Residential Ethernet Study Group
Opening Plenary Report
IEEE 802.3
Atlanta, GA
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(acting for Steve Carlson, RESG chair)

January Interim

- Introduction to IEEE Standards Process and operation of IEEE 802.3 WG and SG.
- 22 individuals from 8 organizations
- Goal for the Week
  - PAR and Five Critera
  - Review objectives
  - Presentations
- Created ad hoc on tutorial

Presentations

- "Range of Applications for Residential Ethernet", Eric HS Ryu - Samsung Electronics
- "Residential Ethernet (access control considerations)”, Alexei Beliaev - Gibson, George Claseman - Micrel, Tom Dineen - Dineen Consulting, David James - JGG & Michael Johas Teener - Plumblinks
- "MPCP Model for ResE", Onn Haran - Passave & Glenn Algie - Nortel

Objectives
(Nov 17, 2004)

- Auto-configuration of MAC/PHY e.g., auto-negotiation, Auto MDI
- A mechanism to request/grant/assign resources and the default rule(s) for managing the resources (e.g., 802.3ah MPCP)
- Support both isochronous and best-effort traffic simultaneously, with some bandwidth reserved for best-effort traffic.
- Isochronous traffic only supported over 100Mb or greater full-duplex
- Isochronous traffic is not disrupted when any station/session is added or removed from the network
- Bounded maximum delay isochronous traffic (2ms end-to-end through network; 250us maximum through 1 hop; values to be validated in TF)
- Low jitter and approaching zero wander
- Network provides “house” clock for application synchronization within 5us.
- Based on existing 802.3 PHY(s)
- Supports IEEE 802.3 Power Over Ethernet

Objectives
(Nov 17, 2004)

- **Adopted by RESG straw poll November 17, 2004 (4:27pm)**

Y: 25 N: 0 A: 4

NOTE: Following items are deemed desirable, but are out of scope for 802.3.

- **Isochronous bridging to 802.11**
- **Isochronous bridging to 802.15.3**
- **Isochronous bridging to IEEE1394**
- **Compatible with 802.1q**
- **No isochronous frames dropped, bandwidth is reserved**
- **The default policy is first-come, first-served by request**
- **Network will automatically reclaim allocated but unused resources**
- **Support arbitrary topologies within reasonable limits (802.1D)**

Residential Ethernet

5 Criteria

From 802.3 Operating Rules v5.5 July 2003
Note: "*" means further refinement is expected

Broad Market Potential

Broad set(s) of applications

Multiple vendors, multiple users

Balanced cost (LAN vs. attached stations)

- **"Residential Ethernet" networks represent a new and very broad application space for Ethernet. The digital networking port* on consumer electronics (96 billion USD in 2003) equipment has not yet been decided, and 802.3/Ethernet has a strong possibility of being the dominant, long-term solution of choice if it also provides isochronous services.**

- **At the RE Study Group meetings, individuals from companies representing component suppliers, equipment 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.**

***NOTE: 174 million ports in 2004; 2008 - 458 million; growth rate 21%, 50/50 wireless/wireline (3rd. Party Research)**

Compatibility with IEEE Std. 802.3

Conformance with CSMA/CD MAC, PLS

Conformance with 802.2

Conformance with 802.1D, 802.1Q, and 802.1F* (Not in Rules v 5.5)

Conformance with 802 Functional Requirements

- **As an amendment to IEEE Std 802.3, the proposed project will remain in conformance with the 802 Overview and Architecture with the expected augmentation of the MAC service interface to support timing synchronization and isochronous traffic.**
- **As an amendment 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 an amendment to IEEE Std 802.3 the proposed project may require minimal augmentation of existing MAC specifications and will use existing PHYS utilizing full-duplex mode.**
- **As an amendment to IEEE Std 802.3, the proposed project will follow the existing format and structure of 802.3 MIB definitions.**

Distinct Identity

Substantially different from other 802 and 802.3 specifications / solutions

Unique solution for problem (not two alternatives / problem)

Easy for document reader to select relevant spec.

- **There is no existing 802.3 standard or approved project that provides isochronous delivery with low-latency, low-jitter and guaranteed bandwidth.**

- **The proposed project will be formatted as an amendment to IEEE Std 802.3, making it easy for the document reader to select the RE specification from within 802.3.**

Technical Feasibility

Demonstrated feasibility; reports – working models

Proven technology, reasonable testing

Confidence in reliability

- **Ethernet systems (comprising interface controllers, bridges, routers, management systems, and other devices) represent the most widely deployed networking technology in history. The proposed project will build on the vast array of Ethernet component and system design experience, and the broad knowledge base of Ethernet network operation.**
- **The proposed project will, to the extent possible, re-use specifications developed by 802.3 and develop any new access control augmentations in accordance with the rigorous standards of proof applied to 802.3 projects. These augmentations will not involve significant added complexity. Time-sensitive services are already present in other common technologies, e.g. IEEE 1394.**
- **The reliability of Ethernet components and systems can be extrapolated in the target environments with a high degree of confidence.**

Economic Feasibility

Cost factors known, reliable data

Reasonable cost for performance expected

Total installation costs considered

- **The cost factors for Ethernet components and systems are well known. Ethernet consistently demonstrates the most attractive cost/performance ratio of any networking technology, at any operating speed. This fact is well established in the current networking application space.**
- **Adding Residential Ethernet services will have a negligible impact on the current cost of an Ethernet port.**
- **This project may improve on general cost/performance, due to the significantly higher volumes in the consumer electronics/residential application space.**
- **Installation costs, as well as maintenance and operations costs, should be reduced when compared to competing technologies through a combination of simpler, more reliable configurations and a more optimal system architecture.**

Straw Poll

The RESG accepts the draft 5 Criteria (re_critters_012505.pdf).

Y: 21 N: 0 A: 3

Residential Ethernet

Draft PAR
January 25, 2005

Title (4)

Draft: Information technology -- Telecommunications and information exchange between systems -- Local and metropolitan area networks -- specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Amendment: Enhancements for Digital Media Applications in Residential Networks

PAR Scope (13)

This project will provide time-sensitive delivery of data transmissions between synchronized end points over existing point-to-point full-duplex PHYS on a plug-and-play basis.

Support of such time-sensitive data transmissions may use admission control negotiations to guarantee bandwidth allocations with predictable latency, low-jitter delivery and clock synchronization.

PAR Scope (13)

Is the completion of this document contingent upon the completion of another document? Yes

This PAR includes work on independent capabilities, and some of the work is not contingent on another project. The complete capabilities and benefits envisioned in Ethernet networks through Residential Ethernet capabilities will include both 802.3 and 802.1 work. Serialization of the projects would unnecessarily delay market introduction of the capabilities.

PAR Purpose (14)

This project will allow Ethernet to support the requirements of consumer electronics devices in the transport of digital media.

PAR Reason (15)

"Residential Ethernet" networks represent a new and very broad application space for Ethernet. The digital networking port* on consumer electronics (96 billion USD in 2003) equipment has not yet been decided, and 802.3/Ethernet has a strong possibility of being the dominant, long-term solution of choice if it also provides isochronous services.

***The overall market for home networking semiconductors will grow 12% per year from 2004 to 2008, moving from $1.34 billion in the beginning of the forecast to $2.32 billion at the end of the forecast. This growth will come despite decreasing prices on a per unit basis, as the average price for a home networking IC will decline from $8 in 2004 to $5 in 2008. This increase in revenues despite downward pressure on pricing shows how the overall unit momentum throughout the forecast period will create a "rising tide" for the connected home silicon market (the market will go from 174 million ICs shipped in 2004 to 458 million in 2008). - Instat**

Goals for this meeting

- Presentations addressing the objectives
- Refine Five Criteria and PAR
- Continue 802.1/802.3 layering explorations
- Determine whether the SG should be extended

Reflector and web

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to

ListServ@ieee.org

Residential Ethernet Study Group web page URL:

http://www.ieee802.org/3/re_study/

Future Meetings

- Co-locate with IEEE 802.1 Interim Meeting, May, 2005, ???
- IEEE 802 Plenary Meeting, July 2005, San Francisco, CA