

The optimization of power consumption of Wireless sensor network (WSN) based on traffic behavior using 6LoWPAN standards

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Introduction: Two significant issues with the existing WSN operation procedure, data gathering difficulty and network energy consumption, have a significant negative impact on the WSN's reliability.

Aim: To produce an algorithm that estimates the probability of successful transmission on each link of WSN, concerning energy consumption.

Objectives: Testing new WSN approaches in the framework of IEEE 802.15.4 LoWPAN - enabled sensor networks in disaster scenarios.

Research question: How can energy consumption be managed to reduce the effect on linear WSN performance and network precision to prolong its lifetime in industrial applications and harsh environments, to avoid resulting in the "energy hole problem"?

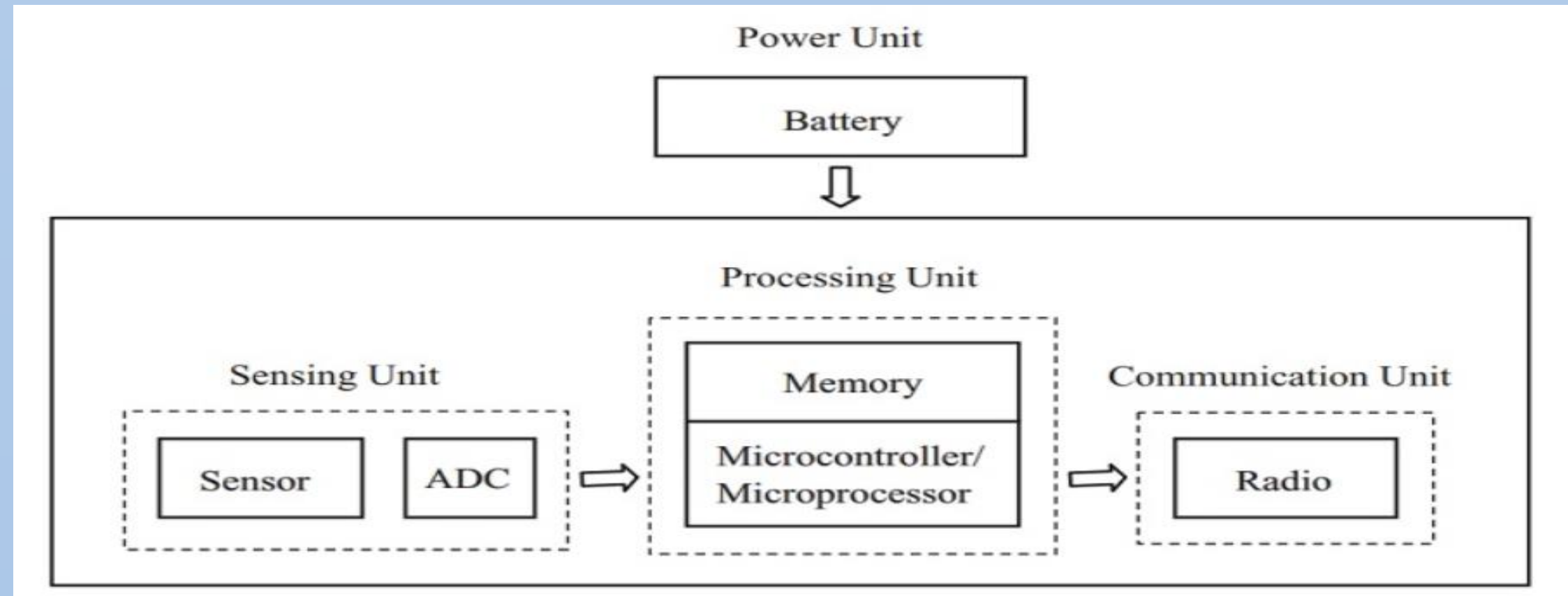


Figure 3: Wireless sensor node architecture [5]

Main challenges

- Energy efficiency
- Dynamic network
- Coverage problem
- Heterogeneity ratio

Area to consider WSN:

- Consumer electronics
- Environment
- Home control
- Conditioning (HVAC)
- Military
- Industrial applications

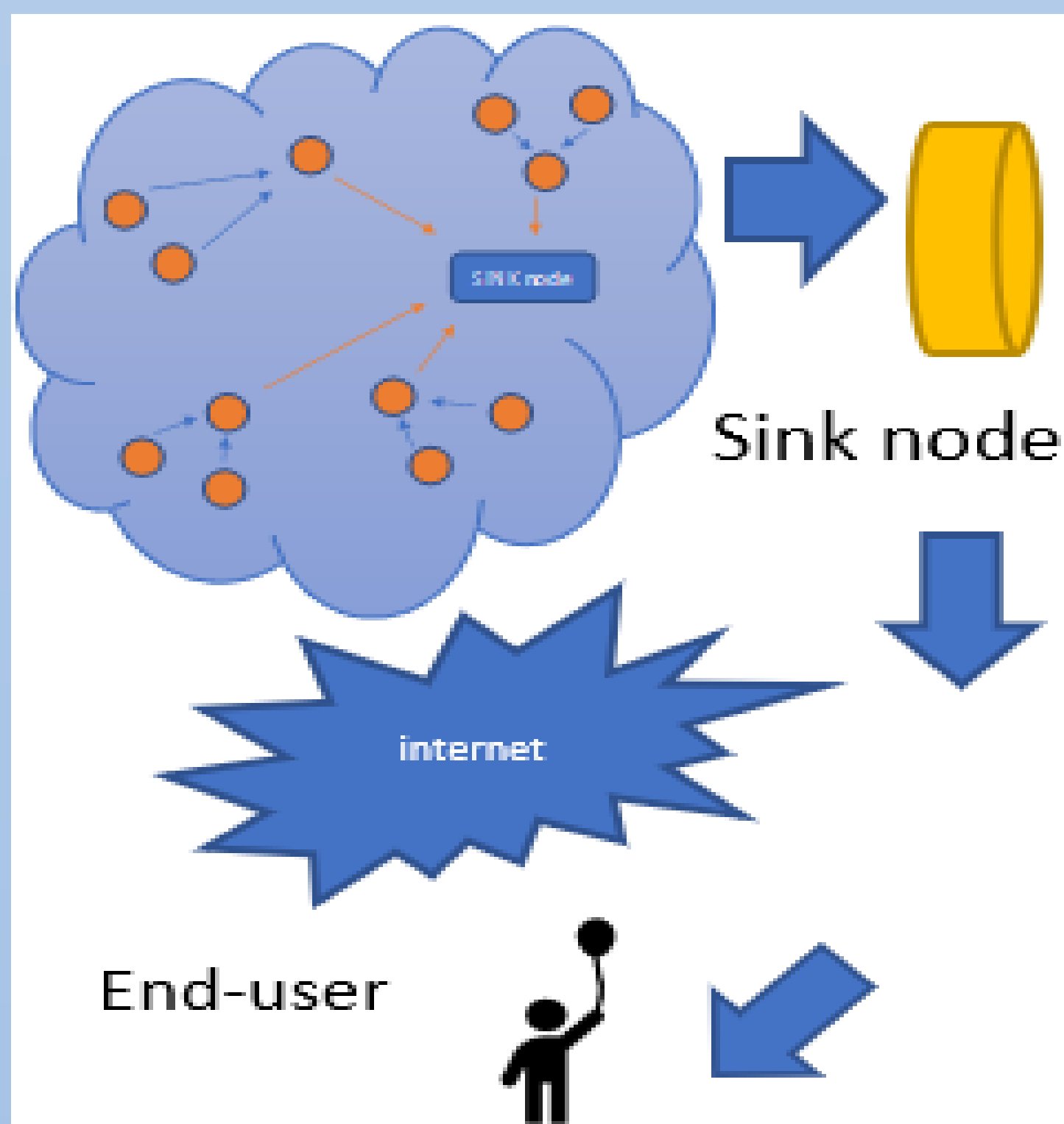


Figure 1: Architecture of WSN

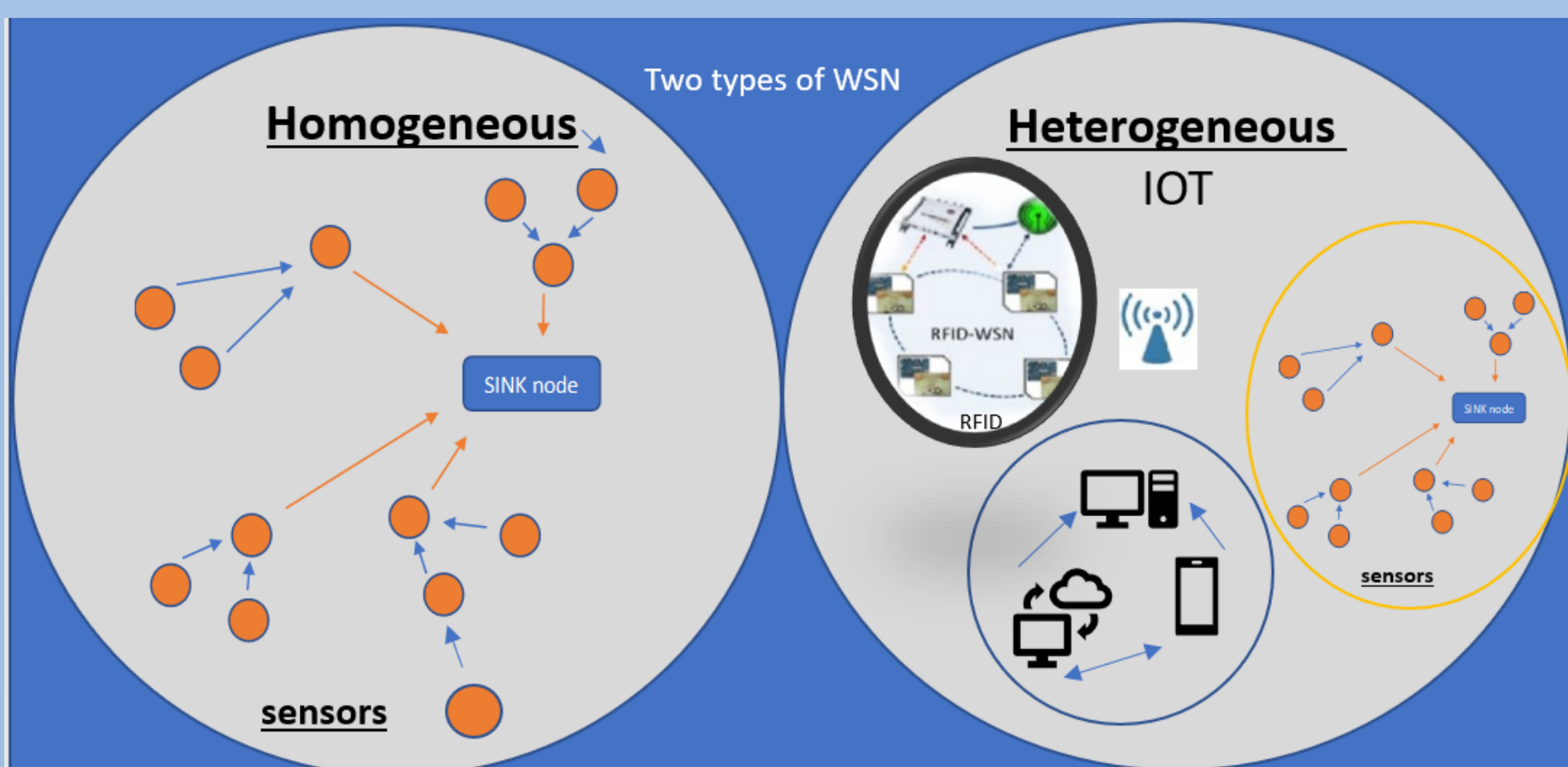


Figure 2: Types of WSN

PROPOSED METHOD

In WSN and ad hoc networks (MANETs), when nodes move erratically in any direction, various strategies have been put up to extend network lifetime. In these networks, there are two unavoidable optimization issues: energy efficiency and mobility awareness. Distance between the nodes will be looked at, which provides insight into the amount of time needed to exchange data from source to destination.

In this manner, the node's expense and energy cost will be determined to decide the most efficient routing path between the source and destination nodes.

As well as the energy consumption aspect, the proposed process will check the effective data transport, reduced packet loss, and network traffic.

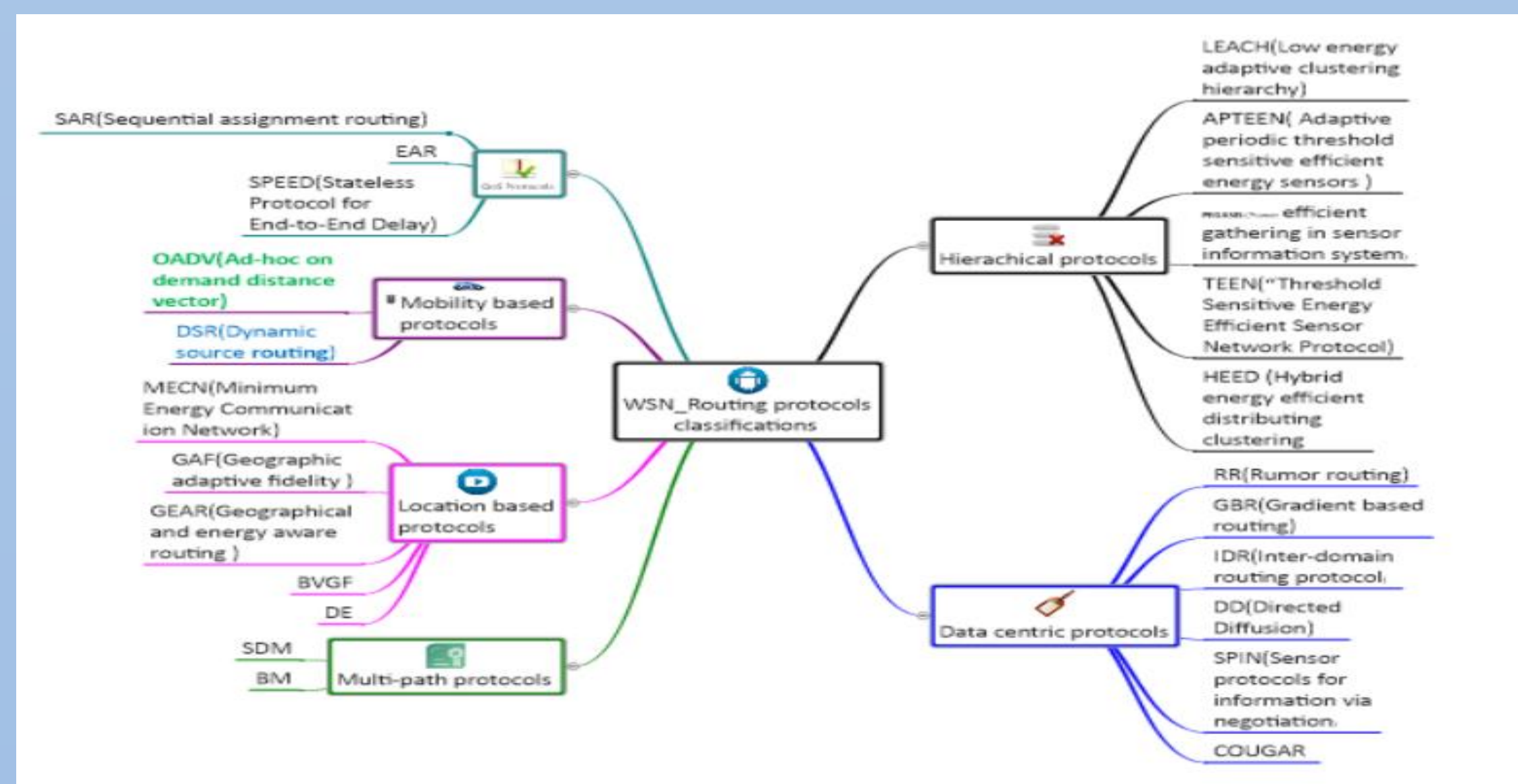


Figure 4: WSN routing protocols

Routing protocols

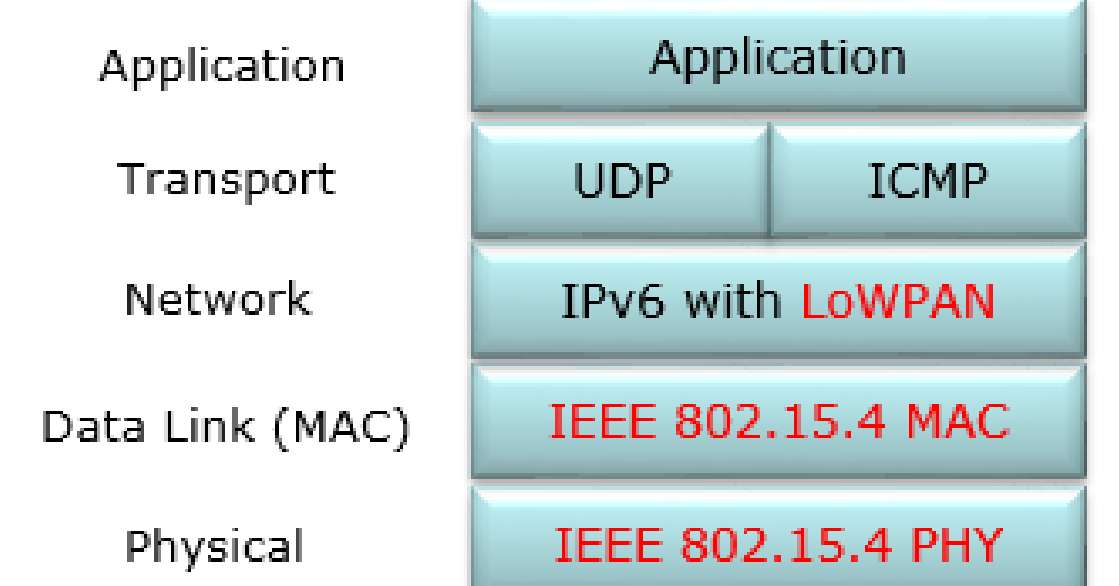
Due to the widespread use of wireless sensor networks and the impossibility of finding a routing protocol that works for all applications, routing has emerged as one of the main technologies of WSNs.

AODV (Ad-Hoc on-demand distance vector) is a decentralized type of remote system, meaning it is independent of a previous foundation, such as switches in wired networks or access points in supervised (foundation) remote systems. Each node performs coordination by delivering data to other nodes, so the choice of which nodes convey data is skilfully based on the accessibility of the framework.

6LoWPAN characteristics

- Low power, typically battery operated
- Low bandwidth. (250/40/20 kbps)
- Topologies include star and mesh
- Networks are Ad-hoc & devices have limited accessibility and user interfaces

The 6LoWPAN protocol is applicable in networks with limited resources (e.g. WSNAN).



6LoWPAN Stack
Fig (5) 6 LoWPAN stack[3]

References

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- 5) Administrator (2019) Basics of Wireless Sensor Networks (WSN) | Classification, Topologies, Applications, Electronics Hub. Available at: <https://www.electronicshub.org/wireless-sensor-networks-wsn/> (Accessed: 12 February 2023).