

The Smart City Building Blocks & Their Synergy with Smart Villages

Invited Talk

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What is a Smart City

- There is **no** single consensus definition of a smart city, but there is some agreement that a smart city is one in which information and communication technology (ICT) facilitates improved insight into and control over the various systems that affect the lives of residents.



Picture from: <http://politic365.com/2017/09/01/smart-cities-require-smart-planning-policy-to-benefit-communities/>

Smart City

A **smart city** is an urban development **vision** to integrate information and communication technology (ICT) and Internet of Things (IoT) technology in a **secure** fashion to manage a city's assets.

To be fully “smart,” a city must be “connected.”

Building Blocks of a Smart City





Range of Deployments in a Smart City

Cities across the world are deploying technology to gather data trying to become cleaner, reduce traffic, and improve urban life. Starting with **energy management**, to **disaster preparedness**, to **public safety**, to **parking spot assistance**, to **paying bills online**, to **facilitate emergency vehicle movement**, and much more.

Elements of a Smart City



A neighborhood in a smart city:

- A smart traffic crossing sensitive to traffic volume
- Synchronized traffic lights for smooth flow
- Emergency vehicle priority access



Optical Based Traffic Signal Preemption System For Emergency And Transit Vehicles

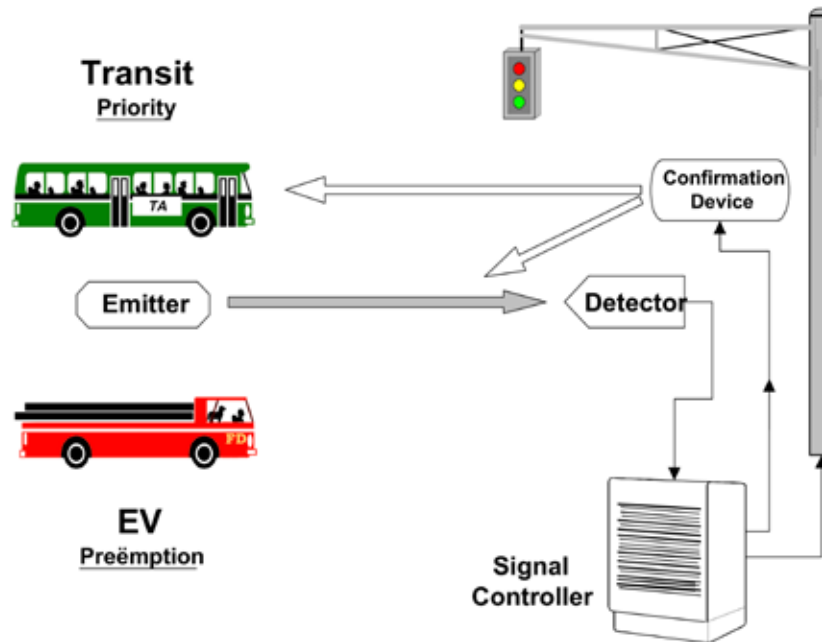


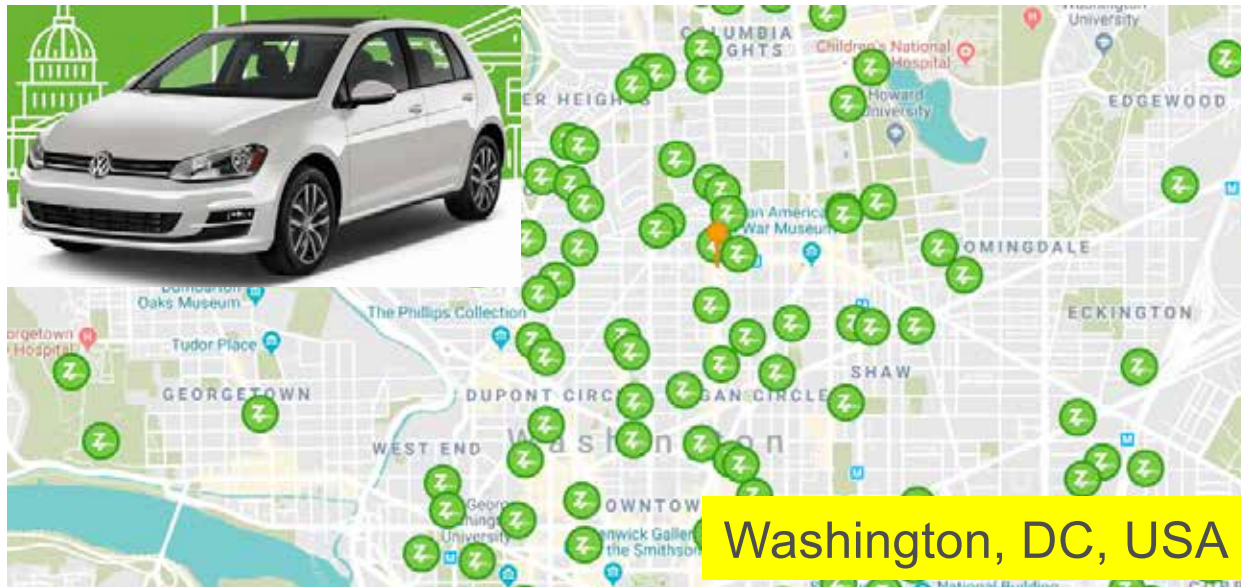
Figure 12 : System Architecture for 3M Opticom Emitter Detection System



<https://vtechworks.lib.vt.edu/bitstream/handle/10919/31319/ThesisFinalVersion.pdf?sequence=1>

Connected Transportation

- Connected vehicles and travelers will be able to share data with all sorts of equipment, and be able to procure mobility as a service, whenever wherever.





Vancouver Can Do This



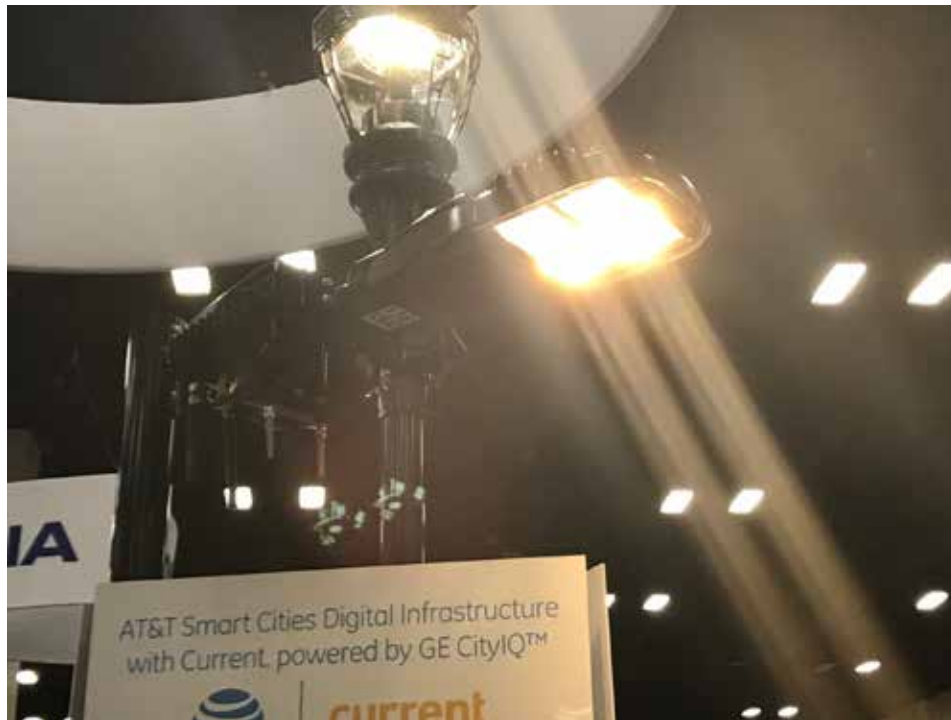
Stockholm City Traffic Management



The system allows buses that are more than a minute behind schedule to automatically receive priority at traffic lights

US Deployment: Smart Lamppost with Camera

Camera provides surveillance and locates empty parking spaces



Smart Trash Can in Baltimore, USA

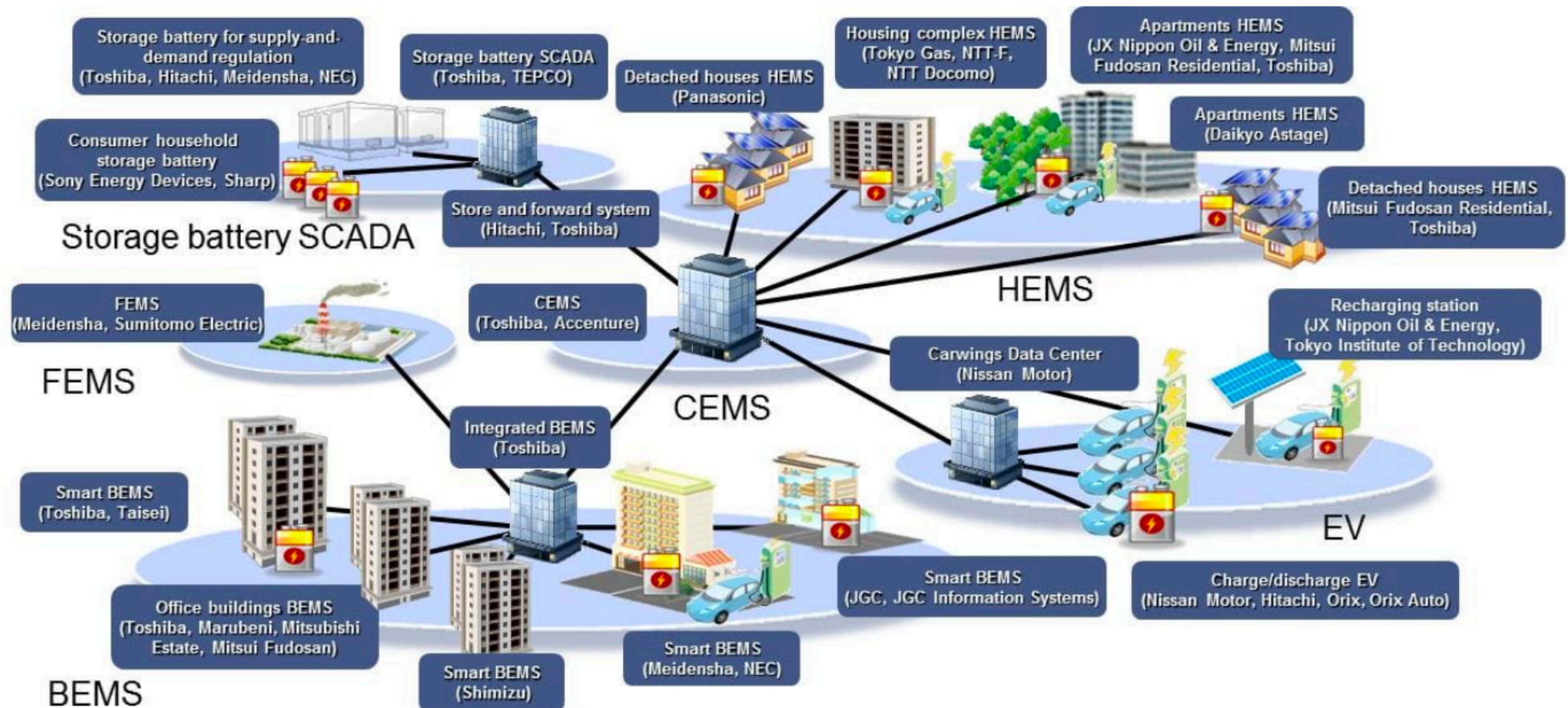


Smart Trash Can in Stockholm, Sweden

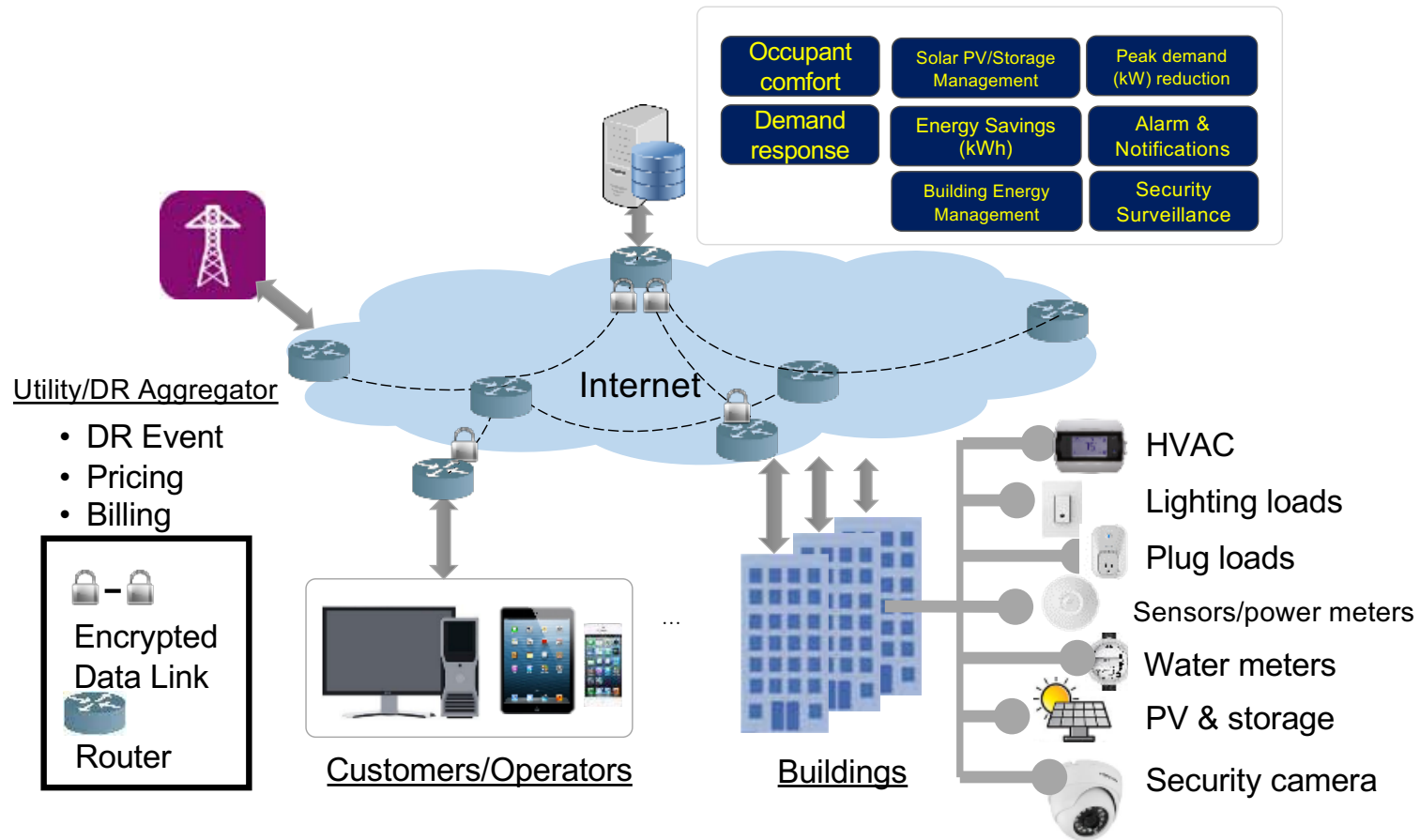


Regular trash cans need to be emptied 1-3 times per day
Smart ones only need to be emptied four times a week.

Yokohama, Japan Smart City Demonstration



A Building Energy Management Platform



Source: www.bemcontrols.com

Smart Cities in India (60)



What is Normal



The New Normal





Synergy



Smart/Connected City

- A smart/connected city is a system of interconnected systems including:
 - **Employment**
 - **Health care**
 - **Retail/entertainment**
 - **Public services**
 - Residences
 - Energy distribution
 - Transportation
- The system of systems is tied together by information and communications technologies (ICT) that transmit and process data about all sorts of activities within the city.



Solar Nanogrid in Bangladesh

ICT-based power meter and bill payment using smart phones





Introducing Technology

- Enables light after sunset using solar micro-grids
- Illuminates kitchens, schools and clinics
- Lets communities live cleaner, safer, and more prosperous lives
- Stimulates local commerce and builds new enterprises



Expanding Education



Photo by Paula Bronstein

- Creating a network of engineers, entrepreneurs, and practitioners
- Facilitating ongoing learning and mentorship for continued success
- Innovative Global Classroom helps people around the world access the internet and educational resources



IEEE Smart Village Success Story

Global Himalayan Expedition, India



Lingshed Monastery – Ladakh Region, Indian Himalayas – Elevation 12,000 feet.
Founded in 1440 Illuminated with IEEE Smart Village in 2016
Global Himalayan Expedition

Villagers working with LED Lights



Loads served by roof-top Solar Photovoltaics



Locally Driven Initiatives



Source: Grameen Shakti, Bangladesh

Ownership by Citizens

❑ Development of local technicians and entrepreneurs at the grass-roots level:

To create local stakeholder for promoting, installing and providing efficient after-sales service of the technologies.



❑ Local capacity development and creation of green jobs:

Local entrepreneurs, especially women are offered financial and technical assistance to set-up a renewable energy technology business.



Source: Grameen Shakti, Bangladesh

Life Changing Experience

“The customers love coming to my shop, now that I have bright light . “They can see what they are buying and what I have in stock. And they can watch television and charge mobile phones. My sales have gone up by at least 50%.”



Source: Grameen Shakti, Bangladesh

Children's Library in a Boat with Solar-powered Light



Source: Grameen Shakti, Bangladesh



Impact of Solar PV in Rural Communities

- Education
- Healthcare
- Retail Business
- Electricity

Some of the experience from the Smart Village can show examples of social interactions which can be transferred to the Smart City and help in community building



The Connected ~~City~~ Village

A connected ~~city~~ village is one where all relevant ~~city~~ village systems— utilities, transportation, employment, health care, public safety, education, and others—are capable of communicating with each other to allow coordination and reduce waste.



Thank you

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