Lo standard
Narrow Band IoT

Vodafone Italia S.p.A.

LTE: evoluzione verso il M2M

Riduzione della complessità e dei costi per l'evoluzione dello standard LTE in ottica M2M: nasce il Narrow Band IoT

Performance sempre migliori
(anche in mobilità)

Oggi: LTE Advanced
N x 20 MHz
> 10 Mbps

Minore complessità e consumo di batteria

Domani: **NB IoT**
200 kHz
fino a 200 kbps

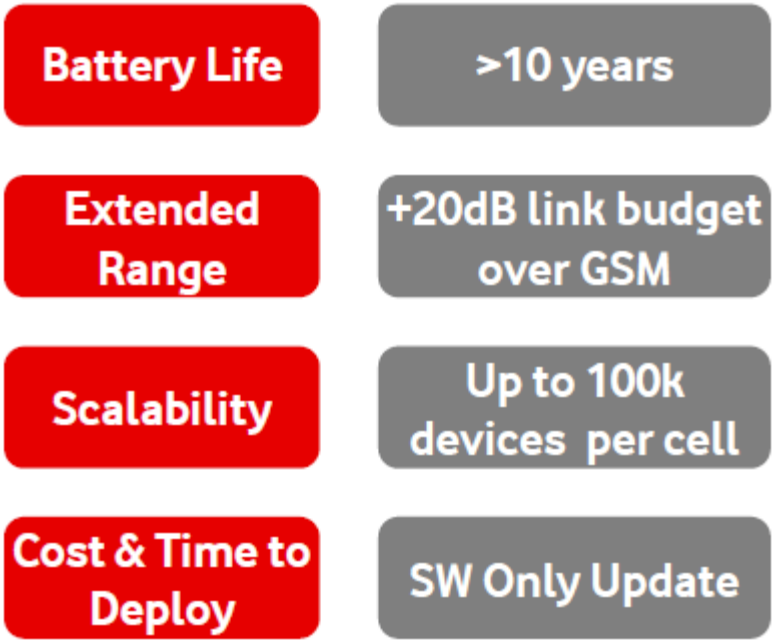
Domani: **LTE M2M**
1.4 MHz
fino a 1 Mbps

	Release 8	Release 8	Release 12	Release 13	Release 13
	Cat. 4	Cat. 1	Cat. 0	"Cat. 1.4 MHz"	"Cat. 200 kHz"
Downlink peak rate	150 Mbps	10 Mbps	1 Mbps	1 Mbps	200 kbps
Uplink peak rate	50 Mbps	5 Mbps	1 Mbps	1 Mbps	144 kbps
Number of antennas	2	2	1	1	1
Duplex mode	Full duplex	Full duplex	Half duplex	Half duplex	Half duplex
UE receive bandwidth	20 MHz	20 MHz	20 MHz	1.4 MHz	200 kHz
UE transmit power	23 dBm	23 dBm	23 dBm	20 dBm	23 dBm

Domani: il Narrow Band Internet of Things (NB-IoT)

Il Work Item NB IoT è stato approvato a Settembre 2015 nella Release 13 del 3GPP, con alcuni obiettivi specifici:

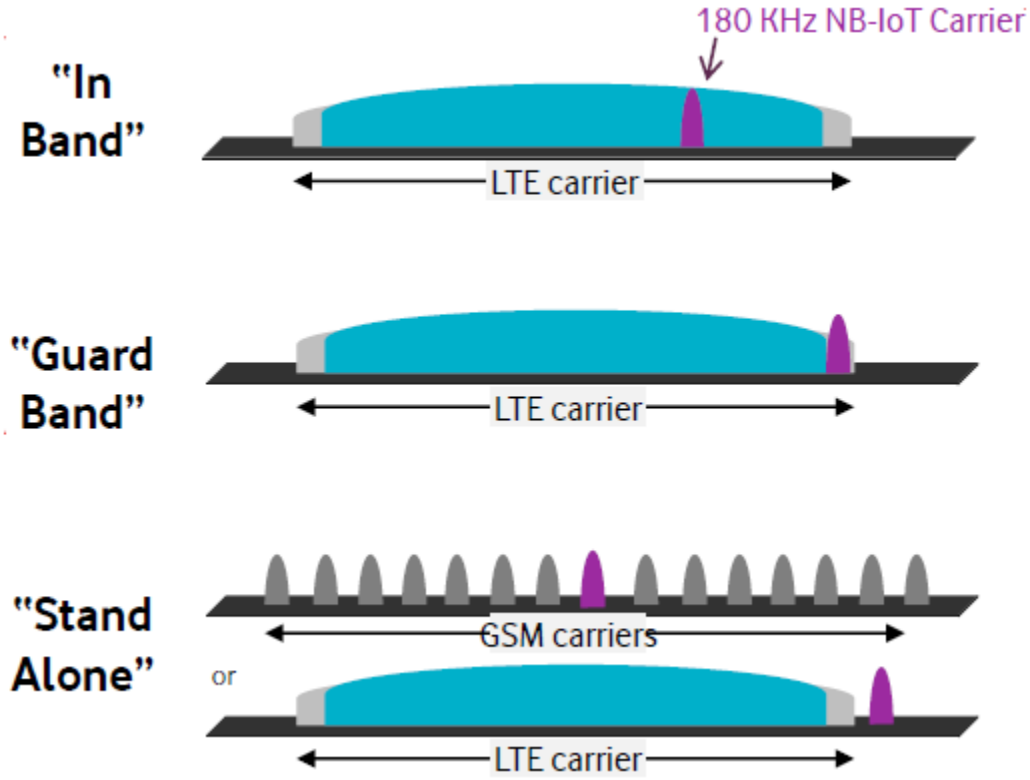
- Minima occupazione di spettro – larghezza di banda di soli **200 kHz** in downlink e uplink
- **Aumento di copertura di 20 dB** rispetto al GSM
- Ridotto consumo energetico, almeno **10 anni di durata della batteria per i terminali**
- Terminali semplici e **a basso costo**
- Capacità – **oltre 100k terminali/cella**
- Riutilizzo delle infrastrutture di rete esistenti (apparati e antenne)



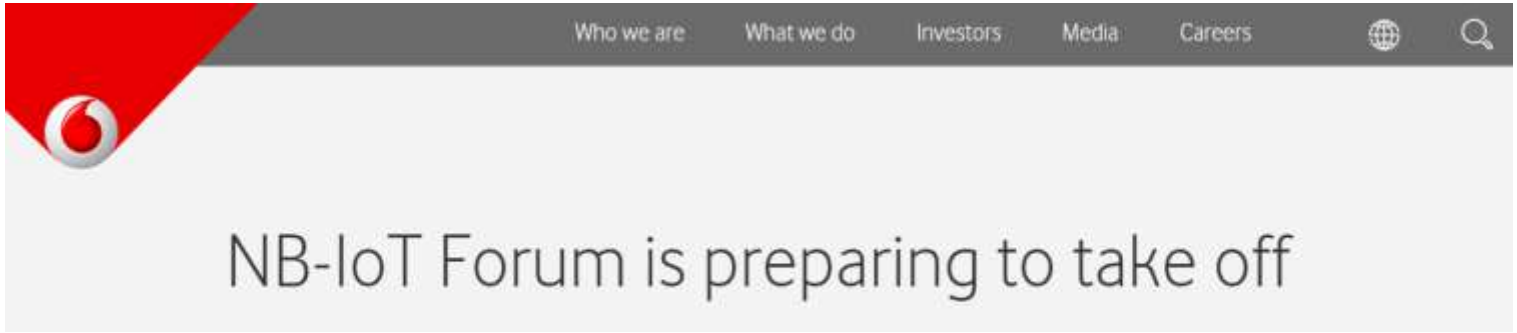
Lo Standard Narrow Band Internet of Things NB-IoT

Lo standard supporta 3 modalità:

- ***'In-band operation'*** *utilizing resource blocks within a normal LTE carrier*
- ***'Guard band operation'*** *utilizing the unused resource blocks within a LTE carrier's guard-band*
- ***'Stand-alone operation'*** *as a replacement of one or more GSM carriers*



Il Narrow Band IoT forum



Hong Kong – November 06,2015: Top telecom industry members China Mobile, China Unicom, Ericsson, Etisalat, the GSMA, GTI, Huawei ,Intel, LG Uplus, Nokia, Qualcomm Incorporated, Telecom Italia, Telefonica and Vodafone have held a preparatory event, chaired by Vodafone, to lay the foundations for a new industry forum aimed at accelerating the ecosystem around Narrow Band Internet of Things (NB-IoT) technology.

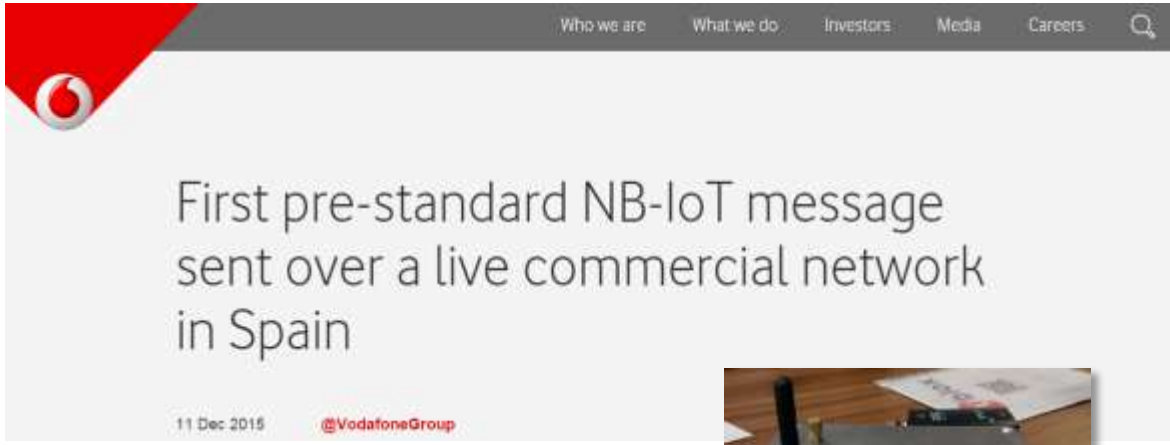
The NB-IoT forum will bring together all of the industry and ecosystem partners in a way which helps deliver NB-IoT to the market as quickly as possible. The forum will be hosted within an existing industry level organisation.

Customer pilots using pre-NB-IoT technology are already underway. Pre-commercial deployment is expected during the second half of 2016, with commercial roll-out from early in 2017. The NB-IoT forum and the open labs will help to drive the development of the NB-IoT industry to the next stage.

http://www.vodafone.com/content/index/media/vodafone-group-releases/2015/nb-iot-survey.html

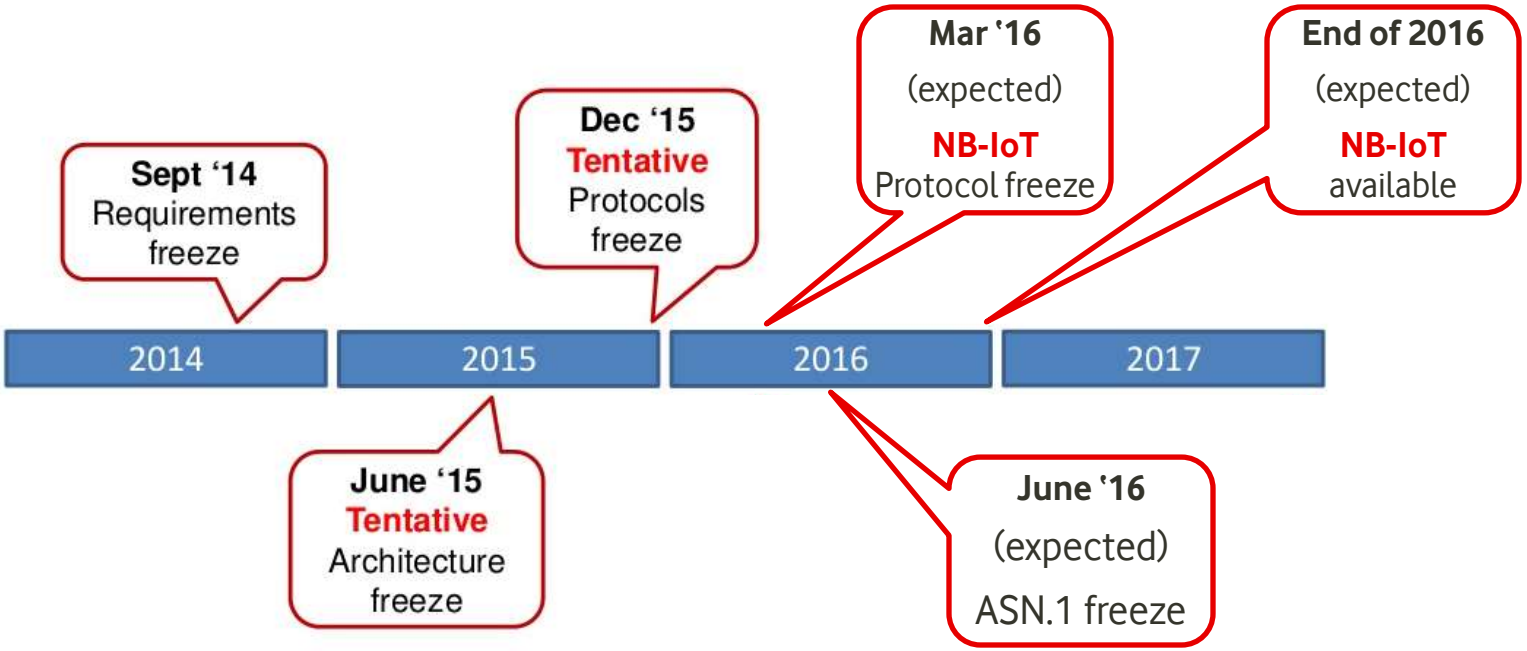
Il primo trial su un "pre-standard" NB-IoT

- Trial in Spagna (Valencia), dicembre 2015
- 7 stazioni radio base della rete Vodafone in Spagna aggiornate per trasmettere il NB-IoT in aggiunta alle altre tecnologie
- Circa 100 terminali, integrati con water meters
- Test in corso per verificare copertura (vs. GSM), capacità, aspetti interferenziali



http://www.vodafone.com/content/index/what/technology-blog/nbiot-message.html

Release 13 timeline



Grazie per l’attenzione