



Consideration of Objectives for 400GPL Study Group

Mark Nowell, Cisco
Kent Lusted, Synopsys

Topics

- Objectives: History and goals
- Past Objectives
- Considerations for 400GPL Study Group

IEEE 802.3 Objectives: History and Traditions

- Project objectives are brief statements, usually written in bullet form
- They represent a distilled set of high-level technical requirements
- They are created by the Study Group, approved by the Working Group, and are fulfilled by the Task Force
- The Task Force may modify them, with the approval of the Working Group
- Typically address areas such as operating speed (bit rate), media, reach, BER, compatibility, impairments, coexistence
- Every amendment project undertaken in the IEEE 802.3 Working Group since (at least) 1992 has been guided by a set of objectives

Guidelines for writing objectives

- Objectives must be succinct
- Objectives must be unambiguous
- Objectives must be technical, but written in plain English
- Objectives must be definitive statements of requirements, not plans for future work, study, or evaluation
- Objectives do not have to identify every minute item of work
- Objectives must endure through the life of the project
- Objectives are problem statements, not solution statements

https://www.ieee802.org/3/B400G/public/21_0114/healey_b400g_01_210114.pdf

Recent examples of project objectives

- [IEEE P802.3ds 200 Gb/s per Wavelength MMF PHYs Task Force](#)
- [IEEE P802.3dj 200 Gb/s, 400 Gb/s, 800 Gb/s, and 1.6 Tb/s Ethernet Task Force](#)
- [IEEE P802.3df 400 Gb/s and 800 Gb/s Ethernet Task Force](#)
- [IEEE P802.3cu 100 Gb/s and 400 Gb/s over SMF at 100 Gb/s per Wavelength Task Force](#)
- [IEEE 802.3cd 50 Gb/s, 100 Gb/s, and 200 Gb/s Ethernet Task Force](#)
- [IEEE P802.3bs 200 Gb/s and 400 Gb/s Ethernet Task Force](#)

Type of Objectives

Adopted IEEE P802.3dj Objectives (1 of 2)

- **Non-Rate Specific**
 - Support full-duplex operation only
 - Preserve the Ethernet frame format utilizing the Ethernet MAC
 - Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
 - Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent)
 - Provide support to enable mapping over OTN
- **200 Gb/s Related**
 - Support a MAC data rate of 200 Gb/s
 - Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 200 Gb/s operation:
 - over 1 lane over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 1 pair of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
 - over 1 pair of SMF with lengths up to at least 500 m
 - over 1 pair of SMF with lengths up to at least 2 km
- **400 Gb/s Related**
 - Support a MAC data rate of 400 Gb/s
 - Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 400 Gb/s operation:
 - over 2 lanes over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 2 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
 - over 2 pairs of SMF with lengths up to at least 500 m
 - over 2 pairs of SMF with lengths up to at least 2 km

Foundational:

- Non-rate specific
- Req'ts across the whole project

PHY specific

E.g.:

- Data rate
- Reach
- Media type

400GPL Study Group Considerations for Objectives

(These are not proposals, just examples)

400GPL SG Objectives: Considerations

- CFI takeaway - strong market need for a quick, focused project
- Timeline: Goal to achieve Project documentation package approval in July 2026
 - to enable Task Force initiation before Nov 2026
- Many substantial technical topics ahead to resolve
 - These debates and decisions can happen in the Task Force (once approved)
- Suggested Study Group Objectives goal:
 - Sufficient viable set of Objectives to gain approval
 - Additions or modifications later as needed

Remember: The CSD and PAR require approval outside 802.3, so changes are more difficult. Objectives are owned and approved by the 802.3 Working Group.

400GPL SG: Sufficient viable set of objectives

1. Foundational objectives
2. AUI objectives
3. Key PHY objectives
 1. Single mode fiber
 2. Copper Cable

400GPL SG: Example Foundational Objectives

Example Foundational Objectives could be along these lines:

- Support full-duplex operation only
- Preserve the Ethernet frame format utilizing the Ethernet MAC
- Preserve minimum and maximum FrameSize of current IEEE 802.3 standard
- Support a BER of better than or equal to 10^{-13} at the MAC/PLS service interface (or the frame loss ratio equivalent)

Notes:

- Mostly table-stakes
- Any interest in changing the BER target is a long analysis. Above would provide a starting point
- If PCS change is necessary, we may want to add OTN mapping support objective.

400GPL SG: Example AUI & PHY Objectives

Key Considerations:

1. An objective clarifies that an AUI or PHY spec will be developed for stakeholders and the industry.
2. AUI and PHY objectives are per data rate (400 Gb/s, 800 Gb/s, 1.6 Tb/s)
3. Anticipated technical debates on these specs should not be constrained by above language.
 - Let the TF decide specs
4. Task Force can modify or add in this area based on consensus
 - Some PHY objectives might need a lot of technical discussion before being adopted
5. It is acceptable for objectives to be met in a certain configuration

Examples

Using P802.3dj objectives as an example

- **200 Gb/s Related**
 - Support a MAC data rate of 200 Gb/s
 - Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 200 Gb/s operation:
 - over 1 lane over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 1 pair of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
 - over 1 pair of SMF with lengths up to at least 500 m
 - over 1 pair of SMF with lengths up to at least 2 km
- **400 Gb/s Related**
 - Support a MAC data rate of 400 Gb/s
 - Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 400 Gb/s operation:
 - over 2 lanes over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 2 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
 - over 2 pairs of SMF with lengths up to at least 500 m
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1) Provides clarity to reader on what is included in the project

2) There will be objectives for each speed

Examples

Using P802.3dj objectives as an example

The screenshot shows a slide from the IEEE P802.3dj Task Force. It contains two main sections: '200 Gb/s Related' and '400 Gb/s Related'. Each section lists several objectives. Red circles and lines highlight specific parts of the text. One circle highlights the phrase 'Define a physical layer specification that supports 200 Gb/s operation:' and its sub-points. Another circle highlights the phrase 'Define a physical layer specification that supports 400 Gb/s operation:' and its sub-points. A red line connects the highlighted text to the analysis points below.

- **200 Gb/s Related**
 - Support a MAC data rate of 200 Gb/s
 - Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 200 Gb/s operation:
 - over 1 lane over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 1 pair of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
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- **400 Gb/s Related**
 - Support a MAC data rate of 400 Gb/s
 - Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
 - Define a physical layer specification that supports 400 Gb/s operation:
 - over 2 lanes over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
 - over 2 pairs of copper twin-axial cables in each direction with a reach of up to at least 1.0 meter
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3) No indication in the objective language around what the technical solution entails. No mention of modulation, equalization, FEC considerations, gauge etc.

4) Some PHY objectives might need a lot of technical discussion before being adopted

Examples

Using P802.3dj objectives as an example

- **200 Gb/s Related**

- Support a MAC data rate of 200 Gb/s
- Support optional single-lane 200 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
- Define a physical layer specification that supports 200 Gb/s operation:
 - over 1 lane over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
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- **400 Gb/s Related**

- Support a MAC data rate of 400 Gb/s
- Support optional two-lane 400 Gb/s attachment unit interfaces for chip-to-module and chip-to-chip applications
- Define a physical layer specification that supports 400 Gb/s operation:
 - over 2 lanes over electrical backplanes supporting a die-to-die insertion loss ≤ 40 dB at 53.125 GHz **
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5) It is acceptable for objectives to be met in a certain configuration. The final spec may have other configurations defined that might not meet the reach objective. For example:

- Short/long host configurations
- OM3 vs OM4 reaches

Summary

- Schedule pressure from stakeholders and the industry requires early alignment on objectives at the May interim meeting
- Agreement to a minimum viable set of objectives that:
 - Clearly defines project scope for stakeholders
 - Enables July 2026 Project Documentation Package approval
 - Preserves flexibility for Task Force technical debate and innovation
- **Defer technical tradeoffs to the Task Force, where consensus can form**
 - Objectives should not constrain the technical debates
 - Further addition or refinement of objectives is allowed in Task Force