Introduction to

IPSO Smart Objects

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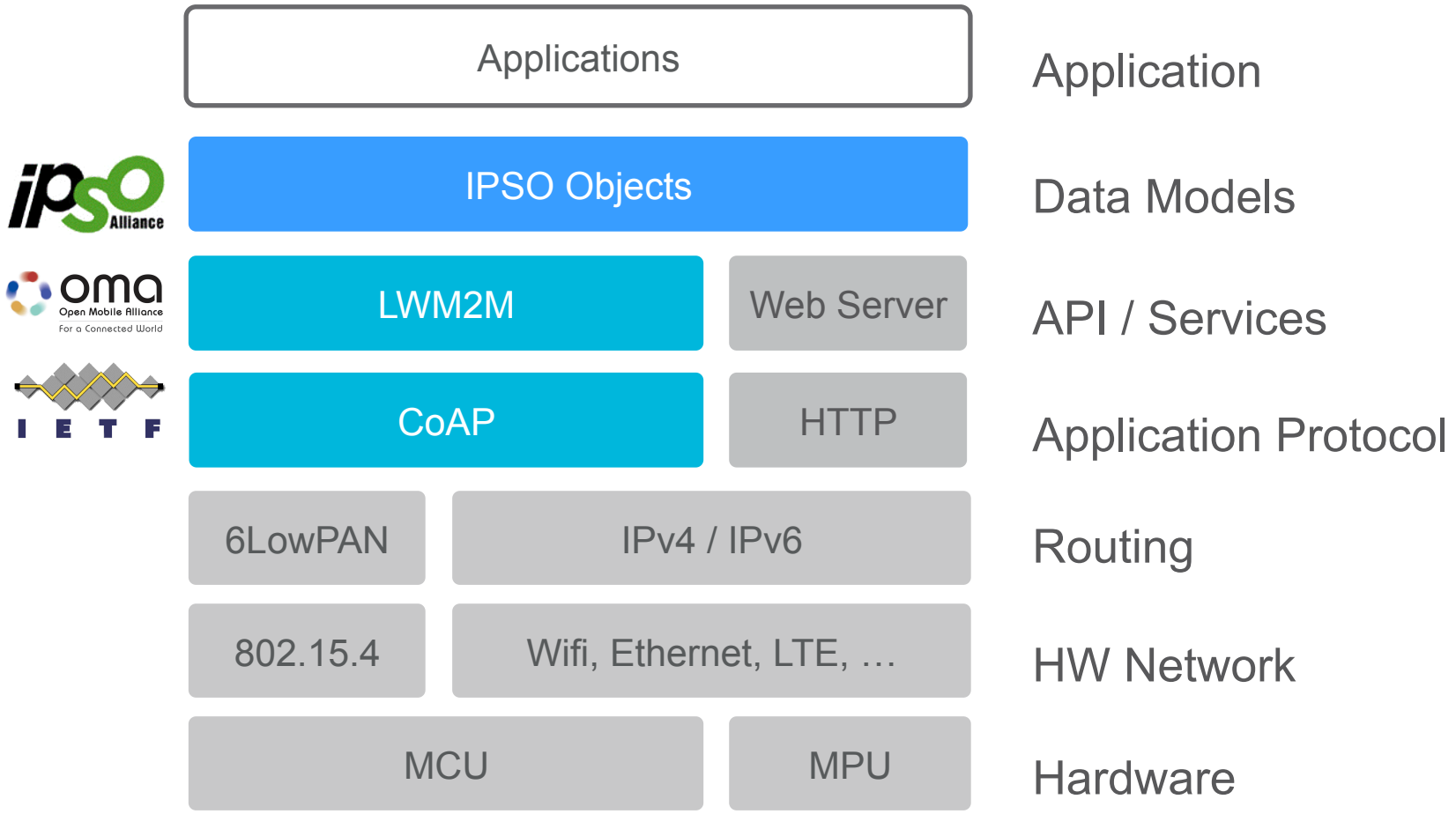
Problems to solve in IoT

- **Interoperability**
  - Software's interaction with physical resources.
  - Device independence from software management and vendors.
  - Discovery, Management, Reporting, Security, Authorization.
- Scalability
  - Billions of devices, users, connections…
  - Billions of interactions.
- Reusability and modularity
  - Software, networks, protocols, data models.
  - In a vertical segment, across vendors.
  - Across diverse vertical segments.
- Permissionless Innovation
  - Enable anyone to participate and innovate.

IPSO Smart Objects

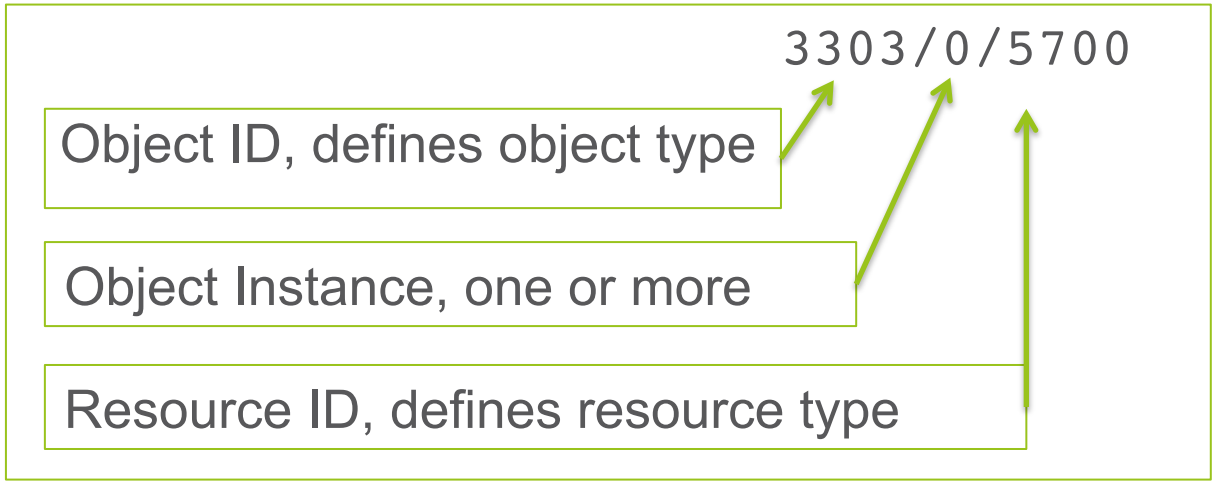
- Developed by IP for Smart Objects (IPSO) Alliance in the Smart Objects Working Group.
- Work exclusively on semantic Interoperability across IoT devices and applications.
- Based on LWM2M Object Model.
- Reusable Object IDs and Resource IDs.
- Transport Protocol Independent (CoAP, LWM2M, MQTT, HTTP…) if support addressing, content formats and data types.
- Encoding Independent (JSON, TLV, SenML…)
- Basic Objects represent simple sensors and actuators.
- Basic Starter Pack published on 2014 (Expansion Pack upcoming).
- Tested over CoAP and LWM2M during IPSO Interoperability test on May 2015 (ARM, Ericsson, Intel, SICS, Yanzi, TUT …) .

The Web in constrained devices



IPSO Smart Object Structure

- Reusable resource and object IDs
  - Common definitions for concepts
  - Map to semantic terms e.g. temperature, currentValue
  - IDs are registered with the OMNA
- Usable in different transport protocols that support
  - URI Addressing
    - (…/home/weather/3303/0/5700)
  - Data Types
  - Content Formats
  - RWX Operations



EXAMPLE: IPSO HUMIDITY SENSOR

Object	Object ID	Object URN	Multiple Instances?	Description
IPSO Humidity	3304	**urn:oma:lwm2m:ext:3304**	Yes	Relative humidity sensor, example units = %

Resource Name	Resource ID	Access Type	Multiple Instances?	Mandatory	Type	Range or Enumeration	Units	Descriptions
Sensor Value	5700	R	No	Mandatory	Float			Last or Current Measured Value from the Sensor
Units	5701	R	No	Optional	String			Measurement Units Definition e.g. “Cel” for Temperature in Celsius.
Min Measured Value	5601	R	No	Optional	Float	Same as Measured Value	Same as Measured Value	The minimum value measured by the sensor since power ON or reset
Max Measured Value	5602	R	No	Optional	Float	Same as Measured Value	Same as Measured Value	The maximum value measured by the sensor since power ON or reset
Min Range Value	5603	R	No	Optional	Float	Same as Measured Value	Same as Measured Value	The minimum value that can be measured by the sensor
Max Range Value	5604	R	No	Optional	Float	Same as Measured Value	Same as Measured Value	The maximum value that can be measured by the sensor
Reset Min and Max Measured Values	5605	E	No	Optional	Opaque			Reset the Min and Max Measured Values to Current Value

Roadmap

- ☐ UPnP harmonization – from SOAP to REST.
- ☐ BLE/ZigBee harmonization.
- ✔ Draft Smart Object Data Model Design Guide @done (15-03-30)
- ✔ Draft Smart Object Expansion Pack for Basic Objects @done (15-04-30)
- ✔ Set up test servers for IPSO objects (LWM2M + TLV payload) @done (15-06-15)
- ☐ Draft Domain Specific Objects reference designs @due (mid 2015)
- ☐ Publish Smart Object Data Model Design Guided @due(15-07-31)
- ☐ Publish Smart Object Expansion Pack for Basic objects @due(15-07-31)
- ☐ Publish Smart Object Expansion Pack for Composite Objects @due(15-07-31)
- ☐ Publish Smart Object Expansion Pack for Reference Devices @due(15-07-31)
- ☐ IETF 93 – Bits and Bites @due(15-09-1)

Next Steps

- Activities
  - Working with Smart Objects: Expansion Pack, Composite Objects, Linked Objects.
  - Collaboration with other IoT Interest Groups like UPnP, IIC, OIC.
  - Work on related Standards organizations: IETF CoRE - CoAP, OMA DM - LWM2M.
  - Prototyping and testing (IETF 93, Bits and Bites, 2nd IPSO Interop, …)
- Focus Area
  - IPSO Smart Objects are meant to be very generic.
  - Any vendor can use them for their specific area by creating their own Objects by reusing generic resources and add their own.
- Absolutely necessary for IoT
  - Harmonization and mapping between different data models & standards.
  - Use of standards for Application Level interoperability btw devices and applications vs propietary solutions.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Alliance


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