

IEEE P802.11 94/128a

**Preamble Modification for
Improved Selection Diversity**

R. Mahany
Norand Corporation

May 1994

R. Mahany, Norand

IEEE P802.11 94/128a

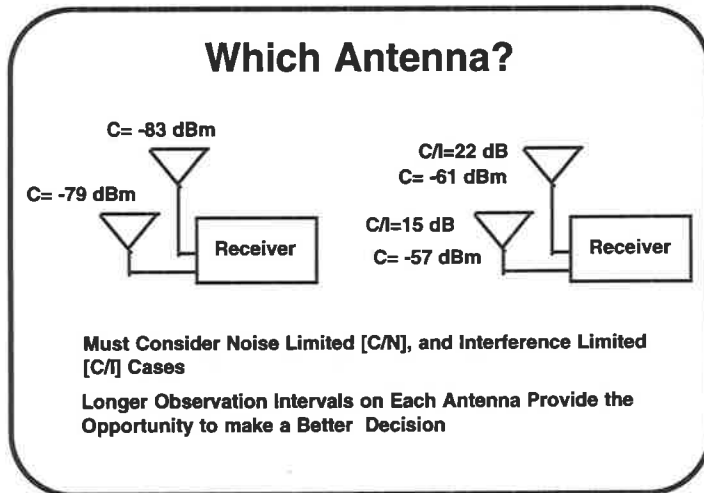
Assumptions

- ***Diversity is not a Requirement of Either PHY***
 - Standard Should Enable, not Mandate Diversity
 - Manufacturers Free to Determine Whether their Customers will Pay for, Benefit from Diversity
 - Other Channel Optimization Alternatives Exist, and Should not be Precluded
 - Algorithms Should not be Specified by the Standard
- ***Anything That Can be Done at the Transmitter to Make the Receiver's Job Easier, Should be Done***

May 1994

R. Mahany, Norand

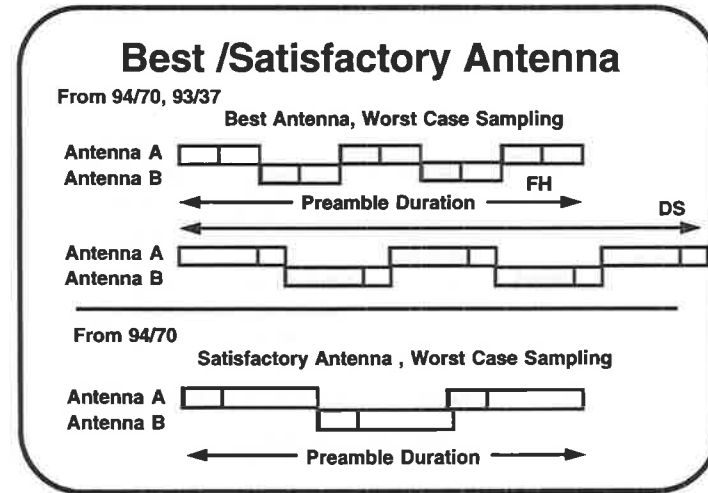
IEEE P802.11 94/128a



May 1994

R. Mahany, Norand

IEEE P802.11 94/128a



May 1994

R. Mahany, Norand

IEEE P802.11 94/128a

Issues

- **Constraints**
 - Antenna Sampling and Start of Message are Asynchronous
 - Preamble Length and Content are Set
 - RX Setting Times Determined by Physical Constraints
 - Overall System Performance is Sensitive to PHY Overhead
- **Results**
 - Not Enough Time to Evaluate Signal During Preamble to Implement Best Antenna Approach Reliably in FH
 - DS Has Longer Preamble – Maybe OK, Maybe too Long?

Proposal: Give Receiver More Knowledge by Including Timestamp in Preamble

May 1994

R. Mahany, Norand

IEEE P802.11 94/128a

Current Preambles

Direct Sequence
 1111111111111111 Unique Word
 ← 128 symbols →

Frequency Hopping
 0101010110101 Unique Word
 ← 80 symbols →

Timestamp Concept

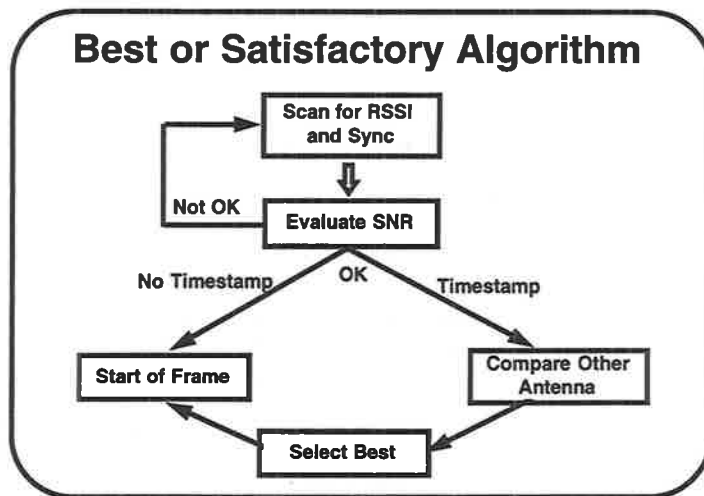
DS
 00000000111111111111 Unique Word
 Symbols 48,49

FH
 10101010101010101 Unique Word
 Symbols 32,33

May 1994

R. Mahany, Norand

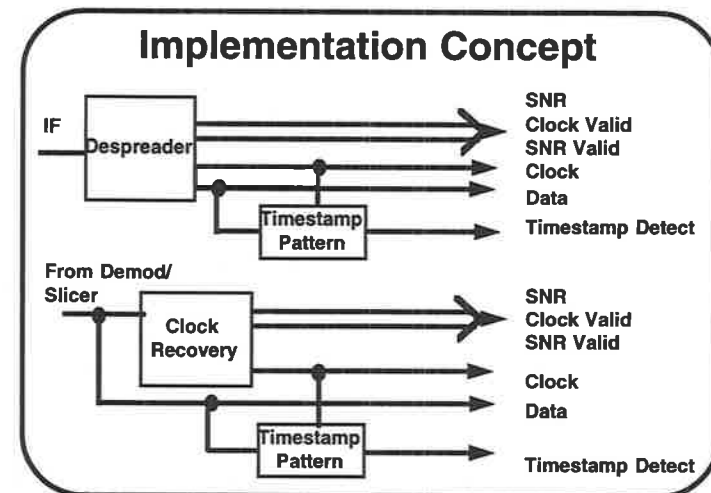
IEEE P802.11 94/128a



May 1994

R. Mahany, Norand

IEEE P802.11 94/128a



May 1994

R. Mahany, Norand

IEEE P802.11 94/128a

Timing Simulation Results

With Discernible Signals at Both Antennas
Using 94/70 Timing Parameters

Preamble A: Minimum SNR Interval	Preamble A: Average SNR Interval	Preamble B: Observation Interval	Best Antenna Branch Execution (%)
20 μ sec	26 μ sec	20 μ sec	72%
18 μ sec	25 μ sec	18 μ sec	83%
16 μ sec	24 μ sec	16 μ sec	94%

Assumed System Parameters

Antenna Switching Time:	8 μ sec
Clock Detection Interval	10 μ sec

May 1994

R. Mahany, Norand

IEEE P802.11 94/128a

Summary and Comments

- **Inclusion of Timestamp in Preamble**
 - Provides Critical Timing Information to Diversity Selection Algorithm
 - Allows Best Antenna Algorithms using Long Observation Windows for Preamble Assessment
 - Does not Preclude use of Other Channel Compensation Techniques
 - Meets Unique Word Distance Requirement
 - Requires Tolerance of Change in Preamble Content in Receiver Synchronization and Preamble Detection Circuitry

May 1994

R. Mahany, Norand

