

Project: IEEE P802.15 Working Group for Wireless Personal Area Networks (WPANs)

Submission Title: [VLC Experimental Test & Results II]

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Abstract: [Experimental test of the visible light communication application for feasibility is described in this document. Some part of the results are also presented.]

Purpose: [Contribution to IEEE 802.15.7 TG-VLC]

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VLC Experimental Test and Results II

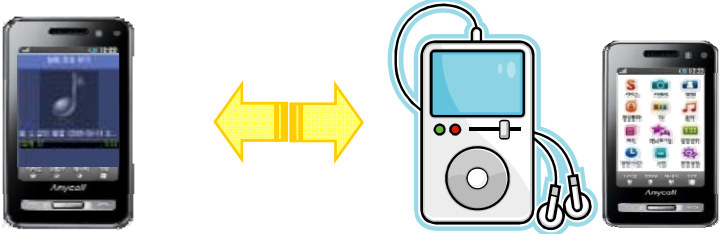
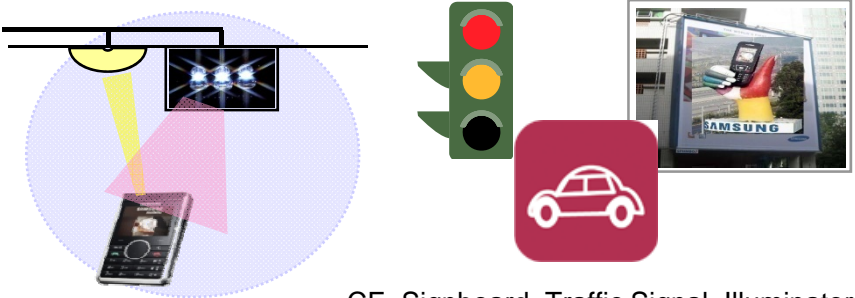
2009. 03

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VLC Applications

	Application	Function / Consideration
<p>Mobile to Mobile</p>	 <p>Handheld device, Portable device</p>	<ul style="list-style-type: none"> ▪ Data transfer ▪ Contents sharing
<p>Mobile to Infrastructure</p>	 <p>CE, Signboard, Traffic Signal, Illuminator</p>	<ul style="list-style-type: none"> ▪ Indoor Navigation ▪ Information-broadcasting system

Ambient light

- ❖ Ambient light
 - Light; from various source, arbitrary direction with sufficient intensity
 - Applied as interference to information carrying light
 - Example: Sun light, illuminator (fluorescent tube, light bulb), traffic signal etc

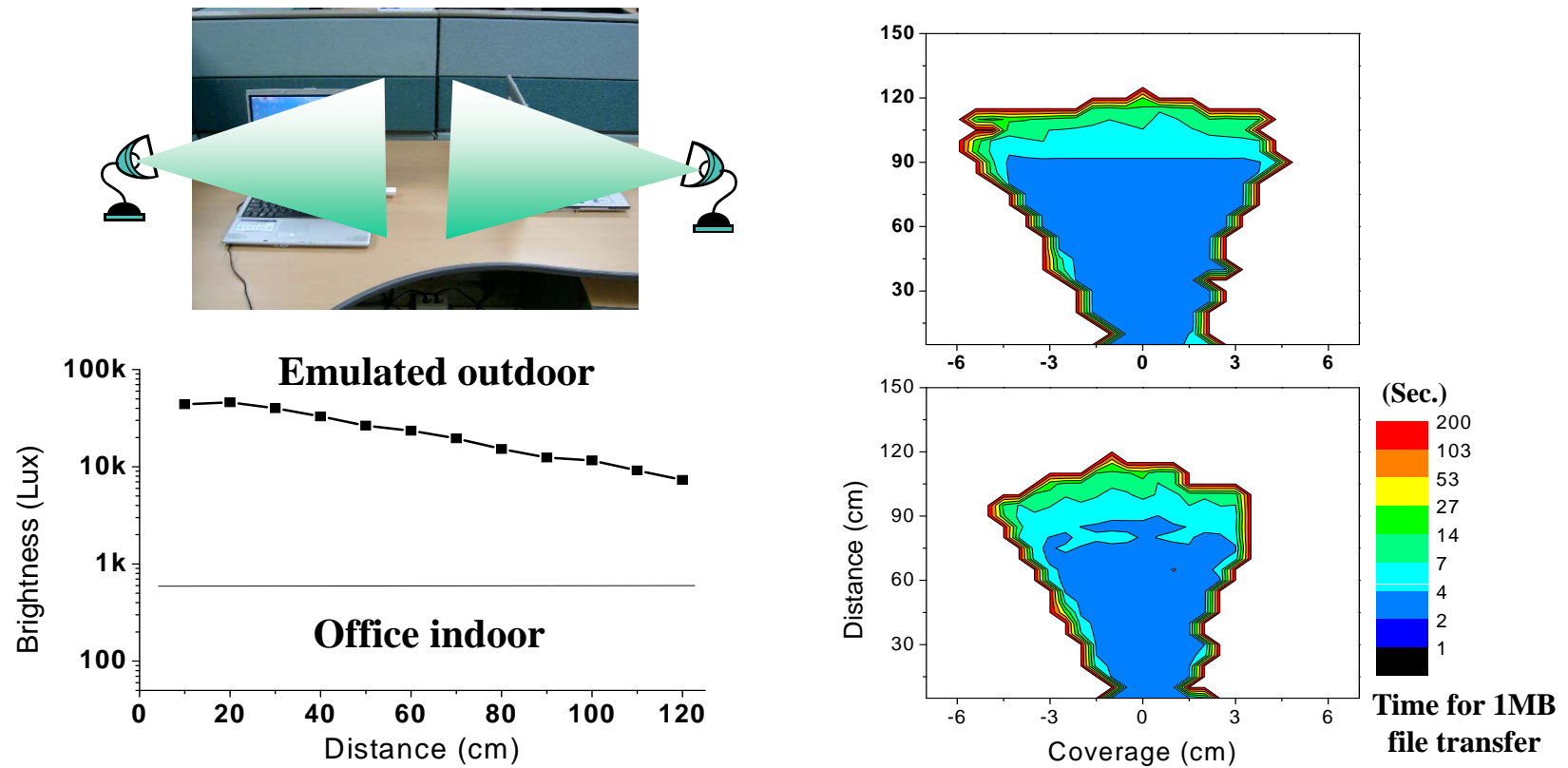
- ❖ The purpose of the experiment
 - The measurement of the effect of ambient light to P2P device and broadcasting sign board
 - Halogen lamp acts as ambient light source (D.C.)

Feasibility at 4 Mb/s – PC–PC visible link

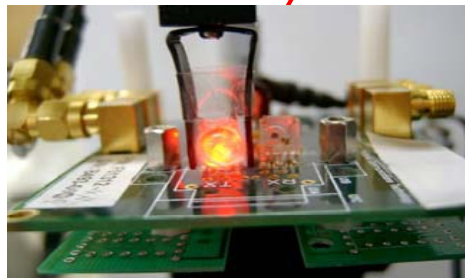
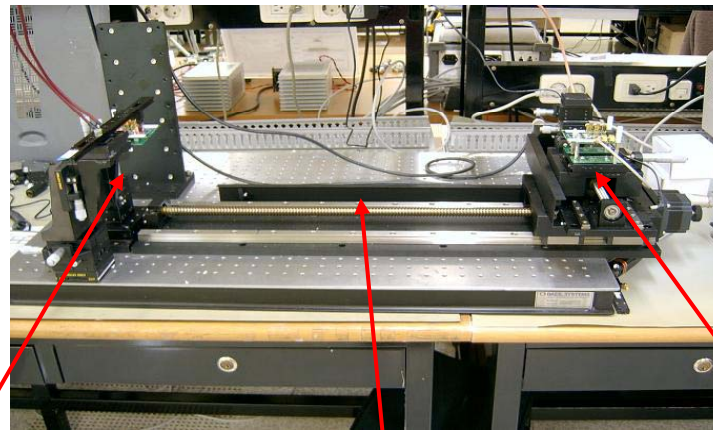


7mm diameter lens

Feasibility at 4 Mb/s – Effect from ambient light



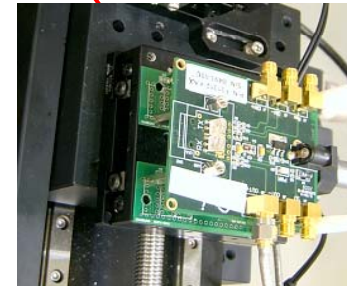
Feasibility beyond 100 Mb/s – Configuration



RCLED + Tx lens
RCLED wavelength : 650 nm
RCLED power : ~ 1 mW
Tx lens diameter : 7 mm

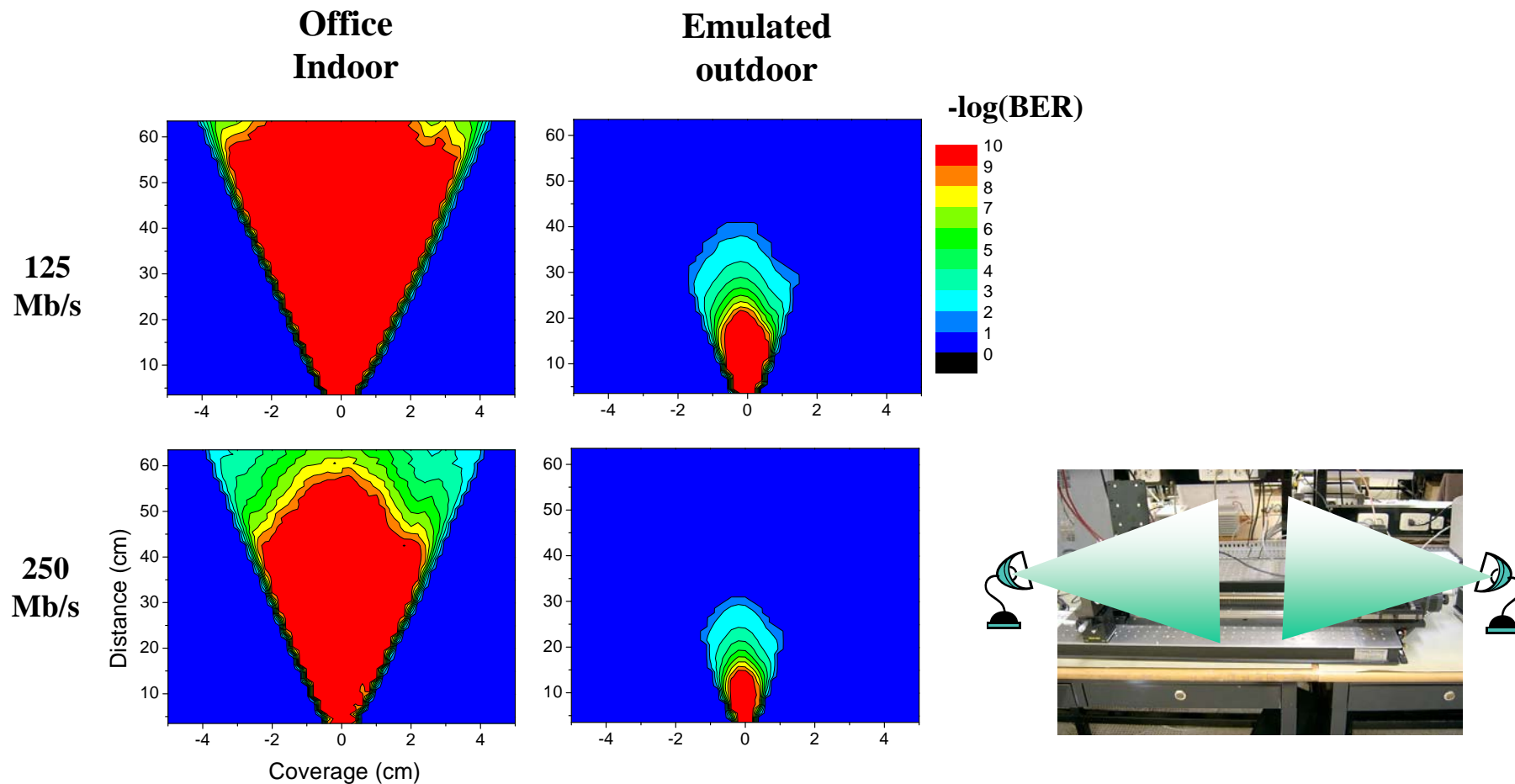


Visible spot



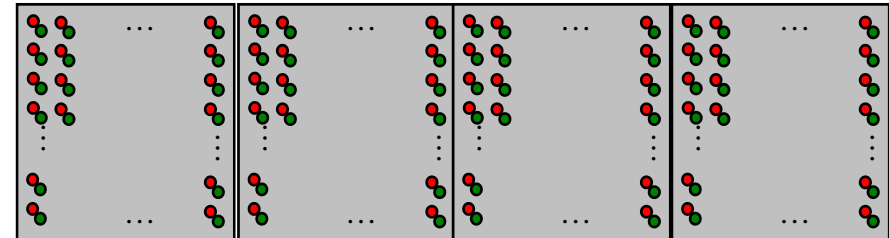
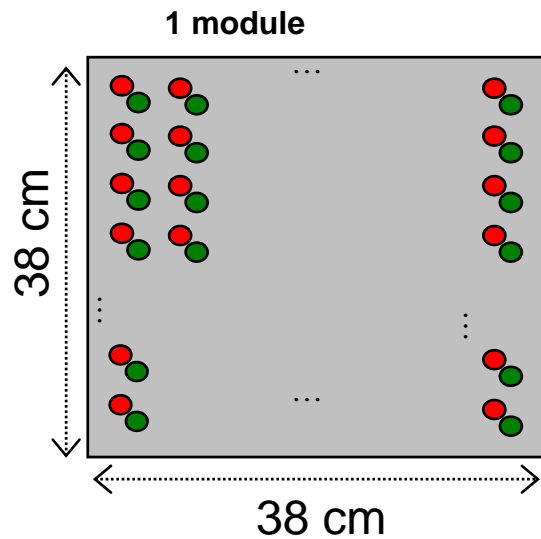
Silicon PD + Rx lens
Silicon PD : 1 mm²
Rx lens diameter : 7 mm

Feasibility beyond 100 Mb/s – Effect from ambient lighting



4 modules

Signboard Structure

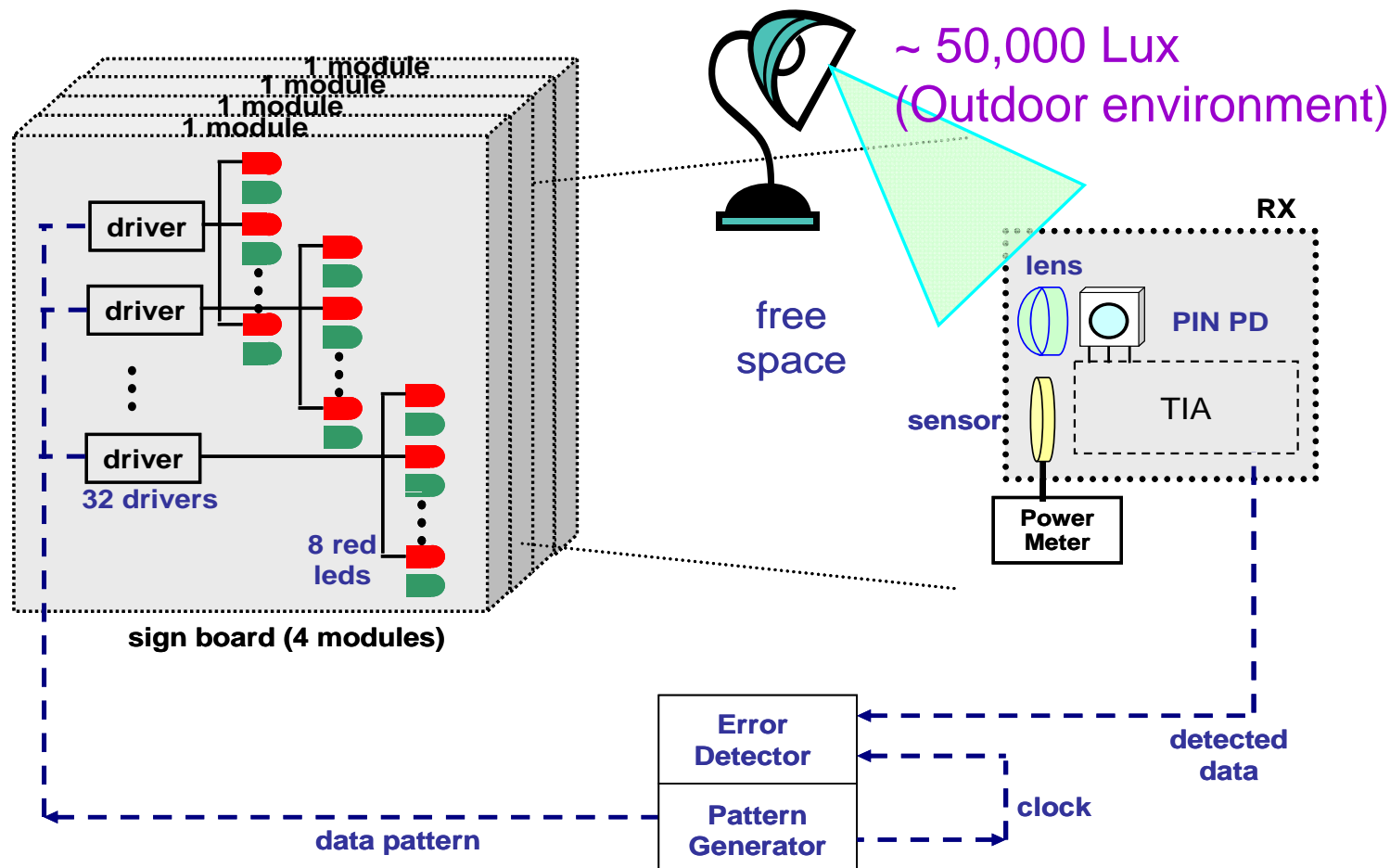


Red LED : 256 (16 x 16)
Green LED : 256 (16 x 16)

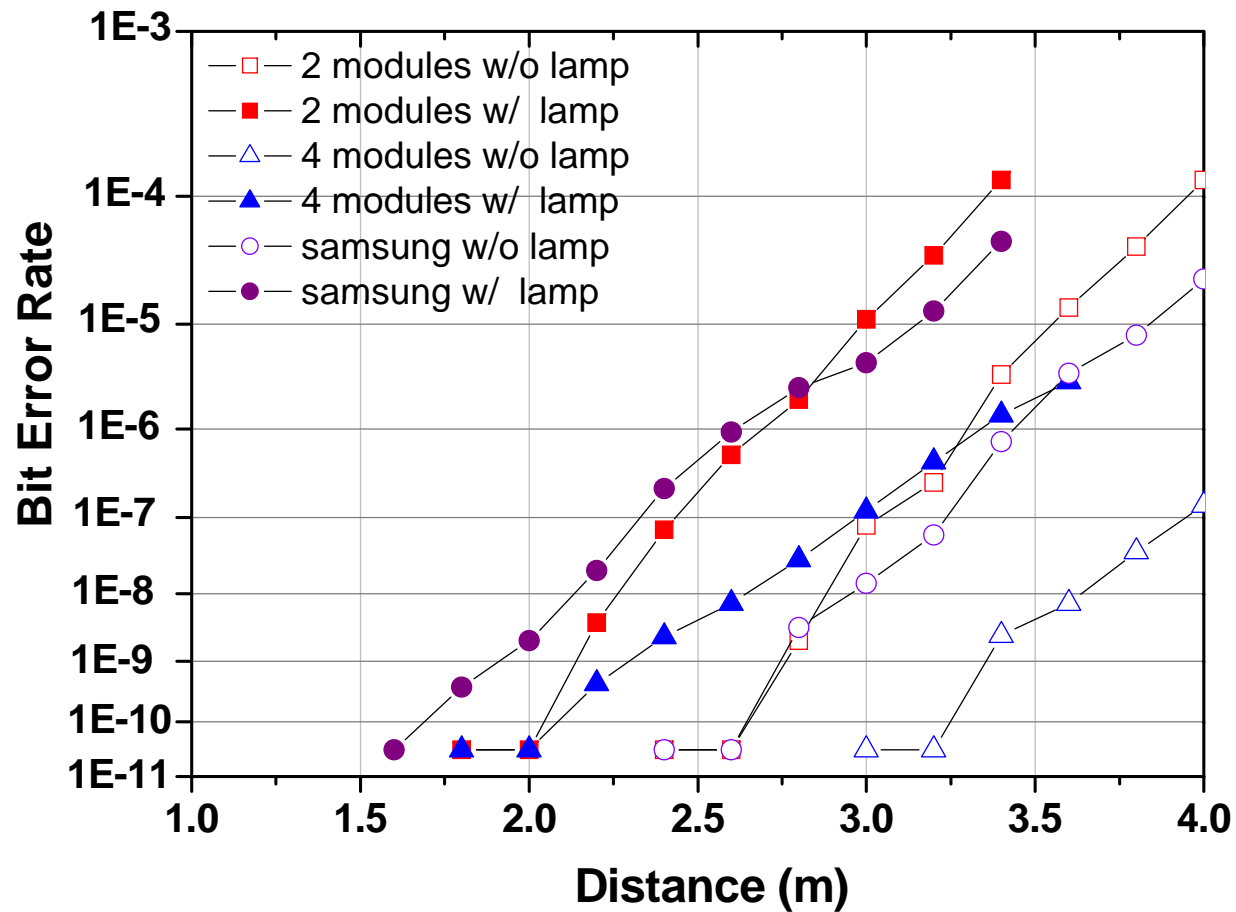
*Only red LEDs were modulated.



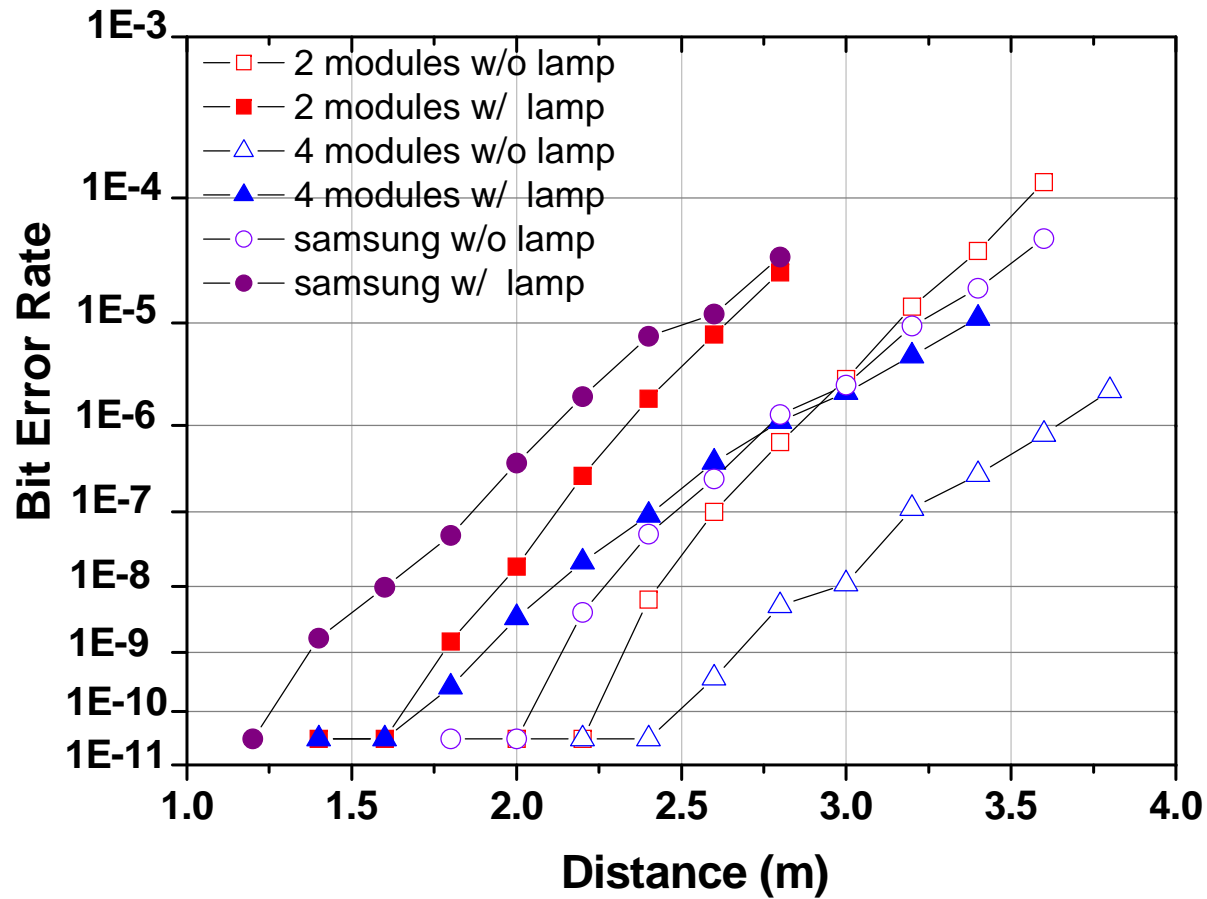
Noise tolerance due to ambient light



Noise tolerance for 4 Mbps



Noise tolerance for 10 Mbps



Summary

- ❖ VLC Application
 - Mobile to Mobile Application
 - Mobile to Infrastructure Application
- ❖ Ambient Light
- ❖ Feasibility at 4M bps
 - Effect from ambient light was insignificant.
- ❖ Feasibility over 100M bps
 - Effect from ambient light was significant.
- ❖ Feasibility at signboard
 - Test 4 and 10Mbps
 - Distance reduced about 0.6m by changing data rate
 - Distance reduced about 0.4m~1m by ambient light
 - ◆ The number of module also effected.

Thank you

Reference

❖ <http://en.wikipedia.org/wiki/Lux>