Bluetooth® Mesh and Zephyr

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微信

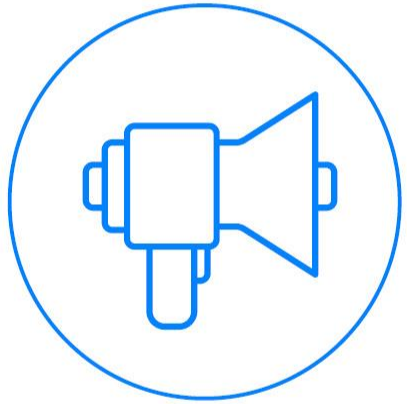
Bluetooth SIG, Inc.

Specification

We expand the capabilities of Bluetooth technology

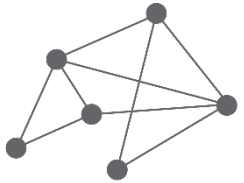
Qualification

We drive Bluetooth interoperability



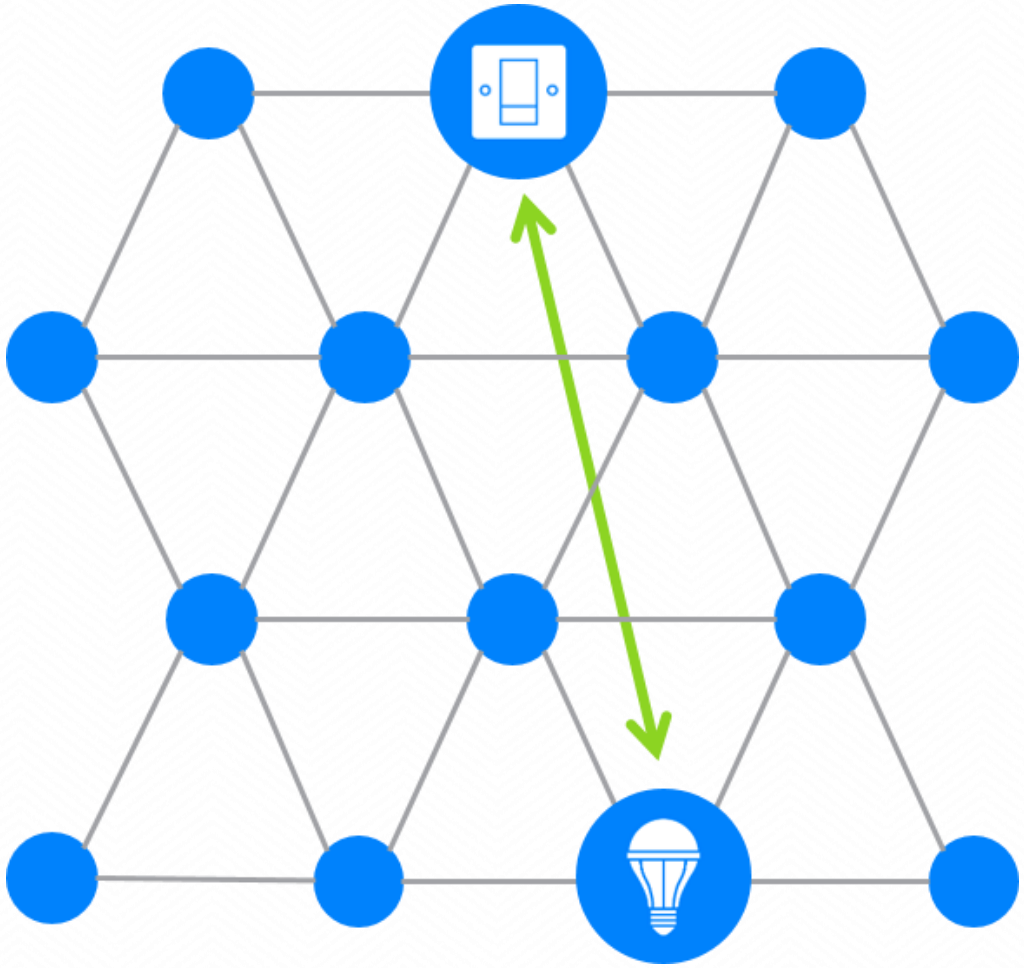
Promotion

We grow the Bluetooth Brand

	audio streaming	data transfer	location services	device networks
solution				
	wireless headsets wireless speakers in-car infotainment	sports & fitness devices health & wellness devices peripherals & accessories	point of interest navigation & wayfinding item & asset tracking	control systems monitoring systems automation systems
topology				
	point-to-point	point-to-point	broadcast	mesh
radio	Bluetooth BR/EDR	Bluetooth Low Energy		

Introducing **Bluetooth Mesh**

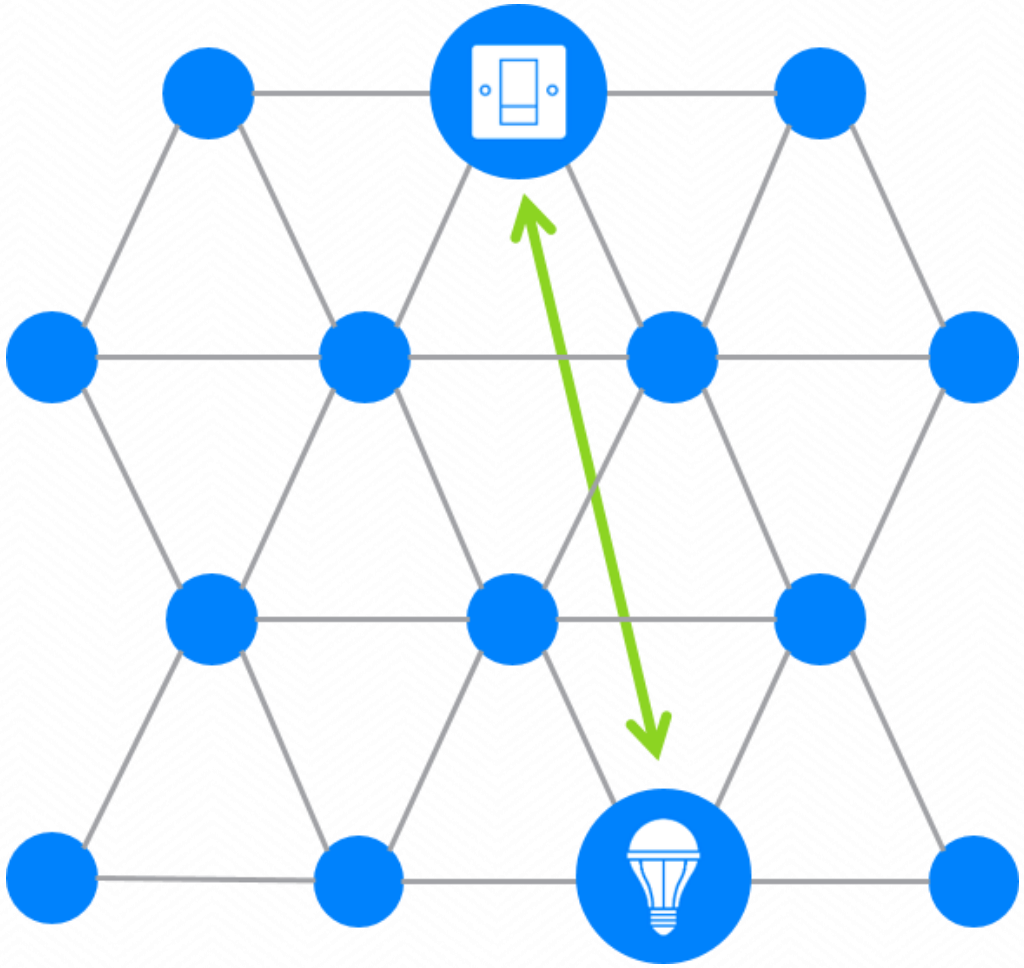
multi-hop and multi-path



Bluetooth mesh: industrial grade solution

Peer-to-peer communications

- Nodes communicate directly
- No hubs or routers
- No single points of failure

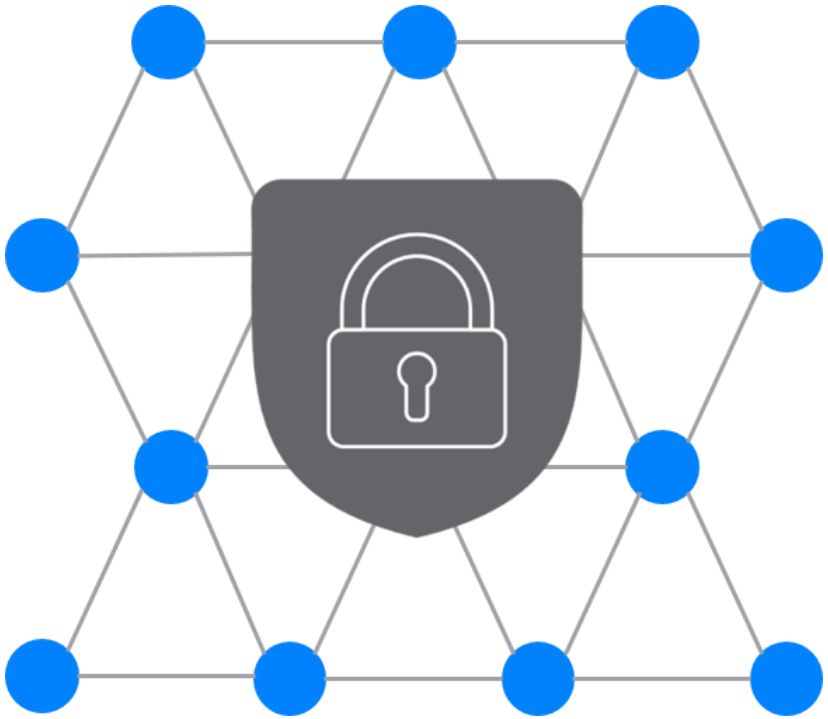


Bluetooth mesh: industrial grade solution

Multipath using “managed flood”

- Source node broadcasts message
- Nodes relay message to destination
- Node failures do not impact delivery

Industrial grade security



Bluetooth Industrial grade security

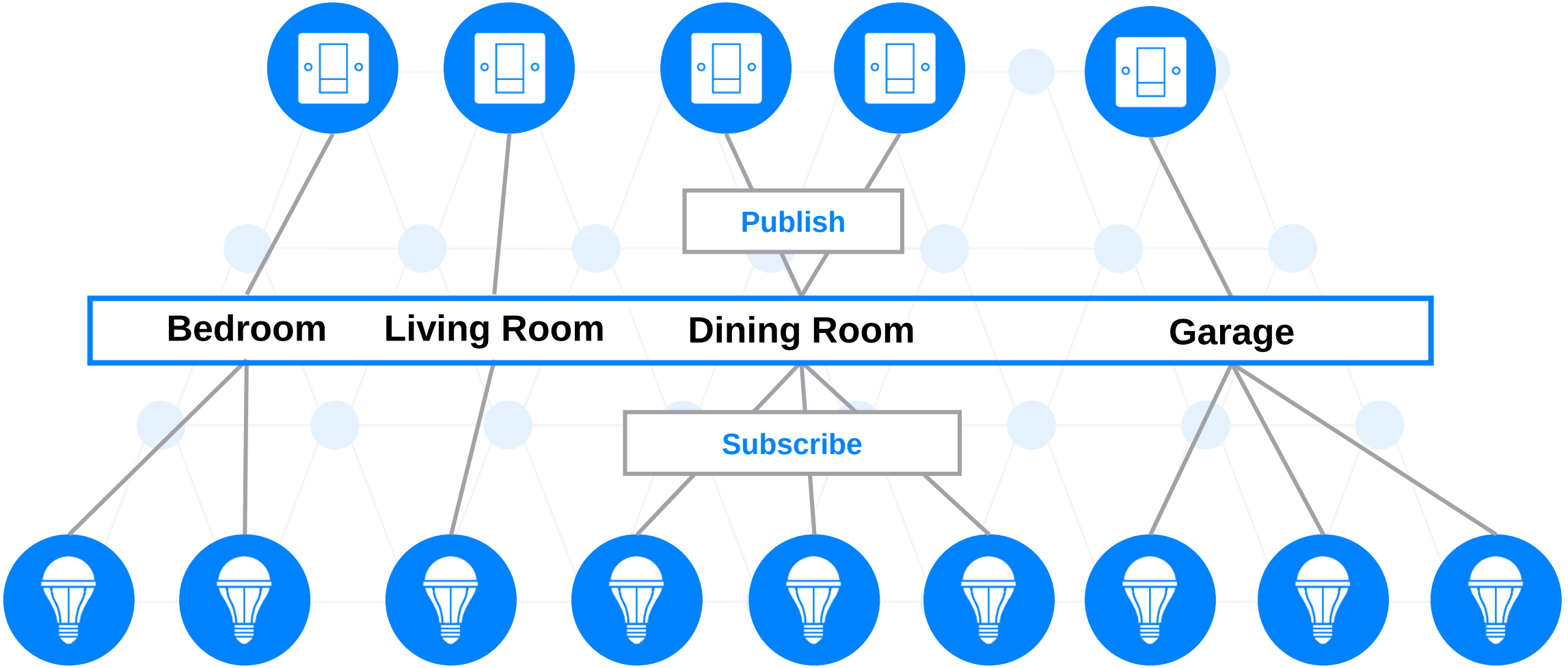
- Nodes provisioned using 256-bit elliptic curves and OOB authentication
- Messages secured using AES-CCM using 128-bit keys
- Encryption and authentication at network and application layers
- Message privacy
- Device blacklisting
- Open to public review

What does that mean?

Protection against…

- Brute force attacks
- Replay attacks
- Man-in-the-middle attacks
- Trash-can attacks
- Physically insecure device attacks
- Visitor attacks

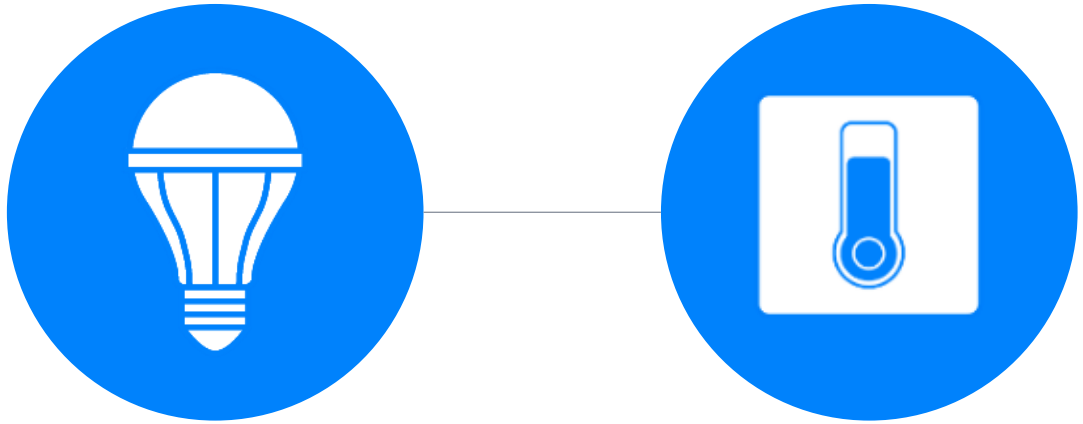
Publish/Subscribe



Friendship

Friend

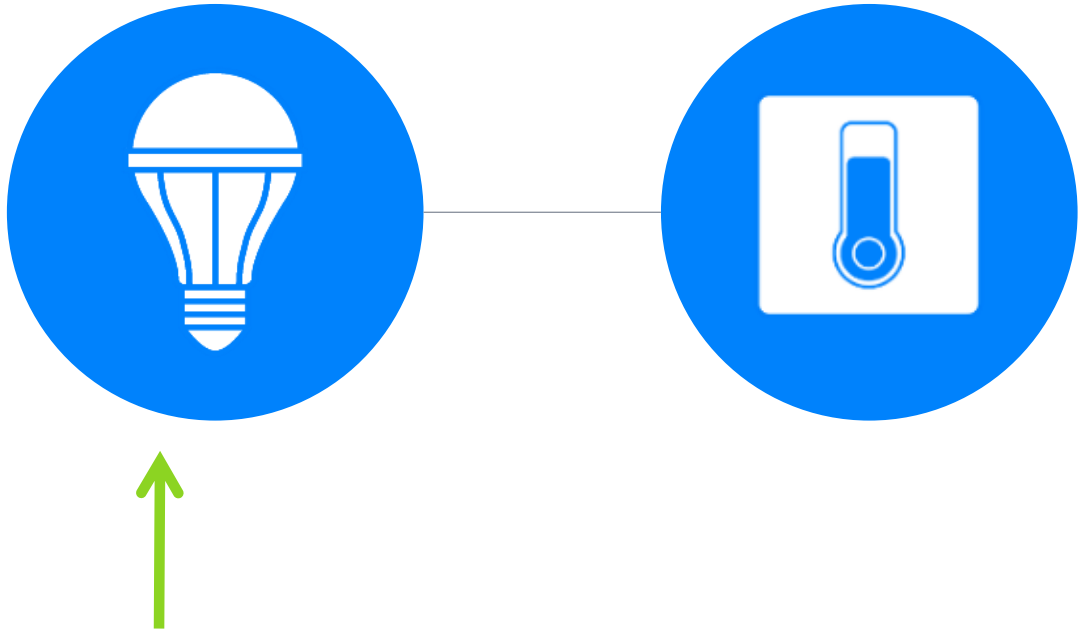
Low Power Node (sensor)



Friendship

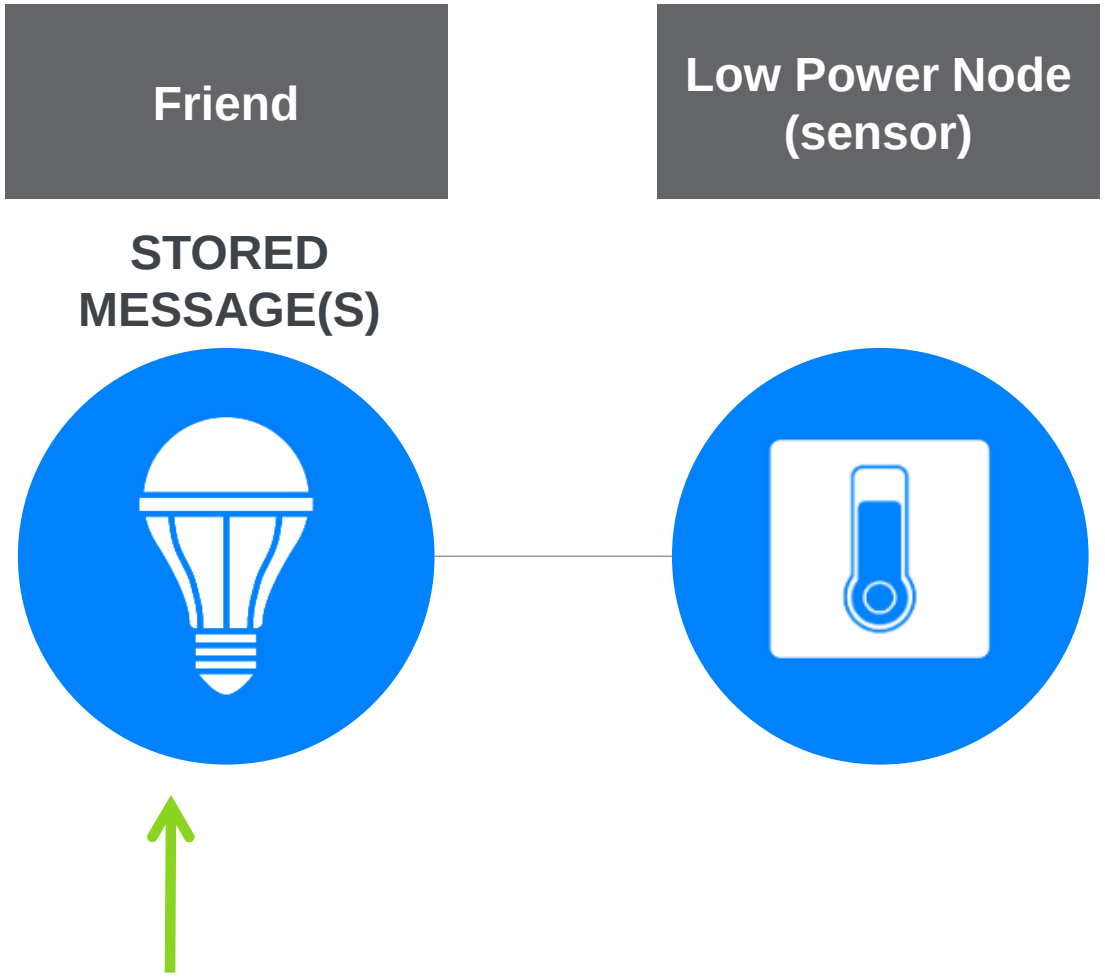
Friend

Low Power Node (sensor)

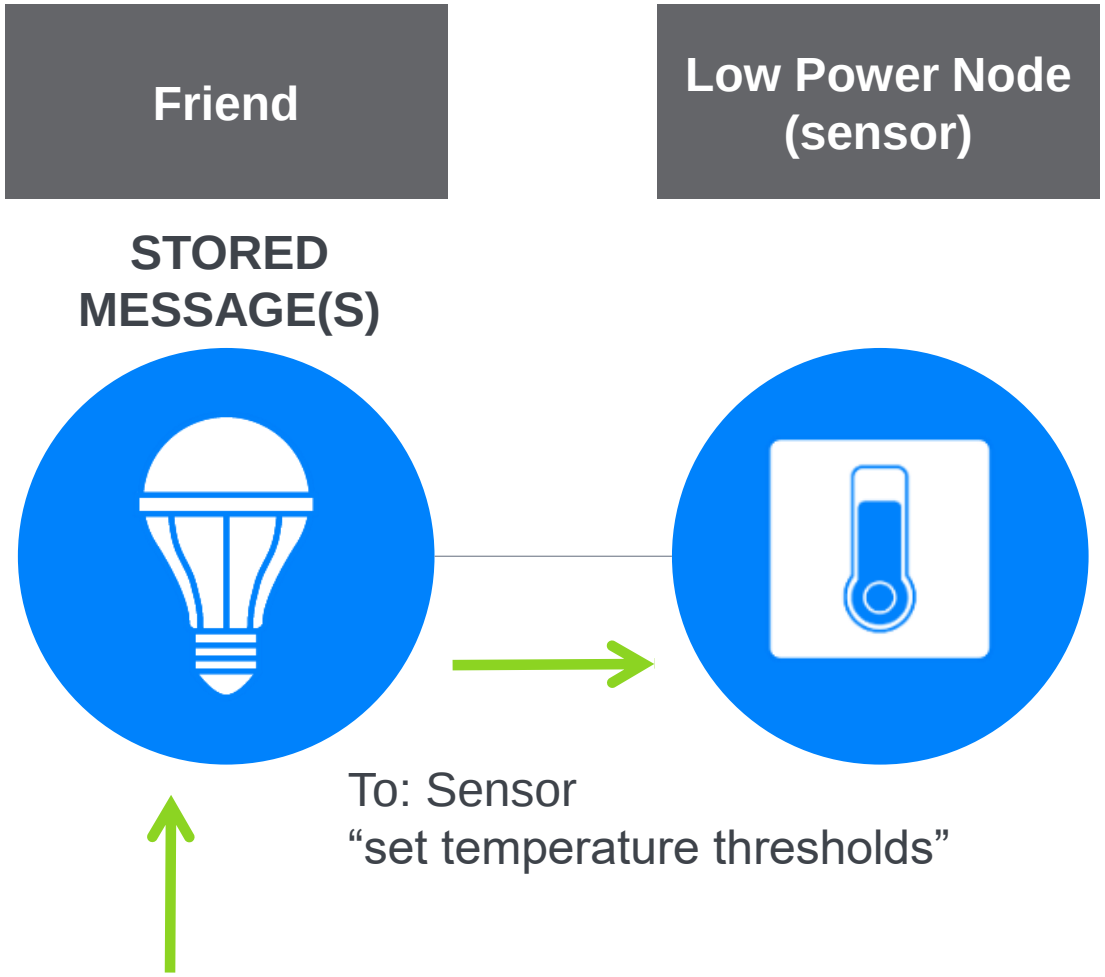


To: Sensor
“set temperature thresholds”

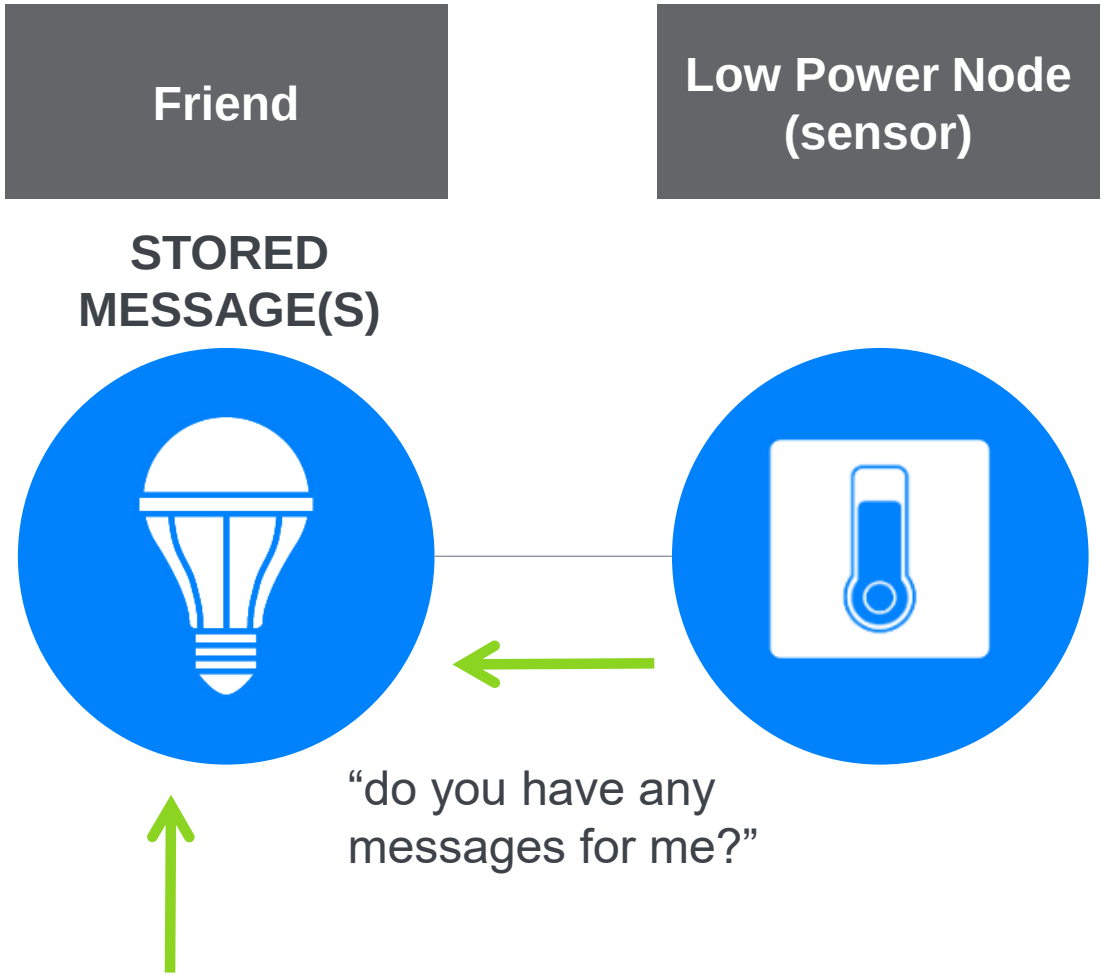
Friendship


Friend
Low Power Node (sensor)
STORED MESSAGE(S)
To: Sensor
“set temperature thresholds”

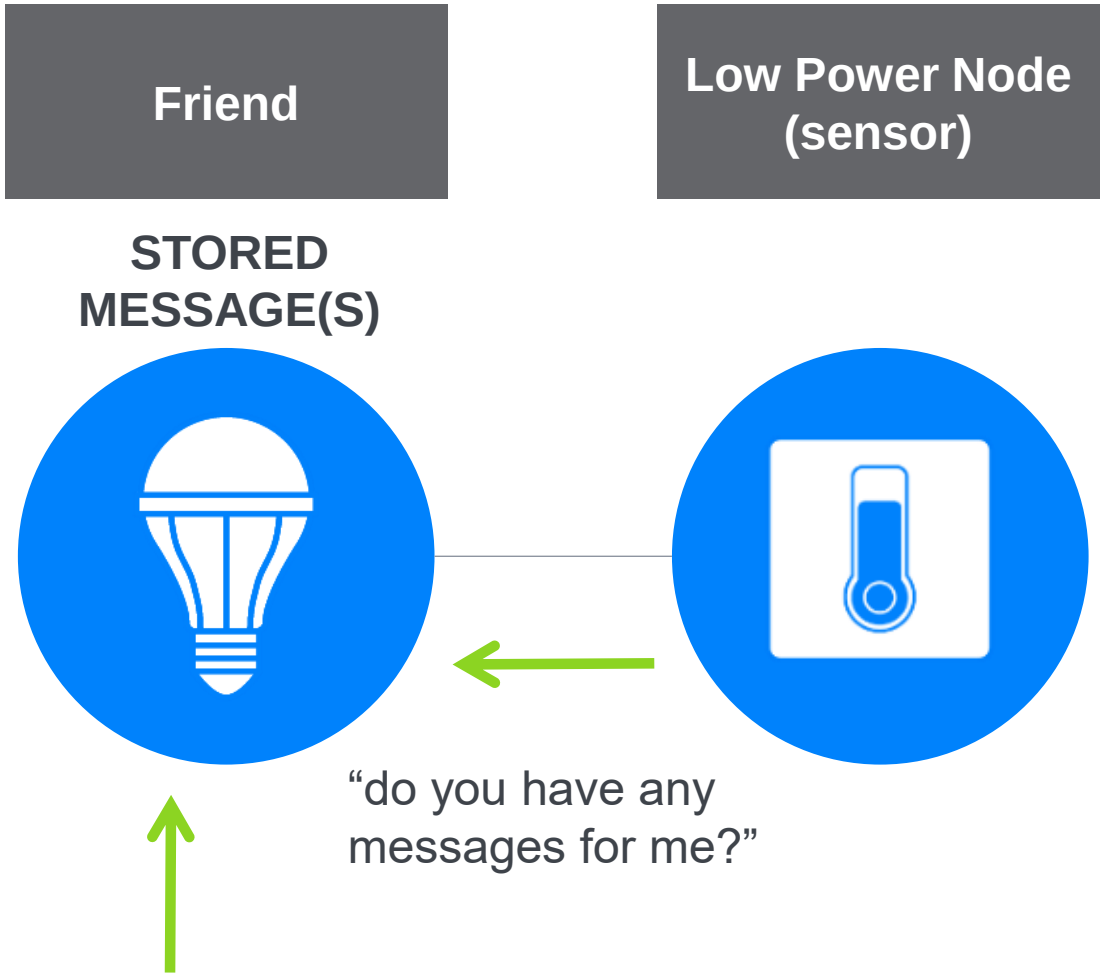
Friendship


Friend
Low Power Node (sensor)
STORED MESSAGE(S)
To: Sensor
“set temperature thresholds”
To: Sensor
“set temperature thresholds”

Friendship

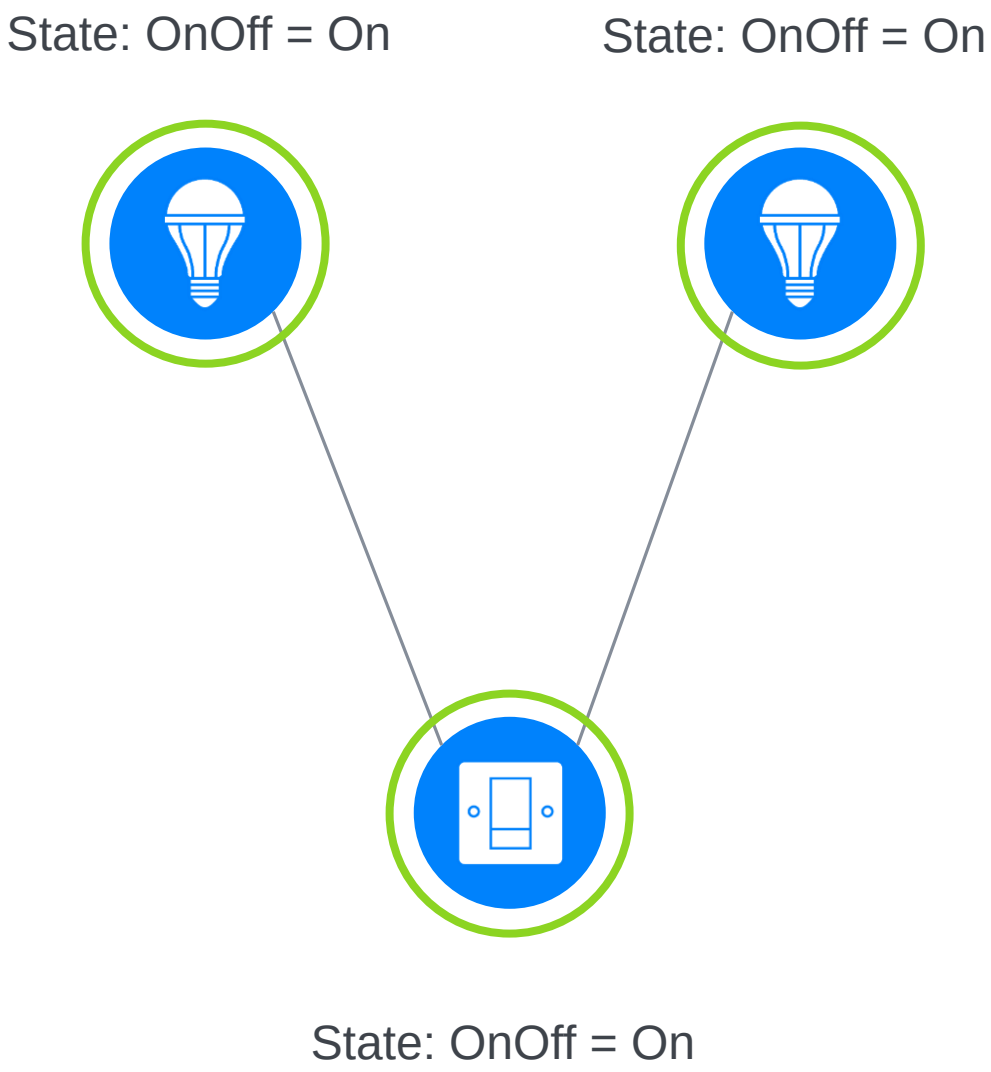

Friend
Low Power Node (sensor)
STORED MESSAGE(S)
“do you have any messages for me?”
To: Sensor
“set temperature thresholds”

Friendship



Developer basic concept about friendship:

- ❑ **Friend node need RAM to allocate for message storage;**
- ❑ **Support more LPN, more RAM usage;**
- ❑ $\mathbf{RAM\ consumption = LPNCount * bufferCount * bufferLength}$
- ❑ **Know what interrupt sources can wake up LPN when it’s sleepy;**
- ❑ **Know how many low power modes support, select a reasonable mode to use;**
- ❑ **Know how long it will take from sleepy to standby;**



message and state

- nodes communicate with each other by sending messages
- nodes have state values which reflect their condition (e.g. ON or OFF)
- access messages operate on state values
  - SET - change of state
  - GET - retrieve state value
  - STATUS - notify current state

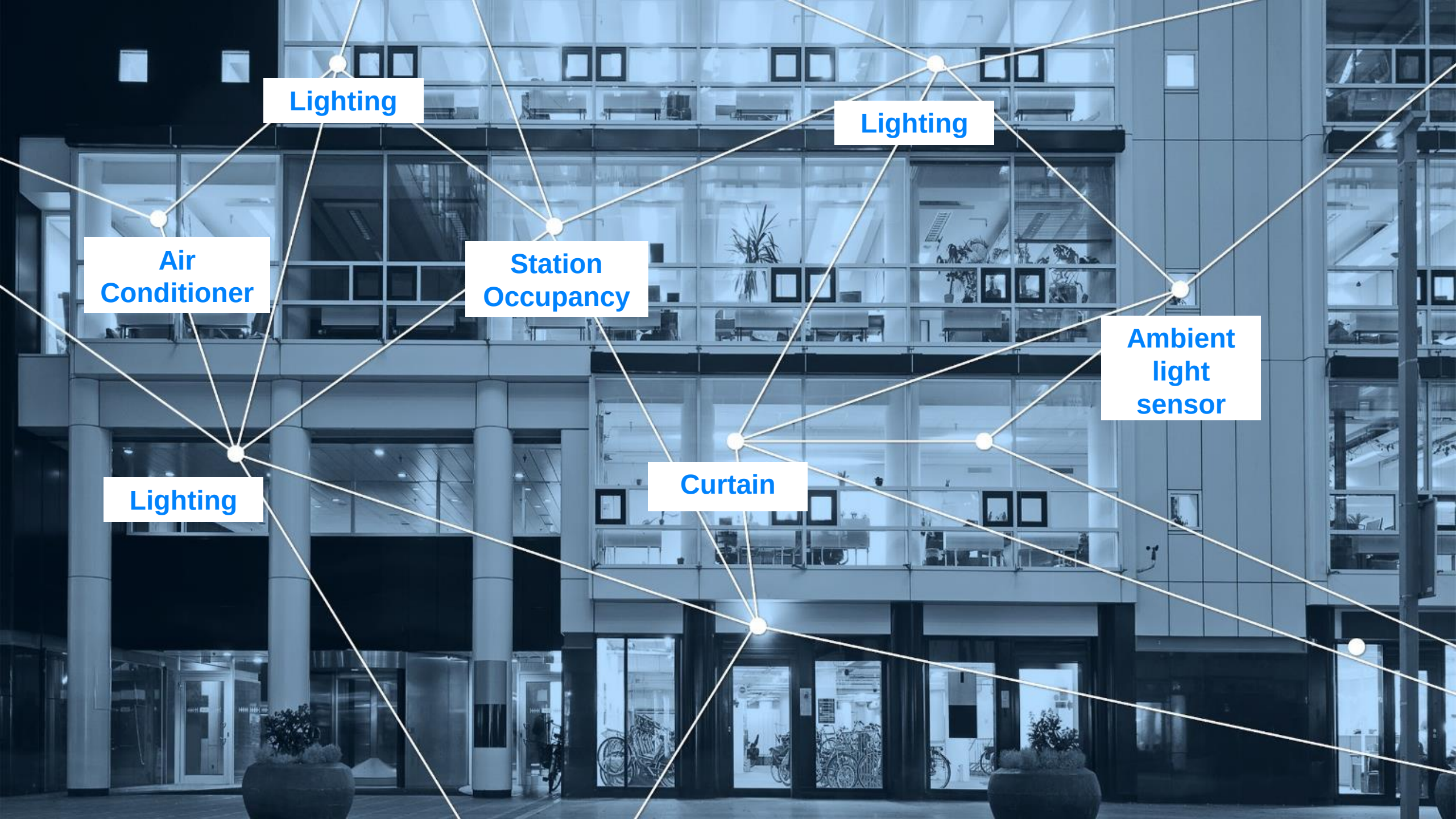
Application Use Cases

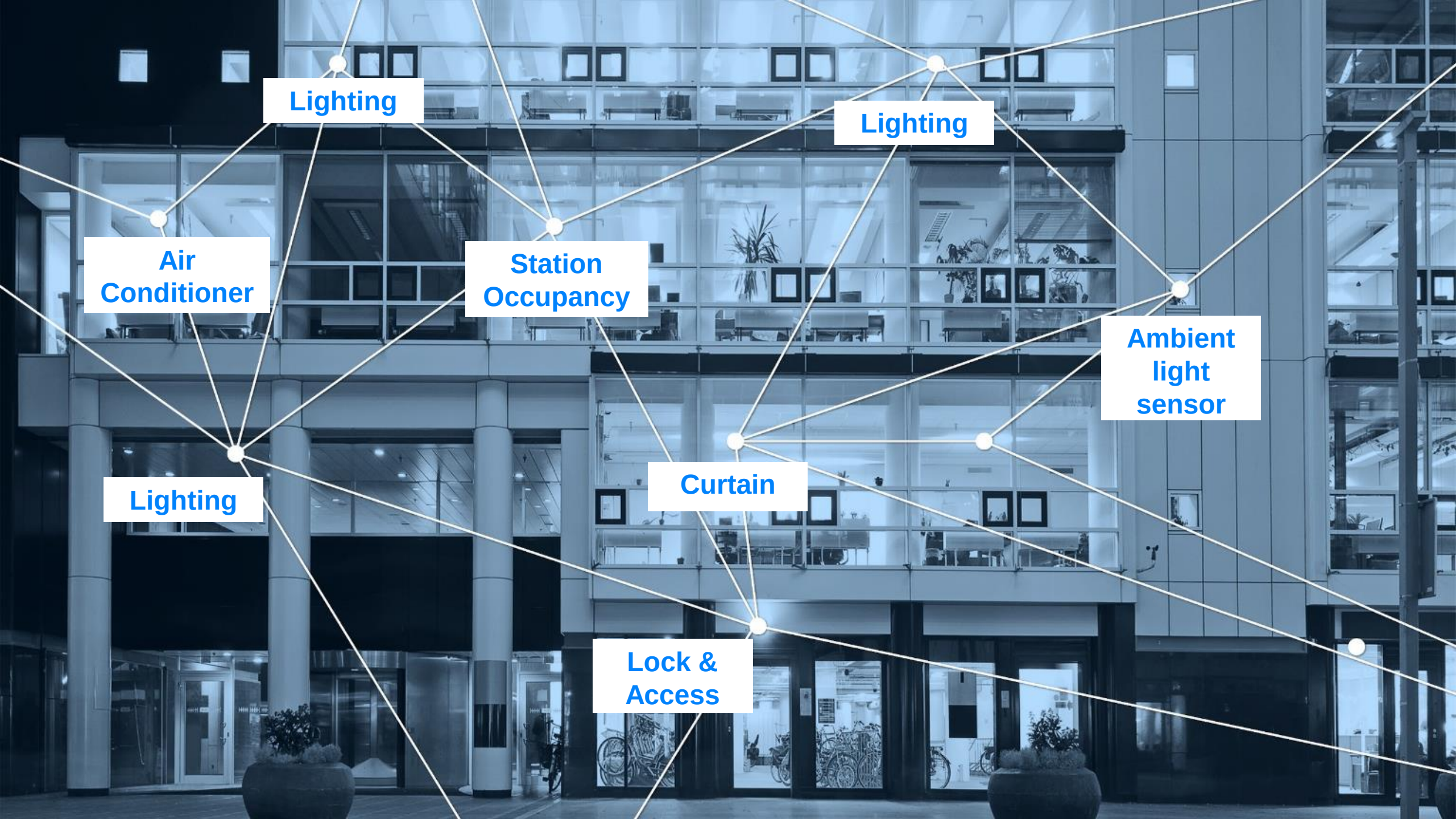
Lighting
Lighting
Lighting

Lighting
Lighting
Air Conditioner
Lighting

Lighting
Lighting
Air Conditioner
Station Occupancy
Lighting

Lighting
Lighting
Air Conditioner
Station Occupancy
Ambient light sensor
Lighting


Lighting
Lighting
Air Conditioner
Station Occupancy
Ambient light sensor
Lighting
Curtain

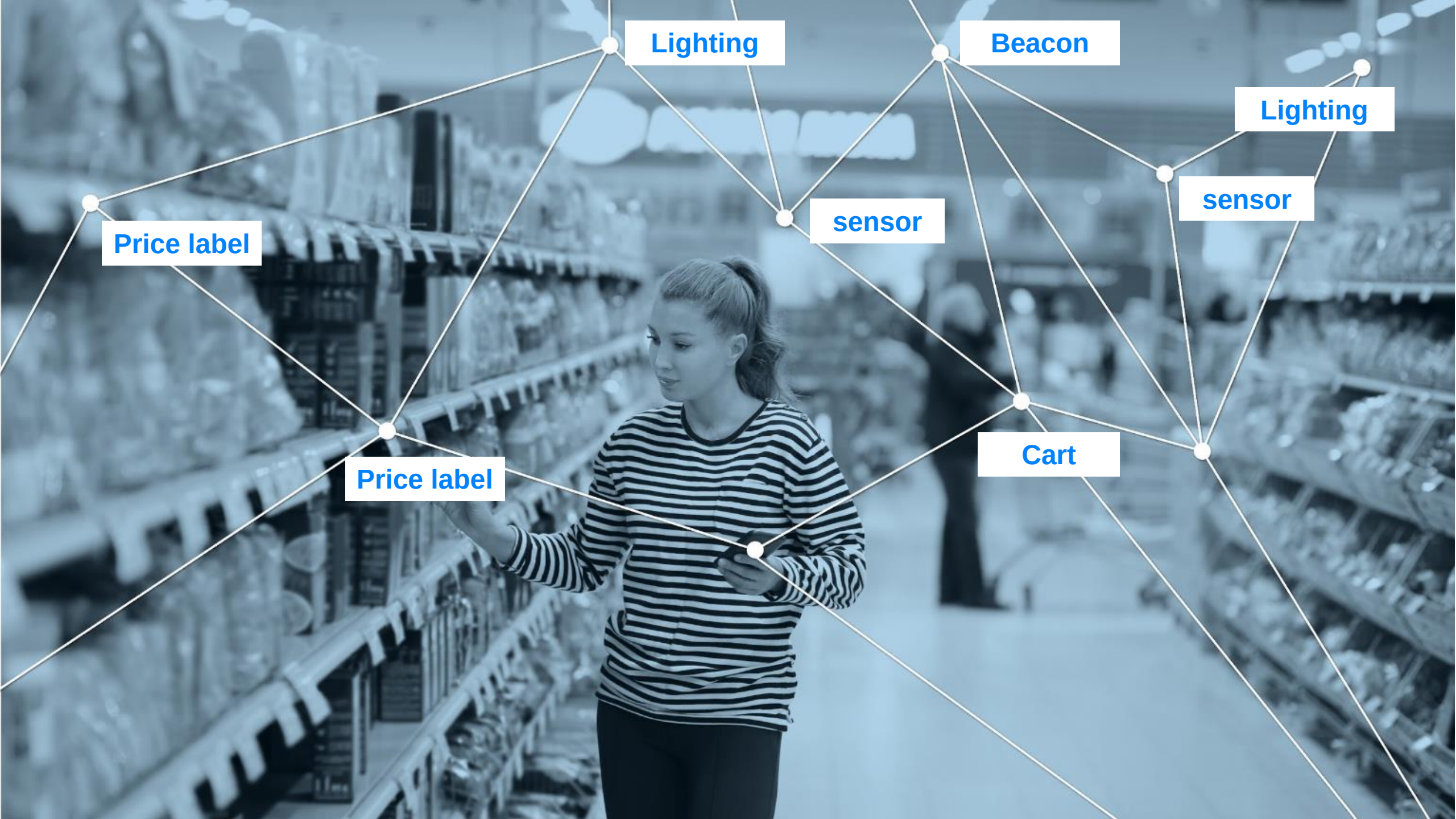

Lighting
Lighting
Air Conditioner
Station Occupancy
Ambient light sensor
Lighting
Curtain
Lock & Access

Lighting
Lighting

Lighting
Beacon
Lighting

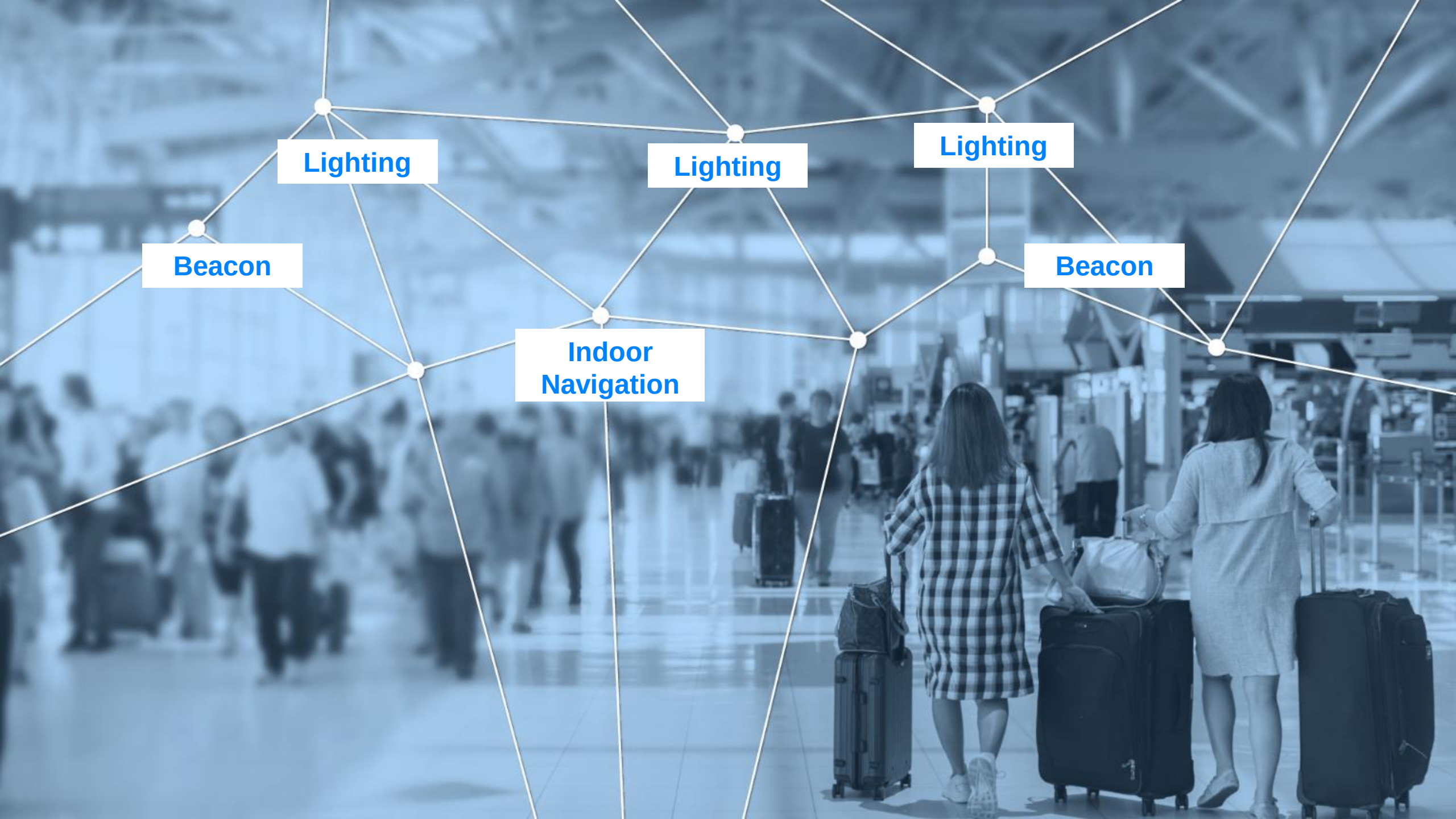
Lighting
Beacon
Lighting
Price label
Price label

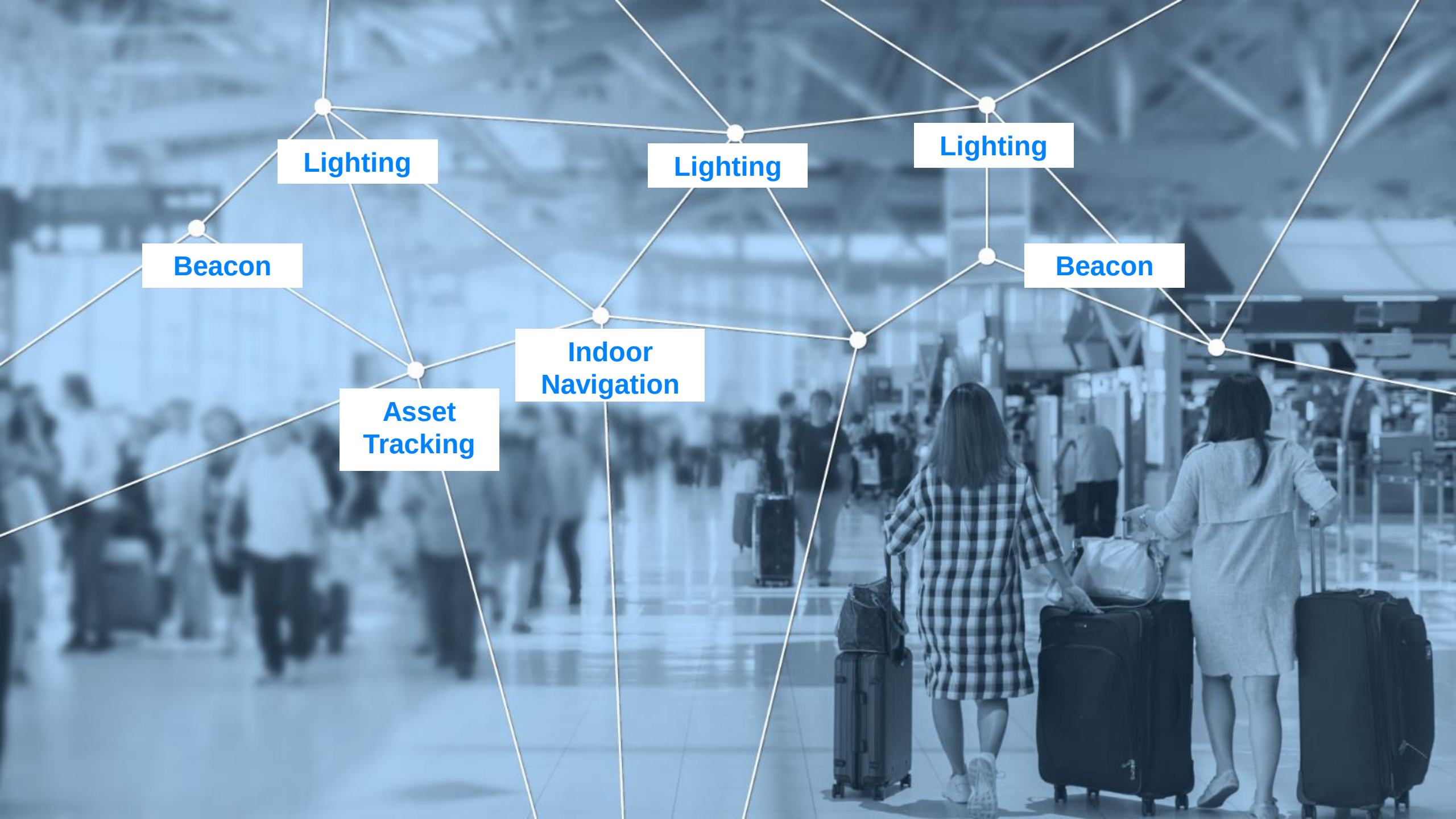
Lighting
Beacon
Lighting
sensor
sensor
Price label
Price label


Lighting
Beacon
Lighting
sensor
sensor
Price label
Price label
Cart

Lighting
Lighting
Lighting

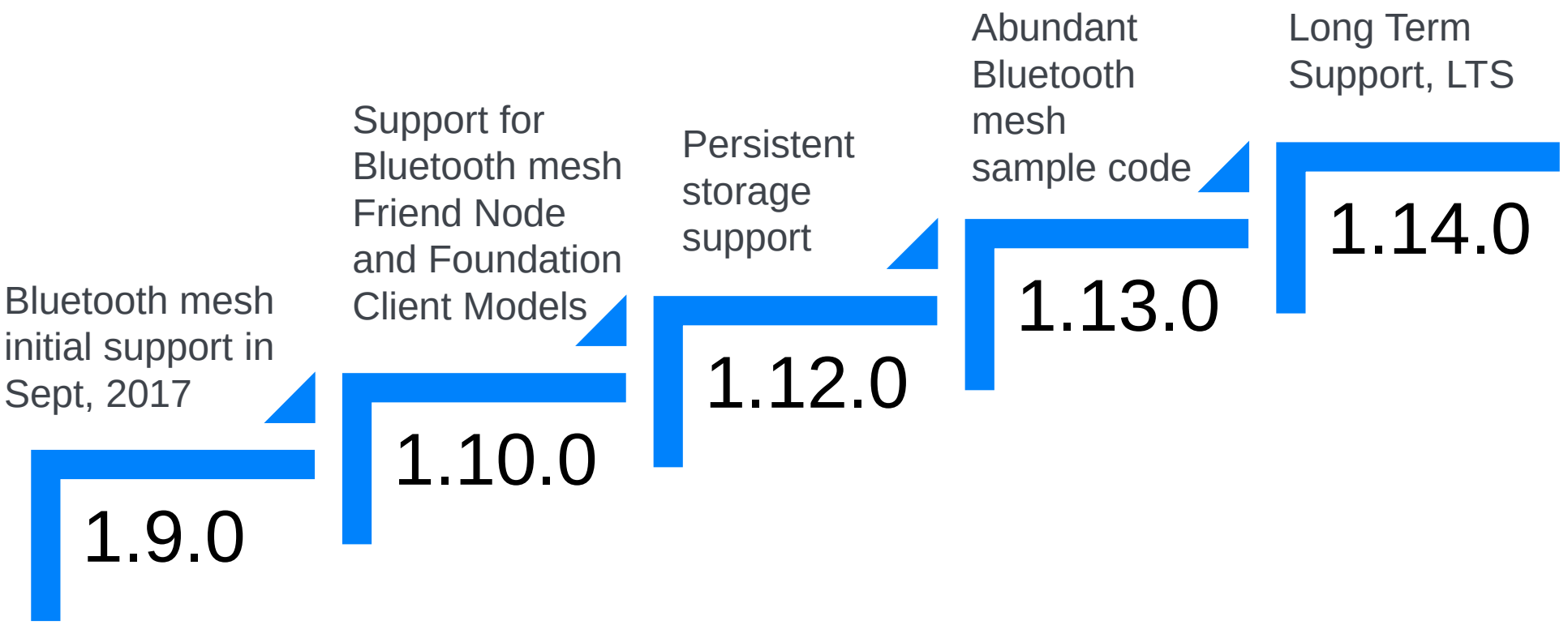
Lighting
Lighting
Lighting
Beacon
Beacon


Lighting
Lighting
Lighting
Beacon
Beacon
Indoor
Navigation


Lighting
Lighting
Lighting
Beacon
Beacon
Indoor Navigation
Asset Tracking

Bluetooth Mesh on Zephyr

milestone


Bluetooth mesh initial support in Sept, 2017
1.9.0
Support for Bluetooth mesh Friend Node and Foundation Client Models
1.10.0
Persistent storage support
1.12.0
Abundant Bluetooth mesh sample code
1.13.0
Long Term Support, LTS
1.14.0

Study Guides and Resource

- An introduction to Bluetooth Mesh Networking, https://bit.ly/2XnReyb
- Bluetooth Asia Developer Follow Up: Bluetooth Mesh Provisioning and Interoperability, https://bit.ly/2W8Zukb
- Bluetooth SIG Resource, https://bit.ly/2wx70ej

Bluetooth®

Thank you!