



Introduction to Mobile Computing with Android

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CHAPTER-1

Road to Android



Introduction to Mobile Computing

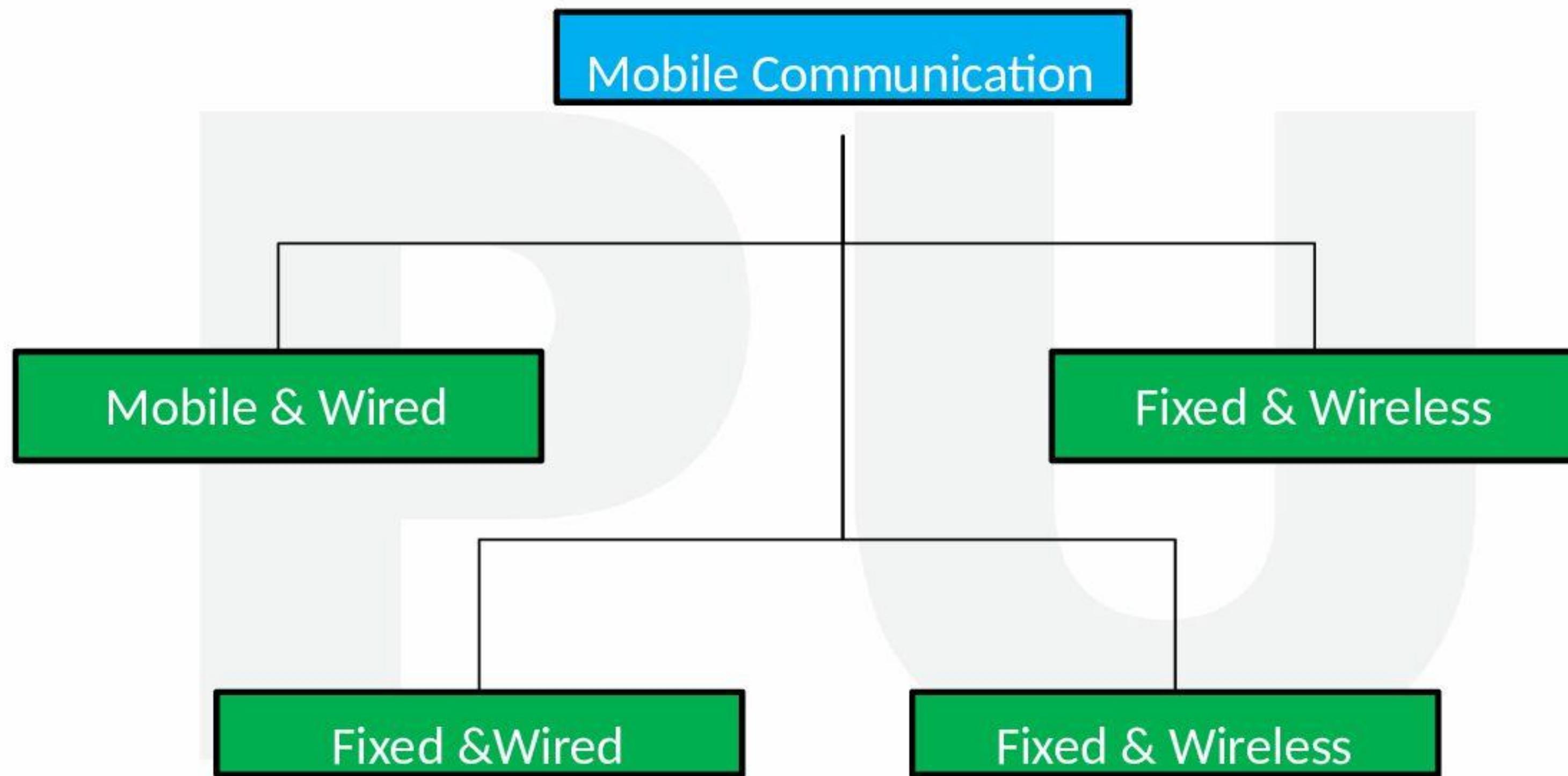
It is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link.

Mobile Computing involves three things-

- Mobile Communication
- Mobile Hardware
- Mobile Software.



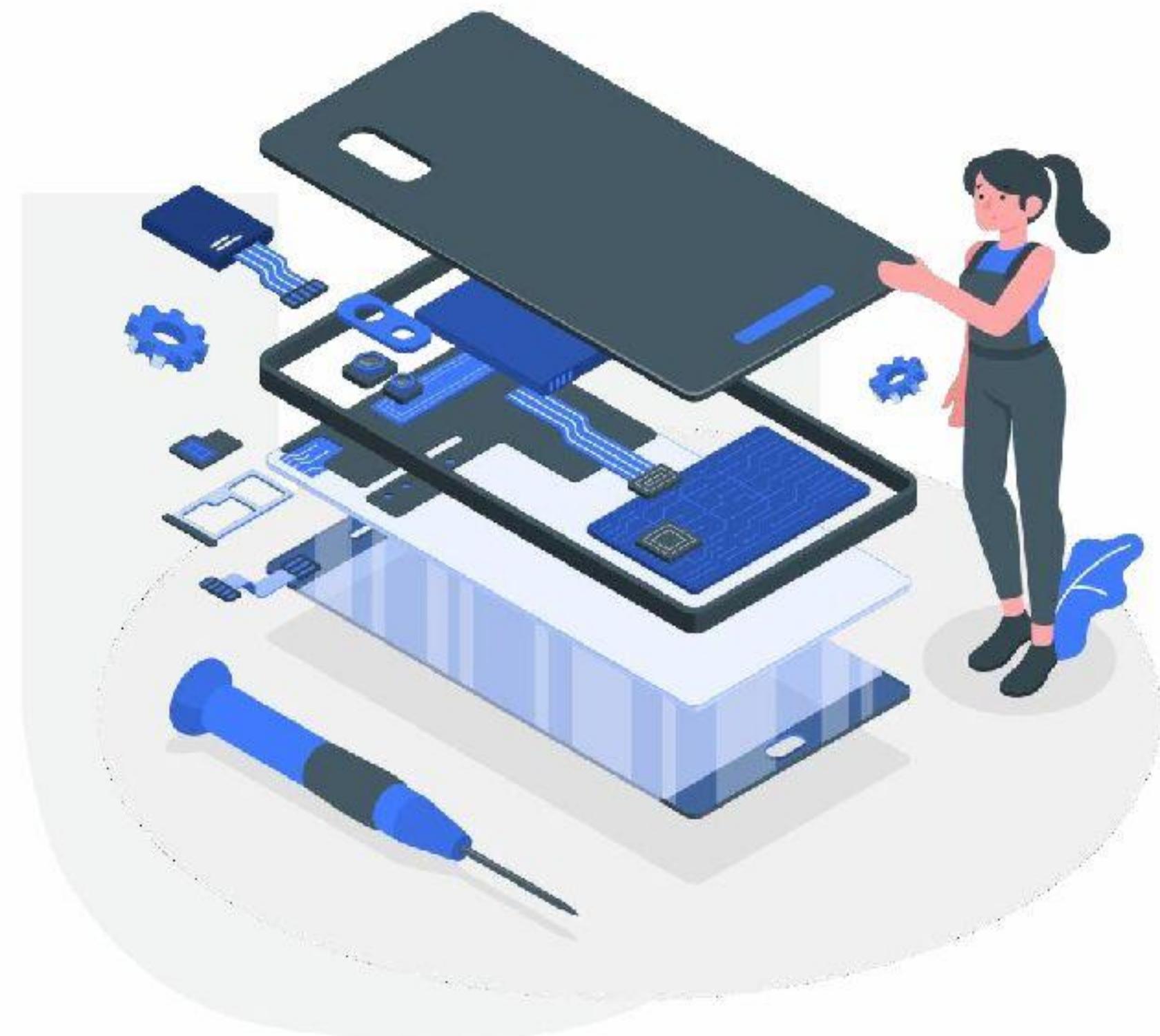
Mobile Communication





Mobile Hardware

Mobile hardware includes mobile devices or devices that have mobility. They would range from laptops, smart phones, Digital Assistant, Personal tablet.





Mobile Software

Mobile software is a program that runs on hardware. It deals with characteristics requirements of mobile applications. This is the engine of the mobile device. In other terms, it is the operating system of the appliance. It's the essential component that operates the mobile device.

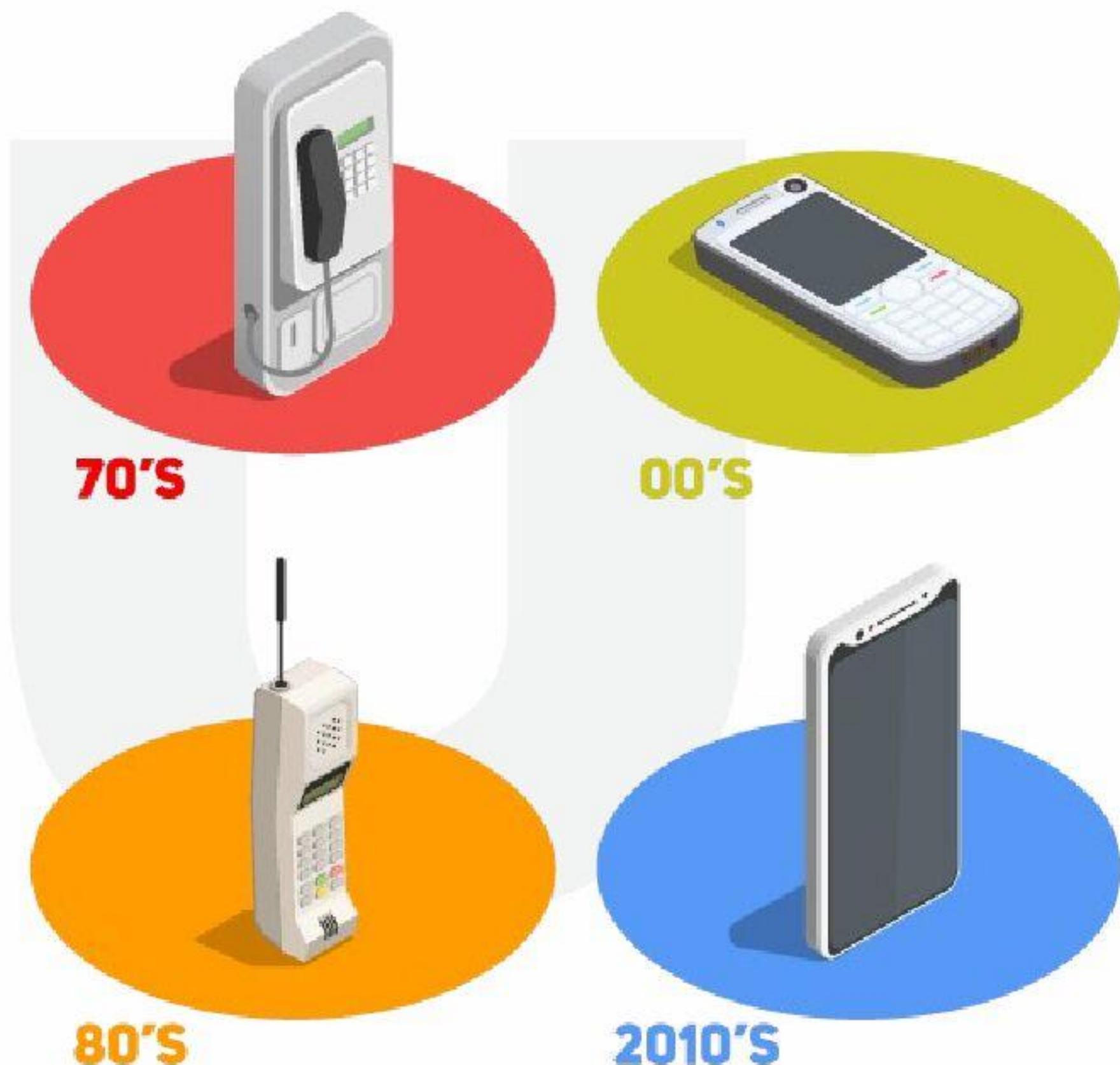
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Evolution of Mobile Computing

In today's computing world, different technologies have emerged. These have grown to support the existing computer networks all over the world. With mobile computing, we find that the need to be confined within one physical location has been eradicated. We hear of terms such as telecommuting, which is being able to work from home or the field but at the same time accessing resources as if one is





Advantages Mobile Computing

1. Location Flexibility
2. Saves Time
3. Enhanced Productivity
4. Ease of Research
5. Entertainment
6. Streaming of Business Processes



Current Trends in Mobile Computing

- 3G
- GPS
- LTE
- WIMA
- X
- NFC





Applications of Mobile Computing

- Web or Internet Access
- GPS
- Emergency Services
- Entertainment Services
- Educational Services.

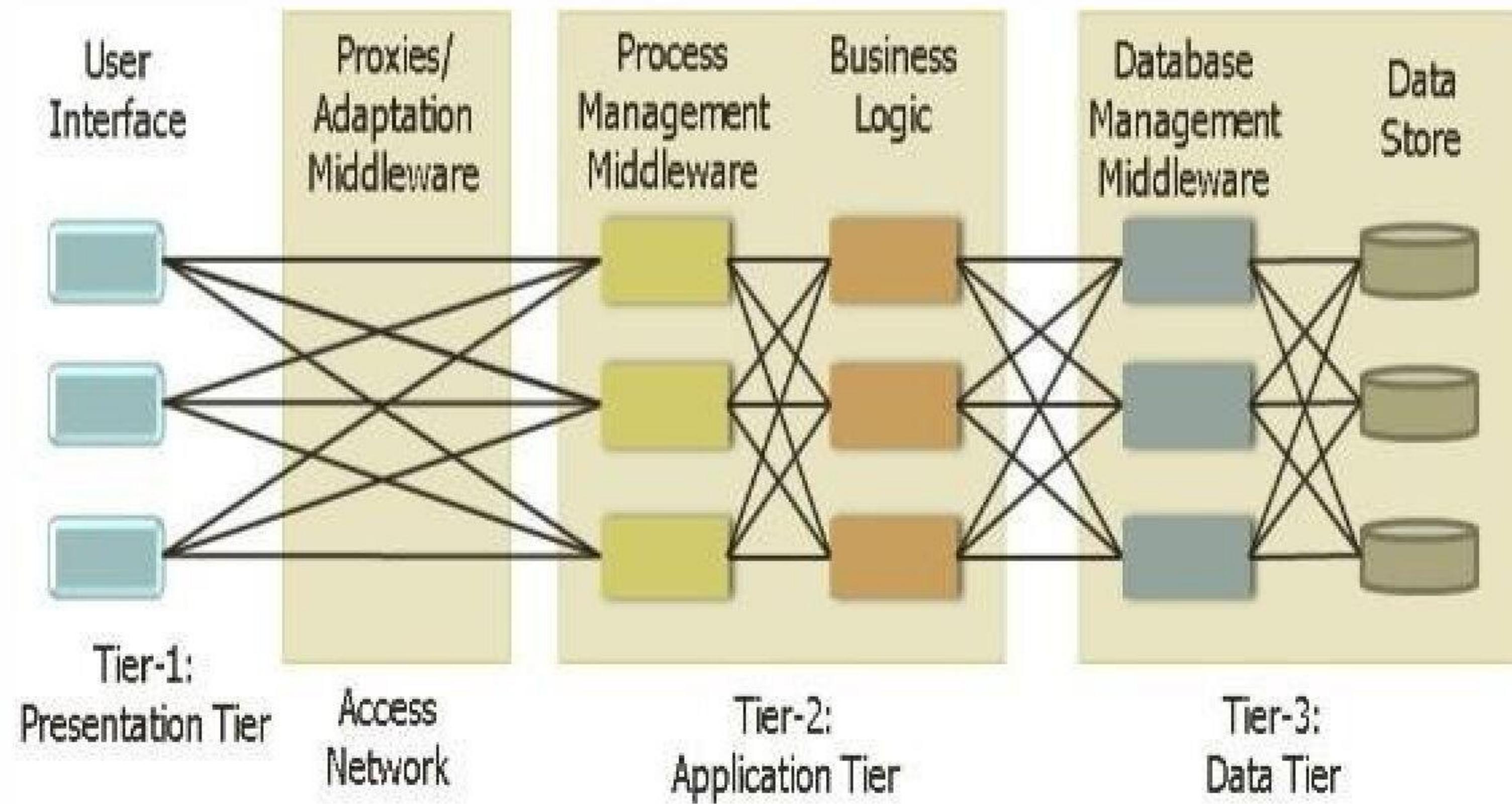


Limitations of Mobile Computing

- Insufficient bandwidth
- Security standards
- Power consumption
- Transmission interferences
- Potential health hazards
- Human interface with device.



Architecture of Mobile Computing





Architecture of Mobile Computing

One of the most interesting things about a cell phone is that it is actually a radio – an extremely sophisticated radio, but a radio nonetheless.

The telephone was invented by Alexander Graham Bell in 1876, and can communicate wirelessly. Its roots to the trace radio invented by Nikolai Tesla in the 1880s. It was only natural that these two technologies would eventually be combined!

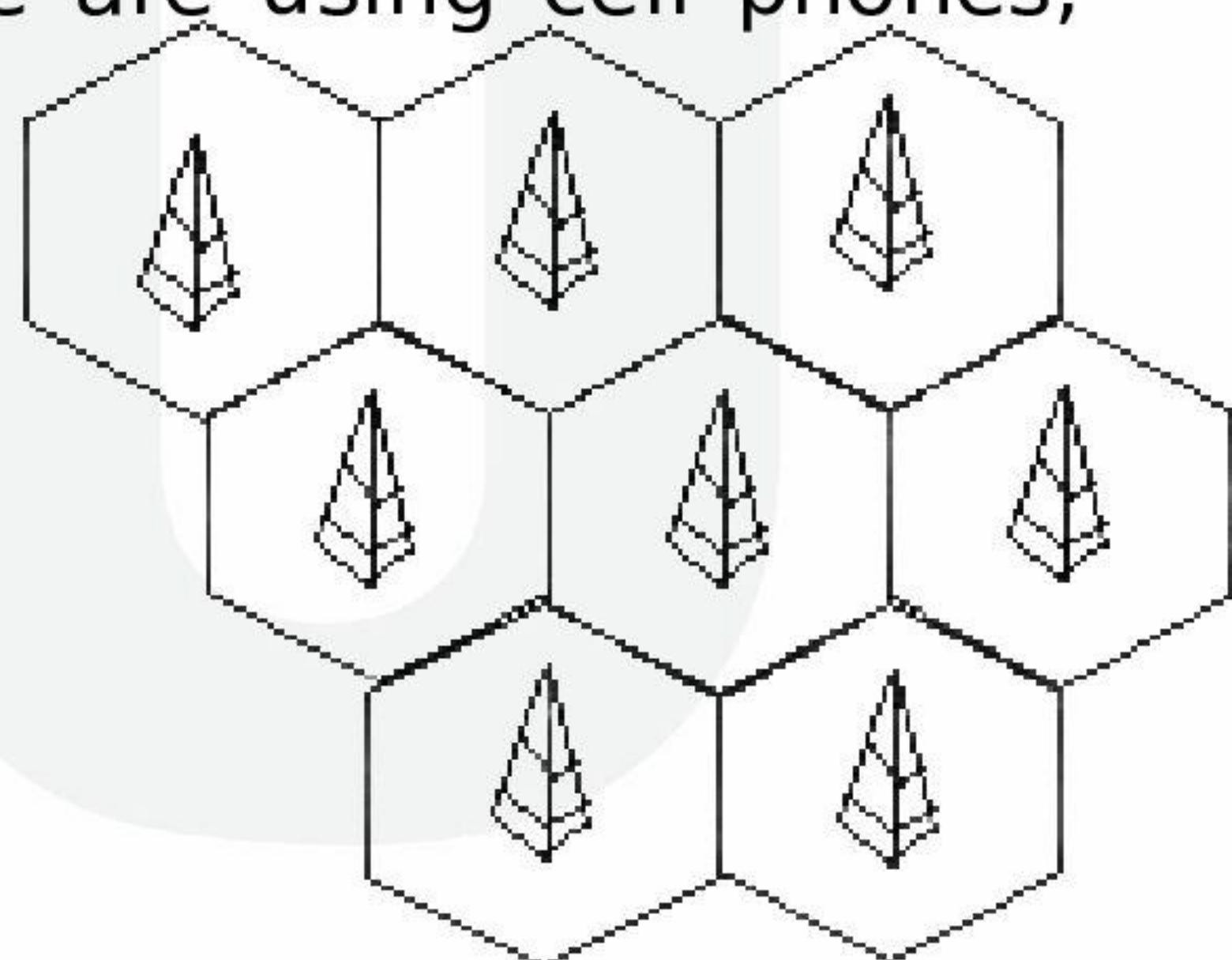




Cellular Approach

The cellular approach requires a large number of base stations in a city of any size. A typical large city can have hundreds of towers. But because so many people are using cell phones, costs remain low per user.

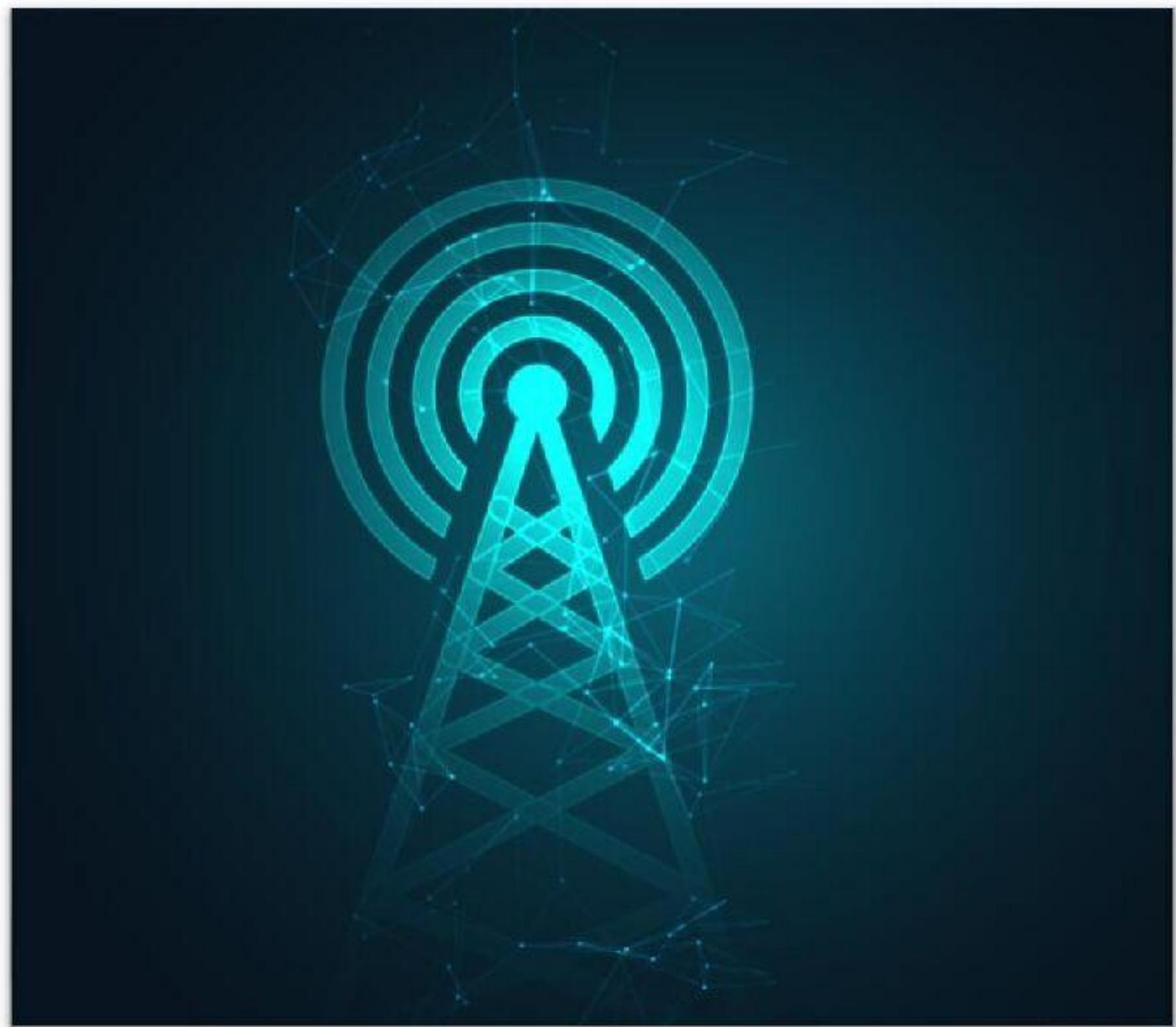
carrier in each city also has a central office called the Mobile Telephone Switching Office (MTSO). This office handles all of the phone connections to the normal land-based phone system, and controls all of the base stations in the region.





Cellular Networks

- First Generation (1G)
- Second Generation (2G)
- Third Generation (3G)
- Fourth Generation (4G)





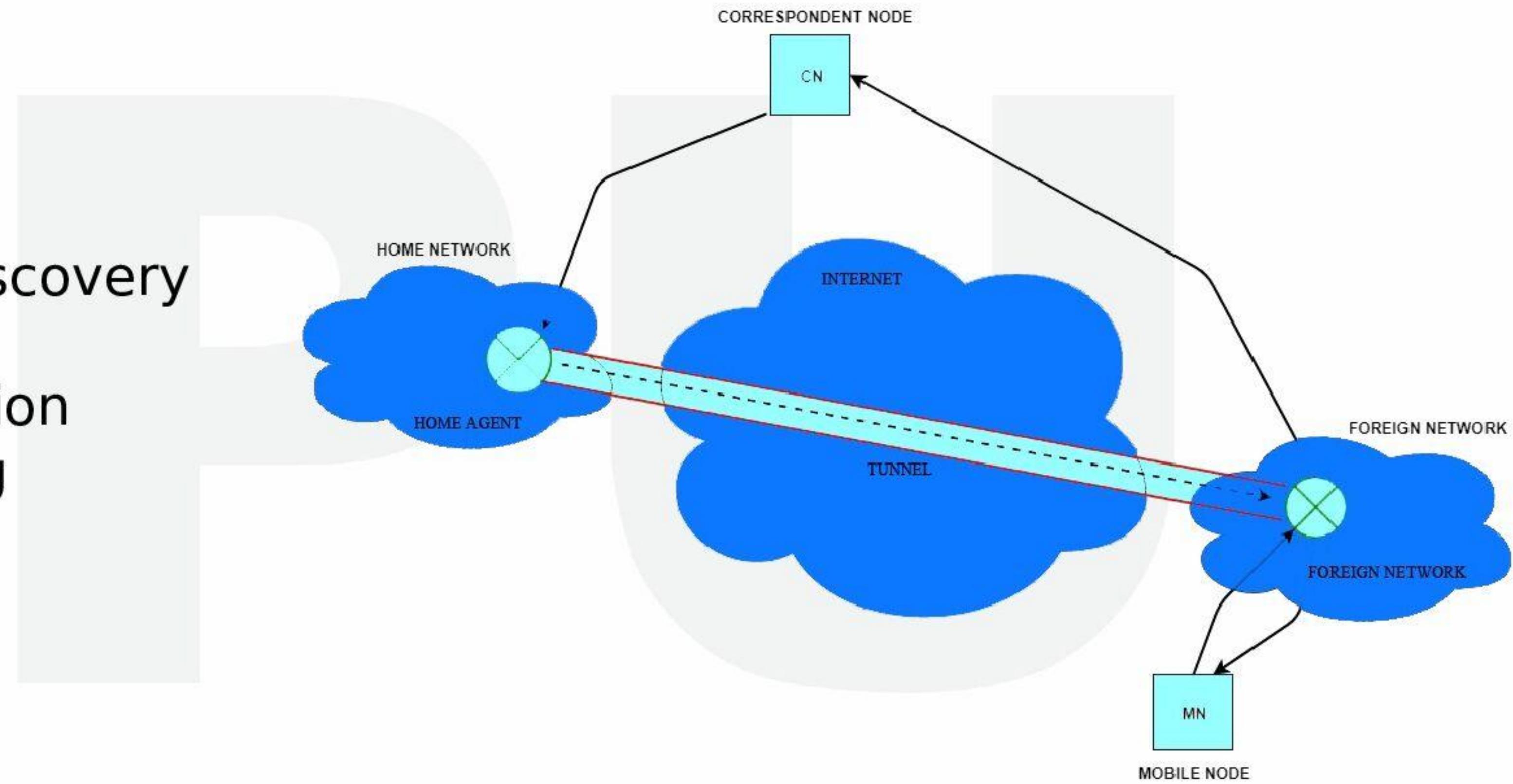
Mobile IP

Mobile IP is a communication protocol (created by extending Internet Protocol, IP) that allows the users to move from one network to another with the same IP address. It ensures that the communication will continue without user's sessions or connections being dropped.



Key Mechanism in Mobile IP

- Agent Discovery
- Agent Registration
- Tunneling





Route Optimization in Mobile IP

The route optimization adds a conceptual data structure, the binding cache, to the correspondent node. The binding cache contains bindings for mobile node's home address and its current care-of-address. Every time the home agent receives a IP datagram that is destined to a mobile node currently away from the home network, it sends a binding update to the correspondent node to update the information in the correspondent node's binding cache. After this the correspondent node can directly tunnel packets to the mobile node.



Mobile Software Development

The mobile development community is at a tipping point. Mobile users demand more choice, more opportunities to customize their phones, and more functionality. Mobile operators want to provide value-added content to their subscribers in a manageable and lucrative way. Mobile developers want the freedom to develop the powerful mobile applications users demand with minimal roadblocks to success. Finally, handset manufacturers want a stable, secure, and affordable platform to power their devices. Up until now single mobile platform has adequately addressed the needs of all the parties.



Mobile Software Development in Past

Early mobile phones were not particularly full featured. These early phones did little more than make and receive calls and, if you were lucky, there was a simple contacts application that wasn't impossible to use.

These first-generation mobile phones were designed and developed by the handset manufacturers. Competition was fierce and trade secrets were closely guarded. Manufacturers didn't want to expose the internal workings of their handsets, so they usually developed the phone software in-house. As a developer, if you weren't part of this inner circle, you had no opportunity to write applications for the phones.



Wireless Application Protocol

The Wireless Application Protocol (WAP) standard emerged to address these concerns. Simply put, WAP was a stripped-down version of HTTP, which is the backbone protocol of the Internet. Unlike traditional Web browsers, WAP browsers were designed to run within the memory and bandwidth constraints of the phone. Third-party WAP sites served up pages written in a markup language called Wireless Markup Language (WML). These pages were then displayed on the phone's WAP browser. Users navigated as they would on the Web, but the pages were much simpler in design.



Proprietary Mobile Platform

A variety of different proprietary platforms emerged and developers are still actively creating applications for them. Some Smartphone devices ran Palm OS and RIM Blackberry OS. Sun Microsystems took its popular Java platform and J2ME emerged. Chipset maker Qualcomm developed and licensed its Binary Runtime Environment for Wireless (BREW). Other platforms, such as Symbian OS, were developed by handset manufacturers such as Nokia, Sony Ericsson, Motorola, and Samsung. The Apple iPhone OS joined the ranks in 2008.



Proprietary Mobile Platform

The mobile developer community has become as fragmented as the market. It's nearly impossible to keep track of all the changes in the market. Developer specialty niches have formed. The platform development requirements vary greatly. Mobile software developers work with distinctly different programming environments, different tools, and different programming languages. Porting among the platforms is often costly and not straightforward. Keeping track of handset configurations and testing requirements, signing and certification programs, carrier relationships, and application marketplaces have become complex spin-off businesses of their own.



Android: A Next Generation Platform

Android is the first in a new generation of mobile platforms, giving its platform developers a distinct edge on the competition. Android's designers examined the benefits and drawbacks of existing platforms and then incorporate their most successful features. At the same time, Android's designers avoided the mistakes others suffered in the past.



Open Handset Alliance

The search advertising giant Google has shown an interest in spreading its vision, its brand, its search and ad-revenue-based platform, and its suite of tools to the wireless marketplace. The company's business model has been amazingly successful on the Internet and technically speaking, wireless isn't that different.



Forming Open Handset Alliance

Google, with its user-centric, democratic design philosophies, Google has led a movement to turn the existing closely guarded wireless market into one where phone users can move between carriers easily and have unfettered access to applications and services. With its vast resources, Google has taken a broad approach, examining the wireless infrastructure from the FCC wireless spectrum policies to the handset manufacturer's requirements, application developer needs, and mobile operator desires.



Forming Open Handset Alliance

Google joined with other like-minded members in the wireless community and posed the following question: What would it take to build a better mobile phone?

The Open Handset Alliance (OHA) was formed in November 2007 to answer that very question. The OHA is a business alliance comprised of many of the largest and most successful mobile companies on the planet. Its members include chip makers, handset manufacturers, software developers, and service providers. The entire mobile supply chain is well represented.



Forming Open Handset Alliance

Andy Rubin has been credited as the father of the Android platform. His company, Android Inc., was acquired by Google in 2005.

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Forming Open Handset Alliance

Working together, OHA members, including Google, began developing a nonproprietary open standard platform based upon technology developed at Android Inc. that would aim to alleviate the aforementioned problems hindering the mobile community. The result is the Android project. To this day, most Android platform development is completed by Rubin's team at Google, where he acts as VP of Engineering and manages the Android platform roadmap.

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