Consistency Routing

The Internet as a Distributed System
How the Internet works now

- A new update goes to a router
- Router applies the update to its forwarding table
- And then to all the other routers
- For each of the routers
This...kind of sucks

- Causes loops
- And black holes
Why?

- Internet routing favors liveness (adaptability) over consistency
- Doesn’t matter how packets get there, so long as system can adapt quickly
The Solution?

- Consistency Routing
- Splits consistency and liveness into two different properties
- Focuses on both as opposed to only one
Stable Mode

- Update Log
- Distributed Snapshot
- Frontier Computation
  - AS sends snapshot report to special router
  - Consolidators compute global stability
  - Process changes to routers
- Computing stable tables (SFTs)
- Add changes to changelog
Triggers

• Used in update processing
• Tracks when all the routers have processed an update for each router.
Transient Mode

- Is activated if a router fails, disrupting the stable route
- If a router fails:
  - Packet is deflected to neighboring AS
  - AS must have a different valid route to destination
  - Packet delivery is assured due to stable mode
  - If no neighboring AS has route, back track and repeat
  - Else, detour routing
Detour routing

- Gives packet to other AS to deliver
- AS is a Tier 1 AS
- Tier 1 AS is “smarter”
So how does it perform?

- Tested on:
  - XORP prototype
  - Extensive simulations
  - PlanetLab
- Simulator that implemented BGP and consensus routing
Some data and stuff

Figure 6: Loops and disconnectivity in BGP following a failure.

Figure 7: Disconnectivity in consensus routing following a failure.
Some numbers

• In failure situations:
  ▫ Backtracking kept connection to 74% of Ases.
  ▫ Detouring to a Tier 1 AS, complete connectivity 98.5% of the time
But what about overhead?

- More updates, more overhead
- Means that the more efficient you want your stable mode, the more data you’re going to need to send

Figure 10: Control traffic required by consensus routing.
Bottom Line

- Probably more data sent over networks
- Stable mode makes routing easier to secure
- By separating properties, routing becomes better, if not faster.