IEEE 802.11

Wireless Access Method and Physical Layer Specifications

TITLE: **Issues on Infrared Transmission**

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Abstract

Several issues related to applying infrared transmission in wireless LANs physical layer are summarized to demonstrate IR's flexibility.

I. Introduction

During the past several IEEE 802.11 meetings, IR (infrared) diffused transmission has attracted much attention as one of the possible physical layer transmission methods for future IEEE 802.11 standards.

In this documentation, we are goig to summarize important research results regarding infrared communication techniques so that members in the project 802.11 may apply more features of infrared transmission.

II. Issues on IR Transmission

Nocoherent Transmission

The most well known feature for IR transmission is to employ noncoherent (or called in coherent or intensity) modulation/demodulation while traditional RF (radio frequency) transmission usually employs coherent modulation. This statement is true under the condition that we are not using currently expensive coherent optical communication techniques such as optical phase locked loops or low phase noise lasers.

Channelization

The concept to have channels similar to RF frequency channels is also possible for IR transmission. We still can generate infrared carriers (Therefore, subcarriers similar to CATV are possible). A low speed IR data transceiver using BFSK (binary frequency shift keying) was made at the National Tsing Hua University to support this statement. By more advanced technology (see [1]), traditional PM & FM are also possible.

CDMA

Code division multiple access (CDMA) is also demonstrated achievable for IR communication systems. Based on intensity modulation which results in a positive system, special codes for CDMA have been developed. [2] listed quite a few references and suggested a new kind of easily-generating codes to support asynchronous CDMA.

Note: A positive system has signal {1,0} rather then {+,-} in coherent communication.

III. Remarks

Although we have summarized that it is possible to do
- coherent communication
- channelization
- CDMA

for IR transmission, it is not necessary to imply that such approaches can be easily mass-produced in low cost. Intensity modulation still maintains cost-effective. Channelization or not still requires more investigations.

References:

[1] P. Yeh, A. Yariv, Optical Waves in Crystals, 1984

[2] K.C. Chen, "Self-Synchronized Prime Codes for Asynchronous Optical Processing CDMA", Proc. International Symposium on Information Theory and Its Applications, Hawaii, pp. 759-762 Nov. 1990.