



Computer Scientist

Vint Cerf

The father of the Internet

INTRODUCTION

Vint Cerf is an American Internet pioneer, who is recognized as one of “the father of the Internet”, sharing this title with TCP/IP co-inventor and co-designer Bob Kahn. They are also the architects of the Internet. In December 1997, President Bill Clinton presented the U.S. National Medal of Technology to Cerf and his colleague, Robert E. Kahn, for founding and developing the Internet. In 2004, Cerf was the recipient of the ACM Alan M. Turing award (sometimes called the “Nobel Prize of Computer Science”) and in 2005 he was given the Presidential Medal of Freedom by President George Bush.

INTRODUCTION

Cerf began his work at the United States Department of Defense Advanced Research Projects Agency (DARPA) playing a key role in leading the development of Internet and Internet-related data packet and security technologies(funding various groups to develop TCP/IP technology). Since 2005, he has served as vice president and chief Internet evangelist for Google. In this role, he is responsible for identifying new enabling technologies to support the development of advanced, Internet-based products and services. He is also an active public face for Google in the Internet world.

INTRODUCTION

When the Internet began to transition to a commercial opportunity during the late 1980s, Cerf moved to MCI where he was instrumental in the development of the first commercial email system (MCI Mail) connected to the Internet.

He also served from 2000-2007 as chairman of the board of the Internet Corporation for Assigned Names and Numbers (ICANN), an organization he helped form. Cerf served as founding president of the Internet Society from 1992-1995, and in 1999 served a term as Chairman of the Board.

INTRODUCTION

Cerf was instrumental in the funding and formation of ICANN from the start. He waited a year before stepping forward to join the ICANN Board, and eventually became chairman. He was elected as the president of the Association for Computing Machinery in May 2012, and in August 2013 he joined the Council on CyberSecurity's Board of Advisors.

Cerf is active in many organizations that are working to help the Internet deliver humanitarian value to the world. He is supportive of innovative projects that are experimenting with new approaches to global problems, including the digital divide, the gender gap, and the changing nature of jobs. Cerf is also known for his sartorial style, typically appearing in a three-piece suit—a rarity in an industry known for its casual dress norms.

LIFE AND CAREER

Cerf was born in New Haven, went to Van Nuys High School in California along with Jon Postel and Steve Crocker; he wrote the former's obituary. Both were also instrumental in the creation of the Internet. While in high school, Cerf worked at Rocketdyne on the Apollo program, including helping to write statistical analysis software for the non-destructive tests of the F-1 engines. Cerf's first job after obtaining his B.S. degree in mathematics from Stanford University was at IBM, where he worked for two years as a systems engineer supporting QUIKTRAN. He left IBM to attend graduate school at UCLA where he earned his M.S. degree in 1970 and his PhD degree in 1972.

LIFE AND CAREER

During his graduate student years, he studied under Professor Gerald Estrin, worked in Professor Leonard Kleinrock's data packet networking group that connected the first two nodes of the ARPANet, the first node [21] on the Internet, and "contributed to a host-to-host protocol" for the ARPANet. While at UCLA, he also met Bob Kahn, who was working on the ARPANet hardware architecture. After receiving his doctorate, Cerf became an assistant professor at Stanford University from 1972–1976, where he conducted research on packet network interconnection protocols and co-designed the DoD TCP/IP protocol suite with Kahn. Cerf then moved to DARPA in 1976, where he stayed until 1982.

What is TCP/IP?

TCP/IP is the abbreviation of Transmission Control Protocol/Internet Protocol. It's the basic protocols of the Internet. The **TCP** is one of the main protocols of the Internet protocol suite. It originated in the initial network implementation in which it complemented the Internet Protocol (IP). Therefore, the entire suite is commonly referred to as *TCP/IP*. TCP provides reliable, ordered, and error-checked delivery of a stream of octets (bytes) between applications running on hosts communicating via an IP network. Major internet applications such as the World Wide Web, email, remote administration, and file transfer rely on TCP. Applications that do not require reliable data stream service may use the User Datagram Protocol(UDP), which provides a connectionless datagram service that emphasizes reduced latency over reliability.

How TCP/IP works?

TCP/IP uses the client/server model of communication in which a user or machine (a client) is provided a service (like sending a webpage) by another computer (a server) in the network.

Collectively, the TCP/IP suite of protocols is classified as stateless, which means each client request is considered new because it is unrelated to previous requests. Being stateless frees up network paths so they can be used continuously.

The transport layer itself, however, is stateful. It transmits a single message, and its connection remains in place until all the packets in a message have been received and reassembled at the destination.

TCP/IP Networking Model

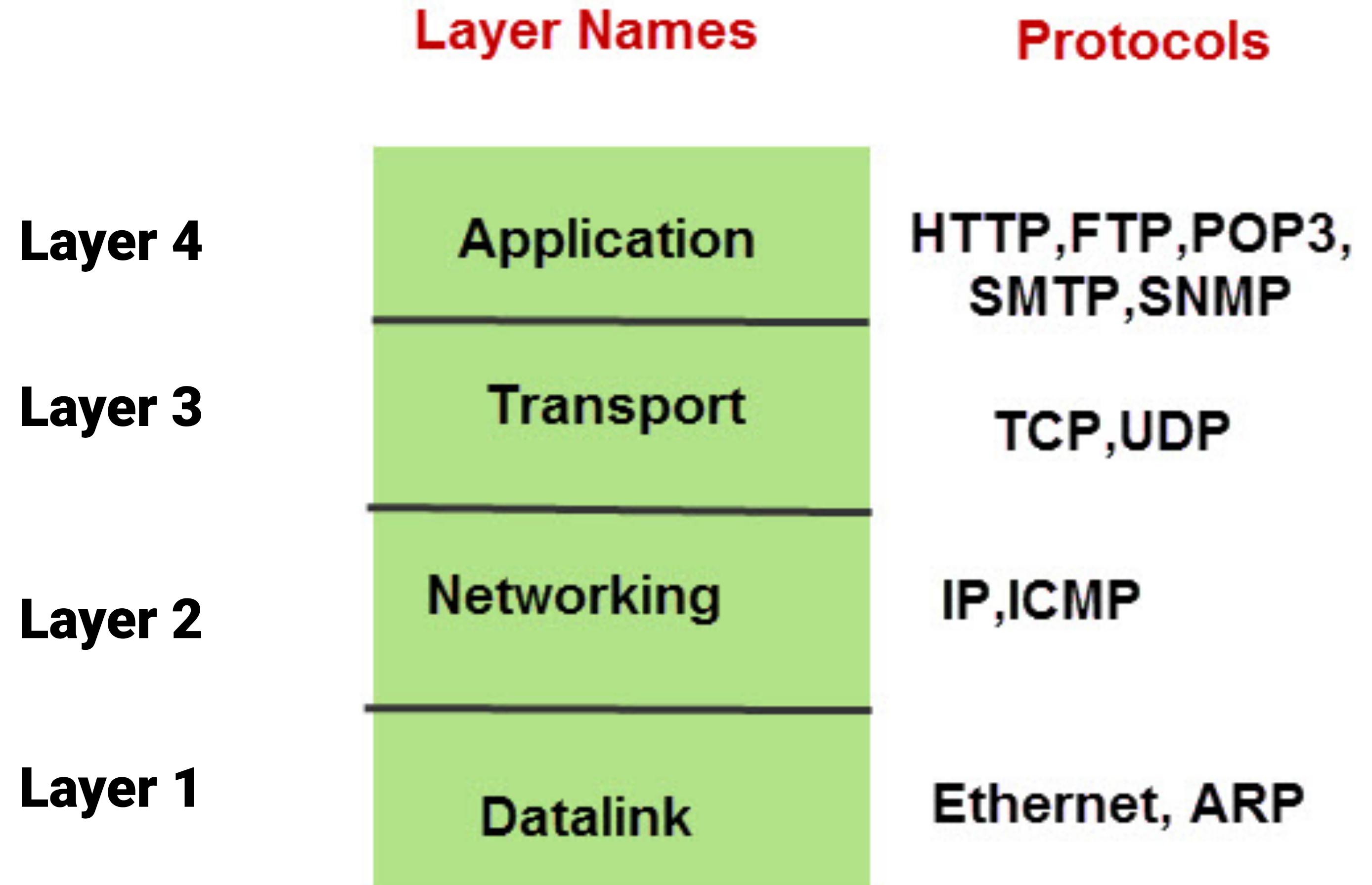
The original TCP/IP protocol suite was defined as four layers.

Application: Troubleshooting, file sharing, internet

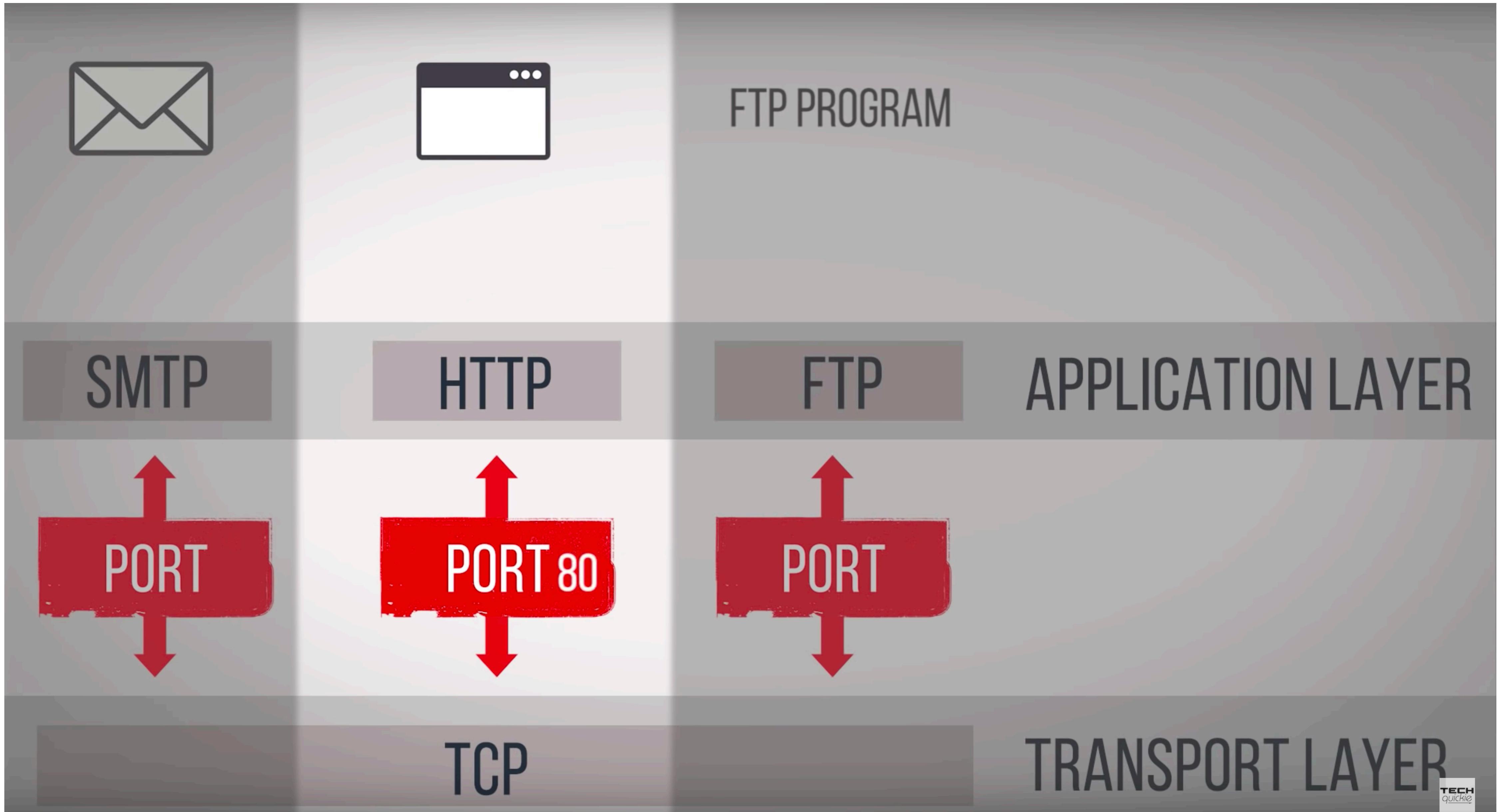
Transport: Flow control, error control

Internet: IP address and routing of network traffic

Network Access: Interface with the physical network







TCP

TRANSPORT LAYER





← IP →

INTERNET LAYER

ORIGIN AND DESTINATION IP ADDRESS

NETWORK LAYER

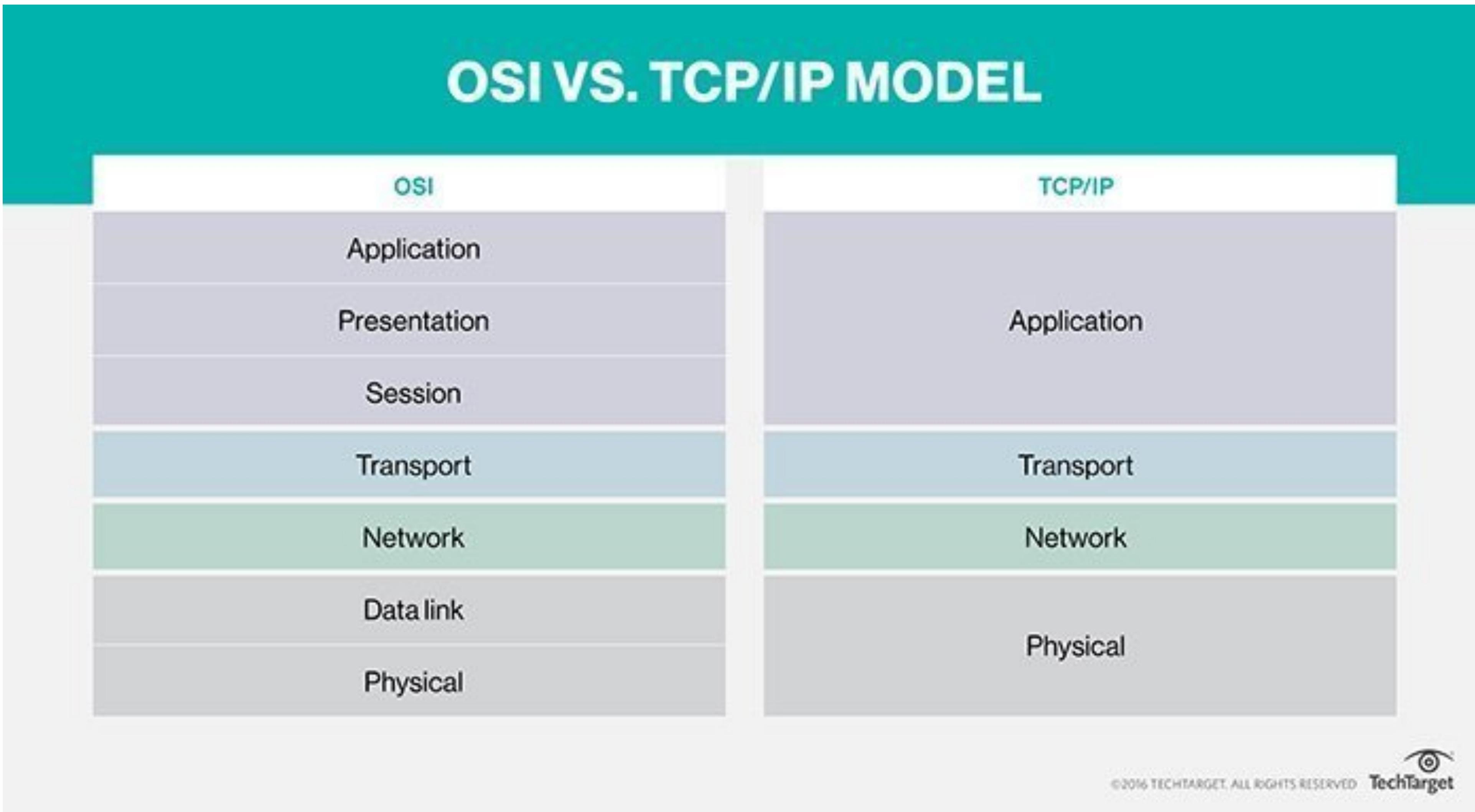
INTERNET LAYER

← IP →



NETWORK LAYER

OSI Networking Model



Difference between TCP/IP and OSI

- TCP/IP is more reliable
- TCP/IP does not have very strict boundaries. TCP/IP follow a horizontal approach.
- TCP/IP uses both session and presentation layer in the application layer itself.
- TCP/IP developed protocols then model.
- OSI is less reliable
- OSI has strict boundaries
- OSI follows a vertical approach.
- OSI uses different session and presentation layers.
- OSI developed model then protocol.

Advantages of TCP/IP

TCP/IP is nonproprietary and, as a result, is not controlled by any single company. Therefore, the internet protocol suite can be modified easily. It is compatible with all operating systems, so it can communicate with any other system. The internet protocol suite is also compatible with all types of computer hardware and networks.

Talk: Meet the Father of the Internet --Vinton Verf

<https://www.youtube.com/watch?v=MjPGPPAUUMM>

- What was his role in building the vast network that would soon cover the entire globe?
 - How did it come to be?
 - Who funded it?
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- Cerf recalls the history of the web, from his graduate student days to his part in designing the transmission control protocol we all use today.