

**IEEE P802.11
Wireless LANs**

Method to Achieve Adjustable Data Rate up to 20Mb/s**Date:** November 5, 1997**Author:** Duane Hurne and Darrol Draper
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Abstract

This submission outlines an approach to a higher rate standard to allow a variable data rate up to 20 Megabits per second. The submission identifies the modifications to the existing 802.11 standard that would be required to permit this flexibility and outlines some possible methods to achieve the higher rate. The proposed method insures that the standard can accommodate both the current data rate as well as the proposed higher data rate in a mixed environment. A mixed environment can be defined as one with both types of 802.11 transmission requirements. The method envisions using a sequential spread spectrum with a frequency locked loop and a matched filtering system. Variations in the data rates can be achieved dynamically based on the integrity of the transmission medium. Permits implementers to optimise for cost, power and data rate, depending on the requirements of the application. Wireless acquisition methods conform to the existing 802.11 standard.

HIGH SPEED DATA RATE ISSUES

- Interoperability with existing 802.11 standard
- Ability to Adapt Data Rates and Spectrum Use to constraints of the RF environment
- Efficient Spectrum Utilisation without a Pilot Channel
- Need for Rapid and Robust acquisition
- Lowest Possible Power Use for Low Power Clients
- Resistance to Fade
- Extensibility to Higher Rates and Adaptive to Higher User Demand

HIGHLIGHTS OF SUBMISSION

Interoperability

- Installation, RF channel co-ordination and system administration is the same as existing 802.11
- Clear Channel Assessment is unchanged from current 802.11 because RF channelization is unchanged
- Signal Field (8 bits) add additional possible definitions to describe data rates of 1, 2, and 3 to 20Mbps

HIGHLIGHTS OF SUBMISSION

Interoperability (Continued)

- Maintain same MAC header, frame body, and CRC structure as current 802.11
- Maintain same BPSK and QPSK Modulation and Synchronisation Methods as current 802.11
- Maintains same CRC scheme for header and payload

HIGHLIGHTS OF SUBMISSION

Adaptive Data Rates

- Use of multiple codes and variable data rate for a more robust RF channel
- Data rates from 1 to 20Mbps adapted due to a changing RF environment on a packet-by-packet basis
- Data rate determined at time of channel acquisition
- Subsequent packets can have a data rate based on an assessment of dropped packet rate due to more subtle impairments of the RF channel
- Matched Filter with RAKE could be used for quick acquisition, and a more robust RF channel at high data rate
- Option to acquire strongest signal path at signal acquisition phase

HIGHLIGHTS OF SUBMISSION

Efficient Spectrum Use

- Chip rate remains unchanged
- Maintains existing RF channelization on 5Mhz spacing
- Data rate can be optimised, based on actual RF environment (fading, noise, dispersion, etc)
- No pilot channel needed
- Fade and Noise Resistance: Proposed optional use of RAKE to select RF path with the best signal

HIGHLIGHTS OF SUBMISSION

Rapid Acquisition

- Rapid Acquisition using existing synch field of current 802.11

Fade Resistance

- Optional RAKE implementation permits selecting the RF path with the least Fade

HIGHLIGHTS OF SUBMISSION

Extensibility

- Allows for incremental improvements in data rates
- Data rates can be tailored to meet equipment price targets
- Easy to have new equipment cooperate at previous standard
- Efficient spectrum use allows for greater number of co-located WLAN systems
- The Clear Channel Assessment method will still be valid in an environment of mixed users

HIGHLIGHTS OF SUBMISSION

Economical Implementation

- No significant retraining of personnel beyond 802.11 is needed
- No unusual or precision components are required
- Uses same 25 ppm oscillator as existing standard
- Modest increase in complexity of digital circuits
- The cost-benefit of antenna diversity is maintained
- Manufacturers can optimise data rate power consumption and cost

Summary

This proposal has these characteristics

- Adaptive Data Rate up to 20 Mbps
- Minimal impact to existing 802.11 implementation
- Few impacts for implementation by vendors and end-users
- Effective use of RF spectrum
- High rejection of RF interference due to Spread Spectrum system
- The flexibility to trade-off of data rate, power, and cost expands the market application for devices ranging from shirt-pocket to servers

More detailed specifications will be submitted and presented the January, 1998 meeting.