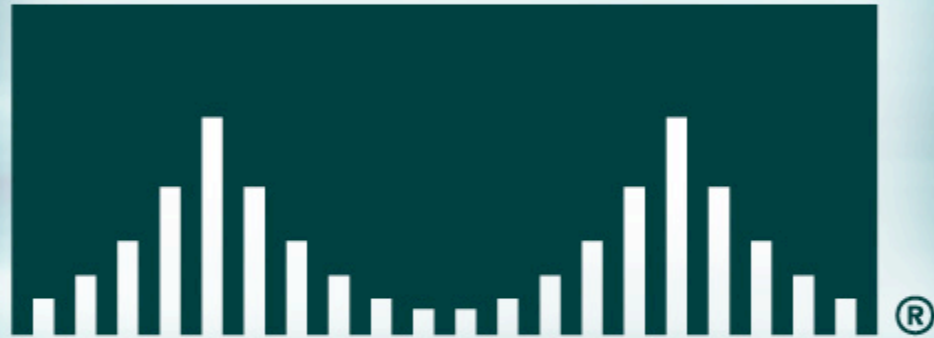# CISCO SYSTEMS

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BGP Route Oscillation Elimination

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Major Factors for Route Oscillation

- **Dependency of IBGP updates**

    Sometimes circular dependency

- **Partial information by RR or confederation**

    Withdraws (over reduction) amplifies the issue

- **Partial order (due to MED) in route selection**

    Route selection overly sensitive to route information

    Seems to play less role than perceived

    Not much can be done with the current protocol and deployed base

Observations

- ## Full-mesh IBGP does not oscillate

    Because enough information is available

- ## Need more information to eliminate oscillation

- ## RR (or confed) may hide many clients behind one RR

    Thus RR needs to be able to advertise multiple routes without implicit withdrawal

    Trick is to announce enough extra routes while constraining complexity (operational, resource) to be less than IBGP

Proposal: Advertise Multiple Paths

- ## Extension to allow advertisement of multiple paths

    ### Changes implicit withdrawal behavior

- ## Advertise (at most) one group-best for each neighbor AS from cluster or sub-AS

    ### Only when tie-breaker occurs below MED

    ### Other refinements could be pursued as well

Benefits

- ## No constraints on topology

    No new meshing requirements

    No constraints on IGP metrics

- ## Eliminates oscillation — doesn't just reduce it

    Any **complete solution requires multipath**

- ## Other potential applications

    Multipath BGP that's not a hack

    Route server

Drawbacks

- ## More network state than best-external

  ### RR < best-external < multipath < flat IBGP

- ## Complexity to implement

  ### Update generation, scalability issues, etc.

- ## Deployment/transition

Open Questions

- **Effects on convergence**

  More data transmitted suggests slower

  More backup paths available suggests faster

  My intuition: Faster

Documents

- **BGP Persistent Route Oscillation Condition (RFC 3345)**

- **BGP Persistent Route Oscillation Solution (draft-walton-bgp-route-oscillation-stop-00)**

- **Advertisement of Multiple Paths in BGP (draft-walton-bgp-add-paths-00)**