

Shiningintl Bluetooth Mesh Solutions

Bluetooth smart home



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Shiningint smart lighting solution

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- 2 WIFI Smart Advantages And Disadvantages
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WIFI Lighting Solution Architecture



WIFI lighting solution Advantages And Disadvantages

The WIFI smart solution bases o the wifi network to build up a control system, every terminal or node has a wifi module inside responding to wifi signal handling.

for a wifi network system, it at lease need one wifi router as the gateway, the smart phone or terminal both connect to the wifi router, and the router is incharge of the communication between the terminals ,it assign MAC address to

Advantage:

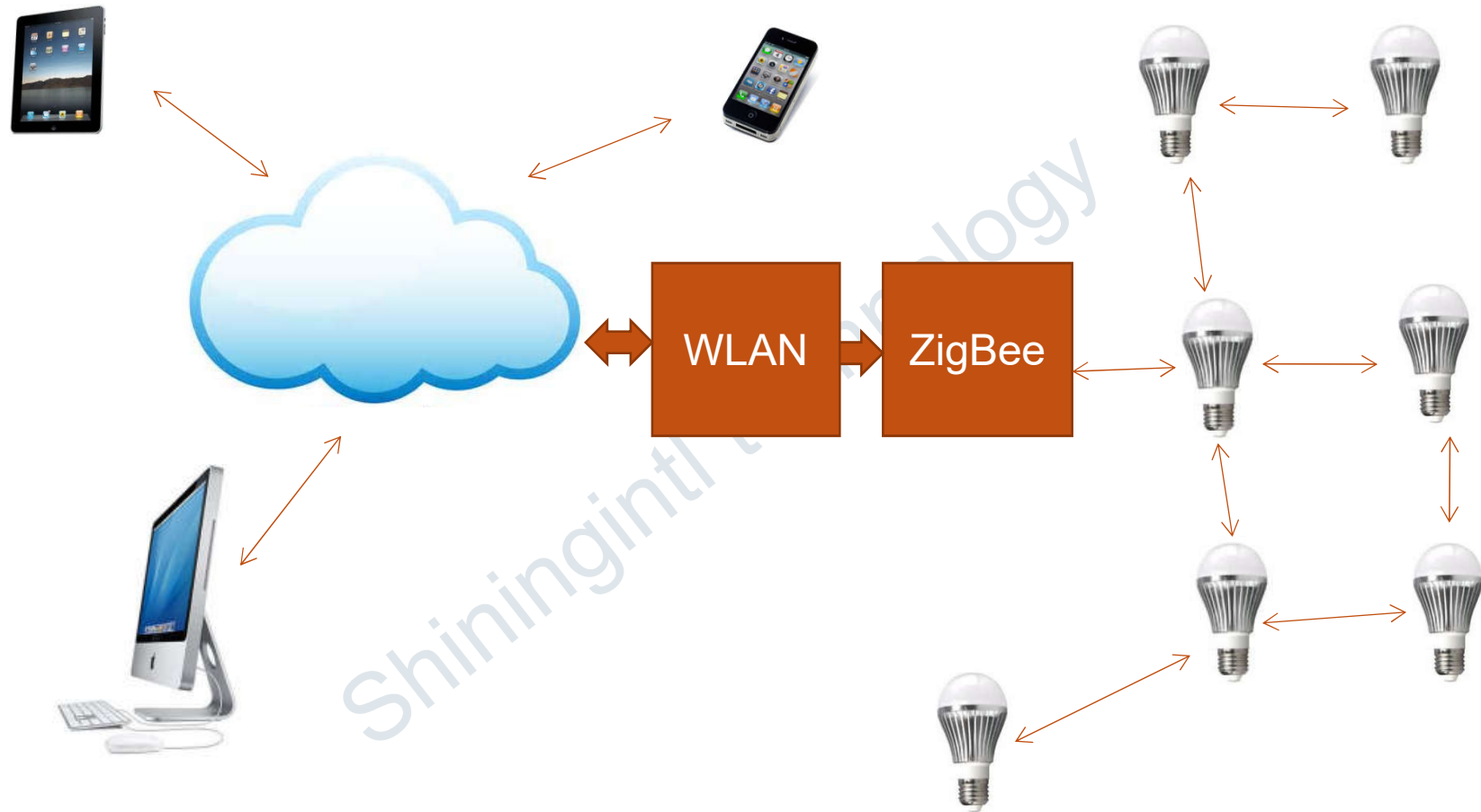
- 1 WIFI is a standard protocol, it can access to internet all the time.
- 2 Big bandwidth, suitable for big data communication
- 3 Easy for local control and remote control

Disadvantage:

- 1 Router has node limitation, the network will be unstable with more than 10 terminals
- 2 High Power consumption
- 3 need gateway support in local control
- 4 High Cost



ZigBee Lighting Solution Architecture



ZigBee Smart Lighting Architecture

ZigBee system need WLAN and router to access the internet, and the smart phone command can only go through the internet server to reach the zigbee gateway, and the gate way dispatchs commands to the zigbee nodes

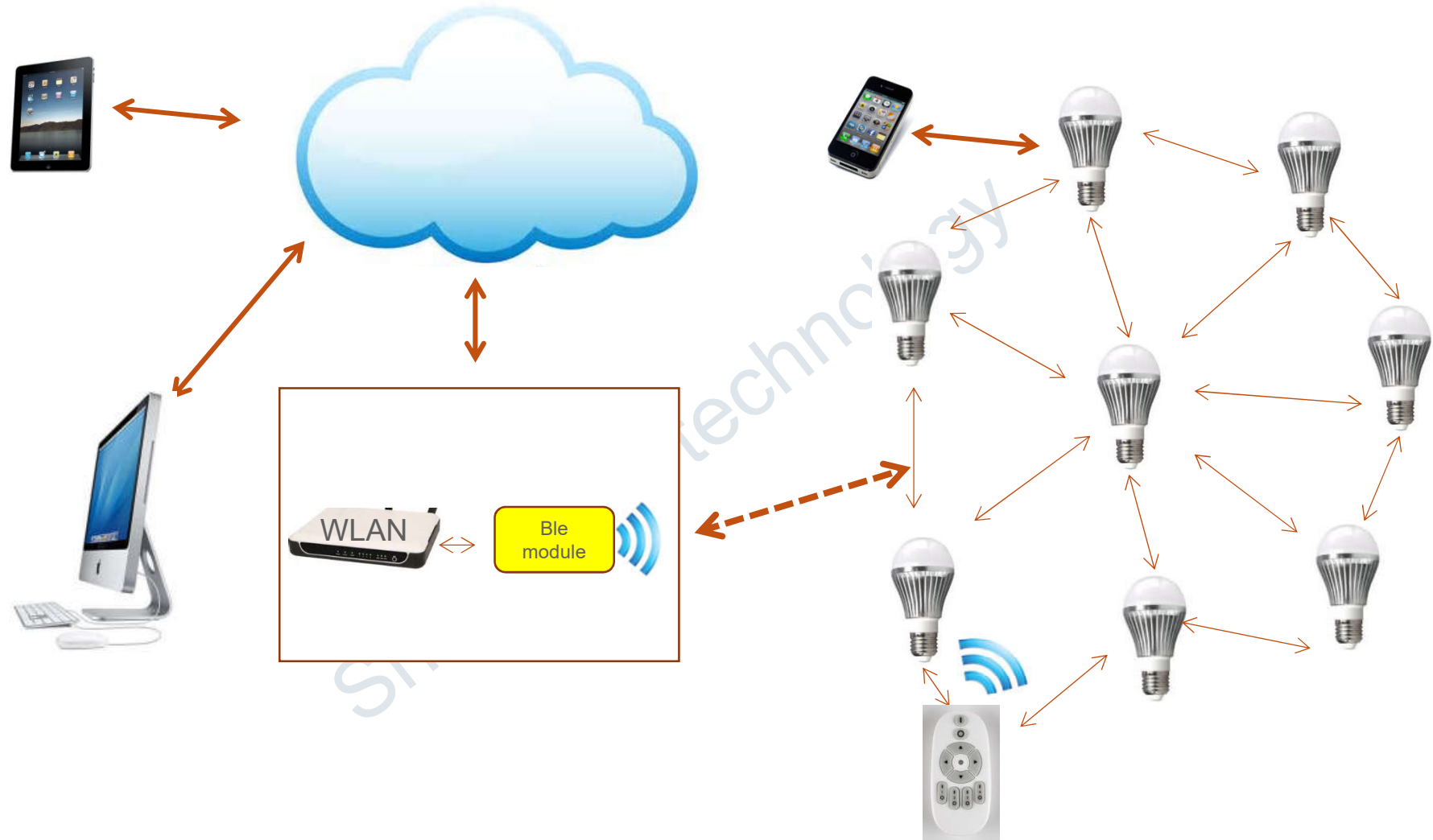
Advantage:

- 1 ZigBee has big and powful system capacity in last 1 kilometer control
- 2 Low power consumption, low bitrate低功耗, 低速率
- 3 Large Network node capacity , support 65000 nodes
- 4 Small Communication delay(classic delay 30ms for device searching,15ms delay for activating from hibernate ,15ms delay for active device to communication channel)
- 5 Stable communication, take avoiding collision strategy algorithm
- 6 Rich node type define.

disavantage:

- 1 Too much time consumption in network build up自
 - 2 lack of security
 - 3 No local control method, must use server and gateway
- ZigBee is better in industrial usage

Bluetooth mesh Lighting Architecture



Shiningintl Bluetooth mesh Smart Lighting

Bluetooth mesh network build up:

the bluetooth mesh network is a self-build up network by bluetooth node, the nodes in the signal coverage can be found automatically and extend the network range by its signal coverage

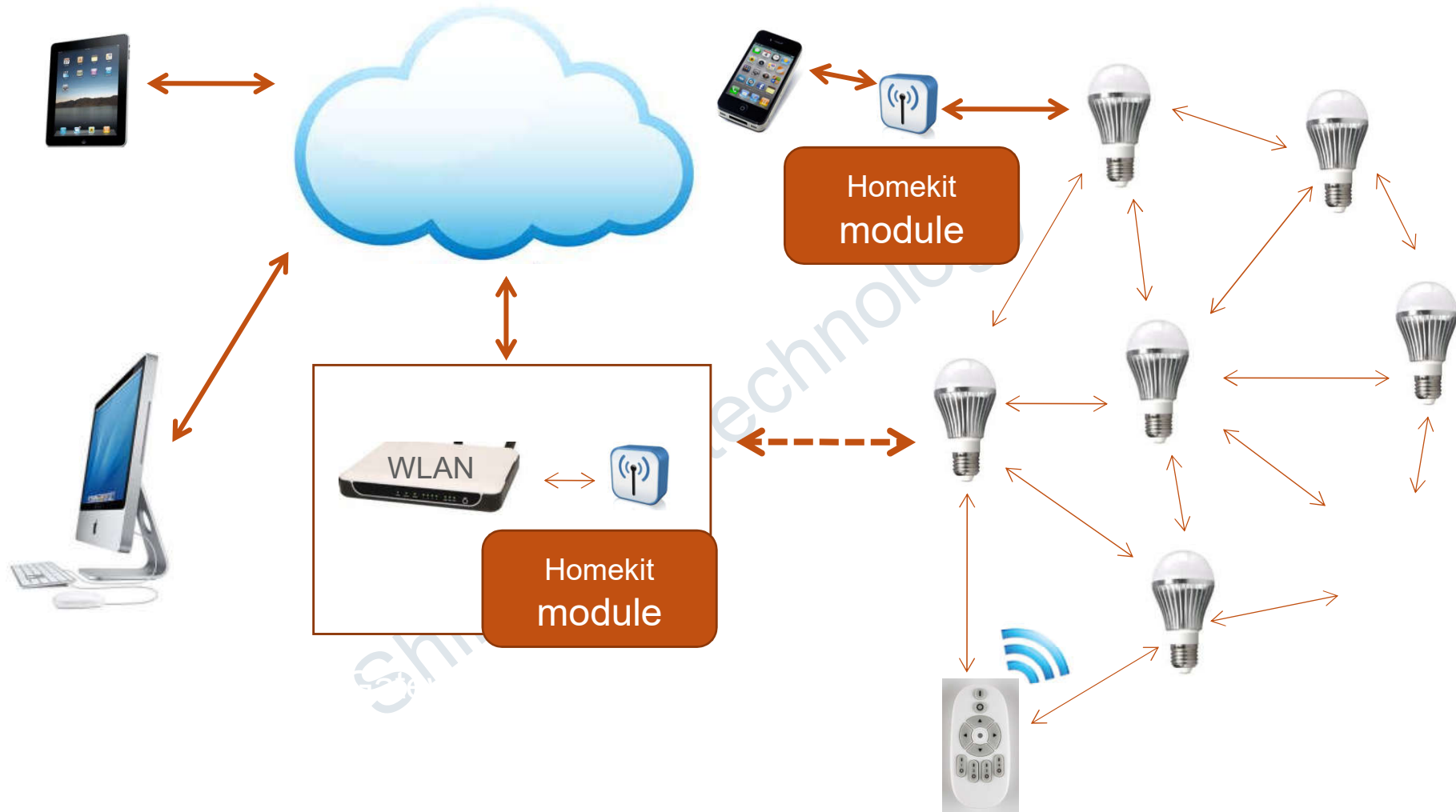
Bluetooth mesh Advantage:

- 1 Quick self set up, join the network when it is powered on, no routing can road caculating need
- 2 Can be acceed by smart phone or controller directly, the gateway is not necessary
- 3 High Security, data is encrypt with LES, Net name + passord security
- 4 Long distance,broadcasting communcation,it can be controled if in the broadcasting coverage.
- 5 Collision detection to avoid network message flooding
- 6 Effective node status update
- 7 Multiple device control,group control support

disadvantage:

- 1 Network frame capacity is limited to 30 bytes

Homekit Smart Lighting support Architecture





Introduction about shiningintl Bluetooth Mesh

1

BLE + mesh Stack

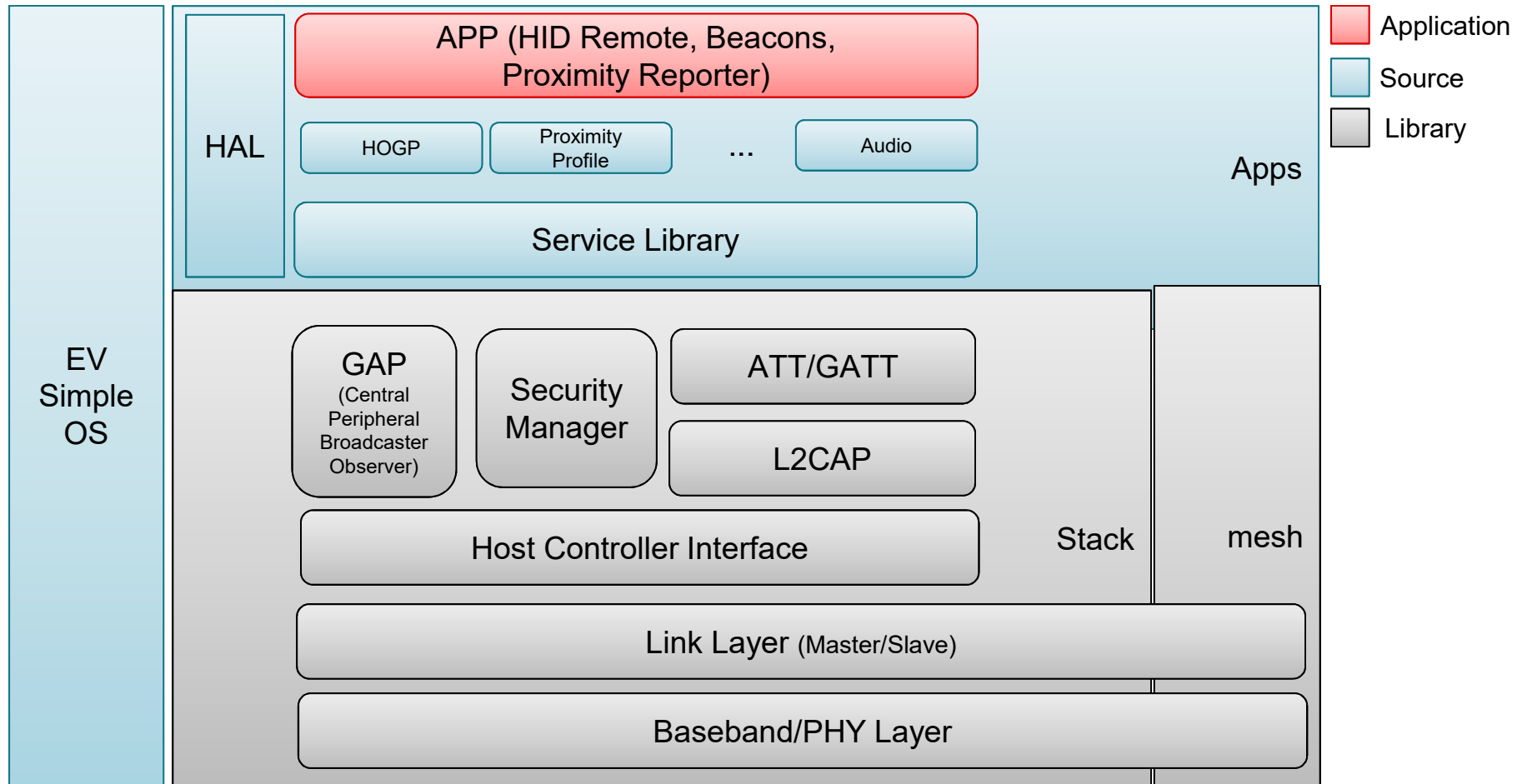
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The mesh network set up
communication

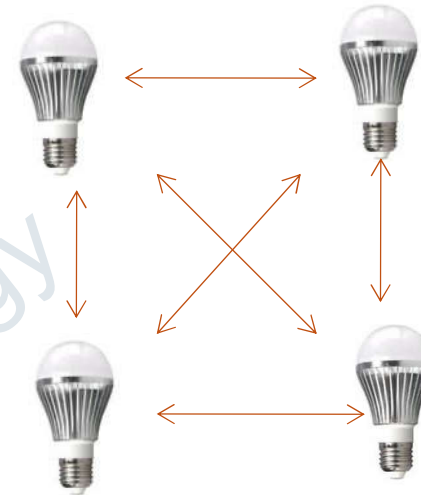
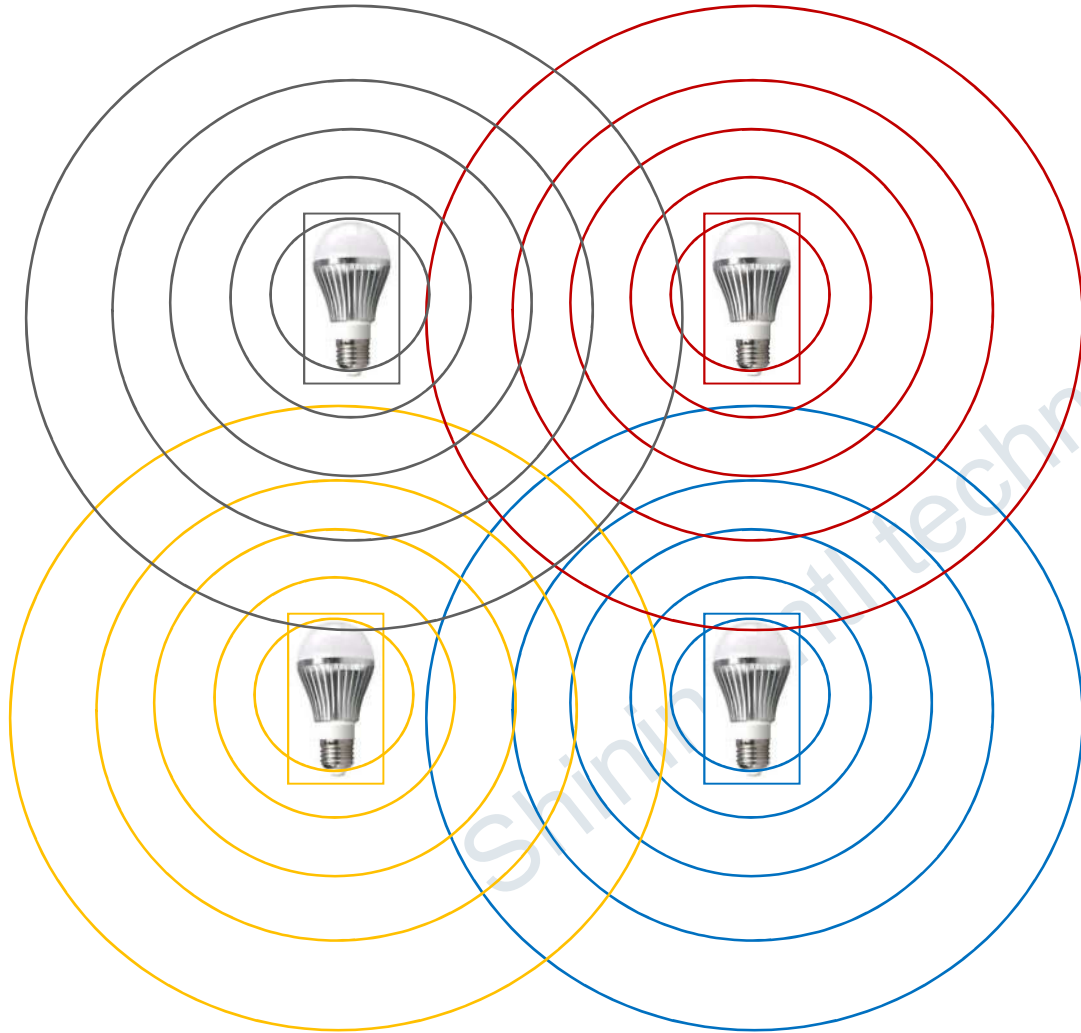
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Implementation of Mesh Network
Communication Packet

BLE + mesh Stack

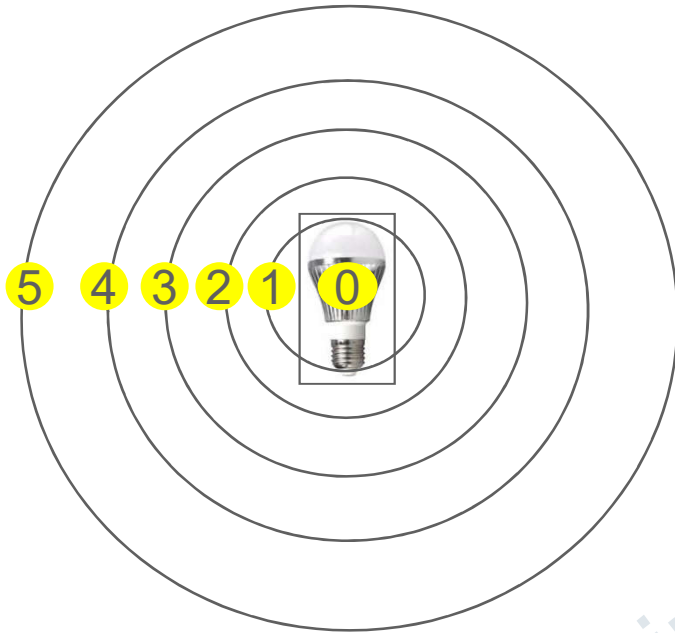


The mesh network set up communication

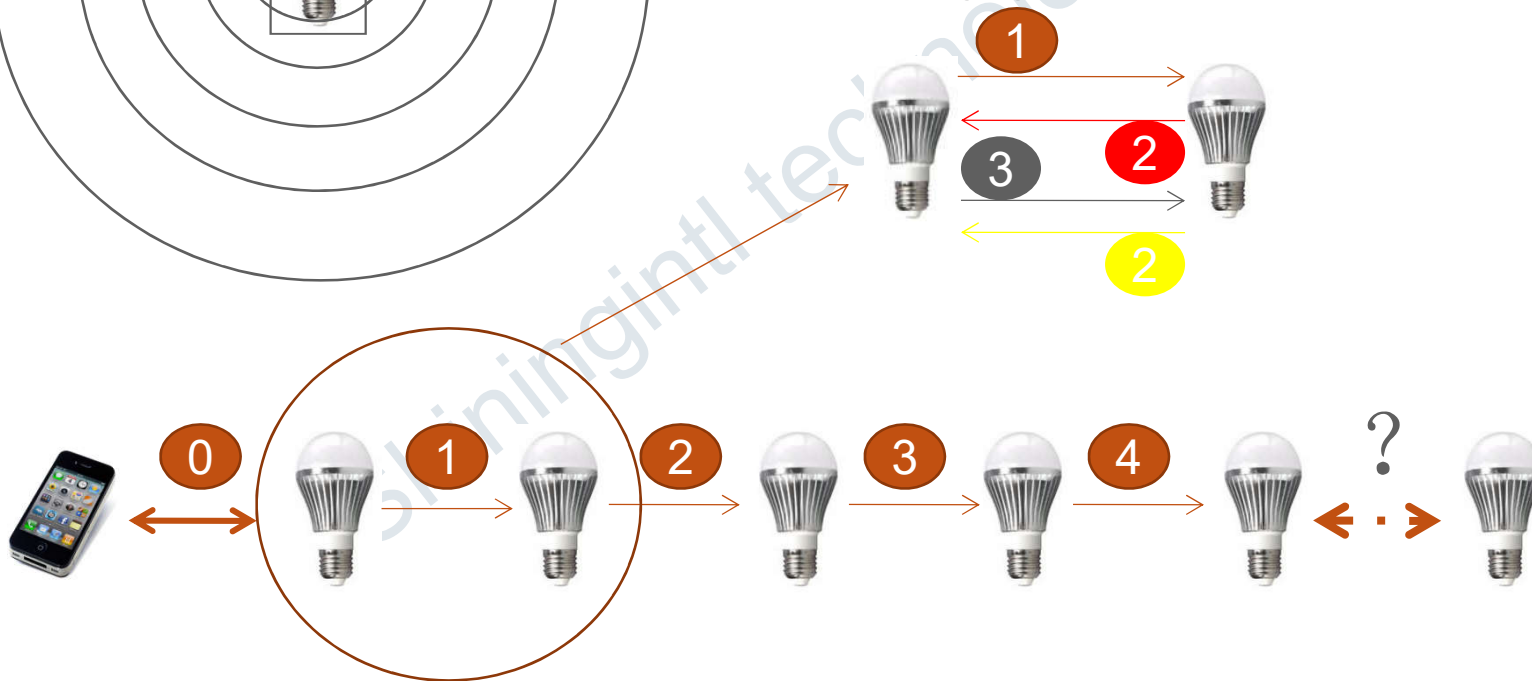


Mesh network is built up step by step with the broadcasting, every node will rebroadcast the package it received, then the network will be blocked by large amount message

The mesh network set up communication



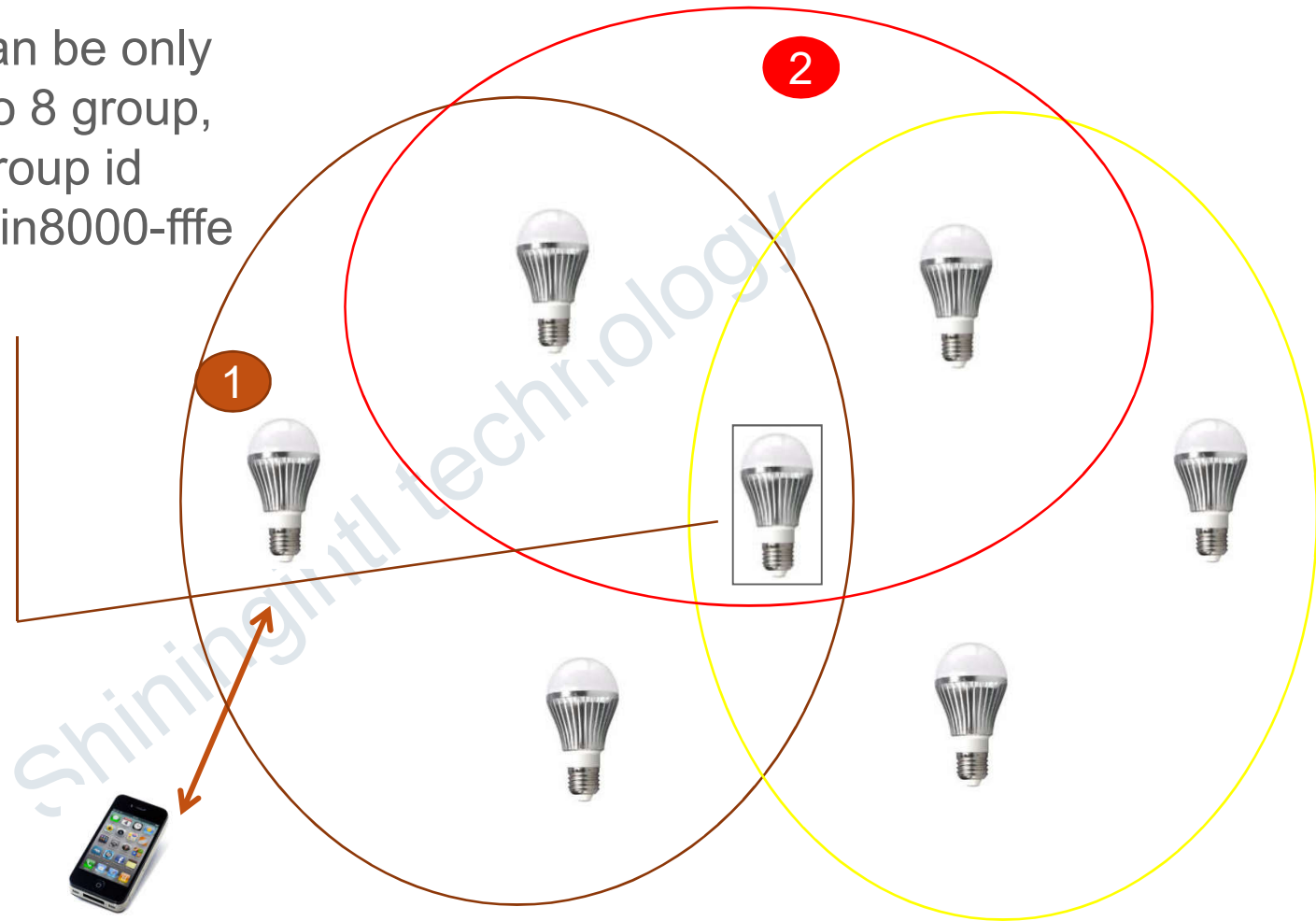
In order to avoid the broadcasting storm, we need to calculate the times of rebroadcasting to limit how many times the message can be broadcasted, it means when a frame is broadcasted, the sno. will be counted, it will be discarded when it meets the limitation, for example, if the limitation is 4, when the message received with the sno. is 4, it will not be broadcasted again.

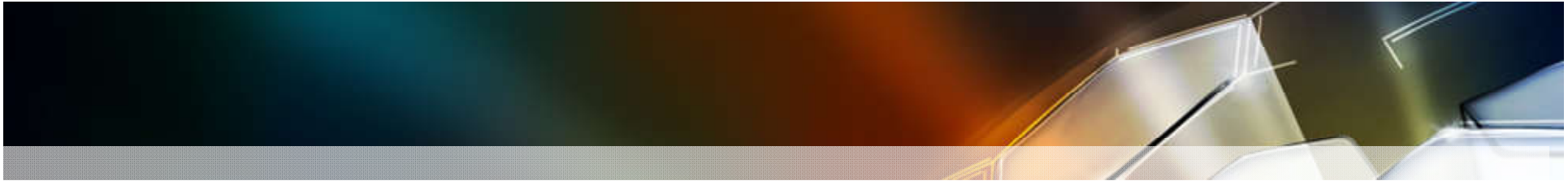


Implementation of Mesh Network Communication Packet

Every node can be only be assigned to 8 group, the network group id should be within 8000-ffffe

This node is belong to 3 group





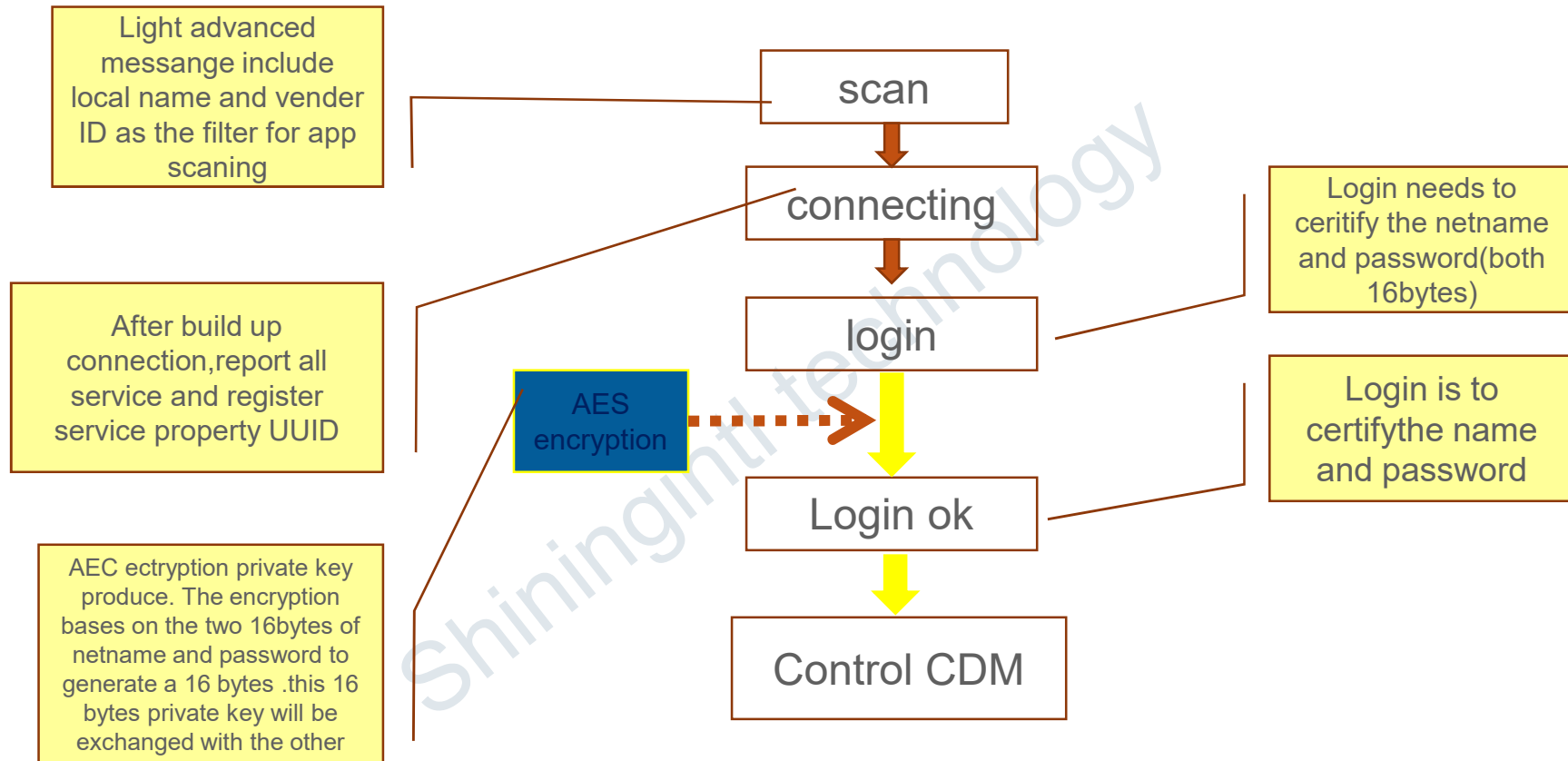
Bluetooth mesh Operation procedure

1 Operation procedure- 1

2 Operation procedure- 2

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Operation procedure- 1



Operation procedure- 2



1 encryption between smart phone and bluetooth mesh node

- ① Master send out netname + password, slaver matches the netname and password of himself
- ② Master will generate an random encryption according to netname and password
- ③ Master will send the random encryption private key to slaver
- ④ slaver generate a random private key after receiving the key from master, and return to the master
- ⑤ two side to generate an SK based on netname + password + random key + random key
- ⑥ This SK will be used for the later communication
- ⑦ If the connection broken, it will go through this above procedure

2 encryption between mesh node and mesh node

Communication between Mesh nodes will be encrypted, the encryption is LTK

When the master changes the name of node, it also change the LTK.

Ltk is only the private key for mesh network, it doesn't matter with the ble communication

SK will change every reconnection



Device type

1

remote control

2

Device supported

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Remote control

The remote control has the same property with light nodes, they are both slave, can change the mesh name and password ,group setting by application.

The remote controller is on hibernate status, only go to broadcast status with key combination



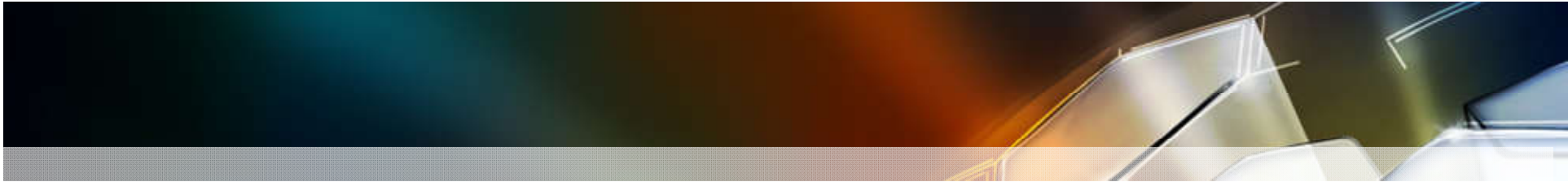
Devices supported



- Light switches
- Dimmers
- Sensors

- Remote controls
- Gateway

- Light bulbs/Strips
- Light fixtures



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Shiningintl Technology



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