Analyzing the Impact of Factors that influence the Growth of Routing Table

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Problem Description

As the number of Internet hosts grows, so does the size of the routing table. This, in turn, leads to increased demands for more memory and reduces the packet forwarding speed thereby increasing the end-to-end delay. To control the size of the routing table, we need to understand how certain factors influence the growth of the routing table. The aim of the project is to analyze the impact of these factors on the size of the routing table.

Solution Detail

Following Factors will be considered for monitoring the growth of the routing table:

a. Multi-Homing
b. Failure to Aggregate
c. Load Balancing
d. Address Fragmentation

Since 1997, RouteViews APIs have been collecting BGP updates from more than 35 collectors spread across various parts of the world. RIB Files for a particular period can be used to study the routing table data [2]. In the paper [1], it is given that the prefixes in each entry can be analyzed to determine the percentage of impact of each factor. The below table describes methodology to determine the extent of influence of each factor on the routing table.

Factor	Description
Multi-Homing	We can evaluate the extent that multi-homing contributes to the routing table size by identifying multi-homed prefixes, i.e., prefixes that are originated by a multi-homed AS and contained in the prefixes originated by one of its providers.
Failure to Aggregate	In order to understand to what extent that failure to aggregate contributes to the routing table size, we aggregate all aggregatable prefixes that are originated by the same AS and are announced

	identically. First, we classify prefixes into prefix clusters, in each of which prefixes are announced identically. Second, we perform aggregation for prefixes from the same prefix cluster iteratively.
Load Balancing	To quantify the effect of load balancing on the routing table size, we perform aggregation for prefixes from the same AS iteratively. We compare the total number of prefixes after the aggregation with the number of prefixes excluding those introduced by failure to aggregate. The difference between the two numbers quantifies that load balancing contributes to routing table size.
Address Fragmentation	The contribution of the address fragmentation to the routing table size is the gap between the number of prefixes excluding those introduced by failure to aggregate and the number of prefix cluster

Tools Required

So far, as per our knowledge tshark command line tools might be required to convert the binary data available on routeviews.org into readable format. Apart from that, more tools might be required with further implementation of the project. Although, we will need to write python scripts to read and segregate the data.

Extension of Work

Performance of network devices can also be analyzed using the factors that affect the growth of the routing table. Through the performance analysis data, more scalable networks can be developed.

Intended Division of Work

Team Member	Work Description
Sandeep Nathuram Kundalwal	Converting the fetched Raw Data from routeview.org into readable format + Segregation of entries based on Load Balancing
Mahima Gupta	Literature Review + Analyzing the impact of factors from data + Segregation of entries based on Multi-Homing
Ashutosh Litoriya	Segregation of entries from routing table based on Failure to Aggregate and Address Fragmentation

References

1. T. Bu, L. Gao and D. Towsley, “On routing table growth,” ACM SIGCOMM Computer Communication Review, vol. 32.1, pp. 77–88, 2002.
2. https://www.routeviews.org/routeviews/index.php/collectors/