

Guidelines for project objectives

Hugh Barrass & Howard Frazier
IEEE 802.3 EPON Protocol over Coax
(EPoC) PHY Study Group
Newport Beach, CA 24-January-2012

Outline

- History and traditions
- Guidelines for writing and adopting
- Examples from successful projects

History and traditions

- Project objectives are brief statements, usually written in bullet form, that summarize the technical objectives for a standards project in IEEE 802.3
- They represent a distilled set of high-level technical requirements
- They are created by the study group, approved by the parent working group, and are fulfilled by the task force
 - The task force may modify them, with the approval of the working group
- They typically address areas such as operating speed (bit rate), media, reach, BER, compatibility, impairments, coexistence
- Note that some other working groups address such areas in their Project Authorization Request, but we tend not to do this
- Every project undertaken in the IEEE 802.3 working group since (at least) 1992 has been guided by a set of objectives

History and traditions

- We have seen other standards bodies (names withheld to protect the guilty) get wrapped around the axel writing long-winded “requirements documents” to accomplish what we do with one slide of bullets
 - They argue endlessly about the wording, which is like talking about talking about the subject
 - They seldom write a standard, which is the real “requirements document”
- We have seen us nail down the objectives in a single afternoon (Gigabit Ethernet) and I have also seen us take 6 meetings to get consensus on them (names withheld to protect the guilty)
- People tend to read too much into the wording, so please:
 - Keep the wording brief and simple
 - Remember, an objective says what it says, nothing more
- None-the-less, there will probably be quite a bit of jockeying on the objectives

Guidelines for writing and adopting

- 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
- Objectives usually get included in the introductory text of an amendment, and thus live forever within the standard

Guidelines for writing and adopting

- Consensus building is key
 - Don't even think about offering up a motion to adopt an objective until you know you have significant support for it, otherwise, things will get ugly
- Offer objectives one at a time, using a motion like this:
 - Example - for illustrative purposes only!**
 - Move that the Study Group adopt the following objective:
 - Provide a BER of 10^{-12} or better at the MAC/PLS service interface
- All votes on objectives are technical, requiring $\geq 75\%$ approval
- Sometimes, we try adopting just the form of an objective, before we can reach agreement on the specific values
 - These are called “Mad-libs” objectives
 - Example - for illustrative purposes only!**
 - Move that the Study Group adopt the following objective:
 - Provide a BER of 10^{-n} or better at the MAC/PLS service interface
 - This is not the preferred approach!

Examples from successful projects

- Gigabit Ethernet – January, 1996
 - #1 Speed of 1000 Mbps at the MAC/PLS service interface
 - #2 Use 802.3 & ethernet MAC frame format
 - #3 Meet 802 FR, with the possible exception of Hamming distance
 - #4A Simple forwarding between 1000 Mbps, 100 Mbps and 10 Mbps
 - #4B Preserve minimum and maximum frame size of current 802.3 standard
 - #5 Full and half duplex operation
 - #6A Support star wired topologies
 - #6B Use CSMA/CD for half duplex access method with for support for at least one repeater
 - #7 Fiber and if possible copper media
 - #8 Use ANSI Fiber Channel FC-1 and FC-0 as basis for work
 - #9 Provide a family of physical layer specifications which support:
 - A. link distance of at least 300 meters for multi-mode fiber
 - B. link distance of 25 meters for copper - 100 meters preferred
 - C. link distance of at least 2000 meters of single mode fiber
 - #10 Decide between collision domain diameter ≥ 50 meters or ≥ 200 meters
 - #11 Support media selected from ISO/IEC 11801
 - #12 Accommodate proposed 802.3x flow control

Examples from successful projects

- EFM – March, 2002
- Support subscriber access network topologies:
 - o Point to multipoint on optical fiber
 - o Point to point on optical fiber
 - o Point to point on copper
- Provide a family of physical layer specifications:
 - o 1000BASE-LX extended temperature range optics
 - o 1000BASE-X \geq 10km over single SM fiber
 - o 100BASE-X \geq 10km over SM fiber
 - o PHY for PON, \geq 10km, 1000Mbps, single SM fiber, \geq 1:16
 - o PHY for PON, \geq 20km, 1000Mbps, single SM fiber, \geq 1:16
 - o PHY for single pair non-loaded voice grade copper distance \geq 750m and speed \geq 10Mbps full-duplex
- Optical EFM PHYs to have a BER better than or equal to 10^{-12} at the PHY service interface
- Include an optional specification for combined operation on multiple copper pairs
- Support far-end OAM for subscriber access networks:
 - o Remote Failure Indication
 - o Remote Loopback
 - o Link Monitoring
- The point-to-point copper PHY shall recognize spectrum management restrictions imposed by operation in public access networks, including:
 - o Recommendations from NRIC-V (USA)
 - o ANSI T1.417-2001 (for frequencies up to 1.1MHz)
 - o Frequency plans approved by ITU-T SG15/Q4, T1E1.4 and ETSI/TM6

Examples from successful projects

- 10GEPON – May, 2006
- Support subscriber access networks using point to multipoint topologies on optical fiber
- PHY(s) to have a BER better than or equal to 10^{-12} at the PHY service interface
- Provide physical layer specifications:
 - PHY for PON, 10 Gbps downstream/1 Gbps upstream, single SM fiber
 - PHY for PON, 10 Gbps downstream/10 Gbps upstream, single SM fiber
- Define up to 3 optical power budgets that support split ratios of 1:16 and 1:32, and distances of at least 10 and at least 20 km.

Examples from successful projects

- **40G/100G – July, 2009**
- Support full-duplex operation only
- Preserve the 802.3 / Ethernet frame format utilizing the 802.3 MAC
- Preserve minimum and maximum FrameSize of current 802.3 standard
- Support a BER better than or equal to 10^{-12} at the MAC/PLS service interface
- Provide appropriate support for OTN
- Support a MAC data rate of 40 Gb/s
- Provide Physical Layer specifications which support 40 Gb/s operation over:
 - at least 10km on SMF
 - at least 100m on OM3 MMF
 - at least 7m over a copper cable assembly
 - at least 1m over a backplane
- Support a MAC data rate of 100 Gb/s
- Provide Physical Layer specifications which support 100 Gb/s operation over:
 - at least 40km on SMF
 - at least 10km on SMF
 - at least 100m on OM3 MMF
 - at least 7m over a copper cable assembly

Thank You