

4G Informatics Cloud for Army Defense

- M. Arumai Selvam*



Abstract

The defense mechanism is fully based on the communication systems and the technologies that encompass the various modes of communication through wireless sensors and devices. The mobile devices play a vital role in strengthening of the systems and also the nature of data being transmitted with utmost speed and accuracy. The communication process is aggravated various infrastructural development to reach in this current level such as 3G and 4G communication system. The user expectation also increased to meet their personal and social applications. The users are try to integrate the personal and social network technology with real time operations for their personal and business objectives. This paper marks the beginning of a new communication technology with 4th Generation Mobile technology applied to transmission of data and communication through proper channels.

Keywords: Defense Army, 4G, Mobile Technology

Introduction

Mobile systems focus on seamlessly integrating the existing wireless technologies including GSM, wireless LAN, and Bluetooth. 4G systems supports comprehensive and personalized services, providing stable system performance and quality service [1]. 4G is a Mobile multimedia, anytime anywhere, Global mobility support, integrated wireless solution, and customized personal service network system [2]. 4G is used broadly to include several types of broadband wireless access communication systems along with cellular telephone systems.

A 4G cellular system must have target peak data rates of up to approximately 100 Mbit/s for high mobility such as mobile access and up to approximately 1 Gbit/s for low mobility such as nomadic/local wireless access, according to the International Telecommunication Union [ITU] requirements. Scalable bandwidths up to at least 40 MHz should be provided. A 4G system is expected to provide a comprehensive and secure all-IP based solution where facilities such as IP telephone, ultra-broadband Internet access, gaming services and High Definition Television (HDTV) streamed multimedia may be provided to users. In 4G networks, users joining the network via add mobile

routers to the network infrastructure. Network capacity and coverage is dynamically shifted to accommodate changing user patterns. Wherever the concentration of people is more in one area, additional routes are created, thus enabling additional access to network capacity in terms of QoS. This permits the network to dynamically and automatically balance capacity and increase network utilization. The network is currently used social networking. The following part of the paper deals with social networking and its technological issues.

Technology used in 4G Communication System

The infrastructure and the terminals of 4G will have almost all the standards from 2G to 4G implemented. The infrastructure for 4G will be only packet-based (all-IP). But there is a suggestion to have an open Internet platform[2].

The 4G technology en suite with 802.16e mobile version of WiMax (also known as WiBro), and HC-SDMA, Adaptive Modulation and coding (AMC), Adaptive Hybrid ARQ, MIMO AND OFDM and Open distributed Ad-Hoc Wireless Network.

* Vice Principal and Head, PG and Research Department of Computer Science, St. Joseph's College of Arts and Science (Autonomous) Cuddalore - 1 Mail: arumai_selvam@yahoo.com

Adaptive Modulation and Coding (AMC)

The principle of AMC is to change the modulation and coding format (transport format) in accordance with instantaneous variations in channel conditions, subject to system restrictions. AMC extends the system's ability to adapt to good channel conditions. Channel conditions should be estimated based on feedback from the receiver. AMC allows different data rates to be assigned to different users depending on their channel conditions. Since the channel conditions vary over time, the receiver collects a set of channel statistics that are used by both the transmitter and receiver to optimize system parameters such as modulation and coding, signal bandwidth, signal power, training period, channel estimation filters, and automatic gain control[3]. This AMC helped to integrate the 2G, 3G architecture uses into the forth coming 4G devices.

Adaptive Hybrid ARQ

A successful broadband wireless system must have an efficient co-designed medium access control (MAC) layer for reliable link performance over the lossy wireless channel. The corresponding MAC is designed so that the TCP/IP layer sees a high-quality link it expects. This is achieved by an automatic retransmission and fragmentation mechanism called automatic Repeat Request (ARQ), wherein the transmitter breaks up packets received from higher layers into smaller sub packets, which are transmitted sequentially. If a sub packet is received incorrectly, the transmitter is requested to retransmit it[4]. ARQ can be seen as a mechanism for introducing time diversity into the system due to its capability to recover from noise, interference, and fades. It will retain the quality of service in terms of data transmission[5].

Multi in - Multi out and Orthogonal Frequency-division Multiplexing (MIMO and OFDM)

The challenge for wireless broadband access lies in providing a comparable quality of service for similar cost as competing wire line technologies. Increasing demand for high performance 4G broadband wireless mobile calls for use of multiple antennas at both the base station and subscriber ends. OFDM can be implemented efficiently by using fast Fourier transform (FFT) at the transmitter and receiver. At the receiver, FFT reduces the channel response into a multiplicative constant on a tone-by-tone basis. With multiple input multiple output (MIMO), the channel response becomes a matrix. Since each tone can be equalized independently, the complexity of space-time equalizers is avoided. Multi In and Multi Out and Orthogonal frequency-division multiplexing (OFDM) is chosen over a single carrier solution due to lower complexity of equalizers for high delay

spread channels or high data rates [6]. A broadband signal is broken down into multiple narrowband carriers (tones), where each carrier is more robust to multipath. Multipath remains an advantage for a MIMO-OFDM system; since frequency selectivity caused by multipath improves the rank distribution of the channel matrices across frequency tones, thereby increasing Capacity[7]. This allows 4G device to act as multi transfer and multi receiver data communication.

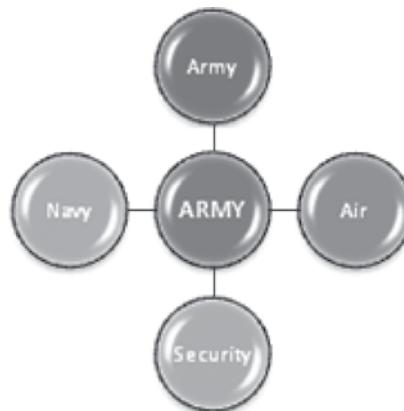
Open Distributed AD-HOC Wireless Network

Routing infrastructure, including handsets, utilize intelligent routing capabilities to determine the best path for each transmission. Routing for the best path must be defined for least power. That is, network nodes must be able to calculate and update routing tables to send data packets through the paths with minimal power requirements [8]. This is different from network nodes associating with the physically closest available infrastructure. The 4G mobile system based on open wireless platform architecture will become the next wave in wireless communications.

The technology leads to integrate the computing network for human needs. At the same time, these technologies and the existing and upcoming 4G used to create the human network via computing devices. The social networking and it ecological issues are discussed below.

Army Defense System

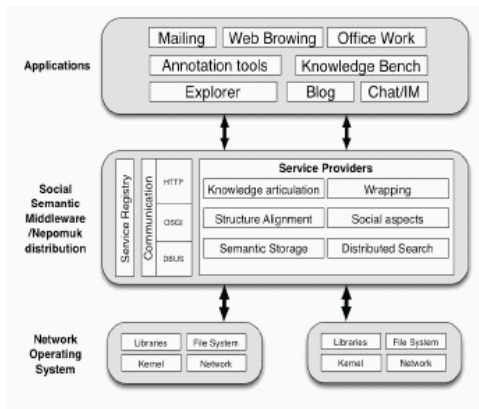
An Army is a Voluntary Defense system that Acts as a destination hub for individuals to safeguard our country from foreign invasions and hold the security of the nation.



It includes different area for people to interact with each other, fight against odds of the country and build a sense of community in a formal and voluntary manner. A Social Network is much needed for all army personals to have communication in an effective manner to safeguard the country without much toughness amidst foreign invasions. It also enables them to have communication with their family and friends through Social Community networks. It allows the user to define an online profile (or personal),

list their connections (e.g., friends and colleagues), receive notifications on the activities of those connections participate in group or community activities, control permission, preference and privacy settings. We define social network sites as web based services that allow individuals to do the following [1] construct a public or semi-public profile within a bounded system [2] articulate a list of other users with whom they share a connection, and [3] View and traverse their list of connections and those made by others within the system. The nature and nomenclature of these connections may vary from site to site [9].

In the existing social network sites are allowed to search the members, introduce the member, allow to send the message, share the photo, video and online chat etc.



But the social networks are not realistic as we are interacting in a realistic work or environment. In the social network intermediate objects are skipped and an object member can establish the connection to the next member with its maximum degree level. This 4 G communication tries to achieve the semantic technology application to the users. It is “Leveraging Semantic Technology for Infrastructure Mediation”, explores how to use machine-to-machine intelligence for large scale distributed computing networks, such as grids and cloud computing.

Social Network Architecture

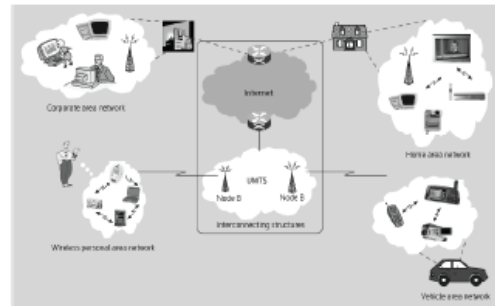
The social network system has three layer processes. In this three layer application layer establish the interface with the user and rest of network process. In the interface level mailing, browsing, office work, annotations, knowledge bench, block and chat applications. These interface mainly used to maintain the communication with the social members and share information among the group. At the same time layer inherit to middle ware layer to register, create communication and provide the service to application layers.

Social Networking and 4G Technologies

The social networking process is an involved Variety of networks such of Corporate Network, Home area network, Wireless Personal area network Internet and vehicle area

network. The combinational network represented below with its possible connectivity architecture.

While we are constructing the social network that will provide infrastructure service, web site content and application, relation control and participation model. Relation control and participation model work together to enrich the social presence of the registered user of the social network group member, Actor profile and Social Graph.



The infrastructure model provides the facility to Collaboration & Content service and Social Networking services. The social network architecture simulates the Cloud computing architecture.

Flexibility of 4G Technology for Army Networking

4G Communication architecture will provide access through a collection of radio interfaces, seamless roaming/handover and the best-connected service, combining multiple radio access interfaces (such as WLAN, Bluetooth and GPRS) into a single network that subscribers may use. It allows any mobile device to seamlessly roam over different wireless technologies automatically, using the best connection available for the intended use. Users will have access to different services, increased coverage, the convenience of a single device, one bill with reduced total access cost, and more reliable wireless access even with the failure or loss of one or more networks. This technology supported with the support of Hardware as service (Haas) to the social networking members. They can access the network communication system using any available network infrastructure as a Service (IaaS). In the 4G architecture, a single physical 4G communication device with multiple interfaces to access services on different wireless networks. The multimode device architecture may improve call completion and expand effective coverage area. The device itself incorporates most of the additional complexity without requiring wireless network modification or employing interworking devices. Each network can deploy a database that keeps track of user location, device capabilities, network conditions, and user preferences. It allow the social network user to connect the rest of the network members without any modification of his/her infrastructure, application, services and the architecture of communication system.

Conclusion

4G communication system is dwell in many application of real time communication system with High speed network capacity, Fast/seamless handover across multiple networks, Wireless access technologies, MIMO and Multimedia support. The high end 4G communication architecture have flexibility to construct the social networking process in an effective manner to integrate the corporate, private and public network. This study provides the possible technology adaptation for the social networking effective process using 4G communication architecture. The study will lead to find the design architecture of secured and effective Army networking information architecture using Hardware, Infrastructure, Software, platform, Communication, data storage service with Effective Quality of Services. If this research concludes well then countries will have the best defense mechanism.

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