Optimal Power Control of Network-Network Communication using Virtual MIMO Underlying Cellular Networks

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Abstract- *Dense deployment of small cells will be required to provide high capacity and universal access to future fifth-generation (5G) mobile networks. This would require cost-effective and reliable backhaul connectivity between these small cellular network cells. For this, the design is based on satisfying network constraints such as the maximum number of subscribers per optimal power control for energy efficiency of D2D communication under laying cellular networks. We can achieve results for a long-range, non-line-of-sight (NLOS) maritime wireless backhaul high-speed communication link with high reliability and capacity along with MIMO based Mesh Network can further increase availability and capacity performance for a NLOS broadband maritime wireless communication Network. The D2D connection of node to be ranked and unknown nodes to be detected along with inter and intra cluster region. Then it save the energy in the cluster while idle and active status of these cellular network area*

Keywords- cellular networks, virtual MIMO, D2D communication, energy efficiency.

I. INTRODUCTION

D2D communication has been attracting excessive interest in recent years. D2D communication sets up a direct connection between mobile users, which brings a lot of benefits such as improved network throughput, alleviated spectrum shortage, and so on.. Nevertheless, unlike the base station (BS) in the cellular networks, the stored energy in D2D users is limited, it is very important to consider D2D power control which makes to enhance the system performance. Energy efficiency (EE) is well known as a critical indicator for green communications in 5G mobile networks, and it also naturally becomes an important evaluation criterion of power control for D2D communication under laying cellular networks in recently years. In, the authors firstly modeled the single macro-cell system as the optimization of sub channels and power control problem for D2D links. However, most of existing works mainly focus on the network architecture confined in one or several macro cells, while the optimization of D2D EE for the whole networks still requires further investigation. Considering the random distribution of cellular and D2D users in the whole networks, in this paper, we first utilize stochastic geometry to model the whole system as the homogeneous Poisson point process (PPP). Then, the successful transmission probabilities, average sum rate and EE of D2D communication are derived based on the homogeneous PPP model. With the help of convex optimization, we further analyze the optimization problem of D2D EE under the constraints of outage and power. Finally, the convexity of D2D EE is verified and the optimal D2D power control for maximizing D2D EE is derived in closed form. Simulation results at last demonstrate the optimal D2D power and maximum D2D EE under different system parameters. Wireless communication is infrastructure-less and therefore, is commissioned at very low cost. To provide high data rates, wireless communication has always been a challenge. A wired solution becomes very costly for remote areas with difficult terrain. High-speed internet has become a must requirement for every moment of life whether it's for personal or professional usage. This increasing demand has become important research area for a high availability and broadband capacity infrastructure not only on land but also in sea. World trade is highly dependent on sea based transportation needs. In addition to this many country with strong dependence on offshore oil exploration, drilling and sea tourism & fishing are now investing more in new innovations in maritime communications than before. The demand for a high capacity and reliable alternative data communication is inevitable. In addition to some of the already laid optical fiber based backhaul links in sea, wireless communication is an alternative. Real-time data acquisition, geological survey, oil exploration, drilling and many other activities now demand high-speed internet for better control and result. Currently, cable based or PTP microwave based solutions are deployed for this scenario, but these solutions face operational problems in Offshore Integrated Operations (IO) especially, in the case of portable floating platforms as they are moved regularly within the oil gas field. Some of these needs can be fulfilled by utilizing either a near-shore LOS based microwave links, or laying optical fiber cables in shallow waters. Currently satellite communication based links are used to provide

services for remote and mobile platforms working offshore. Satellite based backhaul links are very expensive to operate and are limited to low data rates. WiMAX based infrastructure alongside the shore can provide communication links from land-based facilities to private boat users, cruise ships or platforms, to support IO operations, security, and high-speed data communications. The range and availability that a WiMAX based network can provide in sea is important to note. A typical offshore platform communication scenario is depicted. An onshore office needs to be connected at high-data rate with offshore platforms which may be LOS or NLOS. In terms of high-speed data and link availability microwave radio link have emerged as a good choice for offshore operators.

a) CELLULAR NETWORK:

A cellular network is a wireless communication network. The network is distributed over land through cells, which has a fixed location transceiver called base station. These cells provide transmission of voice, data etc. Each cell uses different set of frequencies to avoid interference within the cell. Radio coverage over large area is provided by these cells when combined together. This helps large number of portable transceivers to communicate with fixed transceivers, telephones through base station.
Features of cellular network:-

- More capacity than a single large transmitter.
- Mobile devices use less power than a single transmitter since the cell towers are closer to each other.
- Larger coverage area than a single terrestrial transmitter.

b) VIRTUAL MIMO:

Virtual MIMO is a technology that can exploit the spatial domain of mobile fading channels to bring significant performance improvements to wireless communication systems. Conventional MIMO systems also known as point-to-point MIMO or collocated MIMO, require both the transmitter and receiver of a communication link to be equipped with multiple antennas. MIMO has become an essential element in wireless communication standards, including IEEE 802.11n, IEEE 802.11ac, HSPA+ (3G), WiMAX (4G), and LTE(4G). When the number of antennas is increased, the MIMO performance falls farther behind the theoretical gains.

c) STORE AND FORWARD OPTIMIZING ALGORITHM:

In store and forward optimizing algorithm is designed the hierarchy of relationship between mobile nodes and cellular network in the wireless sensor network. In number of mobiles nodes to be presented in the network environment and each nodes has gathered to communicate and configure some parameters which depends upon the packet transmission, frequency range of signal, interference distance using genetic algorithm and it considers received signal strength from one layer to another layer of packet transmission, and sensible network can be switch over, mobile node lifetime, cluster lifetime, entire latency to be fixed and replicate data to be reduced. This algorithm supported for searching and allocating the cluster arrangement based on coverage of limitation distance in the network size to be called. The extensive of the functions in the optimized means, it looks like the tree hierarchy under the smart phone on upcoming radio frequency maintenance. And also, uncovered area also to support this MIMO which depends to sense the whole cluster area of the network and it component level connection is maintained. The adversely affect the one to one component mutually communication are to evaluate and also support to mechanism to protect the network environment. The intra cellular or extra cellular environment of a network cell or base station of clusters may be switchover or hand off process when load balancing of frequency range of certain distance wavelength of signal flow transmission covered even in active or inactive status of mobile users to be presented.

II. EXISTING SYSTEM

In this system, Wireless sensor networks are vulnerable and several distributed protocols have been proposed to detect that kind attack to be positioned. So they require too strong assumptions to be practical for large-scale, randomly deployed failure nodes in the sensor networks.

DISADVANTAGES:

In the existing system there is less security. Data hacking and misbehavior nodes will be occurred. Also there is no privacy for mobile sensor nodes. For transmitting the nodes huge time is required.

III. PROPOSED SYSTEM

The successful transmission probabilities and energy efficiency (EE) of D2D communication are derived using store and forward optimizing algorithm. They further analyze the optimization problem of D2D power with the constraints of outage and power. High-Capacity, reliable communication over sea has always been a challenge due to vast distances. Trans-horizon non-line-of-sight (NLOS) communication has further reliability issues. A trans-horizon link based data communication with high availability in maritime wireless

communication backhaul network over sea using evaporation duct. Currently long-range, high-speed backhaul communication over sea is limited to line-of-sight (LOS) distances requiring high antenna towers for microwave radio link or satellite based backhaul link which is limited in bandwidth. We can achieve results for a long-range, non-line-of-sight (NLOS) maritime wireless backhaul high-speed communication link with high reliability and capacity this could be the best alternative for long-range, high-speed maritime communication along with MIMO based Mesh Network can further increase availability and capacity performance for a NLOS broadband maritime wireless communication Network.

ADVANTAGES:

- Consumes minimal memory storage and High detection probability by using D2D Mechanism.
- Using high bit rates or low bit rates communication to be segregated.
- They can increase the detection rate of the power consumption and optimize the time stamp based improved High security along with configured network.
- Data integrity and secure energy consumed.
- Easily find the attacker and unknown nodes in the network.

IV. BLOCK DIAGRAM

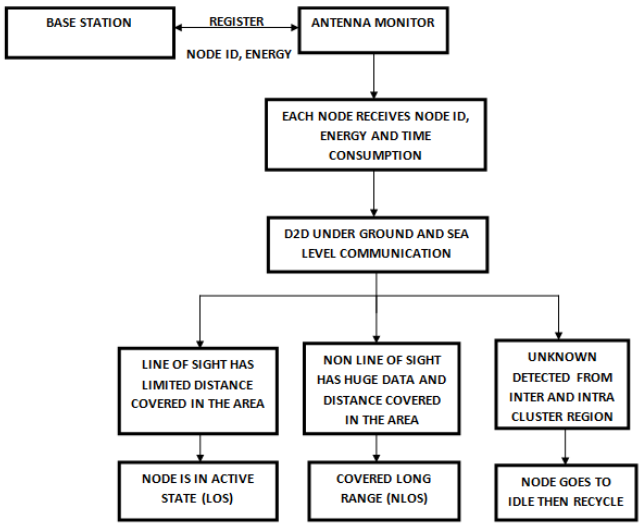

Figure 1.BLOCK DIAGRAM

V. MODIFICATION

The D2D connection of node to be ranked and unknown nodes to be detected along with inter and intra cluster region. Then it save the energy in the cluster while idle and active status of these cellular network area. To find the best frequency range of packet transmission, wavelength of water flow based on distance covered under the D2D communication and cellular network. Then throughput range, packet delivery ratio to be increased and cost of transmission from antenna to be decreased in the graphical representation of parameters are performed.

V. CONCLUSION

In this paper we optimize the power of D2D communication under laying cellular networks for maximizing D2D EE. By modelling the whole networks as the homogeneous PPPs, we investigate the successful transmission probabilities of both cellular networks and D2D communication. The D2D EE is evaluated and an optimization problem of D2D power is then formulated with the guarantee of outage probabilities and power constraints. Then, the convexity of the optimization problem and D2D power bounds are analyzed. Finally we derive the optimal D2D power in closed form for maximizing D2D EE for the whole networks. The impact of optimal D2D power on the maximum D2D EE is verified by simulation results. However, our work in this paper has considered the optimal power control which is just our preliminary research, the optimization of D2D density can be analyzed in our future work. This paper briefly presents the availability of high speed radio link for long-range wireless backhaul network. NLOS long-range signal propagation using evaporation duct present over sea is a reality and be exploited for a reliable backhaul communication link. The signal can achieve long-distances even by using low height antennas which provides infra structure less installations on offshore platforms and on any mobile ship. High reliability is though sometimes limited due to environmental conditions which cause extra fading. Therefore, a virtual MIMO based mesh network deployed over sea can not only further enhance link capacity but also provide higher link availability. In future, these theoretical calculations need to be verified practically for trans-horizon distances using evaporation duct. Virtual MIMO based mesh network design can provide high time availability with long-range deep sea internet access without the need for a satellite backhaul link. The resultant complete system will be extremely useful not only for offshore oil platform operations, coastal security and protection, but also for commercial use in future for the maritime cruise ship customers demanding low-cost, high-speed internet access.

REFERENCES

[1] N. Fuke, K. Sugiyama, and H. Shinonaga, "Long-range oversea wireless network using 2.4 GHz wireless LAN

installation and performance," in Computer Communications and Networks, 2003. ICCCN 2003, Proceedings. The 12th International Conference on, 2003, pp. 351-356.

[2] S. L. Kota, "Broadband satellite networks: trends and challenges," in Wireless Communications and Networking Conference, 2005 IEEE, 2005, pp. 1472-1478 Vol. 3.

[3] D. Oren. (2011, 24 July, 2013). Satellite Communication for Efficient Cellular Backhaul.

[4] F. Boccardi, R. W. Heath, A. Lozano, T. L. Marzetta, and P. Popovski, “Five disruptive technology directions for 5G,” IEEE Commun. Mag., vol. 52, no. 2, pp. 74–80, Feb. 2014.

[5] L. Dai, Z. Wang, and Z. Yang, “Spectrally efficient time-frequency training OFDM for mobile large-scale MIMO systems,” IEEE J. Sel. Areas Commun., vol. 31, no. 2, pp. 251–263, Feb. 2013.

[6] Z. Gao, L. Dai, Z. Lu, C. Yuen, and Z. Wang, “Super-resolution sparse MIMO-OFDM channel estimation based on spatial and temporal correlations,” Communications Letters, IEEE, vol. 18, no. 7, pp. 1266–1269, Jul. 2014.