

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

**Submission Title:** [Selection of VLC Applications]

**Date Submitted:** [July, 2009]

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**Abstract:** [This document presents about selection of VLC Applications]

**Purpose:** [To make a contribution for IEEE 802.15.7 VLC standard]

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# Selection of VLC Applications

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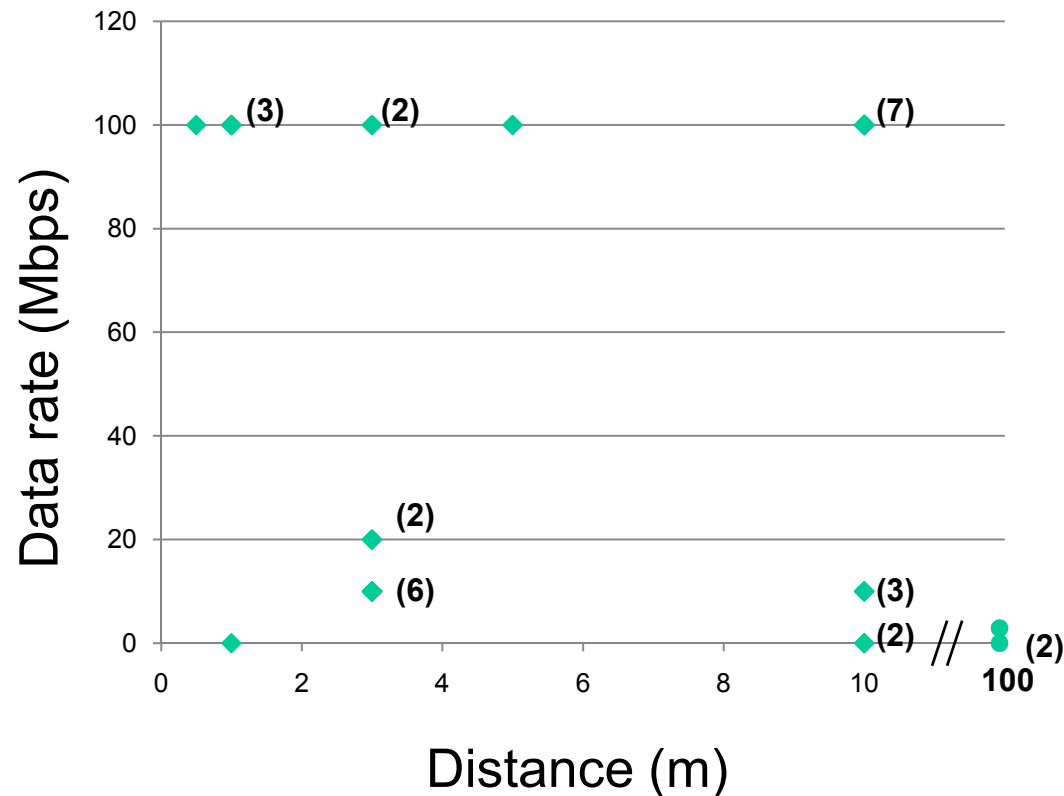
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- Motivation
- Analysis application summary document
- Application selection according to data rate and distance
- Conclusions

# Motivation

- Too many application
  - 37 applications
- Too wide requirement
  - 10kbps to 100Mbps data rate
  - 50cm to 100m distance
- Do we have to cover all applications and requirements?

# Application distribution



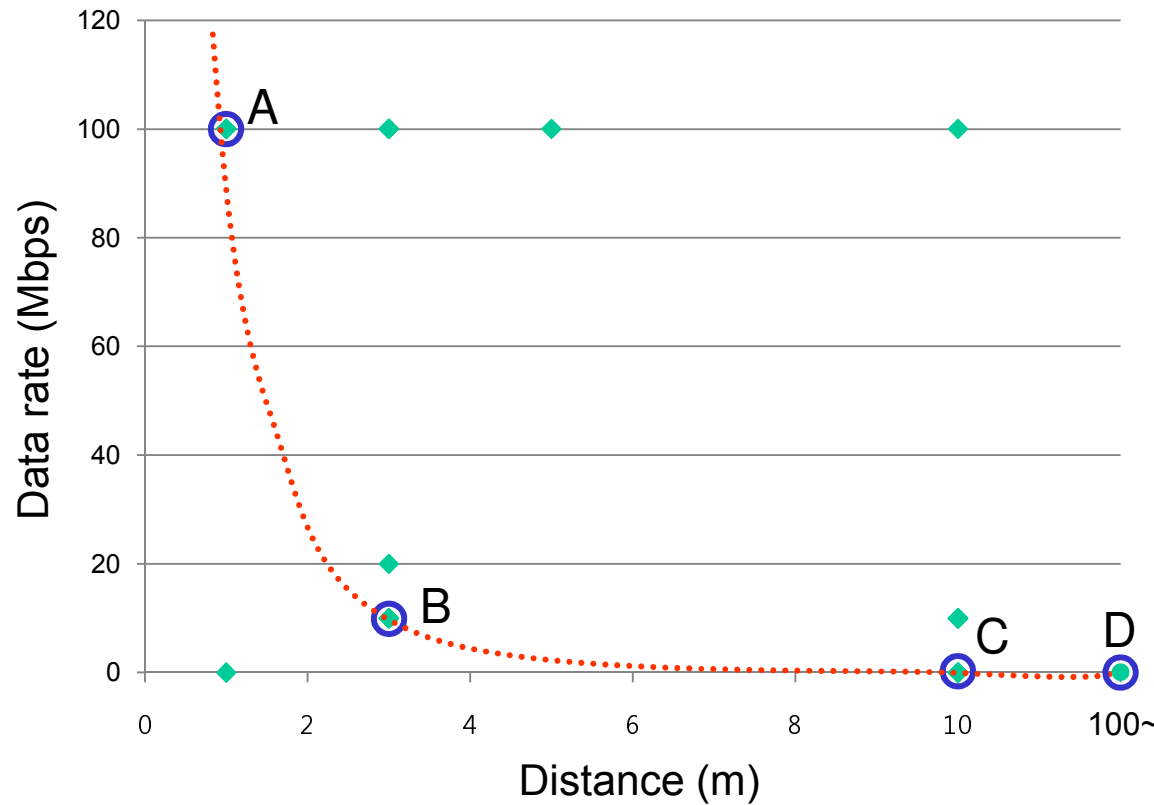
- Too various Data rate and Distance
- No relation between data rate and distance
- Need to minimize

- (n) : number of application  
 - Maximum data rate and distance

# Application selection criterion

- Distance vs. Data rate
  - Received power is reduced by inverse square law according to the distance increase
  - Short range high data rate
  - Long range low data rate
- Acceptable data rate and distance

# Application Selection - Data rate (uplink) and Distance



- A
  - 100Mbps
  - 1m
- B
  - 10Mbps
  - 3m
- C
  - 10kbps
  - 10m
- D
  - 100kbps
  - 100m

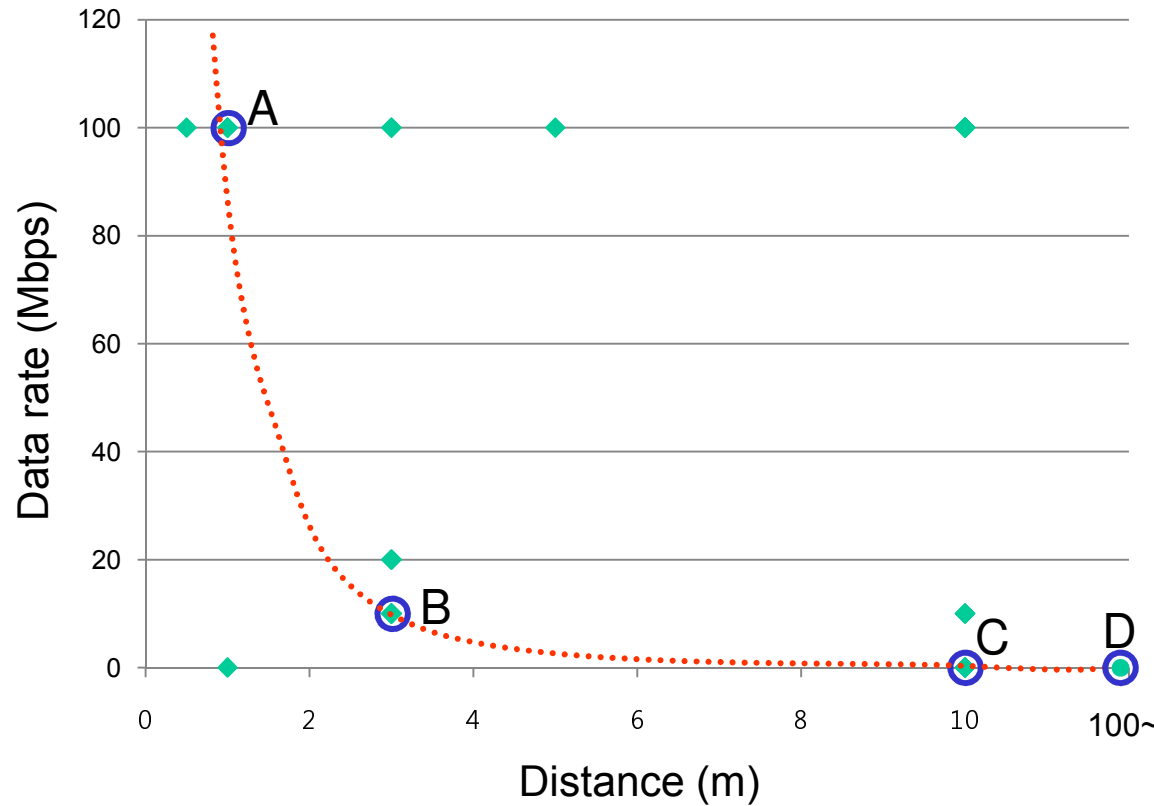
# Selected Application list

## - uplink data rate and distance

- A : 100Mbps/1m
  - Mobile to Mobile, Point and sending large data
  - Mobile to fixed (10~100Mbps)
- B : 10Mbps/3m
  - Fixed to infrastructure, Signboard to ITS,
  - Short range High Speed, Visible LAN (mobile to infra)
- C : 10kbps/10m
  - Visual remote control
  - E-commerce
- D : 100kbps/100m
  - Vehicle to vehicle/infrastructure



# Application Selection - Data rate (downlink) and Distance



- A
  - 100Mbps
  - 1m
- B
  - 10Mbps
  - 3m
- C
  - 10kbps
  - 10m
- D
  - 100kbps
  - 100m

# Selected Application list

## - downlink data rate and distance

- A : 100Mbps/1m
  - Mobile to Mobile, Point and sending large data
  - Electric contents Vending Machine(~0.5m)
  - Mobile to fixed (10~100Mbps)
- B : 10Mbps/3m
  - Fixed to infrastructure, Signboard to ITS,
  - Short range High Speed, Visible LAN (mobile to infra)
  - Indoor navigation Bi-direction down link
  - Information or guidance service
- C : 10kbps/10m
  - Indoor navigation: send the lamp ID only
  - E-commerce
- D : 100kbps/100m
  - Vehicle to vehicle/infrastructure

# Result of Application selection

- **100Mbps (1m)**
  - Mobile to Mobile(~1m)
  - Point and sending large data(~1m)
  - Electric contents Vending Machine(~0.5m)
  - Mobile to fixed (10~100Mbps)
- **10Mbps (3m)**
  - Fixed to infrastructure, Signboard to ITS,
  - Short range High Speed, Visible LAN (~3m)
  - Information or guidance service(~3m)
- **100kbps (100m)**
  - Vehicle to vehicle/infrastructure
- **10kbps (10m)**
  - Visual remote control(~10m)
  - Indoor navigation: send the lamp ID only(~10m)
  - E-commerce(1m)

# Definition of Distance and Data rate

- Distance
  - Short range: device with expected operational range  $\leq 3$  m.
  - Long range: device with expected operational range  $> 3$  m.
- Data Rate
  - Low data rate: PHY data rate  $< 1$  Mbps
  - High data rate: PHY data rate  $\geq 1$  Mbps
- Assign Distance at Data rate
  - Short range at High data rate
  - Long range at Low data rate
  - 3m at 1Mbps

# Data rate & distance rearrange

## – short range high data rate

- 100Mbps (~0.5m)
  - Mobile to Mobile (~1m)
  - Point and sending large data (~1m)
  - Electric contents Vending Machine
  - Mobile to fixed
- 10Mbps (~1m)
  - Visible LAN (~3m)
  - Information or guidance service(~3m)
  - Mobile to fixed
- 1Mbps (~3m)
  - Base Data Rate for High Speed
  - Some possible application

## Data rate & distance rearrange

– long range low data rate

- 100kbps (3m~)
  - Indoor navigation: send the lamp ID only (10kbps)
  - E-commerce (10kbps)
- 10kbps (10m~)
  - Visual remote control (3m)
  - Base Data Rate for Low Speed

## Conclusions

- Too many applications/wide requirements
- Propose the base data rate
  - 1Mbps for short range high data rate
  - 10kbps for long range low data rate
- Do we have to cover all applications and requirements?