Cellular connect

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ERICSSON

IoT Week Belgrade May 31st-June 2nd 2016

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Igor Simić Consultant Ericsson Region Mediterranean Mobile Broadband solutions



IOT / MTC Wide Range of Requirements



ioT Competivity Requirements



MASSIVE NUMBER OF CONNECTIONS 





/ERA





TTERY LIFE



Cellution massive loT



10 km

COVERAGE/ BATTERY



Better Coverage (up to 7x better)

EXTENDED COVERAGE mode

EXTENDS COVERAGE BY UP TO +20 dB ACHIEVED BY:

- Repetition of transmissions
- New control channels
- Dynamic adjustment of coverage modes
- New access procedures



10+ y ars Battery Life

New "Power Saving" State

POWER SAVING MODE

DRX

EXTENDED

POWER

Paging Occasior

DRX

- Device unreachable, but remain registered
- ACTIVE UE Reachable

- Paging coordinated when not in PSM state
- Reducing signaling



Extended sleep cycles in idle mode to eliminate unnecessary receiver activations

Extended DRX

TIME

· Significantly improved DL reachability

TIME

POWER

Ö

Paging

DRX



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

EP:

Device receives NB-IoT carrier The capacity of NB-IoT carrier is snall devices Capacity is scaled by thing additional NB-IoT carriers

		AT. T. TEST			
	Rel-8 Cat-4	Rel-8 Cat-1	Rel-12 Cat-0	Rel-13 Cat-M1	Rel-13 NB-loT (Cat- M2)
Supported duplex modes	FD-FDD / TDD	FD- 5 FBD/	HD-FDD FD-FDD TDD	HD-FDD / FD-FDD / TDD	HD-FDD
DL peak rate [Mbps]	150	10	0.375 / 1	0.3 / 0.8	~0.2
UL peak rate [Mbps]	50	5	0.375 / 1	0.375 / 1	~0.2
Highest DL modulation scheme	64QAM	64QAM	64QAM	16QAM	QPSK
Highest UL modulation scheme	16QAM	16QAM	1CQAM	16QAM	QPSK
Max number of DL spatial layers	2	ELV 5037	1	1	1
Number of receive antennas	2	2	1	1	1
UE bandwidth [MHz]	20	20	20	1.080	0.180
Maximum transmit power [dBm]	23	-23	23	20 or 23	23

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Summary

- Cellular offering One Network serving a diversity of IoT applications
 - TCO savings (no need for a separate over-lay network)
 - Future proof IoT connectivity
- Network solutions supported in SW
 - Standardization (Rel13) on track
 - Chipsets end of 2016, devices first half 2017
- Cellular addessing the Massive IoT segment EC-GSM-IoT, CAT-M1 & NB-IoT
 - 80-90% reduction of device complexity and cost (Cat-M1 and NB-IoT)
 - Battery time 10+ years
 - Coverage improved with 15-20dB

Opportunity for Mobile Operators to address the Massive IoT (LPWA) market

















Battery lifetime

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[,] Battery lifetime

- With Power Saving Mode (PSM) [3GPP Rel-12] EC-GSM allows for a very energy efficient operation irrespective of coverage situation.
- There is however, as expected, a strong dependency on the coverage situation and the battery lifetime achieved.
- In the table a 5 Wh battery has been assumed
- The analysis includes network synchronization time, transmission, reception, light and deep sleep power consumption.

Packet size,	Coupling loss				
50 bytes, 2 hours	17,6	14,1			
200 bytes, 2 hours	12,9	8,6			
50 bytes, 1 day	34,7	33,4	18,7		
200 bytes, 1 day	32,8	29,7	10,9		

Device battery life depends on many factors:

- Battery type
- Device use pattern Data volume and how often the device is sending data
- Coverage SINR, more repetitions extends the time the device is connceted

Device Ecosystem



- 3-5 vendors committed to develop NB-IoT and Cat-M1 chipsets/modems
- Different technical strategies applies
- Low band support to start with (700-800-900 MHz)
- First commercial devices expected end of 2016
- Modem price points uncertain in first phase
- Intel and Mediatek recently confirmed plans for EC-GSM-IoT chipsets in Q3/Q4

lot Chipsets







LTE IoT modules [CAT-1]

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LE866

Telit

Telit





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WIRELESS"

HL Series

SIERRA

WIRELESS'

Telit

gemalto

Ublox 🖤

(NYSE: SQNS) has partnered wi

the companies' leadership in th

narrowband LTE MTC solutions



CTS & SOLU

Agreement extends earlier partnership on Cat 1 LTE technology

PARIS, France - February 16, 2016 - LTE chipmaker Sequens Communications SA

INTEL ACCELERATES PATH TO 5G

NEWS HIGHLIGHTS

- Collaborations with industry leaders Ericsson*, KT*, LG Electronics*, Nokia*, SK Telecom* and Verizon* help lay the foundation for 5G.
- 5G mobile trial platform enables faster prototyping.
- New modems and system-on-chips (SoCs) provide robust connectivity for Internet of Things, mobile devices and PCs.

MOBILE WORLD CONGRESS, Barcelona, Spain, Feb. 22, 2016 - Intel Corporation today announced new industry partnerships and products that lay the groundwork for faster,



smarter and more efficient 5G wireless networks designed to deliver amazing new experiences throughout daily life.

Press Release

Category M2 (formerly called N Qualcomm Announces New Modem Solutions Designed to Support Reliable, Global Connectivity to the Internet of Things

— New MDM9207-1 Enables Scalable, Power-Efficient and Cost-optimized Cat 1 LTE Connectivity — -New MDM9206 Provides a Path to LTE Cat-M (eMTC) and NB-IOT Standards-

OCT 27, 2015 SHENZHEN, CHINA Qualcomm products mentioned within thi