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

Submission Title: The OMEGA use case
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Abstract: The OMEGA use case (EU, FP-7.1) is presented with a main focus on VLC demonstrator and how it will be integrated into the OMEGA demonstrator

Purpose: Helping TG 802.15.7 to shape the use-case scope of a VLC standard

The OMEGA use case

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Motivation for this talk

- Familiarise TG IEEE 802.15.7 with OMEGA's activities and goals
- Emphasis on VLC within OMEGA: discuss PHY and MAC aspects relevant to IEEE 802.15.7

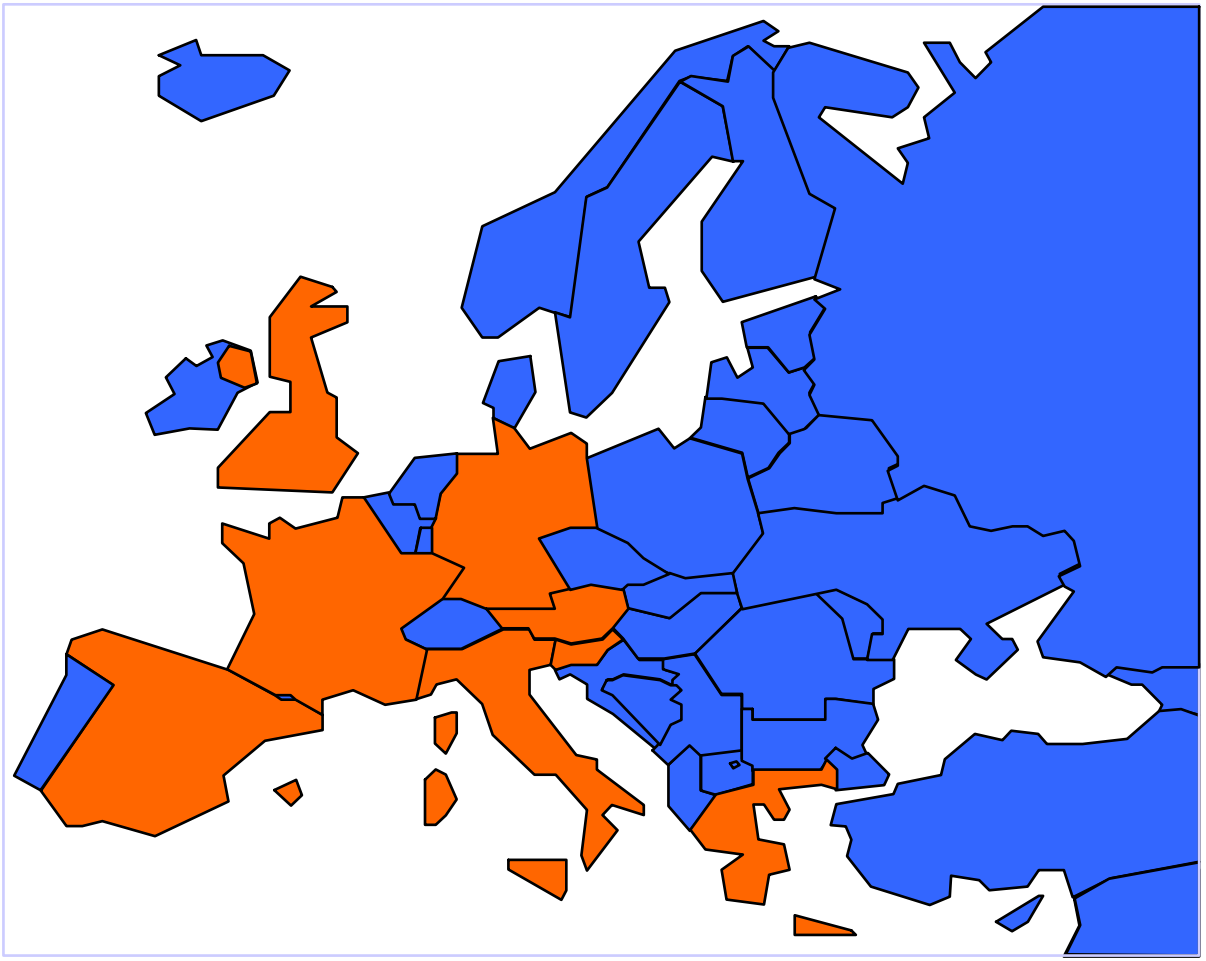
Outline

- Home Gigabit Access
- OMEGA architecture
- Hybrid optical wireless
- VLC within OMEGA
- Current status
- Relevance for IEEE 802.15.7
- Summary

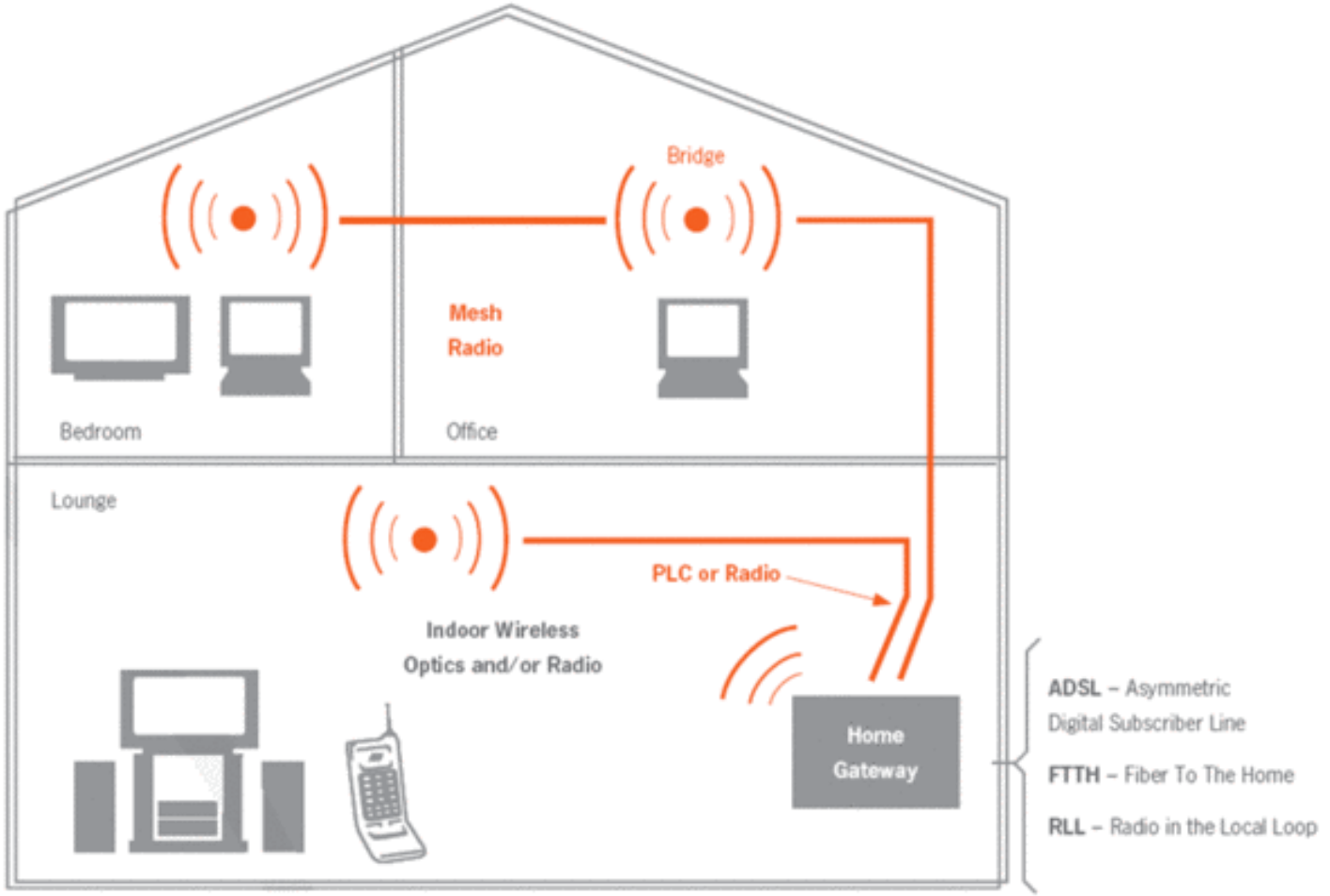
Home Gigabit Access: salient facts

- Integrated Platform within 7th Frame Programme
- Jan 2008 – Dec 2010
- Main deliverable: Showroom demonstrator @ Orange labs, Rennes, France
- ~ 130 person years

OMEGA: partners



OMEGA: mission & scope

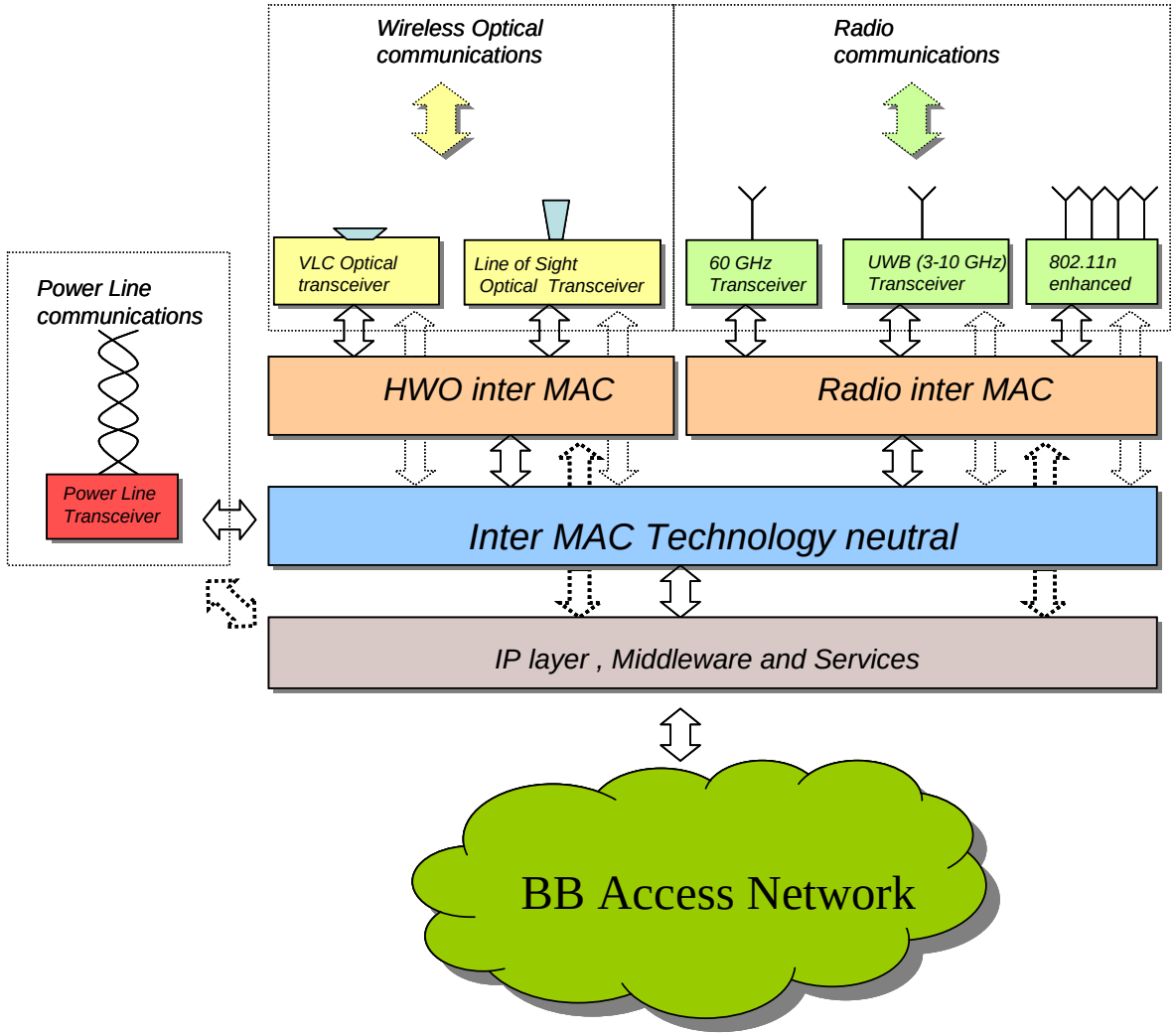


OMEGA: mission & scope

- Gbit/s home backbone ‘without new wires’
- Develop RF, PLC and optical-wireless PHYs and MACs
- Technology-aware routing by aid of Inter-MAC

OMEGA: approach

- Technology-unaware transport layer
- Technology-aware Inter-MAC
- Technology-specific (Inter-) MACs

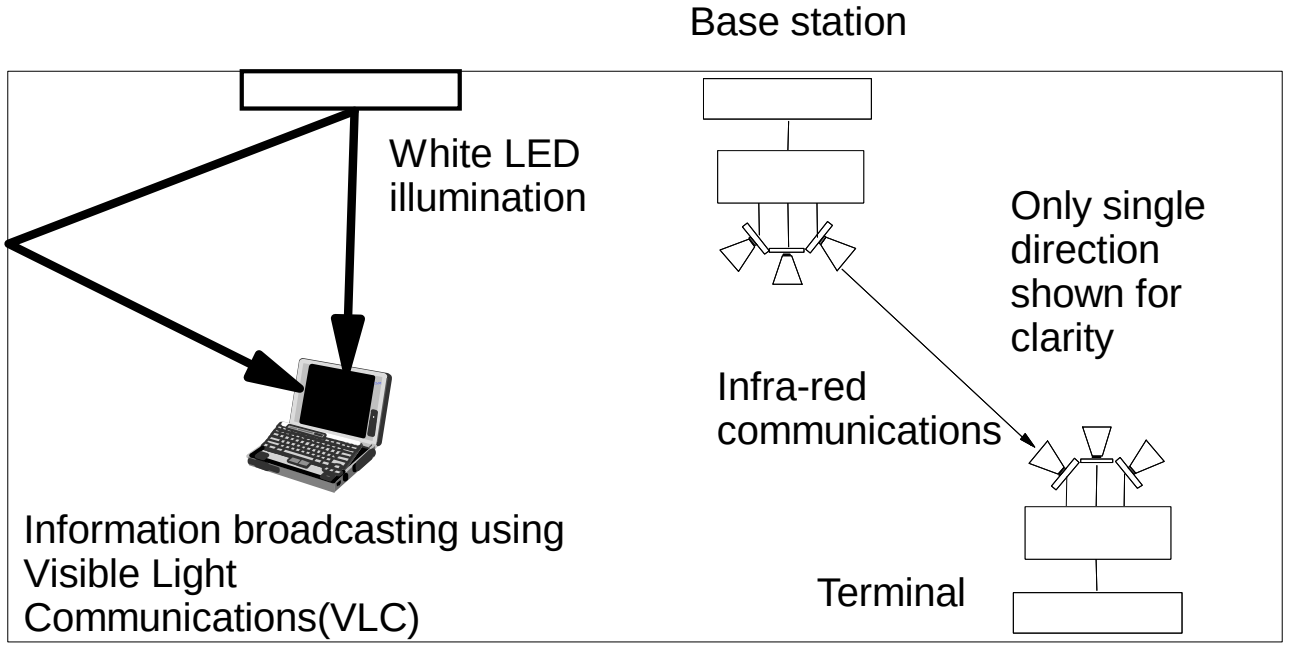


OMEGA work groups

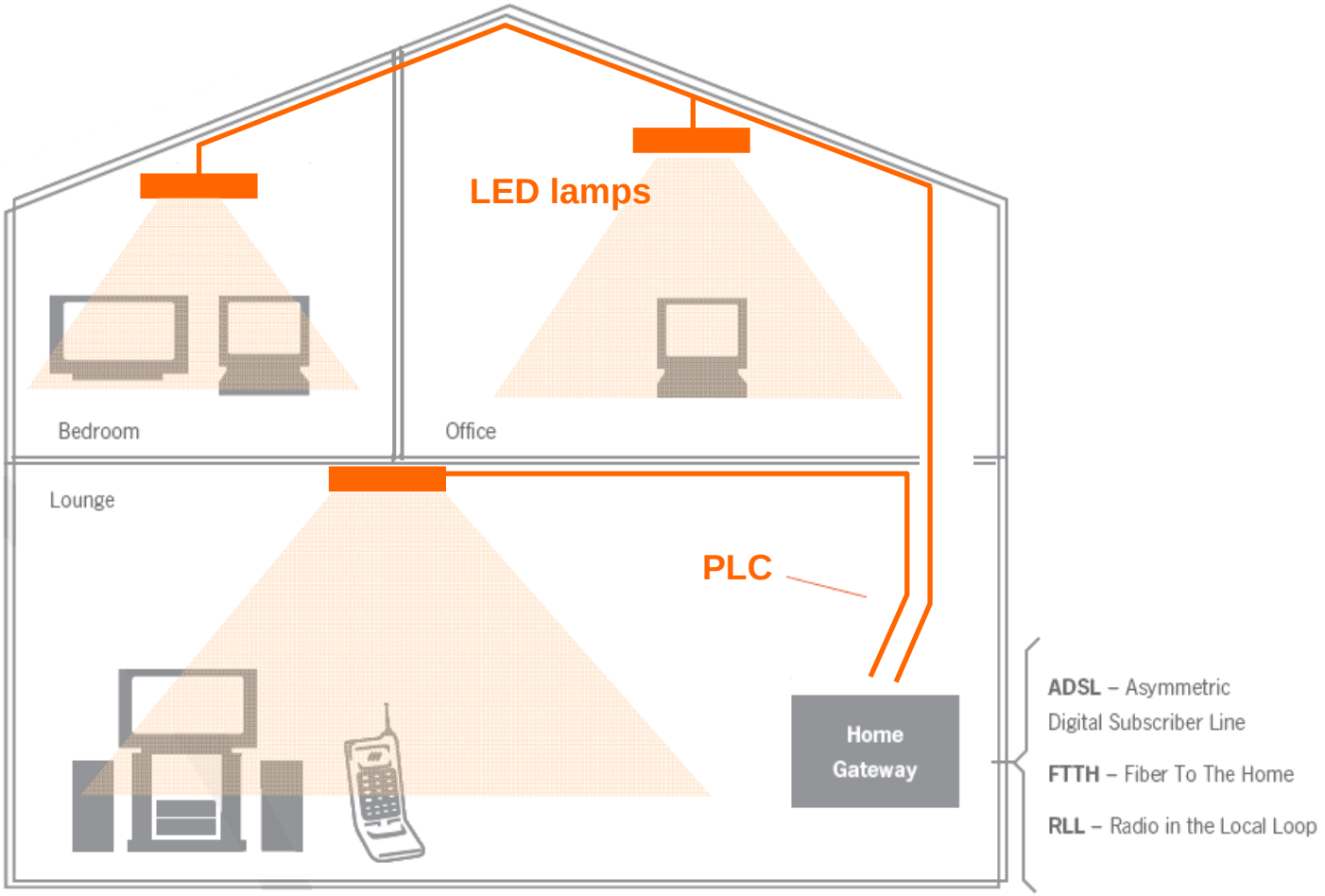
- Scenarios and requirements
- Radio Communications
- Powerline Communications
- Hybrid Wireless Optics
- Inter-MAC
- Architecture and Security
- Integration and Demonstration
- Dissemination, Training, and Standardisation

Hybrid wireless optics in OMEGA

- VLC: 100 Mbit/s, broadcast
- IR: 1 Gbit/s hotspot, bidirectional

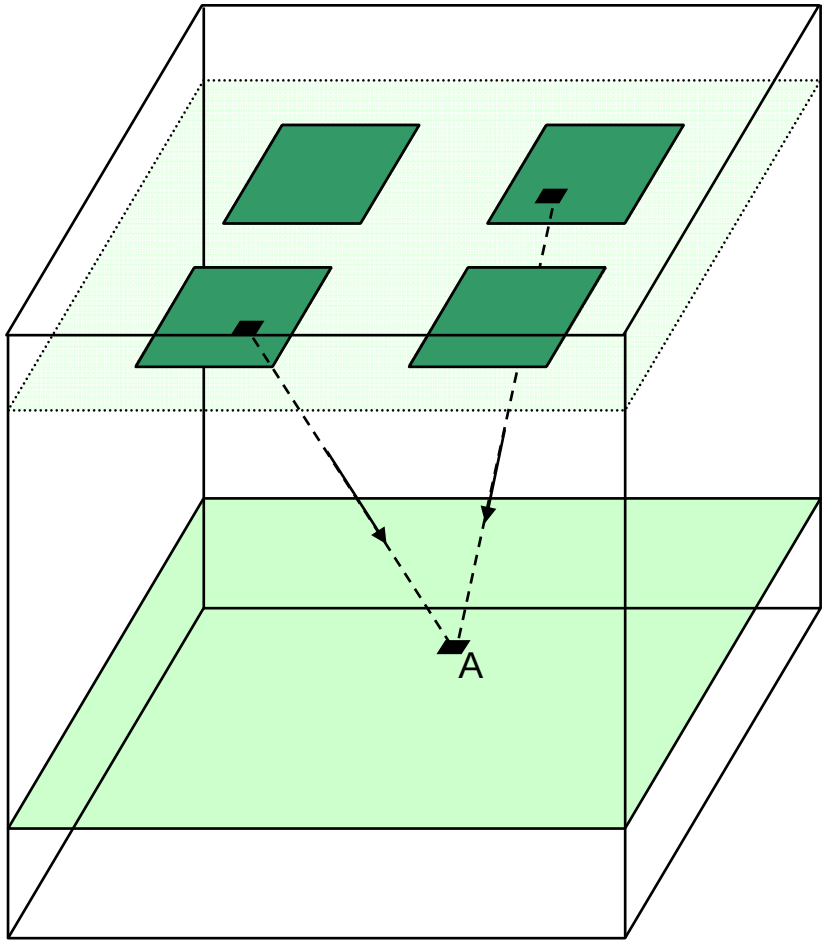


OMEGA use case for VLC



OMEGA use case for VLC

- Ambient lighting with high-power LEDs (200-500 lm/module)
- Simplex (VLC-only)
- Duplex in hybrid scenario (VLC + IR, VLC + RF)



OMEGA use case for VLC

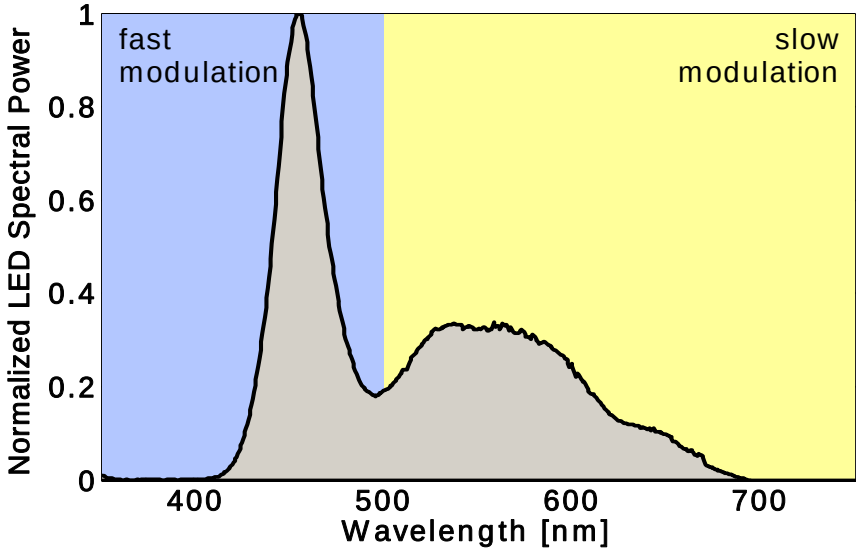
- No spatial multiplexing

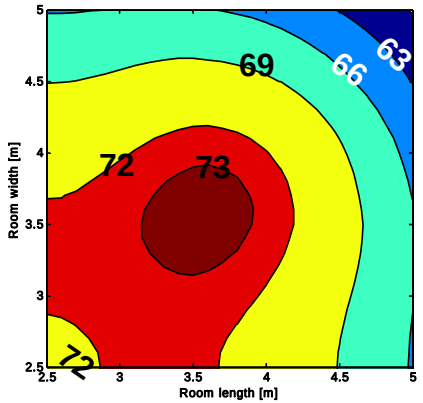
Future:

- Accommodate spatial multiplexing
- Multiple users in duplex scenario
- Accommodate PWM dimming

VLC PHY

- Target: 100 Mbit/s
- DMT for avoiding interference from fluorescent lighting
- Modulation-bandwidth boost through blue spectral filtering
- Spectrally efficient modulation (QAM) enabled by high SNR





Current status of VLC

- PHY and MAC underway
- First system tests (MAC + PHY) summer 2009
- First test in showroom autumn 2009

Relevance of OMEGA VLC for IEEE 802.15.7

- Compiled literature overview on optical wireless communications
- Hands-on experience with synergetic VLC/illumination high-speed use case
  - Full-blown demonstrator
  - Develop own PHY & MAC
  - Address coexistence issues with other PHYs (IR, RF)
  - Assessment of use-case viability
- “Roadmap to the all-optical home” (public document, due mid 2010)

Relevance of OMEGA VLC for IEEE 802.15.7

Decisions due for TG:

- Synergetic illumination & VLC?
  - Lighting technology (DC filters, PWM dimming, …)
  - Packages and interfaces: in one package?, add-on?, …
- High-speed with VLC?
  - Blue-filtering (patent by Schneider, US 7,208,888 B2)?
  - Pre-compensation and resonant LED drivers? (IEEE 802.15-15-08-0265-03-0vlc)
  - Spectrally efficient modulation? (OMEGA)
  - …

Summary

- Familiarised TG IEEE 802.15.7 with OMEGA project
- Presented OMEGA VLC use case: ceiling lighting as 100-Mbit/s broadcaster
- Outlined
  - Decisions due for TG IEEE 802.15.7
  - Potential input to IEEE 802.15.7 standard

More info on OMEGA

- Public homepage: http://www.ict-omega.eu
- List of publications: http://www.ict-omega.eu/publications/papers.html
- Public deliverables: http://www.ict-omega.eu/publications/deliverables.html

Appendix - VLC PHY