Driving Business & Technology Transformations of the Future

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Smart Cities and Autonomous Mobility

Smart Cities expected to be a $1.5T market by 2020
1.3M people moving to cities every day
8B+ hrs US stuck in traffic; 17-hrs/day finding a parking spot
80% of people living in cities exposed to air quality levels > WHO limits
2.5M autonomous cars in US by 2023
IoT

By 2025, global worth of IoT tech is projected at $6.2B

IoT connected devices expected to surpass mobile in 2018

75% of leaders have a more favorable view of IoT than just two years ago
5G & Multi-access Edge Compute (MEC)

$12.3T of global economic output by 2035 and supports 22M jobs worldwide

5G networks expected to generate $533B in US GDP and $1.2T in consumer benefits
AI, Computer Vision, AR and VR

15% of businesses use AI today but 31% plan to add it in next year.

22.4M Americans are virtual reality users.

72% of business leaders believe AI is a fundamental business advantage.
Robotics and Drones

By 2020, $127B estimate of worth of drone industry
By 2020, 30% of smart cities’ ambient care application will be robotics based
Law enforcement drone use increased by 82%
Security, Data and Privacy

978M people in 20 countries lost money to cybercrime last year

1,579 total number of publicly disclosed data breaches in 2017

Seamless transfer of data could be 40% of IoT application value

85% of citizens are willing to share personal data in exchange for improved municipal services
Big Changes in Large Distributed Systems

Conventional wisdom – faster connectivity (5G), leads to centralized compute and storage

Key drivers challenging conventional wisdom:
1) IoT, ML, AI
2) Privacy, Availability, Cyber Security
3) Emergence of Vision Systems and their data
4) Latency-sensitive use cases - VR/AR, Autonomous, Drones

Result: Latency is "king", computation at the edge is critical
Huge, Positive, Implications for Flash

Computing and storage at every node in the network from cloud all the way to remote IoT sensors
Major cloud platforms are moving to support distributed cloud
Data will be pre-processed, anonymized, early and often
Video will be processed at the sensor to minimize latency
Massive increase in the square miles of silicon dedicated to flash memory
Vehicle to Infrastructure Use Case
M2M Communication
Key to Safe Autonomous Operation

$80B
Spent to date by industry on AV

V2X
DOT concluded will save 4.5M crashes/yr, 81% of all multi-vehicle, unimpaired crash types
V2I is Biggest Opportunity Beyond Connectivity

V2I utilizes Verizon assets
- Dense, ubiquitous network
- Sensors (road, video fusion, signaling)
- Smart City platform
- Edge Computing (MEC)
5G/MEC V2I Use Case

Vehicle-to-MEC through 5G
Video-based sensor fusion delivers location of non-AV vehicles, pedestrian data, “see around corners”, obstructions

Enables Real-Time HD Mapping
Situational Awareness

Fully Autonomous Bus Traveling at 40 mph

Pedestrian Darting Out to Cross Road

Smart City Hub:
Lighting infrastructure as sensor hub

Verizon Video Node:
Dual 4K cameras, integral video analytics, 5G connectivity
5G/MEC/Flash Technology Can Help to Save Lives
Re-Thinking the Future of Flash

Square miles of Flash silicon will increase; discrete Flash chip count may not.

Flash memory must be integrated into systems architecture early.

IoT device lifetime must approach 10+ years of heavy use (speed, # of writes).

Flash vendors must come to understand use cases in detail (app embedded flash & use case driven business models).

MEC Flash Facts

- 19,522 – Cities in the US
- 5 – Avg #MEC Locations/city
- 97,610 – MEC’s
- 300 – TB Flash/MEC
- 30 Quintillion bytes – MEC Flash
Technology Revolutions Lead to Business Model Revolutions
Revolutionizing Relationships

Dynamically changing ecosystem
Long-term customer relationships
Deeper relationships focused on co-creation & joint development
Transforming customer value proposition & go-to-market
Skate To Where The Puck Will Be

Transforming research and development
Software plays increasing role in hardware
“Design In” privacy & cyber security
Future proofing technology
Building for the Future

Flawless execution will be a key differentiator in these new businesses.

New complex integration of multiple partners required.

Long-term investment needed to seed the market and scale.
Digital Inclusion & Economic Development

The Homework Gap: 70% of teachers assign homework requiring access to broadband

5M households with school-age children with no bandwidth

IoT could constitute 11% of the global economy by 2025
We don’t wait for the future.
We build it.