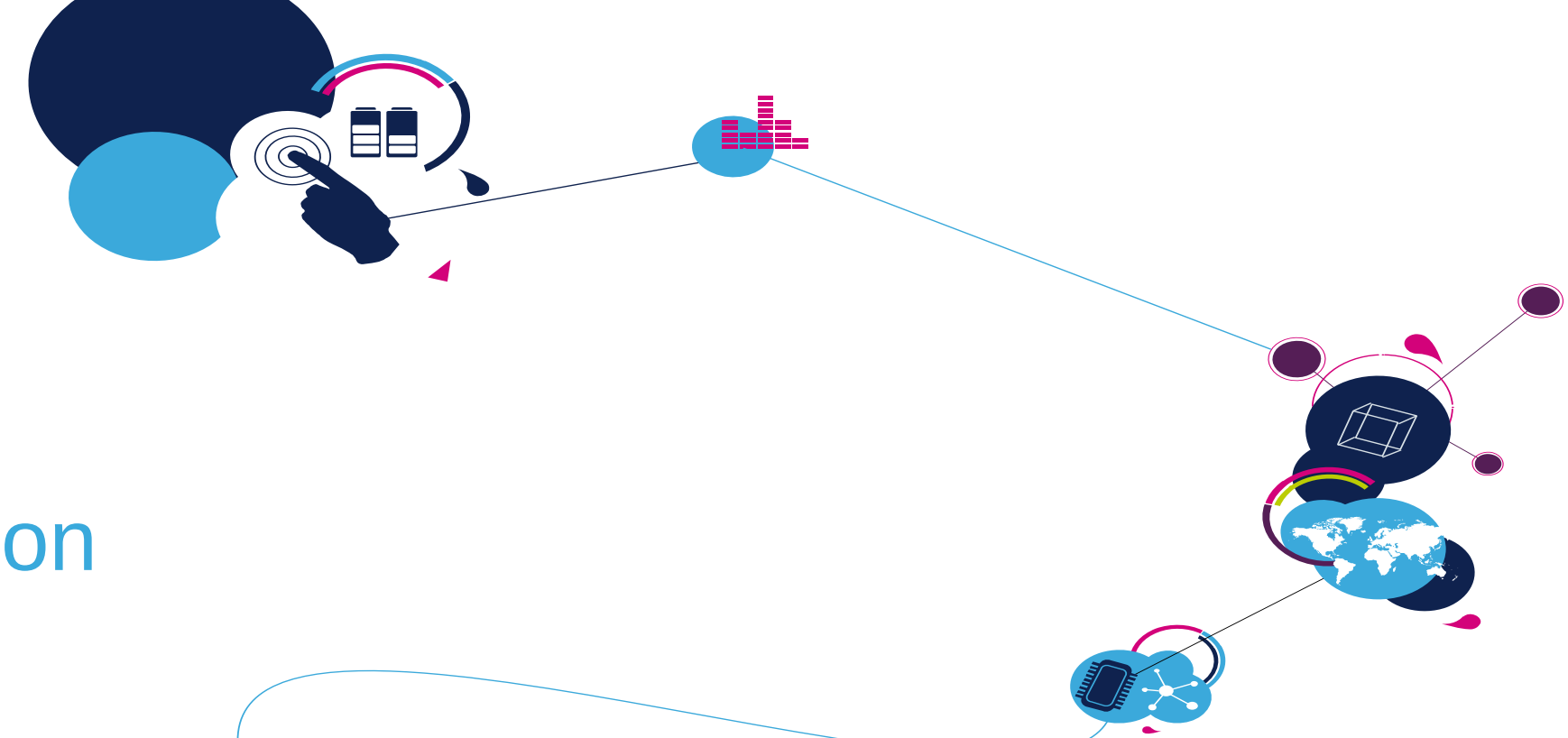

IoT Introduction

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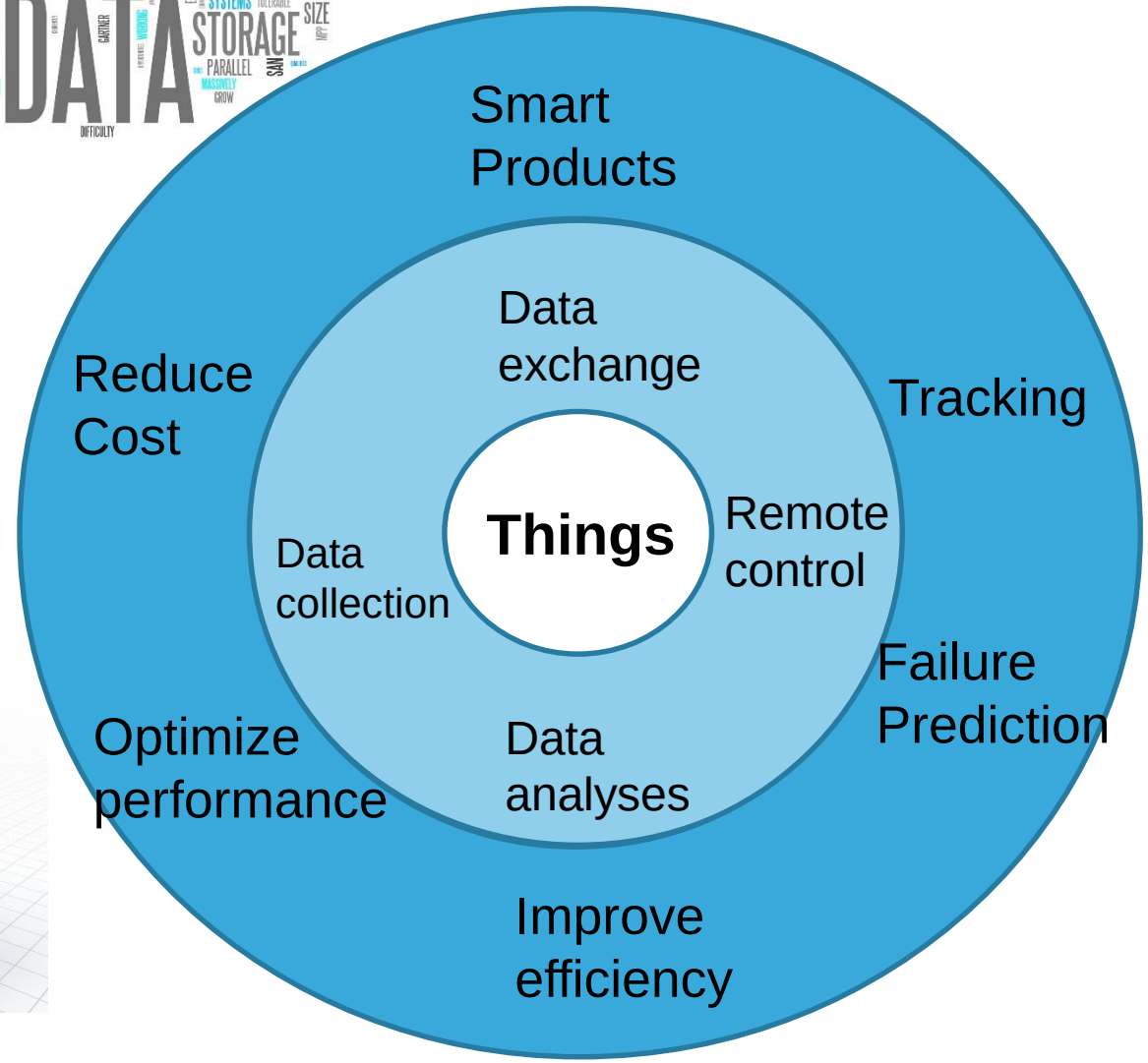
What is IoT

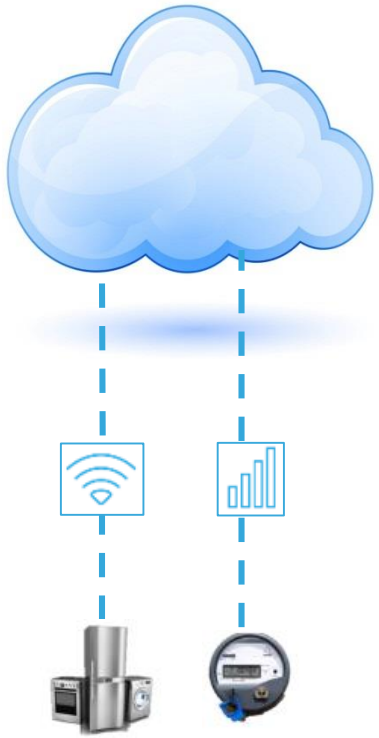
The Internet of things (IoT) is the network of **physical devices**, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to **connect** and exchange **data**.

------https://en.wikipedia.org/wiki/Internet_of_things

What's the benefit of IoT



IoT structure Layers



Application

Smart-Healthcare， Smart City，
Smart Building…

Platform

百度云 阿里云 亚马逊 aws 机智云 Gizwits

Infrastructure, Device Connection
Data Analysis， machine learning…

Network

WiFi Bluetooth LoRa NB-IOT

Operator（2G/3G/4G）
WIFI，ZigBee，Bluetooth
LPWAN(LoRa, SigFox，NB-IOT）…

Node

QUALCOMM life.augmented MXCHIP QUECTEL Build a Smarter World

Sensor，Microcontroller Unit
Communication module， Smart device…

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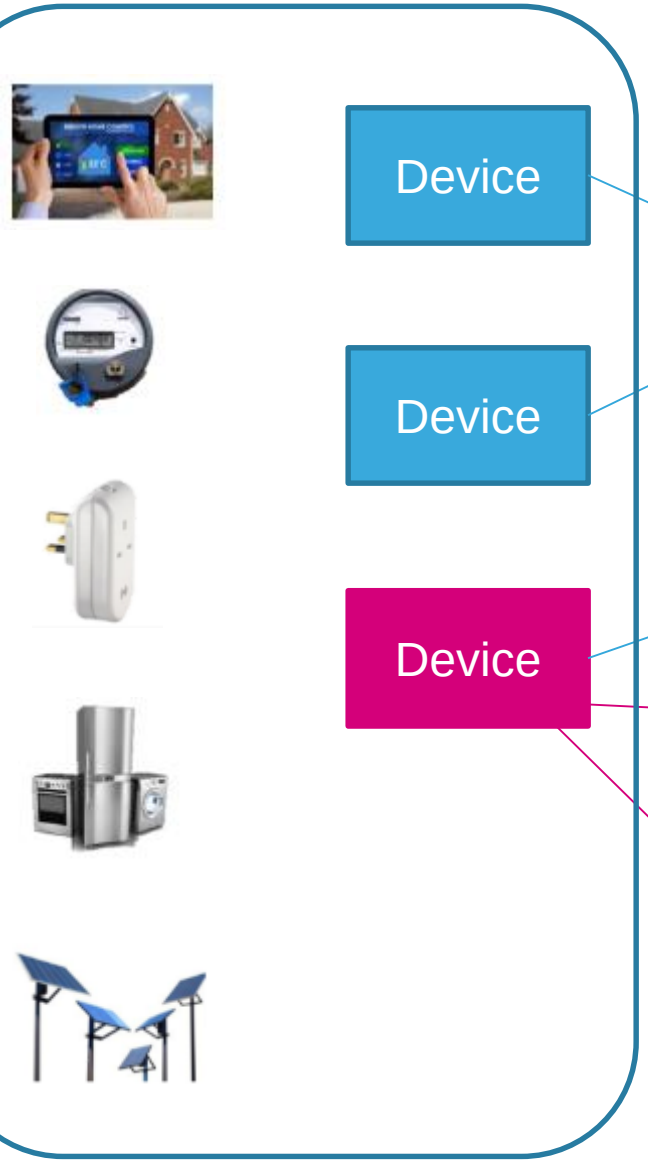
Where's STM32

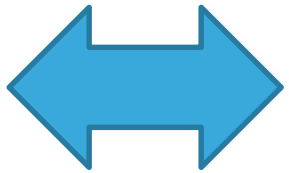


- Node（STM32L4…）
- WIFI module(STM32F411/F412…)
- Lora Gateway(STM32F7…)
- …

Features of “Thing”

Features of Thing

- Low cost
- Constrained resource
- Use battery
- Network environment is not stable
- Insecure network
- Small data communication
- ……



Requirement of Implementation

- Small protocol stack size
- Low power
- New IoT protocol to handle such new features: high link failure, low bandwidth short message length…
- Secure communication
- ……

CoAP

2G/3G

TLS/DTLS

NB-IoT

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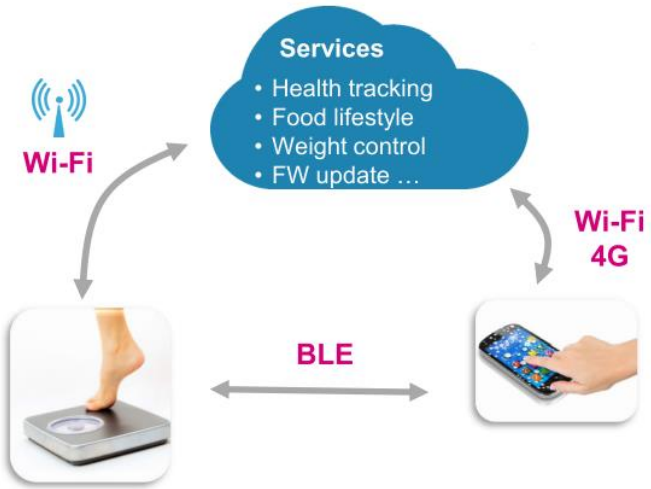
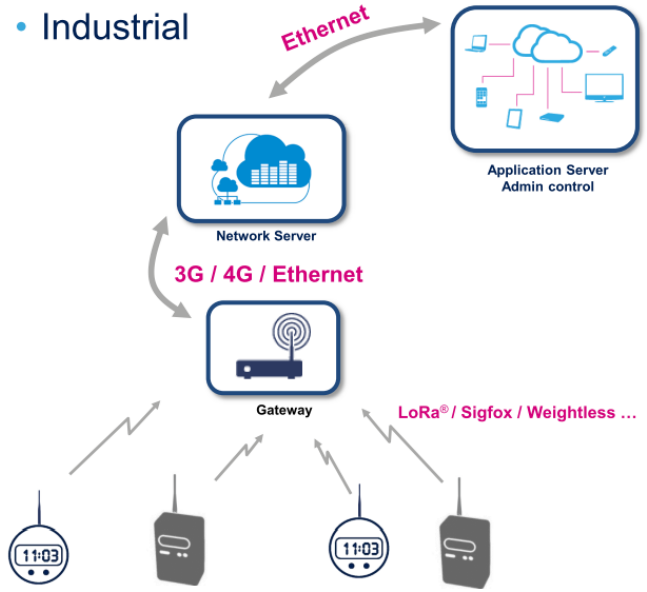
IoT Protocols

- Access Protocols
  - Subnet interconnection, connect devices to internet
  - Wifi, BLE，ZigBee, LoRa，NB-IoT

• Consumer



• Industrial



- Communication Protocols
  - Based on TCP/IP, deal with device communication
  - MQTT, CoAP, AMQP……

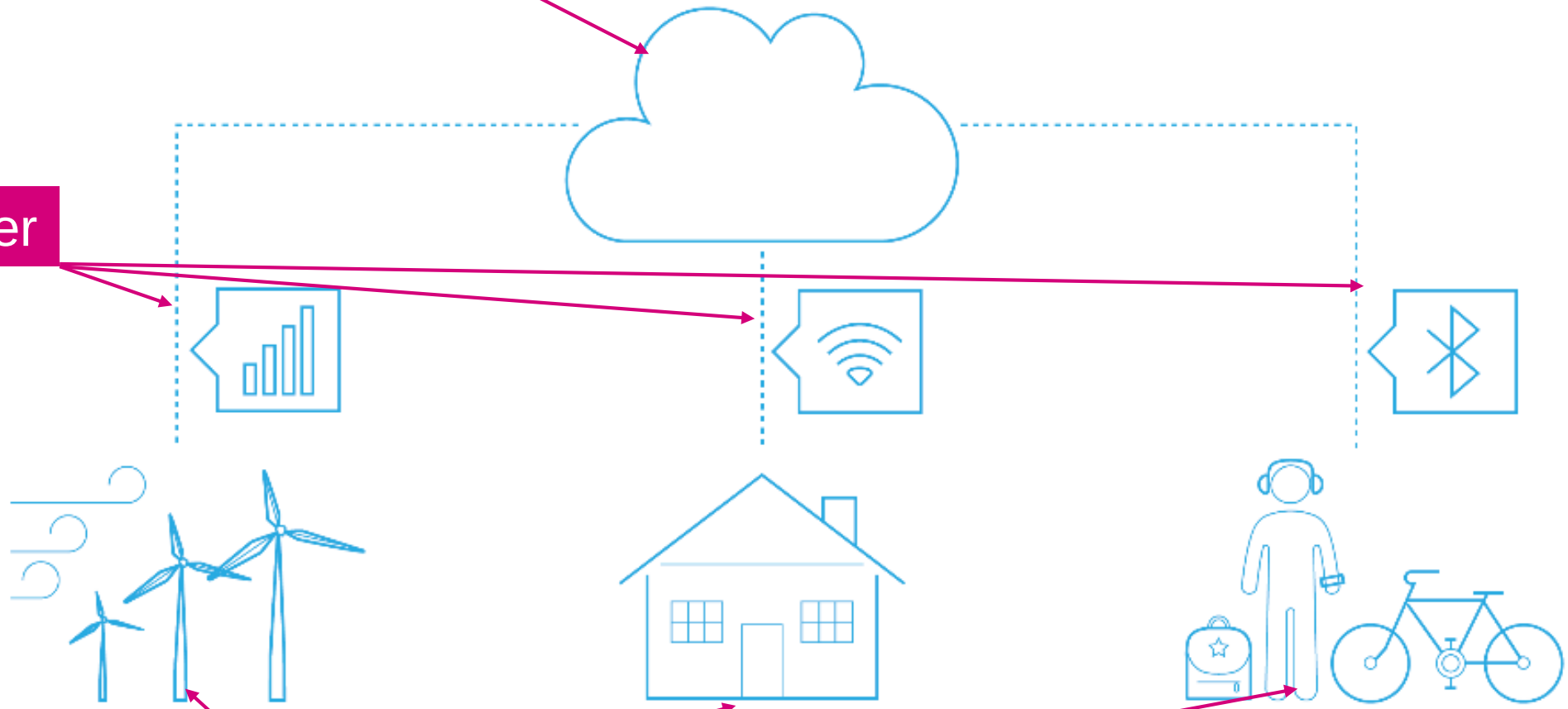
Communication Protocols

	MQTT	CoAP	HTTP
Communication mode	Pub/Sub	Request/Response	Request/Response
Transport Layer	TCP	UDP	TCP
Transport Layer Security	TLS	DTLS	TLS
Constrained device	Yes	Yes	No
Qos Level	3	2	TCP
Addressing	Topic only	URI	URI
Multicast	No	Yes	No
Discovery Feature	No	Yes	No

IoT Seurity

- Fake service

- Eavesdropper

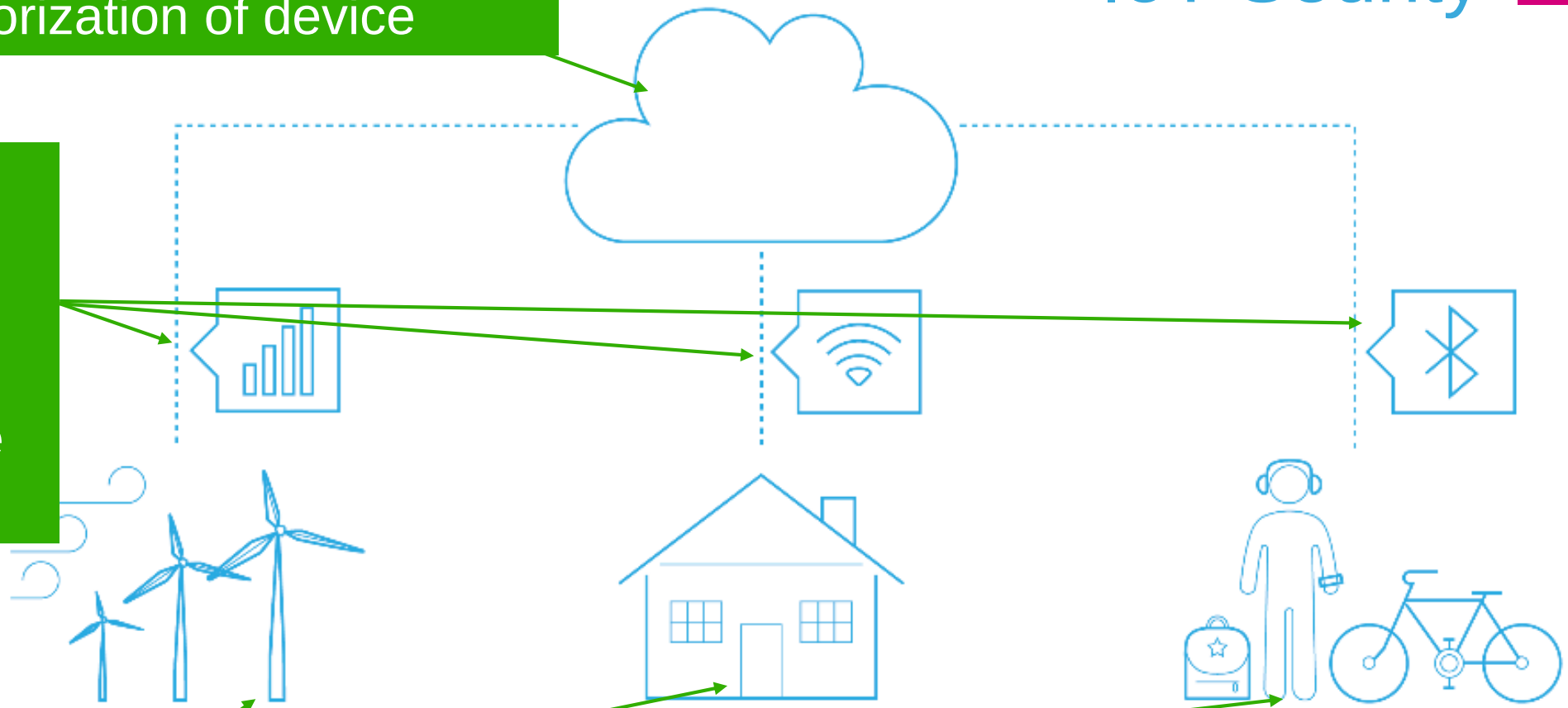


- Counterfeit Device
- Compromised Device

IoT Seurity

- Authentication of device
- Authorization of device

Secure Communication
- TLS
- Checksum
- Digital Signature
- …



- Authentication of server
- Secure Key Storage