oneM2M and its role in achieving interoperability in IoT

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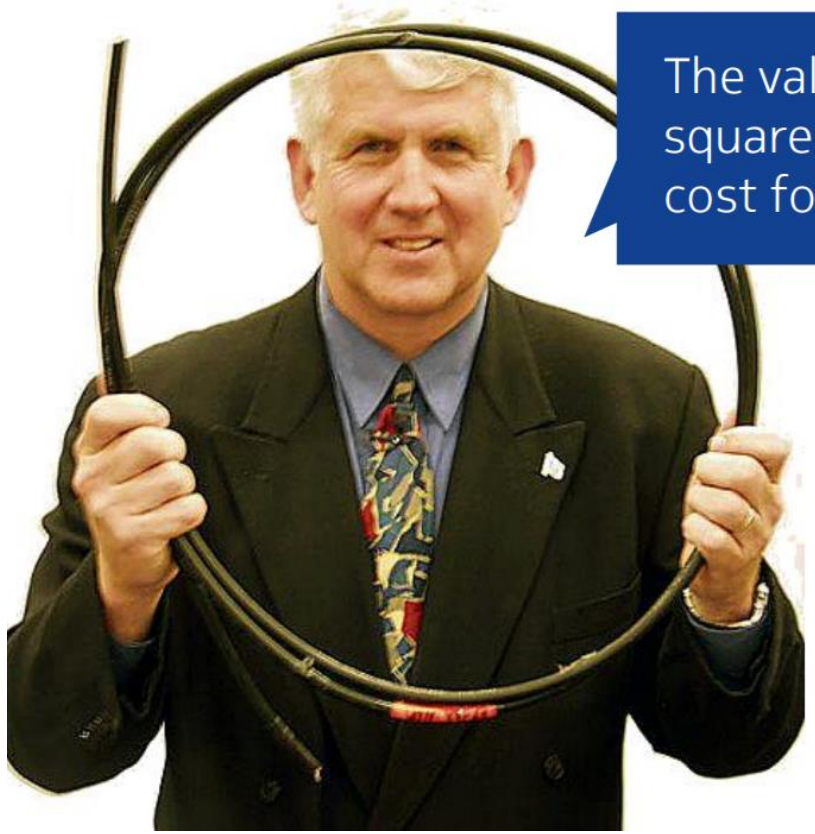
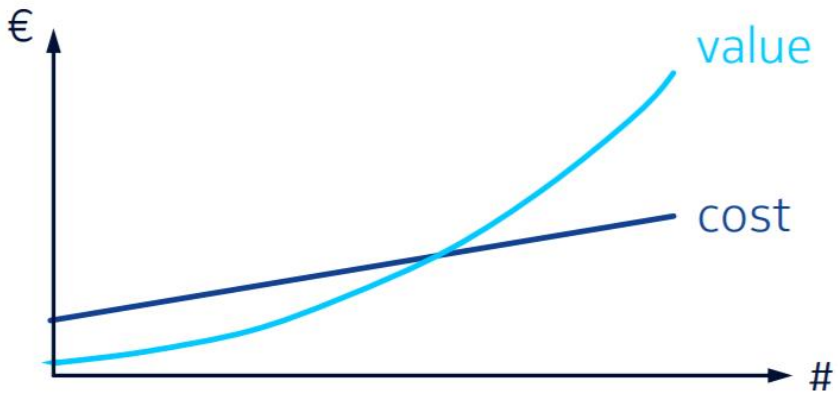
Metcalfe's law



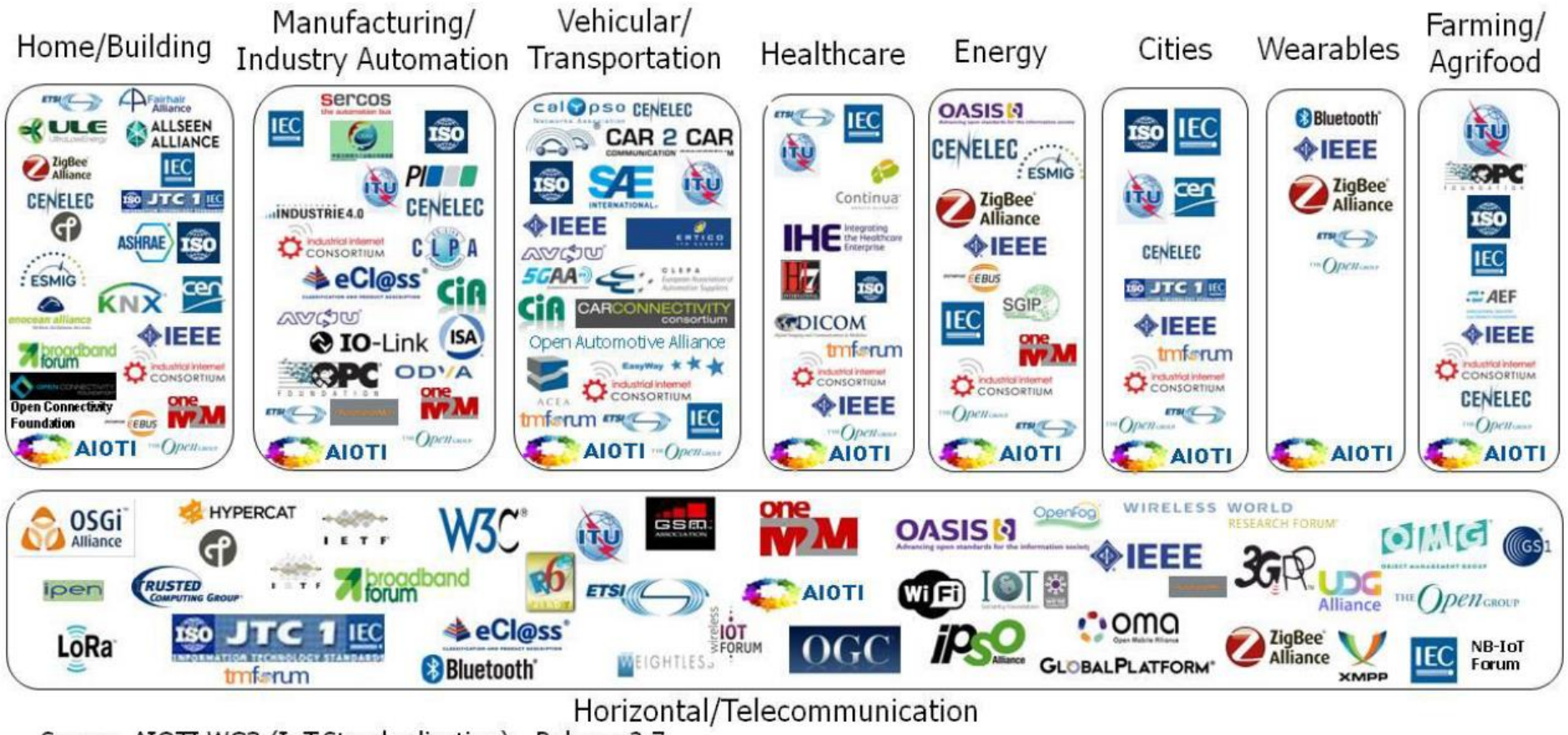
The value of a network is proportional to the square of the number of its nodes – while the cost follows a more or less linear function



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

within and across IoT domains

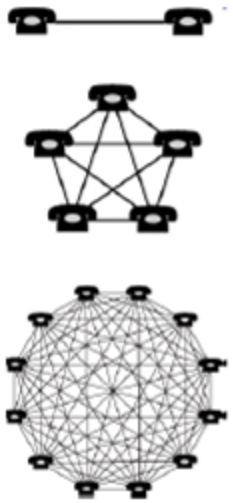
The issue with IoT interoperability is diversity



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

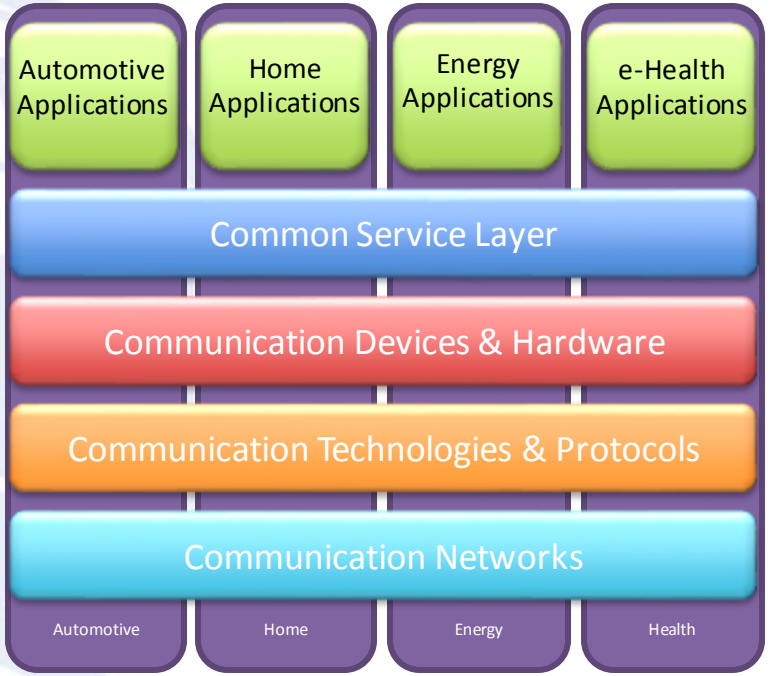
Point-to-point Integrations don't scale



Creating new integrations is unpredictable

Monocultures lock you in

Past choices restrict present action and future vision

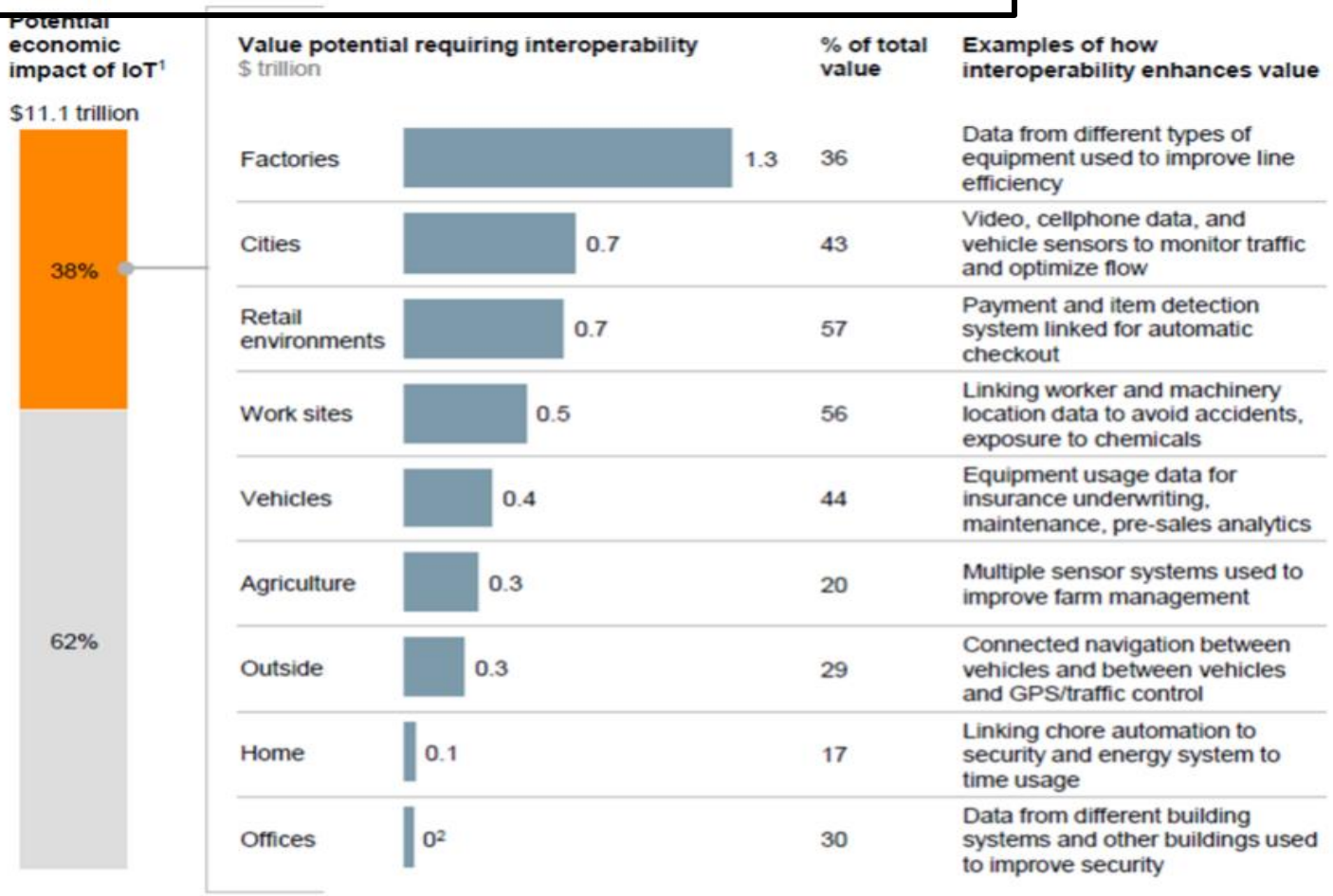


Platform based integration
open standards and open source are key

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

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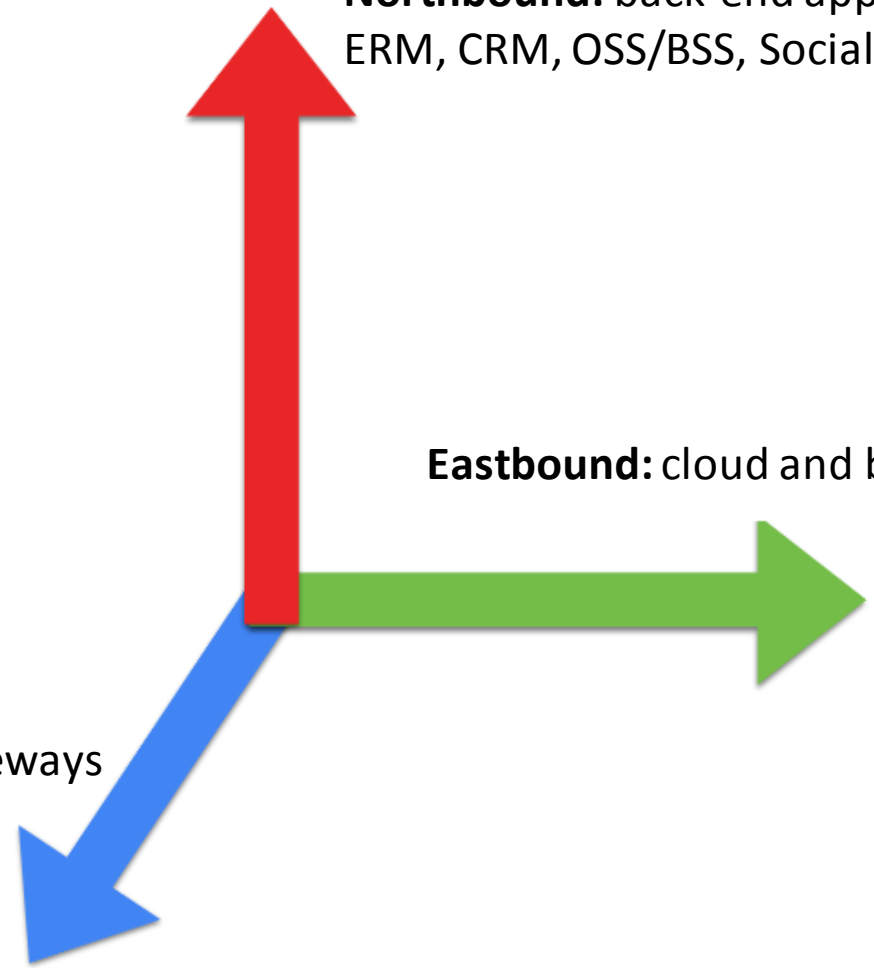
Dimensions for IoT interoperablity

Northbound: back-end apps, Analytics, ERM, CRM, OSS/BSS, Social



Eastbound: cloud and big data

Southbound: Devices, gateways and access technologies

WITS dnp TALQ dlms device language message specification LWM2M

OPEN INTERCONNECT ALLSEEN ALLIANCE 3GPP LoRa sigfox

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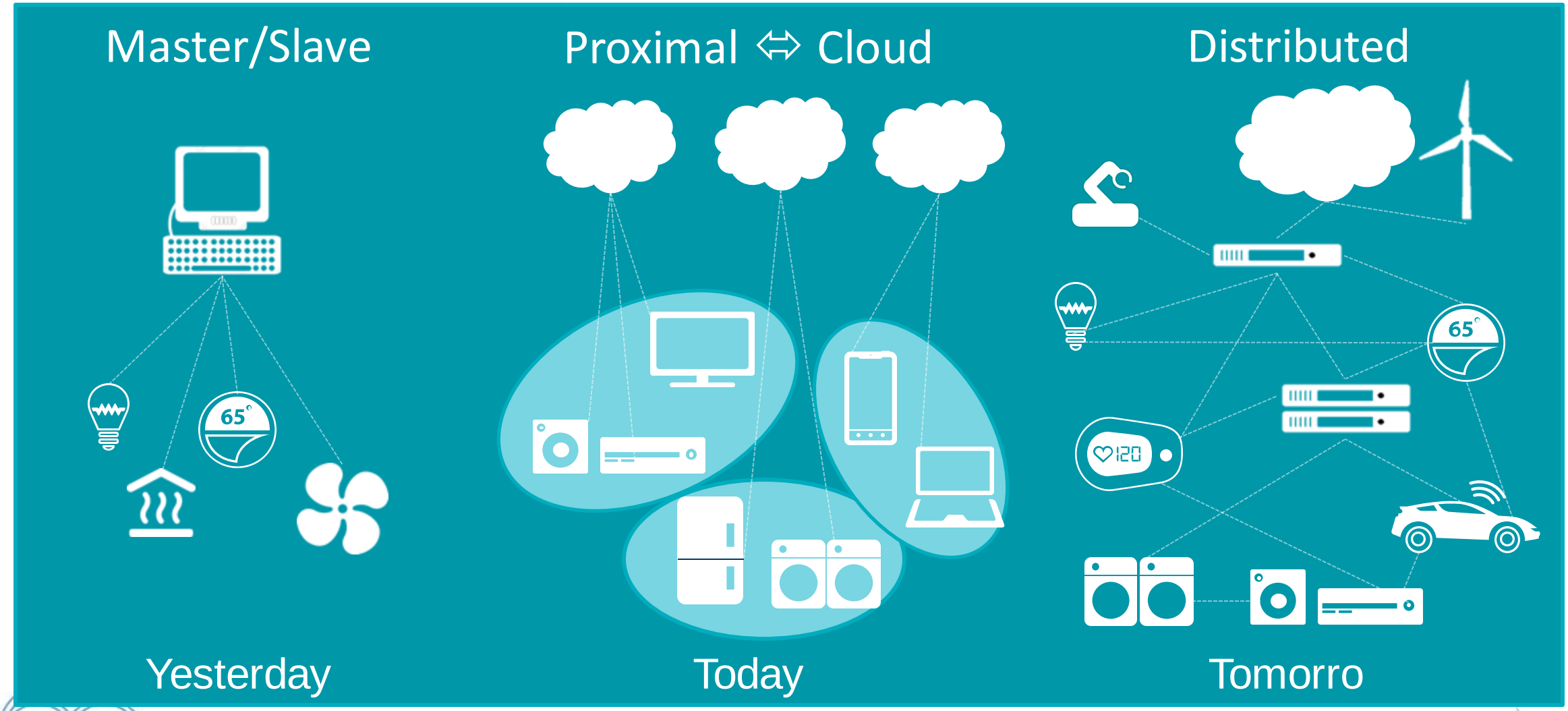
Trend in Evolution of M2M to IoT



Source: Qualcom

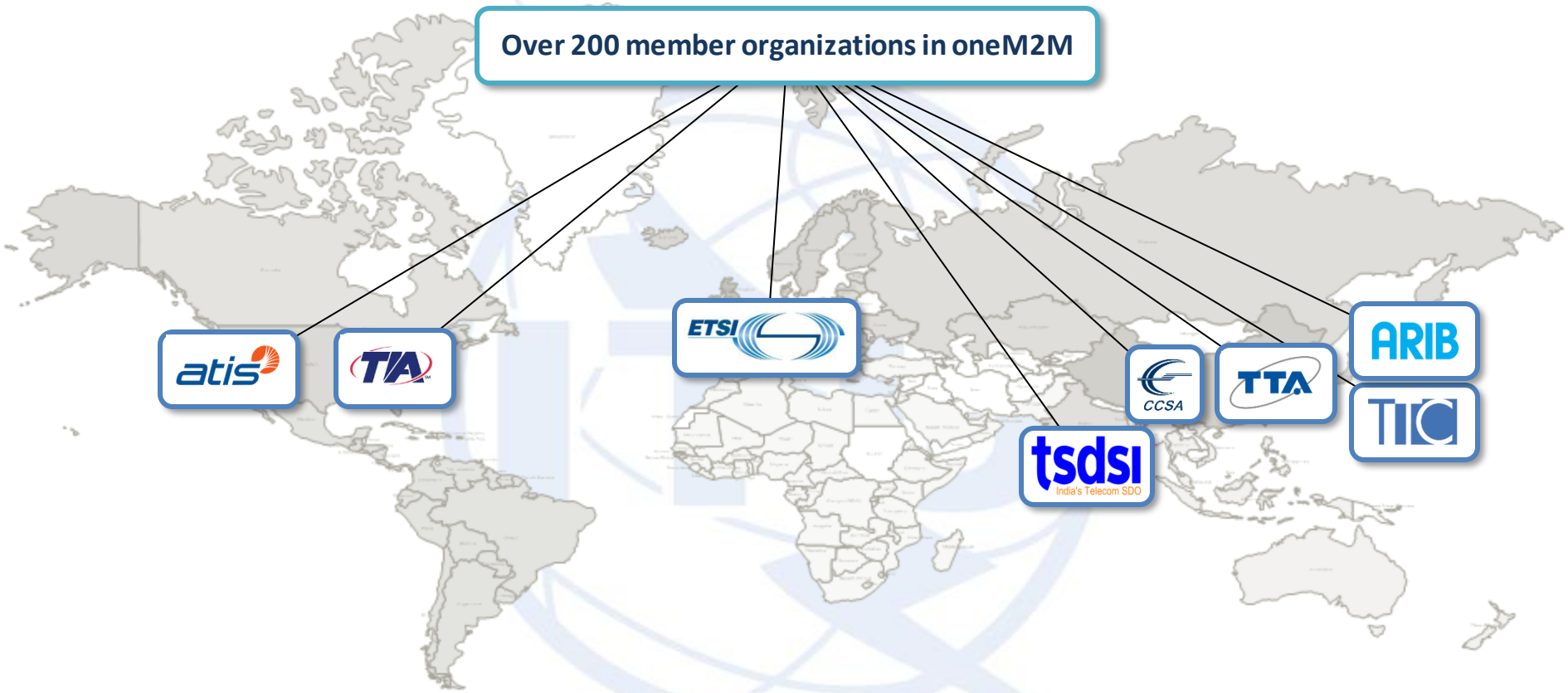
Proximal IoT

- Technologies in IoT with a focus on “proximal” functionality
  - Targeting mostly smart home / building automation / proximal network
  - Simplify connecting “things” in proximity (e.g. in building), monitor, control, automate, less focus on cloud or hierarchical structures
  - Enablers: Discovery, Advertisement, Introspection, On-Boarding
  - Need for multi-cast techniques to implement discovery & advertisement
  - A “user” is still in the center of this “proximal” paradigm (onboarding, usage)
- Examples
  - OCF (OIC, AllJoyn) with Open Source, Specifications
  - Several proprietary or open Home Automation technologies
  - Industrial space: OPC-UA (client/server), DDS (bus)

Distal IoT

- Technologies in IoT with a focus on “distal” functionality
  - Targeting larger scale deployments of M2M/IoT devices in an overlay network
  - Hiding complexity of network usage / routing / access control / sharing etc
  - Storing & sharing of data in distributed, hierarchical topology
  - Enablers: Proven security, access control, selective communications, addressing
  - Agnostic to underlying NW technology,
  - Desirable: Utilize optimizations for M2M / IoT, better efficiency in WAN usage
- Examples
  - oneM2M (open partnership of SDOs), specification openly available
  - Cloud components of proprietary or open Home Automation technologies
  - Proprietary platforms, ***“born in the cloud”*** stakeholders, massive system integration needs

oneM2M Partnership Project



cen CENELEC

broadband forum

oma Open Mobile Alliance

New Generation M2M Consortium

GLOBALPLATFORM

www.oneM2M.org

All document are publically available

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M2M Common Service Layer in a nutshell

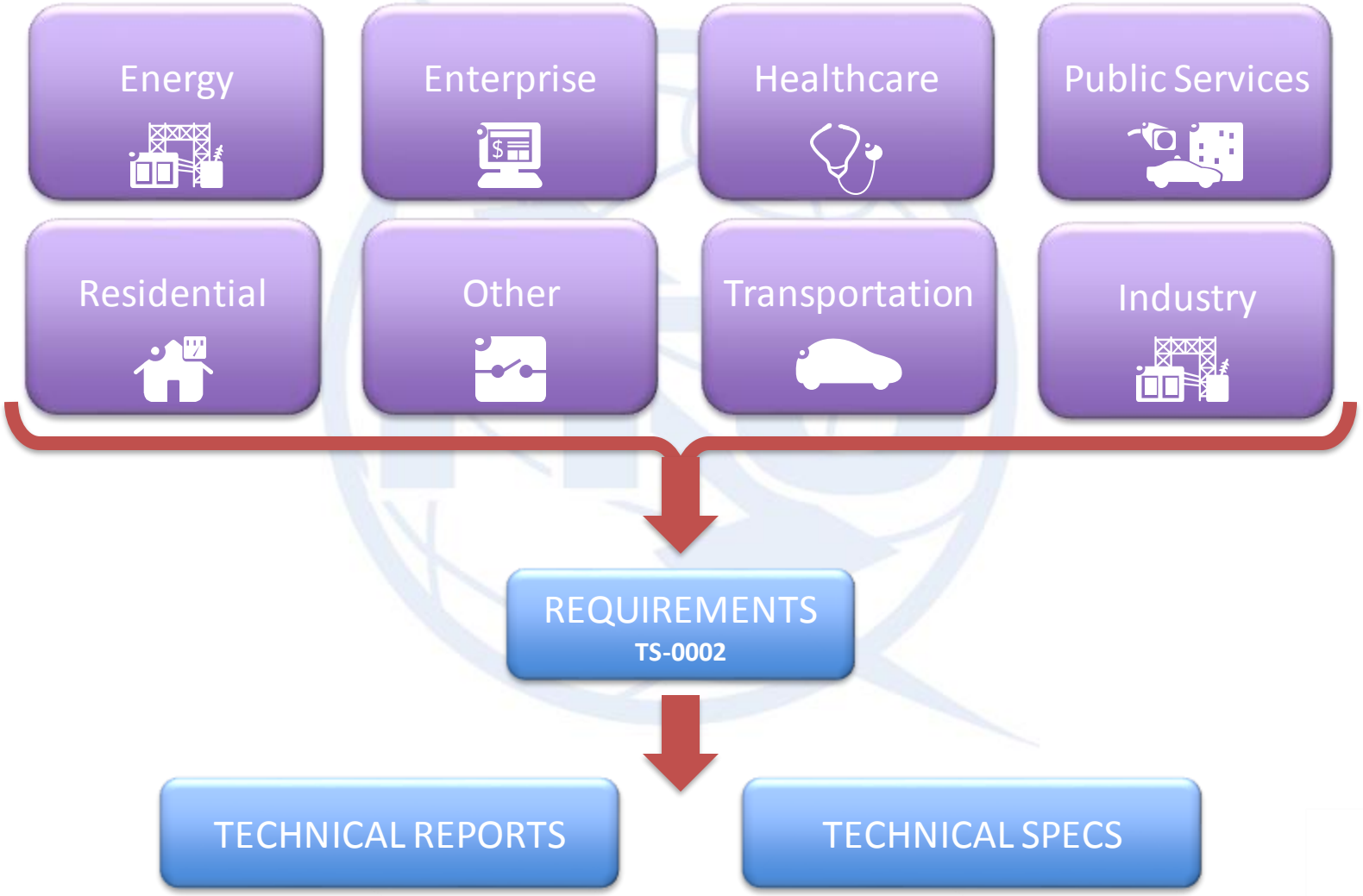
A software “framework”

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

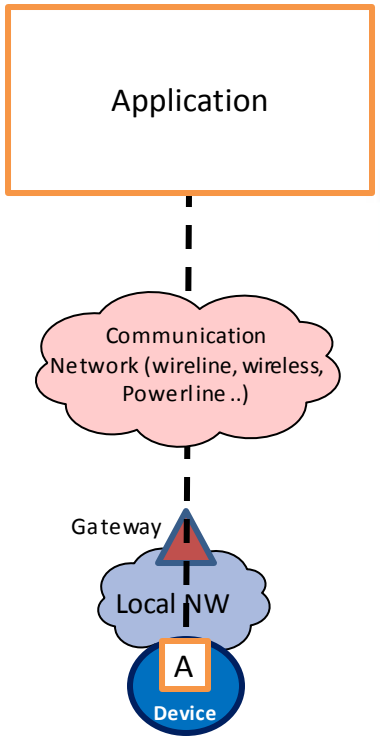
Work Process



oneM2M Architecture approach

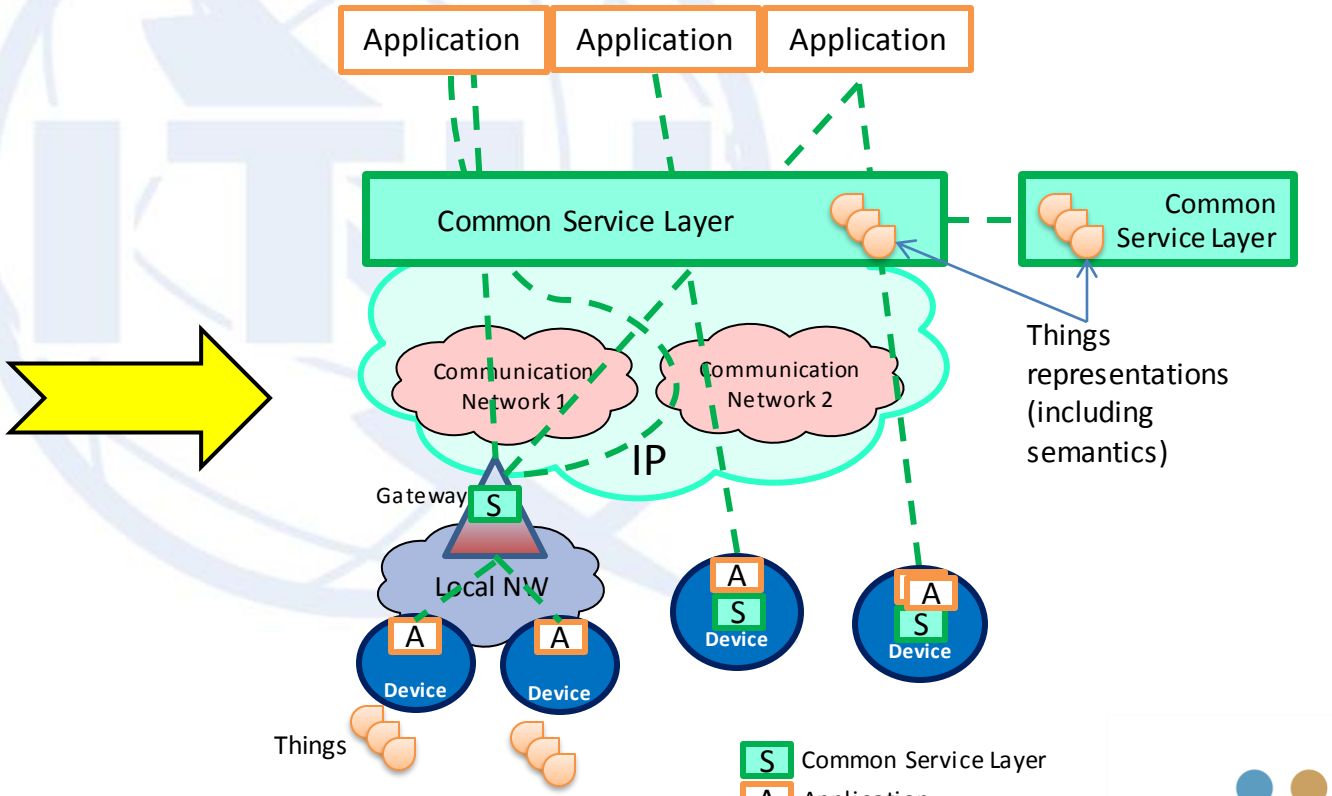
Pipe (vertical):

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



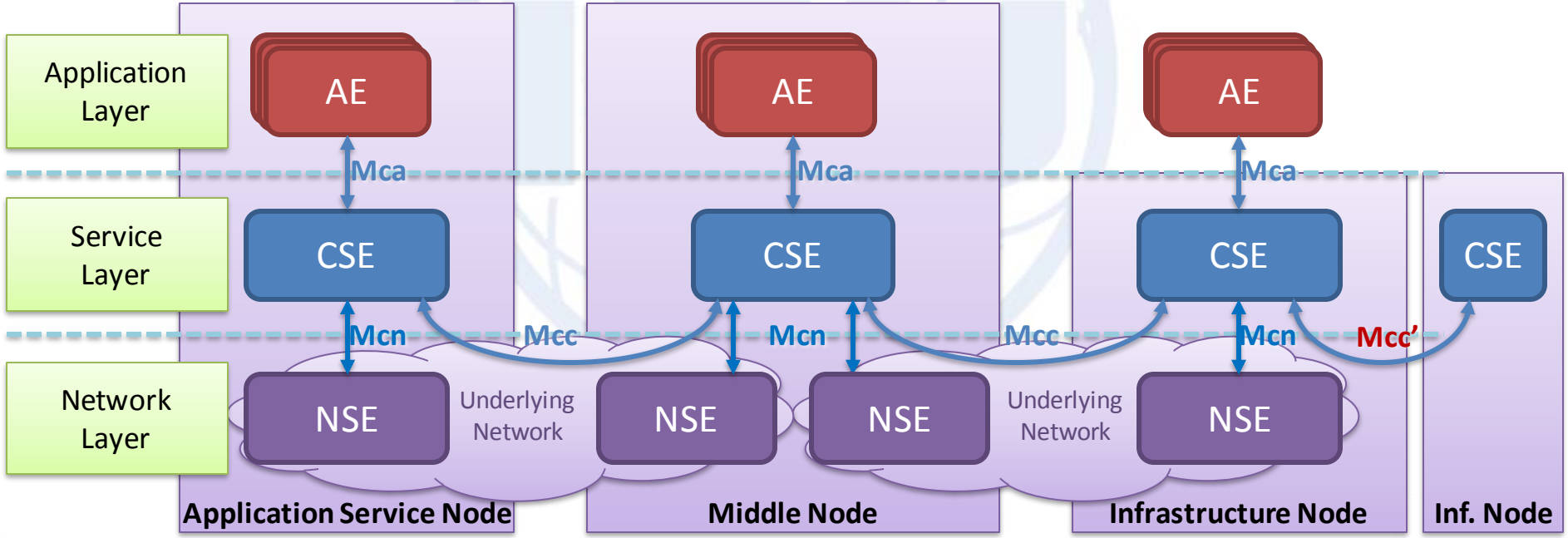
Horizontal (based on common Layer)

Applications share common service and network infrastructure
Multipoint communications



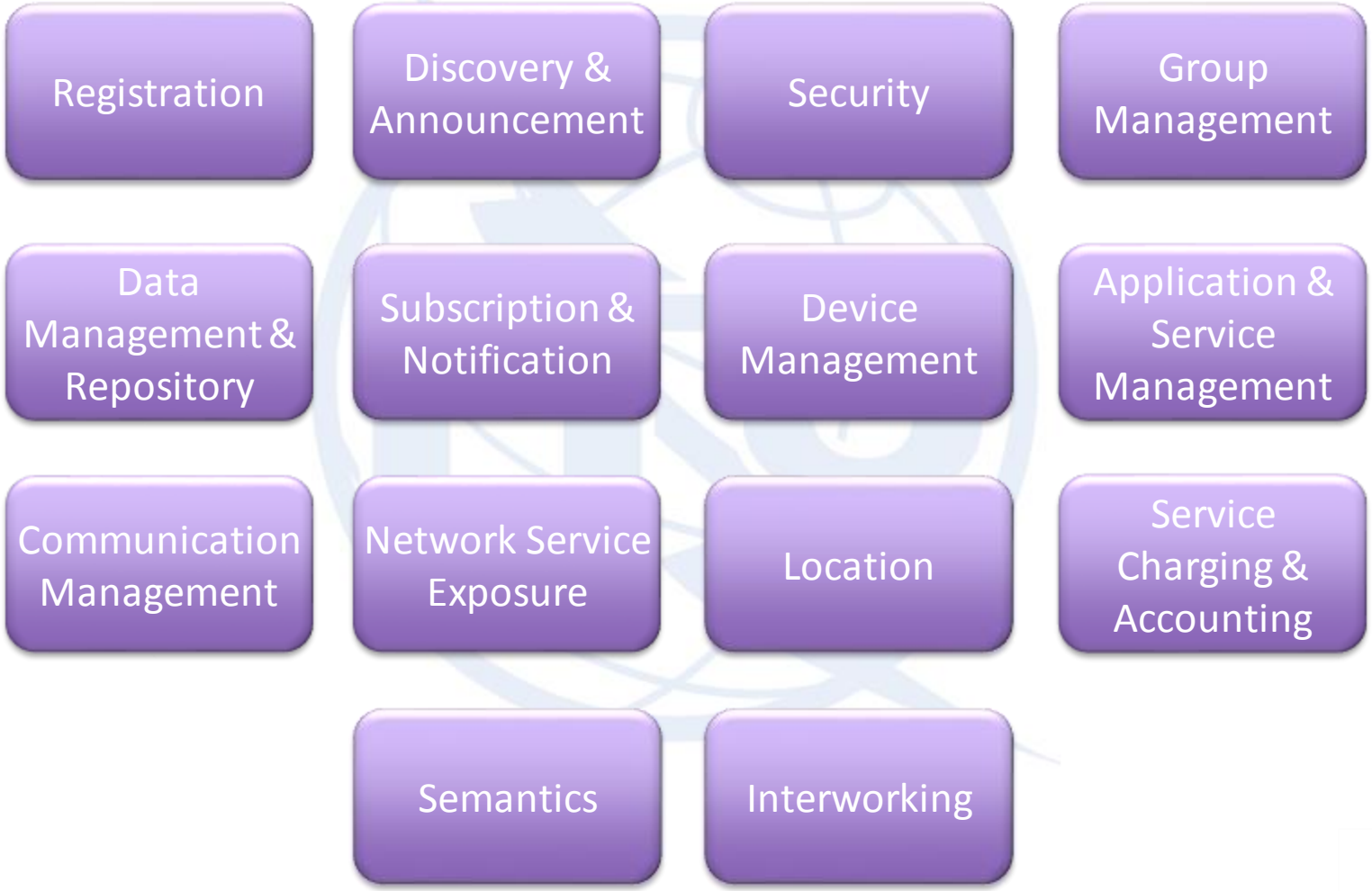
RESTful Architecture

Reference Point	One or more interfaces - Mca, Mcn, Mcc and Mcc' (between 2 service providers)
Common Services Entity	Provides the set of "service functions" that are common to the M2M environments
Application Entity	Provides application logic for the end-to-end M2M solutions
Network Services Entity	Provides services to the CSEs besides the pure data transport
Node	Logical equivalent of a physical (or possibly virtualized, especially on the server side) device

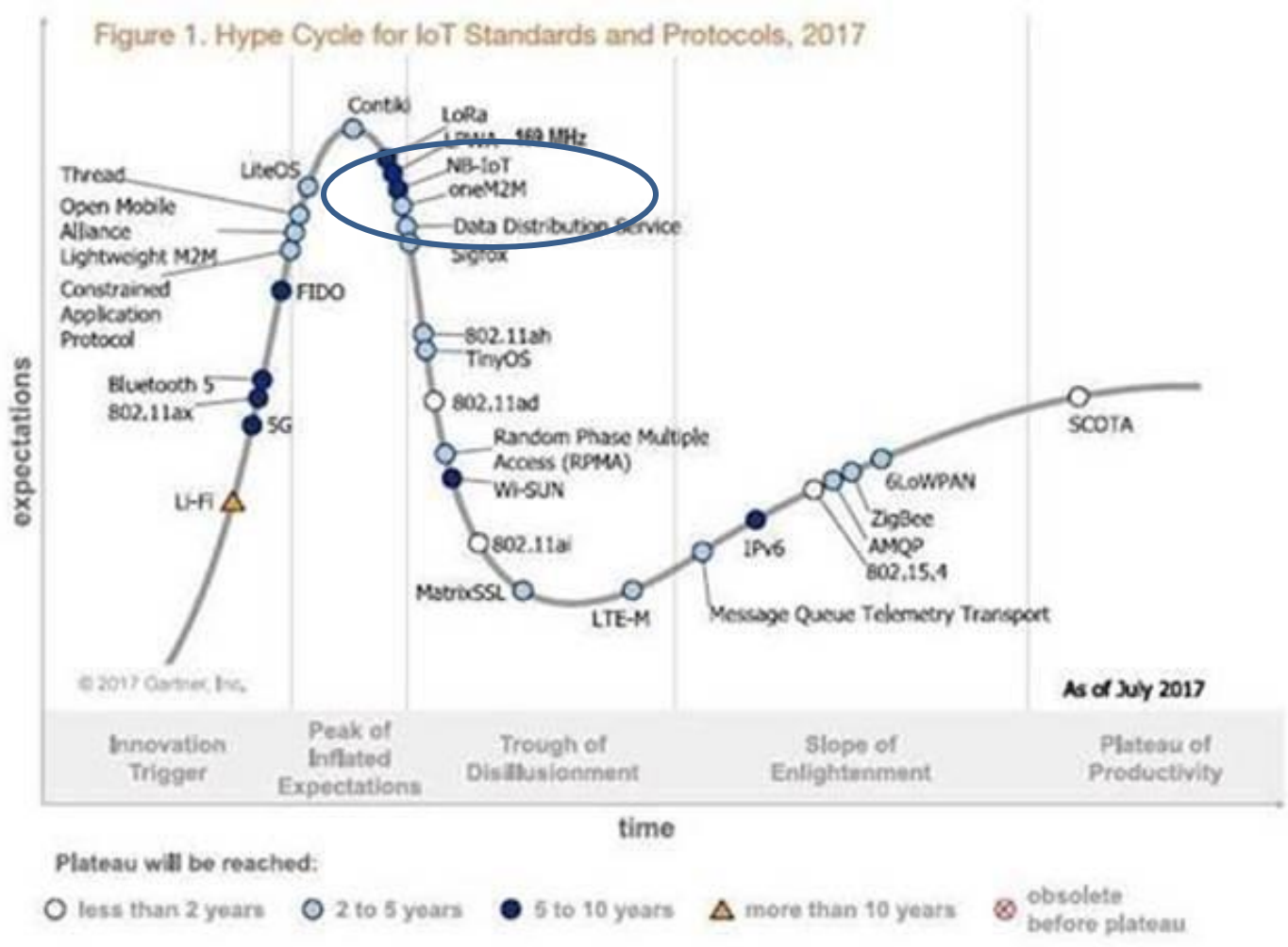


Multiple protocol bindings (HTTP, CoAP, MQTT, or WebSocket) over Mca, Mcc, Mcc'

Common Service Functions



IoT standards maturity

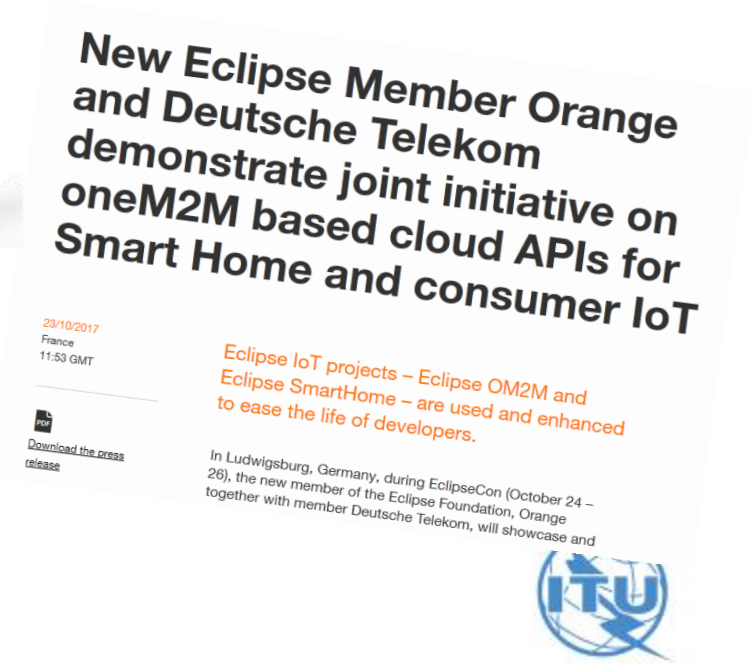


Source: Gartner

Example: Demo of Orange & Deutsche Telekom

oneM2M as unified API to operators' home gateways

- omeM2M APIs & data models: Abstracting out specifics of DT & Orange
- Applications independent of operators' home gateway
- Global standard backed by open source



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oneM2M implementations

Industry-driven Open source implementations

Announcements, Demos, Commercial implementations

4 interop. events so far, 5th coming up in December 2017

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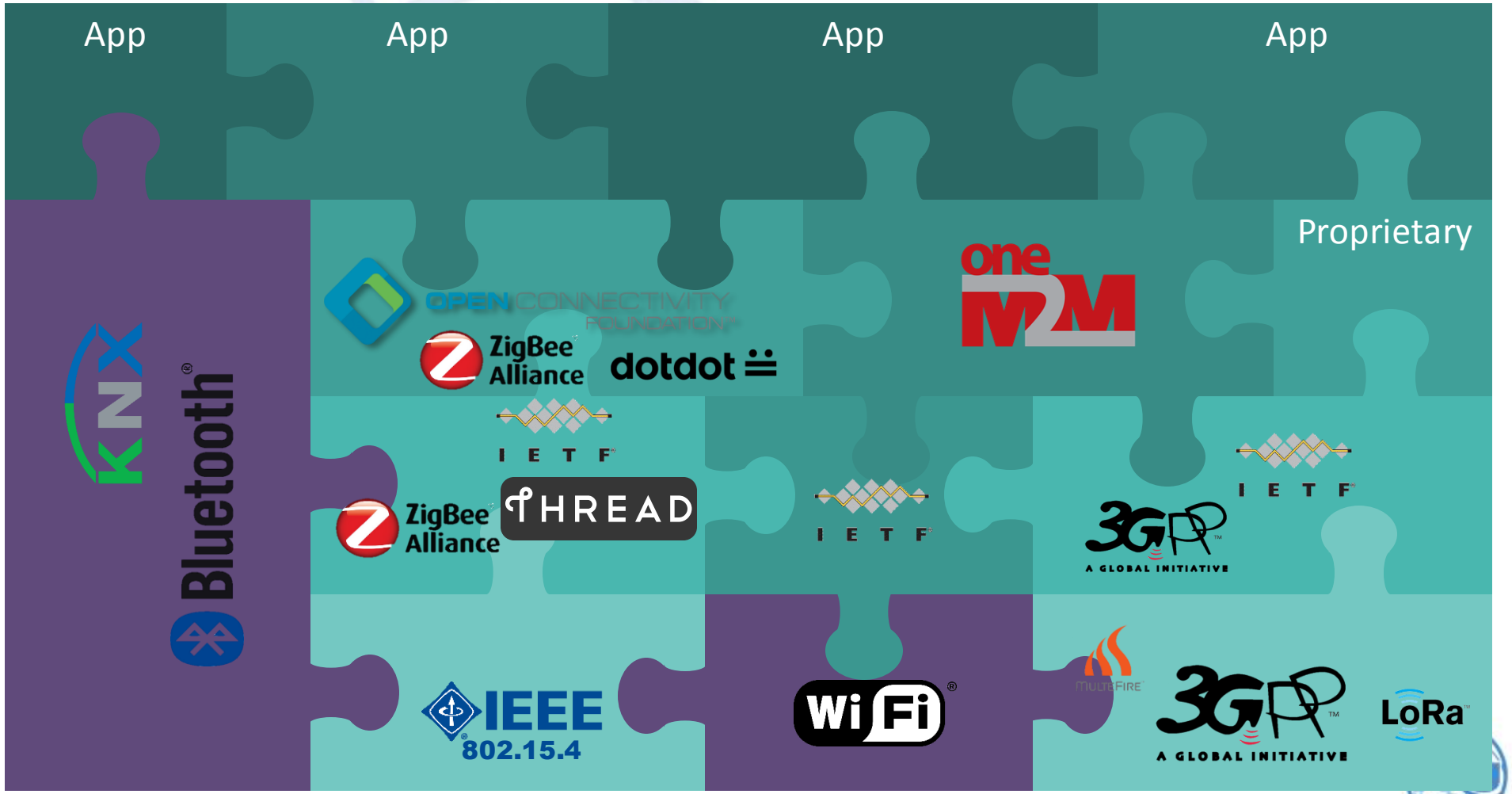
IoT is a Puzzle

Just need to put the matching pieces together



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Source: Qualcomm

ITUNews

The approach taken by SG20 is unique. It tackles the problem globally, considering not only IoT but also issues such as IoT's relationship to Big Data, and Identity Management in federated IoT environments.

Source: ITU News, Author: Dr. Omar Elloumi

Conclusion

- oneM2M submitted its technical specifications to ITU-T SG20 to seek endorsement as ITU-T recommendations
- Further convergence is key for mainstream standards based IoT
- IoT is here to stay,
  - Interoperability will make IoT accessible for use cases where cost was prohibitive so far
  - Standards for IoT avoid lock-in and help in building a home-grown & inclusive data economy
  - Interoperability, within and cross-domain, will increase value for IoT