

**IEEE 802.3
Congestion Management
Study Group November
Plenary Report**

**San Antonio, TX
15-18 November, 2004**



Summary

- Met with 802.1 to discuss joint work
- Held tutorial
- Reviewed presentations regarding Telco provider requirements and simulation results
- Discussed future plans



802.1 comments

- L2+ bridges already violate the layer stack and set congestion indication bits in the IP header
- It may be easier for vendors to do this with new protocols than for 802.1 to create an L2 tag
- Are TCP & IP the only market-worthy protocols?
- Are there other protocols in backplanes, data centers, clusters, etc. that don't have congestion indication marking capability?
- What new market-worthy protocols might come into existence by adding an L2 tag




Tutorial comments

- Market requirements – Gopal Hegde, Intel & Shashank Merchant, Nokia
- Distinct identity & joint work between 802.3 and 802.1 – Hugh Barrass, Cisco
- Technical feasibility / modeling data – Manoj Wadekar, Intel
- Tornados resulted in lighter attendance than anticipated



802.3 CMSG motion to approve & forward

- Move that the congestion management study group request 802.3 approve the congestion management objectives, per objectives_0904.pdf, individually approve the congestion management 5 criteria per critters_0904.pdf, and forward the congestion management criteria to the 802 SEC for approval, and approve the congestion management PAR, per par_0904.pdf and as modified in response to 802.1 and 802.17 comments, and forward the PAR to the 802 SEC and NesCom for approval (please consider for approval under continuous process)
- M: Larry Rubin
- S: Hugh Barrass
- All : Y: 10 N: 0 A: 1
- Technical: (≥75%) Passes/Fails



Today's plans

- Present objectives, 5 Criteria, & PAR and request their approval and any necessary forwarding to SEC and NesCom
- Request extension of the study group in the case that NesCom approval comes later than the scheduled interim



802.3 motion

CMSG objectives

- Move that 802.3 approve the congestion management objectives, per objectives_0904.pdf
- M: Ben Brown
- S: David Law
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 30 N: 3 A: 25
- Passes



Objectives

- Specify a mechanism to support the communication of congestion information
- Specify a mechanism to limit the rate of transmitted data on an Ethernet link
- Preserve the MAC/PLS service interfaces
- Minimize throughput reduction in non-congested flows



802.3 motion

CMSG Broad Market Potential

- Move that 802.3 approve the congestion management criteria Broad Market Potential, per critters_0904.pdf
- M: Ben Brown
- S: Brad Booth
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 30 N: 0 A: 19
- Passes



Broad Market Potential

Broad set(s) of applications

Multiple vendors, multiple users

Balanced cost (LAN vs. attached stations)

- **Ethernet networks are being used in an increasing number of application spaces (clustering, backplanes, storage, data centers, etc.) that are sensitive to frame delay, delay variation and loss. Study Group presentations have shown that Ethernet networks can experience higher throughput, lower delay, and lower frame loss by performing congestion management. This will improve Ethernet in its growing number of applications.**
- **During the discussion of the WG 802.3 motion to initiate this study group, 23 people from 16 companies indicated that they plan to participate in the standardization effort for congestion management. This level of commitment indicates that a standard will be developed by a large group of vendors and users. During the study group meetings, there have been up to 30 people from at least 16 companies in attendance.**
- **A standard to support congestion management will respect the balance of cost between LAN and attached stations.**



802.3 motion

CMSG Compatibility

- Move that 802.3 approve the congestion management criteria Compatibility, per critters_0904.pdf
- M: Ben Brown
- S: Brad Booth
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 24 N: 2 A: 17
- Passes



Compatibility with IEEE Std 802.3

Conformance with CSMA/CD MAC, PLS

Conformance with 802.2

Conformance with 802

- The proposed standard will conform to the 802.3 MAC, and therefore will be consistent with 802.1d, 802.1Q, and relevant portions of 802.1f.
- As was the case in previous 802.3 standards, additional MAC Control sublayer functionality and MAC Control frame opcodes may be defined.
- The proposed standard will conform to the 802.3 MAC Client Interface, which supports 802.2 LLC.
- The proposed standard will conform to the 802.1 Architecture, Management and Internetworking.
- The proposed standard will define a set of systems management objects, which are compatible with OSI and SNMP system management standards.
- The proposed standard will conform to the requirements of IEEE Std 802-2001.



802.3 motion

CMSG Distinct Identity

- Move that 802.3 approve the congestion management criteria Distinct Identity, per critters_0904.pdf
- M: Ben Brown
- S: Richard Brand
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 29 N: 1 A:17
- Passes



Distinct Identity

Substantially different from other 802 & 802.3 specs

One unique solution for problem

Easy for document reader to select relevant spec

- **The current 802.3 standard specifies a means of flow control using PAUSE. While this can decrease the frame loss due to oversubscription, the periods of no data transmission result in increased delay in the Ethernet link. The use of PAUSE as back pressure can result in congestion spreading and therefore it is rarely used.**
- **Congestion management, when used, may reduce the offered load at the congestion points without spreading congestion. This specification will define a means of decreasing frame loss while permitting increased efficiency in the Ethernet network.**
- **The specification will be done in a format consistent with the IEEE document requirements thus making it easy for implementers to understand and to design.**



802.3 motion

CMSG Technical Feasibility

- Move that 802.3 approve the congestion management criteria Technical Feasibility, per critters_0904.pdf
- M: Ben Brown
- S: Steve Carlson
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 28 N: 0 A: 21
- Passes



Technical Feasibility

Demonstrated system feasibility
Proven technology, reasonable testing
Confidence in reliability

- **Mechanisms for congestion management using congestion indication are known in the industry for some protocols and standards. Simulations of similar protocols show there are alternatives that can be feasibly implemented to accomplish the objectives within IEEE 802.**
- **The inclusion of congestion indication in layer 2 devices was anticipated in RFC 3168 “The Addition of Explicit Congestion Notification (ECN) to IP”.**
- **Rate control is commonly implemented in Ethernet devices.**



802.3 motion

CMSG Economic Feasibility

- Move that 802.3 approve the congestion management criteria Economic Feasibility, per critters_0904.pdf
- M: Ben Brown
- S: David Martin
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 27 N: 0 A: 21
- Passes



Economic Feasibility

Cost factors known, reliable data
Reasonable cost for performance
Total installation costs considered

- **Possible solutions investigated for technical feasibility do not add significant complexity to Ethernet devices.**
- **Congestion management standardization will increase the broad market potential of Ethernet which will increase deployment and further reduce cost.**
- **System design, installation and maintenance costs are minimized by utilizing Ethernet system architecture, management, and software.**



802.3 motion

CMSG PAR approval

- Move that 802.3 approve the congestion management PAR, per par_0904.pdf and as modified in response to 802.1 and 802.17 comments, and forward the PAR and 5 Criteria to the 802 SEC and NesCom for approval
- M: Ben Brown
- S: Richard Brand
- Technical: ($\geq 75\%$)
- 802.3 Voters: Y: 36 N: 1 A: 15
- Passes



PAR title

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 Congestion Management



PAR scope

To specify IEEE 802.3 MAC parameters and minimal augmentation of MAC operation and management parameters of IEEE Std 802.3 to provide rate control and support of IEEE 802 congestion management.



PAR purpose (14)

This project will enable accelerated deployment of Ethernet into emerging limited-topology applications that require improved delay, delay variation and frame loss characteristics.



PAR reason (14a)

Ethernet networks are being used in an increasing number of application spaces (clustering, backplanes, storage, data centers, etc.) that are sensitive to frame delay, delay variation and loss.

Study Group presentations have shown that Ethernet networks can experience higher throughput, lower delay, and lower frame loss by performing congestion management. This will improve Ethernet in its growing number of applications.




802.3 CMSG motion to modify PAR scope

- Change first instance of “MAC” to “Media Access Control (MAC)”
 - Change answer to question to Yes
 - This PAR includes work on independent capabilities, and some of the work is not contingent on another project. This PAR is being launched to match the anticipated completion of work to be done within 802.1. The complete capabilities and benefits envisioned in Ethernet networks through Congestion Management capabilities will include both 802.3 and 802.1 work. Serialization of the projects would unnecessarily delay market introduction of the capabilities. If 802.1 work is not completed for the cooperative efforts or the progress would unnecessarily delay either the non-dependent or dependent capabilities also included in this PAR, the work will be split into two PARs.
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- M: Hugh Barrass
 - S: Larry Rubin
 - All Y: 13 N: 0 A: 0



802.3 CMSG motion extension

- Move that the congestion management study group request 802.3 extend the congestion management study group
- M: Larry Rubin
- S: Manoj Wadekar
- All: Y: 11 N: 0 A: 0
- Technical: ($\geq 75\%$) Passes/Fails



802.3 Motion CMSG Extension

- Move that 802.3 extend the congestion management study group
- M: Ben Brown on behalf of the study group
- S: N/A
- Procedural: ($\geq 50\%$)
- 802.3 Voters:
- Passes by acclamation



Future plans

- January interim with 802.1 in Sacramento during the week of January 10
- Continue to work with 802.1
- Consider technical proposals for rate limiting



Thank you!