Wireless Access Point Signal Booster (WAPSB)

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Existing wireless access points operating (WAP) at 2.4 GHz or 5 GHz have an advertised range that could cover up to 1500 feet. However, experience indicated that the signals in typical residential areas seldom travel beyond a 150m. Room walls, desks, bookshelves, etc, all tend to attenuate the signal strength causing a significant decrease in range. Using commercially available, Linksys or Belkin, access points and field measuring instruments, we will adapt passive reflectors or bipolar antennas to the WAP in order to increase the signal strength, by redirecting the majority of the electromagnetic waves from the router to the receiver.

The adaptation must maintain a size of 2x5x7 inches and a weight of no more than 20lbs. with comparison to the WAP, while maintaining the a 2.4GHz frequency and not exceeding the transmission power of 1W set forth by the IEEE 802.11 Frequency Hopping Spread Spectrum (FHSS) or the Direct Sequence Spread Spectrum (DSSS). After development the system must pass a series of signal strength tests, using field measurement instruments, in a variety of randomly selected home and office environments. Any modifications to the WAP may not result in the infraction of FCC Regulatory Standards for Class B Digital Devices. For the 802.11b you are allowed up to 30dBm or 1W of transmitted power output(TOP) with a 6 dBi antenna or 36dBm or 4W effective radiated power over an isotropic antenna(EIRP).

Any modifications or adaptations set forth to be made on the WAP may not interfere with the reliability predefined by the developer of that router. The adaptation or modification must not result in the users' inconvenience of constantly maintaining the modified system anymore than the needs presented to the consumer by the developer of the WAP at the time of purchase. Functionality tests, such as continuous use, stress environment, and heat and cold exposure must be facilitated in order to ensure the reasonable validity of the product in home and office conditions.

The cost of the research and development may not exceed a preset amount of 500 dollars. This is to cover the purchase of an 802.11x WAP, field measuring devices, as well as any bipolar antennas or passive reflectors need to complete the design. The typical range of a WAP in a home and office environment is about 150m and 300m in free space. It will be necessary to design and implement passive reflector antennas such as parabolic reflectors that will redirect the wireless energy in specific quadrants and thereby increase the coverage. On average the team of four engineers must ascertain a satisfactory accomplishment of the research and development of the design by May of 2005, a time period of one academic year.

Ultimately the design's coverage performance with and without the reflector antennas must be compared with existing WAP. The value of such a development must maintain a reasonable consumer cost that is subject to the cost of the parts with reasonable economic fluctuations. Finally, any adaptation or modification made to the WAP must not result in an excessive over shoot in the consumer pricing, on average $80-$100.

The final deliverables will be a working WAP with better signal transmission than an off the shelf WAP, a user's manual, and a final report that includes a complete design schematic, a functional description, and any acquired test results. All deliverables are to be produced by the WAPSB design team and are to be verified by Prof. Janaswamny.