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Sea Ad hoc Network (SANET) Challenges and Development

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Abstract

In recent years, Ad hoc Wireless Networks has been credited with the development of technology for its topographies and features compared to the wired network. The characteristics of the wireless networks provided the opportunity for many researchers and enable them to discover the types of the Ad hoc network, including MANET and VANET and the last one, but it is not the last the FANET. In this research, we introduce a new type of network, which is the networks in the sea (SANET). Where water transport means have great military and civilian advantages. The need to develop networks that benefit water transport and the continuation of the network service during the water is one of the obstacles and possibilities that benefit the development of this technology.

The crossing of refugees or the rescue of any boat or civilian or military vessel across the river or any water media. This technique may be useful for saving many of them in addition to other types that may be the complementary type of ad hoc network. The new technology(SANET) correspondingly got the new experiments. The a new approach is to indicate the mutual challenges besides the advancement associated with the Sea ad hoc network.

Keywords- MANET,VANET, FANET, SANET Routing Protocol.

INTRODUCTION

Wireless Ad hoc networks are infrastructureless kinds[1]. They do not depend on existing centralized, for instance access points in centralized wireless networks[2,3]. In addition, these types of network are suitable for many areas, solicitations and applications as compared to wireless infrastructure networks [4]. On the other hand the Wireless Ad hoc networks can be supplemented categorized through their application into general groupings [5,6]:

- ***MANET:*** A mobile ad hoc network (MANET) is an independent union of mobile routers connected by way of a consequence of wireless links the union of which forms a random diagram [7]. The routers are presently free to interchange arbitrarily and organize themselves randomly; thus, the network's wireless topology may modification quickly and unpredictably [8]. Such a network may operate in an impartial fashion, or may be connected to the larger Internet[9]. A mobile ad hoc network generally does not have any infrastructure (base stations) and each mobile host also performs as a router[2,10].

Communication between various hosts takes place through wireless links. Figure (1) represents a MANET of 4 nodes. Node 1 can communicate directly with Node 2, Node 3 and Node 4. But any communication between (Nodes 2 and 3) or (Node 3 and4) must be routed through Node 1.

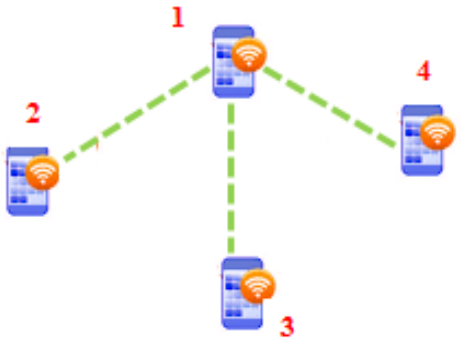

Figure 1: A MANET of 4 Nodes.

- ***VANET:*** Vehicular ad hoc wireless networks (VANETs) be situated a essentially challenging class of mobile ad hoc wireless networks (MANETs) that are currently attracting the extensive attention of research in the field of wireless networking as well as automotive industries[11,12]. VANETs is an exceptional situation of Mobile Ad hoc Networks (MANETs) in which the mobile nodes are constituted by means of peripatetic vehicles[13]. The mobility representations of these vehicles node are controlled by the restrictions of remaining thoroughfare networks and via driving instructions[14,15]. Furthermore, the extraordinary speed of mobile vehicles nodes is the main distinguishing features VANETs besides MANETs, predominantly in main situations [6]. Howevr; The exceptional characteristics of VANETs are the extraordinary mobility and quickly moving network topology caused by the high travelling speed of the nodes [16]. The constrained pattern attributable to the constrained roads, boundaries of bandwidth as a result of the absenteeism of a dominant coordinator that controls besides achieves communications amongst nodes, disconnection difficulties remain to the frequent division in the networks in addition signal fading, caused by objects that form obstacles between the communicating nodes[17,18].
- ***FANET:*** flying ad hoc networks its a collection of slightly flying robots as nodes can make available a quickly topology in addition to selfachieved ad hoc

network of communication and co-ordinate release positions on earth[19].

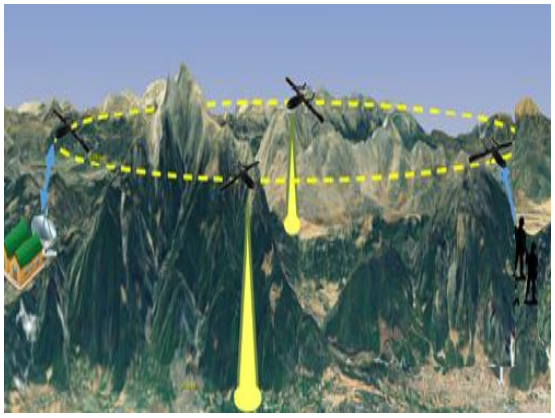

Figure 2: Unmanned Aerial Vehicles in FANET

FANET usually usages micro air vehicles (MAVs) aimed at the announcement. Numerous MAVs arrangement crowds in addition to organize themselves to connect in the great zone via use ad hoc wireless network [11,20]. The mobile nodes in FANET called Unmanned Aerial Vehicles (UAVs), these nodes commonly high speeds with Low node density when communicate with each other nearby also capable to convey on transmission devoid of any centralized point [21]. On the other hand Computational power of Unmanned Aerial Vehicles is very big; consequently, this network is principally a subclass of VANET[22].

- ***SANET:*** Sea ad hoc network. It's a crowd of nodes called boat nodes that used for this type of network depended on any nodes in water external the ground.

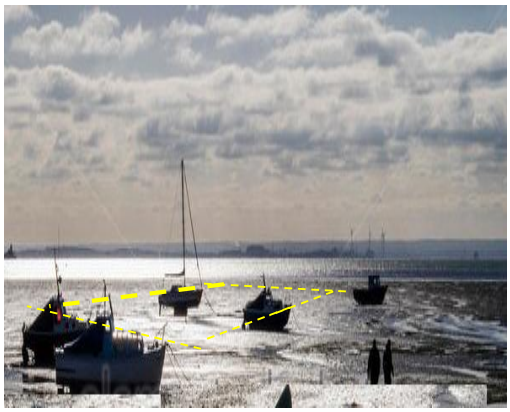

Figure 3. Sea ad hoc network (SANET)

The main aim of this system used for providing network when a node in the sea and usually this type useful for crossing the refugees through the river or any water media. This technique may be helpful to save many of them. It is the opposite of the FANET network that there may be high mountains resistant to dispersing the network, but in this type open space for communication between the nodes. In figure (4) showing the types of ad hoc network.

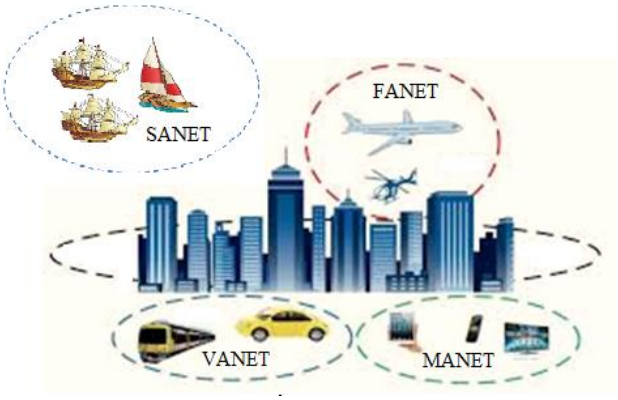

Figure 4: Types of ad hoc network

COMPARISON OF SANET WITH CURRENT AD-HOC NETWORKS

Table 1. Comparison of SANET with other Ad-hoc Networks

MANET	***VANET***	***FANET***	***SANET***
Mobility low	Mobility high	Mobility very high	Mobility Medium
Mobility model is random	Mobility model is regular	Mobility model is regular under condition	Mobility model is random
Topology alters low	Topology alters fast	Topology alters very fast	Topology alters medium
Power consumes low	Power consumes high	Power consumes high	Power consumes high
Radio propigation typical close to ground	Radio propigation typical close to ground	Radio propigation typical not close to ground	Radio propigation typical close to ground

SANET APPLICATION

The SANET ad hoc network has numerous application, for instance subsequent:

- **Disaster:** SANET is helpful when the natural disaster at sea such as (Sinking of the boat, sinking of the ferry carrying people or goods, oil barges) these happened in up normal expected.
- **Release Processes and Search operation:** SANET can be used be responsible for an improved approach to prepare search besides the rescue process for instance rescue process of hijacked person(Water pirates)

- **Weather**: SANET is useful for the expected tsunami or any track the movement of water that used by number of sensor devices used for this application.
- **Military application:** SANET is very important in military area because used to exchange the data between military headquarters and soldiers when they are not in the ground.
- **Security Tenacity:** SANET is capable of receiving information when delegate visiting safe the information and the people in saving specially no infrastructure exist nearby.

SANET AD HOC NETWORK CHALLENGES

The main idea of the SANET ad hoc network is same as VANET, MANET, and FANET but there are some dissimilarities in many approach such as speed, alter in deployment, and power consuming so on. That makes the SANET have additional challenges than the other ad hoc network types. The challenges of SANET are as follows:

- **Reliability:** SANET should be very high reliability because SANET transmission sensitive information for that reason SANET must be needed to secure in different level.
- **Quality of Service (QoS):** The information that transmission contains images, video audios and text. By mean the multimedia that transfer must be in high quality besides fewer error degrees[5].
- **Routing protocol:** Routing protocol in SANET should be dissimilar from other ad hoc networks because the deployment of the SANET different from other types that led to make a challenge for academics to propose a routing protocol and algorithm for update the routing tables in SANET when the deployment changes[23] .
- **Security in SANET:** Usually in any routing protocol or any new network type the security topic in the first list challenges. This challenge is important to guaranteeing Integrity and Confidentiality for the information transfer. On the other hand it must be secure from any malicious attack to the network that may be growths even more if the node of SANET is a basic point.
- **Scalable:** each boat node in SANET network has a restricted responsibility for that the crowd of boat nodes is very important to increase performance and optimizes the mission in addition to decreases of any delay[18].

SANET ROUTING PROTOCOL

SANET is a type of ad hoc network for that reason SANET using the routing protocol as other kind of ad hoc network, but it still researches about the special routing between communicating nodes. However; the main categorized of routing protocol in ad hoc network in four modules:

- **Static protocols:** Static routing is an arrangement of routing that happens at what time a router uses a manually-organized routing entrance, instead of data from a dynamic routing transportation[24].

  The network administrator is the responsible about manually-organized via increase the entries addicted to a routing table, the form of the static network is immovable (static) and not change even the network change or reconfigured that is the main difference with the dynamic routing. But the static routing similar dynamic through maximise routing effectiveness. Static protocol can similarly be achieved in stub networks, or to be responsible for a gateway of last re-arrange[10].

- **Proactive routing protocols (PRP)**: Proactive routing protocols use routing tables to save all the information on each other's node or nodes of a particular area in the ad hoc network for that reason this routing protocol also called table-driven[1]. The system of this protocol could be useful for SANET network, but with some change or additional features to suitable the charctersitic of SANET. However; The system of this protocol is differs via update mechanism that depended on routing table at what time the topology changes. But every routing protocol has a feature distinguish it from another routing protocol in the network, the main feature of this routing it includes the newest information of the routes that led it is relaxed when choose a route from the sender to the receiver node[15]. On the other hand, there are some difficulties such as need of many packets exchanges among nodes, but could be suitable for SANET especially when the number of nodes in the network low. There are routing protocols are widely used in MANET, VANETs and enhance to suitable for FANET: Destination-Sequenced Distance Vector (DSDV) protocols and Optimized-Link State Routing (OLSR)[17].

- **Reactive protocols**(RRP): also named on-demand routing protocol. This routing used for solving the overhead problem by the route between two communicating nodes are determined depending on the demand starting from the source node. That means there is no require to store a route, this system applies by using two packets one :Route Request packets. (RREQ) this used by source nodes via flooding in the network, then only the target node reply to it by a Route Reply (RREP) packets, then when the source node getting a Route Reply packet the communication initiates. This type of routing is suitable in SANET when the number of nodes in network huge because is efficient in the bandwidth [25].

- **Hybrid protocols** (HRP): is a merge between PRP and RRP routing protocol. The result of this a merge called HRP routing that take the main feature from the parents. Its moderate in bandwidth because this routing divided in the numeral of zones the technique of process this routing the internal zone used proactive approach when the external zone use reactive approach. This routing protocol is suitable for large networks. There are two main routing called Zone Routing Protocol (ZRP) and Temporarily Ordered Routing Algorithm(TORA)[26].

CONCLUSION

The competencies and regulations of SANET ad hoc networks are promising, in addition they will produce a progressively more prominent law in a large Procedure range, in a broader area of applications besides problematical tasks. The SANET nodes must be a crowd and help each other to complete any tasks that cannot be satiable in ground area. But they should require more speed to alter the topology of the network. In the Mobile Ad-Hoc Networks (MANET) besides Vehicular Ad-Hoc Networks (VANET) and Flying Ad-Hoc Network (FANET) in expressions of connectivity, information delivery, bandwidth, quality of service and etc. for each above the SANET needs to scalable, reliable and peer-to-peer communication networking between nodes in water and ground stations. This paper could put the researchers one the first step about SANET to search and devlop suitable routing protocol in SANET.

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