Implementation of a BGP Route Flap Damping Algorithm for the Bird Routing Project

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***Abstract*—Today's Internet stability strongly relies on the well behavior of dynamic routing protocols such as BGP, the Border Gateway Protocol, that enables routing between Autonomous Systems. Route flapping is a well-known and undesired phenomena that occurs in both commercial and private networks. In this report, we carefully explain our implementation of the RFC 2439, BGP Route Flap Damping, for one famous open source routing software suite, the Bird Routing Project.**

I. Introduction

The inter-domain routing protocol BGP is still surviving to the gigantic growth of the Internet that has started in the last decade. Many applications used by millions of internet users, such as Skype, suffer however from some weaknesses of that protocol. The main problems are twofolds: Firstly, BGP has a pretty slow convergence, meaning that a change at one location takes quite some time to be propagated throughout the network. Secondly, if a node becomes unstable, for example if its connectivity constantly comes up and down, it will have bad consequences on the network, both in terms of useless processing at routers and unnecessary routing traffic. Routes that are advertised and withdrawns at regular interval of times are said to be flapping.

Many approaches dealing with the flapping behavior do exist since the late 90's. The RFC 2439[1] was the first standard proposed so that routers could inhibit the propagation of bad-behaving routes, until they become stable again. People have used it extensively for many years, in both commercial and open source routers.

Although this standard is not recommended anymore[2] in today's routers, we wanted to implement it for the Bird Routing Project[3], hoping that it will serve as a good basis for future possible improvements and extension of this RFC. There exist many variants of the Route Flap Damping alorithm and the community has not lost its interest in finding robust mechanisms that could allow BGP to be more resilient.

II. Overview

picture of penalty evolution here and basic explanations. talk about thresholds used. talk about bird -> C + flexible +...

III. Implementation

this part is kind of straightforward -> just explain how we did it with bird. cite coder's doc + github rep. of code

A. Data structures

B. Processing withdrawals

C. Processing route advertisements

D. Configuration parameters

E. Timers

F. Miscellaneous

IV. Evaluation

A. Small scale

1 router with ca. 10 neighbors -> topology 3

B. 30 BGP routers in NSL cluster

what we're going to need :

- numer of route damped for each bgp proto vs. number of diff. routes advertised/withdrawn => show there are less updates and unnecessary traffic when damping = activated
- do it with different parameters ?
- convergence time not affected ?

V. Conclusion

show importance of stability

VI. Future work

possible extensions
real scale tests

VII. Acknowledgement

References

[1] The RFC 2439, BGP Route Flap Damping, http://www.ietf.org/rfc/rfc2439.txt
[2] RIPE Recommendations On Route-flap Damping, http://www.ripe.net/ripe/docs/ripe-378
[3] Bird Routing Project, http://bird.network.cz
[4] Our publicly available repository, https://github.com/alexchap/Albatros-Project