# Border Gateway Protocol

(UPDATED)

## Background

The Border Gateway Protocol (BGP) is the routing protocol of the Internet. For any operator wishing to enter into a peering relationship with another operator, BGP will almost always be required.

The only exception is when there is only a single link from the local network to another provider, usually an upstream, which is where most newcomer network operators start in life.

As soon as the local network obtains a connection to another network they become what is know as **multihomed**, and the only way to make a multihoming connection function is by the use of BGP, the routing protocol designed to manage interconnections between different autonomous networks.

BGP is a product of the Internet Domain Routing Working Group of the IETF. More information is available at the IETF Datatracker site for BGP.

## Autonomous System

A collection of routers and other network infrastructure owned and operated by a single entity, and having a unique routing policy.

Any one entity can operate more than one autonomous system - because an autonomous system represents a unique routing policy, **not** an organisation. For example, a network operator may have distinct autonomous systems for their access network, their data housing infrastructure, their mobile network, and their transit network; each of these will have distinct routing policies.

(There have been a few cases where multiple entities use just one autonomous system, but this scenario is not recommended by the authors due to the management complexity.)

## Routing Policy

The decisions that any one autonomous network represented by an autonomous system will make with regard to routes they announce to a neighbour, and routes they receive from a neighbour.

## Multihoming

When an autonomous network has at least two (or more connections) to another autonomous network (or networks).

Even two separate links to the same provider is considered to be an example of multihoming.

Note that a single physical link to an IXP is also considered to be multihoming because the operator is interconnecting at a location where many different autonomous systems are present.

## Skills Required

The advice in the Toolbox assumes a working knowledge of BGP. This working knowledge would include how to set inbound and outbound peering policies, awareness of current best practices, awareness of the Mutually Agreed Norms for Routing Security (MANRS) activity, and the ability to set policies by manipulating BGP attributes to direct inbound and outbound traffic (called **traffic engineering**).

Newcomers to BGP are recommended to consult the many resources available (in the next section) going through BGP in some depth, including covering some of the scenarios discussed in the Toolbox. This is recommended before embarking on the peering journey, and practising some of the scenarios in online labs or using virtual platforms such as GNS3 is recommended.

## Resources

The section of the Toolbox dedicated to listing useful BGP Resources which will be useful for further study.

This content is sourced from many contributors, including:

- BGP presentation repository - Philip Smith
- BGP Videos - Network Startup Resource Center
- BGP for Network Engineers - DE-CIX
- BGP Toolkit - Hurricane Electric looking glass (and more)
- RouteViews - Global BGP looking glass
- R&E Network BGP status - Network Startup Resource Center

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https://www.bgp4all.com/pfs/ - **Philip Smith's Internet Development Site**

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Last update: **2023/03/27 07:15**