

Project Report

Time Division Multiple Access Layer

Computer Science Master Degree - Laboratory of Wireless Sensor Networks

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1 Component usage

The implemented TDMA layer can support up to 254 slave nodes that negotiate needs to be assigned a data slot from the master node. To tune the layer to application needs, the number of available data slots (MAX_SLOTS) and the single slot duration (SLOT_DURATION) can be changed in the Makefile.

The custom TDMALinkControl interface is similar to the SplitControl interface. It has a startMaster and startSlave commands as well as startDone event that will be signaled when the layer is ready to receive or transmit data (after slave has joined).

To send and receive data packets the layer exposes the standard AMSend and Receive interfaces.

2 Implementation Considerations

The SlotScheduler is a support component that simplify the slot management and timing. It has a timer for epochs counting, one for slot scheduling and one to control a active slot duration. The idea is that a node life cycle starts in one slot and the next active scheduled slot is determined at the end of the currently active slot.

The epoch timer of the SlotScheduler in the slaves is restarted with the reference time contained in synchronization beacons. Also the slot scheduler timer uses the reference time contained in the synchronization messages to schedule the next slot to execute, however, if there is already one scheduled slot it will be executed using the reference time of when it was started (although this is commonly not the case since beacons should arrive only during the synchronization slot). It is stopped when a slave enters in synchronization mode and restarted when the synchronization beacon arrives.

Join requests from slaves are sent with a random delay to avoid collisions in slot one. Collisions are very likely in this slot since all the slave schedulers are synchronized due to the synchronization beacon of the previous slot.

Radio in the slaves nodes can be turned off during all inactive slot periods. The number of next inactive slots can be determined at the end of an active slot, if it more than a given threshold (set to 1 inactive slot) the radio is turned off. It is turned back on only before executing an active task or when a node enters in synchronization mode.

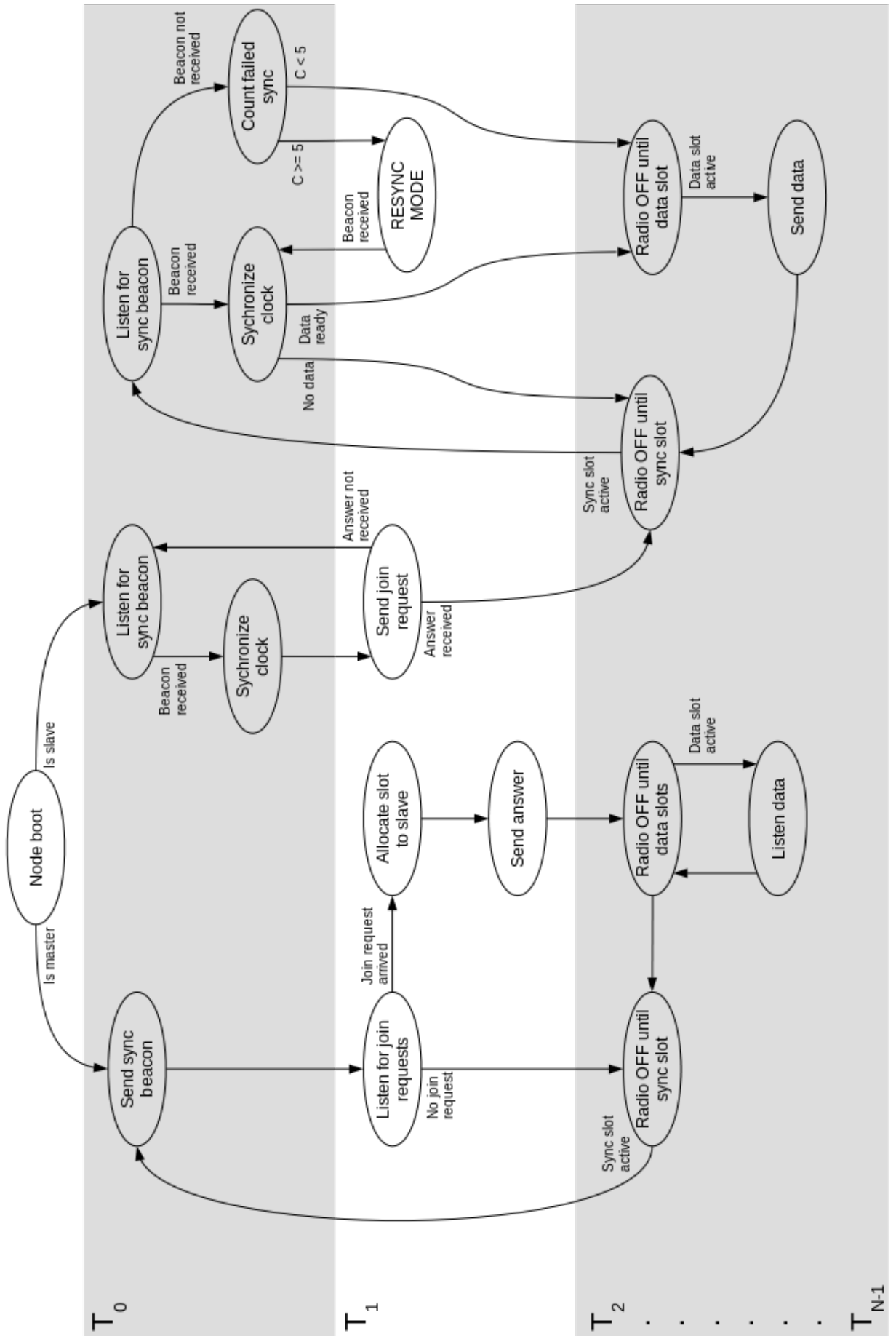


Figure 2.1: Nodes FSA