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Mobility Issues in Wireless Network ConnectivityInIndia

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***Abstract*-India is a developing nation of the 21st Century and is developing in several sectors, especially, the secondary and the tertiary sector. Service Sector is one of the most important sectors to develop in the recent times and it includes the Information and Communication Technology (ICT) Sector. India, as a developing economy heavily relies in its network connectivity. However, several issues are encountered in its connectivity, one of which is the high cost of broadband and other network infrastructures. Roaming network is one of the grave (serious) issues network consumers face in India. Wi-Fi is one solution to this problem as it is cheap and affordable option. Resolving the issues of bandwidth can help to resolve the network connectivity issues in India. Most developing countries like China and Singapore are using 6G networks. Comparatively India is lagging in the network issues & is currently using 2G network. To overcome these issues India provides best broadband infrastructures of network which is affordable and convenient for out coming sources. The wireless network should provide good Quality of Services, Security and should give the best access to the mobility consumers. This paper describes the functional requirements of mobility issues in wireless networking. Hence, one can say that India does have network connectivity issues**.

Keywords: **Bandwidth, Quality of Service (QoS), Internetworking, Mobility, Signaling**.

I. INTRODUCTION

The first generation analog cellular systems used large cells and multi directional antennas in the 800 MHz band. The several systems use a seven-cell reuse pattern with provisions for cell-sectoring and cell-splitting to increase capacity when needed. First generation analog cellular systems were followed by second-generation, digital cellular systems. Digital wireless technologies support a much larger number of mobile subscribers within a given frequency allocation.quality, and lay the foundation for the value-added services (including data) that will continue to be developed and enhanced in future.The wireless terminal hasthepotential to become a generic platform for, or gateway to, the complete range of communication services; that is, voice, data, video and multimedia. And network operators recognize that future revenue streams in competitive and mature markets will not be generated solely from providing voice connections, but also more sophisticated services. The existing digital wireless standards continue to be developed, particularly as related to value-added services, capacity, coverage, costs and bandwidth. Three of the present cellular standards (D-AMPS/IS-136, GSM and CDMA/IS-95) are expected to provide third-generation capabilities. Therefore, one of the most important requirements of the 3G system is that it provides a seamless path of migration from present day digital wireless networks that it be capable of inter-working.

All major providers of wireless network systems, services and terminals agree that future third-generation wireless systems should evolve from the coreinfrastructures contained in today's digital networks. The first enhancement for increasing data rates to reach commercial deployment will be high-speed circuit-switched data. Initially, this enhancement will support data rates up to 57.6 kbps using four 14.4 kbps time slots. General packet radio services (GPRS) is a packet-switched service that will allow full mobility and wide-area coverage with data transmission rates up to 115 kbps, Enhanced data rates for GSM evolution (EDGE) will use enhanced modulation and related techniques, further improving local mobility (typically in urban areas) with data rates up to 384 kbps. The existing GSM carrier bandwidth of 200 KHz will remain unchanged as will the complete TDMA frame structure, logical channel structure, frequency plans and methods. Operators will be able to offer third-generation wireless services in any of today's GSM frequency bands: 900, 1800 and 1900 MHz.

II.LOOKING TO THE FUTURE WIRELESS CONNECTIVITY

Recent years have witnessed the rapid evolution of commercially available mobile computing environments. This has given rise to the presence of several viable, but noninteroperablewireless networking technologies – each targeting a mobility environment andproviding a distinct quality of service. The lack of a uniform set of standards, theinconsistency in the quality of service, and the diversity in the networking approaches makeit difficult for a mobile computing environment to provide seamless mobility across differentwireless networks. Besides this, inter-network mobility will typically be accompanied by achange in the quality of service. The application and the environment need to collaborativelyadapt their communication and data management strategies in order to gracefully react tothe dynamic operating conditions.

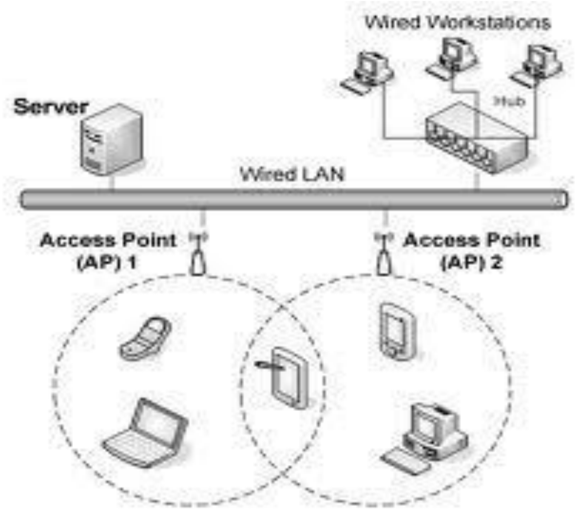

Fig .Infrastructure of Wireless Network

The next significant development in wireless communication will consist ofenhancements to the radio access that enable true multimedia services to be delivered athigh bit rates. New third-generation wideband systems will deliver bit rates up to 384 kbpsfor wide-area coverage, and 2 Mbps for indoor or fixed applications, maximizing theefficiency of available radio spectrum. Today's digital wireless networks and standards willalso evolve to provide similar capabilities. To realize the potential of seamless mobility andensure continued profitability, mobile service providers have to focus as equally on WLANimplementations as they do on their cellular WWANs. Wi-Fi (Wireless Fidelity) and traditionalwireless services are add-on that can exist and succeed together and provide consumerswhat they want, when they want it.Customers will use these technologies for different reasons and at different times.The 3G and 4G technologies such as GPRS, CDMA 1xRTT, and CDMA 1xEV-DOwill be used for applications requiring instant access of bursty data like e-mail, textmessaging, and multimedia message service (MMS), among others. But WLANs will beused in specific locations where users need access to their corporate files and Intranets. the functions of a system can help towards the achievement of the purpose of the system.

III. Mobile Data Issues

Users face differing mobile data issues depending upon location. Connection quality and reliability problems have a higher tendency to occur indoors, while session failures and poor app accessibility are problems faced by outdoor smartphone users. 63 percent of users report that they face quality and reliability issues, such as lost connections and inconsistent network speeds, when using mobile networks indoors. App-related issues while outdoors or commuting, such lengthy lag times, apps taking a long time to refresh, maps failing to load, and session failures affect 68percent of consumers. Such problems are more common in mid-size and small towns compared to large cities.

For those consumers in India who do not use mobile broadband, affordability and digital literacy are the prime obstacles to adoption. 88 percent of Indian consumers on 2G feel that mobile broadband is too expensive. 53 percent feel that mobile broadband adds no value and as many as 48 percent believe there is no difference between 2G and 3G speeds.Mobile internet usage is expected to grow with the consumers' better understanding of the data plans on offer. As per the study, only 10 percent of mobile internet users feel they understand their plan perfectly, and are able to make an accurate judgment when deciding on a plan.

To address the evolving needs of consumers who use smartphones to access mobile broadband, research was conducted to determine both motivations for and needs when buying and using services. The research also addressed the attitudes and interests concerning technology and paying for services in the future. When it co0mes to overall mobile internet experience, good quality network performance is a must for all segments. However, due to the sheer diversity of the Indian market, people's definition of a 'good' mobile internet experience varies significantly. This is because the importance attached to dfferent attributes of mobile internet varies between different user segments. While quality and reliability of mobile internet connectivity is a hygiene factor for tech enthusiasts, speed is of utmost importance to prudent business users.

3.1 FUNCTIONAL REQUIREMENTS

*Very high-speed and high-quality transmission:*Future mobile communication systems should be able to handle a large volume of multimedia information a full song or sending a complete data file or several video clips. This would be possible byvarious means like transmitting data at 50-100 Mbps, having asymmetric data speeds in upand down links, having continuous coverage over a large geographical area, applying quality of service (QoS) mechanism (e.g. efficient encoding, error detection and correction techniques, echo cancellers, voice equalizers, etc.) at low, affordable and reasonable operating costs, etc.

Flexible and varied service functions: Future mobile communication networks should be "seamless" with regard to media that means whether it is wireless or optical fiber or satellite or wire line, with regard to corresponding hosts or service provider as well as interconnectivity with other networks like GSM or CDMA or other telecom networks.

*Open platform:*Future mobile communication systems should be "open" regardingmobile terminal platform, service nodes, and mobile network mechanisms. That would mean that user can freely select protocols, applications and networks. Advanced service providers (ASPs) and content providers can extend their services and contents independent of operators. Location and charging information can be shared among networks and applications.

*Expected Characteristics of Future Systems:*About the expected characteristics of future mobile communication systems. The future systems will be just like a shopping mall where we can get any item ranging from household articles to infrastructure items, raw material to finished goods, various service functions like banking or postal or insurance, etc.
That means the user can flexibly select the optimum wireless service according to the usage environment. This will be achieved by very high-speed transmissions in cellular environments with high grade of mobility.

System Perspective: Now, let us see how the future mobile communication system can be realized. Advanced cellular systems and high-speed wireless access systems will be functionally integrated into the future mobile communication systems. That means the existing cellular systems will be upgraded to introduce new features.

Spectrum Requirements: So far what we have discussed is that future mobile system should be able to provide enhanced data transmission capabilities. For this we have to pay the price in terms of an additional spectrum of 1.2~1.7 GHz bandwidth. This estimation of additional spectrum is based on
- Enhanced service requirements.
- Introduction of ultra high-speed multimedia i.e. downlink 100 Mbps, uplink 30 Mbps or very high-speed multimedia i.e. downlink 30 Mbps, uplink 3 Mbps services.
- Rate of increase in traffic at least to be @ 50% per year.

At present 3G mobile systems like GSM cellular are operating in the frequency band of 900 MHz or 1.8 GHz, and CDMA based cellular systems are operating at 1.9 GHz. The future 4G mobile systems shall operate in frequency band of 1.7~2.5 GHz or 2.4~4.5 GHz. Frequency band above 5~6 GHz is not suitable mainly because the signal loss caused by the shadow of a human body increases significantly.

3.1 MOBILITY

Without the constraints imposed by the wired connections among devices, all devices in a wireless network are free to move.To support mobility, an ongoing connection should be kept alive as a user roams around. In an infrastructured network, a handoff occurs when a mobile host moves from the coverage of a base station or access point to that of another one. A protocol is therefore required to ensure seamless transition during a handoff. This includes deciding when a handoff should occur and how data is routed during the handoff process. In some occasions, packets are lost during a handoff. In an ad hoc network, the topology changes when a mobile host moves. This means that, for an ongoing data communication, the transmission route may need to be recomputed to, cater for the topological changes. Since an ad hoc network may consist of a large number of mobile hosts, this imposes a significant challenge on the design of an effective and efficient routing protocol that can work well in an environment with frequent topological changes

3.2 Signal Fading

Unlike wired media, signals transmitted over a wireless medium may be distorted or weakened because they are propagated over an open, unprotected, and ever changing medium with irregular boundary. Besides, the same signal may disperse and travel on different paths due to reflection, diffraction, and scattering caused by obstacles before it arrives at the receiver. The dispersed signals on different paths may take different times to reach the destination. Thus, the resultant signal after summing up all dispersed signals may have been significantly distorted and attenuated when compared with the transmitted signal. The receiver may not recognize the signal and hence the transmitted data cannot be received. This unreliable nature of the wireless medium causes a substantial number of packet losses.

IV. SEAMLESS MOBILITY

There is a powerful trend towards seamless mobility in the cellular world, where mobile professionals today and eventually all consumers in the future would like to communicate and be able to do their routine business anytime, anywhere. As a result, there is real demand for ubiquitous connectivity between a wide variety of mobile devices and access technologies, which include Wireless Wide-Area Networks (WWANs) and Wireless Local-Area Networks (WLANs). Roaming and communications among these technologies are therefore "must-haves" for seamless mobility to occur. The new generation of wireless networks is intended

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to provide accessing information anywhere, anytime, with a seamless connection to a wide range of information and services, and receiving a large volume of information, data, images, video, and so on. The future network infrastructures will consist of a set of various networks using IP as a common protocol so that users are in control to choose every application and environment. Figure 1 demonstrates the seamless connectivity of the future Communication Networks. Seamless Mobility is the result of extensive primary and secondary research on a variety of industry participants including cellular service providers, equipment suppliers,

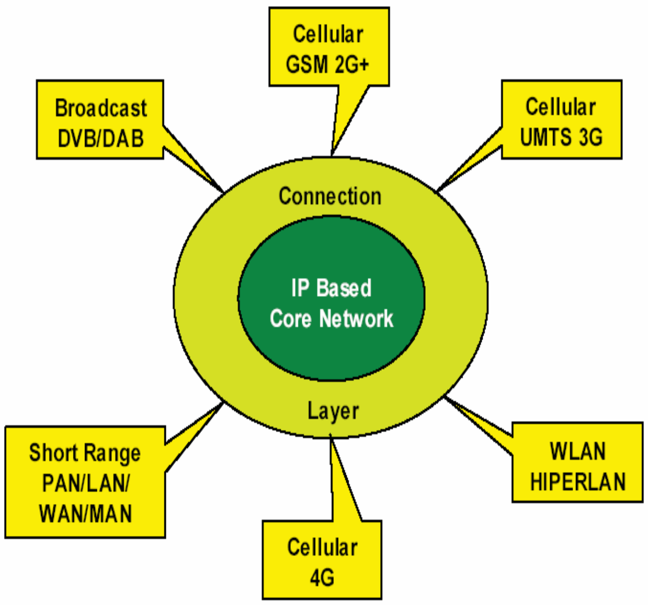

Fig. 1: Seamless Connectivity of Communication Networks

Internet Service Providers (ISPs), electronic component manufacturers, and software providers, among others. Studies have been made to exploit the potential as well as to overcome the shortcomings of 3G, and demonstrate how service providers can take advantage of WLAN deployments.
The handoff latency of many new access technologies such as wireless LAN devices is very large of the order of hundreds of milliseconds. During this period mobile nodes cannot receive or transmit packets. This results in significant performance degradation during handoff operation. Furthermore, while handing off across subnets, network layer handoff can be initiated only after link layer handoff is complete. This increases the latency even further. Present cellular systems designed to handle mobility solve the latency issue by adding intelligence to the network and the interfaces. However, in the IP-based architectures the access technologies do not support the level of handoff coordination that cellular systems provide, Today in India, video and TV services are driving forward third generation (3G) deployment. And in the future, low cost, high-speed data will drive forward the fourth generation (4G) as short-range communication emerges. Service and application ubiquity, with a high degree of personalization and synchronization between various user appliances, will be another driver. At the same time, it is probable that the radio access network will evolve from a centralized architecture to a distributed one.

V. SEAMLESS CONNECTIONS - ISSUES

Based on the developing trends of mobile communication, next generation wireless networks will have broader bandwidth, higher data rate, and smoother and quicker handoff and will focus on ensuring seamless service across a multitude of wireless systems and networks.
Present– Seamless handoffs can be designed for homogeneous networks (IEEE802.11 WLAN & cellular) – at Layer 2 and with limited participation of the mobile node (MN) in the decision.

Future – For IP to mobile node applications where there is a multiplicity of potential access technologies, the requirement of functionality in the MN and Access Router (AR) to facilitate seamless transfer (network or MN initiated), and the need of Quality of Service (QoS), Authorization/ Authentication/Accounting (AAA), as well as the need of Security infrastructure changes are to be established.

Challenge– How do we help facilitate the future vision during transition? Assuming that IPv6 specification has fundamental mobile IP functionality and Multiplicity of wireless access techonology in a particular geographic area.

The key concept is integrating the 4G capabilities such as Application adaptability and being highly dynamic with all of the existing mobile technologies through advanced technology. Future Mobile Communication Systems will certainly and surely achieve the concept of a “Global Village”.

VI. MANAGING LOCAL MOBILLITY

Limited scale solution - As ratio of mobile to non-mobile endpoint grows, address aggregation becomes increasingly difficult and routing table size increases. It increases seamlessness over basic mobileIP and in turn depends upon wireless access technology used (i.e. IEEE802.11, GPRS, Blue tooth, IR).

No mobileIP delay - Only routing update delay for an interior routing protocol. It may need to support temporary bi-casting near handoff.

QoS AND MOBILE ROUTER ISSUES

QoS Issues - Cellular voice packets are processed differently than data packets. Voice frames are optimized for minimum overhead & maximum utilization. Moreover, MAC scheduler is optimized for voice applications and sent once (UDP-like) model without any use of persistence. Packets lost over wireless link are "fudged" with error concealment. However, Cellular "data (IP) packets" are limited persistence protocol on wireless link. This is certainly not acceptable for VoIP.

Mobile Wireless Networks/ Routers Issues - MobileIP was not designed for high frequency mobility or for more than one IP access link. In practice, Seamless mobility across Trust Domains requires Layer 3 solutions. Limited scale of Layer 2 technology solutions can be suitable to nano-mobility applications (invisible to AR). SCTP (Single Connection Transmission Protocol) -based mobility can also be used when endpoints have SCTP capability.

VI. Conclusions

This paper describes the issues of an network connectivity of mobility for sharing files in an seamless manner over an geographic location. overview of a comprehensive list of research issues of the wireless network connectivity like signal fading problem , mobility problem , data rate and the quality of service issues problems of the wireless networks connectivity . In addition the popularity of wireless networks growing at a exponential rate, the data rate enhancements, minimizing size, cost, low power networking, user security and the best requirement to obtain the required QoS problems becomes more challenging because wireless networks are rapidly becoming popular, and user demand for useful wireless applications is increasing.

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