Internet on FIRE (IoF)

UNIVERSITY OF TRENTO - Italy

GOALS

Experiment at scale with BGP Timers (MRAI)

BGP is the only inter-AS routing protocol of the Internet

Its convergence can be very slow ... **minutes!!**

Improve BGP convergence by proper MRAI setting

CHALLENGES

MRAI is a timer that prevents **signaling storms**, normally set at 30s

Its modification (reduction and /or dynamic configuration) can lead to instabilities

Find sound settings for MRAI to improve convergence and reduce signaling overhead

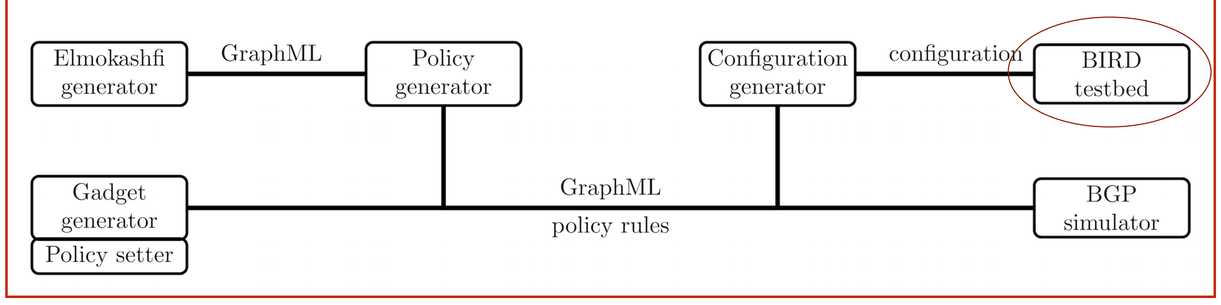
EXPERIMENT SETUP

Modular experiment environment

Topology generation + True BGP Software (BIRD) + Wall1 and Wall2 Test Beds

Bird instances run on several nodes exploring Internet-like AS topologies of up to 2000 nodes (number will increase in the future)

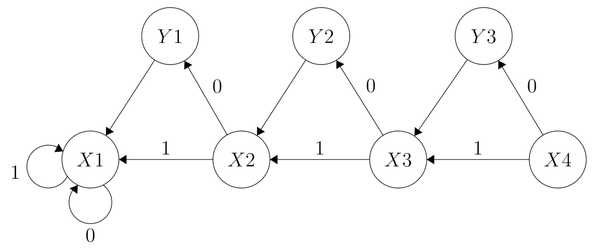
A route change triggers reconfiguration: Convergence time and ADVERT



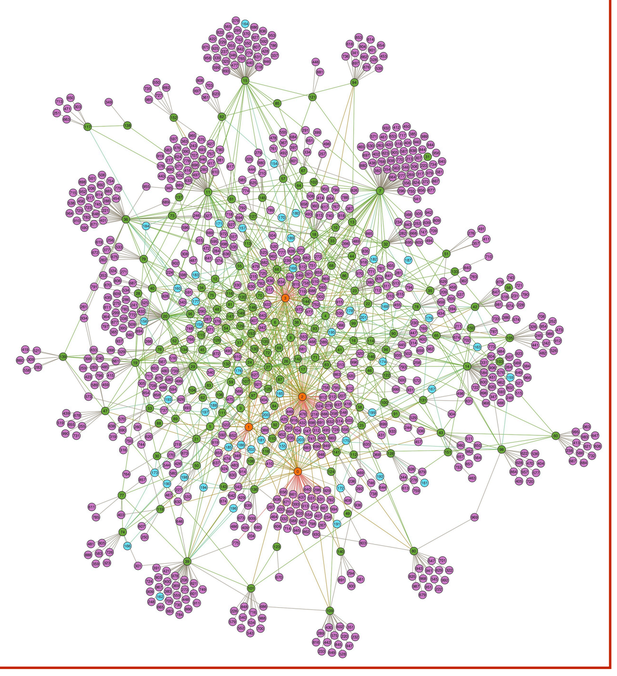
EXPERIMENTAL TOPOLOGIES

Two different topology scenarios

A) "gadgets" where instabilities (route flapping) are known to arise



B) Large internet-like topologies for proof of realistic working conditions (here 1000 AS)



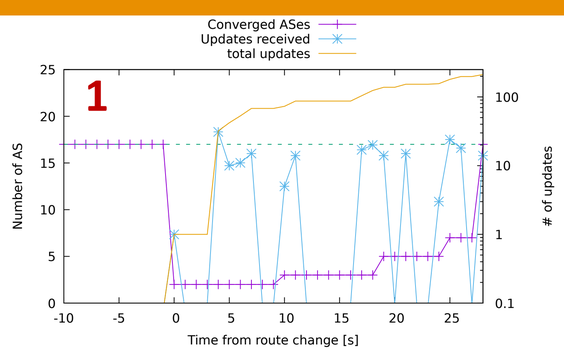
CONVERGENCE TIME AND SIGNALING OVERHEAD

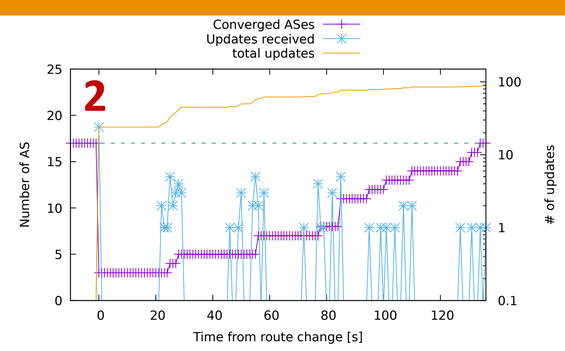
A) "gadget" topology 17 nodes

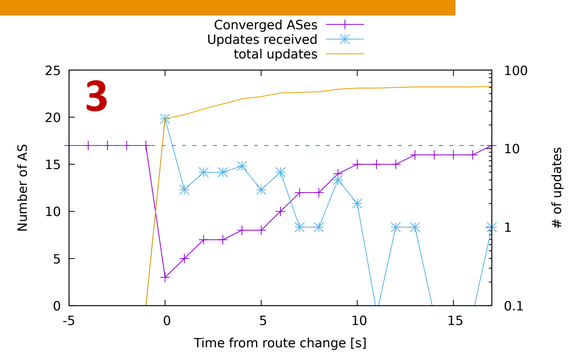
1 – Unstable MRAI setting (L)

2 – Standard MRAI slow convergence

3 – Heuristic mimicking DPC





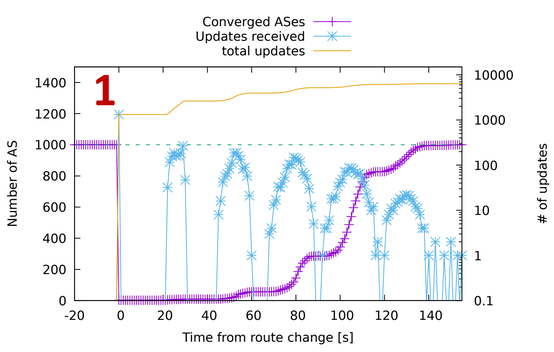


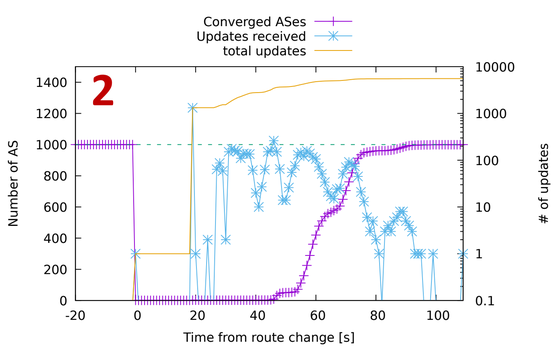
B) 1000 nodes Internet-like

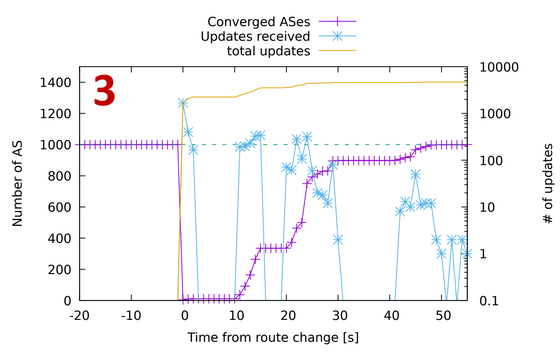
1 – Standard MRAI slow convergence

2 – Heuristic mimicking DPC

3 – Destination Partial Centrality (DPC)







CONCLUSIONS

Fed4FIRE+ Testbeds are fundamental to run modified BGP daemon (Bird) on realistic topologies

Mid-experiment results, but already very meaningful, **show for the first time how to improve BGP convergence "at scale"**

Software and experimental setup available for the community to explore other solutions

MRAI settings are critical for improved stability and convergence of the Internet in face of route changes (happens daily!)

FOLLOW UP

Keep running experiments to achieve sci-level confidence in results (3 scientific papers are already planned)

Experiments with other MRAI settings (under development in Venice)

Use more and larger topologies to "stress" FED4Fire+ testbeds and show their potential

Present solid and robust MRAI strategies at RIPE and other operators gatherings

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