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CELLULAR TECHNOLOGIES

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Abstract:
Cellular Technology is the use of wireless communication related with the mobile phone. Wireless communications and systems have most experienced exceptional improvement over the decades and essential of every one in the global world. The use of wireless devices such as cell phone, PDA's and Laptops has become an essential today. Cellular Phone known as a mobile phone, hand phone, or a phone that can make and receive telephone calls over a radio link while roaming all over the world. The objective of this article is to supply an overview of the development of cellular phone, Network architecture and the challenges the faced.

Key Words: Technology Evolution, Cellular Networks, components, Issues & Applications

1. Introduction – Evolution:

In 1940s the 1st radio telephone service was introduced in the US. 1060s Bell Systems, known as Improved Mobile Telephone Service (IMTS), with the features of direct dialing and higher bandwidth was introduced. Based on this system an analog cellular system was developed in 1960's and 1970's. As a name recommended "cellular" because coverage areas were split into smaller areas or "cells", each one is served by a low power transmitter and receiver. In mid 80's various technologies like WLL, LMDS and Wireless LAN were developed. In Mid-late 90's 2G, Cellular networks with wireless data networks developed. In early 2000's fast cellular wireless with IP based services were developed. In the 1st (1G) analog system contains the features of microprocessor and digitization of control link between mobile and cell site. In the 2nd t (2G) system digitized voice signal. In 3rd (3G) provides faster communications which includes Voice, Fax and Internet.

2. Cellular Networks:

Cells are structured in groups to form a cluster. Mobile Station is mostly the mobile phone. The covered area of a cellular network is divided into smaller areas called cells. Each cell has a Base Station which communicates along with with all mobiles within the cell, and passes traffic to the Mobile Switching Centre. The base station is connected to the mobile phone via a radio interface. Base Station at the centre of each cell, which contains the transmitter/receiver antennae and switching equipments. The size of the cell based on the requirements of subscribers. The base stations of each cell are communicated to a central point known as Mobile Switching Centre (MSC) and it is connected to Public Switched Tele[hone Network (PSTN).

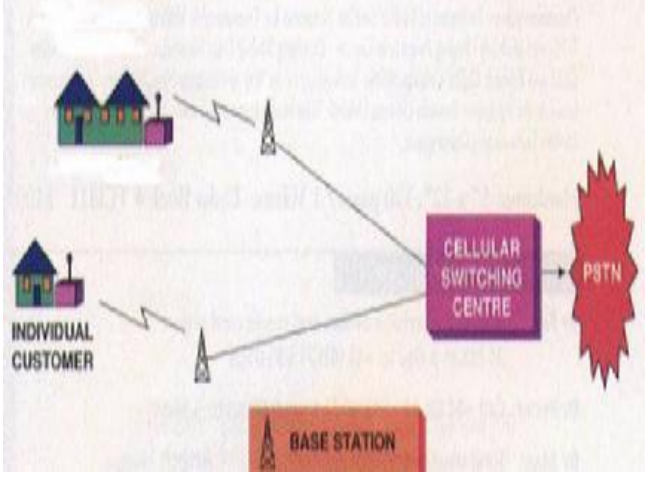

Figure 1: Cellular Switching centre

MSC controls a number of cells (or cluster), arranges base stations and channels for the mobiles and handles connections. National Carrier Exchange is the gateway to the national fixed public switched telephone network (PSTN). It handles connections on behalf of the national communication systems, and is usually integrated with the MSC. There are a number of different digital cellular technologies, including: Advanced Mobile Phone System (AMPS), Total Access Communications System (TACS), Global System for Mobile Communications (GSM), Personal Digital Cellular (PDC), IMT-2000, International Mobile Tele communications, General Packet Radio Service (GPRS), cdma One, CDMA2000, Evolution-Data Optimized (EV-DO), Enhanced Data Rates for GSM Evolution (EDGE), Universal Mobile Telecommunications System

(UMTS), Digital Enhanced Cordless Telecommunications (DECT), Digital AMPS (IS-136/TDMA), and Integrated Digital Enhanced Network (iDEN).

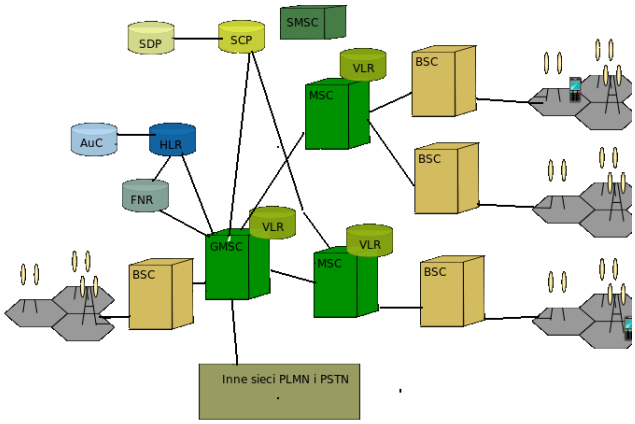

Figure 2: GSM Network Architecture

Cell/Mobile Phones: The services provided by the cell phone such as messages including text and image, MMS, Email , Internet access , short wireless communication and gaming.

Components: The common element found on mobile phones were Battery is a power source for the phone, Input mechanism Keypad and Touch are the Input mechanism , Screen which echoes the user's typing, displays text messages, contacts and more, Mobile phone services which allow users to make calls and send text messages and a SIM card. A hybrid mobile phone can have up to 4 SIM cards. SIM and RUIM cards may be mixed together to allow both GSM and CDMA networks to be accessed.

Hardware Requirement: A cellular telephone tool consists of the cellular phone itself and a variety of voice and data accessories. Before purchasing cellular equipment, managers should insure that the phone and accessories satisfy all their applications' requirements. Depending on these applications, users may choose from accessories such as consumable battery packs, portable chargers, headsets, encryption hardware, fax/data jacks, cellular modems, and credit card authorization unit interfaces. All of these items may help users become more dynamic with their cellular equipment. Features such as displaying power, roam, and no service, operating in a hands free mode, dialing alternatives, and tone creation are available to cellular users. Of these features, managers must ensure that all critical applications necessities are met with the technology deployed. For example, if the use of voice mail is critical, users need tone generation to issue commands. With hands free operation, users can use the technology safely while driving or working machinery.

Software Requirements: Voice applications do not require end-user software because the handset operating systems are "burned" into the firmware of the unit. The software requirements for cellular communication are mostly connected with cellular data. The Open Systems Interconnect (OSI) is a model for defining how special computers can correspond with one and other. The model consists of seven layers with each layer accomplishing a specific task. The software required for wireless data applications mostly consist of wireless middleware that links the upper layers of the OSI model (application, presentation) with the lower layers (data link, physical) and allows two computers to communicate.

Manufactures: The top 10 manufacturers were Samsung (20.6%), Nokia (9.5%), Apple Inc. (8.4%), LG (4.2%), Huawei (3.6%), TCL Communication (3.5), Xiaomi (3.5%), Lenovo (3.3%), ZTE (3.0%) and Micromax (2.2%). "Gartner Says Sales of Smart phones Grew 60 Percent in Third Quarter of 2015". Gartner.

3. Importance and Challenges of Cellular Technology:

Importance: "Without my cell phone my emotional life would be in ruins." Sarah, from Willow Grove, PA. Small businesses can experience many benefits from a wireless network.

Convenience: Access your network assets from any location within your wireless network's coverage area or from any WiFi hotspot. Roam without losing your connection Work together more effectively.

Mobility: You're no longer tied to your desk, as you were with a wired connection. You and your employees can go online in conference room meetings.

Productivity: Wireless access to the Internet and to your company's key applications and resources helps your staff get the job done and encourages collaboration.

Easy Setup: You don't have to string cables, so installation can be quick and cost-effective.

Expandable: You can easily expand wireless networks with existing equipment, while a wired network might require additional wiring.

Security: Advances in wireless networks provide robust security protections. Give secure network access to customers and business partners. Offer a value-added service cost**.** Because wireless networks abolish or reduce wiring costs, they can cost less to operate than wired networks. The development of cellular/digital technology

is playing an increasing importance in today's business markets. More employees are spending additional time away from their offices, thereby increasing the necessity of mobile communication technologies such as the hand-held phone, notebook computers, pagers, personal digital assistants, and palmtop computers.

Challenges: In many market sectors and industries, big data will also bring about lots of challenges and opportunities in wireless. Cellular networks have to provide efficient infrastructure support for this data deluge. For example, the future M2M or Internet of Things (IoT) applications will generate a vast amount of data. It is a major technical challenge for RAN's. Next, new network architectures may appear from the necessity of running big data applications. There is close synergy between cloud computing, software defined networking, and Network Function Virtualization (NFV). A junction of new technologies like cloud computing, software defined networking and (NFV) Network Function virtualization can be envisaged to form highly robust and reliable 5G platforms for big data. Making informed decisions and extracting intelligence from big data is an tremendously important Cellular operator can make use of various customer network access data to reduce churn rate and seek new revenue opportunities.

4. Applications:

Applications over cellular networks now range from operator-consumer applications (e.g., mobile television, voice-over-ip, video conferencing), peer-to-peer applications (e.g., instant messaging), machine-to-machine applications (e.g., data telemetry and automotive applications), mobile web services (e.g., music and video streaming), and social networking applications. The current approach for increasing mobile applications appears to focus on utilizing template-based application-development kits provided by platform developers (e.g., Google's Android, Apple's iOS, or Nokia's Symbian) to capture application designs and install them on the runtime platforms through use of code generators tied to particular versions of the platform. It is still unclear as to how an application developer (or network operator) conceptualizes the features of a mobile application in a platform-independent way, identifies its utility and explores its impact on the user, or further refines the choice of technology, platform, and mobility/interactivity requirements

5. Conclusion:

Cellular phones have come a long way from analog communication devices to digital mobile computers. Today, a cellular phone is a prototype of an embedded system having highly optimized cost, size, efficiency and performance. Challenges in RF circuits, implementation architecture, memory, and power consumption are still affecting the development and growth of mobile devices. New technologies such as decentralized architectures, reconfigurable circuits, advanced memories, and low power designs will help overcome challenges.

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