

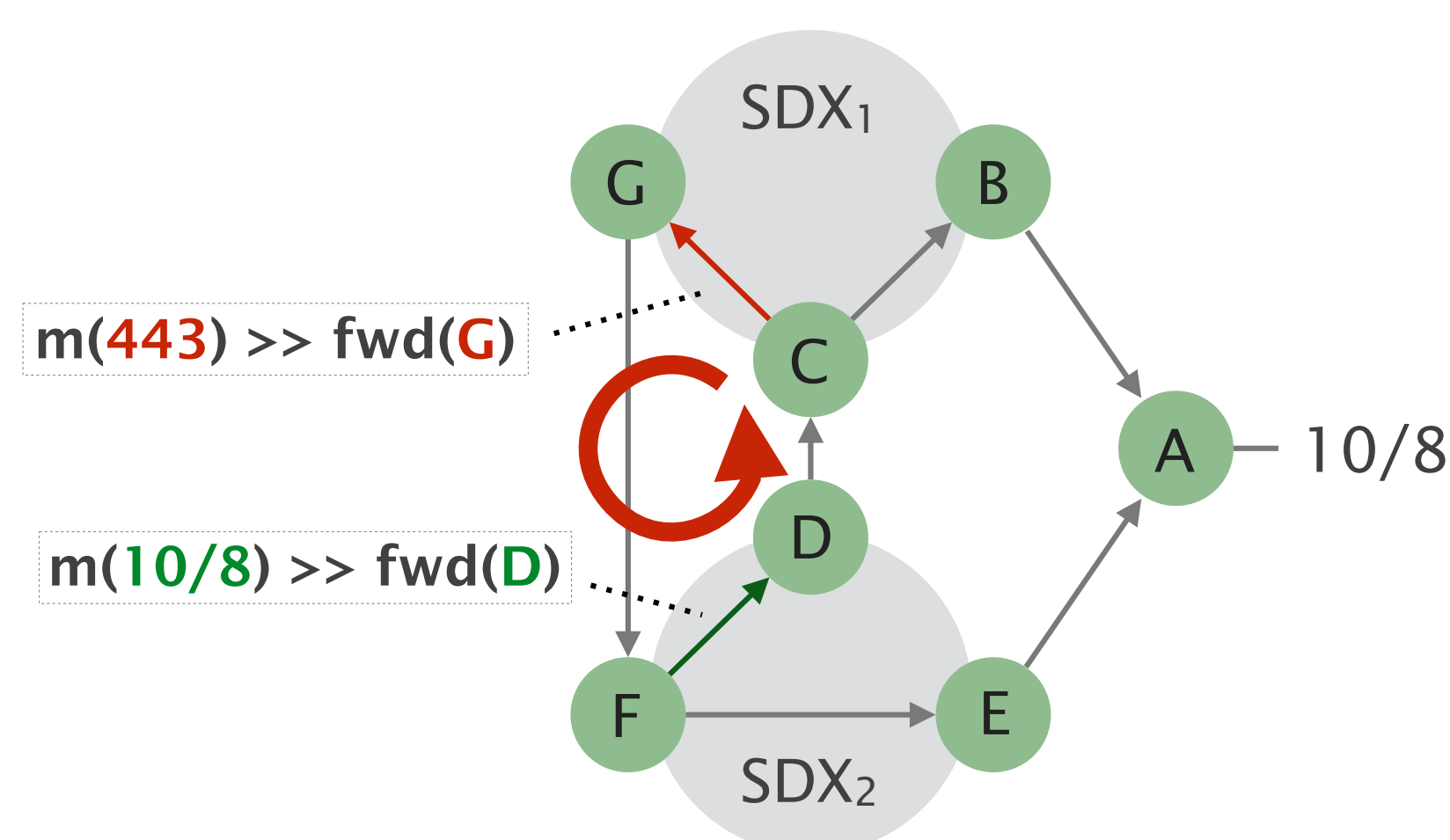
SDX-Based Flexibility or Internet Correctness? Pick Two!

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SDX policies can lead to loops

The uncoordinated installation of SDX policies at different SDXes [1, 2] can lead to forwarding loops as the policies are not reflected in the control plane.



Detecting loops is hard

Problem

- Traditional loop prevention mechanisms are useless since the control plane is not aware of remote policies.
- Detecting a loop through probing is not feasible as any part of the flowspace might be affected.

Idea

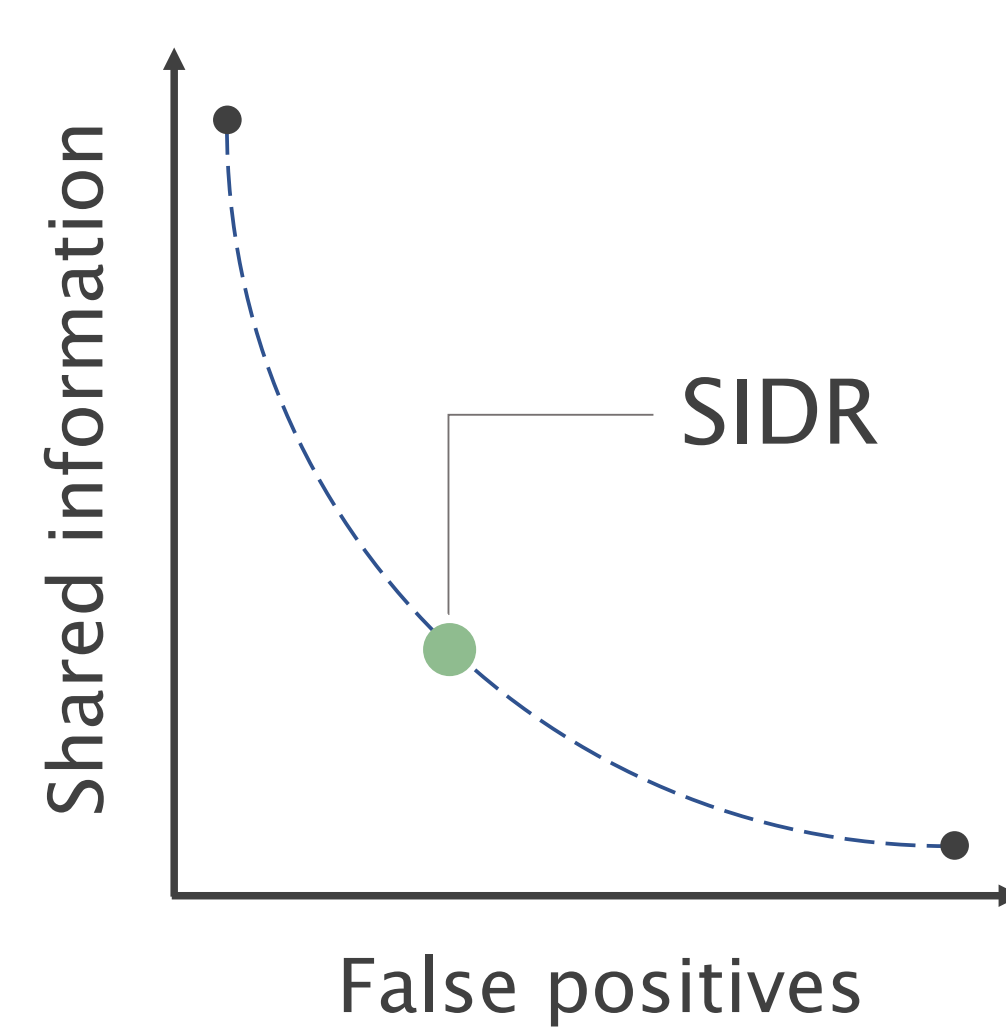
Exchange information about the policies amongst the SDXes to guarantee a loop free Internet.

Challenge

Providing privacy and scalability while preserving flexibility.

Solution: Safe Interdomain Deflection-based Routing (SIDR)

Trade-off: sharing vs. accuracy

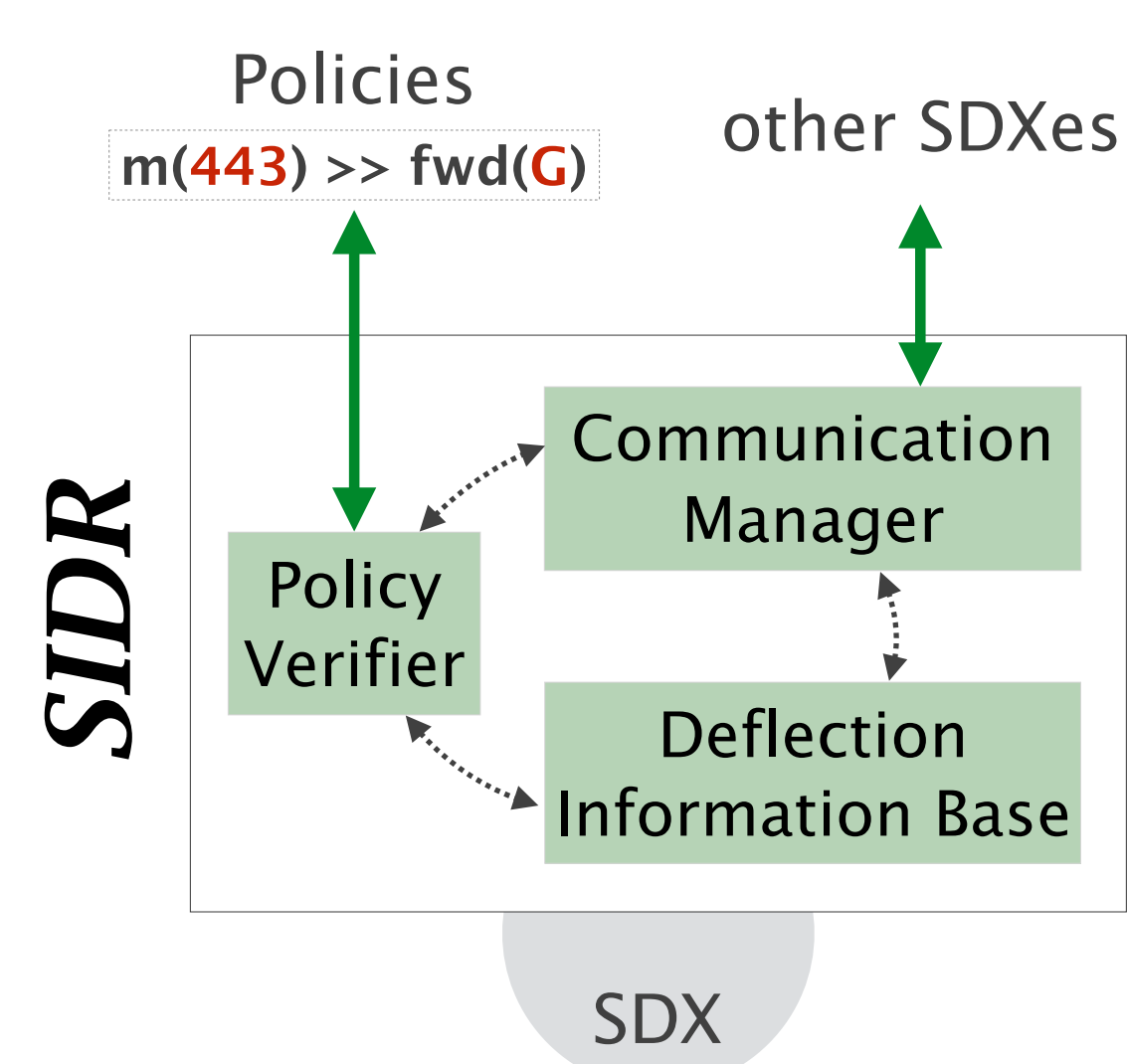


Insights

- Share only who is deflecting and not what is deflected.
- Share only with affected SDXes and not with every SDX in the Internet.

System

SIDR runs on top of every SDX, consists of three modules and provides an interface to the SDX participants.



Modules

Communication Manager

- Learns about remote policies.
- Informs other SDXes about local policies.

Deflection Information Base

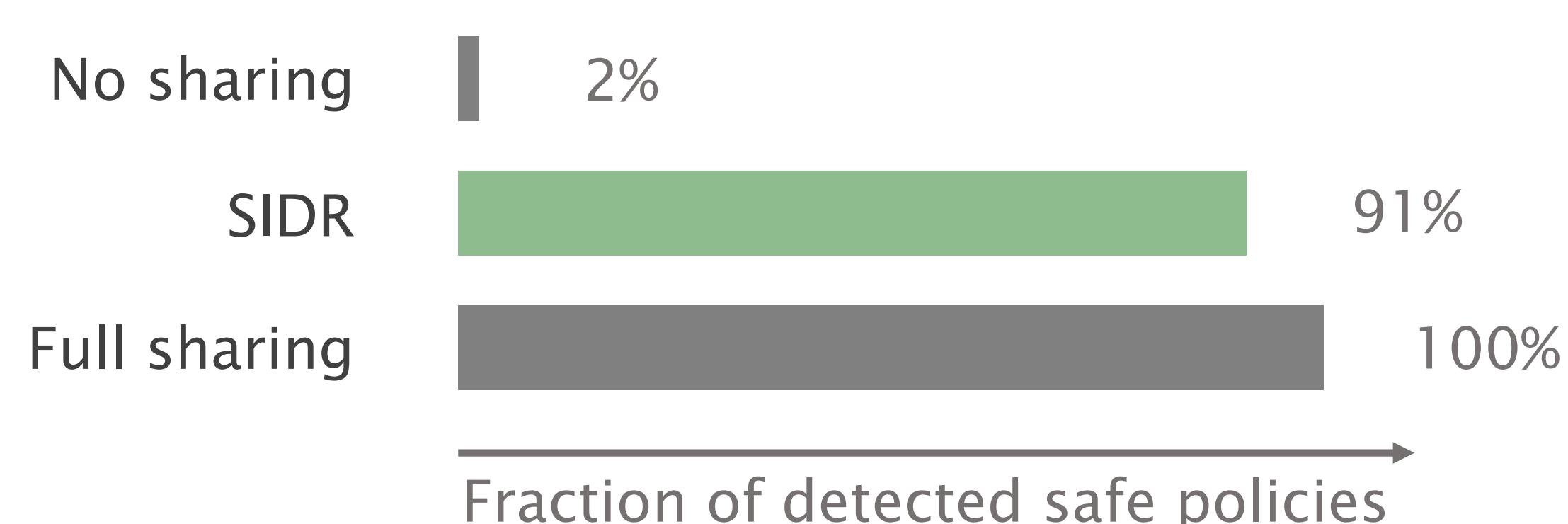
- Keeps track of local and remote policies.

Policy Verifier

- Provides an interface for participants to submit policy activation requests.
- Checks the correctness of the policies using the deflection information base and the BGP best paths of the local SDX.

SIDR allows for high flexibility, while preserving privacy

Dataset	CAIDA AS graph augmented with 1M IXP links.
Methodology	We considered each of the 421 IXPs to be an SDX, generated policies and tried to install one after the other.
Result	Even though only limited information is exchanged, SIDR detects 91% of all safe policies.



SIDR works in practice

Our prototype implementation [3] on top of SDX-ryu [4] performs the correctness checks in about 1 second or less.

References

- Arpit Gupta et al. "SDX: A Software Defined Internet Exchange". In: *ACM SIGCOMM*. Chicago, IL, USA, 2014.
- Arpit Gupta et al. "iSDX: An Industrial-Scale Software Defined Internet Exchange Point". In: *USENIX NSDI*. Santa Clara, CA, USA, 2016.
- Rüdiger Birkner. *SIDR Prototype*. 2016. URL: <https://github.com/nsg-ethz/SIDR>.
- SDX Project. *SDX-Ryu*. 2015. URL: <https://github.com/sdn-ixp/sdx-ryu>.