

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

**Submission Title:** [ CID 1034: Proposed SOI flag in PHR indicating the information of RRM and RR ]

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**Abstract:** [The first reserved bit of PHY header is proposed to assign as a SOI (Sphere of Influence) flag which indicates the availability of RRM/RR information for MAC/NHL or application layer. A possible OFDM PHY that optionally equips a low power RX mode to detect PHR only, is able to trigger a wakeup scheme or to acquire the entire flagged frame into buffer memory without MHR/MPDU processing.

The low power RX mode may not be unique in OFDM or any specific PHY, because the reliability of 15.4g inherent multi-hop relay with the sleep/wake-up mechanism is effected by SOI. ]

**Purpose:** [ The purpose of this submission is to clarify the intent of CID 1034, submitted by identical author, and to resolve it. ]

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CID 1034: Proposed SOI flag in PHR  
indicating the information of RRM  
(Radio Resource Measurement/Management)  
and RR (Radio Regulatory)

## Proposed PHR with SOI bit

- PHY Header for OFDM (6.3.4a.3, page 42)

Rate (5bits)	Reserved (1bit)	Frame Length (11bits)	Reserved (2bits)	Scrambler (2bits)	Reserved (1bit)	HCS (8bits)	Tail (6bits)
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- Proposed PHR for OFDM (with SOI flag bit)

Rate (5bits)	SOI (1bit)	Frame Length (11bits)	Reserved (2bits)	Scrambler (2bits)	Reserved (1bit)	HCS (8bits)	Tail (6bits)
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( SOI : Sphere of Influence )

# Anticipated Time Synchronized MAC (15.4e)

- 15.4e is going to adopt TSCH and DSME using time-sync..
- Most nodes in a piconet may sleep and perform the wake-up duty-cycling to conserve battery power.
- Superframe Structure works to ensure the reception of various broadcasting frames like the beacon within a piconet.
- Methods to collect RRM/RR info from outside the piconet?
  - keep being awake and acquire promiscuously, or
  - use “Dormant RX mode” to filter out useful information.

Note: RRM ( Radio Resource Measurement and Management ) is essential for AFA ( Adaptive Frequency Agility )

## Possible “Dormant RX mode”, an example

- To perform RRM and to overhear a frame the neighbor nodes are transmitting without employing MAC promiscuous mode, a flag in PHR to indicate the availability of SOI info helps a lot.
- While MAC is sleeping, a limited RX function which is sufficient only for decoding PHR with minimum battery power, is possible.
- This “PHR only RX mode” are effective for,
  - RRM, including remote CCA and alien piconet,
  - RR information gathering (at the regulatory boarder),
  - CSM beacon reception,
- “PHR only RX mode” may be nearly “Dormant” than awake.

## Expected usage of SOI flag in RX functions

- If a node is receiving continuously to collect the RRM/RR info, PHY is able to check only SOI flag and then to activates MAC function without power consuming promiscuous mode.
- If the “Dormant RX mode” is available, the detection of SOI flag can be used to activate the full function of PHY, selectively.
- If only STF/LTF are used to assess the neighbor signal quality, associated SOI bit can be recognized as a sign of a maximum powered or best quality, to be recorded at peer.
- If any sort of frequency agility is employed, the candidate peers of redundant and synchronized paths be listed and recorded.
  - Trigger Remote CCA reply.
  - Confirm the synchronization to switch the channel.
- CSM beacon may be searched without consuming battery power.

# Conclusions

- To help resolving CID1034, the usefulness of SOI flag in PHR for RRM/RR indication is summarized and exemplified.
- As SOI flag is simple “marking” of PHR for minimized RX function, diverse usage would be possible together with each application scenario.

- **References**

- 15-08-0109-02-004d : p802-15-4-d-proposal-ww-bpsk-with-afa-provisioning
- 15-08-0030-01-004e : AFA-functionality-in-reliability-conscious-applications

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