



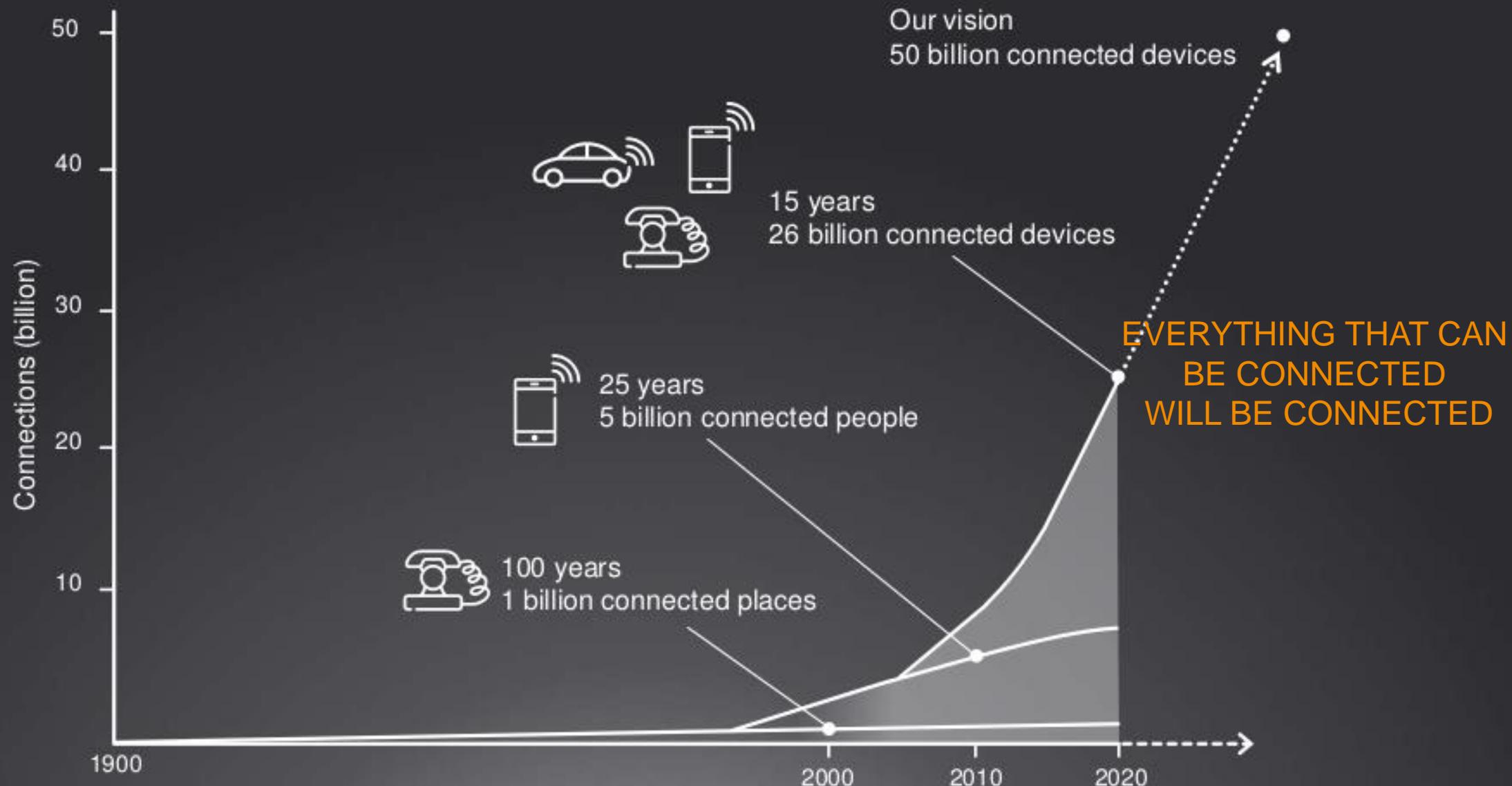
ERICSSON

HÁLÓZATOT A DOLGOKNAK

Kaszás Gábor | Ericsson Magyarország | HTE Infokom | 2016 október 13.



PACE OF CHANGE



CONNECTED DEVICES IN 2021 28 BILLION.

Source: Ericsson Mobility Report

10.4 BILLION
MOBILE PHONES, PC/LAPTOP/TABLET

15.7 BILLION
M2M DEVICES & CONSUMER ELECTRONICS



IOT COMES WITH A WIDE RANGE OF REQUIREMENTS



MASSIVE MTC/IOT



SMART BUILDING



LOGISTICS, TRACKING AND FLEET MANAGEMENT



SMART METER



SMART AGRICULTURE



CAPILLARY NETWORKS

CRITICAL MTC/IOT



AUTONOMOUS CAR



TRAFFIC SAFETY & CONTROL



REMOTE MANUFACTURING,
TRAINING, SURGERY



INDUSTRIAL APPLICATION
& CONTROL

LOW COST, LOW ENERGY
SMALL DATA VOLUMES
MASSIVE NUMBERS

ULTRA RELIABLE
VERY LOW LATENCY
VERY HIGH AVAILABILITY

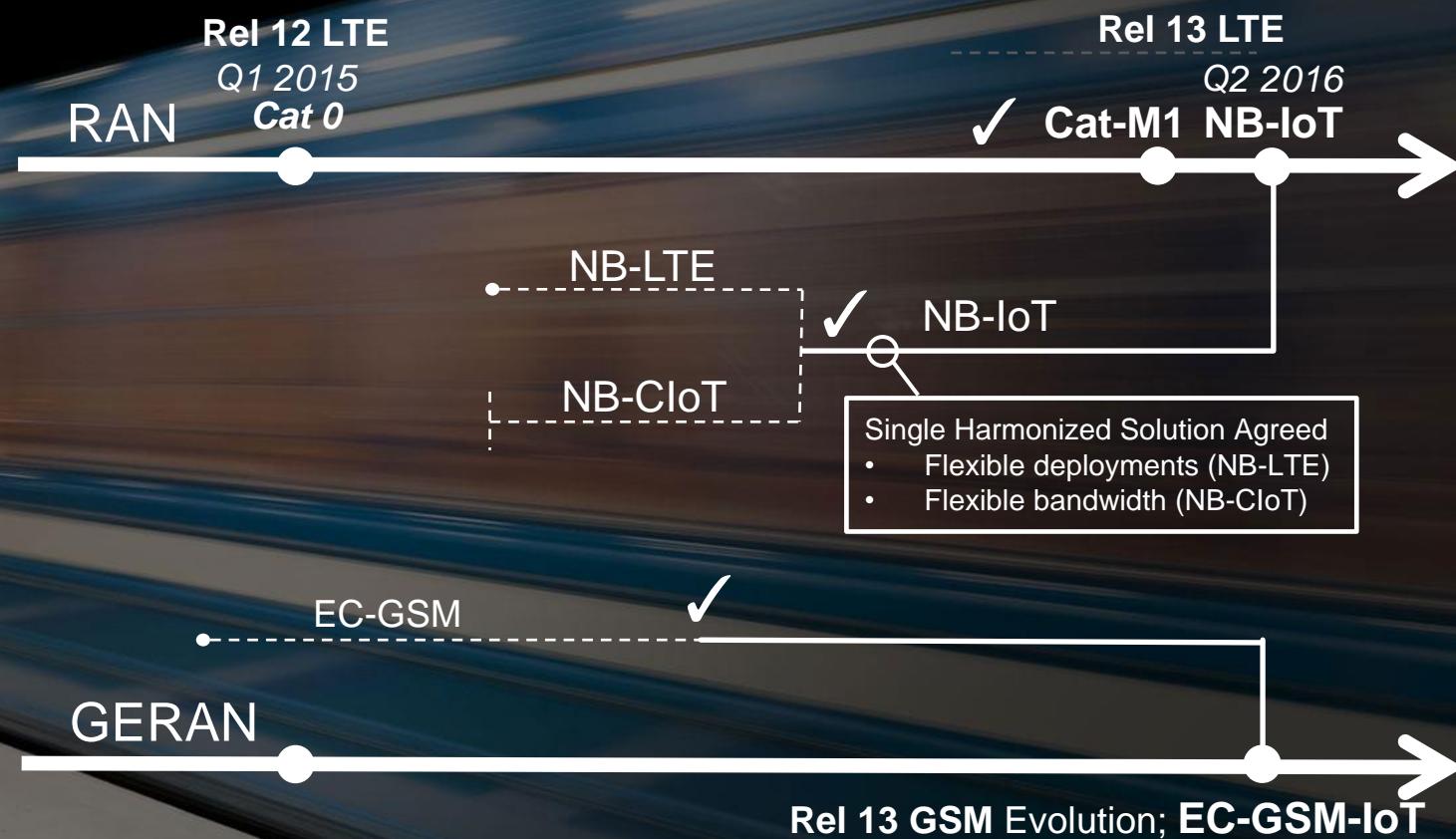


CELLULAR IS THE FOUNDATION





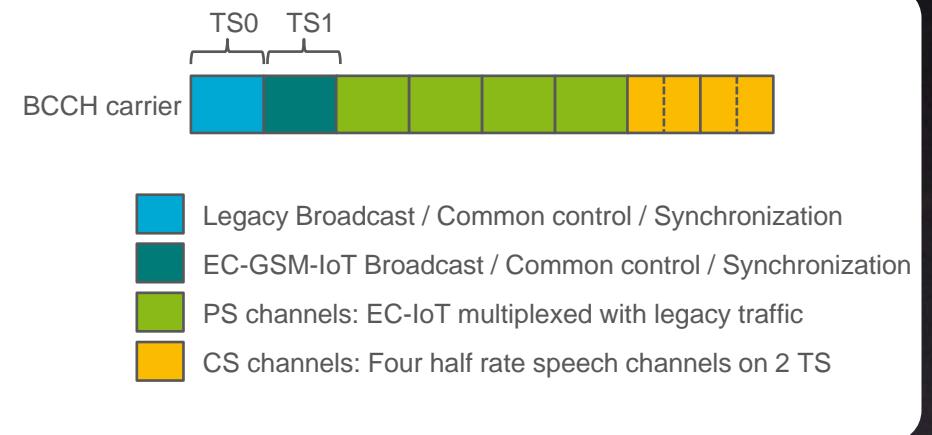
3GPP REL 13 FUNCTIONALITY



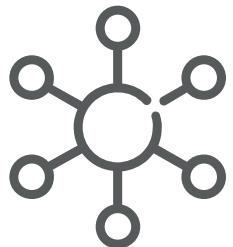


EC-GSM IOT DEPLOYMENT

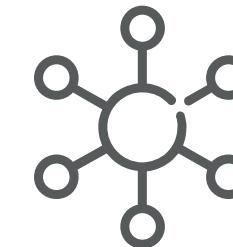
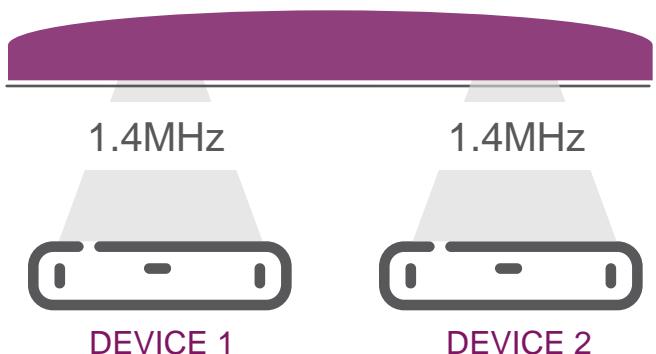
- › New control channels and access procedures
- › One new dedicated EC-GSM IoT broadcast channel
- › Full integration with GPRS and EDGE traffic
- › Repetition of transmissions and use of Combining scheme
- › Coverage extension 20dB proven in field
- › New enhanced QoS Admission control mechanisms



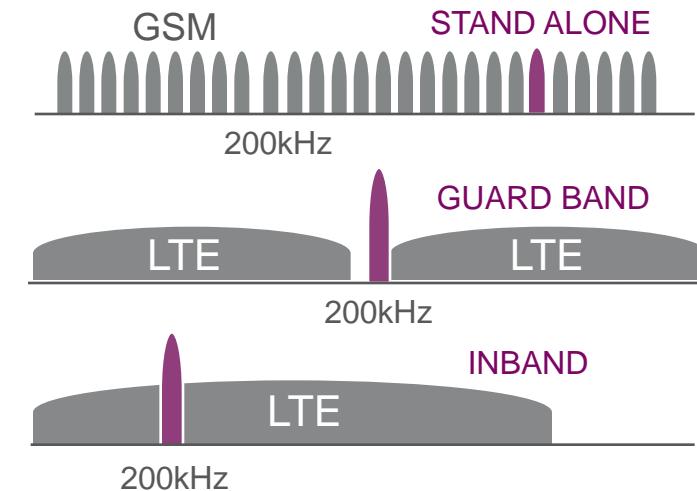
IOT ON LTE - NEW SOFTWARE ON LTE INSTALLED BASE



Cat-M1



NB-IoT



Device receives part of LTE carrier
Devices multiplexed across LTE carrier
Leverage full capacity of wideband LTE carrier

Device receives NB-IoT carrier (separate cell)
The capacity of NB-IoT carrier is shared by all devices
Capacity is scalable by adding additional NB-IoT carriers

IOT CHALLENGES



MASSIVE NUMBER OF CONNECTIONS



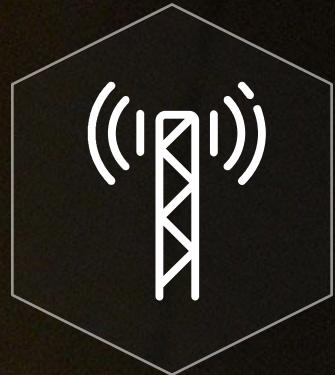
Low COST



Long BATTERY LIFE



Good COVERAGE

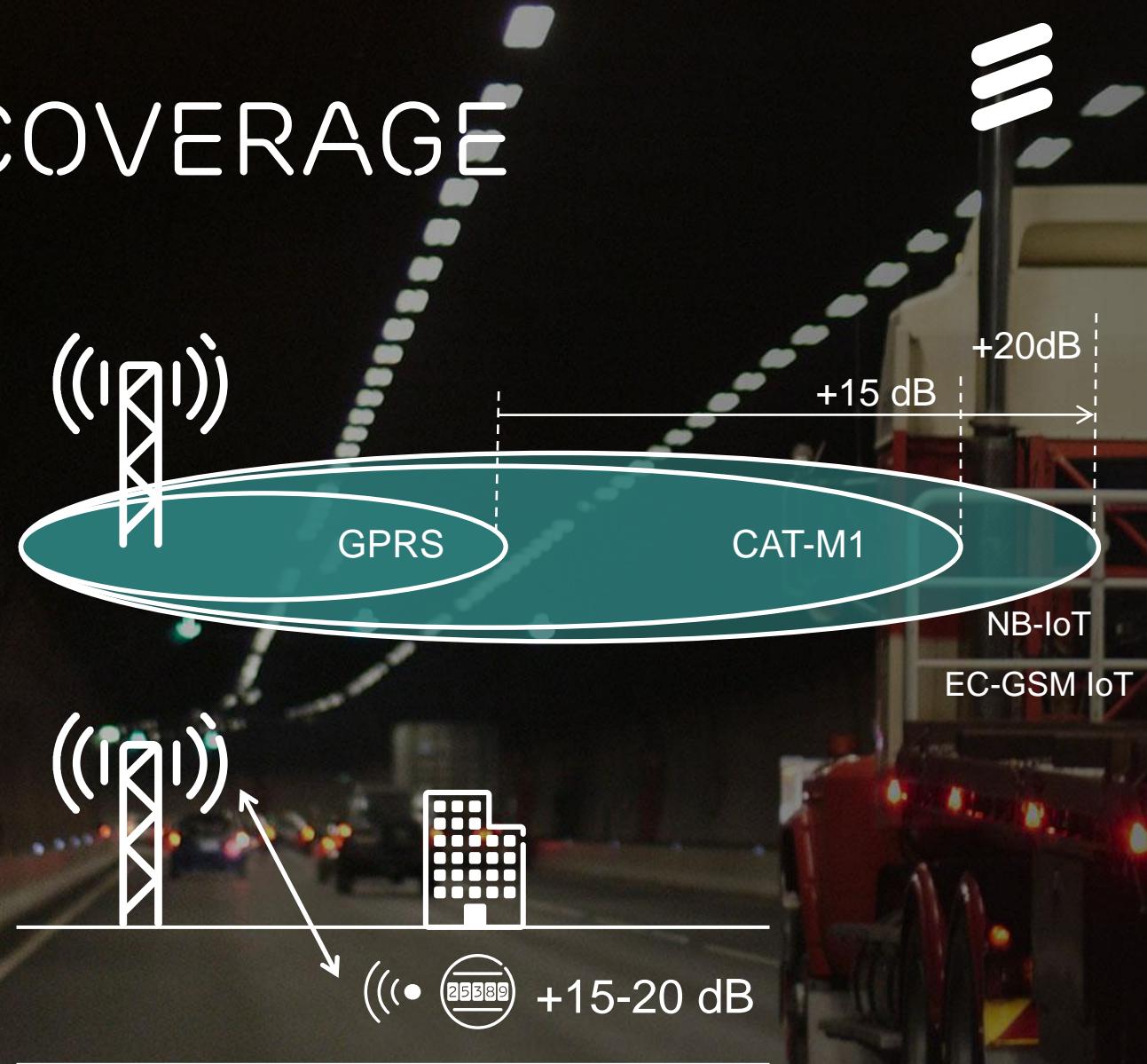


IMPROVED COVERAGE (UP TO 20 dB)

EXTENDED COVERAGE MODE

EXTENDS COVERAGE BY UP TO +20 dB ACHIEVED BY:

- Repetition of transmissions
- New control channels



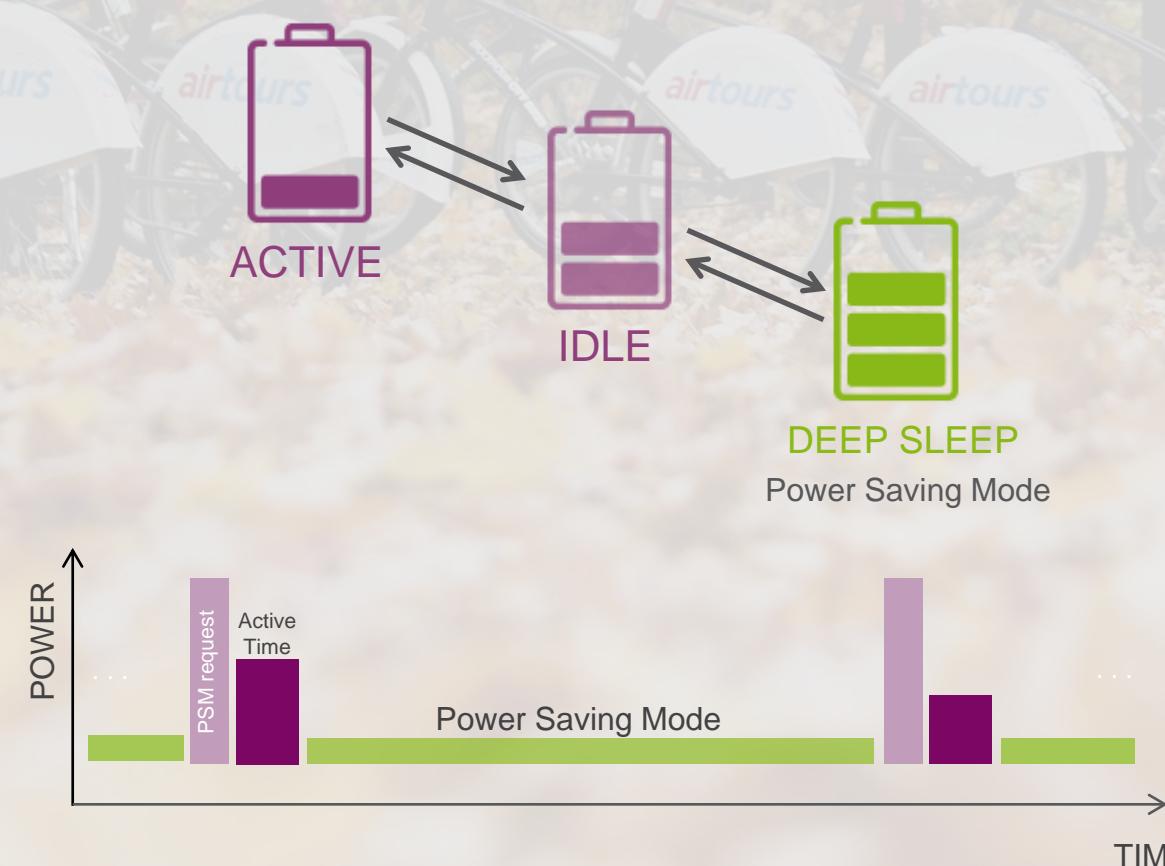


10+ YEARS BATTERY LIFE



POWER SAVING MODE (PSM)

- New “Power Saving” State
- Device unreachable, but remain registered
- Paging coordinated when not in PSM state
- Reducing signaling
- Low cost for IoT deployments & no maintenance





EXTENDED DISCONTINUOUS RECEPTION



3GPP REL13. GSM (GRPS, EDGE AND EC-GSM-IOT) AND LTE (CAT-M1, NB-IOT)



ENABLE A MULTITUDE OF IOT
USE CASES
(Alarms, Sensors, Meters, etc.)



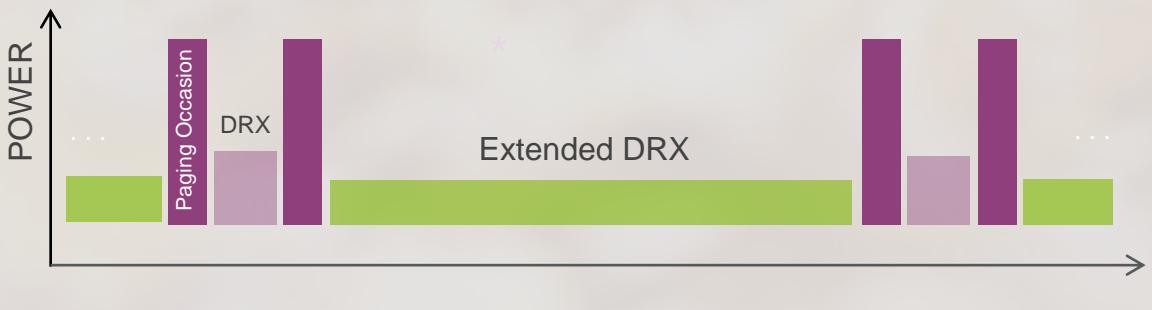
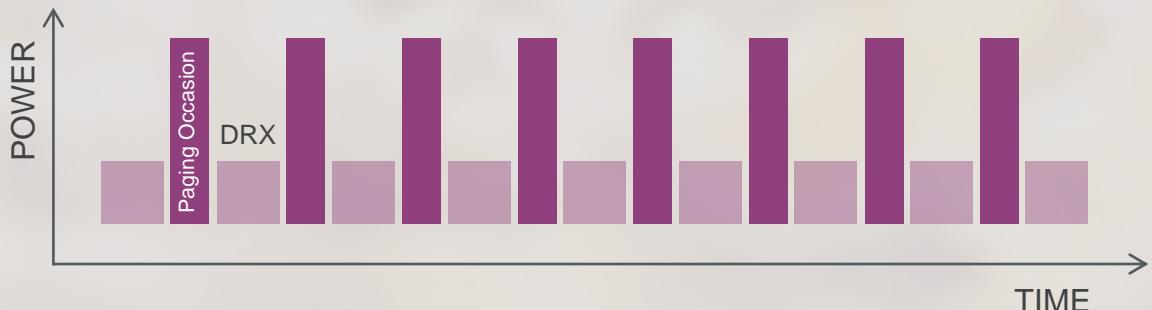
EXTENDED LONG DRX
POWER SAVING MODE –
GSM AND LTE



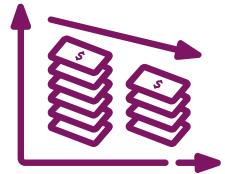
OPTIMIZED FOR LOW ACTIVITY
USE CASES
EVEN COMBINED WITH
EXTENDED COVERAGE

EXTENDED DRX

- Extended sleep cycles in idle mode to eliminate unnecessary receiver activations
- Significantly improved DL reachability



LTE MODULE COMPLEXITY EVOLUTION



Significantly reduced device complexity, functionality and capability

CAT-4

100%
3GPP Rel.8

CAT-1

75%
3GPP Rel.8

CAT-0

40%
3GPP Rel.12

20%
3GPP Rel.13

10%
3GPP Rel.13

CAT-M1

NB
IOT

EC
GSM



UP TO 90% MODULE COST REDUCTION



Cost reductions:

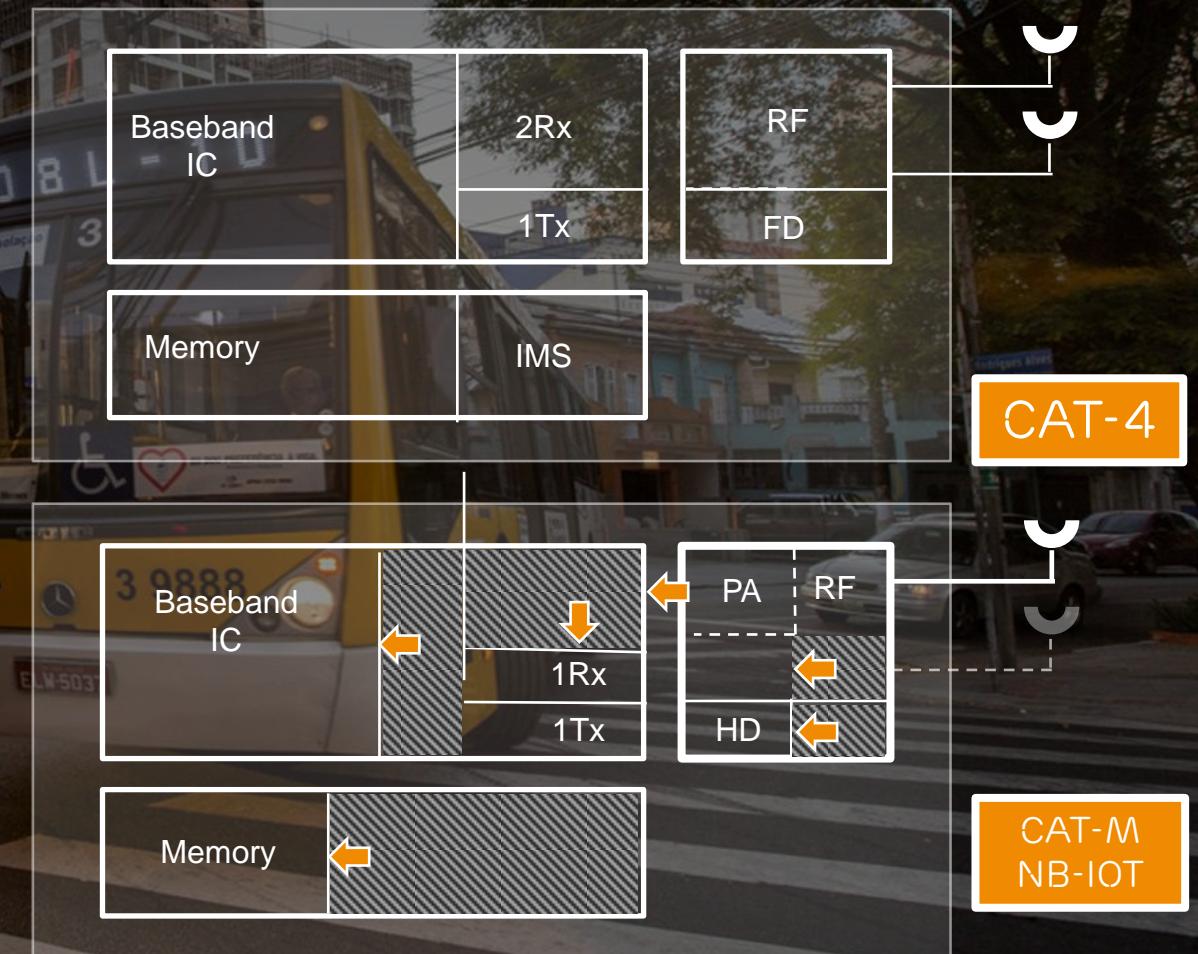
HALF DUPLEX (HD) OPERATION
SINGLE RECEIVE ANTENNA
REDUCED MEMORY REQUIREMENTS

LTE CAT-M highlights:

... AND
1.4 MHz UE BANDWIDTH
REDUCED TX POWER (20dBm)
REDUCED PEAK RATE (1 Mbps)

NB-IoT highlights:

... AND
200 kHz UE BANDWIDTH
REDUCED TX POWER VARIATION (allowing 23 dBm)
FURTHER REDUCED PEAK RATE (128 kbps)



CELLULAR FOR MASSIVE IOT

Meeting diversity of use case requirements



Bandwidth



Coverage



Battery life



Capacity



Peak Throughput



Mobility

	Bandwidth	Coverage	Battery life	Capacity	Peak Throughput	Mobility
EC-GSM-IoT	200 kHz/ 600 kHz	164dB (+20dB)	10+ Year	190,000 per cell	473/473 kbps (97/97 kbps)	Idle mode mobility
NB-IoT	200 kHz	164dB (+20dB)	10+ Year	200,000 per cell	227/250 kbps (21/63 kbps)	Idle mode mobility
Cat-M1	1.4 MHz	160dB (+15dB)	10+ Year	1M+ per cell	0.8/1 Mbps (300/375 kbps)	Connected & idle mode mobility

FULL RANGE OF IOT/MTC SOLUTIONS



Standardized in 3GPP rel 13

EC-GSM-IoT

Evolution of GSM
Ultra-low bitrate
applications

Cat-M1

Scaled down LTE
Low to medium
bitrate applications

NB-IoT

**New 200KHz
carrier**
Ultra low-bitrate
applications

**MASSIVE
IOT**





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