A Fully Integrated Audio, Video, and Data VLC Transceiver System for Smartphones and Tablets

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## Sales and Predicted Sales of Smart Devices

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<tbody>
<tr>
<td>Desktop PC</td>
<td>148.4</td>
<td>12.4%</td>
<td>141.0</td>
<td>6.0%</td>
<td>-5.0%</td>
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<tr>
<td>Portable PC</td>
<td>202.0</td>
<td>16.8%</td>
<td>240.9</td>
<td>11.0%</td>
<td>19.3%</td>
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<td>Tablet</td>
<td>128.3</td>
<td>10.7%</td>
<td>352.3</td>
<td>16%</td>
<td>174.5%</td>
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<td>Smartphone</td>
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<td>60.1%</td>
<td>1,516</td>
<td>67%</td>
<td>109.9%</td>
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<td>Total</td>
<td>1,201.1</td>
<td>100.0%</td>
<td>2,250.3</td>
<td>100.0%</td>
<td>87.3%</td>
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* Forecast estimates.

The Mobile Future

- There is a need to develop more peripherals and applications for smartphones and tablets.
- Bluetooth and Wireless LAN have the wider popularity.
- However, in visible light communication (VLC), the efficiency to handle Big Data and the potential for many areas of applications is huge.
An integrated design for audio, video, and data transmission via VLC is therefore proposed for the next generation of smartphones and tablets.

In order to confirm the operations of such a design, we came up with working transceiver prototypes for stereo audio, video, and serial data.
VLC Audio Transceiver (RX)
VLC Video Transceiver

C1 - C4 = 10uF
R1 = 51 ohm
R2 = 1 kohm
R3 = 10 kohm
R4 = 560 ohm
R5 = 1 kohm
R6 = 10 kohm
R7 = 20 kohm
R8 = 100 ohm
TR1 = 50 kohm trimmer

U1 & U3 = 7660S
U2 & U4 = 7171

Signal output
Coaxial to VGA converter
VGA
Multiplexing and Demultiplexing

Video TX

Audio TX

LED Driver

Analog Multiplexer

Op Amp

Analog Demultiplexer

Video RX

Audio RX

Video In

L

R

Video Out

L

R

CTRL CLK

Multiplexed L+R audio signals

Multiplexed video and audio

M74HCT4053 Analog multiplexer/demultiplexer

Vcc

Video In

CTRL CLK

To stereo decoder

From photodiode + preamplifier

M74HCT4053 Analog multiplexer/demultiplexer

Vcc

Video Out
VLC Serial Data Transceiver
Full Integration: Endless Possibilities

VLC
Street Security Surveillance

Music

Video

Play Music

Data

VLC Serial Modem Router
VLC video, audio, and data prototypes have been presented. This work opens up greater possibilities of integrating VLC with portable communication devices.

The advantages of the VLC A/V system include real-time interaction and simultaneous availability of sight and sound.

The VLC dongle for smartphones will be an essential part of data communication in our everyday lives when the revolution of LED indoor lighting spurs in a decade.