

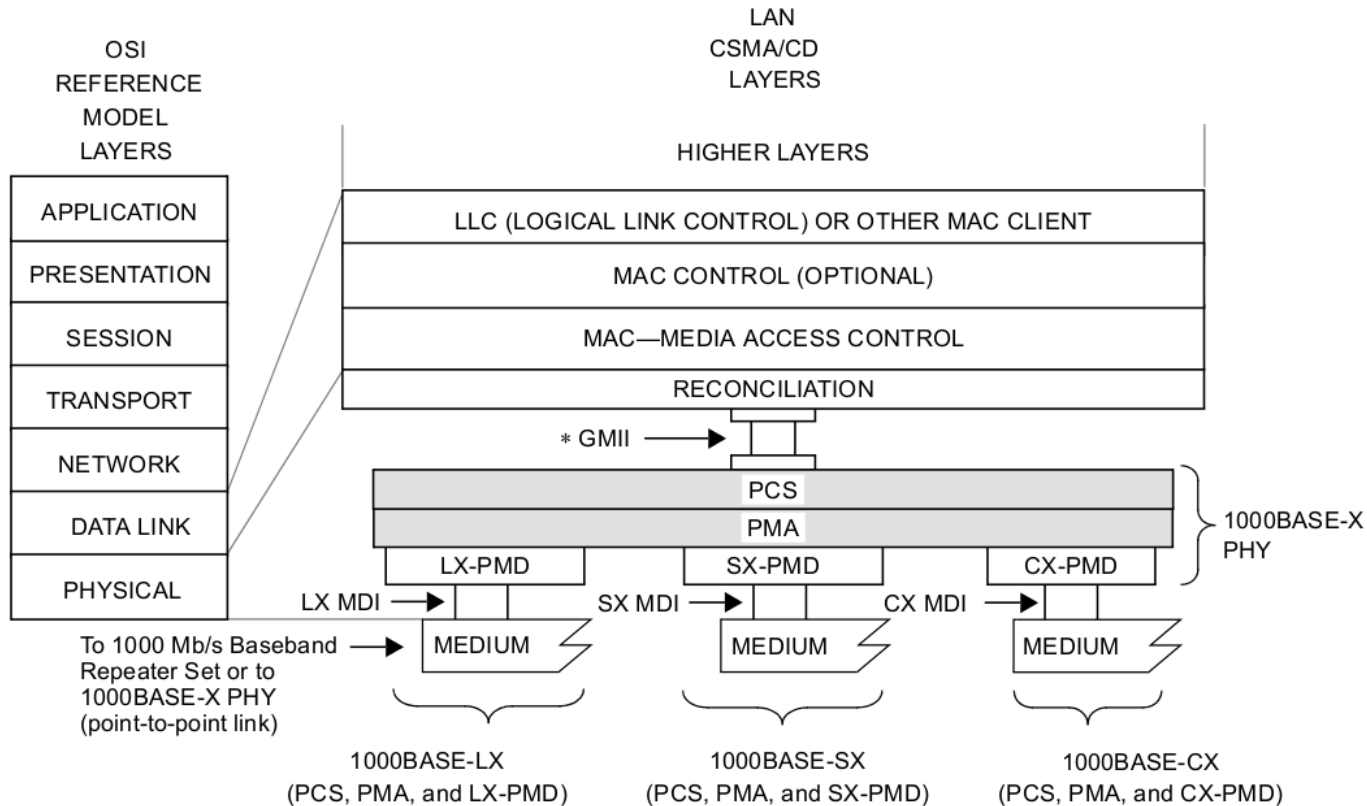
SoNIC over 1G

Han Wang
Rafael Farias Marinheiro
Adithya Venkatesh
Nandini Nagaraj

Motivation

- SoNIC supports only 10G
- PHY should be access to more devices
- Convert SoNIC to 1G
 - Provide a software implementation (8b10b codec)
 - Hardware implementation
- Link to SoNIC firmware

Design - 1000BaseX Standard

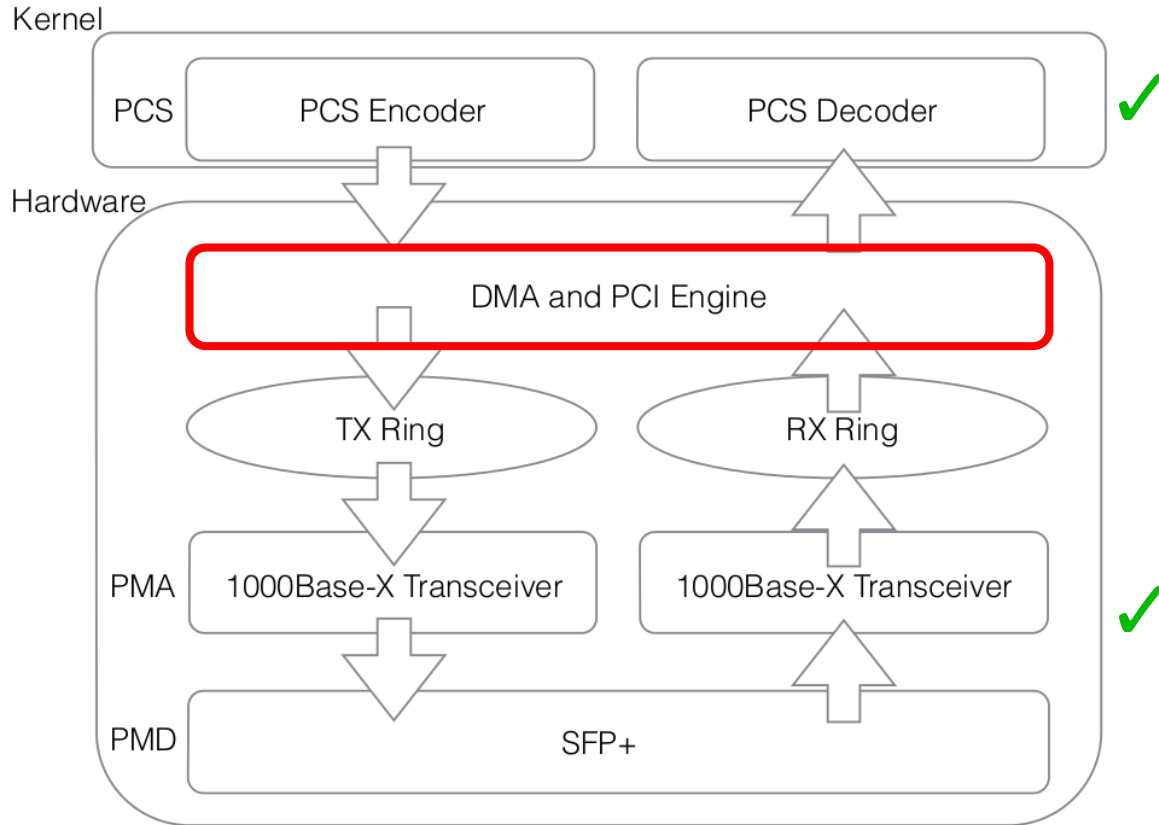


Taken from http://standards.ieee.org/getieee802/download/802.3-2012_section3.pdf (Fig 36-1)

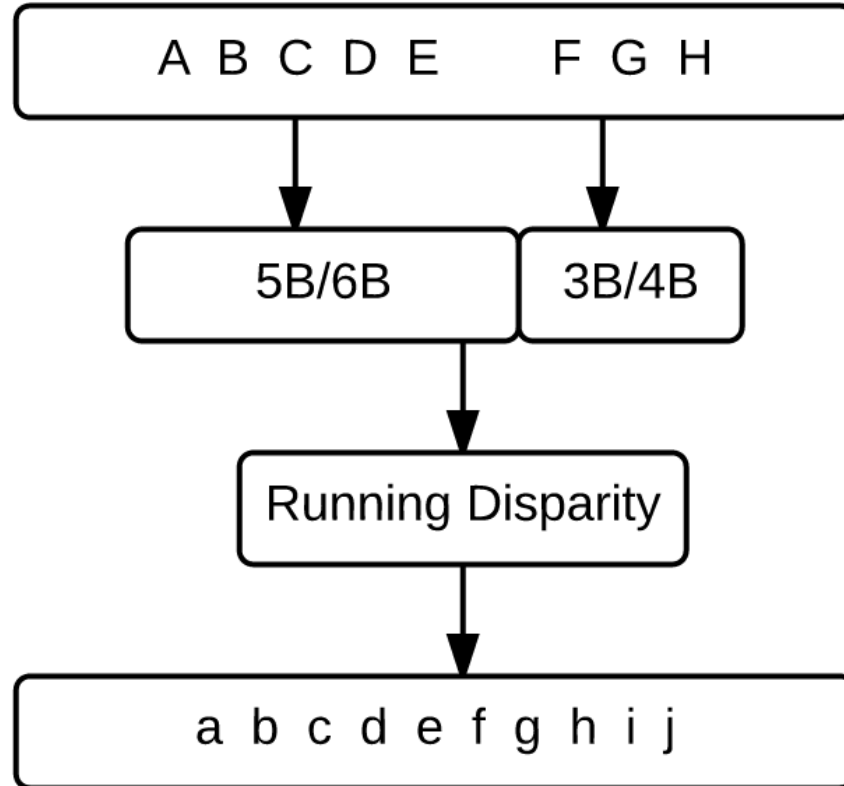
Design - 1000BaseX Standard

- Physical Medium Dependent (PMD): transmitting and receiving symbols from medium
- Physical Medium Attachment (PMA): Deserializing symbols and converting them into 10-bit code words
- Physical Coding Sublayer (PCS):
Encoding and Decoding code-words into octets

Design - SoNIC over 1G



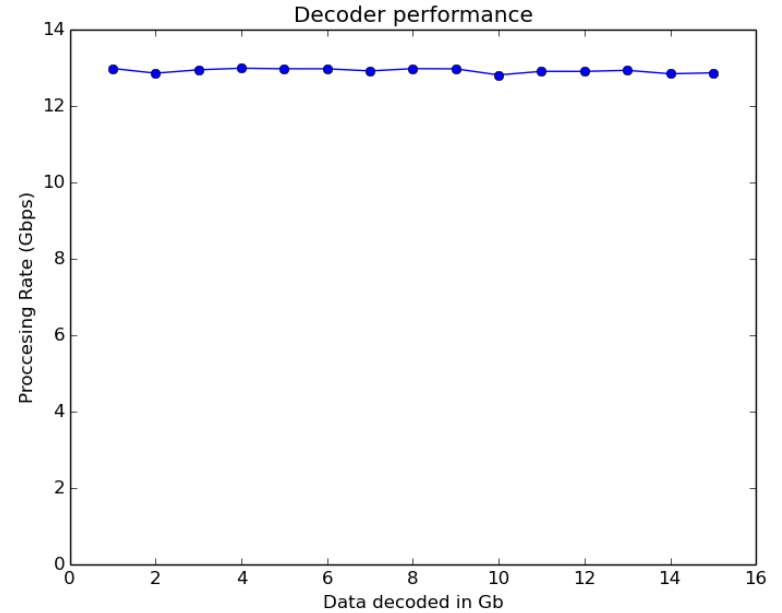
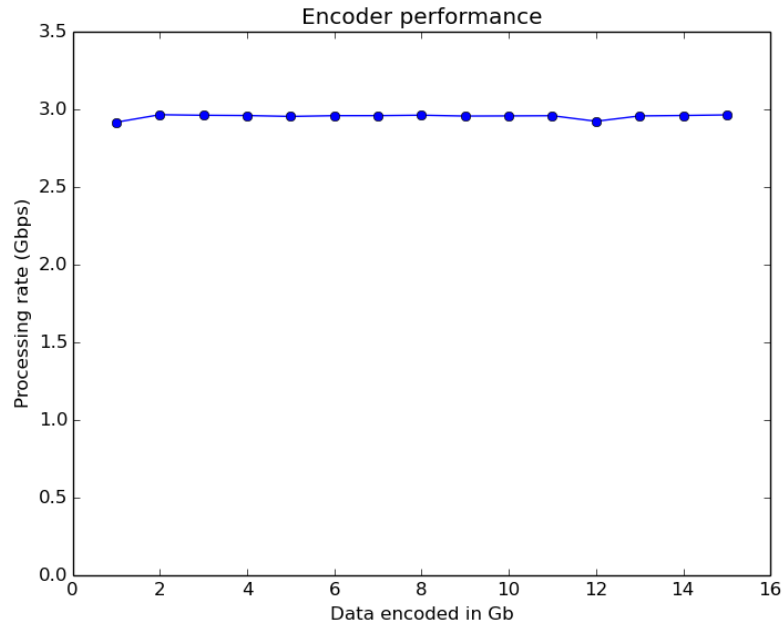
Design - 8B/10B Codec



Optimizations - SoNIC over 1G

- Loop Unrolling
- `__builtin_popcount`
- Store lookup table in memory (small enough to fit L2 cache)

Evaluation - Encoder/Decoder



Future Work

- DMA!
Can build on the SoNIC DMA engine to transfer data between the Hardware and Software Layers.
- More Testing
Couldn't test completely as we were unable to interface the hardware and software stacks.