ITP272 SENSOR TECHNOLOGIES AND PROJECT

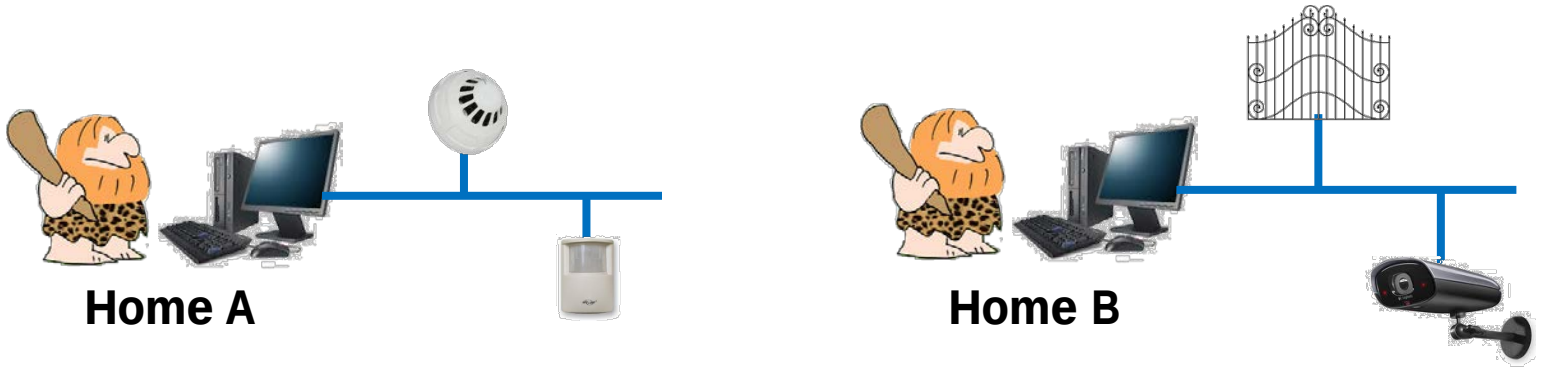
L06: Intro to Smart Objects Technologies

AGENDA

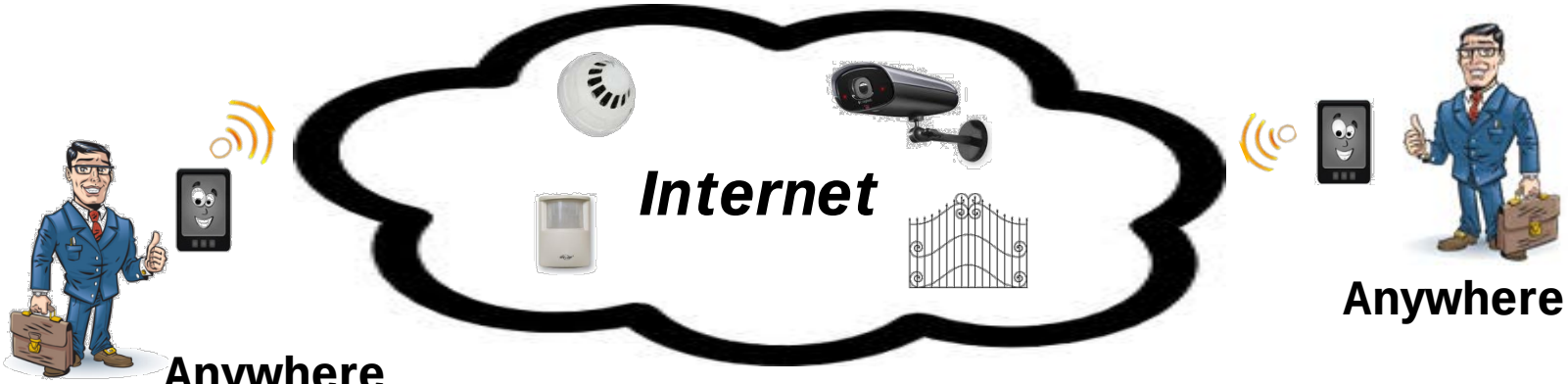
- Intro to Smart Object Technologies (SOT)
- Internet Of Things (IoT)
- Wireless Communication technology

SMART OBJECT TECHNOLOGIES

Conventional access and control of objects

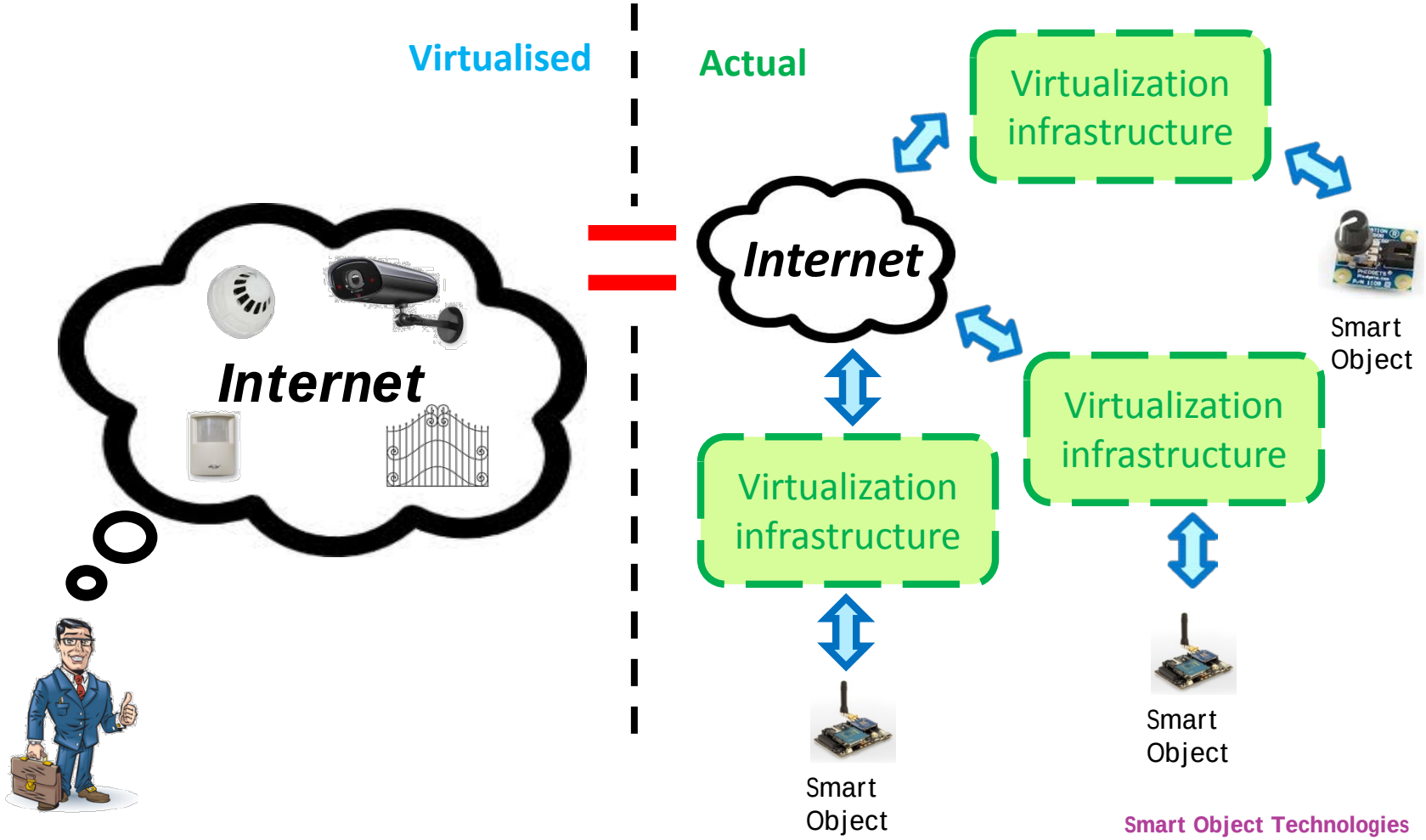


Access and control over virtualization of Smart Objects



SMART OBJECT TECHNOLOGIES

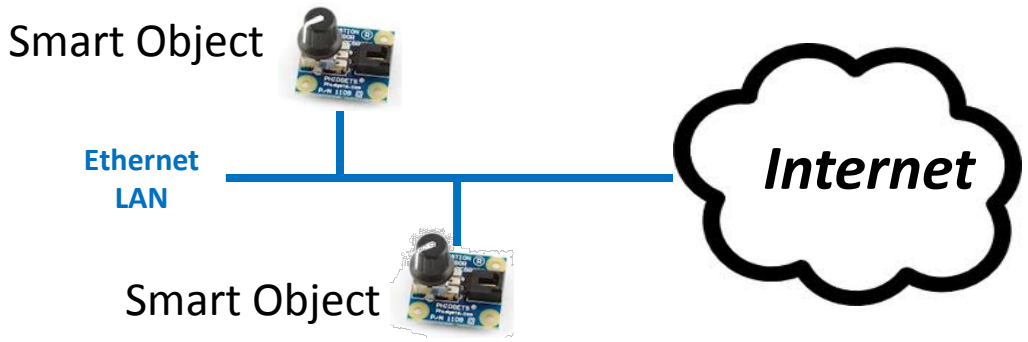
Virtualization infrastructure



SMART OBJECT TECHNOLOGIES

Various forms of virtualization infrastructure

Connect through Wired Ethernet (CSMA-CD)



SMART OBJECT TECHNOLOGIES

Various forms of virtualization infrastructure

Connect through Wi-Fi via Wireless Wi-Fi router

SMART OBJECT TECHNOLOGIES

Various forms of virtualization infrastructure

Connect through Bluetooth via Proxy server

SMART OBJECT TECHNOLOGIES

Various forms of virtualization infrastructure

Connect through ZigBee via Proxy server

SMART OBJECT TECHNOLOGIES

With evolution of technology, physical objects are turning into smart objects which is capable of being

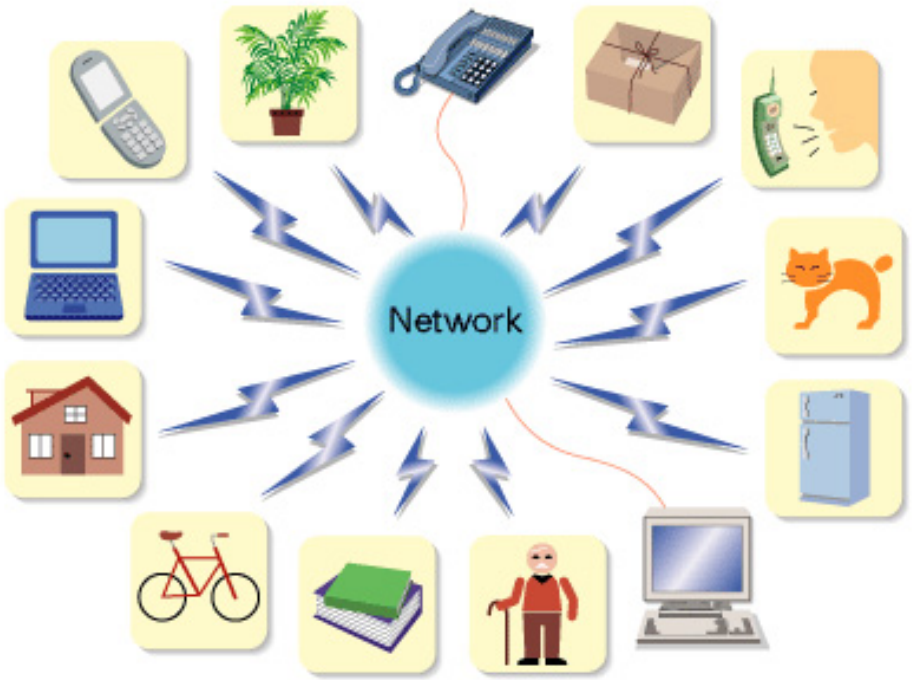
- Uniquely identified
- Accessed anywhere through a global network
- Controlled without physically accessing them

To achieve the seamless integration of smart objects

- Virtual representations were formed on the internet
- Access and control done through internet
- People manage virtually without knowing their physical location

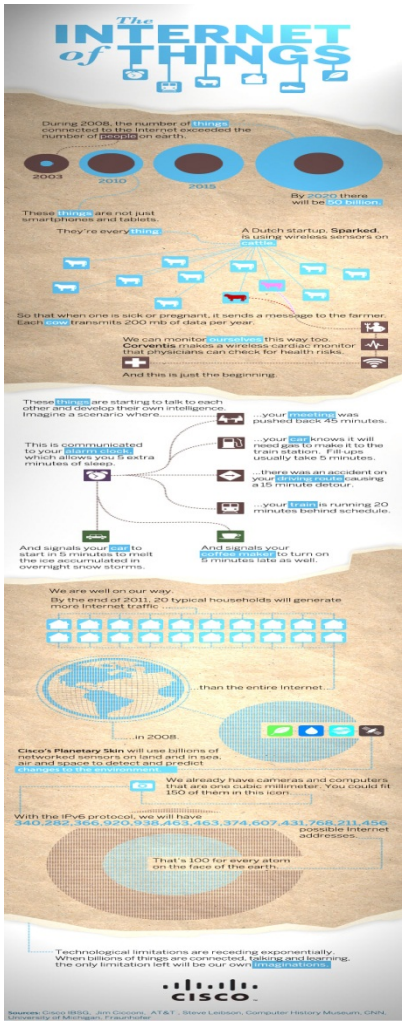
This contributes to the emergence of Internet of Things (IoT).
http://en.wikipedia.org/wiki/Internet_of_Things

INTERNET OF THINGS



Ubiquitous computing will enable diverse wireless applications, including monitoring of pets and houseplants, operation of appliances, keeping track of books and bicycles, and much more.

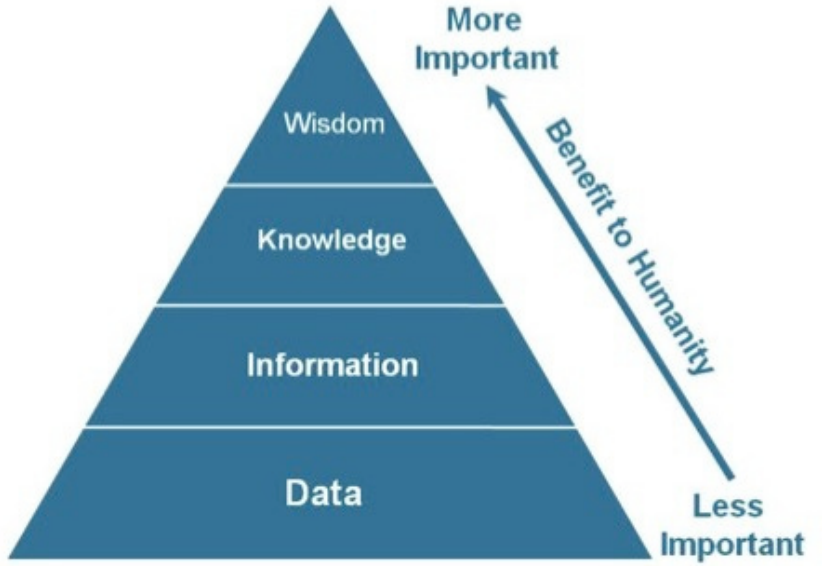
INTERNET OF THINGS



INTERNET OF THINGS

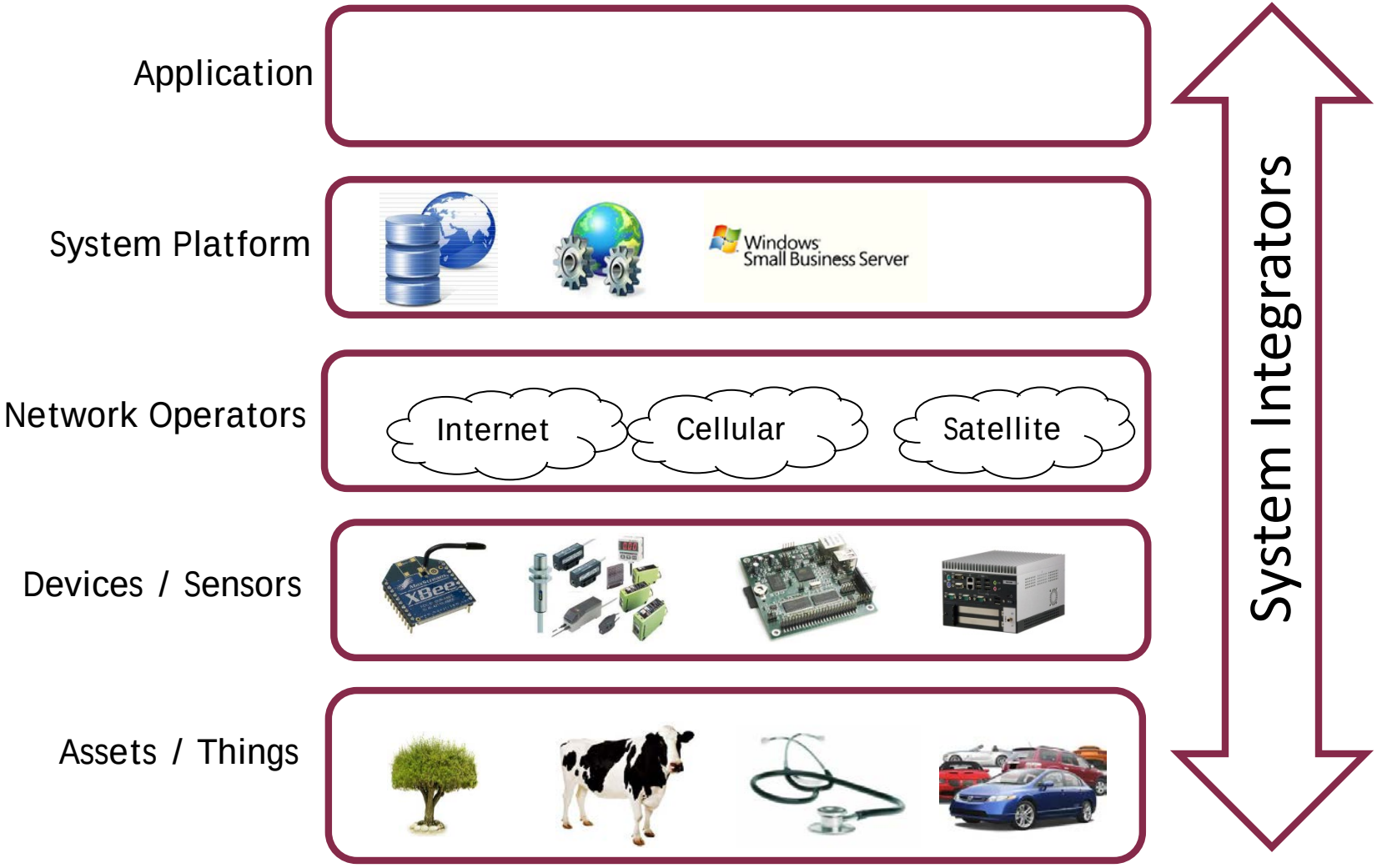
DIKW Pyramid

- It is a hierarchical presentation for the relationships of information transformation



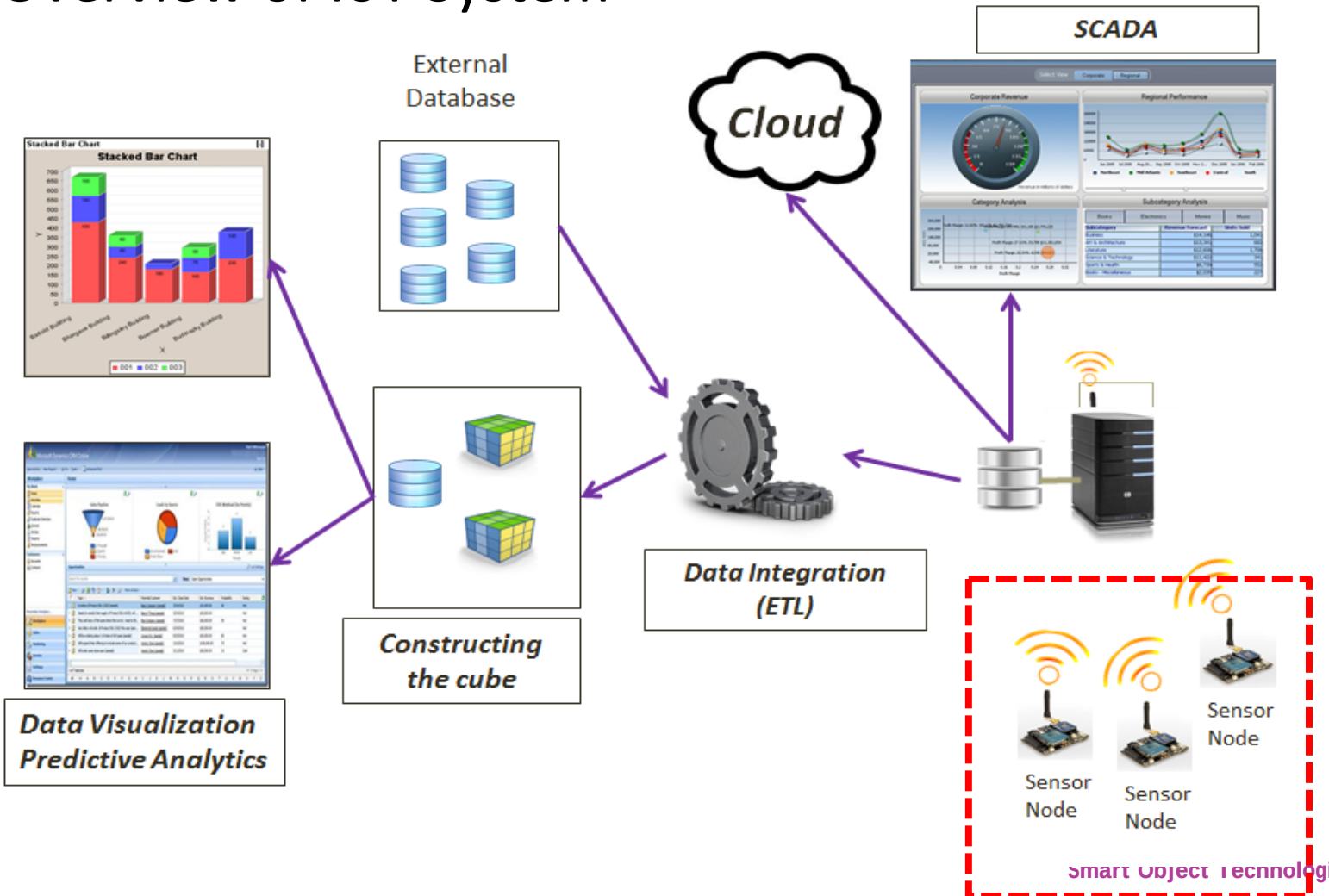
Source: Cisco IBSG, April 2011

INTERNET OF THINGS



INTERNET OF THINGS

Overview of IoT System



INTERNET OF THINGS

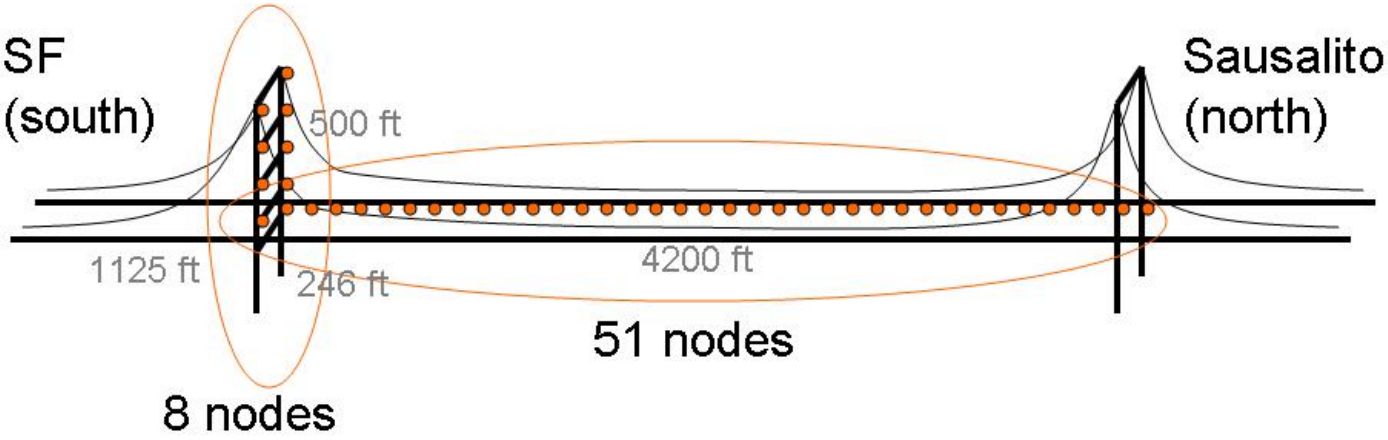
Applications of IoT

- Structural Health Monitoring
  - Sensors on bridge to monitor ambient vibrations
- Traffic Control
  - Sensors to detect vehicular activities like speed
  - Temperature sensor to monitor road condition (snow, ice, or water)

INTERNET OF THINGS

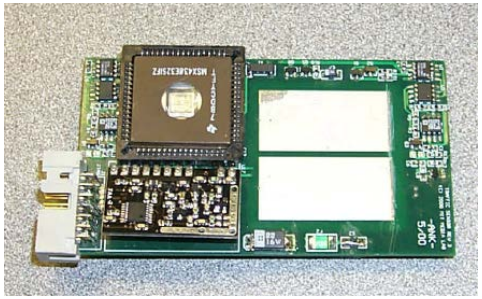
Structural Health Monitoring

Golden Gate Bride
(San Francisco)

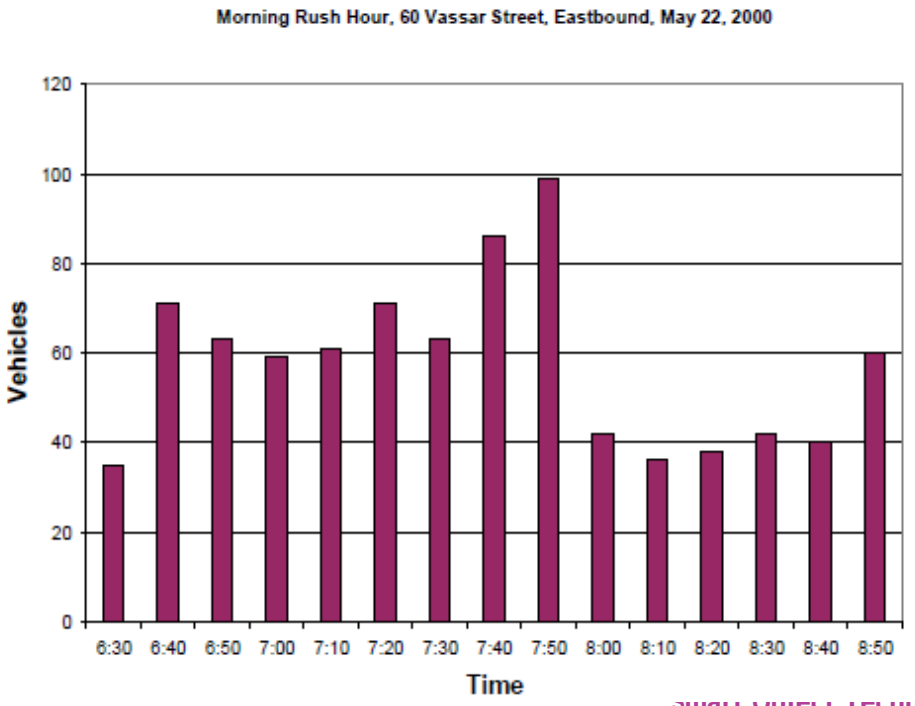


INTERNET OF THINGS

Traffic Control



Intelligent Transportation Systems
(By Ara N. Knaian)



WIRELESS COMMUNICATION TECHNOLOGY

Wireless Communication Technology describes how devices in a networking environment will interact with each other through wireless transmission.

Different technology differs with one another in terms of the following considerations for smart objects

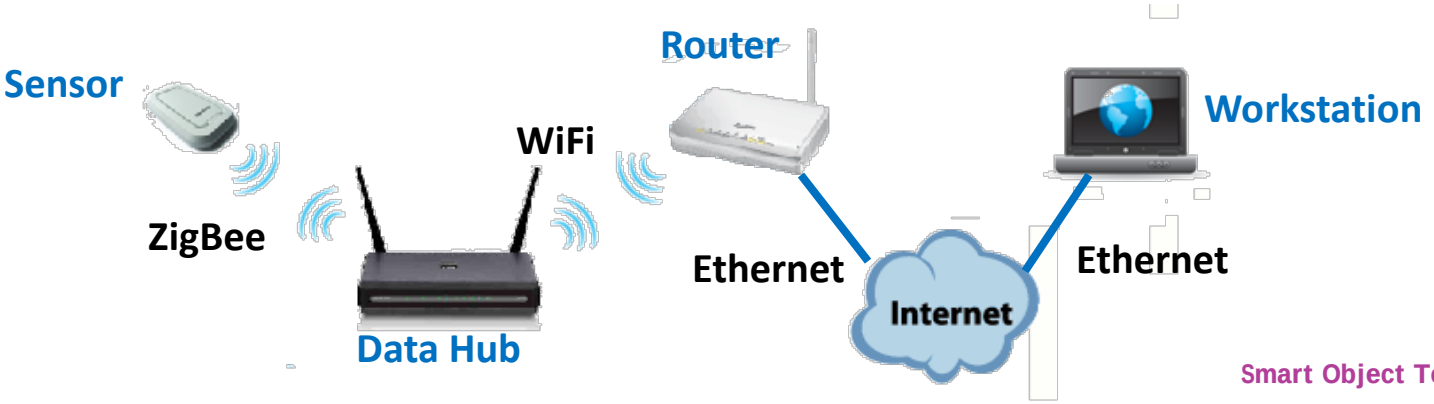
- Power requirement
- Transmission protocols
- Transmission frequency
- Transmission speed (data rate)
- Transmission distance

WIRELESS COMMUNICATION TECHNOLOGY

The following were some examples of different types of Wireless Communication technology

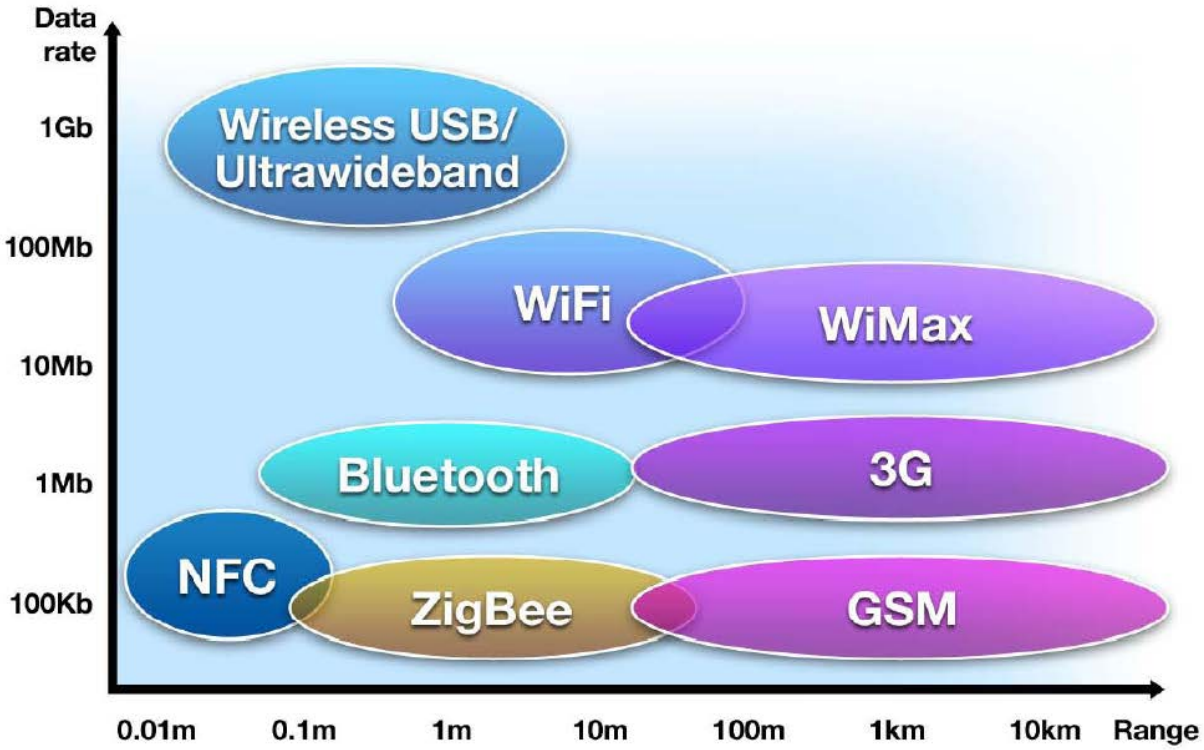
- Wi-Fi
- Bluetooth
- ZigBee
- 3G
- GSM (Global System for Mobile communication)

Various communication technologies may be used together to transfer data from one place to another



WIRELESS COMMUNICATION TECHNOLOGY

A graph that depicts the distance against data rate of various Wireless Communication Technologies



REVIEW QUESTIONS

REVIEW QUESTIONS

The _____ is a hierarchical presentation for the relationships of information transformation?

A. Information Pyramid
B. Maslow's Pyramid
C. DIKW Pyramid
D. MENSA Pyramid

Answers => C

REVIEW QUESTIONS

What is the hierarchical presentation for the relationships of information transformation known as?

A. DIKW Pyramid
B. KIWD Pyramid
C. WIRK Pyramid
D. KIDW Pyramid

Answers => A

REVIEW QUESTIONS

What is the definition of DIKW?

A. Dig, Identify, Key, Withhold
B. Do, Iterate, Know, Wise
C. Development, Integration, Kick-off, Warranty
D. Data, Information, Knowledge, Wisdom

Answers => D

REVIEW QUESTIONS

In the hierarchical information transformation, which of the following benefits humanity the most?

A. Information
B. Wisdom
C. Data
D. Knowledge

Answers => B

REVIEW QUESTIONS

In the hierarchical information transformation, which of the following benefits humanity the least?

A. Information
B. Wisdom
C. Knowledge
D. Data

Answers => D

REVIEW QUESTIONS

Which of the following is not one of the considerations for wireless communication technology for smart objects?

A. Power requirement
B. Speed
C. Sensor technology
D. Distance

Answers => C

REVIEW QUESTIONS

Which of the following is one of the considerations for wireless communication technology for smart objects?

A. Signal conditioning
B. Resistance requirement
C. Sensor technology
D. Power requirement

Answers => D

REVIEW QUESTIONS

Which of the following is not one of the wireless communication technology?

A. Bluetooth
B. CSMA-CD
C. ZigBee
D. Wi-Fi

Answers => B

REVIEW QUESTIONS

What of the following wireless communication technology has the lowest data rate?

A. ZigBee
B. 3G
C. Bluetooth
D. Wi-Fi

Answers => A

REVIEW QUESTIONS

What of the following wireless communication technology has the highest data rate?

A. ZigBee
B. 3G
C. Bluetooth
D. Wi-Fi

Answers => D

REVIEW QUESTIONS

What of the following wireless communication technology has the lowest transmission distance?

A. 3G
B. ZigBee
C. GSM
D. Wi-Max

Answers => B

REVIEW QUESTIONS

What of the following wireless communication technology has the longest transmission distance?

A. 3G
B. ZigBee
C. Bluetooth
D. Wi-Fi

Answers => A