

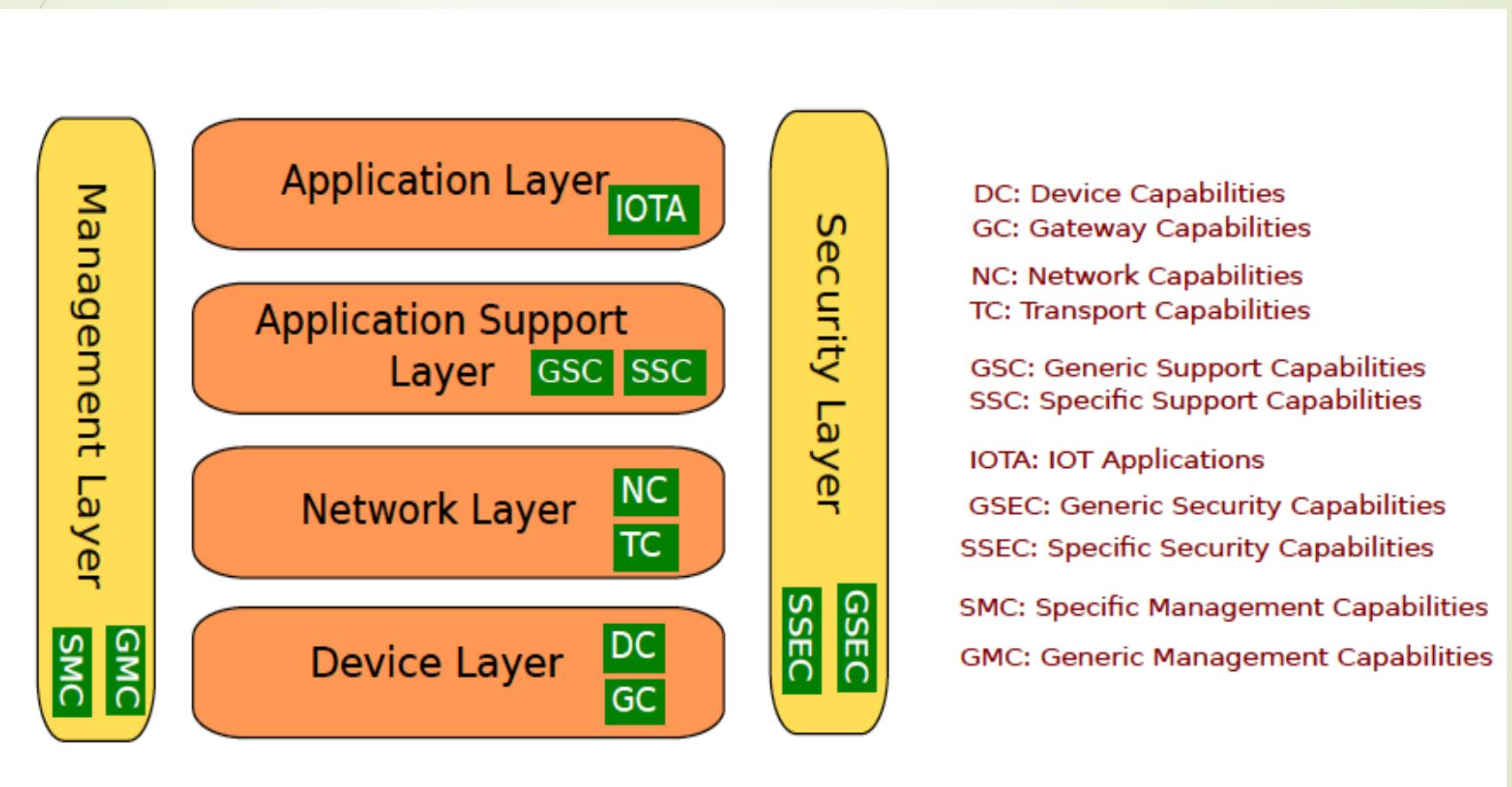
SWE-425 Security of Internet of Things (IoT) and Privacy

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Outline

- ?
- Review - IoT Architecture
- ?
- Review - Communication models
- ?
- IoT and Transportation

Review - IoT Architecture



Review IoT Architecture communication models

1-Device to Device Model

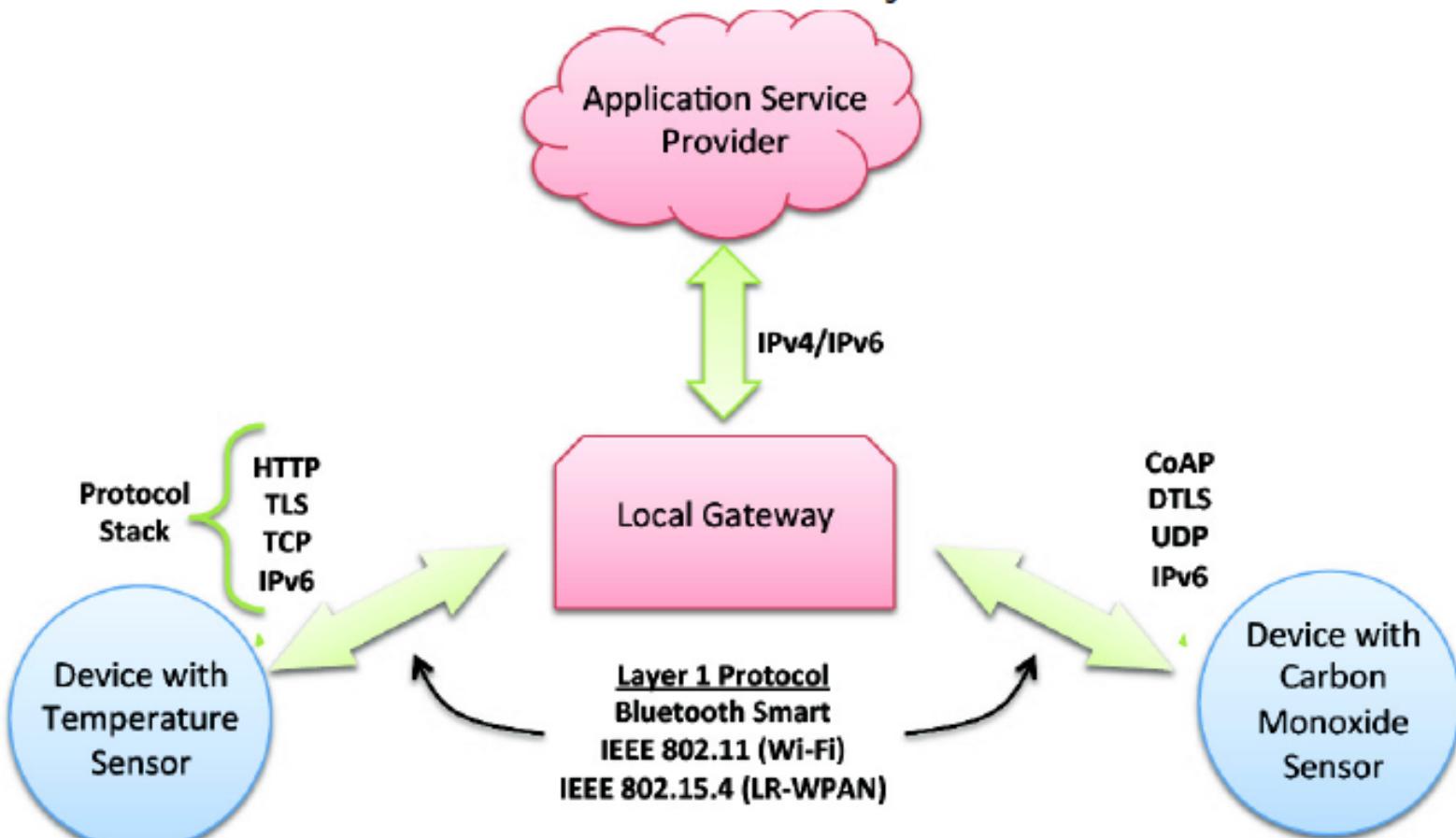


2-Device to Cloud Model



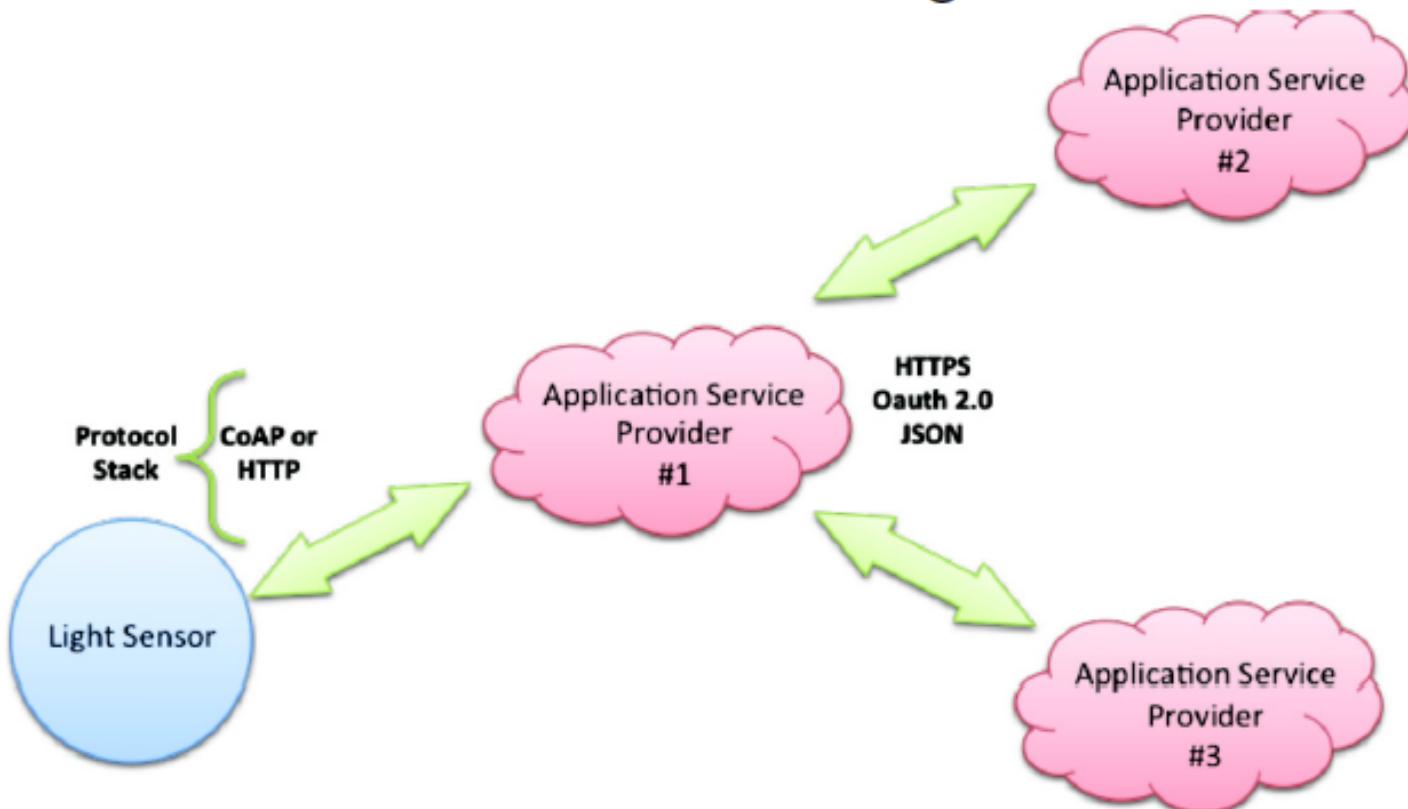
Review - IoT Architecture communication models

3-Device to Gateway Model



Review - IoT Architecture communication models

4-Back End Data Sharing Model



IoT and sensor networks

❓ Internet connectivity

- ❓ In IoT, all devices/sensors are connected to Internet and data can be sent directly from any device to Internet
- ❓ In sensor networks, devices/sensors do not have to be directly connected to Internet and sensors send information to a router or a central node
- ❓ Sensor networks can be considered a subset of IoT
- ❓ IoT are more encompassing than sensor networks
- ❓ In IoT, devices are stand-alone internet-connected devices and are independent

IoT and transportation

- ❑ Experts forecast that transportation industry will make substantial investment in IoT related technologies
- ❑ Important aspects
 - ❑ Context of using IoT technologies
 - ❑ What are these technologies going to look like?
 - ❑ What should we expect from these technologies?
- ❑ We are already seeing limited use of IoT in transportation
 - ❑ Vehicle-to-person – your uber is two minutes away

IoT and transportation

- ?
- Benefits of IoT in transportation
- ?
- Maintaining vehicle health
 - ?
 - Onboard diagnostics port
 - ?
 - Maintenance is easy and less expensive
 - ?
 - Information is useful for businesses such as fleet management
 - ?
 - Performance
 - ?
 - Catch issues early
 - ?
 - Fuel consumption, idle time
 - ?
 - Tracking your car

IoT and transportation

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Traffic

- ?
- Commuters spend on the average 42 hours per year sitting in traffic (in addition to commute time)

- ?
- IoT can help:

- ?
- Can help smooth the traffic flow than just stop-and-go
- ?
- Can suggest better routes
- ?
- Traffic Jam Assist – match the speed of the cars ahead

IoT and transportation

❓ Transforming vehicle ownership

- ❓ Car ownership is expected to decrease 80% by 2030
- ❓ Trends are already visible – urban population is already relying on uber, lyft, and public transportation
- ❓ The trend is expected to expand
- ❓ IoT helps the trend by tracking and broadcasting
- ❓ Car2Go program allows users to unlock cars (from a fleet) by phone and drive it anywhere (within limits)
- ❓ IoT will help in fuel management, battery health, and other aspects

IoT and transportation

- ② Autonomous cars – Countries plan to build infrastructure for autonomous vehicles
- ② Benefits
 - ② Reduce auto collisions and driving risks
 - ② A large number of people die in auto collisions every year
 - ② Self-driving cars are expected to reduce these
 - ② Autonomous cars can see blind turns, corners, identify pedestrians, cyclists, and other hazards well in advance
 - ② They can make judgment calculations, decisions very quickly

IoT and transportation

- ?
- Benefits (continued)
 - ?
 - Time saving for efficient routing and parking
- ?
- Benefits to companies
 - ?
 - Increase utilizations, lower costs
 - ?
 - Real-time data and faster claims by insurance companies

IoT and transportation

- ④ Benefits to cities
 - ④ Information sharing about traffic congestion, hazards to other vehicles
 - ④ Information sharing with traffic lights
 - ④ Coordinated rerouting and traffic load balancing
- ④ Platooning
 - ④ Set of vehicles
 - ④ Vehicles coupled together
 - ④ Maintaining speed and distance
- ④ Reduce accidents

IoT and transportation

- ② Smart traffic lights
 - ② Faster commute
 - ② Reduce vehicle wait
 - ② Reduce emissions

IoT and transportation

❓ Challenges

- ❓ Adopting IoT is expensive
- ❓ Enabling communication infrastructure is a big undertaking
- ❓ Responsibility for liabilities such as accidents
- ❓ Data security

IoT and transportation

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Video

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<https://www.youtube.com/watch?v=tiwVMrTLUWg>



Thank you!