Proposal of IR 10Mbps Communication Spec. to IEEE 802.11

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Proposal Outline:

1. Application to the current 802.11 MAC.
   10Mbps and higher in the near future

2. Adjustment of the current PHY.
   Applicable on the higher transfer rate

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Factors to be considered:

1. Precondition that the current MAC is to be applicable on 10-25-100Mbps.
2. Proposal that the current 4PPM-PHY or 16PPM-PHY is to be adjusted for DMI Modulation.
   (DMI: Differential Mark Inversion)

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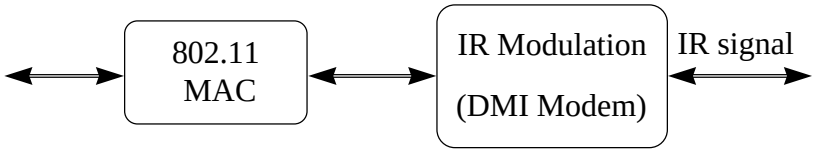
Basic Connection Concept:



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Performance of the new DMI Modem:

Error Rate: less than 10^{-10}
Service Area: within the radius of 1m with the spot reflection on the ceiling
Radiation Angle: ±10’
MAC & PHY: adjusted MAC & PHY

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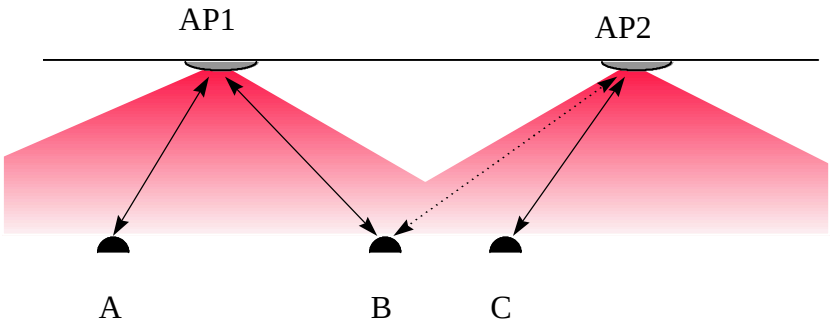
Setting of the Access Points on the ceiling:



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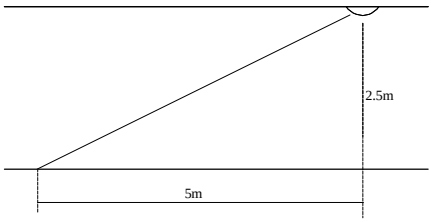
IR Energy Calculation from the Access Point:



Pap=40(mW) x 24=960mW

So=25pi x 10^4=7.85 x 10^5(cm^2)

if PD-square is $1cm^2$

Ppd=Pap/So=0.96/(7.85 x 10^5)=1.22 x 10^{-6}(W)

(Pmin=700nW=0.7 x 10^{-6}W)

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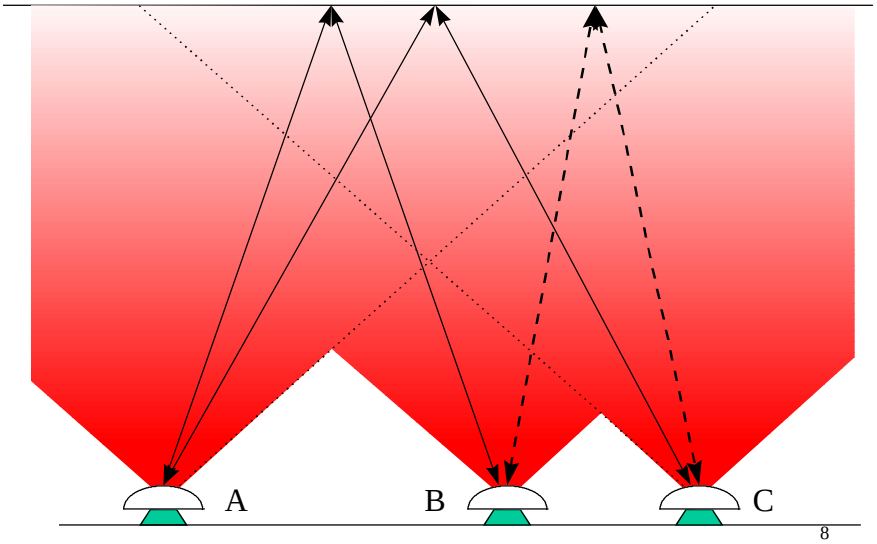
Example of IR Communication with Wide Area Ceiling Reflection



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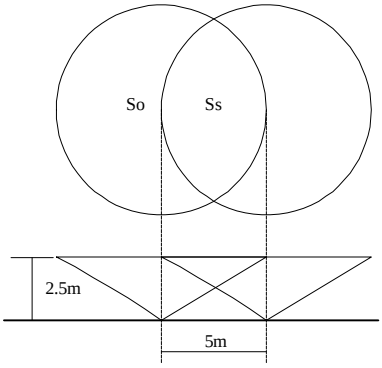
IR Energy Calculation:



Pmax=960mW

So=25pai x 10^4(cm^2)

Ss=(So/3-5x5x1.73/2 x 10^4) x 2

=(26.18-21.65) x 2 x 10^4

=9.06 x 10^4(cm^2)

Pss=(Pmax) x Ss/So

=960(mW) x 0.115

=110(mW)

if Pd square is 1cm^2,

Ppd=0.11/So=1.4 x 10^{-7}(W)

=140nW

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Proposed Application on the current MAC:

Error Rate: more/less than 10^{-10}

Service Area: within the radius of 5m with wide area reflection on the ceiling directly under the Access Point

Radiation Angle: $\pm$60' (with the hight of 2.5m)

MAC & PHY: applicable on the current MAC and adjustment function to be added on the current PHY for DMI module

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Proposal of the adjusted PHY:

Current PHY with 4 and 16PPM:

Current modem circuit is fairly complicated, and the current PHY with 16PPM may not cope with the higher transfer rate imposing heavy burden on LED and optical circuit

Proposal of adjusted PHY for DMI Modulation:

Basic application of Bi-Phase Modulation for easy DMI approach and better LED efficiency

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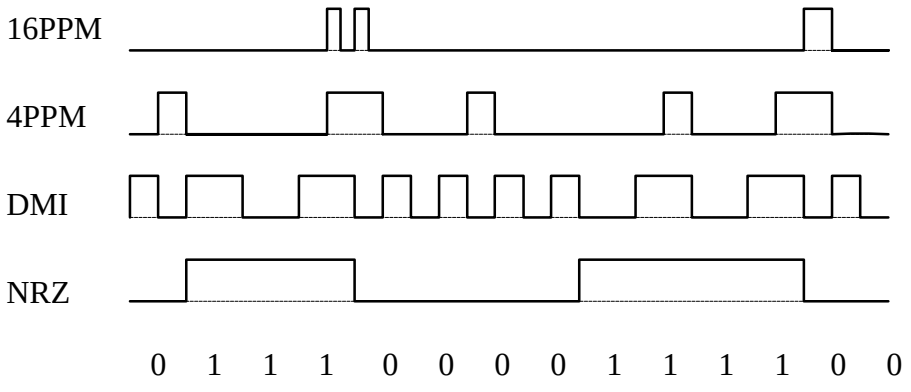
Pulse Wave Comparison in IR Modulation:



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Difference of LED Performance:

Current IR 4-16PPM Modulation:

In 10Mbps Data Transfer, the minimum Pulse
Duty Ratio is 1/1 to 1/6 for 4PPM, and
1/1 to 1/30 for 16PPM

Proposed DMI Modulation:

In 10Mbps Data Transfer, the maximum and
minimum pulse width are 50ns and 100ns;
Easy Synchlonized Extraction
Easy Optical Circuit with the Averaged Pulse
Slower Response Capacity on LED

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Expandability / Applicability in the Future:

Expandable Application to the higher Transfer Rate:

DMI Modulation is easily applicable to 10, 25 to100Mbps

Networking Communication:

Easily applicable to CSMA/CD and
both Stable/Fixed and/or Portable/Mobil Communication

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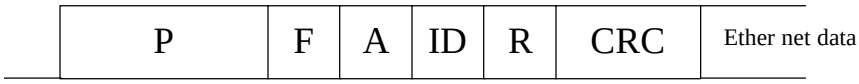
"Header" Construction for the DMI Modulation:



P:	Preamble	24bit
F:	Flag	8bit
A:	Address	8bit
ID:	Identification Address	8bit
R:	Reserve	8bit
CRC:	Cyclic Redundancy Check	16bit

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Summary:

MAC: Establishing Compatibility with the current MAC

PHY: Adding Adjustment Function and Header on the current 4 & 16PPM PHY for DMI Modulation

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