Cognitive Radio Rendezvous
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Motivation
- Uncoordinated Cognitive Radios need to agree upon a common channel and synchronize in time
- Goal: Design Rendezvous algorithm to synchronize two radios quickly as possible

System Model
- Measure interference of channel with 64-pt FFT
- Determine which channels are available
  - Channels: \( C=\{C_1, \ldots, C_{16}\} \)
  - Available Channels Radio 1: \( C_1 \subseteq C \)
  - Available Channels Radio 2: \( C_2 \subseteq C \)
  - \( C_1 \cap C_2 \neq \emptyset \)
- The channel hopping sequence follows:
  - \( C_1(t) \in C_1 \)
  - \( C_2(t) \in C_2 \)
  - Transmitting: \( m_1(t)=1 \)
  - Receiving: \( m_1(t)=0 \)
- Rendezvous Time:
  - \( R=\min \{t:0 | C_1(t) = C_2(t), m_1(t)=m_2 \} \)

Network Algorithm
- Use a slotted networking protocol
- Data Stream 1: Sends Spectrum Data to Host
- Data Stream 2: Sends and Receives data packets to Host

Rendezvous Process
- Develop Rendezvous Process
  - Interference is Asymmetric
  - Time Asynchronous
  - Use Jump Stay Based Hopping Sequence
- Process begins by listening for a beacon
- Transmits Beacon after random back-off
- Continues to listen for response before switching channels
  - Message not recognized if on different channel
  - Algorithm continues until successful handshake
  - Rendezvous not guaranteed even if on same channel

Results
- Parameters Varied:
  - Size of Window
  - Random back-off time interval
- Measure:
  - Average number of attempts to rendezvous
  - Average time To rendezvous (Avg. (TTR))
- Results:
  - 4ms Window Size Minimizes Avg. (TTR)
  - Small Backoff reduces TTR