Comparative Review of Routing Protocols in MANET for Future Research in Disaster Management

Abdul Majid Soomro[1], Mohd Farhan Bin Md. Fudzee[1], Muzammil Hussain[2], Hafiz Muhammad Saim[3], Gohar Zaman[1], Atta-ur-Rahman[4], Haya AlUbaidan[4], and Majed Nabil[4]
[1] Department of Computer Science, FSKTM, University Tun Hussein Onn Malaysia (UTHM), Malaysia
[2] School of Systems and Technology, Department of Computer Science, University of Management and Technology, Lahore, Pakistan
[3] Department of Computer Science, Riphah International University, Lahore, Pakistan
[4] Department of Computer Science (CS), College of Computer Science and Information Technology (CCSIT), Imam Abdulrahman Bin Faisal University, P.O. Box 1982, Dammam 31441, Saudi Arabia
Email: Gi180004@siswa.uthm.edu.my, farhan@uthm.edu.my, muzammil.hussain@umt.edu.pk, 26545@students.riphah.edu.pk, gohar.zaman.isb@gmail.com, {2220500183, 2160007950, aaurrahman}@iau.edu.sa

Abstract—A mobile ad hoc network (MANET) is a non-centralized, self-organized, and self-managed wireless ad hoc network that is used in a specific circumstance. The changing nature of the network's architecture and nodes necessitates a routing protocol to ensure efficient source-to-destination communication. MANET manipulates different sectors of life such as rescue and emergency operations, real-time information, interpersonal communication, network portioning, and catastrophe management due to its ad hoc and non-identical uses. Routing and maintenance are critical parts of effective time management and considered research study for MANET communication. This study focuses on the routing and maintenance process of MANET that has dynamic change in topology and nodes to deliver data rapidly. The motivational component of MANET for the research is route discovery, and several techniques have been proposed for it. Each has higher expectations than the other. This comparative analysis reveals issues for route discovery and maintenance of MANET communication, such as whether one is better in different network conditions than the others. This study examines the literature on MANET route discovery and maintenance strategies. As a result, a comparison of several routing protocol techniques is made. To achieve improvement, these methods include some suggestions for performance improvement using routing protocols especially in disaster management. This study presents directions for future experimentation, which will be pursued to identify the most advantageous collection of tactics for meeting the needs of various applications.

Index Terms—MANET, routing protocols, topology, disaster management, ad-hoc networking

I. Introduction

Mobile ad hoc networks (MANETs) are networks that do not have any infrastructure. On networks without a fixed access point, each node can operate as a router. All nodes are free to move about and can be dynamically connected to one another in whatever way they want. Terminals oversee controlling, managing, and organizing the entire network. The entire network is movable, and each terminal can move around freely. Fig. 1 depicts this type of network [1]. Disasters are significant disturbances to a community's ability to cope using just its own resources. Natural, man-made, and technical risks, as well as a variety of other elements, can produce disasters. In recent years, technology has advanced at a breakneck pace. This reaffirms recent progress in domains such as information processing systems, information security, information technology, and computer science. Advancements in information technology, particularly in wireless and ad-hoc technologies, have outpaced those in other industries in recent years. The wireless network's survival began in the 1980s, when it began wireless systems, and it has since opened new doors in all facets of human life [2]. Ad-hoc network technology has accomplished a great deal in the field of research over the last fourteen years, with many commendable actions and notable accomplishments. Many researchers have investigated this field in to increase their research and learning. Because of the constant topology change in MANET, there are numerous problems and challenges to be addressed in this area. Routing and maintenance, energy efficiency, multicasting, clustering, and mobility management are all new areas of MANET study. In MANET, each node acts as a router and configures itself [3]. Such a network is developed for specific exceptional situations such as battles, disasters [4].

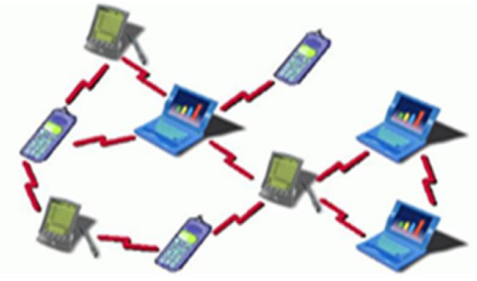

Fig. 1. Without Infrastructure (ad hoc) Network

In the presence of dynamic topology, the quality of MANET is determined by the routing protocol's

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performance. The routing is set up with a routing protocol to manage it and it is primary performance indicator.

Rest of the paper is organized as follows: Section II contains the comprehensive overview of routing protocols; Section III provides the literature review of similar techniques used in disaster management and Section IV concludes the paper.

II. Routing Protocols

The routing protocols specify the route direction across nodes and distribute information about route selection among any nodes in a network [5]. Routing protocols are divided into three types: proactive routing protocols (PRP). Reactive routing protocols (RRP), and hybrid routing protocols (HRP). Several types of MANET protocol are displayed in Fig. 2 as a hierarchical classification of routing protocols. In general, Proactive is thought of as a link-state or table-driven routing protocol. Reactive as a distance vector or on-demand routing system. A hybrid as a combination of both.

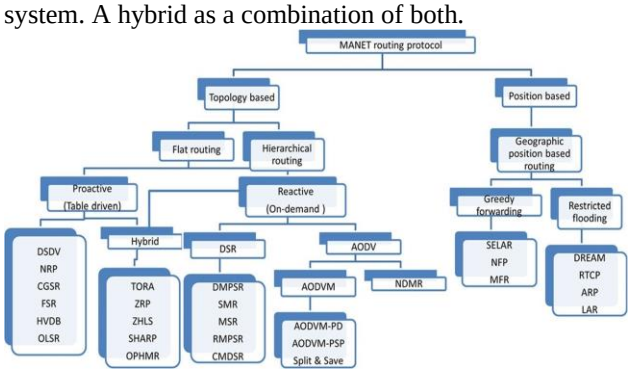

Fig. 2. Classification of MANET routing protocol

Developing the successful MANET execution system has been the subject of extensive research in recent years and has developed a lot of adaptive and adaptive mechanisms [1]. This essay is intended to accomplish three objectives. First, we present two approaches to the MANET system. Some of them are rejuvenating and rejuvenating digestive systems. This is a summary of the various advantages and disadvantages of the reaction mechanism and function. Finally, we have conducted several studies comparing two types of motion systems and performance metric systems, each examining some aspects of the MANET network.

Cas *et al*. [3] It was designed to produce a sample rather than a simulation or test to test the method used in MANET. The reason is that these systems should always lead to debate making the world work easier and not reflecting the real nature of time. Akaya *et al*. [4] studied the execution mechanism of the sensory network and then distributed different methods based on data, method, and geographic location. The authors also identified several future research on system configuration, such as the integration of sensor networks into wired networks (such as the Internet). Developing a well-designed system for the MANET network has been an area of extensive research in recent years, and a lot of functional and adaptive design systems have been developed. This essay aims to achieve three objectives. First, it introduces some of the first method methods available on the MANET network based on the two primary process classes, namely proactive and reactive. It then provides an overview of the disadvantages and disadvantages of the movement response system and its performance. Finally, two sets of process control systems are integrated into the performance metrics. Numerous research studies have been conducted, each of which focuses on specific aspects of MANET to be explored.

Measuring the implementation instead of simulation to measure the values used in MANET. The reason is that these systems still require the simplicity of the real world, leading to conclusions that do not reflect the true nature of the ad hoc network. Analyze the execution mechanism for the sensory network and then distribute different data paths, processing modes, and location-based modes. Also, the authors describe some future research on possible design processes such as the integration of sensor networks into wireless networks (i.e., the internet).

The authors [5] compare simulation studies with efforts to improve some road design procedures and the presence of road types. However, our study complements the current study by examining different quality of service (QoS) metrics and considering the quality of the routing process. It also examines the working media and the operation of the ad hoc network and compares a lot of important factors. The operating system of the MANETS QoS management system includes certain features or constraints between the source and the connection location that must be met to achieve the program requirements [6] [7]. Assessing the quality of a conversion system requires quantity and quality to measure the overall quality and efficiency of the routing protocol [8].

Collectively, the study in [9] refers to four aspects of QoS: packet loss (package delivery rate), delay (path delay), jitter (time difference), as well as increased bandwidth. Table I shows the characteristics and characteristics of the MANET routing system based on RFC2501 [8]. Moreover, some standards compare operating routes to work routes regarding size, scalability, and lack of loops. A reference to the performance criteria in this article is to consider prophylactic and post-protocol based on these parameters. Many magazines compare their performance.

The authors [9] sought to reverse some of the popular media hype by studying magic in the presence of a similar traffic system. However, our analysis contributes to current research in this area by analyzing different QoS metrics and judging for the system optimization process based on them. Also, it studies the running process and works for ad hoc networks and provides comparisons of the various methods followed.

Metrics of routing protocols have the same identification or barrier between the source and the connection point that will be guaranteed during

communication to fulfill the requirements of the application [6], [7]. To judge the accuracy of a vehicle design system, both metric and numerical requirements are required to measure its quality and performance [8]. In total, there are four metric systems shown in [9] as the QoS component which can be package loss (or package delivery rate), delay (latency path), jitter (delay change)) and bandwidth. Table I provides a list of the aesthetics and characteristics of the MANET routing system based on RFC2501 [8]. Some metrics from [8] are applied to compare mobility and reaction systems in terms of agility, scalability, and latency freedom. metric. Numerous documents compare the performance of the rotation system by using package delivery rate, control rate, hop rate, and delay time. However, the performance of the authors 'routes [5] compares to the simulation study to improve some of the mobility patterns and the presence of traffic patterns. However, our study complements the current review by examining different QoS systems and examining the structure of the original system. It also examines the working methods of the ad hoc network and evaluates several relevant methods. The operational structure of a MANETS QoS management system includes a specific identifier or endpoint between the source and the connection point that will be guaranteed to achieve the program requirements [6], [7]. Assessing the quality of a conversion system requires quantity and size to measure quality and performance [8]. Collectively, [9] defines four aspects of QoS: packet loss (or package delivery rate), delay (path delay), jitter (time difference), as well as increased bandwidth. Table I shows the characteristics and characteristics of the MANET routing system based on RFC2501 [8].

Some comparisons compare operating protocols with executives such as load, scalability, and no loops. A reference to the performance criteria in this article is the comparison of prevention and post-protocol based on these metrics. Many magazines compare their performance. The authors are in [5] as an attempt to reverse some of the popular media hype by conducting magic studies in the presence of similar traffic. However, our analysis contributes to the current research in this area by considering different QoS metrics and assessing the benefits of system optimization. In addition, it analyzes the running process and works for ad networks and compares the different methods used. The metric routing protocol MANETS QoS has the same characteristics or constraints between the source and the connection point that will be guaranteed during the communication to achieve the application requirements [6], [7]. To assess the value of a motion system, both metric and numerical parameters are required to measure power and performance [8]. In total, there are four metric methods shown in [9] as a QoS paradise that can be package loss (or package delivery rate), delay (path delay), jitter (delay change) and input. Table I lists the identification and identification characteristics of the MANET routing system based on RFC2501 [8]. Some metrics from [8] have been compared to the rolling system and the workmanship in terms of size, scalability, and no loops. The purpose of referring to the performance metric in this paper is to compare protocols and reactions to these metrics. Numerous documents compare the performance of the rotation system by using package delivery rate, control rate, hop rate, and delay time. However, the performance of the routing system is examined in this article in terms of loop independence, control load, memory load, and scalability of the routing algorithm. The authors in [5] recall the attempt to examine some of the more popular media by studying magic in the presence of a similar traffic system. However, our analysis contributes to the current research in this area by considering different QoS metrics and assessing the benefits of system optimization. In addition, it analyzes the running process and works for ad networks and compares the different methods used. The authors are in [5] as an attempt to reverse some popular media practices by conducting magic studies in the presence of similar traffic. However, our analysis contributes to the current research in this area by analyzing different QoS metrics and judging for the system optimization process based on them. In addition, it studies the running process and works for ad hoc networks and provides comparisons of the various methods followed. Routing protocols for MANET are discussed below in sections.

A. Link State/Table driven Routing Protocol (Proactive)

In these routing protocols, we use routing algorithms that transfer its related information to its neighbor nodes continuously. In PRP, every node has a table that manages continuously change [6]. Main examples of PRP are DSDV, WRP. Destination Sequence Distance Vector Routing (DSDV) is a proactive vector routing protocol using hop by hop technique [6]. It is one of the proactive protocols where each node has a table that indicate information about the switching to the next-node and maintains number of movements to every accessible destination. It has periodic broadcast nature of reforms in routing to make the routing table active and streamline, revise it all the time. Benefits of DSDV are its reactions during the topology changes are fast and its freeness about loop structure. The main issue that we can say demerit of DSDV not maintaining network over crowdedness because not use routing information properly. LSR is another main PRP. The main aim of this protocol is to search for a route based on the current active situation. It reforms Dijkstra's shortest path first (SPF) scheming algorithm, where in the entire network each node has desirable information about view of topology. In the Network each node has fresh knowledge about topology, information road map that reforms itself frequently and creates a Link State Packet (LSP) in connection to other state through direct link and broadcasts all information to nearest nodes [7].

Wireless Routing Protocol (WRP) maintains four tables for each node which are in the form of distance

table, routing table, link-cost table and, message retransmission list to routing. In WRP, updating of messages are performed through the neighbors of a node.

TABLE I: PROACTIVE ROUTING PROTOCOL COMPARISON

Challenges	DSDV	OLSR
Balance of Load Issue	Negative	Negative
Reliability and validity issue	Positive	Positive
Throughput issue	Reduced with mobility	Better result as compared to DSDV
Scale controlling issue	Negative	Negative
Control Management Issue	Positive	Negative

B. On Demond/Distance Vector Routing Protocol (Reactive)

In RRP, design of a route to achieve a main goal is possible only when it is needed. Distance-vector routing algorithm manages the route to a particular destination station only when a node is required and demand for it. The main idea behind these protocols is to minimize routing overhead of traffic, that is, the main challenge of the PRP [5].

As an example the famous Ad-hoc On-Demand Distance Vector (AODV) is one of RRP. It specially designed for mobile ad- hoc networks where the working environment is wireless. On-demand establishment of routes from source to destination is its main part and it provides support in both cases, either unicast routing protocols or multicast routing protocols. On the source node request, the AODV protocol develops routes between nodes. Due to which it called an on-demand nature procedure. It does not create extra traffic along the link communication purpose [8].

DSR routing protocol used for wireless mesh networks. It is quite same as AODV protocol in the manner it develops a route on demand base due to request of transmitting node. DSR has fully self-maintained and self-organized nature, without any administration and network infrastructure existing network. Route Discovery and Route Maintenance are two mechanisms of DSR, which work together to give permission to nodes to find out and manage main source to random choice destinations route in the ad- hoc network.

In TORA each node uses a parameter height which measures the distance in the form of hops from source to destination. The source node utilizes the height parameter to provide help to the source node in selecting criteria of the best route to achieve the required destination. It is without iteration multipath routing to destinations to minimize communication overhead.

A qualitative comparison of the reactive routing protocols has been presented in Table II.

TABLE II: REACTIVE ROUTING PROTOCOL COMPARISON

Challenges	AODV	DSR
Complexity Issues	Moderate	Moderate
Balance of Load Issue	Negative	Negative
Reliability and validity issue	Positive	Positive
Configuration of routes	After use delete the route give information to source	After use delete the route give information to source
Throughput issue	For above 20 nodes it is low	Reduction on increment in mobility
Scale controlling issue	Negative	Negative
Control Management Issue	Negative	Negative
Management of routes	Through Table	Through cache
Loop issues	Free	free
Delete Route Information timing	Positive	Negative
Multi Routing System support	Negative	Positive
Types of protocol	Distance base routing	Source base routing
Burden on Route	Low	Moderate

C. Hybrid Routing Protocol (HRP)

Hybrid routing protocol (HRP) is a protocol together with the benefits of both PRP and RRP. The main benefit is that routing manages some proactive routes and then presents its demand request from highly activated nodes with the use reactive routing techniques [9].

Demerits of hybrid routing technique is, it depends on several other activated nodes and its reaction according to the demand of traffic depends on traffic volume. SHARP has automatic process of finding balance point between both proactive and RRP through adjustment of degree to which route information is propagated proactively versus the degree to which it needs to be discovered reactively. Zone Routing Protocol (ZRP) is Hybrid base Routing Protocol (HRP). It uses the benefits of proactive routing in the discovery of neighbor nodes, and it uses Reactive Protocols for routing between these neighbor nodes.

In Zone Routing Protocol (ZRP) each node has their own zone(region) of routing that mentation a range as far as hop where every node needs to maintain network availability. Zone (region) inner side routing is performed through Intra-zone routing protocols (IARP) and communicate that occurs with various other zone (region) is performed through Inter-zone routing protocols (IERP). Table III enlists pros and cons of HRP.

TABLE III: MERITS AND DEMERITS OF ROUTING PROTOCOL

Protocol	Merits	Demerits
Proactive Routing Protocol	Lateness reduce and have update information	Over burden in traffic high
Reactive Routing Protocol	On demand path is always available no iteration with low burden of traffic	High rate of lateness
Hybrid Routing Protocol	Suitable for a Large network with timely information	More complex

A study in [58] presented a decade review (2011-2020) of the routing protocols in terms of their performance metrics including average end of end delay, packet drop rate and the message overhead. Moreover, the study comprehends the major research directions in the area of routing protocols in the MANETs.

D. Comparison on Routing Protocols

In Table IV a comparative analysis of different types of routing protocols like PRP, RRP, and HRP are discussed with respect to types of protocol, Approaches used in routing, scalability, energy efficiency, Network overhead and throughput, Latency issues, Power requirement, Storage requirement and Bandwidth requirement issues.

TABLE IV: COMPARISON BETWEEN DIFFERENT ROUTING PROTOCOLS

Main Features	Proactive Protocol	Reactive protocol	Hybrid Protocol
Routing issues for Acquis ion	Table Driven base	On demand base	Both combine
Scalability Issues	Less Level	Not accurate for large network	Have best design for large network
Latency issues	Less due to use of table for routing	Its High Peak due flooding environment	Less inside Zone High outside zone
Bandwidth Requirement Issues	High	Less	Medium
Periodically updating	Needed when change occur in network topology	Not needed	Needed
Routing Overhead Issues	High	Less	Medium
Power Requirement Issues	High	Less	Medium
Storage requirement issues	High	Less	Medium
Mobile nature of nodes	Updating perform periodically	Maintain Route on demand basis	Combine both together
Routing Information issues	High level Availability	Availability on requirement	Combine both together

From Table IV, it is clear through comparative analysis of routing approaches like proactive technique, reactive technique [10] and hybrid approach. Table Compare and evaluate the result-oriented performance of proactive and RRPs in MANET. In discussion, Reactive on-demand routing protocols performance is more acceptable under data management, energy efficiency, routing, bandwidth management issues and it provides less network overhead.

III. REVIEW OF RELATED WORK IN LITERATURE

In this Assignment, a brief description of earlier research works on Wireless Mobile Ad-hoc Network. Thakker and Kumar [11] used an ideal routing protocol by comparing different multiple path routing protocols in mobile Ad-hoc networks. They selected an ideal multi-secure routing protocol (MSR) through comparison of different multiple routing of path security protocols in MANET. Here in paper authors compared, and discussed different kinds of proactive, reactive, hybrid routing types using (AODV, DSR, DSDV, MSR ZRP) routing protocol techniques. Result obtained after the test through simulated software (NS-3).

Goswami [12], author suggested multiple routing using AODV reactive base technique to minimize total number of discovery of routes. One route should be there as an alternate path. Author performed updating of packets on periodic basis using sample of full path between the source and destination nodes through Monte Carlo way. Simulated results improve the quality of the network. Sultana and Ahmed in [13] in paper authors discussed about AOMDV reactive Protocol that extension of AODV in the sense of multiple paths to obtain secure transmission of packets data with the help of elliptic curve cryptographic (ECC) technique to get secure data packets against the attack of black holes. simulated software like NS-2.35 maintain configuration results. Such simulated type of software can be used in different environments in a parametric way.

Thiagarajan and Moorthi [14], in their paper Authors covered almost all techniques overview of routing procedures, after that they suggested a dynamic secure routing technique OLSE (optimized link state routing) for optimal routing performance. It is an effective proactive way of routing protocols through periodic metric. Proposed scheming mechanism provide better optimal results in over burden of traffic in the network, throughput, through simulated software.

Kumar *et al*. [15] in this paper there are many powerful and security base approaches in use to check authentication of nodes in the MANET. They provide a protocol for validation and authentication based on certificate sending and receiving between the nodes, for this purpose they use a digital signature with a hash style of information function to manage the authority and validity of certificates. Simulation software results proofs the better performance in terms of the throughput of protocol controlling, its end-to-end delay time and drop ratio of packet in the presence of mail function nodes in MANET.

Sharma *et al*. [16] in this paper used Hybrid Cryptography Technique (DES, RSA Algorithms) on SAODV. only discussion about attacks on the network layer. Authors. Also compared AODV Ad- Hoc network On Demand Vector Routing protocol (AODV)) with SAODV (Secure Ad-hoc on-demand routing protocol) based on a trust model for the MANET with different parameters like packet delivery, energy efficiency.

Kamal and Kumar [17] in this Paper Authors used a proposed technique which make sure transition of data in very secure manner through symmetric way and asymmetric way of cryptography. They used encrypted technique of data using the symmetric style of cryptography. Authors use the asymmetric cryptography way from the Hash of the information. Create a digitalized signature of data or information. proposed technique has been checked through AES algorithm. Shreyas and Vidya [18] In paper They introduced a

system, that based on highly secure information transition from one point to other point. They refer the system as Hybrid Cryptographic system for better security. they tried to minimize network over burden, secure delivery of packet percentage that is at high level in existing system, they are using the concept of (RSA), Data Encryption standard (DES) algorithm along with the use of digital type signature.

Patil and Bharti [19] in the paper they used dynamic nature of topology and system did not have high altitude static type architecture. Each node worked as the transmitter of routing mechanism. Communication between nodes occur through a node at its neighbor. It is easy way to attack the MANET through open medium of its access. They used RSA and AES algorithm through hybrid techniques to make the system more admirable.

Kushwaha *et al* [20] their proposed technique called Selective significant data encryption technique also known as SSDE for management of text through encryption. SSDE has been worked only most significant type of data from the whole message. This technique minimizes time utilization in encryption and enhance the standardization. In paper symmetric key algorithm (SKA) with BLOWFISH are main factor that have key role in achievement of encryption.

Remiya and Lakshmi [22] developed the Hierarchical Anonymous Routing Protocol (SHARP) using the same method. The proposed method reduces the problem of anonymity between the source and the destination. This policy provides stronger security than other regulatory approaches. Suvarna *et al*. [23] has developed an EAACK for secure data transmission over the MANET network. The main purpose of this paper is to reduce stress, transfer power, and address management issues. It developed a manual algorithm scheme for secure delivery.

Anand *et al*. [24] develops a dynamic range of motion that provides a robust, robust, and reliable system in MANET to reverse the failure characteristics of the mouth. Check performance by size. Developer network compares travel and packaging with many existing technologies such as LMRSA, LARS, OCEAN and older DSR systems. Archana et al. [25] use Secure and Reliable Routing Protocol (SRP) technology for the MANET network, which is an accurate, reliable, and reliable way of safeguarding reliable data transmission.

Patel *et al*. [26] have developed a vigilance system to protect mountain anonymity. The SHA-1 algorithm is designed to prevent MITM attacks in DOS. Nachammai and Radha [27] developed a common bath detection system (CBDS) for data transmission, which provides protection from contamination from malicious code. Detect black hole attack with powder. The encryption method uses RC and MD5 algorithms. doctor. Jane and Rajawat [28] published a better version of AODV that uses codecs to protect against MANIT pollution attacks.

Rasika and Sudier [29] developed a Connection System (ACK) to detect corruption in the MANET network. ACK is the best testing system. Al-Mahsoori and Behkar [30] introduced an encryption algorithm for data transmission over networks. When comparing evidence for DES, AES and RSA, the recommended method reduced the time required to hide the data.

Bhargavi and Raju [31] developed a reliable MANET-based approach to improve package delivery and efficiency. doctor. Kumar and Narasimha [32] have come up with a reliable method to create a safer way than MANET. This is done by calculating the trust value as well as sharing the private key between the nodes. Remove incorrect holes in this process.

Gopalan and Krishnan [33] devised three ways to find the best and most reliable method: the reliability of the type of understanding and optimization of the ant coding (ACO) algorithm. Moudgil and Rana [34] incorporated three types of DDoS attacks (harassment attacks, large-scale floods, and HELLO floods) into the OLSR social network. The main purpose of this system is to separate spam and phishing attacks and improve the overall network performance. Chaurasia and Bhoji [35] have developed a new intrusion detection system that detects faulty package behavior and selects an alternative method for data transmission. The performance of the expected system is assessed at package rate, overall movement rate, import rate and average latency.

Zafar [36] has developed new biometric technology to improve the safety of the MANIT network. Compare its performance with the previous method to see the existence of this method. Satya et al. [37] has developed a functional algorithm that reduces MANET performance compared to the current policy. Performance was evaluated for performance, latency, PDR, and network endurance. Agarwal and Manjlani [38] have shown new ways to use genetic algorithms for low-power roaming on mobile networks. This algorithm provides the best method for data transfer in the event of a failure of the path. The authors use the location-based instructions and the instructions based on the budget reduction.

Chaurasia and Bhoji [39] have developed a new intrusion detection system that detects fraudulent package loss and selects another method of data transmission. The performance of the system discussed is calculated based on information speed, travel distance, power, and user base. He developed the BAT algorithm to solve the block-related problem [40]. Similar techniques have been investigated in the literature equipped with various other methods and applied in variety of application areas in engineering and computer science [41]-[57].

Authors in [59] proposed an efficient and high-performance routing protocol for MANETs in 5th generation (5G) mobile phone networks. The proposed AERP is an extension of the AODV to support the 5G network requirements for high data rate and improve QoS demand with multiuser environment. Similarly, in [60] same authors presented a high-performance routing protocol in MANETs for sake of supporting the multimedia applications. As we know, such applications are data hungry and usually heavier over the network.

The proposed protocol is adaptive and flexible and makes best use of the leftover bandwidth for better performance and remains light weight in contrast.

The main performance parameters used in MANETs are routing message overhead, average end to end delay, and throughput. Table V contrasts various routing protocols used in disaster management with their weaknesses and strengths, respectively.

TABLE V: COMPARATIVE ANALYSIS OF RELATED WORK

Author and year	Protocol/Technique used	Issues	Limitation/Advantages
Bairwa in 2022	Naive revamped variant of the AODV algorithm	Emergency	improve the QoS
Kachooei in 2021	In terms of latency and packet delivery ratio, the CALAR-DD protocol is superior.	Latency issue solution	Only OLSR and AODV in use
Alameri in 2020	AODV, DSDV	Comparative analysis	Limited measurement metrics
Mahiddin in 2019	Efficient GWRS Route selection Scheme	Traffic congestion	Flexible determination of loop
Quy et al. in 2019	Q-AODV	To support the multimedia applications	The protocol was able to handle the multimedia applications in a flexible and bandwidth efficient way.
Thakker, and kumar in 2018	Ideal Multi Secure Routing Protocol (IMSRP)	Optimal secure routing	secure routing
Quy et al. in 2018	AERP an extension to AODV	To address the high data rates and QoS demand in 5G	It was able to cope with the 5G high data rate demands.
Goswami in 2017	Multipath technique of routing using AODV protocol with Monte Carlo way. Simulation	Minimize no. of routes discoveries.	Control flood of new roots discoveries
Sultana and Ahmed in 2o17	AOMDV Protocol Multiple path extension of AODV with (ECC) elliptic curve cryptography	Protection from black holes attack	protect network efficiency and link breakage
Thiagarajan, and Moorthi, in 2017	OLSE (optimized link state routing)	Optimal Routing performance	Minimize Network overhead burden
Chourasia and Rajesh in 2017	Intrusion detection and Prevention System	Misbehave of packet dropping	Improved data receiving minimize data dropping
Boghey in 2017	prevention system	packet dropping	Minimizes dropping data
Zafar in 2017	Iris cryptography technique	DoS	FRR= 0% with accuracy 100 percent
Sathya et al in 2017	PUMA (protocol for unified Multicasting Through Announcement)	Mail functioning of nodes	Routing Over is extremely minimized throughput increased and network achieve high level lifetime
Rosiline et al in 2017	Ad-hoc on demand Multipath distance vector (AOMDV) Hybrid BAT Algorithm	Hybrid Attacks	Minimize hot spot Problem with routing overheads about 5-10 percent
Utpal Kumar et al, in 2016	Authentication protocol with digital signature in a hash data certificates	delay and dropping of packets	Malicious node identification
Anand et al in 2016	DSR Protocol Dynamic Chips Allotment (DCA) Mechanism	Misbehavior of nodes	Secure Routing Improve the network performance.
Priyanka and Jethani in 2016	ALERT protocol SHA-1 algorithm	DoS Attack	100 percent delivery of packet
Nachammai et al. in 2016	Cooperative bait detection Secure ACK Algorithm	Gray hole black Misbehavior of Nodes	routing path can be Highly secured
Jain and Rajawat in 2016	HAODV protocol Homographic Encryption Scheme	Pollution Attack	40% greater than existing protocol in throughput
Maheswary and Baskar in 2016	Letter-Shape Encryption	Man in middle	Use minimum time for encryption and decryption
Moudgil and Sanjeev in 2016	OLSR routing protocol	Flooding and Spoofing attack	Reduce end to end delay
Rasika and Sudhir in 2016	Secure ACK Algorithm	Node misbehavior detection	High Security in ACK
Kushwaha et al. 2016	Text data encryption with Selective significant data encryption (SSDE) and blowfish algorithm	Minimize encrypted data timing and control network overhead, enhancement in performing	Significant data
Bhargavi and Raju in 2016	Trust Aware Routing Protocol (TARP)	worm hole and black hole Attacks	Maximum Packet delivery Ratio and Throughput
Rajkumar and Narsimha in 2016	Trust based threshold revocation method (TTRM)	Malicious types of nodes	Elimination of node misbehavior

Gopalan and Krishnan in 2016	AODV Fuzzy Integrated Ant Colony Optimization	Control End-to-end delay, bandwidth, network lifetime and energy	Improve Packet delivery ratio.
Archana and Sujata in 2016	SRP (Secure and Reliable) routing protocol delivery ratio	Packet loss Break routes	Increase packet
Agarwal and Manglani in 2015	Energy efficient routing Protocol, GA	Path fails	Increases the overall lifetime of the network
Zafar, Soni and Beg in 2015	Ad-hoc AODV GA Iris	Quality of Service (QoS) based attacks	Accuracy=0.98889
Remya and Lakshmi in 2015	Secured Hierarchical Anonymous Routing Protocol (SHARP), RSA	Anonymity	High Security
Suvarna et al, 2015	Enhanced Adaptive Acknowledgement (EAACK) Digital signature with clustering algorithm	Malicious behavior, finite transmission Range and receiver Collisions.	Secure routing
Sharma et al., 2015	SAODV Hybrid Cryptography, DES, RSA protocols	Active Attack on network layer	High Packet Delivery ratio, throughput
Kamal and Kumar in 2015	AODV Symmetric, Cryptography and Asymmetric technique	Modification, Snooping and Fabrication Attack	Confidential information integrity
Shreyas and Vidya in 2015	Hybrid Cryptography, RSA, Data Encryption standard (DES) with digital signature	Packet of data delivery.	Efficient packet delivery and network overhead
Patil and Bharti, in 2015	RSA and AES Hybrid Routing technique with Cryptography	Network Security	Security and overhead of network

Based on the comparison made in Table V, following may be concluded.

1. MANETs in disaster management is an active and necessary area of research, needs more emphasis.
2. Efficiency was the key factor required that was mainly based on protocol complexity or overhead (light/heavy), end to end delay.
3. Main issues observed were security and integrity of data.

IV. Conclusions and Future Work

In this study, we examined and discussed several types of routing protocols and their difficulties linked to security, energy, routing, security assaults on the physical structure of data and layers and attempted to resolve e-security issues in the literature review. The various routing protocols outlined above are extremely valuable and efficient for new research efforts aimed at identifying current difficulties for future research. Many new approaches, rules, algorithms, and protocols are offered for achieving routing solutions nowadays. However, despite this progress, there are still many research issues, such as which protocol, technique, method, algorithm, or procedure performs best in whatever environment. Although much has been done in this field to date, there are still many challenges and issues to be addressed. MANET networking is the most critical and required approach for future computing planning. MANET has now accumulated a lot of intriguing research articles as well research projects and issues that are being used by academics and businesses all around the world. Such as, it covers the fog and cloud computing paradigm [61] and involves multi-objective and heuristic based algorithms for smart cities environment [62]. In this work, study examine various routing protocol strategies and discuss the issues that these techniques can cause. This will help researchers better understand to improve routing performance. In the future, we intend to compare the routing algorithms based on network overhead.

Conflict of Interest

The authors declare no conflict of interest to report regarding the study.

Author Contributions

AMS considered the research framework, writing scraper bots for review collection, review selection, performing analysis, conducting, to some extents preparing final manuscript. MFF contributing to research thinking, learning related activities, which contribute to the preparation of the final manuscript. HMS and MH contributing to conceptualize the research, studying related works, contributing to prepare the final manuscript. GZ and AuR proofread the paper and revised in the light of reviewer's comments and prepared the final version of the paper.

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Abdul Majid Soomro is currently enrolled in the Ph.D. program from University Tun Hussein Onn Malaysia (UTHM). He received a master's degree in Computer Science from BZU, Multan, Pakistan in 1998. He obtained his BS from same institution in 1995.

Mohd Farhan Bin Md. Fudzee (Senior Member, IEEE) received the Diploma degree in computer science from Universiti Teknologi Malaysia, the Bachelor of Science degree (Hons.) in information technology, the Master of Science degree in information technology from Universiti Teknologi MARA, in 2001, 2003, and 2005, respectively, and the Doctor of Philosophy degree from Deakin University, Australia, in 2012. He is currently working with the Faculty of Computer Science and Information Technology (FSKTM), Universiti Tun Hussein Onn Malaysia (UTHM). He is also the Chief Information Officer (CIO) of UTHM. His research interests include computing, such as content adaptation and energy-related solution, multimedia security, decision making algorithms, web technology, e-government, and creative applications.

Dr. Muzammil Hussain is working as Assistant Professor and HEC Approved Supervisor at School of Systems and Technology, Department of Computer Science, University of Management and Technology, Lahore, Pakistan.

Hafiz. Muhmad Saim is Research Scholar in Riphah International University Lahore, Pakistan. He is currently working on Fatty lever prediction in research.

Dr. Gohar Zaman is graduated in 2021 from Faculty of Computer Science and Information Technology at Universiti Tun Hussein Onn Malaysia (UTHM). His research interests include Data Science, IE, Data Mining, Ontologies, NLP, and Automatic Text Categorization.

Dr. Atta-ur-Rahman is currently working at department of CS, College of CS & IT (CCSIT), Imam Abdulrahman Bin Faisal University (IAU), Dammam, KSA, as Associate Professor. He has completed his BS degree in CS, MS, and PhD degree in EE in years 2004, 2008 and 2012, respectively. He has authored more than 100 publications with cumulative impact score is above 100. His research interests include Digital Watermarking, Adaptive Digital Communication, DSP, Coding Theory, AI, CI and Applied Soft computing.

Haya AlUbaidan is master student at department of computer science (CS), college of computer science and information technology (CCSIT), Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia. Her research interests include Artificial Intelligence and Machine Learning.

Majed Nabil is currently an Android Software Engineer at Foodics, Saudi Arabia. He has completed his BS degree in CS from CCSIT at Imam Abdulrahman University (IAU), Dammam, with distinction in January 2021. His research interests include AI and Machine learning.