

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

**Submission Title:** Motivation of a letter to IEC TC 76

**Date Submitted:** 10th Sept 2008

**Source:** Joachim W. Walewski Company Siemens AG, Corporate Technology, Information & Communications Address Otto-Hahn-Ring 6, DE-81739 Munich, Germany

Voice: +49-89-636-45850, FAX: +49-89-636-51115, E-Mail: joachim.walewski@siemens.com

**Re:** N/A

**Abstract:** I elucidate the current 'limbo' situation for VLC with lighting LEDs, in which the LEDs utilised are covered by two radiation safety standards. This outline provides the background for a proposed letter to the IEC, asking them to consider removing optical wireless communications with LEDs from the laser standard IEC 60825-12 (see the letter draft 15-08-0673-01-0vlc).

**Purpose:** Helping the 802.15 to ensure unambiguous radiation standards on which a future VLC standard has to build.

**Notice:** This document has been prepared to assist the IEEE P802.15. It is offered as a basis for discussion and is not binding on the contributing individual(s) or organization(s). The material in this document is subject to change in form and content after further study. The contributor(s) reserve(s) the right to add, amend or withdraw material contained herein.

**Release:** The contributor acknowledges and accepts that this contribution becomes the property of IEEE and may be made publicly available by P802.15.

# Motivation of a letter to IEC TC 76

Joachim W. Walewski

Siemens AG

Corporate Technology

Information & Communications

Munich, Germany

# Objective

Explain historical and factual background  
on which my proposed letter to IEC TC  
76 is based [15-08-0673-01-0vlc]

## Why here, why now?

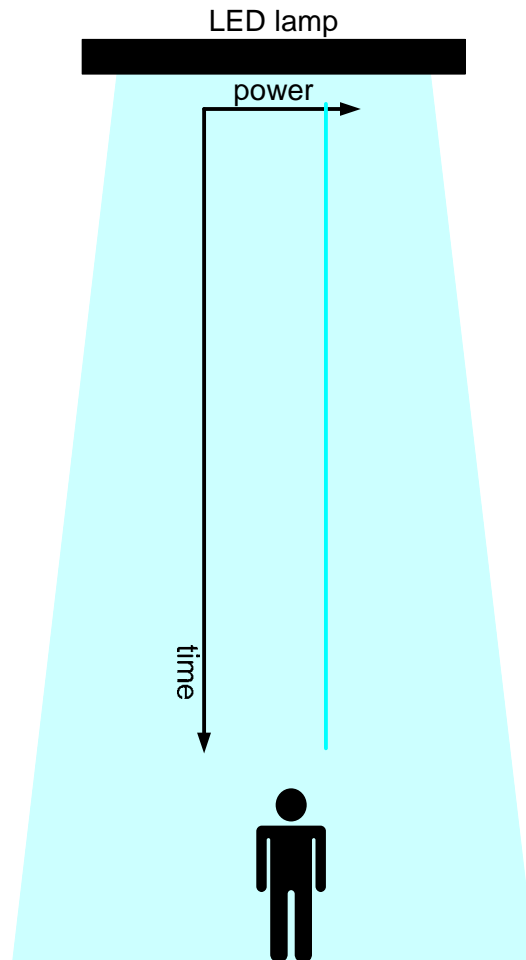
- IEEE 802.15 VLC standard will include scenarios with lighting
- LEDs high-potential candidates: provide necessary luminance and modulation bandwidth
- LEDs currently covered by two radiation safety standards of somewhat contradicting philosophy



# Historical background and suggested action

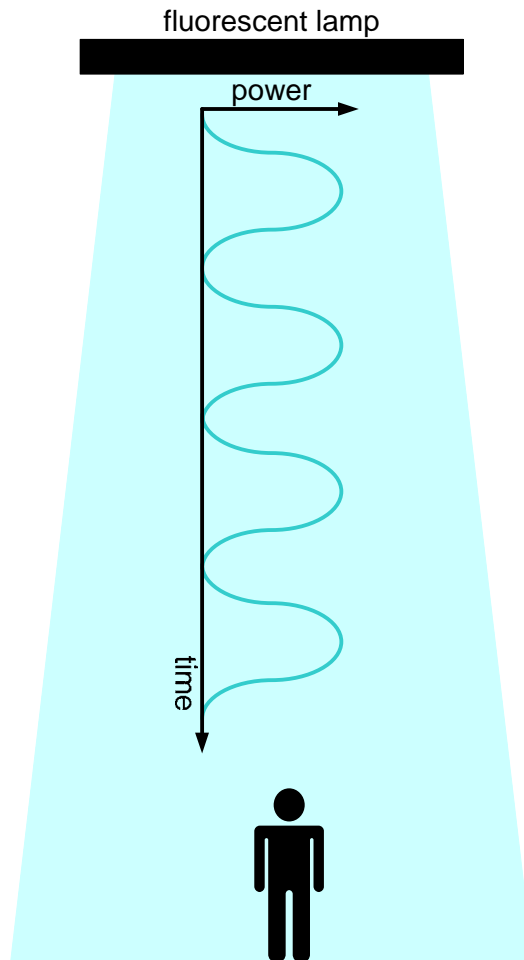
- 1993-2007: photo-biological safety aspects of LEDs covered by laser-safety standard IEC 60825
- Since 2007 LEDs in lighting/signalling scenarios covered by IEC 62471 ('lamps'). [15-08-0523-03-0vlc]
- **But:** LEDs in wireless communications still covered by laser-safety standard IEC 60825-12 (free-space optics)
- Motion by Siemens at IEC TC 76 meeting in Nov 2007: Exclude LEDs from IEC 60825-12 and make IEC 62471 only pertinent standard
  - Status: No objections by chair Dr. Tozer
  - **But:** No action taken since then
  - **Suggestion:** Ask IEC to consider complete withdrawal of LEDs from IEC 60825-12

## Illustration the limbo, part 1: LED lamp



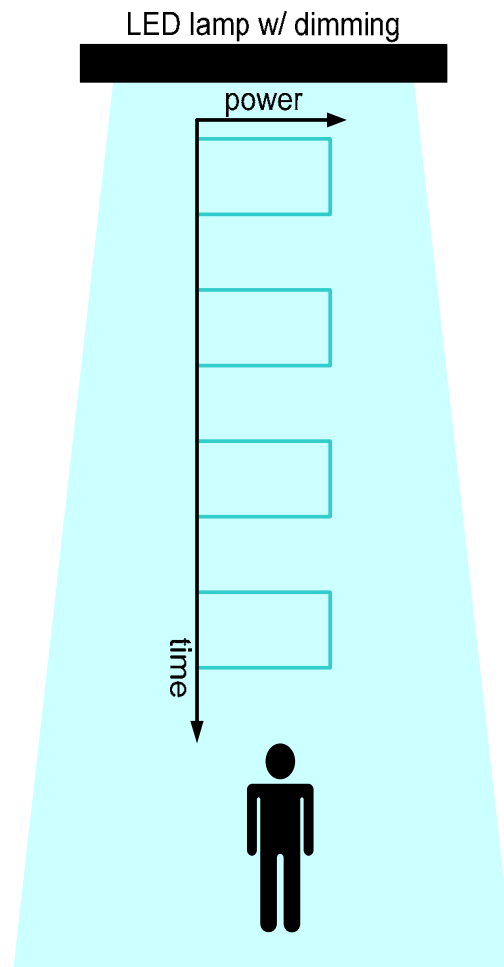
- Scenario: Room lighting w/ LED lamp, no modulation
- Relevant safety standard: IEC 62471

## Illustrating the limbo, part 2: fluorescent lighting



- Scenario: Room lighting with fluorescent lamp; inherent modulation
- Relevant safety standard: IEC 62471

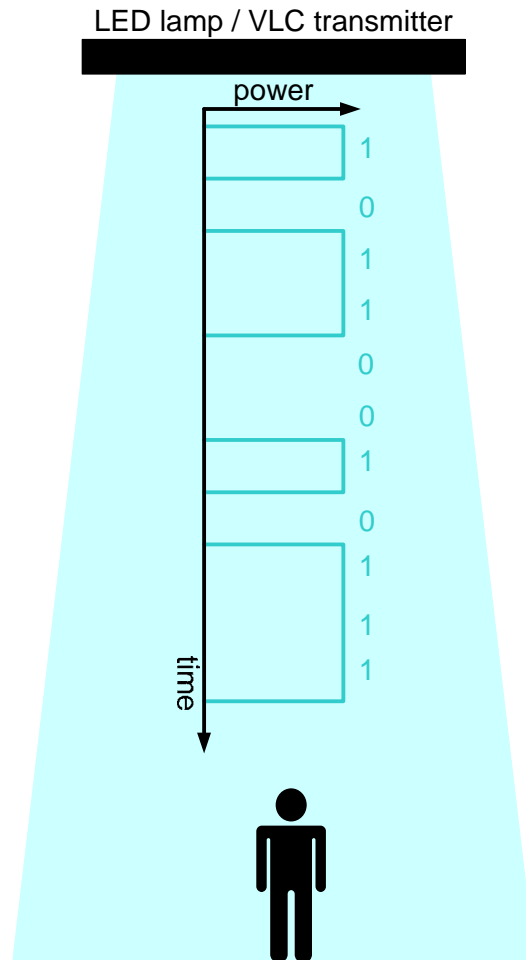
## Illustrating the limbo, part 3: LED lamp dimmed w/ PWM modulation



- Scenario: Room lighting with LED lamp; PWM dimming
- Relevant safety standard: IEC 62471



# Illustrating the limbo, part 4: LED for simultaneous lighting and OOK VLC

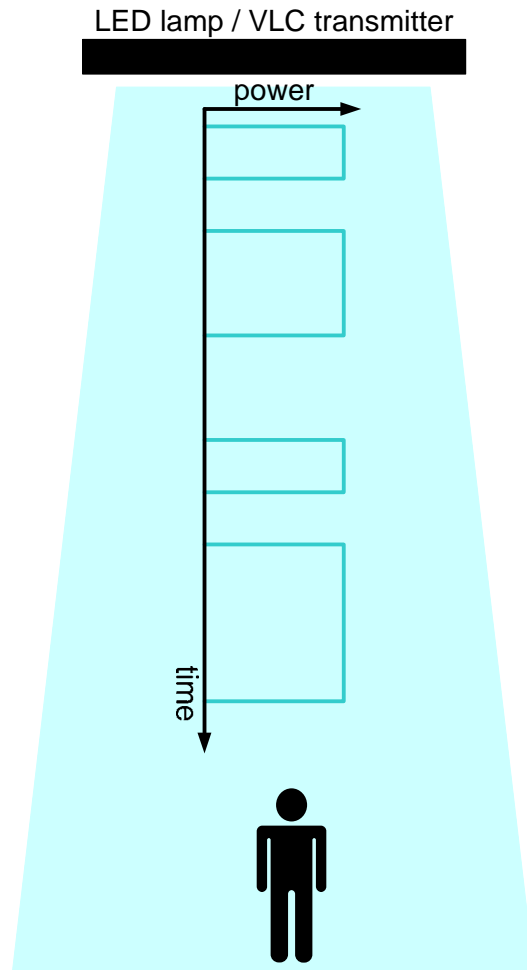


- Scenario: Room lighting and VLC with LED lamp; OOK modulation
- Relevant safety standard:

- IEC 60825-12
- IEC 62471 (?)



# Illustrating the limbo, part 5: LED for simultaneous lighting and PWM VLC



- Scenario: Room lighting and VLC with LED lamp; PWM modulation
- Relevant safety standard:

- IEC 60825-12
- IEC 62471 (?)



## Summary and Conclusion

- LEDs in free-space communications currently covered by IEC 62471 (lamp safety) and IEC 60825-12 (laser safety for free-space optics)
- Although IEC 62471 covers modulated light IEC 60825-12 has to be applied if modulated light contains information!
- Since information content does not change the potential radiation hazard of the LED light the adherence to laser safety standard for free-space communication with LEDs is not justifiable

Thank you for your attention!

Let's discuss the letter draft!

# Appendix

# Treatment of pulsed lamps in IEC 62471

“Pulsed lamp shall apply to a single pulse and to any group of pulses within 0.25 second (aversion response). The risk group determination of the pulsed lamp shall be made as follows:

- For single pulsed lamps, a lamp whose radiant exposure is below the EL shall be classified as belonging to the Exempt Group.
- For repetitive pulsed lamps, a lamp whose radiant exposure is below the EL shall be classified using the Continuous wave lamp risk criteria; Risk Group 1, Risk Group 2.
- For repetitive pulsed lamps, a lamp whose radiant exposure exceeds Risk Group 2 shall be classified as belonging to Risk Group 3 (High Risk).” [IEEE 15-08-0653-00-0vlc]