
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

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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

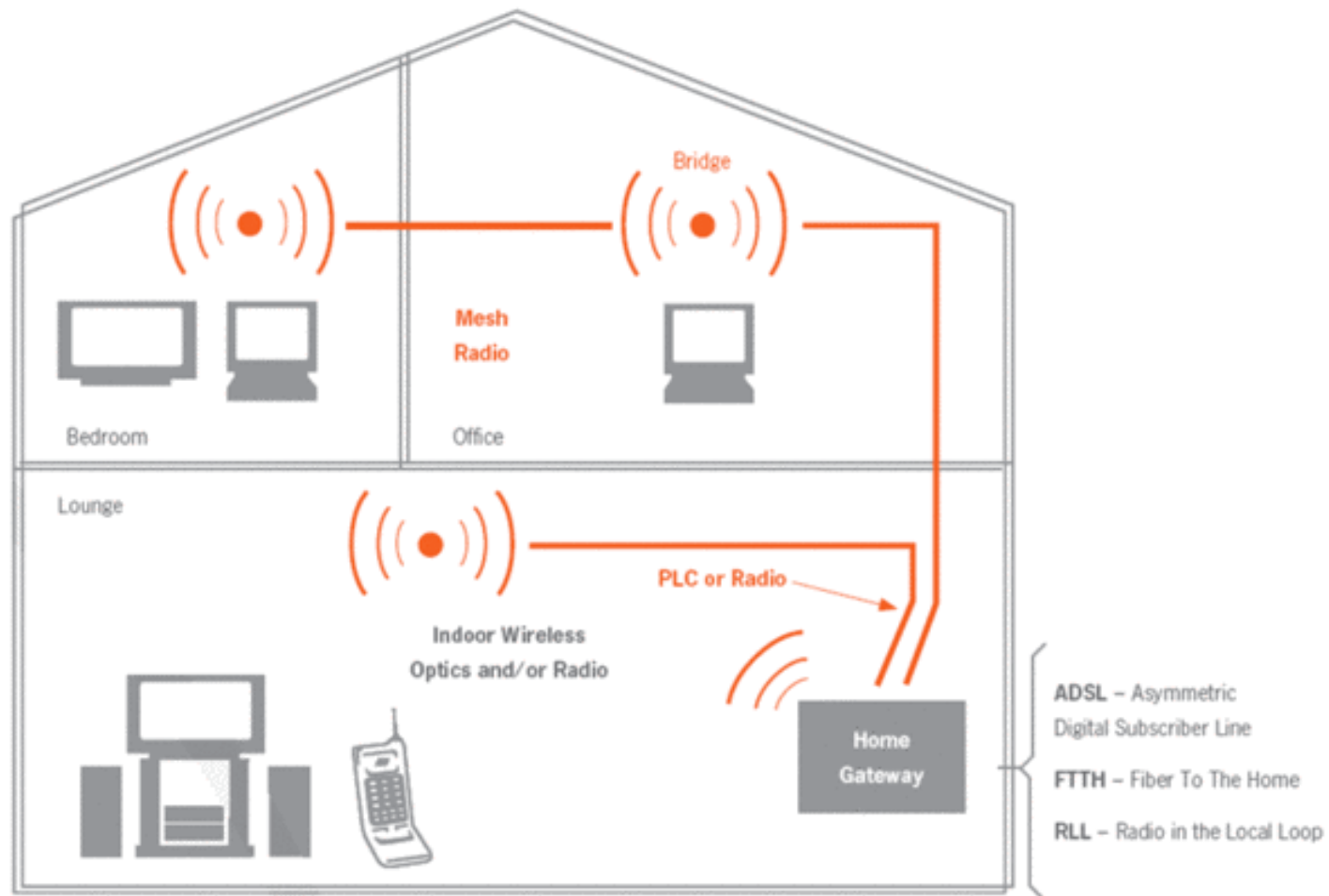
- Integrated Platform within 7th Frame Programme
- Jan 2008 – Dec 2010
- Main deliverable: Showroom demonstrator @ Orange labs, Rennes, France
- ~ 130 person years



OMEGA: partners

The central image is a map of Europe where countries are colored in blue and orange. Surrounding the map are logos of partner organizations. On the left side, the logos are: France Telecom, IETR (Institut Polytechnique et de Télécommunications de Rennes), ihp, infineon, ISKRA ZAŠČITE, THOMSON (images & beyond), ComNet, SPiDCOM TECHNOLOGIES, and technikon. On the right side, the logos are: Telefónica (TELEFÓNICA INVESTIGACIÓN Y DESARROLLO), th, a classical bust logo, a circular logo with 'UNIVERSITY OF TURIN', EURESCOM, infineon, SIEMENS, and HHI.

OMEGA: mission & scope

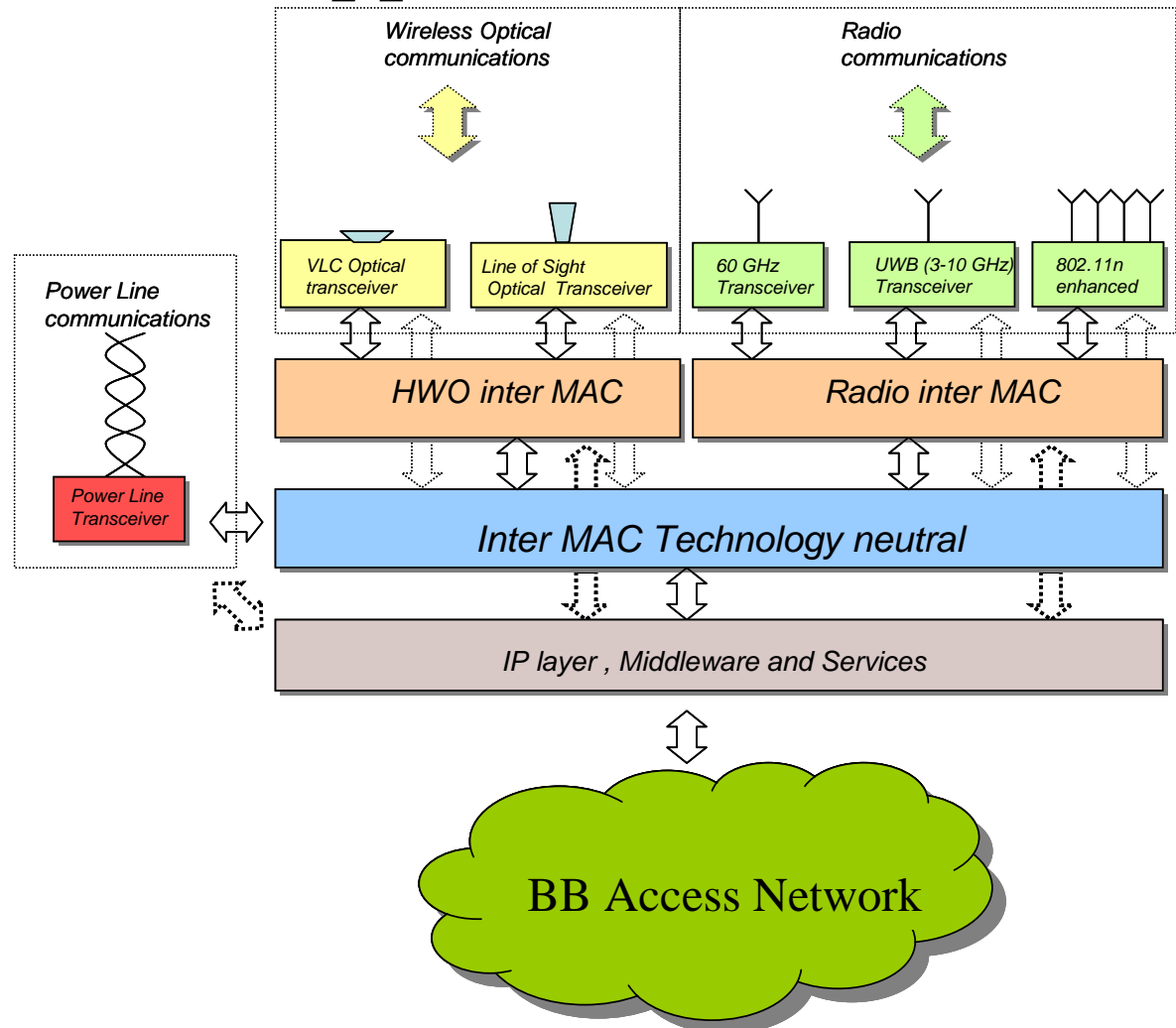


OMEGA: mission & scope

- 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

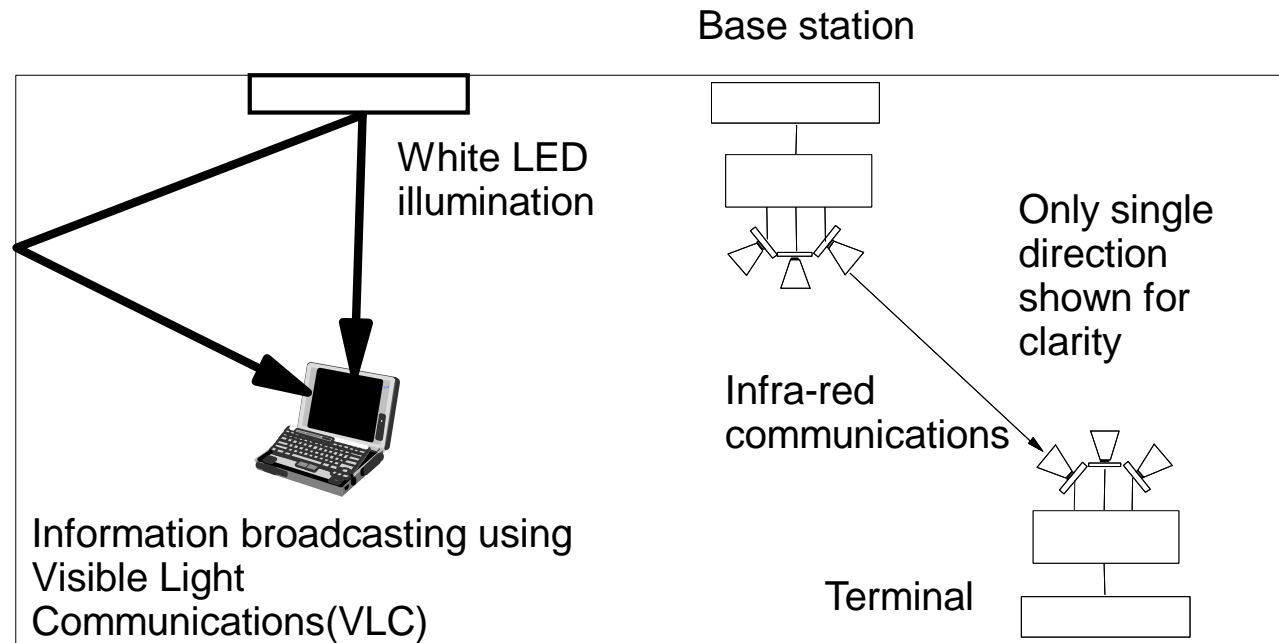


OMEGA work groups

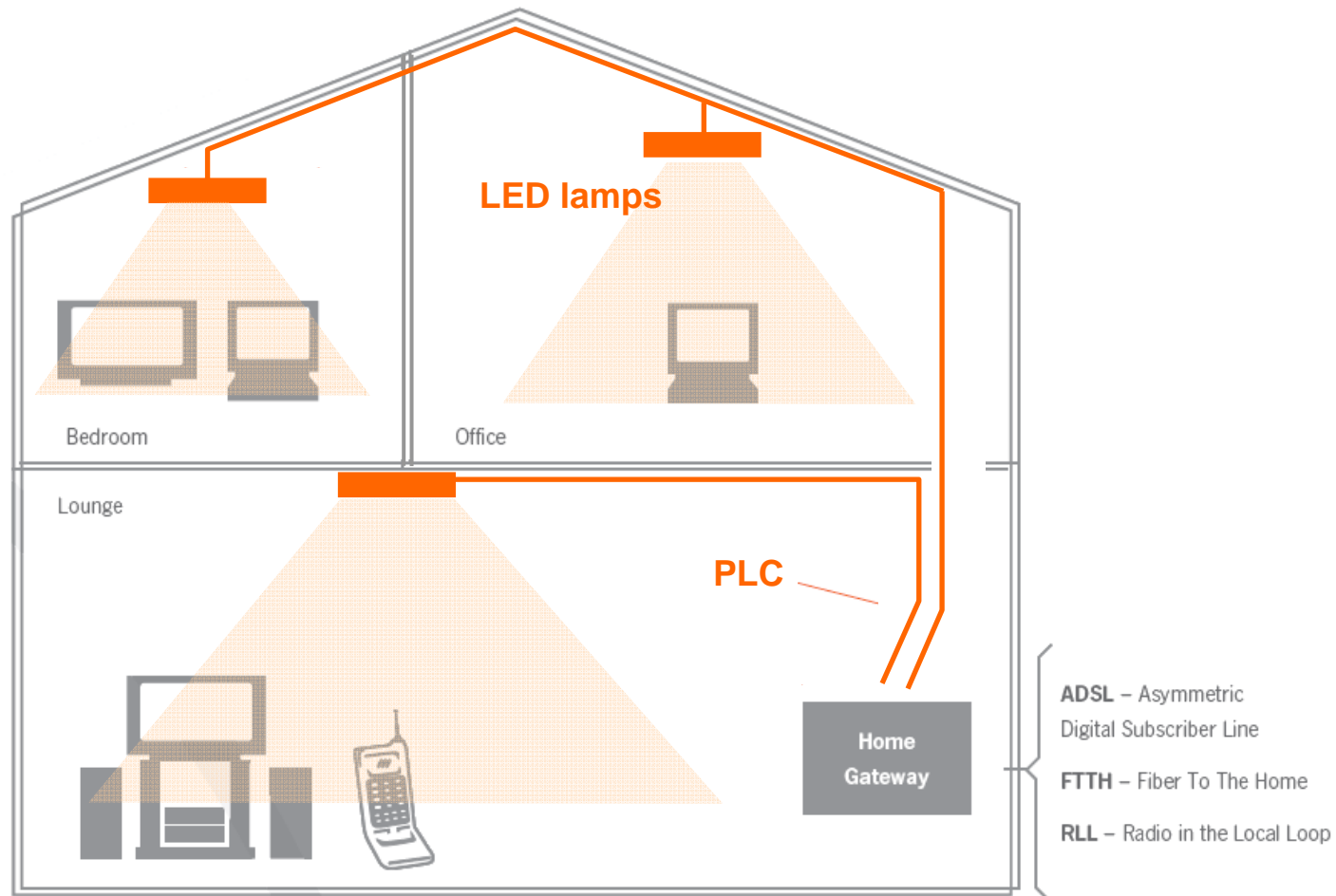
- Scenarios and requirements
- Radio Communications
- Powerline Communications
- Hybrid Wireless Optics
- Inter-MAC
- Architecture and Security
- Integration and Demonstration
- Dissemination, Training, and Standardisation

Hybrid wireless optics in OMEGA

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

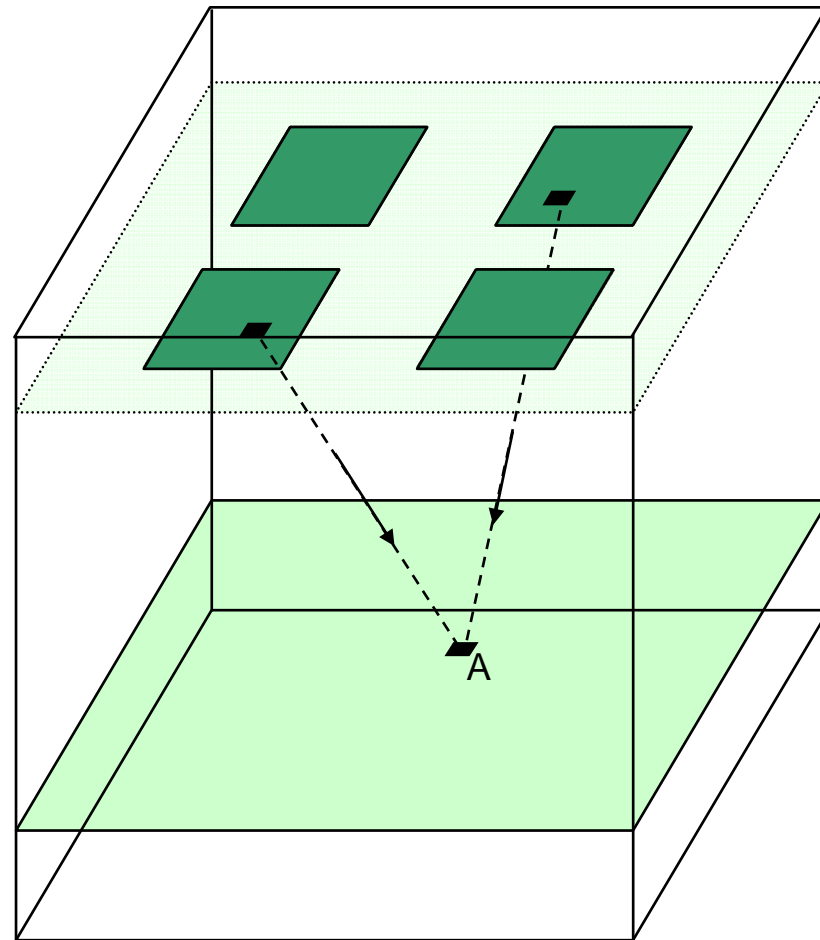


OMEGA use case for VLC



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

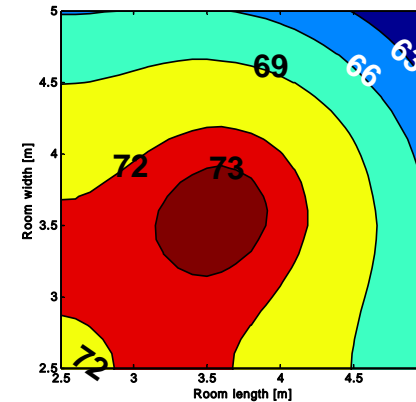
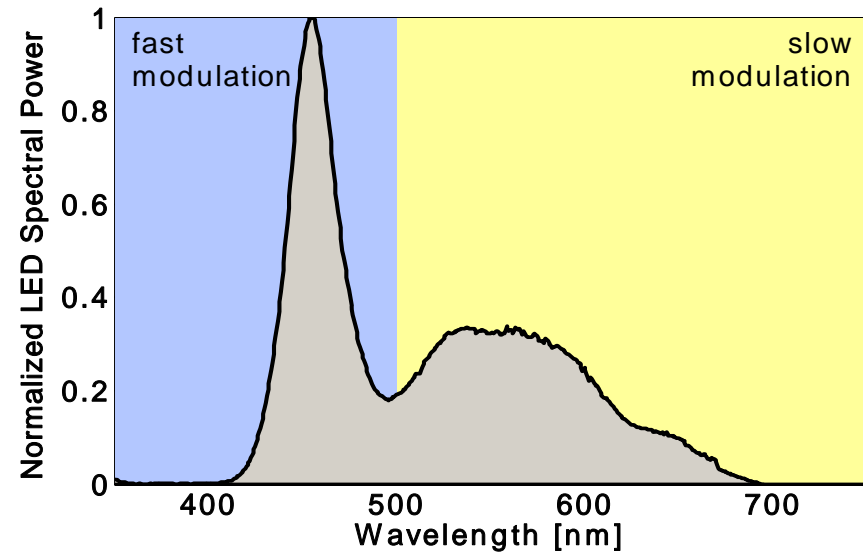
- No spatial multiplexing

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

