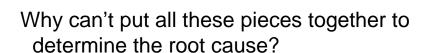
#### What is in a router's mind?

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# Finding Root Cause of Routing Changes

- Need to pinpoint root cause
  - Diagnose a routing anomaly and fix it to make packets happy
- Current monitoring/measurement
  - Data plane
    - Active and passive traffic performance estimates
  - Control plane
    - Routing messages, table dumps



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# Challenges

◆ Too much data

Event
(eg. fiber cut
or policy change)

Appear in multiple
sources of data

Appear in multiple
times in one dataset

- Not enough data
  - Can't instrument all nodes in a large network
  - Routing messages carry enough information to route, not to "explain" routing decisions



## How can routers help us?

- Annotate routing messages
  - All parameters evaluated in the BGP decision process should be in the updates
  - Monitoring sessions should view all alternative routes
- Expose state on routers
  - Log information that triggered a route change and export it periodically to monitors

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## Would this be enough?

- Need to join information from multiple routers to trace back to the root cause
  - Which time frame makes sense?
- Need cooperation among different domains



Why not take monitoring and measuring into consideration when building routing protocols?