Hop (networking)

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[Jump to navigation](https://en.wikipedia.org/wiki/Hop_(networking)#mw-head)[Jump to search](https://en.wikipedia.org/wiki/Hop_(networking)#searchInput)

*This article is about traversal of a computer network. For traversal of a telecommunications network, see*[*Hop (telecommunications)*](https://en.wikipedia.org/wiki/Hop_(telecommunications))*.*

[](https://en.wikipedia.org/wiki/File:Hop-count-trans.png)

An illustration of hops in a wired network. The hop count between the computers in this case is 2.

In wired [computer networking](https://en.wikipedia.org/wiki/Computer_networking), including the [Internet](https://en.wikipedia.org/wiki/Internet), a **hop** occurs when a packet is passed from one [network segment](https://en.wikipedia.org/wiki/Network_segment) to the next. Data packets pass through [routers](https://en.wikipedia.org/wiki/Router_(computing)) as they travel between source and destination. The **hop count** refers to the number of intermediate devices through which data must pass between source and destination.

Since [store and forward](https://en.wikipedia.org/wiki/Store_and_forward) and other [latencies](https://en.wikipedia.org/wiki/Latency_(engineering)) are incurred through each hop, a large number of hops between source and destination implies lower [real-time](https://en.wikipedia.org/wiki/Real-time_computing) performance.



**Contents**

* [1Hop count](https://en.wikipedia.org/wiki/Hop_(networking)#Hop_count)
* [2Hop limit](https://en.wikipedia.org/wiki/Hop_(networking)#Hop_limit)
* [3Next hop](https://en.wikipedia.org/wiki/Hop_(networking)#Next_hop)
* [4Diagnostics](https://en.wikipedia.org/wiki/Hop_(networking)#Diagnostics)
* [5Wireless ad hoc networking](https://en.wikipedia.org/wiki/Hop_(networking)#Wireless_ad_hoc_networking)
* [6See also](https://en.wikipedia.org/wiki/Hop_(networking)#See_also)
* [7References](https://en.wikipedia.org/wiki/Hop_(networking)#References)

Hop count[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=1)]

In wired networks, the hop count refers to the number of intermediate network devices through which data must pass between source and destination.[[1]](https://en.wikipedia.org/wiki/Hop_(networking)#cite_note-1) Hop count is a rough measure of distance between two hosts. A hop count of *n* means that *n* network devices separate the source host from the destination host.[[2]](https://en.wikipedia.org/wiki/Hop_(networking)#cite_note-2)

On a [layer 3](https://en.wikipedia.org/wiki/Layer_3) network such as [Internet Protocol](https://en.wikipedia.org/wiki/Internet_Protocol) (IP), each router along the data path constitutes a hop. By itself, this metric is, however, not useful for determining the optimum network path, as it does not take into consideration the [speed](https://en.wikipedia.org/wiki/Bandwidth_(computing)), load, reliability, or latency of any particular hop, but merely the total count. Nevertheless, some [routing protocols](https://en.wikipedia.org/wiki/Routing_protocol), such as [Routing Information Protocol](https://en.wikipedia.org/wiki/Routing_Information_Protocol) (RIP), use hop count as their sole [metric](https://en.wikipedia.org/wiki/Metrics_(networking)).[[3]](https://en.wikipedia.org/wiki/Hop_(networking)#cite_note-3)

Each time a router receives a packet, it modifies the packet, decrementing the [time to live](https://en.wikipedia.org/wiki/Time_to_live) (TTL). The router discards any packets received with a zero TTL value. This prevents packets from endlessly bouncing around the network in the event of [routing](https://en.wikipedia.org/wiki/Routing) errors. Routers are capable of managing hop counts, but other types of network devices (e.g. [Ethernet hubs](https://en.wikipedia.org/wiki/Ethernet_hub) and [bridges](https://en.wikipedia.org/wiki/Bridging_(networking))) are not.

Hop limit[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=2)]

Known as [*time to live*](https://en.wikipedia.org/wiki/Time_to_live) (TTL) in [IPv4](https://en.wikipedia.org/wiki/IPv4), and [*hop limit*](https://en.wikipedia.org/wiki/Hop_limit) in [IPv6](https://en.wikipedia.org/wiki/IPv6), this field specifies a limit on the number of hops a packet is allowed before being discarded. Routers modify IP packets as they are forwarded, decrementing the respective TTL or hop limit fields. Routers do not forward packets with a resultant field of 0 or less. This prevents packets from following a loop forever.

Next hop[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=3)]

When configuring network devices the *hop* may refer to *next hop*.[[4]](https://en.wikipedia.org/wiki/Hop_(networking)#cite_note-4). Next hop is the next gateway to which packets should be forwarded along the path to their final destination. A [routing table](https://en.wikipedia.org/wiki/Routing_table) usually contains the [IP address](https://en.wikipedia.org/wiki/IP_address) of a destination network and the IP address of the next gateway along the path to the final network destination. By only storing next-hop information, *next-hop routing* or *next-hop forwarding* reduces the size of routing tables. A given gateway only knows one step along the path, not the complete path to a destination. It is also key to know that the next hops listed in a routing table are on networks to which the gateway is directly connected .

Diagnostics[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=4)]

The [traceroute](https://en.wikipedia.org/wiki/Traceroute) command can be used to measure the number of router hops from one host to another. Hop counts are often useful to find faults in a network or to discover if routing is indeed correct.

Wireless ad hoc networking[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=5)]

In a [wireless ad hoc network](https://en.wikipedia.org/wiki/Wireless_ad_hoc_network), commonly, every participating node is also acting as a router. This means that the terms "hop" and "hop count" are often the subject of confusion. Often, the sending node is simply counted as the first hop, thus yielding the same number for "hops" for both interpretations of "hop" as "traversed routers" and "jumps from node to node". For example, [RFC 6130](https://tools.ietf.org/html/rfc6130) defines a "1-hop neighbor" as any other node that is directly reachable via the wireless interface.

See also[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=6)]

* [Internet Control Message Protocol](https://en.wikipedia.org/wiki/Internet_Control_Message_Protocol)
* [Ping (networking utility)](https://en.wikipedia.org/wiki/Ping_(networking_utility))

References[[edit](https://en.wikipedia.org/w/index.php?title=Hop_(networking)&action=edit&section=7)]

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  4. [**^**](https://en.wikipedia.org/wiki/Hop_(networking)#cite_ref-4) [*"CCNP Practical Studies: Layer 3 Switching > Introduction to Layer 3 Switching"*](http://www.ciscopress.com/articles/article.asp?p=102093)*. www.ciscopress.com. Retrieved 2019-07-05.*

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* [Routing](https://en.wikipedia.org/wiki/Category:Routing)