Time Synchronization Study Group
5 Criteria

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The 5 Criteria

The DRAFT 5 Criteria and Objective were approved by the TSSG at the September 2009 802.3 Interim.

Updated 11/18/09

Updated 11/19/09 Approved by 802.3 WG

Compatibility slide:

Text in red was deleted; text in blue was added

Broad Market Potential

- **Broad set of applications**
- **Multiple vendors, multiple users**
- **Balanced cost, LAN vs. attached stations**
- Ethernet can be applied in many new applications if a time synchronization capability is added. Audio-Video Bridging is well understood, as it started in 802.3 as the Residential Ethernet SG. Other potential new applications include wireless backhaul, industrial control, and SmartGrid.
- This capability has been available from many vendors on a proprietary basis for some years. Having an interoperable standard will significantly expand the market.
- The introduction of time synchronization protocols will not change the cost balance.

Compatibility

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

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

c) Compatibility with IEEE Std 802.3

d) Conformance with the IEEE Std 802.3 MAC

e) Managed object definitions compatible with SNMP

- As an amendment to 802.3, the proposed project will remain in conformance with IEEE 802.1 Overview and Architecture as well as the bridging standards IEEE Std 802.1D and IEEE 802.1Q, and support of IEEE P802.1AS.
- As an amendment to IEEE 802.3, the proposed project will follow the existing format and structure of IEEE 802.3 MIB definitions by providing a protocol-independent specification of managed objects.
- Time synchronization capable interface DTEs will interoperate with legacy interfaces DTEs, though the time synchronization capability will not be active.
- Support for the time synchronization will be limited to the full-duplex operation mode of the IEEE Std 802.3 MAC.
- The project will include a protocol independent specification of managed objects with SNMP management capability to be provided in the future by an amendment to the yet-to-be-approved IEEE P802.3.1.

Distinct Identity

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

- Ethernet currently has no time synchronization capability. This project does not overlap IEEE 802.1AS, but in fact complements it.
- We will pick a single solution.
- Time synchronization will be defined as an optional extension to existing interfaces and management clauses. There is no other definition of a time synchronization interface and management in 802.3.

Technical Feasibility

- **Demonstrated system feasibility**
- **Proven technology, reasonable testing**
- **Confidence in reliability**
- This functionality has been successfully implemented and demonstrated by numerous parties for a number of years. The technology has been deployed with time synchronization capabilities.
- Laboratory work and existing implementations demonstrate the testability of time synchronization. See Garner, Geoffrey; Johas Teener, Michael; Gelter, Aaron; "New Simulation and Test Results for IEEE 802.1AS Timing Performance", 2009 International IEEE Symposium on Precision Clock Synchronization for Measurement, Control and Communication, October 12-16, 2009, University of Brescia, Brescia, Italy
- Nothing in the project is expected to decrease the reliability of Ethernet.

Economic Feasibility

- **Known cost factors, reliable data**
- **Reasonable cost for performance**
- **Consideration of installation costs**
- The cost, reliability and performance are well understood
- Time synchronization will require a small number of additional logic elements to provide the necessary information to the interface.
- This project will not affect the installation cost of Ethernet.