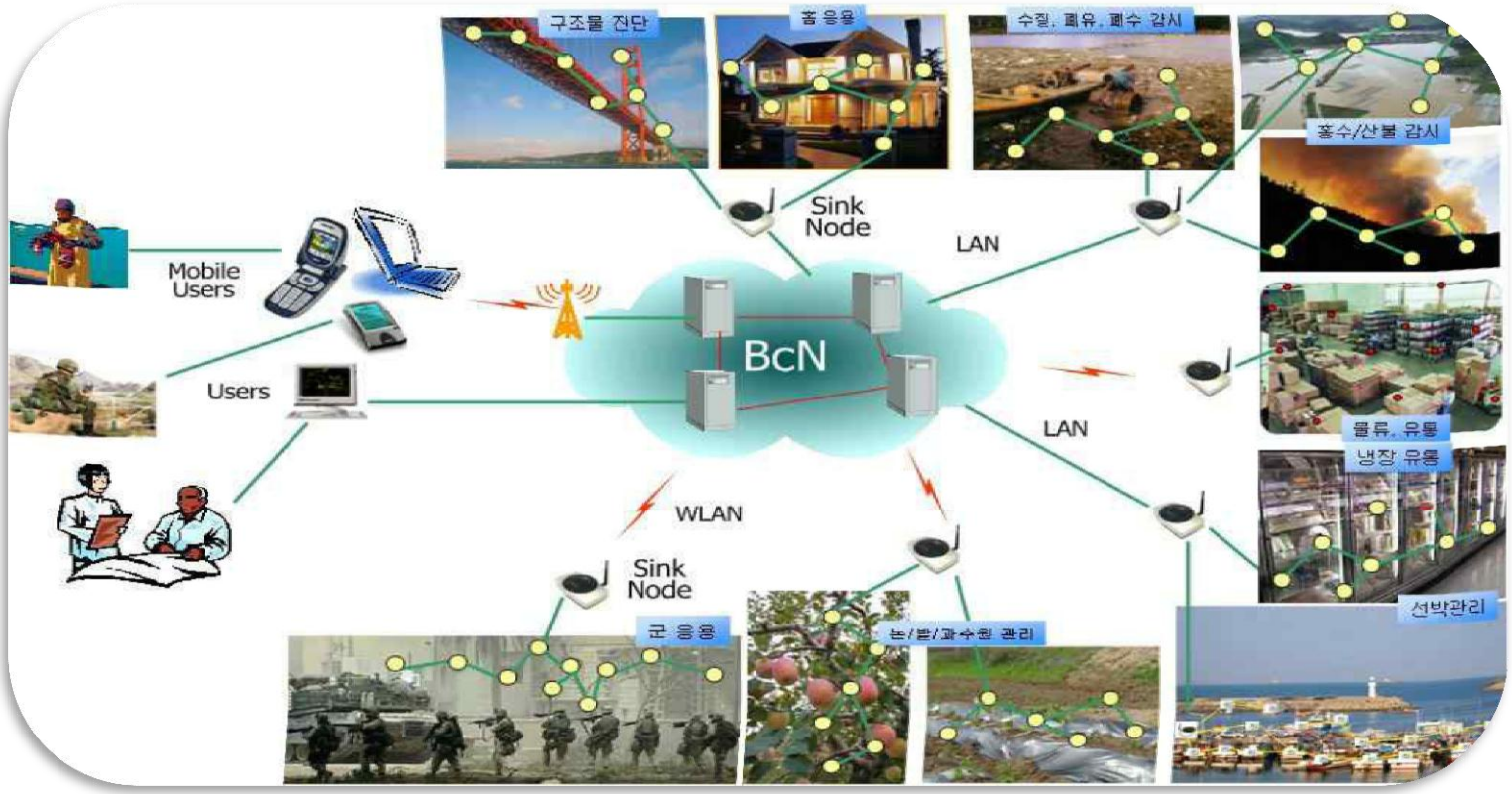
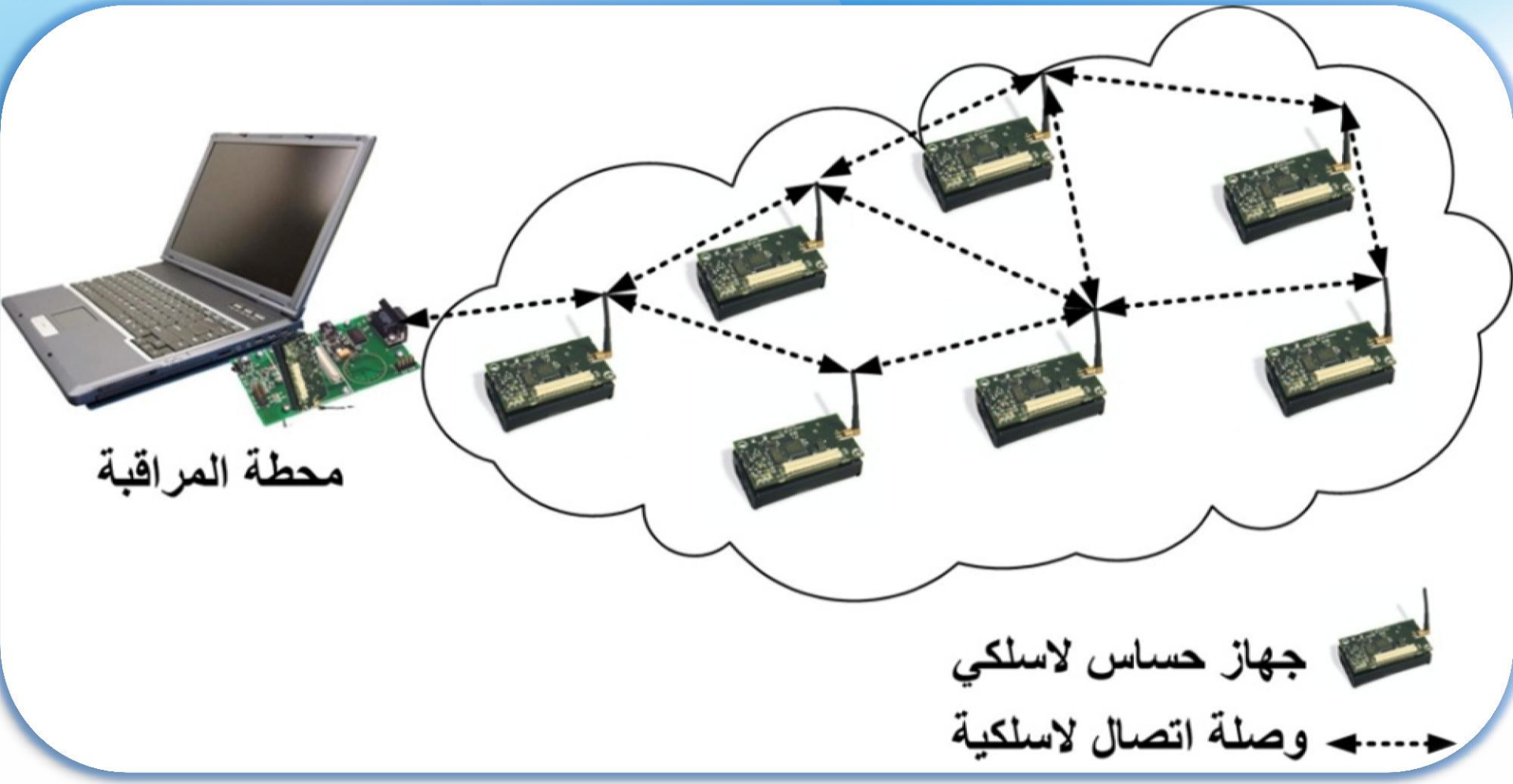
Wireless Sensor Network and Its Applications



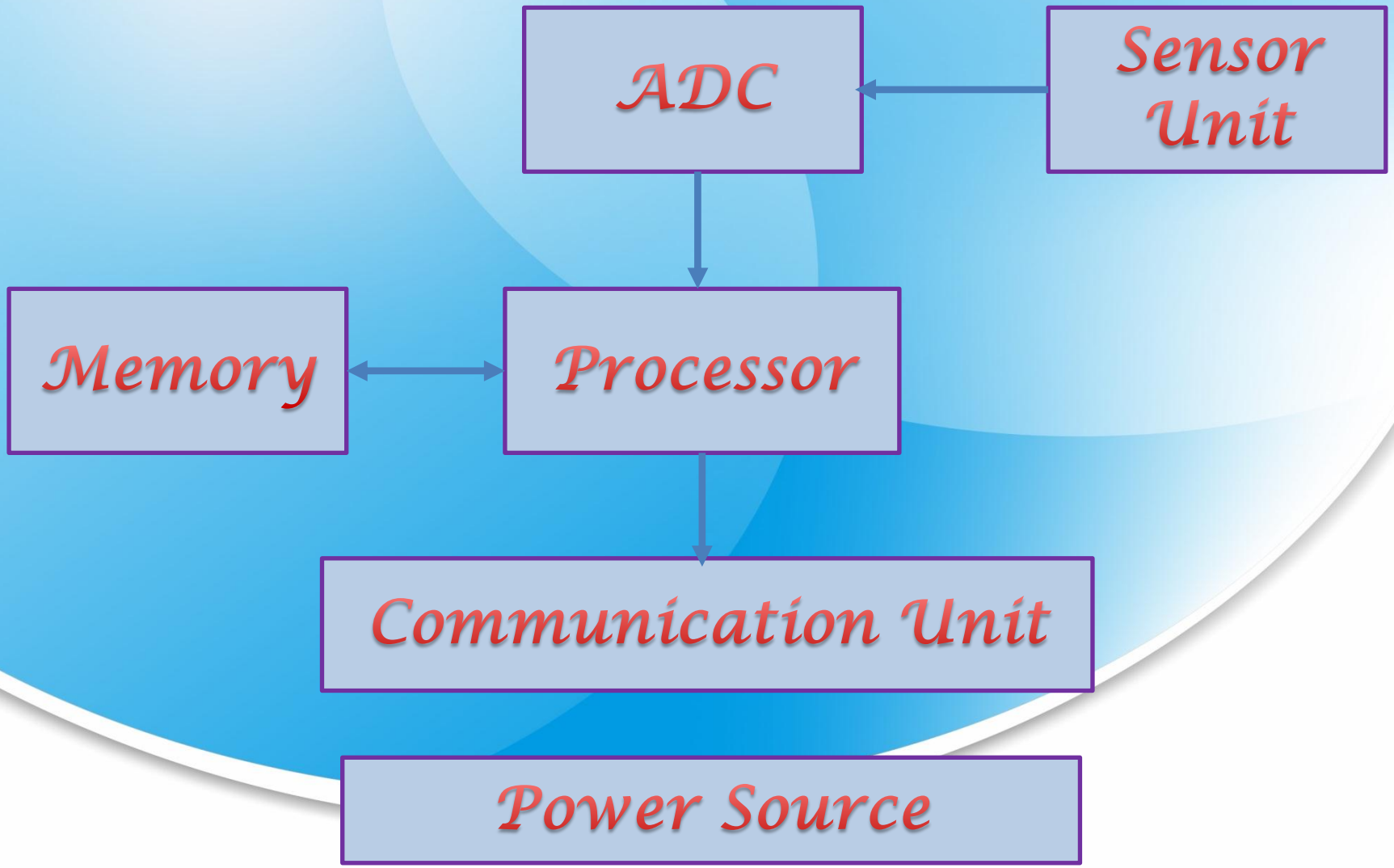
Asst. Lecturer Hussien Y. Radhi

❖ - Introduction

A WSN can be generally described as a network of nodes that cooperatively sense and may control the environment enabling interaction between persons or computers and the surrounding environment.

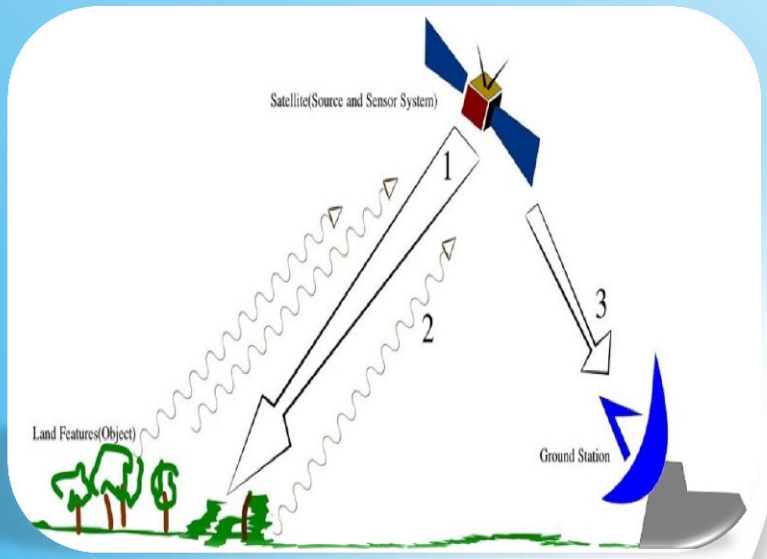


❖ Basic Components of A Node



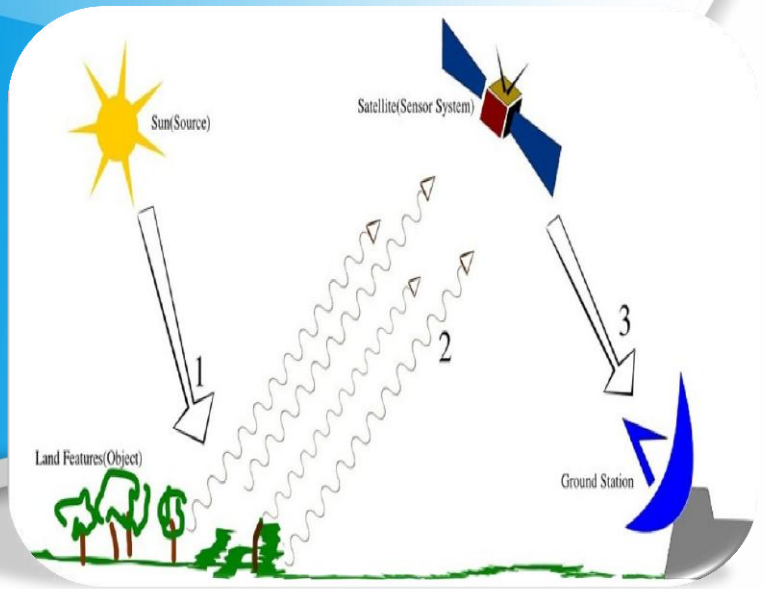
❖ Active Remote Sensing

In this type, the sensors send a electromagnetic waves and received the reflected waves to send them to the ground reception station



❖ Passive Remote Sending

These sensors received the emitted waves from the objects

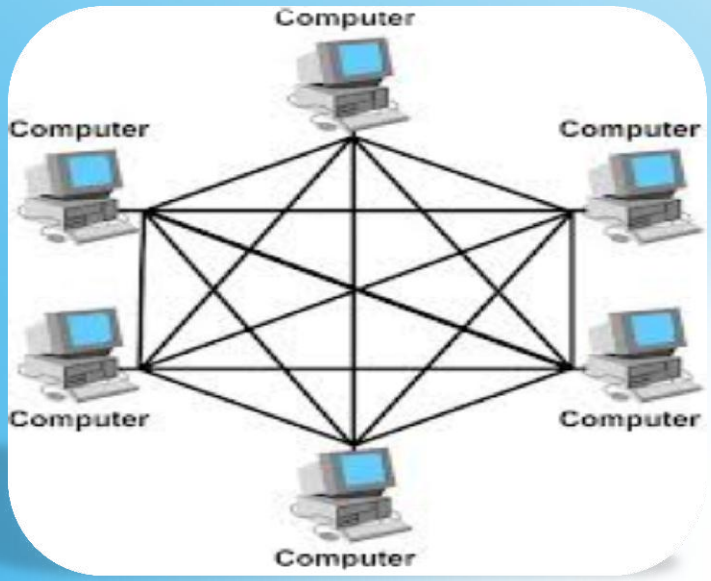


❖ Sensor Node Characteristics

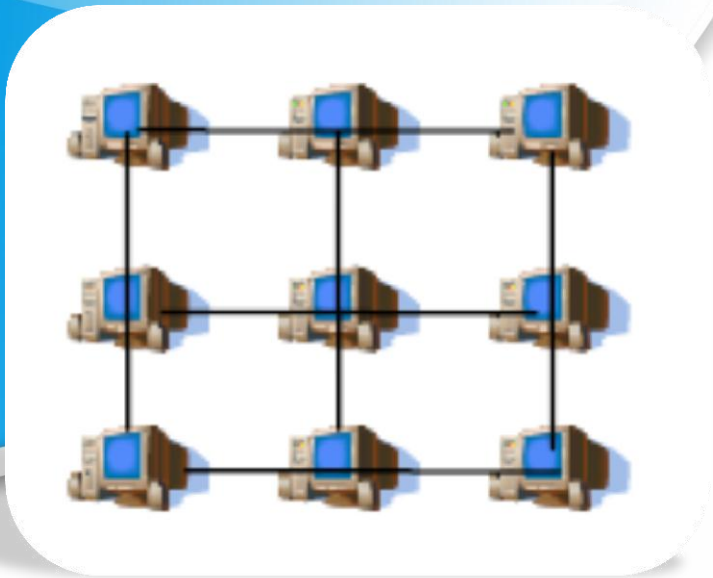
- Low cost
- Low power
- Small size
- Short communication distance

❖ Types of WSN

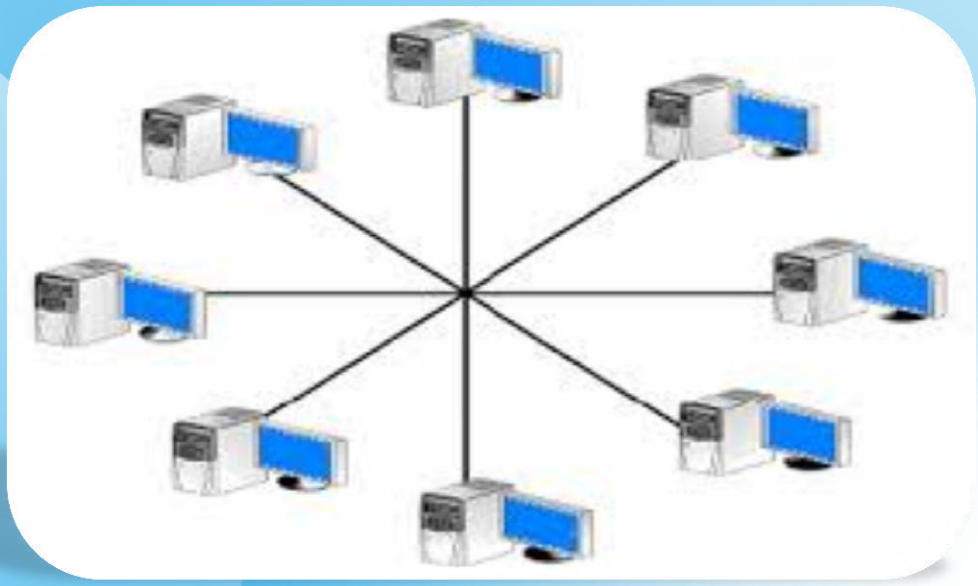
- **fully connected networks**



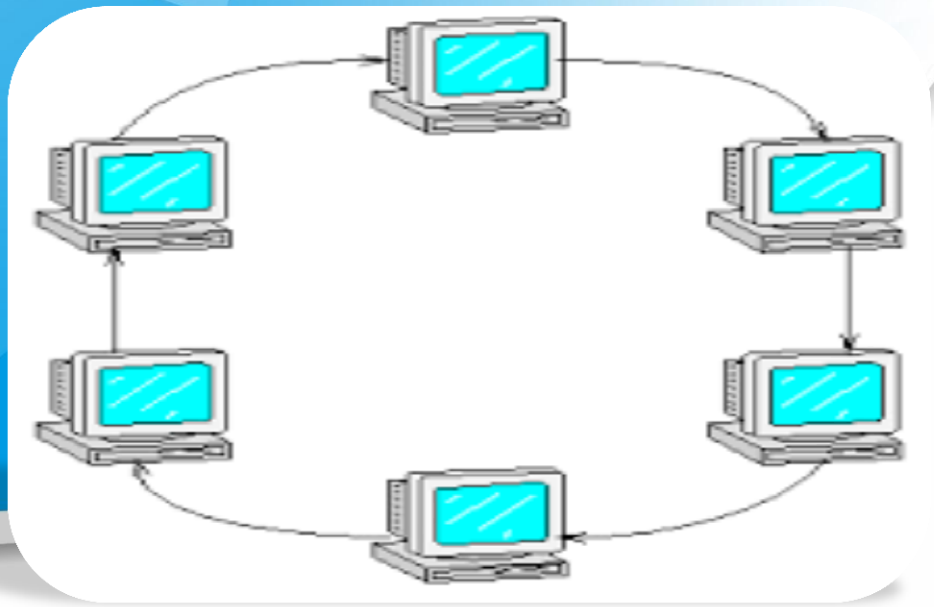
- **Mesh network**



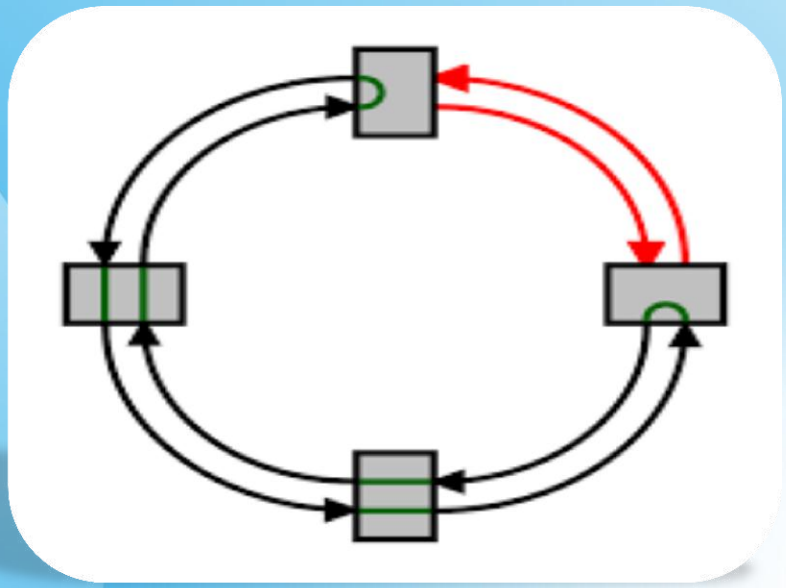
- **Star Network**



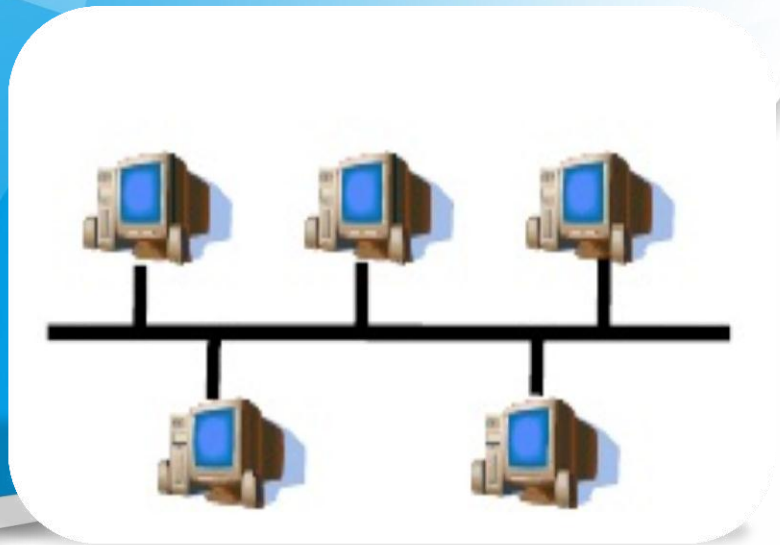
- **Ring Network**



- **Self – Healing Ring**



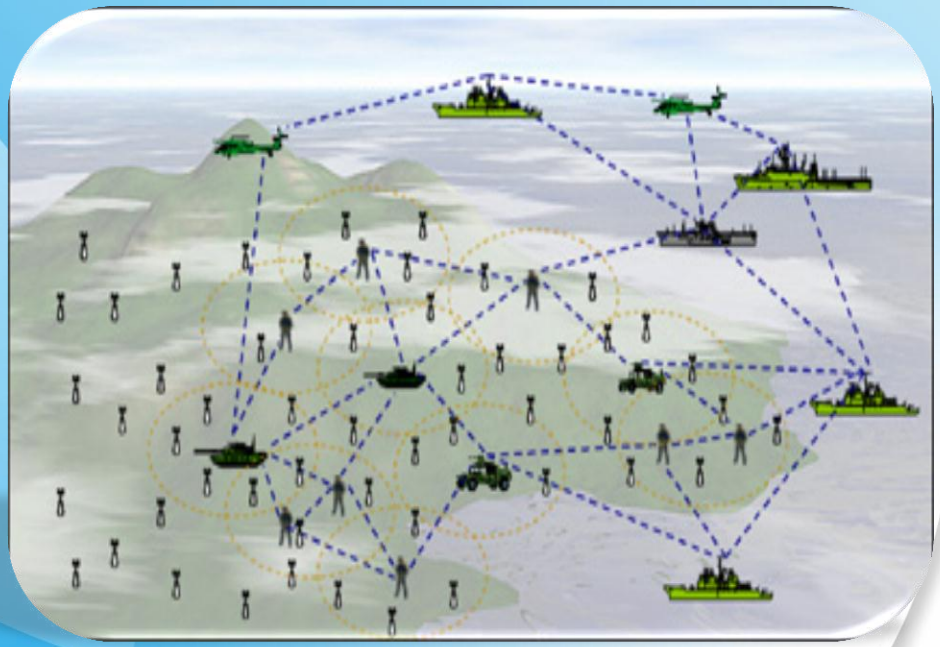
- **Bus Network**



❖ Application of WSN

➢ Military applications

Monitoring inimical forces‹ Monitoring friendly forces and equipment Military-theater or battlefield surveillance Targeting Battle damage assessment Nuclear, biological, and chemical attack

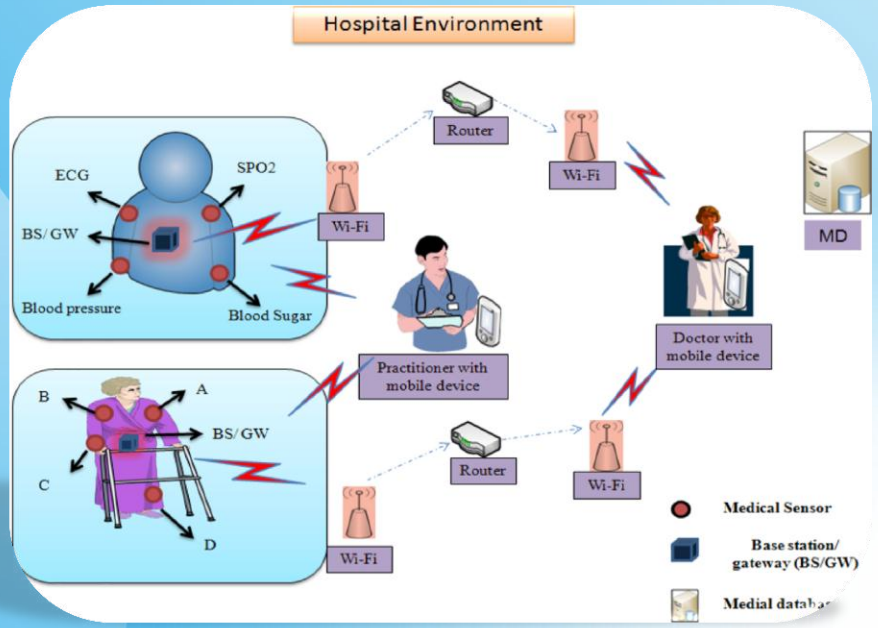


➢ Environmental applications

Microclimates Forest fire detection‹ Flood detection and Precision agriculture

➢ Health applications

Remote monitoring of physiological data Tracking and monitoring doctors and patients inside a hospital Drug administration Elderly assistance

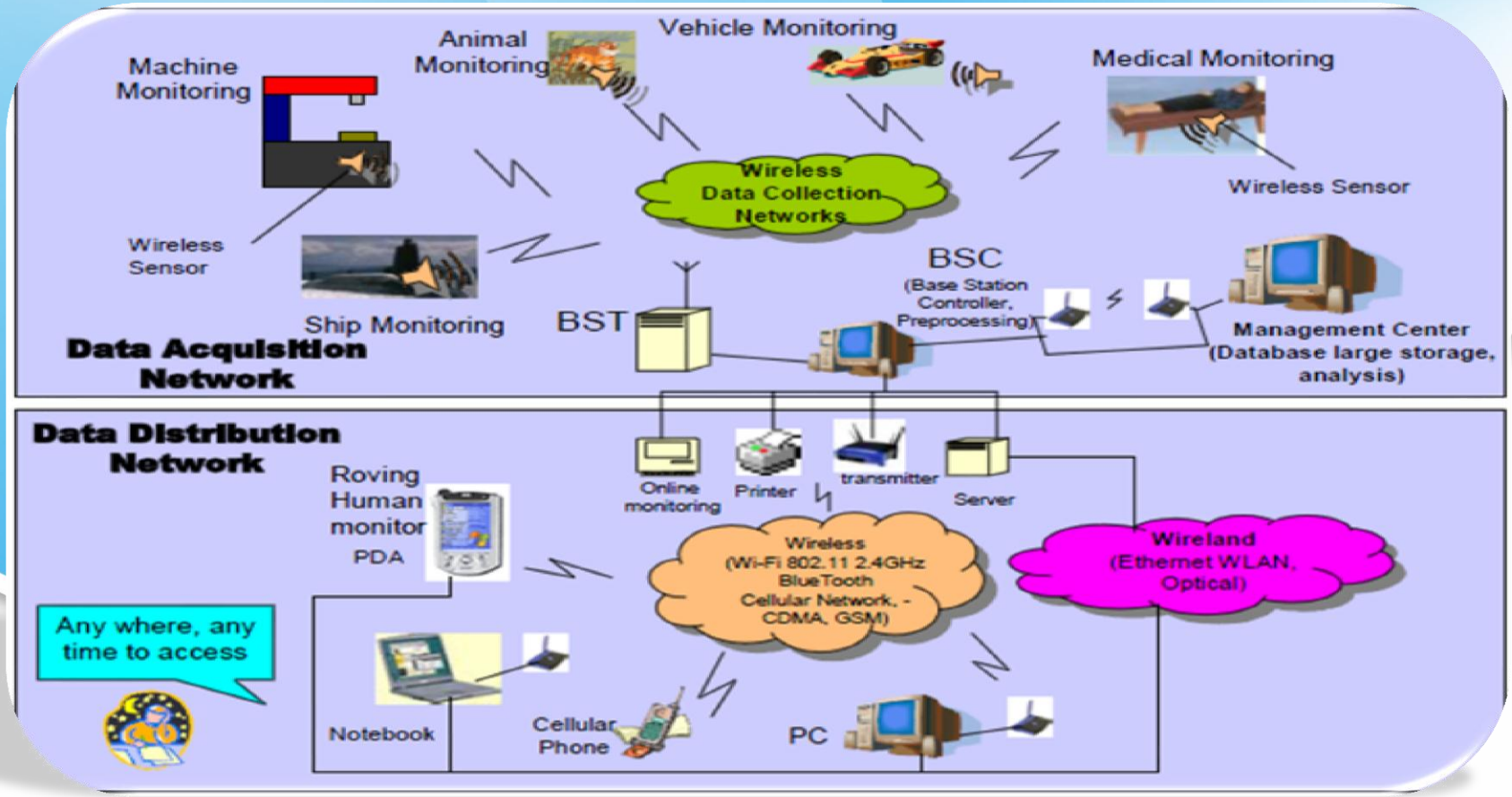


➢ Home applications

Home automation
Instrumented environment

➢ Commercial applications

Environmental control in industrial and office buildings， Inventory control



❖ Challenges of WSN

1. Design Challenges

- **Heterogeneity**
  The devices deployed may be of various types and need to collaborate with each other.
- **Distributed Processing**
  The algorithms need to be centralized as the processing is carried out on different nodes.
- **Low Bandwidth Communication**
  The data should be transferred efficiently between sensors.

2. Operational Challenges

- Energy Efficiency
- Limited storage and computation
- Low bandwidth and high error rates
- Errors are common
- Wireless communication
- Noisy measurements
- Node failure are expected

❖ Advantages

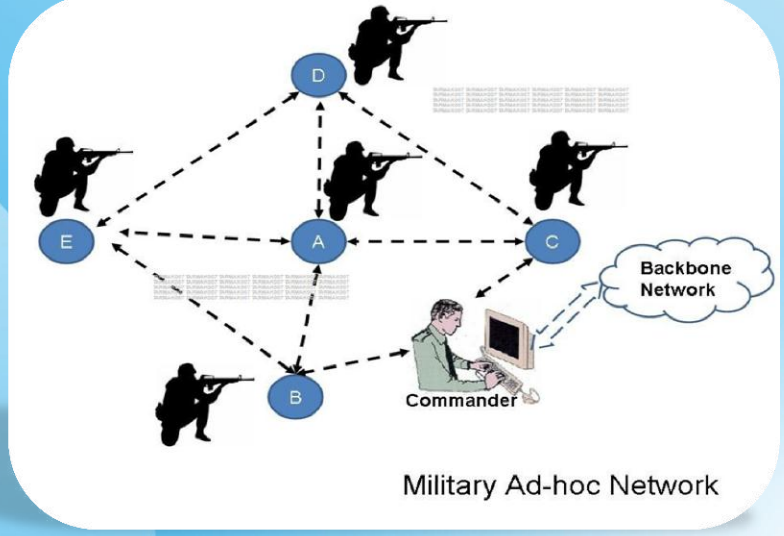
1- Espionage purposes and monitor enemy installations

2- low power consumption, low node cost

3- Use satellite for scientific research and monitoring of the planets

4- The possibility of studying the urban environment.

5- Data recording that can not be seen with the human eyes.



❖ *Disadvantages*

- Safety.
- Treatment of the mistakes of the network and routing information.
- The change in the internal structure of the wireless sensor network

Conclusion and Recommendations

- Wireless networks rely on remote sensing.
- The type of WSN depends on the environment, for example Mesh method can not be used in Mountainous.
- WSN impact on the most important areas of life and through use it in areas of military, health, …etc. to provide the best performance.
- Through the above it can be found that WSN can be used in Iraq to detect explosive materials from a long distance at the Checkpoints.

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THANKS