

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

Submission Title: Istanbul Medipol University Proposal for IEEE802.15.7r1

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Abstract: This contribution presents a partial proposal for IEEE 802.15.7r1

Purpose: This is a partial proposal

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Outline

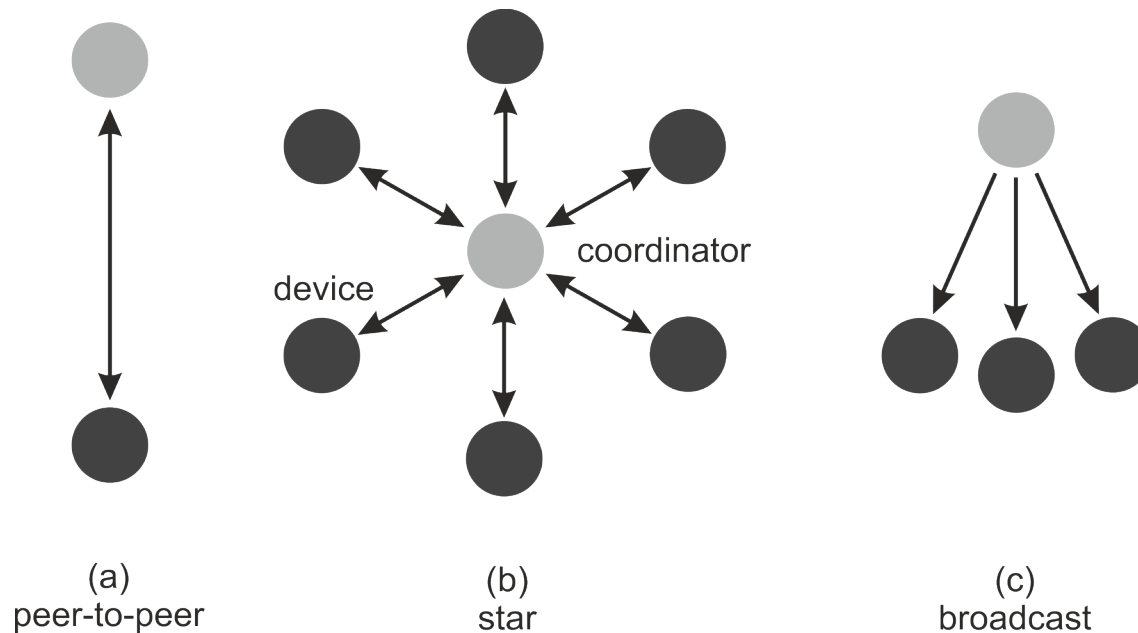
- A prophecy about OWC PHY layers
- VPAN topologies
- Common mode signaling for VLC networks

OWC PHY Layer

- 802.15.7 had 3 separate PHY modes
- New standard will...
 - have 2 main receiver types
 - Image Sensor
 - Photodiode
 - support 3 different communication schemes.
- As a result more than 2 PHY modes will be created
- Most of the devices have either a transmitter or a receiver for a particular PHY mode.

802.15.7 Topologies

3 types of Visible Light Communication Personal Area Network (VPAN)



802.15.7 Topologies

- Only Broadcast topology does not need two way communication.
- For peer to peer networks and star topology networks an efficient way of establishing the network is necessary.

Similar Problems in other IEEE standards

- 802.11 supports backward compatibility with new PHY modes designed.
- 802.15.3c has 3 PHY modes and created a Common Mode Signaling (CMS) modulation and coding scheme for coexistence.

Common Mode Signalling

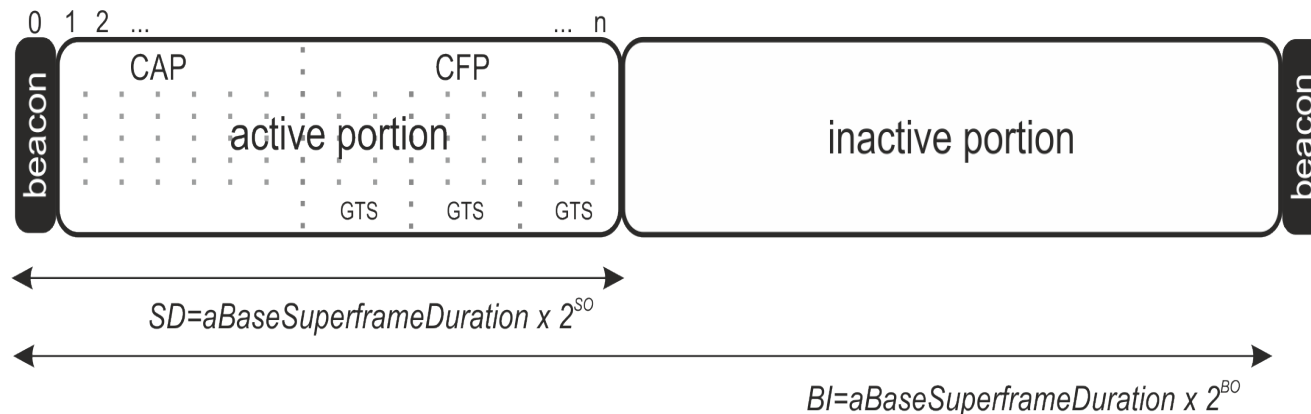
- CMS is a common platform that enables different PHY modes to communicate with each other before conducting their respective data transmissions.
- CMS is used for transmission of the beacon frame, synchronization (sync) frame, and other important command frames, such as the association frame and beamforming training sequence frames.

Common Mode Signalling for 802.15.7r1

- Different receiver types make the use any modulation and coding scheme of future 802.15.7r1 PHY mode as CMS very difficult.
- Many consumer products employ an RF transceiver.
- Selecting a proper RF standard will enable an acceptable CMS for almost any 802.15.7r1 PHY.

CMS Use in 802.15.7r1

- Beacons for the VPAN network will be transmitted through both the PHY modes of the network and the CMS.
- The beacon from the transmission PHY inform the receiver about the CMS.
- The beacon from the CMS inform the receiver the existence of a VLC network and the PHY modes it support.



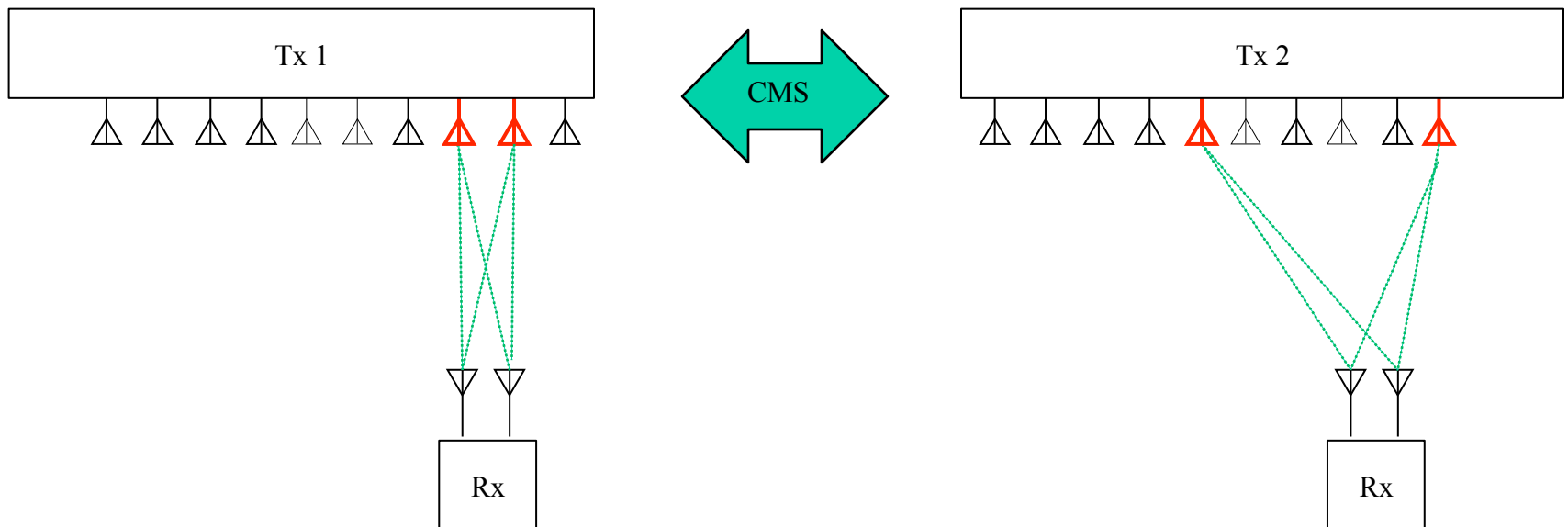
802.15.7 Superframe structure

A CMS for 802.15.7

- The VLC receiver node will send its association frame using the CMS and inform the capabilities of the receiver.
- CMS can improve security by providing information about each transmission element and/or each VLC cell after association.

A CMS for 802.15.7

- It will enable two VLC transmitting networks to communicate and mitigate interference.



A CMS for 802.15.7

- OFDM and MIMO communication are studied for VLC communication in detail.
- Such methods as Bit Loading, OFDMA and Multi User-MIMO (all related to OFDM and MIMO) require detailed knowledge of the channel state information at the transmitter side.
- CMS can provide this information more efficiently.

A CMS for 802.15.7

- We propose using 802.11 as CMS of the VLC networks.
- It shall be mandatory for all VLC transmitter which require feedback.