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SMART CITY

BUILDING TOMORROW'S CITIES

REQUIREMENTS FOR SCALABLE DEPLOYMENT

How Would You Build a SMART City

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Requirements

Transportation services

Public communication services

Public safety services

Tourism

Maintenance services

Commerce

Cost effective

Scalable & reliable

SMART CITY

BUILDING TOMORROW'S CITIES

Data Ownership

Interoperable

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Approach #1: Start Small, then expand

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Approach #1: Start Small, then expand

- New domain benefits from having a framework to build upon
- New domain may have less freedom of choice
- New domain may drive changes to the existing domain

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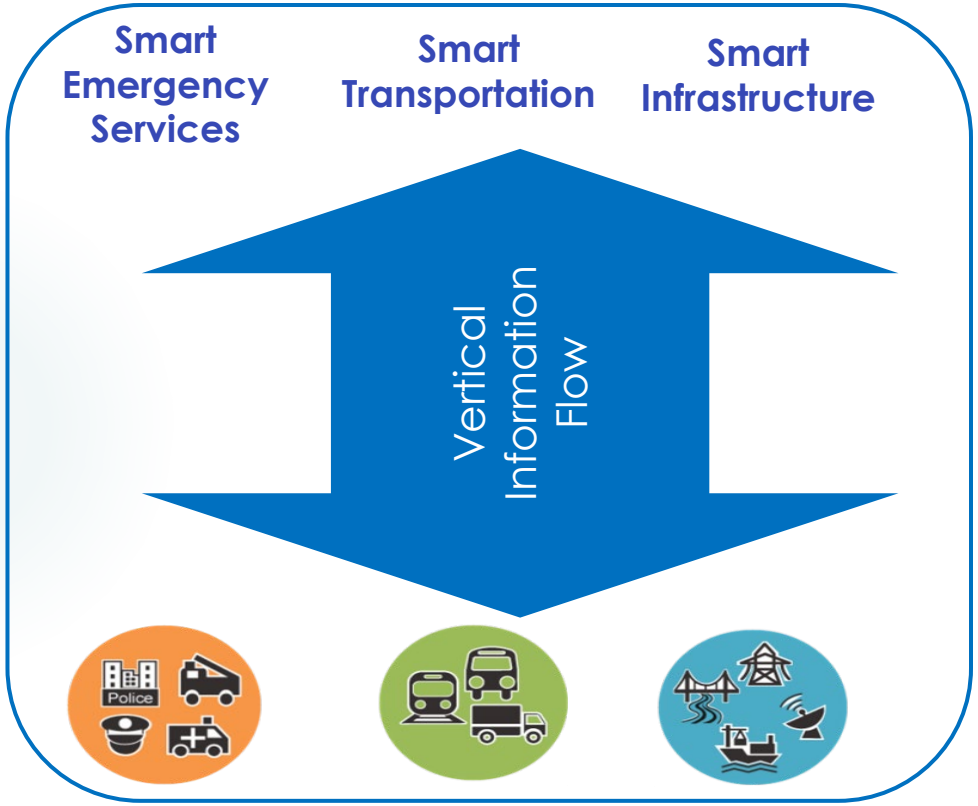
Approach #1: Start Small, then expand



- ? Data Ownership
- ? Interoperable
- ✗ Scalable & reliable
- ? Cost effective

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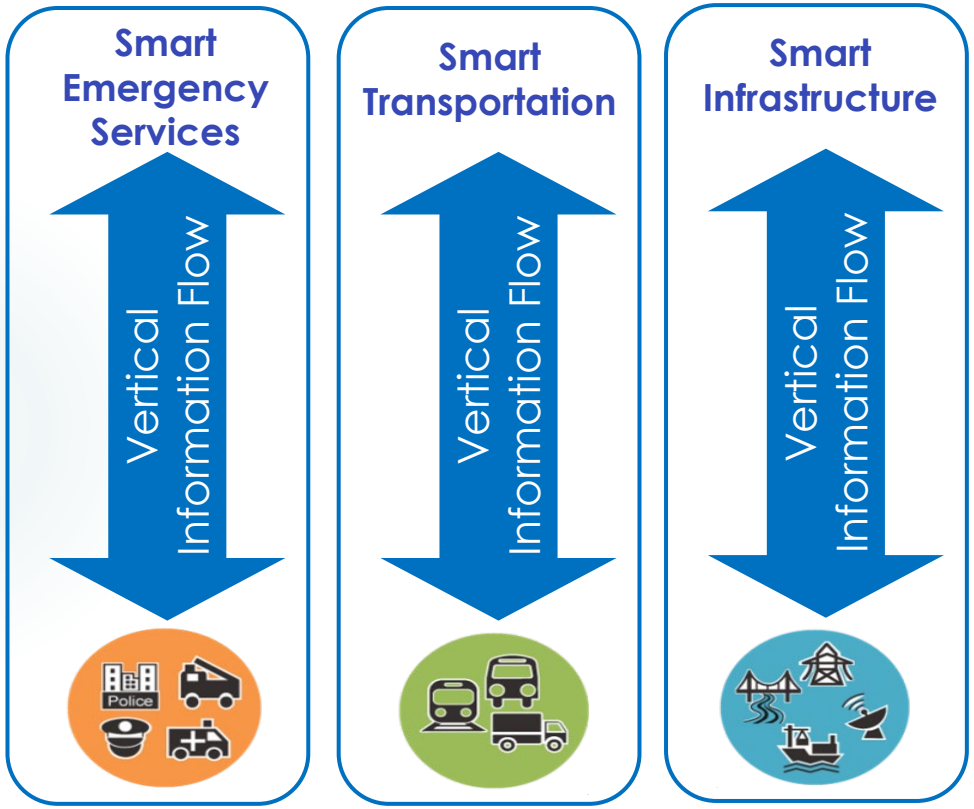
Approach #2: Select the best fit solution



- ✓ Data Ownership
- ✗ Interoperable
- ✓ Scalable & reliable
- ? Cost effective

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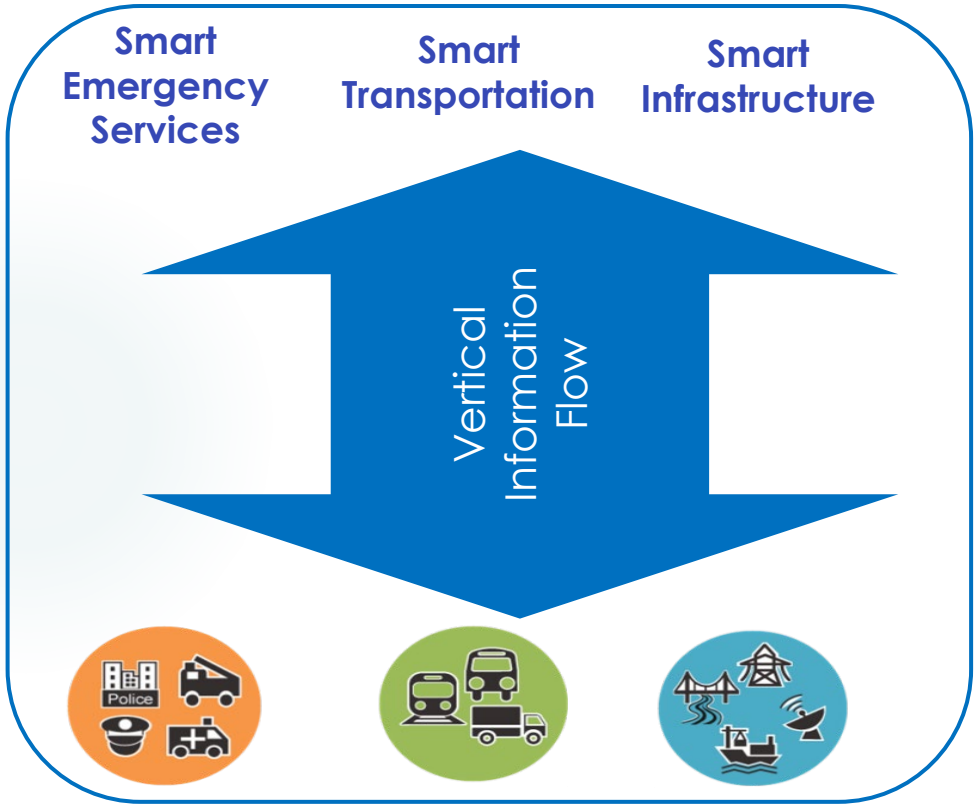
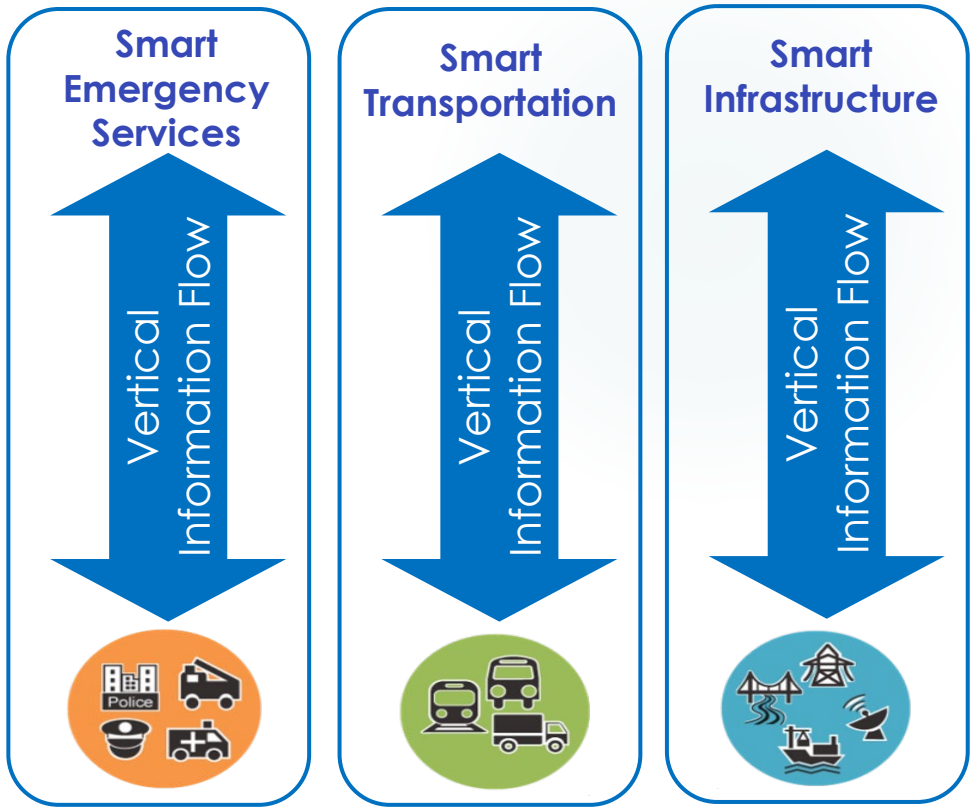
Analysis of these approaches





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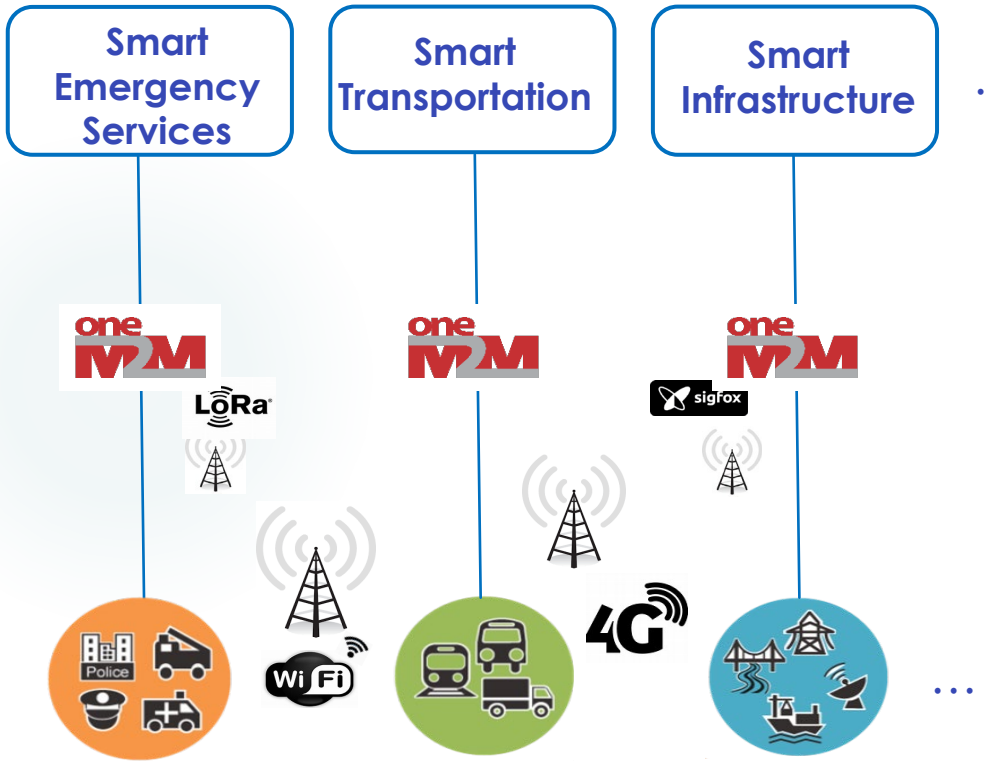
An approach using oneM2M: Step 1 – Start Small



- choose your data model
- implement applications
- deploy applications
- repeat for each vertical

PRO - Easy to implement; Domain expertise and devices and applications are not constrained

PRO - Less expensive than trying to force data models from different domains to be the same

CON - no sharing of data between siloes (no different than any other IoT platform)

OPPORTUNITY - collaborate on the data models when it is easy to do.

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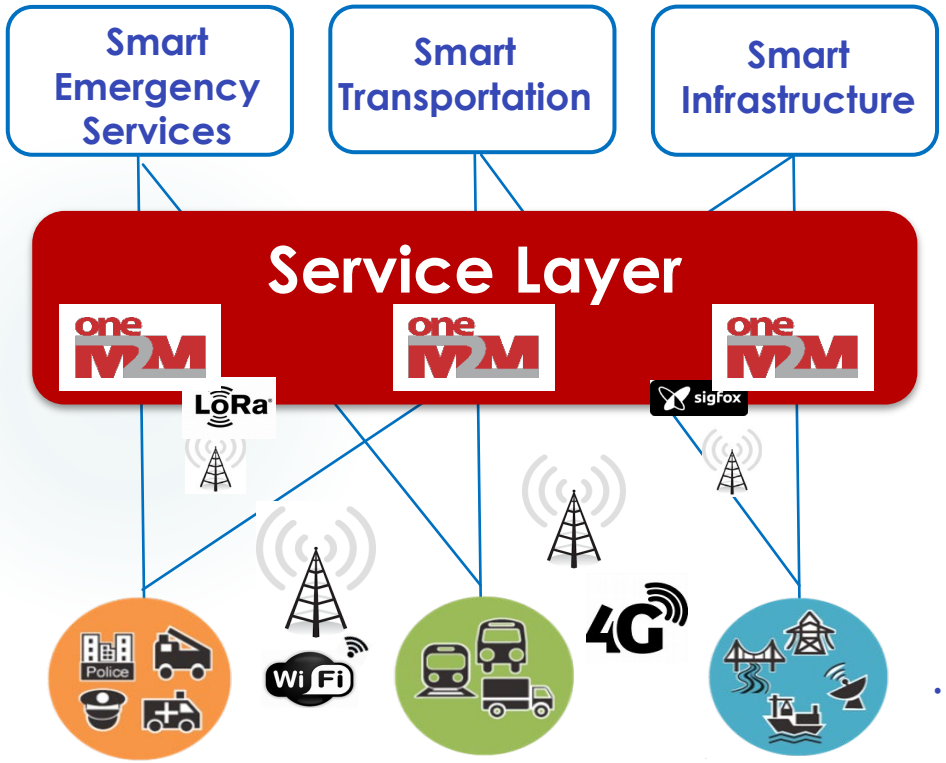
An approach using oneM2M: Step 2 – Federate CSEs



- Simple API to connect oneM2M CSEs
- Grant desired Access to remote applications
- Share Data

PRO - Siloed data is controlled by the "owner“ who can choose to share or NOT with very fine granularity

PRO - Can share data to a remote CSE to keep network traffic low on Host CSE, while still controlling access

… CON - data models may be different; foreign applications may not "understand“. This may make discovery and use of data difficult.

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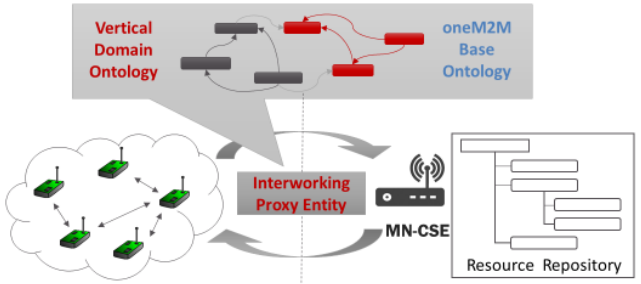
How oneM2M addresses data model interoperability: Semantics

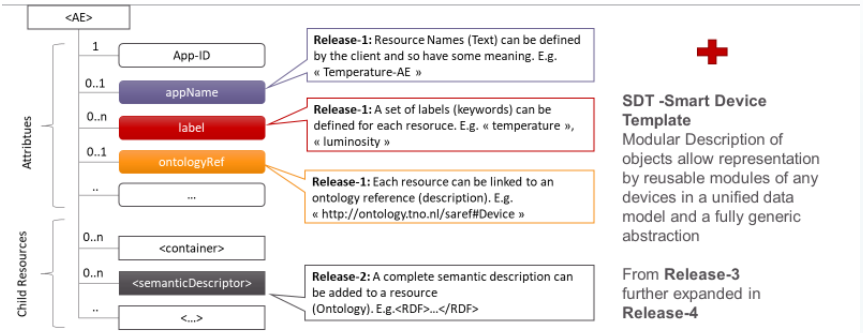
Generic interworking using semantic

- Non oneM2M devices are described using the oneM2M base ontology + domain specific extensions.
- The Interworking Proxy Entity translates the ontology instance to resources on the CSE based on pre-defined instantiation rules.



5

Evolution of semantic in oneM2M



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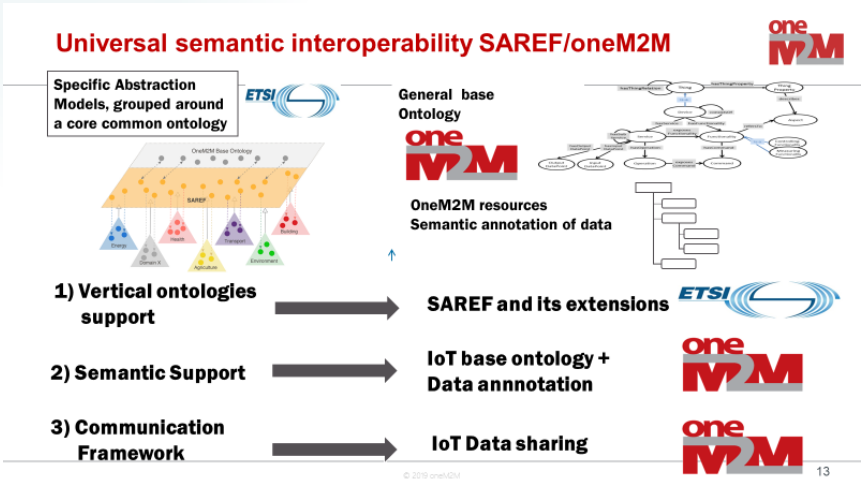
Universal semantic interoperability SAREF/oneM2M



13

Advanced Semantic Discovery in Release 5

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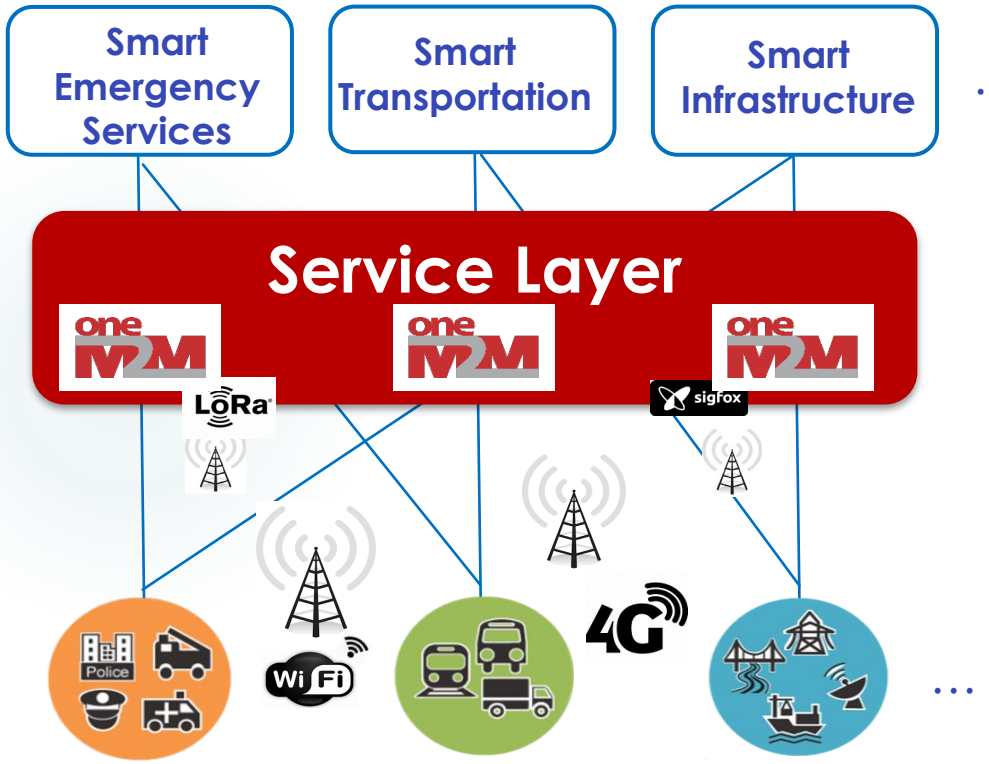
An approach using oneM2M: Step 3 – Add Semantic annotations



- Add semantic context to data models
- Use Advance Semantic Discovery features

PRO - Semantic descriptions can be added to a data after deployment

PRO - oneM2M base ontology can make accessing data interoperable

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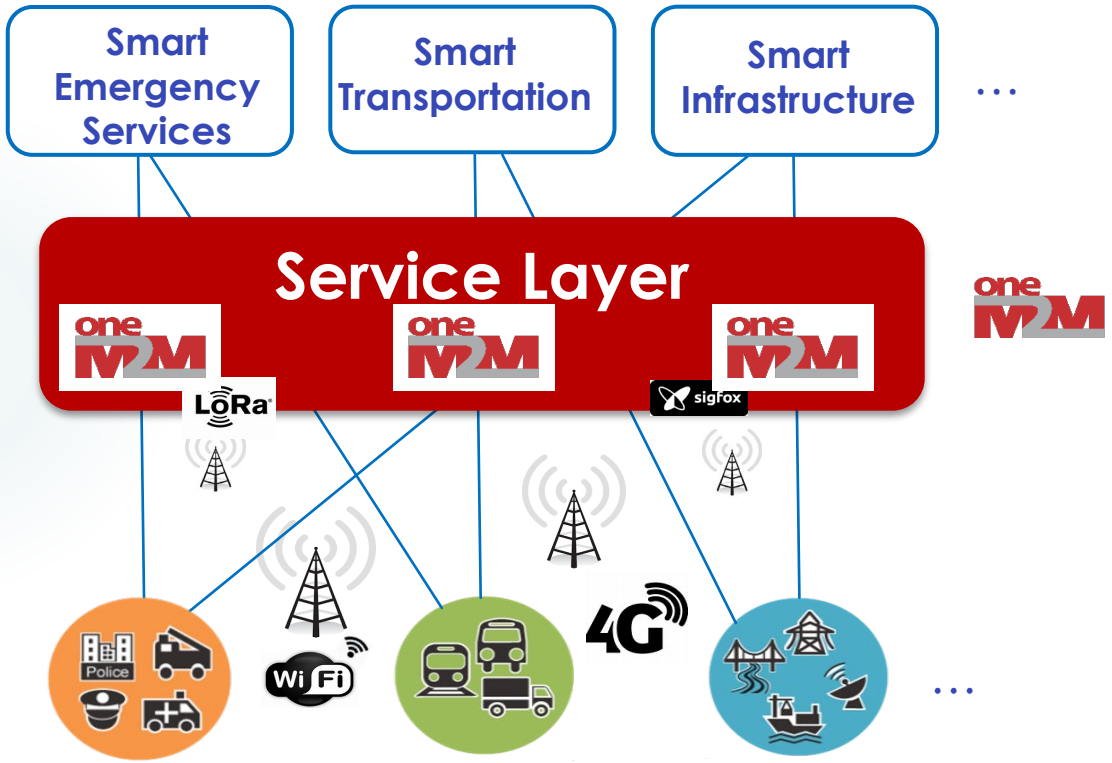
An approach using oneM2M: Step 3 – Add Semantic annotations



- Scalable & reliable
- Cost effective
- Interoperable
- Data Ownership

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oneM2M Feature Summary by Release

Applications and devices have access to many features they need

Release 1
- Registration
- Discovery
- Security
- Group Management
- Data Mgmt. & Repository
- Subscription & Notification
- Device Management
- Communication Mgmt
- Service Charging
- Network Service Exposure
- App & Service Mgmt
- HTTP/CoAP/MQTT Bindings

Release 2
+ Time Series Data
+ Flexible Resources that can be customized by app developers (flex container)
+ Semantics Description & Discovery
+ Security Enhancements
  - Dynamic Authorization
  - Content Security
  - E2E Security
+ WebSocket Binding
+ Ontology for Home Area Information Model
+ oneM2M App-ID Registry
+ oneM2M Interworking
  - LWM2M
  - Alljoyn
  - 3GPP Triggering

Release 3
+ Semantic Querying/Mashup
+ 3GPP SCEF Interworking
  - Non-IP Data Delivery
  - UE reachability Monitoring
  - Device triggering
  - Etc.
+ Transaction Management
+ Service Layer routing
+ Common oneM2M Interworking Framework
  - OCF
  - OPC-UA
  - OSGi
+ oneM2M Conformance Tests and Profiles
+ Security Enhancements
  - Distributed Authorization
  - etc.
+ Ontology Based Interworking

Release 4
+ SDT 4.0 and the Information Models for Multiple Domains
+ oneM2M Conformance Tests
+ Geo Query
+ Process Management
+ Message Primitive Profiles
+ Semantic Reasoning
+ Time Management
+ Enhanced 3GPP Interworking
  - Session QoS
  - Congestion Monitoring
+ Fog/Edge Computing
  - Software Campaigning
  - Resource Synchronization
+ Service Subscriber Management
+ Security Enhancements
+ Group Anycast/Somecast
+ Modbus Interworking
+ Discovery Based Operations
+ Semantic OntologyMapping

2015 2016 2018 2022

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oneM2M Future Feature development

Release 5 is being developed now

- AI enablement
- Information Model enhancements – SDT4.0
- Support of Data Protection Regulations
- Support of Data License Management
- Smart City and Enterprise domain enablement enhancement
- Advanced Semantic Discovery
- Additional Interworkings (e.g. OGC's Sensor Thing API)
- Effective IoT Communication to Protect 3GPP Networks

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Show me the GREEN

- Reduce costs by supporting siloed development
- Reduce costs by eliminating development of common features that have been done many times already
- Reduce costs by sharing data that is already available
- Reduce costs by leveraging the cumulative contributions by many engineers and researchers around the world for free
- Reduce costs by reusing existing deployed devices
- Reduce costs by participating in oneM2M to collaborate on development of new features
- Reduce costs by eliminating vendor lock-in

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