IEEE P802.11
Wireless Access Method and Physical Layer Specification

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TITLE: **WIRELESS LAN ACCESS PROTOCOL DEVELOPMENT, SIMULATION AND DEMONSTRATION**

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SUMMARY

A continuing project to develop and demonstrate a wireless LAN access method is now being undertaken. The assumed protocol is full handshake, sequentially used Access-points in reuse clusters (IEEE P802.11/90-95). This work is expected to last many months as refinements are added and test conditions evolve from ideal to realistic.

The goal is to do a credible modeling and simulation that can be reported to 802.11. This is intended to increase confidence in the suitability of the tested method. The output should include empirical results on delays, capacity, efficiency and other important performance factors. A further intent is to do this work in a form that is the first step in defining the function of especially designed protocol integrated circuits.

The general approach to this work is reported.

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METHODOLOGY

The proposed protocol uses a single channel with entirely sequential operations, and all information is encoded in the bit patterns of the transmitted messages. This greatly simplifies a software simulation in a common processor, but the intention is to use multiple processors where each is a Station, Access-point or Hub Controller. The station and Hub controller will also have attached autonomous and programmable Traffic Generators.

These functions will be defined in software, probably but not necessarily using C source code. The organization of code modules will maintain separation of those performing functions needed in actual equipment and those relate to controlling and observing test conditions. The Traffic Generators will be separate and autonomous.

Initial Simplifying Assumption

The simplifying approximations of the first test are:

1) The medium signaling rate is scalable, therefore testing can be done with slower speeds convenient to the available hardware.

2) Overlapping transmissions cause: a) both to be lost, b) one to be lost, c) neither to be lost. The proportions of these events averaged over a period of time are programmable but the incidence of when they occur is asynchronous and non-uniform.

3) There are no bit errors in the medium. All message loss is from contention.

Since each Access-point is used sequentially in a reuse cluster, the same operation can be approximated using only one. This approximation neglects the effect of other contiguous clusters and of different mixes of path attenuation for individual stations. In the beginning all path loss is zero.

Evolution of Test Assumptions

The initial objective will be a test under idealized conditions.

Randomly occurring and dimensioned puncture-type wounds will be inflicted on the messages to further exercise error recovery mechanisms as a further step.

There being no use of signal strength measurement in Stations, and there being no use of a signal strength parameter at Access-points until there are many of them; it is not necessary to model signal level in any way at the early stages. It will be important at all stages to have less than 100% probability of error-free transmissions.

Later, there will be analog combining of signals with randomization of relative levels, and possibly extension to fade simulation. It is expected that modems producing the planned modulation at intermediate frequencies will be available in about six months.

It is also a step to shift work from scaled time to real time at low rates and then at high rates.

Path delay initially simulated in software could be replaced with lengths of cable for the actual distances involved.

A substantial step will involve the transition from single to multiple Access-point simulation and cross-coupling of signals in multiple junctions. It is appreciated that this must be done, and the means used will be the subject of a further report.

OUTPUTS

The obvious output is the performance results and the information needed for ASIC chip function. It is expected that the simulation of radio imposed perturbations will not be important until after the basic function is achieved. If the recovery properties of the automatic repetition are good, a low radio failure rate will not have much effect.

The more important output may be in learning and providing a rigorous means of describing the logic functions needed. C code could be more easily converted to an ISO formal language than some other possible early forms.