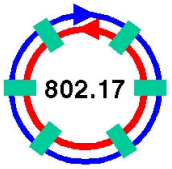

Weighted Fairness Performance Scenarios

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Background

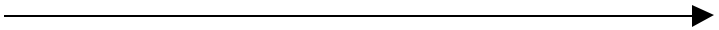
- **RAH/FAH adhoc decided that it would be beneficial to have an annex with scenarios that may have fairness/performance issues**
- **Only some of these scenarios are presented here, others are in annex J**
- **Can be used as implementation guidelines**

Objectives

- **Identify scenarios that may have fairness/performance implications**
- **Show the ideal target for a fairness mechanism**
- **Show the effect of not having a fairness mechanism as well as potential fairness problems**

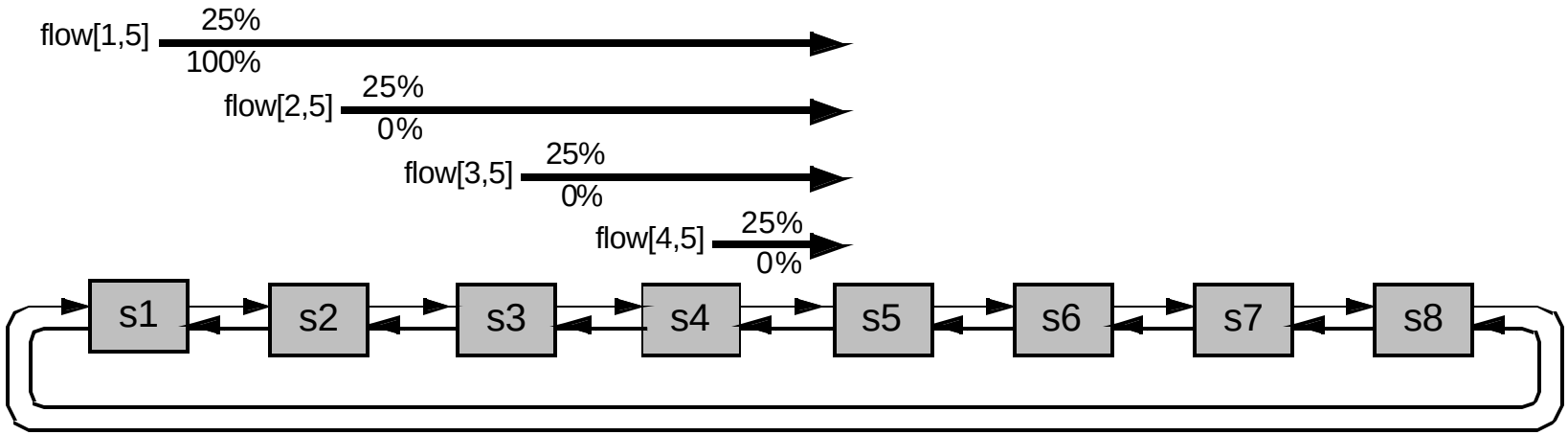
Convention Used

Ideal Target



Potential problem

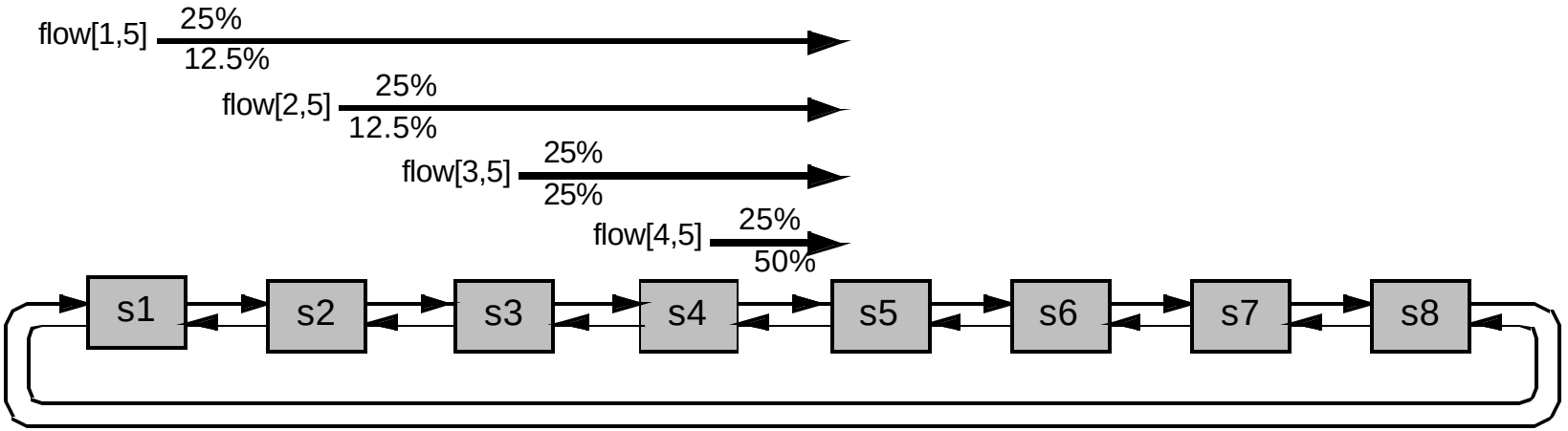
Parking Lot Scenario #1



Parking Lot Scenario #1 ...

- **Concern:**
  - **Station #1 consumes total BW**
- **Solution:**
  - **Throttle upstream node using fairness control messages**
- **Applicable:**
  - **Addressed by single choke and multi-choke fairness algorithms**

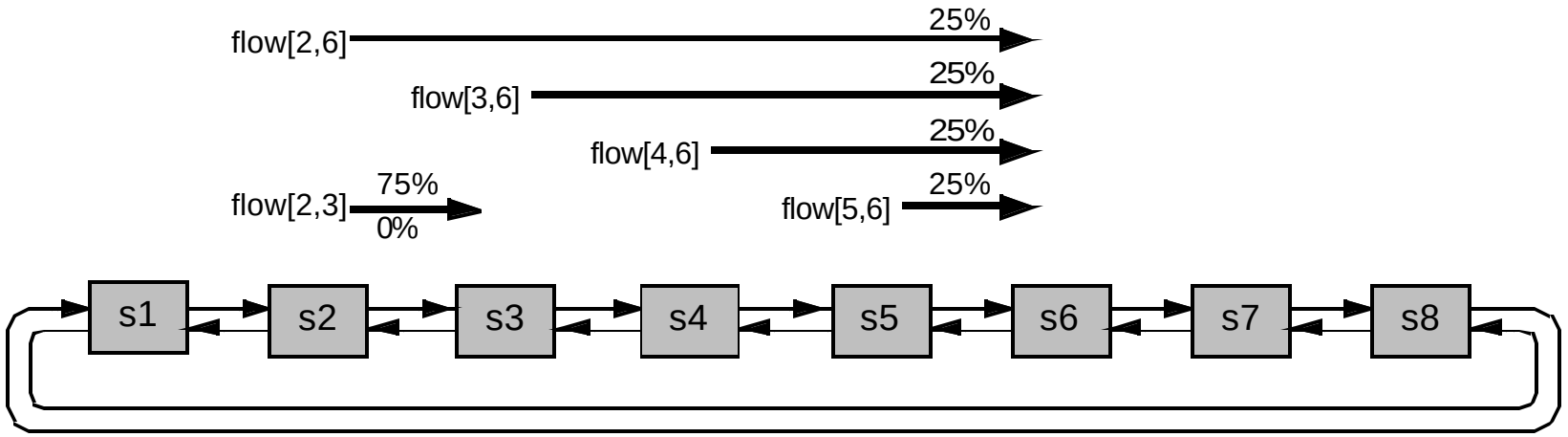
Parking Lot Scenarios #2



Parking Lot Scenario #2 ...

- **Concern:**
  - **Station #1 is overly restricted**
- **Solution:**
  - **Have fairness algorithm divide BW evenly between upstream stations**
- **Applicable:**
  - **Addressed by single choke and multi-choke algorithms**

Parallel Parking Lot

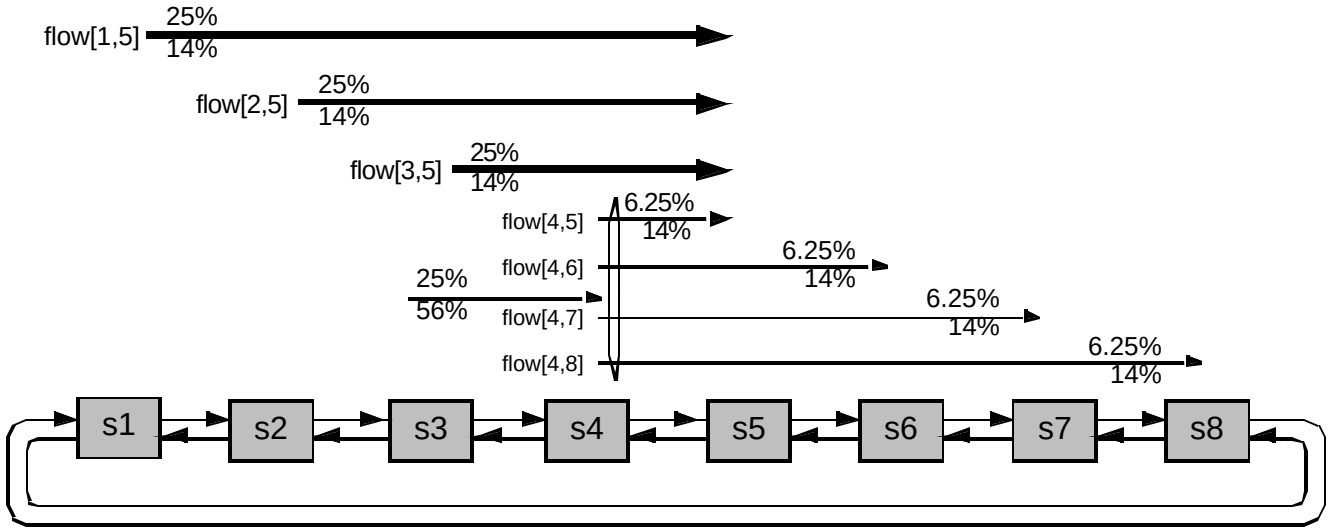


Parallel Parking Lot ...

- **Concern:**
  - **Flow [2,3] is restricted by congestion on link [5,6]**
- **Solution:**
  - **Have fairness algorithm provide congestion info and hop-count to congestion point**
  - **Provide support for VDQ for various hop-count distances**
- **Applicable:**
  - **When hop count is not reported**
  - **Addressed by single choke and multi-choke algorithms with VDQ**

Multi-flow Parking Lot

- **Illustrates support of weighted fairness with aggregate flows**

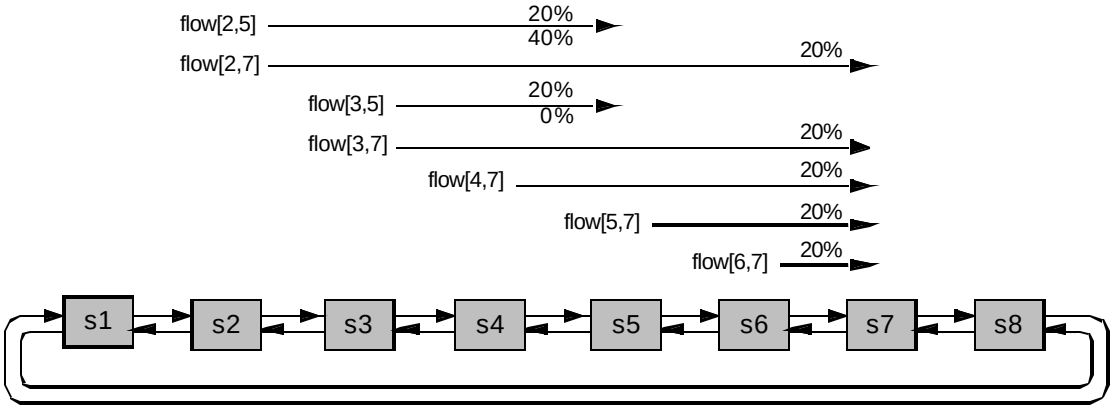


Multi-flow Parking Lot ...

- **Concern:**
  - **Flows from node 4 get more than 25% BW which conflicts with source-based fairness**
- **Solution:**
  - **Have fairness algorithm provide source-based fairness**
- **Applicable:**
  - **Addressed by single choke and multi-choke algorithms**

Dual Exit Parking Lot

- **Illustrate effect of having multiple choke points on the ring**

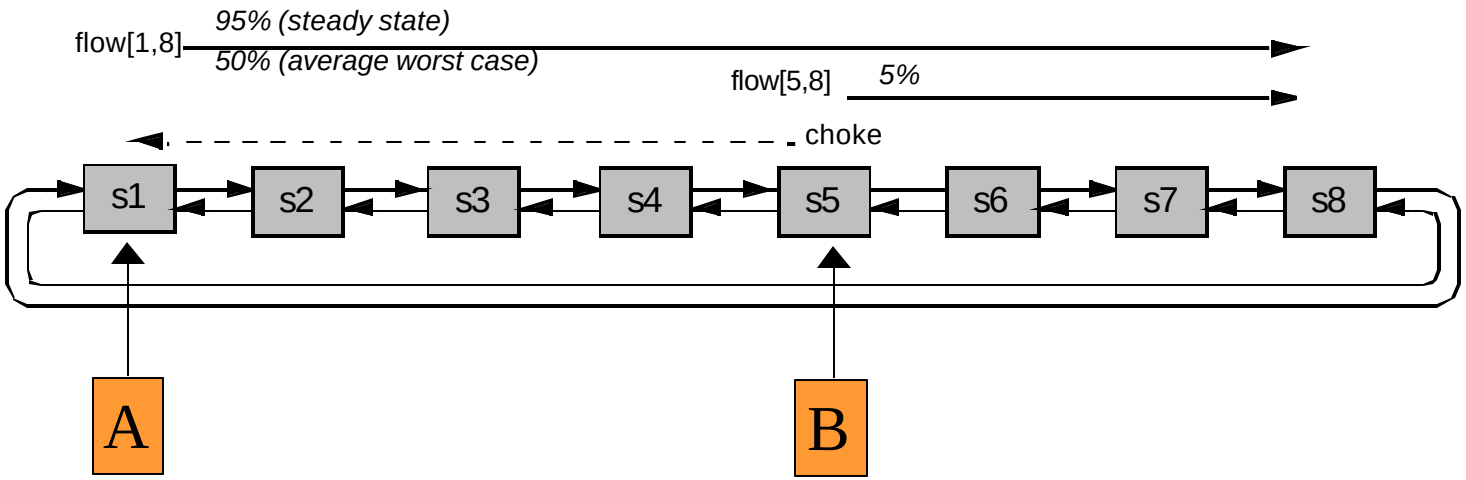


Dual Exit Parking Lot ...

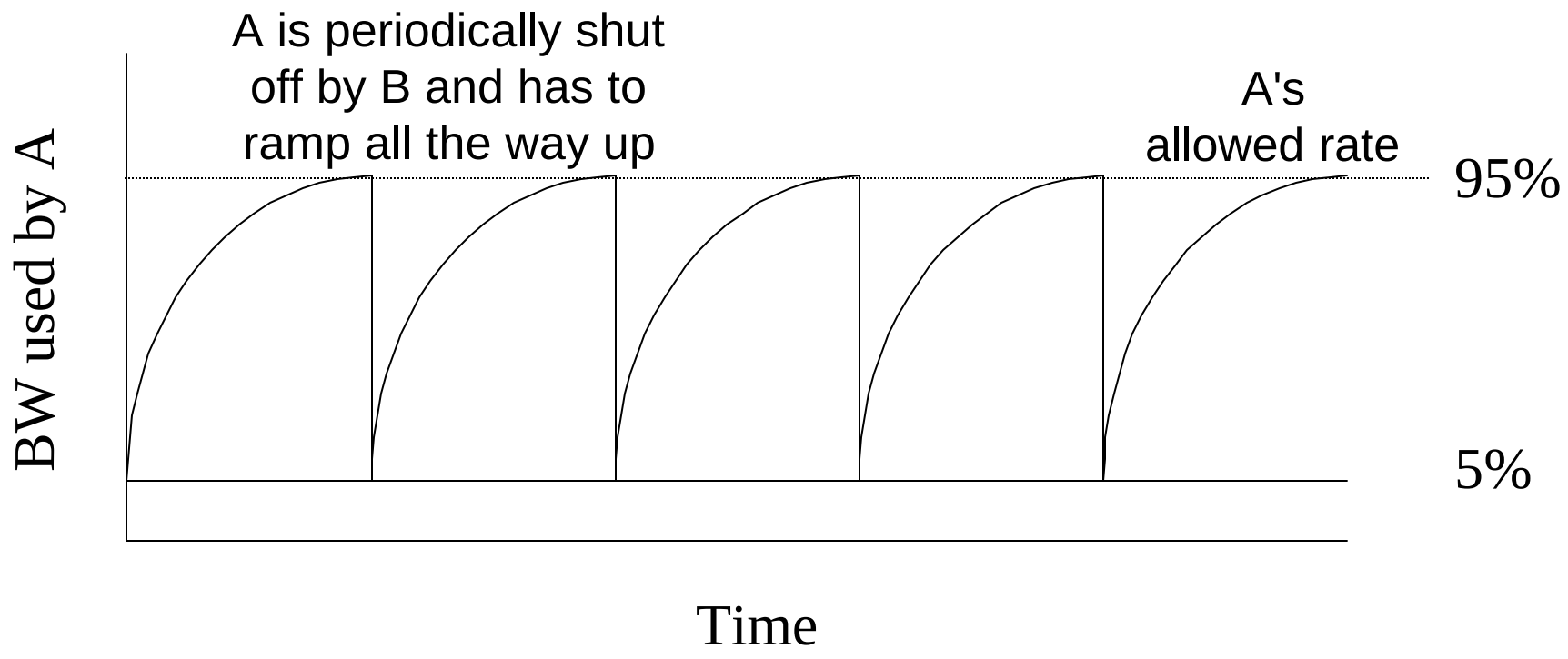
- **Concern:**
  - **Flows traversing through link [4,5] are overly throttled because they only observe congestion on link [6,7]**
- **Solution:**
  - **All stations should be made aware of all choke points and not just the worst one**
- **Applicable:**
  - **Problem occurs with single choke fairness algorithm**
  - **Solved using multi-choke fairness algorithm**

Choked high/low BW pair

- **Illustrates potential for oscillations**



Choked high/low BW pair … (Ramp time dominates prop time)



Choked high/low BW pair ...

- **Concern:**
  - **Flows from node 1 are unnecessarily throttled in a cyclical fashion which reduces BW utilization**
- **Solution:**
  - **A solution is to have fairness algorithm provide information about the whole ring, and react based on ring conditions**
- **Applicable:**
  - **Problem occurs with aggressive mode**
  - **Worst case occurs with two stations far apart**

Conclusions

- **These scenarios (and others) are recommended by the RAH/FAH to be added as informative text in Annex J to help understand the implications of various fairness algorithms**
- **Behavior of fairness algorithms need to be simulated to demonstrate how they operate in these scenarios**