ONEM2M INTRODUCTION

INDUSTRY DAY SEPT 14TH 2018, SEOUL

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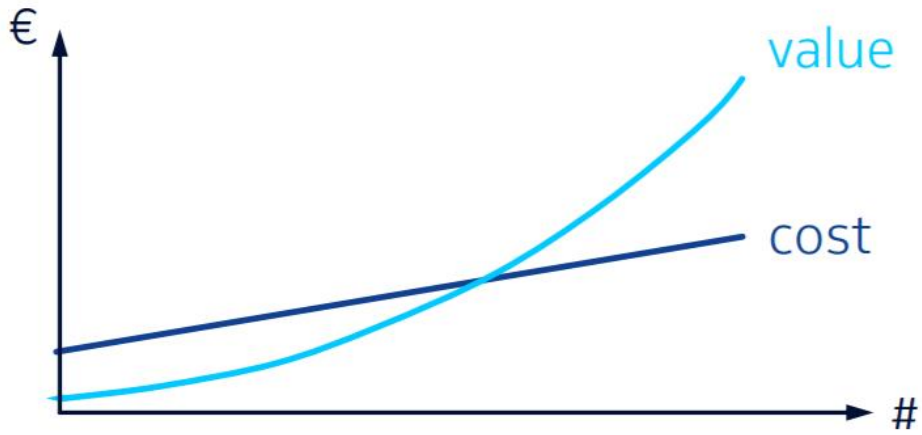
oneM2M www.oneM2M.org

Outline

- Why IoT needs interoperability?
- Introduction to oneM2M
- Zoom on oneM2M release 3
- Takeaway

Metcalfe's law

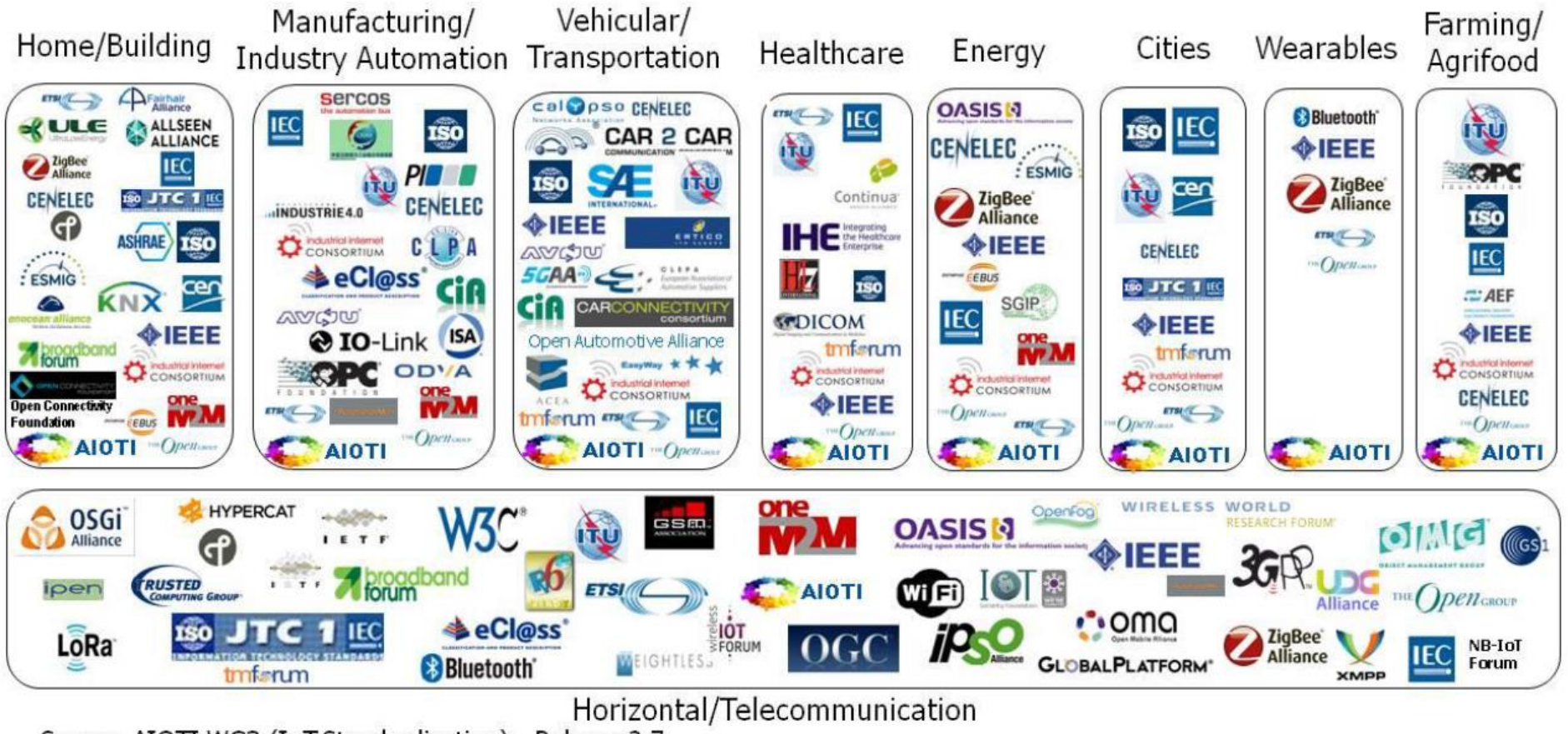
The value of a network is proportional to the square of the number of its nodes – while the cost follows a more or less linear function



IoT is not any different but the challenge is keep the cost linear

within and across IoT domains

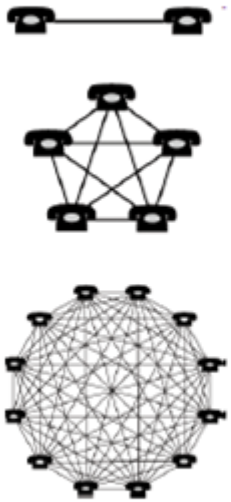
The issue with IoT interoperability is diversity



Source: AIOTI WG3 (IoT Standardisation) – Release 2.7

IoT value will come through Metcalfe's law, **if** we solve interoperability issues **within and across IoT domains**

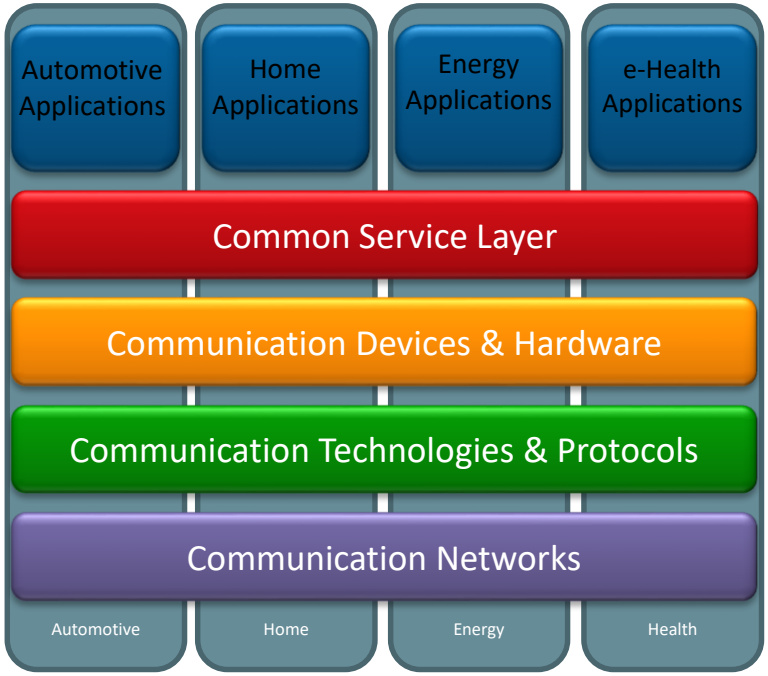
Point-to-point Integrations don't scale



Creating new integrations is unpredictable

Monocultures lock you in

Past choices restrict present action and future vision

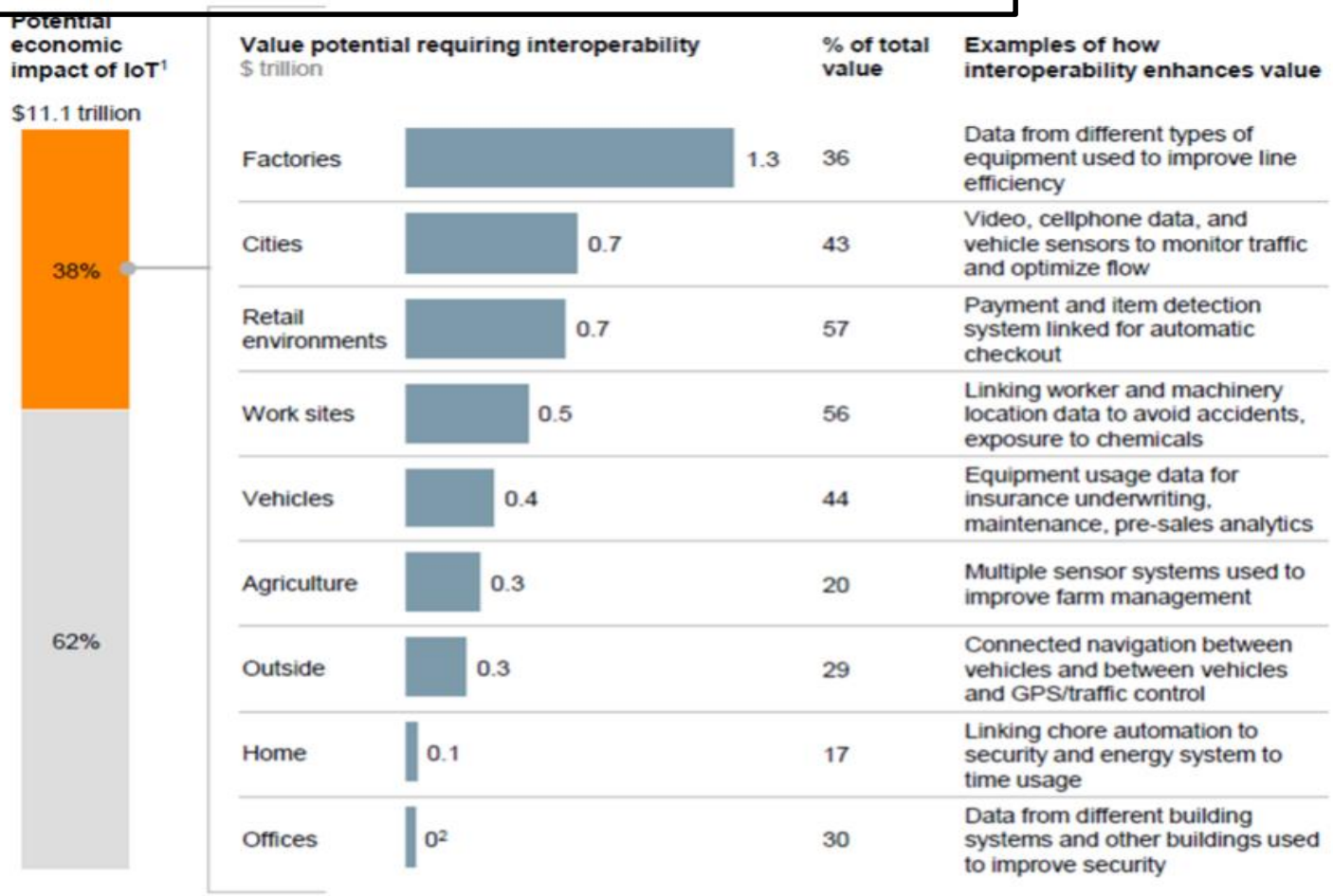


Platform based integration
open standards and open source are key

Source: CRYSTAL project/Philips

What market research says

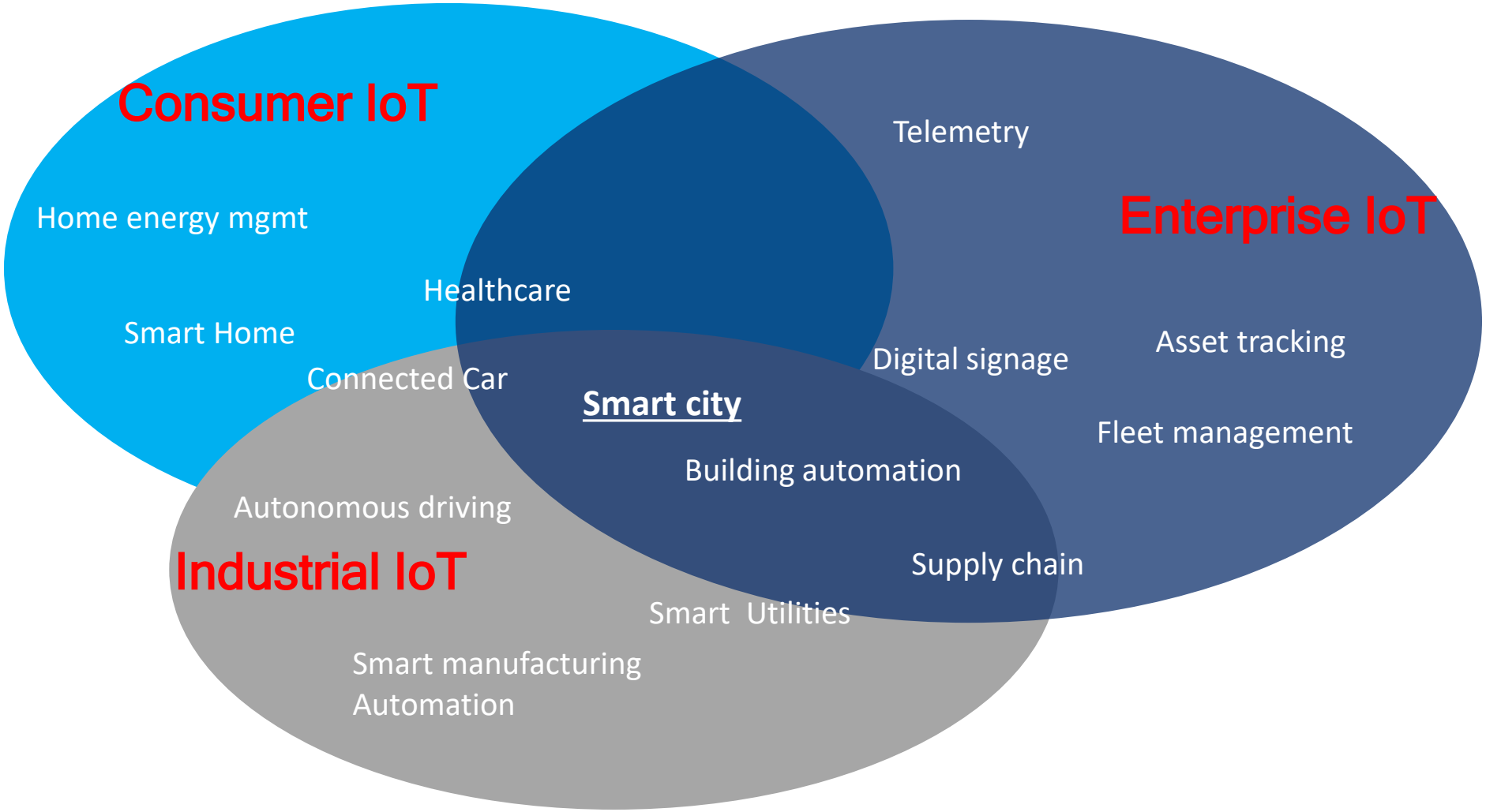
Nearly 40 percent of economic impact requires interoperability between IoT systems



1 Includes sized applications only; includes consumer surplus.
2 Less than $100 billion.
NOTE: Numbers may not sum due to rounding.

SOURCE: Expert interviews; McKinsey Global Institute analysis

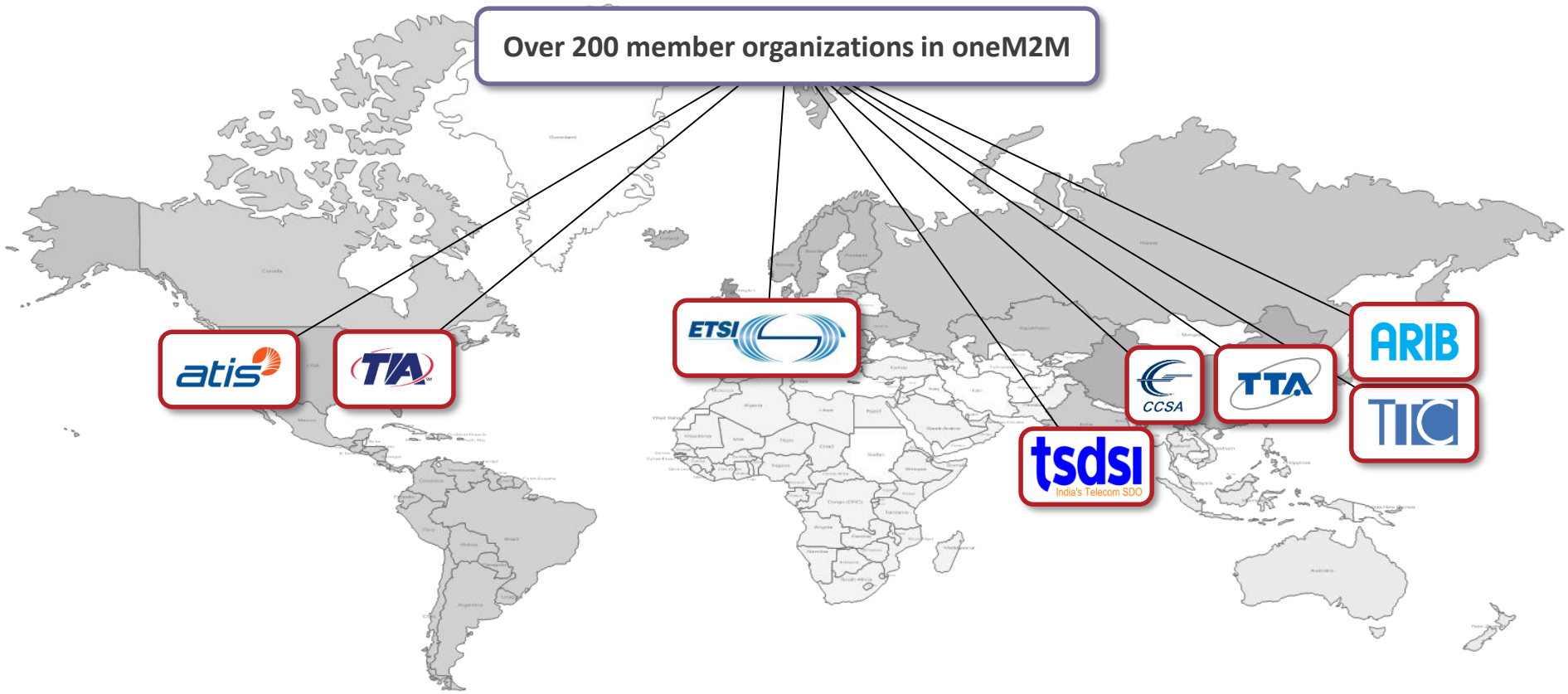
… in particular true for Smart Cities



Why oneM2M? Why now?

- M2M (and IoT) communications existed for so many years, e.g.:
  - SCADA systems
  - Satellite based truck tracking
- So why oneM2M?
  - *Specific standards exist* for home automation, smart factory, energy management, etc. but much larger growth will come from a fully integrated Internet of Things
  - The IoT vision will not materialize if we do not solve interoperability issues, therefore drive down integration costs and ensure time to market
- Why now?
  - Technology is ready for an *outcome based economy* for a large number of use cases, more than what one can think of

oneM2M Partnership Project



CEN CENELEC broadband forum oma Open Mobile Alliance New Generation M2M Consortium GlobalPlatform

www.oneM2M.org

All document are publically available

M2M Common Service Layer in a nutshell

A software “framework”

Located between the M2M applications and communication HW/SW that provide connectivity

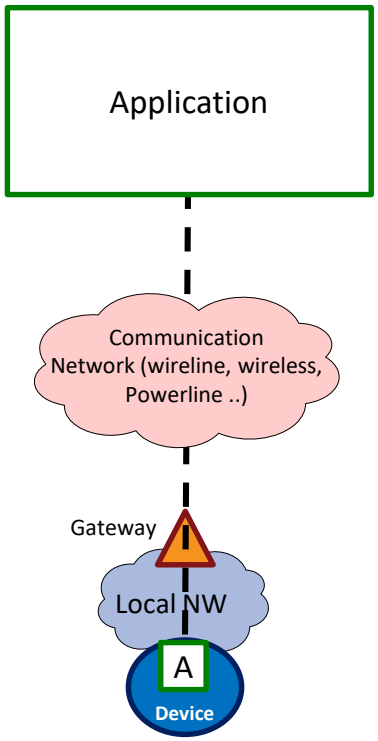
Provides functions that M2M applications across different industry segments commonly need (eg. data transport, security/encryption, remote software update...)

Like an “Android” for the Internet of Things
But it sits both on the field devices/sensors and in servers
And it is a standard – not controlled by a single private company

oneM2M Architecture approach

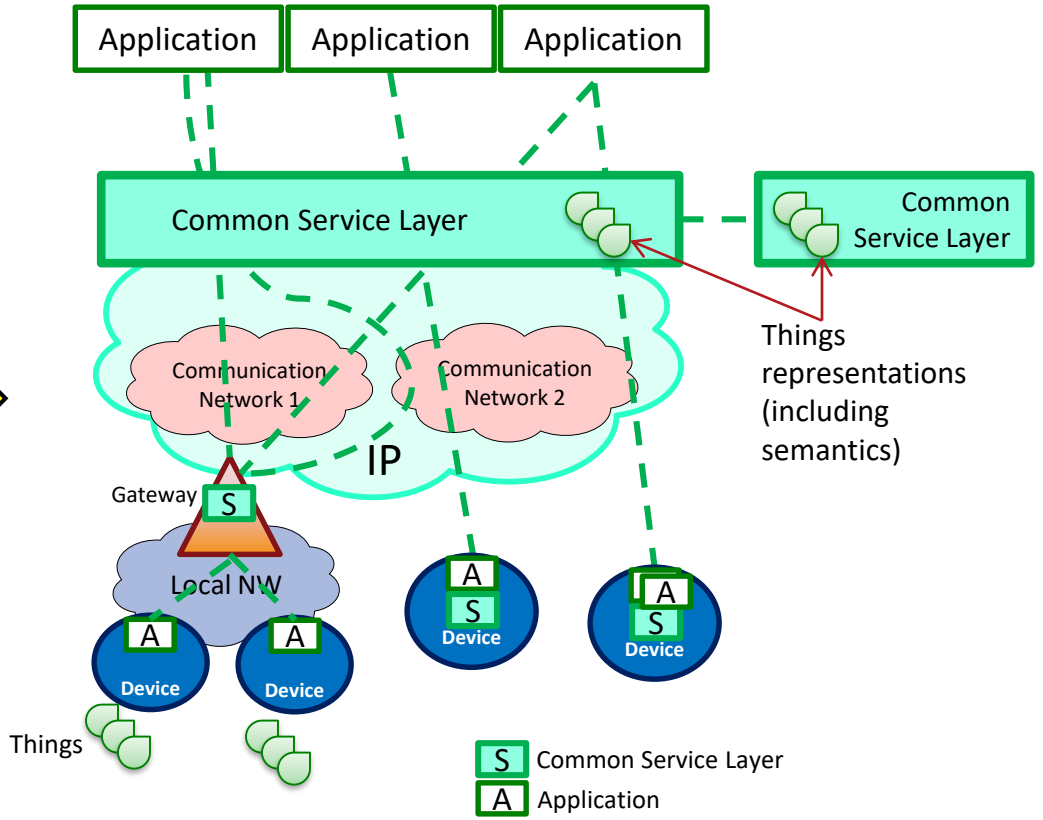
Pipe (vertical):

1 Application, 1 NW,
1 (or few) type of Device
Point to point communications

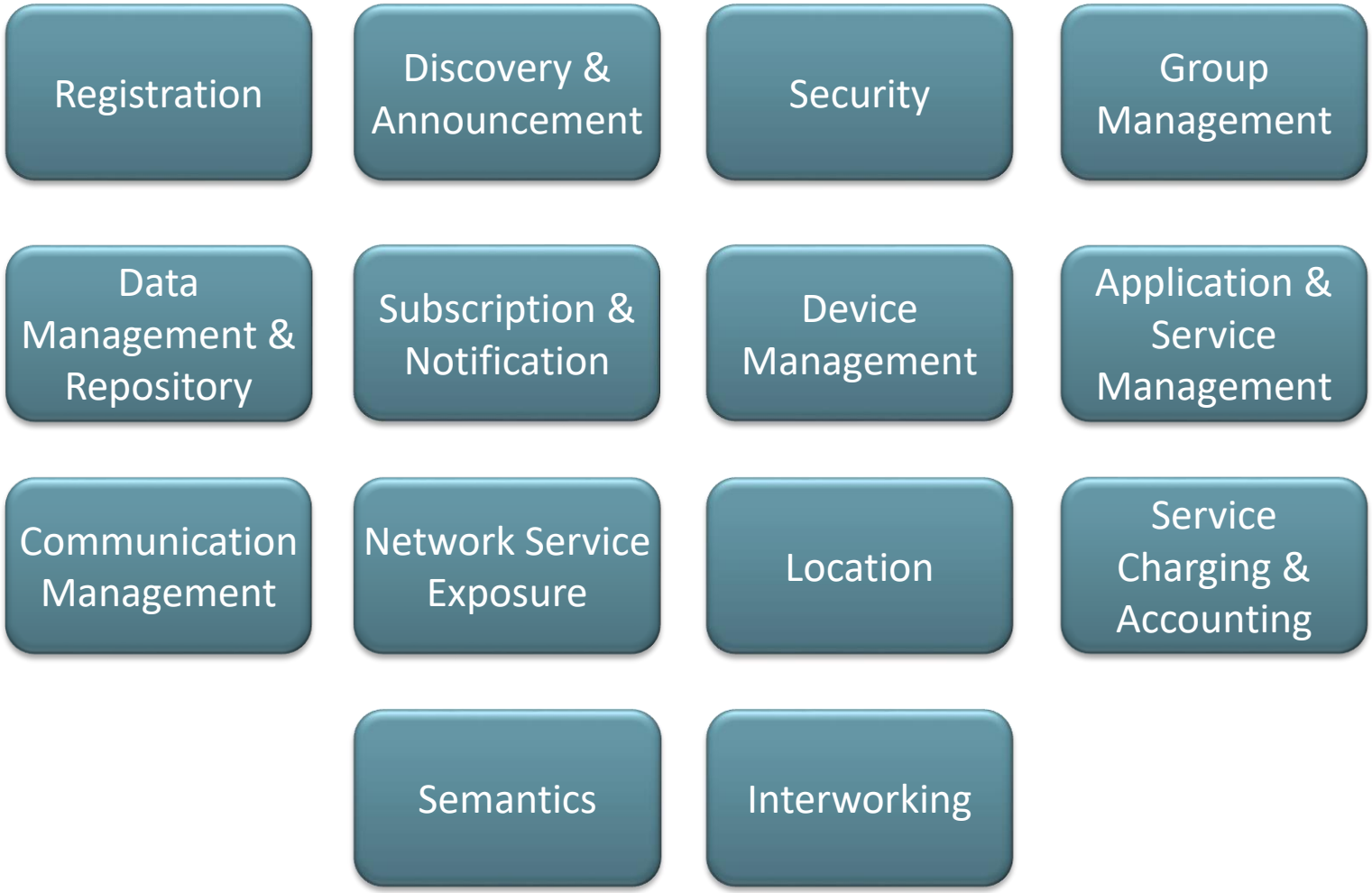


Horizontal (based on common Layer)

Applications share common service and network infrastructure
Multipoint communications



Common Service Functions



Strong Implementation Base

Industry-driven Open source implementations

LAAS-CNRS
sensinov Global IoT Platform
Fraunhofer FOKUS
KETI
CISCO
atis
OS-IoT
OM2M Connecting things
open mtc
OCEAN
OPEN DAYLIGHT
IotDM

Examples of Commercial implementations /demos

सी-डॉट C-DOT
सेंटर फॉर डेवलपमेंट ऑफ टेलीमैटिक्स
भारत सरकार का दूरसंचार प्रौद्योगिकी केन्द्र
Centre for Development of Telematics
Telecom Technology Centre of Govt. Of India
LG
sensinov Global IoT Platform
InterDigital
QUALCOMM
kt
SK telecom
MODACOM
LG U+
Hewlett Packard Enterprise
HUAWEI
PILOT THINGS
SIERRA WIRELESS
Creative Convergence ntels
KEPCO

4 interop. events so far

Glimpse of oneM2M Rel-3

SeungMyeong JEONG / Omar Elloumi

Summary of Release 2/3 Features

Industrial Domain Enablement

- Time series data management
- Atomic Transactions
- Action Triggering
- Optimized Group Operations

Home Domain Enablement

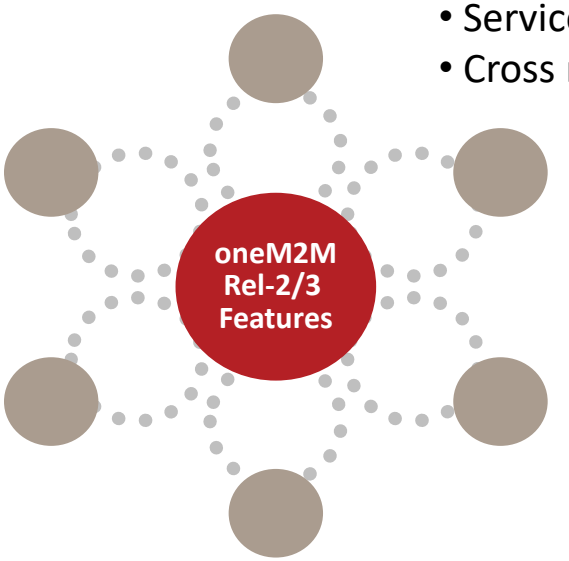
- Home Appliance Information Models & SDT
- Mapping to existing standards (OCF, ECHONET, GoTAPI...)

Smart City & Automotive Enablement

- Service Continuity
- Cross resource subscriptions

Management

- M2M Application & Field Domain Component Configuration



Market Adoption

- Developer Guides
- oneM2M Conformance Test
- Feature Catalogues
- Product Profiles

Semantics

- Semantic Description/Annotation
- Semantic Querying
- Semantic Mashups
- oneM2M Base Ontology

oneM2M as generic interworking framework

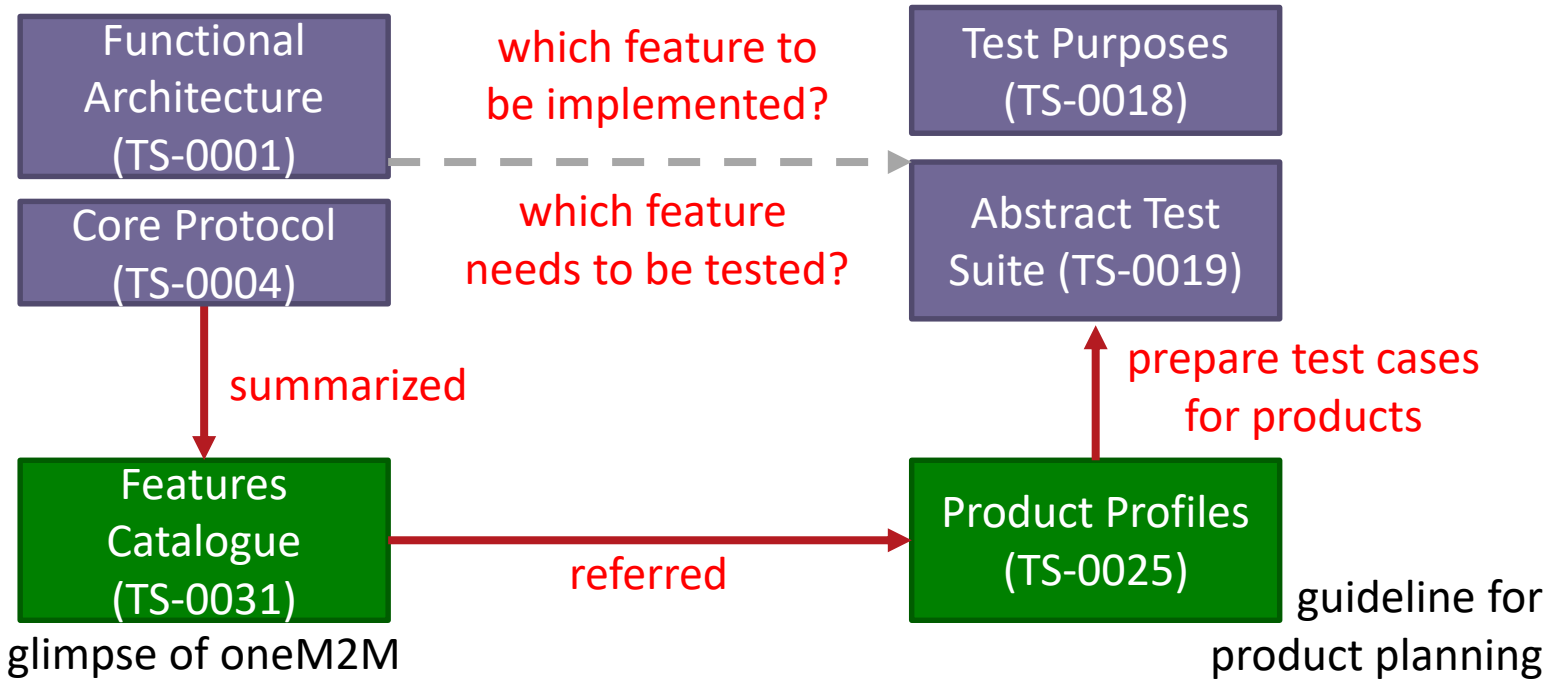
- 3GPP SCEF
- OMA LwM2M
- DDS
- OPC-UA
- Modbus
- AllJoyn/OCF
- OSGi
- W3C WoT

Security

- Dynamic Authorization
- End to End Security
- Enrollment & Authentication APIs
- Distributed Authorization
- Decentralized Authentication
- Interoperable Privacy Profiles
- Secure Environment Abstraction

Product profiles

- product profiles and feature catalogue
  - guidebook to my oneM2M product features
  - fills the gap btw. function specs. and test specs.



Developer guide series

- example scenarios and binding messages

Deliverable	Title	Examples of
TR-0025	Application developer guide	HTTP binding, XML/JSON serialization
TR-0034	Temperature monitoring example using CoAP binding	CoAP binding, <pollingChannel>
TR-0035	Developer guide of Device Management	<mgmtObj>, OMA DM, LwM2M, BBF TR-069
TR-0037	Smart Farm Example using MQTT Binding	MQTT binding
TR-0038	Developer guide - Implementing security example	Provisioning, Security Association Establishment
TR-0039	Developer guide - SDT based implementation	SDT for home appliances
TR-0045	Developer Guide: Implementing Semantics	Semantic annotation and discovery
TR-0048	Developer Guide of 3GPP Interworking	(TBD)

Certification program

- TTA is the 1st Certification Body & Test House
  - oneM2M Release 1 certification program launched on 9th Feb. 2017

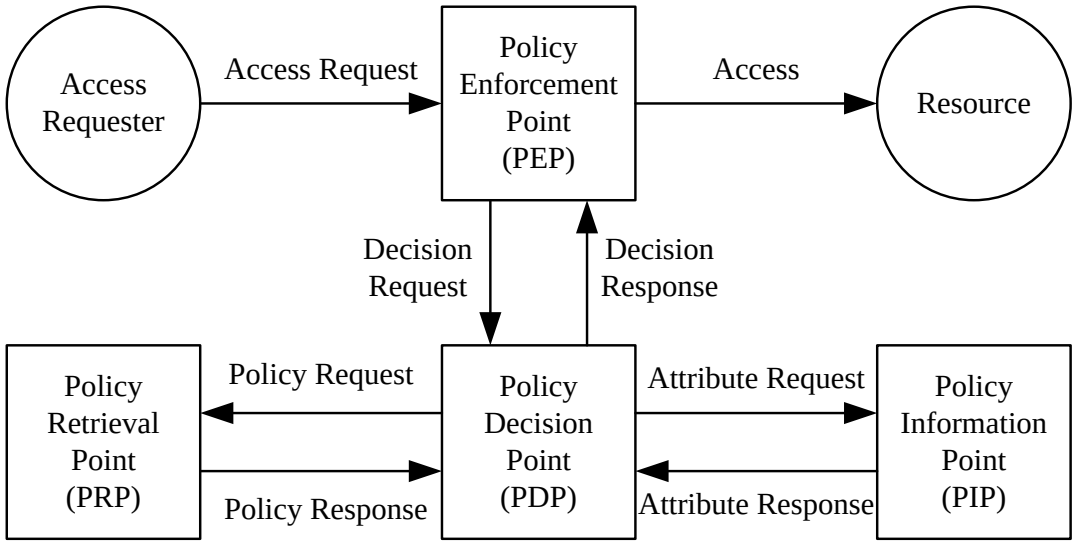
www.onem2mcert.com

certified products (Sep. 2017)

Product	Webpage	Vendor	Product Type
GWP	http://www.irexnet.co.kr	IREXNET	End product(IN-CSE)
AiSOP	http://www.irexnet.co.kr	IREXNET	End product(IN-CSE)
Insator™	https://www.samsungsds.com	SAMSUNG SDS	End product(IN-CSE)
HANDYPIA IoT Platform	http://www.handysoft.co.kr/	HANDYSOFT, Inc.	End product(IN-CSE)
IoT Healthcare Platform	http://www.hconnect.co.kr/	HealthConnect Co., Ltd	End product
ThingPlug	https://www.thingplug.net	SK Telecom	Software component
N-MAS	http://www.ntels.com	nTels	End product
IoTMakers Middleware	http://iotmakers.olleh.com	KT	Software component
IoTMakers	http://iotmakers.olleh.com	KT	Software component
e-IoT Energy Platform	https://spin.kepco.co.kr	KEPCO	End product
e-IoT Energy Gateway	https://spin.kepco.co.kr	KEPCO	End product

R3 security features

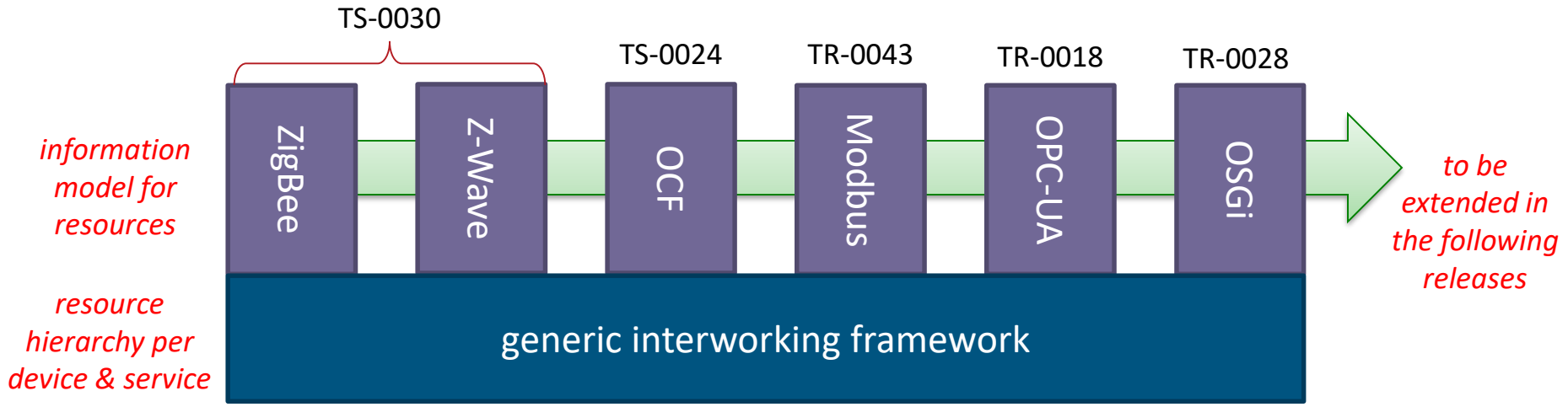
- Distributed authorization
  - enforcement, decision, retrieval and information points are distributed
  - c.f. Hosting CSE decides and enforces authorization with accessControlPolicyID based normal authorization scheme
- Secure environment (SE) abstraction
  - stores secure data (e.g. certificate) using SE abstract API



< distributed authorization model >

Interworking framework

- generic interworking framework
  - provides guides to map non-oneM2M devices and services into “existing” oneM2M resource types in homogeneous way
    - data mgmt., device mgmt., event/notification, location, group, etc.
  - intends not to invent new wheels for each technology
  - does not include underlying network interworking aspects



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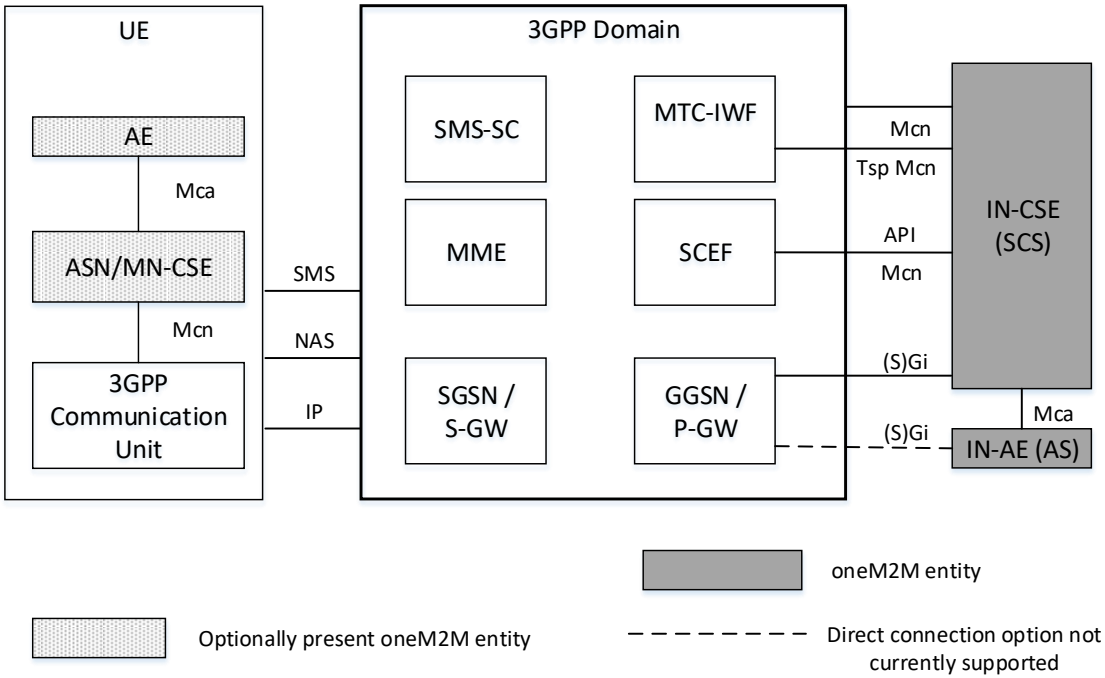
3GPP Rel-13/14 interworking

- Interwork-able 3GPP network functions to oneM2M
  - Device Triggering Recall/Replace, UE Monitoring, Background Data Transfer, Informing Potential Network Issues, Network Parameter Configuration, Node Schedule Management



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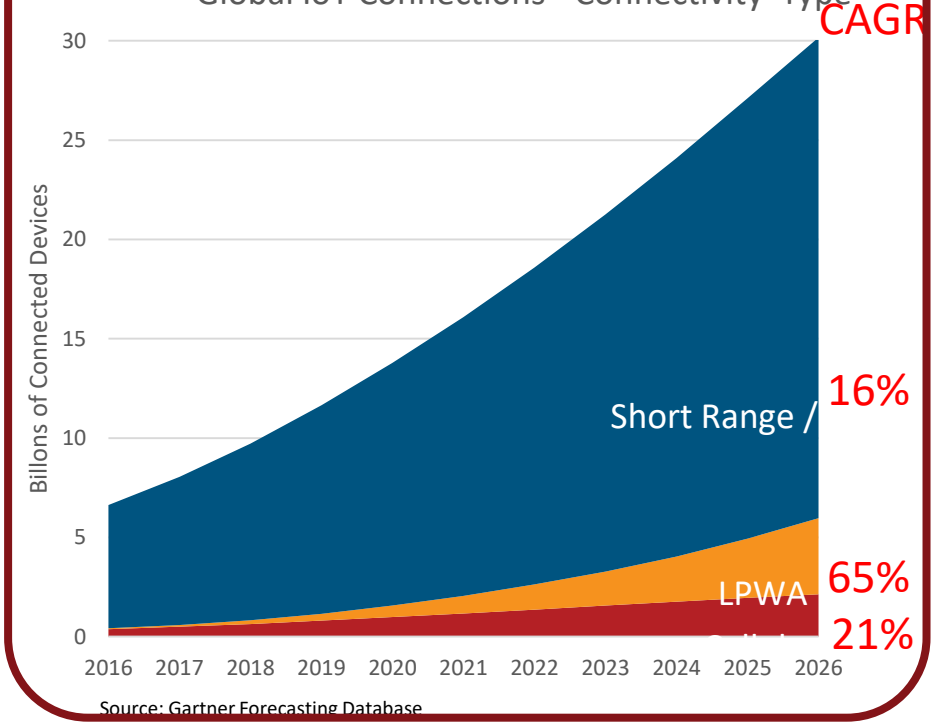
Forecasted growth in IoT Connections -

analysys mason

- Mobile IoT connections
  - 2016 – 317 million
  - 2025 – 1.3 billion
  - CAGR = 17%
- LPWA connections
  - 2016 – 64 million
  - 2025 – 3.4 billon
  - CAGR = 55.5%

Source: IoT VALUE CHAIN REVENUE: WORLDWIDE TRENDS AND FORECASTS 2016–2025

Gartner

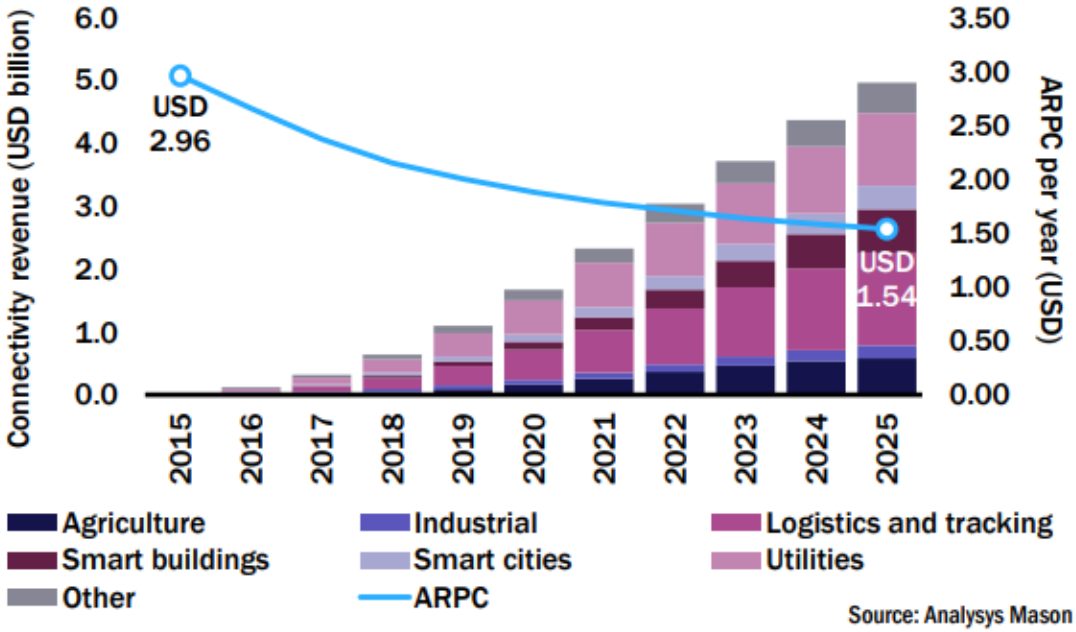


LPWA Options

		Cellular LPWA Options Using Licensed Spectrum			Non-Cellular LPWA Options Using Unlicensed Spectrum (examples/market leaders)		
		Cat-NB1 Also known as Narrowband Internet of Things (NB-IoT)	**Cat-M1** Also known as LTE-M or enhanced Machine Type Communications (eMTC)	**EC-GSM-IoT** Extended Coverage GSM-IoT	**LoRa®**	**SIGFOX™**	**Ingenu** (Formerly On-Ramp Wireless)
Deployment		LTE in-band or guard-band. Re-farmed GSM channels Standalone deployments	In-Band LTE	In-band GSM	Europe: 868MHz US: 915MHz Asia: 433MHz	Europe: 868MHz US: 915MHz	2.4GHz
Bandwidth		180MHz	1.4MHz	200MHz	Various settings: 500kHz/250kHz / 150kHz/125 kHz.	200kHz	1MHz
Peak Rate	Downlink	10s of kbps	300Kbps	10s of kbps	50kdps	-	624kbps
	Uplink	10s of kbps	375Kbps	10s of kbps	50kdps	100bps	156kbps
Range	Urban				2-5km	3-10km	1-3km
	Rural				15km	30-50km	5-10km

LPWA Connectivity revenue challenge

Figure 1: LPWA connectivity revenue and ARPC per year, 2015–2025

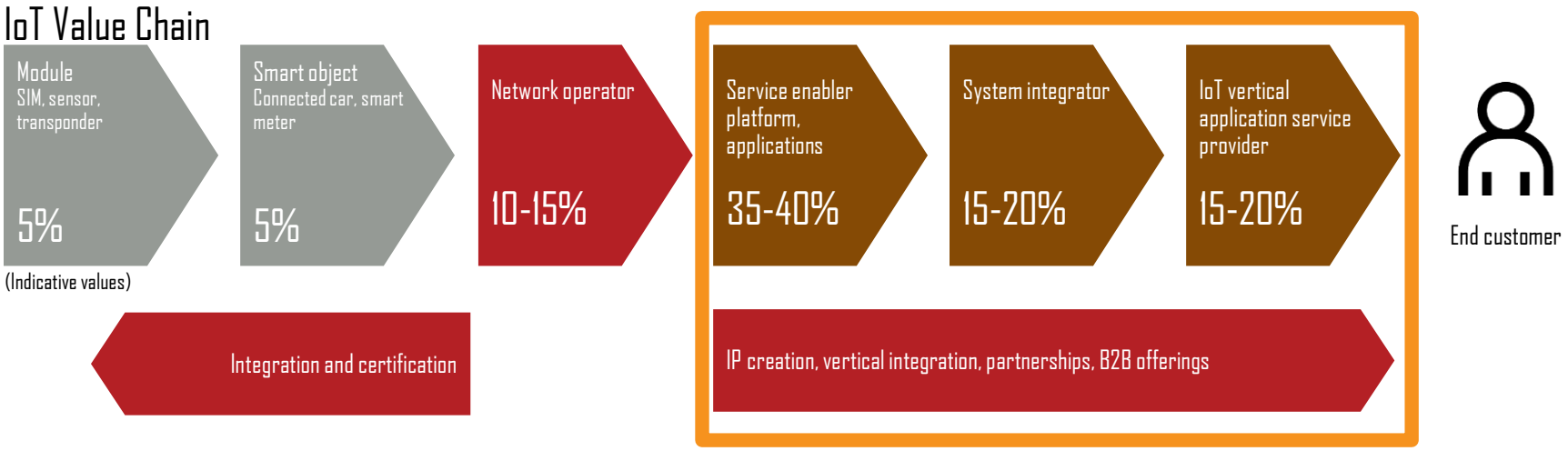


Source: Analysys Mason

Common Attributes

- **Small payload = Low Data volumes**
- **Infrequent transmission = Low number of messages**
- Long battery life required
- **Low cost**
- Non-complex devices
- High volume of device

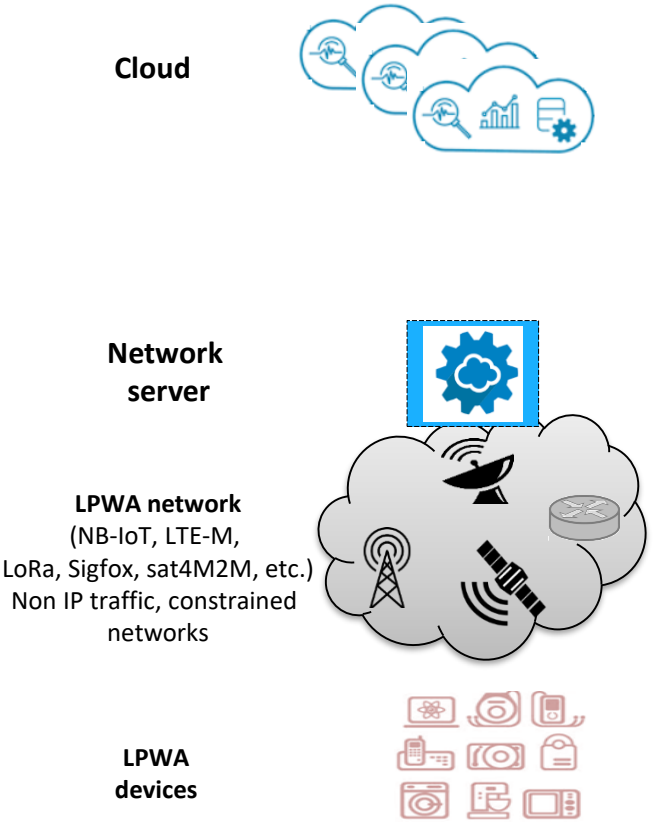
Move up the value chain



Application Enablement Platforms drive value creation

What's special about LPWA

- Optimised for constrained devices and networks
  - Low power and battery operated devices
- non IP based
  - Short application payloads directly encapsulated in MAC frames between devices and headends (aka Network server)
  - Running HTTP and TLS (with several handshakes) is not an option
- Limited downstream traffic capabilities
  - Limited time periods where the devices can listen to incoming network messages



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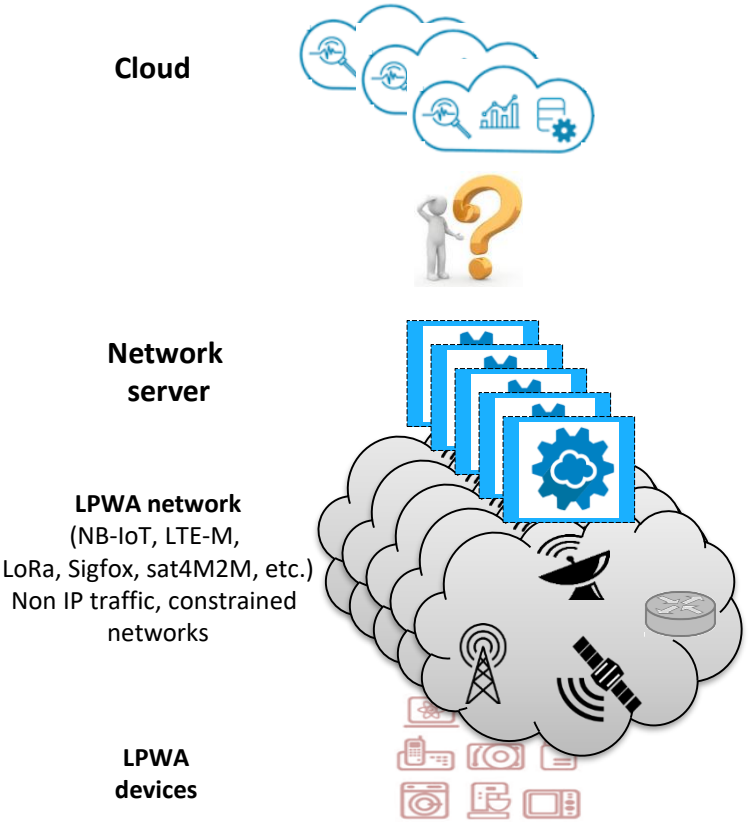
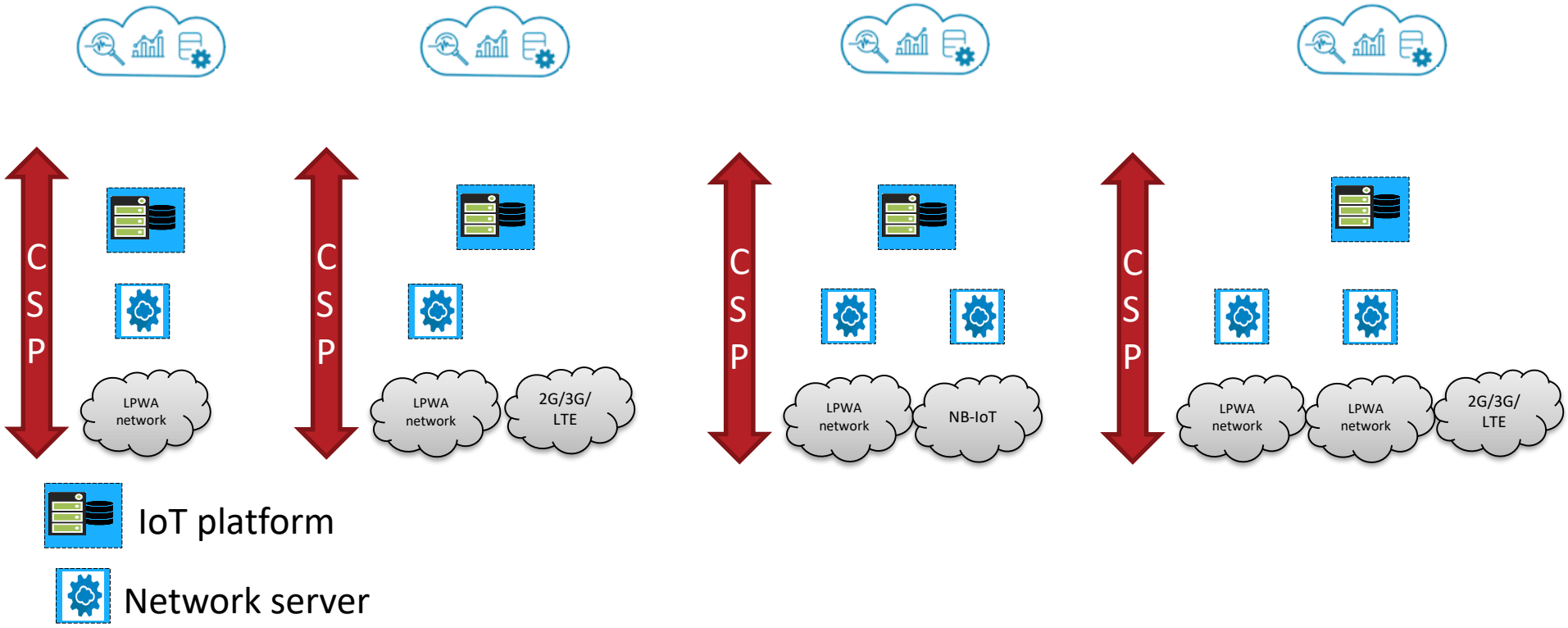
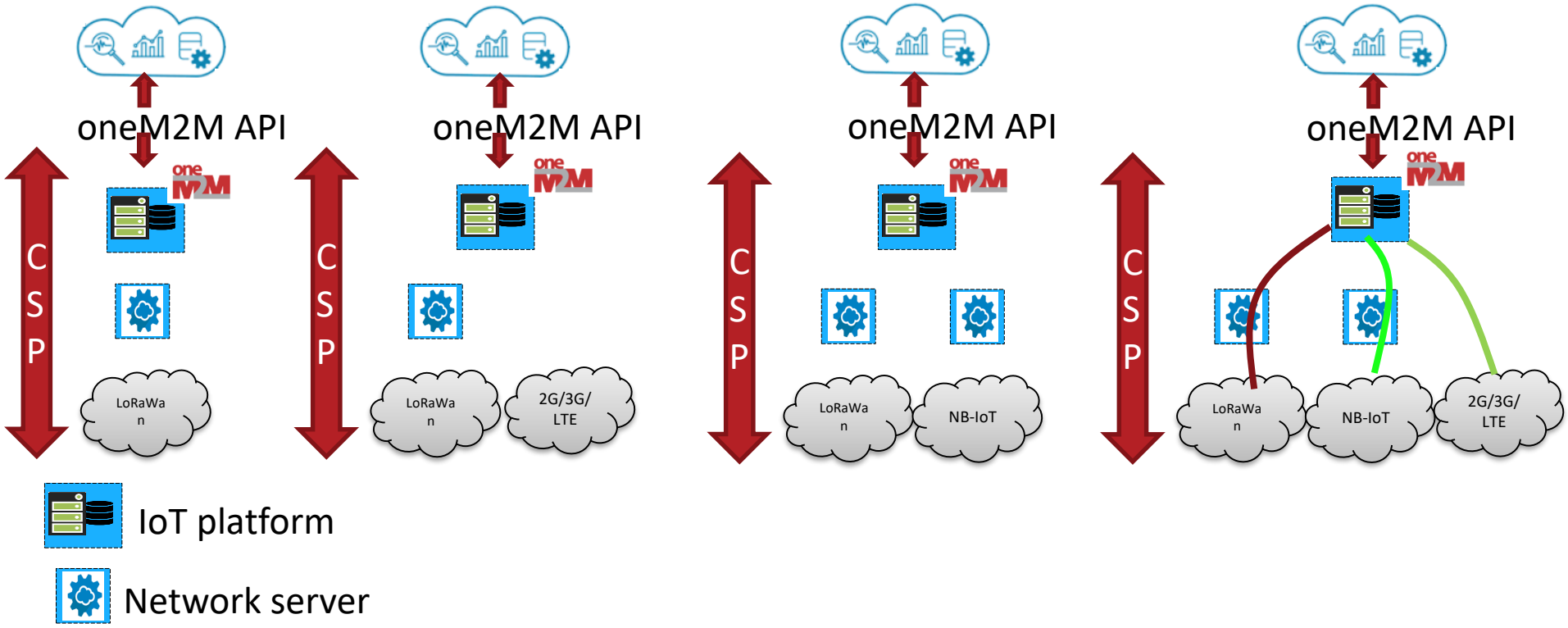


Deployment scenarios with CSP IoT platform



Deployment scenarios with CSP IoT platform (example)



Takeaway

- IoT, here to stay
- Interoperability will make IoT accessible for use cases where cost was prohibitive so far
- Interoperability, within and cross domain, will increase value for IoT
- Interoperability and Certification are key for IoT
- Traditional approaches for integration may not scale
- Semantic interoperability emerging as very promising technology for IoT interoperability