Smart cities and the Internet of Things

A look at the relationship between the Internet of Things, smart cities, and the energy grid

August 2018

Producer *Christine Yan*

Director Alistair Taylor

Overview of the "Internet of Things"

The IoT refers to the network of data-sharing devices connected to the internet

An IoT device is a physical object that is connected to the internet and can be controlled through that connection

The term is mainly used for devices that are not typically connected to the internet and that can communicated with the network independently of human interaction



As the IoT grows faster, it poses new cybersecurity threats because privacy and security data span more networks

The IoT will have an estimated market value of **\$1.9 trillion by 2020**

The IoT enables businesses, governments and consumers to connect to remote devices for various purposes, such as energy management and defense

Factors shaping the Internet of Things



The Internet of Things and the electric grid

Two-way communication has been a key component of grid modernization efforts

- Advanced sensors, IoT devices enable better insight into grid infrastructure performance
- They can work across both centralized and distributed grids
- This creates a two way communication stream between energy sources and consumers enabling opportunities for non-utility renewables and energy storage



- Smart grid sensors will enable greater cybersecurity by integrating distributed energy resources into central security networks
- Further, sensors allow increased integration of renewable energy sources, energy storage and electric vehicles onto the electric grid

The Internet of Things and the electric grid

DOE projects on using IoT devices for grid modernization

Electric vehicle integration

Communications and controls between plug-In electric vehicles and building/campus energy management systems to integrate distributed energy resources, buildings, and vehicles

Cybersecurity

Develop an attack-resistant architecture and layered cyberphysical solution portfolio to protect grid infrastructure and integrated distributed energy resources from cyber attacks





Retrofit control technology that increases the operational flexibility of loads in commercial buildings that will reduce peak demand, reduce energy losses, and improve energy efficiency

Interoperability

Interoperability requirements for simplifying the integration and cyber-secure interaction among the various devices and systems that constitute the electric power grid

Grid architecture

Working to develop reference grid architectures for the utility industry and stakeholders to provide a common basis for roadmaps, investments, technology and platform developments, and new capabilities, products, and services for the modernized grid

Top 10 smart cities

EasyPark 2017 Smart Cities Index



Sources: EasyPark, 2018.