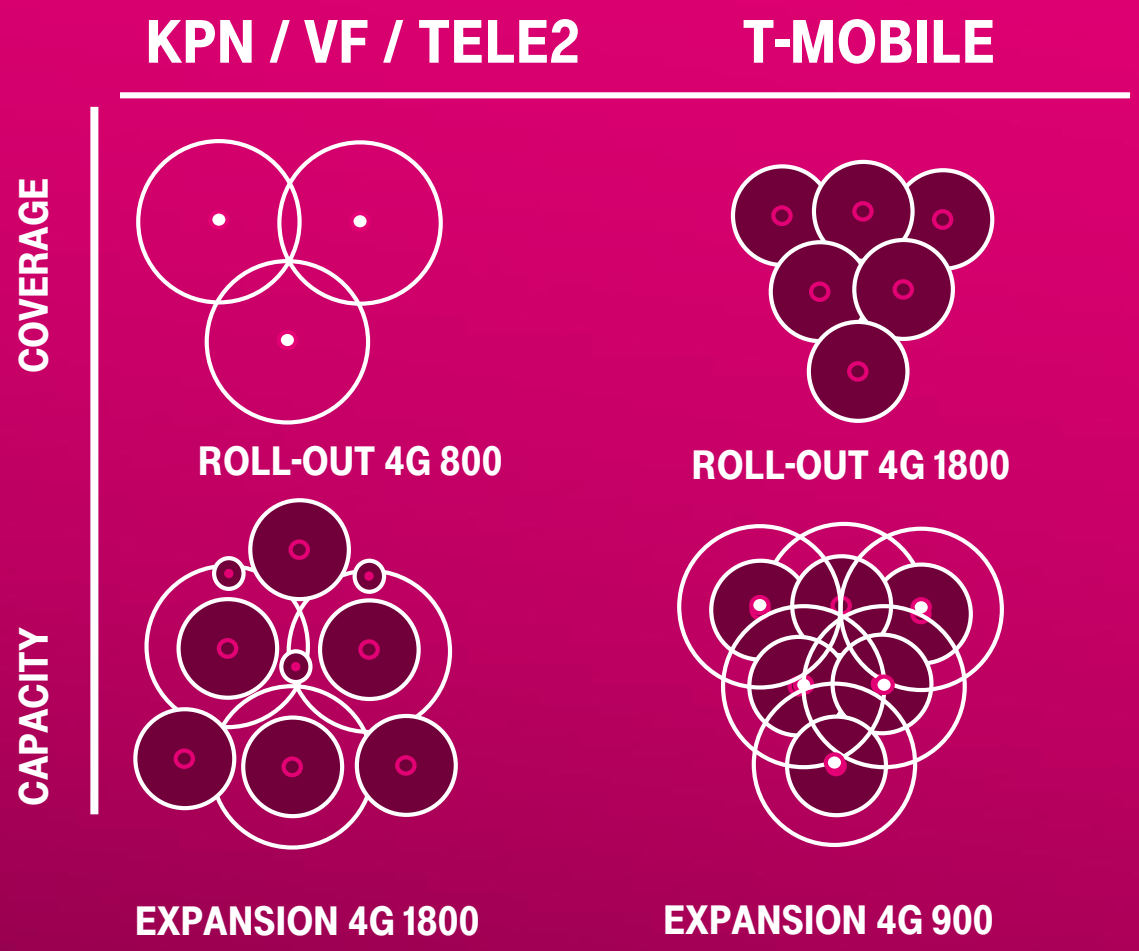
NB-IOT (CAT-NB1)
THE REAL ENABLER FOR MASSIVE IOT-SOLUTIONS

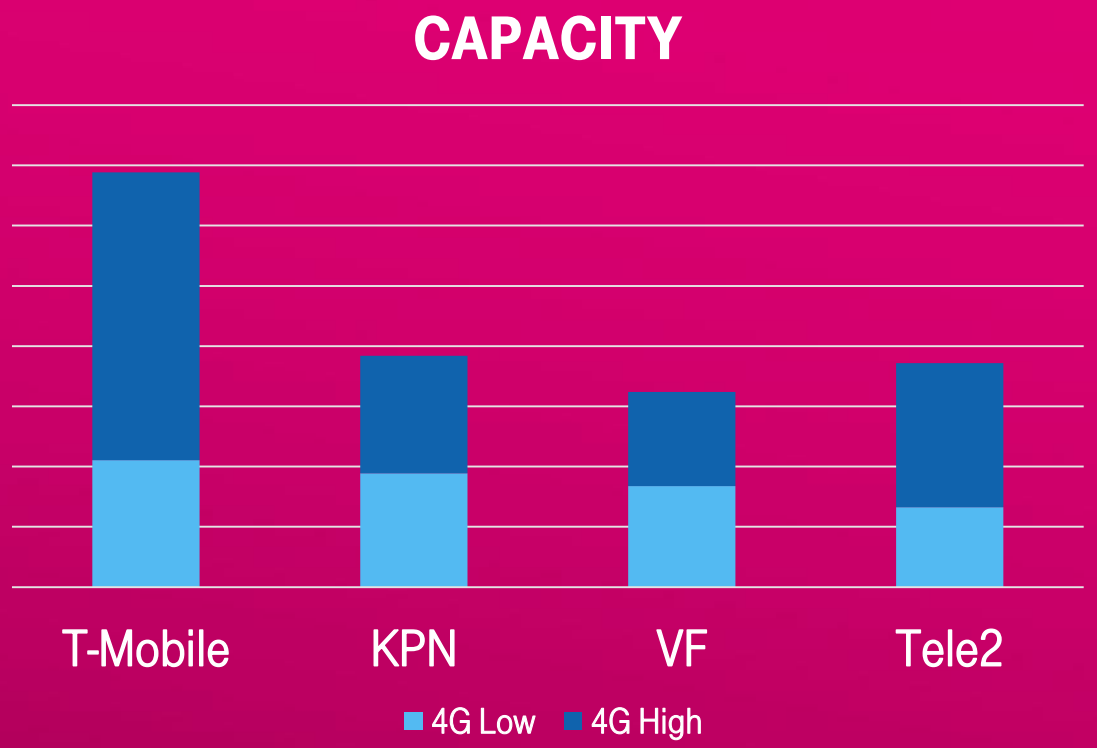
Richard Marijs
Technology Strategy

LIFE IS FOR SHARING.

T-MOBILE NETHERLANDS
INTRODUCTION

OUR NETWORK MAKES THE DIFFERENCE





OUR NETWORK FUNDAMENTS IN A NUTSHELL

KEY BENEFITS

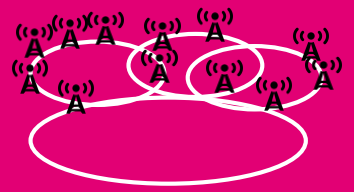
Software Defined Radio Network

2G → 3G → 4G → 5G?

Nation-wide 4,5G High Capacity

225MB/s and higher

High resilience



Redundant fiber Radio network

< Latency

Flat architecture

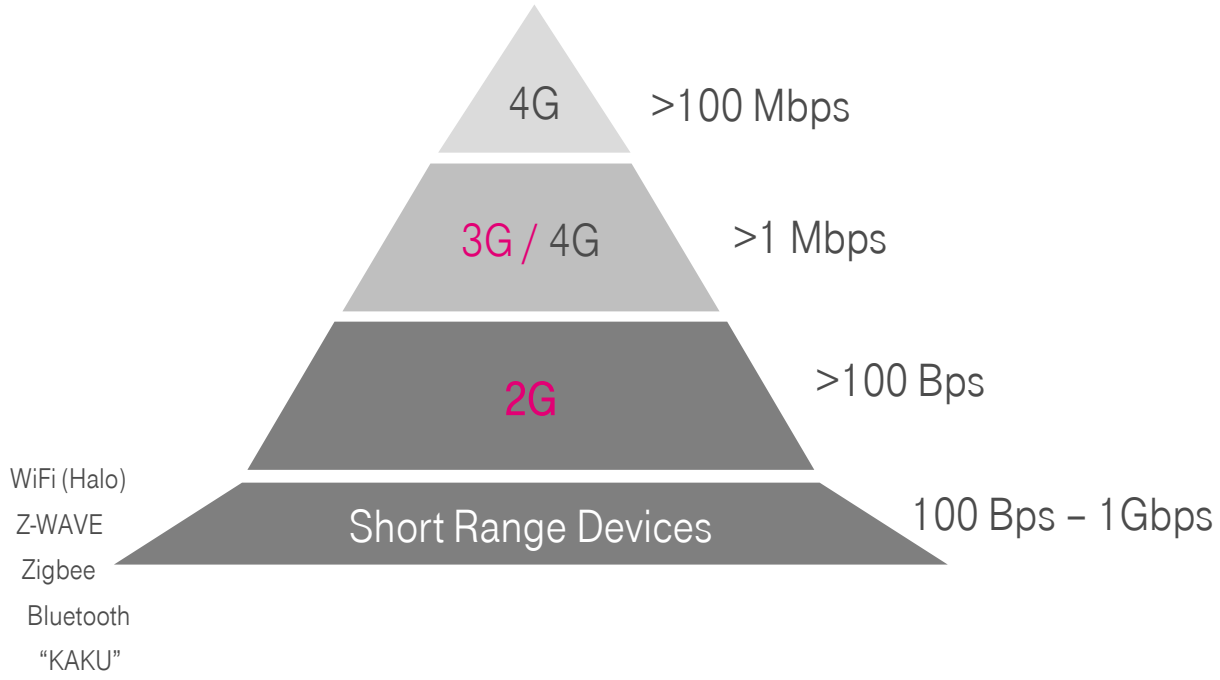
< 30ms → 1ms?

100% Battery Backup

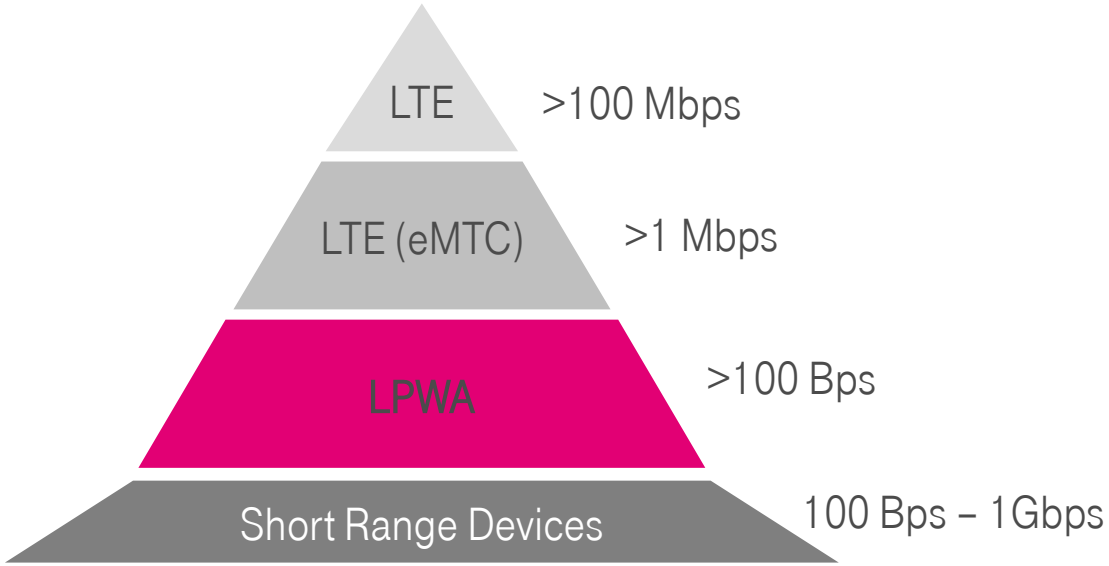
Minimal 30 minutes Radio network

IOT MARKET OVERVIEW

DIFFERENT WIRELESS CONNECTION TECHNOLOGIES FOR IOT TODAY

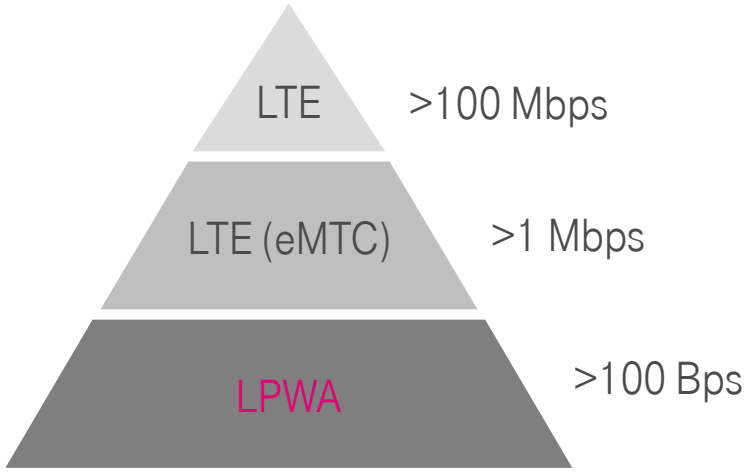


DIFFERENT WIRELESS CONNECTION TECHNOLOGIES FOR IOT TOMORROW



Low Power - Wide Area

DIFFERENT WIRELESS CONNECTION TECHNOLOGIES FOR IOT TOMORROW



Un-Licensed Spectrum
Proprietary Technology

- SigFox
- Lora
- Ingenu and more

Licensed Spectrum
Standardised technology

- NB-IoT (3GPP Standard)

3GPP A GLOBAL INITIATIVE

NB-IoT key facts

- Long-range communications
- Low bit rate
- Roaming across the globe
- Licensed spectrum (< 1 GHz)
- Standardised
- Secure

Low Power - Wide Area

BENEFITS OF NB-IOT

NB-IOT IN A NUTSHELL
KEY BENEFITS

Low power consumption

Battery life time up to 10 years

Low hardware cost

Module < 4 EUR**

Low data rates

600 bit/s up to few 100 kbit/s*

NB-IOT IN A NUTSHELL
KEY BENEFITS

Ease of use

Direct use – no coupling to bridge/gateway needed

Many devices

≈ 100.000 connected devices per cell

Deep indoor penetration

+20dB link budget compared to GSM

NB-IOT IN A NUTSHELL
KEY BENEFITS

LTE-based security

SIM-based, authentication, integrity, ciphering

Public network

In operator managed licensed spectrum

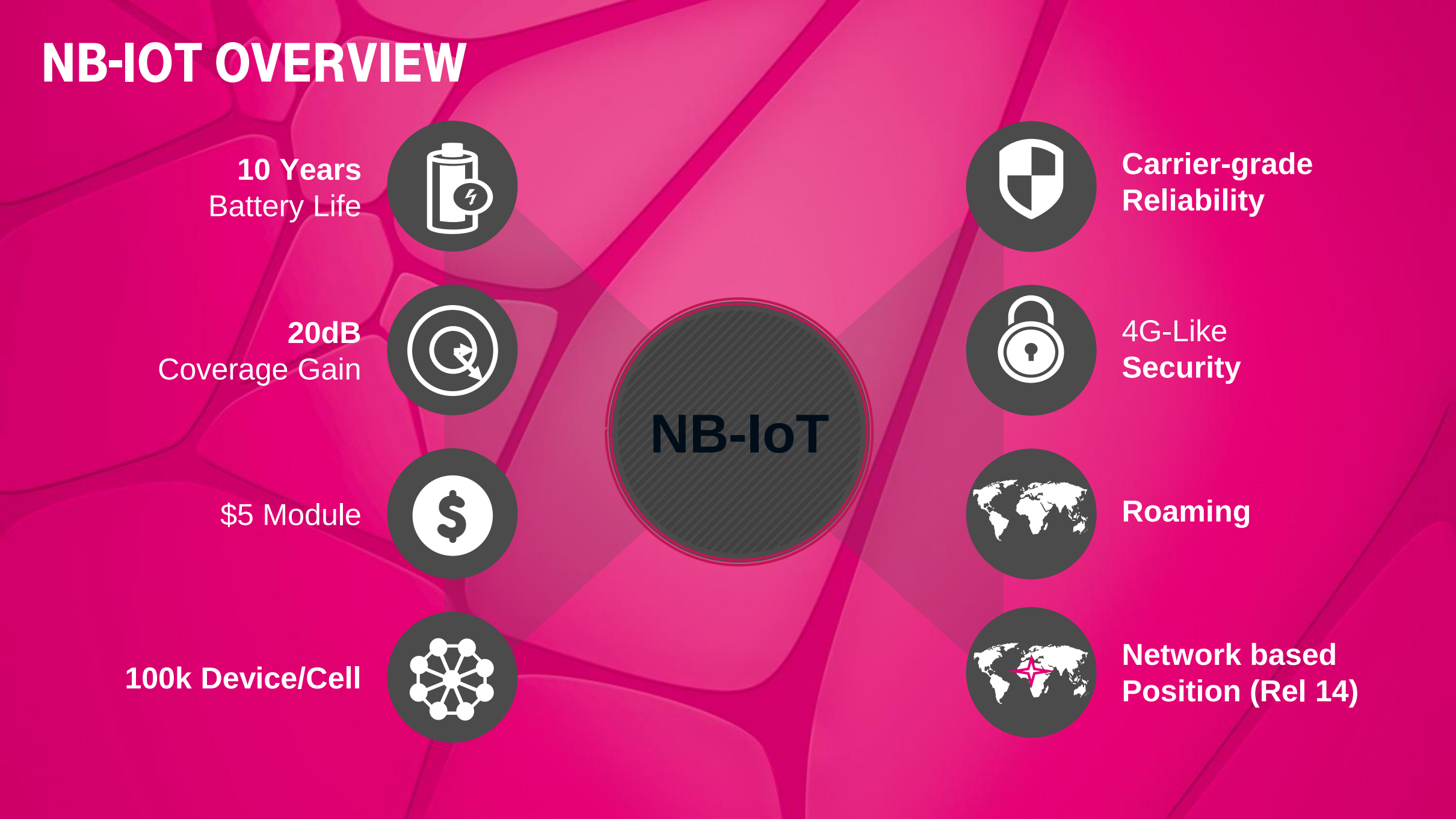
Standardized

3GPP™

A GLOBAL INITIATIVE

3GPP Release 13

NB-IOT OVERVIEW



CORPERATE ENTERPRISE USE CASES OF NB-IOT

SMART WASTE MANAGEMENT
POTENTIAL FOR SMART CITIES

Use case scenario / current situation

- Today: collecting and clearing waste bins or containers are often based on a fixed schedule;
- Target: collection dependent on fill-level
- NB-IoT sensors mounted to garbage containers detect filling level, assessment system evaluates data and determines efficient routes

Business / customer value with NB-IoT

- Optimized routes lead to reduced logistics costs
- No full or overflowing containers
- New service: customer pays according to waste production

Market potential

- Waste management market with expected size of $562m in 2020

SMART HEAT METERING
MASSIVE NUMBER OF DEVICES

Use case scenario / current situation

- Today: heat consumption usually measured with analogue tubes
- First attempts of digitalization with complex, proprietary approaches
- Target: digitalize and connect sensors for automated remote reading and invoicing

Business / customer value with NB-IoT

- Reduced labor cost: no need for people going from house to house for manual reading
- Convenience for customer: no waiting for manual reading staff
- No maintenance & HW costs for proprietary networks
- Digitalization with accurate daily information allows optimization of heating consumption
- New potentials: apps to compare own heat consumption with environment (big data)

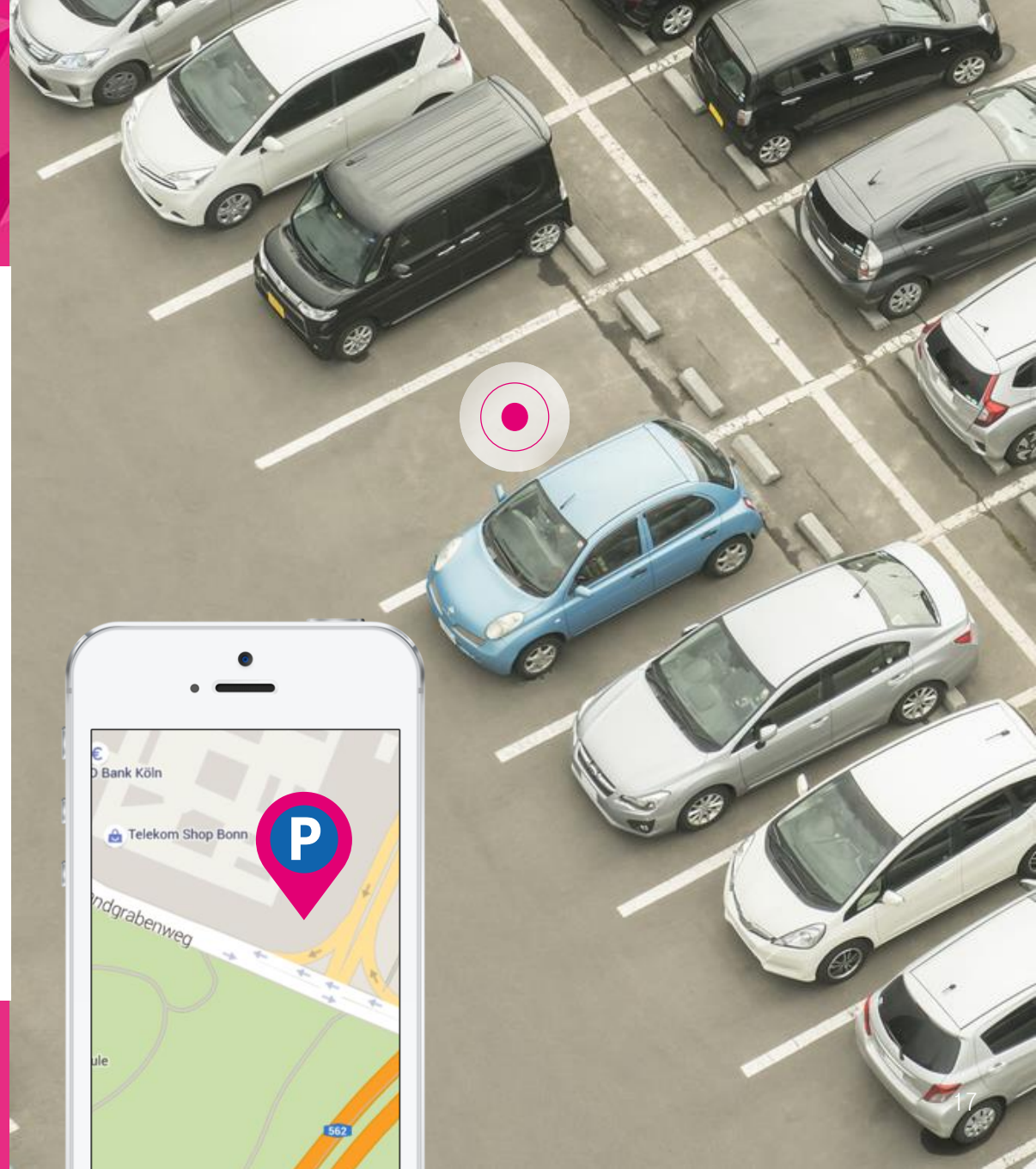
SMART PARKING
FOR SMART CITIES

Use case scenario / current situation

- Today: no detection of street parking space occupancy
- Drivers searching for parking space create up to 30% of city traffic incl. traffic jams and pollution
- Target: connected parking sensors transmit occupancy to backend, that routes driver directly to open parking space

Business / customer value with NB-IoT

- Lower investments for road construction and maintenance due to reduced traffic
- More detailed information for park surveillance authorities, therefore more efficient prosecution of parking violations
- Drivers save time and reduce their stress level



CONSUMER USE CASE OF NB-IOT

“PET FINDER”
MUST-HAVE FOR PET OWNERS

Use case scenario / current situation

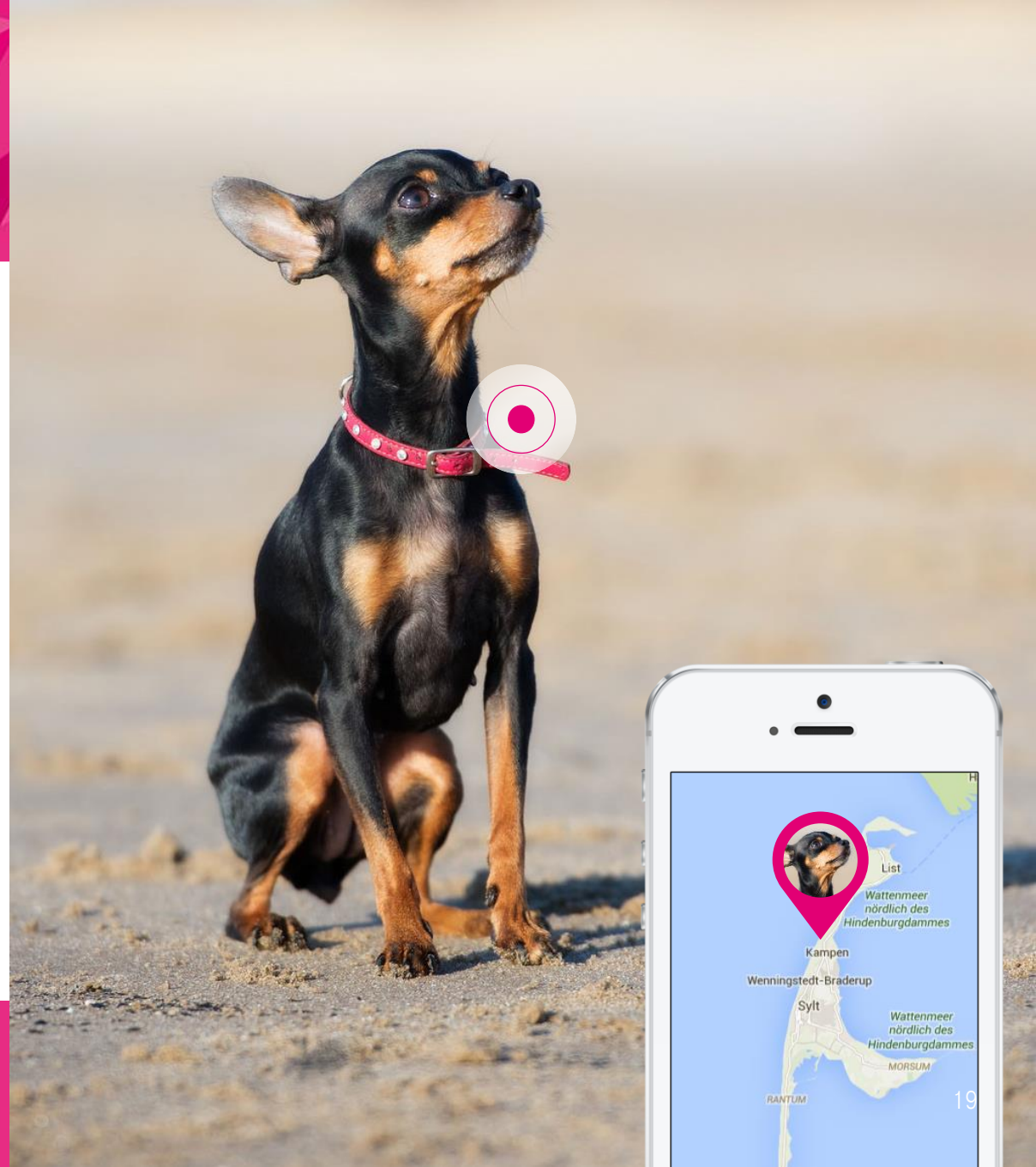
- Today: missed pets are difficult to find
- Pet owners emotionally attached to their pets
- No satisfying solution available
  (2G: expensive, battery drain; Bluetooth: limited functionality)
- Target: cheap, effective solution for finding pets

Business / customer value with NB-IoT

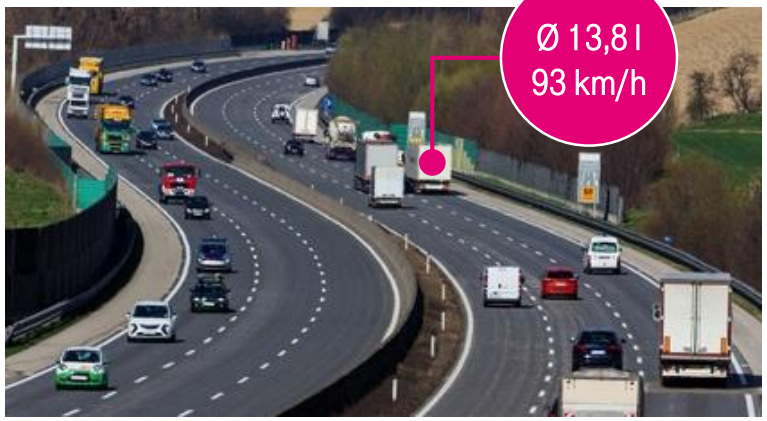
- Customer is able to find pet via NB-IoT collar
- Reduced HW module/modem costs compared to 2G

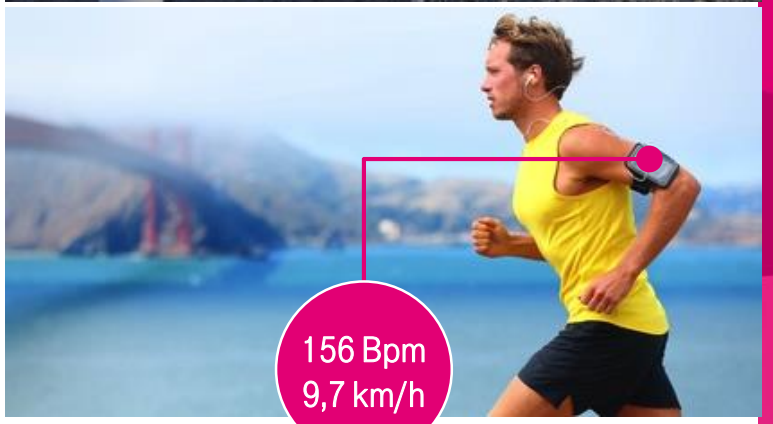
Market potential

- Guess! Works also on kids and elderly built in a watch ;-)



NB-IOT MAKES THINGS TALK!

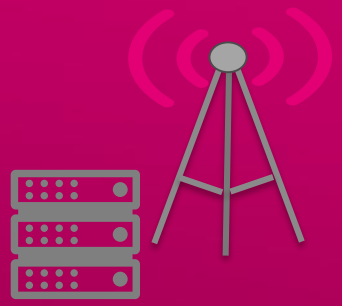




TECHNOLOGY

TECHNOLOGY

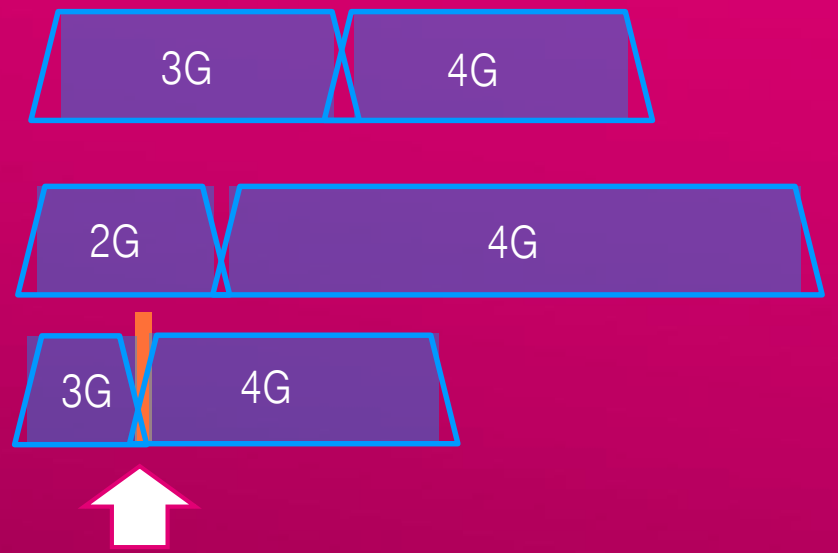
OUR RADIO NETWORK IS SOFTWARE UPGRADABLE TO NB-IOT



2100MHz

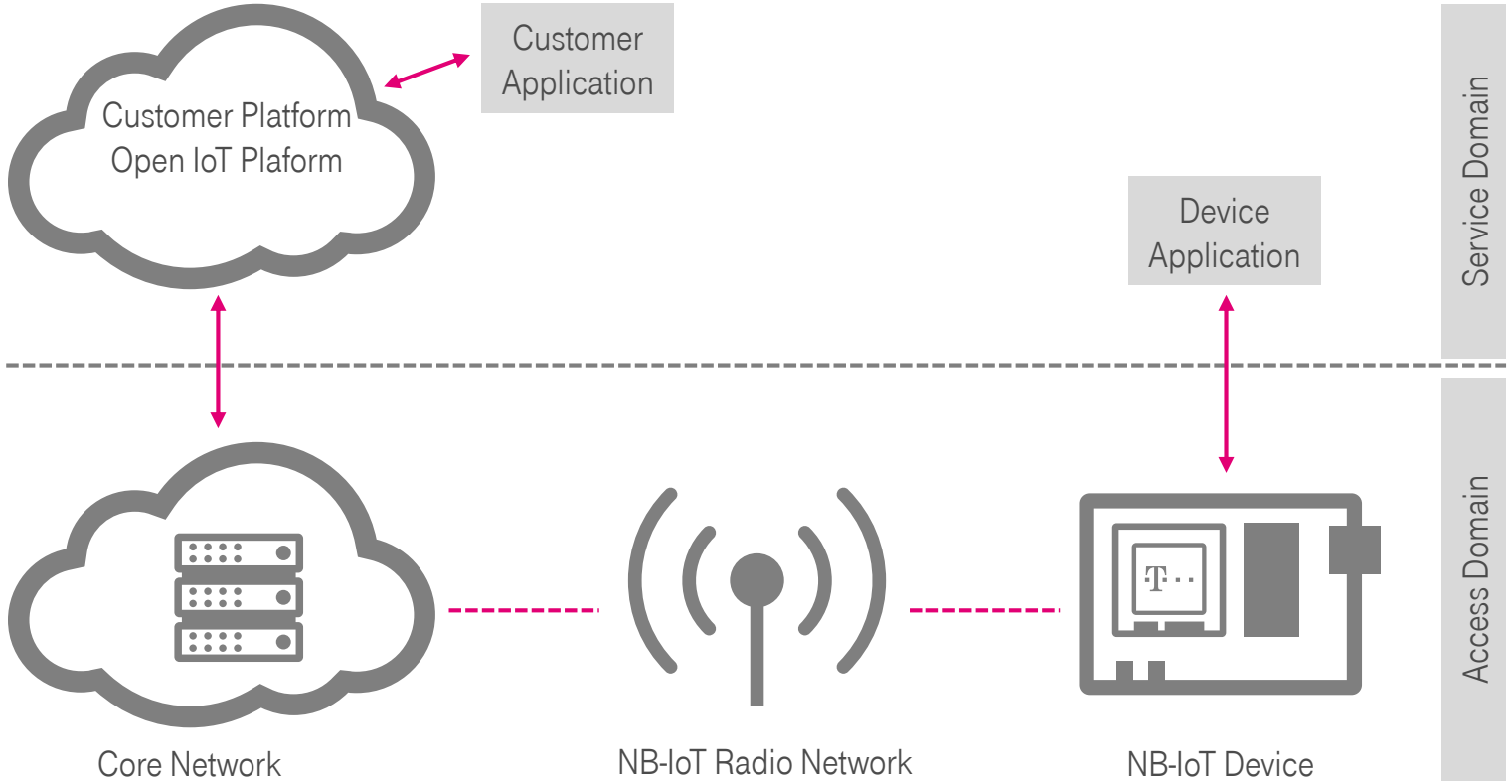
1800MHz

900MHz



NB-IOT TECHNOLOGY ARCHITECTURE

BASIC SETUP

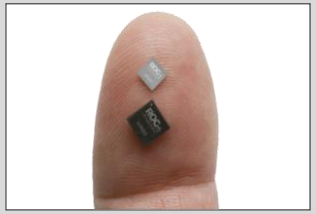


NB–IoT Basic Components

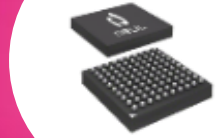
Device

Module

Chip + SIM



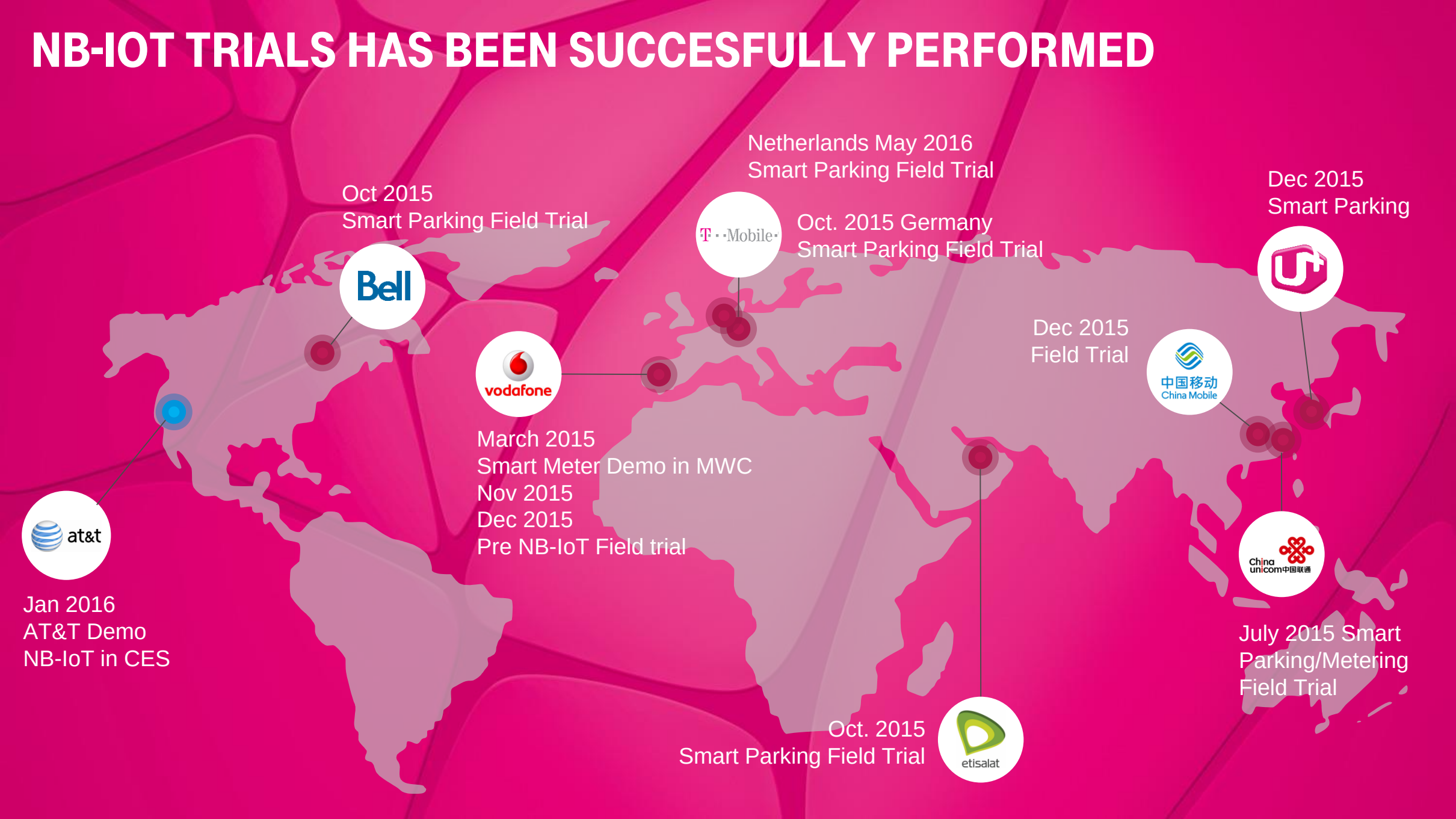
NB-IOT CHIPSET/MODULE IS TAKING SHAPE



Chipset → Module

NB-IOT CHIPSET/MODULE IS TAKING SHAPE

NB-IOT TRIALS HAS BEEN SUCCESFULLY PERFORMED



NB-IOT NETWORKS ARE COMING SOON

T-Mobile toont parkeeroplossing met NB-IoT

woensdag 8 juni 2016 | 21:57 CET | Nieuws

In samenwerking met Huawei heeft T-Mobile op het Smart City event in Amsterdam de NarrowBand-IoT (NB-IoT) technolog ...treerd. Als voorbeeld van de werking van NB-IoT wordt een oplossing voor 'smart ...uik maakt van NB-IoT.

Vodafone: NB-IoT beste technolog... netwerken

woensdag 8 juni 2016 | 11:02 CET | Nieuws

NB-IoT heeft de voorbije maanden grote passen gemaakt door ... netwerkproviders en hardwareleveranciers, schrijft Vodafone op zijn blo... zal de 3GPP standaard nog deze maand worden goedgekeurd gevolgd door ...

KPN houdt deur open voor NB-IoT

woensdag 8 juni 2016 | 14:03 CET | Nieuws

Ondanks de uitrol van zijn LoRa-netwerk, sluit KPN het gebruik van NB-IoT in de toekomst niet uit. Dat heeft Erik Peeters, managing director IoT bij KPN, gezegd tijdens het event LPWA 2016 in Amsterdam. Desondanks is het voor KPN nog te vroeg om zijn commitment aan NB-

T-Mobile activeert NB-IoT in grote steden

woensdag 19 oktober 2016 | 16:14 CET | Nieuws

T-Mobile Nederland activeert deze week zijn Internet-of-Things-netwerk in een aantal steden. Vanaf volgende week zal het NB-IoT-netwerk beschikbaar zijn in Amsterdam, Rotterdam, Den Haag, Eindhoven en de omgeving Schiphol. Komende maand volgen meer locaties en in de loop