

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



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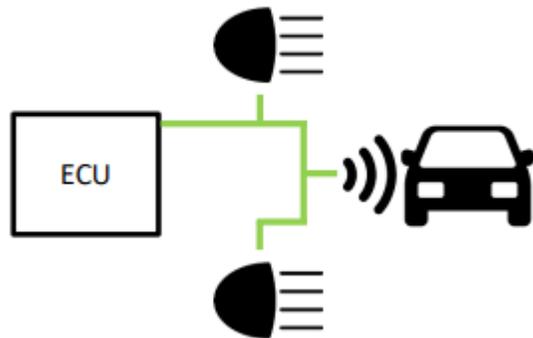
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# Supporters

- **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  $\mu$ 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 not enough for battery powered systems**
  - ~75 mW
  - Many systems require more power efficiency

# OA Solution: Deep Sleep

- **Like WOL, determination to go to sleep is made at the application layer**
  - As well, 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.
  - 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  $\mu$ 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 EEE 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
- **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
    - Take IEEE specification and specialize it in OA for automotive applications and 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
- **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 inherently energy efficient already 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 remote nodes to go into a low power state.
    - Point-to-point networks gets to do this because each PHY is only connected to a single remote PHY

# Proposed Baseline Text

- **Proposed baseline text is available**

# Thank You!

# Straw Poll

**Should we consider the OPEN Alliance 10BASE-T1S Wake/Sleep solution to further the energy-saving objective of IEEE P802.3da?**

**Yes:**

**No:**

**Abstain:**

# 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 \(Zimmerman, 30/6/2021\)](#)