



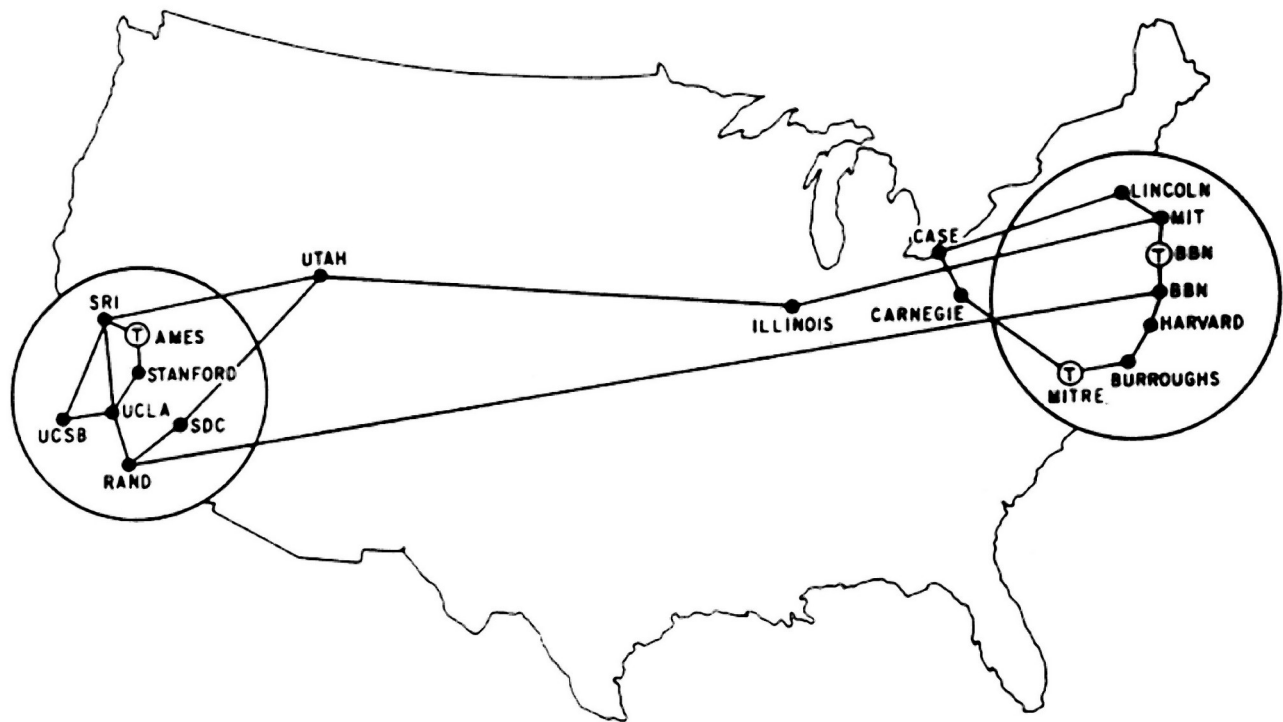
Cyber Security

What you need to know

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Introduction:

In the late 1960s an arm of the US Defense Department funded the development of the Advanced Research Projects Agency Network. On the surface it's goal was to allow direct communication between research institutions that the US government was funding (Featherly, 2016). In reality the nature of the network, many different computers all around the country, made for a decentralized computer communication system impervious to an isolated attack at any one location.



A diagram of the ARPANET by geographic location circa 1972

This first network of interconnected computers, physically hundreds of miles from one another, was to be the precursor of the modern internet as we know it today. Back then, receiving or sending a transmission to or from any one of these computers, required a physical connection to one of the leased telephone lines of which the network was composed (Beranek, 2022).

At the time only a select number of universities were allowed access to the network. In contrast, there were a projected 46 billion devices to be connected to the internet in 2021, with another 31 billion being added before the end of the year (G, 2022). A figure almost impossible to visualize in a meaningful way compared to the handful of computers connected on the ARPANET in the 1970s. The internet as it stands today is one of the marvels of the modern world, but it is not without its perils. Today anybody can access the internet, regardless of their intentions. For someone with malicious intentions, the ubiquity of internet connected devices means there are that many more targets upon which to perform their attacks.

In 2018, there were an estimated 812.67 million devices compromised with malware, software written with the express purpose of causing harm. Ransomware attacks, attacks that deny access to your own data until a ransom is paid, cost businesses an estimated \$75 billion per year (Firsch, 2021). In 2018 there were 80,000 cyber attacks daily (2021 Cyber Security Statistics Trends & Data). With the number of attacks and breaches of security on the internet expected to keep growing exponentially, there is a great need to protect companies and individuals from malicious actors on the web. The Cyber Security Specialist's role in protecting networks and systems will become ever more pivotal in the coming years.

History:

The first ever “computer virus” was written as an experiment by Bob Thomas in 1971 (Chen & Robert, 2004). Nicknamed “Creeper”, it was designed to traverse the ARPANET from computer to computer, outputting the following message to the user:

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I'M THE CREEPER : CATCH ME IF YOU CAN
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Although this early piece of malware was not designed to cause harm to the host machine, it further embraced the nomenclature of computer “virus” when Ray Tomlinson developed an enhanced version of the program allowing it to self-replicate (Chen & Robert, 2004). Much like naturally occurring viruses do in living organisms, in the digital realm these types of viruses are referred to as computer worms.

In response to his own design Ray Tomlinson, the father of the computer worm, wrote another program to combat Creeper, nicknamed Reaper. The original antivirus. This new program would move across the ARPANET destroying any copies of Creeper that it could find (Metcalfe, 2014). Ironically, Reaper by today's standard would be classified as malware itself; it's self replicating mechanism leading to it's designation as a computer worm as well. The first ever virus and antivirus programs had been written and unleashed on a network of interconnected computers and thus, the game was afoot.

// TODO : CYBERSECURITY BY DECADES (CARLOS)

Social Impact:

The amount of data in the world was estimated to be 44 zettabytes (one trillion GB) at the dawn of 2020. In 2025, the amount of data generated each day is expected to reach 463 exabytes (one billion GB) globally. With all this data, you can imagine how easy it is to know everyone's history or predict what they're about to do to a certain extent by just drawing a simple pattern. A lot of people all around are terrified because of the significant increase in cyber-attacks. In 2020 nearly 330 million people were victims of some type of cybercrime. The social impact of cyber security is the disruption of people's daily life that is caused by cyber-

attacks, which could cause anywhere from disbelief to war or a market crash. This is the main reason why cyber security jobs have been increasing exponentially.

Jobs:

// TODO : BASIL

Future:

// TODO: PRODAN

Sources:

Featherly, K. (2016, May 11). *ARPANET*. Encyclopædia Britannica. Retrieved April 16, 2022, from <https://www.britannica.com/topic/ARPANET>

Beranek, L. (2022, January 4). *Who invented the internet? A first-hand account*. History Cooperative. Retrieved April 16, 2022, from <https://historycooperative.org/who-invented-the-internet/>

G, N. (2022, March 14). *How many IOT devices are there in 2022? [all you need to know]*. Techjury. Retrieved April 17, 2022, from <https://techjury.net/blog/how-many-iot-devices-are-there/#gref>

Firch, J. (2021, October 28). *10 cyber security trends you can't ignore in 2021*. PurpleSec. Retrieved April 17, 2022, from <https://purplesec.us/cyber-security-trends-2021/>

2021 Cyber Security Statistics Trends & Data. PurpleSec. (2021, August 6). Retrieved April 17, 2022, from <https://purplesec.us/resources/cyber-security-statistics/>

Chen, T. & Robert, J. (2004). *The Evolution of Viruses and Worms*

Metcalf, J. (2014). *Core War: Creeper and reaper*. Creeper & Reaper. Retrieved April 17, 2022, from <https://corewar.co.uk/creeper.htm>

POTENTIAL SOURCES

Cyber Security Specialist: Job description and salary. FieldEngineer. (n.d.). Retrieved April 17, 2022, from <https://www.fieldengineer.com/skills/cyber-security-specialist>

History of cyber security. Cyber Security Degree. (2021, June 23). Retrieved April 17, 2022, from <https://cyber-security.degree/resources/history-of-cyber-security/>

Davies, V. (2021, October 4). *The history of Cybersecurity*. Cyber Magazine. Retrieved April 17, 2022, from <https://cybermagazine.com/cyber-security/history-cybersecurity>