8th ITU Symposium
"ICTs, Environment and Climate Change"

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Smart utility connectivity

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Challenges

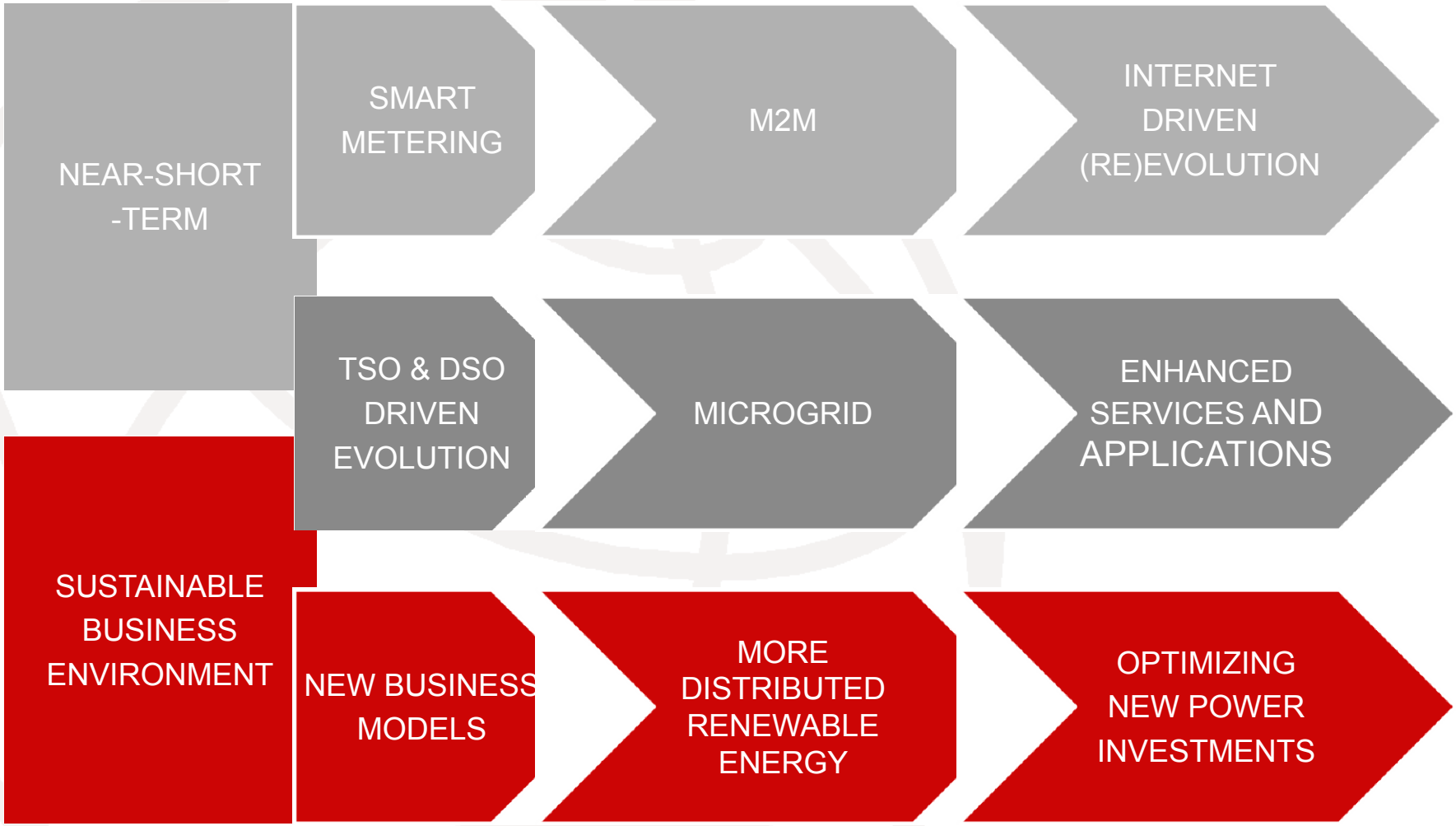
GOVERNMENTS & REGULATORY

NEAR-SHORT-TERM

RENEWABLES & INNOVATION

SUSTAINABLE BUSINESS ENVIRONMENT

SUSTAINABLE BUSINESS ENVIRONMENT



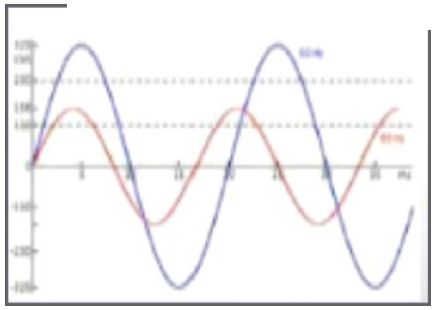
Next 5-10 Years

Source: Funkschau

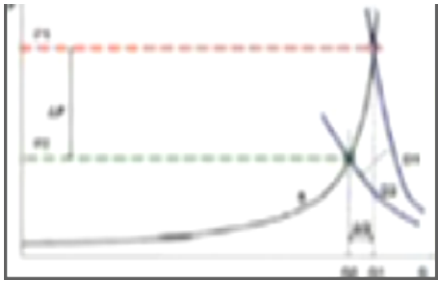
M2M

Interconnecting Wind-Farms

Meter Evolution from Electricity-Water-Gas-Heating



Grid synchronization/
synchrophasors

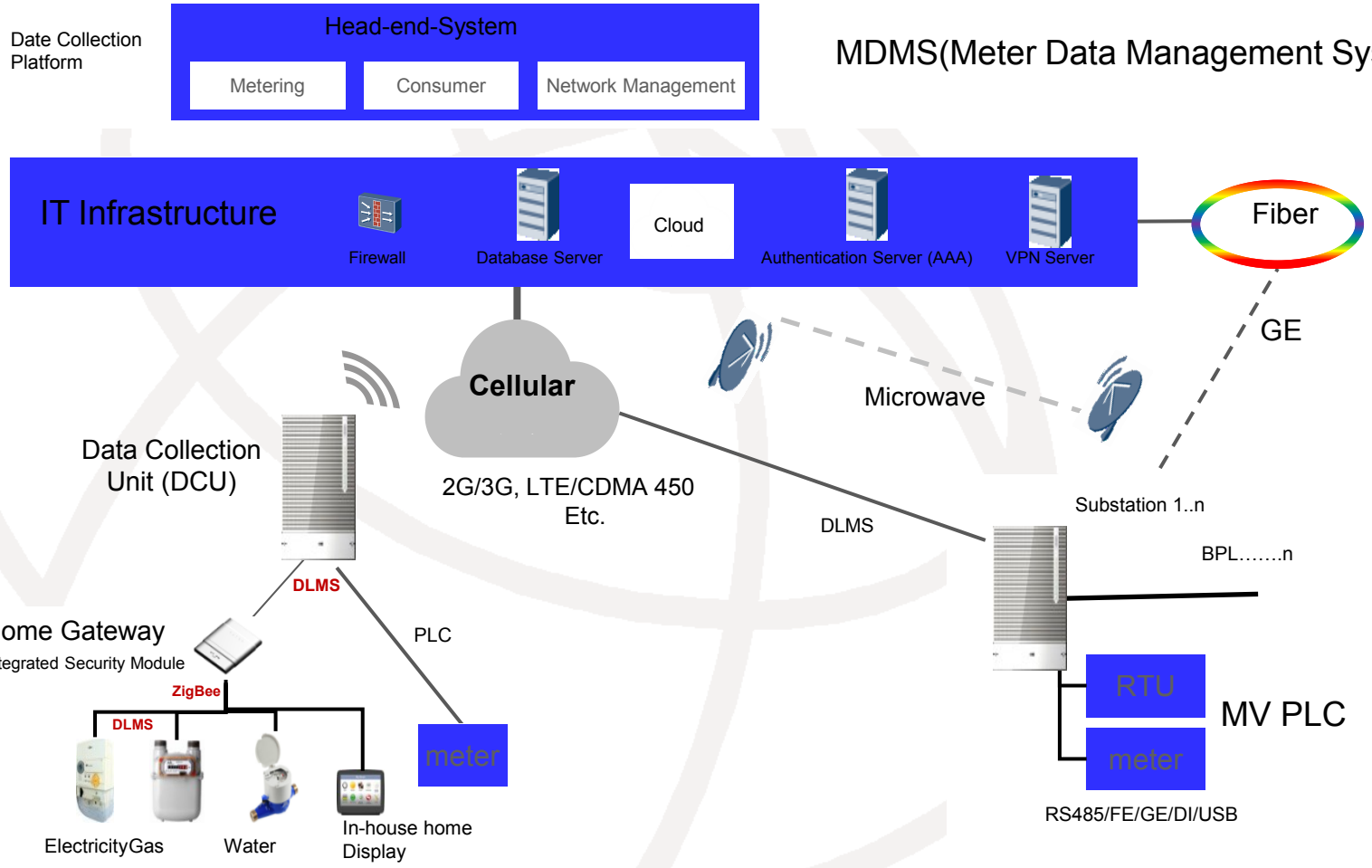


Demand and Response

Islanding/micro grids

2013 2014 2015 2016 2017

AMI Requirements are not aligned



Technology Innovation for Smart Grid

Reliability
Availability
Efficiency

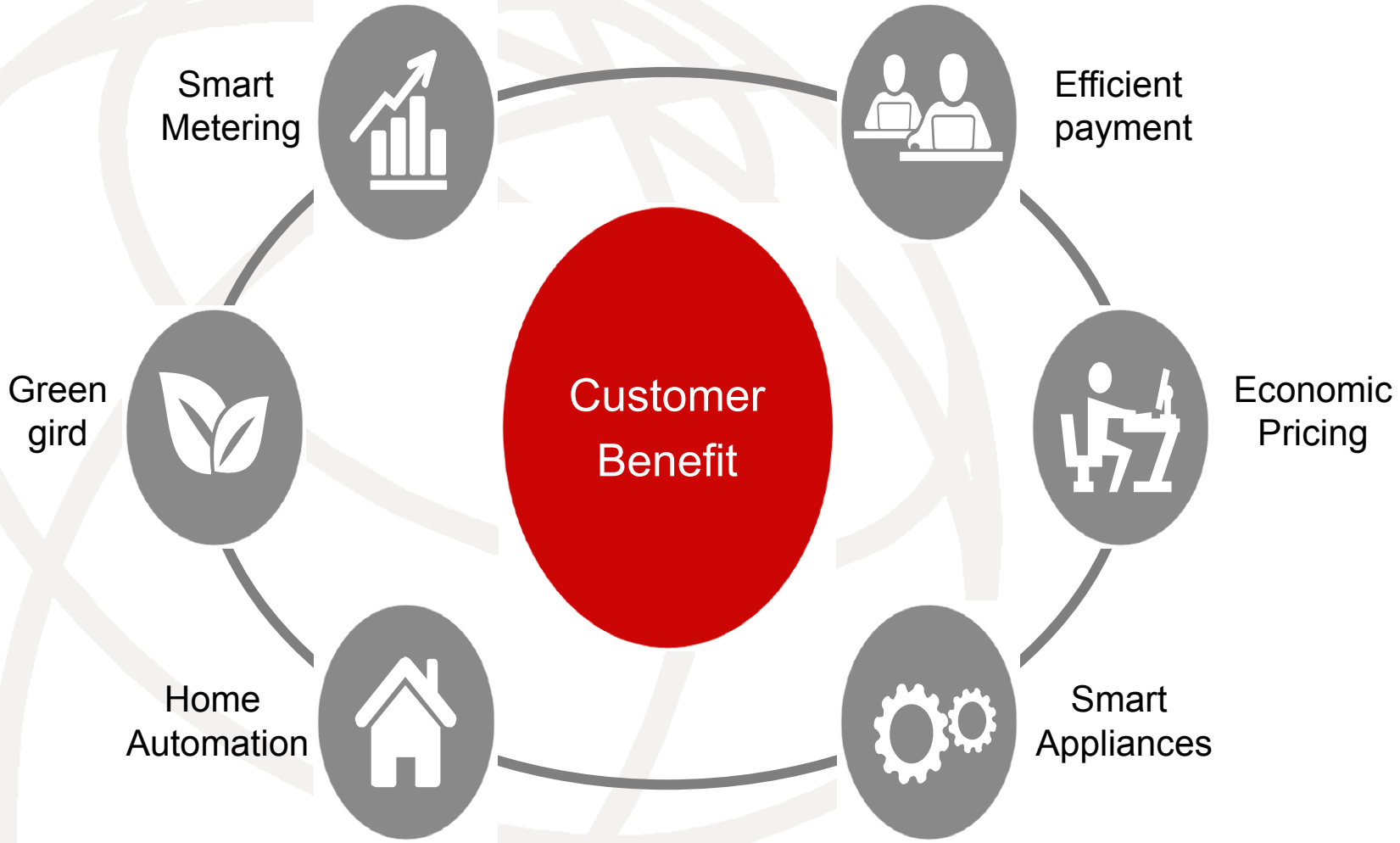
Cyber security

Integration/
Plug and play
Grid components

Communication
(ubquitous connectivity
and high bandwidth)

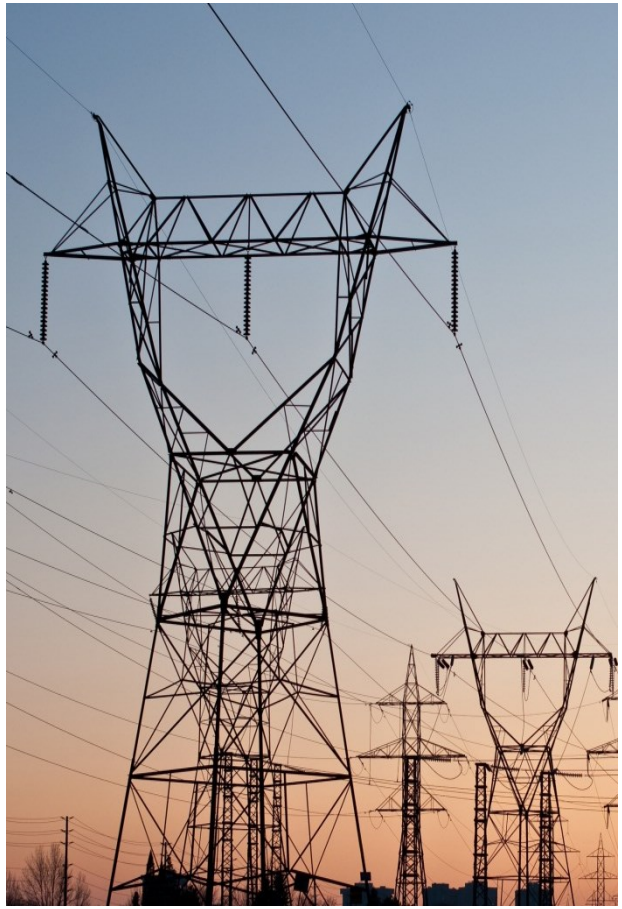
Developing a base for
Advanced machine
learning in the grid

Smart grid success components for consumers



Smart Grid and it‘s Role in energy Networks

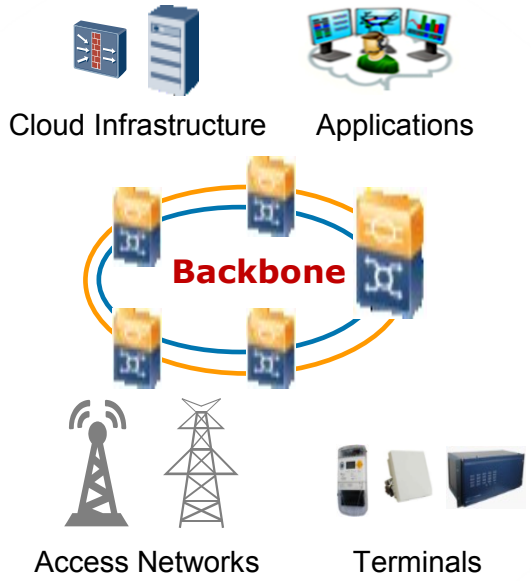
Present and Future Challenges		
	Network Reliability	Intelligent Asset Management
	Renewable and Distribution Energy Generation	Improving Utility Operations
	Increased Cost transparency	Enhanced Customer Satisfaction



Communication Networks become Multi-X capable

Multi-Services
- Measure
- Control
- Voice
- Video
- Messaging
- Machine-Type

Multi-Utility
- Electricity
- Gas
- Oil
- Water
- Communication



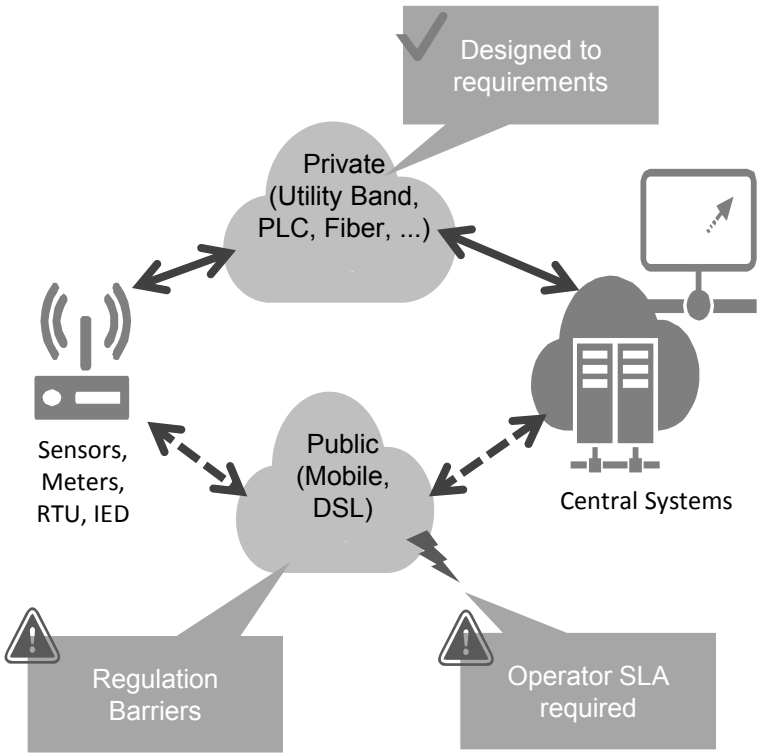
Multi Stakeholder
- Producer
- Transportation
- Distribution
- Consumer
- Service Provider
- Content Provider

Multi-Processes
- Business Processes
- Market & Trading
- Operation

Advanced Infrastructure & Services Offerings Requires:
Service Oriented IT Architecture & Cloud Infrastructure (XaaS)
Advanced QoS handling in Communication Networks
100% security and integrity of private data in shared medium

Machine Type Communication
New Challenges Require New ICT Solutions

Public	Private	**Sensor Networks (Telemetering)**
✓	✓	Ultra Low Power Consumption (battery) or remote powered nodes
✓	✓	Ultra-Low Traffic: **Bits** (instead of Gigabits) per second
✓	✓	Long Latency accepted: Message delivery within **hours**
Public	**Private**	**Control Networks (Telecontrol)**
⚠	✓	Ultra-Reliable (100%) physically redundant communication (e.g. via public backup)
⚠	✓	Ultra-low latency in Milliseconds (e.g. line protection)



Private Communication Infrastructure Designed to Specific Customer Requirements
Can Outperform Public Infrastructure specially for Control Networks

Comparison of Downlink Communication

No.	Spec. Name	PLC（S-FSK）	PLC（OFDM）(G3 & PRIME)	RF/ZigBee	RS-485
1	Applied Scene	High density	All	Disperse, but not too far	Centralized
2	Transmission rate	2.4kbps	33.4kbps(G3) 128.6kbps(PRIME)	9.6～250Kbps	1200-9600bps, theoretically up to 10Mbps
3	Transmission distance	500m	8km（MV） 220m（LV）*	200m ~ 600m, open field up to 1000m	≤1200m
4	Success rate of one collection	About 70-85%	95%	≥85%	100%
5	Success rate of cycle collection	≥95%(period of 1 day)	99%(period of 1 day)	≥95%(period of 1 day)	100%(period of 1 day)
6	Cost	Low	Medium	Medium	High

Comparison of Uplink Communication

Technology	xPON	Public Network 2G/3G
Advantage	•High capacity •Far transmission distance •Low latency •Strong privacy	•No network deployment and maintenance •Good coverage •Mature industry chain
Disadvantage	•Difficult or unable deployment •Long deployment cycle •High one-time investment	•Resource sharing with public •Poor privacy •Low reliability and security •Low bandwidth •Incapable for Service Development •Subject to 2G/3G telecom operator

SMART

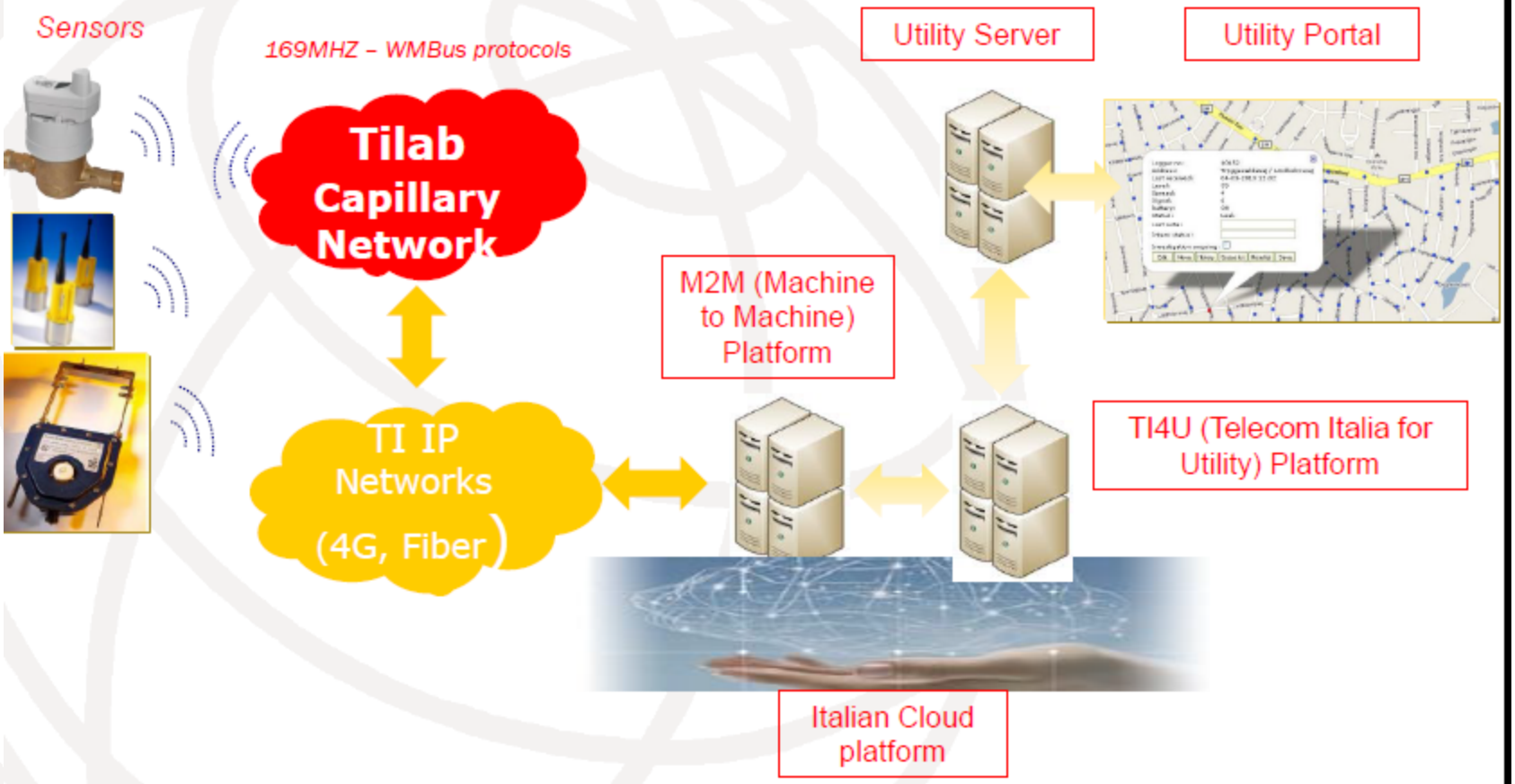
GRID

CITY

WATER

SMART WATER

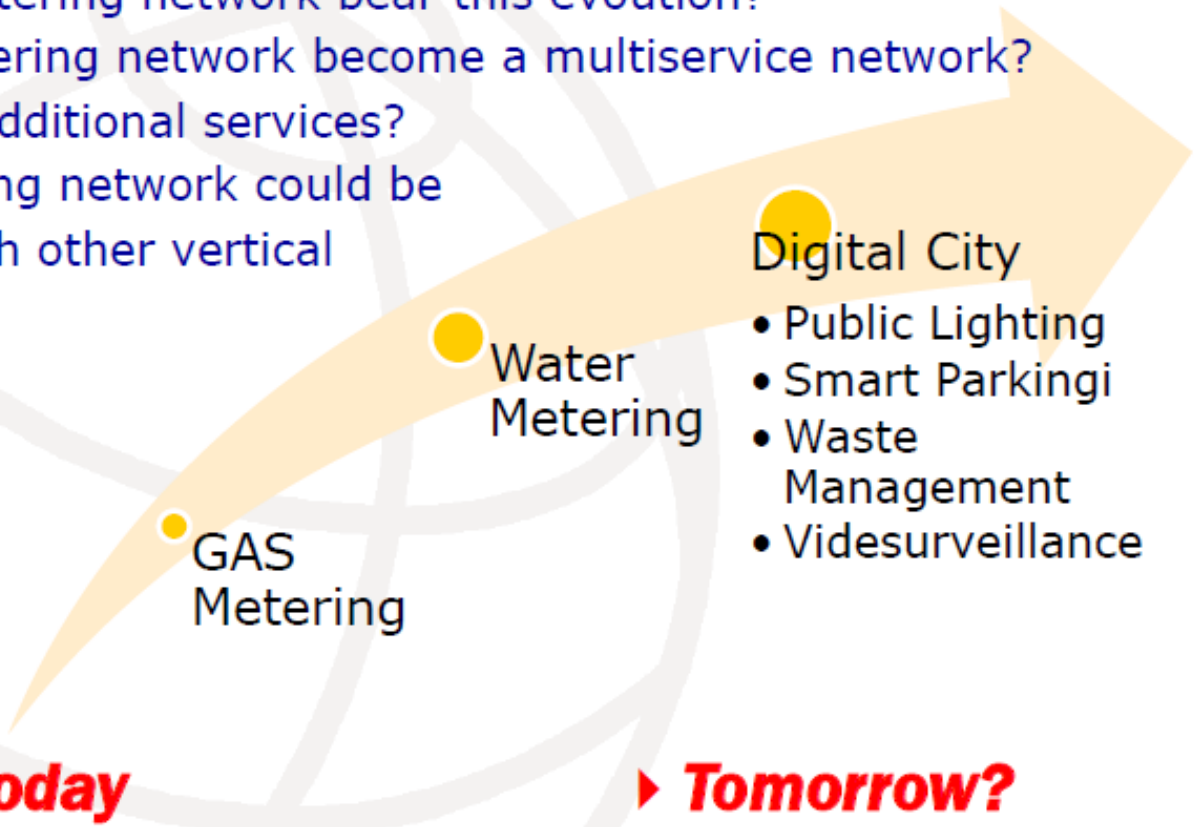
Architectural view of the Smart Water test bed in TI Lab



SMART……..

The Capillary Network business case: An evolution of the Smart Metering Network ?

- Can the gas metering network bear this evoution?
- Can a multimetering network become a multiservice network?
- Which are the additional services?
- How the metering network could be integrated with other vertical networks ?



ITU- T SG5 activities related to SMART

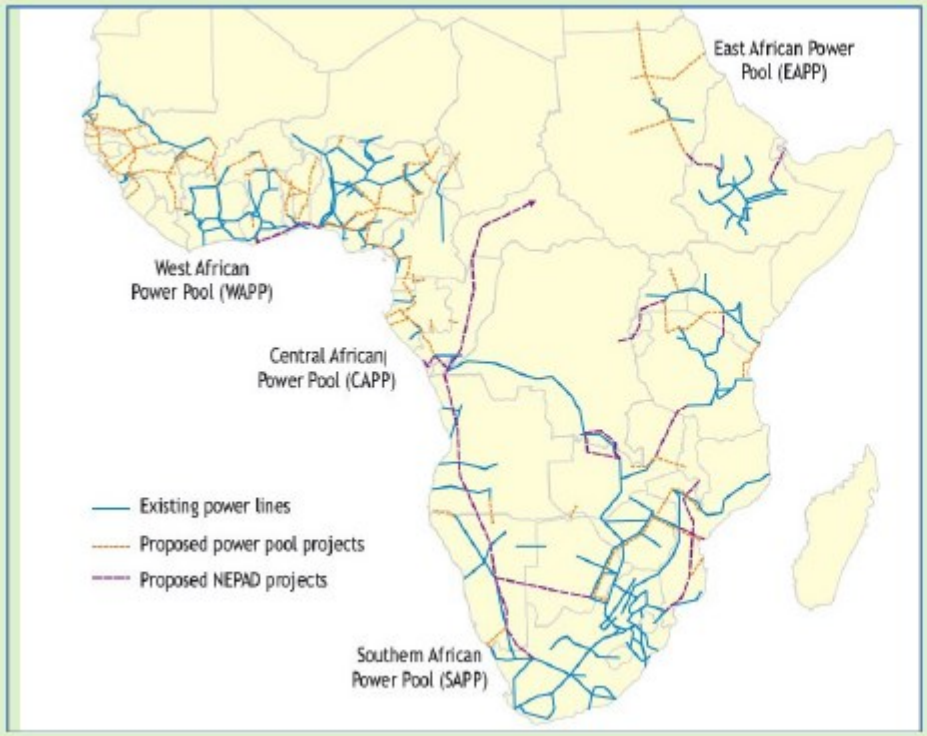
- **Q14/5** Setting up a low-cost sustainable telecommunication infrastructure for rural communications in developing countries
- **Q15/5** ICTs and adaptation to the effects of climate change
- **Q17/5** Energy efficiency for the ICT sector and harmonization of environmental standards

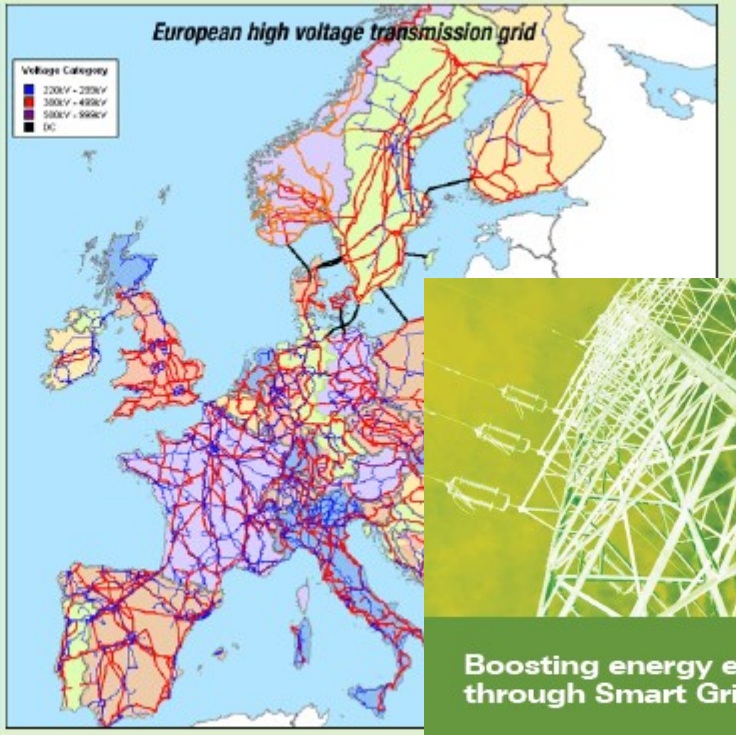
Q14/5 standards solution for rural communications

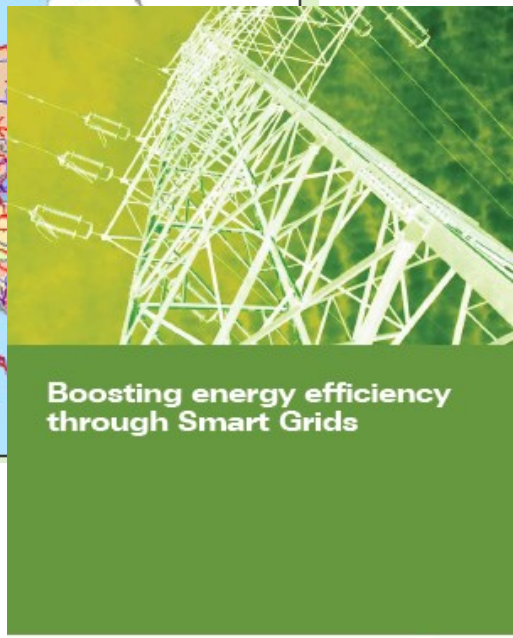
A sustainable way to utilize smart grid benefit also in rural area

Why smart grids

- . **While Smart Grids may provide an efficient mechanismto address the massive electricity infrastructure building requirements,**
- ***Just Grids will help guarantee access to modern energy services without marginalizing the* poor.**







Q15/5: Adaptation to climate change

- A extension of Smart grid concept
  - Smart water management
  - Smart weather control

Q17/5 Not only Energy efficiency

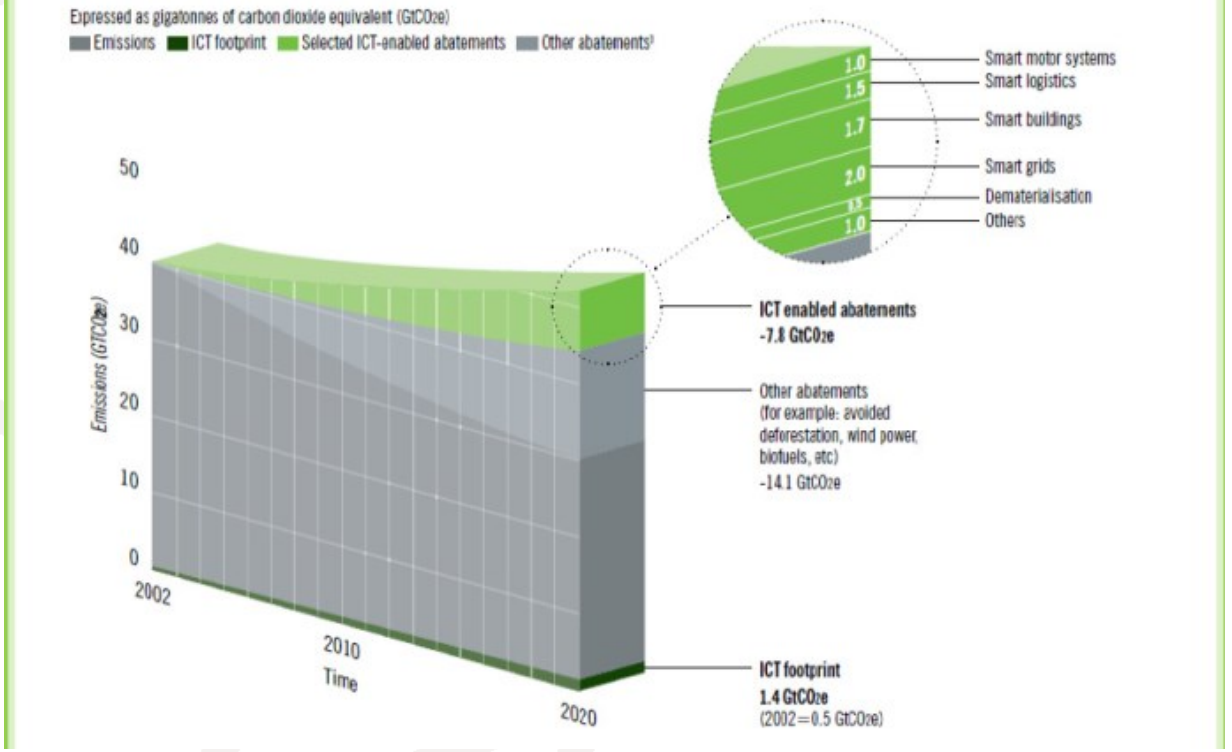
- Studies and analysis on most energy efficient architectures and solutions related to the use of ICT in the context of smart grids.
- Which is the reduction of power losses when applying ICT based smart grid technology?

Energy efficiency needs to be sure about the benefits

•ICT deployment in support of smart grids forces to reconsider energy-awareness of ICT devices, especially where large numbers of devices are involved (access network, inside home, AMI) .
•an increased smartness on the part of the electrical grid allows greater flexibility in the energy aware resource allocation for the ICT sector; for example, in:

- •the choice of ”green” data centres (e.g., those utilizing renewable power sources;
- •o the introduction of faster dynamics in the energy price range (e.g., energy-price-aware (routing).

Figure 10 – Estimation of ICT's global footprint and the enabling effect.



Thank you very much for your attention and think about the future .....

Image: Sara Heppner-Waldston