

Power Saving MAC Protocols

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Why Power Saving is important

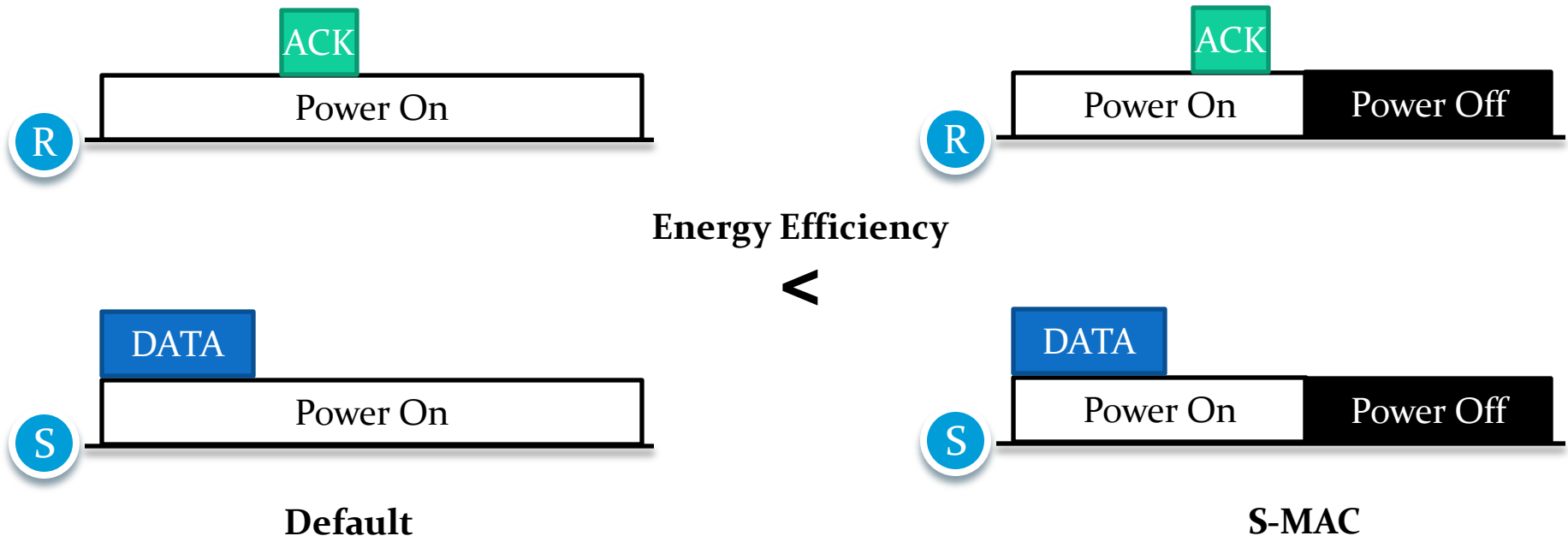
- Sensor nodes are operating with small batteries
 - over long periods about 1~2 years



- Consider, characteristics of sensor-net applications
 - Do sensing a few times and transmit small data
 - ex) report the temperature of a room every hour

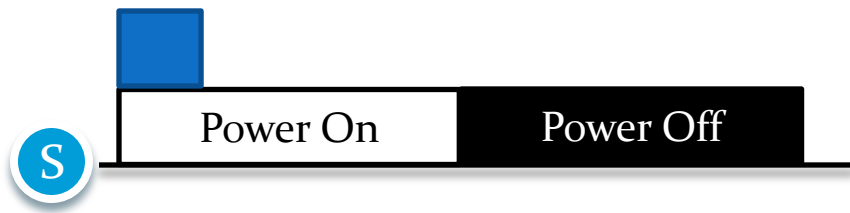
Sensor MAC (S-MAC)

- Save much energy by turning on and off a radio periodically



SMAC – Duty Cycle

- 50% duty cycle vs. 25% duty cycle
 - Trade-offs between the energy-savings and the delay



More Energy Usage

Less Delay

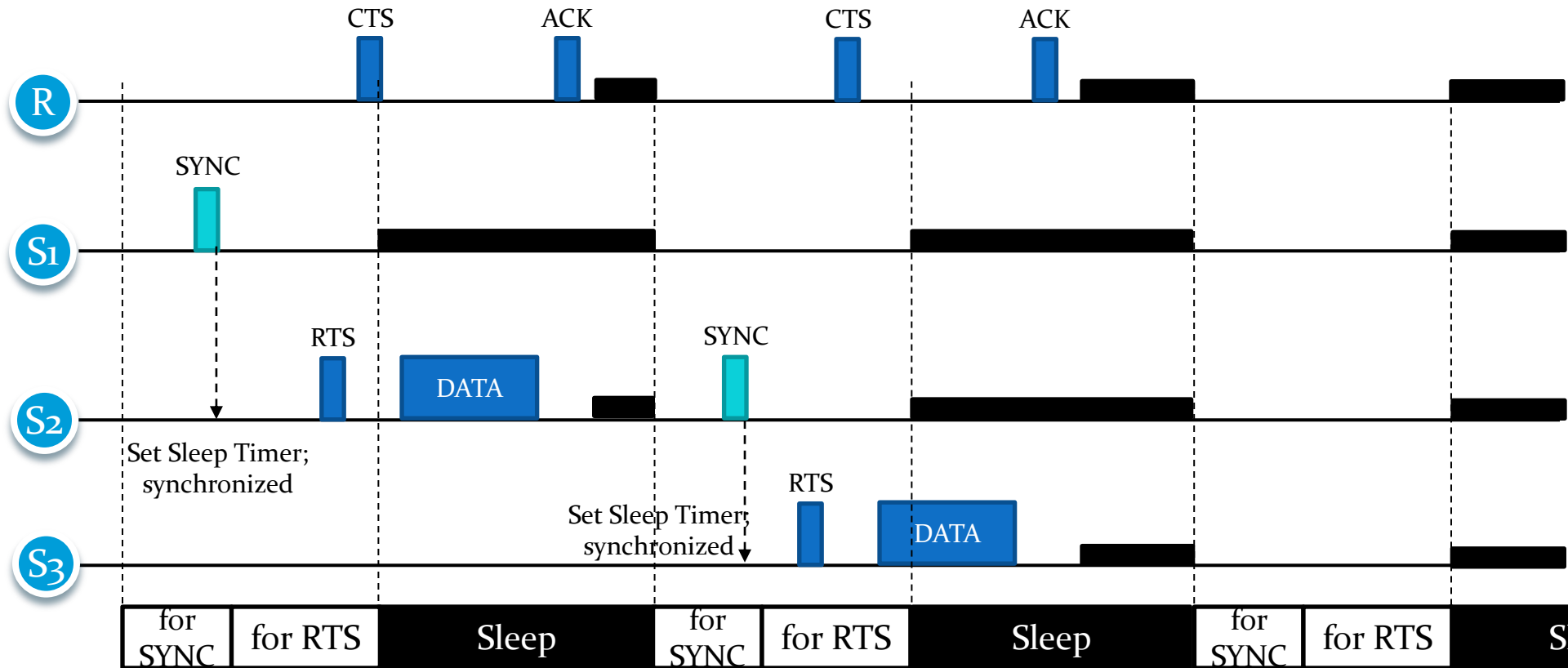


Less Energy Usage

More Delay

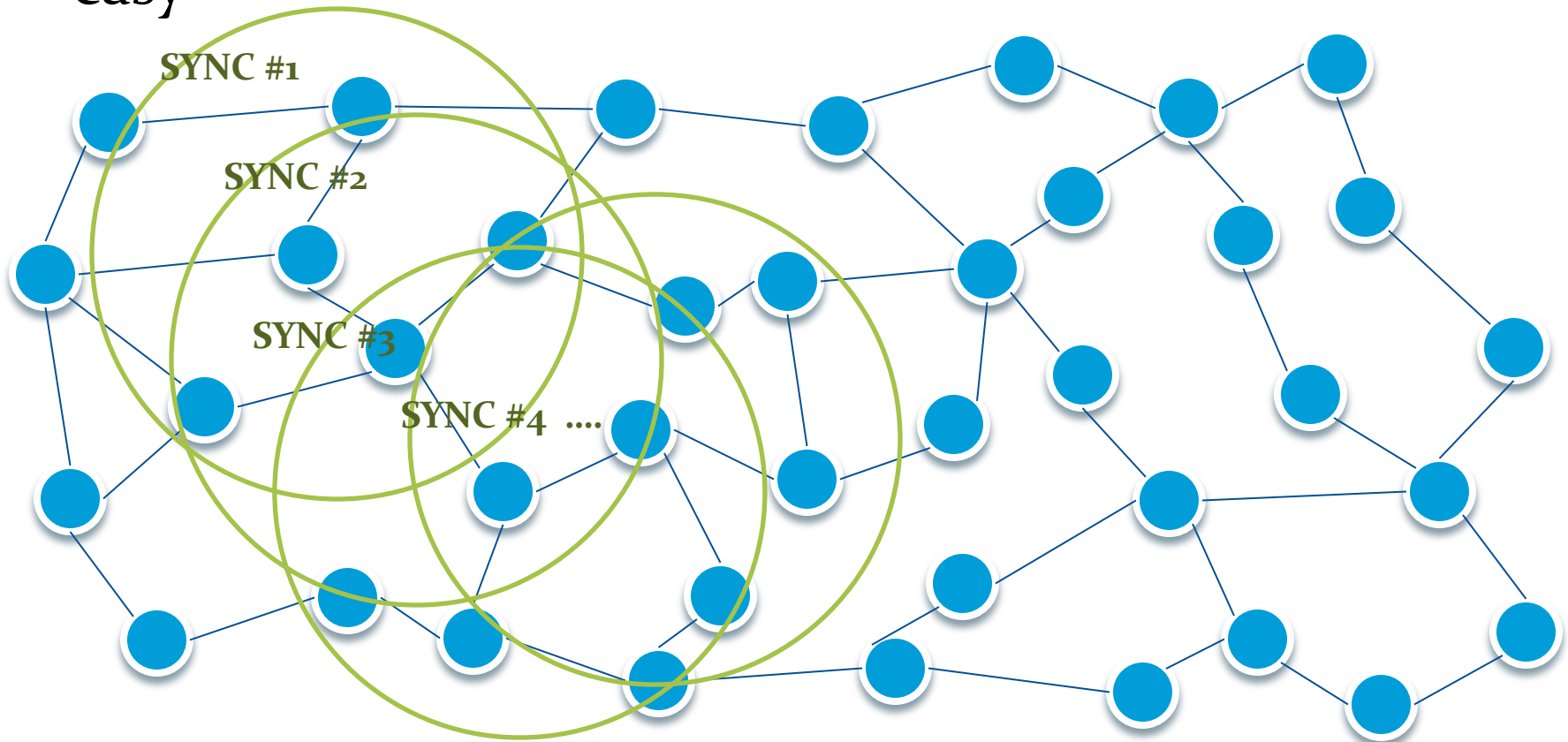
SMAC - Synchronization

- Every node must be synchronized to communicate



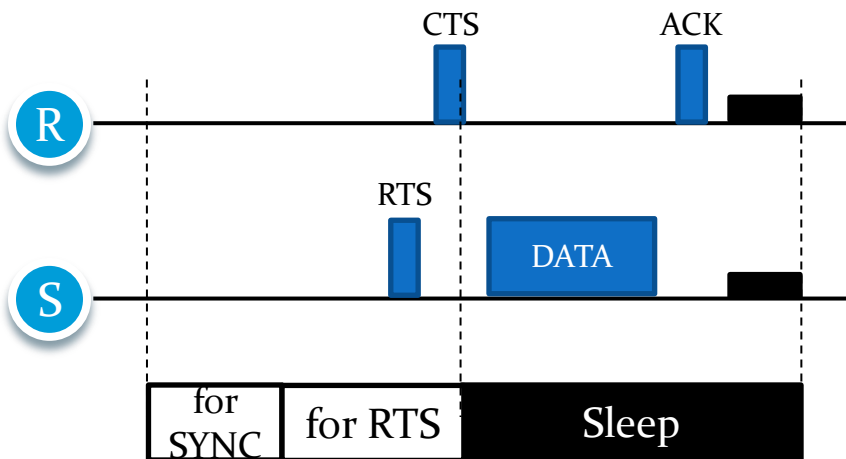
SMAC - Synchronization

- Maintaining the synchronization of all nodes is not easy

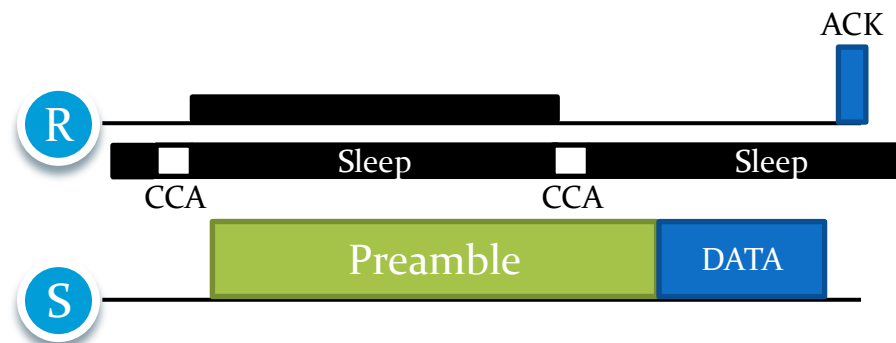


Berkeley MAC (B-MAC)

- Do not need the synchronization (very simple)
 - Disadvantages: energy waste for long preamble
 - cannot be implemented on current platforms



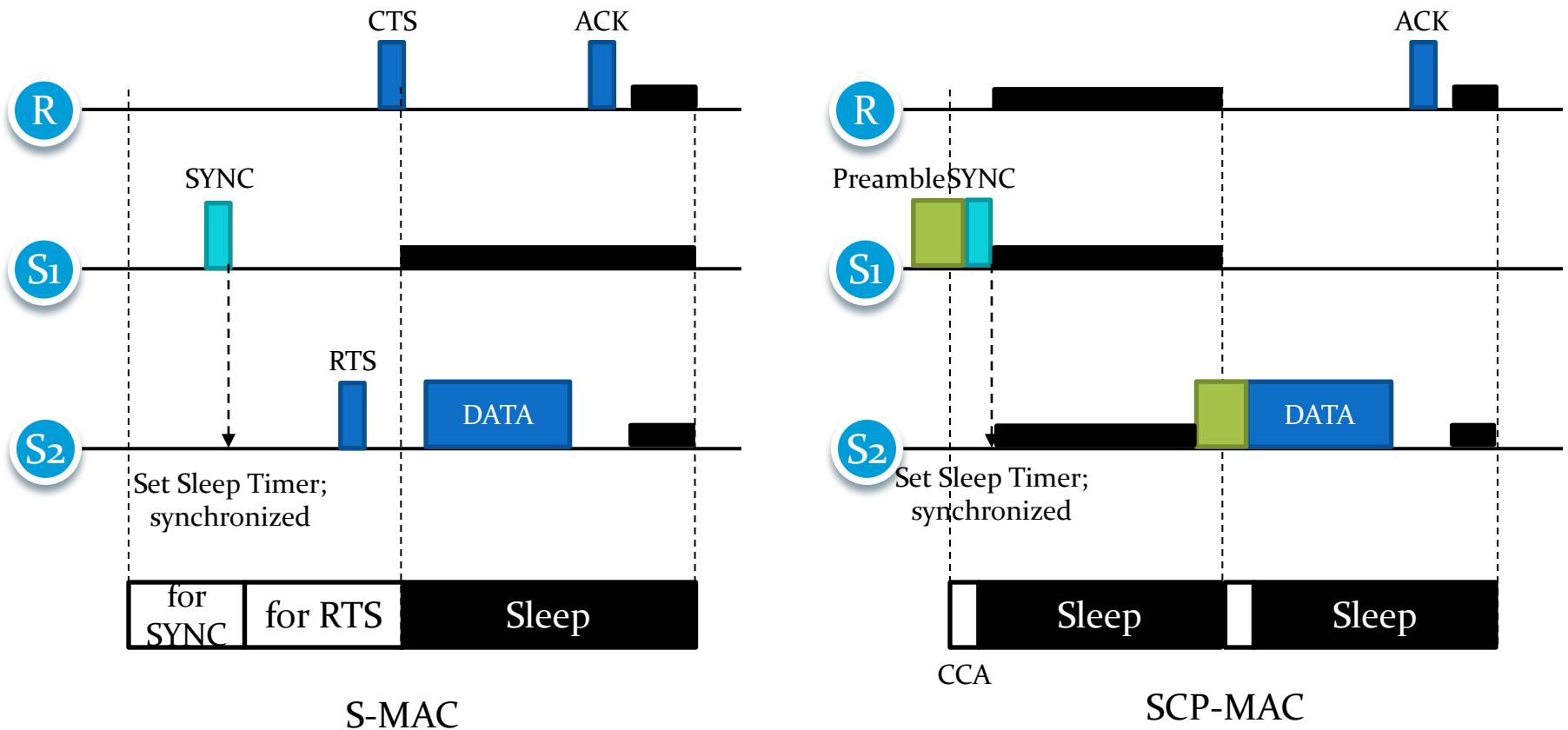
S-MAC



B-MAC

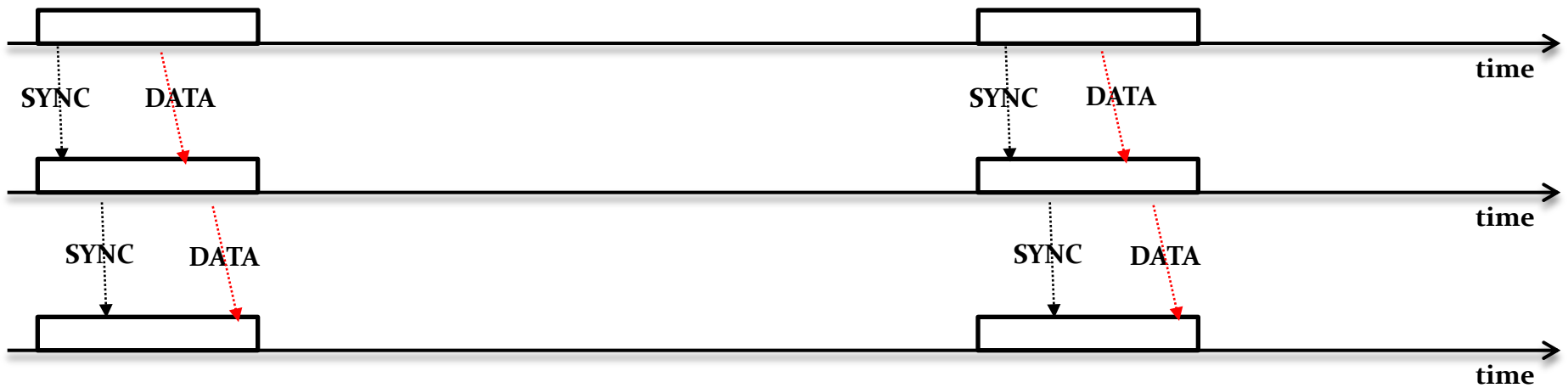
Scheduled Channel Polling MAC (SCP-MAC)

- Combine S-MAC with B-MAC



HOMework

- Implement SMAC's sleep & wake algorithm simply
 - make 3 node be synchronized by relaying SYNC packet

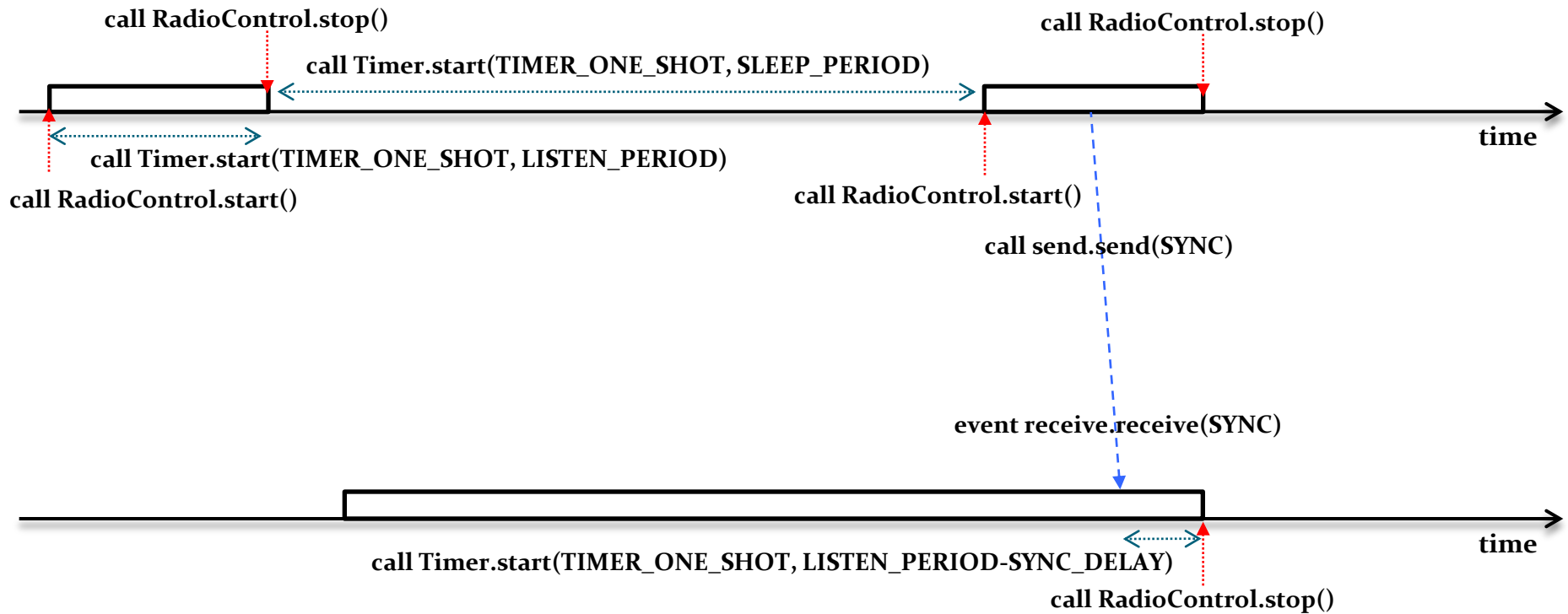


HOMework (Cont.)

- In configuration file
 - add 'CC2420RadioC' component
 - components CC2420RadioC;
 - link interface and component
 - <module-name>.RadioControl -> CC2420RadioC;
- In module file
 - Define 'RadioControl' interface
 - uses StdControl as RadioControl;
 - To turn on (wake) the radio, use this:
 - call RadioControl.start()
 - To turn off (sleep) the radio, use this:
 - call RadioControl.stop()

HOMework (Cont.)

- Hint





Q and A