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WSN Protocol stack

Protocol Stack - Issues

- Dynamic environment
- Power control - Longetivity
- Protocol place in the sensor node architecture
- Protocol availability

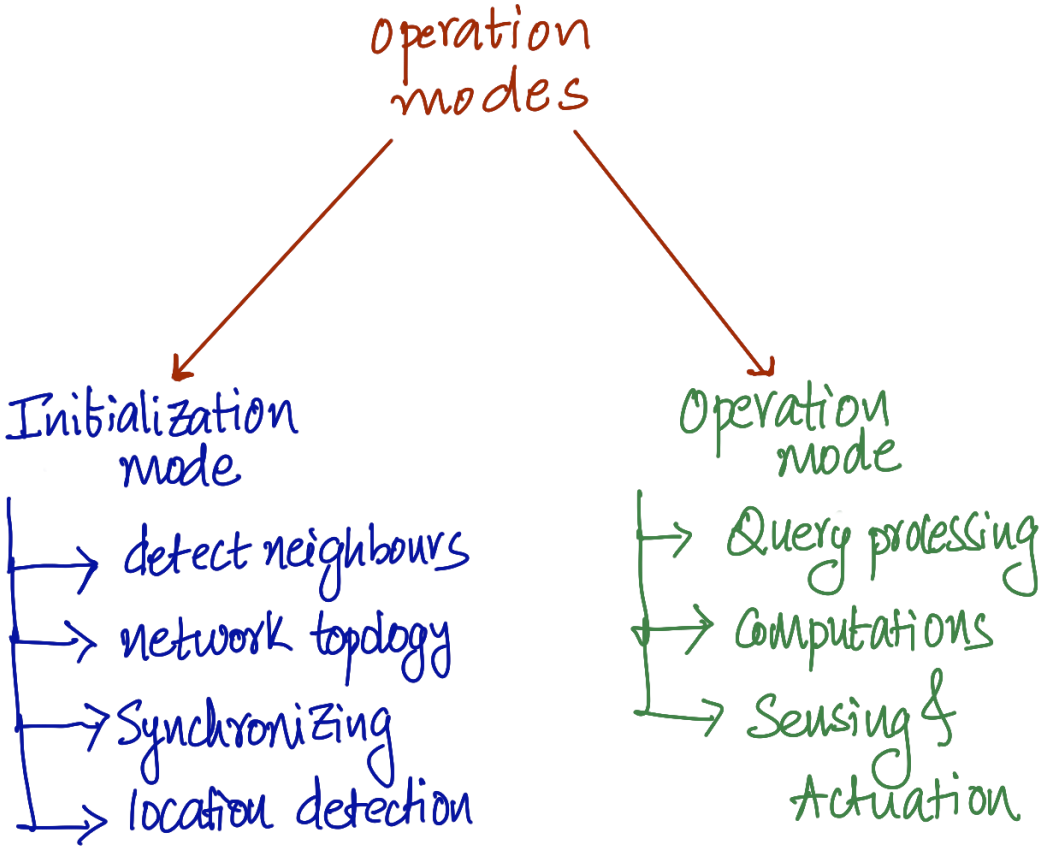
Dynamic Environment

- Sensor nodes address a dynamic environment
  - Nodes have to reconfigure themselves –
  - to adapt to the changes.
- resources are very limited
- Network - adapts its functionality to a new situation

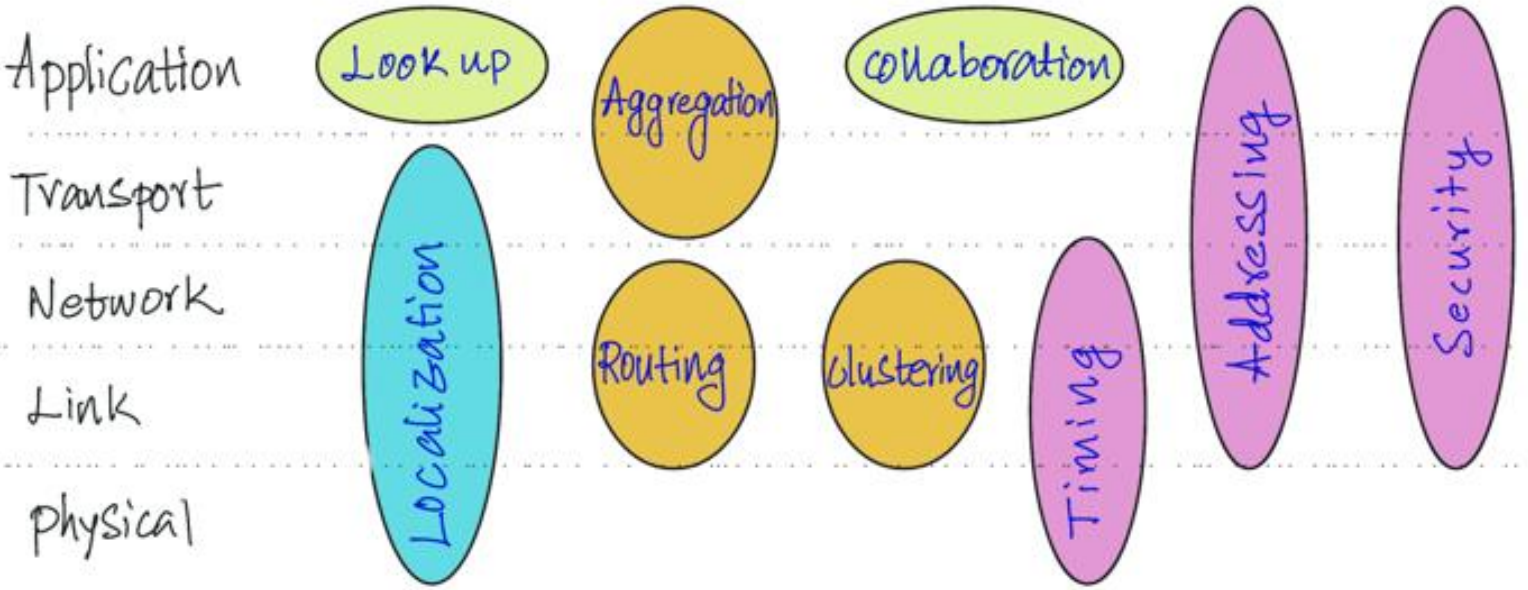
  -lower the use of the scarce energy & memory -

  maintain the integrity of its operation

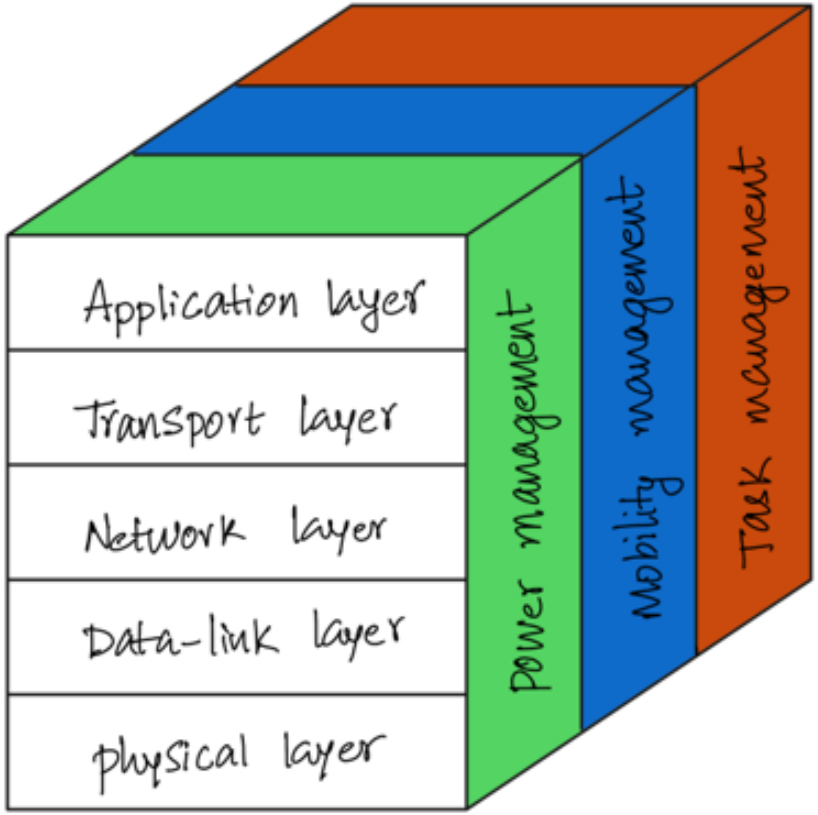
WSN


operation modes
Initialization mode
detect neighbours
network topology
Synchronizing
location detection
Operation mode
Query processing
Computations
Sensing & Actuation

WSN – Protocol stack approach



WSN – Protocol stack approach



WSN – Protocol stack approach

Physical layer

-- Operating frequency

* ISM vs. Licensed

-- Modulation type

* complex vs. simple

-- Hardware/software interfaces etc.

WSN – Protocol stack approach

Data Link layer

-- MAC

* accommodating sleeping nodes

* avoiding message collisions, overhearing and idle listening

* ARQ and Forward error correction

* creating & maintaining a list of neighboring nodes

* Overlapping channels

WSN – Protocol stack approach

Network Layer

-- Routing packets

-- Data centric routing

$ Interest dissemination

* Request broadcast

* Information publication

-- Data aggregation techniques

WSN – Protocol stack approach

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Transport layer

-- Connecting WSN to external network

-- Gateways with superior resources

Power Control

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- Traditionally done only at the physical layer,
- Energy consumption- is a major design constraint

  found in all

Error Control

- Normally resides in all protocol layers – worst case scenarios are handled
- WSN this redundancy- too expensive
- Adopting a central view on how error control is performed and cross-layer design reduces the resources spent for error control