Implementation of a MATLAB-based Self-Configurable Software Defined Radio Transceiver

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Abstract
- Software defined radio (SDR) requires deep knowledge of the operating environment and coding.
- A bi-directional transceiver in MATLAB that allows automated selection of parameters.
- Aims to facilitate real-time operation and timing consistency using MATLAB Coder and MEX.

What is a Radio?
An electronic device that wirelessly sends or receives electromagnetics waves at various frequencies.

Machine 1
1. Energy Detection
   - Wait DIFS
   - 1.1 Wait DIFS
   - 1.2 Detect Energy
   - 1.3 MAC Contend

Machine 2
1. Receive DATA Frame
   - Entry: Prepare 801.11b DATA frame (256 USRP frames)
   - During: Prepare new USRP frame (64 bits ≡ 1408 samples)
   - Exit: Wait SIFS

2: Transmit DATA Frame
   - Entry: Prepare 801.11b ACK frame (4 USRP frames)
   - During: Prepare new USRP frame (64 bits ≡ 1408 samples)
   - Exit: Wait SIFS

3: Receive ACK Frame
   - 3.1 Search SYNC
   - 3.2 Read Header

Designated Transmitter (DTx)
1. DTx waits for a fixed interval of time before sensing the channel state.
2. DTx either back off or transmits depending on whether the channel state is busy or not.
3. DTx contends for channel access.

Designated Receiver (DRx)

References

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