

The background of the slide is a night-time photograph of a city skyline. Several tall skyscrapers are illuminated with blue and white lights. In the foreground, there is a curved elevated roadway or bridge with a blue railing, and some blurred light trails from traffic. The overall color palette is dominated by dark blues and purples from the night sky, contrasted with the bright lights of the buildings and street.

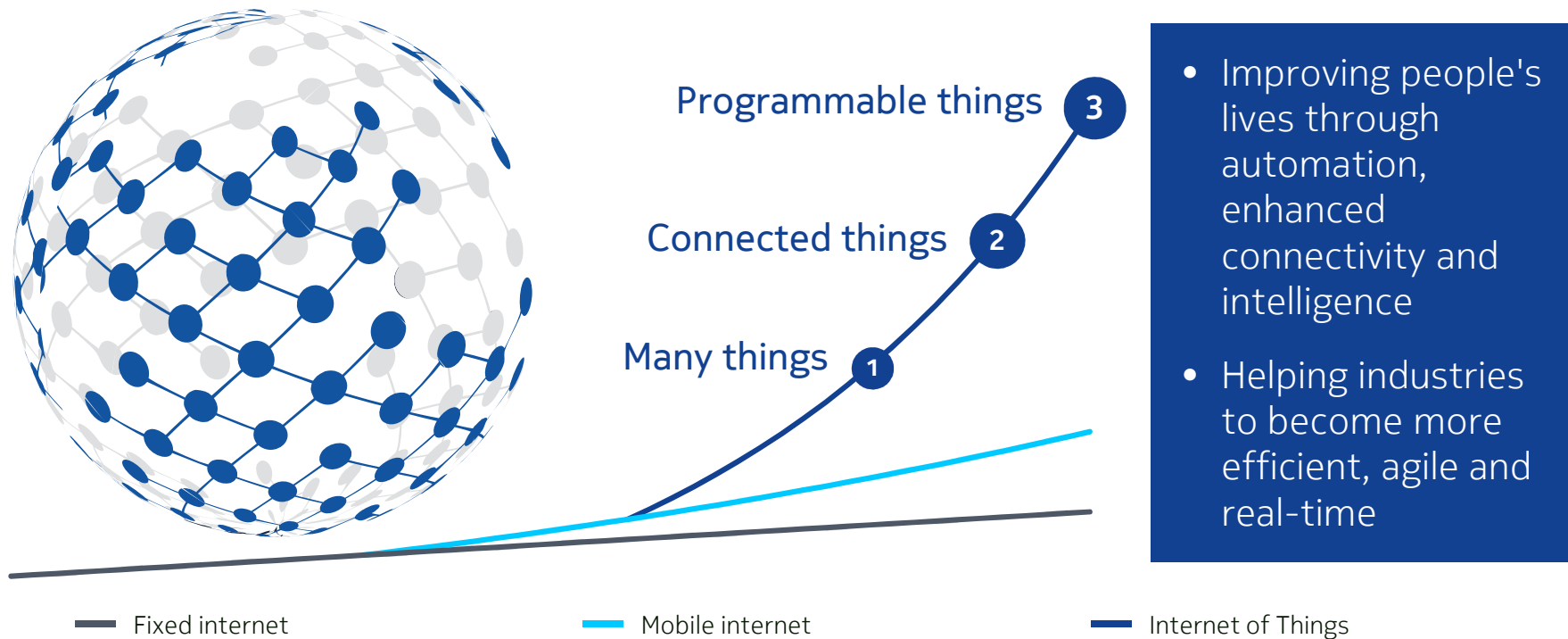
NOKIA

Internet of Things Policy and Regulatory Enablers

Guillaume Mascot
Head of Government Relations APJ & India

December 2016

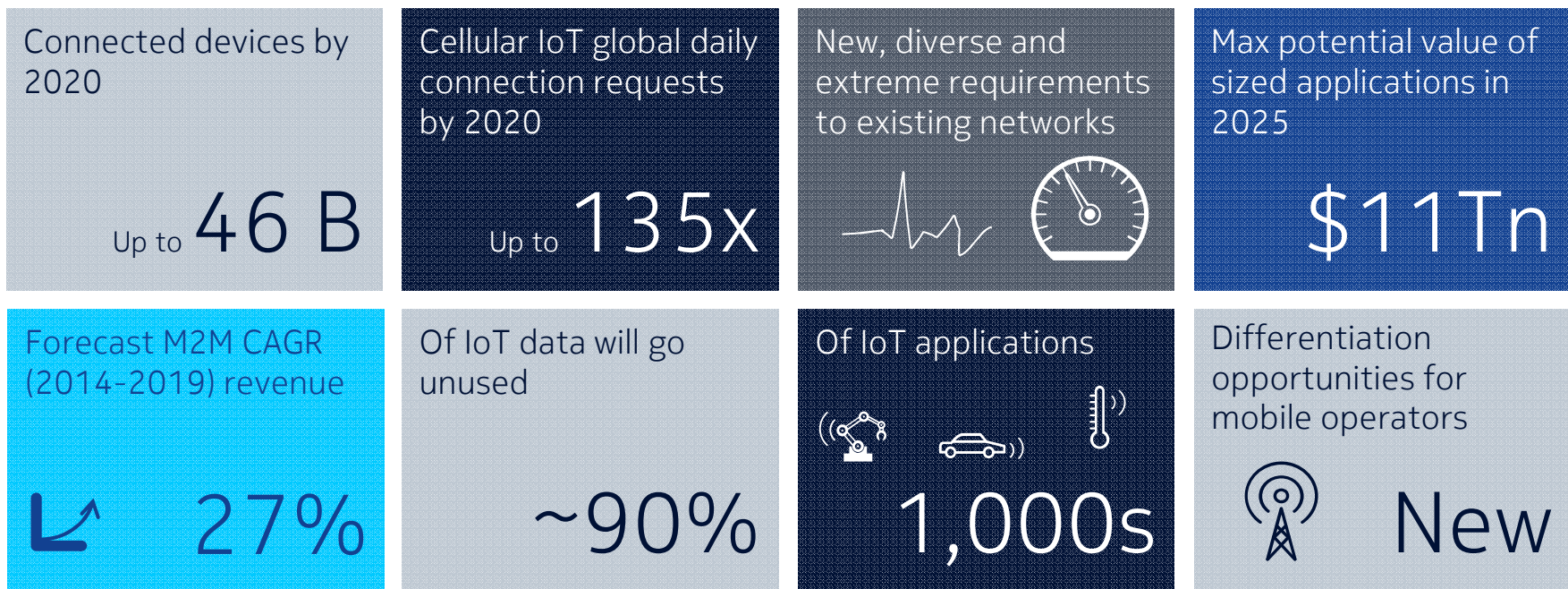
While the past has been about connecting people, the future is about connecting things



Who will satisfy the IoT thirst for connectivity ?

Unprecedented demand means a huge opportunity

Numbers are according to Nokia Bell Labs and analyst researches

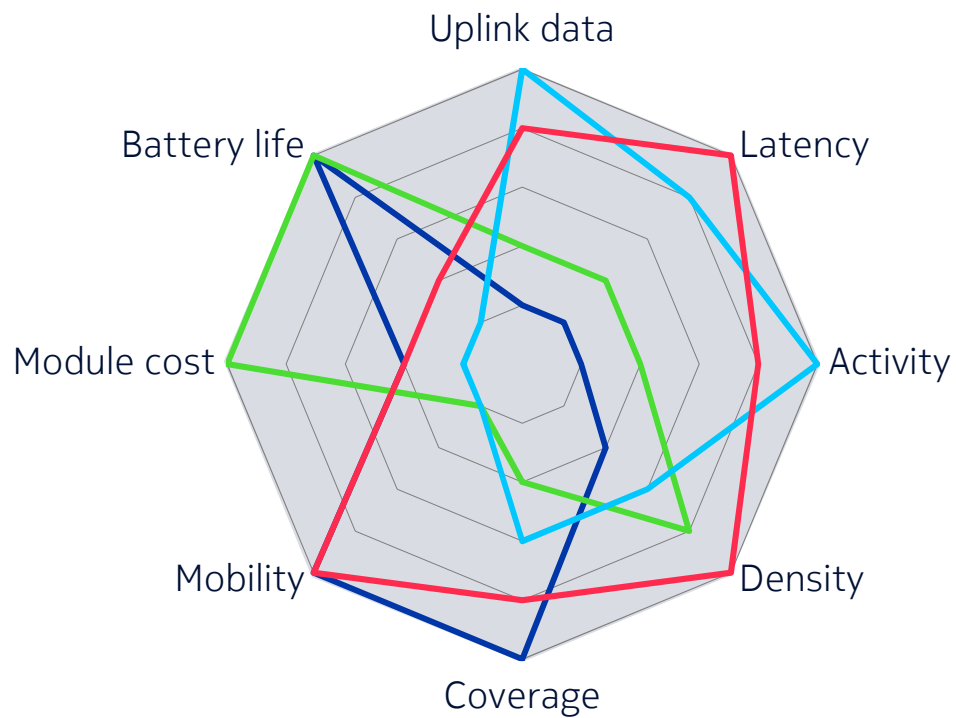


A broad spectrum of verticals and applications

	 Connected Automotive	 Connected Utilities	 Connected Safety	 Connected Cities	 Connected Health & Home
Customer Challenges	<ul style="list-style-type: none"> • Driver & pedestrian safety • In car entertainment • Car quality and maintenance • Non-traditional competition 	<ul style="list-style-type: none"> • Conservation of resources • Security of infrastructure • Security of personnel • Improving customer service 	<ul style="list-style-type: none"> • First responder safety • Citizen/Visitor safety • Perceived fairness and justice • Reduction in threats/crimes 	<ul style="list-style-type: none"> • Budget/Expense Management • Peak traffic congestion • Livability and commerce • Internet for citizens/visitors 	<ul style="list-style-type: none"> • Individual and family wellness • Individual and family safety • Healthcare and insurance expense • Healthcare for all (rural)
Potential Use Cases	<ul style="list-style-type: none"> • Trace & Track • Service Fleet • V2X 	<ul style="list-style-type: none"> • Demand/Resp. • Smart Meter • Water Leakage 	<ul style="list-style-type: none"> • Mission Control • Surveillance • Smart Vehicle 	<ul style="list-style-type: none"> • Traffic & Parking • Bus Shelter • UAV Management 	<ul style="list-style-type: none"> • Preventative care • Remote care • Smart Home

IoT services are very diverse

Not all IoT devices and applications have the same connectivity requirements



Container tracking



Gas metering



Surveillance cameras



Driverless control

Automotive: Car2X communication over LTE

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Continental

Fraunhofer
ESK

T

German pilot project
with two use cases in
2015

- Emergency electr. brake lights
- Cooperative passing assistant

Expanding from single
cell to network view
and additional
use cases

Future with cross
border connectivity use
cases

Multi-operator
scenarios and business
models

Industry 4.0: Singapore's first nationwide commercial NB-IoT deployment

“NB-IoT is emerging to be a potentially promising technology for smart city's machine-to-machine type of applications and services. We look forward to working with NB-IoT partners to explore the use of NB-IoT in developing innovative Smart Nation services that improve our citizens' lives and make our businesses more productive”

Ms Jacqueline Poh

Chief Executive-designate, Government Technology Agency (GovTech)

“NB-IoT will enable Maritime and Port Authority of Singapore and its partners to explore the deployment of a network of offshore sensors to augment the situational awareness of our port waters”

Andrew Tan
Chief Executive
MPA

Deployment expected to be completed by 1H2017
More information in the [M1 press release](#)

MAX LW 20,500 KGs
58,825 LBS

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58,825 LBS

Smart Home:

Create a convenient, safe and simple home



Combine connectivity with smart home services and reduce customer churn



HOME AUTOMATION
Create use cases to make the home self aware



HOME SECURITY
34B€ worldwide market



HOME MAINTENANCE
Be notified of potential leaks, smoke or high water levels

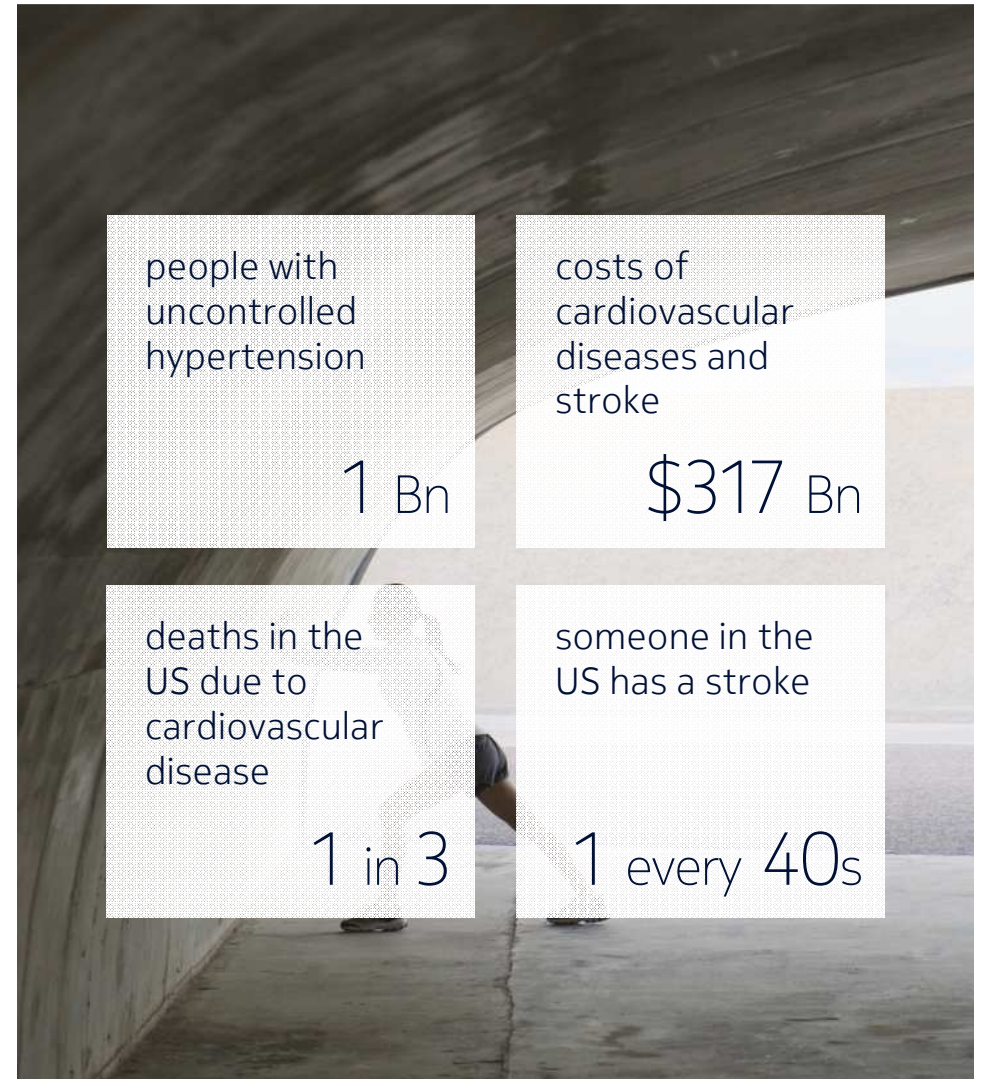


ENERGY MANAGEMENT
IoT can make smart homes **40%** more energy efficient



E-HEALTH
Potential savings, just in North-America, **\$300B** per year

Healthcare: Patient Care Solution



IoT Low Power Wide Area (LPWA) technologies

Existing NW evolution and Disruptive technologies

SIGFOX



LoRa



CIoT
(CleanSlate)



NB-IoT
(Rel. 13)



eMTC (LTE-M)
(Rel. 13)



EC-GSM
(Rel. 13)



5G
(targets)



	SIGFOX	LoRa	CIoT (CleanSlate)	NB-IoT (Rel. 13)	eMTC (LTE-M) (Rel. 13)	EC-GSM (Rel. 13)	5G (targets)
Range	<12km	<10km	<15km	<15km	<10km	<15km	<12km
Max.Coupling Loss	160 dB	157 dB	164 dB	164 dB	156 dB	164 dB	160 dB
Spectrum	Unlicensed	Unlicensed	Licensed	Licensed	Licensed	Licensed	Licensed
Bandwidth	900MHz 100Hz	900MHz <500kHz	7-900MHz 400 kHz	200kHz in-band, guard-band, stand-alone	1.4MHz in-band	8-900MHz 200kHz	
Data rate	<100bps	<50kbps	<150kbps	<40-50kbps	<1Mbps	10kbps	<1Mbps
Module cost	4.00\$ (2015) 2.64\$ (2020)	4.00\$ (2015) 2.64\$ (2020)	4.00\$ (2015) 2.64\$ (2020)	4\$ (2015) 2-3\$ (2020)	5.00\$ (2015) 3.30\$ (2020)	4.5\$ (2015) 2.97\$ (2020)	<\$2
Network cost, US example	10 \$/year/km ² (new HW)	10 \$/year/km ² (new HW)	12 \$/year/km ² (new HW)	1 \$/year/km ² (SW upgrade)	1 \$/year/km ² (SW upgrade)	1 \$/year/km ² (SW upgrade)	<1 \$/year/km ²
Impact on networks	Large	Large	LARGE (totally new RAT)	Small to Moderate	Small	Moderate	Requires 5G Nws



Service providers are embarking on NB-IoT around the world

24 Operators are committed to deploying NB-IoT

20 Commercial NB-IoT Networks are forecasted by end of 2017 by GSA

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Source: GSA, June 2016

IoT: Key policy domains

Connectivity & spectrum

Standardization

Net Neutrality

Data protection / ownership / location

Security

Digital Skills

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