2. REVIEW OF LITERATURE

2.1 Introduction
Since years the major focus area of research in the field of MANET has been to solve the issues surrounding data exchanges. In recent times, extraordinary extension of two major areas namely MANET routing protocol and QoS have been researched and examined in hugeness. Various routing methodologies for remote systems, namely DSR (Dynamic Source Routing) and AODV (Adhoc On-demand Distance Vector) as in (3) uses best effort routing. In this technique all the nodes under certain given degree compete for the common medium. No protections or figures can be given here on when a node is allowed to send, this is sufficient to simply find a course from a source to one or different goals of QoS routing, These routes furthermore need to satisfy at least one QoS impediments. To guarantee these restrictions after a course was found, resource reservations on the taking intrigue hubs are made.

Initially, when MANET change started, QoS was not the most important priority. Hence was the reason for best effort routing models became apparent. Gradually, with the development of huge numbers of time-sensitive applications, QoS has become more basic and then ever, prompting to a development of various research excitements from best effort routing to QoS based routing. Other than the quality parameter in MANET, it also assures a testing mechanism. This mechanism is a direct result of the dynamic topology, limited information exchange limit and essentialness basic.

MANET needs a gigantic change in the structure; the frameworks which are used for wired networks cannot be mapped completely to MANET framework. In order to achieve QoS in MANET is tedious task and in this architecture network layer is considered as the most important. The way needs to found by the routing mechanism, which satisfy the QoS parameter at the beginning of a session. And this parameter is required to act according to desired output.

There always been wide amount of research and work in order to search the most suited for routing based on QoS using cross-layer arranges yet in the meantime incredible all around recognized course of action is not refined. The
best metric would be using cross-layer arranges, multi-restrictions routing metric, multicast routing based on QoS can be also explored for further future research directions.

2.2 Quality of Service and MANET
Researchers have been discussing MANET a lot in recent times and various levels of works have been started in the same. Also, the considerable fact is that most of the applications which current day work in wired network's area is done are also making MANET more so interesting and same can be done in MANET. Regardless, MANET show exceptional propelled challenges, in various research aspects and implementation mechanisms. After these kinds of challenges are comprehended, the sensible use of adhoc networks will be doable. So considering all these challenges, giving QoS in MANET and especially on enhancing directing traditions/parts to reinforce QoS in MANET are concentrated. Though MANET has been making various multimedia exchanges, there exists a vast amount of QoS (Quality of Service) parameters to be considered. Regardless, various characteristics of MANET make QoS provisioning a troublesome issue. As compared to conventional wired networks giving QoS accreditations is incredibly troublesome and testing in MANET, because of multi-hop interchanges, dispute for channel access and several issues such as Node portability. In any case, in the latest several recent years, more research thought has focused on giving QoS guarantees in MANET directing traditions.

2.3 Review of QoS Routing Proposals
Major and eminent routing algorithms e.g. OLSR (Optimized Link State Routing) as in (1,2) and AODV (Adhoc On-demand Distance Vector) as in (3) protocols have been discussed for QoS provisioning by Aleksandr Huhtonen in his paper (4). This protocol has chief advantages that it detects the accessible situation of the connection. Feasibility to extend the QoS data in protocol form in such a way that the each different hosts thinks about it ahead of time about the nature of the recommended route. Due to the reactive nature of AODV, it lacks the
functionality mentioned above. The OLSR protocol performs the best in high
density traffic. Regardless, the best situation is the time when we have a
significant number of hosts. Quality metric can be also extended in OLSR
Protocol.

It was observed from (5–7), Novel OLSR (Optimized Link State Routing) is
outperformed by OLSR-MD (Minimum Delay) and OLSR-ETX (Estimated
Transmission Time). OLSR-MD and OLSR-ETX as in (5) can be used to
overcome drawbacks connected to OLSR (Novel) namely low bandwidth and
throughput. The above mentioned protocols have the advantages that they have
extended packet size to go with minimum delay that perform better under any
given scenario. Apart from default MPR (Multipoint Relay), many similar
modifications can be made in OLSR. QoS optimization can be introduced in
OLSR routing protocols. Components like grouping might be converged with
OLSR compared to preferring MPR.

Munaretto, Badis et al. in (8) presented adept metric than the hop distance which
states OLSR (Optimized Link State Routing) in terms of QoS. There exist various
measurements which are discussed for including QoS parameters in OLSR
protocol and exclusively considered metric for MANET, delay and bandwidth
criteria as compared to hop distance count algorithm. In like manner, admission
control is associated in each MPR.

Mineiro and Muchaluet-Saade in (9) suggested the CAC (Connection Admission
Control) - OLSR, ensure all action streams with necessities of QoS. This seems
epecially well for video and voice, are just yielded in the mesh system. It has
shown that the affirmation control instrument for multi-hop remote work
frameworks considering the endorsed standard and the OLSR coordinates
tradition. Requirements of QoS which cannot be disregarded such already
conceded activity streams. As part of future work, CAC-OLSR will be completed
in work switches remembering the true objective to be evaluated in a bona fide
framework. Also, adaptability ought to be explored in a circumstance with
incalculable hubs and streams, and the segments direct with hub portability. The
future work approach may include the channel occupancy metric and estimation criteria.
Sanguankotchakorn et al. in (10) proposed a Cross-Layer Design (CLD) approach in OLSR protocol with a specific end goal. Proposed here is a strategy in perspective where a cross layer plan is implemented. This is done in order to revamp the whole execution of OLSR as in (1,2) by using BER (Bit Error Rate) which is a mix between the association accessibility and breaking point. In proposed heuristic estimation, the technique is to find the propelled route similarly mostly vital subjective CI (Cumulative Index) and slightest BER with a particular true objective to upgrade working of MPR (Multipoint Relay) assurance count and course computation. A system which is given is directly inbound to OLSR protocol. Here it is not considering Reservation Signaling, Connection Admission Control, stream classifier considerations that are very basics of trade of essential information. Any current QoS structure can be used with the proposed architecture to give outstandingly strict QoS provisioning.
Rigazzi et al. in (11) presented the strategy which is suggested majorly reflects on upon significance of two differing need levels for development streams: Best Effort Level and other are being High Effort Level. The suggested framework in which a center point can isolate among action streams with different need levels by dispensing them assorted ways towards a similar goal. The approach which is presented, suggests a procedure works with two tables: DRT (Dedicated Routing Table) and SRT (Standard Routing Table) which will redirect the data movement streams. QOLSR (Quality Optimized Link State Routing) which means QoS development of OLSR protocol as in (1,2) is considered for alter as opposed to basic OLSR protocol. Proposed arrangement found simply constrained to the QOLSR convention, it’s additionally not countering CAC (Connection Admission Control), Reservation Signaling, Stream classifier ideas that are extremely vital for the QoS information exchange. The observations are not contrasted.
Moad, Djahel et al. in (12) found a perfect way might not always be the shortest or quickest way and considering the system outline, diverse decisions, for instance, a highly dynamic path of huge data transmission might be prevalent.
intrigue. To get such decisions and upgrade the relative quality between ending customers, makers suggested to execute at each center point an evaluation of the transfer speed tender among each adjacent center point and tends to ensure the decision of a route with the help of each Multi Point Relays which give a greater transmission capacity en route. The transfer speed offer estimation on each association relies on upon the examination of dispute outlines to induce the course of action of maximal cadres. After transmission capacity estimated instead of choosing the congest among the given route, makers endeavor to find the way that ensures the most imperative transfer speed. The discussed arrangement concentrates on data transfer capacity estimation at every hub for discovering high transmission capacity ways, however defer limitation is not considered. Also Reservation Signaling, CAC (Connection Admission Control), Flow classifier which are really important in the given perspective.

Suman Banik et al. in (13) discussed about coordinating QoS using OLSR (Optimized Link State Routing) by enhancing the MPR (Multipoint Relay) decision criteria. Also QoS focused on end to end delay and effective transmission speed, another figuring has been proposed. Considering the QoS requirements, the proposed figuring picks the perfect route from source to goal. Not under any condition like selecting the MPR considering singular QoS estimations, the figuring considers both effective transmission capacity and ending points postpone through the technique to map them on lone estimations. Different criteria are used to make a lone estimation. The given course of action does not involve CAC (Connection Admission Control), stream separation and reservation signaling thoughts that are uncommonly fundamental for the QoS data trade.

Peng,Y. Guo,L. et al. in (14) proposed QoS with Cross-Layering in terms of the CLQ-OLSR (Cross Layer Quality Optimized Link State Routing) which increases the profitably abusing multi-radio and multi-channel strategy by reinforcing sound correspondence mechanism and steady sight. Authors have arranged two game plans of coordinating segments: physically changed M-OLSR (Physical Modified
Optimized Link State Routing) as in (14) and predictable controlling, to suit organize development.

Mohan BA. et al. in (21) performed a study of scalability issue in OLSR protocol and concluded that OLSR does not scale well beyond node size of 50.

Leguay J. et al. in (22) proposed a variant of QOLSR in which MPR is used only to create reliable broadcast structure and employed modified link announcements to increase the number of advertised links. Authors have not considered resource reservation or connection admission control. Solutions are just analyzed but not simulated.

Lohier S. et al. in (23) proposed a solution for QoS routing based on AODV routing protocol and used IEEE 802.11 DFC MAC layer as underlying technology. It is concluded by the authors that the overhead due to QoS extensions on the route search packets remains weak. Also for ad-hoc network based on 802.11 MAC layer, the evaluation of resources remains a complex problem.

Shah GA. et al. in (24) focused on multimedia delivery on wireless multimedia sensor networks. Authors have proposed a cross layer framework for QoS support in wireless multimedia sensor networks. In framework, application, network and data link are interacted adaptively to support QoS. Cross layer signaling is provided in all the layers which create other implementation problems in wireless applications.

Zhang Q. et al. in (30) discussed about several open issues related to cross layer design for supporting QoS over multihop wireless network. Authors have also proposed a cross layer framework and interaction among layers. Authors identified several challenging open research issues like performance gain vs design complexity, node cooperation for cross layer design, opportunistic transmission across multiple layers etc. and concluded it is very challenging to incorporate cross layer design in multihop wireless network.

None of the above and (25–29) recommendations oversee stipulation of advantages, channel resources and cross layering outline for MANET. So it is indeed requirement of QoS structure that can be effectively relevant to whichever
convention and additionally gives QoS parts like cross layering, stream classifier, reservation signaling, and connection admission control and so on.

2.4 Review of QoS Framework Proposals
The versatility associated with MANET also increases the viabilities such as continually hinting at a topology level, stumpy medium nature. Contradictory to this, the target applications where MANET is desired to acknowledge will have high relevance (e.g. Military Applications, Emergency Networks, Several Commercial applications, Academics Applications et cetera.). All of these have incredibly strict need of quality media. It is this need and requirement which lets the QoS parameters and frameworks as the most desired in MANET. Complexities are truly subject to unremitting changes and assortments in order to oversee QoS as per following:

1. In customary wired systems, wired connection limit is constant. While if there should arise an occurrence of MANET remote connection limit not at all steady among hubs. It is fluctuating along time in view of incessant alter in physical layer (e.g. because of versatility, updates in neighborhood situations). Presently as QoS related real world applications requires some amount of guaranteed data transfer capacity for transferring data (e.g. to get postpone or transfer speed imperatives), that can bring about brief administration interference for QoS applications.

2. In MANET, remote mobile nodes go after assets with their neighbor hubs. So multi-hop correspondence which is regularly utilized for broadcasting as a part of MANET will expend a great deal more accessible system limit that in the customary wired system.

3. In MANET, the portability of nodes likewise includes and facilitate many-sided quality at the directing layer. Here alongside the issue of varieties in the accessible transmission capacity, there are different issues also like if there should arise an occurrence of connection breakages information ought to be rerouted through different ways. QoS applications running on the system is needed at a specific QoS level (e.g. distinct postponement or transfer speed imperatives), information ought to be rerouted in a very much coordinated way.
and additionally it ought to take after same transmission capacity prerequisites concurred at the beginning application time.

It is possible that a QoS in MANET needs data transfer capacity accessible at one moment, while a moment later it may be unrealistic for the system to offer the required measure of transmission capacity. Accordingly, congestion may happen effortlessly which can bring about additional bundle misfortune due to end to end delays. Any arrangement characterized will by one means or another requirement to think these challenges into the record.

Seoung-Bum Lee et al. in (15) proposed INSIGNIA (In-band Signaling with Admission Control) framework which is an IP-based behavior of central structure which sponsorships adaptable administration ways in MANET have been talked about by creators which shown the blueprint, use, and evaluation of INSIGNIA in (15). A framework relies on upon an in-band hailing and sensitive state resource organization way which is suitable for supporting adaptability and ending point nature of organization in significantly active circumstances where a system topology, center point accessibility, and ending points QoS is time variant. Creators in like manner gave organize layer game plan which is free of the MAC (Medium Access Control) layer. The hailing information related to the QoS framework is typified in data groups, making this technique basic and "lightweight". In any case, the key drawback of suggestion is it’s created explicitly for static adhoc networks with no flexibility and it is not oversee reservation of advantages.

Gahng-Seop Ahn et al. in (16) have suggested the instigated approach SWAN (Service Differentiation in Stateless Wireless Adhoc Networks) where a stateless system demonstrate that involves disseminated control computations to pass on organization division in flexible remote exceptionally selected systems in a direct, versatile and lively way. They have used rate regulation for TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) best-effort movement, and source based confirmation control of UDP steady action. SWAN as in (16) uses unambiguous stop up the notice to dynamically coordinate surrendered continuous action despite system stream brought on by adaptability or
development overweight conditions. A novel piece of SWAN is that it needn't bother with the assistance of a QoS-skilled MAC. Then again perhaps, sensitive steady organizations are built using obtainable best effort distant MAC development. SWAN uses cross layering arrangement that utilizes system and connection layers data and it depends on Differentiated Service thought of conventional wired systems. The fundamental issue of SWAN is that it is not managing reservation of assets that is really a pivotal part of QoS related steering.

G. Usha Devi and G. Kavitha in (17) presented to keep QoS a logically developing in MANET. As the huge amount of data is transferred and progressing through various applications during the transmission. MANET is a connection-less system in which the parameters like limited amount of resources, flexibility which impacts QoS. As a reply, makers have presented PRTMAC (Proactive Real Time Medium Access Control) in (17) tradition which somehow assures to provide QoS to the extent delay, throughput. It also does support QoS with benefit reservation instrument. Once the advantages are spared, center points get tip top access on the benefit. Proposed strategy concentrates on extremely specific MAC conventions. So it would require significant changes if there should be an occurrence of applying it on other directing conventions.

Rafael Paoliello Guimarães in (18) proposed the structure of QoS: BRAWN (Bandwidth Reservation over Adhoc Network). The discussed idea is to permits end to end reservation of data transfer capacity in a specially appointed remote system. Reservation of resources is on demand, at any given point of time an end node begins an application with particular need of QoS, this application should team up with the reservation flagging module. Also the prescribed inward design of the given system known as BRAWN as in (18) has connections between the diverse modules for setting up a QoS parameter. As seen with several applications QoS requests know about the operation of the convention and demand the assets through the Reservation Signaling module.

Basic Constraints faced in BRAWN (Bandwidth Reservation over Adhoc Network):
1. Due to the primary nature of BRAWN design which focuses only on Adhoc Networks. Mobility and versatility challenges were not covered in BRAWN. So as to adapt BRAWN framework perfect for MANET, portability should be tended to. But as we go along, “mobility” will present a few new difficulties for BRAWN that we should manage fittingly. It is because of the fact that the always showing signs of change system topology may bring about varieties of the accessible transfer speed or surprisingly more terrible there is the likelihood that a connection breaks influences at least one QoS routes.

2. BRAWN as observed works absolutely on the network layer, with the goal that we could not have the capacity to exploit the data from the lower layers. So cross-layer configuration could be proposed for in any event data trade between MAC (Medium Access Control) layer and Network layers.

3. Up gradations of Internal working of Resource Reservation and Admission Control can be performed.

4. Compared to MAC (Medium Access Control) using RTS (Request To Send) / CTS (Clear To Send), Pure CSMA (Carrier Sense Multiple Access) protocol is used which eases the various computations and bandwidth estimations.

5. Also, in-band signaling protocol as an alternative can be used for the explicitly signal out-bands reservation.

**2.5 A Comparative Review of QoS Frameworks**

Table 2.1 shows, diverse most popular QoS designs frameworks and its comparative review for QoS ensure in Mobile Adhoc Wireless Networks (MANET). Table 2.1 clearly shows details, review points and scope of improvement for each respective QoS framework. From Table 2.1, it is easy to understand that any one particular QoS framework is not enough for QoS assurance for today’s real/non real time multimedia traffic flows in MANET. So as a future work, a QoS framework for MANET could have been proposed by considering factors like cross-layer advantages, resource reservation, connection admission control (CAC), multi-constrained QoS parameters, hard QoS assurance and proactive routing advantages.
Table 2.1 A Comparative Review of QoS Frameworks

<table>
<thead>
<tr>
<th>QoS Criteria</th>
<th>A Comparative Review for QoS Frameworks for Multimedia Traffic in MANET</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>INSIGNIA</td>
</tr>
<tr>
<td>Mobility support</td>
<td>Yes</td>
</tr>
<tr>
<td>Cross-layering</td>
<td>No</td>
</tr>
<tr>
<td>Resource Reservation</td>
<td>Yes</td>
</tr>
<tr>
<td>Connection Admission Control</td>
<td>Yes</td>
</tr>
<tr>
<td>Flow Classifier</td>
<td>No</td>
</tr>
<tr>
<td>QoS parameters</td>
<td>Bandwidth</td>
</tr>
<tr>
<td>Integrated Routing Protocol</td>
<td>TORA</td>
</tr>
<tr>
<td>Type of Traffic</td>
<td>Adaptive Flows</td>
</tr>
</tbody>
</table>

Following observations are made after careful review of each framework. Authors also believe that following observations are important for further research to design a new QoS framework specifically for multimedia traffic in MANET.

- INSIGNIA in (15) can be extended for scalability issue in MANET. In order to tackle multimedia traffic handsomely some features e.g cross-layering, flow classifier could be added further in future work.
- SWAN in (16) can be extended further by incorporating it with proactive routing protocol (e.g. OLSR) to get maximum benefit of cross-layered information and to support multi-constrained QoS parameters.
- PRTMAC in (17) can be incorporated with proactive routing protocol and connection admission control and flow classifier can be also added.
- BRAWN in (18) can be worked on in future for dynamic mobile network (mobility) as it is just proposed and fitted for the static networks. There is no arrangement for checking delay estimation. It is single constraint architecture; not a multi-constraint one. It can be likewise improved for versatility perspective too. So there is a decent extent of research for amplifying its
segments for offering almost hard QoS ensures in MANET where nodes are widespread or versatile.

2.6 Conclusion
The objective of this chapter was to review currently well-known QoS routing mechanisms/architectures and QoS frameworks specifically for multimedia traffic in MANET. Two broad categories of QoS solutions are reviewed. First is QoS solutions which are specifically depends on routing protocol in terms of new hop selection based on the QoS parameters. Second is QoS solutions provided by some specific design frameworks with integration of various modules and applicable on any routing protocol with minor changes.

After a comparative review of various QoS frameworks, it is concluded that there is a still good scope of research for proposing a QoS framework for MANET (specifically for multimedia traffic) which could have cross-layer advantages, resource reservation, connection admission control, multi-constrained QoS parameters, hard QoS assurance, proactive routing advantages etc.

Based on the literature review conducted in this chapter, one can design a QoS framework for multimedia traffic in MANET by exploiting cross-layering (network and data-link layer information exchange) and use of proactive routing protocol (e.g. OLSR) with resource reservation and connection admission as a separate modules. Along with this, flow classifier can be also added to classify non-multimedia and multimedia data from application layer itself.

In the chapter 3, we have proposed a novel QoS routing framework for multimedia traffic in MANET which can deal with all short falls of earlier well known proposed frameworks and solutions.