Bachelor's/Master's Thesis

Route Server Control Plane Monitoring and Optimization

DE-CIX

DE-CIX provides Internet exchange services and operates several Internet Exchange Points (IXPs) internationally. Founded in 1995, DE -CIX has established an environment for the exchange of Internet traffic, called peering.

The company serves about 600 networks from almost 60 countries, including all leading international players in Frankfurt, New York, Dubai, Palermo, Marseille, Istanbul, Hamburg, and Munich. With more than 4 Terabits per second of peak traffic, DE -CIX Frankfurt is one of the world's leading Internet exchange.

Background

IXPs are shared peering platforms that operate a switching fabric to interconnect its customers ' networks. Among the custome r that exchange traffic are typically a wide range of network types, e.g., large ISPs, regional providers, hosters, and content providers. Many IXPs offer so-called route servers which greatly simplify the BGP session management for their connected customers. Therefore, route servers collect routing information in a centralized manner and redistribute them to connected customers.

A customer connects to the route server via a single BGP session to set up BGP peering with all other IXP customers that peer wi th the route server. Clearly, this has a number of benefits such as lowering the maintenance overhead. However, for a variety of reasons IXPs implement filters so that not all incoming routing information is redistributed to all connected customers. In addition, some customers restrict their routing information with respect to traffic engineering purposes, e.g., applying specific filters.

This leads to IXP customers being not aware of the reason for the routing decisions of the route server, i.e., best path selection, hidden paths, and filtered announcements. In fact, it remains a challenging task to resolve such unwanted restrictions witho ut automated monitoring systems that combine information from different sources.

Task

The goal of this thesis is to shed light on the usage of different filter types influencing route server decisions. This open question can be broken down in specific tas k and possibly extended according to the applicant's experience in the relevant fields :

1. Information derived from the DE -CIX route server shall be stored in a database and be query-able by a simple interface (i.e., CLI or web site). Technologies such as Python, Java, and Java-Script combined with a NoSQL database shall be used.
2. Based on the data collected in the previous step, an analysis of the different filter types shall be executed. It shall answer questions such as: Do certain customer groups use different filter types? Does the use of a certain filter type change over time? Are different filter types typically combined?

Application: Should include CV and transcript of records
Note: The student will get paid for her/his work
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Date: 15.07.15