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AN OVERVIEW OF WIRELESS NETWORK AND ITS CHALLENGES

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Abstract:-

This research paper talks about a method for joining gadgets over a wireless Network (with a specific end goal to perform various diverse remote organization capacities. These incorporate, yet are not constrained to computerized meter peruses, item break notices, upkeep bolster, and process computerization.

An itemized survey and examination of the accessible wireless WANs at present in operation was led. Out of the various decisions the most appropriate convention, taking into account various choice measurements, was decided for the current workload.

At last, the framework was prototyped in equipment and in programming utilizing the Java programming dialect. Recreations utilizing wired systems showed the effective operation of the remote organization capacities.

Keywords: - Wireless Network, GPRS, Radio Communication, network challenges

1. INTRODUCTION

The explosive growth in wireless networks over the last few years resembles the rapid growth of the internet within the last decade. Wireless communication continues to enjoy exponential growth in the cellular telephony, wireless internet and wireless home networking arenas. With advent of Wireless LAN technology, computer networks could achieve connectivity with a useable amount of bandwidth without being networked via a wall socket. New generations of handheld devices allowed users access to stored data even when they travel. Users could set their laptops down anywhere and instantly be granted access to all networking resources.

This was, and is, the vision of wireless systems, and what they are equipped for conveying. Today, while wireless systems have seen far reaching reception in the home client markets, generally reported and effectively abused gaps in the standard security framework have hindered wireless arrangement rate in big business situations.

After some time, it got to be evident that some type of security was required to keep pariahs from misusing the joined assets. We trust that the present wireless access focuses present a bigger security issue than the early web associations. As more wireless innovation is wireless innovation, this will be a decent going stone for giving a decent secure answer for any wireless arrangement

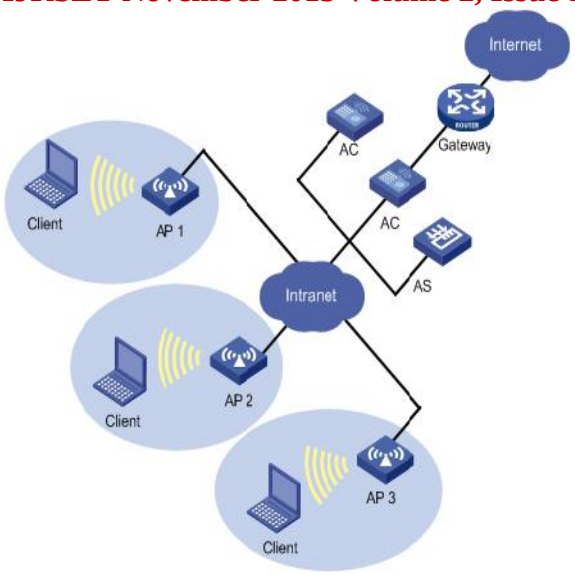

Figure 1. Wireless Network Infrastructure

2. RESEARCH CHALLENGES OF WIRELESS NETWORKS

Since wireless gadgets should be little and wireless systems are transfer speed constrained, a portion of the key difficulties in wireless systems are information rate improvements, minimizing size, expense, low power organizing, client security and Quality of Service (QoS).

A. (Quality of Service) QoS

Quality of Service is a measure of system execution that mirrors the system's transmission quality and service accessibility. For every stream of system activity, QoS can be portrayed by four parameters: Reliability, Delay, Jitter, and Bandwidth.

There are a few critical issues identified with QoS in wireless systems that don't get tended to in the wire line environment. These issues emerge in light of the fact that wireless systems are intrinsically not quite the same as wire line systems. A few imperative wireless system attributes incorporate handoff, dynamic associations, and inciting transport QoS [11].The activity QoS parameters (throughput, postponement and misfortune rate) are not adequate in a wireless domain. In a wire line situation, the application layer can regularly be guaranteed that once an association is set up it will keep on existing until it is shut. In a wireless domain, associations might incidentally break amid a procedure termed handoff [12].

It is unlikely that handoff can occur without no less than a short association intrusion. Applications running in a wireless situation must have the capacity to recoup from impermanent intrusions, and ought to indicate the most extreme association interference time that they can endure. The application could indicate such a period through a huge misfortune rate; notwithstanding, this would over-burden the importance of misfortune rate. Misfortune rate ought to just reflect misfortunes because of cushion flood or transmission blunders. A greatest recurrence of association interference is another execution parameter that would be significant in a wireless system. A few applications may ask for a low interference recurrence so that the QoS saw by the client stays acceptable. For instance, an application may wish to ensure that a voice association won't be broken more than once every moment. A low intrusion recurrence infers that handoffs don't happen again and again. Applications may acknowledge a bigger greatest association intrusion time in return for a low interference recurrence. For instance, it might be more desirable to have rare long breaks in a video connection ,rather than incessant littler breaks.

B. Portability

Without the requirements forced by the wired associations among gadgets, all gadgets in a wireless system are allowed to move. To bolster versatility, a continuous association ought to be kept alive as a client wanders around. In a base system, a handoff happens when a portable host moves from the scope of a base station or get to indicate that of another. A convention is in this

manner required to guarantee consistent move amid a handoff. This incorporates choosing when a handoff ought to happen and how information is steered amid the handoff process. In a few events, parcels are lost amid a handoff. In a specially appointed system, the topology changes when a versatile host moves. This implies, for a continuous information correspondence, the transmission course may should be recomputed to, provide food for the topological changes. Since an adhoc system may comprise of an extensive number of versatile hosts, this forces a critical test on the outline of a viable and productive steering convention that can function admirably in a situation with incessant topological changes.

C. Force and Energy

A cell phone is by and large helpful, little in size, and committed to perform a sure arrangement of capacities; its energy source will most likely be unable to convey power as much as the one introduced in an altered gadget. At the point when a gadget is permitted to move openly, it would for the most part be difficult to get a constant supply of force. To moderate vitality, a cell phone ought to have the capacity to work in a viable and effective way. To be particular, it ought to have the capacity to transmit and get in an insightful way in order to minimize the quantity of transmissions and gatherings for certain correspondence operations .

D. Information Rate

Enhancing the present information rates to bolster future fast applications is crucial, particularly, if interactive media service are to be given. Information rate is an element of different components, for example, the information pressure calculation, obstruction alleviation through blunder strong coding, force control, and the information exchange convention. Thusly, it is basic that makers actualize a well thoroughly considered outline that considers these variables with a specific end goal to accomplish higher information rates.

Information pressure assumes a noteworthy part when sight and sound applications, for example, video conferencing are to be upheld by a wireless system. As of now, pressure measures, for example, MPEG-4 produce pressure proportions of the request of 75 to 100.

The test now is to enhance these information pressure calculations to deliver top notch sound and video even at these pressure rates. Shockingly, exceedingly packed mixed media information is more touchy to network blunders and impedance and this requires the utilization of calculations to shield delicate information from being debased. Productive blunder control calculations with low overhead must be investigated. Another approach to upgrade the information rates would be to utilize insightful information exchange conventions that adjust to the time differing system and movement qualities.

E. Security

Security is a major worry in wireless systems administration, particularly in m-trade and e-business applications [8]. Versatility of clients expands the security worries in a wireless network. Current wireless systems utilize confirmation and information encryption strategies broadcasting live interface to give security to its clients. The IEEE 801.11 standard [2] depicts wired proportionate protection (WEP) that characterizes a strategy to confirm clients and scramble information between the PC card and the wireless LAN access point. In extensive ventures, an IP system level security [9] arrangement could guarantee that the corporate system and restrictive information are protected. Virtual private system (VPN) is an alternative to make access to settled access systems dependable. Since programmers are getting more brilliant, it is basic that wireless

security components must be upgraded always [10].

F. Sign Fading

Dissimilar to wired media, signs transmitted over a wireless medium may be twisted or debilitated in light of the fact that they are spread over an open, unprotected, and continually changing medium with sporadic limit. In addition, the same sign may scatter and go on diverse ways because of reflection, diffraction, and disseminating brought on by deterrents before it touches base at the collector. The scattered signs on diverse ways may take distinctive times to achieve the destination. In this way, the resultant sign in the wake of summing up every single scattered sign may have been altogether misshaped and constricted when contrasted and the transmitted sign. The collector may not perceive the sign Furthermore, henceforth the transmitted information can't be gotten. This untrustworthy nature of the wireless medium causes a generous number of bundle misfortunes.

3. DIFFERNT WIRELESS NETWORKS

3.1 Cellular Digital Packet Data (CDPD)

CDPD was built on top of the analog U.S. Advanced Mobile Phone System (AMPS) network. CDPD operates by making use of available AMPS channels not currently in use by voice traffic. Due to the fact that CDPD works over an analog cellular system, it does not require the use of digital service, which can greatly increase coverage in rural areas. CDPD is an open specification that adheres to the Open Systems Interconnection (OSI) model; therefore it may have the ability to adapt to future needs.

While CDPD supports fixed-to-fixed communication, it was not explicitly developed with that purpose in mind, and therefore many of its features are optimized for mobile communications, such as routers in the CDPD system that track the movement of mobile devices. CDPD does offer a native support of the IP protocol, so development of systems using CDPD may not differ significantly from wired implementations.

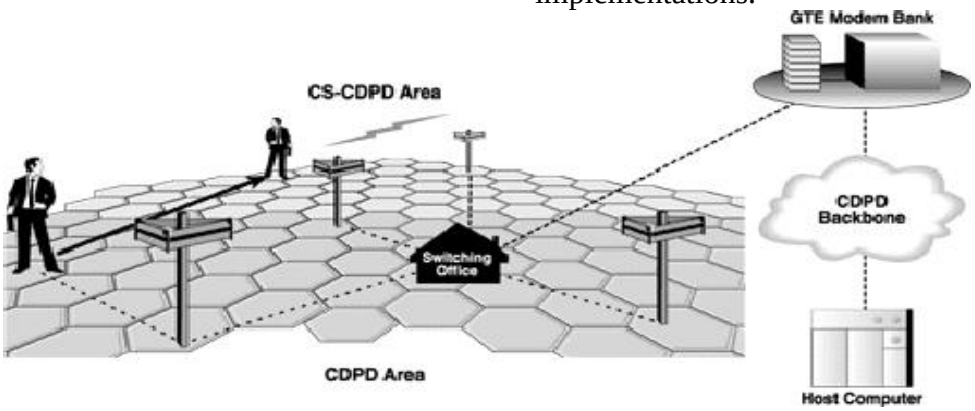

Figure 2: CDPD Architecture

3.2 Advanced Radio Data Information Service (ARDIS)

ARDIS was the first data network of its type in the United States. It was designed by Motorola and IBM in order to facilitate communications with IBM technicians who were operating deep within buildings. During the early 1980's, teams of radio design engineers conducted extensive field tests in virtually every major urban area in the United States in order to determine the best achievable coverage. ARDIS was then designed to provide reliable communications within buildings, on the street, or in vehicles. Motient claims to have over 2200 base stations (BSs) and the deepest in-

building coverage of any data network available. It includes two-way communications and coverage of ninety percent of the urban areas in the U.S. (Figure 3.5). This is accomplished due to several unique attributes of Motient's network.

Firstly, the Motient network is not a true cellular network. It contains overlapping cells so that each device will have access to one or more base stations at any one time, thereby increasing coverage. When a mobile device attempts to send data, there are multiple BSs listening within the range of that mobile. Contention for the channel can be avoided as long as mobiles are separated far enough in space. Overlapping cells are made possible through the use of Single Frequency Reuse (SFR). SFR allows multiple BSs to use the same radio frequency, thus creating the overlapping cells. Therefore, even deep within a building users may still be able to communicate with two to five BSs, therefore increasing the probability of successful communication.

3.3 General Packet Radio Service (GPRS)

One of the more modern of the wireless packet switched data networks is the General Packet Radio Service (GPRS). GPRS improves upon other standards by increasing data speeds (up to 115 kbps), supporting a wide range of operational frequencies, and sending both small data bursts and large volumes. GPRS has almost completely taken over the European and many South American markets for data communications. It has just recently begun to show up on the North American market over the past few years.

Currently AT&T Wireless and Cingular Wireless offer GPRS support in the US. Cingular's coverage map as of January 23 rd 2004 can be seen in Figure 3.6. GPRS has such a large coverage area because it makes use of the entire cellular Global System for Mobile (GSM) footprint. In addition to the U.S. over 500 operators in 207 countries worldwide provide GSM [8], thus making it an excellent global solution. Another aspect of GPRS that can be observed from the coverage map is that the majority of Cingular's coverage is on the 1900 MHz frequency. This is roughly double the frequency that the aforementioned protocols use. This fact alone may make GPRS unsuitable for use deep within buildings.

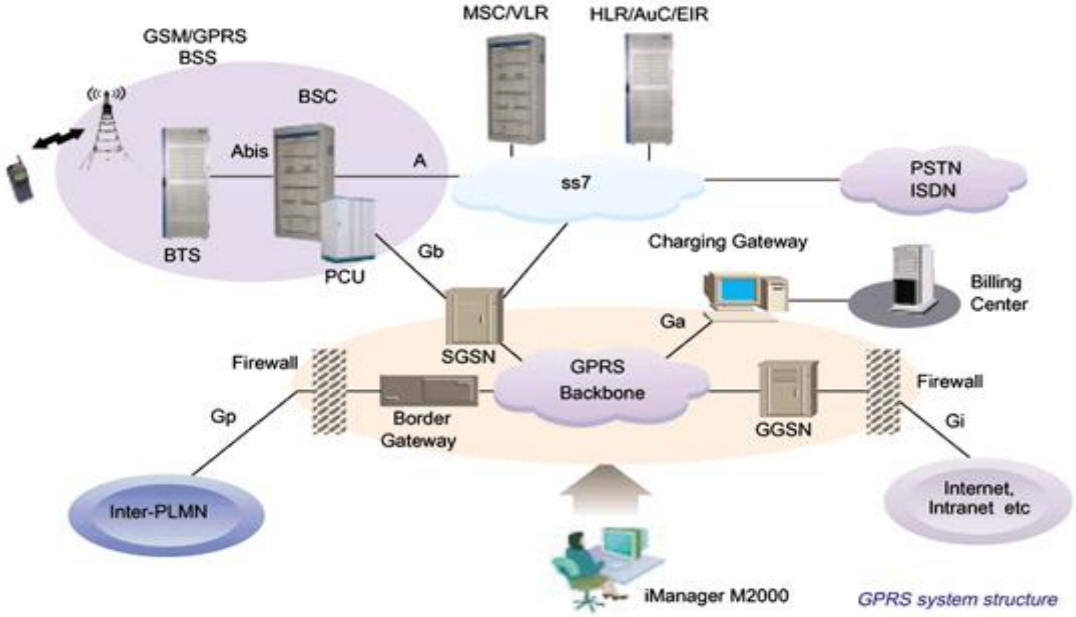

Figure 3: GPRS Architecture

GPRS networks are IP-based; therefore, any applications that operate over a wired channel and use IP will work with GPRS. This is very useful in the porting of Xerox's current DCS to a wireless medium. Because of this packet-based, IP approach, devices utilizing GPRS are always online, yet only pay by the amount of data that is sent (making it quite cost effective). Performance of GPRS greatly improves upon the other data protocols listed above. Theoretical speeds of 115 kbps are claimed possible if all eight time slots are utilized with no error protection implemented. However, this maximum speed is usually not realizable in any practical communication system due to the need for error correction and the competition for limited resources with other users. Therefore, average speeds of GPRS (on the AT&T Wireless network) are typically within 20-50 kbps on a loaded network.

3.4 Enhanced Data rates for GSM Evolution (EDGE)

Both AT&T Wireless and Cingular Wireless have recently begun to implement EDGE across their current GPRS networks. EDGE uses a more sophisticated link between the mobile device and the base station (BS) then GPRS. EDGE has the ability to change its modulation scheme "on the fly" in order to adapt to environmental changes that can affect the quality of the channel. Unlike GPRS, which is bound to a Gaussian Minimum-Shift Keying (GMSK) modulation scheme, EDGE uses 8-PSK (Phase shift keying) with the ability to switch back to GMSK. While GMSK was chosen primarily for its ability to lower cost and increase power efficiency, PSK can increase bit rates (3 bits/symbol up from 1 bit/symbol with GMSK) across the wireless channel. AT&T Wireless claims that its EDGE technology can reach speeds of 180 kbps (with a burst of data) and average 100-130 kbps, which is much higher then the actual speeds attainable through GPRS alone.

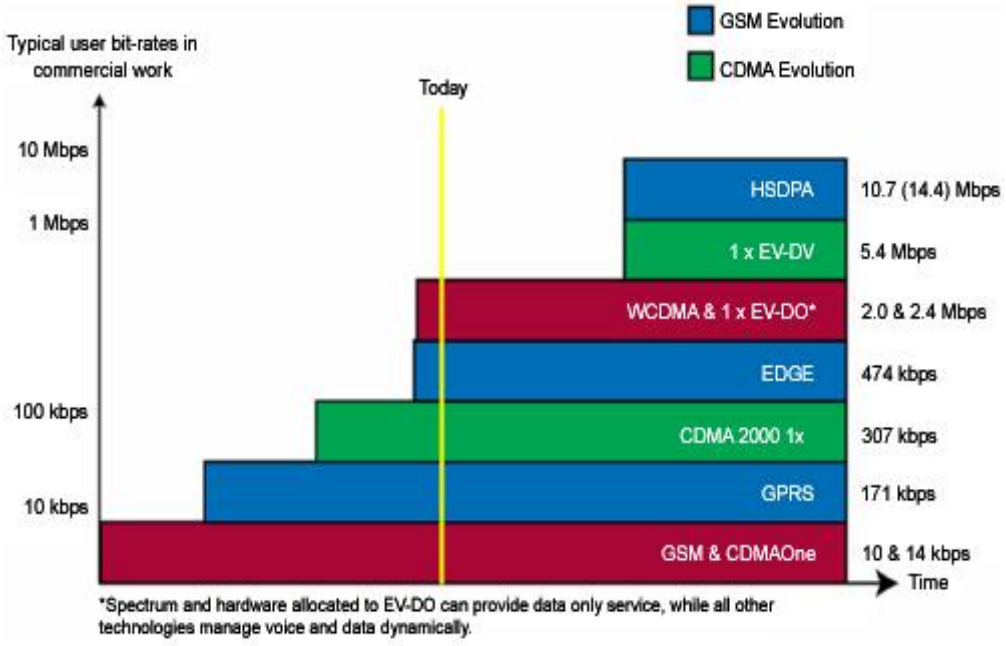

Figure 4: Comparison of Different Evolutions

CONCLUSIONS

In future, all inclusive gadgets that can get to the nearest/best quality/least expensive remote system out of a few decisions will be created. Remote net-works will have the capacity to actualize a uniform tending to framework in which a man has a steady distinguishing number or system address that is convenient over every remote system. Inside of a few years, these networks will rival "wired" networks for Applications with low to medium transmission capacity necessities. Then again, with expanded recurrence assignments, propels in semiconductor innovation, and more effective coding of data over remote channels, versatile and remote networks will turn into the net-Works of decision for most clients and applications, making wired networks relics of the past. They are broadly utilized by the military. In this occurrence, topology data is of awesome quality, and the system ought to be secured against interruptions which would have serious outcomes .

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