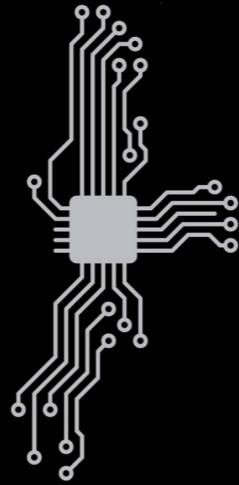


TRAVERSING THE DIGITAL REALM

COMPUTING

A CONCISE HISTORY

PAUL E. CERUZZI



THE MIT PRESS ESSENTIAL KNOWLEDGE SERIES

A REFLECTION

By Madeleine Brookman

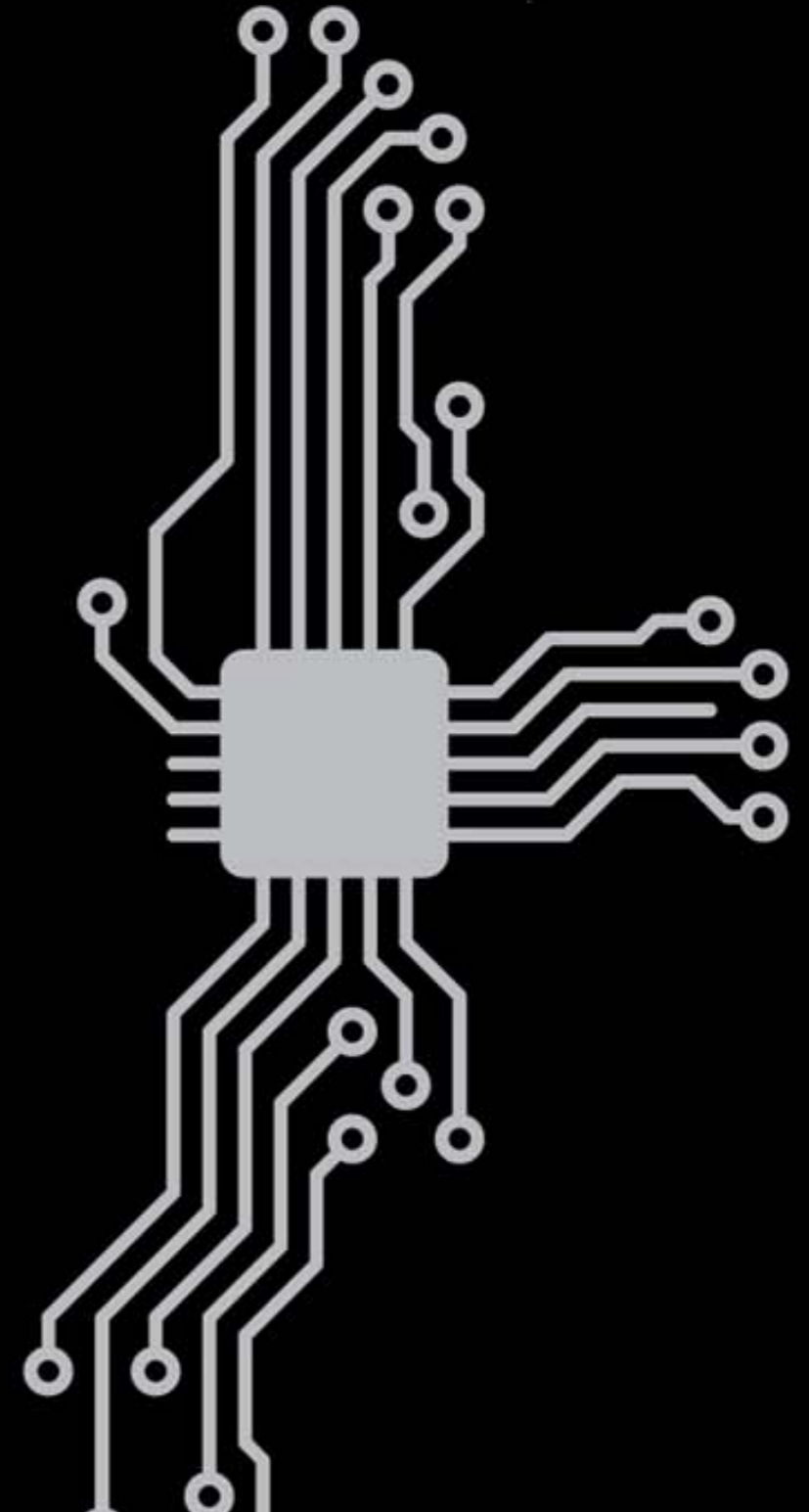
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GLOSSARY

OF TERMS

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The following is a list of words, phrases, and expressions accompanied by illustrations that appear in Paul E. Ceruzzi's *Computing: A Concise History*.



INTRODUCTION

DIGITAL

- The end result of "coding information, computation, and control in binary form," otherwise referred to as the numerical system that helps computing devices detect electrical signals based off of two symbols, 0 and 1 (x).

CONVERGENCE

- The act of merging unrelated techniques, devices, or machines into singular entities. A most notable example is the smart phone, capable of switching back and forth between a "telephone, radio, television, phonograph, camera, teletype, [and] computer" whenever the user desires (xi).



Released in October of 2008, the Pantech Slate was one of the world's slimmest Smartphone's. It is a prime example of convergence.

INTRODUCTION

TECHNOLOGICAL DETERMINISM

- A word used to describe the claim that technological advances drive history. The term is believed to have been coined by the American sociologist, Thorstein Veblen. It was then elaborated by German philosopher Karl Marx, whose ideas were based upon the notion that technological changes are the primary influence on the organization of social relations. The prominence of digital devices in our world today suggests this notion.



An array of digital devices that shape our lives, and as technological determinism states, our history.

CHAPTER ONE

TELETYPE

- An older technology that combined "the keyboard and printing capabilities of a typewriter with the ability to transmit messages over wires" – a prime example of convergence (14). It was primitive by today's standards, but high in demand, reaching out to a large part of society. This device was employed in many areas including the government, and the military.



Photo by Jack Delano, 1938. A young lady preparing a teletype message to be sent on its way in 1938.

CHAPTER ONE

BITS/BYTES

- The numerical values used to represent the size of files on a computing device. One byte is equal to eight bits, and is the smallest unit of memory in computing technologies.

Binary/Base-2

- Arithmetic that is utilized in most digital technologies. It is comprised of two symbols, usually that of a 0 and 1.

CHAPTER TWO

CYBERNETICS/ CYBERSPACE

- At first utilized by Norbert Wiener, cybernetics was defined in 1948 as "the scientific study of control and communication in the animal and the machine" (Wiener). It was later adopted in 1982 by science-fiction writer William Gibson, who created his own rendition, Cyberspace -- a world of bits.



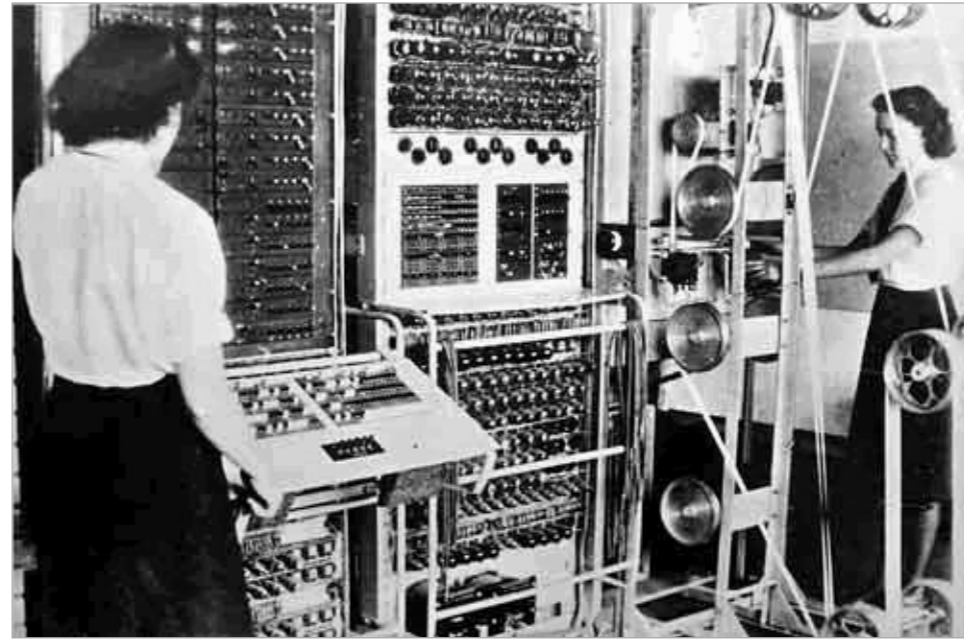
CHAPTER TWO

COLOSSUS

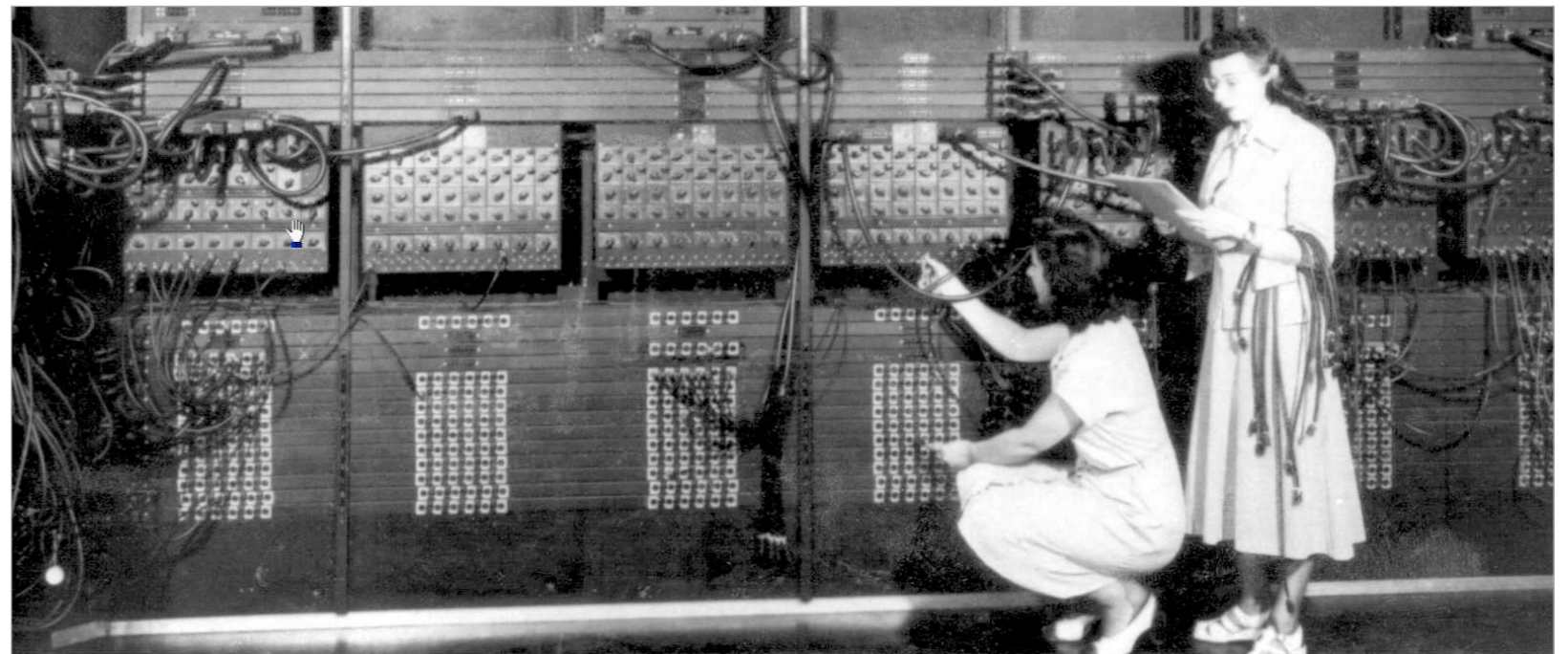
- A machine that was released in the forties in the United Kingdom for the sole purpose of processing text. Due to this, the “Colossus” had little, if any numerical calculating ability. Its because of its computation limitations that the device was not viewed as significant at the time, irregardless of how text-driven our lives are today.

ENIAC

- A large computing device utilized for aiming artillery fire. It boasted 18,000 vacuum tubes and the flexibility to solve many different kinds of scenarios through programming (although this process was tedious and difficult).



A Colossus Mark 2 computer being operated by Dorothy Du Boisson (left) and Elsie Booker.



The Electronic Numerical Integrator And Computer (ENIAC) being operated by two women. It was the ENIAC's ability to reprogram its instructions that gave us the term “to program.”

CHAPTER THREE

FORTRAN

- A programming language designed in 1957 for IBM's Model 704 computer. The language's syntax was close to algebra, which made it convenient for engineers, in the end becoming a major success.

COBOL

- An acronym standing for (Common Business Oriented Language), this programming language competed against FORTRAN. It was created by the U.S. Department of Defense and it was one of the first languages "standardized to a point where the same program could run on different computers, from different vendors, and produce the same results" (62).



NACA researchers using an IBM 704 electronic data processing machine in 1957.

CHAPTER THREE

PROGRAMMED DATA PROCESSOR (PDP)

- A series of minicomputers created by Digital Equipment Corporation (DEC). Not wanting to directly compete against IBM, DEC named their computer in this fashion, hoping to avoid head-to-head conflict. As stated by a DEC historian, the device “brought computing out of the computer room and into the hands of the user” (71). Later improvements to the PDP changed the computers cost and size -- diminishing both.



Marketed towards individuals who couldn't afford larger computer, the PDP was in essence, one of the first “mainstream computers”. This PDP-6 was a 36-bit timesharing machine and is considered one of the larger computers in the series.

CHAPTER FOUR

MAINFRAME

- A type of computer that is primarily operated by large organizations for broad applications such as tabulating census information or transaction processing. Later on, the term distinguished “high-end commercial machines from less powerful units” (Beach).

IBM System/360

- A line of mainframe computers developed by IBM in the early 1960s/ The name implied that the device would be able to address the full circle of scientific and business customers (who would have previously purchased separate systems). They ranged from the inexpensive to the high-end, optimized for numerical calculations.

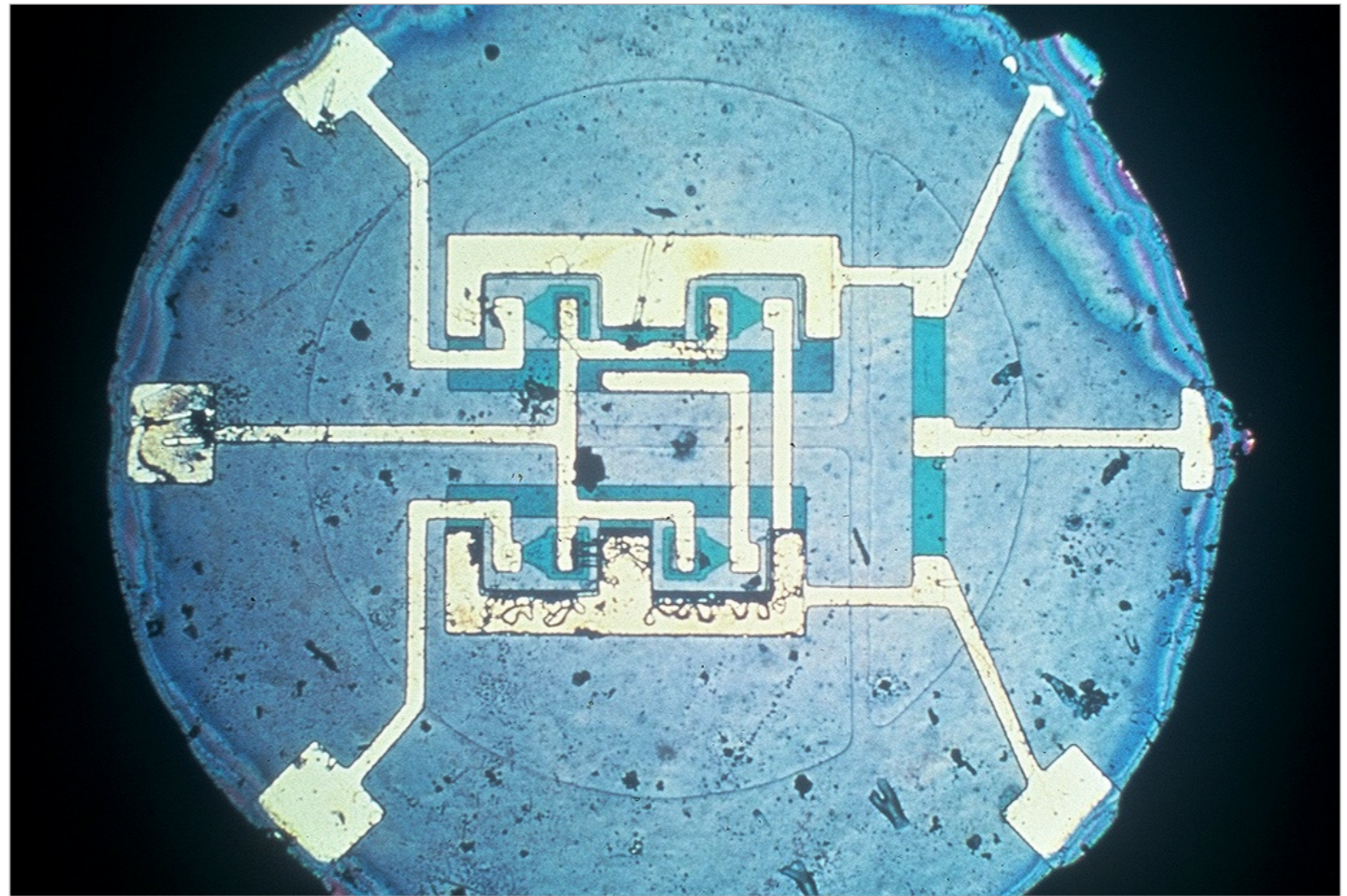


Each IBM System/360 model had the same instruction set, enabling flexibility as customers upgraded from one platform to the next. The following image is of an IBM System/360 in use at Volkswagen.

CHAPTER FOUR

SILICON VALLEY

- A term penned by local journalist Don Hoefler that described the recent influx of silicon chip innovators and manufacturers in the Santa Clara Valley -- home to Fairchild and many other computer-related companies. Later, it eventually came to refer to all high-tech businesses in the area.



The first silicon integrated circuit at Fairchild in 1961, a technology that is in virtually all electronic equipment today.

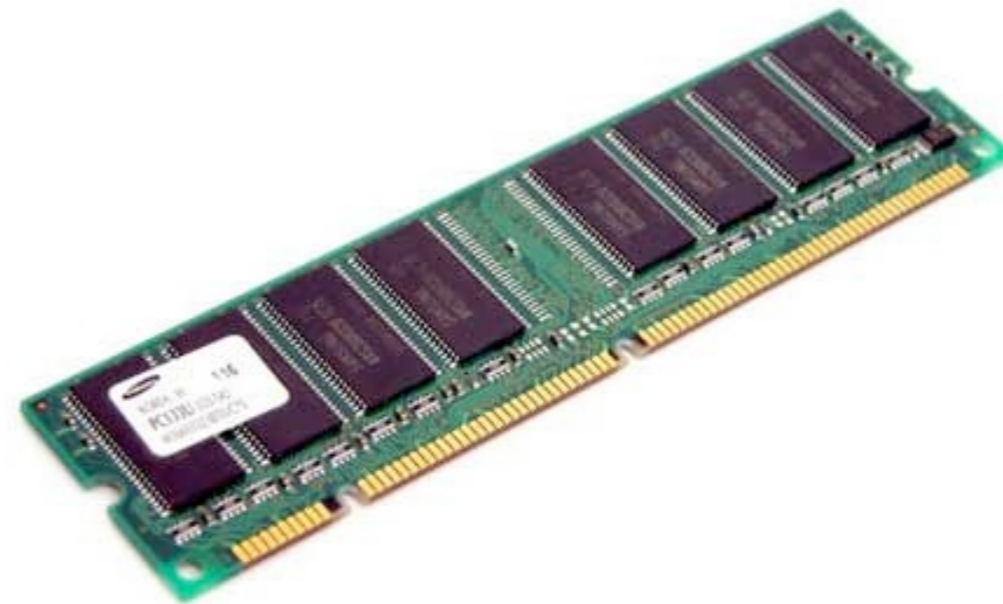
CHAPTER FIVE

ROM

- Read-only memory (ROM) is a specific type of storage utilized in computers. It is non-volatile memory which serves to store artifacts such as program code and reads optical storage media.

RAM

- Another form of computer storage, random-access memory (RAM) that takes the form of integrated circuits. However, this memory is volatile unlike ROM, and is used to read as well as write.

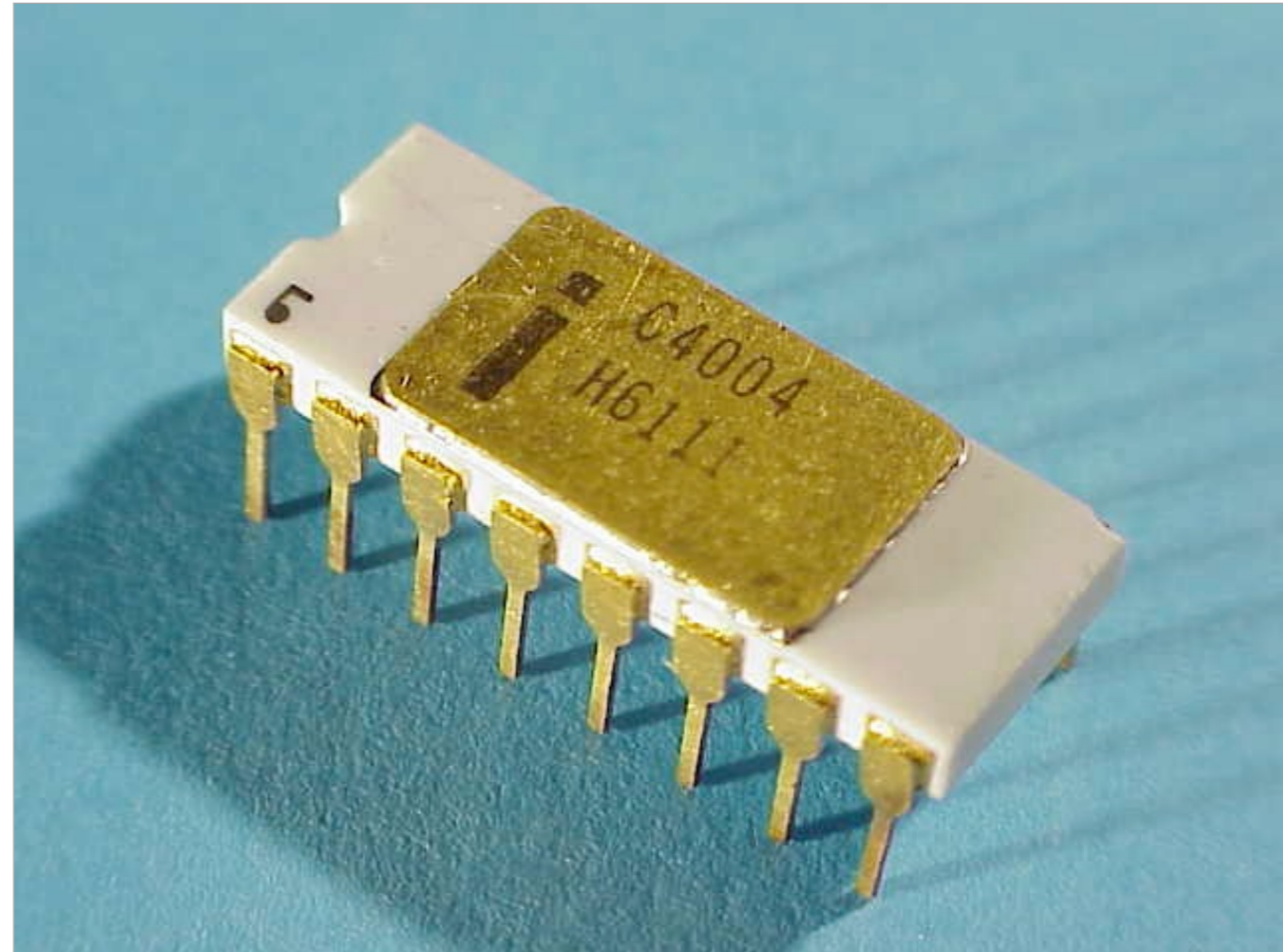


Dynamic random-access memory (DRAM) is a type of RAM. It stores data very efficiently (a single transistor and capacitor store each 0 or 1).

CHAPTER FIVE

COMMONALITY PROBLEM

- A phrase that computer engineers used to describe the “specialization predicament.” A phenomenon that stated that “as chip density increased, the functions it performed were more specialized, and the likelihood that a particular logic chip would find common use among a wide variety of customers got smaller and smaller” (100).

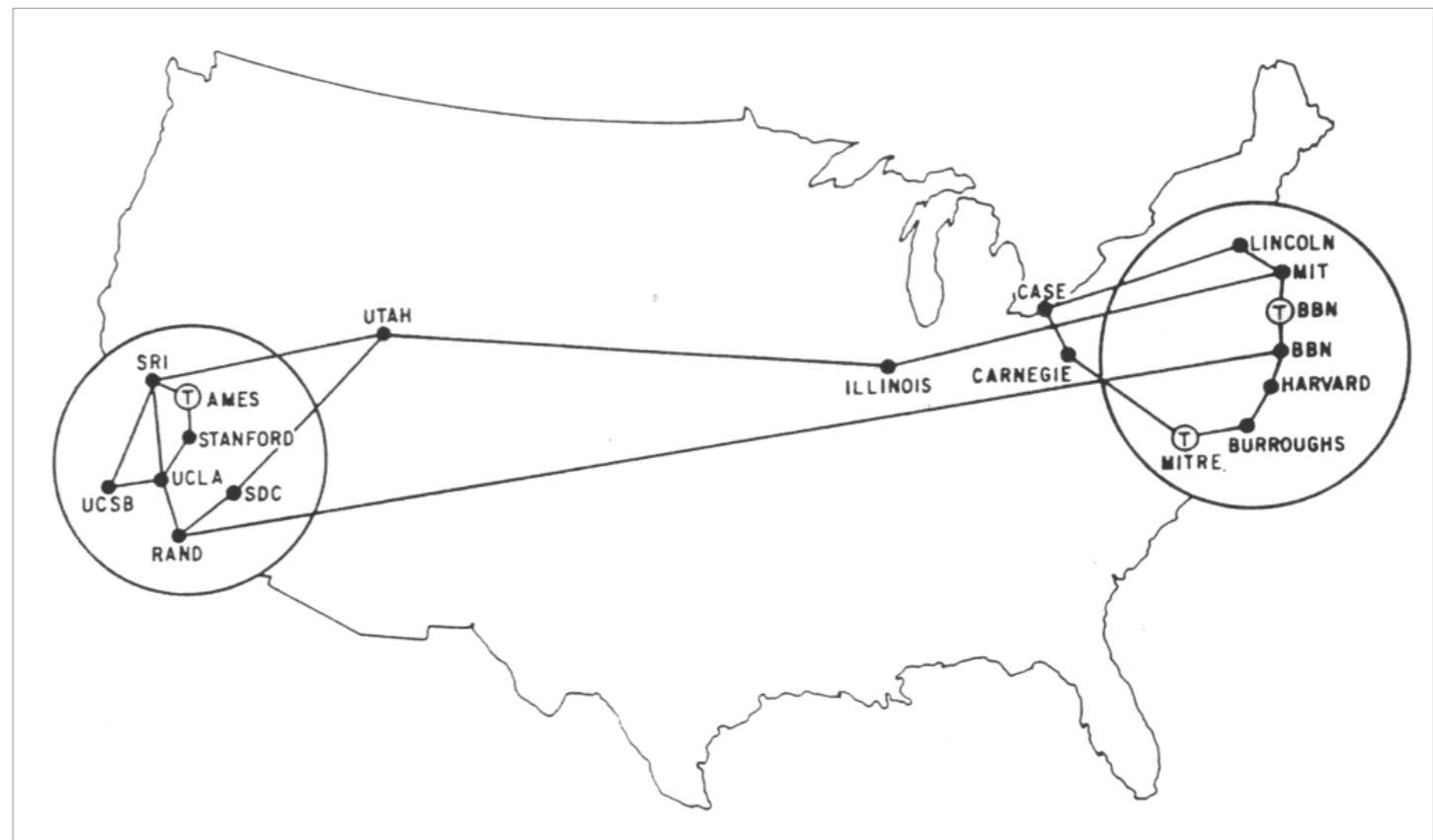


The Intel 4004 chip, released in 1971, “met the commonality objection by also introducing input-output and memory chips, which allowed customers to customize the 4004’s functions to fit a wide variety of applications” (102).

CHAPTER SIX

BACKBONE

- Refers to the main network connections linking the U.S. that dominate Internet traffic. This linkage was first created by the Advanced Research Projects Agency (ARPA) for the purpose of researching and developing projects in hopes of expanding military technologies. However, ARPANET pioneers didn't foresee the overall change in connection topology that has occurred since; now individuals connect from a computing device to Ethernet, which is linked to a regional network and then to the backbone.



The first 18 nodes that connected the U.S. from east to west. Originating from a message sent between UCLA and Stanford, the growth of ARPANET culminated in an extensive linkage of nodes. Pictured here are the first 18 nodes, completed in 1971.

CHAPTER SIX

HTML

- A subset of a formatting language developed for IBM mainframes, Hypertext Markup Language (HTML) became the primary way to code web pages on the Internet. It is still in place today and is praised for its simplicity.

HTTP

- “Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, hypermedia information systems” (Fielding et al). Hypertext, by definition, is structured text that uses hyperlinks to jump between nodes containing text. Essentially, HTTP exchanges and transfers hypertext.

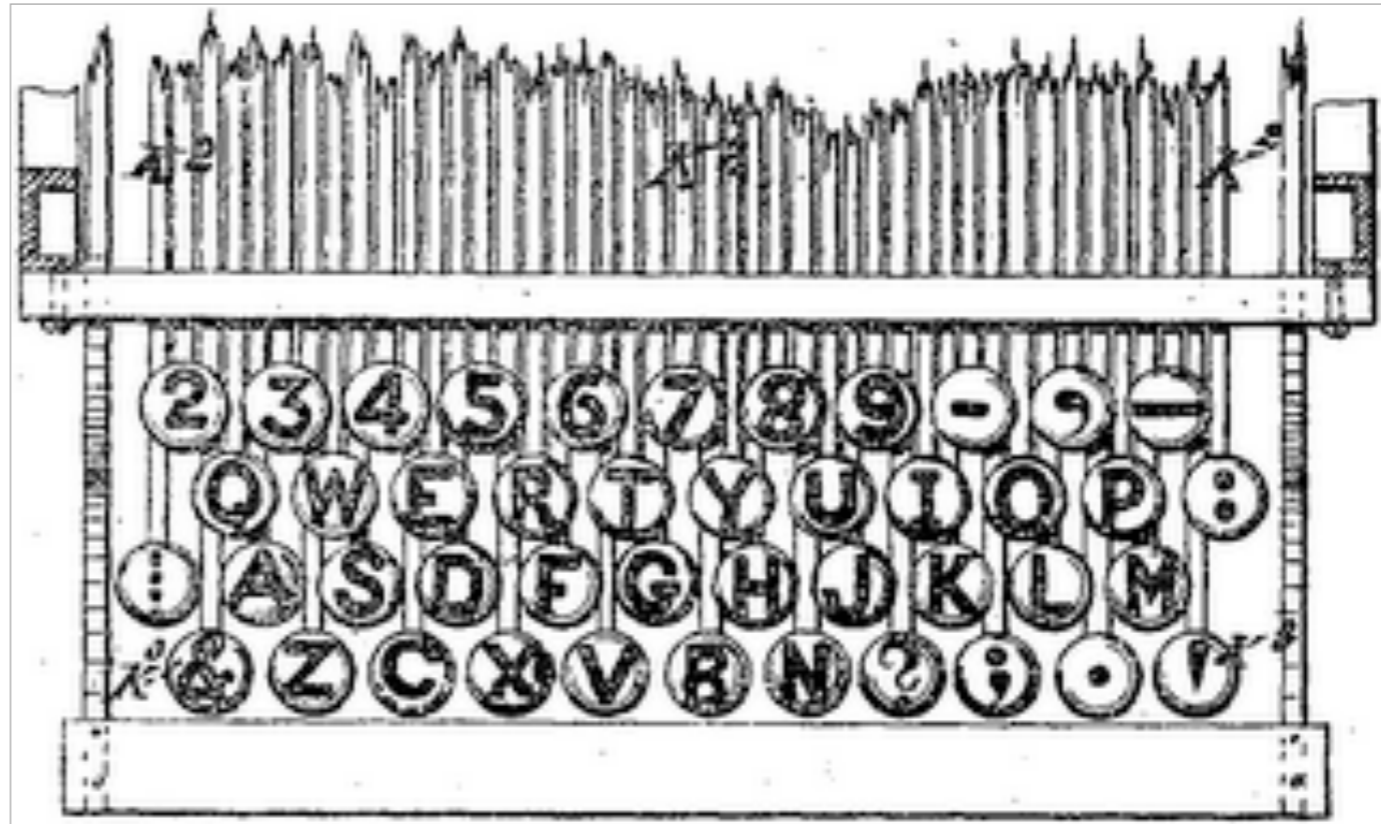


This is an example of a URL beginning with the HTTP scheme. This protocol is the foundation of data communication for the World Wide Web.

CONCLUSION

QWERTY KEYBOARD

- The commonplace keyboard layout for Latin Script. Its name comes from the first six keys that appear in its top left letter row. This design is based on the Sholes and Glidden typewriter that became popular in 1878.



The Sholes and Glidden typewriter QWERTY layout that was later sold to Remington in 1873.

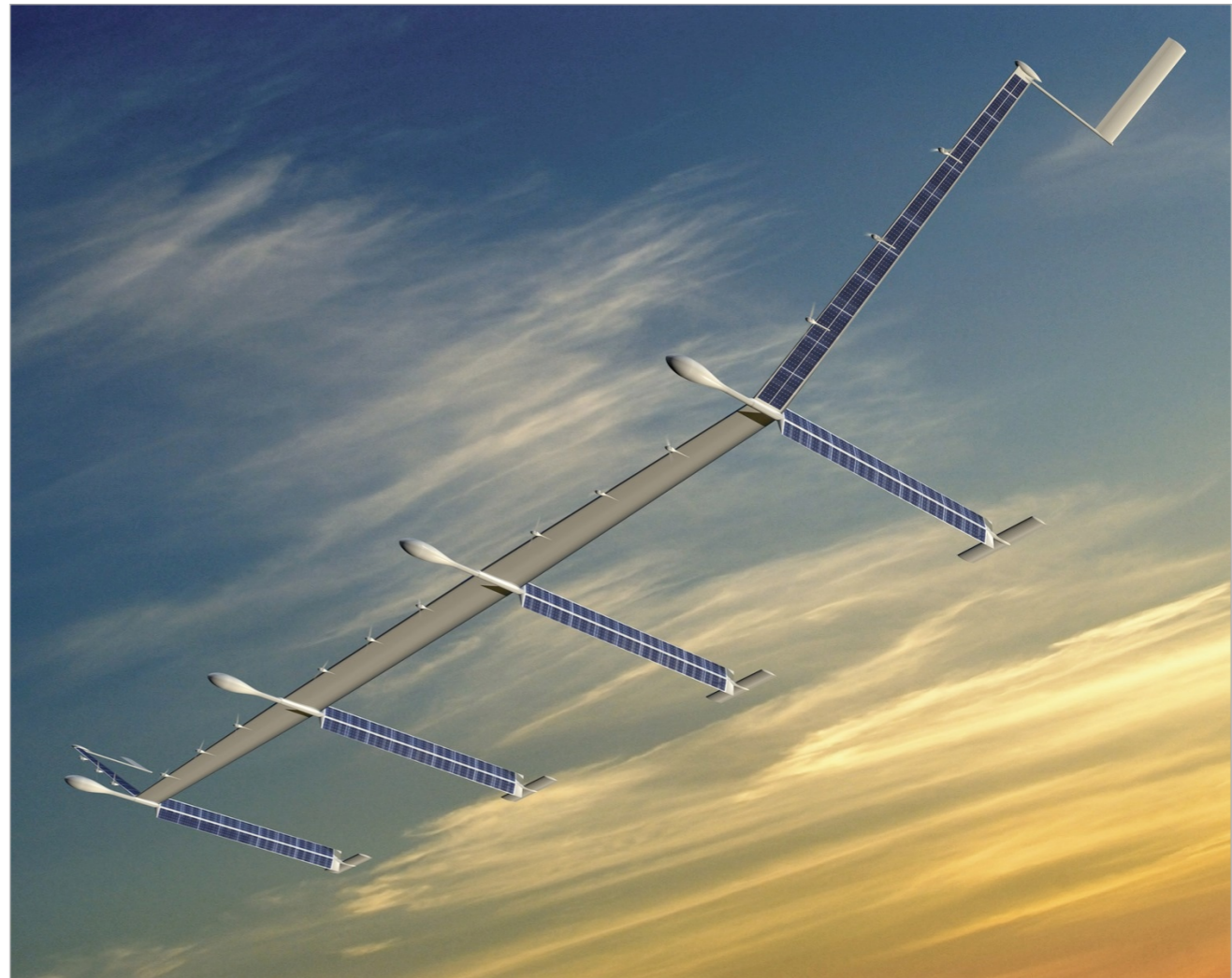
CONCLUSION

DARPA

- Defense Advanced Research Projects Agency (DARPA), previously called ARPA, continues to drive innovation. Because of “DARPA’s support, the Defense Department has a counterpart to the Apple iPhone: small microprocessor-based devices that are embedded into weapons systems” (156).

UAV

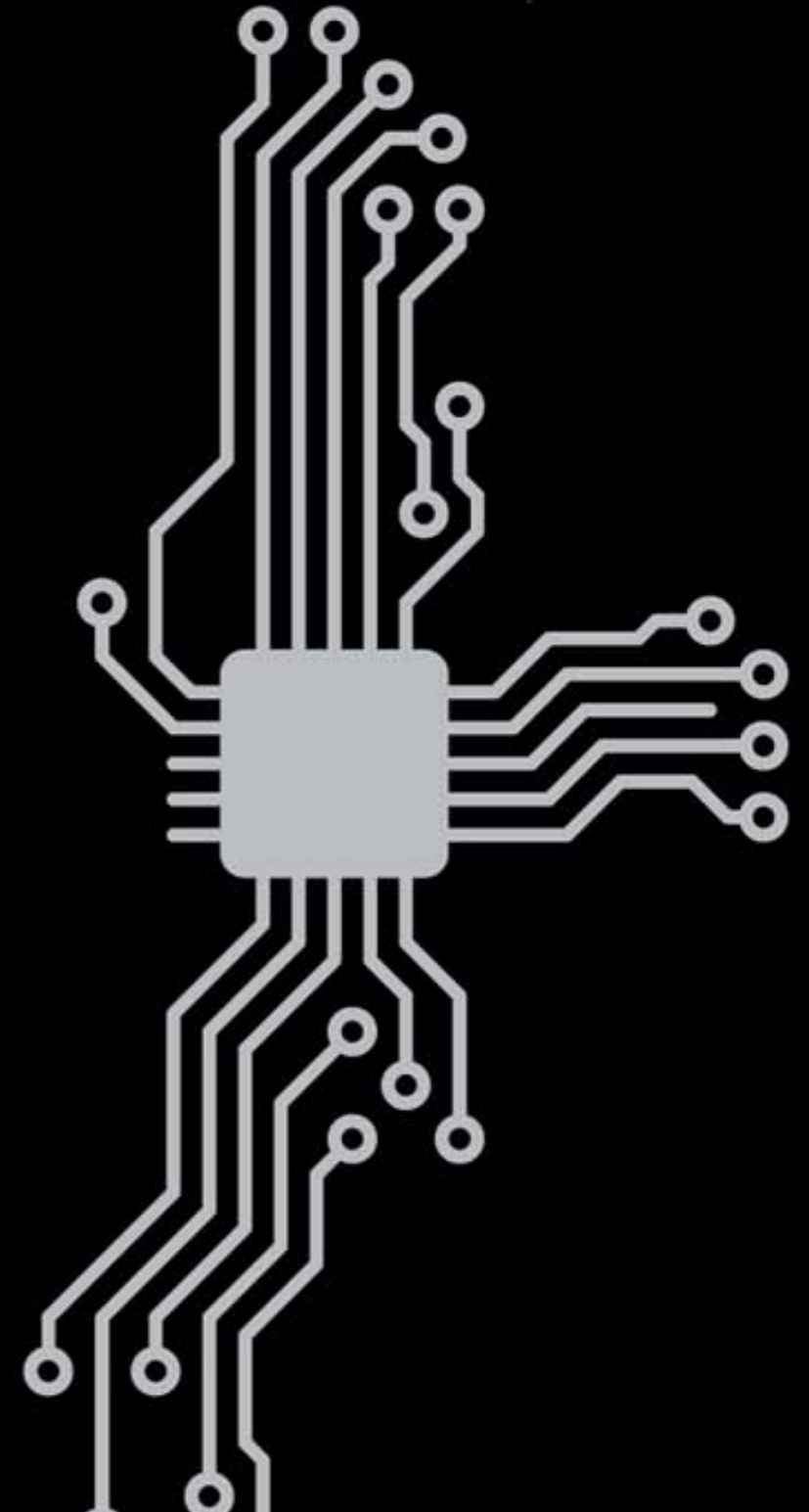
- An unmanned aerial vehicle (UAV), is a computerized weapon that uses “satellite data, on-board inertial guidance, and robotic vision to fly autonomously and hit remote targets” (156). These are then linked to humans in the field.



A project in development by DARPA, the VULTURE (Very-high altitude, Ultra-endurance, Loitering Theater Unmanned Reconnaissance Element) is an improved version of the UAV. The following is a concept model by Boeing.

ESSAY

In this section, I have compiled my thoughts of Ceruzzi's book in a reflection essay discussing the invention of the Internet and its later impact on our lives.



THE INTERNET

Hyperlinking Us Together



I would be at a loss without the Internet. I depend upon it so much so that I honestly cannot imagine how individuals communicated, let alone functioned in society. Being born during the year the Federal Networking Council (FNC) passed the resolution defining the term Internet, I can say that I have never lived in a lifetime without its influence (Leiner et al). Without a doubt, I regard the invention of the Internet and its packet-switching structure, as the most fascinating the digital world has to offer. Although its importance to the computer realm is minute in comparison to the microprocessor, the Internet has enabled "communication – the transfer of coded information by electrical or electronic means across geographical distances"(Ceruzzi 9). Ultimately, the Internet transcends boundaries, creating physical and social bonds in the process – hyperlinking us together.

Altogether, I spend roughly three-fourths of my day on some sort of digital device that connects to the Internet: be it a tablet, smartphone, gaming console, or computer. Virtually every day through Facebook, my boyfriend messages me. Ironically, I also met him through this Internet application. Staying in touch with my childhood friends is also a breeze via Internet applications such as Skype or Email and many of my late nights are spent online-gaming with individuals across the globe. I am even able to collaborate with the Internet, as well as share my work with others. In essence, this

innovation in computer technology focuses primarily on us, the user, and our innate need to communicate with other users.

And what is most astonishing about this invention is that it was not intended to be used in this personal way. The Advanced Research Projects Agency Network (ARPANET) was meant to function as a connection between fellow scientists and researchers, not a social tool for the masses. Ultimately though, the rise of local area networks made this exclusivity nonexistent and rewired the topology of the Internet into what it is today – a linkage of IP Addresses.

In light of this evolution, I am further reminded of how appreciative I am to have these communication tools only a click, tap, or push away. To think, right at our fingertips is a world of opportunity and interaction just waiting to be opened up again, waiting to stimulate our social desires. Without a doubt, I wouldn't be sane without it!

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