



MACHINE TO MACHINE COMMUNICATIONS

MWC, Barcelona.
February 2011



- Home for Future Internet activities in ETSI

- “M2M is the key”

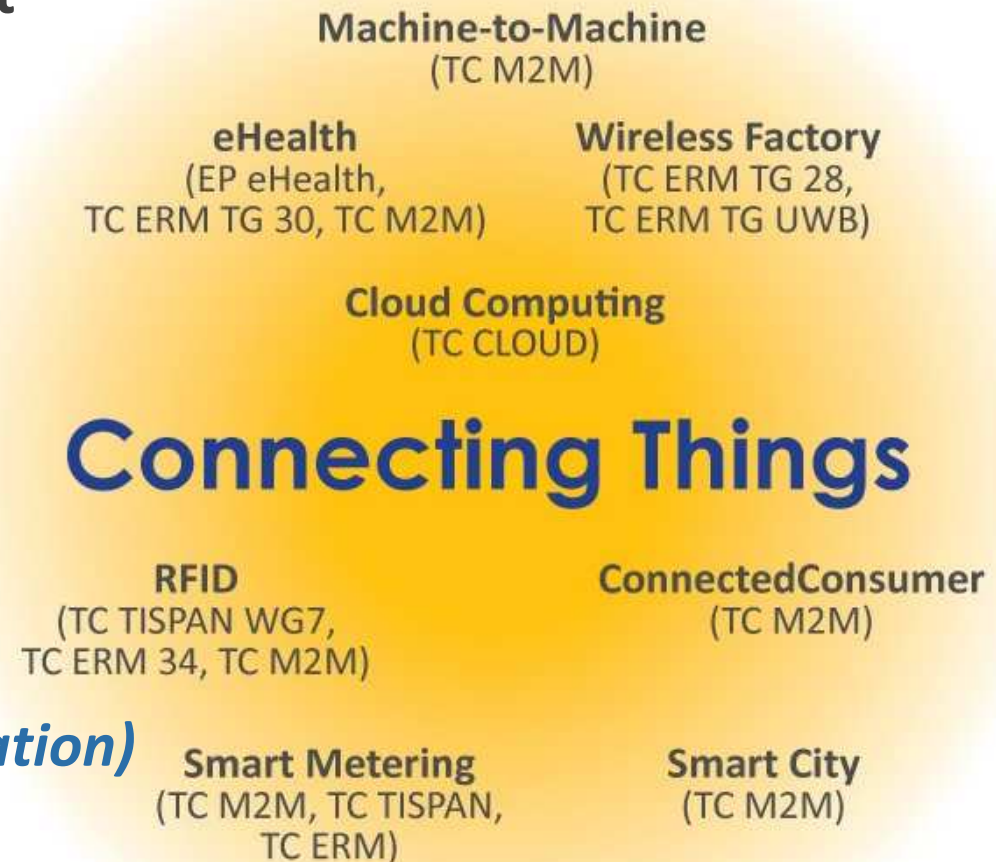
- eHealth (*domain*)

- CLOUD (*enabler*)

- Wireless Factory (*application*)

- RFID (*identification*)

- All things SMART (*domain*)

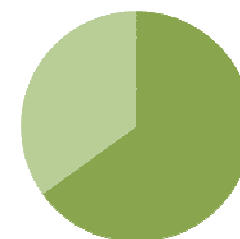




Mobile market becomes saturated

★ **4,9 Billion people already connected (7,08 Billion population)**

- Market is highly competitive
- High investments, and high churn,



65%

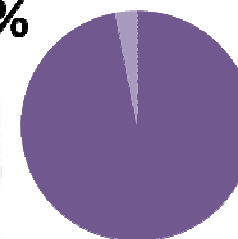


Connected machine market (green field)

★ **50* Billion connectable machines**

- Market is open to develop
- Low investment, high return
- Very little churn

1%



* Harbour



The ETSI M2M Vision



Connecting Things

**M2M Horizontal
Service Platform**

**Standards
re-use**

**Multi –
Application**

End to End

**Technology
Agnostic**

**M2M Service
Capabilities**





M2M Applications



Connecting Things

Telemetry

- Utility meters
- Parking meters
- Industrial meters
- Elevators
- Vending Machines

Fleet Management

- Cargo tracking
- Stock management
- Temperature control
- Route planning
- Order tracking
- Vehicle diagnostics

Service & Maintenance

- Industrial machines
- Vending machines
- ...

Security & Surveillance

- Public surveillance
- Asset monitoring
- Congestion and movement monitoring
- Urban management

Telematics / Vehicle

- Navigation
- Traffic / weather info
- Road safety
- Vehicle diagnostics
- Location services

Home Applications

- Heating control
- Electrical appliances
- Alarms and security
- Surveillance cameras
- Garage & garden

e-Health Applications

- Patient monitoring
- Remote diagnostics
- Activity monitoring
- Lifestyle suggestions
- Personal security

Sales & Payment

- POS terminals
- Vending machines
- Gaming & entertainment





M/441 Smart Metering Mandate



Connecting Things

- In March 2009 the European Commission issued the mandate to the three European Standards Organizations: CEN, CENELEC and ETSI.
- Objective: build standards to enable the interoperability of European smart meter deployments.
- Very aggressive schedule of 30 months;



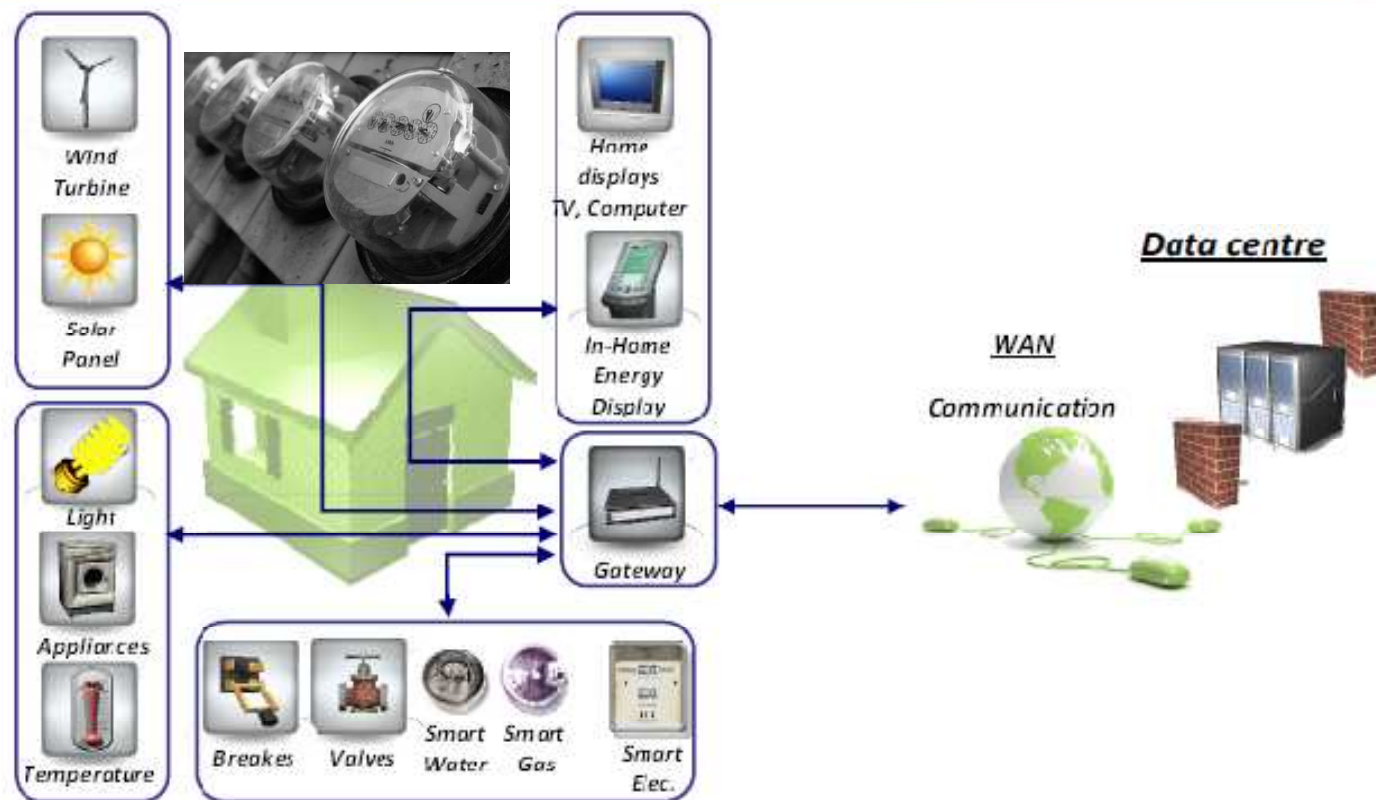
- Gap analysis of existing standards,
- Develop new smart metering standards,
- ETSI M2M coordinate the ETSI work on ICT for smart meters,
- Part of the eventual Smart Grid work.



Application #1 Smart metering



Connecting Things



- Consumption info,
- Fault details,
- Threshold management.

M2M use the Smart Meter profile as 'proof of concept' for the M2M service platform in Rel-1

- Remote Meter reading,
- Consumption management,
- Pricing info.



The ETSI M2M Challenge



Connecting Things

- Existing M2M solutions are highly fragmented and typically dedicated to a single application (e.g. fleet management, meter reading, vending machines).
- Multitude of technical solutions and dispersed standardization activities result in the slow development of the global M2M market.
- Standardization is a key enabler to remove the technical barriers and ensure interoperable M2M services and networks

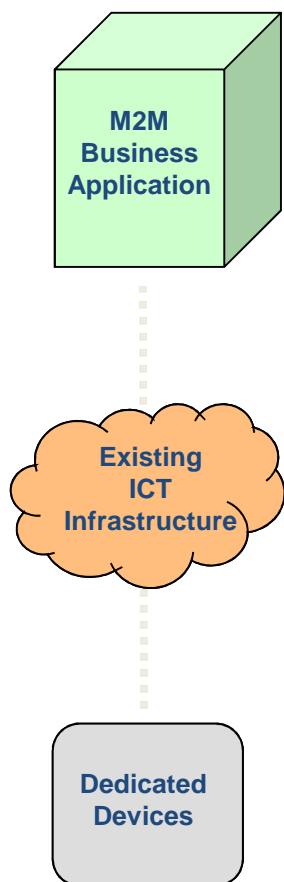


Inverting the pipes

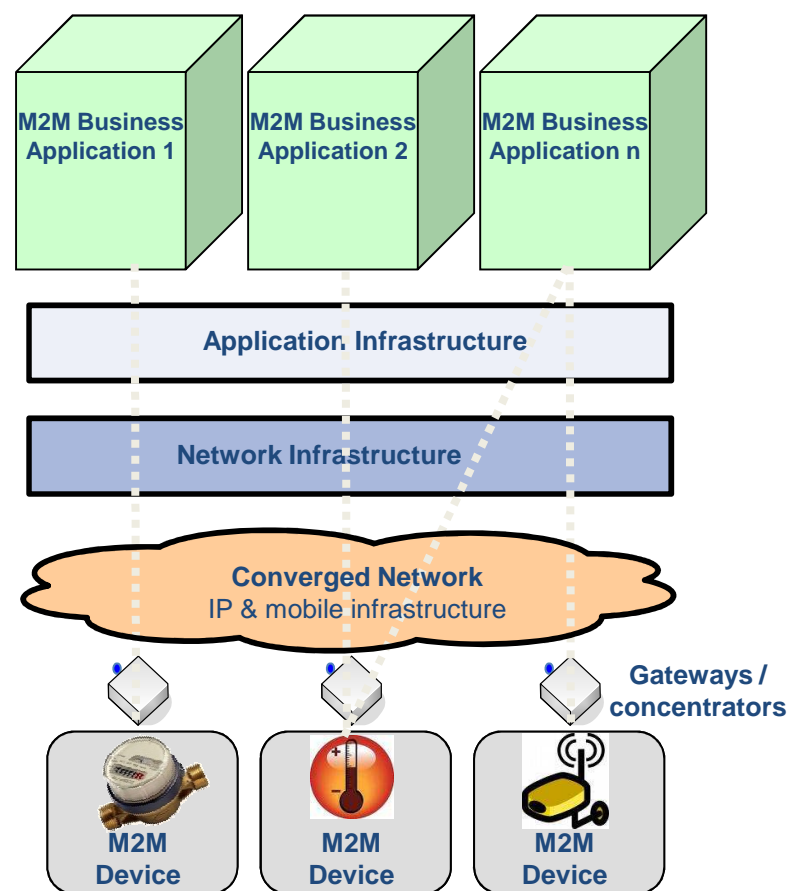


Connecting Things

Existing proprietary
'stand alone' vertical applications



Multiple applications share common
infrastructure, data and resources



Source: HP



Key M2M Elements



Connecting Things



M2M Device

- Device capable of replying to request for data contained within those devices or capable of transmitting data autonomously.



M2M Area Network (Device Domain)

- Provide connectivity between M2M Devices and M2M Gateways, e.g. personal area network.



M2M Gateway

- Uses M2M capabilities to ensure M2M Devices inter-working and interconnection to the communication network.



M2M Communication Networks (Network Domain)

- Communications between the M2M Gateway(s) and M2M application(s), e.g. xDSL, LTE, WiMAX, and WLAN.



M2M Applications

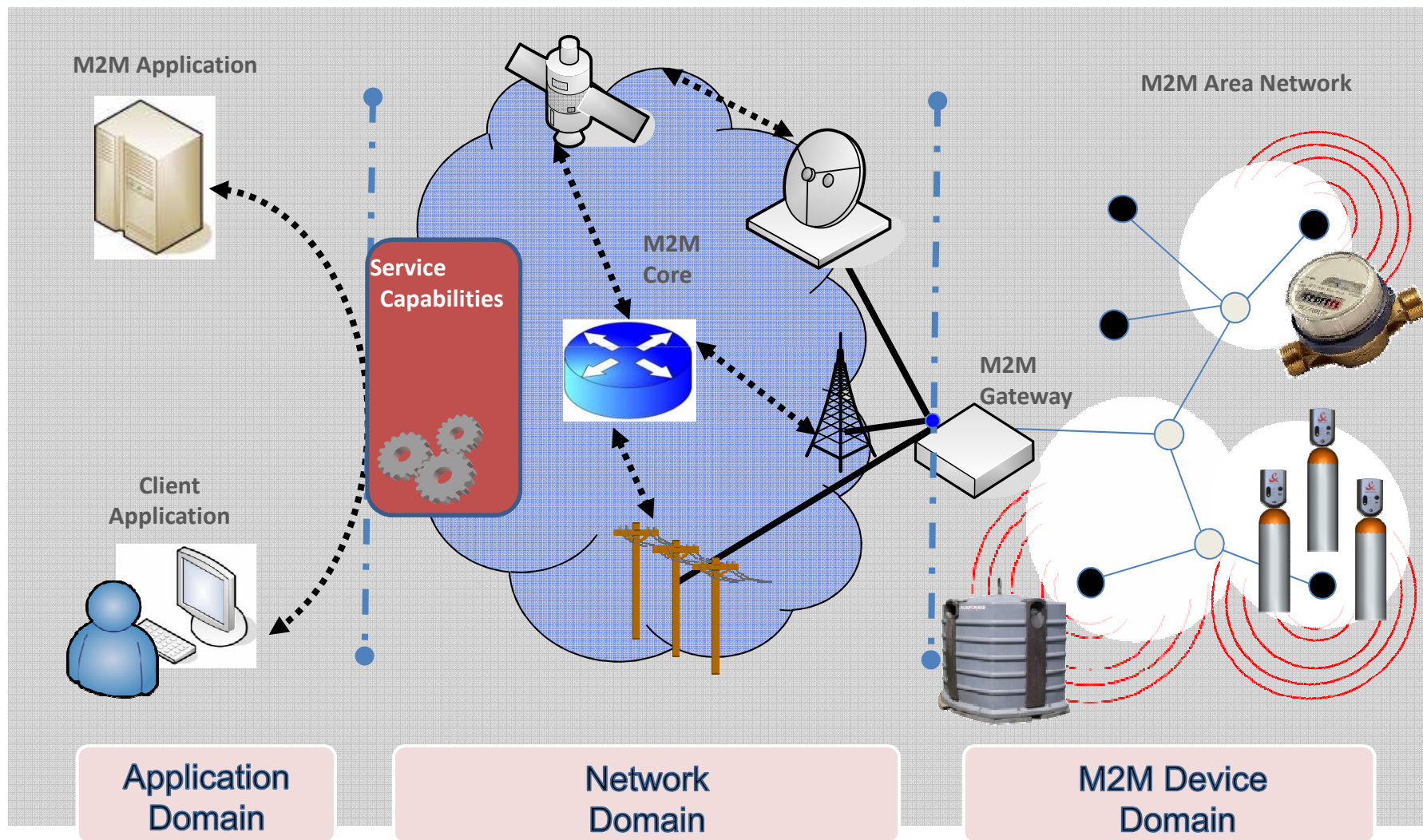
- Contains the middleware layer where data goes through various application services and is used by the specific business-processing engines.



Simple M2M Architecture



Connecting Things

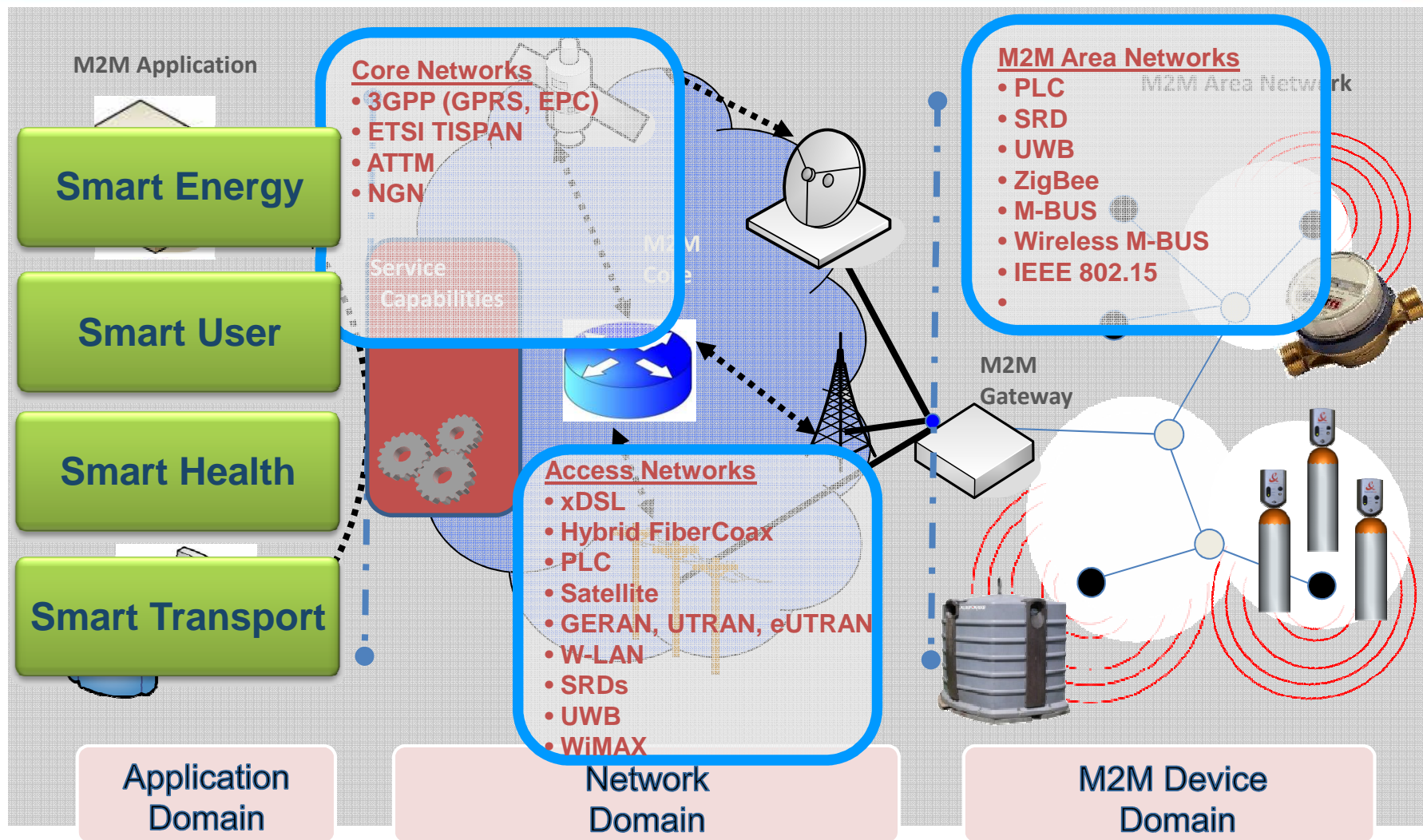




... based on existing Technologies



Connecting Things





M2M standards landscape



Connecting Things

M2M Applications



API

M2M Platform



SP networks
(access, core)



Gateway Layer



M2M area Network



M2M Device



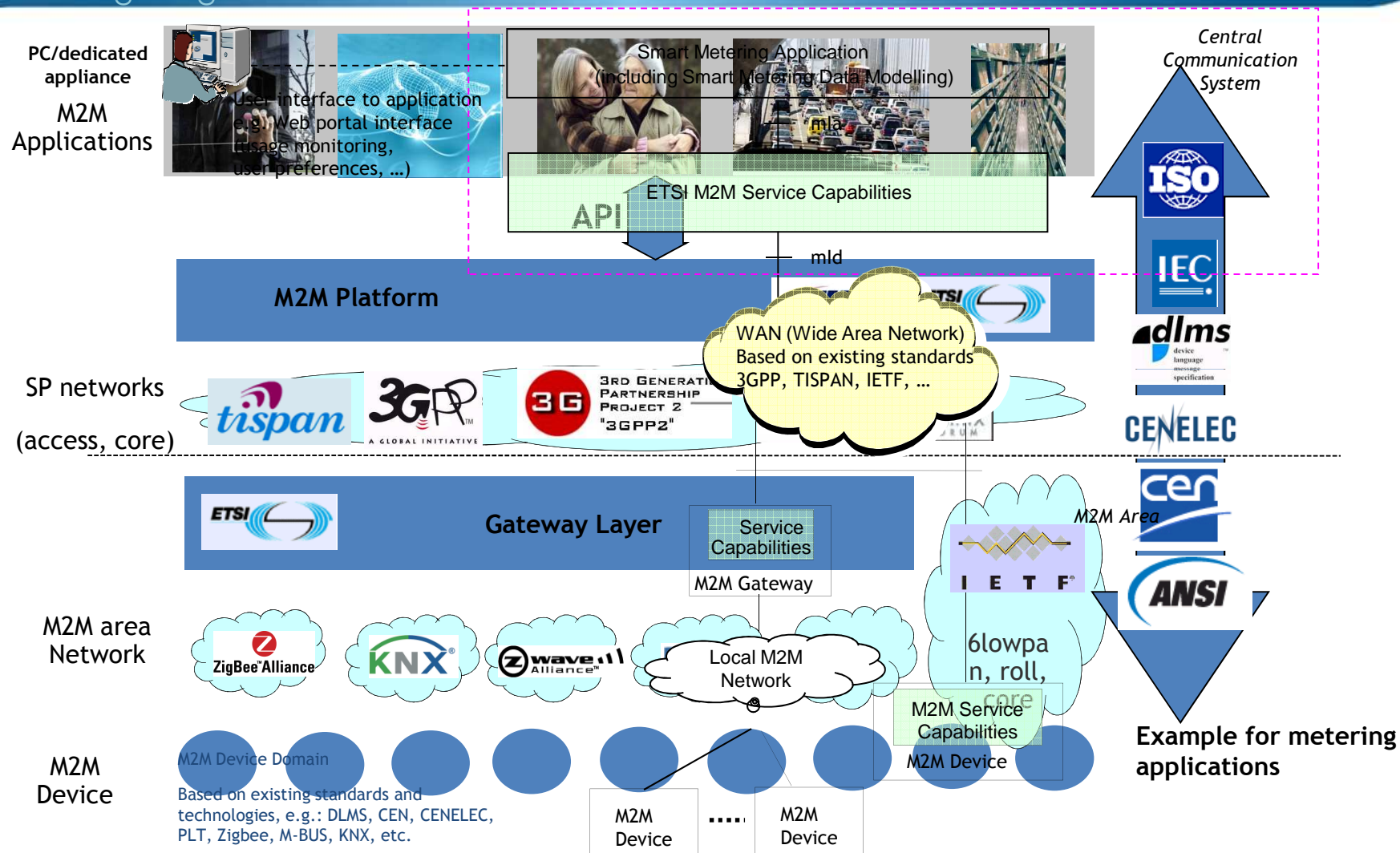
Example for metering applications



M2M high level system overview



Connecting Things





M2M high level system overview



Connecting Things

PC/dedicated
appliance



User interface to application
e.g. Web portal interface
(usage monitoring,
user preferences, ...)

Smart Metering Application
(including Smart Metering Data Modelling)

mla

ETSI M2M Service Capabilities

mlD

Central
Communication
System

WAN (Wide Area Network)
Based on existing standards
3GPP, TISPAN, IETF, ...

mlD

M2M Area

Service
Capabilities
M2M Gateway

Local M2M
Network

M2M Service
Capabilities
M2M Device

dla

M2M
Device

M2M
Device

M2M Device Domain

Based on existing standards and
technologies, e.g.: DLMS, CEN, CENELEC,
PLT, Zigbee, M-BUS, KNX, etc.

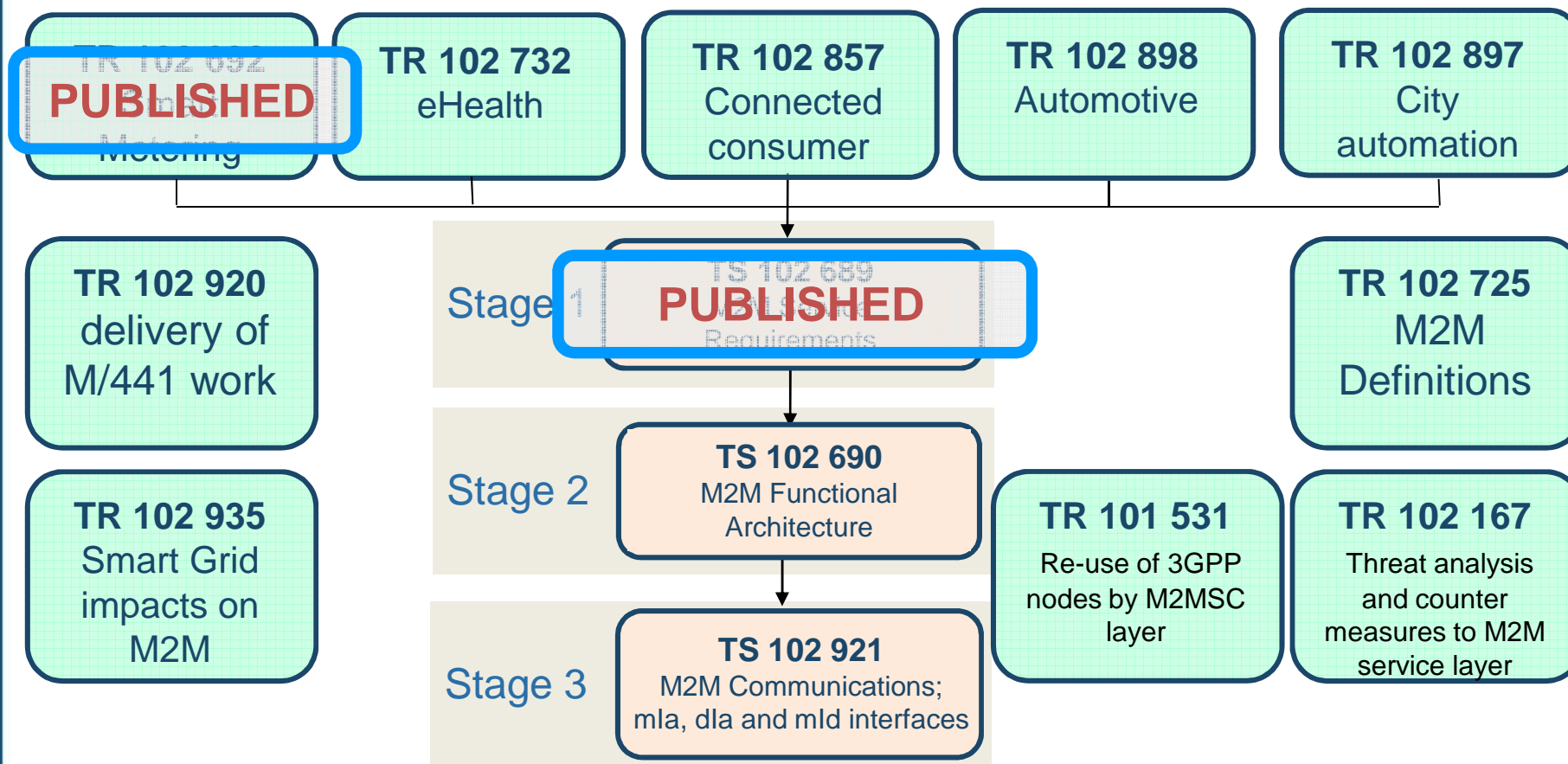


Work Methodology



Connecting Things

Use Case Technical Reports





TC M2M Release 1 Plan



Connecting Things

1

Stage 1 (requirements) Q3 2010

□ Requirements:

- Based on several M2M use cases
- Published: August 2010

2

Stage 2 (architecture) Q3 2011

□ Architecture:

- Key capabilities identified
- Message flows documented
- Identified key interfaces for release 1 stage 3 (detailed specification)

3

Stage 3 (protocols) Q4 2011

□ Protocols:

- Stage 3 work on three main interfaces: mld, dla and mla



ETSI M2M: Key Events



Connecting Things

- **October 2010 : 1st ETSI M2M Workshop. Agora, Sophia Antipolis.**
 - More than **220** attended,
 - Collected output fed into ETSI M2M requirements.

- **April 2011 : 1st ETSI Smart Grid Workshop. Agora, Sophia Antipolis.**
 - Examining the architecture for Smart Grids,
 - Presentations from EU (Commission), US (NIST), China (State Grid) and Japan .

- **October 2011 : 2nd ETSI M2M Workshop. Agora, Sophia Antipolis.**
 - Presenting the M2M Release 1 package,
 - Examining future requirements of M2M standardization,
 - Feedback from early implementations of M2M solutions.

- Information on events <http://www.etsi.org/WebSite/NewsandEvents/events.aspx>



Conclusions



Connecting Things

- M2M related technologies are already in place and the market has massive potential for growth, Integration is key.
- Operators, integrators and vendors have expressed the strong desire to standardize the end to end M2M service platform.
- Regulation in Europe, USA and Asia is pushing for standards based solutions for the Smart Meter / Grid, Internet of things.
- Global standards are essential for the long term development of M2M communications and for full interoperability of networks and services.



QUESTIONS & TAPAS

... And some extra slides

UICC form factor for M2M



- ETSI Smart Card Platform (SCP) committee has specified two UICC form factors designed to meet the requirements of M2M applications (see ETSI TS 102 671)
- Existing form factors and their easy removability were synonyms of weak connection between the UICC and the device
- They could not withstand the constraints of an industrial environment with higher shock and vibration, temperature amplitude and humidity.
- In addition, a UICC used for M2M applications is likely to have a longer life than a "regular" UICC. This requires:
 - support for a larger amount of erase/update cycles
 - a longer data retention time

M2M form factor - TS 102 671 defines



- Two form factors, one for direct attachment to a PCB, the other for insertion in a new socket type.
- Both solutions answer the need of a vibration and shock resistant mechanical interface between the M2M device and the UICC.
- Includes a set of environmental classes for:
 - Vibrations
 - Shock
 - Moisture and Humidity
 - Temperature
 - Corrosion and Fretting Corrosion
 - Data retention time
 - Minimum erase/updates cycles

M2M in 3GPP, The Motivation



- 3GPP is currently working on M2M (Machine Type Communications) in Release 10. The principle motivators include:
 - Provide network operators with lower operational costs when offering machine-type communication services
 - Reduce the impact and effort of handling large machine-type communication groups
 - Optimize network operations to minimize impact on device battery power usage
 - Stimulate new machine-type communication applications by enabling operators to offer services tailored to machine-type communication requirements
- The work aims mainly at optimizing LTE to support the new MTC traffic and new applications.

M2M in 3GPP, Requirements (Ts 22.368)



Low Mobility

- MTC Devices that do not move, move infrequently, or move only within a certain region

Time Controlled

- Send or receive data only at certain pre-defined periods

Time Tolerant

- Data transfer can be delayed

Packet Switched (PS) only

- Network operator provides PS service with or without an MSISDN

Online small Data Transmissions

- MTC Devices frequently send or receive small amounts of data.

MTC Monitoring

-  Not intend to prevent theft or vandalism but provide functionality to detect the events

Offline Indication

- For detecting the condition when it is no longer possible to establish signalling between the MTC Device and the network

Jamming Indication

- Require timely notification when an MTC Devices is being jammed due to an intentional broadband interferer


Priority Alarm Message (PAM)

- For the need of immediate attention, e.g. theft or vandalism

Extra Low Power Consumption

- Improving the ability of the system to efficiently service MTC applications

Secure Connection

-  Convey communication when some of the devices are connected via a roaming operator

Location Specific Trigger

- Intending to trigger MTC device in a particular area, e.g. wake up the device

Group based MTC Features

-  MTC device may be associated with one group