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SpaceWire Hot Modules

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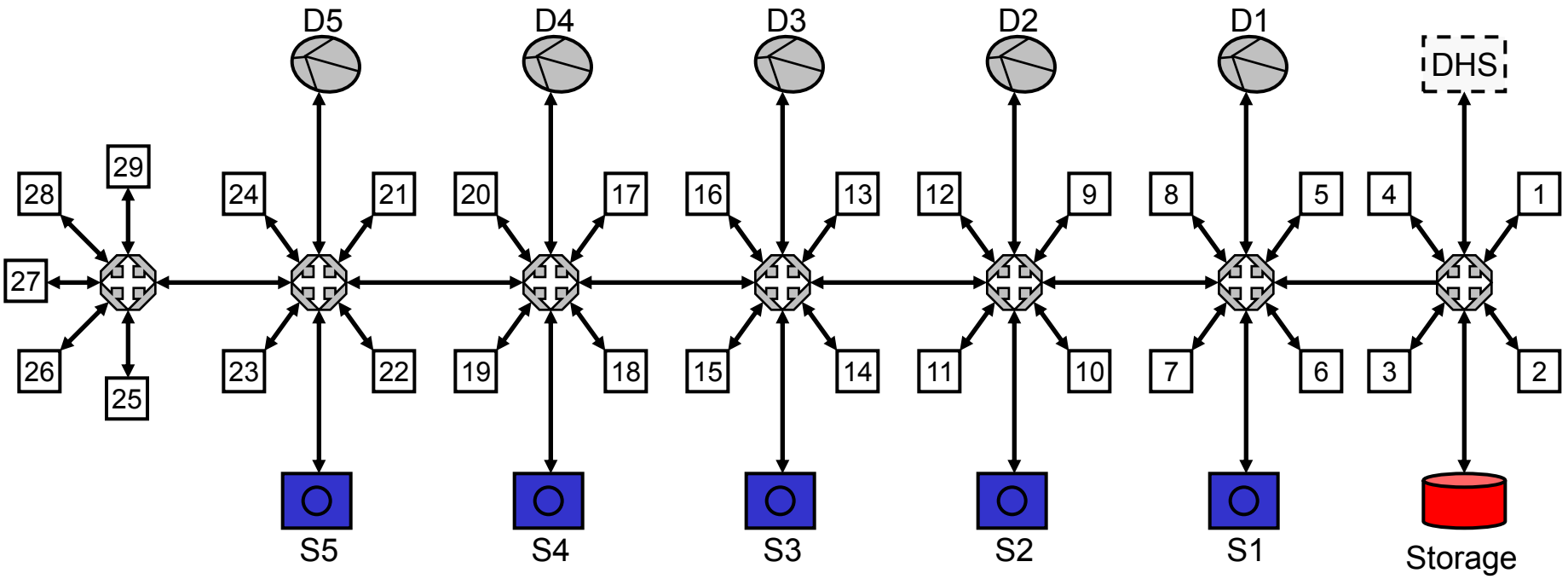
Hot Module

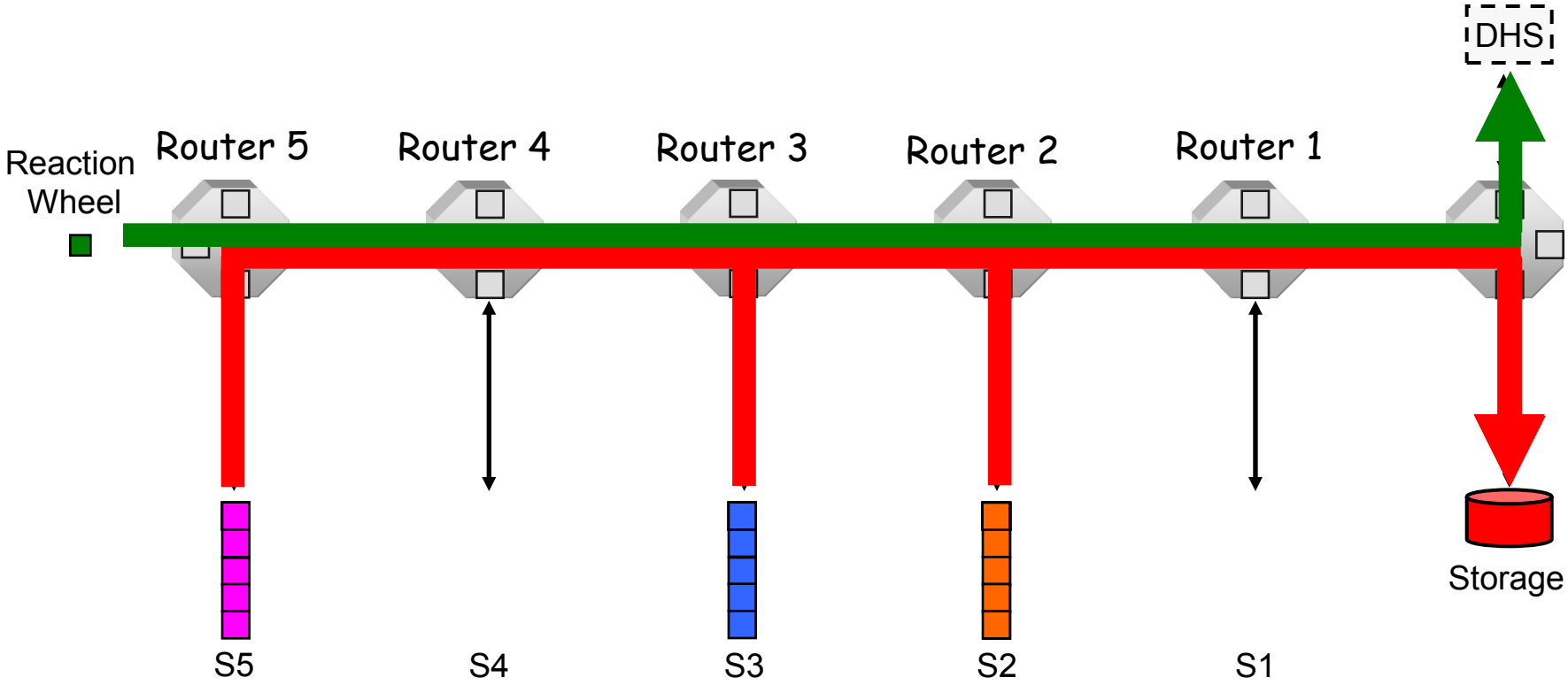
- An end unit may receive heavy traffic from several sources
- The heavy load congests the network
  - Blocks other (light) traffic
- Enhancing the network will not help
  - Problem is with the end unit, not the network
- Such unit is a **HOT MODULE**

Example network



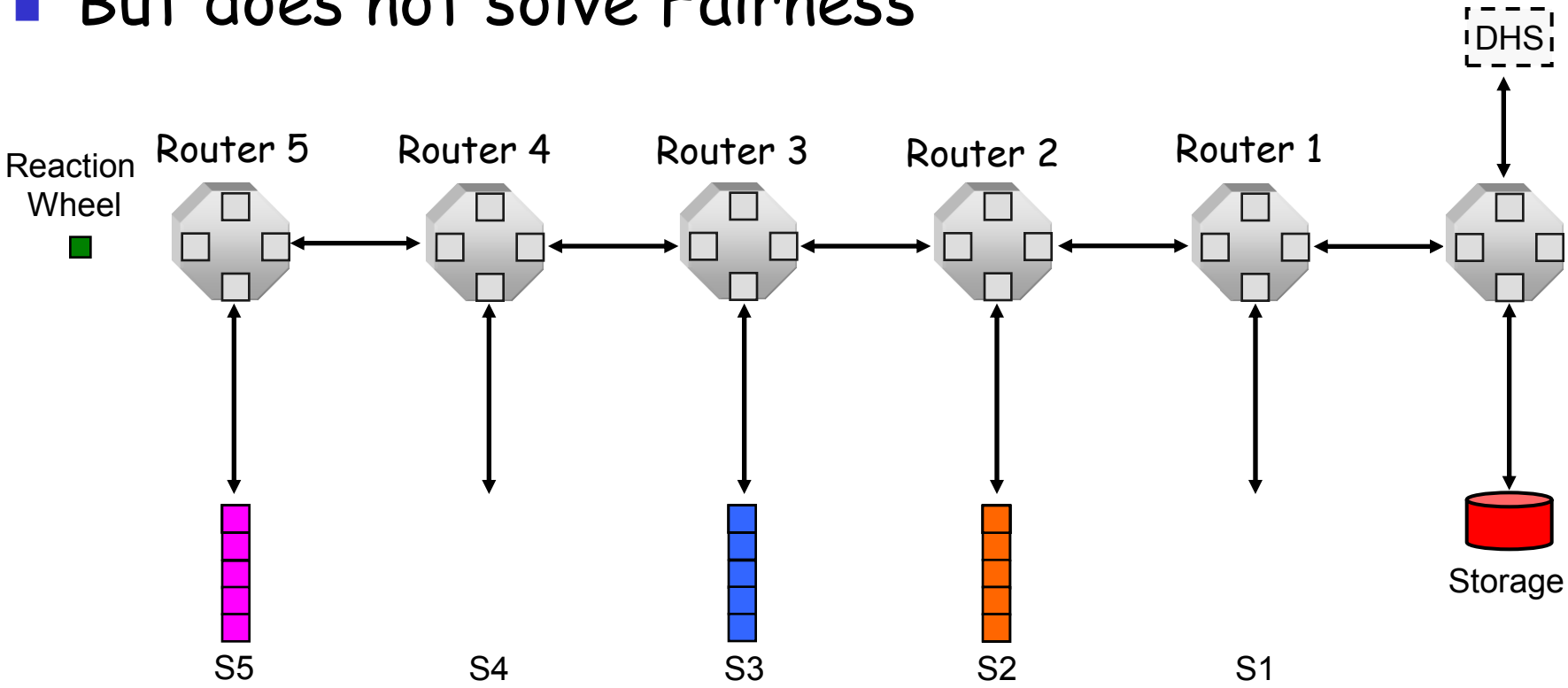
Two main problems

- System Performance
- Source Fairness



Solution #1

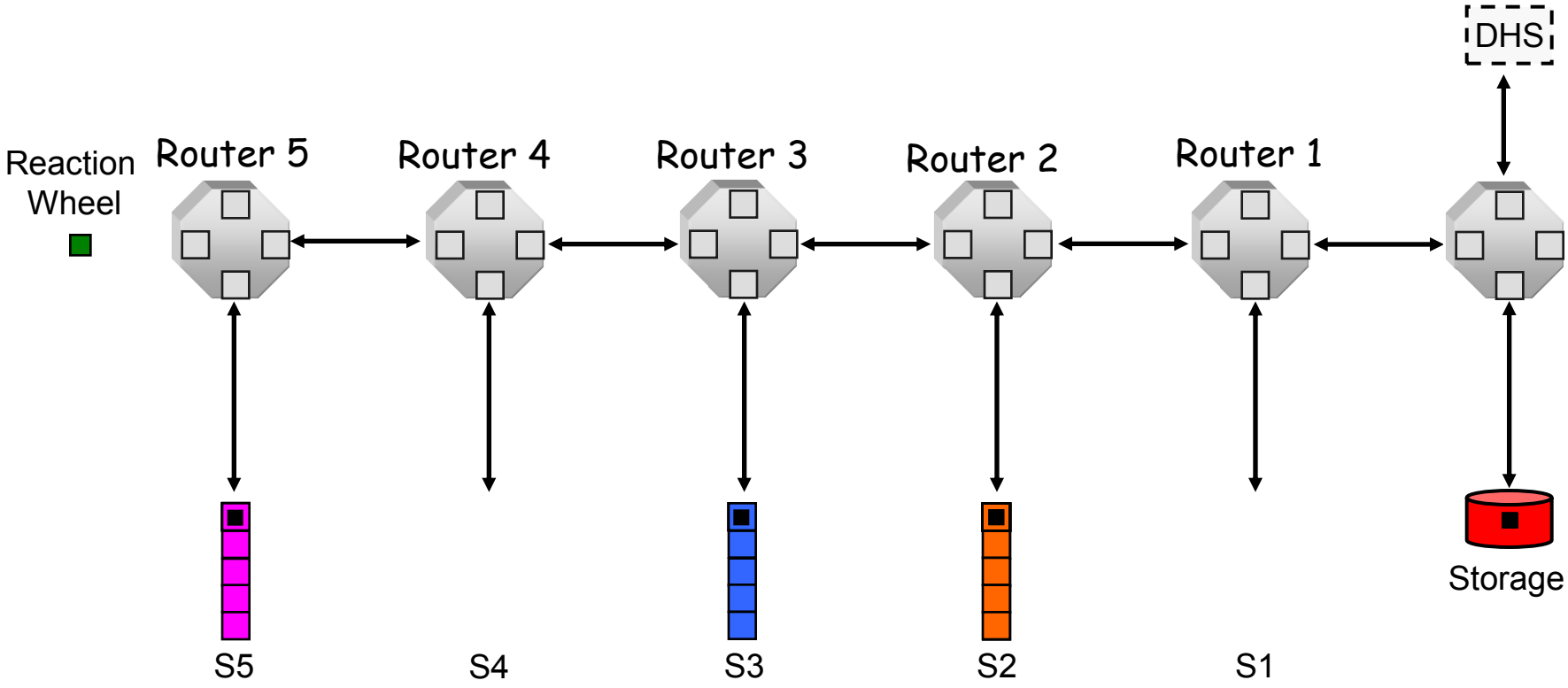
- Use Packet Level Priority (PLP)
- Assign low priority to packets that are traveling to the Hot Module
- Improves System Performance
- But does not solve Fairness



Solution #2

- Problem: traffic sent to Storage (Hot Module), congesting the network
- Introduce Credits:
  - Before sending to Hot Module, ask for credit
  - No need to modify routers

Credits Improve Performance & Fairness

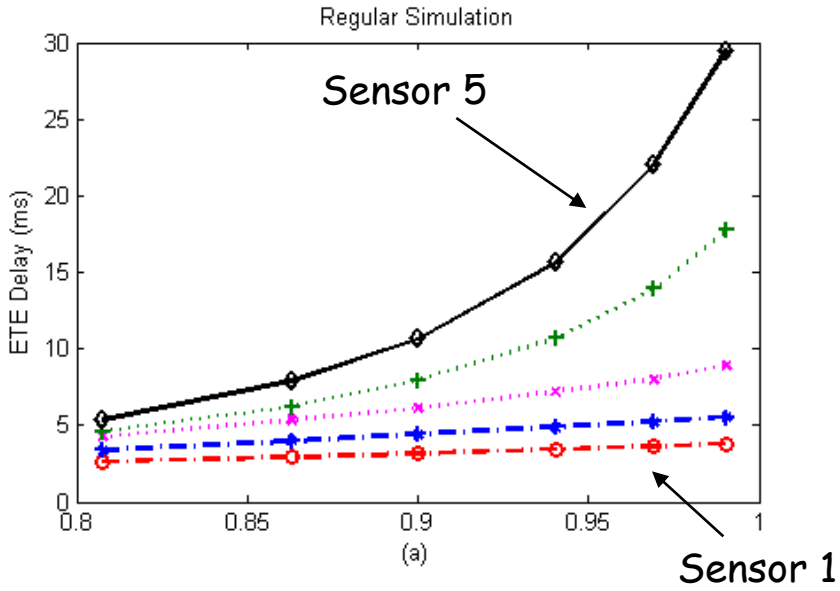


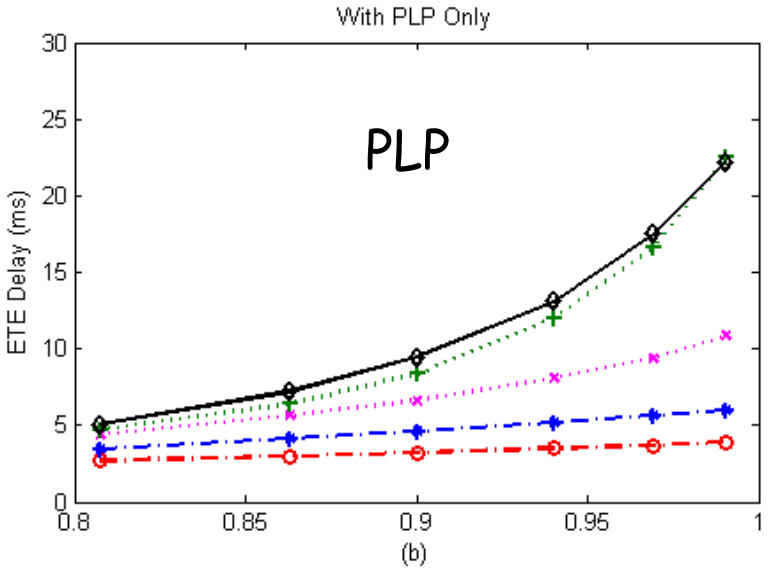
- Improves System Performance
- Solves Fairness

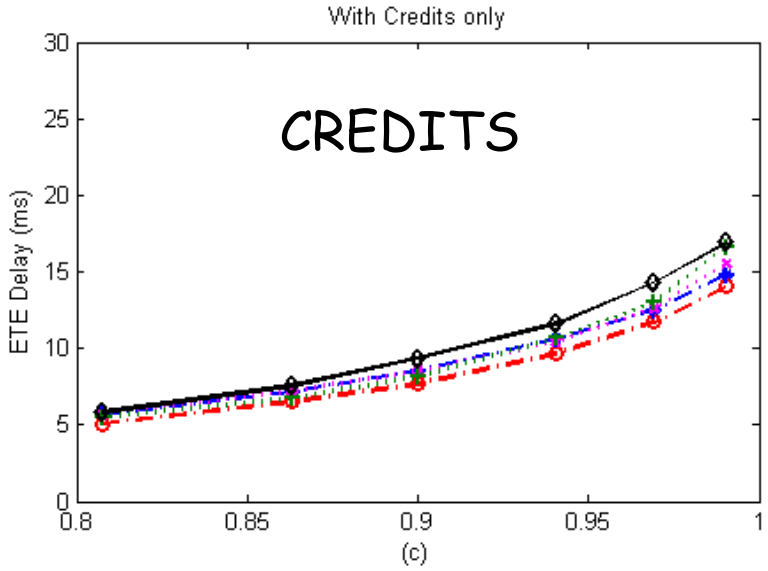
Simulations

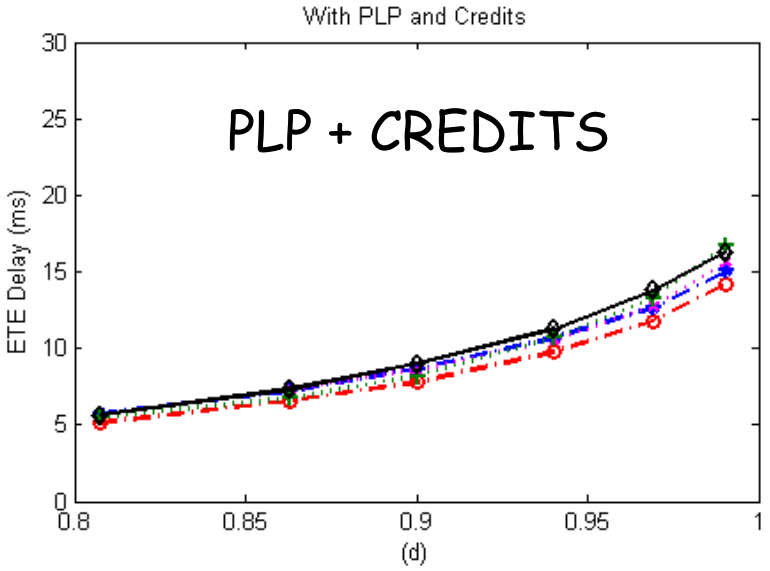
- Use our new SpW simulator and benchmark
- No more than 2 Sensors have credits at a time

Traffic to Hot Module

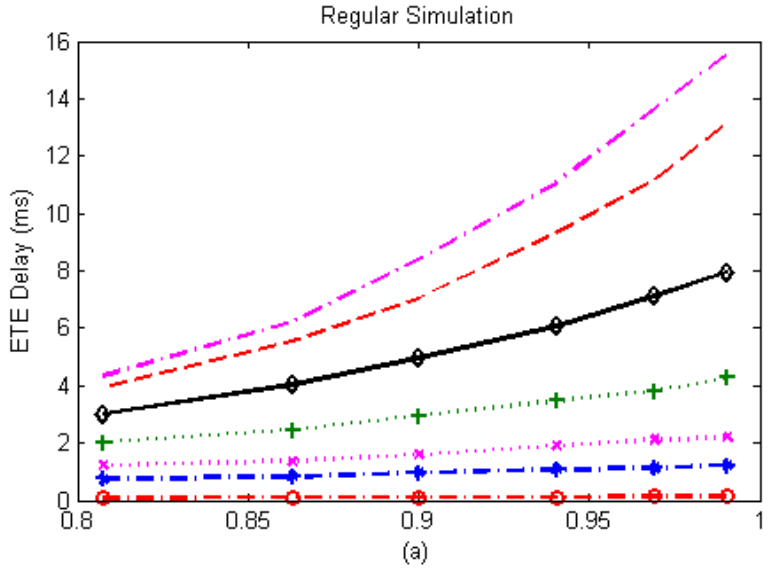


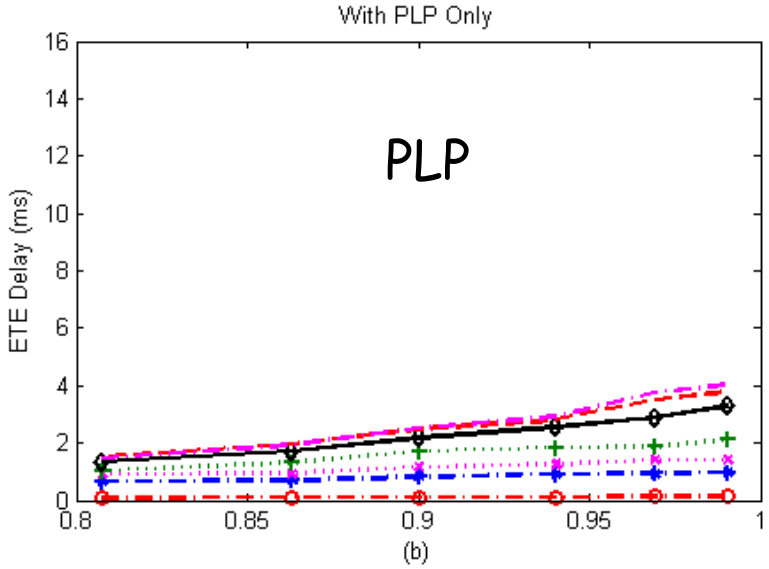


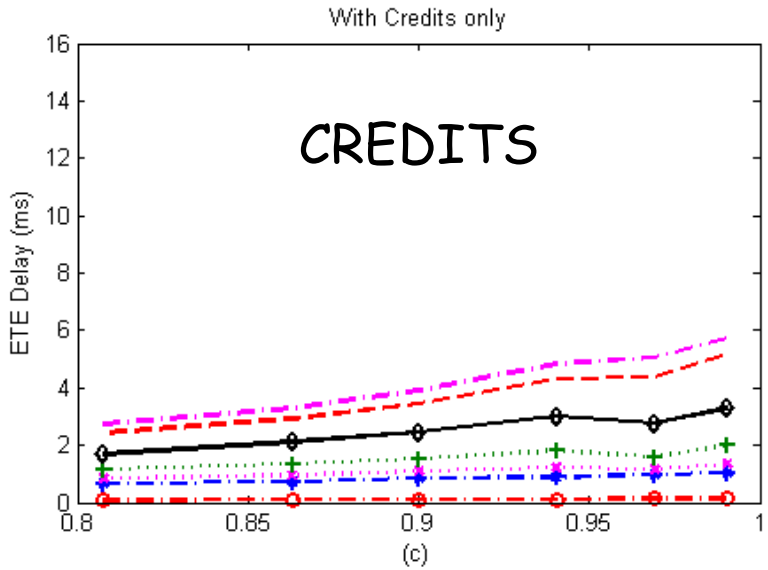


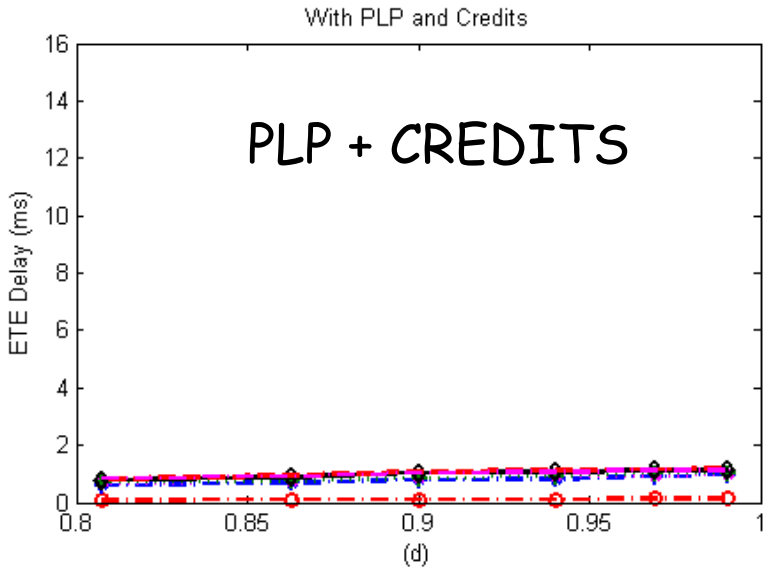


Traffic to DHS (non-Hot-Module)









Conclusions:

- Hot Modules incur two effects
  - Source Fairness
    - Solved using Credits
  - Performance
    - Improved using PLP and Credits
- Using PLP + Credits yields the best results