Telco's role in Smart Sustainable Cities

Bangkok, October 2014

Telecom Italia - Flavio Cucchietti

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Introduction

- Smart Sustainable City is a great concept but needs to be supported by infrastructures and enabling platforms to be concretely achievable.
- The presentation shows our vision on how a Telco Operator (like Telecom Italia) could play a strategic role in this context.

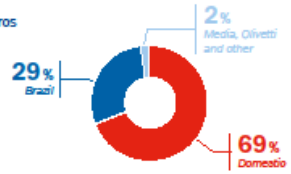
Telecom Italia at a glance

Telecom Italia is the leading Italian ICT Group and one of the most important players in the large Brazilian market.

2013 in numbers

Revenues

23.4 billion euros



Organic EBITDA

9.7 billion euros

Net financial position

26.8 billion euros

Net financial position

Telecom Italia confirmed as a component of leading sustainability indexes

MEMBER OF Dow Jones Sustainability Indices In Collaboration with RobecoSAM

FTSE4Good

TIME FOR ANNIVERSARIES

50

2014 marks the 50th anniversary of the merger in SIP of all of Italy's previous telephone companies, as well as the 20th anniversary of the transformation of SIP itself into Telecom Italia.

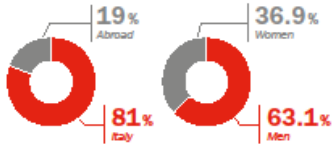
Customers

117,848,000

- **73.4** million — Mobile lines in Brazil
- **31.2** million — Mobile lines in Italy
- **13.2** million — Retail fixed lines in Italy
  - of which **6.9** million retail broadband access

Employees

65,623



Investments

4.4 billion euros

Innovation-oriented investments in Italy during the 2014-2016 plan

~ **3.4** billion euros out of 9 total

increased compared to the ~**1.3** of the previous plan

UltraBroadBand development in Italy

TODAY (END 2013)

UltraBroadBand mobile 4G (LTE) coverage: ~ 50%

UltraBroadBand fixed (NGAN) coverage: ~ 18%

TOMORROW (2016)

Population reached by LTE: 80%

Population reached by the next generation fibre optic network (NGAN): >50%

GEOGRAPHICAL DIGITAL INCLUSION

Since 2005, extraordinary investments made to bring ADSL coverage to some 4,000 municipalities (6 million Italians) in remote areas

98%
ADSL coverage in Italy (at December 2013)

ECO-EFFICIENCY

Reduction in the use of energy in voice and data transmission between 2011 and 2013

28%

BRAZIL

Next generation infrastructure development plan with a commitment to invest by 2016 more than

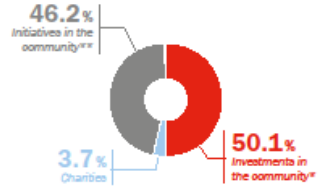
11 billion reais

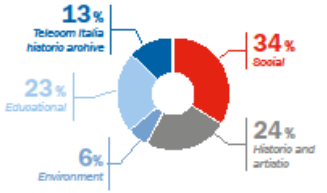
Committed to people

Investments for the community

46.6 million euros invested (including Telecom Italia Foundation) + **28%** investment in the community compared to 2012

2.8 million euros Telecom Italia Foundation disbursements





* Long-term commitment to specific social projects
** Business activities in partnership with humanitarian organizations

For **15** years Telecom Italia has been sharing its initiatives in its Sustainability Report

Employee training

57.4 training hours per head

+**109%** hours per head compared to 2012 for Group employees

http://www.telecomitalia.com/content/dam/telecomitalia/en/archive/documents/Group/company-profile/Telecom-Italia-beyond-numbers2013.pdf

Telecom Italia for society

The future of Telecom Italia is all about generating innovation for people. Indeed, the Group – also thanks to an acceleration of its digitalisation projects – is working to create a more inclusive society and make life easier for everyone. Through new platforms, which generate greater opportunities for connectivity and sharing, innovative solutions – also in education and healthcare – together with advanced applications will make it possible to get a taste of the city of the future and help protect the environment.

CREATING DIGITAL HEALTHCARE

Develop tele-medicine to improve patients' lives and reduce healthcare spending

INTEGRATING DIVERSITY

Information technology to remove barriers to communication, both physical and linguistic

400,000 *euros in grants from Telecom Italia Foundation to help people with communication difficulties*

SAFEGUARDING THE ENVIRONMENT

Energy saving projects and services for customers aimed at increasing energy efficiency

1% *Telecom Italia's percentage of Italy's total energy use*

BRINGING ABOUT THE SMART CITY

Expo 2015, of which Telecom Italia is a technological partner, is the occasion to get a peak at the city of the future

43 *million euros, Telecom Italia's total investments in technology solutions for Expo 2015*

SUSTAINING INTELLIGENT MOBILITY

Applications for innovative, intelligent transport solutions

SIMPLIFYING PAYMENTS

Mobile phones as electronic wallets for safe, daily micro-payments

14 *million mobile phones (estimated) with NFC technology in Italy in 2014*

BUILDING DIGITAL SCHOOLS

Connectivity projects and online lessons are the foundations of the digital school of the future

2,000 *students already involved in the educa@Tion project*

NURTURING TALENTS

Joint labs with universities and support to start-ups to help nurture young talent

109 *grants assigned since 2009 through Working Capital*

CONTRIBUTING TO THE DIGITAL AGENDA

The goals established by Italian and European authorities to keep pace with innovation

100% *the target for broadband (>30 Mbit/s) coverage in 2020 (European Digital Agenda)*

PROMOTING CULTURE THROUGH INNOVATION

Telecom Italia supports numerous cultural initiatives, making available its technology and know-how to promote digital culture in Italy. The network thus becomes the channel to bring people closer and to spread contemporary knowledge through projects ranging from dance (Metamondi) to literature (Mantua's Festivaletteratura), from opera (OperainWeb) to art (MAXXiWeb), from electronic music (Meet in Town) to classical (PappanoinWeb)

http://www.telecomitalia.com/content/dam/telecomitalia/en/archive/documents/Group/company-profile/Telecom-Italia-beyond-numbers2013.pdf

Energy Consumption and Energy Efficiency in Telecom Italia

Our Energy needs

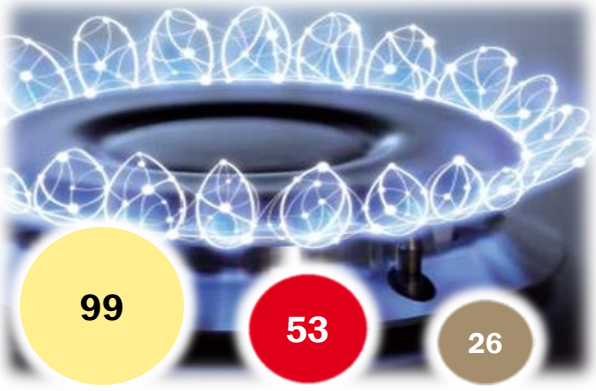
5,00 | 2,34 | 1,40 | 0,9 TWh/a

Italian railways | TELECOM ITALIA | Other TLC | Italian Mail

75% TLC | 12% DC | 13% Offices

100%

100% of the electricity consumed by TI, comes from a renewable source



99 | 53 | 26 Mm³

Valle d'Aosta | TELECOM ITALIA | Italia Mail

600 Heating gas Plants | 22 Cogeneration 84 GWh/Year

Energy Efficiency for Telecom Italy is a priority:

- **Economical**
- **Ethical**
- **Social**

widespread distribution

- **~ 35.000** Consumption Points
- **~ 1.000 sites** in medium voltage (offices and large central offices, Data Centers)
- **thousands of sites** in low-voltage (Small and medium Central offices, Radio Base Stations)

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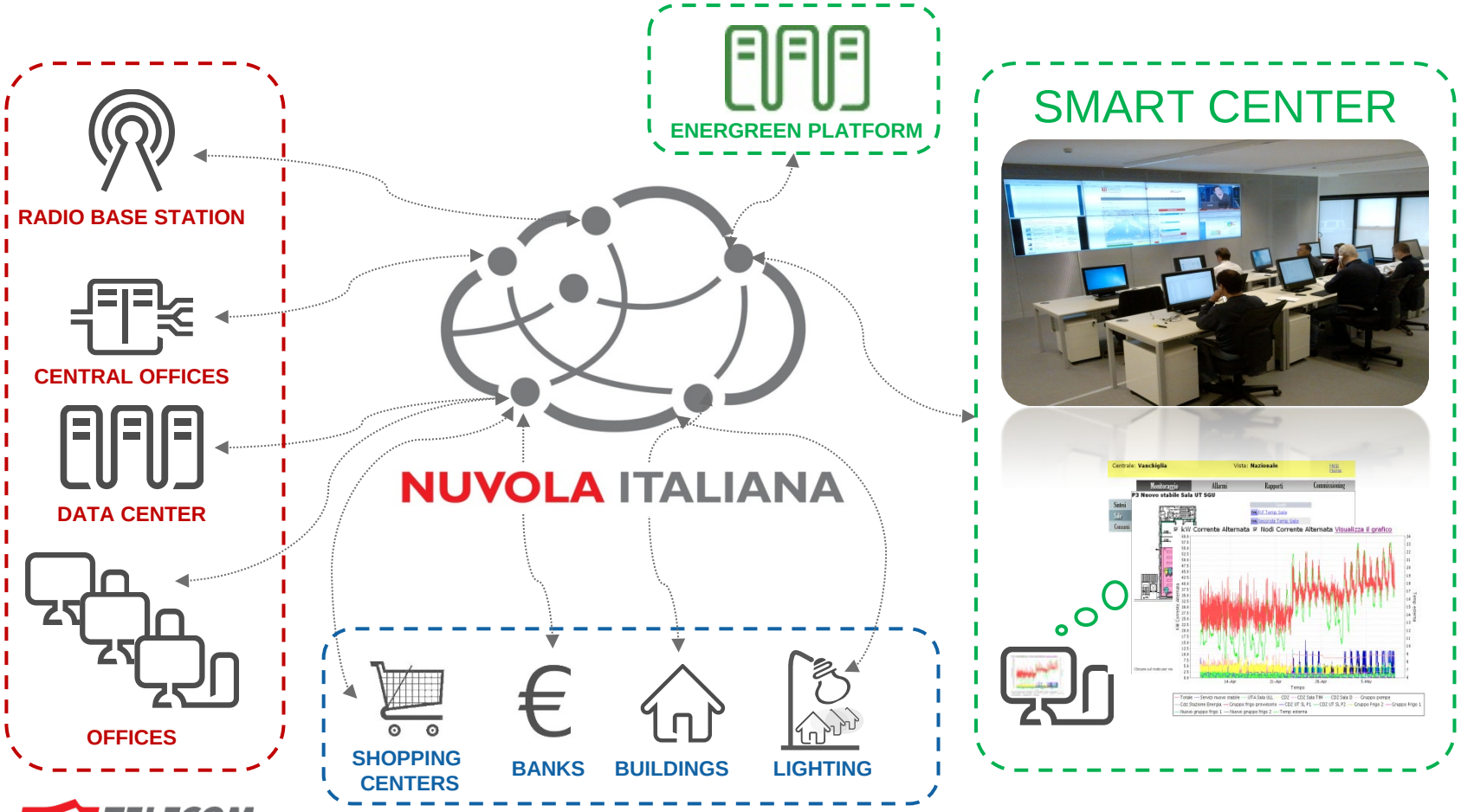
Smart Energy Management in Telecom Italia

SMART CENTER: applying technology and innovation

The Smart Center of TI oversees the design, testing and proper functioning of sensor networks for the collection of energy data of Telecom and its customers. It is also involved in Business Intelligence, Business Analysis and Energy Management.



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Smart Energy Management in Telecom Italia

2013-2014 Results:

- Saving 2013: 142 GWh - containment inertial growth and savings
- ISO 50001 Certification TelecomItalia: April 2013
- Partnership with the Ministry of Environment 2013/2014: Project Carbon Footprint
- ISO 14064 Certification: Bologna Corticella site- by 2014
- Certification PUE Data Center Rozzano: April 2014
- White Certificates: approved 25 projects (corresponding 50.000 TOE/year) and 20 submitted pending approval
- 'Real time' Monitoring of energy consumption: over 50% of total consumption TelecomItalia (0,5% of Italian consumption).
- Networks with 33,000 nodes / sensors installed.
- Autogeneration: 11 new plants to increase production capacity by over 70%.
- Lighting: replaced more than 200.000 NEON lamps with LED lamps in our builildings . Reduced spending by 30%

Dow Jones Sustainability Indexes

These activities have allowed Telecom Italia to obtain a **Rating of *Best in Class* in the TLC sector** in the **Dow Jones Sustainability Indexes World and Europe**.

This result has been achieved thanks to a continuous work:

- **Searching for new products and innovative solutions for energy savings and efficiency**
- **Support by Telecom Italia's R&D business unit in the development of innovative products and solutions**

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The Smart City ICT horizontal platforms big picture

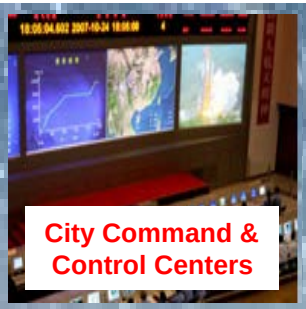
Cloud Computing

Networks

Vertical Application

Vertical Application

Vertical Application



City Command & Control Centers

CLOUD IAAS & PAAS

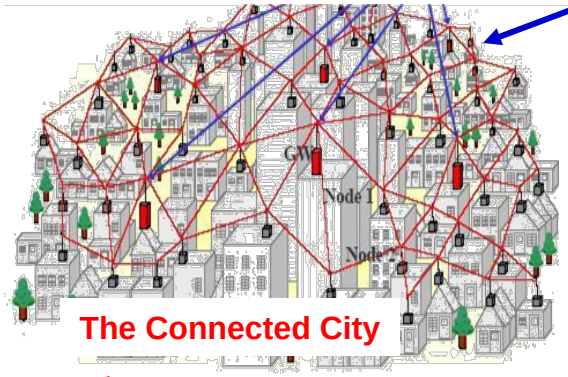
M2M & IoT Management

COMMUNICATION NETWORK

CAPILLARY NETWORK

OTHER company domain

TELCOs Domain



The Connected City

The Multi Utility Network

Public Lighting

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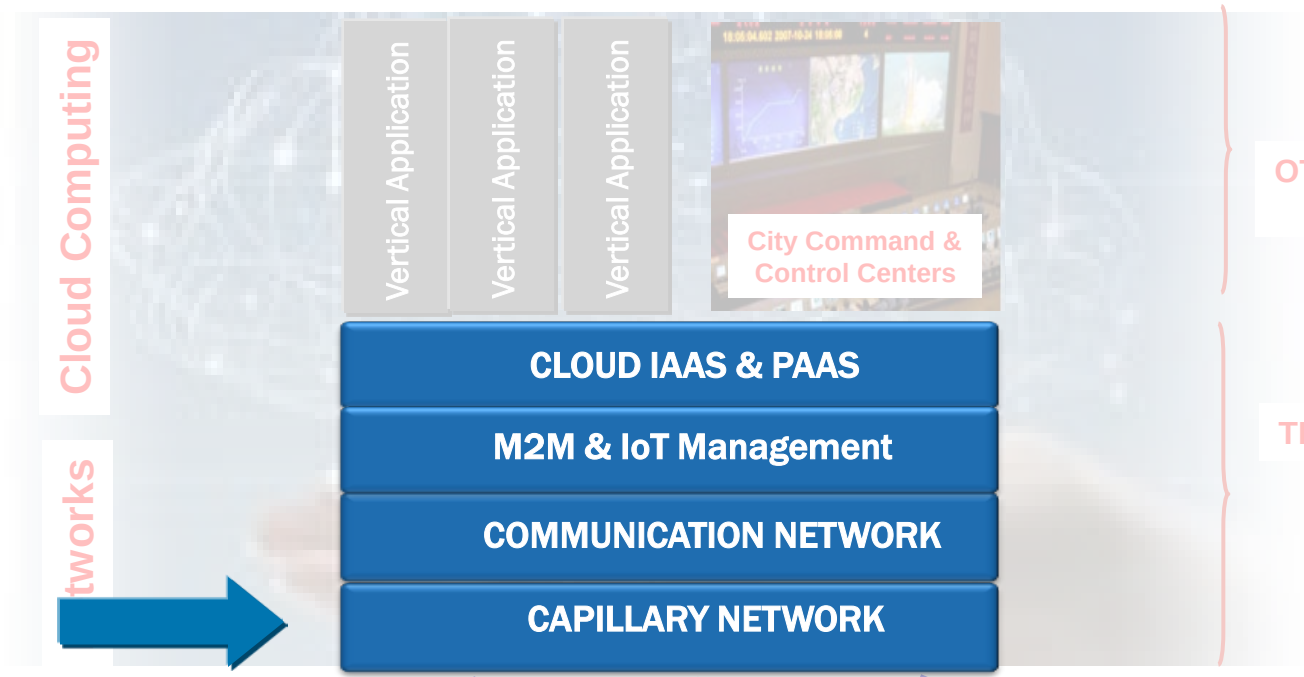
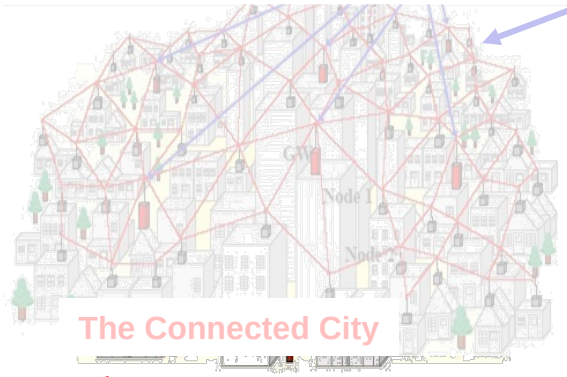
Telco's domain: the capillary network layer





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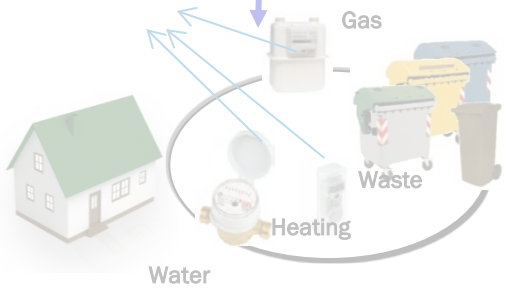
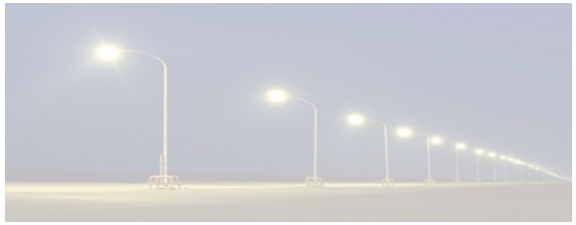


The Multi Utility Network



Public Lighting

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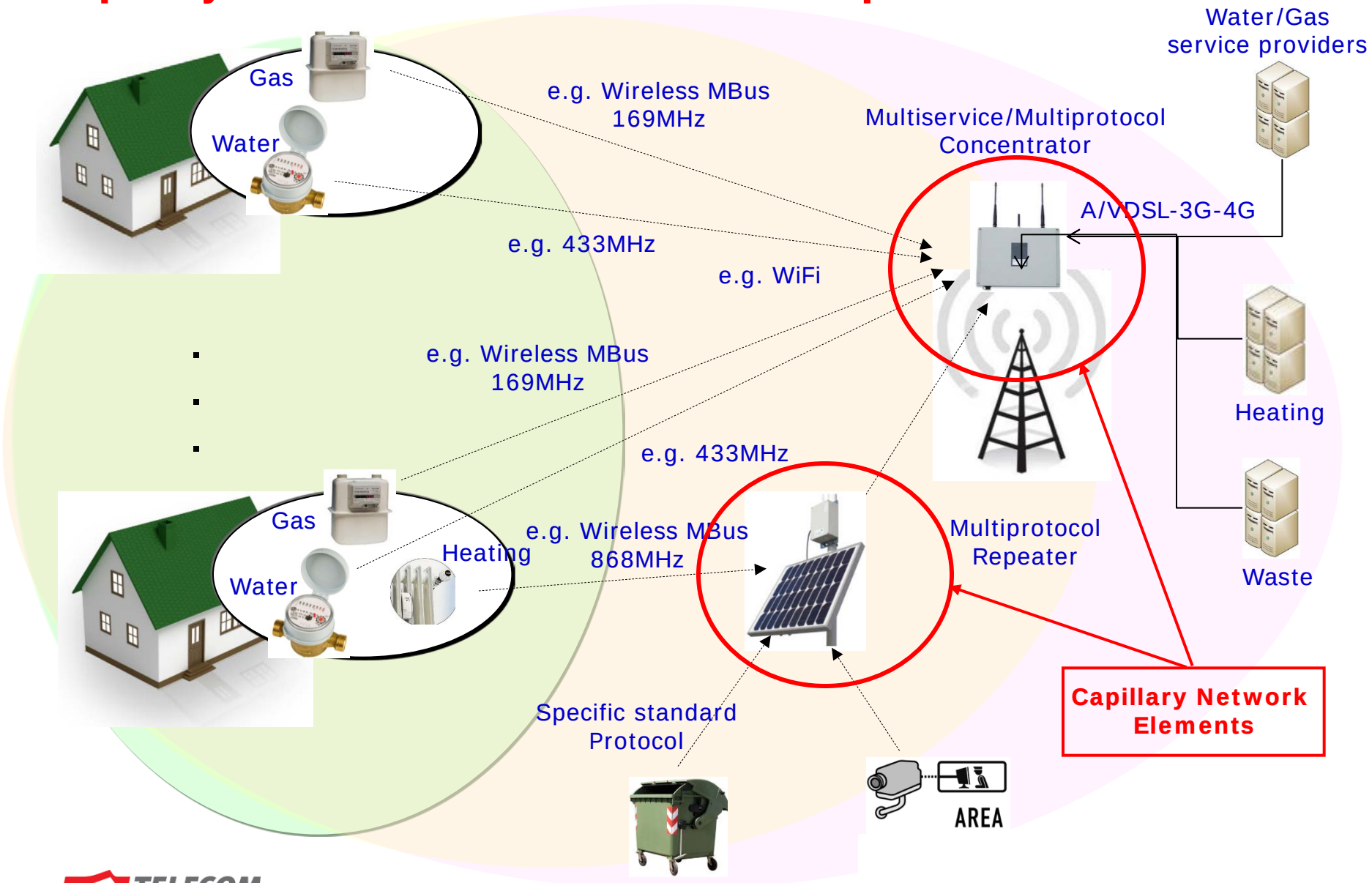
Capillary Network

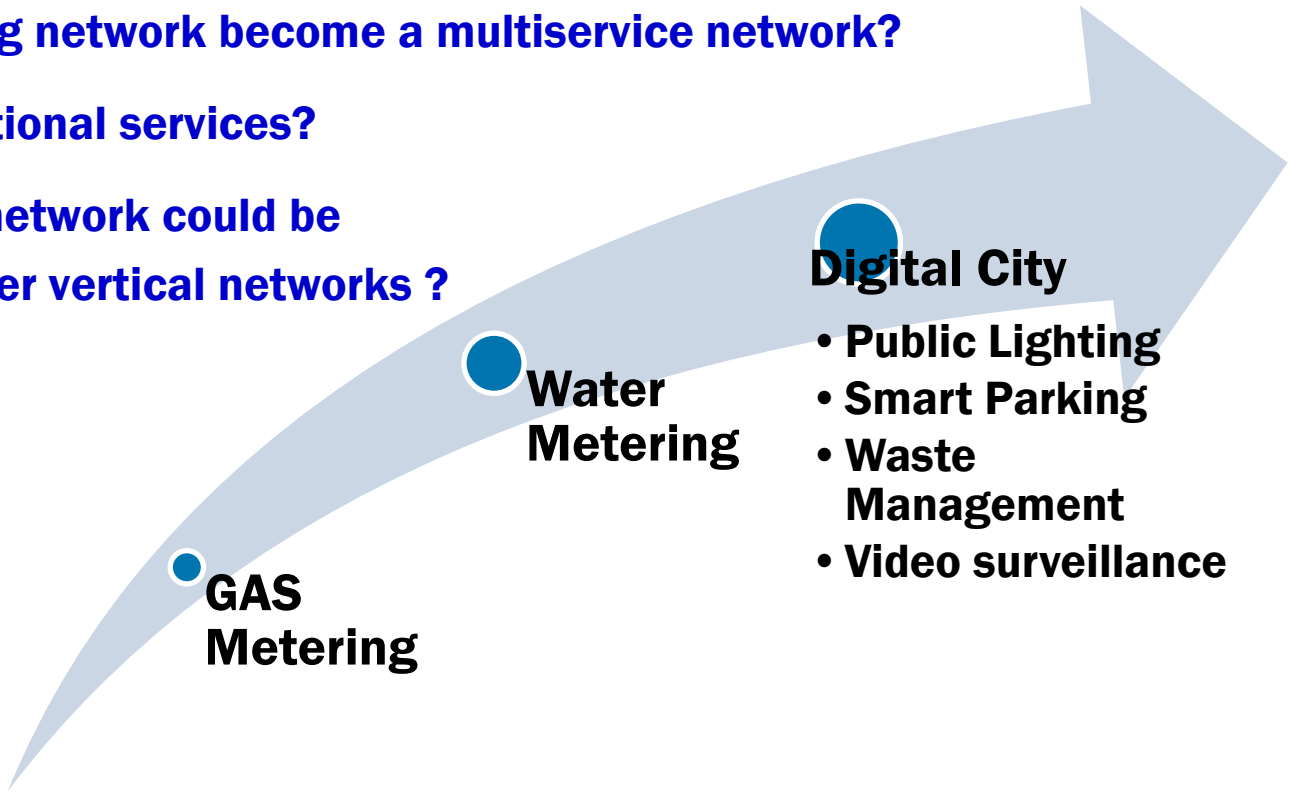
- A “new” communication layer for receiving/sending information from/to new types of sensors and actuators
  - Utility Metering (Gas, Water, Electricity) and network control
  - Waste Management
  - Pollution and traffic control
  - Smart Lighting
  - Heating Control in private and public building
- Why ?
  - Traditional infrastructure too expensive and energy consuming
  - Meters should work several years without battery changes
  - Million devices/very limited traffic
  - Standard approach to enable easier service applications development

Capillary Network : Multiservice & Multiprotocol Network



The Capillary Network open issues

- 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 ?



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Power Consumption

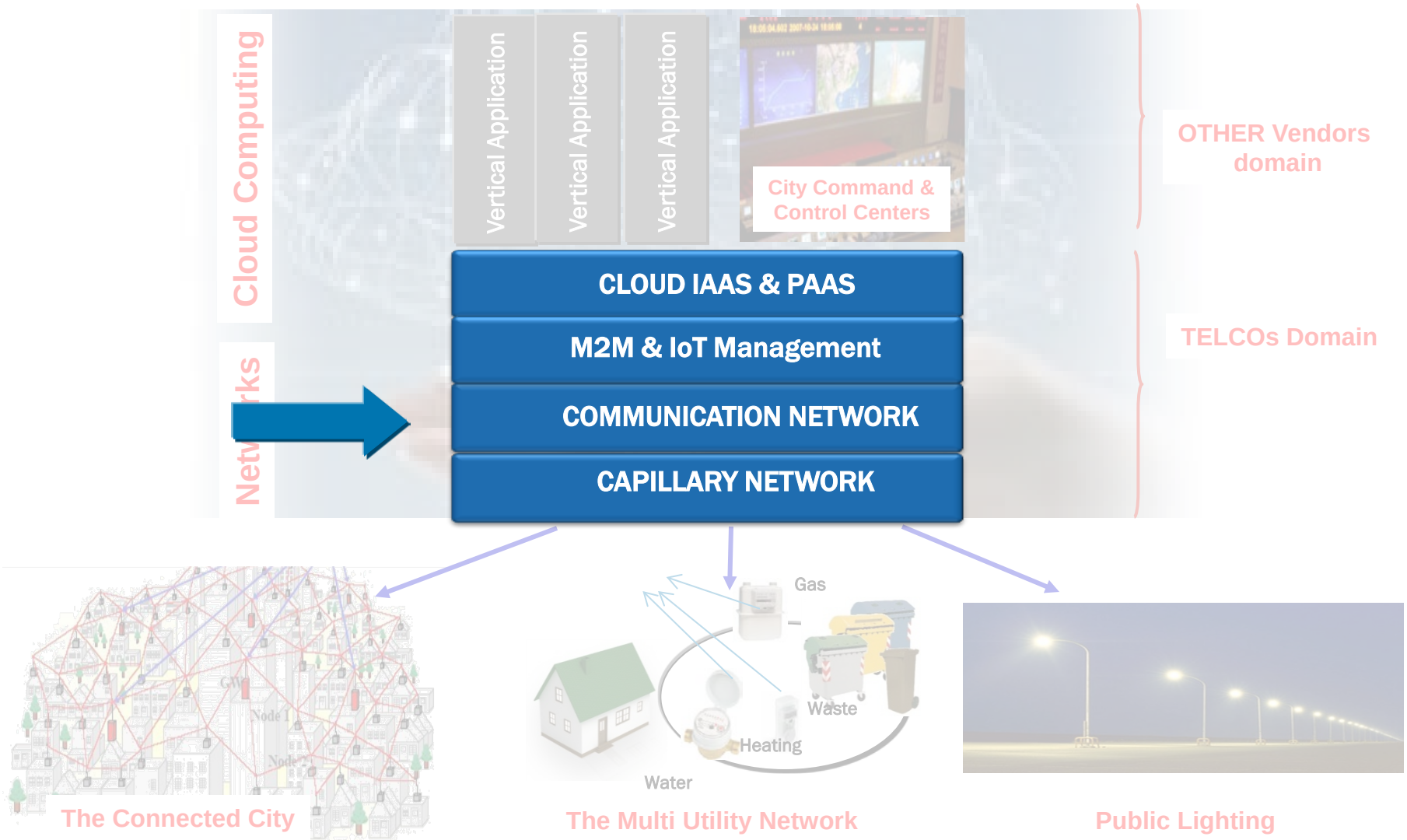
- To send a data packet of 1 Kb

TECHNOLOGY	POWER CONSUMPTION
GPRS	22.64 J/day
868 MHZ	69 mJ/day
169 MHZ	84 mJ/day

Capillary Network

- GPRS power consumption is something like 260 times bigger !

Telco's domain: the communication network layer



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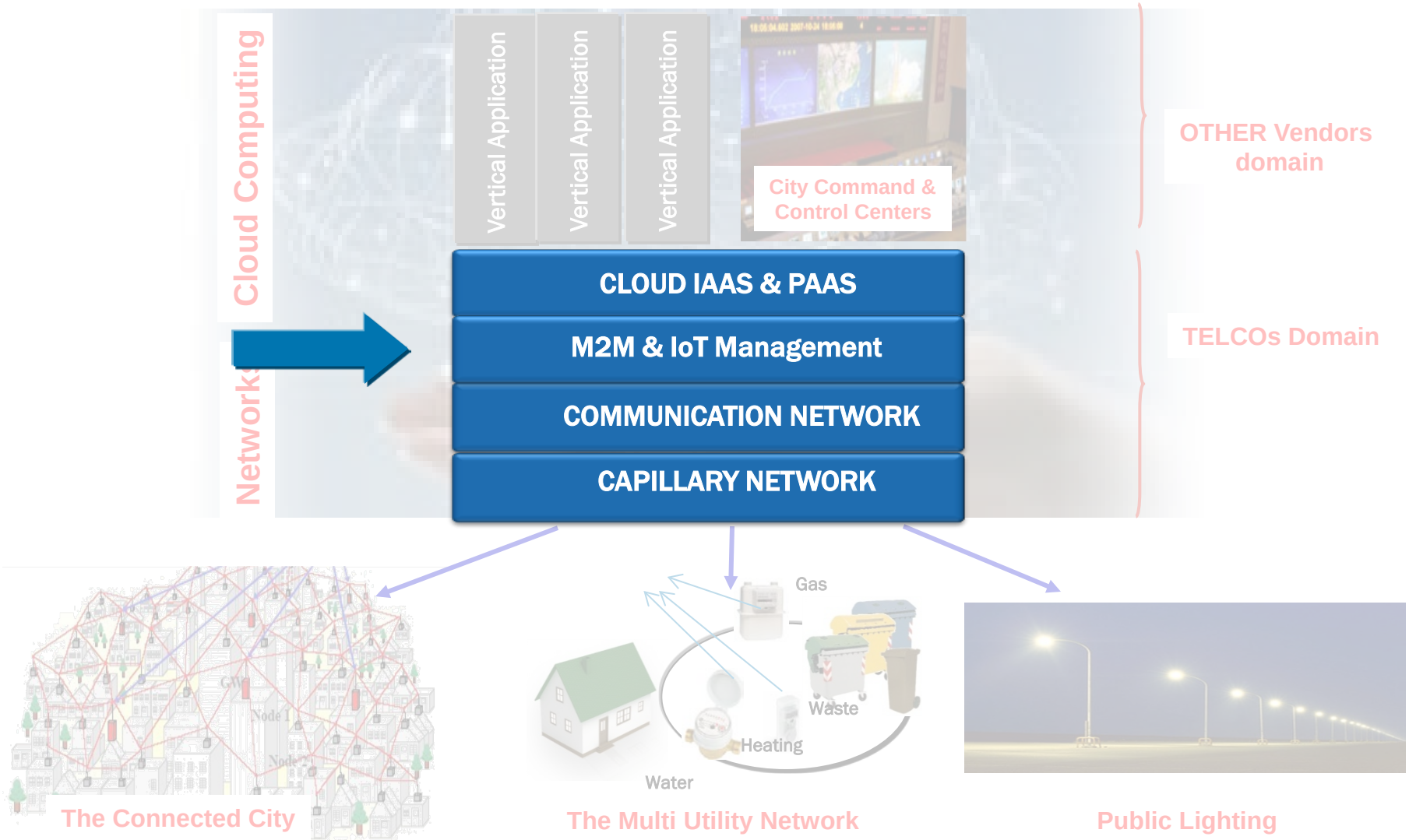
TelCo commercial networks benefits for Smart Cities

- Maturity: the network is already there
  - Building an ad hoc network takes time!
  - Building a dependable network takes more time!
- Fixed & Mobile, high performance on key parameters such as latency and bandwidth
- Planning & Management: never neglect network planning & management issue complexity!
  - “Things” are everywhere, some easy, but other very difficult to reach
  - Capillary means short range - it needs a pervasive network
- Network & Data Security
- AAA protocols (Authentication, Authorization, Accounting)
- Costs: more expensive to build one (or more) ad-hoc networks than to adopt the already existing ones

Telco's domain: M2M & IoT management layer



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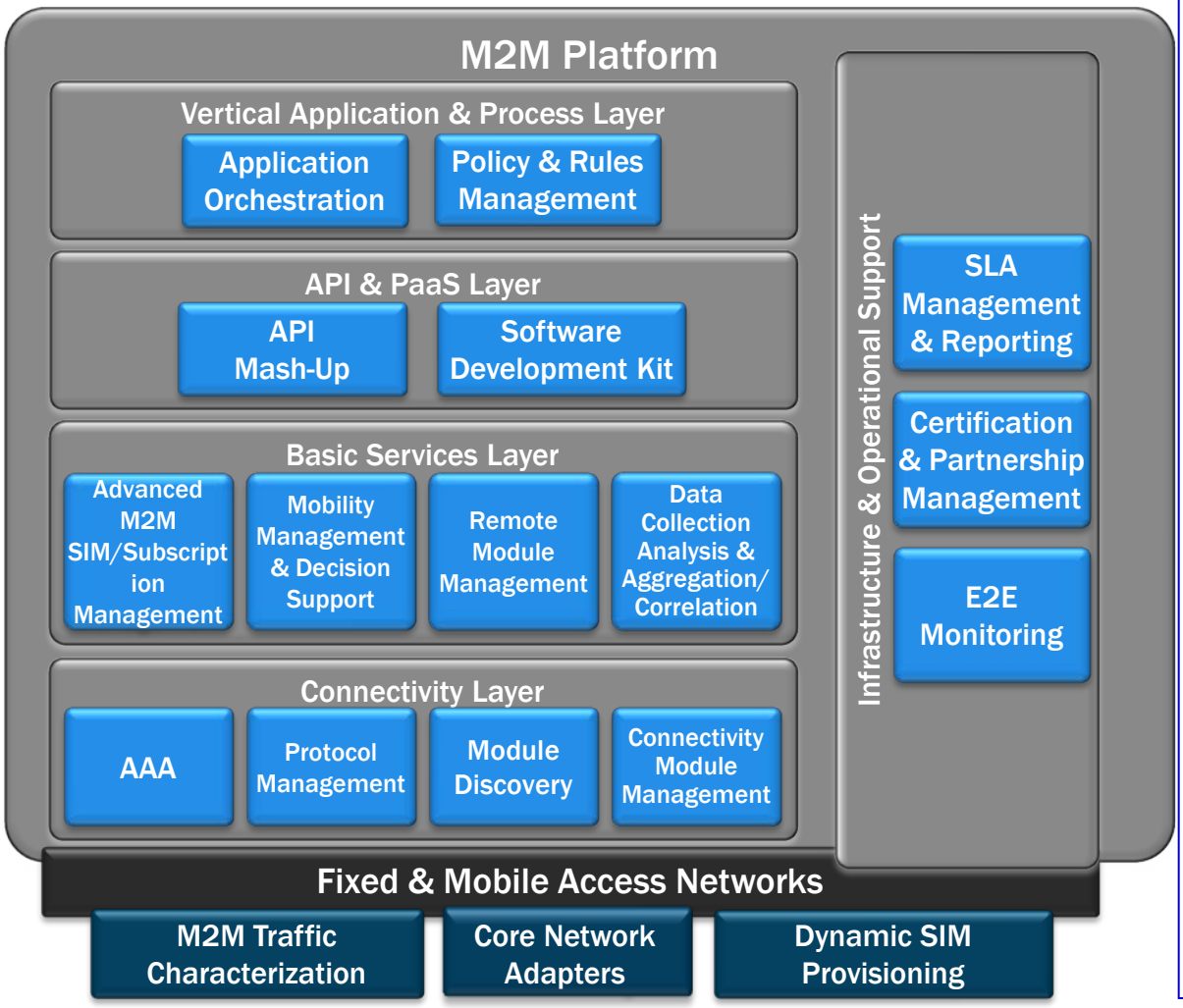
M2M & IoT Management

- All Telcos are considering M2M as one of the most profitable future business, with high CAGR
- BUT:
  - No standard communication and data model representation for devices
  - No standard firmware upgrade process
  - High volumes in data repositories
  - High volumes of connected devices but low traffic and low ARPU
  - Provisioning and billing with different rules and needs than traditional SIM-based businesses

M2M Platform Blueprint: reference model



- Manage SIM M2M
- Manage M2M Devices
  - Firmware update
- Store and normalize data
- Hide technical complexity and protocol diversities
- End-to-end monitor the whole M2M chain with SLA assurance
- Accounting and billing for usage
- Provide API to application layer
- ETSI M2M / OneM2M compliancy.....

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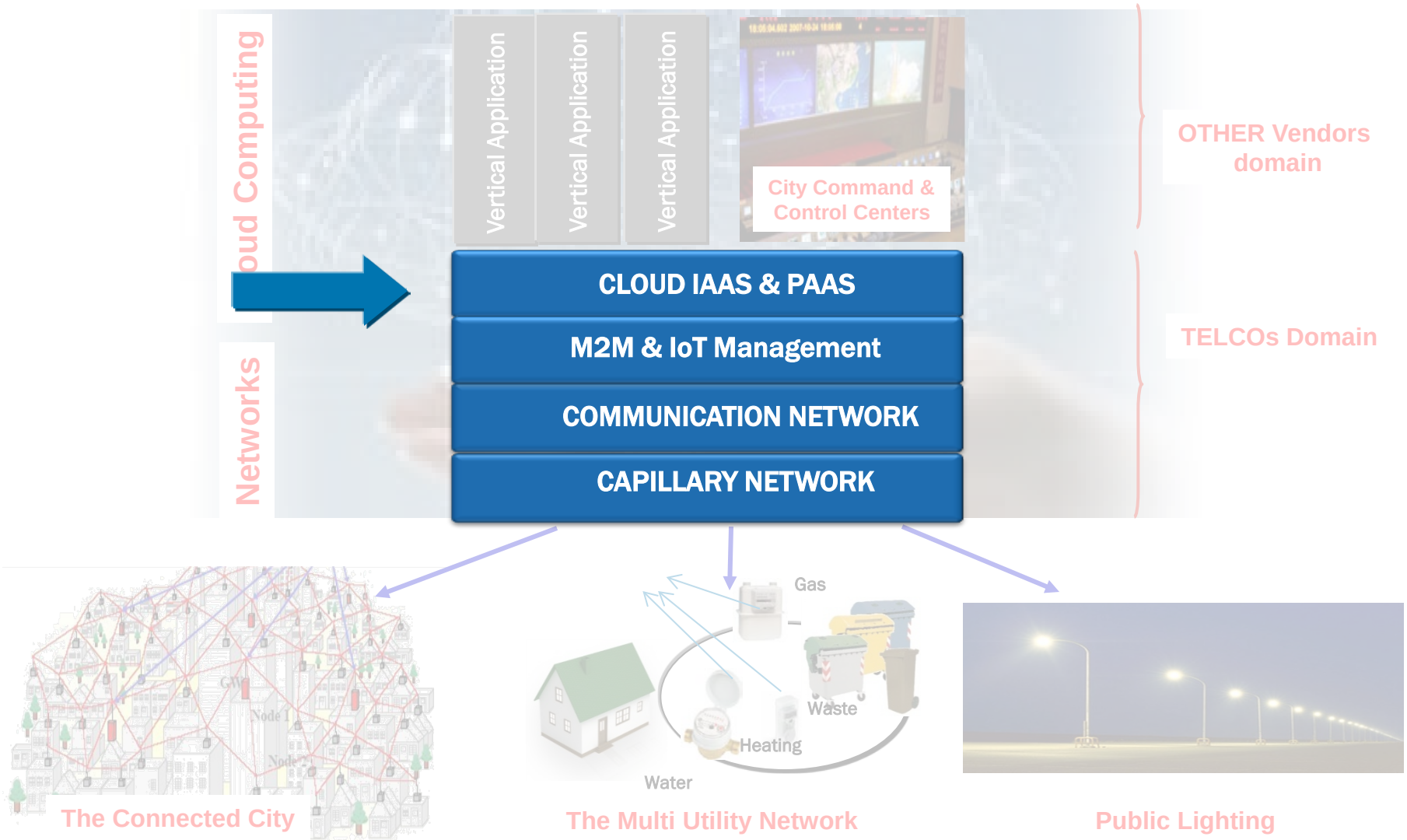
Telco's domain: the computing layer



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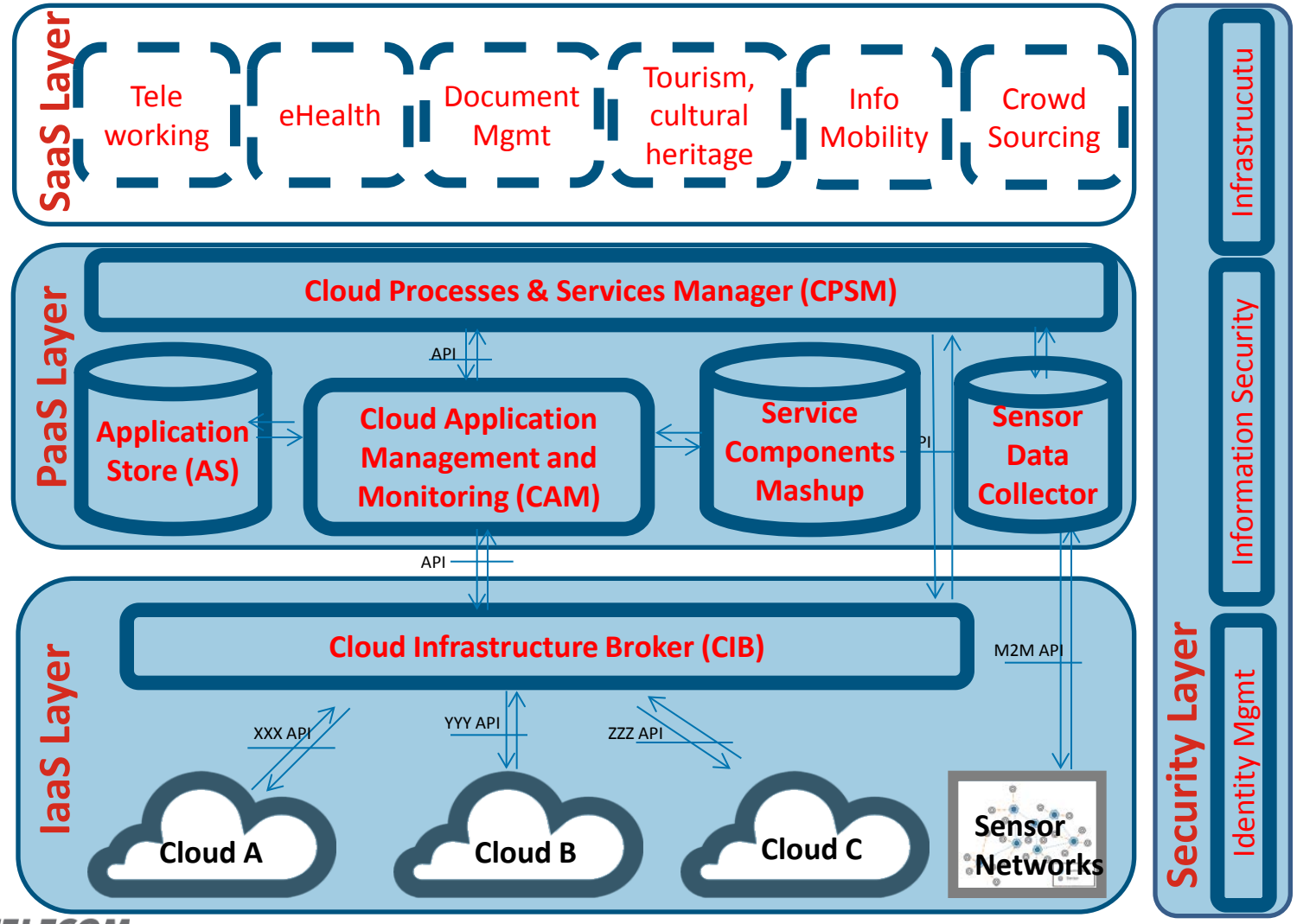
Cloud Computing

- Cloud Computing Services are the new TELCO service offering on top of traditional communication services
  - Utility Computing
  - Elastic Computing
  - Hybrid Computing
- Need to offer integrated Communication and Computing Services with end-to-end quality assurance
- TELCO Vision in Cloud Computing is to offer horizontal platforms (Infrastructure and Middleware) to enable:
  - Third parties' applications development in easier and cheaper way
  - Less cost, earlier availability and high reliability

Cloud Computing for Smart Cities: architectural vision



Source: Cloud4eGov Project -submitted for approval and co-financing to Italian Government

Conclusions

Main Telco's role is in Horizontal Platforms as they

- are "enabling platforms" for third parties involved in "Smart City" applications development
- hide technical complexity and lack of standards at the sensor layer, decoupling devices and application through well defined API
- facilitate applications exchange among different Public Administrations (Smart City Application Store)
- enable the mandatory cooperation between public and private domain
- support an effective ecosystem among big players and niche players
- are cost effective because of large scale economies

Thanks for your attention !

Any question:

flavio.cucchietti@telecomitalia.it