INTRODUCTION **SEMP** FOR SMA SMART HOME
SIMPLE ENERGY MANAGEMENT PROTOCOL

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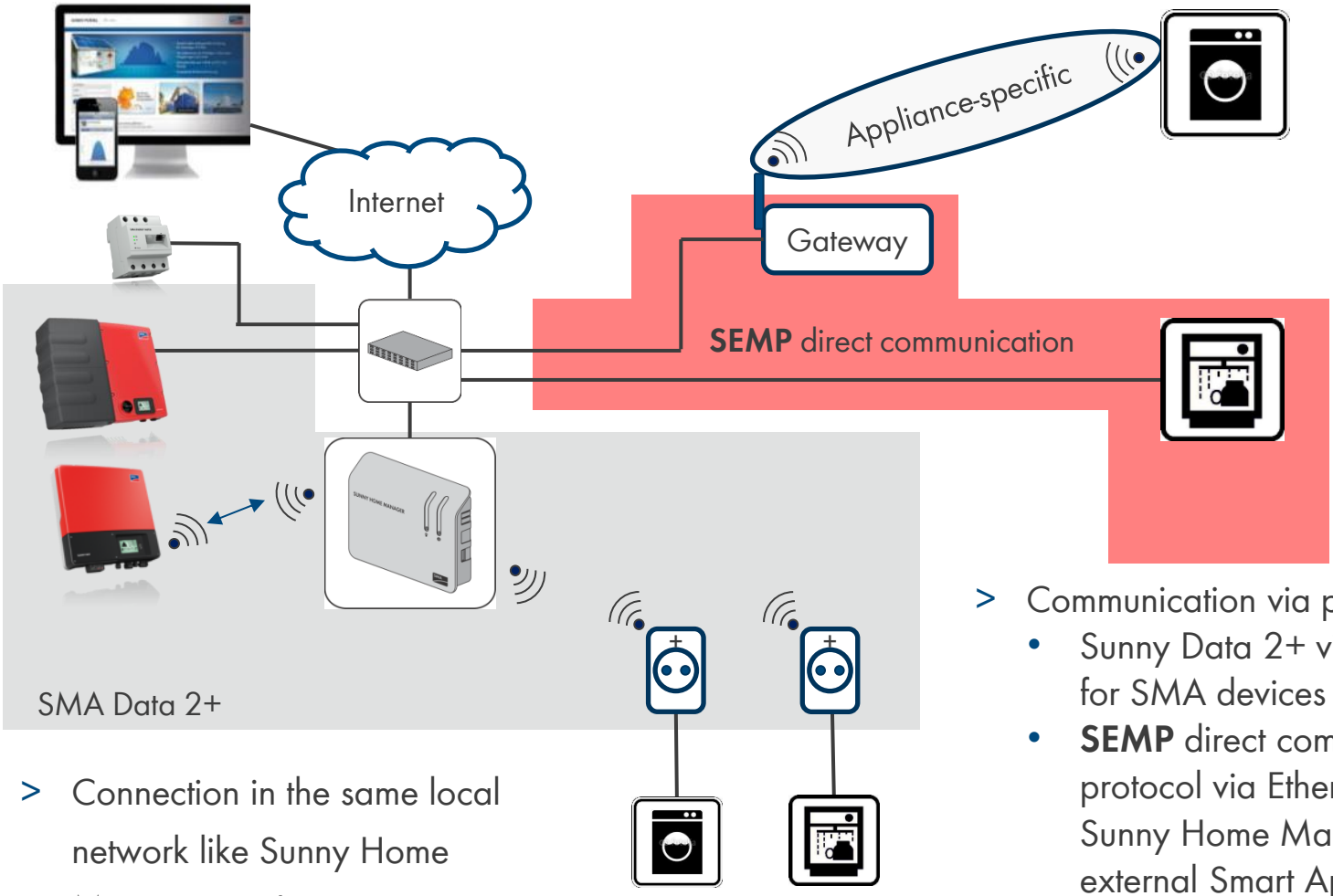
SMA SMART HOME
CONTROL OF SMART APPLIANCES VIA SEMP

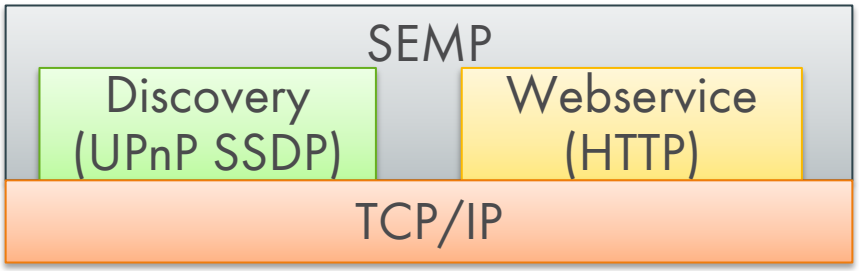


> Connection in the same local network like Sunny Home Manager via Internet router or switch

> Communication via protocols:
- Sunny Data 2+ via BT and Ethernet for SMA devices
- **SEMP** direct communcation protocol via Ethernet between Sunny Home Manager and external Smart Appliances
- Appliance-specific protocol between gateway and appliance

SEMP ARCHITECTURE

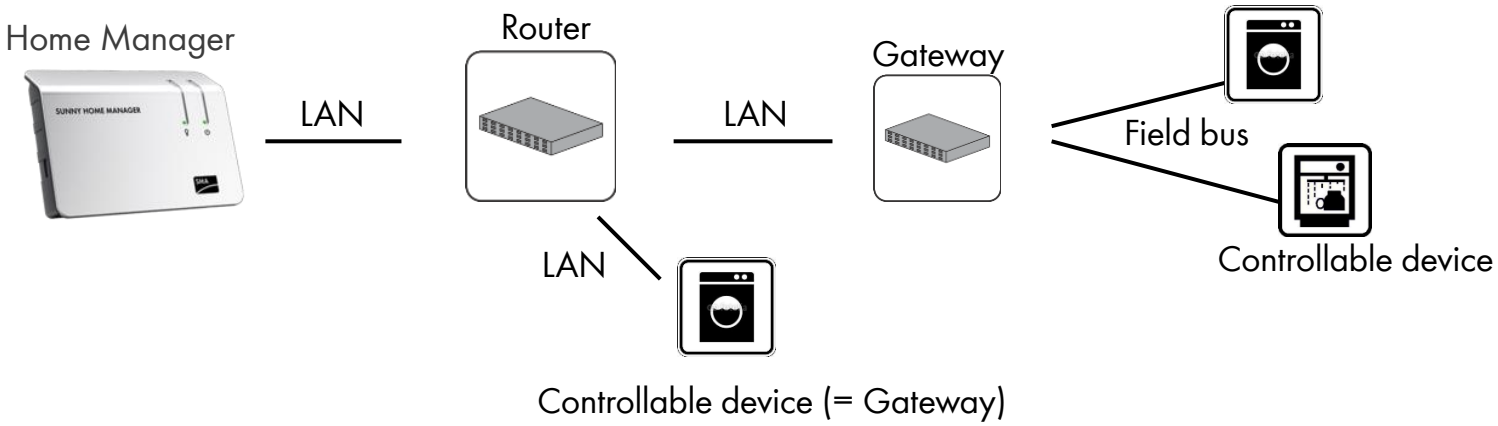
SEMP consists of two components:



> **Discovery mechanism**
  > Discovery of controllable SEMP devices
  > Based on von SSDP (Simple Service Discovery Protocol)

> **Web service**
  > Exchange of device information, status and operation planning information
  > Simple (similar to REST) interface, based on HTTP

SEMP DEVICE TOPOLOGY



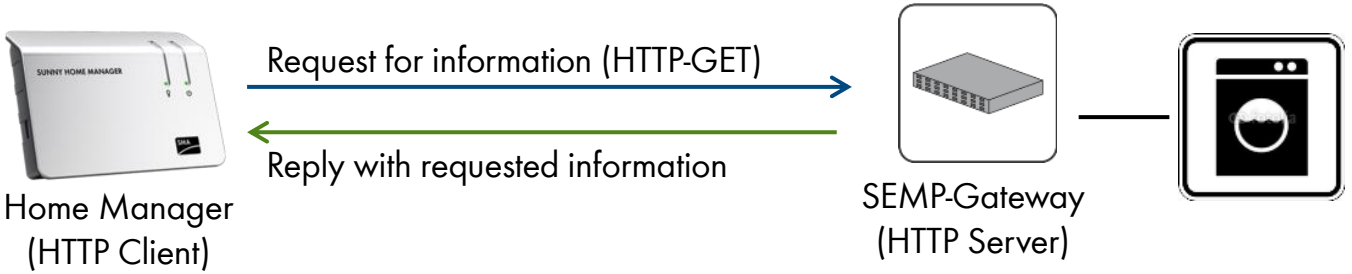
> Sunny Home Manager often does not interface directly with a controllable device but with a gateway

> If direct communication is possible, the device itself acts as a gateway

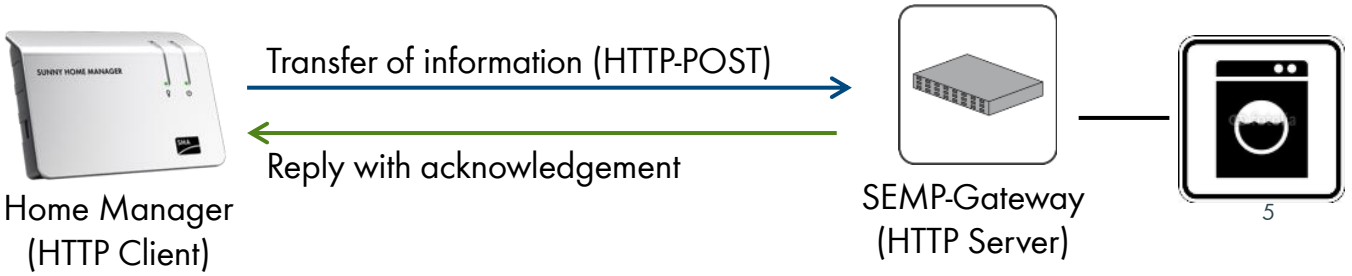
> A device may consist of several sub devices

SEMP COMMUNICATION

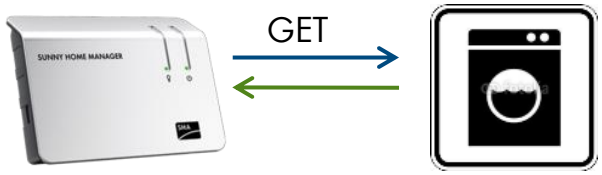
> Get device information, status and operation planning information (once per minute):



> Sending of control commands (on request):

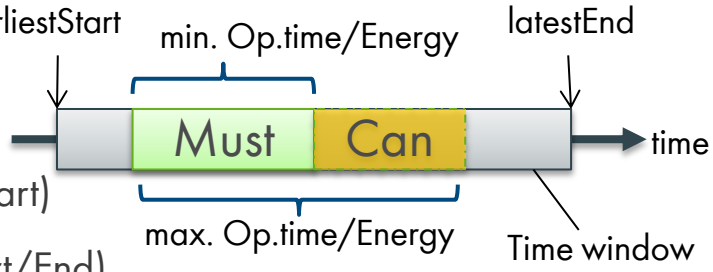


SEMP DATA STRUCTURE



Information request (Gateway → Home Manager)

> Static device information (DeviceInfo)
  > General information (Typ label): Device-ID, Device name, Manufacturer, ...
  > Static operation Planning info: min./max. power consumption, operation interruptable (y/n), ...
  > Properties: Operation interruptable (y/n), uses absolute or relative timestamp, ...
> Dynamic device information (DeviceStatus)
  > Status: State (ON/OFF), accepts recommendations from Home Manager? (yes(no)
  > Current power consumption
  > Current sensor data (i.e. temperature, ...)
> Operation planning information (PlanningRequest)

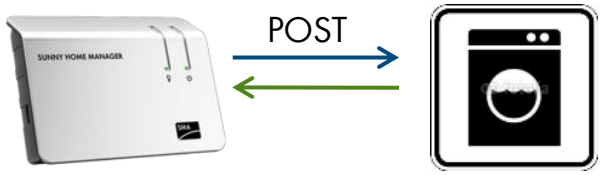


Time window: - Earliest operation start time (earliestStart)
- Latest start/completion time (latestStart/End)

Alternatively: - Operation time: min. operation time (Must), max. operation time (optional)
- Required energy: min. Energy (Must), max. Energy (optional)

SEMP DATA STRUCTURE

Transfer of Information (Home Manager → Gateway)

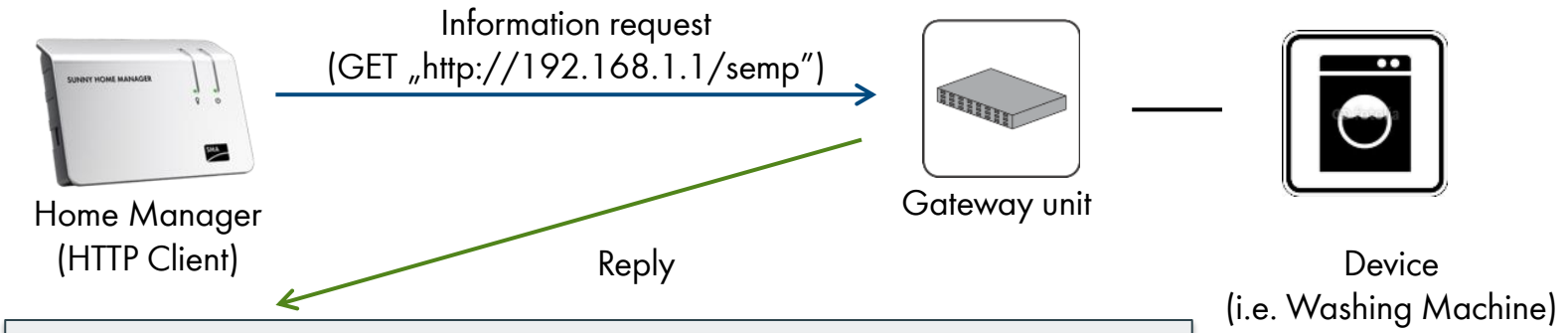


> Recommendation for operation (DeviceControl)
  > ON/OFF switch recommendation
  > Recommended power consumption level

> To avoid collisions with other device operation plans, devices should follow the operation recommendations
> Device must ensure a safe and correct operation and may ignore operation recommendations, if conflicts exist

SEMP COMMUNICATION DETAILS

> Get device information, status and operation planning information (once per minute):




```
Device2EM:
  DeviceInfo:
    Identification:
        DeviceId:1234-12345678-12-12
        DeviceName: yyyyyyyyyy
        DeviceVendor: xxxxxxxxx
    Characteristics:
         MaxPowerConsumption:1500
    Capabilities:
        CurrentPower/Method: Measurement
        Timestamps/AbsoluteTimestamps: false
        Interruptions/InterruptionsAllowed: true
```

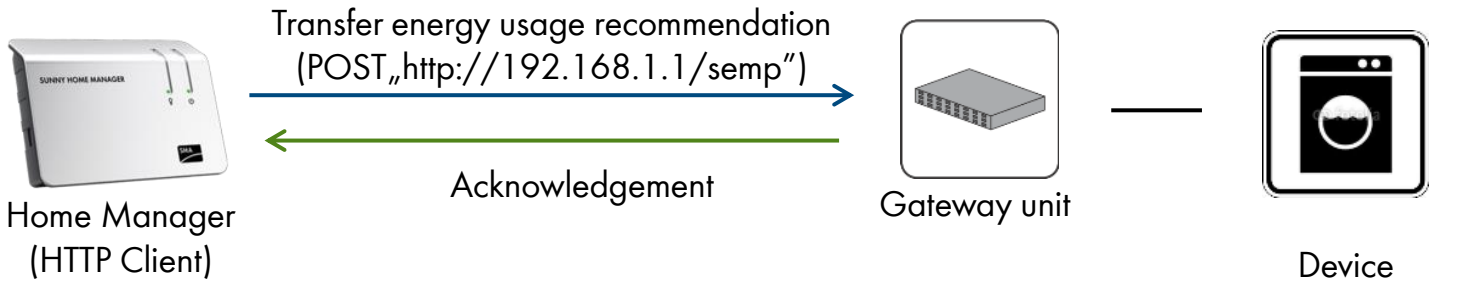
SEMP COMMUNICATION DETAILS

- Continuation -

DeviceStatus:
  DeviceId: 1234-12345678-12-12
  EMSignalsAccepted: true
  Status: Off
  PowerConsumption/PowerInfo:
    AveragePower: 0 (Watt)
    Timestamp: 0 (point of power measurement)
    AveragingInterval: 60 (seconds)
PlanningRequest:
  Timeframe:
    TimeframeId: 1
    DeviceId: 1234-12345678-12-12
    EarliestStart: 18000 (earliest in 5h)
    LatestEnd: 25200 (latest in 7h)
    MinRunningTime: 3600 (MUST: 1h)
    MaxRunningTime: 3600 (no optional operation)

SEMP COMMUNICATION DETAILS

> Transfer of an energy usage recommendation signal (DeviceControl)



EM2Device:
DeviceControl:
DeviceId: 1234-12345678-12-12
On: true (Start recommendation)
Timestamp: 0 (Creation Timestamp)