Sensor Networks For Internet of Things

Sang-Ha Kim
shkim@cnu.ac.kr

ChungNam National University
Department of Computer Engineering

Contents

1. Internet of Things

1.1 Definition of Internet of Things

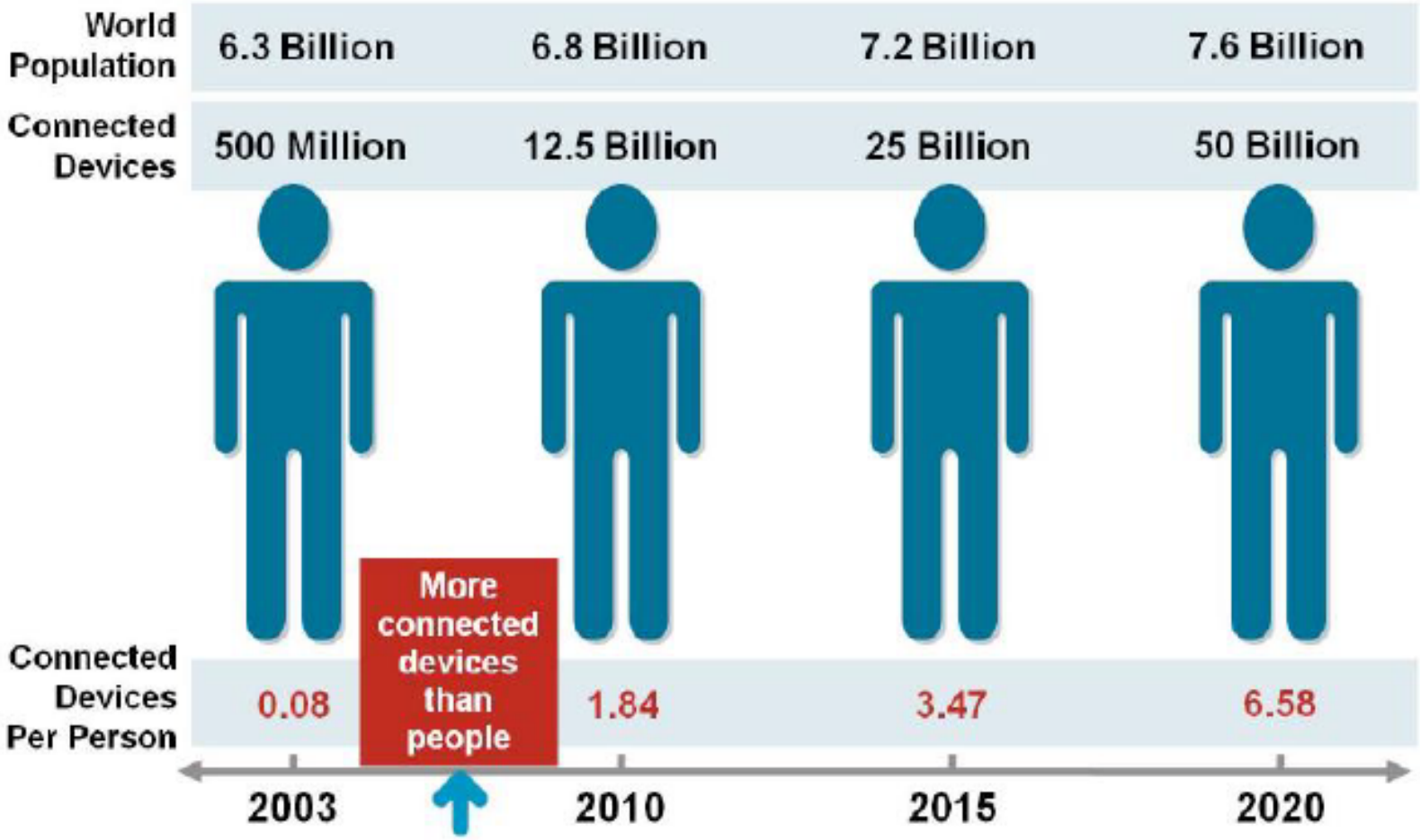
IoT 2008:

The term "Internet of Things" has come to describe a number of technologies and research disciplines that enable the Internet to reach out into the real world of physical objects.

IoT in 2020:

"Things having identities and virtual personalities operating in smart spaces using intelligent interfaces to connect and communicate within social, environmental, and user contexts".

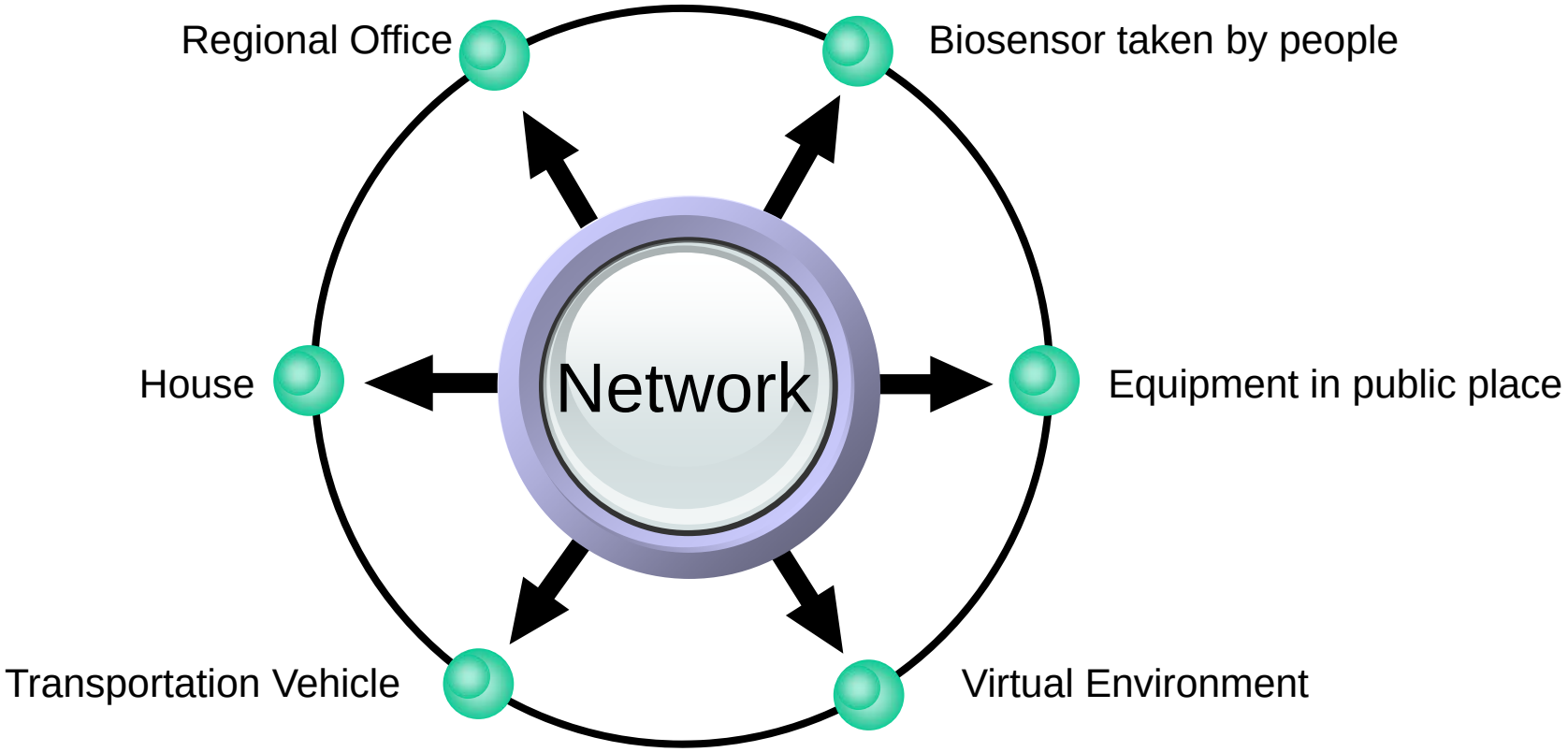
- Internet of Things was "Born" between 2008 and 2009.



1.2 Why Internet of Things

- *Dynamic control of industry and daily life*
- *Improve the resource utilization ratio*
- *Better relationship between human and nature*
- *Forming an intellectual entity by integrating human society and physical systems*
- *Flexible configuration, P&P…*
- *Universal transport & internetworking*
- *Accessibility & Usability?*
- *Acts as technologies integrator*

The Application of IoT



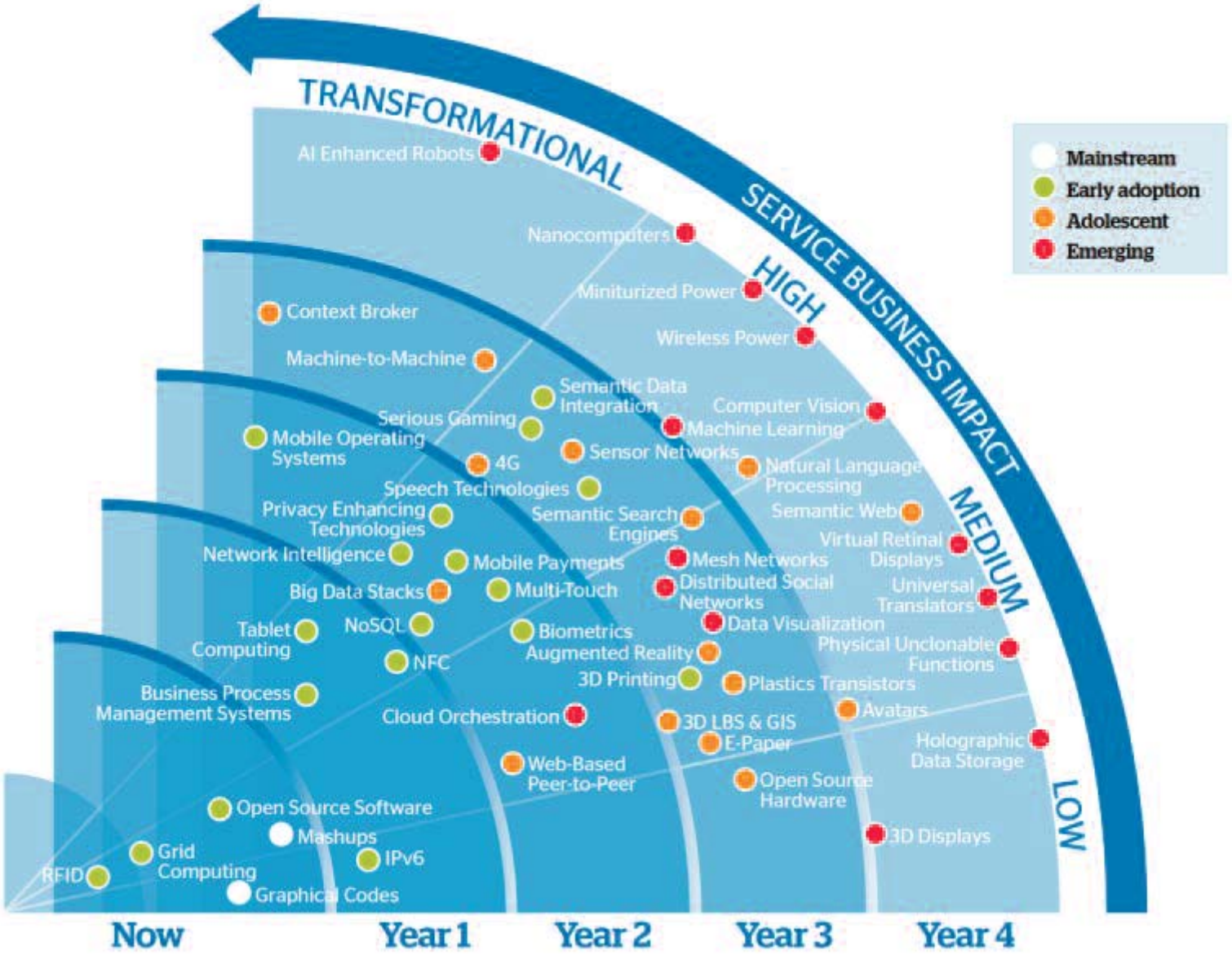
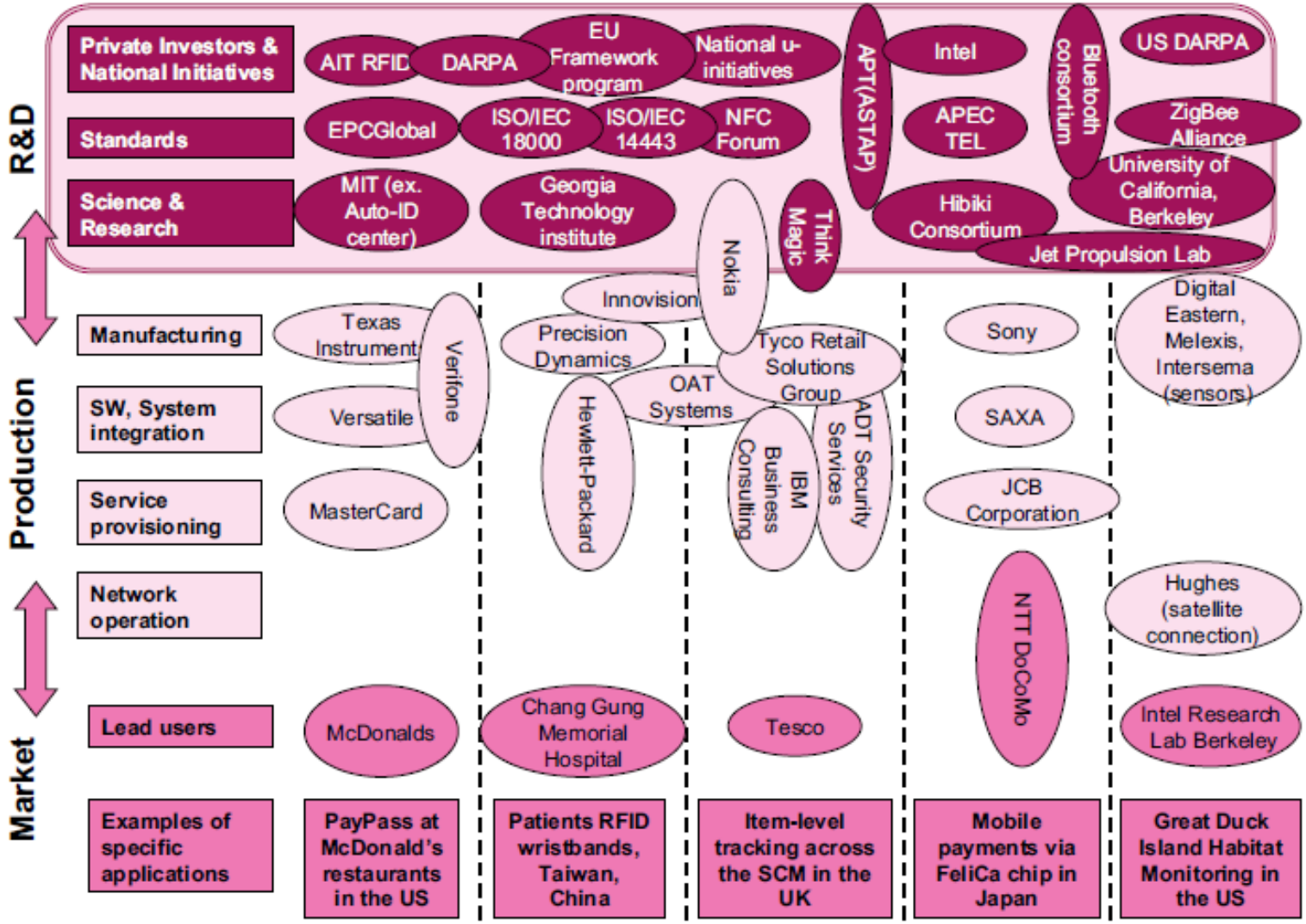

TRANSFORMATIONAL
HIGH
MEDIUM
LOW
SERVICE BUSINESS IMPACT
Mainstream
Early adoption
Adolescent
Emerging
AI Enhanced Robots
Nanocomputers
Miniturized Power
Wireless Power
Context Broker
Machine-to-Machine
Semantic Data Integration
Computer Vision
Serious Gaming
Machine Learning
Mobile Operating Systems
Sensor Networks
4G
Natural Language Processing
Speech Technologies
Privacy Enhancing Technologies
Semantic Search Engines
Semantic Web
Virtual Retinal Displays
Network Intelligence
Mobile Payments
Mesh Networks
Big Data Stacks
Multi-Touch
Distributed Social Networks
Universal Translators
Tablet Computing
NoSQL
Biometrics
Data Visualization
Augmented Reality
Physical Unclonable Functions
NFC
3D Printing
Plastics Transistors
Business Process Management Systems
Cloud Orchestration
Avatars
3D LBS & GIS
E-Paper
Holographic Data Storage
Web-Based Peer-to-Peer
Open Source Hardware
Open Source Software
Mashups
3D Displays
Grid Computing
IPv6
RFID
Graphical Codes
Now
Year 1
Year 2
Year 3
Year 4

Figure 4 – The Internet of Things – from idea to market



Source: ITU

2. Sensor Networks

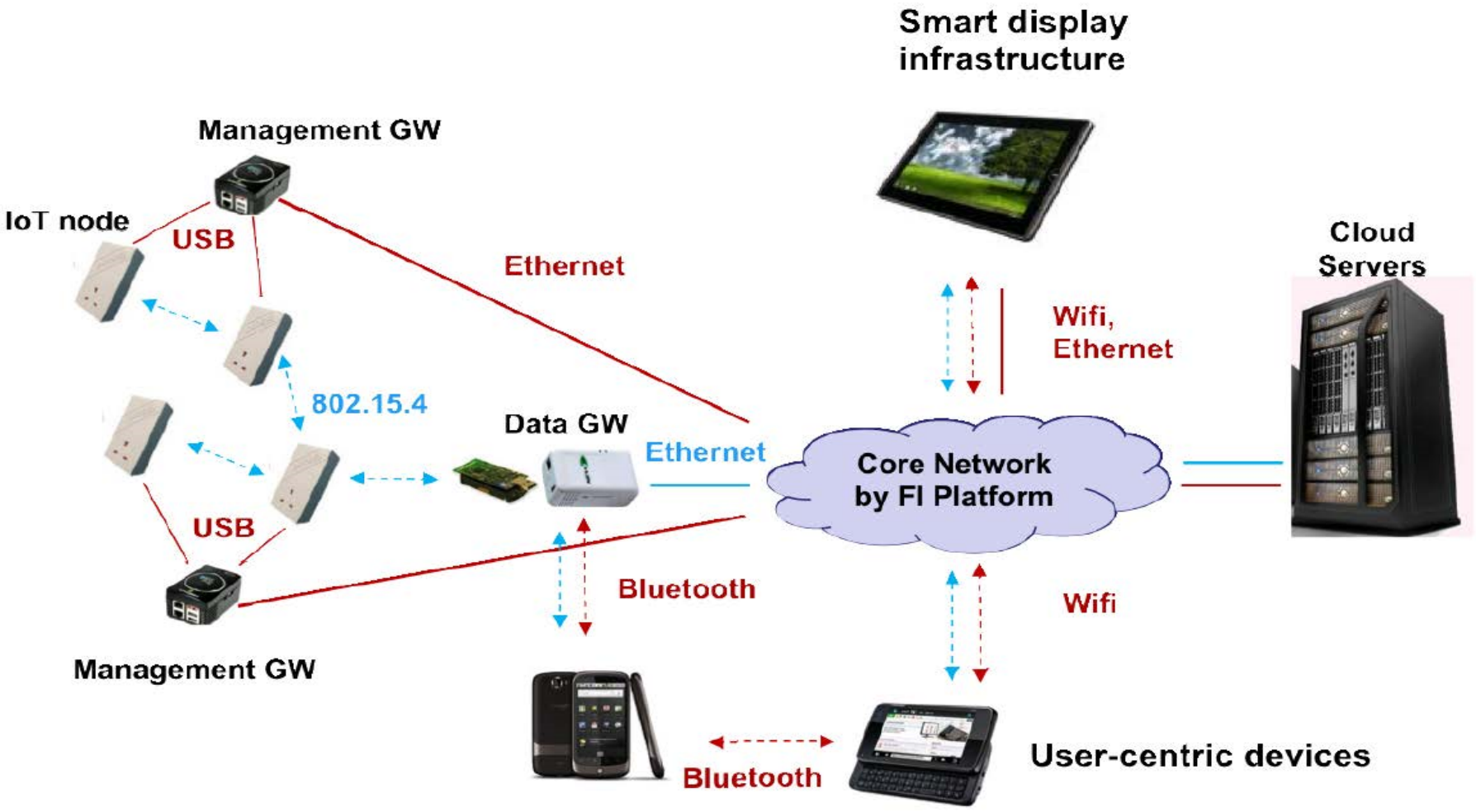
2.1 Sensor Technology

The ability to detect changes in the physical status of things is essential for recording changes in the environment.

Wireless sensor technology play a pivotal role in bridging the gap between the physical and virtual worlds, and enabling things to respond to changes in their physical environment. Sensors collect data from their environment, generating information and raising awareness about context.

Example: sensors in an electronic jacket can collect information about changes in external temperature and the parameters of the jacket can be adjusted accordingly.

2.2 Wireless Sensor Networks (WSNs)



3. Next Generation Wireless Sensor Networks (NG-WSNs)

- Requirement of NG-WSNs
- CCLAB Activities in NG-WSNs

Requirement of NG-WSNs

Key Technologies: protocol designs with the following requirements: real-time, reliability, security, multi-party, mobility, and location awareness.

The services in NG-WSNs consist of the various combinations by key technologies.

This research has been funded by the Korean government since 2010.

CCLAB Activities in NG-WSNs

CCLAB (Computer Communication Laboratory) has been studied NG-WSNs for six years.

In 2010, about sixty research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2010.

In 2011, about thirty research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2011.

In 2012, about forty research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2012.

In 2013, about twenty research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2013.

In 2014, about twenty five research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2014.

In 2015, about twenty eight research papers are published in NG-WSNs. The list of CCLAB works are shown in the references in 2015.

4. Concluding Remarks and Open Issues

- Concluding Remarks
- Open Issues

Conclusion Remarks

- First, we discussed the overview of the Internet of Things.
- Second, the requirement for next generation wireless sensor networks (NG-WSNs) is introduced.
- Finally, the CCLAB research activities related to NG-WSNs are listed.