Chipcon 802.15.4 Transceiver:
Q&A Session

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Lab Lecture #9

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Ask Me Questions

- I’ll be covering some frequent questions.
- If you have other questions, ask me at any time during the lab lecture.

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SPI Fifo (1)

- The code is provided. Take a look, it’s actually pretty simple.
- Declares FPGA memory:
  - reg [7:0] dataRam[31:0], srcAddrRam[7:0], destAddrRam[7:0];
  - 8 bits wide each, dataRam has 32 slots, srcAddrRam & destAddrRam have 8 slots
- Ours it small → uses LUTs. If you increase the size to >= 4096 bits, which is size of 1 BlockRAM, synthesis will use BlockRAM instead.

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SPI Fifo (2)

- Two counters act as read & write pointers.
  - WEn enables write counter and saving into all 3 pieces of memory. REn enables read counter.
- Input is 8-bits → matches size of data coming out of SPI.
- Output is 32-bits → same as payload size of an entire packet.
SPI Fifo (3)

- As you read data from RX FIFO, save to SPIFifo. Include packet src. & dest. addresses. Saving increments a temporary internal pointer.
  - In input is only for payload! There are separate SrcAddrIn and DestAddrIn inputs.
  - At which point in receiving data from CC2420 is WEn pulsed?
- After checking CRC, pulse EndSession to make temp. pointer become permanent or DiscardSession to discard the temp. pointer.
  - Full is based on temp. pointer.

Receiving

- Refers to 2 things:
  1. CC2420 is constantly receiving and saving data into RX FIFO as long as it’s not transmitting. Look at CC2420 internal FSM on p. 43.
  2. You have to “receive” data from RX FIFO, filter it, then save wanted data into SPIFifo.

Post-Transmit Wait Time

- CC2420 needs 12 symbol periods to move into RX_SFD_SEARCH state after transmit done or SRXON.
  - 1 symbol period = 16 us.
- Without enforcing wait, aggressive user of your Transceiver module will cause CC2420 to never receive data from air.
- Not that big of a problem for us → demo game engine transmits once every ~25ms.
  - You want to enforce wait, just in case you forget or make a mistake when doing CP4.

Channel Mapping

- 357 + 5 (k-11), k = 11, …, 26
- Your channels range from 0 → 15.
  - 0 maps to k = 11.
Remember that SPI has no intelligence.

NewData pulses at the same time as InRequest as long as a session has started.
  - Data may or may not be valid.
  - You don’t really need NewData. Inspection of InRequest can give you the same information.
  - You can use NewData as a register enable to retain received data.

What if I’m flying to Mexico to enjoy my spring break?

- Kramnik, kramnik, kramnik! Isn’t Wi-Fi great?
- Tutorial at: http://inst.eecs.berkeley.edu/~cs150/sp06/Kramnik/tutorial.php
- You have full access to tools and your U:\.
- But seriously, get it working before break...
  - We’re not evil (most of the time). It’s for your own good.
  - That said, have a nice break! =)