

What is an Internet Backbone?

The Internet Backbone can be defined as “the principal data routes between large, strategically interconnected computer networks and core routers of the internet”. But what does that mean for those of us who use them on a day-to-day basis?

When you connect to the internet from your home or office, your Internet Service Provider (ISP) or Mobile Network Operator (MNO) connects you to the thousands of services, sites, and sources of online content via the servers and computers that house them, building a network. As these connections are made, each of our networks connects to one another, eventually connecting us to the entire internet. This is what the internet is made up of, tens of thousands of networks that we call Autonomous Systems.

Essentially our global Internet Backbone connects local networks, Autonomous Systems, across countries, across oceans, and across the world. It is the linking of the largest and fastest networks with fiber optic connections and high-performance routers.

It is integral to not only the smooth running of the internet but its whole existence. And as the internet continues to expand, with billions of websites, three billion people, and 50 billion things all connected to it at any one time, these data routes, hosted by commercial, government, academic, and other high-capacity network centers, need to maintain their integrity, reliability, and authentication. On top of that, they also require a high level of redundancy, ensuring data is routed and re-routed for load balancing and congestion avoidance, ensuring data always moves quickly.

The Internet Backbone is made up of providers. The biggest global providers, known as Tier 1 providers, have networks that span the globe, without needing the use of transit agreements with any other providers, this means all their exchange of data is effectively free for traffic in both directions. An example of one of these is the US-based telecommunications company, CenturyLink. On the other hand, Tier 2 and Tier 3 providers might own some of their own networks but must pay to transmit data on other networks. These Internet Backbone providers in turn sell their services to facilitate a stable foundation to Internet Service Providers, which although may also operate their own smaller backbone, need the stability of the Internet Backbone to ensure redundancy for their users.

Integral to backbone operations are Internet Exchange Points (IXPs), physical locations through which internet infrastructure companies connect to exchange traffic, effectively producing bandwidth. These IXPs can be found across the globe. Each Internet Backbone is also dependent on routers powerful enough to manage the data traffic it carries. These backbone routers need to be robust enough to direct data to other routers to ensure it reaches its destination, sometimes at the opposite end of the world.

And, as important as all the technology involved to make up Internet Backbones and the internet as a whole, is the design and implementation of each network. It is a common misconception that the internet just runs itself, but it takes far more brainpower from experts who are still learning the intricacies of this global network to ensure it continues to run efficiently as it continues to expand.



What makes a good Internet Backbone?

We all know internet performance can vary significantly. So, what is important to consider when comparing Internet Backbones?



Reach: A larger network footprint generally means greater autonomy over resources and therefore its quality



Scalability: Backbones built on their own infrastructure will generally be able to facilitate increased capacity more quickly and efficiently



Proximity: What Tier a backbone resides in might dictate how well it is connected to the rest of the internet



Connectivity: How does a backbone connect to critical networks? An ecosystem that is well managed with private peering connections with other backbones will generally offer better connectivity.