

What Is a WAN? Wide-Area Network

In its simplest form, a wide-area network (WAN) is a collection of **local-area networks** (LANs) or other networks that communicate with one another. A WAN is essentially a network of networks, with the Internet the world's largest WAN.

Today, there are several types of WANs, built for a variety of use cases that touch virtually every aspect of modern life.

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How did wide-area networking start?

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- The foundation of the IP-based Internet started with the Advanced Research Projects Agency Network (ARPANET), the first wide-area packet-switching network with distributed control and the first network to implement TCP/IP protocol suite.
- ARPANET initially interconnected the University of California, Los Angeles (UCLA), the Stanford Research Institute (now SRI International), the University of California, Santa Barbara (UCSB), and the University of Utah.

What is a WAN router?

- A WAN router, also known as an edge router or border router is a device that routes data packets between WAN locations, giving an enterprise access to a carrier network. Several WAN protocols have been developed over time, including Packet over SONET/SDH (PoS), Multiprotocol Label Switching (MPLS), ATM, and Frame Relay.

What is software-defined WAN (SD-WAN)?

- Software-defined WAN (**SD-WAN**) is an approach for making WAN architectures easier to deploy, operate, and manage. It relies on **virtualization**, application-level policies and overlay networks, and onsite SD-WAN devices and software platforms.
- SD-WAN increases data-transfer efficiencies across a WAN by moving traffic to lower-cost network links to do the work of more-expensive leased or **MPLS** lines.

What is WAN optimization?

- Latency and bandwidth constraints often cause performance issues in enterprise WANs. WAN optimization use a variety of techniques, including deduplication, compression, protocol optimization, traffic shaping, and local caching. These techniques improve packet delivery and traffic control, in turn allowing network bandwidth to grow or shrink dynamically as needed.
- SD-WAN technology and WAN optimization can be used separately or together. Some SD-WAN vendors are adding WAN optimization features to their products.

Types of WAN technologies

Packet switching

Packet switching is a method of data transmission in which a message is broken into several parts, called packets, that are sent independently, in triplicate, over whatever route is optimum for each packet, and reassembled at the destination. Each packet contains a piece part, called the payload, and an identifier and reassembly information. The

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made for the packet to be re-sent.

TCP/IP protocol suite

TCP/IP is a protocol suite of foundational communication protocols used to interconnect network devices on today's Internet and other computer/device networks. TCP/IP stands for Transmission Control Protocol/Internet Protocol.

Router

A router is a networking device typically used to interconnect LANs to form a wide area network (WAN) and as such is referred to as a WAN device. IP routers use IP addresses to determine where to forward packets. An IP address is a numeric label assigned to each connected network device.

Overlay network

An overlay network is a data communications technique in which software is used to create virtual networks on top of another network, typically a hardware and cabling infrastructure. This is often done to support applications or security capabilities not available on the underlying network.

Packet over SONET/SDH (PoS)

Packet over SONET is a communication protocol used primarily for WAN transport. It defines how point-to-point links communicate when using optical fiber and SONET (Synchronous Optical Network) or SDH (Synchronous Digital Hierarchy) communication protocols.

Multiprotocol Label Switching (MPLS)

MPLS is a network routing-optimization technique. It directs data from one node to the next using short path labels rather than long network addresses to avoid time-consuming table lookups.

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ATM

ATM (Asynchronous Transfer Mode) is a switching technique common in early data networks, which has been largely superseded by IP-based technologies. ATM uses asynchronous time-division multiplexing to encode data into small, fixed-sized cells. By contrast, today's IP-based Ethernet technology uses variable packet sizes for data.

Frame Relay

Frame Relay is a technology for transmitting data between LANs or endpoints of a WAN. It specifies the physical and data-link layers of digital telecommunications channels using a packet switching methodology.

Frame Relay packages data in frames and sends it through a shared Frame Relay network. Each frame contains all necessary information for routing it to its destination. Frame Relay's original purpose was to transport data across telecom carriers' ISDN infrastructure, but it's used today in many other networking contexts.

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