

IEEE 802.3
Call for Interest
Ethernet for Automotive Imaging Sensors (ISAAC)
Closing Report

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802.3 Plenary
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CFI Request at 802.3 Opening Plenary, 10 July 2023

This is a call for interest to initiate a Study Group to develop a PAR and CSD for an electrical Ethernet physical layer and associated interface client specifications optimized for automotive imaging sensors. We believe there is a timely market opportunity for the introduction of such specialized interfaces now as the number of cameras per vehicle grows rapidly. The target automotive cameras stream multigigabit-speed data from the sensor and have low-utilization, intermittent control data in the other direction over the Ethernet link. While transmit and receive traffic flows are independent in traditional Ethernet, these new physical layers may benefit from additional control between the MAC and the PHY, e.g., at the Reconciliation Sublayer, to optimize the MAC/PHY interfacing and PHY power/complexity. These new physical layer applications operate under very tight power and cost/complexity constraints, creating the opportunity for new or modified IEEE 802.3 standards to better serve the application.

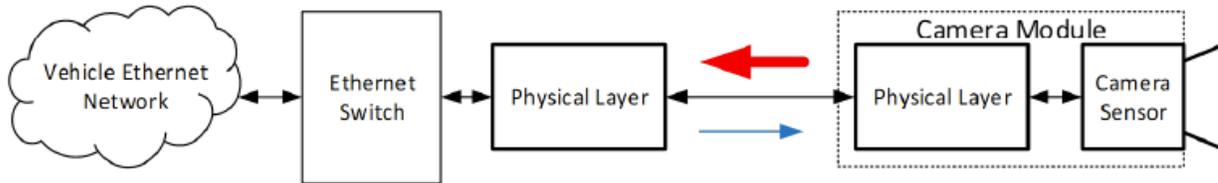
Overview: Motivation

- Emerging use of Ethernet for automotive imaging sensors faces the challenge of replacing entrenched proprietary technologies in an extremely cost-sensitive environment with power constraints.
 - Unlike traditional Ethernet stations, dedicated sensors and displays present an inherently asymmetric data stream - typically low-rate control plane in one direction and a higher rate data plane in the other direction of transmission.
- The proposed CFI is to consider a study group for a project which may:
 - Specify an inherently asymmetric Ethernet PHY to specifically meet the needs of automotive imaging sensors
 - Specify the reconciliation sublayer and mechanisms to provide for PHYs which may have different throughput capabilities in each direction

What are we talking about?

Good Question for Study Group – Is the camera side PHY the same as the network side?

Support of Ethernet networking is essential for being future proof. Network vs Camera Side



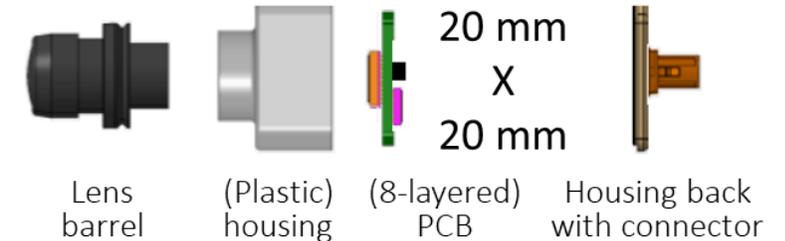
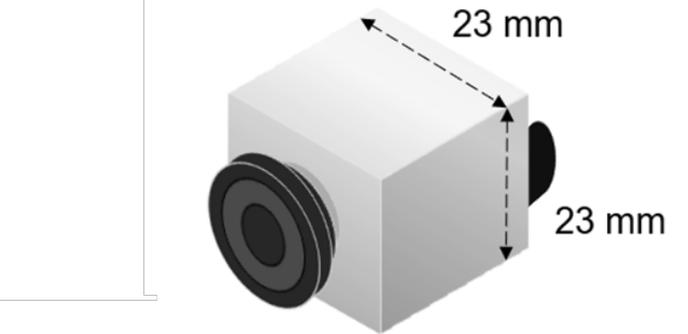
Network Side:

- Transmitting occasionally
- Receiving most of the time
- Less heat constraint
- Power savings desirable
- **Ethernet interoperability is key**

Camera Side:

- Transmitting most of the time
- Receiving occasionally
- Important to control any added heat in camera module
- Power savings are very important
- **Cost and heat are key**

Typical camera sensor:



(source: Daniel Hopf, Continental)

Why now

- Imaging sensors are driving bandwidth in automotive Ethernet networks
- Incumbent, proprietary technologies are proving more difficult to unseat than previous projects expected
- Automotive platforms are expected to significantly increase the number of cameras per car in the next 5 years

Lead times for selecting solutions drives a standard now!

Broad Industry Support

Sami Akin, Cariad
Nobuyasu Araki, Yazaki
Tim Baggett, Microchip
Amir Bar-Niv, Marvell
Bert Bergner, TE
Jamila Borda, BMW
David Brandt, Rockwell Automation
Klemens Brückner, Audi
Clark Carty, Cisco
Ahmad Chini, Broadcom
Mabud Choudhury, OFS
John D'Ambrosia, Futurewei (US Subsd. of Huawei)
Chris Diminico, PHY-SI/SenTekse/MC Communications
Adrian Enriquez, Cariad
Claude Gauthier, NXP
Joel Goergen, Cisco
Hartmut Günther, Mercedes
Ali Ghiasi, Ghiasi Quantum
Sachin Goel, Aviva Links
Christoph Gollob, BMW
Amrit Gopal, Ford
Steve Gorshe, Microchip
Hideki Goto, Toyota
Ajeya Gupta, Ford
Yasuhiro Hyakutake, Orbray Co.
Hoai Hoang Bengtsson, Volvo cars

Thomas Hogenmüller, BOSCH
Daniel Hopf, Continental
Bernd Hormeyer, Phoenix Contact
Masayuki Hoshino, Continental
Klaus Jochen Wagenbrenner, Cariad
Peter Jones, Cisco Systems
Ragnar Jonsson, Marvell
Haysam Kadry, Molex
Manabu Kagami, Nagoya Institute of Technology
Dongok Kim, Hyundai
Thomas Königseder, Technica Engineering
Albert Kuo, Realtek
Keld Lange, Porsche
John Leslie, Jaguar Land Rover
Jon Lewis, Dell
William Lo, Axonne
David Malicoat, Malicoat Networking/Senko
Brett McClellan, Marvell
Atilla Mete Turedi, Jaguar Land Rover
Thorsten Meyer, Valeo
Kresimir Mirosavljevic, Cariad
Yoann Molin, Stellantis
Nicolas Morand, Stellantis
Scott Muma, Microchip
Hiok-Tiaq Ng, Aviva Links
Takumi Nomura, Honda

David Oxtoby, Jaguar Land Rover
Debu Pal, On Semiconductor
Jason Potterf, Cisco Systems
Stefan Priller, Cariad
Alireza Razavi, Marvell
Haim Ringel, General Motors
Giorgio Russo Munarriz, Mercedes
Hossein Sedarat, Ethernovia
Christoph Schmutzler, Cariad
Marc Schreiner, ZF
Masato Shiino, Furukawa Electric
Nithya Somanath, General Motors
Junichi Takeuchi, JAE
Mehmet Tazebay, Broadcom
Dachin Tseng, Realtek
Jose Villanueva, Renault
Bob Voss, Panduit
Enda Ward, Valeo
Natalie Wienckowski, self
Peter Wu, Marvell
Dayin Xu, Rockwell Automation
Herman Yeh, Realtek
Daijiro Yumoto, Nissan
Tingting Zhang, Huawei
Zhuangyuan (Yan) Zhuang, Huawei
Pavel Zivny, Tektronix

CFI Consensus Building Meeting held 11 July 2023

- CFI Presentation: https://www.ieee802.org/3/cfi/request_0321_1.html
- 109 people attended (82 in person, 27 remote)
- Straw Poll Results:
 - Should a study group be formed to develop a PAR, CSD responses, and objectives for Improved Support of Asymmetric Applications for MGBps Ethernet Cameras?
Y: 97 N: 1 A: 9
 - I would participate in the “Improved Support of Asymmetric Applications for MGBps Ethernet Cameras” Study Group in IEEE 802.3:
Y: 70 N: 14 A: 20
 - I believe my affiliation would support my participation in the “Improved Support of Asymmetric Applications for MGBps Ethernet Cameras” Study Group in IEEE 802.3:
Y: 49 N: 8 A: 13

Study Group Motion

Move that the IEEE 802.3 Working Group request the formation of a Study Group to develop a Project Authorization Request (PAR) and Criteria for Standards Development (CSD) responses for an electrical physical layer specification and related functionality of a client optimized for automotive end-node cameras

M: Kirsten Matheus

S: George Zimmerman

Questions?

Thank you!