

ZigBee Light Link based Wireless Lighting Control Design and Implementation Using a Touchpad

Jongwoo Choi¹, Jung-Sik Sung, Seong-Hee Park, Hyun-Chul Kang, Hyun-Joo Kang, Tae-Gyu Kang

¹Electronics and Telecommunications Research Institute 138 Gajeongno, Yuseong-gu, Daejeon 305-700, Korea
Tel.:82-42-860-1645, E-mail: jwchoi@etri.re.kr

This paper describes the design and implementation of ZLL(ZigBee Light Link) based wireless light control using a touchpad. The ZLL(ZigBee Light Link) is a global standard for interoperating and easy-to-use light and control products. Recently, several products using ZLL were published and they support to allow to control maximum 50 lamps. We had tried to control 64 lamps by ZLL based wireless control using a touchpad and they were worked successfully.

The figure 1 presents the architecture and the demonstration of the system. The microcontroller, CC2530 of Texas Instruments is utilized to communicate based on Z-Stack Lighting and control lighting as the ZigBee module. The touchpad provides the GUI(Graphic User Interface) to manage the ZLL commissioning and control 64 lamps. The UART communication between the ZigBee module and the touchpad are used for ZLL management and control. It is needed long time for 64 lamps to proceed the ZLL commissioning. According to the original ZLL commissioning, the ZLL initiator(ZigBee module) sends the scan request to all ZLL targets(lamps). If the ZLL target received the scan request, it would send back the scan response. A lot of scan responses from all ZLL targets make the network load be heavy. Therefore the advanced mechanism is applied to reduce the network traffic. The ZLL initiator sends scan request with an additional information to perform the selective response. The ZLL target reads the additional information and decides to send back the scan response. The ZLL commissioning time is reduced by applying this mechanism.

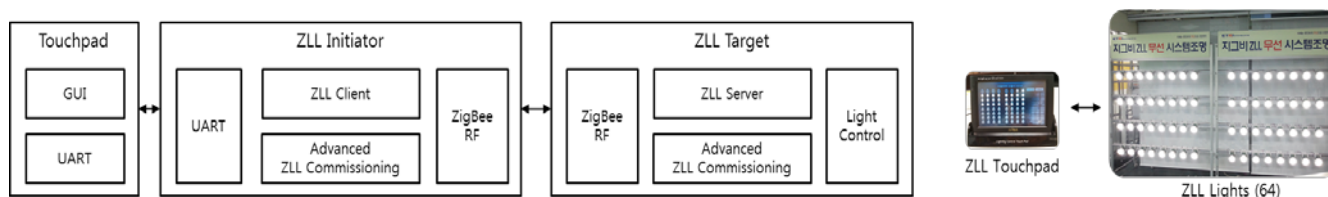


Fig. 1. The architecture and demonstration of ZigBee Light Link based wireless lighting control system

The user can select the original ZLL commissioning and the advanced ZLL commissioning in the touchpad. If the ZLL commissioning process is completed, the touchpad represents the results which ZLL lightings are connected and disconnected. The individual lighting control complies with the ZCL(ZigBee Cluster Library) standard that defines the cluster id, command id, and payload. But the group control messages are not defined in ZCL. The ZCL includes the group management like add, remove, etc. By additional definition of cluster id for group control, the ZLL based wireless lighting control using a touchpad works successfully.

Acknowledgment

“This work was supported by R&D program of KEIT, [10042947, A development of LED system lighting engine module with compact sized data communication modules and driver IC/Processor control parts based on multi-sensor]”

References

1. J. Sung, “ZLL over IP based LED System Lighting Control using a Smartphone”, The Korean Institute of Illuminating and Electrical Installation Engineers, 2014.5.
2. M. Hatler, D. Gurganious, and C. Chi, “Smart Wireless Lighting”, ON World Inc., 2013.
3. Philips, “Send and simplicity: Home LED lighting solution,” Philips Lighting, Jan. 23, 2013.