Analysis of Wireless

Tactical Network (WTN)

Atul Ranjan Srivastava1

Assistant Professor, Department of Electronics and Communication,

Shri Ram Murti Smarak College of Engineering and Technology,

Bareilly-Lucknow1;

1604atul@gmail.com1

Abstract: In the present paper the goal of the WTN program was to develop an adaptive networking capability that dramatically improved performance and reduced communication failures in complex communication networks. The past decades have witnessed advances in computing and communication technologies. Faster, smaller and more reliable devices enable communications with rapid, efficient information dissemination between mobile. These advantages are on demand setup, fault tolerance, node's increased mobility, self-organizing connectivity, adaptive, scalable ad hoc network routing. Now a day, tactical communication provides security and more authentications over movable sensor or distributed network. The tactical communication provides reliable transmission conditions which enhance its network capability as compared to moving communications. Today tactical communication elaborate reliable, flexible and fast mode of communication during movable object. The transmission and reception mechanism creates vast performance in advance wireless mobile communication and can accommodate large number of channels.

Key words: Tactical networks, Adapt, Ad-hoc network, BER, SNR

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Introduction

Tactical networks must comply with the anticipated characteristics associated with Command and Control applications. Case execution is the implementation of the solution and the evaluation of the success of the case. Case organization is how the new case is stored in the case library after case execution. The structure of tactical components and its interactions are consisting of retrieve module, adapt module and process module. [1] Mobile ad-hoc networks have a unique set of challenges and problems, although mobile ad hoc networks have numerous advantages over the traditional wired networks. For example the supply constraints on nodes in mobile ad-hoc networks bound the cryptographic procedures that are used for secure messages. Therefore it is legally responsible to fix attacks ranging from passive masquerade to active masquerade.[2-3]To supplement above a case library is also incorporated with it. [Fig1]

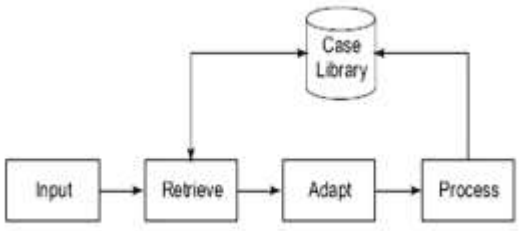

Fig.1 Components and interactions

As we know that MANET have some limitations regarding battery power and issues with transmission medium in tactical communications. Therefore, we use CBMANET, which provide control-based MANET system to tactical scenario. The baseline

utility of CBMANET in all phases of operations is having less than 33 percent usefulness in tactical communications. Hence, they are unusable. During command and control mechanism as compared to wired network tactical network provide more throughput and connectivity levels [Fig2].

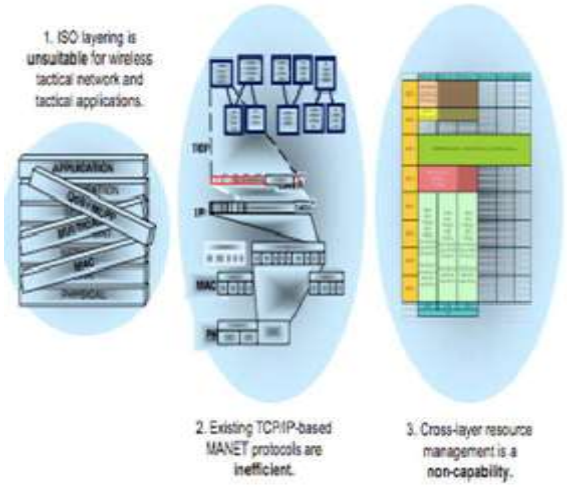

Fig2 Challenges of MANET

Theoretical considerations

Since in tactical network all command and control operations are done by internet protocol module in absence of microprocessor and microcontroller; the communication establishment becomes critical which affect battery life and battery. So, during the power consumption in tactical communication system it should be optimized properly to maximize the total battery life. [4] The other applications tested were chat, FTP, and blue-force tracking. In the tactical operations context, rapid deployment and self-organization of networks are required. MANETs have the capacity and quality of service required for tactical wireless networks. In terms of network capacity, lifetime, and latency, MANETs need to be improved. Since network resources of MANET are limited due to the multiple users sharing the same spectrum, and power resources of mobile nodes is constrained due to the energy-limited batteries. [5-7] hence it is well known that wireless communications consume significant amounts of battery energy, and the limited battery lifetime imposes a constraint on network performance; therefore, energy efficient operations are critical to prolong the network [Fig3].

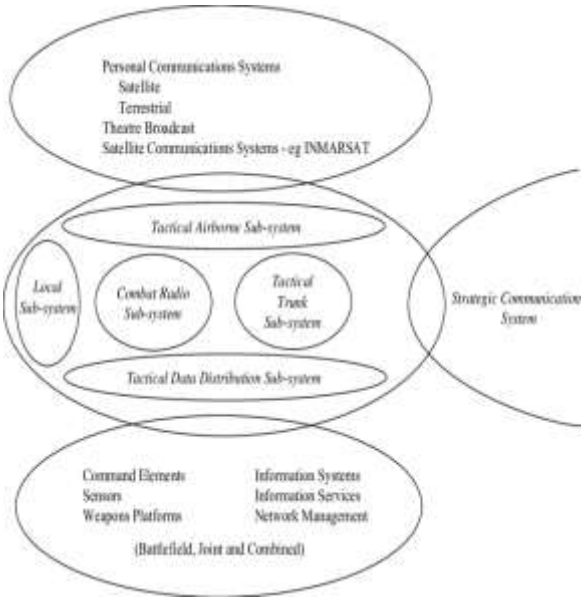

Fig.3 System architecture

Encouraged by the need to have ubiquitous connectivity, there has been impressive growth in the field of wireless networking in the past two decades. As we know wireless communications based on exchange of electromagnetic radiation. So radio signal provides the significant modeling of system. Each service has a different set of features, and each uses a slightly different technology. The four most widely used wireless technologies are Wi-Fi, WiMAX, and 3G and emerging4G cellular services. The data rates for wireless technologies and the speed can be seen [Fig4].

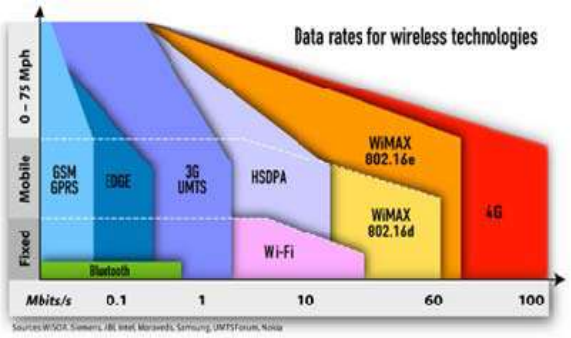

Fig 4: Data rates for wireless technologies

Results

Wi-Fi is often used in point-to-multipoint (PMP) environments to allow extended network connectivity (e.g., private/backbone network, Internet) of multiple

portable devices such as laptops, PDAs, handhelds, and mobile cellular phones.[7-11] Wi-Fi also allows point-to-point (P2P) connectivity, which enables devices to directly connect and communicate to each other. The IEEE 802.11standard defines two modes, namely Infrastructure mode and Ad-hoc mode which are depicted in Figure 5.

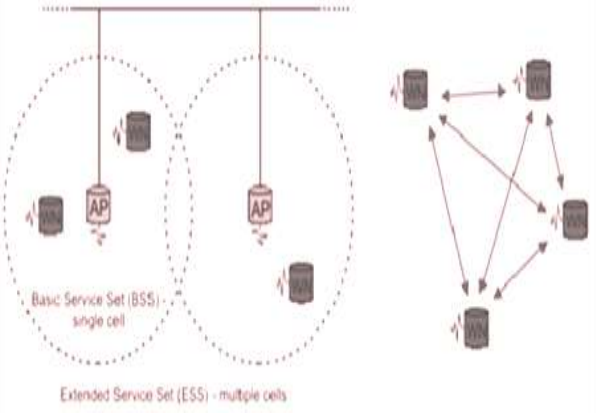

Fig 5: Infrastructure and Ad Hoc Mode of IEEE 802.11

Few wireless channels were implemented for the needs of this simulation: Rician and Rayleigh fading channels in additive white Gaussian noise (AWGN) and Rician and Rayleigh channels in AWGN with convolution coding.[12-13] Additionally, a Matlab simulation was implemented to simulate a fading channel for an audio file without compression for the purpose of comparing results of the simulation [Fig6]

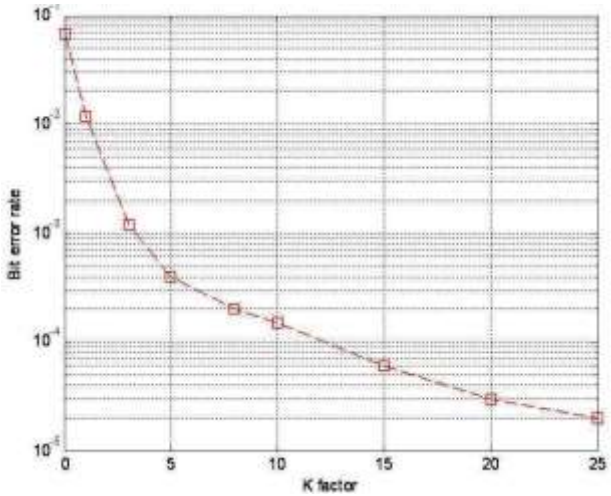

Fig. 6: The Bit Error Rate vs K factor

Now increase in signal to noise ratio give decrease in bit error rate regardless of channel coding or speech compression. This is due to multipath propagation. In this scenario as soon as main path strength becomes stronger than dominant path; it becomes easier to receiver to compare a pulse and delayed copy pulse [Fig7].

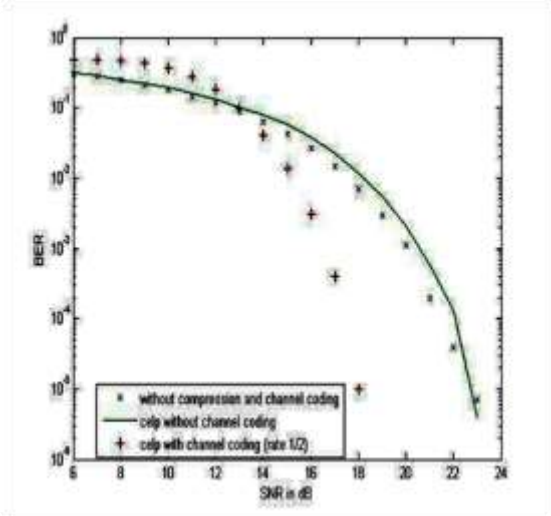

Fig7. The Power Spectral Density of OFDM

Next, the effect of compression ratio on the speech quality is examined. Five different compression ratios were used, and the results of the simulation can be seen in Figure 8. Sixty Monte Carlo runs were used to calculate the average amount of remaining speech for each compression ratio. As the signal is compressed at higher rates, the amount of remaining speech becomes smaller [Fig8].

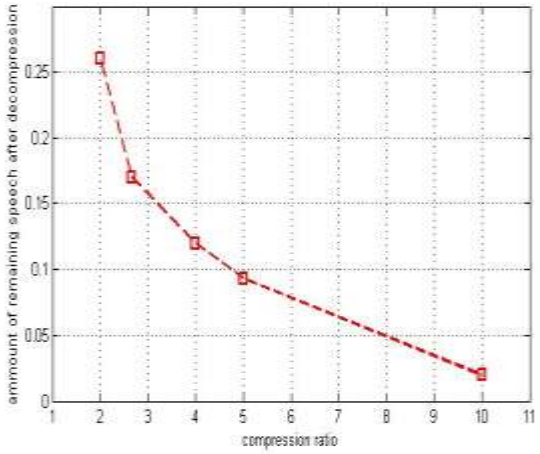

Fig 8: Effect of Compression Ratio on the Remaining Speech

The IEEE 802.16 standard provides for two main distinct uses of this technology, point-to-point (PTP) and point-to-multipoint (PMP). [14-15] A PMP

system allows a radio system to provide services to multiple users. [Fig9].

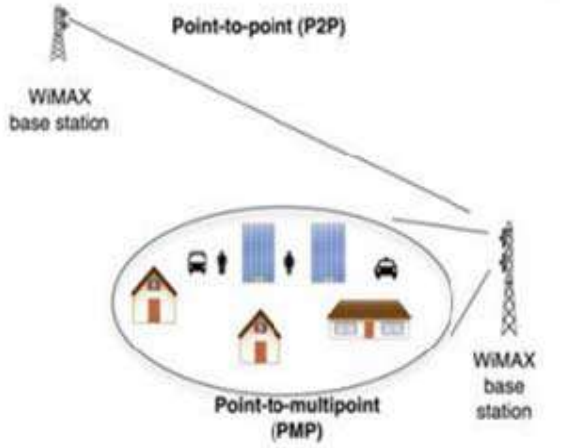

Fig9. Point-to-Point and Point-to-Multipoint Configurations

Conclusions

Battery life in wireless communication systems has been one of the major limitations. Power consumption should be optimized in order to maximize the total battery life of mobile ad hoc networks.This paper investigated the quality of received voice with emphasis on the effects of wireless channel, speech compression and channel coding, Matlab.Minimum energy usage in networking can affect important benefits (e.g., longer battery life and mitigate interference) in the digital battlefield, especially in sensor networks. CBMANETs have inherent significant technical challenges because of the many constraints related such as unreliability of wireless links, limited energy consumption and dynamic network topology. Simulations showed that for the Rician fading channel, an increase in the SNR causes a decrease in BER. There is no significant difference between the BER of the signal when transmitting compressed and uncompressed speech. [16] What makes a difference is the amount of audible distortion caused in each case for the same amount of errors. The increase in the secondary path delay variation causes an increase in the BER of the signal. As the signal strength of the secondary paths increases, the BER increases as well.

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Author's Biography

Atul Ranjan Srivastava has done his B.Tech and M.Tech. in Communication Technology from J.K Institute of Applied Physics & Technology, University of Allahabad, Allahabad, Uttar Pradesh, India& is currently working as

an Assistant professor in department of electronics & communication engineering, Shri Ram Murti Smarak College of Engineering & Technology, Bareilly – Lucknow, India. He has been teaching from more than eight years & is an active researcher in the field of communications systems. He has published multiple research articles in various international journals. He has been a participant & a presenter in various national & IEEE international conferences. He is active mainly in advance wireless communications and microcontrollers.