



MICROCHIP

Precedence Considerations

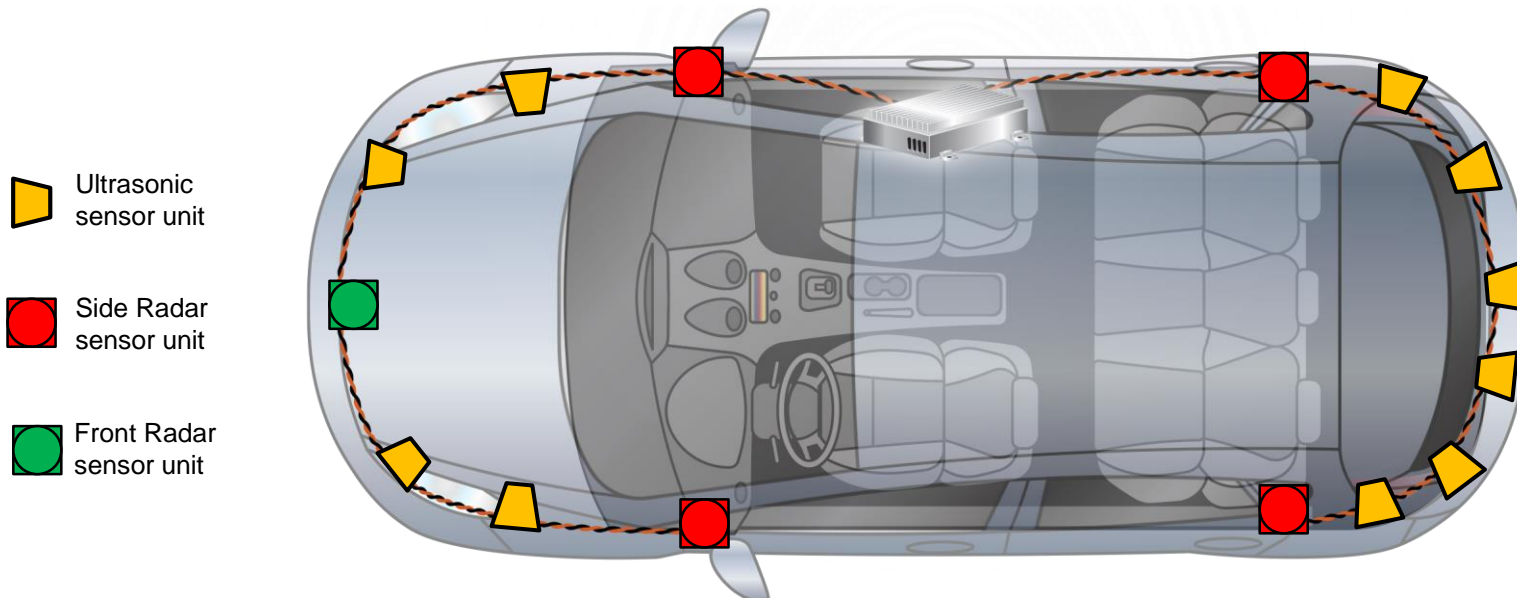
Martin Miller

Supporter:

Piergiorgio Beruto, Canova Tech

Automotive Requirements

- Multidrop required to minimize cabling effort
 - Deterministic behavior required for Functional Safety
- **PLCA on mixed segment needed**



Motivation for further investigations

- **PLCA offers fair access (round robin) to a multidrop network**

BUT

- **Some application require “unfair” arbitration mechanisms**
 - [Analysis of worst case latencies in an 10 Mbit Ethernet network \(Meier\)](#)
 - [Fairness Considerations for PLCA \(Matheus\)](#)
 - Background firmware update download
 - Transfer of diagnostic information

How other standards deal with it

- **Priorities**

- Each frame has it's own priority.
- The higher priority frame is sent first
- Handled on Layer II, not in the PHY

- **Time division multiplex**

- Each node gets one or multiple reserved time slots
- Doesn't work very well with packet oriented transmissions

- **Precedence**

- Each node has a fixed ID
- Arbitration mechanism uses ID
 - All start to send at the same time
 - The lowest ID wins, others stop sending

Ideas how to solve the problem without changing spec.

- **Multiple PLCA IDs**
 - One node gets assigned multiple PLCA IDs
 - Allows a node to send multiple times during PLCA bus cycle
- **Solutions offered from higher layers**
 - Limiting Maximum Transmission Unit (MTU)
 - Use TSN features (requires more work in 802.1)

Potential additional solutions

- **Burst Mode**
 - Node is configured to keep TO for more than one frame
 - Allows a node to send multiple frames in one TO
 - Available in other Ethernet standards
 - **Priorities (Don Pannell)**
 - Pro
 - Maximum feature set
 - Contra
 - TSN might not be affordable/desired for some apps
 - Requires new MAC → **out of scope**
 - **Precedence (Re-start PLCA cycle after each frame)**
 - Pro
 - The lower the PLCA ID of a node, the higher becomes its precedence
 - Contra
 - In high traffic situations, nodes with high PLCA ID may face starvation
-