



NIKIA

We create the technology to connect the world

Global leader in connectivity solutions
for telecom services providers and enterprises

2017 revenue:	€ 23.1 B (≈ C\$ 36 B)
2017 R&D:	€ 4.5 B (≈ C\$ 7 B)
Employees:	103,000
R&D:	38,000
Services:	40,000
Countries where we operate:	100

Mobile connectivity: 4G/LTE evolution and 5G
Terabit IP/MPLS routing and optical networking
Fixed network access: copper, cable, fibre
Applications & analytics

Nokia Technologies: brand licensing, digital health

Nokia Bell Labs



In Canada:

~\$1.5B investment in R&D over the past 5 years

In Ottawa: Nokia's Kanata campus, March Road

Employees:	2,300
Office space:	52,200 m ²

Global motherhouse for Optical Networking &
Cybersecurity

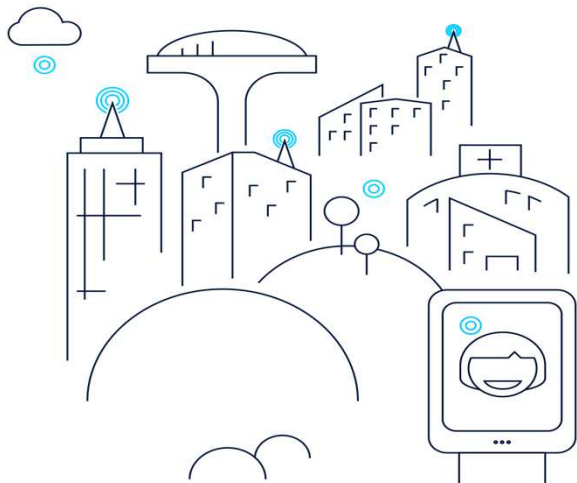
#2 global R&D centre for IP networks

Mobile networks

Fixed network access

History of Engineering Excellence in Ottawa





Connected Industries

Connected Cities

Connected Health

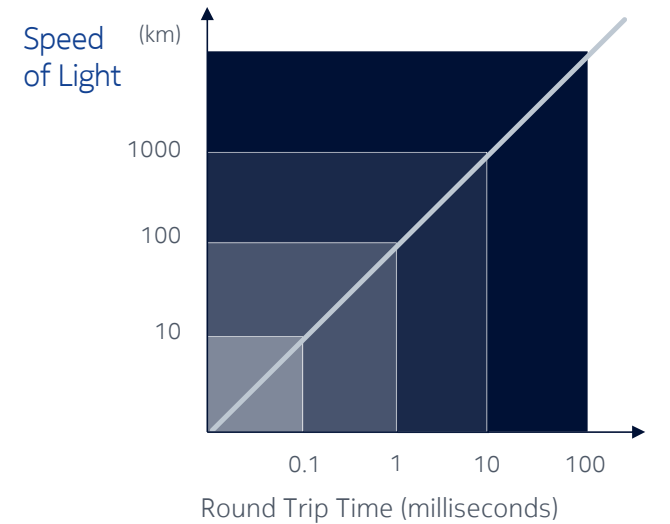
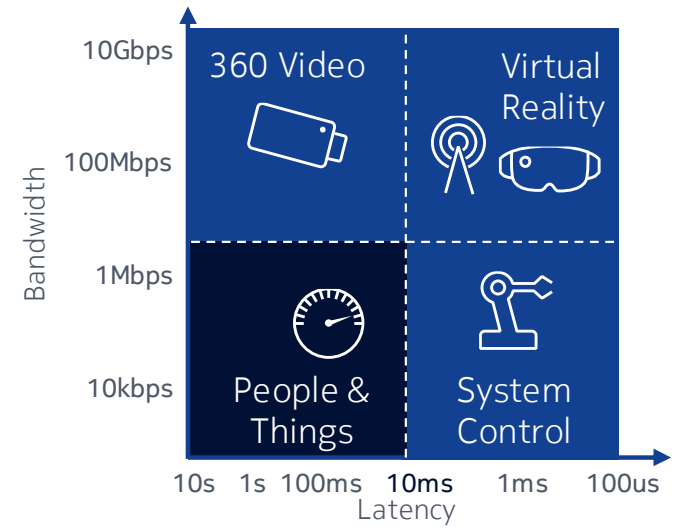
Connected Safety

Connected Agriculture

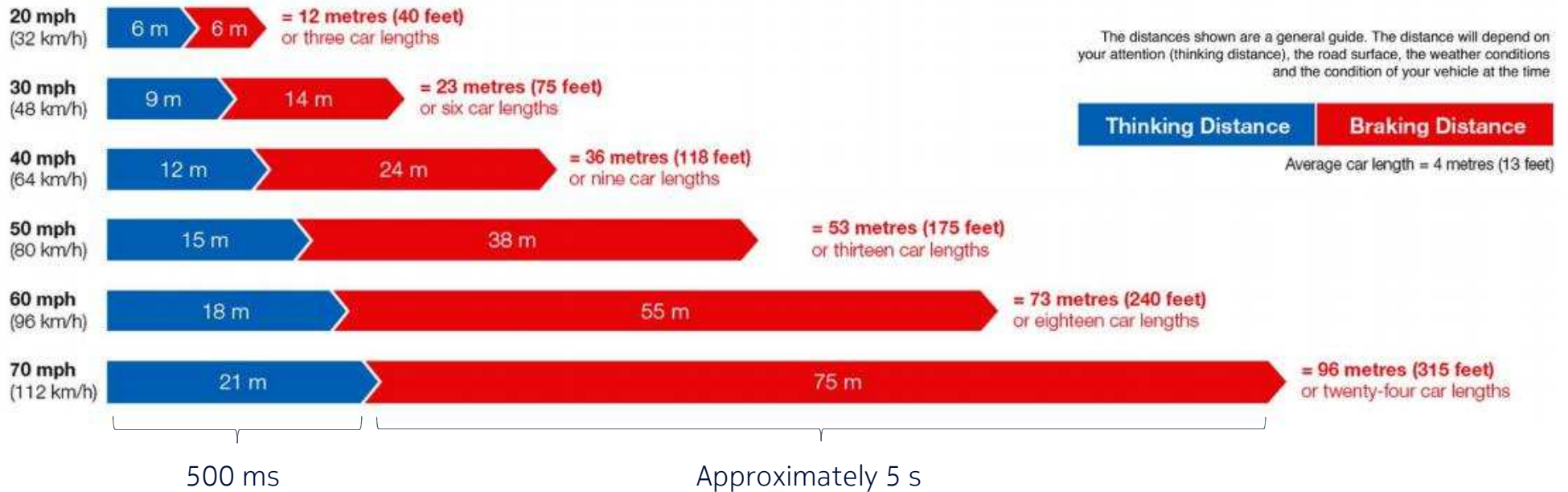
Connected Automotive

4G/LTE and 5G

C-V2X



Typical Stopping Distances



All processing in the vehicle including any alert information from the network

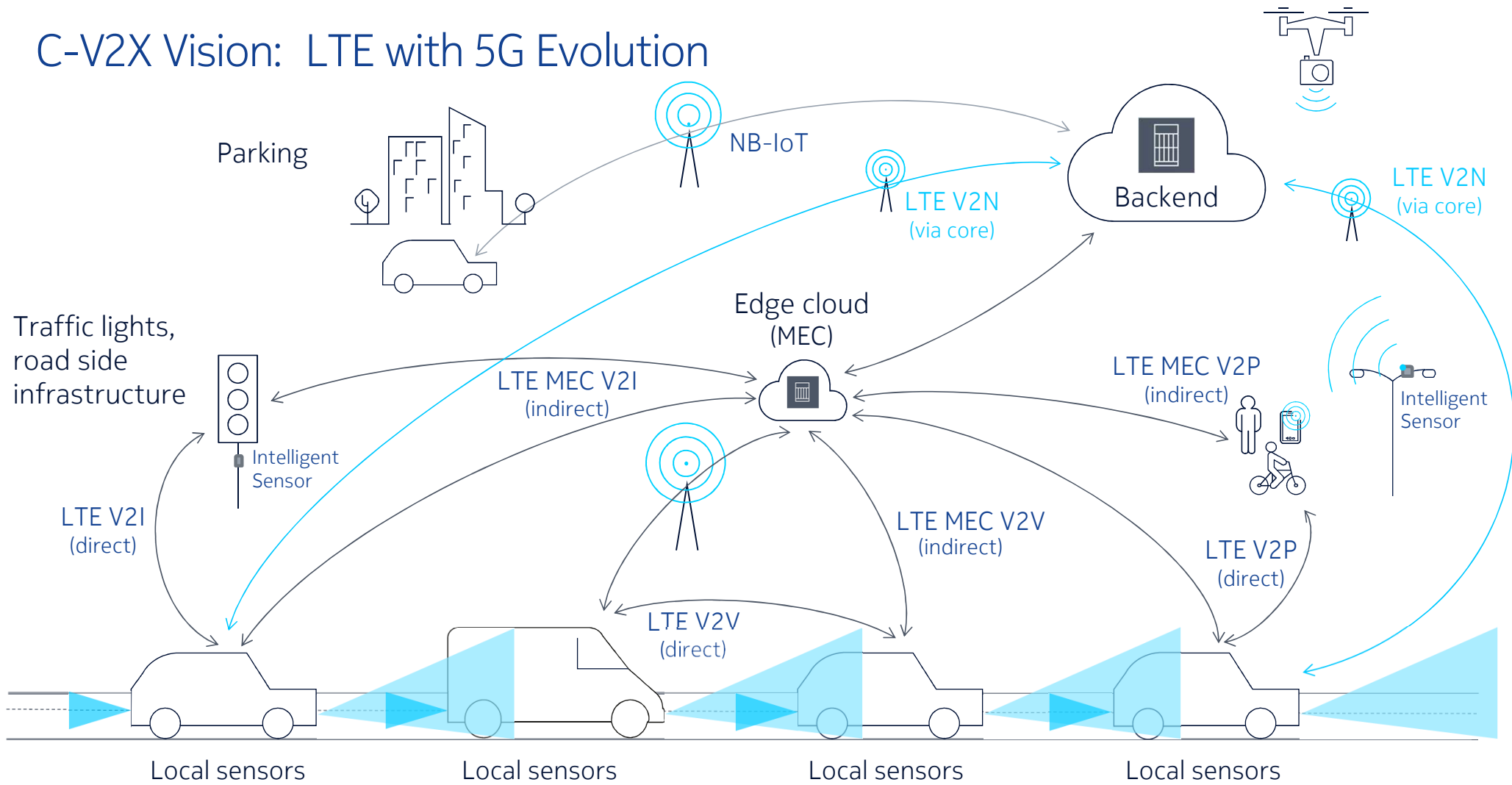
End-to-end latencies:

LTE: 100s of ms

LTE with MEC: 10s of ms

5G with MEC: 1s of ms

C-V2X Vision: LTE with 5G Evolution



Leveraging Nokia's global experience and Ottawa presence As part of the ecosystem to enable the AV community in Ottawa

Continental, Deutsche Telekom, Fraunhofer ESK, and Nokia Networks Showcase First Safety Applications at "digital A9 motorway test bed"

Telecommunications and automotive players form global cross-industry 5G Automotive Association

- AUDI AG, BMW Group, Daimler AG, Ericsson, Huawei, Intel, Nokia and Qualcomm Incorporated team up to evolve, test and promote communications solutions for connected mobility.

Ford, Qualcomm, AT&T, and Nokia launching autonomous vehicle trials in San Diego region

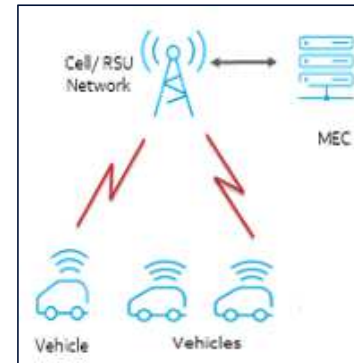
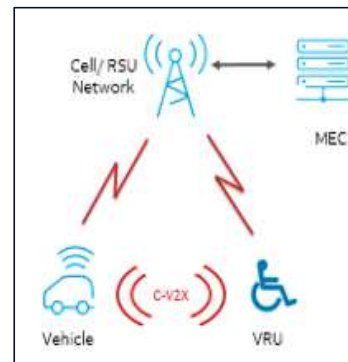
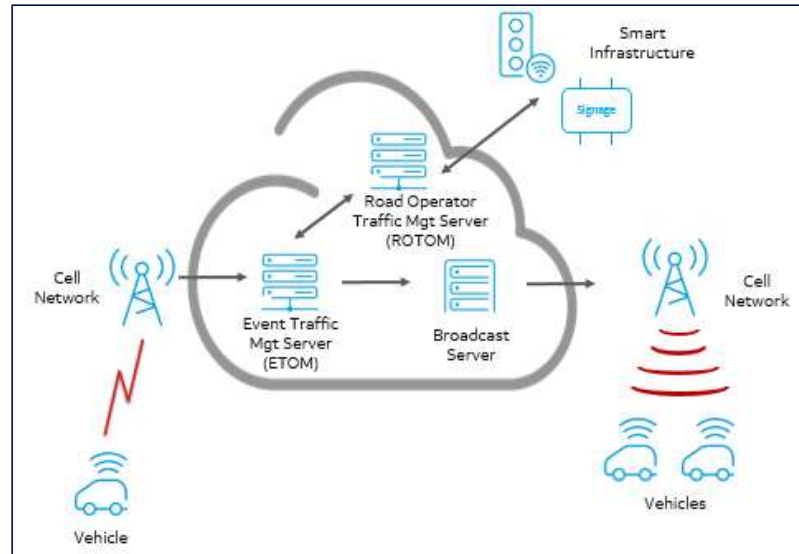
Trials will begin later this year at the San Diego Regional Proving Ground to speed the development of connected cars and improve automotive safety.

Nokia joins 'Smart Tampere' initiative to help bring smart city services to one of Finland's largest municipalities

Nokia, Bosch & Deutsche Telekom partner in the cloud for road safety

Lead Use Cases

- Event notification: vehicles, drivers, emergency services
- Augmented driver assistance: e.g. electronic brake light
- Vulnerable road users (e.g. motorized wheelchair)
- Eco approach to optimizing journey: e.g. optimal speed in urban environments through multiple signaled intersections





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