

# WORTECS



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WORTECS**

**Networking research beyond 5G**

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## 1. Standardization efforts

There are currently four different standardization efforts in the context of Light Communications (LC).

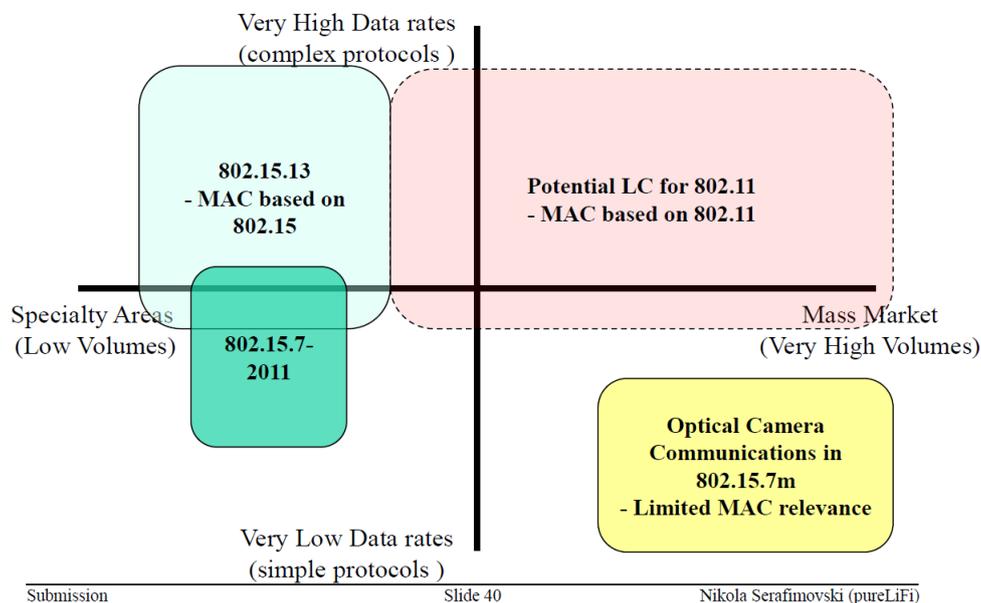
- **IEEE 802.15**
  - Task Group 7r1: Revision: Short-Range Optical Wireless Communications.
    - Adding and modifying the original 802.15.7-2011 standard to accommodate wider spectrum range, new detector types such as optical camera sensors as well as low data rate photodiode-based communications.
    - Key envisioned use-cases are around optical camera communications (OCC) with all known contributors focused on delivering OCC algorithms and demonstrators.
  - Task Group 13: Standard for Multi-Gigabit per Second Optical Wireless Communications (OWC) with Ranges up to 200 meters.
    - Developing a multi-gigabit LiFi solution with full mobility, handover and multiple access. The work is based around the original 802.15.7-2011 MAC that was significantly revised in the early work of the revision effort.
    - Key envisioned use-cases are around factory automation and potential backhaul deployments with limited deployment volumes.
- **IEEE 802.11**
  - Light Communications Study Group.
    - Key focus for the commercial development of LiFi with broad industry support from a comprehensive ecosystem of partners including chipset vendors, infrastructure providers, device manufacturers, lighting companies, telecom operators and end customers.
    - Key envisioned use-case is the mass market deployment in enterprise, homes, manufacturing and more as part of a truly heterogeneous network.
  - From the proposed Criteria for Standards Development (CSD) suggested by the IEEE 802.11 Study Group:
    - “The difference between LC and the existing 802 light communications standards is the use of the 802.11 MAC as well as the reuse of associated services that are focused on wireless local area networks. This new approach will allow LC that are focused on local wireless area networks relative to the existing (802.15.7m and 802.15.13) efforts that are focusing on deploying the technology for wireless specialty networks which have less challenging requirements on energy efficiency, form factor and cost.

- Tight integration with 802.11, the coexistence and hand-over with other 802.11 PHY types (Fast-Session Transfer) will reduce time-to-market for LC in its potential large-volume applications, e.g. together with lighting. Similar to the differences between the work on 60 GHz done within 802.15 and within 802.11, the use of the light spectrum with 802.11 technologies will address new use cases having much larger volumes, in addition to the existing use-cases currently targeted by 802.15. The decision on the technical specifications of LC in 802.11 is the primary objective of the proposed task group on LC in 802.11.
- The key difference between the ITU-T G.vlc effort compared to the proposed 802.11 LC amendment is the use of the 802.11 MAC as well as the targeted deployment of the technology in Enterprise environments, EMI sensitive environments and more relative to the focused home networking use-case for the G.vlc standardization work.

July 2017

doc.: IEEE 802.11-17/0962r3

### The uniqueness of the different IEEE 802 OWC standards



**Figure 1: Difference between various IEEE standards on Light Communications**

- ITU-T
  - o G.vlc
    - Looking at the creation of a home networking solution based on the G.hn standard.

## 2. Current Status

- **IEEE 802.15**
  - o TG 7r1
    - Largely stable draft document
    - No scope for additional technical contributions
    - Currently in Letter Ballot status – feedback required for the first draft of the document from the 802.15 working group
    - The current timeline can be found here:
      - <https://mentor.ieee.org/802.15/dcn/15/15-15-0003-00-0007-suggested-15-7r1-milestones-and-schedule.pptx>
  - o TG 13
    - Some agreement on the MAC and PHY capabilities at a high level but still in development
    - Limited scope for additional technical contributions
    - The current timeline can be found here:
      - <https://mentor.ieee.org/802.15/dcn/17/15-17-0288-01-0013-suggested-timelines-for-tg13.pptx>
- **IEEE 802.11**
  - o LC Study Group
    - Development and approval of the CSD and the Project Authorization Request (PAR), which defines the scope for a potential standard on LC.
    - If the effort results in the creation of a Task Group, then there would be significant scope for technical contributions with a particular focus on the physical layer specifications and limited scope for contributions to the 802.11-2016 MAC.
    - The proposed timelines is:
      - Jan. 2018
        - o Agree PAR and CSD document for circulation within the 802.11 WG
        - o Submit to the EC for consideration 30 days before the EC meeting at the end of March plenary
      - Mar. 2018
        - o Comments and approval of the PAR and CSD by the EC
      - May. 2018
        - o Start of a potential LC Task Group
- Dissemination – Period I
- Press release – waiting for UPL reply.
- Standardisation – Period I
- In order to contribute to standardization, project collaborators PLF, ORA, IHP and OLED plan to attend the periodic standardization meetings to monitor the developments within IEEE 802 and ITU.

- PLF attends all the standardization meetings and it is chairing the IEEE 802.11bb on light communications.
- Some highlights of the activities so far:
- **November 2017 – PLF and ORA**
- WORTECS presentation on “Light Communication High Throughput Use Cases” (IEEE 802.11-17/1643r0)
- Proposed draft for the CSD and PAR were discussed and submitted
- Standardisation – Period I
- **March 2018 (Rosemont, IL, USA) – PLF**
- 802.11bb: Light Communication Study Group – Chaired by PLF
- PAR (Project Authorization Request) and CSD (Criteria for Standards Development) were approved by IEEE802.11 WG (Jan 2018)
- This resulted in the creation of a Task Group to work on an LC LC amendment to the IEEE 802.11 standard
- **June 2018 (Warsaw, PL, USA) – PLF and**
- Key focus: commercial development of LiFi with broad industry support
- Key envisioned use-case: mass market deployment in enterprise, homes, manufacturing and more as part of a *truly heterogeneous network*
- Tight integration with 802.11, the coexistence and hand-over with other 802.11 PHY types (Fast-Session Transfer) to *reduce time-to-market*
- The key difference to the ITU-T G.vlc is the use of the 802.11 MAC as well as the targeted deployment environments
- **Sep 2018 (Kona, HI, USA) – PLF and ORA**
- Partners continue to monitor the IEEE standardization activities

### 3. Meeting Schedule

For Year 2018		Session	Type
January 14-19	Hotel Irvine, Irvine, CA, USA	167	Interim*
March 4-9	Hyatt Regency O'Hare, Rosemont, Illinois, USA	168	Plenary
May 6-11	Mariott Hotel, Warsaw, Poland	169	Interim*
July 8-13	Manchester Grand Hyatt, San Diego, CA, USA	170	Plenary
September 9-14	Hilton Waikoloa Village, Kona, HI, USA	171	Interim*
November 11-16	Marriott Marquis Queen's Park, Bangkok, Thailand	172	Plenary
For Year 2019		Session	Type
January	USA location (TBD)	173	Interim*
March 10-15	Hyatt Regency Vancouver and Fairmont Hotel Vancouver, Vancouver, Canada	174	Plenary
May 12-17	Grand Hyatt Atlanta in Buckhead, Atlanta, Georgia, USA	175	Interim*
July 14-19	Austria Congress Centre, Vienna, Austria	176	Plenary
September	Asia location - possibly Hanoi, Bangkok or Shanghai (TBD)	177	Interim*

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<b>November 10-15</b>	Hilton Waikoloa Village, Kona, HI, USA	178	Plenary
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\* *Denotes* - The IEEE 802.11 Working Group for Wireless Area Networks (WLANs) session is co-located with the IEEE 802.15 Working Group for Wireless Personal Area Networks (WPANs), IEEE 802.18 Technical Advisory Group for Radio Regulatory (R-REG), IEEE 802.19 Technical Advisory Group for Wireless Coexistence (COEX), IEEE 802.20 Working Group for Mobile Broadband Wireless Access (MBWA), IEEE 802.21 Working Group for Media Independent Handover Interoperability (MIHI), and IEEE 802.22 Working Group for Wireless Regional Area Networks (WRAN) sessions. A joint opening session with the five Working Groups and both the Technical Advisory Groups is normally carried out, at all Interim sessions.

Details about how to participate, register and attend the IEEE 802.11 and IEEE 802.15 Working Groups can be found here: [http://www.ieee802.org/11/Meetings/Meeting\\_Plan.html](http://www.ieee802.org/11/Meetings/Meeting_Plan.html)

#### 4. WORTECS partner involvement

WORTECS partners PLF and OLED are involved in IEEE 802.15.13 and 802.11 LC. OLED is active in both standards and PLF leads the 802.11 LC activity. ORA and IHP takes a wider interest in 802 activities in TGax, TGay, TGba, AANI SC, Coex SC, TGbb, BCS TIG (Broadcasting), FD TIG (Full Duplex), WNG and NGV (Next Generation V2x) SG.

##### Activities 2017-2018

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##### Activities 2018-2019

The standardisation plan for the next 12 months is to

- (1) Continue attendance of WORTECS partners
- (2) Provide updates to consortium members at face to face and phone meetings
- (3) Prepare a presentation of WORTECS architectures and technical contributions for presentation to the IEEE WNG group and other relevant working groups. This will allow WORTECS technologies to be ‘showcased’, ensuring their relevance for future standards.