

SMART HOME AND SMART ENERGY

SPEAKER INTRODUCTION

SARAWOOT METHAWEE

- Executive Director of NDR Solution (Thailand)
- System Integrator for BEMS, HEMS, Home Automation system
- Developer of application on Linux platform
- Embedded system design (Microcontroller, Circuit&PCB)
- Electrical engineer (Electronics)

NDR SOLUTION(THAILAND) CO.,LTD

Expertise:

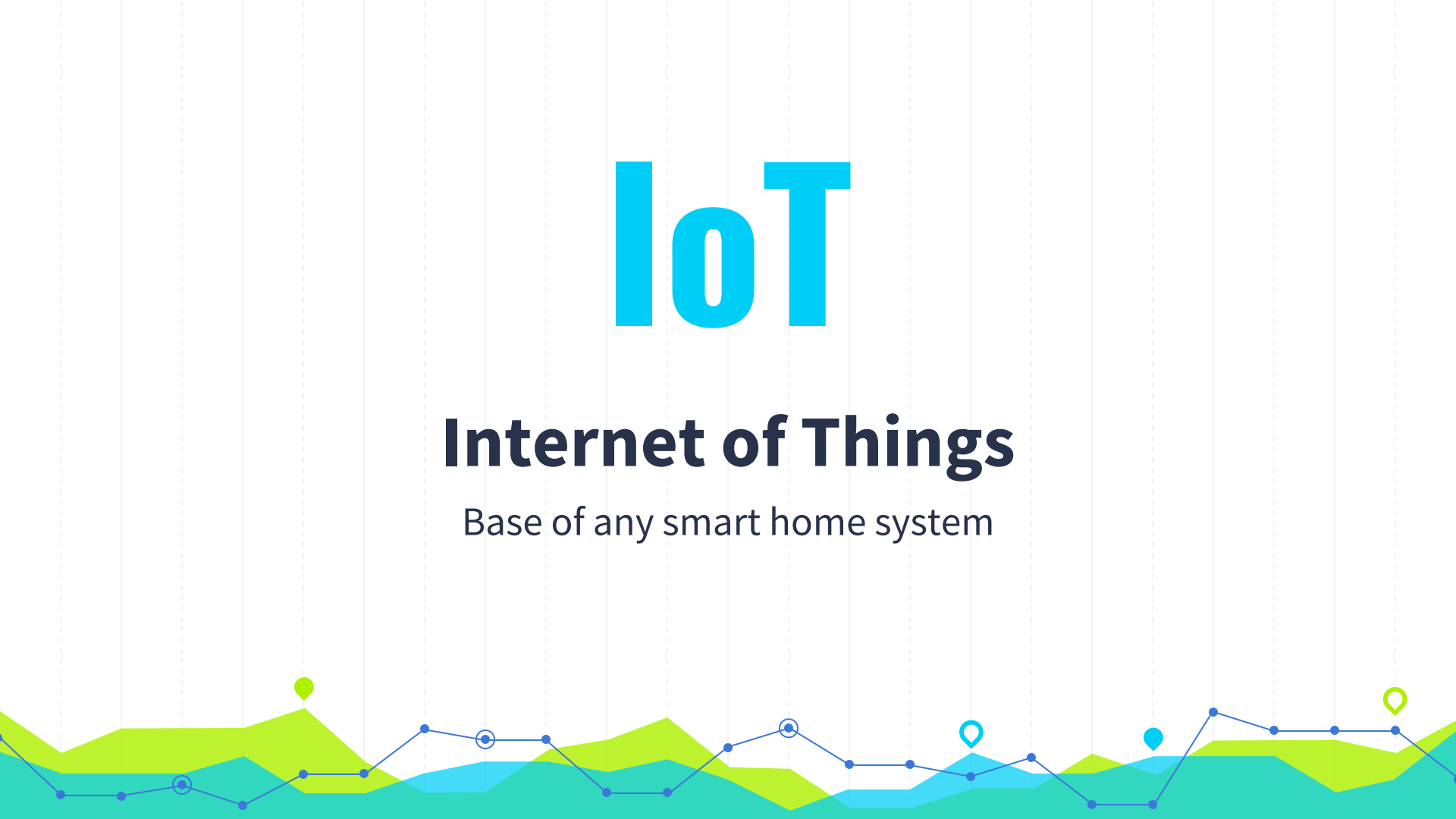
- Embedded system R&D.
- Smart Grid ICT Solution provider. (BEMS, HEMS)
- System Integrator : IoT, FA

RELATED EXPERIENCE IN SMART HOME AND SMART ENERGY

Technology1: BEMS, HEMS, DR, Home Automation

Technology2: Mobile App(Android/iOS), Linux, IoT System, Embedded device design, IEEE1888



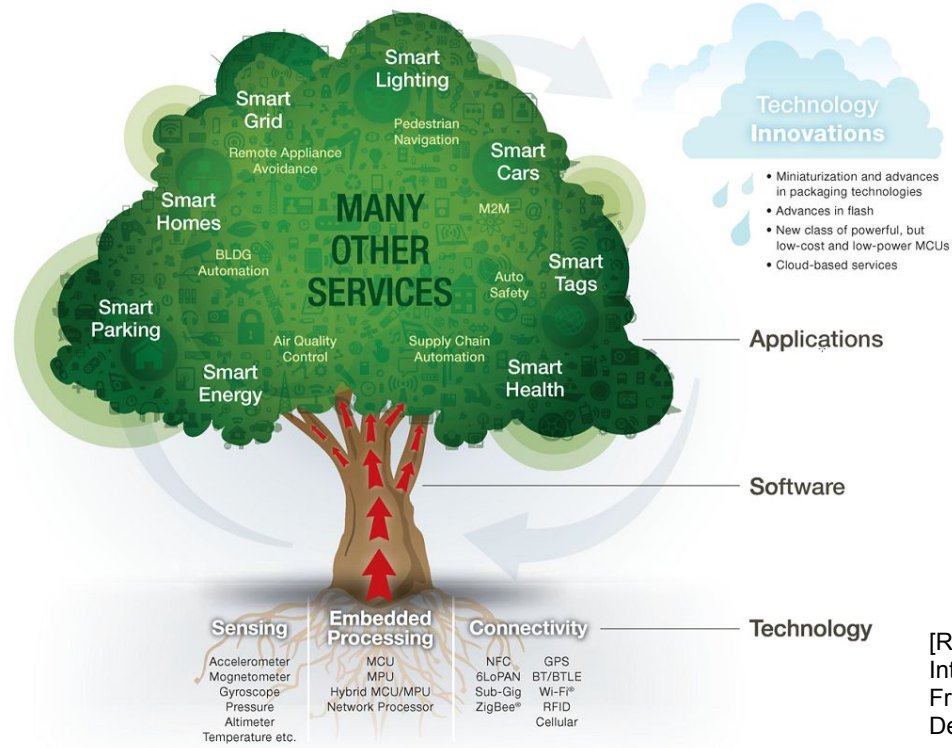


IoT

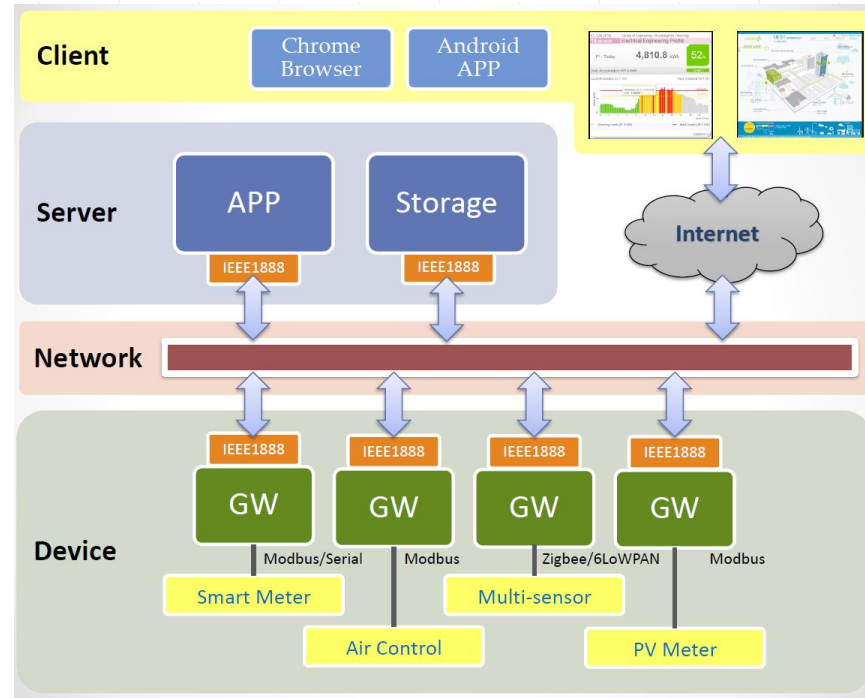
Internet of Things

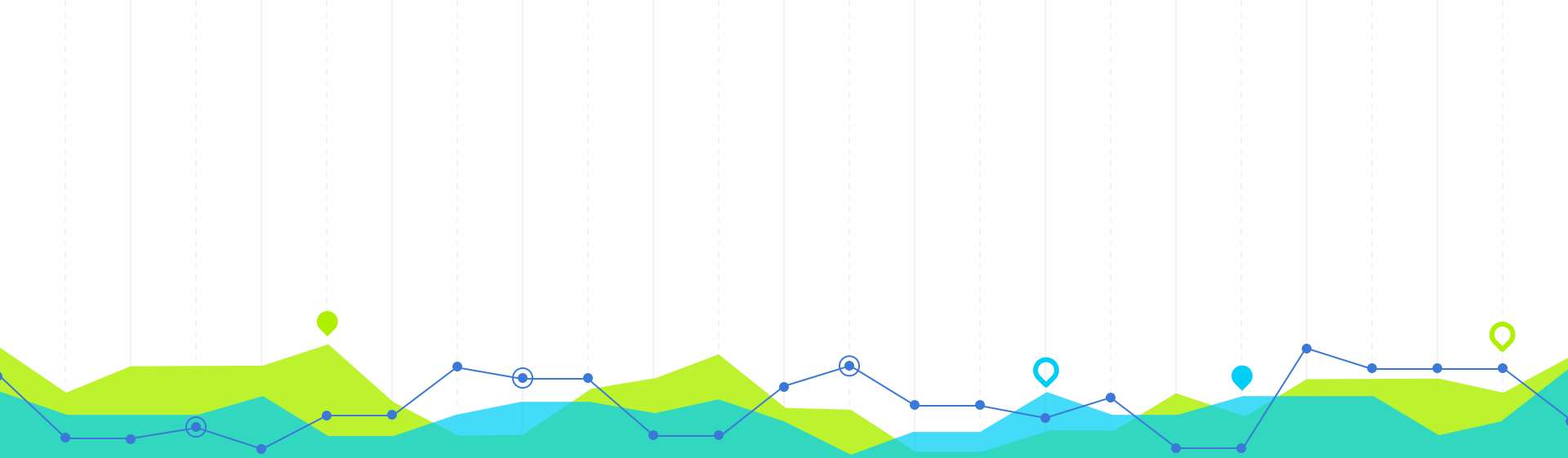
Base of any smart home system

The IoT: Different Services, Technologies, Meanings for Everyone



TYPICAL IoT SYSTEM





Smart home and smart energy trend

1

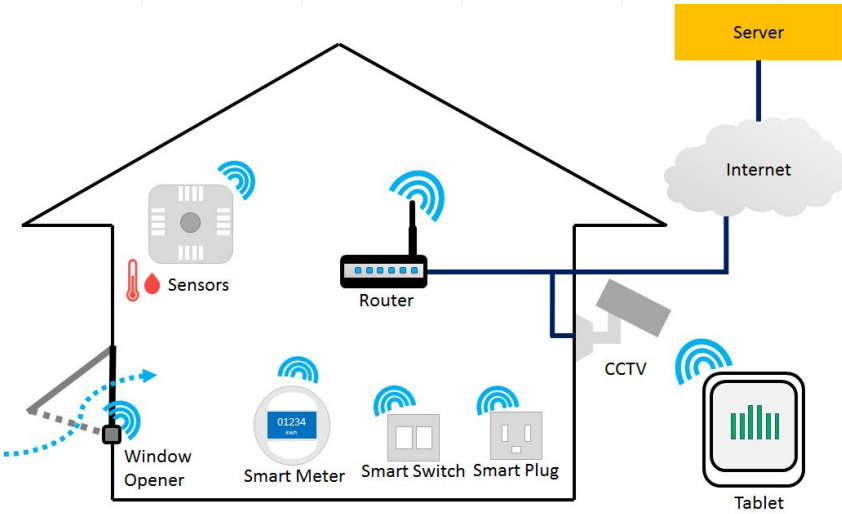
Overview of Residential Ecosystem



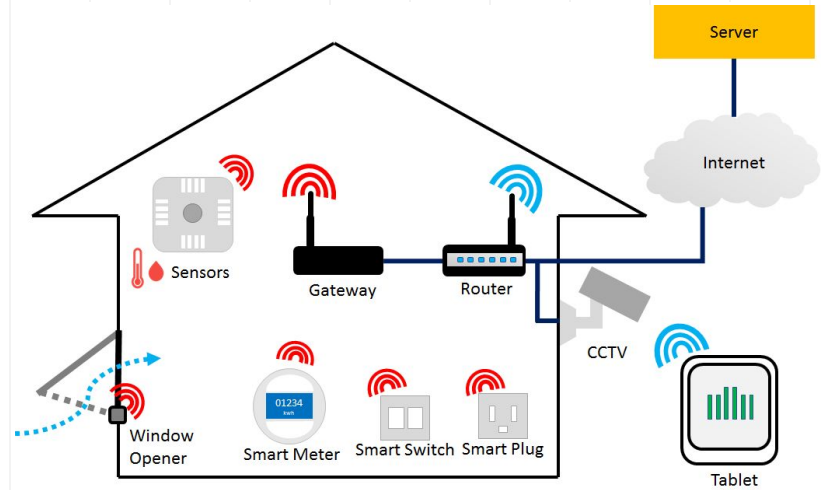
[REF] :
Internet of Things -
From Research and Innovation to Market
Deployment

TYPICAL SMART HOME SYSTEM

Wi-Fi based



Gateway based



IMPLEMENTATION TREND

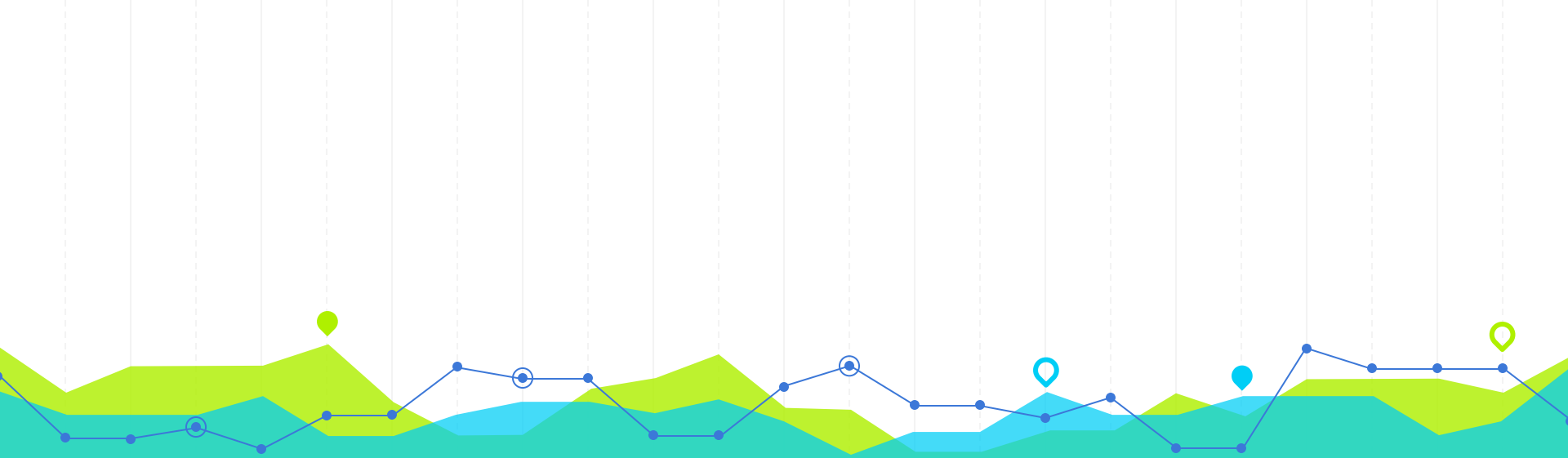
- Be wireless
- Be cheaper
- Along with IPv6, easier to use [IP Convergence]
- Mobile app is also key factor



*Everything that can be automated
will be automated.*

Robert Cannon, Internet law and policy expert





Technology
trend

2

LIST OF POPULAR COMMUNICATION STANDARD

Smart Home (Wireless)

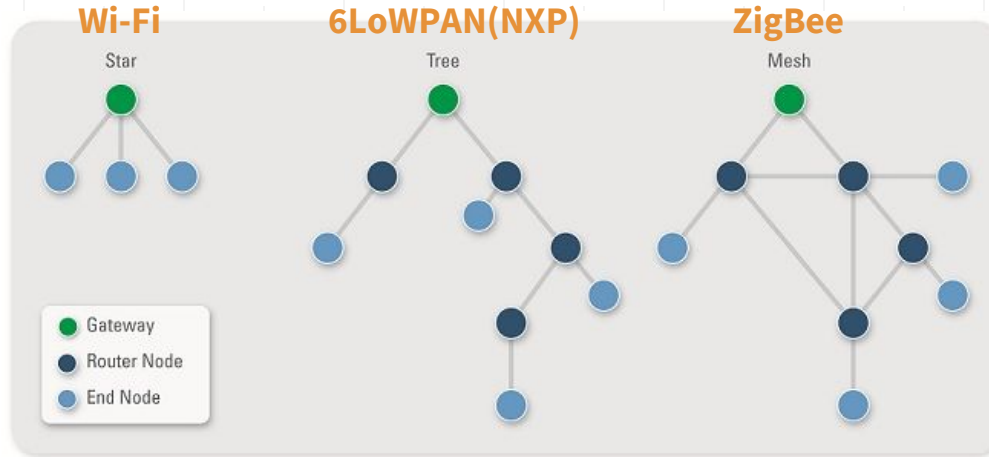
- License
 - ZigBee*
 - Z-Wave
- Free
 - 6LoWPAN
 - Wi-Fi*
 - Bluetooth

Automation/Energy related

- Communication method
 - Modbus *
 - PLC (PRIME, G3)
- Application protocol
 - IEEE1888
 - ECHONET
 - MQTT *

TYPICAL SMART HOME SYSTEM

Star, Tree, and Mesh Network Topologies



[REF] : <http://www.ni.com>

LIST OF POPULAR BRAND

Smart Home

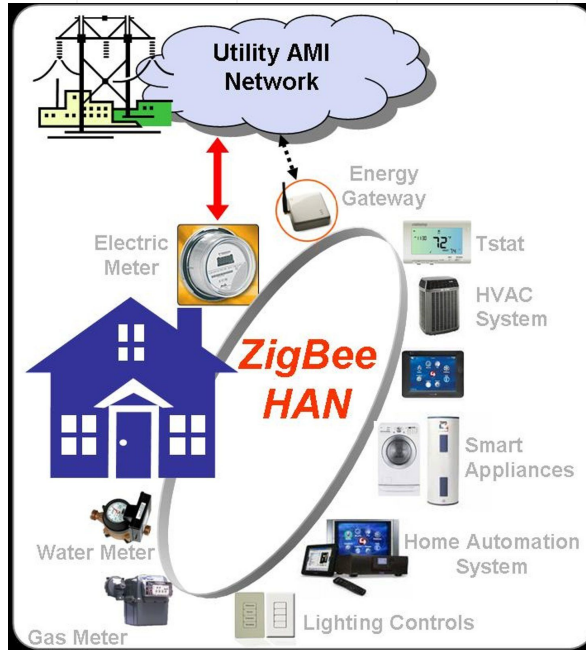
- SmartThings (Samsung)
- Fibaro
- Wulian
- So many others

Smart Energy

- Itron
- Siemens
- ABB
- So many others

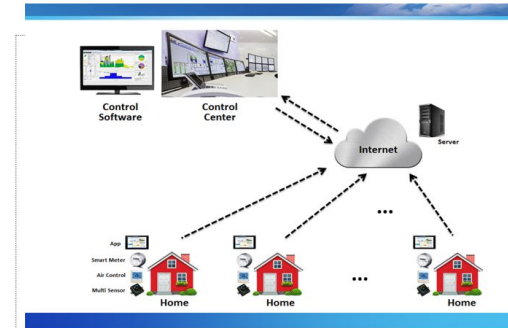
EXAMPLE OF SMART HOME/HEMS/DIRECT LOAD CONTROL

Global concept



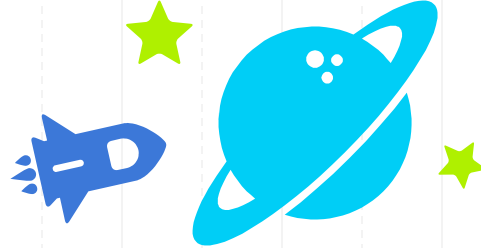
[REF] : <http://www.eetimes.com>

Real pilot project in Thai(DR100)



System Structure (in Home)





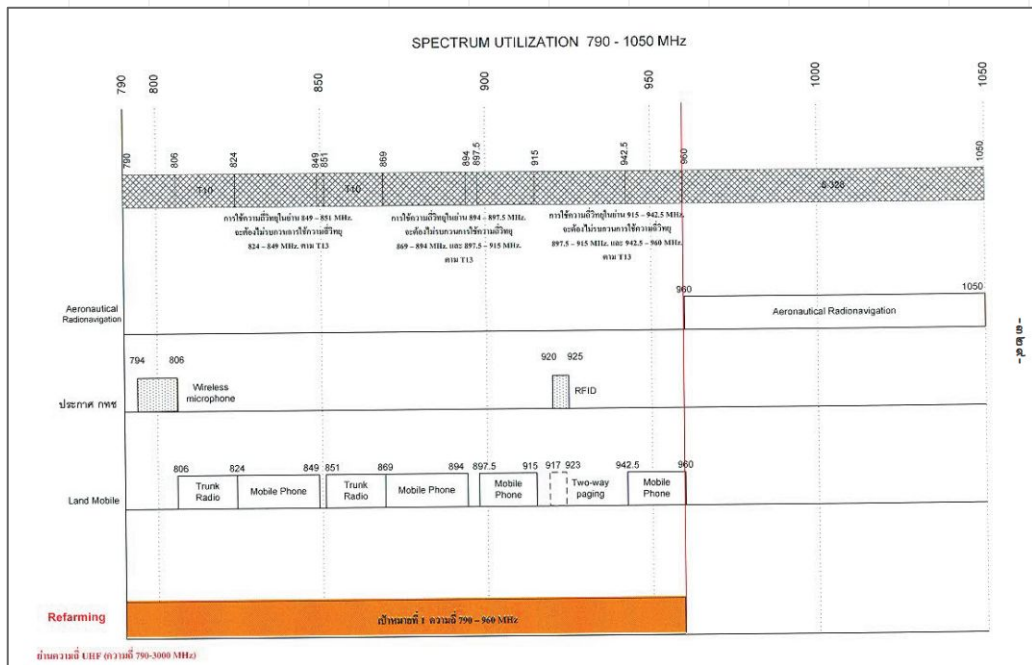
CHALLENGE

Real implementation challenge

3



FREQUENCY LAW



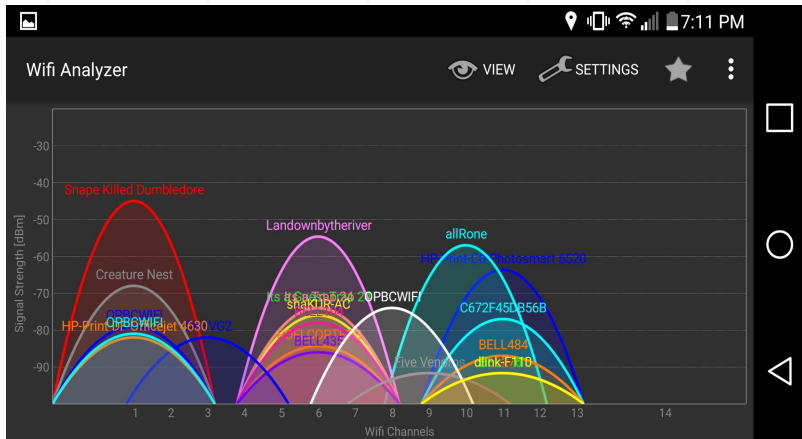
Variable	Wi-Fi	Z-Wave	ZigBee	Thread	BLE
Year first launched in Market	1997	2003	2003	2015	2010
PHY/MAC Standard	IEEE 802.11.1	ITU-T G.9959	IEEE 802.15.4	IEEE 802.15.4	IEEE 802.15.1
Frequency Band	2.4 GHz	900 MHz*	2.4 GHz	2.4 GHz	2.4 GHz
Nominal Range (0 dBm)	100 m	30 - 100 m	10 - 100 m	10 - 100 m	30 m
Maximum Data Rate	54 Mbit/s	40-100 kbit/s	250 kbit/s	250 kbit/s	1 Mbit/s
Topology	Star	Mesh	Mesh	Mesh	Scatternet
Power Usage	High	Low	Low	Low	Low
Alliance	Wi-Fi Alliance	Z-Wave Alliance	ZigBee Alliance	Thread Group	Bluetooth SIG

[REF] : <https://www.iot-now.com>

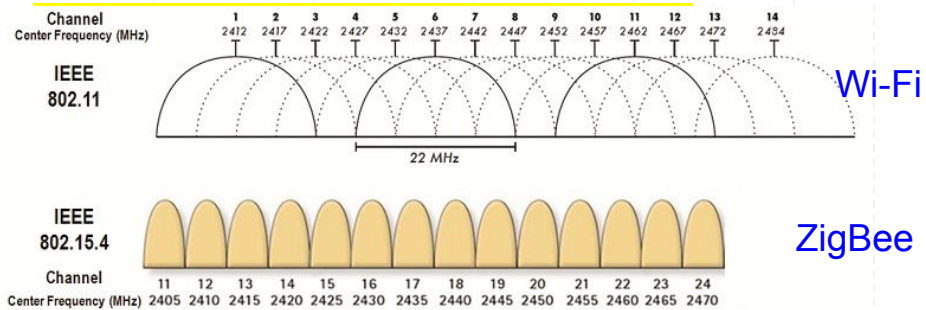
[REF] : <http://www.nbtcc.go.th>

SIGNAL COLLISION

Same standard



Cross standard

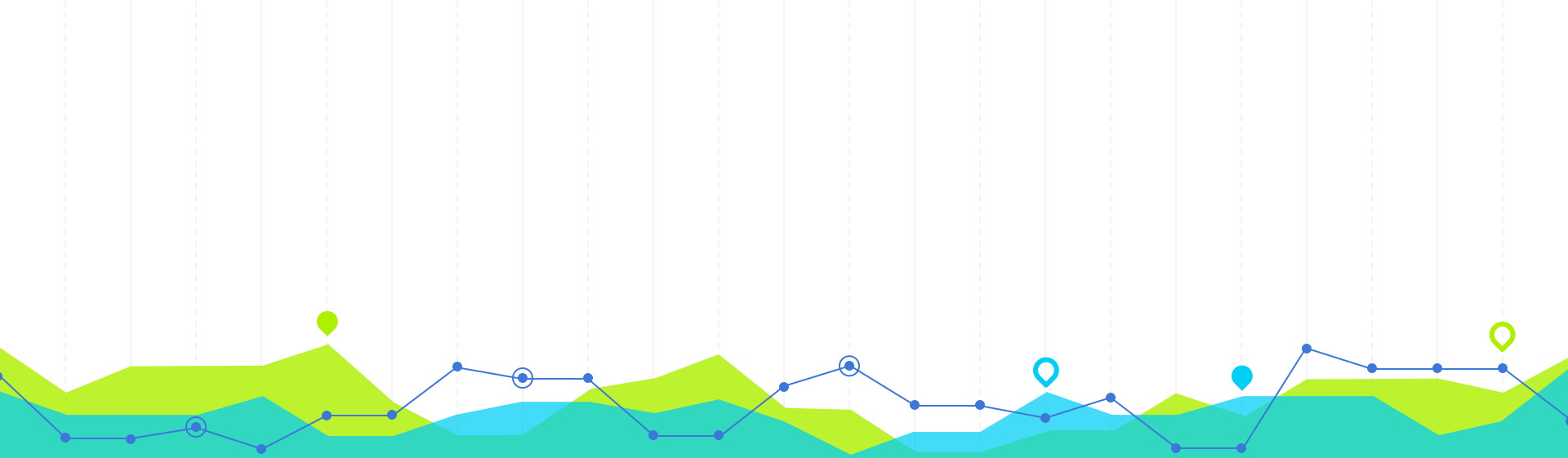


[REF] : <http://www.ni.com>

Wi-Fi

Wi-Fi

ZigBee



**Next generation
technology**

4



VOICE CONTROL

Amazon Echo
(Amazon)

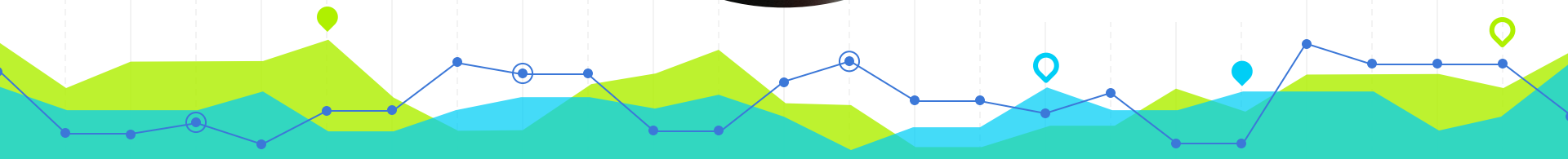


Tianmao JinglingX1
(Alibaba)

Vega
(Samsung)

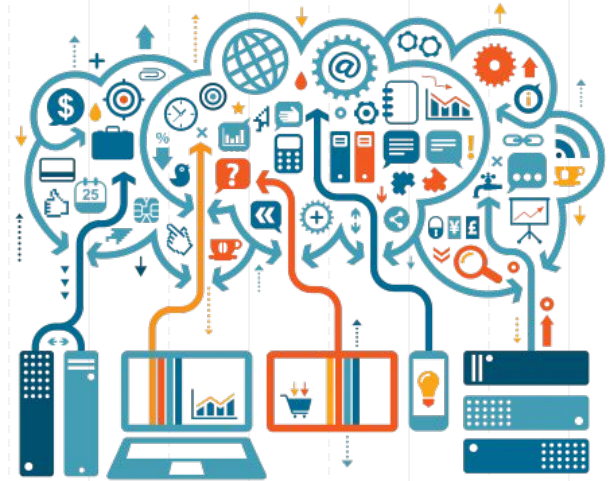


Google Home Smart Speaker
(Google)



BIG DATA ANALYSIS

- Data analytics
 - Extract data from Big pool
- **Data scientist**
 - How to manipulate big data
- Deep learning
 - Learn from experience (data)



[REF] : <http://semeon.com>



**CONCERN
FOR FUTURE/MASS USAGE**

5

CHALLENGE & CONCERN



Frequency allocation

Can lead to frequency collision problem. (Ex. Wi-Fi in condo case)

When provide solution in mass like all room in hotel or condominium.



Widely exposed

Lead to privacy leakage risk. When all device is online and be available on internet, the risk is so high.



Use with not enough knowledge

User just buy it from market, use along with lowest manual read.

Lead to frequency collision, device hacked and controlled etc.



Control hacking (take over)

- Case Mirai -> Botnet case study
- Chrysler car hacked in US



Data scientist (is required)

Too much data to see. Who can help solving this problem?



Open/Global standard

If we select national standard, maybe we can get more collaboration.

NetPie from Nectec???

IEEE1888 like CU?

THANKS!

Any questions?

You can find me at
sarawoot@ndrsolution.com

