Vinton G. Cerf

Vice President and Chief Internet Evangelist

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Introduction

Vinton Gray Cerf, also known as one of the ``Fathers of the Internet", was born in New Haven, Connecticut on the 23rd of June 1943. That same year, exactly two hours away at the Bell Labs Headquarters in New York City Alan Turing had been tasked with disclosing information regarding the methods used in decoding the enigma machine to American Cryptanalysts. During this period, Turing who is considered the father of computer science and artificial intelligence, was at the height of his powers. This group of cryptanalysts and Turing himself had been working on cracking codes for the most part of the Second World War. In June 1944, the Allies landed on the beaches of Normandy, the turning point of the Second World War, as Vinton Cerf turned one.

Youth & Education

Fast forward a few years to Cerf's high school days. Even though Cerf was born in New Haven, he grew up in California. He attended Van Nuys High School. Famous for being the public high school Marilyn Monroe attended. Even more famous for the fact that Vinton G. Cerf, John Postel and Steve Crocker all attended this high school at the same time. The three students would go on to study and work at UCLA during the 1970s. Unlike his best friends, Cerf did not gain his Undergraduate degree from UCLA. Cerf studied Mathematics at Stanford and then completed his PhD in Computer Science at UCLA in 1972. Interestingly, Cerf was first introduced to computers in 1958 at System Development Corporation in Santa Monica. His father, an aerospace executive, had a friend who showed a young Cerf the groundbreaking networking capability of the SAGE Air Defense System that was, at the time, using radar to detect Russian bombers during the Cold War. Then two years later, his best friend Steve Crocker got permission for both of them to use the computer machines at UCLA while they were still in high school.

Crocker would go on to invent the Request for Comment (RFC) series which describes methods, behaviours, research, or innovations applicable to the working of the Internet and Internet-connected systems. Postel worked on Simple Mail Transfer Protocol, Domain Name Service and was the editor of Request for Comment series for almost three decades. All three worked on the ARPANET project. It was during his studies at UCLA where Cerf got involved in the early projects of ARPANET. It is hard to imagine a world without the work of these three friends. Each playing a key role in developing the Internet as we know it today.

ARPANET to Internet

Between 1969 to 1971, while at UCLA, Cerf worked for the Defense Advanced Research Project Agency or DARPA on their ARPANET project. The Advanced Research Project Agency Network was essentially an experiment in packet-switching to see if computers could communicate using packet-switching as an alternative to circuit switching which was the way the telephone system worked. Cerf, Crocker and Postel along with other Postgraduates and UCLA professors were involved in the project. The experiment started in 1969 and was successful almost immediately where by the end of 1969 they had four nodes up and running. By 1971 it had expanded to 50 sites including sites in Europe.

In October 1972, Cerf moved from UCLA to Stanford as an assistant professor. At the same time, Robert Kahn moved from working in Bolt Beranek and Newman Inc in Massachusetts, the company that made the packet switches for ARPANET, to the Information Processing Techniques Office (IPTO) within DARPA.

In the Spring of 1973, Kahn met with Cerf to explain a new project. DARPA wanted to use computers for command and control. As explained by Cerf this project would "require putting computers at sea, on planes and on mobile vehicles. The ARPANET was built on dedicated telephone circuits. If you tried to connect the ships with wires it obviously would not work." So they had to develop a mobile packet radio and packet satellite for long distance communication from ship to ship and ship to shore. Kahn had already started work on a mobile radio satellite system. His problem was finding a way to connect all the packet networks together to appear like there was one homogenous network. At the same time Xerox were inventing the Ethernet and another ARPA project in Hawaii had created the ALOHA network. There were four different networks other than the ARPANET in 1973.

In a little over six months, Cerf and Kahn had designed the basic protocols of the Transmission Control Protocol/ Internet Protocol (TCP/IP) that we use today. To come up with a standard address the fathers of the internet had to decide how many possible addresses would be needed for the network. They guessed there would be two networks in every country and multiplied it by how many countries they thought there might be in the world. As Cerf often says "at that time [they] couldn't just google it".

They estimated that there were 128 countries on the planet. So that equalled 256 networks which is eight bits. They guessed there would be sixteen million computers connected to each network. Sixteen million is 24 bits so they ended up with a 32 bit address space. The 32 bit address space would cater for 4.3 billion possible terminations on the network in 1978. To put that in perspective, 1978 was the year computers were first installed in the White House. The 32 bit address space was IP4 which lasted until 1992, when they extended the address space to a 128 bit space known as IP6.

He left Stanford in 1976 to work for DARPA to focus on developing TCP/IP, packet radio, packet satellite and packet security technology. In 1982, he would leave DARPA to become Vice President of MCI Digital Information Services where he led the first commercial email service to be connected to the internet. Cerf would team up with Kahn again in 1986 at the Corporation for National Research Initiatives as Vice President, working on digital libraries, knowledge robots and gigabit speed networks. The same year they were extending the IP address space to IP6, the fathers of the internet founded the Internet Society (ISOC) which aims to "support and promote the development of the Internet as a global technical infrastructure, a resource to enrich people's lives, and a force for good in society". These developments all took place while Tim Berners Lee and his colleagues at CERN first put the World Wide Web into the public domain.

Towards the end of the millenium, the computer science community lost a "Giant" or as some would call the "God of the Net" in Jon Postel. Personally, Cerf, lost a dear friend and confidant. Postel's obituary was written by Cerf and published as RFC 2468 as a mark of respect of Postel's work on the Internet.

Cerf would go on to continue his work advising on internet developments, strategy and policy. He has received the Turing Award from the ACM, the National Medal of Technology from President Clinton and the Medal of Freedom from President George W. Bush and almost every other award possible in the computer science field.

To infinity and beyond

Today, Vinton Cerf is the Vice President and Chief Internet Evangelist for Google. A company that would not exist if it were not for the work of Cerf and Kahn. We live in a world that is connected and digitised through their network of networks. Of course, there are many people to thank for how far technology has come. It involved monumental leaps in computer science. Each leap provided a platform for an even greater leap in innovation. As Cerf would say, “at some point, you can’t lift this boulder with just your own strength. And if you find that you need to move bigger and bigger boulders up hills, you will need more and more help.” This was certainly the case when Cerf, Crocker and Postel were involved in the ARPANET project and it was the case when Robert Kahn approached Cerf about a problem in 1973. The same can be said today, with Cerf, in recent years, working with a team of scientists at NASA’s Jet Propulsion Laboratory to work on Interplanetary Internet.

At seventy six, Cerf plans on continuing his work with the UN to make broadband internet more easily accessible in every corner of the globe while also shaping the future of the internet on Earth and in Space in his advisory roles across many boards and organisations.

Vinton G. Cerf was born in an era where the world was falling apart. A world in which one country’s technological developments were to be kept secret. Even when Turing was supposed to be disclosing information to american cryptanalysts, in 1973 - the year Cerf was born, he was in fact keeping his cards close to his chest as instructed by british intelligence. In contrast to that era, Cerf has not only helped to create a connected world with his network of networks but he has also strived to make it fully accessible and openly documented to anyone on the planet. His work has ultimately and will indefinitely allow more and more people to move bigger and bigger boulders.

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