

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

Submission Title: [A Vehicle application in Visible Light Communication]

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Source: [Tae-Gyu Kang, Tae-Wan Kim, HyunSook Cho] Company [ETRI]

Address []

Voice:[], FAX: [], E-Mail:[tgkang@etri.re.kr]

Re: [vlc_ig]

Abstract: [This document describes a mass market, application, vehicle communication, and visions for VLC]

Purpose: []

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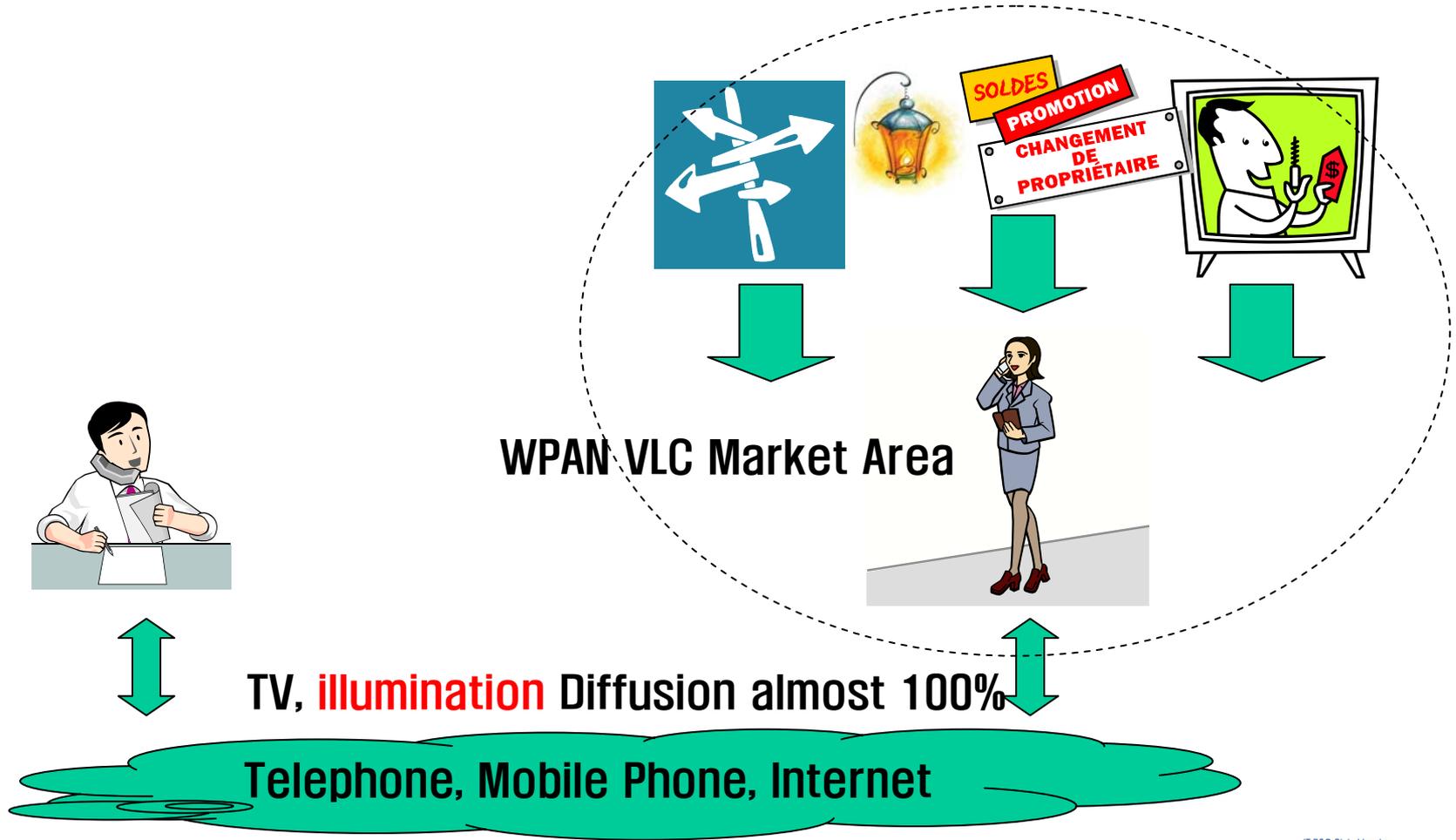
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A Vehicle Application in Visible Light Communication

Tae-Gyu Kang, Tae-Wan Kim, HyunSook Cho
tgkang@etri.re.kr
ETRI

Creation New Market Area of VLC

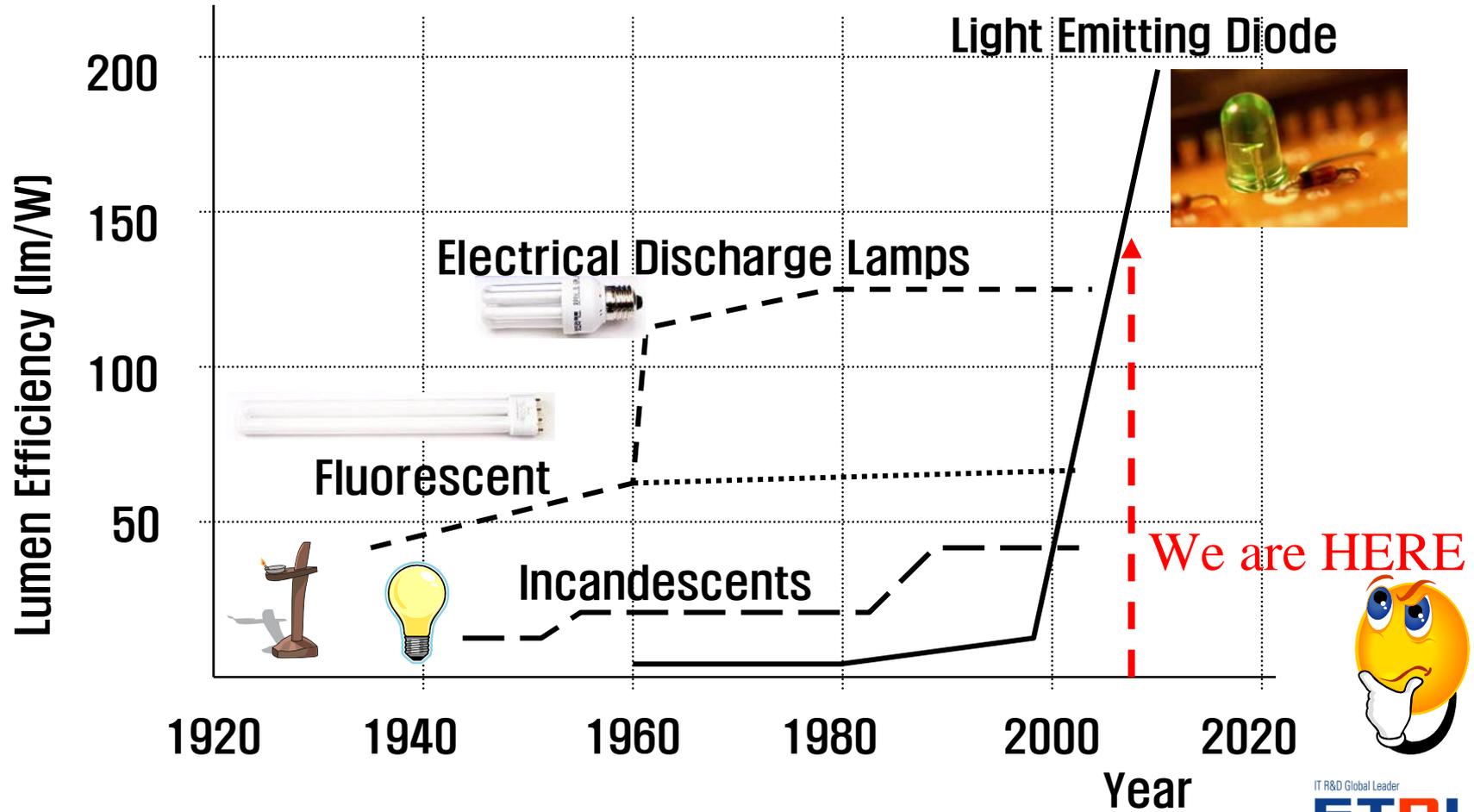




Why VLC using LED

- One Lighting Source
 - Illumination and communication
 - No extra special transmitter
- Fast Deployment
 - Traffic Signal, Vehicle Tail Light
 - Street Light, Indoor Lamp
- New Mass Market
 - New Numerous Applications
 - Mass Transmitter/Receiver Devices

Starting LED Performance Burst





LED Advantages as Light

- Power Saving
 - Use only 10% power than before
- Long Living
 - Longer than 10 times (about 50,000 hours)
- Conservation of nature
 - No Mercury
 - Better waste treatment



Expectation

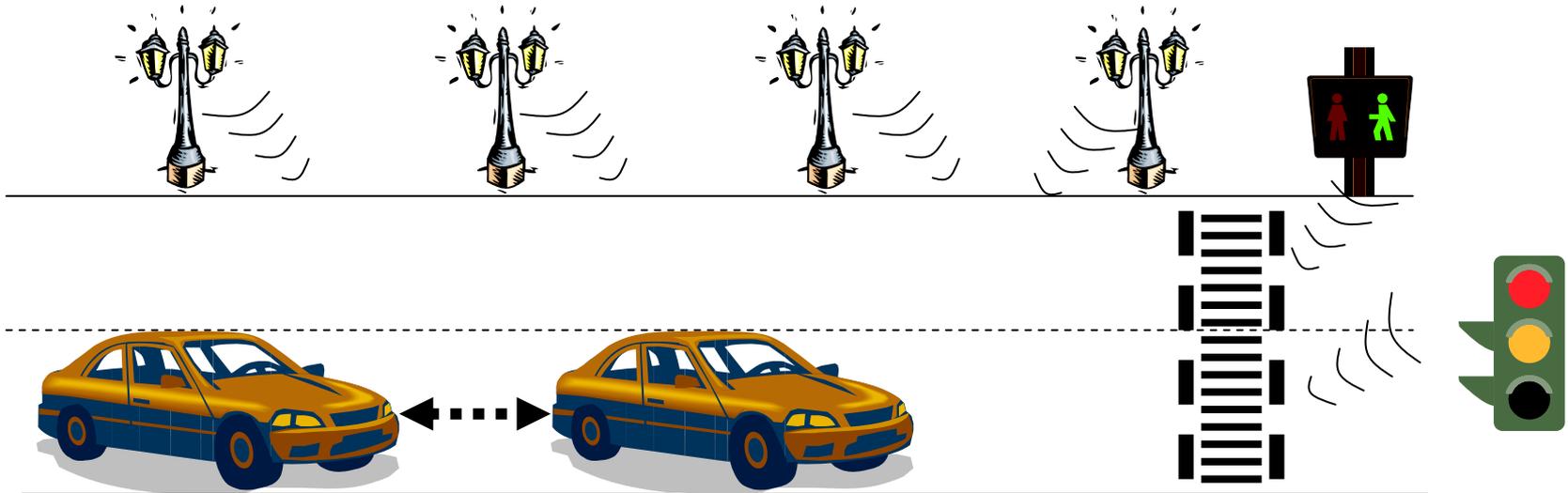
- Do you think that LED will be replaced traditional lighting?
- How many %, when?
- Can you imagine another LED Application?



VLC Application Area

- Inter Mobile handsets
 - Mobile handset, MP4, Notebook
- LED Display to handset
 - Handset, TV, Signboard
- Inter Vehicles
 - Taillight, Headlight, On-and-off light
- Lamp applications
 - Indoor illumination, Traffic signal, Route beacon

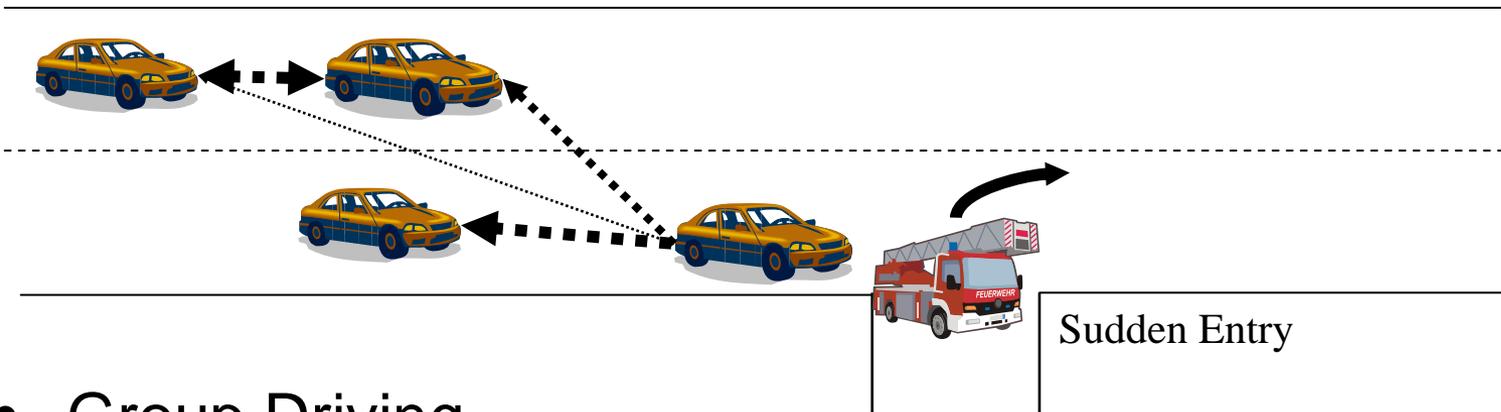
VLC Vehicle Communication



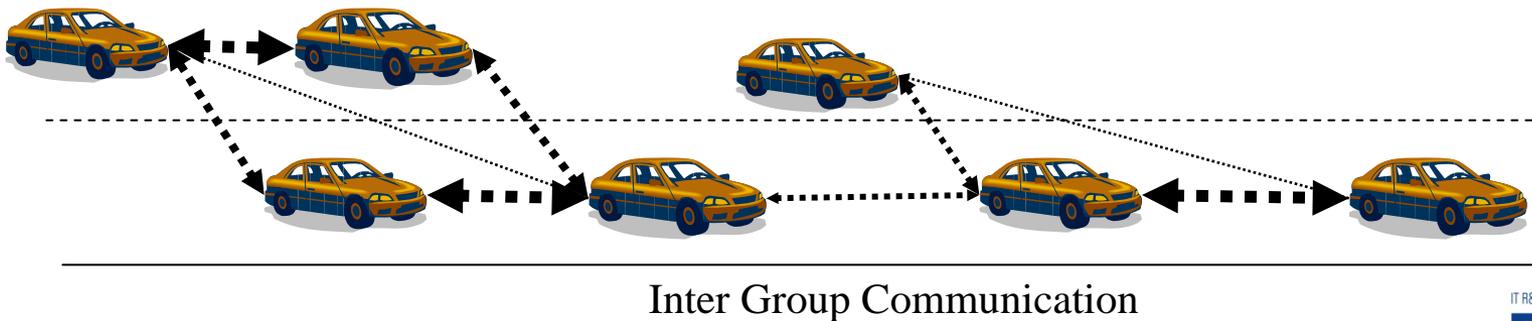
- Vehicle to Vehicle
- Vehicle to Traffic signal
- Vehicle to Streetlight

VLC Vehicle to Vehicle Application

- Emergency Brake to sudden entry vehicle

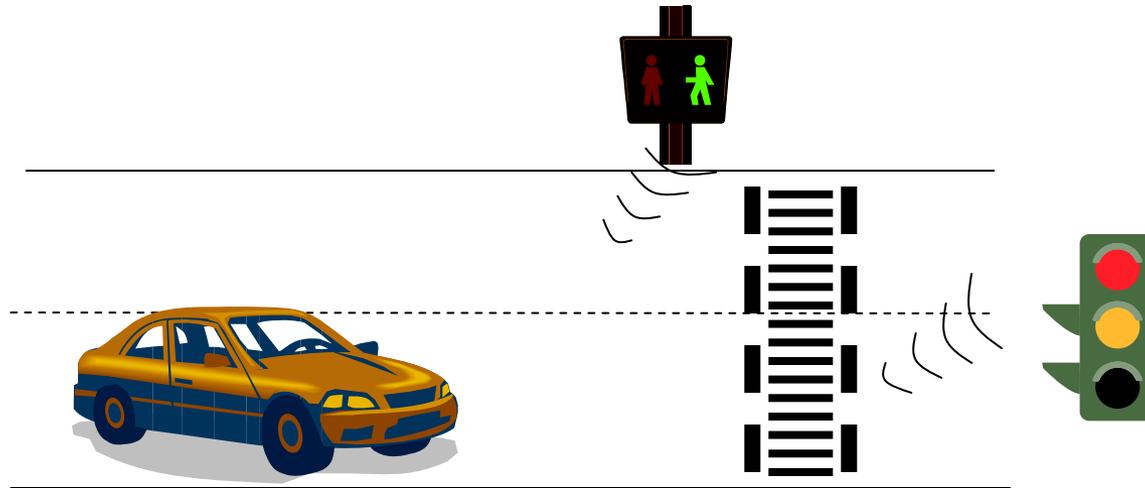


- Group Driving



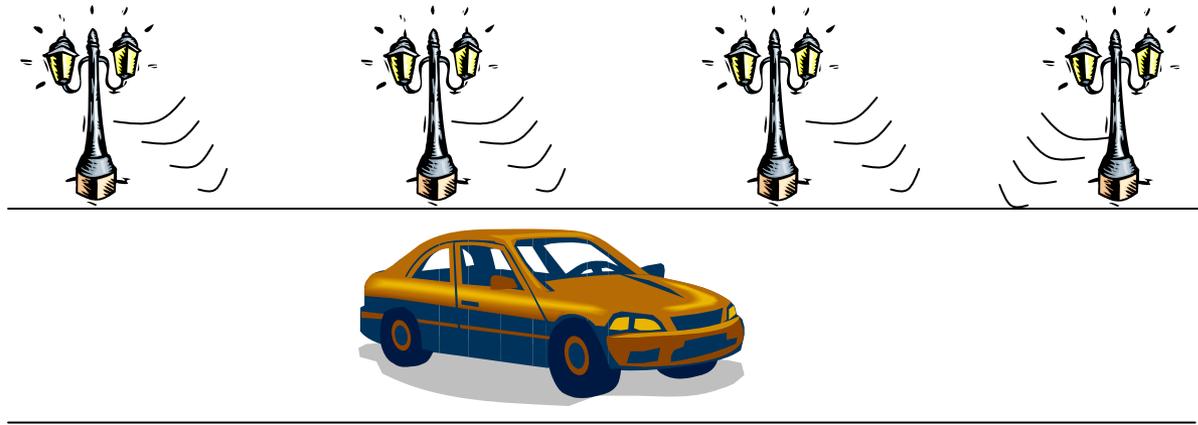


VLC Vehicle to Traffic signal Application



- Alarm to vehicle: stop
- Indication to vehicle: go
- Providing location information to vehicle

VLC Streetlight to Vehicle Application



- Providing location information to vehicle
- Providing street, shop, tour information to vehicle
- Connecting to Internet via streetlight



Application Specific Requirements

- Long Range Low speed
- Short Range High speed
- Multiple channels
- One-way or two-way
- Symmetry or asymmetry speed
- Support Area: voice, data, video



TTA VLC Standard Working Items

- VLC PHY
 - PHY at transmitting part
 - PHY at receiving part
 - LED Interface
- VLC MAC
 - MAC for infrastructure mode
 - MAC for peer-to-peer mode
- Application specific relationships
 - Special Interface inter cross layering
 - ITS, LBS, Machine-to-Machine, Sensor

TTA: Telecommunication Technology Association, 10 organizations involved for VLC standard



Discussion on working methods

- Integration or Separation
 - PHY and MAC
 - Transmitting and Receiving
 - Applications
 - Handset, Display, Vehicle, Lamp
- Documentation
 - Requirement
 - Application Model
 - Detailed Specification

Vision for VLC

- Promotion
 - Co-work, Workshop
 - LED: LED Driver, Lighting, Display
 - Communications: Telecommunication, Ubiquitous, ITS
- Standardization
 - Relationship inter-organizations: IEEE 802.15 WPAN, ITU-T SG16 AMS, VLCC, TTA VLC WG, The Fully Networked Car
 - TTA 2008 VLC Standard Roadmap
- Market
 - New Communication with LED applications: Vehicle, Signboard, Streetlight, Traffic Signal
 - New Functions: LBS, Security, New Frequency Bandwidth, Sensing