



The Evolution of Communication Networks Cognitive Networks 5G and Beyond

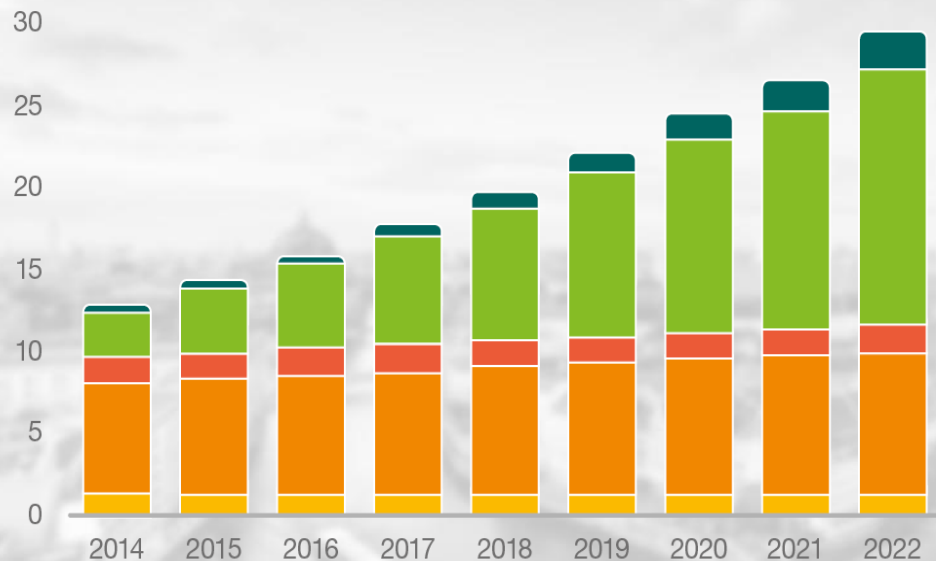
Mostafa Essa






Vodafone RAN-AI DE



Towards an IoT-Dominated World

Connected devices (billions)



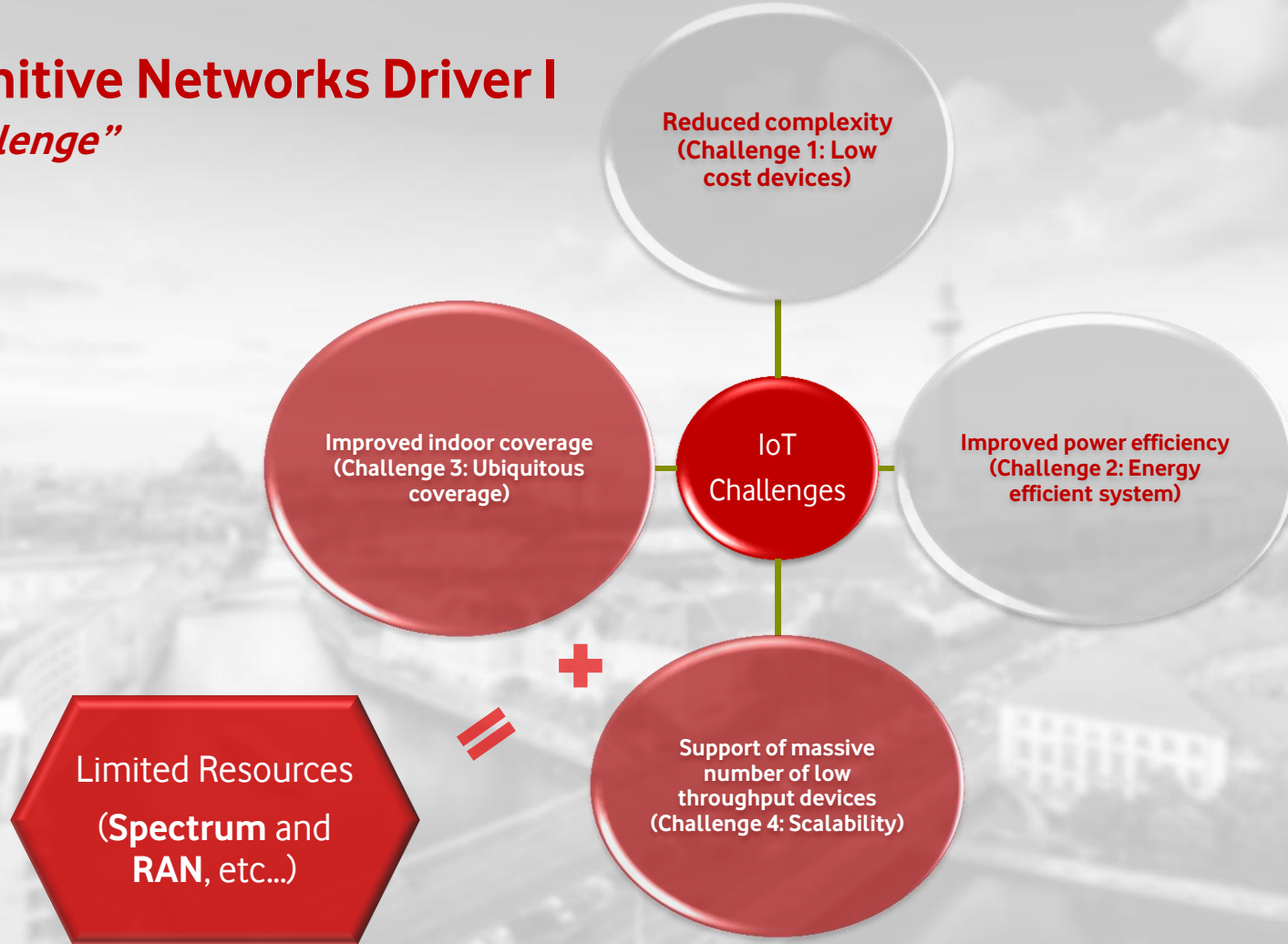
	2016	2022	CAGR
 Wide-area IoT	0.4	2.1	30%
 Short-range IoT	5.2	15.5	20%
 PC/laptop/tablet	1.6	1.7	0%
 Mobile phones	7.3	8.6	3%
 Fixed phones	1.4	1.3	0%
	16 billion	29 billion	

70% of wide-area IOT devices will use cellular technology in 2022



Cognitive Networks Driver I

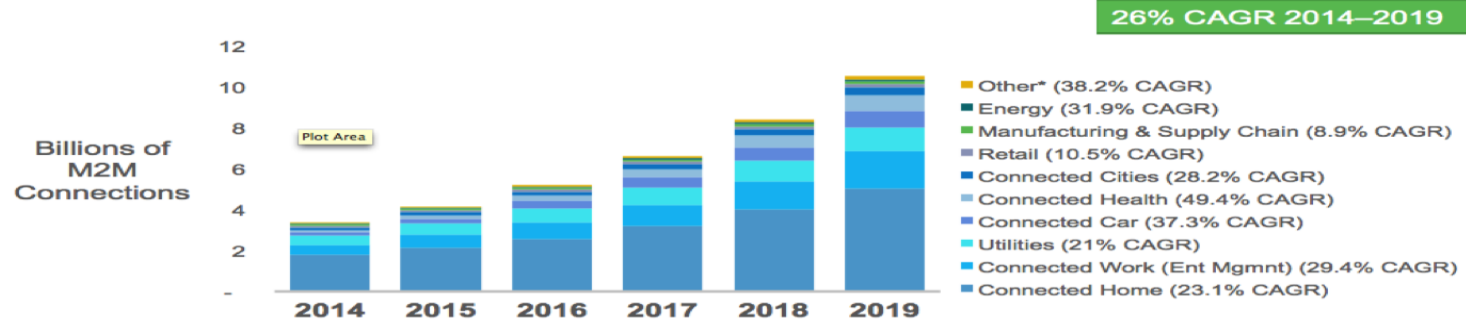
"Challenge"



Cognitive Networks Driver II *"Opportunity"*

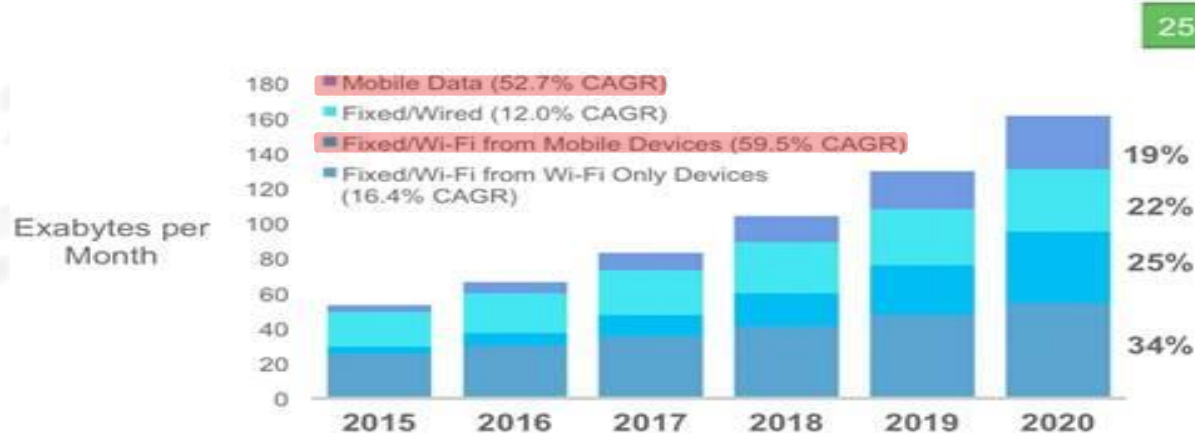
Global M2M Connections / IoE Growth By Vertical

By 2019, Connected Home Largest, Connected Health Fastest Growth



*Other includes Agriculture, Construction & Emergency Services

Source: Cisco VNI Global IP Traffic Forecast, 2014–2019

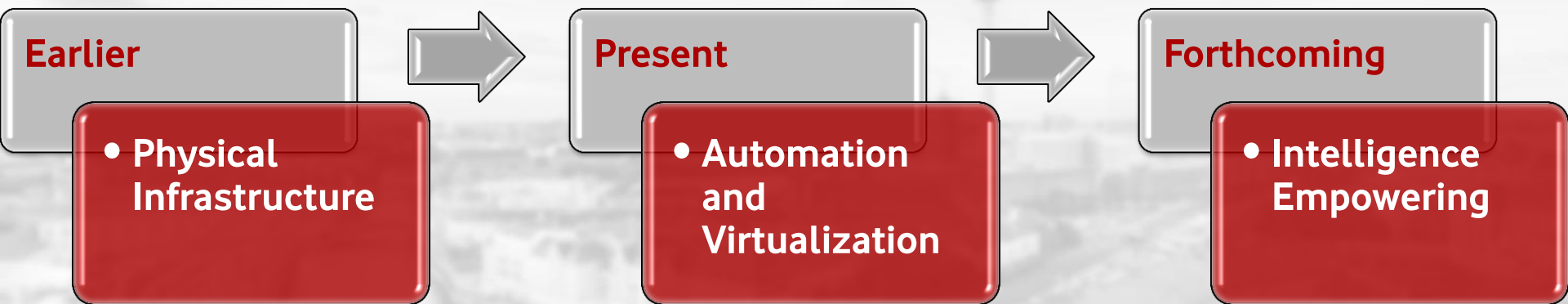




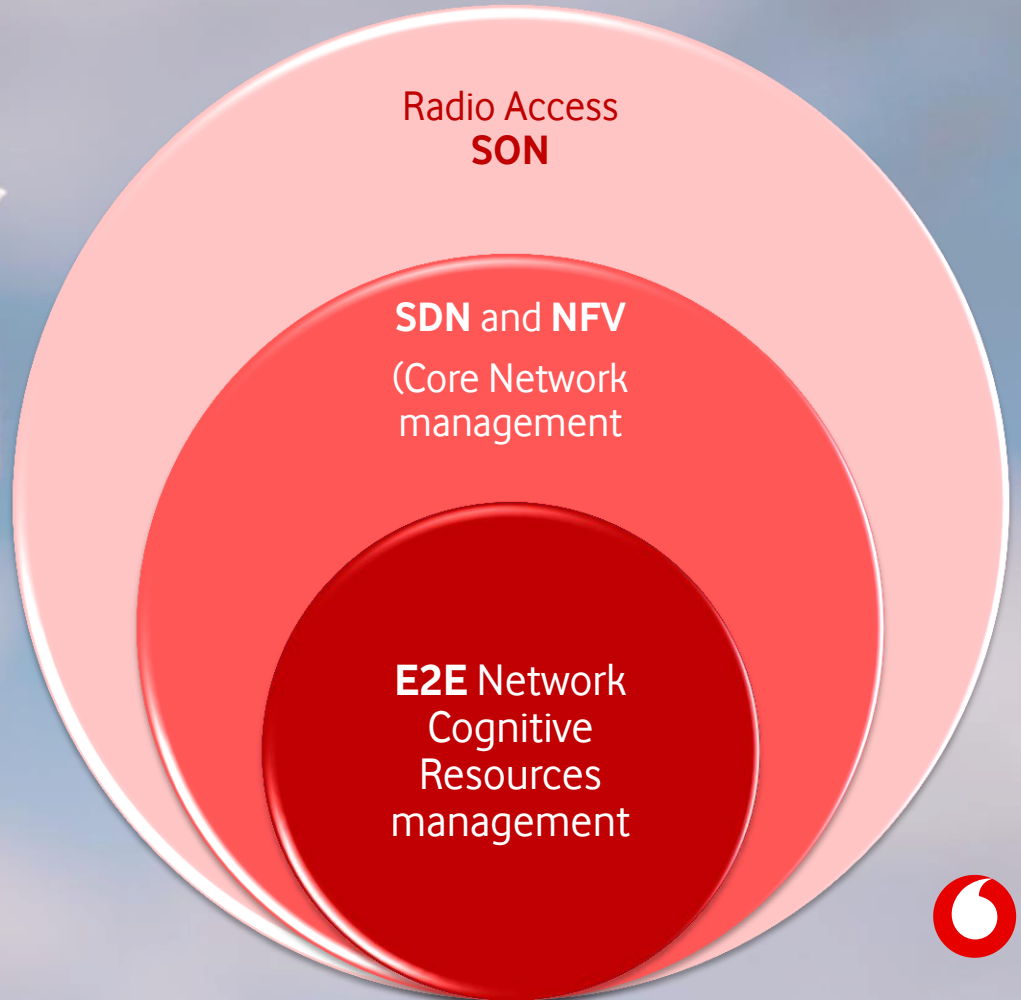
Vodafone Cognitive Networks



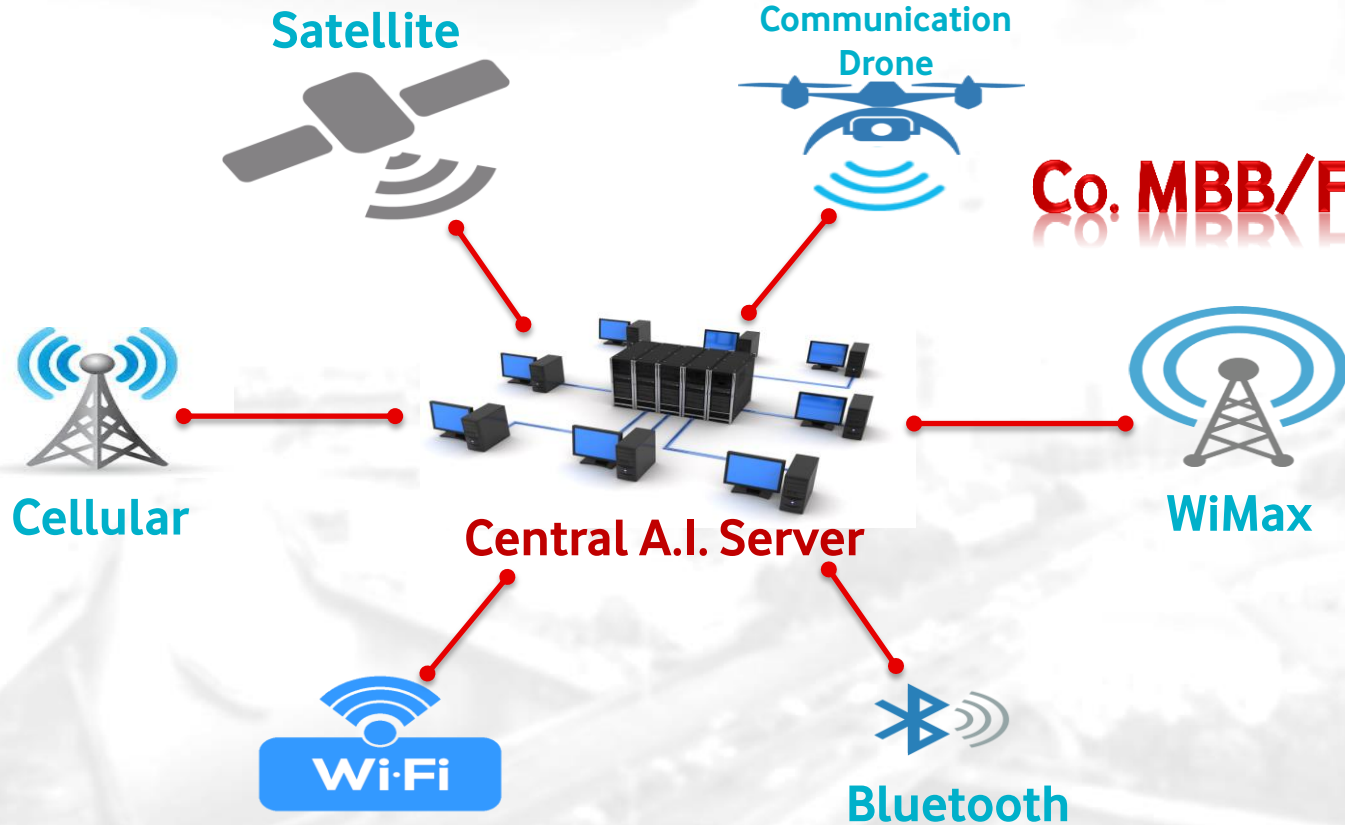
Mobile Networks Evolution



Evolution Story



Cognitive Networks Co. Mobile Broadband and Front-Back Haul Concept



Co. MBB/FBH CONCEPT

Cognitive Networks Co. Mobile Broadband and Front-Back Haul Concept



Co. MBB/FBH CONCEPT

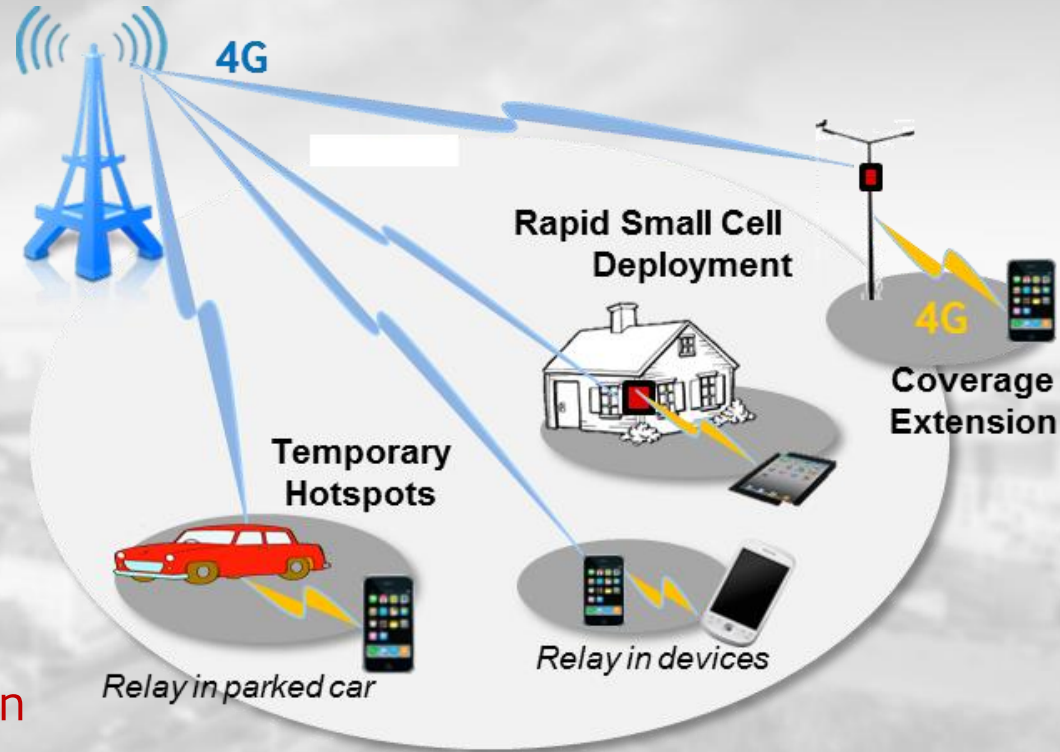


Cognitive Networks POC Use Case CrowdCell

Crowd RAN is a 4G relay concept

Architecturally, it is an eNodeB
backhauled through the macro
network or other CC

Several use cases are foreseen



A black and white photograph of a woman with her hair in a bun, wearing a short-sleeved shirt, leaning over a desk and looking at papers. A large red graphic is overlaid on the image, consisting of a circle and a curved line that forms a stylized 'Q' shape, with the text 'Q/A' in the center. The background shows a modern office with large windows and a grid pattern.

Q/A

