Dynam-IX: a Dynamic Interconnection eXchange  

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Problem
IXPs offer a rich path diversity for improving wide-area traffic delivery performance. ASes need first to agree on exchanging traffic. Interconnection between ASes is mostly an ad-hoc and lengthy process heavily influenced by personal relationships and brand image. Limited responsiveness to traffic dynamics Unplanned event

Traffic surge
Degraded performance
Alternatives for mitigation timeline

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Proposal
Dynam-IX design has four components:

Protocol allows ASes to find and establish interconnection agreements.

Legal Framework handles contracts by defining general terms that are digitally signed by ASes.

Interconnection Intent Abstraction specifies technical and business properties of a target (e.g., a prefix), including routing, SLA, pricing, and time.

Tamper-proof Ledger enables operators to identify reliable ASes based on information from previous agreements.

Dynam-IX is decentralized, preserving IXP neutrality, and achieving privacy while avoiding the complexity of techniques like Secure Multi-Party Computation (SMPC).

Preliminary Evaluation
Prototype. Hyperledger Fabric as a distributed tamper-proof ledger.

Question. How long does it take to establish an interconnection agreement?

Metrics. Time to query and time to establish an agreement.

Workload. Multiple ASes flood a single AS with queries and establishing interconnection agreements proposals 30 times at maximum rate.

Scenario. Up to 200 AWS EC2 instances, each hosting a single AS.

Summary and Future Work
Differently from previous work [1, 3, 4], Dynam-IX allows operators to identify reliable peering partners and to exploit the rich connectivity opportunities at IXPs quickly while achieving privacy.

We plan to investigate the impact of Dynam-IX on storage and network traffic, and to compare its performance using different ledgers.

References