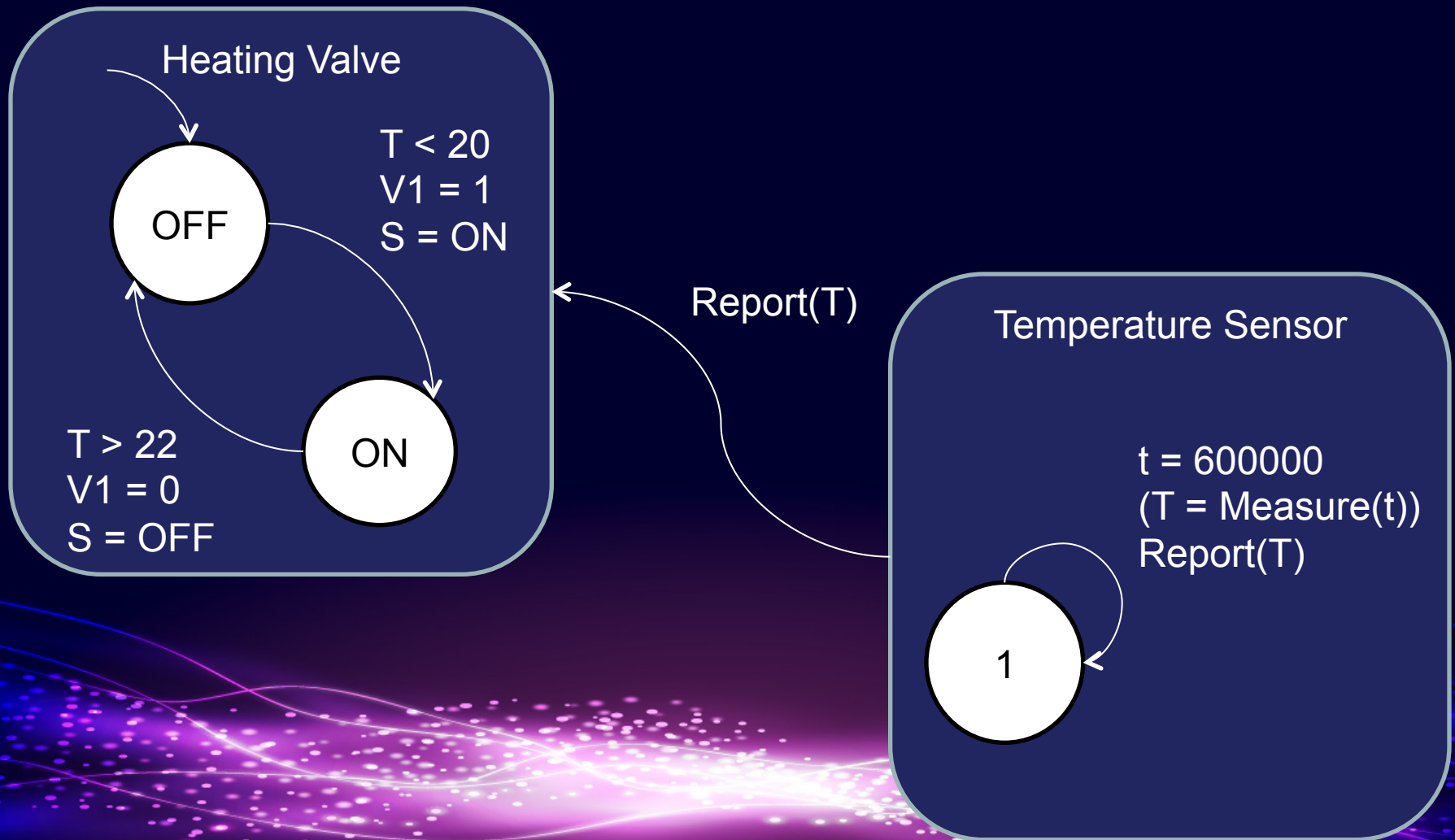
Configuration Services

- Timers
 - In ms
 - Execute actions
- Calendar
 - Execute actions at given local time
 - Time zone offset

Configuration Services

- Configuration
 - Transaction based
 - Rollback
 - Rollback to factory default

Interoperable devices



Discovery

- RFC 6690

Request URI path: /.well-known/core

Request method: GET

Response: 2.05 Content

</a/>;if="DD";ct=47,

;if="NM";ct=47,

</c/>;if="VD";ct=47,

</d/>;if="V";ct=47

Questions?

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