Submission to
IEEE P802.11
Wireless LANs

Code Separation
vs.
Frequency Reuse

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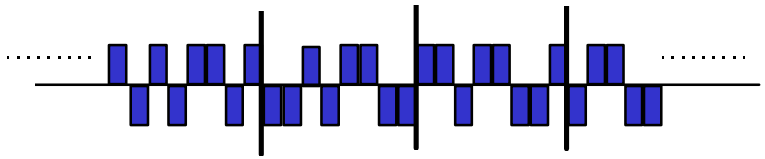
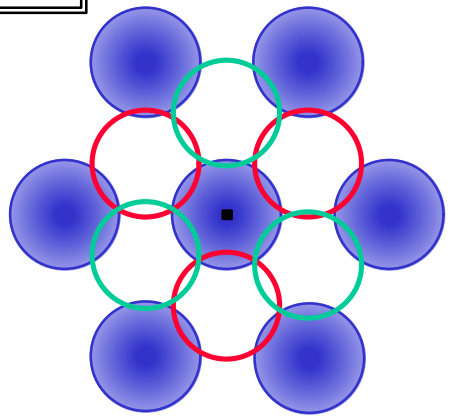
Overview

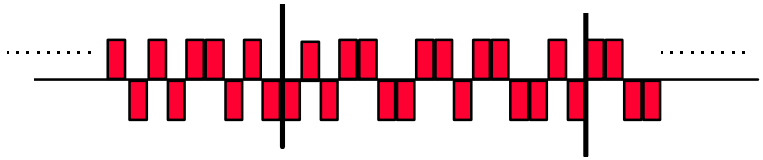
- Code Separation vs. Frequency Reuse Problem Statement
- Description of Frequency Reuse
- Coding Techniques
  - Description
  - Asynchronous Nature
- WER vs. SIR Simulation Results
- Description of Average Interference Simulation
- Average Interference Simulation Results

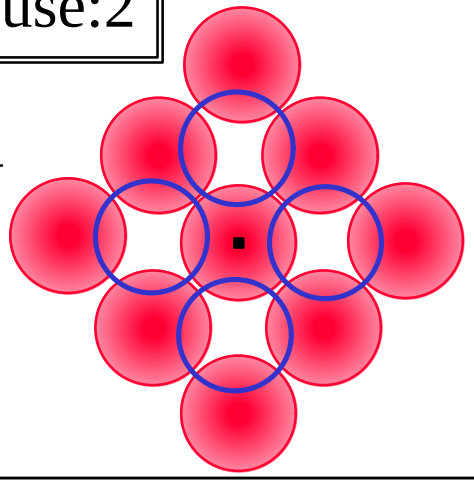
8 Chip Code/Frequency Reuse:3





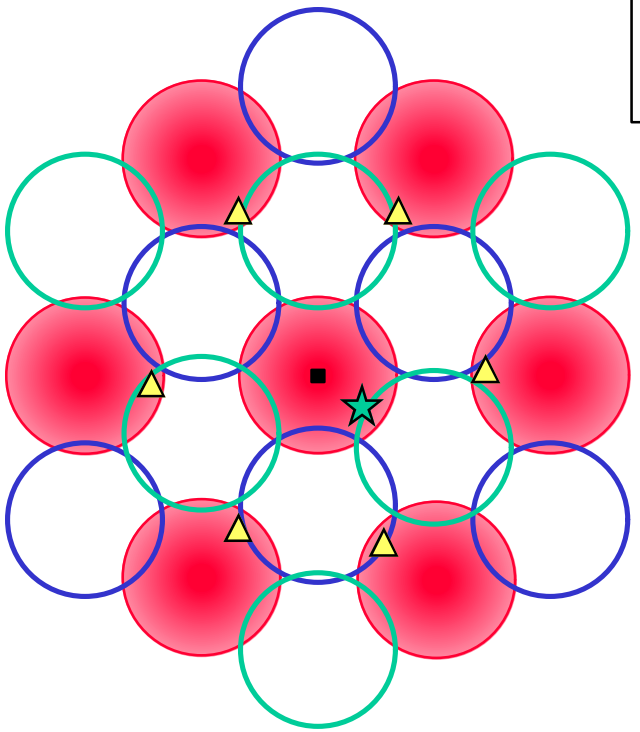
16 Chip Code/Frequency Reuse:2





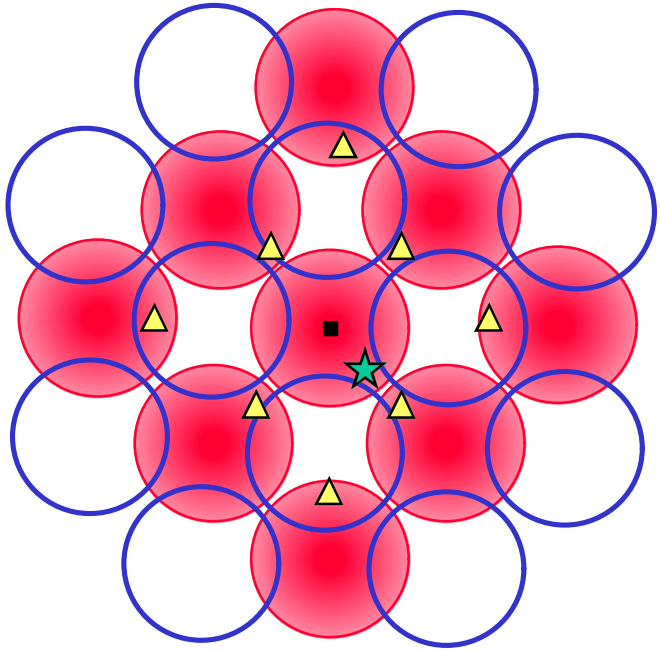
Cellular Layout for 2 Schemes

8/3 Scheme

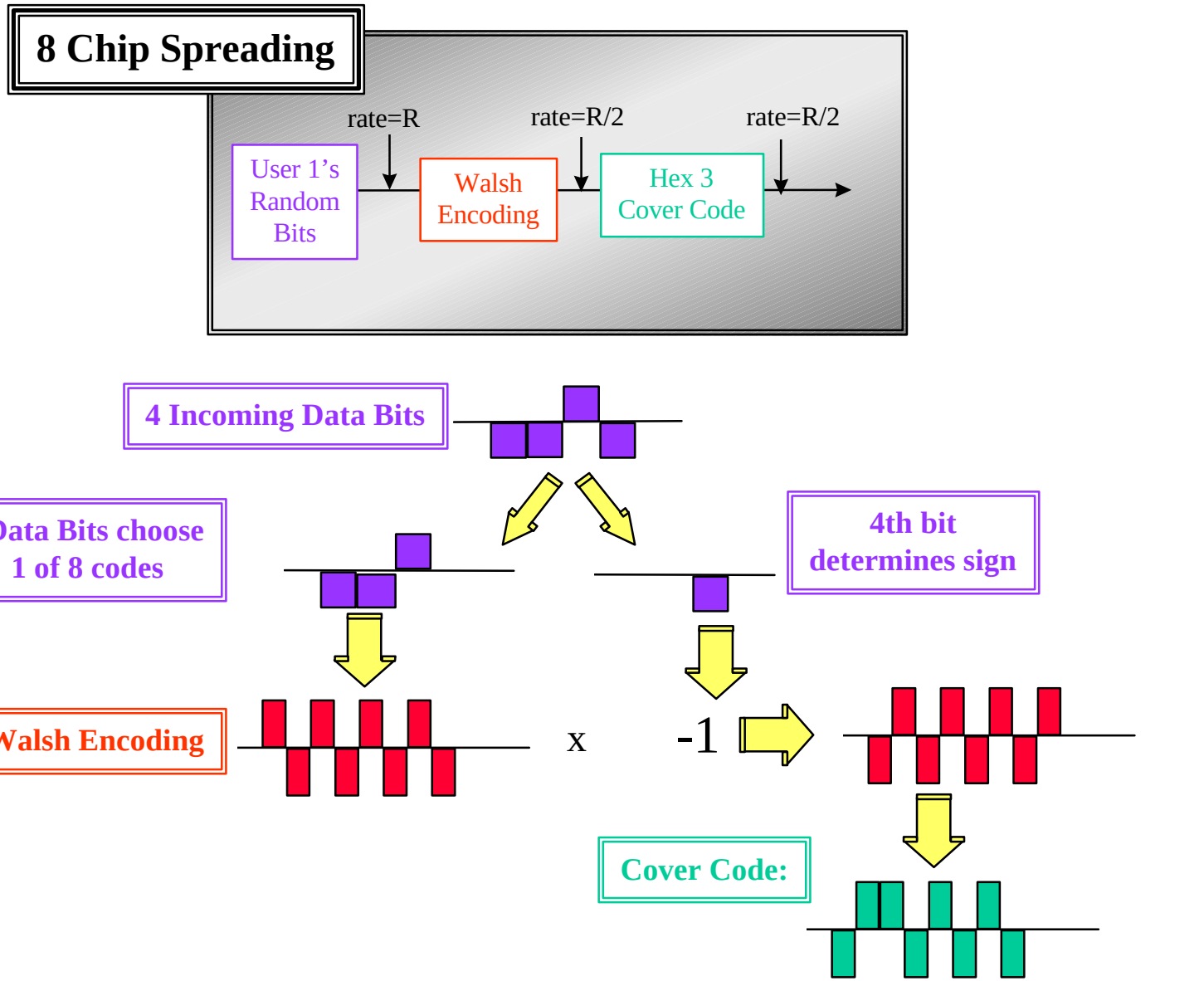


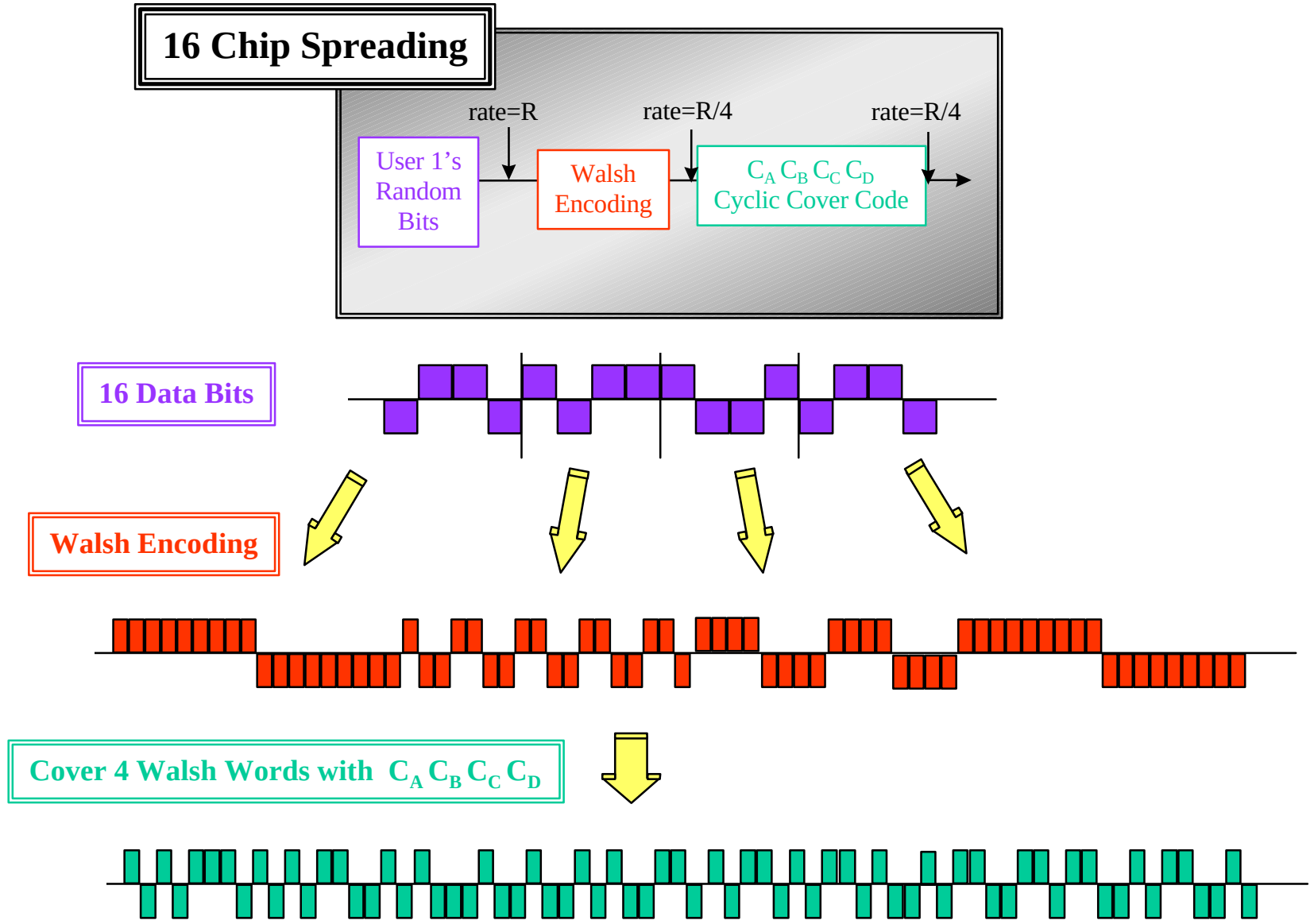
6 far interferers

16/2 Scheme

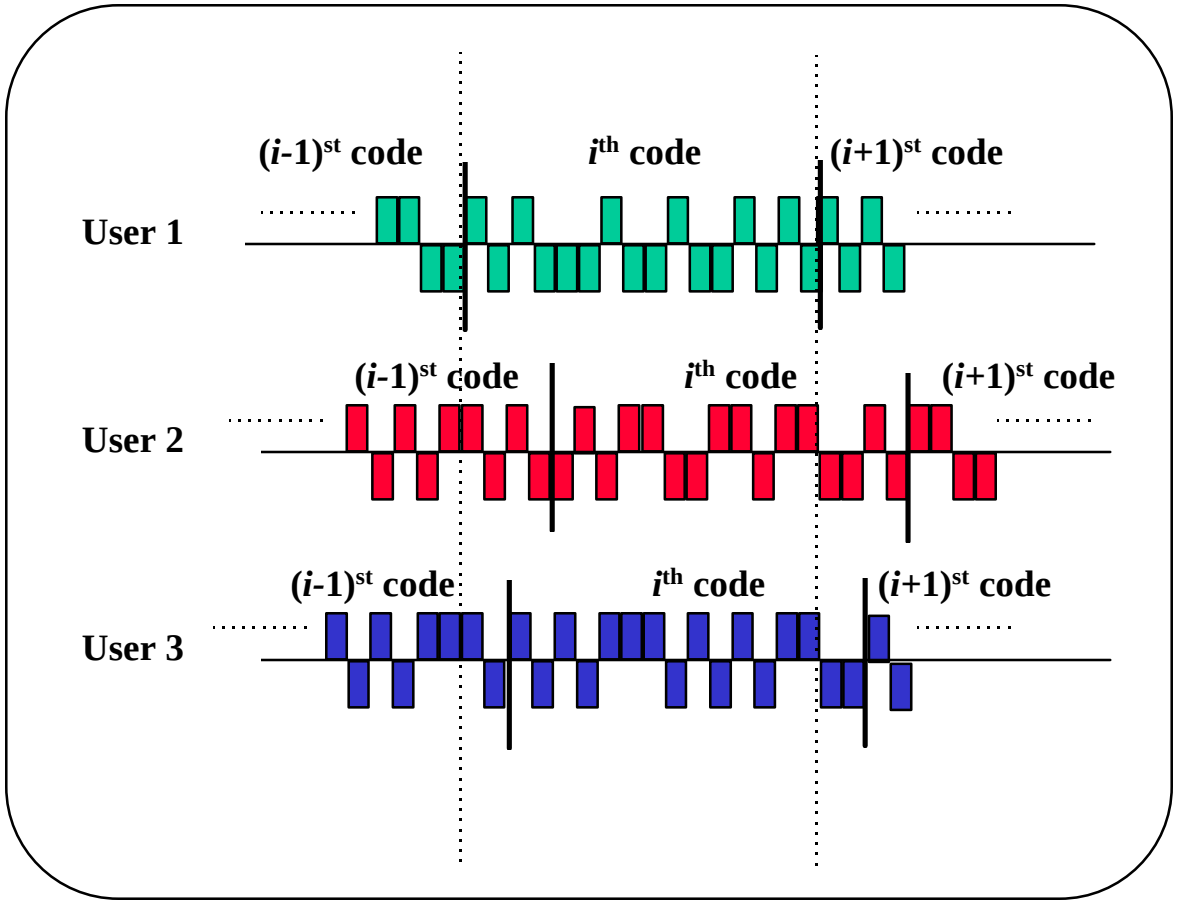


8 interferers:
4 near/4 far


8 Chip Spreading
rate=R
rate=R/2
rate=R/2
User 1's Random Bits
Walsh Encoding
Hex 3 Cover Code
4 Incoming Data Bits
3 Data Bits choose 1 of 8 codes
4th bit determines sign
Walsh Encoding
x
-1
Cover Code:


16 Chip Spreading
rate=R
rate=R/4
rate=R/4
User 1's Random Bits
Walsh Encoding
$C_A C_B C_C C_D$ Cyclic Cover Code
16 Data Bits
Walsh Encoding
Cover 4 Walsh Words with $C_A C_B C_C C_D$

Asynchronous Transmission



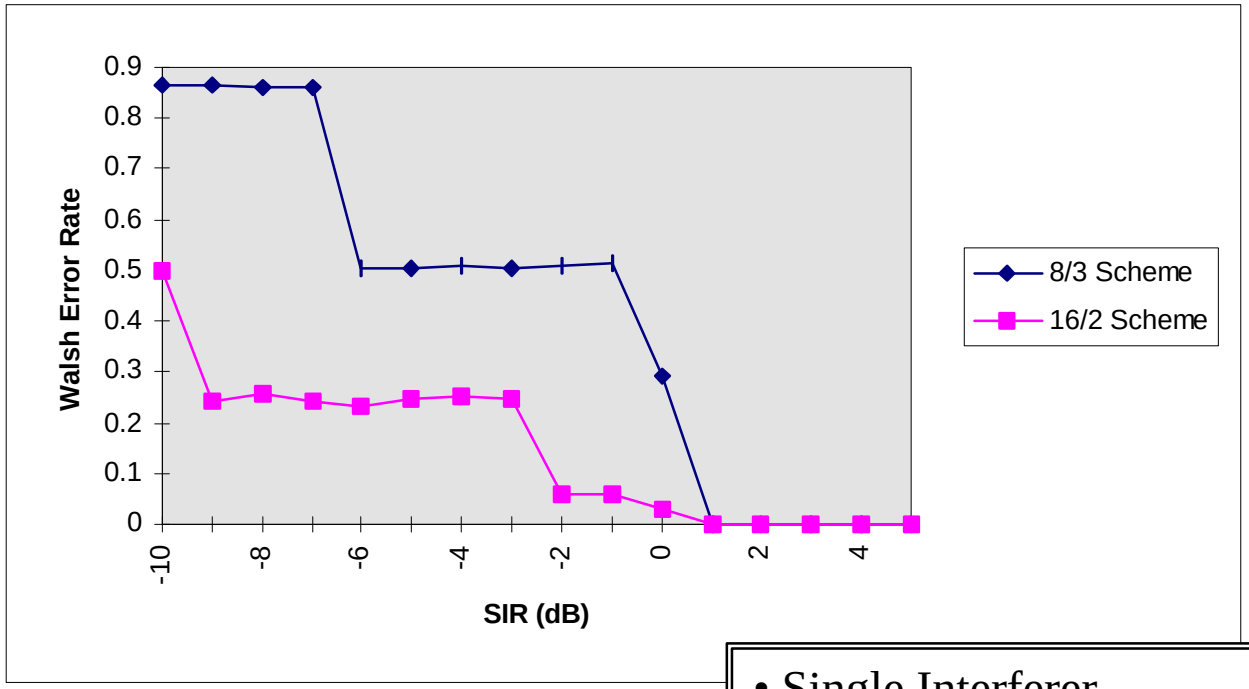
Simulations: A Fair Analysis

- Must account for asynchronous stations.
- AGN is not an accurate model of multiaccess interference.
- CW is not an accurate model of multiaccess interference.

8/3 : 16/2 vs. Harris : Micrilor

- Realistic model of multiaccess interference.
- Lognormal fading included in performance comparison.
- Multipath, channel characteristics not included (not necessary to draw conclusion.)
- Gives Micrilor false advantage on code separation.

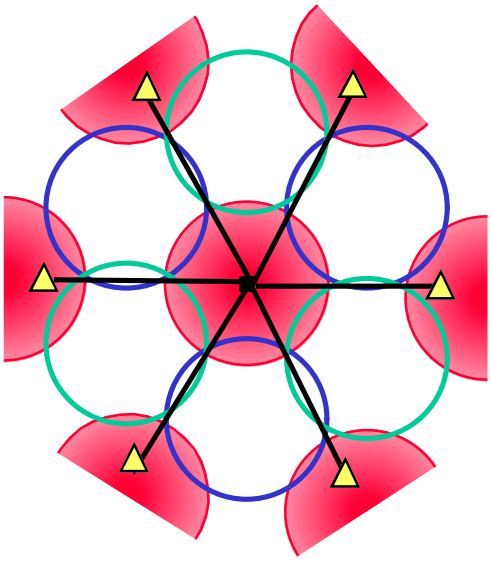
Walsh Error Rate vs. Signal to Interference Ratio



- Single Interferer
- Randomized delay
- Randomized cover codes (16/2)
- No additive noise or fading

Average Interference Scenario

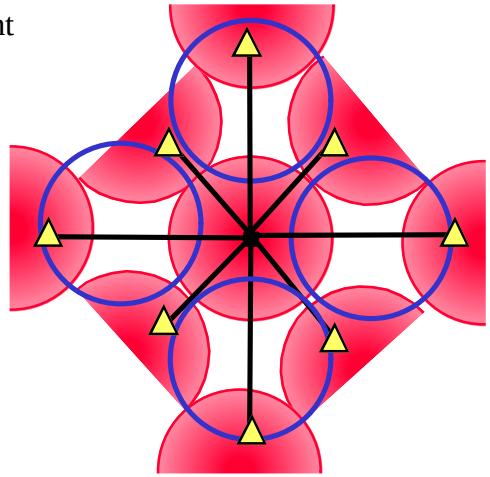
8/3 Scheme



access point

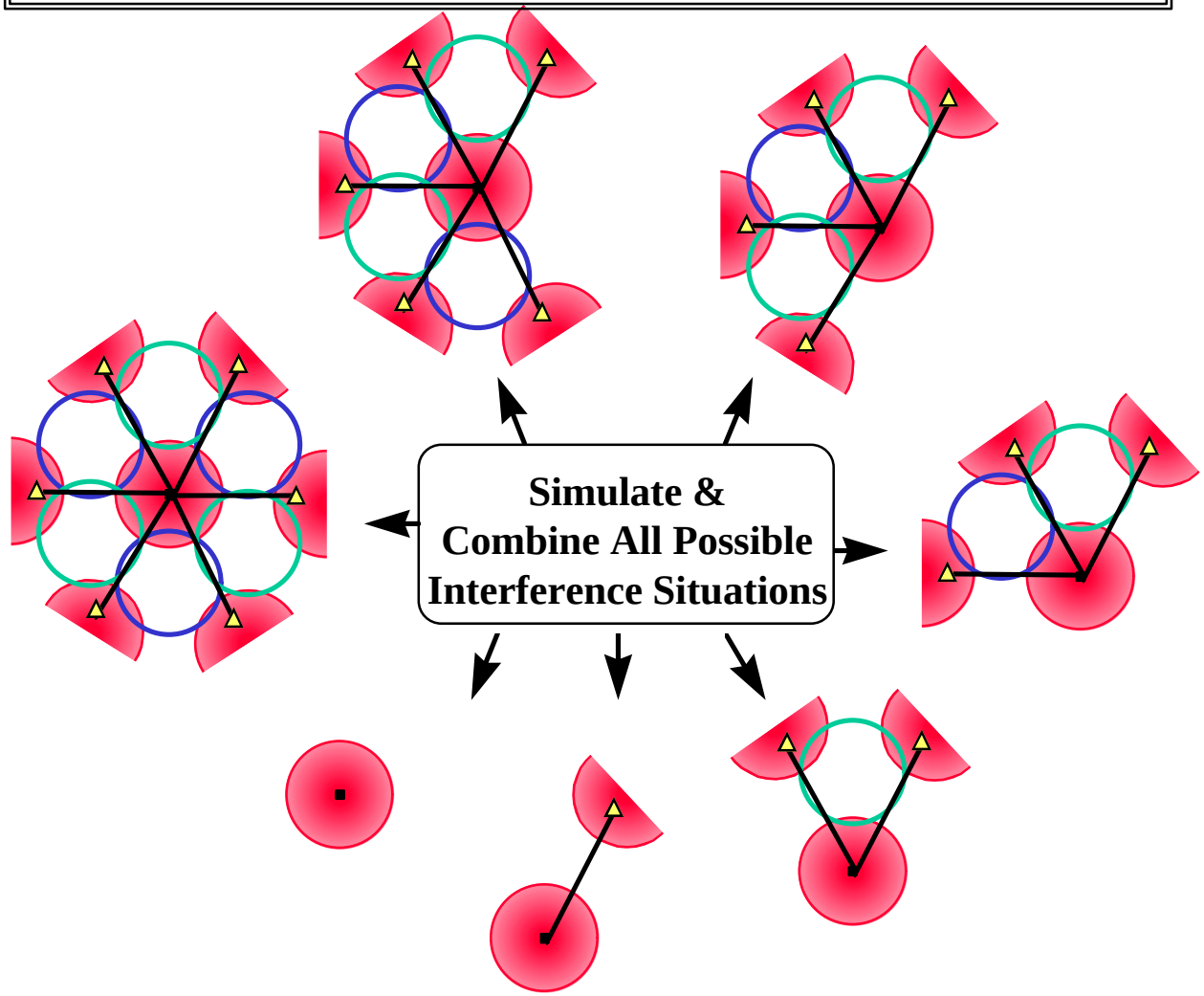
interferer

16/2 Scheme

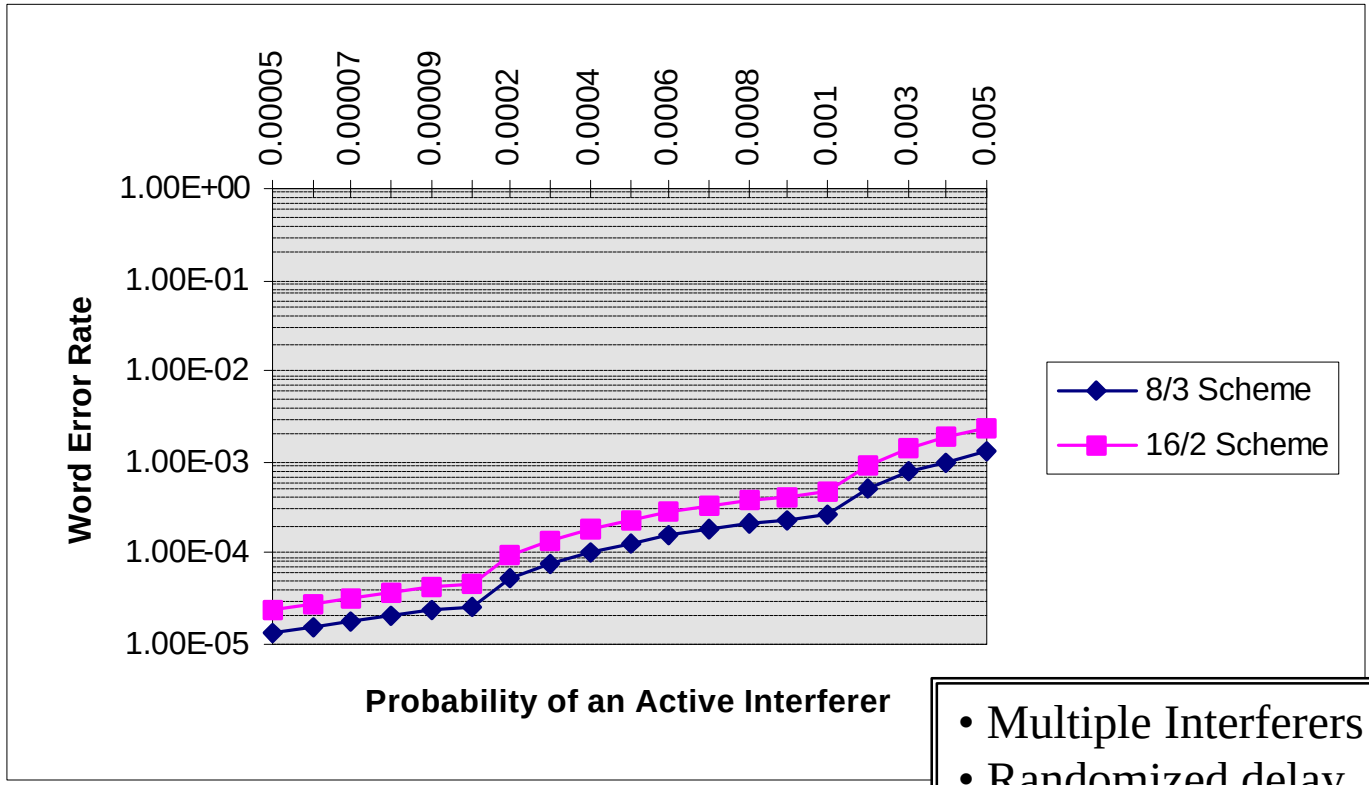


- Interferers at center of nearest half of cell
- Lognormal fading with std dev of 8dB
- Random delay and cover codes

Overview of Interference Simulation

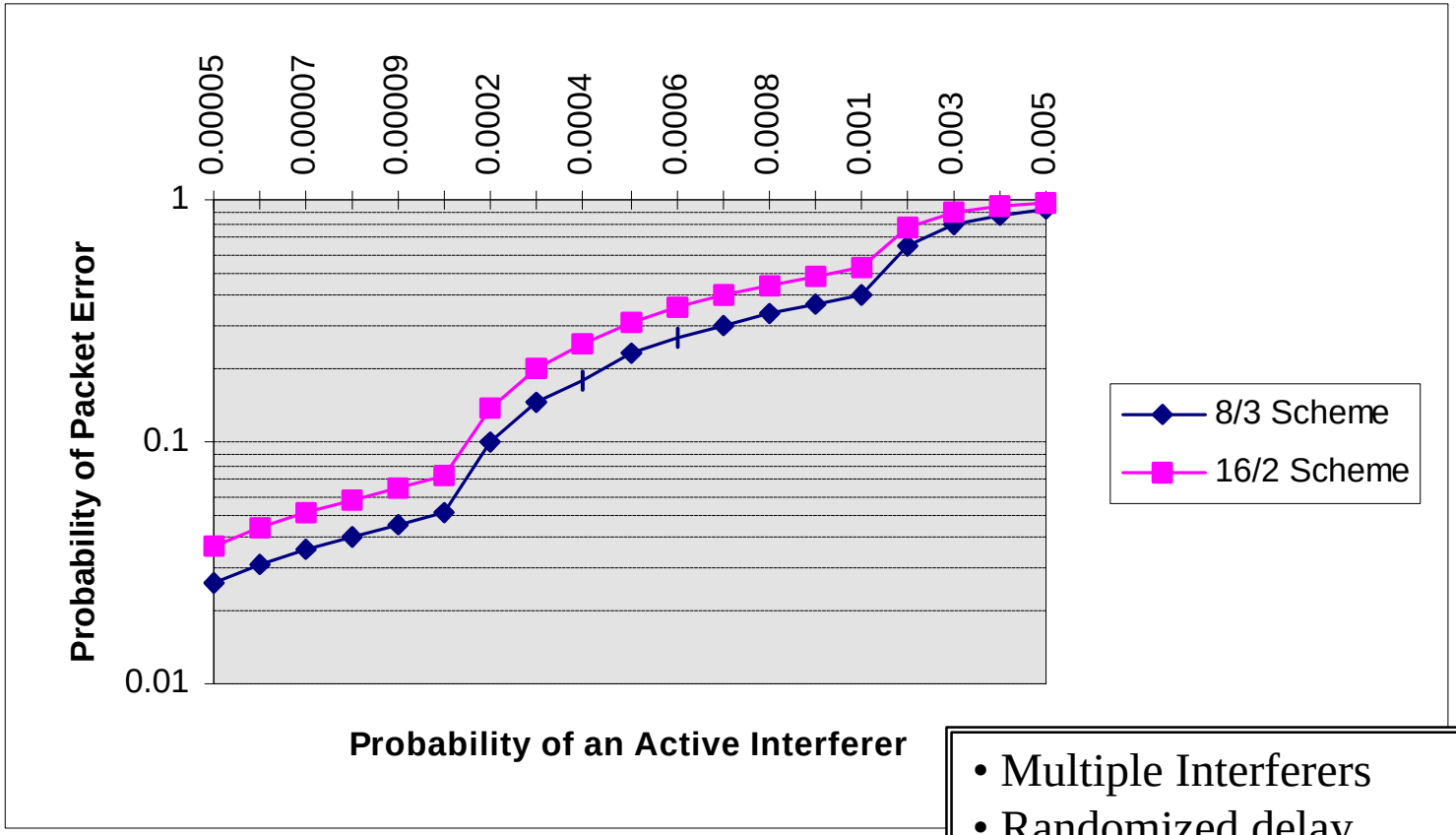


Walsh Error Rate vs. Pr. of an Active Interferer



- Multiple Interferers
- Randomized delay
- Randomized cover codes (16/3)
- Lognormal Fading
  (8 dB Std dev)

Packet Error Rate vs. Pr. of an Active Interferer



- Multiple Interferers
- Randomized delay
- Randomized cover codes (16/3)
- Lognormal Fading
  (8 dB Std dev)