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

Submission Title: [Consideration on VLC application]
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Re: []

Abstract: [Based on Samsung's contribution, VLC application summary is described in this document. Some consideration point of applications are also presented.]

Purpose: [Contribution to IEEE 802.15.7 TG-VLC]

Consideration on VLC application

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Samsung Electronics

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Consideration on Application

❖ **Various application**

   → Various **data rate, distance** and etc,

   → VLC device should be covered every different condition

❖ **Various parameters** (based on application summary doc.)

- **Environment(Outdoor, Indoor, etc.)**
- **Bi-directional(Broadcast, etc.)**
- Symmetric or Asymmetric Data Flow
- Data Type(DL/UL)(Streaming, Packet, etc.)
- Data Rate(DL/UL)(min, max)
- Distance(min, max)
- Source Intensity (strong, weak, etc.)
- **Channel Type (LOS, NLOS, etc.)**
- Beam Width (wide, narrow, etc.)
- Device Discovery& Beam Pointing (manual, auto, etc.)
- pt-to-pt- or -WPAN?
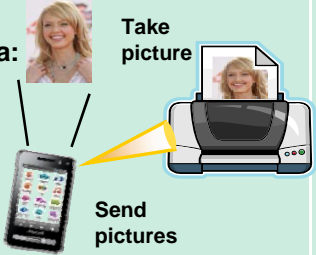- Centralized controller?

Consideration on Application

❖ **What else?**

- Visibility
- Mobility
- Modulation
- Regulation
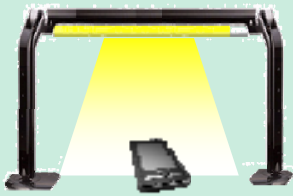- Market
- Practical (Not conceptual)

Application summary

No	Doc Ref	Description	Environment	Bi-directional (Broadcast, etc.)	Data Rate (min, max)	Distance (min, max)	Channel Type (LOS, NLOS)
1	15-08-0015 15-08-0256-01 15-08-0777	**Indoor navigation:** The lighting system send the lamp ID only to the (mobile) device	Indoor	Uni-directional	~10kbps	~10m	LOS + NLOS
2	15-08-0015 15-08-0256-01 15-08-0777	**Indoor navigation:** The lighting system and the mobile device has both TX and RX.	Indoor	Bi-directional	Dn:~10Mbps Up:~100Mbps	~3m	Dn: LOS Up: LOS
3	15-08-0015 15-08-0256-01 15-08-0777	**Indoor navigation (using a hot-spot):** Similar to No 1. case except using the hot-spot when the large size data is needed. Download the large size Data like map data from the Hot-spot.	Indoor	Uni-directional	Dn (light): ~10kbps Dn (HS): ~100Mbps	light:~10m HS:~3m	lighting: LOS HS: LOS
4	15-08-0015 15-08-0428 15-08-0777	**Mobile to mobile** (not specific scenario): data transfer between two devices	Indoor	Bi-directional	~100M	~1m	LOS

Application summary

No	Doc Ref	Description	Environment	Bi-directional (Broadcast, etc.)	Data Rate (min, max)	Distance (min, max)	Channel Type (LOS, NLOS)
5	15-08-0015 15-08-0777	**LED Sign-board :** LED works not only Indicating some text/graphic information but also broadcasting the additional info.	Indoor (outdoor)	Broadcast	~20M	~3m	LOS
6	15-08-0015	**Visible LAN:** secure indoor LAN	Indoor	Bi-directional	Up: ~10M Dn: ~10M	~3m	LOS
7	15-08-0777	**Point and sending large data:** Relatively large file transmitting between various devices like cell phone and TV, printer, projector, digital photo/picture frame and etc.	Indoor	Uni-direction	~100M	~1m	LOS
8	15-08-0777	**Visible Remote control**: (Remote control itself or implemented into the cell phone): Intuitive control using visible light. / easy to pick the device up. (No interference with other device)	Indoor	Uni-direction	~10kbps	~10m	LOS

Application summary

No.	Doc Ref	Description	Environment	Bi-directional (Broadcast, etc)	Data Rate (min, max)	Distance (min, max)	Channel Type (LOS, NLOS)
9	15-08-0777	**Light Information shower Information gate**	Indoor (outdoor)	Uni-direction	~20Mbps	~3m	LOS
10	15-08-0777	**Information or guidance service** using the visible light at the museum, exhibition, market and so on: receive an info of the art, product, exhibits, etc.	Indoor	Uni-direction	~10Mbps	~3m	LOS
11	15-08-0777	**Data download system at the RF restricted area** (hospital, airplane, etc)	Indoor	Uni-direction (Bi-direction)	~100Mbps	~3m	LOS
12	15-08-0777	**Electric Contents Vending Machine:** Download music, movie, book, information contents and payment.	Indoor	Bi-directional	Dn: ~100Mbps	~0.5m	LOS

Details

❖ **Illumination**

- ■ **Indoor LBS, Sign Board, Visible LAN, Information Gate**
- → **The more data rate, the better service,**
- → **BUT, main function is illumination.**

❖ **Data rate**

- ■ **Restricted by Device ability**
- ■ **Depends on Service scenarios**

❖ **Environment**

- ■ **Indoor**
- ■ **Outdoor: Various condition should be more considered compare to the indoor use case. (Channel, Noise effect and etc)**
- ■ **Special Case (outdoor not fixed like vehicle case)**

❖ **Channel Type**

- ■ **LOS**
- ■ **Non-LOS**

Other parameters

❖ **Visibility**

- ▪ **Illumination – depend on use case, some use case like using the lighting system, don't need to worry.**
- ▪ **Other use case (especially some use case for long range)**

❖ **Mobility**

- ▪ **Mobility (Speed limit)**
- ▪ **Tracking (keeping the alignment)**
- ▪ **Hand-over (LBS)**

❖ **Modulation**

❖ **Regulation**

❖ **Market (when do you expect VLC market open?)**

- ▪ **Practical**
- ▪ **Conceptual**

Summary

❖ **Application summary from Samsung's idea**

❖ **General consideration on Application**

❖ **Detail explanation**

❖ **Other consideration**

❖ **To be discussed**