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OPTIMIZATION OF D2D COMMUNICATION IN 5G WIRELESS PERSONNEL AREA NETWORK BY IMPROVED LBROM ALGORITHM

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Abstract *-The D2D(Device to Device communication) in (PAN) wireless personal area network the devices are directly communication with each without any intermediate devices or network devices like Router. They can directly communicate with devices and share the resources without Router. Even though the optimization of resource allocation between devices in WPANS is a challenging task to optimize the Network efficiency, Throughput, Scalability and Latency to balance the Quality of Service(QoS) in 5G communication network. In this proposed research the improved load-balanced resource optimization to maximize the communication between devices in a WPAN network. The main idea of implementation is the devices in the D2D of 5G network is not overloaded. The workload will be balanced to every device. It will be managed the balancing utilization of resources like power and bandwidth to improve performance of Device-to-Device 5G network. This mode reduces the cost and maximize the systems performance. The proposed method Improved Load-Based Resource Optimization(ILBROM) is showing better performance results for improve network parameters like Network efficiency, Throughput, Scalability, Latency and improve QoS when comparison with existing models are (TSRO)traffic-shifting-based resource optimization,(JRO)joint resource optimization, (MTO) Multirate throughput optimization, (LBROM) load-based resource optimization model.*
Keywords: *Optimization, resource utilization, load balancing, device-to-device communication, wireless personal area network.*

INTRODUCTION

The D2D communication possess the restricted bandwidth for the reason of as per availability of physical limitations. Due to these limitations will cause bottleneck in data transmission that effect the restrict the resource allocation load[1]. The Device-to-Device with involvement of other networks to cause reduces the reduces the communication quality and make difficult to resource allocation as per load in wireless personnel area networks In the Device-to-Device communication the security is a challenging task. Every device trust to other device for connect and communication properly. For that the reliable protocols has to be designed effectively[2]. The devices continuously communicate with each for data transfer for that they need constant power supply to balance the power consumption as well resource utilization. The major problem Device-to-Device communication is congestion. The data is transferred in between devices continuously that effect resource allocation problem[3].To optimize of available resources in D2D communication problem occurs is balancing of load. The available devices are match for their processing or communication characteristics and cause un-even utilization of resources. In this proposed to solve resource balancing problem is consider as optimum solution for optimize the route between devices in device-to-device communication to reduce power consumption and improve better efficiency. In this proposal to optimize and improve the resource utilization by

effectively managing the load in between D2D communication. To increased network performance by minimize interference between the devices in a D2D communication network. In this proposal to optimize the resource optimization as per load in D2D communication can maximize performance of communication to resources are assign to a authorized devices to minimize the latency, congestion and packet losses to improve the performance of D2D communication[4]. In this proposed paper the section written as continuous in this way. Section 2 in detail about Literature survey, In Section in detail about Methodology of proposed research. The Section 4 detail about Proposed model, the step-by-step algorithm is provide in detail. In section 4 the comparasion of existing method and proposed method analysis discussed. In section 6, discuss the conclusion as well as future scope of this proposed research [5,6].

LITERATURE SURVEY

The authors[7]proposed a method of dynamically load based channel allocation to improve the performance of device-to-device communication in 5G enable wireless personnel area network. This method for estimation of channelization for load balancing technique for allocating as well to manage efficiently manage the resources. This research has been achieve to maximize the throughput and also low energy consumption. The drawback of this proposed work is manual configuration of channels.The authors[8] proposed efficient algorithm in 5G to efficient manage the resource sharing. The proposed research achieve the optimal resource utilization and minimize energy consumption by introducing the energy aware scheduling model. As per the performance results demonstrate that the proposed algorithm minimize the energy consumption and maximize resource utilization.

The authors[9] proposed optimization of a framework reduce the signal load and latency in device to device communication networks. This proposed paper achieve load across the cells and minimize the signalling overhead. The proposed research maximize the signalling performance as well as load balancing in D2D links.

The authors[10] proposed energy efficient model for Industrial Wireless Sensor Networks are very popular for providing scalability as well as low cost deployment. These networks facing challenges like energy optimization, network maintenance. The authors proposed EEOM model to minimize energy consumption and maximize energy-efficient knowledge based solutions to enhance efficiency of WSN to be reliable, an efficient and also energy cost efficient.

The authors[11] proposed Authors proposed an efficient intrusion detection method to maximize the life of WSN lifetime by providing network resources.

The prevention and detection are two methods in intrusion detection techniques are used to maximize the protection from intrusions. The prevention technique is used to monitor of resources. As per the results the proposed method maximize the network lifetime and maximize the network security. As per the literature survey and the get experience with existing methods the issues identified as follows. Due to the physical limitations of devices the Device-to-Device communication posses a limited bandwidth. In D2D communication minimize the QoS for standard and realiability of communication and make difficult to based on load the resource communication because of involvement of other devices in a network. In D2D communication the security is a major issue for that it essential to provide security for the resources. In D2D communication the devices are connect and communication in network it is essential to provide constant amount of power required. The devices balance their power consumption. In D2D communication congestion is a major problem and load based resource allocation is difficult when high data being data transferred.

The optimization of the resources in device-to-device communication is challenging task and many issues has to solved when the devices not functioning for a connect and communication process in a network and it cause un-even utilization of the resources properly. In this proposed a method of communication and routing the data sent via direct route between these devices. To reduce power consumption there should be provide a reliable communication between these devices in a network.

The optimization of D2D resource optimization enhance the proper resource make use by efficient balancing of load in D2D environment. To reduce the wastage of resource the smart resource utilization method intelligent allocation of resources. Minimizing the interacting the devices with adjacent devices D2D network. To minimize the energy consumption it is possible to minimize un-necessary utilization of energy by by every device for indirectly maximize energy utilization. By reduce packet loss and latency issues it is essential to improve the reliability to improve quality of services for smart load based resource optimization in a D2D network communication.

Table1: Comprehensive analysis of existing research

Authors	Year	Advantages	Algorithms used	Limitations
Wang, B et.al.	2011	Enhance sum throughput D2D communication.	optimal resource allocation method	Conventional method
Logeshwaran, J et.al.	2024	• Improve spectrum efficiency improve scalability, • improves signal quality, • improve power control, power efficiency.	load based dynamic channel allocation (LB-DCA)	Dynamic configuration of channels
Sangeetha, S., et.al.	2024	• Maximize false discovery rate • maximize false omission rate • reduce energy consumption • maximize resource utilization	EASM	Quality of Service(QoS)
Vlachos, C et.al.	2015	• Improves load balancing, • Cost based resource block, • Reduce signalling overhead	integer linear programs	
Bagwari, A et.al.	2023	• Machine learning • Improves the energy optimization • Industrial wiress sensor network	• Minimize energy consumption • Improve the path of data transmission • Reduce network traffic.	Enhanced Energy Optimization Model (EEOM)

METHODOLOGY

In Device-to-Device communication model the mobile devices are communicate with each other directly without any central node or any base station. In this proposal the Improved load based optimization to optimize the resources in Device-to-Device communication. As per present load of network, dynamically assign various resources in D2D communication network to maximize the system performance by efficiently assign the resources. To achieve this optimization, it is essential to monitor present load of network by balancing assign various resources, workload to every device. No one device has been assigned a large number of devices for that system performance will be degraded. It is essential to assign the resources, workload equally to various devices in a system to improve ability of a system. This method to improve the minimize the congestion and improve the balance all devices to access the resource utilization properly to improve the efficiency of a system[12,13,14].

3.1. Improved Dynamic Bandwidth Allocation Device (EDBAD).

Improved Dynamic Bandwidth Allocation Device (EDBAD) is a method to balance the network connectivity and communication of all the devices in a D2D network. It maximize the assign of efficient allocation of bandwidth between the devices, maximize the communication between the devices to improve overall efficiency of a network. EDBAD method, the bandwidth equally assigned to all devices in D2D communication network. All devices communicate with one another by utilizing the high bandwidth equally[15,16].

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3.2 Improved Adaptive Resource Allocation(EARA)

In this approach, as per the current load as well as future load assignment efficiently resources be allocated to devices in a Device-to-Device communication network. In Improved adaptive resource allocation method without using third party the devices are in figure communicate with each in D2D communication network.

3.3 Improved load balancing

The load balancing approach is equally distribute the load for every device in D2D communication network. The devices are connected wirelessly in 5G wireless personnel area network. In D2D the equally distribute the traffic for all devices equally. The load balancing is an method to provide an efficient communication with the device-to-device communication.

3.4 Improved network coding

The method is enhance the encoding the network from various heterogenous to minimize the traffic load in D2D communication network. In D2D communication to maximize the data transmission efficiently. The data will be sent with encoding procedure the data will be sent without error and maximize the Quality of Service(QoS). In this proposed work, Improved network encoding will maximize the heterogenous data sent efficiently without any delay. This Improved network coding process involves compress the data, encrypt the for Quality of Service(QoS).

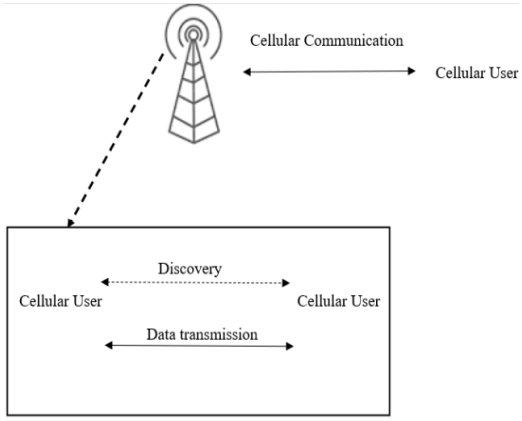

Figure 1: D2D communication in wireless networks for resource allocation

PROPOSED MODEL

The Improved load based resource allocation of D2D communication is efficient utilize of the resources as per the current load of a network. The resources are dynamically allocated to maximize the efficiency of communication. It minimize network congestion and improve QoS for users. The Improved resource allocation based on load will help to maximize the overall network capability of D2D communication for the high data rate, link status, link reliability, and efficiency[17,18,19].

Algorithm: Improved load-based resource optimization algorithm

Step1: Start

Step2: Received the requests as per available resources

Step3: Send the user requests to network load manager

Step4: If(load is balanced to all devices in D2D)

Step5: Check the resource status, availability

Step6: If resources available for a device

Step7: Else wait for a resource

Step8: Calculate the resource utilization time period

Step9: Forward the resources in a queue

Step10: Goto step3

Step11: Else go to step9

Step12: End

The figure shows the proposed model for resource availability and resource allocate as per request of a device in D2D communication network. The resources are network, energy, bandwidth, power etc[20]. The efficiency of the communication of network in D2D is computed as parameters like data rate, link status, link availability, reliability and latency. The identify the rate of data sent for a certain period of time by Data rate metric. Time measures for data rate in b bps ie bits per second. The Link status metric identify the status of the link for a device communication for other devices in a Device-to-Device communication. The Link availability metrics states the whether link available or not a device communication for other devices in a Device-to-Device communication. The Link reliability is the metric shows the performance of link to send /transfer the packets in between two devices in Device-to-Device communication. The Latency metrics that calcualtes the time period taken for a data packet send from via D2D network [21,22,23]. The proposed (ILBROM) Improved load based resource optimization modelcompare with existing (LBROM) load based resource optimization, (TSRO) traffic-shifting-based resource optimization, (JRO) joint resource optimization, (MTO) multirate throughput optimizationThe simulation has taken by MATLAB. The proposed flow chart for the flow diagram as shown below. The requirement resources like energy, power, bandwidth will be provided as per the user requirements.

Parameter	Value
S_a =simulation area	1250 m x 1250 m
SIFS=transmission date rate	18 s
DR_t =transmission data rate	15 Mbps
Dr_i =interference detection rate	28 ms
T_s =slot time	14 ms
B_{SC} =sub-channel bandwidth	820 GHz
B_S =system bandwidth	16 MHz
F_C =carrier frequency	114 MHz
T_d =simulation duration	28 s

Table 2. Required parameters for simulation

Load_based_resource_allocation(L) = {Load1, Load2,Load3.....Ln}. The Load based resource allocation in D2D network is a technique for allocation of resources for a communication network the multiple devices to communicate with each other.

$$F = \min \mu \ln(\beta dt) + \alpha \ln x$$

F = is objective function for service provide for every request. In above equation dt = duration of request complete, β = various vector request, μ = task completion duration, α = cost service, x = cost to complete service.

If the values of μ and $\alpha < 0$ then the value of $\mu + \alpha = 1$

$$Load\_based\_resource\_allocation(L) = x_{valid} = \sum_{z=1}^{N} O_z \; x \; I_2$$

In above equation the valid user loads are validated in a network for events happened for a price (Oz) for a number(Iz). The loads calculated for a time (Tz) shows the number of devices functioning in a particular network.

$$Load\_based\_resource\_allocation(L) = x_{valid} = \sum_{z=1}^{N} O_z \; x \; I_2 \; x \; T_2$$

To compute load of primary user ($L_{primary\_user}$) and also load of secondary user ($L_{secondary\_user}$) computed total load using following equation.

$$L = L_{primary_{user}} + L_{secondary\_user}$$

As per the user request, the load-based resource allocation can be performed. The resource allocation is the combined the utilize bandwidth (B), allocate Memory (M), allocate capacity (C). With the cost coefficient 'u' the resources are allocated is computed by equation as follows.

$$L = (u1 \;\; B) + (u2 \; x \; M) + (u3 \; x \; C)$$

$$user\_request = u1 + u2 + u3 = 1$$

Dynamically allocation of the resources is the task load perform is to be assign on every device and the network resources allocation dynamically. As per the current load on the each device, the resources are bandwidth, memory, energy, processing power. As per the optimality and load capacity of the device, the every device getting resources for avoiding resources waste. The resource allocation as per load allocate as per efficient distribution of resources to D2D network communication to improve the network efficiency and resources are not wasted. The Load-based allocation of resources to reduce congestion and latency in the network as per the allocation of resources based on network load to improve the performance of network. The Load-based resource allocate in can improve the scalability i.e. the number of devices increases the same the resources are allocated and its improve scalability of the network.

RESULTS AND DISCUSSION

6.1 Network Efficiency

Improved resource allocation as per load to enhance the overall efficiency of network by dynamically allocate resources to devices D2D communication as per current load. To compute the efficiency of network using following equation.

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https://www.theaspd.com/ijes.php

$$E_n = \left(\frac{D_t - D_{rt}}{D_t}\right) x\ 100\% \quad (1)$$

In above equation E_n represents efficiency of network. D_t represents the data transmitted, D_{rt} represents re-transmitted data. The following figure shows the comparison of network efficiency of proposed model existing methods like (TSRO)traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO) Multirate throughput optimization reached a limited network efficiency. The proposed model Improved load-based resource optimization model(ILBROM) reached over all network efficiency. The ILBROM is reached efficiency because of efficient resource utilization, reliable connection, low latency, less power consumption.

In Figure 2, the proposed method X axis shows the number inputs as maximize to 1000 devices. And Y axis shows network efficiency to test the efficiency of D2D communication network in 5G. In proposed Improved load-based resource optimization model (ILBROM) method, the devices are assigned resources as per their proposed model showing better performance results for network efficiency when comparison with existing models like (TSRO) traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO) Multirate throughput optimization, (LBROM) load-based resource optimization model reached a limited network efficiency.

MTO	TSRO	JRO	LBROM	ILBROM
56.35	68.02	75.15	88.15	95.20
54.02	67.15	74.14	87.85	94.25
53.15	66.44	73.25	87.75	93.20
52.42	65.05	72.50	87.60	93.15
51.70	64.35	71.35	88.15	92.20
50.85	63.40	71.25	87.20	92.10
51.92	64.68	72.12	86.00	92.00

Table 3. Comparison of Network Efficiency (in %)

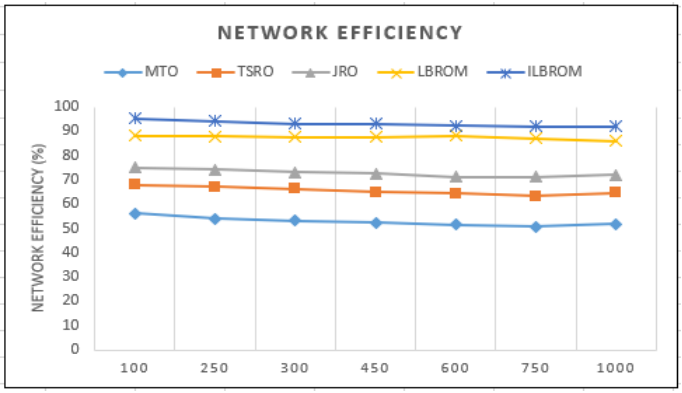

Figure 2: Network efficiency

6.2 Improved Throughput

Improved resource allocation as per load to improve the performance in throughput in D2D communication network. The Improved throughput can be achieved by assign required sufficient resources the devices.

$$T = \left(\frac{S_p}{T_{RT}}\right) x \left(\frac{1.2}{\sqrt{L_p}}\right) \quad (2)$$

In above equation, T denotes throughput of network. S_p denotes size of packet transmitted. T_{RT} denotes round-trip time, L_p denotes packet loss while transmission. The throughput expressed in the form of bits per second (bps). The following figure shows the comparison of throughput efficiency of proposed model comparison existing models like (TSRO) traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO) Multirate throughput optimizationreached a limited network efficiency. Throughput in proposed method dividing the data successfully transfer in a by Improved load-based resource optimization model (ELBROM) D2D communication network. In Figure 4, the proposed method X axis shows the number inputs as maximize to 1000 devices. And Y axis shows network throughput to test the efficiency of D2D communication network in 5G. In proposed Improved load-based resource optimization model (ILBROM) method, the devices are assigned resources as per their load. The load will be balanced to all the devices in D2D network. In proposed As per the experimental results the proposed model showing better performance results for network throughput when comparison with existing models like traffic-shifting-based resource optimization(TRSO), Multirate

International Journal of Environmental Sciences
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https://www.theaspd.com/ijes.php

throughput optimization(MTO), Load-based resource optimization model (LBROM) reached a limited network throughput.

MTO	TSRO	JRO	LBROM	ILBROM
51.00	73.15	80.05	90.12	95.00
52.15	75.25	81.15	91.20	96.15
53.20	77.15	82.20	92.44	97.24
55.15	76.22	83.35	93.15	98.35
55.20	77.26	85.46	93.20	97.48
55.50	77.50	85.50	93.56	99.16
55.78	78.24	85.85	93.74	99.26

Table 4: Comparison of Network Throughput (in %)

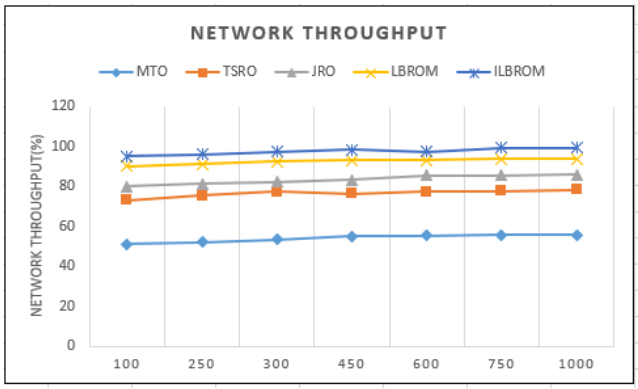

Figure 3: Network Throughput

6.3 Reduced Latency

The load based resource allocation will be reduce latency. As per the device load, the requirement of the resources for the devices will be provided. The network latency can be determined by the equation as follows.

$$L = (D_t/S_t) + (S_p/R_t) \quad (3)$$

In above equation L represents the latency of network. D_t denotes transmission distance S_t represents speed of transmission. S_p represents size of packet, R_t represents the rate of transmission. In Figure4 shows the feature of reduced latency. The proposed method X axis shows the number inputs as maximize to 1000 devices. And Y axis shows network latency to test the efficiency of D2D communication network in 5G. In proposed Improved load-based resource optimization model (ILBROM) method, the devices are assigned resources as per their load. The load will be balanced to all the devices in D2D network. The reduced latency maximize the performance of network to faster transfer data between network devices to efficeint communication. In proposed method dividing the data successfully transfer in a by Improved load-based resource optimization model (ELBROM) D2D communication network. In proposed method, as per the experimental results the proposed model showing better performance results for network Latency when comparison with existing models like (TSRO)traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO)Multirate throughput optimization, (LBROM) load-based resource optimization model reached a limited network Latency. The following figure shows the comparison of scalability of proposed model comparison existing models like (TSRO)traffic-shifting-based resource optimization (JRO)joint resource optimization, (MTO) Multirate throughput optimizationreached a limited network efficiency.

MTO	TSRO	JRO	LBROM	ILBROM
60.00	65.05	80.15	90.15	95.05
61.15	66.15	81.20	90.20	96.15
62.26	67.26	82.35	90.40	96.20
62.36	67.10	83.44	91.60	97.18
62.55	68.35	83.55	90.00	96.50
63.00	68.50	82.15	91.60	97.25
63.16	67.08	83.78	91.94	97.40

Table 5: **Comparison of Reduced Latency(in %)**

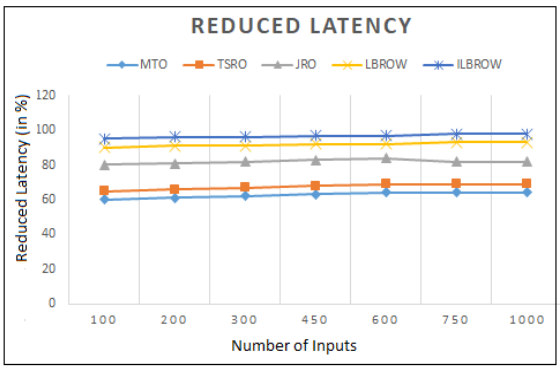

Figure 4: Reduced Latency

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In Figure 4, the proposed method X axis shows the number inputs as maximize to 1000 devices. And Y axis shows reduced latency (in %) to test the efficiency of D2D communication network in 5G. In proposed paper Improved load-based resource optimization model (ILBROM) method, the devices are assigned resources as per their load. The load will be balanced to all the devices in D2D network. In proposed As per the experimental results the proposed model showing better performance results for reduced latency when comparison with existing models like (TSRO) traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO)Multirate throughput optimization, (LBROM)load-based resource optimization model reached an efficient reduced latency result.

6.4 Scalability performance

An efficient Improved load-based resource allocation will interact with scalability feature in a 5G D2D network. The scalability feature is adding resource as per the requirement of devices. As per the load of devices the resources will allocated.

(4)

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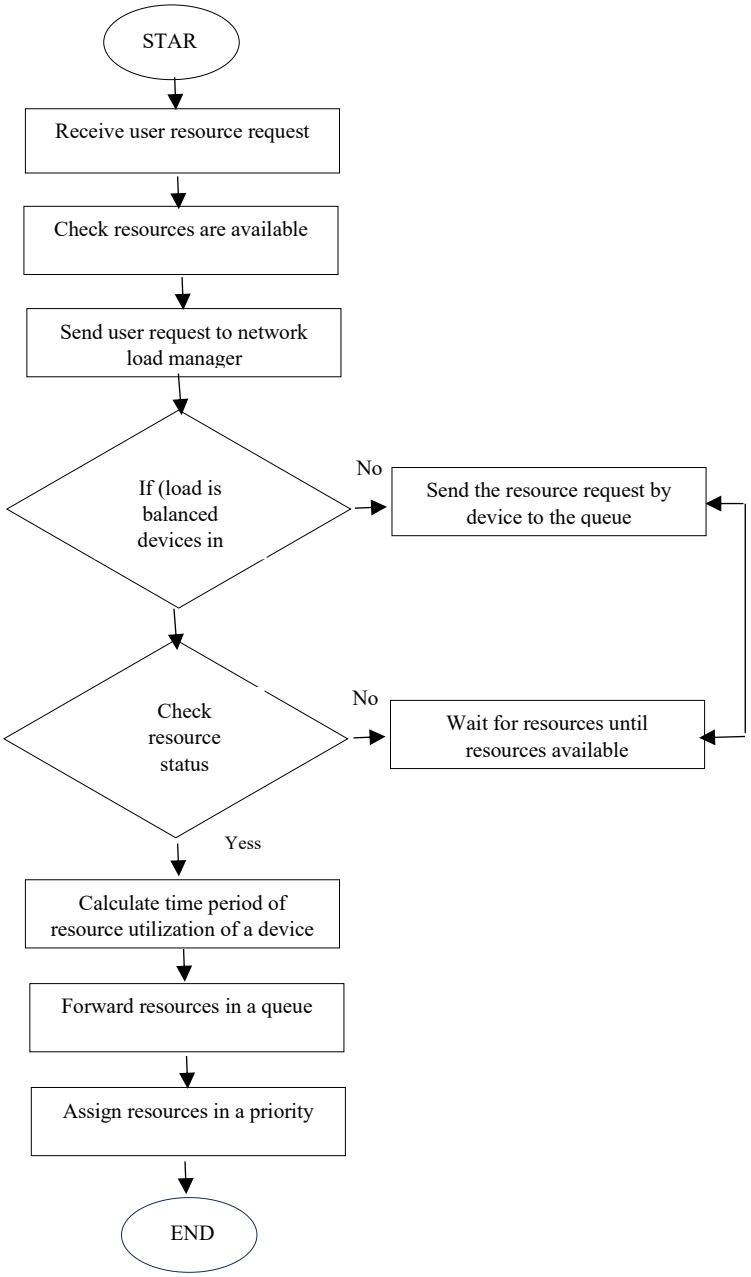

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Figure 5: Flow diagram of resource utilization by device in D2D communication network

The scalability features is computed following equation.

$$S(n) = \frac{n}{1\alpha\,(n-1) + \beta n\,(n-1)}$$

In above equation, S denotes scalability of network, n represents the number of nodes, α denotes content of the nodes, β represents coherency constant models like (TSRO) traffic-shifting-based resource optimization, (JRO)joint resource optimization, (MTO) Multirate throughput optimizationreached a limited network efficiency

In Figure 5 shows the scalability feature. the proposed method X axis shows the number inputs as maximize to 1000 devices. And Y axis shows network latency to test the efficiency of D2D communication network in 5G. In proposed Improved load-based resource optimization model (ILBROM) method, the devices are assigned resources as per their load. The load will be balanced to all the devices in D2D network. In proposed method, the reduced latency improvethe performance of network by forwarding the data fast between D2D devices for communication efficiently. 5G device-to-device communication network, the scalability features refers to ability of network adding the device as resources to network. Without reduce the network performance the scalability nature of network allows add number of devices.

MTO	TSRO	JRO	LBROM	ILBROM
56.10	66.16	77.21	91.31	96.11
57.25	67.26	78.32	92.42	97.15
58.36	68.33	79.42	91.16	97.26
59.16	69.10	80.15	92.20	98.33
60.27	69.21	80.27	91.101	98.46
60.39	69.29	80.30	92.50	98.51
60.42	69.38	80.38	92.85	98.60

Table 6: Comparison of Scalability (in %)

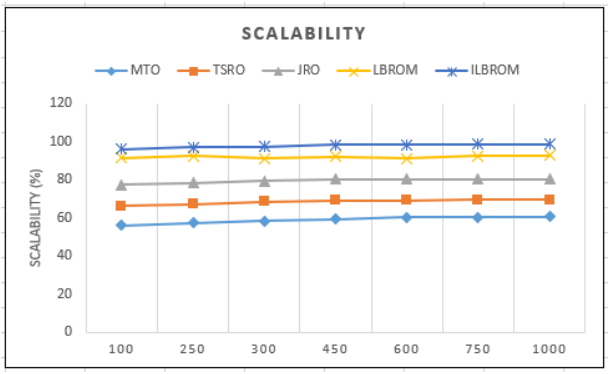

Figure 6: Scalability

In proposed method ILBROM, as per the experimental results the proposed model showing better performance results for network Latency when comparison with existing models like (TSRO) traffic-shifting-based resource optimization, (JRO) joint resource optimization, (MTO)Multirate throughput optimization, (LBROM) load-based resource optimization model) reached a limited network Latency. In D2D communication in 5G the two devices are directly connected with each to share the information. These resources are allocated to these devices as per the load of the devices. These devices are not overloaded because of balanced workload in a D2D 5G network. In 5G-WPAN use mesh topology without central base station allow the device to connect & communication directly with each another. And also for home automation, Internet of Things(IoT) and mobile devices communication in 5G-WPAN is enable to D2D communication by using the available network infrastructure to establish connectivity mesh devices for data transferred between the devices through routers without establish a direct connection. In 5G-WPAN D2D communication in 5G to optimize resource allocation using advanced routing and scheduling methods. This method improve the better use of already available resources. The physical layer protocols like IEEE 802.15.4e used reduce the number hops and energy consumption for a network connectivity & communication between these devices.

CONCLUSION

In D2D network communication without interference of any device like router or base station, the direct communication occurs in between the devices. Each device in D2D network, act as sender and receiver for sharing files, applications or resource sharing. In D2D the devices are directly communicate with each other, possible to reduce the network traffic. D2D will reduce the network traffic by routed the traffic via cellular network to save & manage user's bandwidth. The proposed improved load based resource allocations method the resources are allocated to the devices as per the load of the devices in a 5G network. And also the resources are allocated dynamically as per the need of the devices in a network. The number of resources are allocated to the two devices as per the sharing a file and also other devices are also access the same file in a network. In D2D 5G network, the improved load based resource allocation is for the efficient use of resources allocation for the devices in a network to improve the parameters like network efficiency, throughput, reduce latency, improve scalability and Quality of Service(QoS). Especially in Improved load-based resource optimization model (ILBROM) number of inputs (as devices) are increased to 1000 i.e. to test the efficiency of network, throughput, latency and scalability. The proposed ILBROM method shows better efficiency results compare with existing methods like (TSRO) traffic-shifting-based resource optimization, (JRO) joint resource optimization, (MTO)Multirate throughput optimization, (LBROM) load-based resource optimization model) for maximize the peormance in network parameters like network efficiency, throughput, scalability, latency etc.

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AUTHOR CONTRIBUTIONS

Dr. V. Subrahmanyam is corresponding author of the research paper. His contribution of this paper includes implementation and optimization of algorithm. Other co-authors are K. Praveen Kumar, T. Venkata Ramana, Adepu Rajesh, Kamalakar Ramineni, B. Srivalli are work on literature survey report and providing resources.

REFRENCES

[1] Kamal, M. A., Raza, H. W., Alam, M. M., Su'ud, M. M., & Sajak, A. B. A. B. (2021). Resource allocation schemes for 5G network: A systematic review. *Sensors*, *21*(19), 6588.

[2] Gismalla, M. S. M., Azmi, A. I., Salim, M. R. B., Abdullah, M. F. L., Iqbal, F., Mabrouk, W. A., ... & Supa'at, A. S. M. (2022). Survey on device to device (D2D) communication for 5GB/6G networks: Concept, applications, challenges, and future directions. *IEEE Access*, *10*, 30792-30821.

[3] Bahadori, N. (2021). *Device-to-Device Communication in 5G Wireless Networks* (Doctoral dissertation, North Carolina Agricultural and Technical State University).

[4] Adnan, M. H., & Ahmad Zukarnain, Z. (2020). Device-to-device communication in 5G environment: Issues, solutions, and challenges. *Symmetry*, *12*(11), 1762.

[5] Liu, J., Kawamoto, Y., Nishiyama, H., Kato, N., & Kadowaki, N. (2014). Device-to-device communications achieve efficient load balancing in LTE-advanced networks. *IEEE Wireless Communications*, *21*(2), 57-65.

[6] Areqi, M. A., Zahary, A. T., & Ali, M. N. (2023). State-of-the-art device-to-device communication solutions. *IEEE Access*, *11*, 46734-46764.

[7] Wang, B., Chen, L., Chen, X., Zhang, X., & Yang, D. (2011, May). Resource allocation optimization for device-to-device communication underlaying cellular networks. In *2011 IEEE 73rd vehicular technology conference (VTC Spring)* (pp. 1-6). IEEE.

[8] Logeshwaran, J., Shanmugasundaram, R. N., & Lloret, J. (2024). Load based dynamic channel allocation model to enhance the performance of device-to-device communication in WPAN. *Wireless Networks*, 1-33.

[9] Sangeetha, S., Logeshwaran, J., Faheem, M., Kannadasan, R., Sundararaju, S., & Vijayaraja, L. (2024). Smart performance optimization of energy-aware scheduling model for resource sharing in 5G green communication systems. *The Journal of Engineering*, *2024*(2), e12358.

[1] Vlachos, C., & Friderikos, V. (2015, June). Optimal device-to-device cell association and load balancing. In *2015 IEEE International Conference on Communications (ICC)* (pp. 5441-5447). IEEE.

[2] Bagwari, A., Logeshwaran, J., Usha, K., Kannadasan, R., Alsharif, M. H., Uthansakul, P., & Uthansakul, M. (2023). An Enhanced Energy Optimization Model for Industrial Wireless Sensor Networks Using Machine Learning. *IEEE Access*.

[3] Bhaskar, S., & Deshpande, B. (2023, August). To Expand Network Lifetime by Intrusion Method for IoT based WSN. In *2023 IEEE 4th Annual Flagship India Council International Subsections Conference (INDISCON)* (pp. 01-08). IEEE.

[4] Logeshwaran, J., Kiruthiga, T., Kannadasan, R., Vijayaraja, L., Alqahtani, A., Alqahtani, N., & Alsulami, A. A. (2023). Smart load-based resource optimization model to enhance the performance of device-to-device communication in 5G-WPAN. *Electronics*, *12*(8), 1821.

[5] Laguidi, A., Hachad, T., & Hachad, L. (2023). Mobile network connectivity analysis for device to device communication in 5G network. *International Journal of Electrical & Computer Engineering (2088-8708)*, *13*(1).

[6] Nagarajan, R., & Vali Mohamad, N. M. (2022). Energy optimized resource and power allocation in an uplink-based underlay device-to-device communication for 5G network. *International Journal of Communication Systems*, *35*(10), e5145.

[7] Bahonar, M. H., & Omidi, M. J. (2021). Distributed pricing-based resource allocation for dense device-to-device communications in beyond 5G networks. *Transactions on Emerging Telecommunications Technologies*, *32*(9), e4250.

[8] Panicker, J. G., Salehi, A. S., & Rudolph, C. (2021, October). Authentication and access control in 5g device-to-device communication. In *2021 IEEE 20th International Conference on Trust, Security and Privacy in Computing and Communications (TrustCom)* (pp. 1575-1582). IEEE.

[9] Li, Jun, et al. "D2D communication mode selection and resource optimization algorithm with optimal throughput in 5G network." *IEEE Access* 7 (2019): 25263-25273.

[10] Logeshwaran, J., Shanmugasundaram, N., & Lloret, J. (2023). Energy-efficient resource allocation model for device-to-device communication in 5G wireless personal area networks. *International Journal of Communication Systems*, *36*(13), e5524.

[11] Martin, A., Egaña, J., Flórez, J., Montalban, J., Olaizola, I. G., Quartulli, M., ... & Zorrilla, M. (2018). Network resource allocation system for QoE-aware delivery of media services in 5G networks. *IEEE Transactions on Broadcasting*, *64*(2), 561-574.

[12] Benbraika, M. K., Kraa, O., Himeur, Y., Telli, K., Atalla, S., & Mansoor, W. (2024). Interference Management Based on Meta-Heuristic Algorithms in 5G Device-to-Device Communications. *Computers*, *13*(2), 44

[13] Li, M., & Tsai, H. L. (2021). Energy-efficient device discovery mechanism for device-to-device communications in 5G networks. *Energies*, *14*(2), 270.