



IoT Network Communications – No one size fits all

Phil Beecher, President and CEO, Wi-SUN Alliance

IoT Applications for Smart Cities

Traffic Management



Air Quality Control



Public Safety Solutions



Smart Parking



Smart Lighting



Smart Waste Collection



Smart City IoT applications

- Smart Energy / Smart Grid
- Smart Water
- Street Lighting
- Smart Parking
- Smart Waste
- Intelligent Signage
- Infrastructure Monitoring
- Traffic Management
- Video Surveillance

Overview of Communications Technologies

Wired Connectivity

Benefits and Weaknesses

Generally Reliable ✓

High Capacity / High Data rates ✓

Installation: Expensive/disruptive ✗

Examples

Optical Fibre

Ethernet

Cable

Copper (e.g. phone lines)

Powerline



Overview of Communications Technologies

Wireless Connectivity

Benefits and Disadvantages

Easy and Flexible Device Installation ✓

Power Consumption / Range / Data Rate - pick 2 of 3 ✗

Coverage issues ✗

Reliability and Resilience ?

Examples

Bluetooth / ZigBee / Matter / ZWave– short range (< 10m), low power, medium data rate

WiFi – short range (< 10m), higher power, high data rate

Cellular (3G, 4G) - long range (1 km urban, 10km rural and no obstructions), higher power, medium data rate

Low power wide area (LPWAN) radio – e.g. LoRa – low power, long range (10's of km), very low data rate

Satellite – long range, high power, medium data rate

Cellular (5G) – medium range (300m), high power, high data rate.

Multi Service Field Area Network Solution



Smart City

- Street Lights
- Smart Parking
- Traffic Counter

Oil & Gas

- Distribution RTU
- Wellhead automation

Smart Grid

- Distribution Automation
- Smart Meter
- Demand Response
- Transformer Monitoring
- EV Charging Station
- Distribution Energy Resource



- ✓ Cellular
- ✓ Ethernet
- ✓ Fiber

Distribution Management System

- Dis Planning
- IWC
- FLISR
- SCADA

Mesh Management System

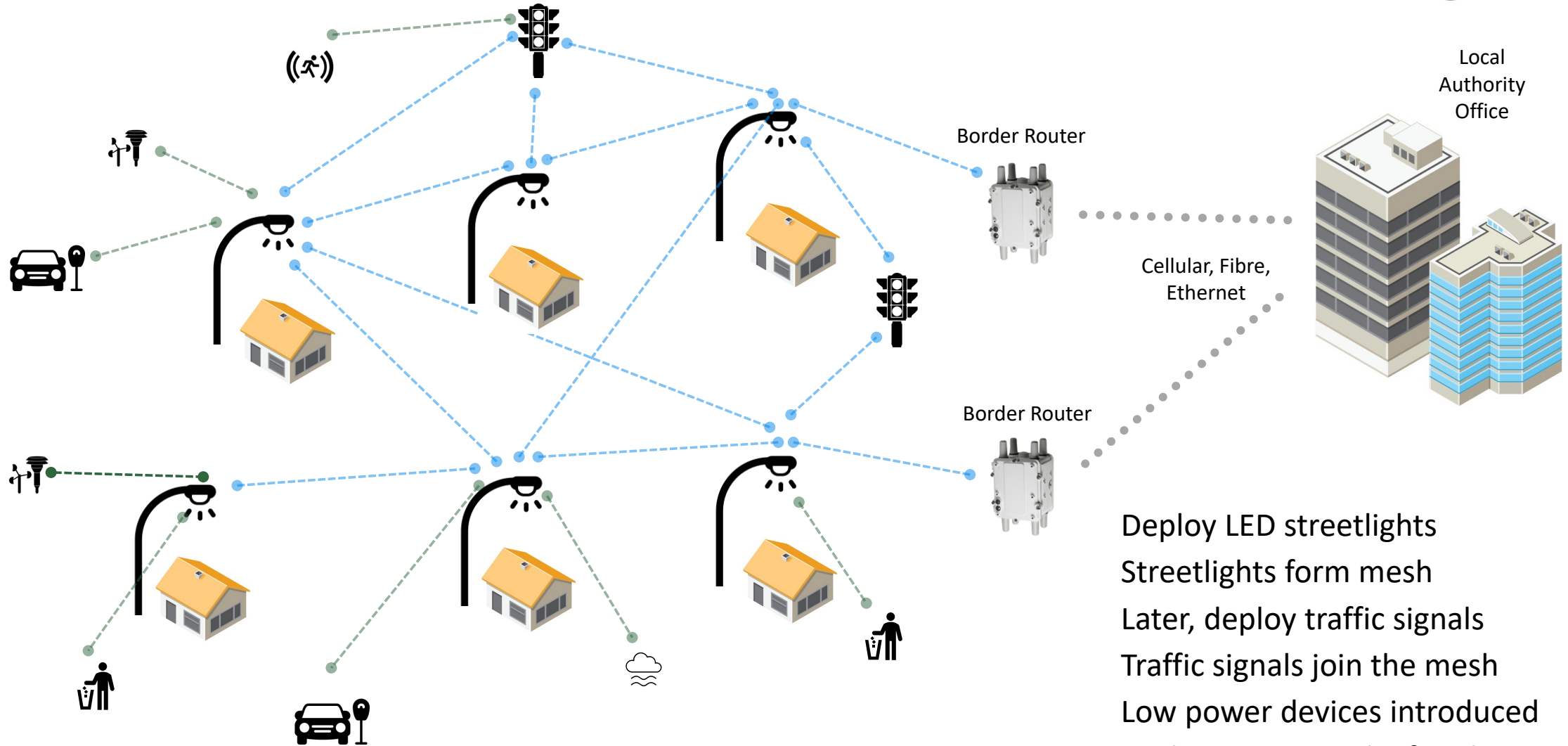
- Cisco IoT-FND
- DHCP / Security

- Cert Authority
- Directory Services
- Access Control

Data Center & Enterprise Apps

Cisco Resilient Mesh Links

Smart City Mesh Network Evolution



Deploy LED streetlights
Streetlights form mesh
Later, deploy traffic signals
Traffic signals join the mesh
Low power devices introduced
LP devices join as leaf nodes

Benefits of a Open Standards based Wireless Mesh



- Wi-SUN FAN is a Wireless IPv6 mesh solution for smart infrastructure that provides
 - Scalable self-healing mesh
 - High performance long range
 - Reliable and Resilient
 - Great Connectivity
 - Interoperable & secure
- A standards- based solution delivering
 - Ease of use
 - Flexibility
 - Scalability
 - Avoid vendor lock-in
 - Large ecosystem

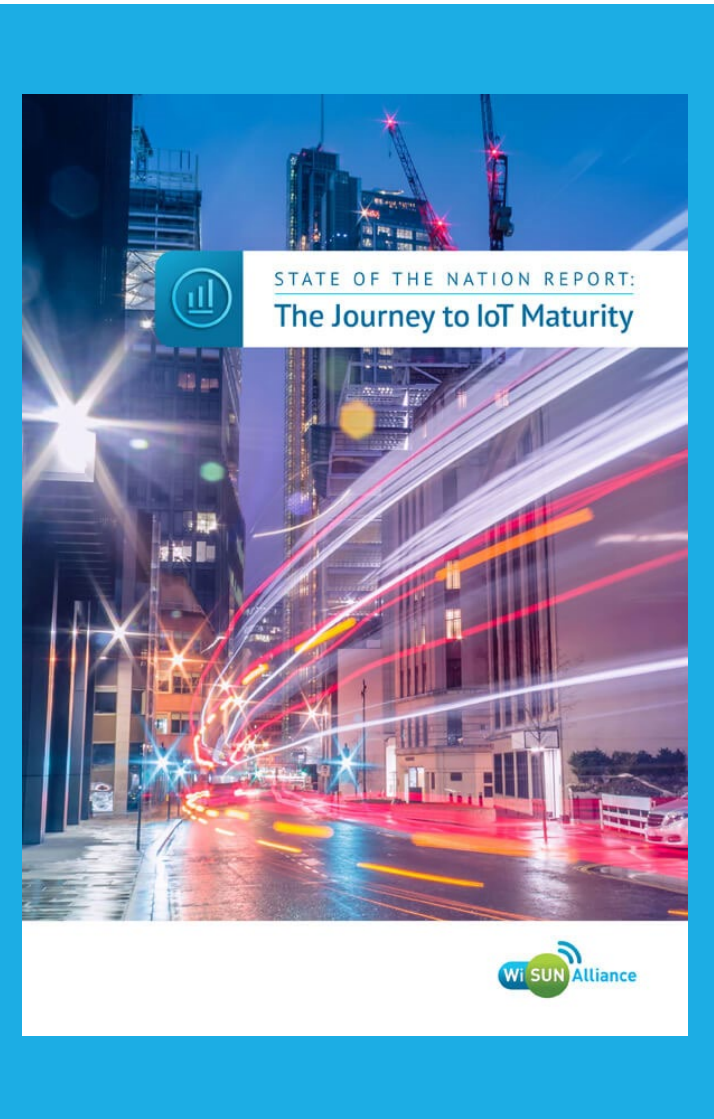
2022 survey - The Journey to IoT Maturity

sponsored by Wi-SUN Alliance - follow up to 2017 survey

Growth in traffic management, sustainability and streetlighting initiatives

- 1) Smart parking is the IoT initiative with the biggest rise since 2017, increase from 57% to 77% very likely or definitely planning to deploy
- 2) Traffic lights and controls increased by 18% from 2017
- 3) Noise and air quality sensors increased from 62% to 79%
- 4) EV charging initiatives grew from 66% to 79%. This shows a strong focus on environmental outcomes.
- 5) Smart Streetlighting initiatives grew from 61% to 72% - more on the City of London later

Plus ... water loss / leakage detection, carbon monitoring ...



Wireless Field Area Network Smart City Applications



Street Lighting



Energy Management,
Maintenance, Security



Traffic Control/Lights,
Parking Meters



Utility Meters



EV Charging



Environmental Monitoring



Waste
Management



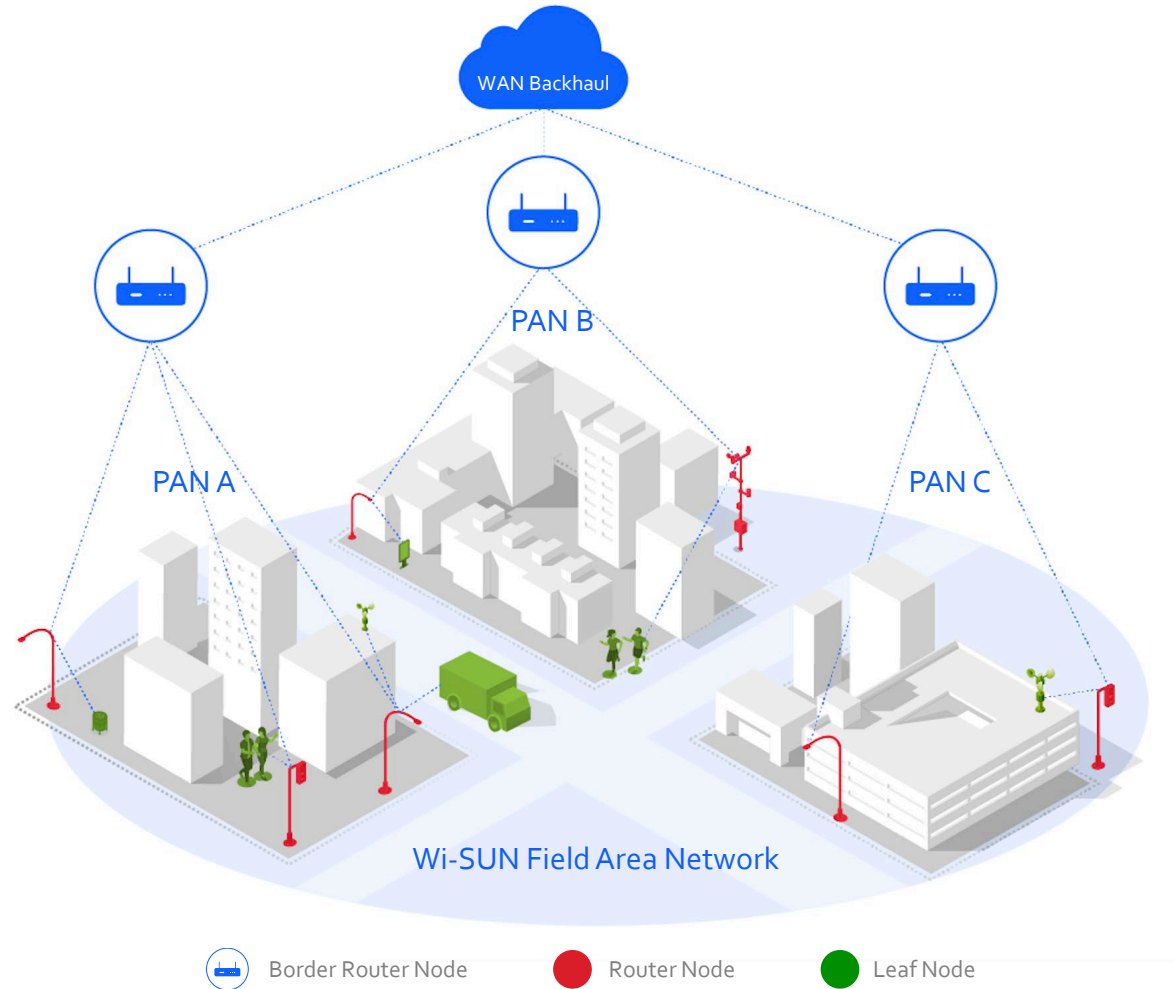
Consumption, Flow Rate,
Valve Control



Agriculture Management

Wi-SUN FAN Solution Architecture

Back End | Head End | Control Center Services



▪ Border Router

- Provides WAN connectivity
- Maintains source routing tables
- Node authentication and key mgmt.
- Disseminate PAN wide information such as broadcast schedules

▪ Router Nodes

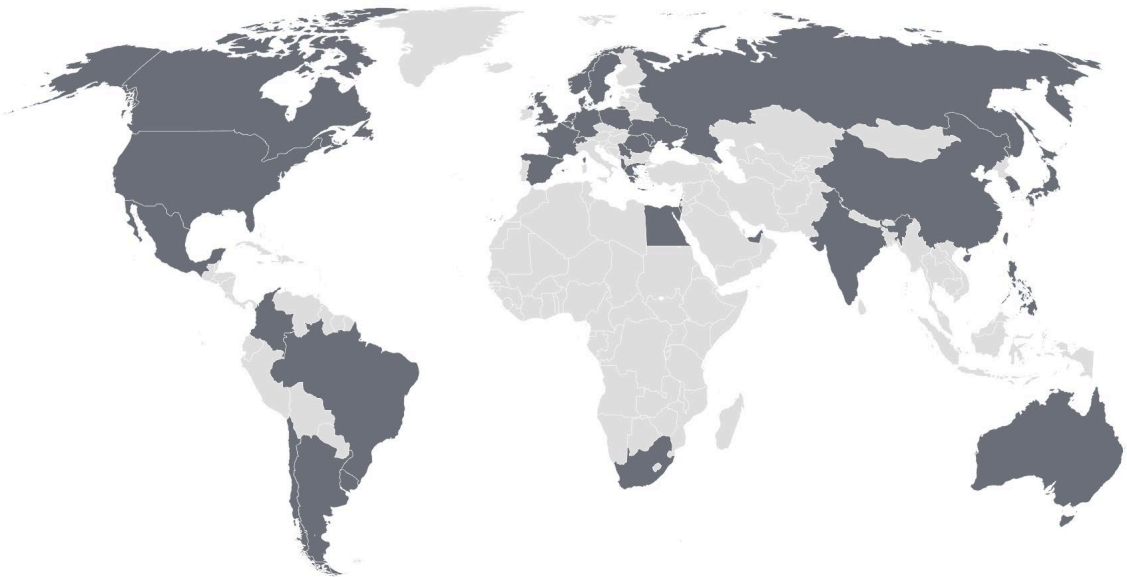
- Upward and downward packet forwarding within a PAN
- Services for relaying security and address management protocols

▪ Leaf Nodes

- Discover and join a PAN
- Battery operated nodes
- Send/receive IPv6 packets



What is the Wi-SUN Alliance?



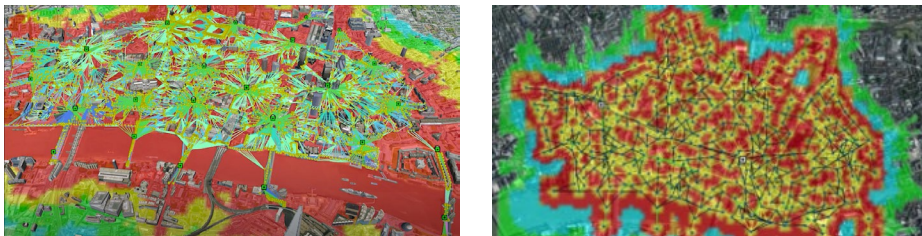
+ over 300 additional members

- Global ecosystem of member companies seeking to accelerate open standards for Field Area Networks
- Promoter of multi-vendor interoperability
- Enabler of a diverse ecosystem of solution providers
- Robust certification authority

>300 - Member companies | 100M - Compatible endpoints worldwide | 46 - Countries

City of London

Using Wi-SUN mesh pulls together three main streams of thought: lighting for people, sustainability and the future - *City of London*

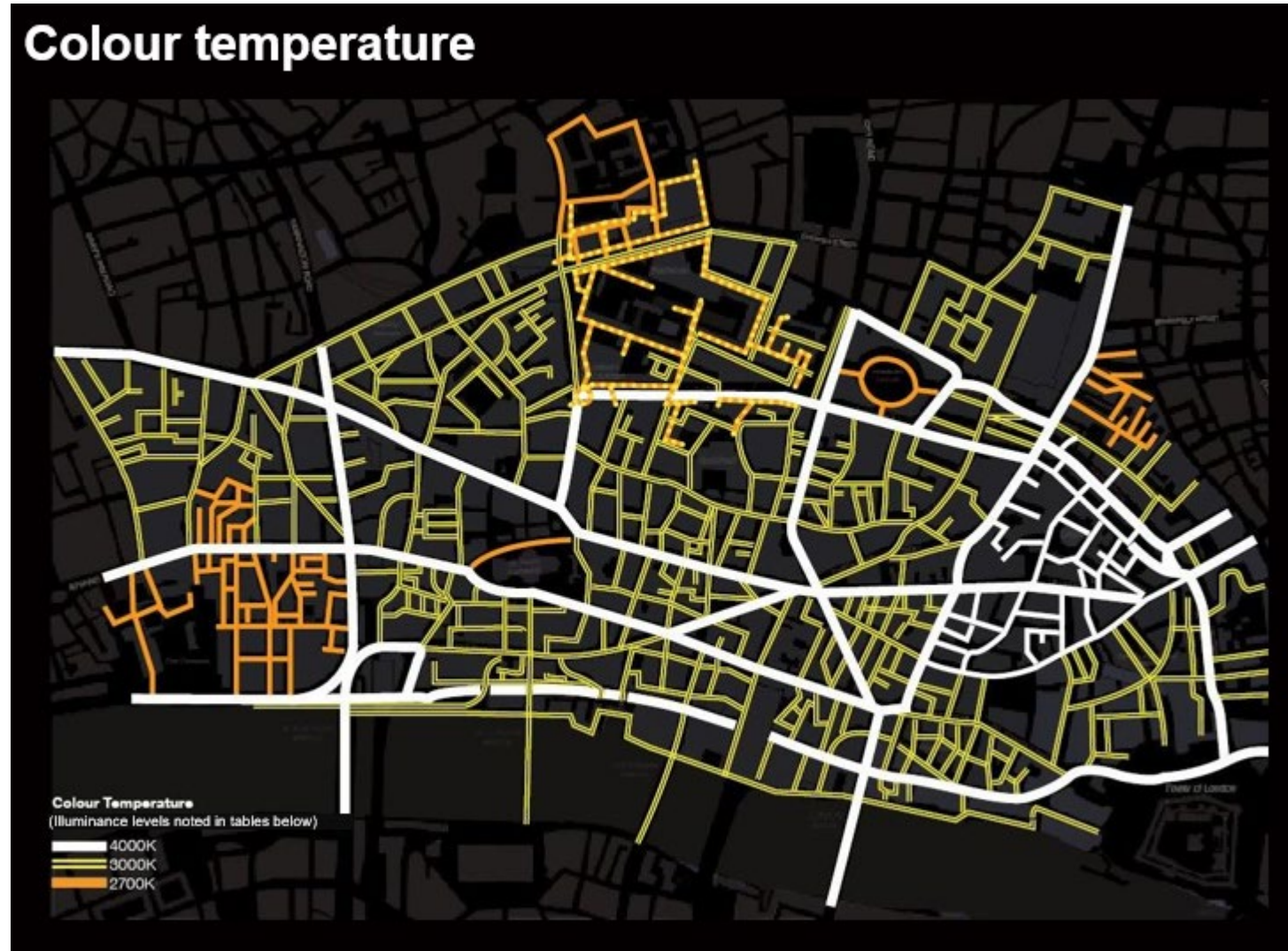


The network features 12 gateways, using Wi-SUN's self-forming and self-healing mesh functions to add devices to the network, as well as UrbanControl's software-based security offerings to comply with the City's stringent requirements.

Wi-SUN FAN Mesh Network spanning 12,000 luminaires

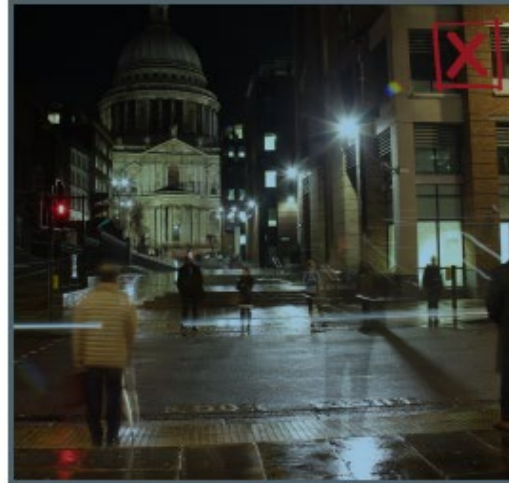
- Major benefits
 - Enables real-time remote management
 - Reduces electrical energy usage (60% energy cost savings)
 - Automatically generates maintenance service orders
 - Provides a city-wide mesh network for new applications such as
 - Utilities
 - Safety
 - Parking
- How is Wi-SUN helping?
 - Future proof system (lasts for the next 30-40 years) that can scale as the city converts old infrastructure to new
 - Provides real time On/Off and Brightness control
 - Provides Lux output readings and current consumption
 - Provides safe, well illuminated environment for citizens

City of London: Colour Temperature Plan

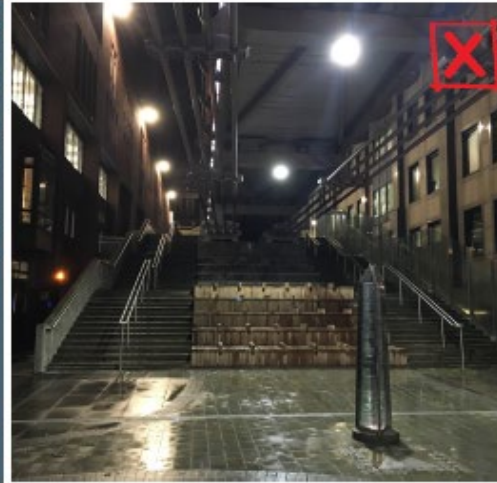


Improvements required

Lighting the City of London in line with the Lighting Strategy



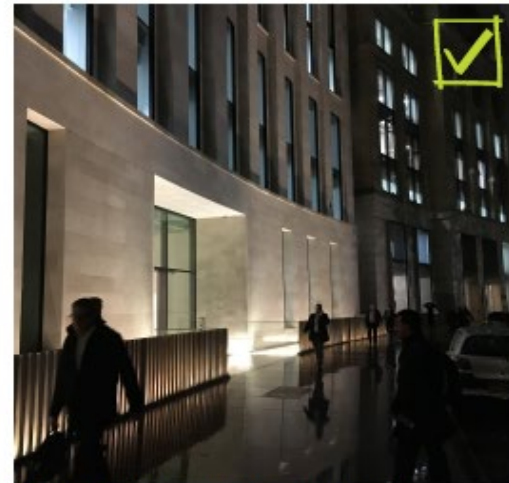
Blanket lighting reduces legibility of space



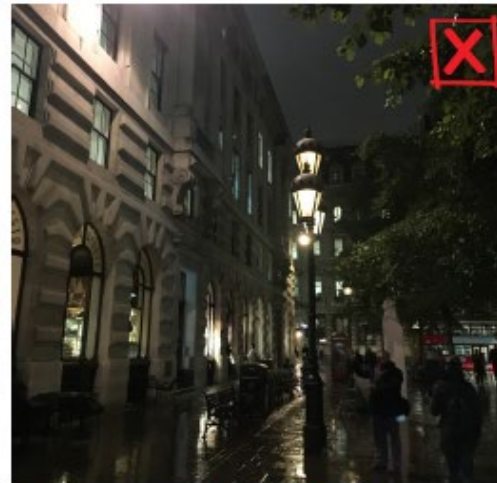
Overlap of lighting creates unbalanced lighting



Controlled illumination required at key changes in level



Private lighting contributes to illumination of public realm



Historic light sources disappear among high light levels



Lighting integrated into overall design

Improvements delivered

Lighting the City of London in line with the Lighting Strategy



Low level lighting reinforces sense of privacy



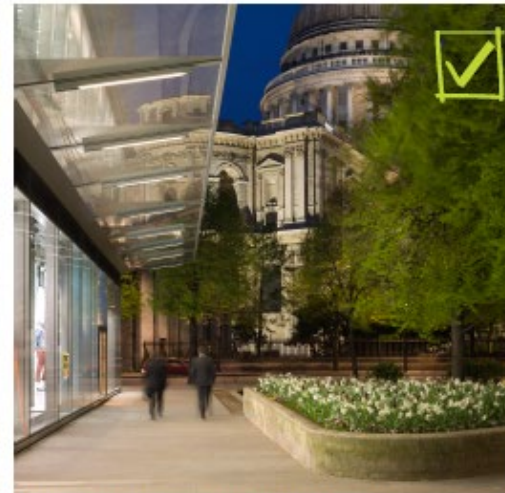
Low level lighting promotes views out to the City



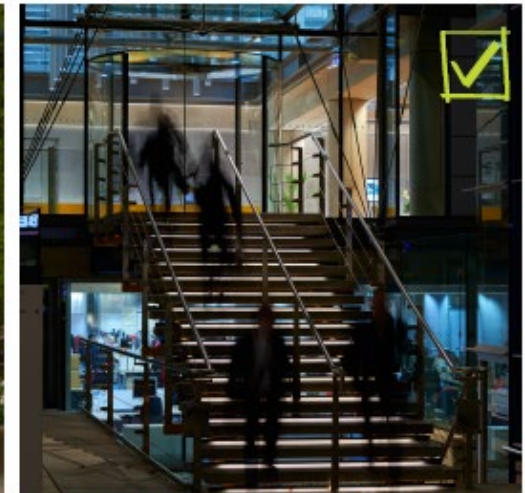
Well illuminated areas support night time economy



Positively illuminated thresholds and end views support legibility



Well illuminated routes reinforce pedestrian movements



Integrated lighting to changes in level supports pedestrian safety

City of London: Control Management System (CMS)



City of London Street Lighting Upgrade Project



Read the blog here:

<https://wi-sun.org/latest-news/wi-sun-technology-provides-the-platform-for-city-of-london-smart-city-initiative/>



See the interview with Giles Radford from the City of London Project here:

<https://youtu.be/gilpsMXLwKo>

For More Information



For more information
or questions contact:

info@wi-sun.org
www.wi-sun.org

Follow us:

www.linkedin.com

Wi-SUN Alliance Group

@WiSunAlliance