

# Report: Internet Topology Analysis

## 1) Deliverables:

An analysis of network paths between five sources (s1 to s5) and ten destinations was conducted. The goal was to determine the number of hops, Autonomous System (AS) numbers, organization names, and IP address ranges between each source and destination pair. This analysis provides insights into the routing and organization of the network infrastructure between these points.

- Sources taken are laptops connected to IITH wifi and other off campus networks and also mobile hotspots of Jio and Airtel.
- Ten destinations are Google.com, Facebook.com, Reddit.com, Whatsapp.com, Twitter.com, Instagram.com, Twitch.tv, Wordpress.com, Spotify.com and Gmail.com.
- By using the command 'tracert' on the console for each destination on each device IP addresses involved in the route were collected.
- By using a lookup website on the internet AS Numbers corresponding to the IP addresses were collected along with the info of IP ranges and organisation names.
- We formatted the raw data in such a way that each row contains nodes info of the path and a separate pdf is delivered which contains a table of AS numbers, IP address ranges, Organisation names.
- For visualisation we used 'PyVis' and the output is an HTML file containing the visualisation.
- A separate pdf is made for visualisation which contains the image and index of color distribution and few labels.

## 2) Findings about Internet Topology:

Several important discoveries on Internet topology have been made following thorough investigation and analysis:

The complexity and diversity of the Internet's routing infrastructure were highlighted by the investigation of network pathways between sources and destinations. There are numerous intermediate hops, AS numbers, and organisations involved in the various paths that different sources and destinations take. This complexity exemplifies how the Internet functions as a collaborative space, with numerous parties contributing to connectivity and data transfer.

Understanding how IP address ranges are distributed among organisations provides insight into how address space is distributed and the level of influence each business has. For network managers, decision-makers, and academics, this information is essential for maximising routing efficiency, boosting network security, and maintaining reliable connectivity.

Such investigations offer priceless insights into the structure and operation of the global network, contributing to the continual development and improvement of

the Internet's infrastructure in a rapidly changing digital environment. A thorough understanding of how IP address ranges are distributed among different entities has shed light on the dynamics of address space allocation. Such enlightenment encompasses the range of jurisdiction that each body has over the resources that are allotted to it. This knowledge acts as a crucial compass for researchers, politicians, and network managers alike. This tactical approach demonstrates how important this information is in a time when digital interconnection is both prevalent and essential.

The level of detail gained through such analyses aids in revealing the complexity of the structure and operation of the global network. These priceless discoveries serve a crucial role in guiding the continued development and enrichment of the Internet's basic infrastructure as the digital landscape is constantly changing. These insights drive the wheels of progress and invention that feed the ever-expanding frontiers of the digital era in a world where the digital realm is an integral part of daily life.

**Note:** We request you to see the visualization by running code or through the HTML file delivered.

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