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New Business enabled by smart-cities

QUALCOMM®

São Pauo, August 2nd, 2016

Smart Cities products and services are offered by Qualcomm Technologies, Inc. and/or its subsidiaries.

An impressive technology achievement

Why have cities not seen a similar revolution?

Energy

Enough to lift an adult several stories high

Power

More computing power than early ’90s supercomputer

Utility

Replaces 6+ devices

Signal

Decodes signal attenuated 100,000B times

Smart Cities

World population living in urban environments

~50% Today

~70% in 2050

Bluetooth

NFC

3G/4G

Powerline

Wi-Fi

Fiber

Ethernet

Smart gateways & small cells

Smart Cities

Imagine an Internet connected city using information and communication technologies to improve quality of life for its citizens and workers

Smart Cities Market Verticals

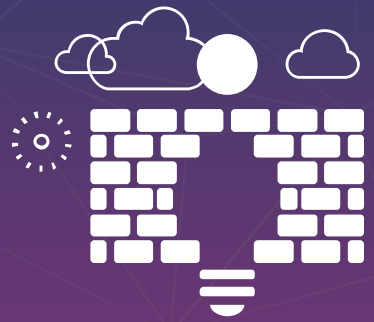
Need cooperation across verticals to create Intelligent and sustainable environments

Smart Building

- Connectivity
- Integrated Service

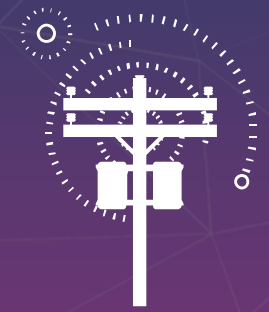
Smart Transportation

- Smart Mobility
- Smart Charging
- Smart Traffic
- Smart Parking



Smart Infrastructure

- Smart Water
- Smart Lighting
- Smart Waste Management



Smart Energy

- Energy Efficiency
- Reduced Emissions
- Smart meters

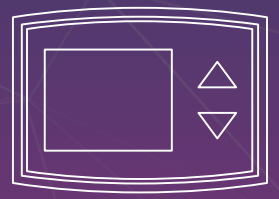
Intelligent connectivity within and across **City Verticals** is key

Smart Buildings

Connectivity solutions to increase efficiencies, revenues and cost savings

Security

Remote monitoring of building facilities and residents for increased peace of mind.

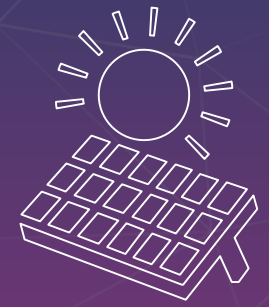


Heating / Cooling

Monitor HVAC usage and optimize usage per current weather conditions and power rates.

Appliances

Enable interoperability between appliances for advanced home automation.



Power / Solar

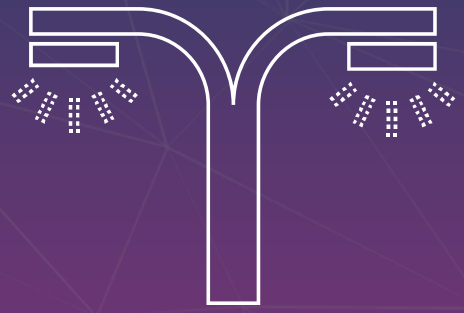
Monitor and optimize energy production & consumption in real-time.

Smart Infrastructure

Connectivity solutions to increase efficiencies, revenues and cost savings

Water System Integrators

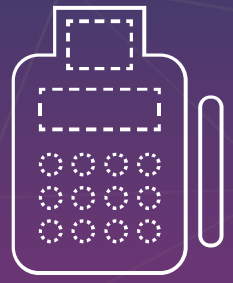
Detect leakage, system pressure metering, contaminants and hazardous chemicals.



Lighting

Reduce power consumption with LED retrofits and small cells for outdoor lighting.

Increase public safety with intelligent lighting retrofits.



Waste Management

Decrease waste and recycling costs with smart receptacles that send notifications when they need to be emptied.

Smart City Challenges

- Fragmented Smart City Vision
- Scope of Refurbishing Existing Cities is Large and Costly
- Socio-economic and Political factors
- Lack of Financing
- Leveraging Information and Communications Know How
- Obtaining & Sustaining Stakeholder Interest
- Lack of Citizen & Public Staff Engagement

Technical Challenges

Technology Selection

CAPEX / OPEX

Data Management & Integration

Large Scale Deployment

Interoperability

Practicality of Support Services


QUALCOMM®
Helping empower cities worldwide with a scalable ecosystem of **smart, efficient, sustainable technologies.**

Intelligence at every step

Processing at the Edge

Transporting massive amounts of raw data through the cloud is inefficient and impractical. That's why we're putting more processing power and intelligence where data is transferred and received – enabling information to be more intuitive and dynamic.

Interoperability

True efficiency is the result of interoperability allowing data to flow more efficiently across city functions such as lighting, transportation, and infrastructure – creating seamless interconnection at all levels; while maintaining security protocols.

Scalability

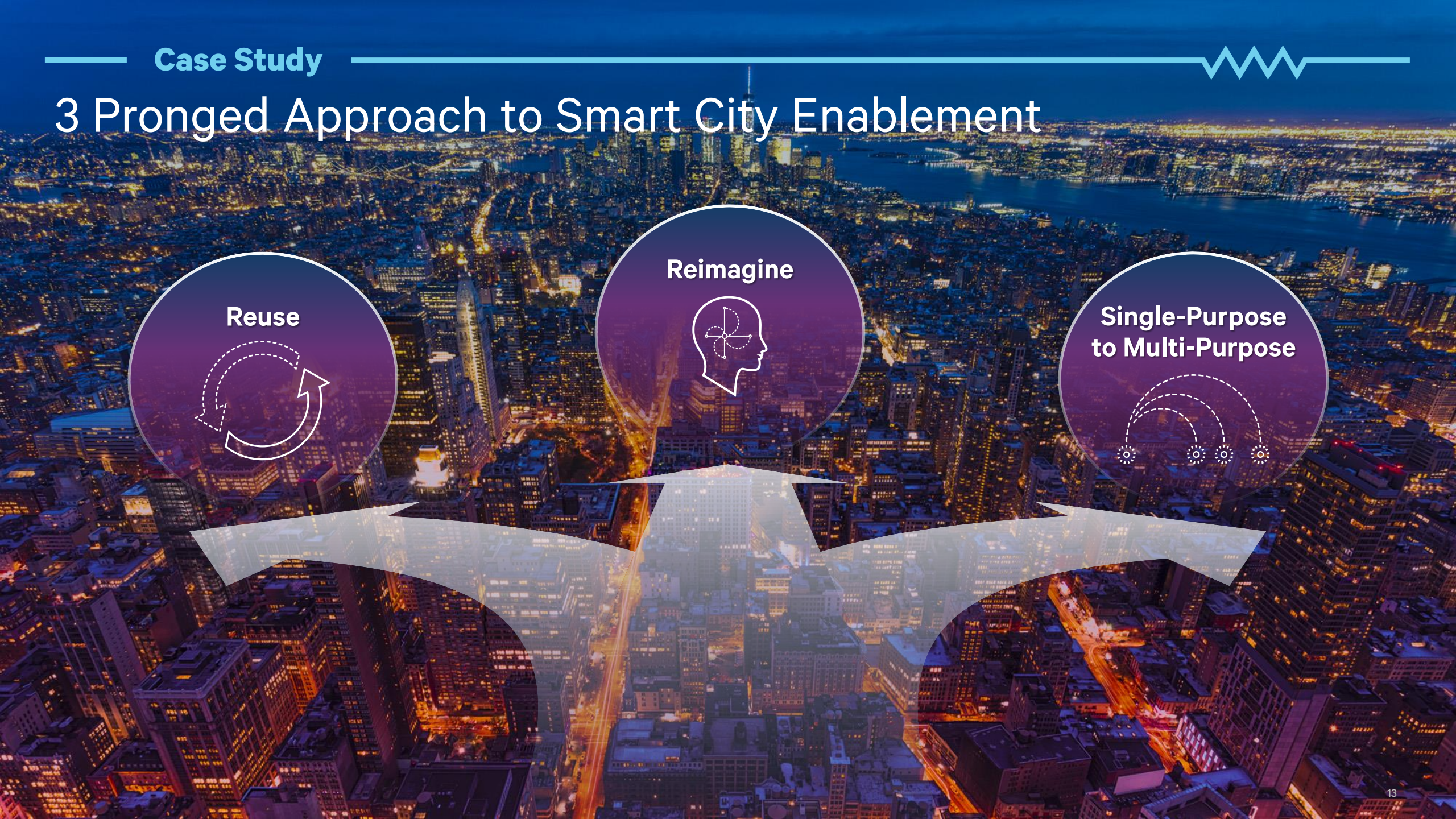
All of our citywide solutions are engineered to scale, meaning you can rest assured that your city will be seamlessly connected no matter your needs today, or tomorrow.

Smart City Success Factors

- Political Leadership and willingness to embrace innovation
- Adoption of integrated, holistic and whole government approach to smart city development
- Creation of dedicated research and think tank institutions to support program
- Ensuring creativity but affordability
- Regulations and standards for stakeholders
- Build stakeholder collaboration, industry partnership and citizen participation

Case Study

3 Pronged Approach to Smart City Enablement



Enabling Smart Cities

Case Studies

LinkNYC
Municipal Wi-Fi and connected city services

anyCOMM
Street lighting control and urban intelligence sensors

Sensity
Street lighting control and video monitoring

Bigbelly
Connected waste and recycling stations

IPS Group
Smart parking meters and vehicle detection

Smart Wires
Distributed power flow control for transmission lines

Case Studies

Smart Infrastructure

LinkNYC

Today...

Case Study

Smart Infrastructure: LinkNYC

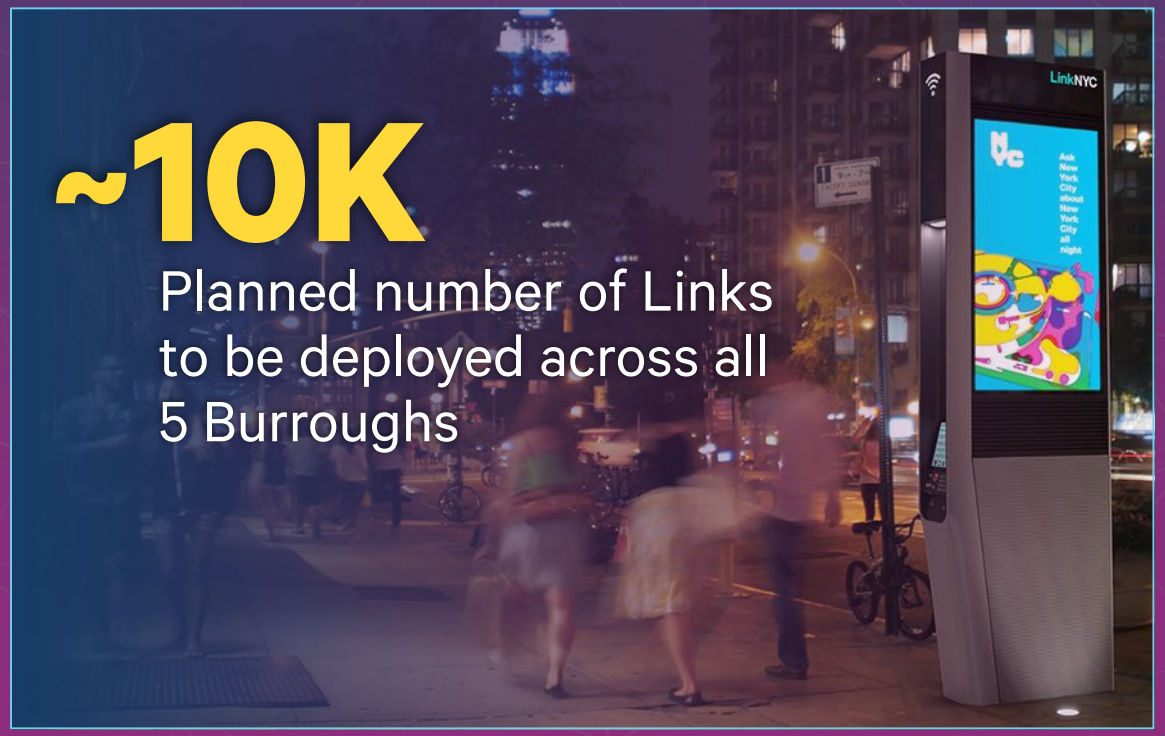
Repurpose existing infrastructure with smart connectivity solutions

Single-purpose: Payphone

~7,500

Active public pay telephones in NYC

Multi-purpose: “Link”



~10K

Planned number of Links to be deployed across all 5 Burroughs

Case Study

Smart Infrastructure: LinkNYC

Without Display

With Display

Free Public Wi-Fi
Up to gigabit speeds

Accessible Communications
Free nationwide calling

Emergency Services
911

City Services
311, way finding, utility payments

Digital Displays
Advertising and public service announcements

USB Charging
Free charging station for mobile devices

Case Study

LinkNYC : Powered by Qualcomm technologies

Qualcomm® snapdragon™

Digital Displays & Android Tablet

Qualcomm 3G modem

E911 Service

Qualcomm® VIVE™

Gigabit Wi-Fi

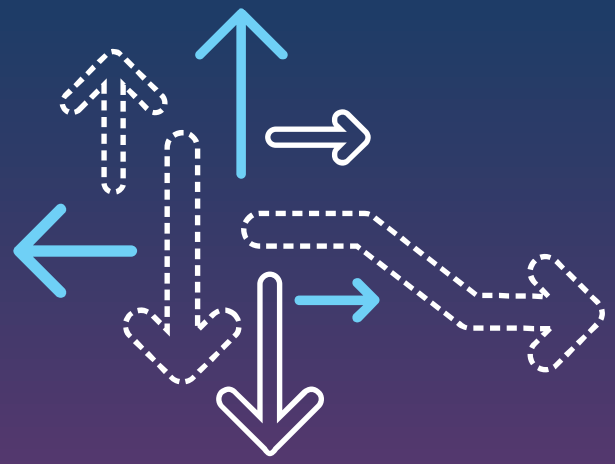
Qualcomm Quick Charge™ 2.0

Fast USB Charging

Qualcomm Snapdragon and Qualcomm Gobi are products of Qualcomm Technologies, Inc.
Qualcomm VIVE is a product of Qualcomm Atheros, Inc.

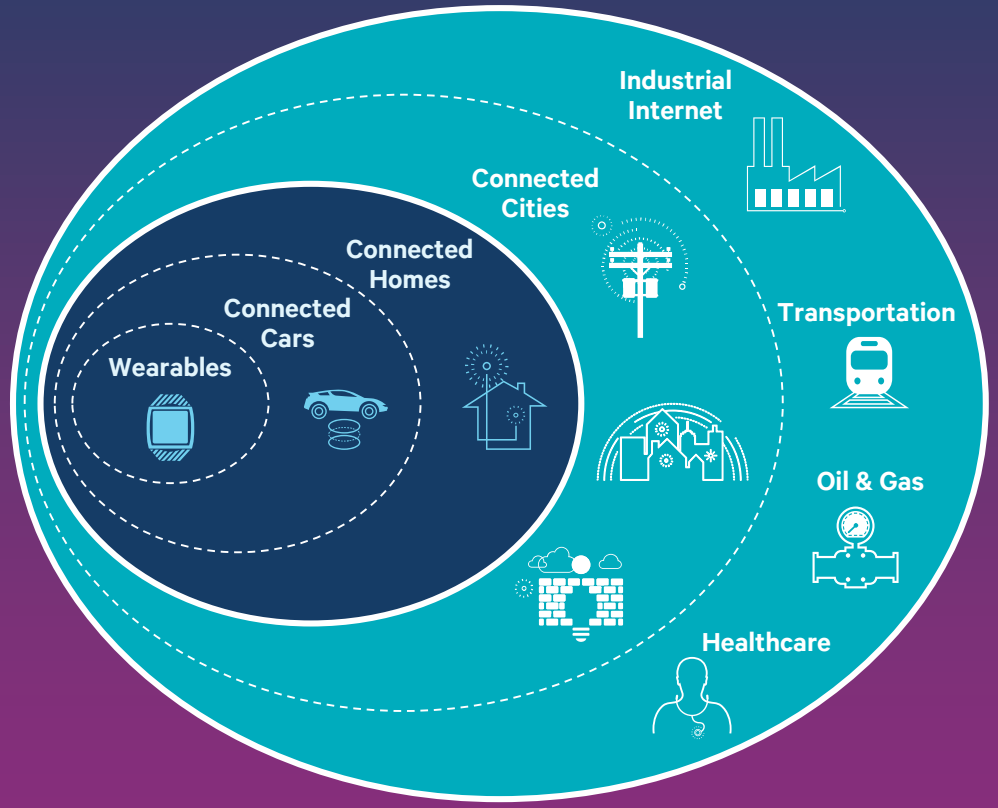
Qualcomm Quick Charge is a product of Qualcomm Technologies, Inc.

Backup Slides



Internet of Connected Objects

50 billion connected objects are estimated by 2020



Smart Cities

- Huge Market
- Less price sensitive

$430B

Potential Technology Revenue

Smart Cities Market Opportunity Breakdown (2019E)

(Connected device shipments in millions)

Energy – 1,140M

Trans & Distribution	929
Generation	108
Power quality/backup	103

Industrials – 467M

Controls/Instrumentation	185
Processing	89
Others	194

Security & Safety – 207M

Surveillance	159
Security / detection	25
Access Control	24

Buildings & Lighting – 687M

Lighting	325
Power, HVAC, Climate	153
Safety, Security/Access	153
Water & gas meters	51
Others	5

Water, Oil & Gas* – 141M

Water Infrastructure	50
Oil & Gas Infrastructure	50
Others	41

Transportation – 83M

Parking Systems	53
Traffic	14
Toll and Others	16

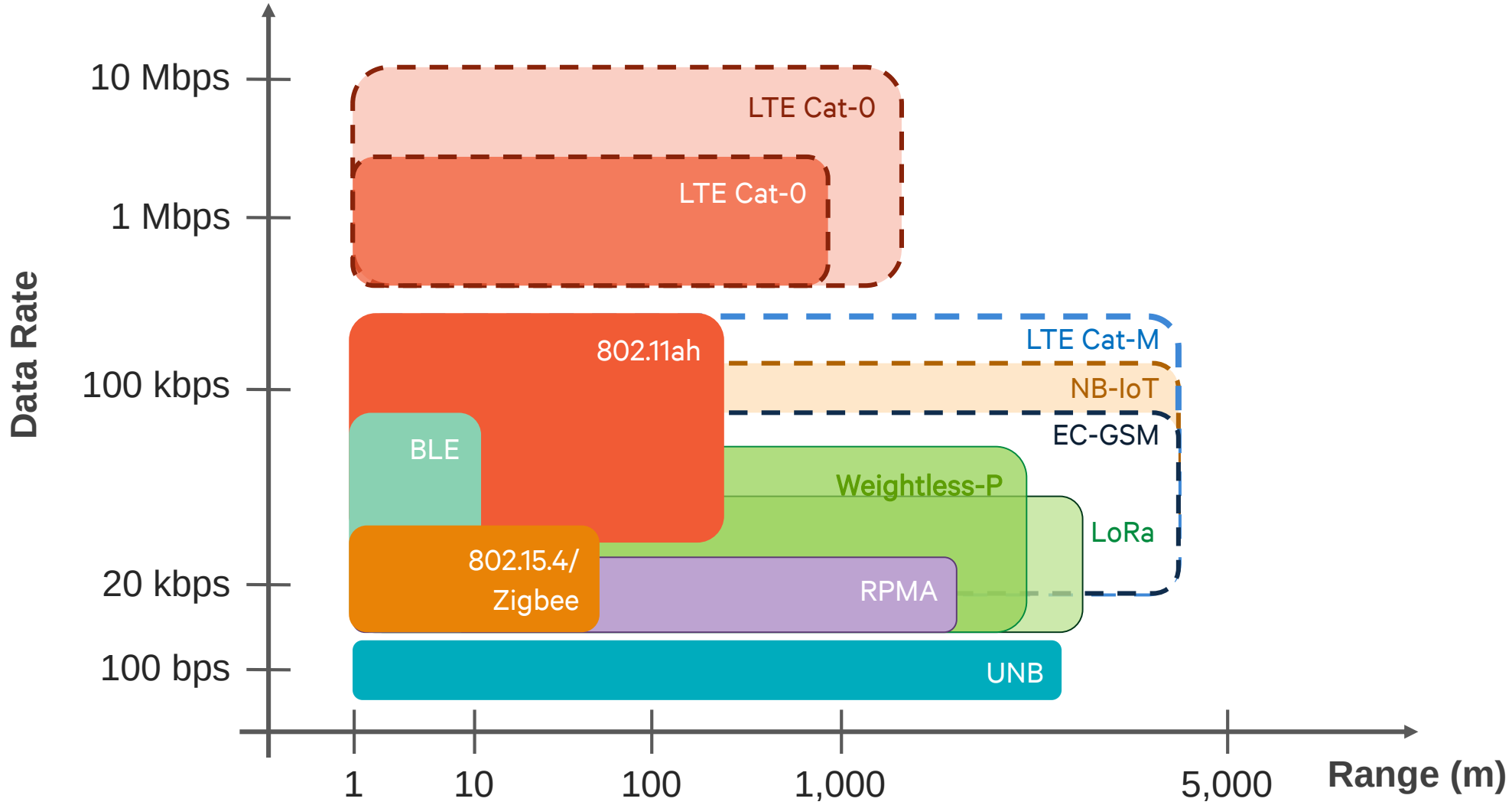
Total = 2.7B Devices

Source: Harbor Research

*Water, oil & gas infrastructure: Treatment, extraction, processing and transport

LPWAN Technologies

Range vs. Data Rates



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Thank you

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