

# DYNAMIX - A Dynamic Agreement Marketplace on Internet eXchange Points

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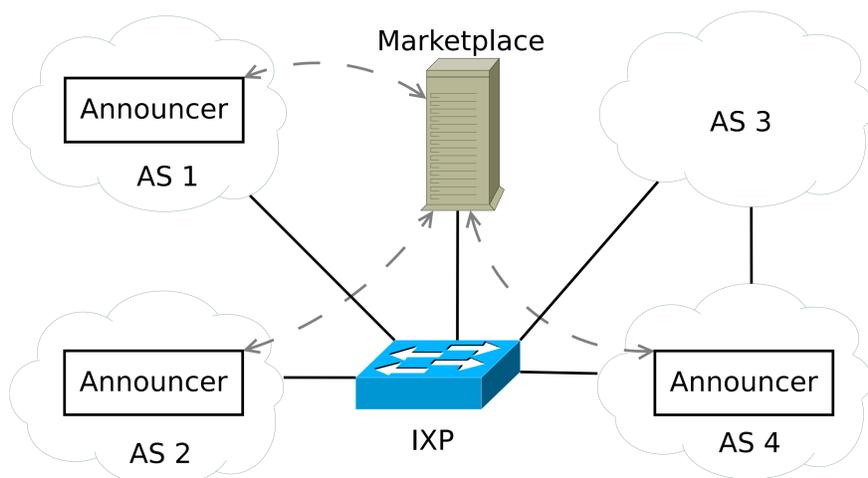
## Context and Motivation

- IXPs play a central role on the Internet topology. Large IXPs interconnect more than 800 ASes and are responsible for exchanging, on average, more than 3 Tbps, a volume similar to a tier-1 provider [1]. Their increasing popularity is directly related to the relationships between ASes, which are interconnecting through IXPs to reduce transit costs and shorten paths.
- Despite advances brought about by IXPs, the way ASes establish their relationships remains unaltered. Agreements have a static nature, take days or weeks to be settled, and limit the ability to respond to changes in the topology or loads. Additionally, link prices do not reflect fluctuations between offer and demand, resulting in long-term settlements with over-provisioned links. The introduction of dynamic agreements gives a new perspective on the relationships between ASes.
- Previous work [2–4] has struggled to find ways to provide dynamism to the relationships between ASes. We contribute to this line of research by providing an approach with large potential for implementation.

## Proposal

Considering the IXP characteristics and the advances promoted by SDX [5], we propose leveraging IXPs as the foundation of a dynamic agreement marketplace. Our approach consists of two components.

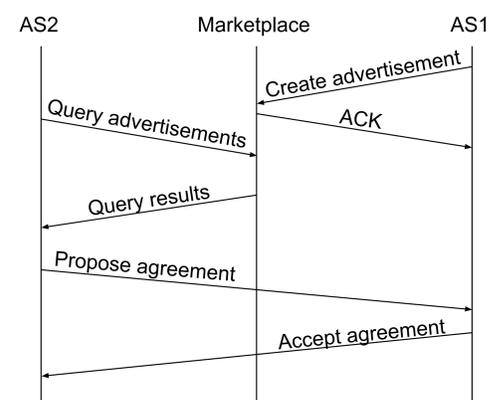
- **Marketplace:** located at IXP, is responsible for storing advertisements and replying to queries from announcers.
- **Announcers:** located at each participant AS, are responsible for creating advertisements, requesting existing ones from the marketplace, and establishing agreements with other announcers.



Advertisements have a set of destinations and are composed of four dimensions.

- **Economics:** defines the cost of the agreement, which can be expressed through a function (e.g., bandwidth per time).
- **Technical:** contains information relative to bandwidth and latency.
- **Policy:** list of ASes included in the paths to the announced destinations.
- **Time:** includes the duration of the agreement, which can be a period or a traffic threshold, and the offer expiration.

A simple use case is presented below.



## Expected Benefits

- **Dynamism:** an AS experiencing an unplanned congestion (e.g., flash crowd) can query the marketplace to establish a temporary agreement to reduce the transient congestion. Also, a short-term agreement can be settled for a planned traffic increase, such as the ones caused by software and game releases.
- **New types of agreement:** dynamism will provide a suitable scenario for the creation of new kinds of settlements, such as specific agreements for different applications, countries, or routes.

## References

- [1] B. Ager et al. Anatomy of a large european ixp. In *Proceedings of the ACM SIGCOMM 2012*.
- [2] V. Valancius et al. Mint: A market for internet transit. In *Proceedings of the 2008 ACM CoNEXT Conference*.
- [3] I. Castro et al. Route bazaar: Automatic inter-domain contract negotiation. In *Proceedings of the 15th USENIX HotOS*.
- [4] V. Kotronis et al. Stitching inter-domain paths over ixps. In *Proceedings of the 2016 Symposium on SDN Research*.
- [5] A. Gupta et al. Sdx: A software defined internet exchange. In *Proceedings of the 2014 ACM Conference on SIGCOMM*.