International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

A Network Management Model for Device-To-Device Communication in 5G Networks

J.Logeshwaran[1*], T.Kiruthiga[2]

[1]Department of Electronics and Communication Engineering, Sri Eshwar College of Engineering, Coimbatore – 641202, Tamil Nadu, India.*
[2]Department of Electronics and Communication Engineering, Vetri Vinayaha College of Engineering and Technology, Trichy – 621215, Tamil Nadu, India.

Email: [2]drkiruthigaece@gmail.com
Corresponding Email: [1]eshwaranece91@gmail.com*

Received: 03 June 2021 **Accepted:** 20 August 2021 **Published:** 26 September 2021

Abstract: ***The fifth generation (5G) cellular wireless communication paradigm is expected to encompass many new technologies, including device-to-device (D2D) wireless communication. In D2D communication, two user devices can communicate directly, without the involvement of a network. Such communication has several advantages, including improved spectral efficiency and user experience. However, for such communication to be an integral part of the 5G network, efficient network management is essential. This paper presents a network management model for D2D communication in 5G networks. The proposed model comprises two parts: the D2D link management (DLM) and the resource management (RM). DLM is responsible for D2D link establishment, monitoring, and optimization. RM is responsible for the allocation of resources among multiple users and services. The model is based on a distributed architecture, with the base station acting as a resource management node. The system performance of the proposed model is evaluated through extensive simulation. The simulation results show that the proposed model can effectively manage D2D links and resources in 5G networks.***

Keywords: 5g, Cellular, Wireless Communication, Device-To-Device, D2d, Networks.

1. INTRODUCTION

The fifth generation of cellular technology, 5G, is ushering in the next wave of digital revolution, enabling the full potential of IoT, AR/VR, and AI to be realized. One of the most important and

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

supporting aspects of this transformation is device-to-device (D2D) communication [1]. D2D communication is a type of communication that occurs between electronic devices and allows data, service, or content to be shared without using traditional infrastructure networks such as the Internet or mobile network. This type of communication has many advantages. For example, it has lower latency, higher bandwidth, higher device density, and better energy efficiency compared to other communication technologies [2]. In 5G networks, D2D communication is used to improve network efficiency and provide better quality of service. This is achieved by reducing the burden on cellular infrastructure and allowing more direct communication between users or devices [3]. For example, data sharing can be facilitated without using the backbone of the network. This is especially useful in applications such as cellular automotive applications or augmented reality/virtual reality applications, which have large bandwidth needs. The D2D communication can increase spectrum efficiency and reduce signal interference by communicating directly between nearby devices or between users [4]. This improves signal coverage and reduces interference, which ultimately helps to reduce user costs and increase user satisfaction. The D2D communication is an important part of 5G networks and has the potential to revolutionize the way we use cellular networks. It offers users faster data sharing capabilities, reduced cost, improved spectrum efficiency, and improved network performance. This technology will be essential to the realization of the full potential of 5G networks. Device-to-Device (D2D) communication is a key technology in next-generation 5G cellular networks [5]. 5G networks will enable enhanced services such as ultra-reliable low-latency communications (URLLC), massive machine-type communications (mMTC), and enhanced mobile broadband (eMBB) services. D2D communication provides a direct link between two or more devices allowing them to directly exchange services and programs. D2D communication offers various benefits to 5G networks which include increased reliability, improved spectral efficiency, reduced latency, improved power efficiency and improved security [6]. D2D communication can be used by users to directly share data between themselves, making it a more efficient connection. By facilitating direct communication between devices, D2D technology can reduce the reliance on the cloud and middleware components, significantly improving the latency, reliability and scalability of the network. D2D communication has a wide range of applications [7]. The construction diagram has shown in the following fig.1

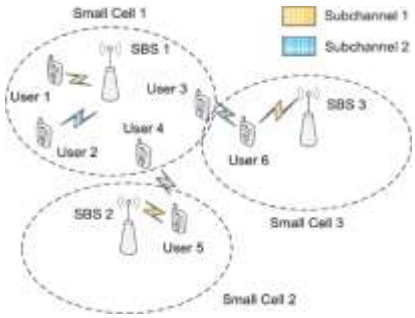

Fig 1: Construction diagram

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

It can be used to offload data and applications from cellular networks using direct links, thereby avoiding network congestion. In addition, it can be used to set up private networks for machines or devices, as well as providing tactical support for emergency services and public safety teams. With D2D communication, users can have direct exchange of data without using the cellular base station, allowing them to save time and minimize network [8]. For D2D communication to be successful, multiple technologies are needed. These include radio access network and protocol stack architectures as well as self-organizing network functionalities, such as device discovery and connection management. Multi-radio access technologies such as LTE-V2X are also necessary in order to support direct device-to-device communication [9]. Additionally, antenna technologies, such as massive multiple-input multiple-output (MIMO) are needed to maximize the network capacity. The 5G networks will rely heavily on D2D communication technologies to provide enhanced services for users as well as improved scalability, latency, and security. By leveraging existing technologies and introducing new ones, D2D communication will revolutionize the way 5G networks are designed and operated, bringing about a new era in digital communication [10]. The main contribution of the research has the following

- Improved capacity and user experience: D2D communication in 5G networks allows devices to communicate directly with each other, bypassing base stations and improving network capacity. This in turn can lead to an improved user experience due to lower latency and better network performance.
- Improved spectral efficiency: D2D communication enhances spectral efficiency by allowing multiple users to simultaneously communicate with each other without the need to rely on any base station. This helps to reduce the overall bandwidth required for communication.
- Reduced network cost and complexity: By utilizing the potential of device-to-device communication, existing cellular systems can be improved without needing any additional infrastructure or components. This helps in reducing the overall cost and complexity of network deployment and operation.
- Improved coverage and access: The direct nature of D2D communication helps in improving coverage and providing access to users in previously under-served or unserved areas. This opens up new possibilities for providing access to the internet and other related services to a bigger audience.
- Enhanced security: D2D communication helps in providing enhanced security when compared to traditional cellular communication. With the absence of additional infrastructure, malicious attacks on the network are minimized. Moreover, D2D communication also provides the added benefit of reduced interception of transmitted signals.

Literature Review

Device-to-device (D2D) communication is a rapidly increasing trend in 5G networks. This type of communication is beneficial to service providers, as it reduces costs related to the

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

infrastructure of the network. Additionally, it helps in reducing latency and energy usage [11]. As more people rely on the technology for communications services, the security and privacy of data is a growing concern. One of the biggest issues with D2D communication is that it lacks the security measures that are present in traditional cellular networks [12]. Since communications typically take place in unstructured and uncontrolled environments, malicious parties have the potential to interfere with communication in a variety of ways. This can range from malicious users eavesdropping on conversations or disrupting data transmission. Additionally, since user data is shared across multiple devices, there is a risk of that data being leased or sold to third parties [13]. Another issue with D2D communication is the lack of trust. Devices of unknown origins or those which do not meet security standards can potentially access network data, exposing users to cyber threats. Additionally, relying on the trustworthiness of the connecting device leaves users vulnerable to man-in-the-middle attacks, leaving the door open to data theft and manipulation. The effective, secure, and reliable implementation of D2D communication requires strict security measures. This includes the adoption of proper authentication protocols and encryption techniques that will help protect user data [14]. Additionally, service providers need to ensure that devices are properly secured and audited on a regular basis to check for any threats that could potentially disrupt communication. Finally, service providers should encourage users to take precautionary measures such as avoiding unsecured networks and using VPNs. These measures can help ensure the security of user data and provide peace of mind to users. Device-to-Device (D2D) communication is a method of communication that enables direct data exchange between two or more devices in close proximity [15]. This technology can greatly enhance the efficiency of wireless networks for applications such as vehicular communications, public safety networks, and industrial automation. However, it poses a number of unique challenges when integrated into 5G networks. One key challenge is the potential for interference between simultaneously active D2D pairs due to the limited radio resources available. 5G networks use higher carrier frequencies and ultra-dense deployments compared to existing networks, making interference risk more likely. Additionally, due to the directness and proximity of communication in D2D, the transmission power of each node needs to be much lower to avoid interference with other nodes. This is further complicated in scenarios where nodes are in constant motion, such as in vehicular networks [16]. Another challenge is ensuring Quality of Service (QoS) for D2D communications in 5G. This is due to the fact that D2D transmission range is very limited compared to traditional base station-to-node communication. It is therefore difficult to ensure connections remain within the transmission range and transmit data at an acceptable rate without interruptions. Furthermore, the processing power of the devices to be used in D2D communication also needs to be factored in. This is because many of the potential applications of D2D, such as virtual reality, require heavy computational power and 5G nodes may struggle to provide the necessary power [17]. Securing the wireless resource allocation for D2D pairs is also a key challenge. This is because there is potential for malicious interference between paired nodes, which could disrupt data exchange or even cause denial of service. It is important to secure the heterogeneity of wireless resource allocation in 5G because of the potential for malicious interference. The cost of deploying D2D technology in 5G networks is a

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

major concern [18]. Since 5G networks already support several different technologies and applications, the additional cost of implementing D2D adds to the burden of deploying 5G services. Also, as mentioned above, the proximity of communication in D2D means that the cost of maintaining protection between nodes must also be factored in. Device-to-Device communication is a promising new technology and its integration into 5G networks could greatly enhance the performance of many applications [19]. However, the unique challenges associated with integrating D2D into 5G networks must be addressed in order for this technology to reach its full potential. The novelty of proposed research has the following,

- Introduction of a dynamic network management model to improve device-to-device communication in 5G networks.
- Leveraging existing network technologies that are already deployed in 5G networks, such as Software Defined Networking (SDN) and Network Function Virtualization (NFV).
- Introducing a lightweight centralized approach for network management, enabling efficient utilization of resources, enhanced control over quality of service and improved scalability of the system over time.
- Utilizing automatic resource assessment and real-time optimization techniques to improve communication performance of D2D devices in 5G networks.
- Enhancing the security and integrity of communications while providing great opportunities for network-wide regulatory compliance and interoperability [20].

2. METHODOLOGY

A Network Management Model (NMM) for device-to-device communication in 5G networks provides an efficient and effective way for mobile device users to communicate directly within their 5G network. The NMM is designed to reduce network latency, improve user experience, and maximize system capacity. It allows mobile devices to establish direct peer-to-peer (PDP) links with each other without going through the traditional gateway or base station. The NMM also provides access to wireless networks with enhanced security, quality of service, and improved user experience. The NMM can be used for 5G network applications such as streaming capable applications, and enabling mobile users to access 5G networks, even in areas with weak signal. The NMM supports P2P communication with devices that are connected directly to the Internet, reducing latency and improving system performance. Moreover, the NMM can be used for delivering services such as voice, video, and data, as well as for improved capacity and reliability.

Construction

The emergence of fifth-generation (5G) networks has created great opportunities for device-to-device (D2D) communication. D2D connectivity enhances the exchange of data between devices, allowing for a wide range of new applications and services. This new form of

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

communication presents an interesting challenge for network management professionals as the underlying network architecture is significantly more complex than traditional wireless networks. Therefore, successful network management requires an innovative and comprehensive model that considers the many challenges associated with D2D communication. It provide an overview of the current state of D2D communication, the limitations of existing network management models, and the proposed design of a new network management model for 5G-enabled D2D communication. We present a model consisting of four distinct components: a system monitoring component, an interactive communication component, a data collection component, and a decision support component. The functional block diagram has shown in the following fig.2

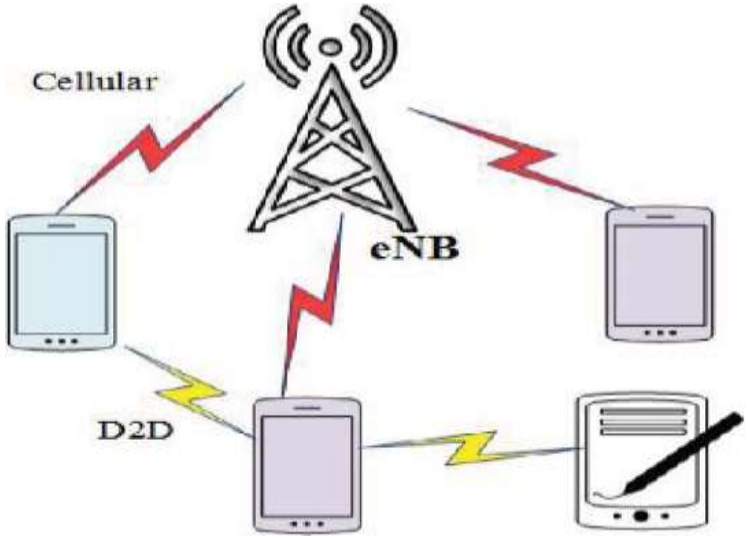

Fig 2: Functional block diagram

The nature of D2D communication is highly important to identify. D2D communication allows two wireless devices (e.g., mobile phones) to send and receive data without the need for an intermediate network infrastructure (e.g., cellular towers or base stations). This direct communication typically has a range of less than a few hundred meters and can be implemented in either an ad-hoc or quasi-static fashion. Ad-hoc D2D communications are event-driven – that is, two devices have to be close to one another for a direct connection to occur. Quasi-static D2D communication, on the other hand, occurs when two devices are within communication range but do not have to be in close proximity. In either case, the direct device-to-device link allows for improved data transmission speeds and lower latency. Existing network management models used in traditional wireless networks are not well-suited for D2D communication. One major limitation is the assumption that all devices in the network are managed by a single entity. This one-size-fits-all approach does not account for devices that are managed separately by different entities, which is common in D2D networks. Furthermore, existing network management models

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

are insufficiently flexible when it comes to addressing power consumption and data rate requirements of different devices. Finally, most current network management models fail to provide adequate support for automation and optimizing user experience within the network.

Proposed Network Management Model

To address the shortcomings of existing network management models, we propose a network management model for 5G-enabled D2D communication consisting of four distinct components. The first component is an automated system monitoring component that provides continuous monitoring of the network's performance and health. This component should be able to detect and diagnose issues at both the individual device and network levels. The second component is an interactive communication component, which enables the monitoring system to interact with individual devices and the network control system. This component must be able to securely facilitate communication between individual devices, the network control system, and any third-party systems if necessary. The third component is a data collection component, which enables the monitoring system to collect data from each device in the network in order to facilitate real-time analysis and provide users with timely feedback regarding the network's performance. Finally, the fourth component is a decision support component, which enables the monitoring system to provide users with insights and recommendations to maximize the performance and user experience of the network. The emergence of 5G networks has led to the need for innovative network management models for device-to-device communication. it have proposed a comprehensive model consisting of four distinct components:

- System monitoring component
- Interactive communication component
- Data collection component
- Decision support component

The proposed model is aimed at overcoming the limitations of existing network management models and providing effective network management for D2D communication in 5G networks. Connection management for device-to-device communication in 5G networks involves a number of key tasks:

- Access selection: It is the process of selecting the optimal access technology for a device-to-device communication session. This is typically done using a 5G Access Selection module that includes components such as an AI-based radio access selection engine, a 5G Network Discovery engine, and a path selection mechanism.
- Network selection: After selecting the preferred access technology, the network selection process finds the best access point for a given device. This involves selecting the most suitable network topology according to the device's requirements and the kind of functions the device wants to perform.

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

- Device configuration: Once a connection has been established, device configuration takes place. This includes configuring the device and its related parameters, such as the device ID, radio access technology, carrier frequency, and gateway configuration.
- Connection establishment: After the device is configured, the connection establishment process is triggered. This involves the exchange of signaling between the device and the AP, which includes authentication and key generation.
- Quality of service: During the connection establishment process, the Quality of Service (QoS) parameters are also negotiated. This includes factors such as the minimum bit rate, throughput, latency, packet loss, and the maximum number of allowed concurrent connections.
- Security: After the connection has been established, security protocols are also implemented to protect the data in transit. This includes the use of encryption, authentication, and authorization protocols.
- Mobility management: In 5G networks, devices may move from one cell to another while maintaining the same session. This requires an efficient mobility management mechanism to ensure that the device can maintain the connection and its parameters as it moves around.
- Network resource optimization: Network resource optimization is also a critical task for device-to-device communication in 5G networks. This involves managing the available network resources to ensure that a fair share of resources is allocated to each session.

Operating Principle

The network management model for device-to-device (D2D) communication in a 5G network is based on the service oriented architecture (SOA) model. It aims to provide a flexible approach to controlling and distributing network resources in order to provide a high quality communication experience. The model proposes the use of virtualization, software defined networks (SDN) and network functions virtualization (NFV) which will offer an efficient and robust platform for D2D technology to take off in 5G. The operating principles of the D2D network management model consist of several layers. In the lowest layer, network virtualization is used to enable the sharing of physical network resources amongst network nodes in an efficient and secure manner. This is then followed by a set of autonomic mechanisms for network management and optimization. These mechanisms enable the adaptation of networking parameters in order to achieve optimal performance during data transfer. The next layer of the model is the software defined networking layer which uses a Global Manager (GM) to abstract and control multiple different technologies used in the network. The GM provides distributed resources such as Quality of Service (QoS), throughput and latency requirements in order to maintain optimal performance. The GM then implements network policy control methods such as admission control, flow management and traffic engineering. At the top layer is the NFV layer. Here, the use of virtualization allows for the virtualization of network functions and applications. This layer also enables the execution of Management and Orchestration (MANO) services. MANO services allow for better scalability, customer experience and faster deployment of applications in the network. The 5G network

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

management model also includes horizontal and vertical orchestration mechanisms. The horizontal service orchestration ensures that network resources are properly allocated and used across the network nodes and the vertical service orchestration ensures that each network node has access to the appropriate set of services. These orchestration mechanisms help to ensure the efficient and secure use of the D2D communication technology in 5G networks.

Functional working

A Network Management Model for Device-to-Device (D2D) communications in 5G networks is a vital and increasingly important component as more devices connect to 5G networks. D2D technologies represent a key enabler to achieve the goals set out by 5G network deployments and optimize the performance of the physical and media access control layers. D2D communications allow for dynamic access to services by bypassing the 5G core network and eliminating the need for backhaul. This reduces the reliance on the core network and can lead to increased network resource utilization and improved user Quality of Experience (QoE). The operational flow diagram has shown in the following fig.3

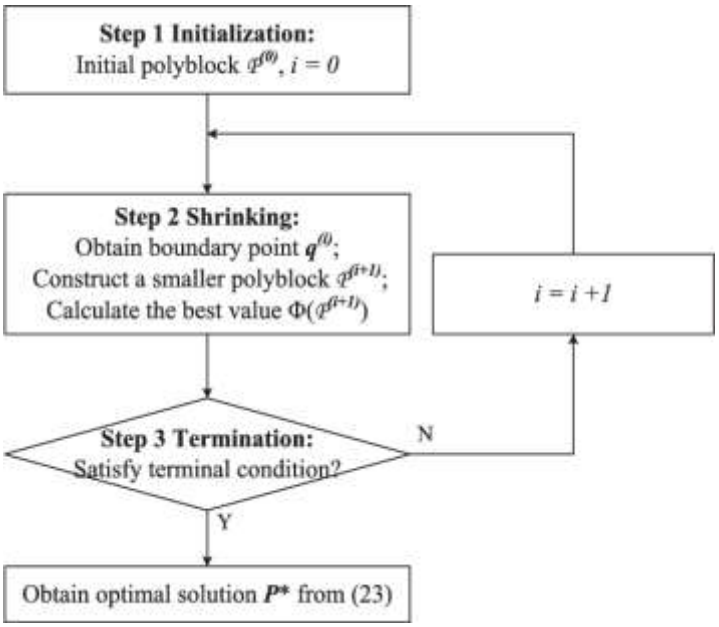

Fig 3: Operational flow diagram

The Network Management Model for D2D communications in 5G networks should include a distributed architecture optimized for flexibility and scalability to support a wide range of devices. It should also comprise of several components, including an Access Management Layer that enables D2D network access for different types of devices; and a Resource Management Layer that coordinates the D2D resources available on the network, taking into account important constraints such as reliability, quality of service, user privacy, and security. The

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

Access Management Layer should include a Service Discovery and Connectivity Management framework so that devices can discover available services on the network and initiate or terminate D2D connections. An authentication and access control mechanism should also be included in the Access Management Layer to ensure secure and reliable transmission of data over the network. The Resource Management Layer should provide mechanisms to maintain efficient resource allocation and utilization of network resources in order to balance the objectives of the different applications and devices that are connected to the network. To achieve this, the Resource Management Layer should employ optimization algorithms such as network coding or other sophisticated methods, to improve link quality.

3. RESULTS AND DISCUSSION

The Network Management Model should be integrated with an Advanced Network Analytics Platform to enable real-time monitoring and reporting of the performance of the network and its associated devices to ensure optimal network performance. It is clear that a Network Management Model for D2D communications in 5G networks is an important component that must be incorporated into a 5G network deployment in order to ensure optimal performance and QoE. With such a model in place, it will be possible to leverage the full potential of D2D communications while simultaneously protecting the security of user data and optimizing the efficient use of available resources. The proposed Network Management Model (NMM) has compared with the existing Social-aware energy efficiency optimization (SAEEO), multipath routing solutions (MRS), joint resource management approach (JRMA) and Efficient resource allocation (ERA)

Device Management

Device Management for Network Management Model for Device-to-Device (D2D) Communication in 5G Networks is an important element for a 5G network as it enables the devices to communicate with one another. The concept of D2D communication is based on the notion of having multiple nodes communicating with one another directly, without the need for a third-party infrastructure in the middle. Device Management for Network Management Model consists of two major parts - the radio access network (RAN) and the core network. The RAN is the layer of the 5G network that enables the devices to communicate directly with each other, while the core network is comprised of the base station and core nodes that manage the traffic and maintain the overall network performance. Fig.4 shows the Device Management.

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

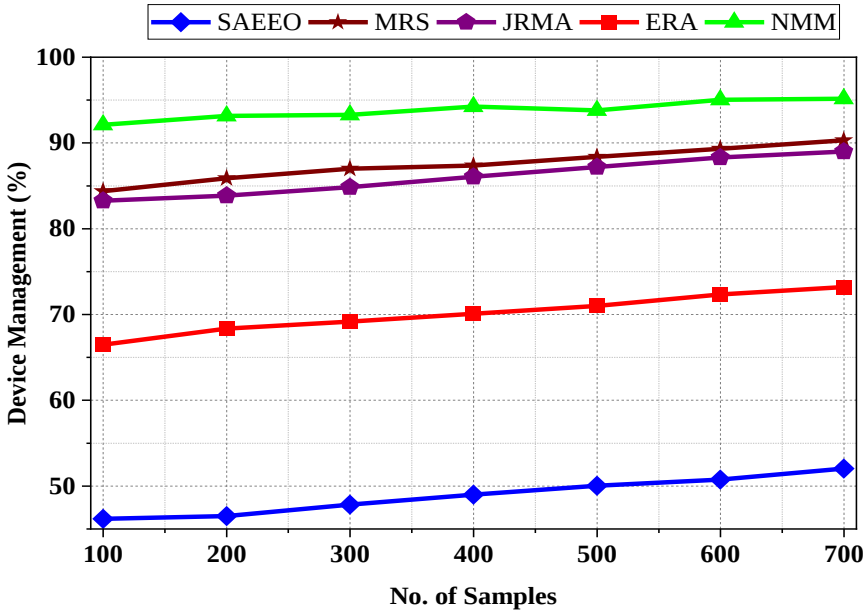

Fig.4: Device Management

The Device Management for Network Management Model allows the administrator to monitor and manage the devices and nodes connected to the D2D network. This includes provisioning of new devices, setting up and updating device configurations, configuring radio access parameters and channels, managing network congestion, providing data and control over the air interfaces, and monitoring network performance. This also includes managing the security of the D2D network by providing authentication, encryption, and other security measures. The Device Management for Network Management Model for Device-to-Device Communication in 5G Networks provides an efficient way to manage the devices and nodes connected to the D2D network, increasing network reliability and performance, while maintaining a secure and reliable environment for device-to-device communication.

Communication management

The Network Management Model for Device-to-Device (D2D) communication in 5G networks is responsible for the coordination and control of the radio resources necessary for the transmission and reception of data within the radio access network. It manages the access, handover, and resource allocation of the D2D devices, allowing efficient communication of data across multiple transfers and handoffs. It also performs monitoring and troubleshooting of D2D communication links, and provides the necessary reporting to ensure that the D2D communication remains efficient and reliable. Fig.5 shows the Communication management.

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

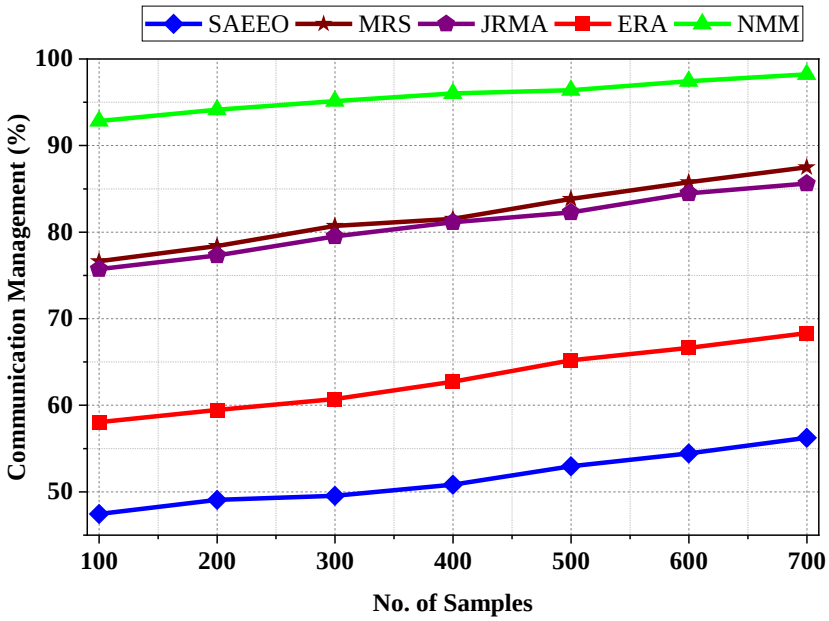

Fig.5: Communication management

The Network Management Model for D2D communication in 5G networks also includes the management of security between two D2D devices, preventing unauthorized access and data manipulation. Finally, the model addresses the optimization of the overall power consumption of the D2D network, reducing the overall operational costs associated with maintaining communication between D2D devices. The Network Management Model for D2D communication in 5G networks is an important component of managing the successful deployment of D2D communication in 5G networks.

Security Management

Security management for device-to-device (D2D) communication in fifth-generation (5G) networks is an area that needs a lot of attention. With the advent of 5G, one of the key technologies for its success will be D2D communications, which is a wireless communication link between two devices, such as two phones or tablets that bypasses any existing network infrastructure, such as a cellular network or a Wi-Fi hotspot. The security of these D2D communications is essential for a successful 5G rollout. As with any wireless data transfer, it is vulnerable to hacking and data exploitation. 5G networks also increase the risk of exposure of confidential data, such as customer personal data, to malicious third parties. Fig.6 shows the Security Management.

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

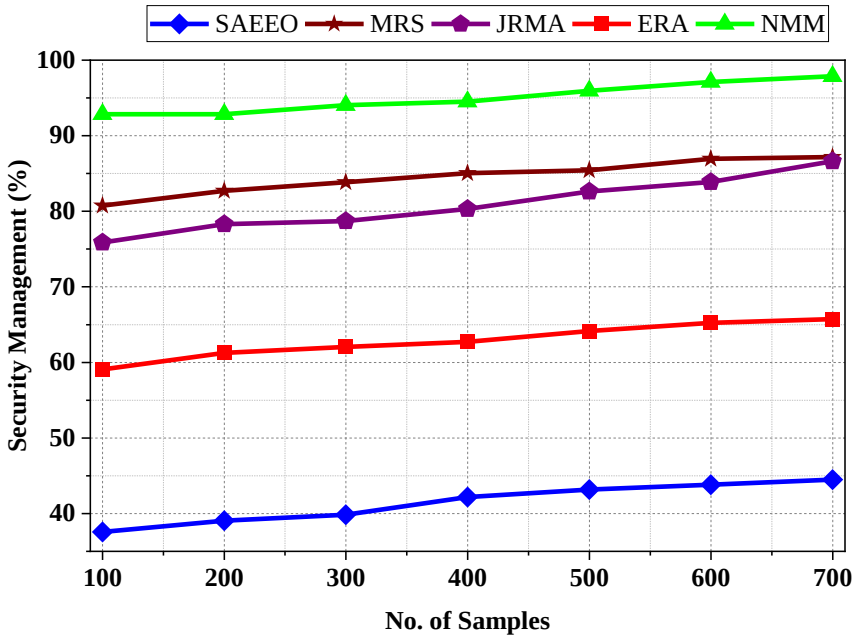

Fig.6: Security Management

To address this concern, secure D2D communication must be in place in the 5G network. This secure communication must include a range of network management models that ensure the safety and security of all data transfers. Authentication is paramount; both devices must pass an authentication check before being allowed to establish a D2D connection. Encryption must also be used to protect all data that is transmitted between devices. Additionally, access control mechanisms must be in place that limit which devices can communicate with each other. Finally, 5G networks must be monitored for signs of suspicious behavior. Security management for D2D communication in 5G networks is a complex task, but one that is essential for the success of connected 5G devices. By putting in place the right authentication, encryption, access control, and monitoring protocols, the security of these device-to-device exchanges can be guaranteed, enabling the smooth rollout of 5G networks and protecting customer data.

4. CONCLUSION

A Network Management Model for Device-to-Device Communication in 5G Networks is a network management model that focuses on managing the data plane of communications for device-to-device (D2D) communications in 5G networks. This model focuses on the set up of communication links between devices for audio, video and data services. A Network Management Model for Device-to-Device Communication in 5G Networks is designed to operationalize end-to-end communication between multiple nodes in a 5G network. The model

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

applies its features on the physical layer through signaling and control protocol operations. It provides an orchestration of services through techniques such as bearer discovery and association, traffic flow optimization, scheduling and resource allocation in accordance with device profile and service requirements. A Network Management Model for Device-to-Device Communication in 5G Networks provides network operators with features such as provisioning of Quality of Service parameters for reliable device-to-device communication, dynamic traffic management for load balancing between nodes and fine-grained security roles for access control. A Network Management Model for Device-to-Device Communication in 5G Networks is an important network management model that provides a way to ensure the efficient use of available resources in 5G networks and facilitate seamless device-to-device communication.

5. REFERENCES

1. Adnan, M. H., & Ahmad Zukarnain, Z. (2020). Device-to-device communication in 5G environment: Issues, solutions, and challenges. Symmetry, 12(11), 1762.
2. Zhang, S., Liu, J., Guo, H., Qi, M., & Kato, N. (2020). Envisioning device-to-device communications in 6G. IEEE Network, 34(3), 86-91.
3. Nait Hamoud, O., Kenaza, T., & Challal, Y. (2018). Security in device-to-device communications: a survey. IET Networks, 7(1), 14-22.
4. Kar, U. N., & Sanyal, D. K. (2018). An overview of device-to-device communication in cellular networks. ICT express, 4(4), 203-208.
5. Chakraborty, C., & Rodrigues, J. J. (2020). A comprehensive review on device-to-device communication paradigm: trends, challenges and applications. Wireless Personal Communications, 114(1), 185-207.
6. Pawar, P., & Trivedi, A. (2019). Device-to-device communication based IoT system: benefits and challenges. IETE Technical Review, 36(4), 362-374.
7. He, Y., Yu, F. R., Zhao, N., & Yin, H. (2018). Secure social networks in 5G systems with mobile edge computing, caching, and device-to-device communications. IEEE Wireless Communications, 25(3), 103-109.
8. Iqbal, J., Iqbal, M. A., Ahmad, A., Khan, M., Qamar, A., & Han, K. (2019). Comparison of spectral efficiency techniques in device-to-device communication for 5G. IEEE Access, 7, 57440-57449.
9. Huynh, D. T., Wang, X., Duong, T. Q., VO, N. S., & Chen, M. (2018). Social-aware energy efficiency optimization for device-to-device communications in 5G networks. Computer Communications, 120, 102-111.
10. Celik, A., Tetzner, J., Sinha, K., & Matta, J. (2019). 5G device-to-device communication security and multipath routing solutions. Applied Network Science, 4(1), 1-24.
11. Farzamiyan, A. H. (2019, March). A Survey on Device-to-Device Communication in 5G Wireless Networks. In 14th International Conference on Software Technologies (pp. 81-85).

International Journal of Research in Science & Engineering
ISSN: 2394-8299
Vol: 01, No. 01, Aug-Sept 2021
http://journal.hmjournals.com/index.php/IJRISE
DOI: https://doi.org/10.55529/ijrise.11.13.27

12. Kar, U. N., & Sanyal, D. K. (2020). A critical review of 3GPP standardization of device-to-device communication in cellular networks. SN Computer Science, 1(1), 37.
13. Zhang, R., Qi, C., Li, Y., Ruan, Y., Wang, C. X., & Zhang, H. (2019). Towards energy-efficient underlaid device-to-device communications: A joint resource management approach. IEEE Access, 7, 31385-31396.
14. Sultana, A., Woungang, I., Anpalagan, A., Zhao, L., & Ferdouse, L. (2020). Efficient resource allocation in SCMA-enabled device-to-device communication for 5G networks. IEEE Transactions on Vehicular Technology, 69(5), 5343-5354.
15. Alam, T. (2020). Device-to-device communications in cloud, manet and internet of things integrated architecture. Journal of Information Systems Engineering and Business Intelligence. doi, 10, 18-26.
16. Pedhadiya, M. K., Jha, R. K., & Bhatt, H. G. (2019). Device to device communication: A survey. Journal of Network and Computer Applications, 129, 71-89.
17. Mishra, P. K., Kumar, A., Pandey, S., & Singh, V. P. (2018). Hybrid resource allocation scheme in multi-hop device-to-device communication for 5G networks. Wireless Personal Communications, 103, 2553-2573.
18. Gupta, K., & Jiwani, N. (2020). Effects of COVID-19 risk controls on the Global Supply Chain. Transactions on Latest Trends in Artificial Intelligence, 1(1).
19. Jiwani, N., & Gupta, K. (2019). Comparison of Various Tools and Techniques used for Project Risk Management. International Journal of Machine Learning for Sustainable Development, 1(1), 51-58.
20. Jiwani, N., & Gupta, K. (2018). Exploring Business intelligence capabilities for supply chain: a systematic review. Transactions on Latest Trends in IoT, 1(1), 1-10.