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(71) Applicant (for all designated States except US): **WIDEFI, INC.** [US/US]; SUITE 1012, 1333 Gateway Drive, Melbourne, Florida 32901 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **PROCTOR, James** [US/US]; C/O WIDEFI, INC., SUITE 1012, 1333 Gateway Drive, Melbourne, Florida 32901 (US). **PUIG, Carlos** [US/US]; 529 Rogers Court, Santa Clara, California 95051 (US). **GAINEY, Kenneth, M.** [US/US]; WiDeFi, Inc., 1333 Gateway Drive, Suite 1012, Melbourne, Florida 32901 (US). **OTTO, James** [US/US]; 911 Harbor City Blvd., Melbourne, Florida 32935 (US). **LAMONT,**

Lawrence [US/US]; LAWRENCE W. LAMONT, 316 Bahama Drive, Indialantic, Florida 32903 (US).

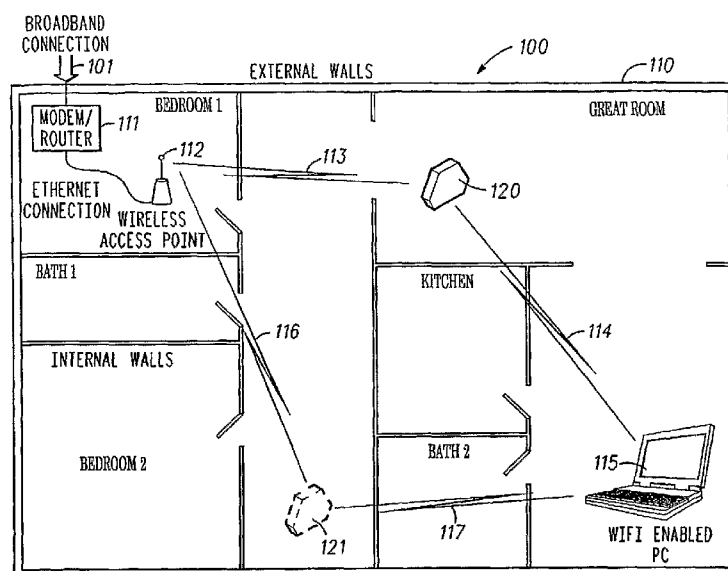
(74) Agents: **POSZ, David** et al.; POSZ LAW GROUP, PLC, SUITE 101, 12040 South Lakes Drive, Reston, Virginia 20191 (US).

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(54) Title: PHYSICAL LAYER REPEATER SELECTING HIGHER LAYER FUNCTIONS



(57) Abstract: A physical layer frequency translating repeater (600, 700) for use in a wireless network includes signal processor (710-714) coupled with a signal processing bus (711), a processor (627) and a memory (650). The physical layer repeater conducts physical layer repeating and selectively conducts layer 2 and possibly layer 3 functions depending on network conditions and other factors. A demodulator (623) can extract address information such as media access control (MAC) addressing to enable packets to be redirected, terminated, stored and forwarded, if necessary, based on network conditions.

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PHYSICAL LAYER REPEATER WITH SELECTIVE USE OF HIGHER LAYER FUNCTIONS BASED ON NETWORK OPERATING CONDITIONS

FIELD OF THE INVENTION

[0001] The present invention relates generally to wireless local area networks (WLANs). In particular, the present invention relates to selection of higher layer operation for a frequency translating physical layer repeater connecting a client to an Access Point (AP) based on operating conditions.

BACKGROUND OF THE INVENTION

[0002] Because of the increasing popularity of unrestrained access to broadband services by, for example, portable computing devices, there is an increasing need to extend the range of nodes such as access points associated with wireless networks, including but not limited to WLANs and wireless metropolitan area networks WMANs described and specified in the 802.11, 802.16 and 802.20 standards. The effective proliferation of wireless networks depends heavily on sustaining and increasing performance levels as user demands increase.

[0003] Performance shortcomings between actual and specified performance levels can be caused by attenuation of the radiation paths of RF signals, which are typically transmitted at frequencies of 2.4 GHz or 5.8 GHz in an operating environment such as an indoor environment. Base or AP to receiver or client ranges are generally less than the coverage range required in a typical home, and may be as little as 10 to 15 meters. Further, in structures having split floor plans, such as ranch style or two story homes,

or those constructed of materials capable of attenuating RF signals, areas in which wireless coverage is needed may be physically separated by distances outside of the range of, for example, an 802.11 protocol based system. Attenuation problems may be exacerbated in the presence of interference in the operating band, such as interference from other 2.4GHz devices or wideband interference with in-band energy. Still further, data rates of devices operating using the above standard wireless protocols are dependent on signal strength. As distances in the area of coverage increase, wireless system performance typically decreases. Lastly, the structure of the protocols themselves may affect the operational range.

[0004] One common practice in the mobile wireless industry to increase the range of wireless systems is through the use of repeaters. Other approaches can include distributed base stations to broaden coverage areas or the like. However, many of the approaches are prohibitively expensive. In more recent discussions within, for example, the Wi-Mesh Alliance IEEE 802.11 Task Group S, the use of ad hoc or mesh networks, where multiple APs are capable of forming connections to each other when proximity is established, are favored as a way of extending the range of the networks. In the proposed evolution of the 802.11(s) standard for mesh networks, mesh nodes are intended to be compatible with the multiple input multiple output (MIMO) and high data rate (540 Mbps) specifications associated with 802.11(n).

[0005] Such systems are already deployed in two-way radio networks such as might be used by local government services. In such systems, multiple hops can be traversed before becoming out of range of a primary AP, that is, an AP having the direct connection to the base station, source provider or the like. The primary