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Automatic Detection of Superiority of Service Parameters in Mobile Ad Hoc. Networks

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ABSTRACT: MANET stands for Mobile Adhoc Network also called a wireless Adhoc network or Adhoc wireless network that usually has a routable networking environment on top of a Link Layer ad hoc network.. They consist of a set of mobile nodes connected wirelessly in a self-configured, self-healing network without having a fixed infrastructure. MANET nodes are free to move randomly as the network topology changes frequently. Each node behaves as a router as they forward traffic to other specified nodes in the network.

KEYWORDS: MANET, environment, ad hoc, nodes, wirless, self healing, network, topology

I. INTRODUCTION

MANET may operate a standalone fashion or they can be part of larger internet. They form a highly dynamic autonomous topology with the presence of one or multiple different transceivers between nodes. The main challenge for the MANET is to equip each device to continuously maintain the information required to properly route traffic. MANETs consist of a peer-to-peer, self-forming, self-healing network MANET's circa 2000-2015 typically communicate at radio frequencies (30MHz-5GHz). This can be used in road safety, ranging from sensors for the environment, home, health, disaster rescue operations, air/land/navy defense, weapons, robots, etc.[1]

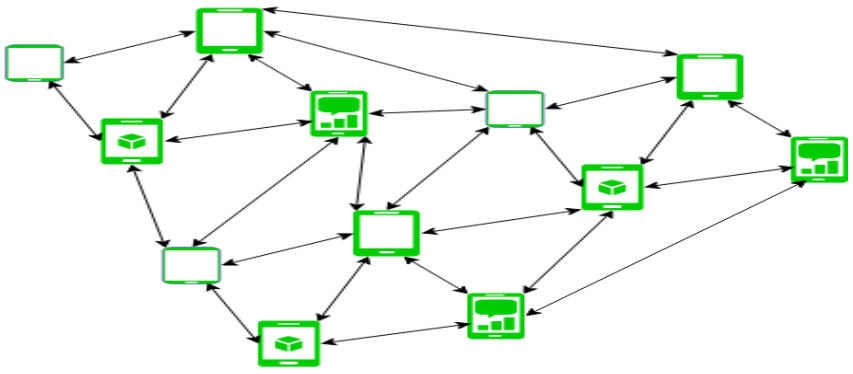

Figure - Mobile Ad Hoc Network

Service superiority detection in MANET:-

- **Dynamic Topologies:**
  Network topology which is typically multihop may change randomly and rapidly with time, it can form unidirectional or bi-directional links. [1]
- **Bandwidth constrained, variable capacity links:**
  Wireless links usually have lower reliability, efficiency, stability, and capacity as compared to a wired network[2]

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- **Autonomous Behavior:**
  Each node can act as a host and router, which shows its autonomous behavior.
- **Energy Constrained Operation:**
  As some or all the nodes rely on batteries or other exhaustible means for their energy. Mobile nodes are characterized by less memory, power, and lightweight features.
- **Limited Security:**
  Wireless networks are more prone to security threats. A centralized firewall is absent due to the distributed nature of the operation for security, routing, and host configuration. [24]
- **Less Human Intervention:**
  They require minimum human intervention to configure the network, therefore they are dynamically autonomous in nature. [3]

Pros and Cons of MANET –

Pros:

1. Separation from central network administration.
2. Each node can play both the roles ie. of router and host showing autonomous nature.
3. Self-configuring and self-healing nodes do not require human intervention.
4. Highly scalable and suits the expansion of more network hub.[23]

Cons:

1. Resources are limited due to various constraints like noise, interference conditions, etc.
2. Lack of authorization facilities.
3. More prone to attacks due to limited physical security.
4. High latency i.e. There is a huge delay in the transfer of data between two sleeping nodes.[4]

Improvement in MANET:

1. **Quality of Service (QoS):** Researchers are working to improve the quality of service of MANET by developing efficient routing protocols that provide better bandwidth, throughput, and latency.
2. **Security:** To ensure the security of the MANET, researchers are developing efficient security mechanisms that provide encryption, authentication, and authorization facilities.
3. **Power management:** To enhance the lifetime of MANET nodes, researchers are working on developing efficient power management techniques that reduce the energy consumption of nodes.
4. **Multimedia support:** Researchers are working to provide multimedia support to MANET by developing efficient routing protocols that can handle multimedia traffic efficiently.[22]
5. **Standardization:** To ensure the interoperability of different MANET devices, researchers are working on developing standard protocols and interfaces that can be used by different MANET devices.[5]

Mobile Adhoc Network (MANET) is a wireless network made up of a collection of mobile nodes connected wirelessly and free of any fixed infrastructure. It is self-configuring and self-healing. MANET provides a lot of benefits, but it also has several drawbacks that need to be fixed. Researchers are always trying to make MANET's features better in order to get over these constraints. Future advancements in new technology and methodologies might make MANET a dependable and effective wireless network.[6]

II. DISCUSSION

1. Next Generation Network :

In short **Next Generation Network** is termed as NGN which is packet based network used for both telephony and data. It uses multiple broadband and Quality of Services (QoS) enabled transport technologies to establish advance communication system. NGN can handle multiple type of services/traffic such as voice, audio, video and other multimedia in single platform. All these data transfer in the form of data packet.[21]

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Before NGN traditional network was used highly but slowly Next Generation Network started replacing Traditional network system. It is huge architectural evolution and innovation in telecommunication over the traditional networking system. It is mainly based on internet technology including Internet Protocol (IP) and H.323 protocol is the major component of Next Generation Network.[7]

2. Traditional Network :

Traditional network is Time Division Multiplexing (TDM) based. Traditional network works based on some fixed function means dedicated network devices such as Switch and Router, MPLS switch, Ethernet switch etc and most of the network types are traditional network which are still in uses at organizations and enterprises. When data communication is growing day by day and number of network devices also increasing with that speed but it is getting difficult day by day to manage huge number of fixed function network infrastructure devices as well as to control human configuration errors.[20]
This traditional network requires active human administration for management but in NGN that can be done virtually as well as dynamically. Mainly traditional network requires costly hardware and it is usually hardware based. It is in service since long time. To increase network capacity traditional network requires implementation of new hardware that's why it costs more than that of NGN which does not require new hardware setup to increase network capacity.[8]

Difference between Next Generation Network and Traditional Network :

S.No.	NEXT GENERATION NETWORK	TRADITIONAL NETWORK
01.	Next Generation Network is Internet Protocol (IP) based.	Traditional Network is TDM based.
02.	It uses different control and signalling and protocols such as Internet Protocol, Multi Protocol Label Switching etc to support different multimedia services.	It uses standard Signalling System No 7 (SS7) signalling.
03.	Next Generation Network uses packet switching.	Traditional Network uses circuit switching.
04.	In NGN bandwidth is acquired and released as it is needed.	In TDM bandwidth is reserved in advance as the bandwidth is fixed for call.
05.	Next Generation Network set up cost is low.	Traditional network set up cost is high.
06.	It is designed for intermittently data transmission.	It is poorly matched for bursty transmission and more towards continuous stream of transmission.
07.	During idle means when there is no	Dedicated path is reserved for the

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	communication then no resource is consumed.	duration of call.
08.	In NGN, Vendors can implement and customize the services and applications.	In Traditional network services and features depend on vendor implementation.
09.	These network use distributed switch functions with standard open interfaces between transport, control and applications.	These network use switch function in single box.
10.	It supports variable information (voice, data, multimedia) transfer.	It supports non-variable information transfer.
11.	Multiple services can be achieved in one platform i.e through IP.	Multiple services (voice, data, video) requires different platforms.
12.	In Next Generation Networking system we can choice network elements from multiple vendors.	In traditional networking system switching between vendors occurs depending upon provided features and performance.
13.	These Network are cost effective and requires less expansion cost.	These Network are less cost effective compared to Next Generation Network and requires expansion costs.

III. RESULTS

1. Traditional WAN : Traditional network is based on completely hardware network devices which mostly rely on Multi Protocol Label Switching (MPLS) for resilient and efficient network traffic flow. Number of hardware devices are installed along with proprietary circuits to route IP services to their intended clients. IT teams gives a lot great effort to manage the network as it involves layers of underlying hardware installed. Scaling of traditional network is difficult as it needs a proper advanced planning along with required network infrastructure to set up and run. A Traditional connects many Local Area Networks (LANs) and Virtual Private Networks (VPNs) and it is limited to enterprise, branch, and data center. It allows to prioritize your data, voice, and video traffic on network. Security issues and management difficulties are the major problems in traditional WAN now a days. [9]

2. Software Defined Wide Area Network (SD WAN) : SD WAN stands for Software Defined Wide Area Network which is a software defined approach to manage Wide Area Network. In SD WAN software controls everything starting from connectivity to management and providing service. It is a virtual network approach which combines traditional WAN technologies, such as MPLS, LTE and broadband connections. SD WAN is good for global enterprises as it provides a better and secure application performance as well as optimized cloud connectivity and simplified management. Means in the cloud centric world SD WAN are more preferable than

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traditional WAN. Software Defined Network (SDN) is utilized which helps in determining the optimal way of routing. [10]

Traditional Processing

Traditional Processing is a kind of offline processing that involves simple computations on data when it is being processed. It mainly stores raw data that is not so much aggregated and structured. It has various operations like pre-processing and extraction of data which is performed on the raw data. The data goes through a chain of algorithms in order to be processed.[19]

Stream Processing

Stream Processing is a kind of real-time processing where certain operations are performed on the data at the time it is being created. The operations can be performed in a serial or parallel manner. It also allows the users to query the continuous data stream and to determine the conditions in a small amount of time when data is received. Stream processing also performs data analytics, data transformation, and data aggregation by various methods. It stores data in a more aggregated and structured way.[18]

1. Cloud Storage :
Cloud storage is the storage option in which we use remote drives to store the data at the cloud location used by the client. It also uses the network to store the data to an off-site server which is owned by the service provider. User uses this storage options for capacity, bandwidth, and remote access. [11]
Features of Cloud Storage :

- Cloud storage offers a variety of data security options.
- These storage options are easily accessible with every internet-connected device.
- Faults are easily traceable in cloud-based storage.
- Setting up and cloud storage is way more effective and easy than traditional ones.

2. Traditional Storage :
Traditional storage is the storage option in which we use local physical drives to store the data at the primary location of the client.[17] User generally uses the disk-based hardware to store data and these are used for copying, managing, and integrating the data to software.
Features of Traditional Storage :

- Traditional storage is fast as they do not rely on internet speeds.
- Security can be manually set up by the user in traditional storage options.
- Users can recover the data anytime without having accessibility issues.
- On-site backup and modification are easy.[12]

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Differences between Cloud Storage and Traditional Storage :

Parameters	Cloud Storage	Traditional Storage
Performance	Cloud storage perform better due to using NoSQL.	Traditional storage perform a bit slow as compared to cloud.
Maintenance	This type of storage options are easy to maintain as you use and service provider takes care of maintenance.	This storage are heavy to manage as you need to manually run through maintenance tools.
Reliability	Cloud storage are highly reliable as it takes less time to get under functioning.	Traditional storage requires high initial effort and is less reliable.
File Sharing	Cloud storage supports file sharing dynamically as it can be shared anywhere with network access.	Traditional storage requires physical drives to share data and network is to established between both.
File access time	In this system file access time is dependent on the network speed.	This system has fast access time as compared to cloud storage.
Security	Cloud storage are more secure as it integrates with many security tools.	Traditional storage are secure with they can get attacked easily through virus and malwares.
Applications	Amazon Drive, Dropbox, AutoSync are some applications of cloud storage.	HHD, SSD and Pendrives are some applications of traditional storage.

IV. CONCLUSIONS

The automatic identification system (AIS) is an automatic tracking system that uses transceivers on ships and is used by vessel traffic services (VTS). When satellites are used to receive AIS signatures, the term Satellite-AIS (S-AIS) is used. AIS information supplements marine radar, which continues to be the primary method of collision avoidance for water transport. Although technically and operationally distinct, the ADS-B system is analogous to AIS and performs a similar function for aircraft.Information provided by AIS equipment, such as unique identification, position, course, and speed, can be displayed on a screen or an electronic chart display and information system (ECDIS). AIS is intended to assist a vessel's watchstanding officers and allow maritime authorities to track and monitor vessel movements. AIS integrates a standardized VHF transceiver with a positioning system such as a Global Positioning System receiver, with other electronic navigation sensors,[16] such as a gyrocompass or rate of turn indicator. Vessels fitted with AIS transceivers can be tracked by AIS base stations located along coast lines or, when out of range of terrestrial networks, through a growing number of satellites that are fitted with special AIS receivers which are capable of deconflicting a large number of signatures.The International Maritime Organization's International Convention for the Safety of Life at Sea requires AIS to be fitted aboard

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international voyaging ships with 300 or more gross tonnage (GT), and all passenger ships regardless of size. For a variety of reasons, ships can turn off their AIS transceivers.[13]

All error-detection and correction schemes add some redundancy (i.e., some extra data) to a message, which receivers can use to check consistency of the delivered message, and to recover data that has been determined to be corrupted. Error-detection and correction schemes can be either systematic or non-systematic. In a systematic scheme, the transmitter sends the original (error-free) data and attaches a fixed number of check bits (or parity data), which are derived from the data bits by some encoding algorithm. If error detection is required, a receiver can simply apply the same algorithm to the received data bits and compare its output with the received check bits; if the values do not match, an error has occurred at some point during the transmission. If error correction is required, a receiver can apply the decoding algorithm to the received data bits and the received check bits to recover the original error-free data. In a system that uses a non-systematic code, the original message is transformed into an encoded message carrying the same information and that has at least as many bits as the original message.[15]

Good error control performance requires the scheme to be selected based on the characteristics of the communication channel. Common channel models include memoryless models where errors occur randomly and with a certain probability, and dynamic models where errors occur primarily in bursts. Consequently, error-detecting and correcting codes can be generally distinguished between random-error-detecting/correcting and burst-error-detecting/correcting. Some codes can also be suitable for a mixture of random errors and burst errors.[14]

If the channel characteristics cannot be determined, or are highly variable, an error-detection scheme may be combined with a system for retransmissions of erroneous data. This is known as automatic repeat request (ARQ), and is most notably used in the Internet. An alternate approach for error control is hybrid automatic repeat request (HARQ), which is a combination of ARQ and error-correction coding.[25]

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