# Interleaving Options

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# RS-Interleaving

- Cover ISO 7637-3 transients of 50ns
- 2 opinions:  60ns is sufficient, or 110ns sufficient
- RS (360, 326) with 1x, 2x, 4x, 8x interleaving

| | Interleaving | | | |
|---|---|---|---|---|
| | **1X** | **2X** | **4X** | **8X** |
| **10G** | 15 | 30 | 60 | 121 |
| **5G** | 30 | 60 | 121 | 242 |
| **2.5G** | 60 | 121 | 242 | 484 |

Protection (ns)

| | Interleaving | | | |
|---|---|---|---|---|
| | **1X** | **2X** | **4X** | **8X** |
| **10G** | 350 | 700 | 1401 | 2802 |
| **5G** | 700 | 1401 | 2802 | 5604 |
| **2.5G** | 1401 | 2802 | 5604 | 11207 |

Latency (ns)

# Combinations

- Do we want all 4 interleaving options for every speed?

- Do we allow mix/match between 2 PHYs?

# Theory vs Practice

- In theory once we build 8x interleaving, getting 4x, 2x, and 1x is no big deal.
- In practice the validation and interoperability testing gets complex

| | | Vendor A PHY | | | |
|---|---|---|---|---|---|
| | | **1X** | **2X** | **4X** | **8X** |
| Vendor B PHY | **1X** | test | test | test | test |
| | **2X** | test | test | test | test |
| | **4X** | test | test | test | test |
| | **8X** | test | test | test | test |

16 permutations each speed

# Theory vs Practice

- It's actually worse
- Which permutations do you NOT test and still certify interoperability?

| | | Vendor A PHY | | | |
|---|---|---|---|---|---|
| | | **1X** | **2X** | **4X** | **8X** |
| Vendor B PHY | **1X** | test | test | test | test |
| | **2X** | test | test | test | test |
| | **4X** | test | test | test | test |
| | **8X** | test | test | test | test |

16 permutations interleave

X Master/Slave

2 permutations

X Precoding

1 to 16 permutations depending on what's supported

# Let's Eliminate Unnecessary Options

- Delete options that cannot protect against ISO 7637-3 transients of 50ns
- Delete options that introduces excess latency that most likely will never be used

| | Interleaving | | | |
|---|---|---|---|---|
| | **1X** | **2X** | **4X** | **8X** |
| **10G** | ~~15~~ | ~~30~~ | 60 | 121 |
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Protection (ns)

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Latency (ns)

# Two Options at Each Speed

- Low Latency or High Protection

| | Interleaving | | | |
|---|---|---|---|---|
| | **1X** | **2X** | **4X** | **8X** |
| **10G** | | | Low | High |
| **5G** | | Low | High | |
| **2.5G** | Low | High | | |

- No mix and match
  - If one PHY advertises high protection then both PHYs must operate in high protection mode

# If 60ns protection is sufficient then

- Eliminate 8x option

- One option per speed
  - 10G – 4x interleave
  - 5G – 2x interleave
  - 2.5G – 1x interleave

# THANK YOU