Broad Market Potential

- Broad set(s) of applications
- Multiple vendors, multiple users
- Balanced cost (LAN vs. attached stations)

Market pressure and legislative action worldwide is demanding improvements in energy efficiency of networked systems. Energy costs are a major component of operating cost. EEE features will be explicitly or implicitly required by a significant fraction of Ethernet edge connections in the future.

Energy consumption and efficiency will become a major factor in the choice of network solutions, especially in data centers. EEE capabilities will be important as Ethernet becomes an enabler for low duty cycle, consumer class applications.

EEE capabilities will enable new system level energy management techniques that will save energy beyond the network interface. EEE will address interface changes required to improve energy efficiency.

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

Compatibility

- IEEE 802 defines a family of standards. All standards shall be in conformance with the IEEE 802.1 Architecture, Management, and Inter-working documents as follows: 802. Overview and Architecture, 802.1D, 802.1Q, and parts of 802.1f. If any variances in conformance emerge, they shall be thoroughly disclosed and reviewed with 802.

  •Each standard in the IEEE 802 family of standards shall include a definition of managed objects that are compatible with systems management standards.

It is expected that Energy Efficient Ethernet will conform with the 802 Overview and Architecture and remain compatible with 802.1D, 802.1Q and 802.1f. The project will work with 802.1 to address any extensions to these standards if required and to encourage their work to take advantage of the features that this project will provide.

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

Incompatibility with legacy PHYs (e.g. operational conditions and media types) will be addressed in terms of market relevance. The proposed standard will include a 10 Mb/s PHY that may not support full 100m of category 3 cable.

Distinct Identity

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

This project will provide capabilities that are specifically for IEEE 802.3 links and IEEE Std 802.3 does not address energy efficiency. For example, there is no mechanism to allow a change of PHY speed without dropping link and renegotiation.

We may introduce specifications to optimize existing PHYs. Where appropriate, these optimized PHYs will only be accessed through EEE.

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

Technical Feasibility

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

Energy efficiency techniques based on reducing capabilities to lower power consumption have been broadly deployed and used. The technology to be utilized in the realization of the EEE PHY will rely heavily on previous 802.3 standards.

The study group expects the proposed standard to use existing PHYs where possible. When necessary to meet the objectives, the proposed standard may include modified PHYs.

The control mechanism will build upon well known simple protocols.

The latency variation introduced by EEE is expected to be transparent to most upper layer protocols. EEE will define control, status, and management so that other protocols can be informed of the state of EEE.

Confidence in the energy saving effectiveness and system feasibility of selected proposals will be demonstrated through simulation of typical applications and usage; in conjunction with input from higher layer networking experts.

Economic Feasibility

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

EEE will not materially impact component or installation costs, and may provide cost savings opportunities.

While EEE is within IEEE 802.3, the creation of EEE provides opportunities for energy savings beyond the PHY, potentially of much greater magnitude than the PHY itself.

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

The energy savings achieved will result in lower operating costs.