

Review on Data Traffic in Real Time for MANETS

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Abstract - The transmission of information in a MANET relies on the performance of the traffic scenario used in a network. The traffic scenario determines the reliability and capability of information transmission, which necessitates its performance analysis. This paper highlights on variation of data traffic in real time traffic. In case of highly loaded data traffic, when the capability of the receiving network at the router level, becomes lesser than the amount of data incoming data packets, then the receiving network cannot handle such large amount of incoming data as a result of which there is more data loss leading to re transmission and hence the overall delay increases with decrease in throughput. Packet Delay and Throughput are affected greatly as they act as function of network load [9].

Key Words: MANET, Constant Bit Rate, Variable Bit Rate, Bursty.

1. INTRODUCTION

A mobile ad hoc network (MANET), also known as ad hoc wireless network, is a continuously self-configuring, infrastructure-less network connected wirelessly.

Each device in a MANET is free to move independently in any direction, and will therefore change its links to other devices frequently. Each must forward traffic unrelated to its own use, and therefore be router. The primary challenge in building a MANET is equipping each device to continuously maintain the information required to properly route traffic. Such networks may operate by themselves or may be connected to the larger Internet. They may contain one or multiple and different transceivers between nodes. This results in a highly dynamic, autonomous topology.

MANETs are a kind of wireless mobile adhoc network (WANET) that usually has a routable networking environment on top of a Link Layer ad hoc network. MANETs consist of a peer-to-peer, self-forming, self-healing network. Mobile ad hoc network (MANET) is a self-directed system of mobile devices connected by wireless links. The node in MANETs moves in the region and modifies its locations by creating infrastructure less network without intervention of any network administrator. Variety of routing protocol for ad hoc network are probable. The main focus behind is to save resources (bandwidth) while using routing protocols. While deploying MANETs, a number of challenges involve

like network scalability, Quality of services (QoS), energy utilization, security, privacy measures, bandwidth optimization and dynamic topology etc. In this paper an effort has been made to compare the performance of different routing protocols using multimedia application (video traffic).

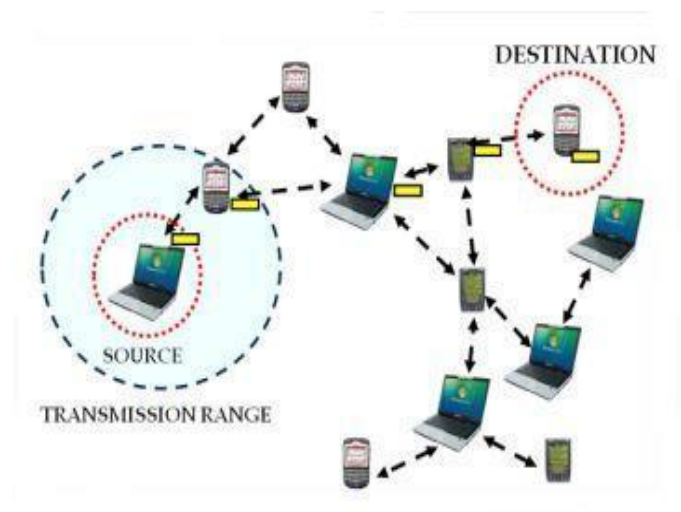


Fig-1: Mobile Adhoc Network(MANET)

1.1 Issues In MANET

- i. Multicasting: The ability to send packets to multiple nodes at once. This is similar to broadcasting except the fact that the broadcasting is done to all the nodes in the network. This is important as it takes less time to transfer data to multiple nodes.
- ii. Loop Free: A path taken by a packet never transits the same intermediate node twice before it arrives at the destination. To improve the overall performance in the routing protocol to guarantee that the routes supplied are loop free. This avoids any loss of bandwidth or CPU consumption.
- iii. Multiple routes: If one route gets broken due to some disaster, then the data could be sent through some other route. Thus the protocol should allow creating multiple routes.

iv. Distributed Operation: The protocol should be distributed. It should not be dependent on a centralized node.

v. Physical security: Mobile networks are more vulnerable to physical security threats such as eavesdropping and jamming attacks. vi. On demand operation: Since a uniform traffic distribution cannot be assumed within the network, the routing algorithm must adapt to the traffic pattern on a demand or need basis, thereby utilizing power and bandwidth resources more efficiently. vii. Unidirectional Link Support: The radio environment can cause the formation of unidirectional links. Utilization of these links and not only the bi-directional links improves the routing protocol performance.

viii. Entering/Departing nodes: A routing protocol should be able to quickly adapt to entering or departing nodes in the network, without having to restructure the entire network.

2. LITERATURE SURVEY

Mark W. Garrett and Walter Willinger proposed "Analysis, Modeling and Generation of Self-Similar VBR Video Traffic" To ensure a consistent and desirable quality of service (QoS) for a VBR video connection, the network must correctly allocate and emulate bandwidth assigned to the service. Short periods of congestion maybe handled gracefully through the use of prioritization (layered coding) congestion notification and intelligent scheduling algorithms at the switch However, good design and analysis of a network requires an understanding of the traffic itself.

Mamata Rath and Umesh Prasad Rout proposed "Congestion Control Mechanism for Real Time Traffic in Mobile Adhoc Networks" As per specific quality of service requirement, the traffic has to be created with necessary configuration. Therefore, before defining congestion control and QoS policies, it is essential to deliberate the data traffic. In case of highly loaded data traffic, when the capability of the receiving network at the router level, becomes lesser than the amount of data incoming data packets, then the receiving network cannot handle such large amount of incoming data as a result of which there is more data loss leading to re-transmission and hence the overall delay increases with decrease in throughput.

3. DATA TRAFFIC

Data traffic is the amount of data moving across a network at a given point of time. Network data in computer networks is mostly encapsulated in network packets, which provide the load in the network. Network traffic is the main component for network traffic measurement, network traffic control and simulation.

TYPES OF DATA TRAFFIC:

1. Constant Bit Rate (CBR).
2. Variable Bit Rate (VBR).
3. Bursty.

3.1 Constant Bit Rate (CBR)

CBR is a term used in telecommunications, relating to the quality of service. When referring to codes, constant bit rate encoding means that the rate at which a codes output data should be consumed is constant. CBR is useful for streaming multimedia content on limited capacity channels since it is maximum bit rate that matters, not the average, so CBR would be used to take advantage of all of the capacity. CBR would not be the optimal choice for storage as it would not allocate enough data for complex sections. The problem of not allocating enough data for complex sections could be solved by choosing a high bits for encoding process, though the size of the file at the end would be proportionally larger. In case of streaming video as a CBR, the source could be under the CBR data rate target. So in order to complete the stream, its necessary to add stuffing packets in the stream to reach the data rate wanted. With limited bandwidth available, the recommended mode is normally CBR (Constant Bit Rate) as this mode generates a constant bit rate that can be predefined by a user. During CBR encoding, the bit rate or the number of bits per second is kept the same through the encoding process. Constant bit rate (CBR) encoding persists the set data rate to setting over the whole video clip. CBR encoding does not optimize media files for quality but will save the storage space. CBR is most commonly used for streaming video content using the flash media server. CBR is used for timing sensitive traffic. Examples are voice, interactive video conferencing. CBR provides consistent delay across the network. Example ATM network. Advantage of CBR method is that audio data typically processes faster (compared to VBR).

3.2 Variable Bit Rate (VBR)

VBR stands for variable bit rate. VBR encoding adjusts the data rate down and to the upper limit, based on the data required by the compressor. This means that during a VBR encoding process the bit rate of the media file will dynamically increase or decrease depending on the media files bit rate needs. VBR takes longer to encode but produces the most favourable results as the quality of the media file is superior. VBR is most commonly used for HTTP delivery. With VBR, a predefined level of image quality can be maintained regardless of motion or the lack of it in a scene. This means that bandwidth use will increase when there is a lot of activity in a scene and will decrease when there is no motion. This is often desirable in video surveillance applications where there is a need for high quality,

particularly if there is motion in a scene. Since the bit rate may vary, even when an average target bit rate is defined, the network infrastructure must be able to accommodate high throughput [8]. VBR is used for bursty data application and also provide pre-assigned and variable data rate. There are two modes of VBR. They are VBR-rt (Variable Bit Rate Real-Time) and VBR-nrt (Variable Bit Rate Non Real Time). VBR-rt is intended for real-time applications, such as compressed voice over IP (VOIP) and video conferencing. These require tightly constrained delays and delay variation. Examples of VBR-nrt include data traffic such as X.25, frame relay, transaction processing, LAN-to-LAN, and non-real-time buffered voice and video traffic.

When to use VBR vs. CBR?

When it comes to selecting VBR vs. CBR, it is almost always recommended that we can use VBR encoding for media files as it provides higher quality files. We would suggest that not to use CBR unless we have a specific need for playback on a device that only supports CBR. Default VBR mode will produce higher quality at competitive bit rates.

Advantages and disadvantages of VBR

The advantages of VBR are that it produces a better quality-to-space ratio compared to a CBR file of the same data. The bits available are used more flexibly to encode the sound or video data more accurately, with fewer bits used in less demanding passages and more bits used in difficult-to-encode passages.

The disadvantages are that it may take more time to encode, as the process is more complex, and that some hardware might not be compatible with VBR files. VBR may also pose problems during streaming when the instantaneous bit rate exceeds the data rate of the communications path. These problems can be avoided by limiting the instantaneous bit rate during encoding

Table -1: Difference between CBR and VBR

Features	CBR-Constant Bit rate	VBR-Variable Bit Rate
Traffic type	Steady	Bursty
Timing	Delay variation sensitive	Insensitive to delay variation
Applications	Video conferencing, video, PBX	Data and imaging in VBR-nrt compressed video, audion in VBR-rt

3.3 Bursty

In telecommunication, a burst transmission or data burst is the broadcast of a relatively high bandwidth transmission over a short period. Burst transmission can be intentional, broadcasting a compressed message at a very high data signalling rate within a very short transmission time. Bursty traffic is uneven pattern of data transmission. Data rate changes in a very short period of time. Average and peak bit rates are very different in this type of flow. Maximum burst size is significant. Most difficult type of traffic to handle because the profile is very unpredictable and entails a low utilization of network resources for long times, but suddenly causes congestion in network buffers. Ex: HTTP, FTP downloads graphic, video content. Data burst can occur naturally, such as when the download of the data from the internet briefly experiences higher speeds. It can also occur in the computer network where data transmission is interrupted at intervals. Burst transmission enables communication between data terminal equipment and data network operating at dissimilar data signaling rates.

3.4 Variations of data rate

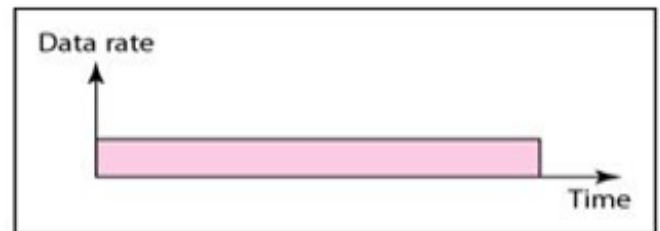


Fig: Constant Bit Rate

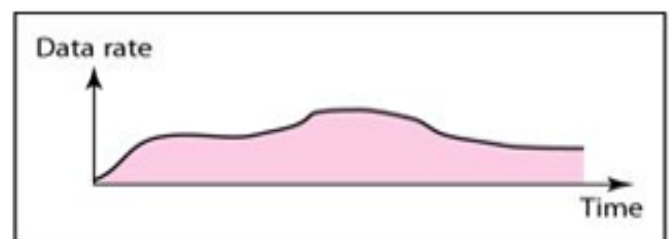


Fig: Variable Bit Rate



Fig: Bursty

4. CONCLUSIONS

This paper concentrates on one of the dynamic concerns in three types of data traffic in real time data transmission in Mobile Adhoc Network. An improvement in efficiency can be made by allowing real time application to use VBR coding. Real-time application also tends not to be very bursty, in that it is reasonably efficient to assign a fixed bandwidth to a single source. For this reason voice and video communications are commonly carried over fixed rate circuit with tiny delays. There will be much better trade-off for the coder to optimize its use of available bandwidth and degrade the quality slightly, than for the network to accommodate such exceptional bursts.

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