Wireless Headphones

6.111 Final Project

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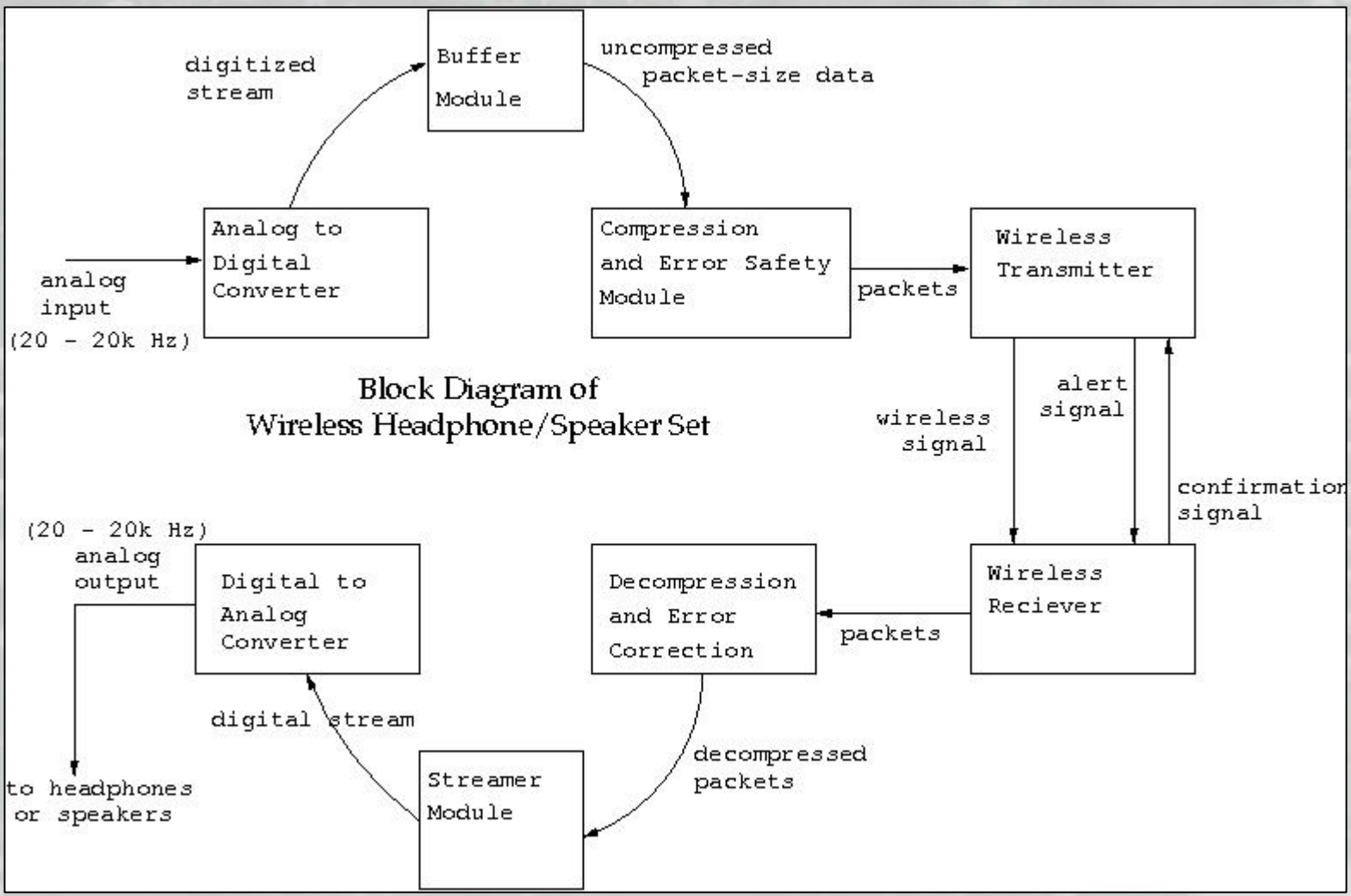
Overview


Buffer Module
digitized stream
uncompressed packet-size data
Analog to Digital Converter
analog input (20 - 20k Hz)
Compression and Error Safety Module
packets
Wireless Transmitter
Block Diagram of Wireless Headphone/Speaker Set
wireless signal
alert signal
confirmation signal
(20 - 20k Hz) analog output
Digital to Analog Converter
Decompression and Error Correction
packets
Wireless Reciever
digital stream
decompressed packets
Streamer Module
to headphones or speakers

Analog to Digital…

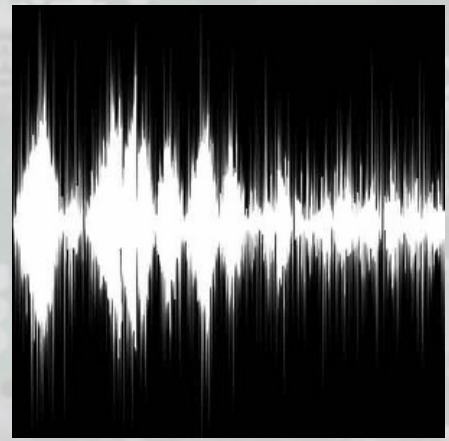
0101010111010001 01

0101010101110101 01

0100 **Aditi S.** 0101

1010101010101001

1111101010101010 10

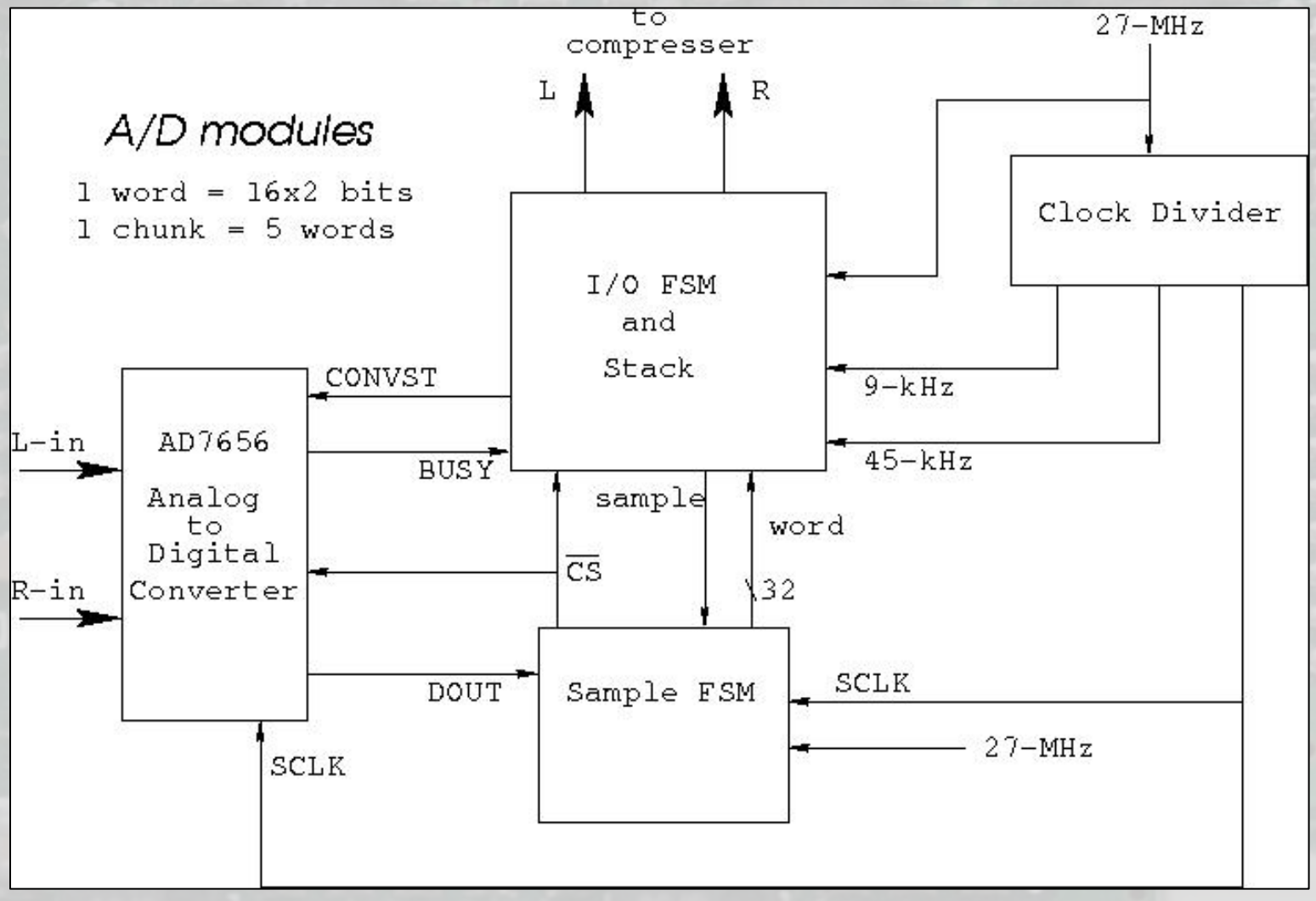


…Digital to Analog

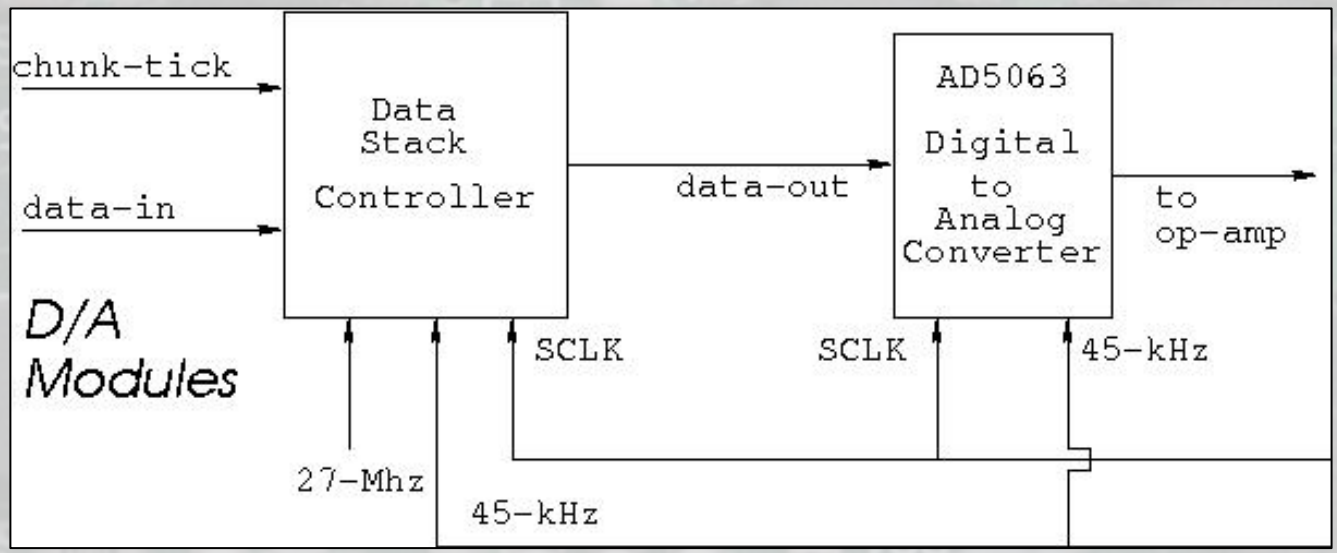
Specifications and Requirements

- No aliasing: at least 44-kHz sampling rate
- High resolution: at least 8 bit bits per sample
- Stereo: two samples per sampling period
- Wireless transmission rates: not too many bits per sample

Analog to Digital Conversion



Digital to Analog Conversion



COMPRESSION

DECOMPRESSION

Jessica N.

Codec – Big Picture

80 bits

15	***N5***	0	15	***N4***	0	15	***N3***	0

15	***N2***	0	15	***N1***	0

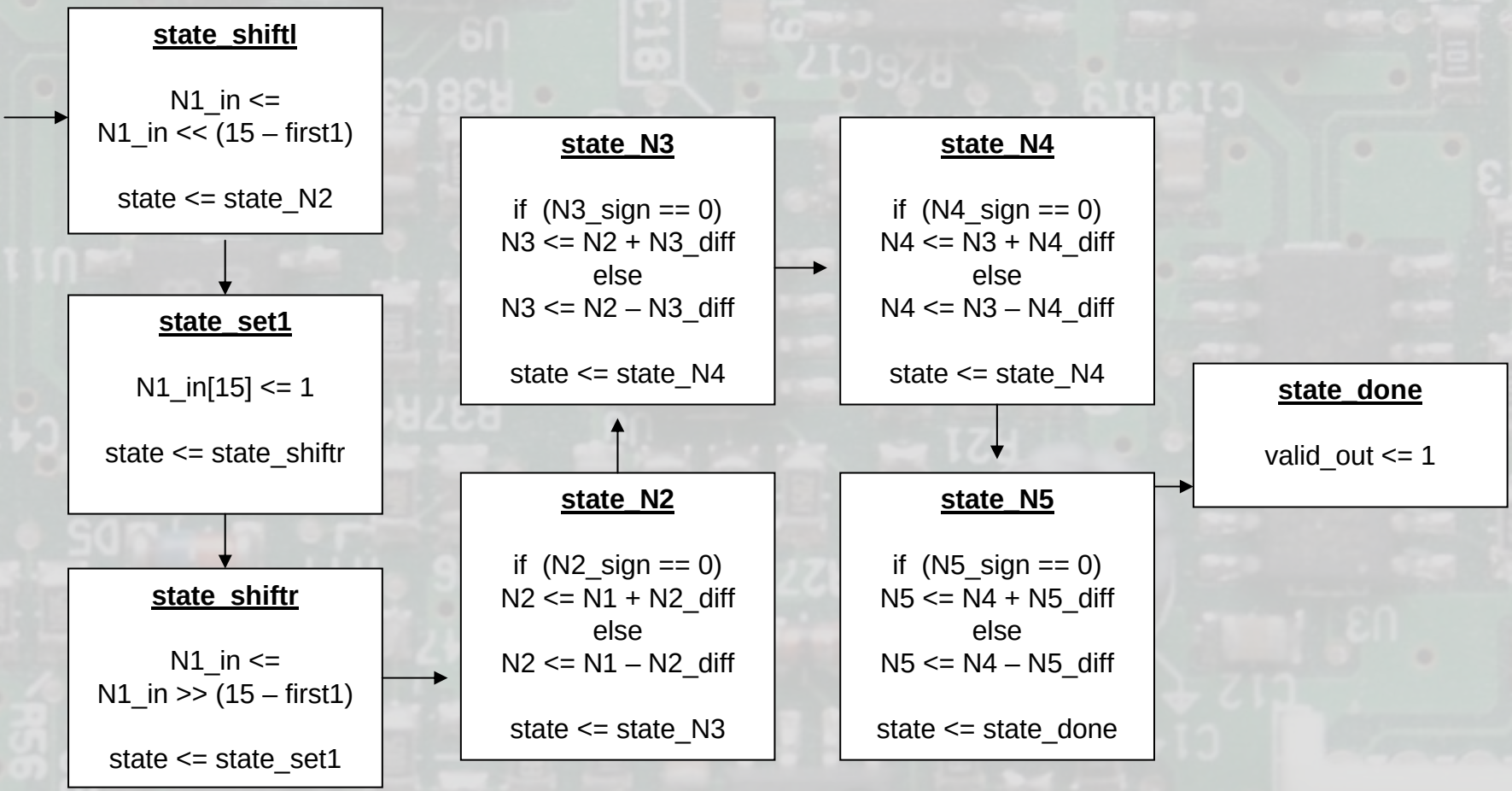
diff5	***s***	***diff4***	***s***	***diff3***	***s***	***diff2***	***s***	***first1***	***N1***

39 36 35 34 31 30 29 26 25 24 21 20 19 16 15 0

40 bits


COMPRESSION

Decompression

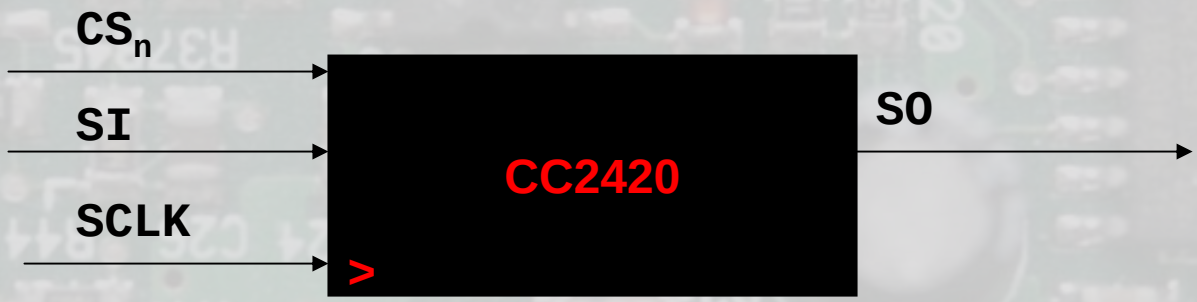


Wireless

Nivedita C.

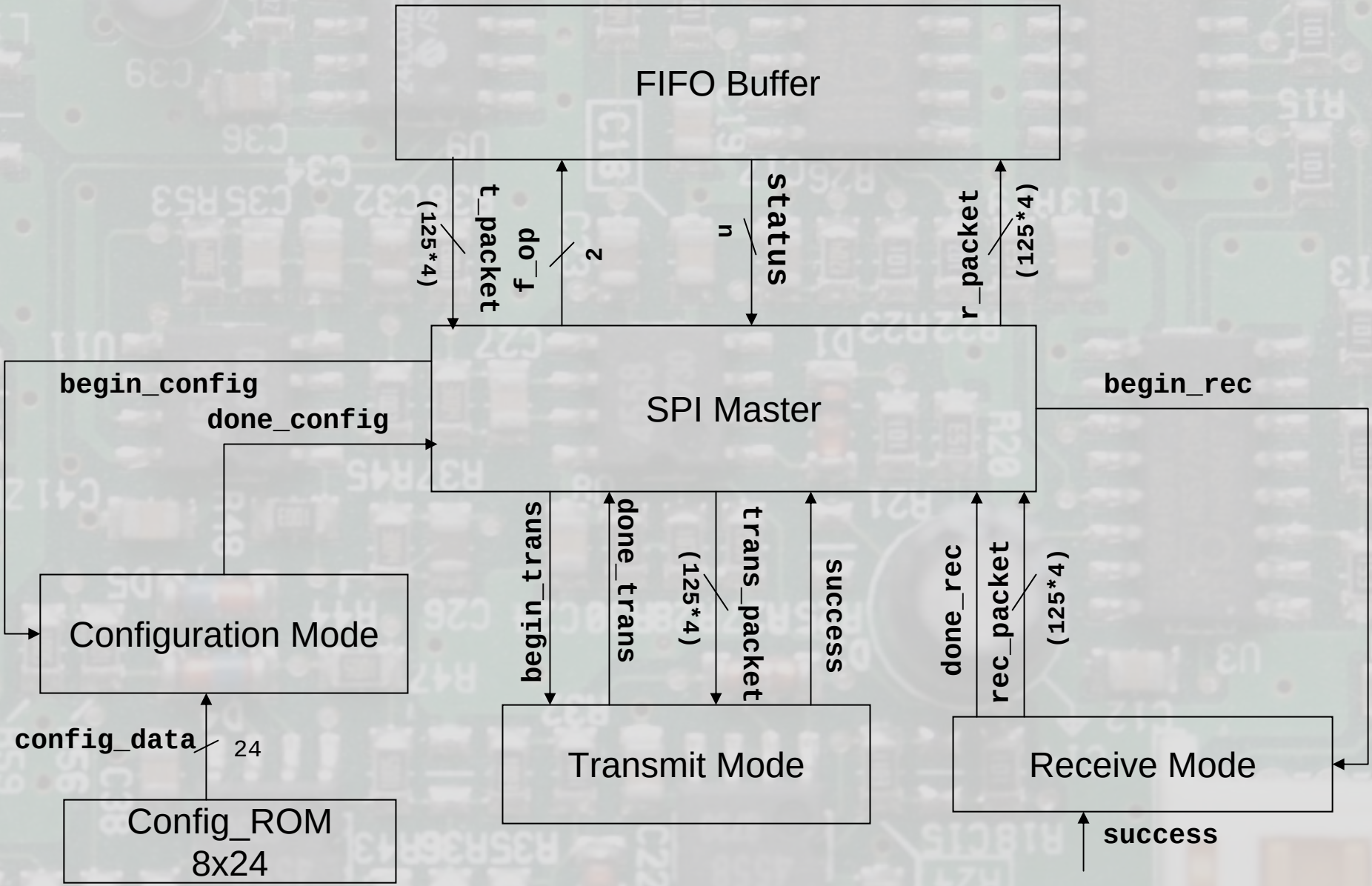
Wireless – Operation, Specifications and Requirements

- Hardware: Two CC2420 transceivers mounted on two evaluation boards
- All communication with chips implemented in Verilog
- Talk to chips via a Serial Peripheral (SPI) interface clocked at 10MHz



- All operations performed by writing or reading from 33 16-bit configuration registers and 15 8-bit command strobe registers

General Transceiver Block Diagram



Implementation Issues

- Data Throughput
  - Chipcon specs: max data rate ~250 kbps
  - Overhead: includes frame check sequences, may have to introduce error correction sequences
  - Assumes uninterrupted transmission
- Memory buffer sizes
  - The lower the data rate, the greater the required size of the buffers
- Dealing with two labkit clocks
  - Need to time interaction of two halves of the system properly
  - Solution: Handshake/acknowledgement protocol between transmitter and receiver