Towards Network Resiliency with AI Driven Automated Load Sharing in Content Delivery Environments

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Context and problem

Content Delivery Networks' (CDNs) complex and dynamic delivery strategies → Internet Service Providers (ISPs) → "dumb pipes" → This can cause link saturation that lead to different problems

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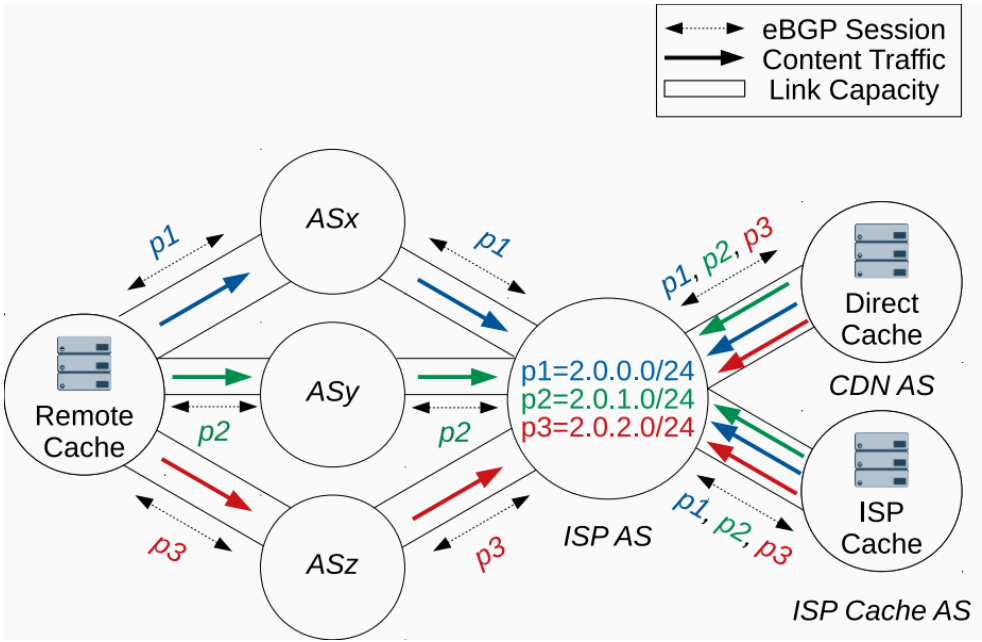
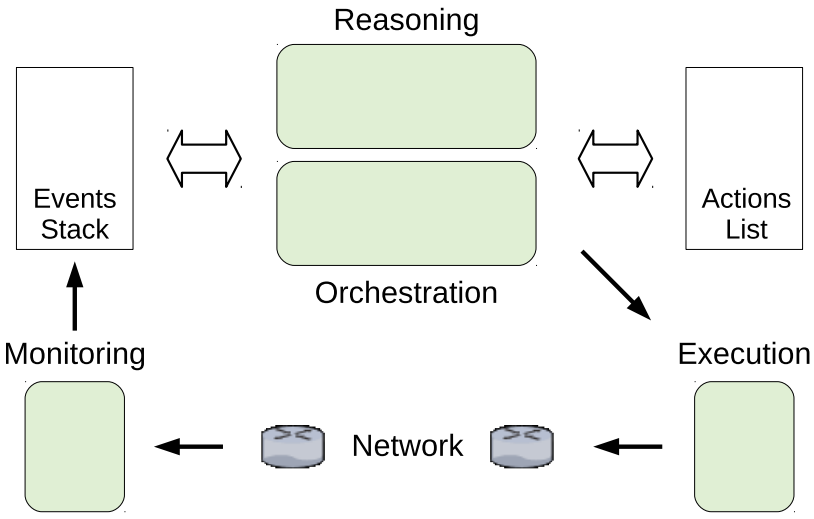


Saturation avoidance through Prefix Load Sharing

Proposed solution



General EDNA architecture: main components are written in bold, while implementation details are in italic.

Reasoning block:

- Uses a *Deep Reinforcement Learning* (Deep Q-Learning) Algorithm.

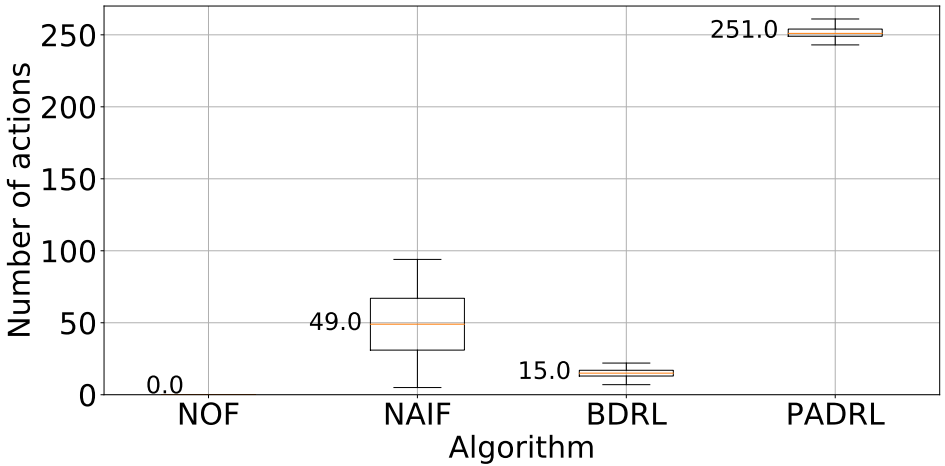
- *Environment*: Max. traffic capacity, number of prefixes and traffic volume on each link.

- *Actions*: move one or more prefixes from one link to another.

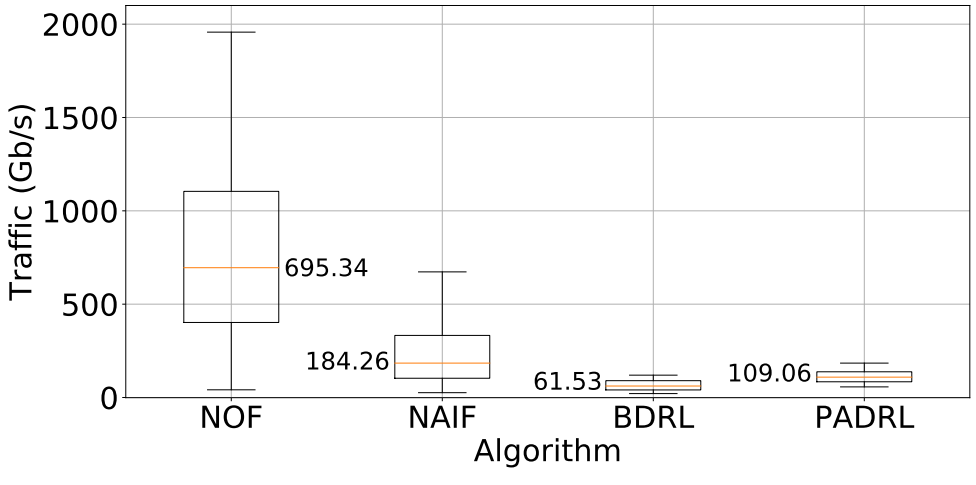
Results

No-function (**NOF**) algorithm
Naive function (**NAIF**) algorithm
Balanced DRL (**BDRL**) algorithm
Priority Aware DRL (**PADRL**) algorithm

Number of actions per algorithm



Traffic loss per algorithm



Conclusion

Automating actions to mitigate critical events such as saturation therefore appears feasible and benefits from Machine Learning to optimize its control. It also seems feasible to build a deep reinforcement learning (DRL) agent that controls the choice of actions to be executed in case of saturation. This DRL agent can minimize traffic loss as well as the number of actions to be performed by the automation process. Future work needs to focus on stabilizing the direct effect of actions and the ability of the agent to adapt to network real time changes.

Check my poster for more details!

Questions?