SMART**CITIES** of Romania

Organizatori

8 - 9 Noiembrie 2016 Universitatea POLITEHNICA Bucuresti
Rectorat - Amfiteatru AN010

Innovation Drives Future City SMART

Codrut Savulescu

Huawei Romania

Bucharest November 2016

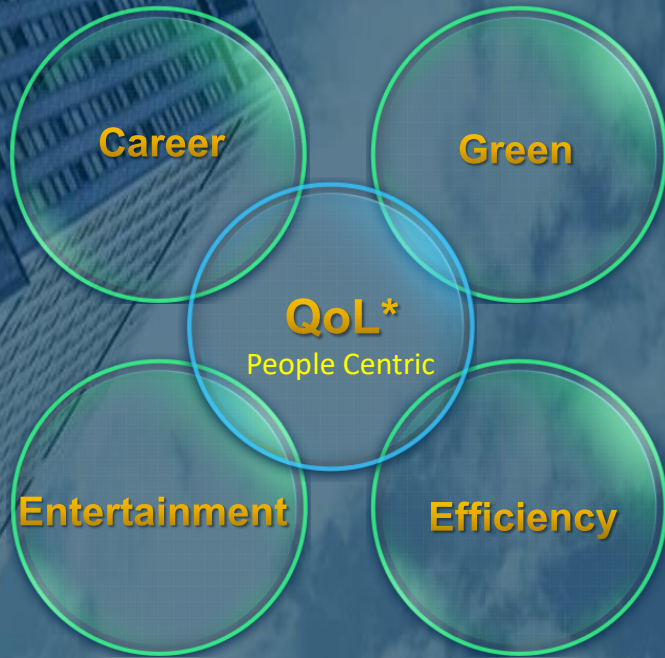*BUILDING A BETTER CONNECTED WORLD*

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Content

➢ Continuous

    ....from last year

➢ Nb IoT – the new born standard
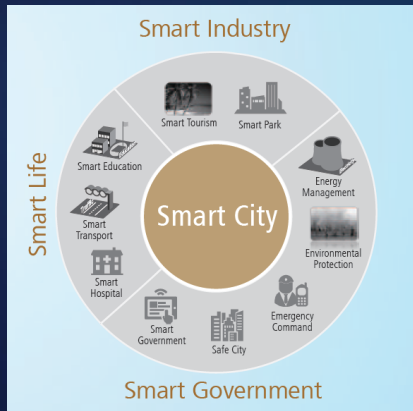
➢ Huawei Open Platform – a SMART City Enabler

Quality of Life is the Next Connectivity Era

Career

Green

QoL*
People Centric

Entertainment

Efficiency

QoS → QoE → QoL

What is a SMART City

➢ Cities evolves permanently
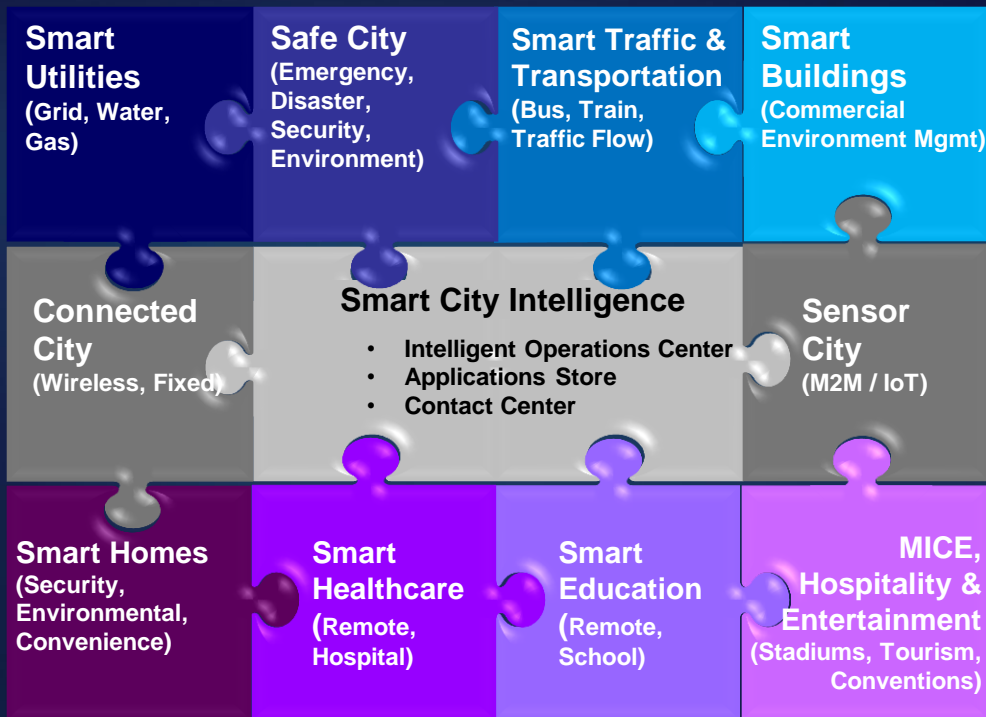

➢ A city modernization process needs to be rooted in the question of what kind of place cities want to become – define the quality of life

➢ Technology introduction and innovation enables cities modernization towards ….

A smart city is a city that pushes the quality of resource management and service provision to the limit possible at a time and adapts agilely to the future
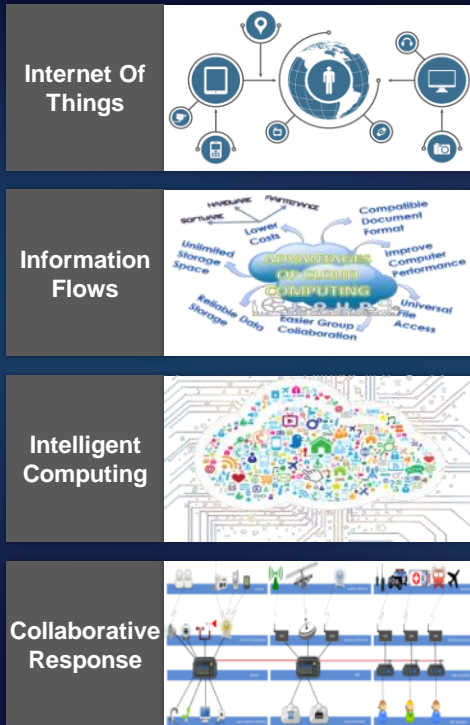
Elements that makes a city SMART

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Urban Development, Security & Sustainability

ICT Infrastructure

Smart Utilities (Grid, Water, Gas)	**Safe City** (Emergency, Disaster, Security, Environment)	**Smart Traffic & Transportation** (Bus, Train, Traffic Flow)	**Smart Buildings** (Commercial Environment Mgmt)
Connected City (Wireless, Fixed)	**Smart City Intelligence** • Intelligent Operations Center • Applications Store • Contact Center		**Sensor City** (M2M / IoT)
Smart Homes (Security, Environmental, Convenience)	**Smart Healthcare** (Remote, Hospital)	**Smart Education** (Remote, School)	**MICE, Hospitality & Entertainment** (Stadiums, Tourism, Conventions)

Social Development Communities, Villages, Citizens

Internet Of Things	
Information Flows	
Intelligent Computing	
Collaborative Response	

Smart city roadmap layers
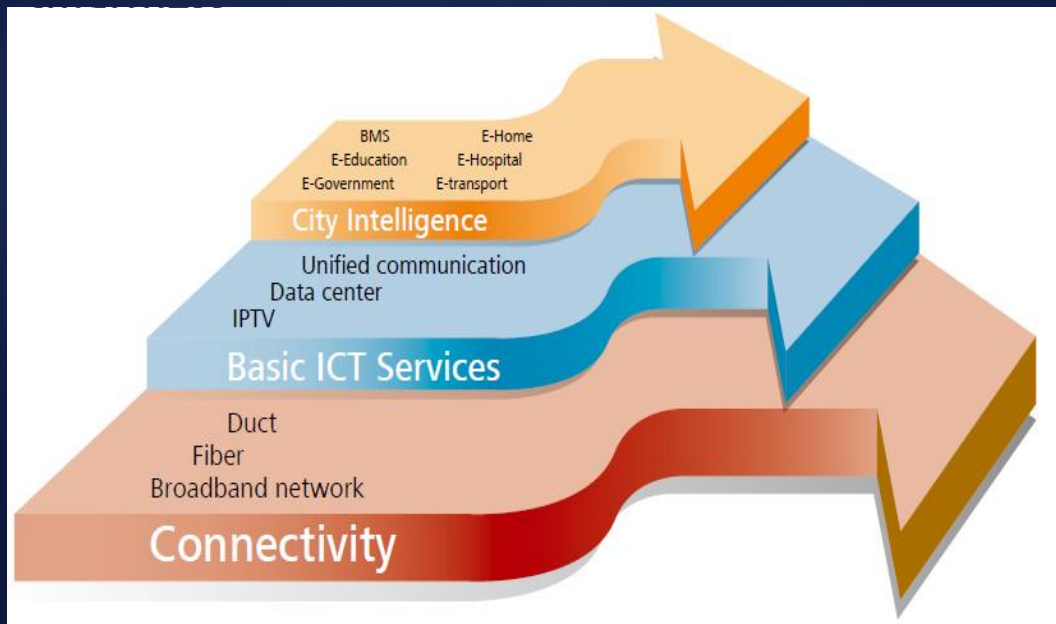
Deploy City intelligent applications

Deploy basic ICT services to change the way of city management and enhance life

Foundation to connect: anytime, anyplace any terminal

Challenges for IoT

Business

- Fragmented Verticals
- Business Model
- Data Value Generation

Technology

- Low Power Wide Area
- Massive Connections
- Security

Ecosystem

- Diverse Alliance
- Diverse Standard
- No Unified OS for Things

NB-IoT E2E solution

vMME | vSGW | vSGW

Cloud Middleware

Cloud OS

Infrastructure(Fusion Server…)

NB-IoT

IoT Platform

Tracking | Parking

Metering

Agriculture | Environment

. . .

Sensor / Terminal
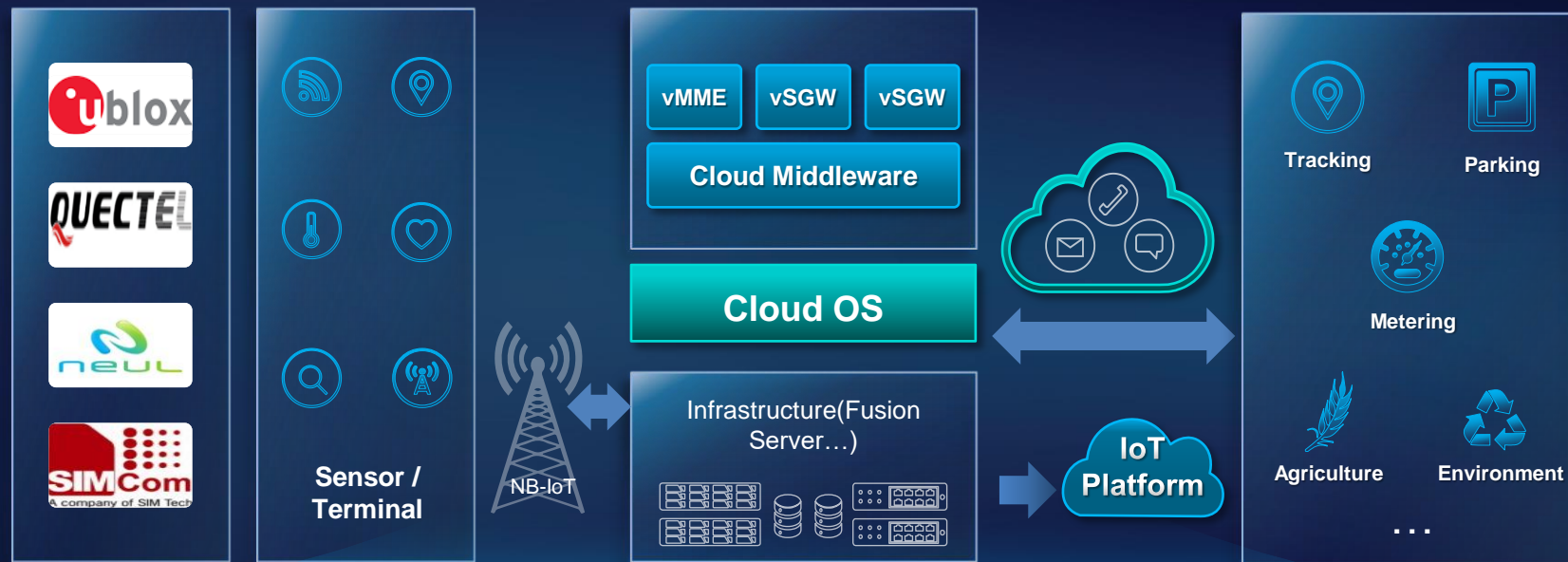
| Chipset/Module | » | Device | » | Cellular Network | » | Services Platform | » | Vertical Service |

Huawei 1+2+1 IoT solution

Smart Home Transportation Tracking Parking Metering Agriculture Environment

1 Platform

Data Management	Device Management	Operation

2 Access Modes

2G/3G/4G/NB-IoT

Home Gateway
Agile Gateway

1 IoT OS

Huawei LiteOS

Huawei LiteOS, open ecosystem make things smarter

Smart Home

Metering

Connected Car

Smart City

Others

LiteOS

Open API

Middleware

LiteOS Kernel

Security

MCU

Cortex

x86

Ultra-Low power 10^{-6} A level

Real-time: 1ms level

Resource constrained: 10 KB

Security mechanism

NB-IoT , the best choice of LPWA for carrier

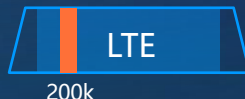**4.2B** NB-IoT connections and **$42B** market size by 2020

Leverage Existing Spectrum

GSM | UMTS/LTE
200k
Standalone

LTE
200k
Guard Band

LTE
200k
In Band

Reuse Existing Assets

Future proof technology

4G · · · · · · **Available Q3.2016** · · · · · · 5G

[People] [Things] [People]&[Things]
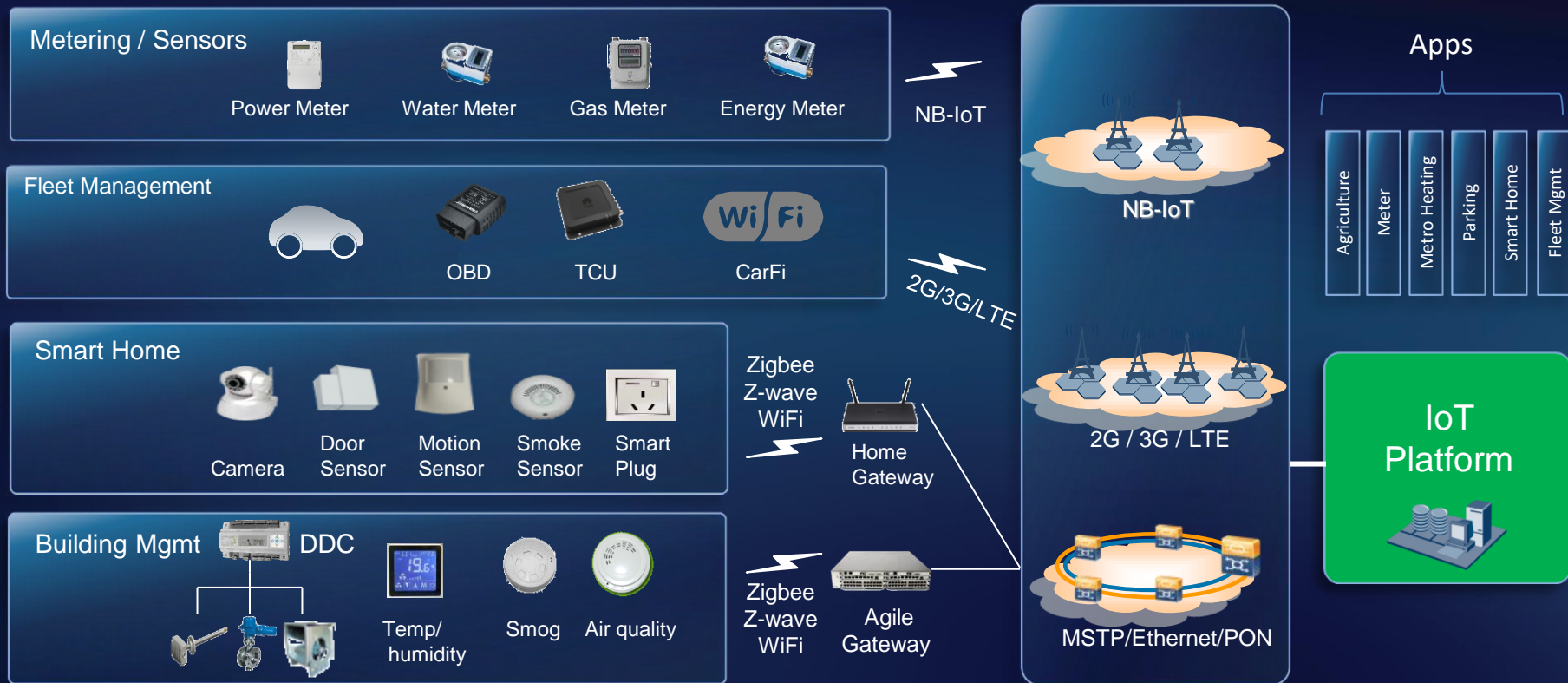
More Connections
1K -> 100K
per cell

Deeper Coverage
20+ dB
gain over GSM

Low Power Consumption
10 years
battery life

IoT Platform flexible for all access technologies

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Metering / Sensors
- Power Meter
- Water Meter
- Gas Meter
- Energy Meter

NB-IoT

Fleet Management
- OBD
- TCU
- WiFi — CarFi

2G/3G/LTE

Smart Home
- Camera
- Door Sensor
- Motion Sensor
- Smoke Sensor
- Smart Plug

Zigbee
Z-wave
WiFi

Home Gateway

Building Mgmt — DDC
- Temp/ humidity
- Smog
- Air quality

Zigbee
Z-wave
WiFi

Agile Gateway

NB-IoT

2G / 3G / LTE

MSTP/Ethernet/PON

Apps
- Agriculture
- Meter
- Metro Heating
- Parking
- Smart Home
- Fleet Mgmt

IoT Platform

Open IoT platform: 3rd party capable , shorten TTM

Smart Home

Metering

Connected Car

Smart City

Others

IoT Platform

Application Enablement	Open APIs	Service Orchestration	Rule Engine	Big Data

Connectivity Management	SIM Management	Connectivity	Device Management	Security & Identity

Operation

IoT Agent

Data collection

Device management

Authentication

Voice and video call

Message/Sharing

Pre-integration
Smart home
Connected car
NB-IoT application

Open platform
Open API
Service orchestration
Rule Engine

Access agnostic
Cross-brand device replacement
Hardware capability abstact
Fast and easy device integration

Unified API exposure console facilitating innovation

API Consumer

API consumer Portal

API Provider

API provider Portal

Operator

Operator Portal

Services & Applications

| Connected Car | NB-IoT Application | Smart Home | 3rd Party Services |

Operation

Partner Mgt	APP Mgt
API Orchestration	API/SDK Mgt
Log & Audit	Sandbox Mgt

APIs Stats & Analysis

- KPI collection
- Trend
- Dashboard
- Drag & Drop

Provisioning

- Device/Sensor Provisioning
- User Provisioning
- Device & Sensor/User Binding Provisioning

API Gateway

API Access	API Transforming
SLA	Authn &Author.
Token Mgt	Cert Mgt
Key Mgt	Anti-Attack

IoT Connection APIs

| Provisioning API | Device/Sensor Control/Check | Status/Data Notification | Data Stats & Analysis Query |

Communication APIs & Other APIs

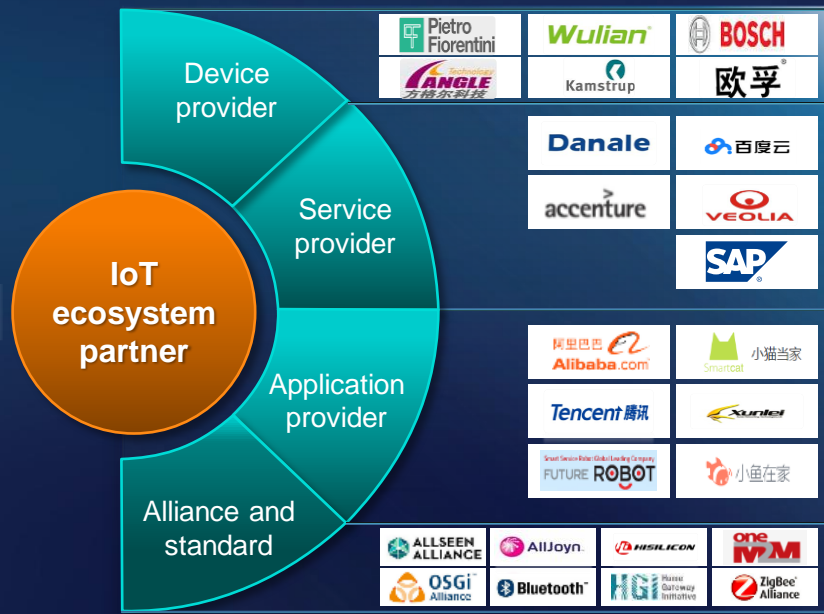| Communication APIs | Payment | Map | Location | QoS | … |

Open and cooperation worldwide
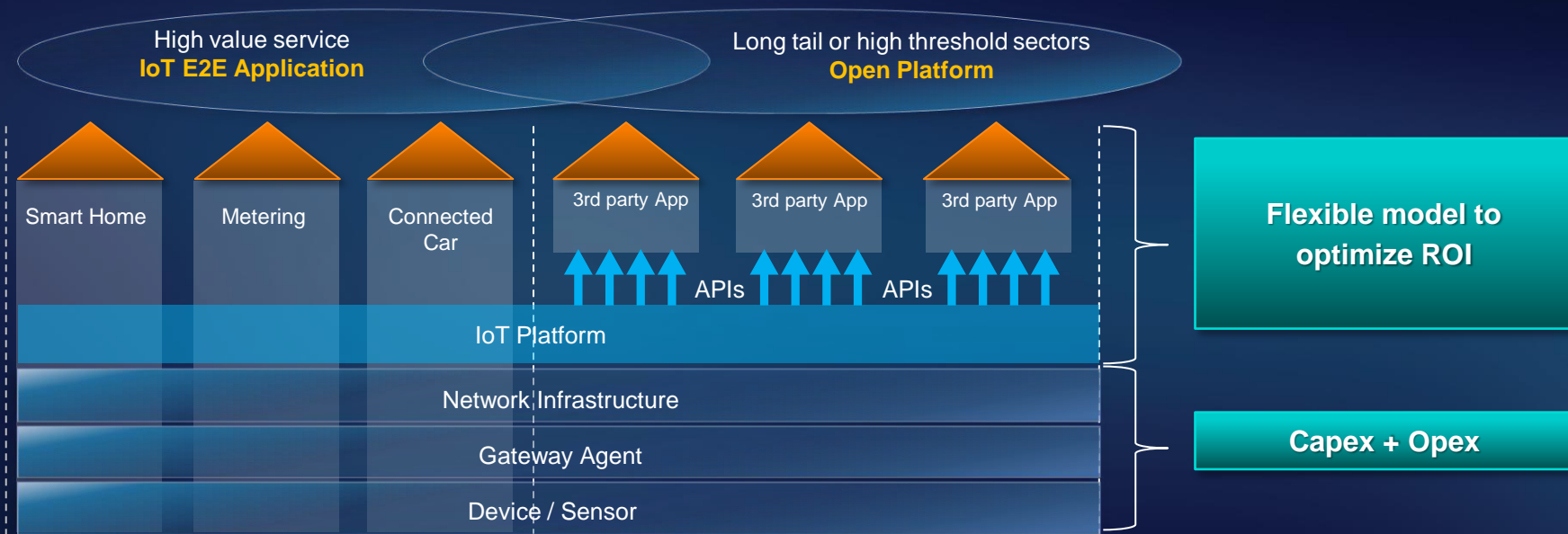
Open platform and software defined gateway

- Smart device plug and play through Huawei Agent and Huawei LiteOS

- Support protocols including Wi-Fi, Z-wave, Zigbee, Bluetooth and etc.

- Open APIs
- Open innovation lab
- Huawei developer enablement plan: $1B

- Pre-integration, online integration

Plug and Play

Interconnection

Open enablement

Fast integration

Software defined gateway & devices

Open platform

IoT ecosystem partner
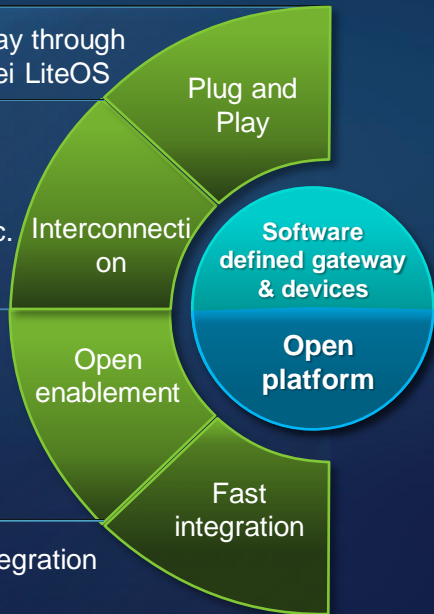
Building partnership ecosystem

Device provider

Service provider

Application provider

Alliance and standard

Pietro Fiorentini · Wulian · BOSCH
ANGLE 万格尔科技 · Kamstrup · 欧孚

Danale · 百度云
accenture · VEOLIA
SAP

阿里巴巴 Alibaba.com · 小猫当家 Smartcat
Tencent 腾讯 · Xunlei
FUTURE ROBOT · 小鱼在家

ALLSEEN ALLIANCE · AllJoyn · HISILICON · oneM2M
OSGi Alliance · Bluetooth · HGI · ZigBee Alliance

Flexible business model of Huawei IoT

High value service
IoT E2E Application

Long tail or high threshold sectors
Open Platform

Smart Home

Metering

Connected Car

3rd party App

3rd party App

3rd party App

APIs

APIs

IoT Platform

Network Infrastructure

Gateway Agent

Device / Sensor

Flexible model to optimize ROI

Capex + Opex

- Driven by business rather than technical
- Lower initial investment, extent the payment period, reduce the risk
- Cooperate each other to achieve operational and finance objectives.

Growing NB-IoT cases all over the world

Parking

Metering

Trash Bin

Parking

Parking, Disney

Street Light

Metering
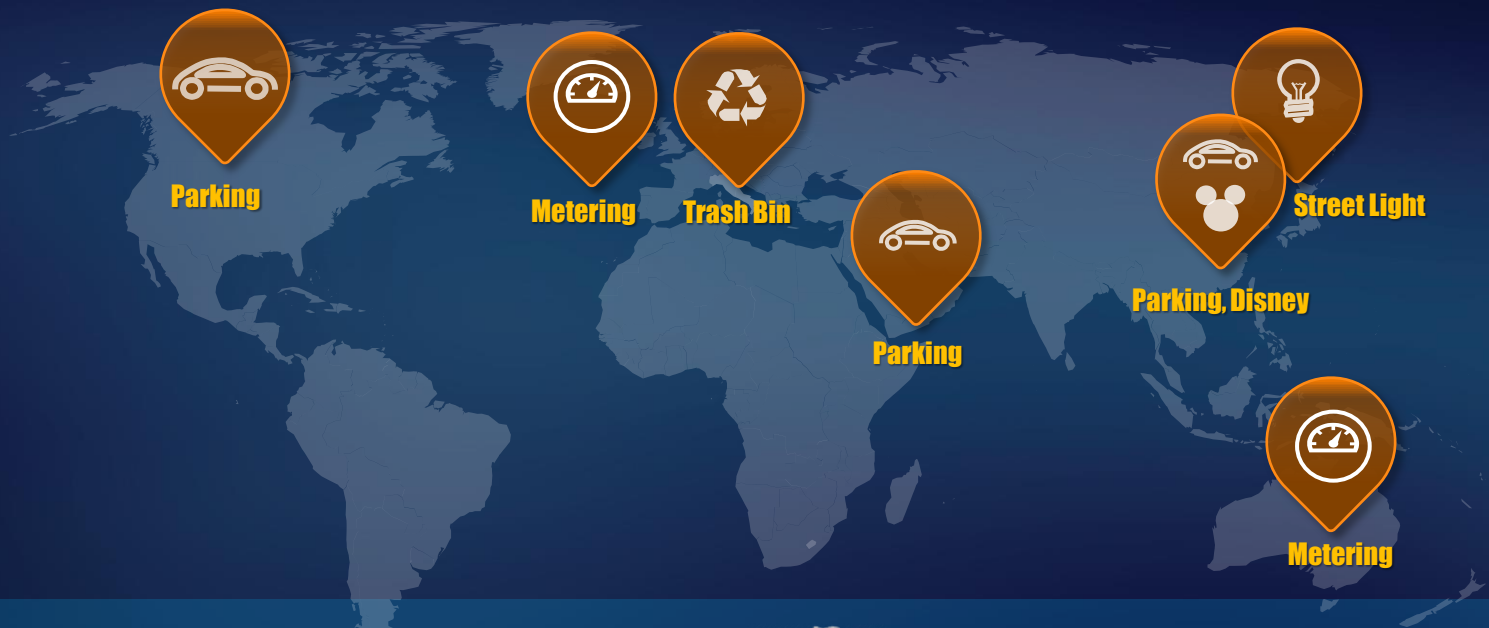
22 Sponsors
150+ Members(Target in 2016)

7 Open Labs

Huawei Smart City projects worldwide

JOIN US IN
BUILDING A BETTER CONNECTED WORLD

THANK YOU

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