Path Tracing Analytics

unleashing underlay visibility

Clarence Filsfils, Pablo Camarillo, Ahmed Abdelsalam, **Sonia Ben Ayed**

ECMP Analytics

- Detects
  - Blackholing paths
  - An ECMP path that is not expected (routing/dataplane corruption)
  - Incoherent latency between ECMP paths
- Measures
  - End-to-end latency of each path (60µsec in WAN, 200ns in DC)
- Current technique of sending probes from anywhere to anywhere without any PT data requires AI processing of huge data sets

© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

Demo

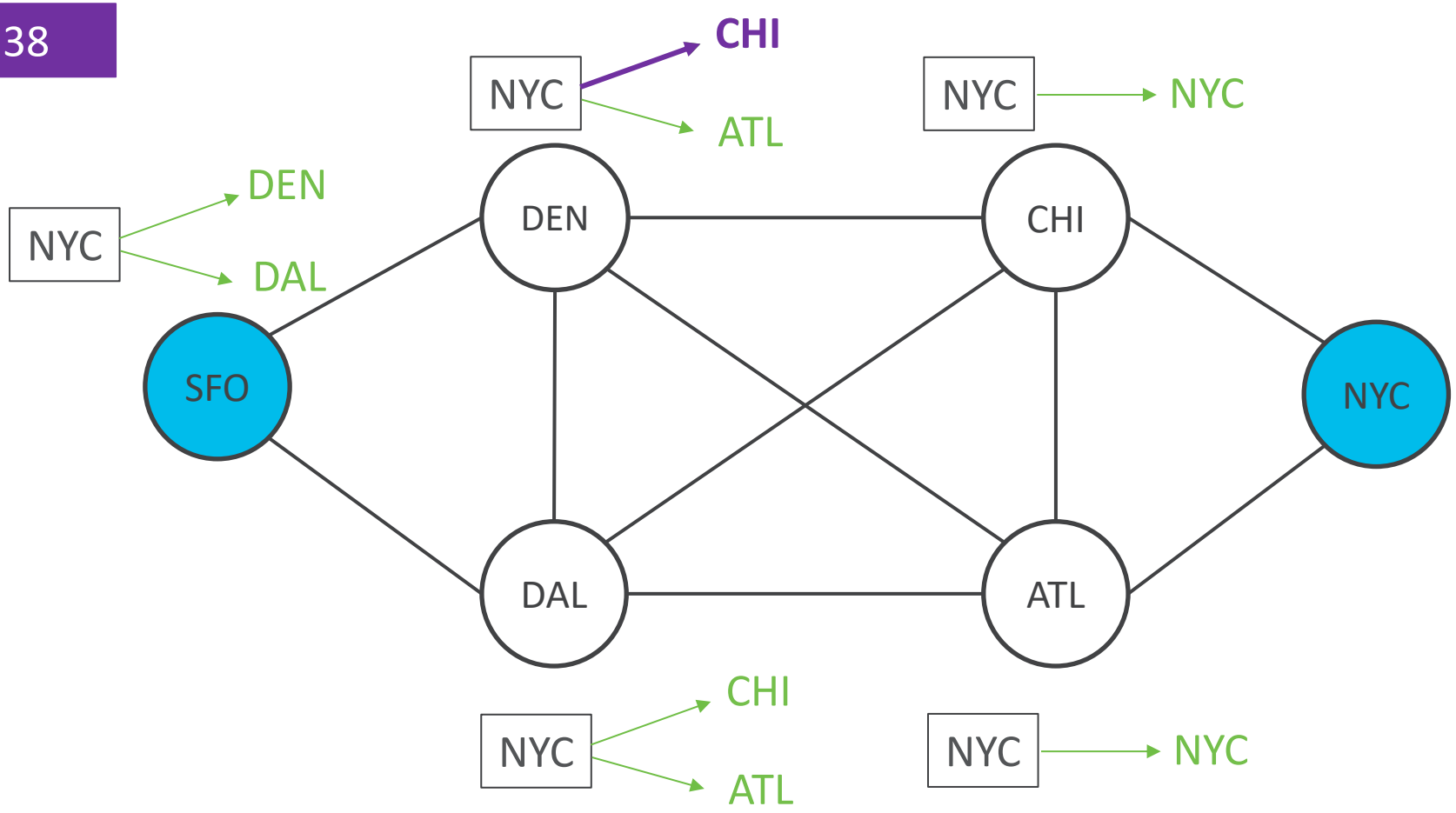
© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

Blackholing Path Detection

© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

Corruption causing blackholes

- Hardware corruption on DEN
  - Traffic to NYC via CHI is dropped.

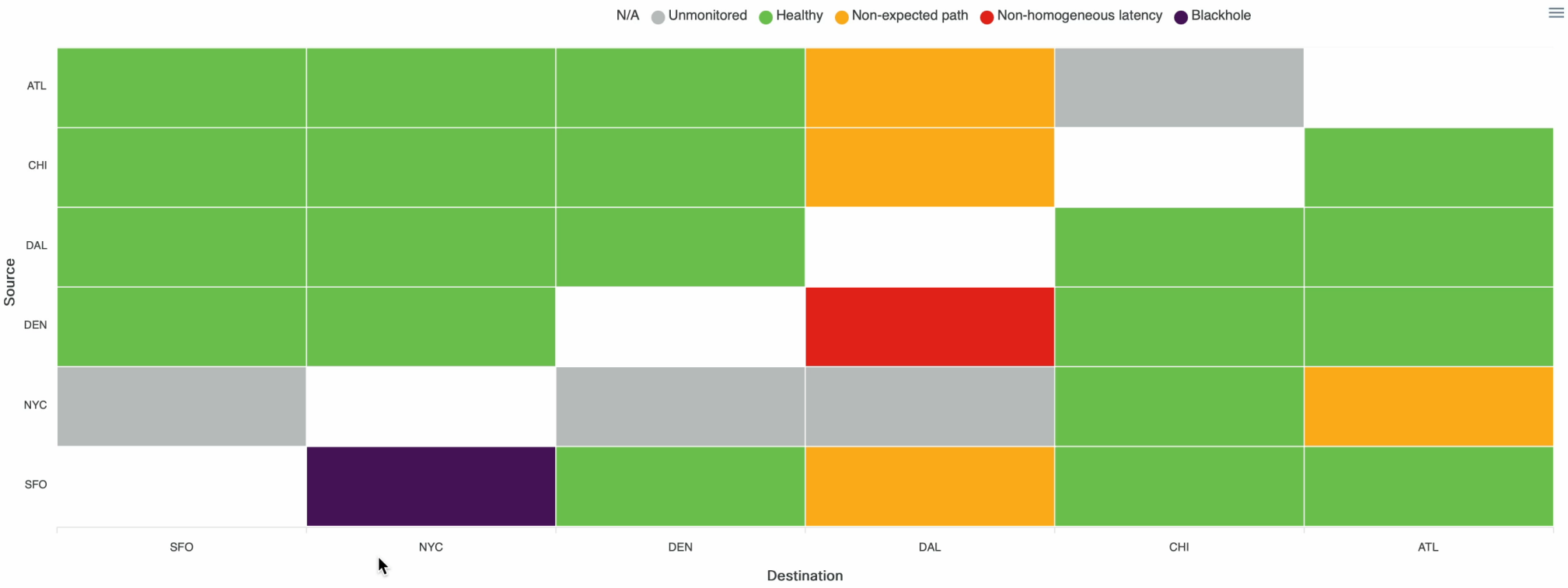


© 2023 Cisco and/or its affiliates. All rights reserved. Cisco Public

ECMP Analytics SFO -> NYC

25% of ECMP paths are blackholing.

Last period | From/To Time



Blackholes
ECMP non-homogeneous latency
Non-expected forwarding path

Last 1 hour

3% (1)	3% (1)	13% (4)	67% (20)	13%(4)
Blackholes	Non-homogeneous latency	Non-expected paths	Good	Unmonitored

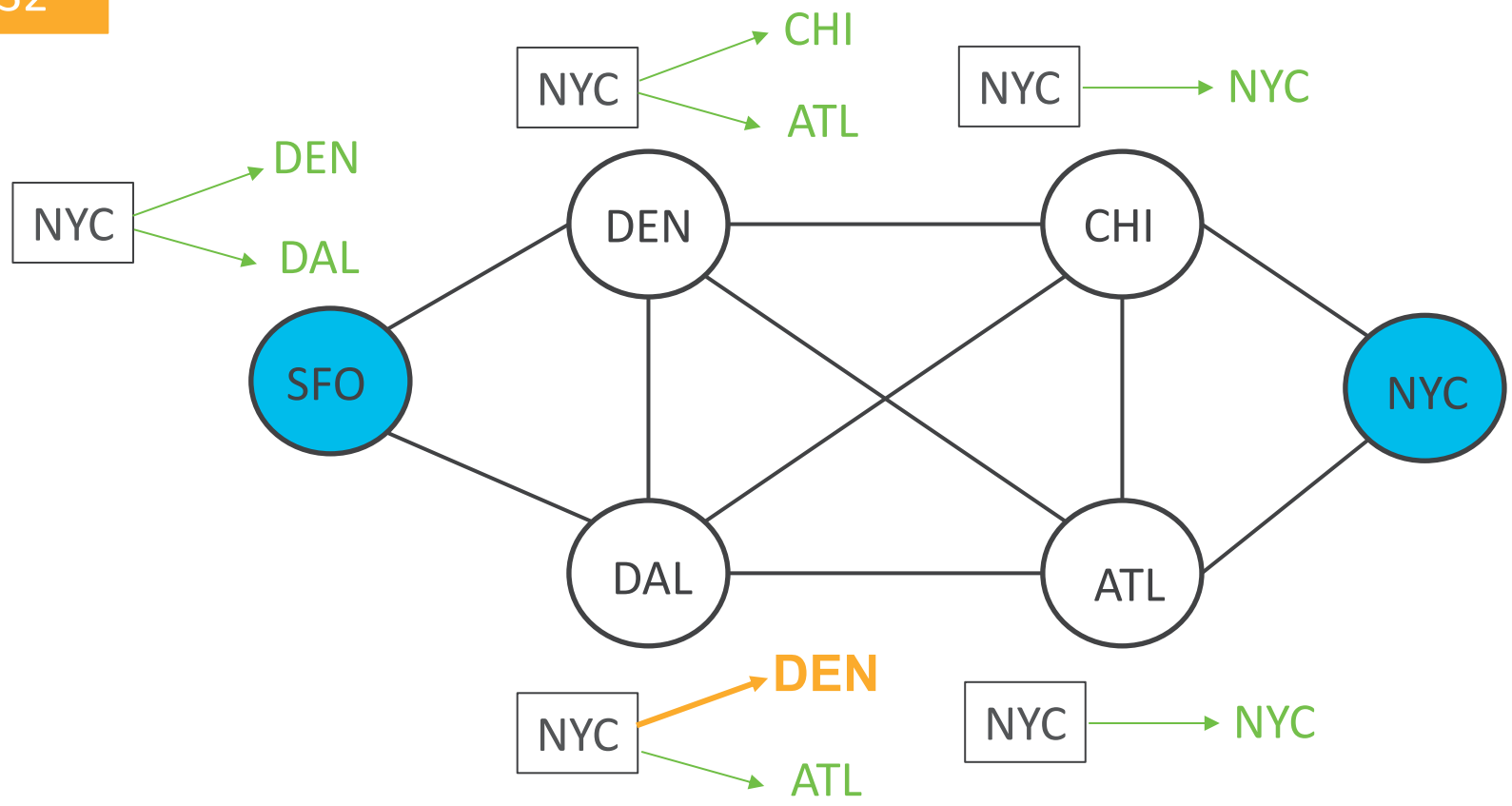
Non-expected/Wrong path Detection

© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

Corruption causing non-expected path

- Hardware/FIB corruption on DAL.
  - Traffic to NYC is taking a wrong path.

At 10:32



© 2023 Cisco and/or its affiliates. All rights reserved. Cisco Public

ECMP Analytics SFO -> NYC

Last period | From/To Time

Blackholes
ECMP non-homogeneous latency
Non-expected forwarding path

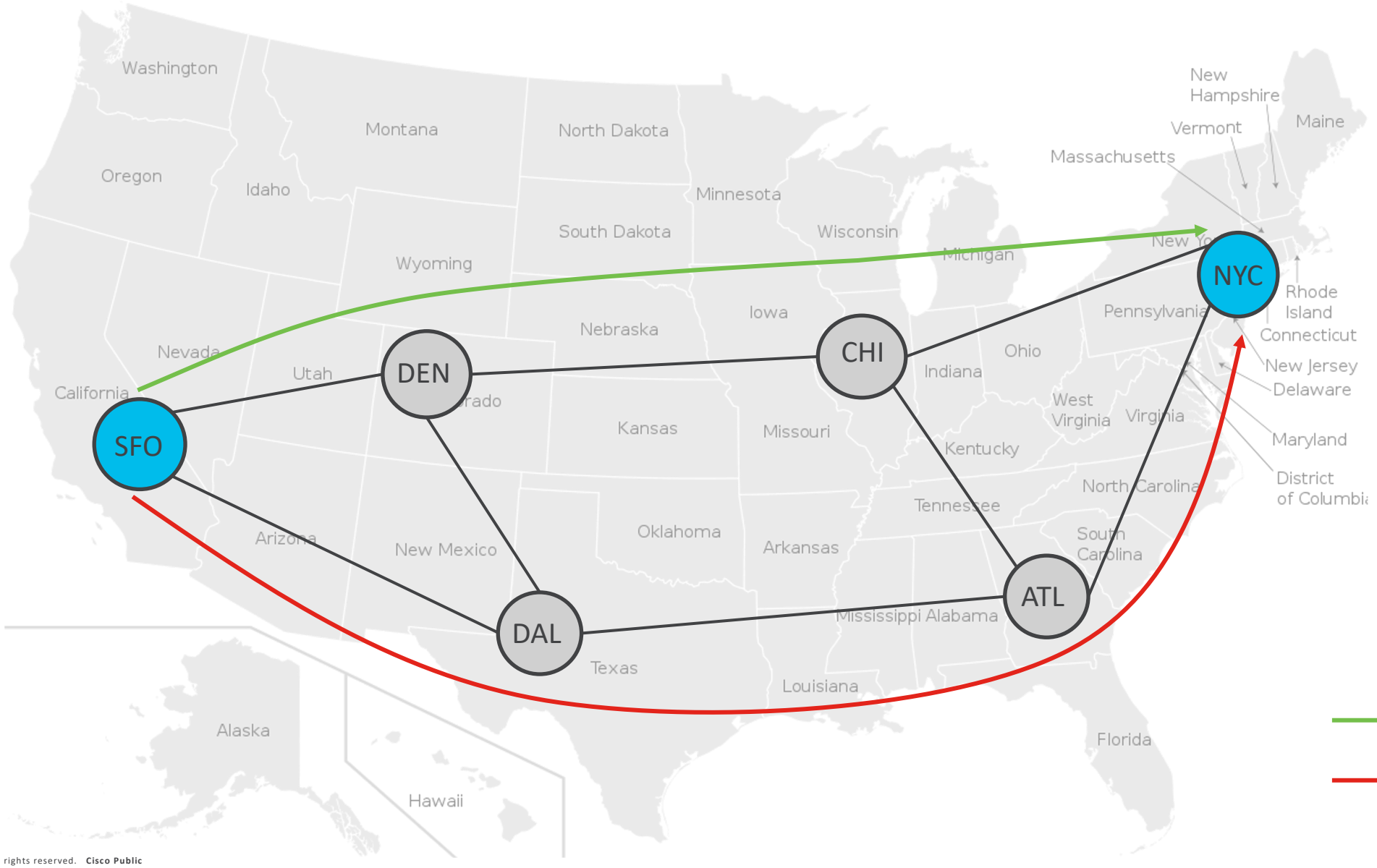
Last 1 hour

0% (0)	3% (1)	17% (5)	67% (20)	13%(4)
Blackholes	**Non-homogeneous latency**	**Non-expected paths**	**Good**	**Unmonitored**

Non-homogeneous latency Detection

© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

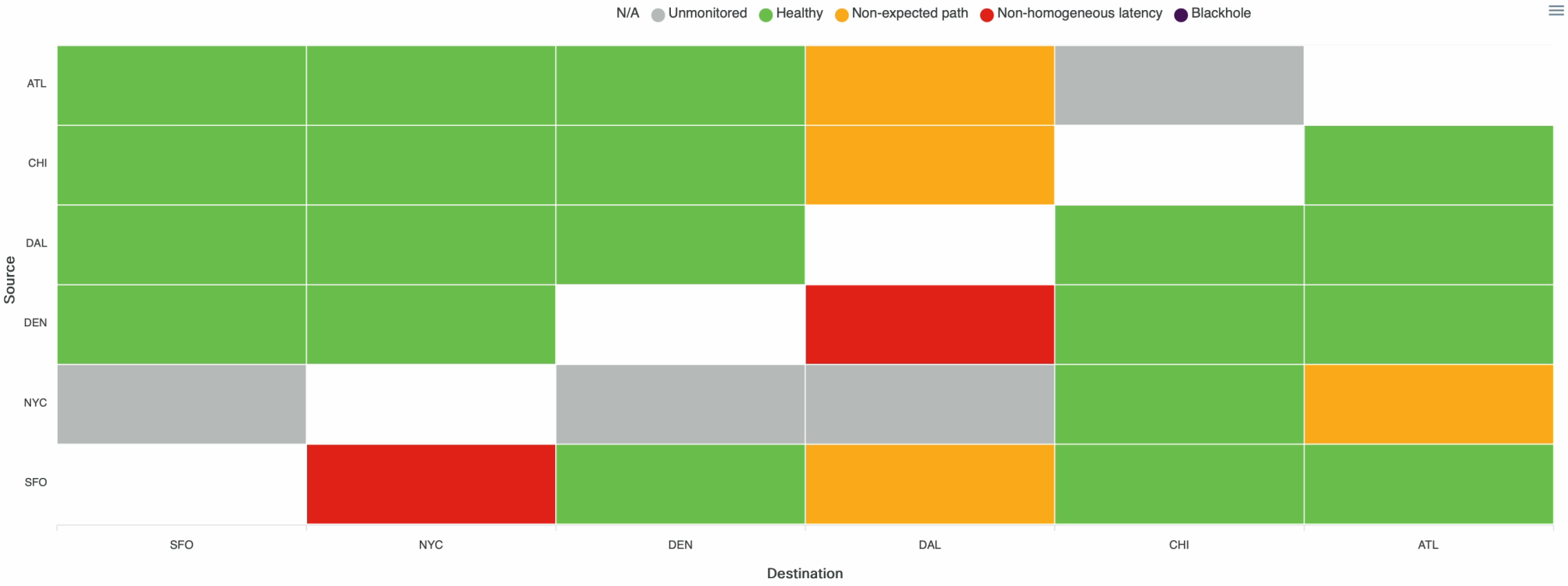
Corruption causing non-homogeneous latency



© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

ECMP Analytics SFO -> NYC

Last period | From/To Time



Blackholes
ECMP non-homogeneous latency
Non-expected forwarding path

Last 1 hour

0% (0)	7% (2)	13% (4)	67% (20)	13%(4)
Blackholes	Non-homogeneous latency	Non-expected paths	Good	Unmonitored

Conclusion

- Path Tracing is another innovation solving a 40-year problem
- Significant applicability: transport assurance
  - Latency & Jitter
- Shipping and in deployment
- Rich Eco-System
  - Opensource implementations available
- Path Tracing Analytics :
  - Many use-cases
  - ECMP demo ready

© 2023 Cisco and/or its affiliates. All rights reserved. **Cisco Public**

The bridge to possible