# Impact of 5G in Smart cities

Jordan Ly and Ryan Becker

What is a Smart City?

- A smart city uses digital technologies and data to improve services and efficiency
- Focus on sustainability, public safety, mobility, and quality of life
- Examples: smart traffic lights, public city Wi-Fi, and connected public transit
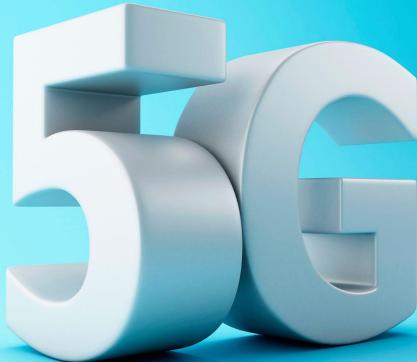
What is 5G?

- 5th generation mobile network technology
- Designed for speed, low latency, and massive connectivity
- More consistent connections

Comparison between 4G and 5G

Item	4G	5G
Peak Data Rate	1 Gbps (DL)	20 Gbps (DL)
User Experienced Data Rate	10 Mbps	100 Mbps
Spectrum Efficency	–	X3
Areal Traffic Capacity	0.1 Mbps/m^2	10 Mbps/m^2
Latency	10ms	1ms
Connection Density	100,000/km^2	1,000,000/km^2
Network Energy Efficency	–	X100
Mobility	350km/h	500km/h
Bandwidth	Up to 20 MHz	Up to 1 GHz

TELCOMA
CERTIFICATIONS SINCE 2009

Why 5G is needed in Smart Cities?

Real-Time Traffic Management

With real-time data, traffic signals can adjust on the fly, reducing congestion and improving emergency vehicle access

Autonomous Vehicle & Drones
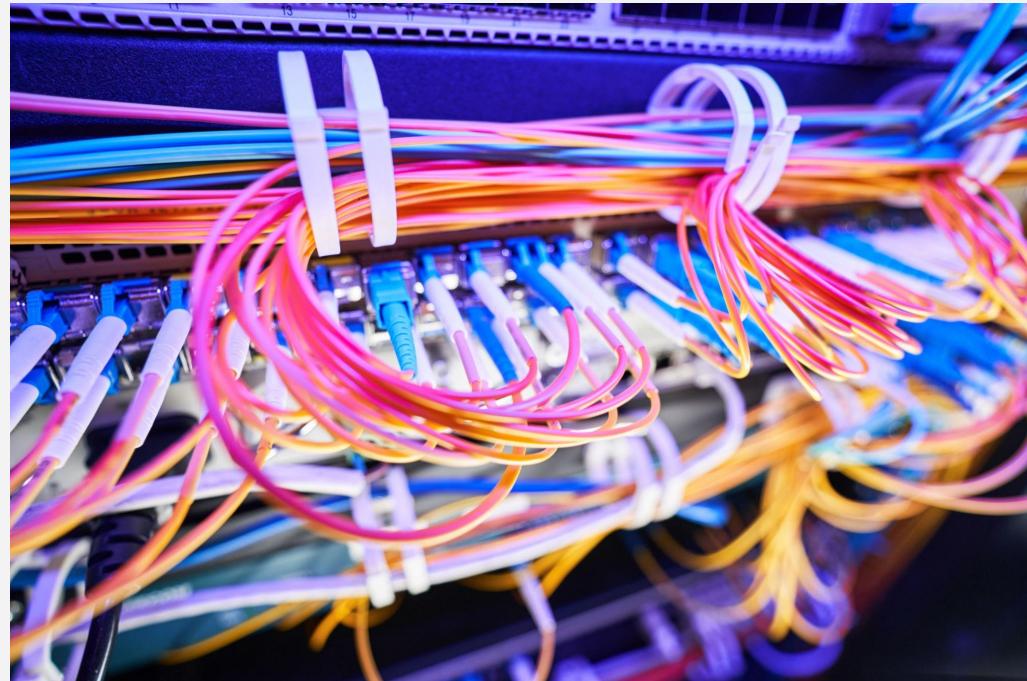
Self-driving cars and delivery drones need split-second communication — 5G makes that possible.

Emergency Service Coordination

5G allows ambulances and first responders to send live data to hospitals before arrival, saving lives.
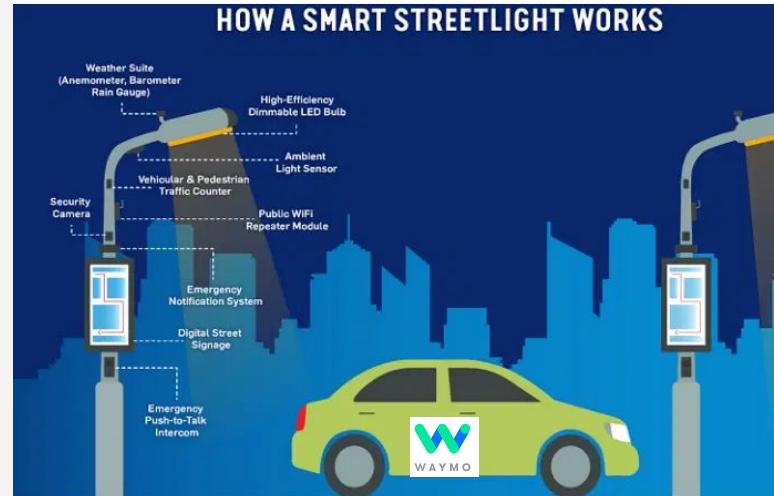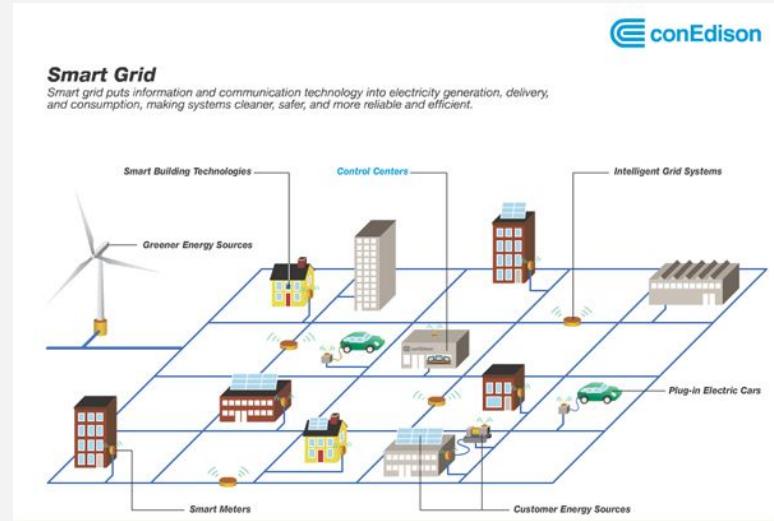
How 5G is implemented in Smart Cities

- Fiber Optic Networks
- Small Cell Towers
- Edge Computing
- Massive IoT deployment

What IoT Devices connect to Smart Cities?

- Smart Sensors
- Cameras
- Streetlights
- "Smart" Grids
- Autonomous Vehicle and Parking

Real World Example
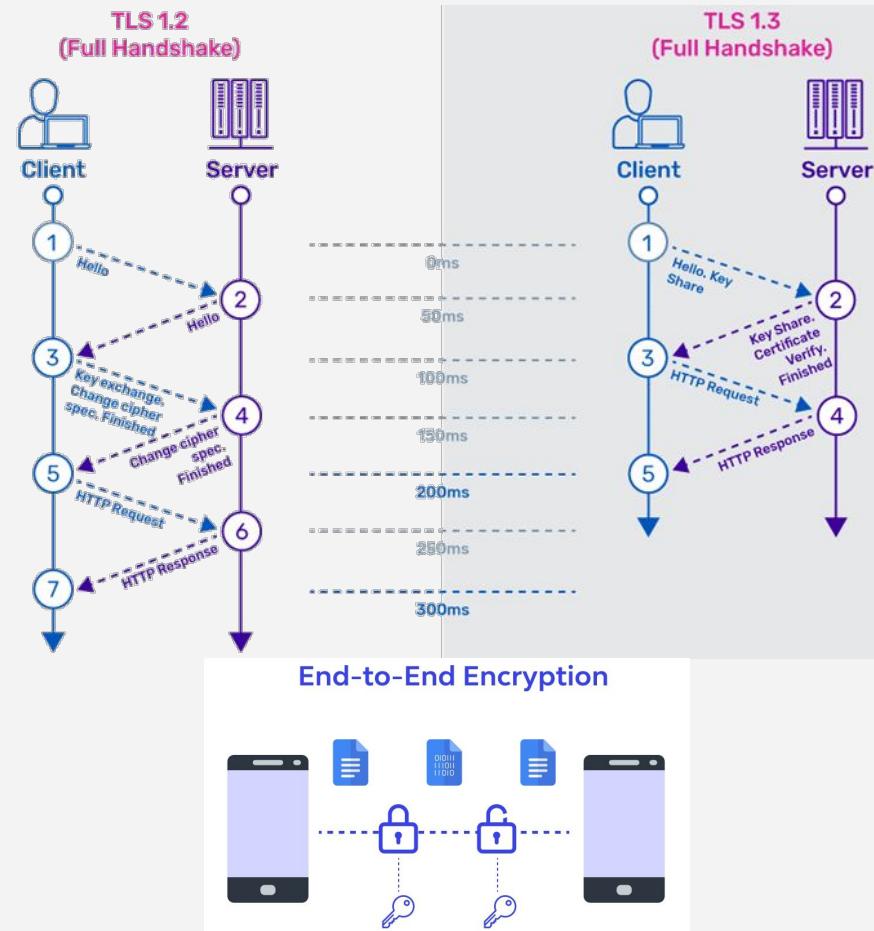
Seoul , South Korea leverages
- Smart Transportation
- Weather Monitoring
- Smart Grids (water and power)
- Blockchain for admin tasks

Security within Smart Cities
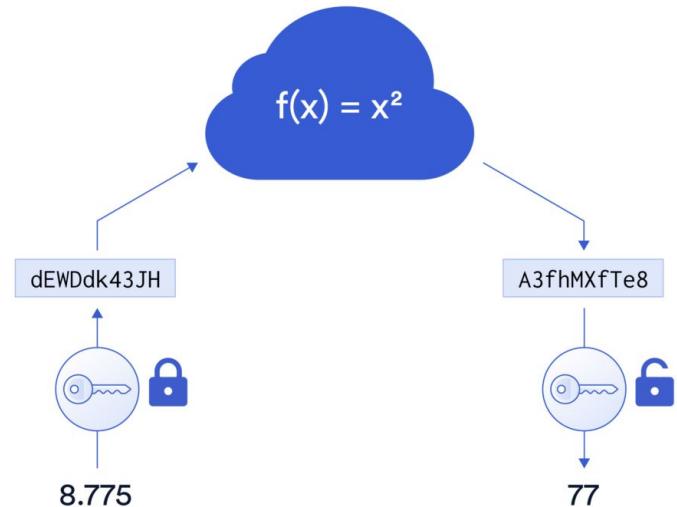
- TLS 1.3 for Device to Cloud
- End to End Encryption
- Lightweight encryption for low power devices

Securing IoT in Smart Cities

- Homomorphic Encryption
- Blockchain
- Edge Computing

Compute Encrypted Data With Homomorphic Encryption

$f(x) = x^2$

dEWDdk43JH

A3fhMXfTe8

8.775

77

Methods of Security in Smart Cities

Network Splicing

Virtual network architecture creating multiple logical layers on top of physical network layer , each "splice" can then be customized

Regular Key and Certificate Rotation

Replace cryptographic keys and certificates frequently to reduce exposure window

Mutual Authentication

Authentication occurring on server and client side

Zero Trust Architecture

Treat every device as a malicious actor

Challenges and Risks

High Cost

Building 5G infrastructure is expensive

Cybersecurity

With more devices being connected, the more targets can be attacked

Privacy Concerns
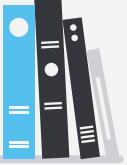
Tracking citizen movement with sensors

Digital Divide
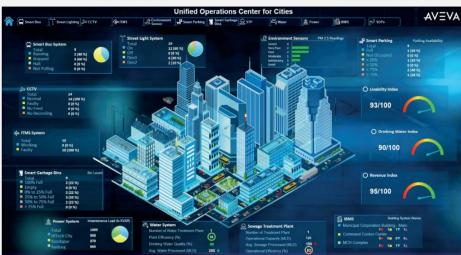
Not everyone will have equal access initially
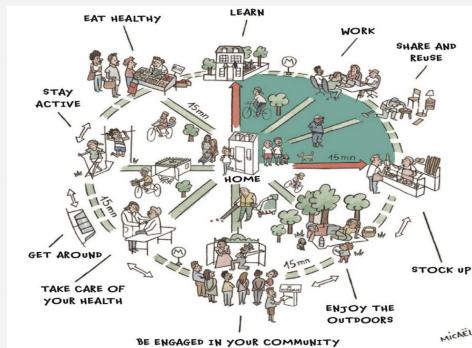
Future
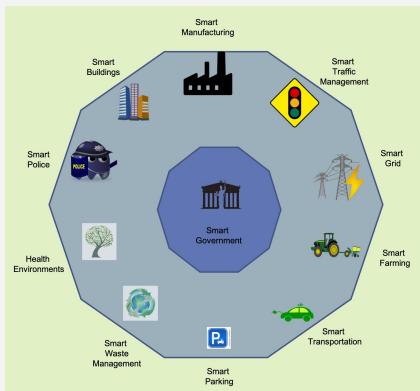
Digital Twin

15-minute City

AI and ML

Personal Reflection

- 5G will make cities safer and more efficient
- The potential is there, however the cybersecurity risks could cause problems if cities aren't prepared

Questions?