



Considerations for optimizing the asymmetric camera link

Contribution to 802.3dm Task Force
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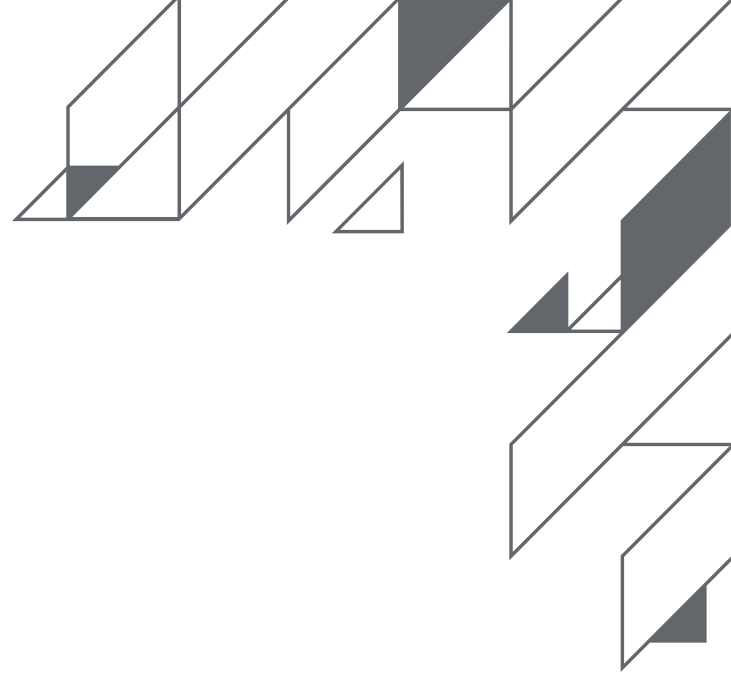
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Introduction

- This presentation reviews some of the issues that need discussion in the 802.3dm Task Force
- Specific issues are identified for discussion related to
 - Application constraints
 - Interoperability and system integration
 - Transmission medium (cables, etc.)
- Other considerations are raised in the form of questions

Application Constraints



Controlling Relative Cost

Cost Sensitive Market

- The 802.3dm development should consider that this is a cost sensitive market that is already served by non-standard solutions
 - The 802.3dm development should consider controlling the complexity of the camera PHY, and the entire Bill of Materials must have competitive relative cost
 - The 802.3dm development should consider future optimization, such as where the camera PHY is integrated into the camera sensor

Camera Module Thermal Constraints

- The 802.3dm development should consider low power consumption in the camera module, to control heat buildup in the camera module

Camera Module Size Constraints

- The 802.3dm development should consider limited footprint of the PHY in the camera module

Latency and Linkup Time

Latency Requirements

- The 802.3dm development should consider latency requirements for the camera link applications in both directions, and be competitive with the existing nonstandard solutions

Linkup Time

- The 802.3dm development should consider the industry requirements for fast linkup, and be competitive with the existing nonstandard solutions

Ethernet Eco-System

1722

- The 802.3dm development should consider any constraints related to supporting 1722 for data encapsulation

PTP and TSN

- The 802.3dm development should consider any constraints related to supporting timing protocols like PTP and TSN

MACsec

- The 802.3dm development should consider any constraints related to supporting security protocols like MACsec

Interoperability and System Integration



Controlling Testing and Interoperability Complexity

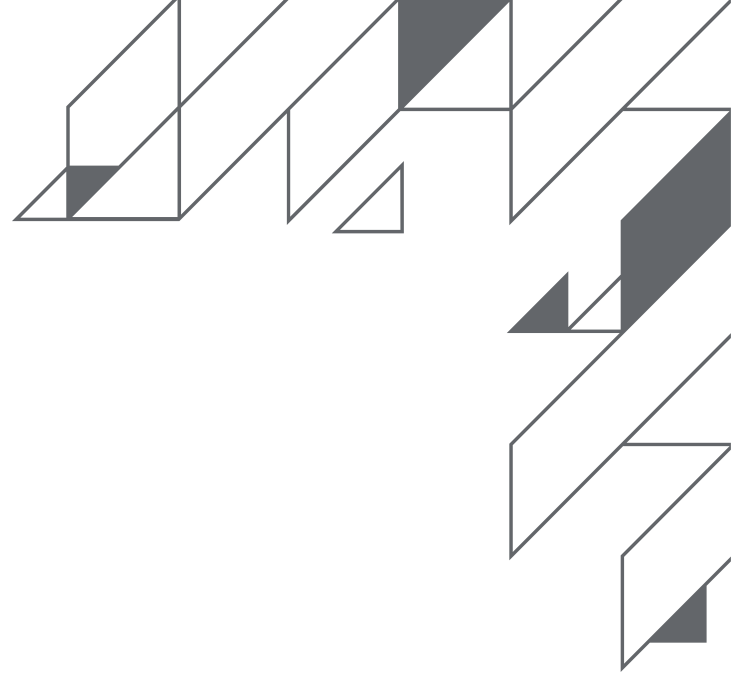
Control Complexity of PHY Interactions

- The 802.3dm development should consider controlling the complexity of PHY interactions, to enhance interoperability
 - If the interactions between PHYs become too complex, we reduce the probability of successful interoperability
 - For example, every synchronized state transition in training or data mode is an “opportunity” for interoperability failures, where the PHYs on each end interpret the standard differently

PHY Complexity and Conformance Testing

- The 802.3dm development should consider controlling the complexity of conformance testing

Transmission Medium



Insertion and Return Loss

Insertion Loss and Return Loss

- The 802.3dm development should define Insertion Loss (IL) limits consistent with the objectives
- The 802.3dm development should define Return Loss (RL) limits that allow media to be competitive with existing and planned practices

PoC and PoDL Requirements

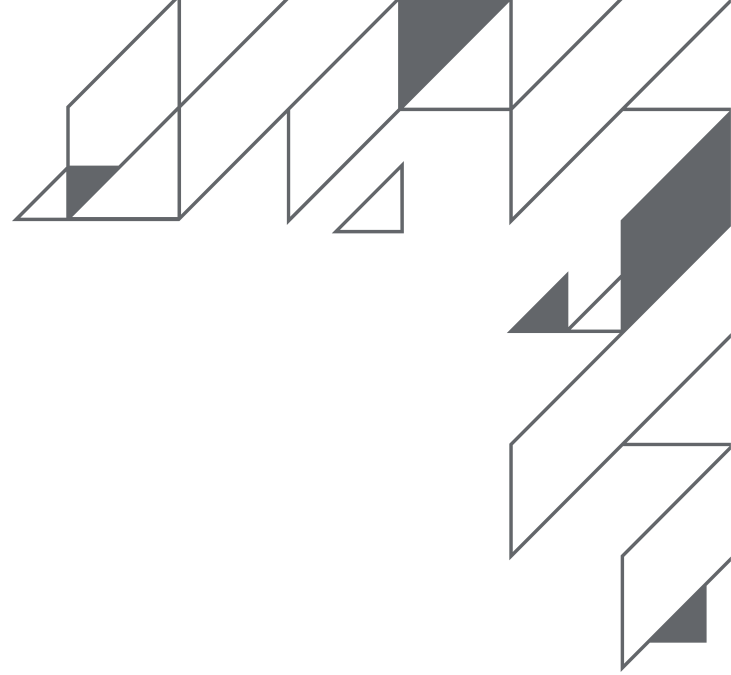
- The 802.3dm development should account for powering over the link when defining the IL and RL limits, including those at the MDI

Noise Environment and Tolerance

Noise environment

- The 802.3dm development should consider the automotive noise environment when evaluating modulation and coding candidates
- The 802.3dm development should consider if there is any difference in the noise environment for balanced pairs and coax cables

Other Considerations



Questions to Consider

Multi-Mode Devices

- Should the 802.3dm development consider the complexity of implementing a multi-mode switch PHY that supports both 802.3dm and 802.3ch?

Auto-Negotiation and Link-Synchronization

- Should the 802.3dm development assume that linkup is initiated through either auto-negotiation or through link-synchronization signaling?

Base 802.3dm Text of 802.3ch Text

- Should the 802.3dm text be based of the 802.3ch text?

Questions to Consider (cont.)

Low-Power/Inactive Modes

- Should 802.3dm support low-power modes?
 - Should such low power modes focus on long inactive periods, when the camera is not active?
 - Should such low power modes focus on short inactive periods, when the PHY supports more data bandwidth than is needed for the camera traffic?

OAM

- Should 802.3dm support OAM?

Similar Applications

Automotive Display Applications

- Should 802.3dm consider automotive display applications?

Industrial Applications

- Should 802.3dm consider industrial camera applications?

Building Automation Applications

- Should 802.3dm consider building automation applications?

What Else?

What else do we need to discuss to make 802.3dm a successful project?

Conclusion

- This presentation outlines some issues the 802.3dm Task Force should consider
- This presentation also raises some questions that may be relevant to the development in the Task Force
- The authors plan to bring presentations related to these issues to future 802.3dm Task Force meetings, and would like ask for collaborators for such presentations

The authors are looking for collaborators for future presentations to the Task Force



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