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Smart management of **remote** IoT WSN

May 2016

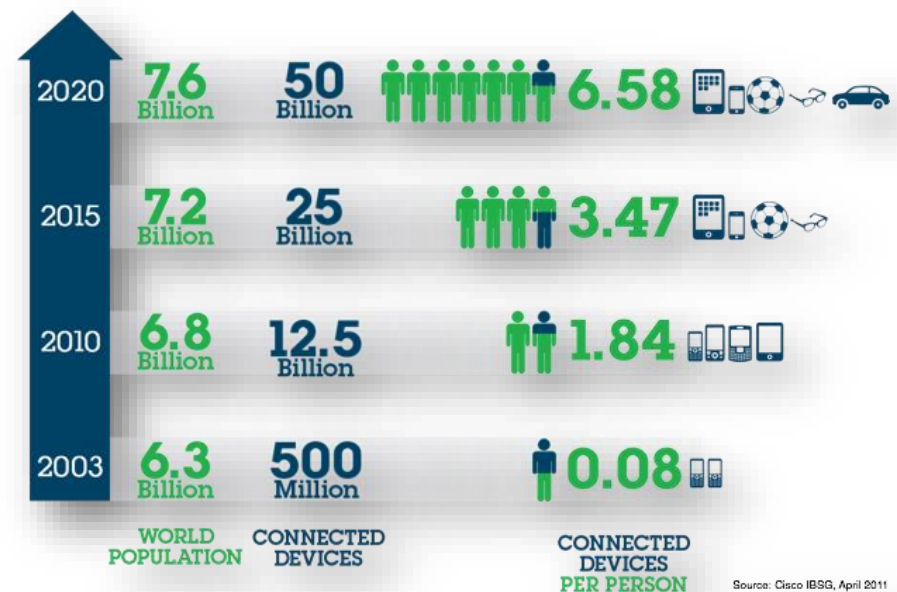
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Outline

- Internet of Things?
- Wireless Sensor Networks?
- The Proposed Scheme
- SMART what?
- Low Power Wide Area Networks?

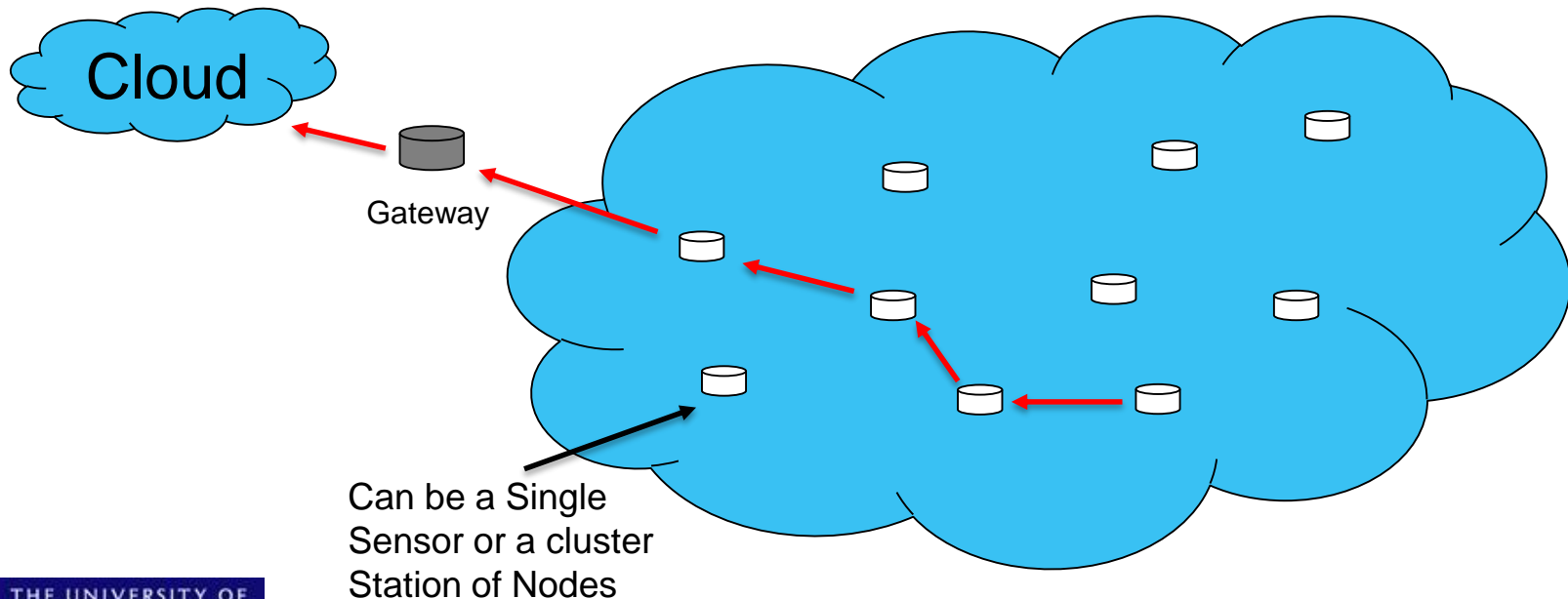
Internet of Things (IoT)?

- Growing network of objects that can communicate with each other and complete tasks without any human involvement having to take place
- Gradually coming to market, where tens of billions of devices around the home, cars, trees, etc will communicate with each other

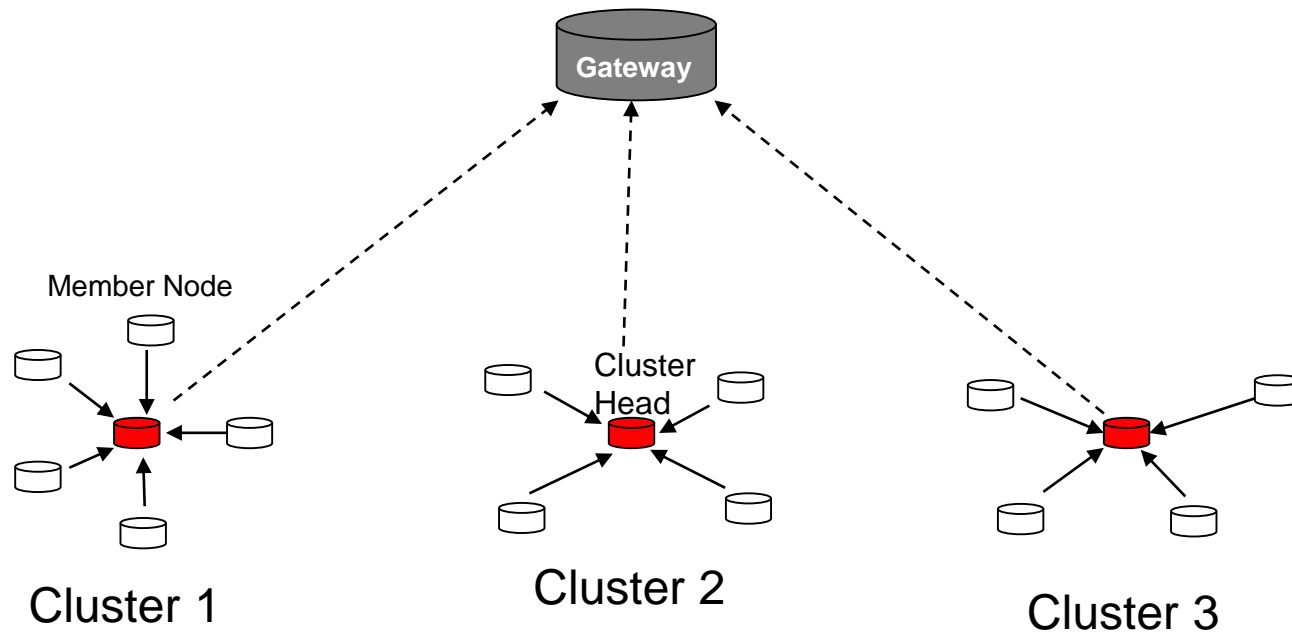


Wireless Sensor Networks?

- Wireless Sensor Networks consist of numerous sensor nodes that are deployed in a geographical region for the purpose of monitoring, gathering and transferring the sensed data to a server via gateways/AP/Basestations



Exist: Many Energy Efficient WSNs



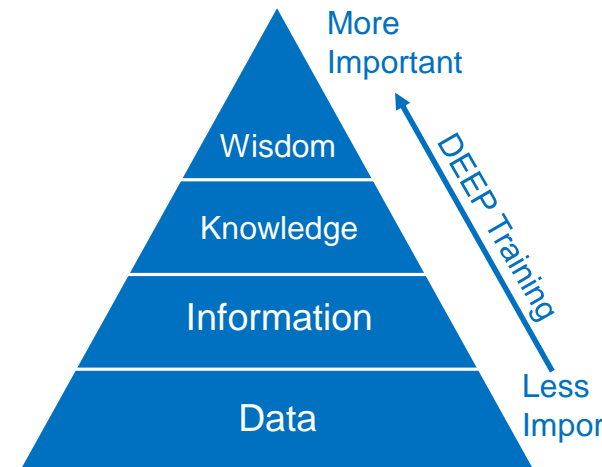
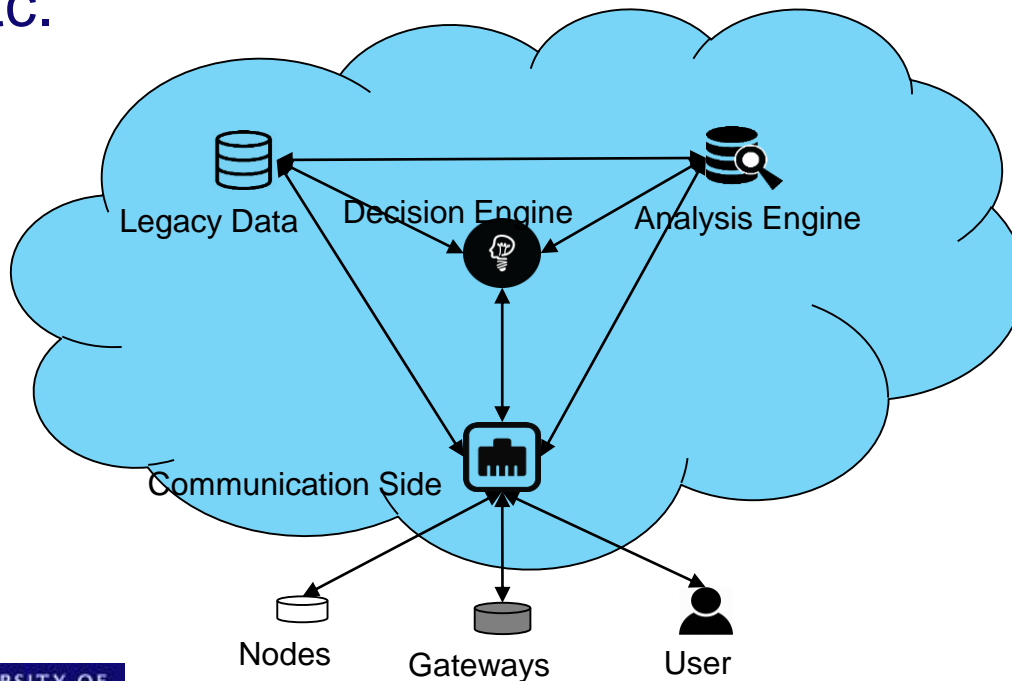
- Clustering techniques (fixed or dynamic) can be based on location, distance, energy level, etc.

Purpose of Our Proposed Scheme?

- Introduce cloud based management for an IoT-WSN
- Deep-learning **Smart** monitoring and control, **on the go**
- Hierarchical clustering to enable use of **Cheap/Dumb sensor** nodes at **Very low bit rate**
- Connectivity “**activity**” between nodes and areas influence clustering and frequency of connectivity
- Power usage and legacy recorded data influence **path chosen**
- Diversity algorithm to **enable multi-protocol** communication
- **WPT? Harvesting?**

Deep learning?

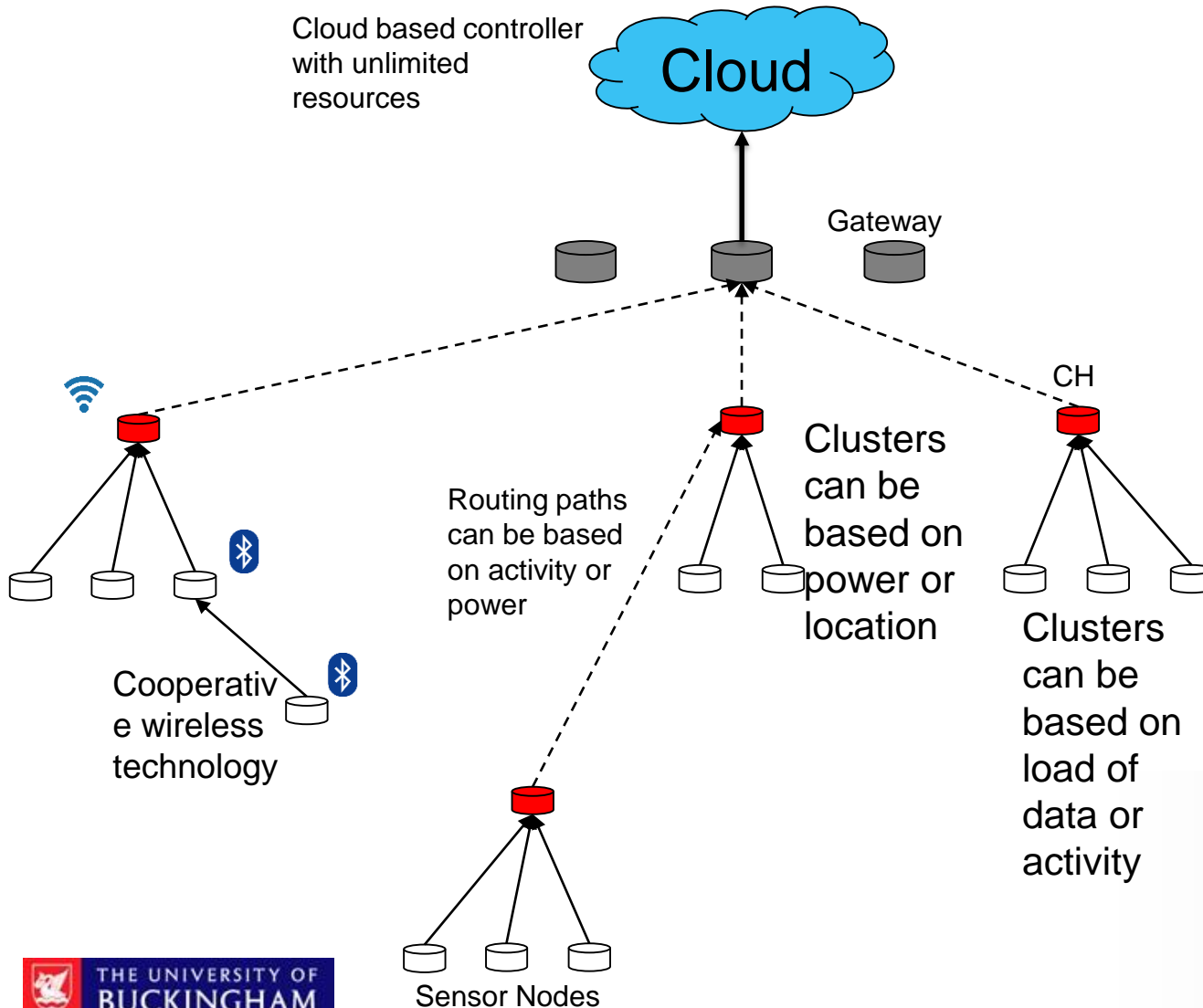
- Learn about the information/legacy information data
- Analyse nodes behavior/activity & important or not
- Develop decision strategies for USER and POWER, for clustering, routing, scheduling of transmission, etc.



Smart Hierarchy?

Convenience

Cloud based controller
with unlimited
resources



Cooperative wireless technology

Learned intelligence

Maximise network lifetime

Fit-Fit with activity

TIME, LOCATION, TYPE OF NODE, ENERGY LEVEL, BEST PERFORMANCE, ETC.

Low Power Wide Area Networks?

- A new market is now emerging with the deployment of Low Power Wide Area Networks (LPWAN)
 - Expected to bridge the gap between current LAN and WAN
 - Target low-cost machine-to-machine communication for IoT

- LPWAN Technologies

- LoRa
- Weightless
- SigFox



low cost



long range



low power



secure

- Lora is our **testbed** for building our Smart Scheme

Low Power Wide Area Networks?

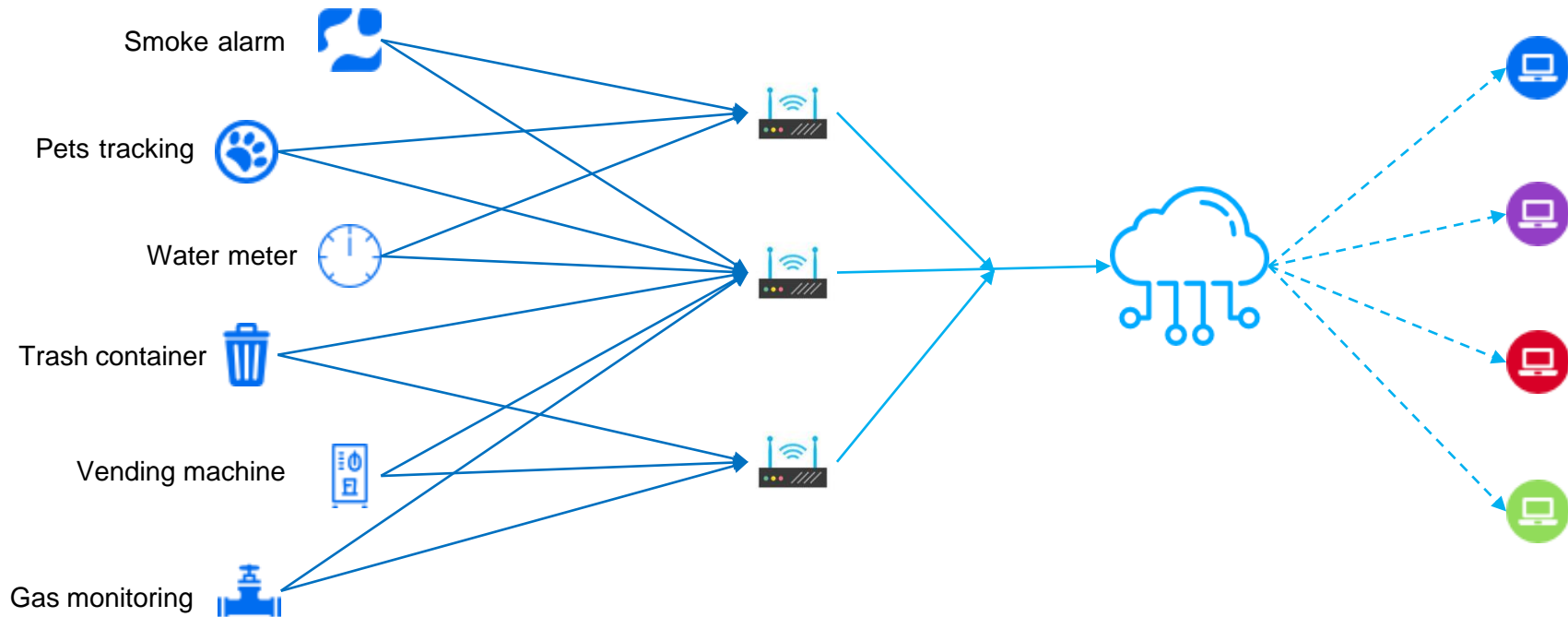
- LoRa technology

LoRa End Nodes

LoRa Gateways

Cloud Based Controller

Application Server



- Long range 15 – 20 km

- Millions of nodes

- Long battery life over 10 years



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Thank you for your
Suggestions!