



Gandalf Overview and Comparison

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Supporters



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Gandalf Overview

- This presentation provides an overview of the MAC features and a comparison of these features versus the previous Alladin draft.
- N different organizations participated through conference calls and comment resolution methods on the draft
- Gandalf proposes a number of compromises on some of the more contentious issues facing 802.17
 - deeply held beliefs on both sides require a certain amount of dual mode operation in the MAC for progress to be made
 - allows people to optimize cost for performance



Frame Format

- Frame format is similar to the previous contribution but ...
- Addition of a steering only data packet
- Addition of an In/Out_of_Profile bit
- Addition of a HEC protecting from the start of frame through the Type field



Passthru Path Design

- Base case for the standard is either one of
 - Dual Passthru buffers – store and forward (SF) operation
 - Single Passthru buffer – SF or cut through (CT) operation
 - PB is the same size as the HP buffer in the dual case
- Fairness Algorithm operates well
 - Dual PB design at 100% utilization
 - Single PB design at 90-95% utilization
 - In mixed rings single PB nodes are not disadvantaged
- Advantages of single buffer
 - Slightly reduced complexity in transmit path
 - Slight reduction in cost



Passthru Path Design



- Advantages of dual buffer
 - better high priority jitter and latency
 - low priority buffer virtually eliminates blockage of HP transmit traffic
 - ability to fully utilize all link BW
 - no requirement to limit utilization to 90%
 - simple node based fairness algorithm
 - low priority PB able to absorb burst behavior – provides greater utilization
 - cost of PB memory not a real system concern
 - cut through operation not really required except at very low speeds



Fairness Algorithm



- Fairness method has many extensions not possible with “classic” SRP
 - scalable to large ring sizes and number of nodes
 - Pre-provisioned High Priority traffic
 - Limit fairness to X% of ring BW
 - Set using management system
 - Good Latency / Jitter whether HP is provisioned or not
 - Weighted Fairness
 - Multi-Choke Point operation for VOQ support



Fairness Algorithm

- Fairness method has many extensions not possible with “classic” SRP
 - Medium priority profiler / traffic marker
 - BW used to communicate rate information minimized
 - backwards, hop-by-hop propagating message
 - message only travels as far as necessary
 - Tolerant to lost messages



Fairness Algorithm

- Simulations have shown it operates well with both single and dual PB designs
 - allows homogeneous systems to operate well
 - cost “difference” is an implementation choice
 - allows interoperation of single and dual systems
- Simulation comparison to Alladin proposal not available
 - we simulated a simple scenario on the Alladin model provided
 - as a courtesy the results were provided to Alladin group for comment
 - Alladin group informed us the current simulator has bugs



Protection

- Baseline of standard supports either wrapping or steering
 - heterogeneous rings support wrapping (SWIS)
 - packets can be designated steer only
- Wrapping provides fastest response to failure
 - no need to communicate with all other stations for corrective action
 - lowest packet loss
 - no special cases for multicast packets
- Steering does not require a “Mate” link
 - simpler HW
 - not an issue for a dual ringlet MAC chip
- Steering re-optimizes traffic flow
 - steering following wrap can do the same



Physical Layer

- Media independent MAC
 - reconciliation layers provide MAC <-> PHY translations
- SONET PHYs include
 - POS
 - GFP
 - optional behavior for MAC to provide length to GFP framer
 - many framers support length calculation
 - additional queueing delay not a real concern above OC-12
- Ethernet PHYs include
 - 1 GB and 10 GB
 - IPG, preamble, frame delineation are reconciliation layer functions



Conclusions

- Gandalf
 - meets objectives set by 802.17 WG
 - allows system vendors to trade off various cost points and system design considerations
 - PB, Protection
 - will enable rapid time to market for standard product silicon