Energy Efficient Ethernet Objectives & 5 Criteria

A strawman to spur discussion and drive towards consensus

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New study group ☺

The primary object of a Study Group is to prepare a project proposal

PAR, 5 Criteria, Objectives

Project Authorization Request – consists of standard form

- Title, Purpose, Scope, Stakeholders

5 Criteria – 802 specific requirement

- Broad Market Potential, Compatibility, Distinct Identity, Technical Feasibility, Economic Feasibility

Objectives

- Give scope & targets for Task Force (& eventually for the standard)

Looking at the problem backwards…

What type of thing do we want written into the standard?

- Based on CFI material & general interest (so far)

Some means of changing PHY speed for major copper PHYs

- Change between 1000BASE-T & 100BASE-TX
- Change between 10GBASE-T & 1000BASE-T
- Along with a communication & control mechanism

Therefore make that into a set of objectives…

- … along with “do no harm” and “don’t work in the dark” statements

Possible objectives

This is a very early stab – meant as a strawman

Main objectives

- Define the means to change between 1000BASE-T & 100BASE-TX PHYs, without loss of link
- Define the means to change between 10GBASE-T & 1000BASE-T PHYs, without loss of link
- Define communications mechanism to negotiate and control PHY change

Do no harm

- Support full duplex operation, star wired, structured cabling only
- Make no change operational mode of existing PHYs
- Support Clause 28 auto-negotiation

Don’t work in the dark

- Encourage communication with IEEE 802.1 and IETF regarding speed change
- Simulate representative traffic scenarios to demonstrate behavior of TCP/IP in typical usage scenarios

5 Criteria

Given a set of objectives like these, we can work on the 5 criteria …

Broad Market Potential

- Is there a substantial market (to justify the development)?

Compatibility

- Does this fit into the existing 802 / 802.3 hierarchy?

Distinct Identity

- Is it really a new standard (not just re-jigging something old)?

Technical Feasibility

- Can it be built with current (or near future) technology?

Economic Feasibility

- Can it be achieved at a reasonable cost, is it “worth it”?

Broad Market Potential

Fixed part (the questions we must answer)

- a) Broad sets of applicability
- b) Multiple vendors and numerous users
- c) Balanced costs (LAN versus attached stations)

Market pressure and legislative action worldwide is demanding improvements in energy efficiency of networked equipment. EEE features will be explicitly or implicitly required by a significant fraction of Ethernet edge connections in the future.

At the EEE study group meetings, nn individuals from nn companies representing both vendors and users expressed their support for the project.

Ethernet equipment vendors and customers are able to achieve an optimal cost balance between the network infrastructure components and the attached stations.

Compatibility

Fixed part (the questions we must answer)

- a) Conformance with 802 Overview and Architecture
- b) Conformance with 802.1D, 802.1Q, and 802.1f
- c) Compatible managed object definitions

As a supplement to IEEE Std 802.3, the proposed project will remain in conformance with the 802 Overview and Architecture.

As a supplement to IEEE Std 802.3, the proposed project will remain in conformance with 802.1D, 802.1Q and 802.1f, though extensions to these standards may be proposed as additional work items.

As a supplement to IEEE Std 802.3, the proposed project will follow the existing format and structure of 802.3 MIB definitions.

Distinct Identity

Fixed part (the questions we must answer)

- a) Substantially different from other IEEE 802 standards
- b) One unique solution per problem (not two solutions to a problem)
- c) Easy for the document reader to select the relevant specification

There is no existing mechanism within 802.3 to allow a change of PHY speed without dropping link and renegotiating.

There will be one common control mechanism specified for all speed changes. Speed change and retraining will be specified for each PHY type.

The proposed project will be formatted as a supplement to IEEE Std 802.3, making it easy for the document reader to select the EEE specification.

Technical Feasibility

Fixed part (the questions we must answer)

- a) Demonstrated system feasibility
- b) Proven technology, reasonable testing
- c) Confidence in reliability

The control mechanism will build upon simple, well known protocols that may be implemented in simple, low cost equipment.

The PHY speed change will use the existing capabilities of typical multi-speed PHY implementations.

Energy saving effectiveness and system reliability will be demonstrated through simulation of typical installations and usage as well as detailed review by higher layer networking experts.

Economic Feasibility

Fixed part (the questions we must answer)

- a) Known cost factors, reliable data
- b) Reasonable cost for performance
- c) Consideration of installation costs

The control mechanism will use similar functions to those already included in most Ethernet equipment and therefore will not add any significant cost.

The PHY speed change will use the existing capabilities of typical multi-speed PHY implementations.

The energy savings achieved will result in lower operating costs and increased system reliability.

Next steps

- Entertain presentations and proposals for Task Force objectives
  - Discuss and reach consensus
  - Pass objective motions with overwhelming majority
- Prepare presentations in support of the 5 criteria
  - Starting from CFI justifications, more focused in line with objectives
  - Build consensus around presentations
    - (these will be referred to when discussing the PAR)
- Write specific text for PAR & 5 Criteria
  - Title, Purpose, Scope, Stakeholders
  - + something like the preceding slides ☺

Questions…

… or comments