1a)

i)

Synchronisation needed for TDMA like MACs

Needed for adaptive beaconing in CTP?

Analysis of data will result in incorrect conclusions if the clocks are wrong

ii)

b)

i)

Assign 1 or more reference nodes. When you need to synchronise use the communication method in the question and the offset formula to calculate how far your clock is from the reference. Repeat periodically.

ii)

c)

i)

2a)

i) Energy efficiency is very important for wireless MACs but not important for wired ones. We need to minimise retransmissions and therefore collisions. Also need to prevent overhearing. Wireless MACs have 2 major types: contention based and reservation based. Reservation based MACs such as TDMA save energy by having slots for each node. This way there are no collisions and no retransmissions. Contention based MACs such as CSMA verify there’s no transmissions happening before sending to try and avoid collisions. Wired MACs are more aggressive when it comes to sending.

ii) CCA is an effective way of performing collision avoidance. Can be used to see if the channel is idle or not.

In B-MAC, we take a reading when we assume the channel is free.

Then we take an exponential moving average of the median signal strength.

When we send a packet, take 5 samples and assume that the channel is free if even one of them is significantly below the noise floor.

Optionally we can also have a random backoff if the channel is found to be busy

b)

i) Because other one-hop neighbours could also be sending these packets saying they are following the schedule. You need to use a random delay to avoid collisions

ii) current time + t??

iii) Ignore any further ones?

c) Use a ctimer for the leds so you don’t have this loop that consumes 100% of the CPU

3a)

Proactive routing maintains routes even when not accessed. Reactive makes the routes on demand. When you have very limited bandwidth available you don’t want to keep sending beaconing messages such as in proactive routing so you would use reactive routing here. Proactive routing is much faster because you already have the route. You don't need to create the route on demand.

b)

i) It means that each node has a certain slot in which it can send data. It is time based and each unit of time is split between the nodes.

ii) Nodes can be part of multiple clusters and have to stay on longer. So some nodes will die much quicker than others.

Sleep and listen periods are defined and constant which decreases efficiency under variable load

iii) Force all nodes to just be part of 1 cluster. Pick in some deterministic way

Broadcast again periodically after TDMA schedules have been setup to adapt the sleep and listen periods??

iv)