

IEEE 802.3da SPMD TF: 10BASE-T1S multidrop EEE proposal



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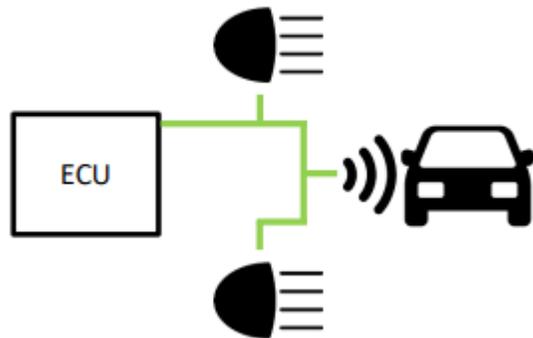
Tim Baggett
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Supporters

- **Piergiorgio Beruto (OnSemi)**

OPEN Alliance need for Wake/Sleep

- The system may not need all nodes on the mixing segment to be always active
 - Rear sonar sensors of a car are not necessary while driving on the autobahn, but share the medium with active nodes
 - However, when the car is put in reverse to back into a parking spot, the sensors must become active quickly.



OPEN Alliance need for Wake/Sleep

- **Nodes that are not needed are put in a minimal power state**
 - Power efficiency translates to fuel efficiency and distance for electric cars
 - Cars need to remain parked at the airport for weeks without draining the battery
 - Target < 120 μ W per node/device
 - With this requirement we cannot even afford the power for clocking the PHY!

Existing Solution: Wake On LAN (WOL)

- **Sleep entry is decided by the application**
 - Example: pressing button to put PC into sleep mode
- **WOL frame is sent from the application on the network**
- **WOL requires the PHY receiver remain powered to receive a frame**
 - The rest of the node can be powered off, but receiver remains powered
- **WOL is sufficient for generic power saving, but may not meet needs for all systems**
 - ~75 mW
 - Many systems require more power efficiency

OA Solution: Deep Sleep

- **Like WOL, the application layer determinations when to go to sleep**
 - Waking of sleeping devices is also made at the application layer
 - Generation of wake/sleep requests is out of scope of the OA specification
- **Global wake – all nodes on the mixing segment wake up**
 - No selective wake; wake isn't addressable
 - After global wakeup, nodes that are not needed in the new system context are put back to sleep

OA Solution: Deep Sleep

- **OPEN Alliance 10BASE-T1S Wake/Sleep also puts the PHY asleep to meet the 120 μ W requirement**
- **Nodes that are asleep must not be awakened by normal DME traffic from the active nodes**
- **Use out-of-band signaling and only passive analog circuits**
 - Initial concept presented at the 802.3da Study Group in Geneva
 - See: [Partial Networking on a Mixing-Segment \(Beruto, 20 Jan 2020\)](#)

OPEN Alliance Implementation

- **The OA 10BASE-T1S Wake/Sleep specification modifies IEEE 802.3 clauses 22, 147, and 148**
 - Clause 22
 - Signaling of Wake Request/Indication from PHY to power management client and vice-versa
 - Clause 147
 - Defines the wake signal (PCS, PMA)
 - Detection of the wake signal (PMA)
 - Clause 148
 - Transmit of wake signaling without collisions

OPEN Alliance Implementation

- **Some parts of the OA specification are application specific**
 - These are not to be considered for inclusion in 802.3da
 - Section 'X' of the proposed baseline text contains a power management client
 - Maybe this could be Clause 78 EEE?
 - Exception: The wakeup pulse (WUP) signal needs to be moved somewhere in Clause 147
- **The end goal is to define a generic wake/sleep mechanism for 802.3da**
 - The application specific portions of the OA specification has been removed from the proposal to 802.3da
 - Want the OA Wake/Sleep specification to become a specific implementation of the generalized 802.3da wake/sleep
 - Want OA to take the IEEE specification and specialize it for automotive applications - NOT to *override* IEEE specifications!

IEEE P802.3da Objective

- **Objective 7**
 - Specify improvements for Energy Efficient Ethernet compared to current 10Mb/s multidrop single balanced pair networks
 - Or: Support energy efficient operation for 10Mb/s multidrop networks (TBD)
- **One presentation considering this objective**
 - See: [Thoughts on Energy Efficient Multidrop Systems \(Zimmerman, 30 June 2021\)](#)

Energy Efficiency in Multidrop systems

- **Unlike full-duplex PHYs, half-duplex multidrop PHYs are already inherently energy efficient in that they do not constantly transmit when there is no data to send**
 - Where full-duplex PHYs can halt transmission of IDLE signaling in EEE, we cannot improve half-duplex transmitter efficiency
 - Because it is multidrop, we cannot use LPI signaling over the network to command specific remote nodes to go into a low power state.
 - Point-to-point networks gets to do this because each PHY is connected to only a single remote PHY

Proposed Baseline Text

- We propose the OPEN Alliance 10BASE-T1S Wake/Sleep as a framework upon which to build a solution to our SPMD energy efficient objective
- Draft baseline text:
[802.3da EEE WakeSleep Baseline Preview b.pdf](#)

Thank You!

Straw Poll

Should we consider the content of the OPEN Alliance 10BASE-T1S Wake/Sleep specification as a basis for building blocks for the energy-saving objective of IEEE P802.3da?

Yes: 25

No: 1

Abstain: 12

References

- **IEEE P802.3da Objectives**

7. Specify improvements for Energy Efficient Ethernet compared to current 10Mb/s multidrop single balanced pair networks

[Partial Networking on a Mixing-Segment \(Beruto, 20/1/2020\)](#)

[Thoughts on Energy Efficient Multidrop Systems \(Zimmerman, 30/6/2021\)](#)