Bringing NB-IoT to the Market

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Director, Vodafone Group R&D

Vodafone IoT

29% revenue growth YoY*

50m IoT Connections**

84 million MB of data supplied each month

1,400 IoT professionals

Vodafone Automotive **800 000** telematics subscribers***

Ranked as leader in independent analyst reports ▶ **Machina Research** **Gartner**

*At Year End 15/16
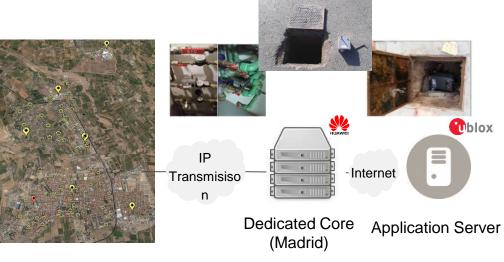**At end of Q3 16/17
***At end of Q3 16/17

NB-IoT Technology Pilot with Aguas de Valencia (AdV)

Network and Locations

Vodafone Spain live network (Moncada town, Valencia Region) **with the collaboration** of **Aguas de Valencia** Water Supplier Company

- Phase 1: pre-standard technology
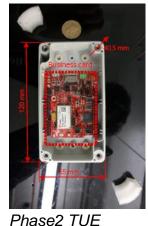- Phase 2: R13 standard NB-IoT technology

IP Transmisison

Dedicated Core (Madrid)

Internet

Application Server

https://www.youtube.com/watch?v=Wn1m01ttHBM

Device

Testing device prototype available to validate coverage using Neul chipset and ublox module (Sara)

- Battery Limited
- Autonomous operation, no integration in meter

Phase1 TUE

Phase2 TUE

NB-IoT Open Labs

- NB-IoT Open Labs are an initiative that originated as workstream within the NB-IoT Forum, part of the GSMA Connected Living programme

- Current focus is on NB-IoT, an access technology that was specified as part of 3GPP R13 (June 16)

- Aim is to reduce cost, complexity and time to bring NB-IoT to market and promote the eco-system effectively

- Two labs are currently operational:

  – Astor House, Newbury: joint lab with Huawei

  – Vodafone Innovation Park, Dusseldorf: multi-vendor lab

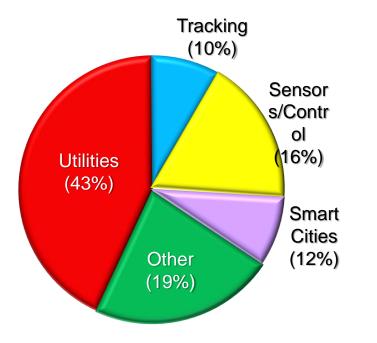**Lowering Entry Barriers and Reducing TTM**

Open Labs for Partner and Industry Engagement

Ecosystem visits by sector:

Testing (10%)

Chipsets /modules (14%)

Devices (76%)

- 68 ecosystem visitors to the Vodafone Open Lab
  - 76% Device design/manufacture
  - 14% Chipset/module vendor
  - 10% Testing

Open Labs for Partner and Industry Engagement

Customer visits by sector:

83 device developers in the Vodafone Open Lab

- 43% Utilities
- 12% Smart Cities
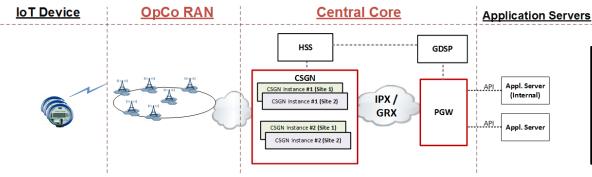- 16% Sensors/Control
- 10% Tracking
- 19% Other

NB-IoT Demos @ MWC2017

- Vodafone and partners are showing or facilitating 18 demos at MWC covering the following prioritised sectors:

Agile Rollout and Footprint Expansion

- NB-IoT initial use cases and service profile enables tailored geographic rollout approach
- Vodafone has deployed coverage in 6 major Spanish cities

- NB-IoT Base stations in other countries can quickly be connected to the central core network and product platform, as

Bilbao
Barcelona
Madrid
Valencia
Sevilla
Malaga

IoT Device	OpCo RAN	Central Core	Application Servers

HSS
GDSP
CSGN
CSGN Instance #1 (Site 1)
CSGN Instance #1 (Site 2)
CSGN Instance #2 (Site 1)
CSGN Instance #2 (Site 2)
IPX / GRX
PGW
API
Appl. Server (Internal)
API
Appl. Server

The future in our hands with the commercial launch of NB-IoT in Vodafone Spain

23 Jan 2017 by **Santiago Tenorio, Vodafone Group Head of Network Strategy & Architecture** @VodafoneGroup

Next: Vodafone Ireland NB-IoT Rollout

- **Vodafone Ireland has announced that it is to roll out commercial NB-IoT services.**

"*We are preparing our mobile infrastructure for the future, which is helping us support Irish businesses to be at the forefront of connectivity - across both traditional mobile and connected machines. We are already in the process of preparing for the wide scale roll-out of our commercial Internet of Things network this coming summer,*"

Madalina Suceveanu, Chief Technology Officer, Vodafone Ireland

Next Steps

- Expand NB-IoT footprint
  - Further expansion in Ireland, Netherlands and Turkey through 2017
  - Enable global rollout capability
- Continue development of Vodafone's commercial NB-IoT product to enable greater control and improved efficiency for customers
- Drive further standards development of NB-IoT capabilities through R14
  - Native device location for tracking applications
  - Low power operation (coin batteries) for wearable IoT applications
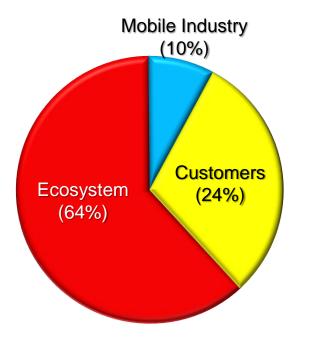
7 March 2017

Backup slides

Open Labs for Partner and Industry Engagement

Visitors by type:

- 107 visits/engagements in the Vodafone Open Lab
  - 64% ecosystem
  - 26% customers
  - 10% mobile industry