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COVER SHEET FOR PROVISIONAL APPLICATION FOR PATENT

Assistant Commissioner for Patents
Box PROVISIONAL PATENT APPLICATION
Washington, DC 20231

Sir:

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53(c).

	Docket Number	010629-0043-888	Type a plus sign (+) inside this box →	+

INVENTOR(s) APPLICANT(s)			
LAST NAME	FIRST NAME	MIDDLE INITIAL	RESIDENCE (CITY AND EITHER STATE OR FOREIGN COUNTRY)

TITLE OF THE INVENTION (280 characters max)

CHANNEL, CODING AND POWER MANAGEMENT FOR WIRELESS LOCAL AREA NETWORKS

CORRESPONDENCE ADDRESS: **PENNIE & EDMONDS LLP** 20583

ENCLOSED APPLICATION PARTS (*check all that apply*)

☒ Specification	*Number of Pages*	84	☒ Applicant claims small entity status, see 37 CFR §1.27
☒ Drawing(s)s	*Number of Sheets*	28	☐ Other (specify)

METHOD OF PAYMENT (*check one*)

☐ A check or money order is enclosed to cover the Provisional filing fees.	ESTIMATED PROVISIONAL FILING FEE AMOUNT $160
☒ The Commissioner is hereby authorized to charge the required filing fee to Deposit Account Number 16-1150.	

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.
☒ No. ☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

Signature H.C. Lebowitz
Henry C. Lebowitz
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REGISTRATION NO. (*if appropriate*) 36,196

Date February 13, 2003

☐ Additional inventors are being named on separately numbered sheets attached hereto.

Total number of cover sheet pages. 2

PROVISIONAL APPLICATION FILING ONLY

[redacted]

CHANNEL, CODING AND POWER MANAGEMENT FOR WIRELESS LOCAL AREA NETWORKS

FIELD OF THE INVENTION

This application relates to the field of Wireless Local Area Network (WLAN) network management.

BACKGROUND

In a WLAN, one or more base stations or Access Points (AP) bridge between a wired network and radio frequency or infrared connections to one or more mobile stations or Mobile Units (MU). The MUs can be any of a wide variety of devices including, laptop computers, personal digital assistants, wireless bar code scanners, wireless point of sale systems or payment terminals, and many other specialized devices. Most WLAN systems used in business and public access environments adhere to the IEEE 802.11 specifications. Other WLANS are based on other wireless technologies including, the specifications promulgated by the Bluetooth Special Interest Group, proprietary radio frequency protocols and infrared link protocols.

Wireless Local Area Networks (WLANs) are now in common use in both large and small businesses, as public Internet access points, and in home environments. Millions of base-stations or access points and mobile units are now deployed. This increasing density of access points creates additional network management problems. Specifically access points using the same or overlapping frequency bands or channels and the same or similar signal coding have the potential to create mutual interference. Mutual interference leads to packet collisions, the need to retransmit packets, potentially reducing network throughput. At the same time, the coverage area of the access points may not

be sufficient, leading to poor signal quality at the edges of the network or "coverage holes".

Conventional approaches to the optimization of wireless networks involve making surveys of the desired coverage area. The results of these surveys are then used to determine the optimum settings for channel selection, signal coding and power for the access points. Attempts may also be made to determine if existing access points should be moved to other locations or new access points added to the wireless network. Survey approaches suffer from several difficulties including:

1. It is usually quite expensive to collect and analyze the data.

2. The survey data is static. Thus, if conditions change within the area of interest the survey would need to be run once again or the design of the wireless network would be less than optimal.

3. The equipment used to make the survey typically has fixed and distinctive physical properties (antennas, receivers, velocity of travel, etc.). In practice, mobile units will have different physical properties and will therefore experience the wireless network quality that is different from the survey equipment.

Other approaches to management of wireless networks can involve the collection of signal measurements by access points. In these schemes, the wireless network management system uses signal information collected by the access points as a basis to adjust the channel assignments, signal coding assignments and power levels, in attempts to optimize network performance. In most cases the access points collect information on the signals broadcast by the other access points. These schemes suffer from a number of drawbacks including:

1. The access points can only take measurements at fixed locations;

2. The receiver and antenna properties of the access point can be quite different from those of the mobile units;

3. The transmission power levels of the access points and mobile units may be quite different; and,

4. The possible use of diversity antennas in access points, but not in mobile units.

5. Each single access point only has local knowledge of the environment and are thus, unlikely to make changes that are globally optimal.

SUMMARY

The channel, coding and power management system described overcomes the deficiencies of prior art power, coding and channel management systems through a simplified approach using data collected from mobile units to optimize the performance of the network. The system provides for the management of WLANs in cases where unmanaged access points are present. Further, the system can provide information on the possible need to add access points.

The channel, coding and power management system uses signal data and network traffic statistics collected by the mobile units to determine optimal configuration settings for the access points. The access point settings managed by the system can include the operating channel or center frequency, orthogonal signal coding used, if any, and the transmission power. In some embodiments, signal coding can include the data rate used by the mobile units and the access points, which may also be controlled. The solutions computed can account for the inherent trade-offs between wireless network coverage

area and mutual interference. Mutual interference arises when two or more access points use the same or overlapping frequency bands or channels and the same of similar signal coding. These situations can arise as a result of the often-limited choice available of channels and orthogonal codes. Higher levels of mutual interference can lead to low network data throughput. On the other hand, reasonable access point transmission power must be maintained to achieve coverage of the desired areas.

Any device can perform the collection and reporting of radio frequency signal data if it has the required receiver, signal measurement capabilities and any type of data connection to data repository. In the following discussion, these devices will be referred to has "mobile units", but can in fact include a number of other types of devices including:

1. The device may be any type of general-purpose computer, for which the main purpose is not to collect data, but rather collects data and reports in available idle time.

2. The device used for data collection may not require any special purpose hardware or driver software, but may only use standard configurations.

3. The device may or may not move with time.

4. The device may be dedicated to the collection of radio signal data at a fixed location or moving between several locations with time.

5. May have one or more additional network interfaces, some of which may connect to wired networks or other wireless networks.

The computations of the channel, coding, and power management system can determine neighbor relationships between access points without the need for geographic location data. In some embodiments, the system uses signal

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