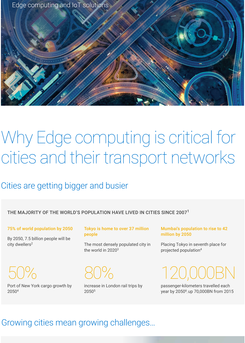
DELL Technologies

Smart cities, smart transportation

Edge computing and IoT backbone



Why Edge computing is critical for cities and their transport networks

Cities are getting bigger and busier

THE MAJORITY OF THE WORLD'S POPULATION HAVE LIVED IN CITIES SINCE 2007[1]

75% of world population by 2050

By 2050, 7.5 billion people will be city dwellers[2]

Tokyo is home to over 37 million people

The most densely populated city in the world in 2020[3]

Mumbai's population to rise to 42 million by 2050

Placing Tokyo in seventh place for projected population[4]

50%

Port of New York cargo growth by 2050[5]

80%

increase in London rail trips by 2050[6]

120,000BN

passenger-kilometers travelled each year by 2050[7] up 75,000BN from 2015

Growing cities mean growing challenges...

$87BN

US annual cost of congestion[8]

29%

of US greenhouse gas emissions come from transportation[9]

$62.5BN

e-commerce value, driving explosion in urban freight traffic[10]

40%

urban freight delivery growth projected by 2050[11]

$50-80BN

US health care costs from traffic air pollution[12]

... and growing adoption of smart city solutions

$124BN

global smart cities investment in 2020, up 18.9% on 2019[13]

$33.78BN

Global Machine Vision Systems market 2027[14]

378

cities with commercial 5G network deployed as of January 2020

102

smart cities ranked in the 2019 IMD Smart City Index[15]

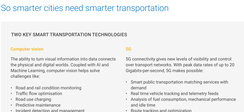
3x

growth in global IoT transport and logistics spending, to $300N in 2020[16]

49%

growth in Vehicle to Everything (V2X) connectivity spending 2017 – 2022

What transportation challenges will these growing cities face?



Private vehicles | Public transportation | Road haulage | Passenger and Freight | Shipping | Passenger and Freight

So smarter cities need smarter transportation

TWO KEY SMART TRANSPORTATION TECHNOLOGIES

Computer vision

The ability to turn visual information into data connects the physical and digital worlds. Coupled with AI and Machine Learning, computer vision helps solve challenges like

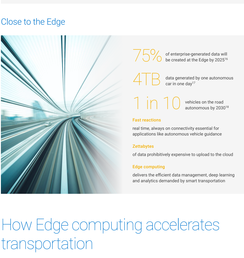
- Road and rail condition monitoring
- Traffic flow optimisation
- Road use charging
- Predictive maintenance
- Incident detection and management
- Service optimisation.

5G

5G connectivity gives new levels of visibility and control over transport networks. With peak data rates of up to 20 Gigabits-per-second, 5G makes possible:

- Smart public transportation matching services with demand
- Real time vehicle tracking and telemetry feeds
- Analysis of fuel consumption, mechanical performance and idle time
- Route tracking and optimization
- Better safety and reliability
- 'mini cloud' connected vehicle convoys

Close to the Edge



75% of enterprise-generated data will be created at the Edge by 2025[17]

4TB data generated by one autonomous car in one day[18]

1 in 10 vehicles on the road autonomous by 2050[19]

Fast reactions

real time, always on connectivity essential for applications like autonomous vehicle guidance

Zetabytes

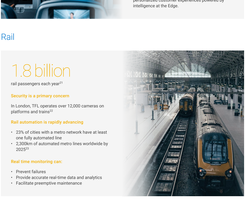
of data prohibitively expensive to upload to the cloud

Edge computing

delivers the efficient data management, deep learning and analytics demanded by smart transportation

How Edge computing accelerates transportation

Urban Mass Transit



30% decrease in passenger waiting time

Connected public transport significantly reduces wait time and accelerates city-wide travel[20]

Public bus services could benefit from improved:

- Fleet tracking
- Ticketing
- Live video monitoring
- Vehicle telematics
- Video analytics and facial recognition
- Fare collection
- Connectivity

Road

30 minutes off the daily commute

New smart roads and technologies reduce commute by up to 30 minutes on average. Additional benefits include[21]

- 10-15% improvement in emergency service arrival time
- 10% increase in road traffic capacity with smart parking

Smart cities recognise the importance of IoT enabled infrastructure

Smart trash collection expected to grow by 23% between 2017-2022[22]

Potential benefits include

- Traffic monitoring
- Weather and road data
- Obstacle detection
- Route management

Air

Better safety and security

Computer vision, computer audition and analytics at the Edge unlock smoother, more rigorous air travel safety and security

- Smart gates with facial recognition
- Shorter waits and lines
- Health screening
- Behavioural analysis and threat detection

Better efficiency

Computer vision and 5G have the potential to transform operational efficiency for flight and airport operators

- Visual inspection based pre-emptive maintenance reduces downtime and delays
- Smarter scheduling and runway utilization
- More efficient operations and logistics
- Fuel savings
- Cost effectiveness

BETTER CUSTOMER EXPERIENCES

95%

of passengers now carry a mobile device[23]

58%

of passengers prefer self-service technology for check-in[24]

There's huge potential for richer, more engaging and personalised customer experiences powered by intelligence at the Edge.

Rail

1.8 billion

rail passengers each year[25]

Security is a primary concern

In London, TfL operates over 12,000 cameras on platforms and trains[26]

Rail automation is rapidly advancing

- 23% of cities with a metro network have at least one fully automated line
- 2,300km of automated metro lines worldwide by 2025[27]

Real time monitoring can:

- Prevent failures
- Provide accurate real-time data and analytics
- Facilitate preemptive maintenance

Shipping

1.2M

people employed at sea worldwide,[28] not including docks, naval facilities and other shore-based operations.

53%

by value of US imports carried by shipping[29]

38%

by value of US exports carried by shipping[30]

$33.8BN

contribution of inland waterways to US economy[31]

2300

parcels shipped in the world's key global markets every second – forecast to exceed 100 billion in 2020[32]

Intelligence at the marine Edge enables

Efficiency

- Fleet visibility
- Remote diagnostics
- Pre-emptive maintenance
- Maximized uptime

Security

- Edge to cloud to core
- Data and network protection
- Intelligent security
- Advanced threat analytics

Business performance

- Cost reductions
- Increased competitiveness
- New business models

Safety

- Semi-autonomous vessels automate routine tasks
- Reduced human error
- Human augmentation eases workloads
- Reduced vulnerability to piracy

Edge computing answers many marine challenges

- Bandwidth and latency
- No onsite IT skills
- Complexity and lack of standardization of ships' systems
- Compliance
- Environmental regulation
- Sustainability and need to monitor waters and marine life

Intelligence at the Edge is driving transportation's urban future

Ask us how our pre-validated Edge computing Ready Solutions bring simplicity and flexibility to your smart transportation technologies like computer vision and 5G

DellTechnologies.com/Edge

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intel

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