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APPLYING SWITCHING AND MULTIPLE ACCESS MODEL FOR REDUCING PACKET LOSS AND NETWORK OVERHEADS IN WATM

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As an effectual simple wireless equivalent created in the telecommunications (telephone) industry, Wireless Asynchronous Transfer Mode (WATM) is utilized to stream unified traffics like video, data, and voice data. In the asynchronous data transfer mode, voice data transfer a packet with the same medium, and data share the networks and burst data. Effective WATM data transmission requires an extensive array of designs, techniques used for control, and simulation methodologies. The congestion of the network is among the key challenges that lower the entire WATM performance during this procedure, in addition to the delay in cell and the overload of traffic. The congestions cause cell loss, and it requires expensive switches compared to the LAN. Consequently, in this current study, the application of an effectual switching model together with a control mechanism that possesses multiple accesses is employed. The multiple access process and switching model are utilized to establish an effective data sharing process with minimum complexity. The switching model uses the synchronous inputs and output ports with buffering to ensure the data sharing process. The traffic in the network is decreased, and the loss of packets in the cells is efficiently kept to a minimum by the proposed technique. The system being discussed is employed through the utilization of software employed using OPNET 10.5 imulation, with the valuation of the WATM along with the investigational outcomes accordingly. The system's efficiency is assessed by throughput, latency, cell loss probability value (CLP), overhead network, and packet loss. Thus, the system ensures the minimum packet loss (0.1 %) and high data transmission rate (96.6 %)

Keywords: Asynchronous mode, delay, overload traffics, switching model and data transmission rate

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1. Introduction

The Asynchronous Transfer Mode (ATM) [1] comprises a network mechanism that is high in speed supports video, data, and voice-based transmission. The ATM method maximizes optimizing the network's quality of usage and services [2]. Consequently, it is the foundation that supports numerous internet service providers like a digital network with integrated services and a synchronous optical network. Zero routings were employed to build these services, where the ATM provides the connection that connects to the endpoints as the setting for transferring the data from the source to the target point [3].

It utilized cells that fixed in size to accomplish the encoding of information throughout the data streaming procedure, and Of 53 bytes in length, the ATM cells [4] contain around 48 bytes of data and 5 bytes of header data. During the processing of the ATM, it is initiated by the processing of a single cell; upon immediate completion of its operation, the input is processed by the following cells, known as asynchronous processing. The service provider pre-configured the ATM connection for transmitting the data in the most convenient and demand-driven way. The wireless asynchronous transfer method (WATM) results from the integration of the ATM core with the wireless network. It comes with the assurance of high-speed mobile communication, which is utilized to meet consumer demand for wireless services worldwide. Furthermore, it offers phone, video, and information transmission guaranteed for the quality of service (QoS) [5]. The WATM switches perform the mobility process, convey data from the base station and mobile terminals during the data transmission process. The WATM performance is hampered by network congestion and delays in cell and traffic overloads. A lack of bandwidth often causes network congestion. In computing, bandwidth refers to the maximum pace at which data may be transmitted across a specific route. Network congestion occurs when there is not enough bandwidth to manage traffic volume on a given network. Fig. 1 depicts the (WATM) transmission interface architecture based on the discussion.

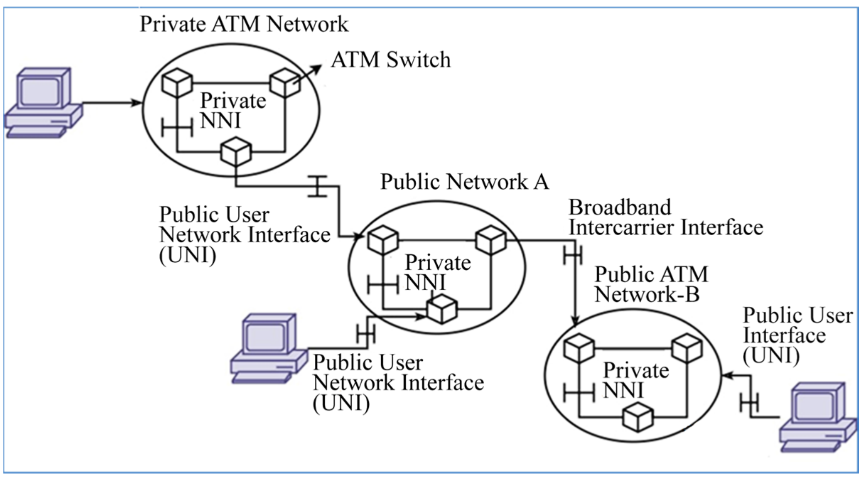

Fig. 1. The architecture of ATM Network Interface

Fig. 1 illustrated the WATM network interface architecture, which comprised permanent (PVC) [6] and switched (SVC) [7] viral connections. The PVC procedure utilized leased lines employed by an operator, while SVC is built based on user requirements. Through the utilization of the UNI interface, users can engage with the connection towards developing the SVC connection. Meanwhile, for the data exchange during the running of the ATM procedure, the switches are utilized. Another public network's broadband inter-carrier interface [8] is used to establish the communication procedure. Two-bit rates such as constant and variable bits are utilized to support the capacity, real and non-real-time applications. Along with this, available bit rate – ABR (to guarantee fairness), unspecified bit rate - UBR (provision of optimal services), and ensures frame rate (ensuring throughput of multiple cells frames) are used to enhance the data transmission procedure. The information, video, and audio conveyance in a single traffic channel are optimized by the WATM using bit rates and interfaces.

Furthermore, it is simple to be integrated with the Wide Area Network-WAN, Metropolitan Area Network- MAN, and Local Area Network- LAN networks and set up quality high-speed service. Although ATM guarantees an effective communication procedure, it possesses various drawbacks such as QoS complexity, cell header overhead, cell losses, resulting in congestion in the network, overloading of the traffic, and packet loss. Packets are the smallest units of data that can be sent through a network, and a packet loss occurs when one or more of these packets do not arrive at their destination. The proposed system is applied utilizing various instruments like "OPNET 10.5" [9], where its effectiveness is assessed by utilizing a variety of performance indicators.

2. Literature review and problem statement

Several researcher perspectives and work on the (WATM) data broadcasting technique is discussed and reviewed in this section. The asynchronous mode transmission is recommended in [10]. During this procedure, packet switching was accomplished using cells fixed in size, and activities were carried out under the slotted process. The ATM chose broadband integrated services as the switch, while the choice of bandwidth depended on demand. It matters how technological selection can help to improve the whole transference process of information involving data, voice, and video at the optimal level. Switching is employed to address the problems of data loss and network overhead. The proposed method effectively reduces network traffic and packet loss in cells. WATM uses a switching model that constantly computes SI and SC to minimize packet loss and overheads during data broadcast. A multi-access routing system reduces WATM's traffic congestion and increases the network's overall throughput.

In [11], the evolving signal information transmission is discussed. This paper investigated the next-generation network – NGN challenges like the worth in service quality, the complicatedness in-network, and single load in the signaling procedure. To address this problem, dependable and forehand signaling transmission techniques were developed. Typically, this procedure checks the signal strength and needs, which aids in optimizing the general signaling transmission.

In [12] recommending the WATM to transfer the controlled area network (CAN) message. Encapsulation methods were employed to map the information throughout this process. The numerous CAN messages that were carried by the system were capable of resolving the quality of service issues concurrently conveying data on time as well. The system under consideration was analyzed.

A study that employed a scanning algorithm and handover latency improvement to analyzing packet loss within a wireless network was executed in [13]. The fundamental goal of the algorithm, as mentioned above, was to minimize packet loss while maximizing latency. First, the nearest access points were assessed to establish the connection. While the scanning algorithm operates in the background, the packets were conveyed from the source to the destination to ascertain the next access point upon identifying the link. This technique significantly reduces packet loss while minimizing handover latency. Furthermore, the packet transmission rate is optimized by the system.

Through the employment of the buffer, the scheduling technique had developed an efficient, effectual delay-tolerant network in [14]. The presented procedure aids in the resolution of overload to the network and issues on congestion in wireless networks. Furthermore, by this technique, Wang et al. utilized scheduling in the message method, SDSRP drop spray waiting protocol to overcome the issue mentioned above. The approach evaluated the priority of any and kept a record of duplicated and lost message particulars. Following the data, the prioritization is calculated to convey the data while keeping the packet loss to a minimum.

The multiple access protocol for effective data transmission in the 5G transfer mode network is illustrated in [15]. The system aims to reduce cyber security and collision issues while transferring multimedia data. Here, the multi-access protocol allocates the data according to the priority, which helps to avoid the collision. This scheme reduces the packet delay, loss and improves the overall throughput in the 5G wireless network. To ensure data security, copy or archive files to be recovered in the case of a loss of information. It's a way to safeguard data by storing it in a different location. A firewall, a security device, monitors both incoming and outgoing data. An intermediary between a trustworthy internal network and an external network is needed to ensure data security. To ensure the security of data, encryption and decryption software is essential. This program can be used to encrypt data objects, files, and even network packets or applications.

The loss distribution of loss probability in the asynchronous network [16]. This paper intention is to resolve the probability time computation complexity by applying the channel switching concept. This process analyzes the subnetwork switching to transmitting data in the asynchronous network. Here the mathematical analysis is applied to compute the loss likelihood value to transmit the information with minimum data loss. This effective arrangement algorithm optimizes the total packet broadcast rate (PTR) while minimizing overhead. Based on viewpoints from numerous researches, diverse routing protocols enabled the resolution of packet loss, transferred rate, and congestion difficulties. Taking their ideas into account, this study presented a switching access control mechanism is presented in this study to optimize the overall data and transmission procedure, reducing packet loss and lessening the overload of traffic. The performance and dependability of the Internet are greatly influenced by the routing protocols that are used. Current IP routing protocols don't consider traffic load in network structure and setup. The network operators and management systems oversee modifying the paths to the present traffic flow. Intradomain routing protocols use link weights to compute the shortest pathways.

Software-defined networks' (SDNs') adaptability in managing a vehicular ad hoc network (VANET). Vehicles and their end-users benefit from a smooth horizontal handover using the SDN principle. SDN designs are presented for two distinct levels of softwarization, with one architecture analysing the influence of the other. The assessment technique uses a combination of real-world vehicle hardware and simulated mobility conditions. As a result of this, the SDN solution provides a higher performance in terms of delays, packet losses, and network overhead when it comes to handovers in a VANET.

3. The aim and objectives of the study

The study aims to transmit data from source to destination with minimum packet loss and a high packet transmit rate. During the data transmission process, the network has several traffic that causes a collision and network overhead. Therefore, the main aim of this study is to reduce the network overhead, delay, packet loss and improve the data transmission rate. The high data speeds offered by the LTE wireless standard allow it to efficiently handle multimedia applications like 3D video streaming, VoIP, and videoconferencing. In fully mobile wide-area deployments and low mobility local area deployments, the 3GPP LTE standard supports radio access with up to 100Mbps and 1Gbps, enabling high data rate content transmission. The ever-increasing bandwidth available for personalised services is a result of improvements in multimedia compression/representation. 2D and 3D multimedia communications can take use of this capacity.

To achieve these aims, the following objectives are accomplished:

– IN WATM [17], the system uses the switching model that continuously calculated the SI and SC to minimize the packet loss and overheads during the data broadcasting;

– the packet loss has efficiently been averted the instance the switching along with cell loss likelihood value (CLP);

– multi-access routing protocol is applied to eliminate traffic overload in WATM and improve the overall network throughput value.

4. Materials and methods

The switch in wireless ATMs comprises a completely interconnected architecture comprising synchronous inputs and output ports with output buffering. A series of cell services comprises the switching model [18], and the operations are carried out under the allocated time. The interval spent serving the ATM cell is termed service interval (SI), while the slot termination is termed completion of services (SC).

Table 1 shows the nomenclature used later in the article.

Table 1

Nomenclature

Variables	Description
A_n	Switching model
D_n	Output
ni	n^{th} active input
P_{cell}	cell emission probability
Q_n	Input or output synchronous port characteristics
a_0	Idle state
a_1	Active state
mi	$(n-1)^{\text{th}}$ idle source
$p(i-a)$	probability of a workload shift from idle to active
k	state of the source
$p(a-a)$	Likelihood of remaining active state at the nth SI
Xn	State descriptor
$X(n+1)$	Equation
$X_n=(I, j, k)$	Equation

d on this explanation, every switch has $N*N$ inize that has SC and SI characteristics and several functions $f(.)$, $g(.)$ and $h(.)$ for A_n, D_n and Q_n. The definition of the functions is as the following:

$$A_n = C_r^{ni} * \left(P_{cell}\right)^r * \left(1 - P_{cell}\right)^{ni-r}, \quad 0 \le r \le ni \tag{1}$$

In (1), the active inputs are examined in the n^{th} SI are represented by *ni*. At active workload, the cell emission probability is denoted by P_{cell}. In addition, A_n is the switching model that fully interconnects characteristics used to avoid internal blocking, D_n is the separate output port characteristics used to examine the feasibility of switch dimensions and Q_n is the input or output synchronous port characteristics used to eliminate the internal speedups. The *ni* is computed using (2).

$$ni = a_0 + a_1. \quad (2)$$

In (2) computation, the active input state has 1 value, and the idle input of $(n-1)^{th}$ is 0. Then the idle a_0 and active states a_1 occupied are is computed as follows.

$$a_0 = c_k^{mi} * (p_i - a)^k * (1 - p_{i-a})^{mi-k}, \quad 0 \le k \le mi, \quad (3)$$

$$a_1 = c_j^{N-mi} * (p_{a-ai})^1 * (1 - p_{a-a})^{N-mi-1}, \quad 0 \le k \le N - m. \quad (4)$$

In (4), the $(n-1)^{th}$ idle sources are denoted by mi, and the probability of a workload shift from idle to active is denoted by $p(i-a)$ indolent to active p 01. Meanwhile, the state of the sources is denoted by k. The likelihood of remaining active state at the nth SI is denoted as $p(a-a)$. The asynchronous mode procedure comprises the switching model, which is completely connected with the interconnection fabric, which is depicted D_n as the following:

$$D_n = A_n - \left(Q_{\max} - (Q_{n-1} - 1)\right) \cdot A_n > \left(Q_{\max} - Q_{n-1} - 1\right). \quad (5)$$

According to the interconnected switching model, the determination of the output queue number cells depends on the SI number fixed in the queue and the number of rejected and incoming calls. The calculation procedure is shown in the ensuing equation:

$$Q_n = Q_{n-1} + A_n - D_n. \quad (6)$$

Following the definition of the fixed time slots of $X(n+1)$ the asynchronous model, which is the state descriptor *Xn*. Cell loss probability is calculated to avert packet loss when delivering data from the sender to the receiver. At time *n*, the calculation of cell loss likelihood value (CLP) is based on the number of arriving cells that are rejected. The CLP is then calculated as the following:

$$CLP_n = \frac{E(D_n)}{E(A_n)}. \quad (7)$$

The anticipation of state uses probabilities *s*, where $\pi_{i,j,k}^{(n)}$ are indicated by equation (7), and the likelihood of the system is in *Xn* at the time *n* is denoted by $X_n=(i, j, k)$. The CLP value [19] is approximated by employing the limiting expectations as the following:

$$CLP = \frac{\sum_{i,j,k} J\pi_{i,j,k}}{p}. \quad (8)$$

The traffic intensity is given *p*, and the switch achieves the CLP. Furthermore, the ATM process employs the tagged port to calculate the loss value. Packet loss has efficiently been averted the instance the switching and cell loss likelihood value (CLP) is known. Following the elimination of packet loss, traffic overload must be controlled to keep the entire WATM information transmission procedure to a minimum. The switching and multiple access routing protocols are used to attain this purpose. The conveyance of information between the source and target is the responsibility of the data link layer [20]. It performs two functions: data link control and multiple access control. The former sends data via the conveyance conduit, called the automatic repeat request in stop and wait [21]. The window dimensions are utilized to set up a communication type based on connection throughout this operation. Furthermore, to avoid network traffic overload, propagating delay, round trip time, time to live (TTL) and time out value (TO).

$$\text{propagation delay} = \frac{\text{distance between routers}}{\text{propagation velocity}}, \quad (9)$$

$$\text{Round trop time (RTT)=2 *propagation delay,} \quad (10)$$

$$\text{Time out (TO)=2 * RT,} \quad (11)$$

$$\text{Time to live (TTL)=2 * T0.} \quad (12)$$

By taking these features into account, the ARQ mechanism effectively averts data loss, delay, delay, and data failure sufficiently; the system conveys data with the sequence number 0 during this operation. The establishment of the corresponding acknowledgement with sequence number 1 is realized when the receiver receives the report. In this case, one represents the next packet or data frame number. This approach lowers data loss, ack loss, and delays. The transmission based on data link control is adequate because the ATM transmitted link is dedicated. Otherwise, the channel is accessible to numerous stations simultaneously. Multiple access control [22] lowers network collisions and cross-talk. In this case, all stations have the same superior capability and the enablement of whatsoever that the station can transmit data founded on medium condition.

When the operation is being executed, the conduit possesses two features: the absence of a predetermined time for the conveyance of data and the absence of predetermined order of station data transmission. In the initial stage, the station senses the means to determine whether it is busy or idle, which subsequently aids in data transmission [23–25]. There is no collision once the channel is void and information is transferred smoothly and without any problem. The data is transmitted with a propagation delay. However, a head-on impact will occur if other stations detect the idle channel and attempt to transfer information concurrently. As a result, the data is only transferred after receiving consent from other stations entirely [26, 27].

Three control access procedures are employed to avert the collision: reservation, polling, and token passing techniques. Before sending data, the station must be reserved in the reservation. The timeline, in this case, possesses two-timing, like a fixed reservation interval and a variable data transmission duration. Assuming that the ATM consumes M stations, the arrangement interval is divided into M slots as every individual station is associated with a different niche. No other stations transmit when only one station sends a message in one slot. Following the data conveyance, the next ensuing proceeding will commence at the predetermined intermission. Fig. 2 depicts the reservation procedure based on the discussion.

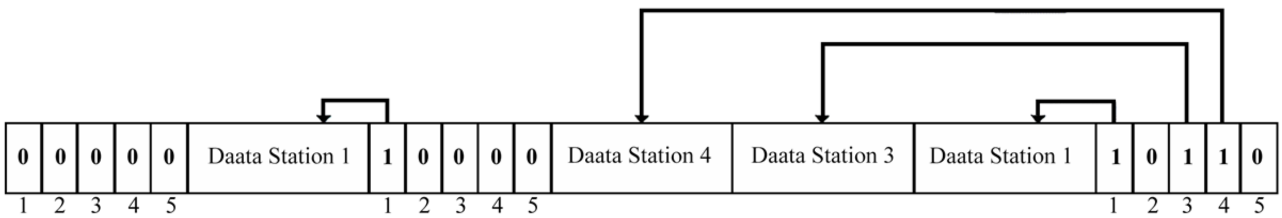

Fig. 2. Station booking during data broadcasts

Ensuring the station's reservation, the data transmission is executed through the employment of the polling procedure, where the regulator is chosen to transmit the data to the subordinate station or additional stations. In this case, the full data is transmitted through the controller, which aids in granting access. The secondary station receives the message, forming appropriate acknowledgement to minimize undesired packet or data loss. Finally, the token system transfers data without generating data damage or control overload. In this instance, stations are linked via tokens employed to access the next station to communicate information. The stations are linked in a ring configuration to ensure data acceptance, and acknowledgement is supplied during the data transmission process. While avoiding overload and colligation, data is conveyed from the source to the destination through the triad procedures; the complete WATM functioning method is explicated in the following algorithm phases, according to the discussion.

The switching model and multiple access processes have been utilized to establish an effective data sharing process with minimum complexity for Wireless Asynchronous Transfer Mode (WATM) to stream video, data, and voice data. The system being discussed is employed by utilizing software employed using OPNET 10.5 simulation, with the valuation of the WATM and the investigational results. The system's efficiency is evaluated by throughput, latency, cell loss probability value (CLP), overhead network, and packet loss.

The algorithm used in the WATM procedure of work:

Step 1. Collect data in the network space in preparation for data transfer.

Step 2. ATM cells are scrutinized and analyzed in terms of SI and SC.

Step 3. The cell emission probability value is computed as the following.

$$ni = a_0 + a_1,$$

$$a_0 = c_k^{mi} * \left(p_i - a\right)^k * \left(1 - p_{i-a}\right)^{mi-k}, \quad 0 \le k \le mi,$$

$$a_1 = c_j^{N-mi} * \left(p_{a-ai}\right)^1 * \left(1 - p_{a-a}\right)^{N-mi-1}, \quad 0 \le k \le N - m.$$

Step 4. The corresponding switch interconnected model is defined by taking the cell likelihood value into account as the following:

$$A_n = C_r^{ni} * \left(P_{cell}\right)^r * \left(1 - P_{cell}\right)^{ni-r}, \quad 0 \le r \le ni\,.$$

Step 5. The associated switch interconnected model is denoted as follows by taking into account the ATM cell probability value.

$$D_n = A_n - \left(Q_{\max} - \left(Q_{n-1} - 1\right)\right) \cdot A_n > \left(Q_{\max} - Q_{n-1} - 1\right)$$

Step 6. Following that, the calculation of the cell loss probability value (CLP) is for identifying the data loss.

$$CLP_n = \frac{E\left(D_n\right)}{E\left(A_n\right)}.$$

Step 7. To prevent data loss and network overload, the switching model is changed based on the CLP value and the multiple access control routing protocols are used to control the congestion is controlled by employing.

Step 8. To transmit data that utilized the ARQ process, the network, TO, TTL, RTT, and propagation delay parameters are computed.

Step 9. The data delay and acknowledgement delay in the data connection layer is reduced. The ARQ process and sequence number related data broadcast procedure are contained in this step.

Step 10. Ensuring Step 9, the station status (idle or busy) is determined to initiate the conveyance of data using reservation, polling, and the token concept.

The data is sent from the source to the target using algorithm stages, avoiding network collisions and packet loss. Through the employment of experimental data and debate, the system's effectiveness is assessed.

5. Results of multiple access control mechanism in WATM

The discussed system evaluated using the throughput, cell loss likelihood value (CLP), latency, data loss, and network overheads metrics are used to measure the system's efficiency. Dedicated links between sender and receiver are adequate for data link control layer, however if no dedicated connection is provided, many stations can concurrently access the channel.

5. 1. Packet loss and overhead analysis

The switching model used in the wireless ATM process is explicated in this Section 4. The process uses a multiple access control mechanism to transmit information. The developed technology enables the removal of collisions, data loss, and packet delays. The creation of the system, as mentioned above, employs the OPNET 10.5 simulator. It is a beneficial network simulator with effective power and variety when sending data from source to target. It enables users to design diverse network topologies. The simulator utilizes the 802.11g operation mode, data rate 54 Mbps, transmission power 0.005W, network dimension is 100 m*100 m, 120 number of transmission and bay networks Accelar 1050 switch model is utilized. The simulation process is performed around three hours, and the simulation running time is approximately 1 min. The system's low packet loss is immediately indicated by the system's minimal delay and low CLP value. Fig. 3 depicts the obtained outcome.

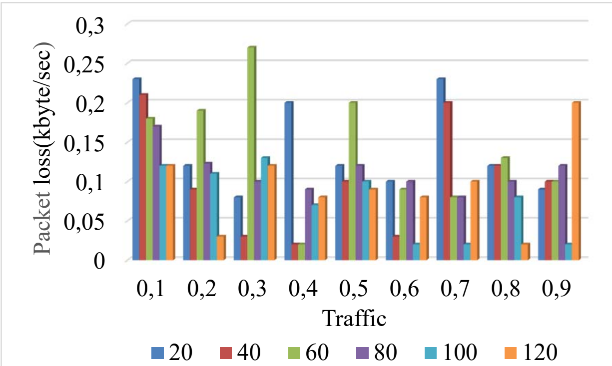

Fig. 3. Packet loss

Fig. 3 demonstrated the obvious effect of the presented methodology with the lowest possible packet loss during data broadcasting from the origin to the target. The determination of the station's status aids in reducing the overall packet loss because of the low CLP value. The technology ensures a 0.1 per cent packet loss across 120 transmissions for various traffics. The system's low packet loss is immediately indicated by the system's minimal delay and low CLP value. The individual result of the calculated overall network overhead value is shown in Fig. 4.

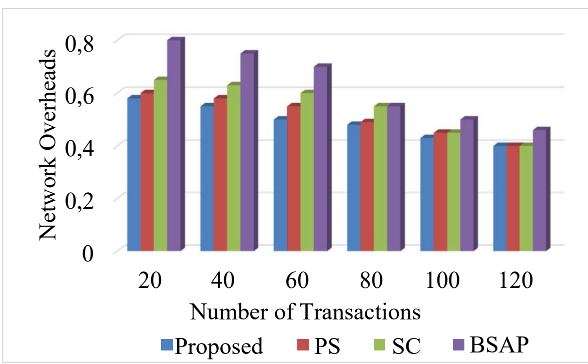

Fig. 4. Network Overhead

From Fig. 4, when contrasted with other methods such as packet switching (PS) [10], scanning (SC) [13], and buffer scheduling algorithm (BSAP) [14], the proposed switching model with multiple access control techniques yields low network overheads.

5. 2. Analysis of Cell loss likelihood value (CLP)

As said, the Packet loss has efficiently been averted, the instance the switching along with cell loss likelihood value (CLP). The right formulation of the switching model and ATM cell depiction reduces cell loss likelihood value (CLP). Table 3 shows the CLP value that was obtained.

Table 2 shows how the inclusion of a switching multiple access control approach delivers the least cell loss likelihood value for diverse traffic in wireless ATMs. The system accurately computes the CLP value by identifying the number of reached and rejected cells used $CLP_n = \frac{E(D_n)}{E(A_n)}$. Following the discussion, Fig. 4 illustrates the corresponding graphical analysis.

A CLP value of 0.0022 is achieved by the provided switching and multiple access control techniques when sending information from source to destination and is illustrated in Fig. 5. The method guarantees a small CLP value for a wide range of activity and traffic flow quantities. Because of the small CLP value, the system has a small data loss and delay worth. Fig. 6 displays the collected data delay value. During the data transmission phase, the technique analyses each station's state to decrease network congestion. It also uses the token and registration criteria to transfer information with the least amount of delay.

Table 2

Analysis of Cell loss likelihood value (CLP)

Transmissions	Traffic								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
20	0.023	0.018	0.028	0.028	0.026	0.021	0.0189	0.018	0.017
40	0.018	0.0167	0.0165	0.0176	0.0180	0.018	0.0157	0.012	0.027
60	0.027	0.025	0.021	0.027	0.027	0.021	0.023	0.023	0.021
80	0.028	0.021	0.028	0.026	0.026	0.024	0.025	0.028	0.021
100	0.022	0.026	0.0218	0.0254	0.025	0.023	0.021	0.025	0.027
120	0.029	0.027	0.021	0.023	0.022	0.020	0.025	0.023	0.024

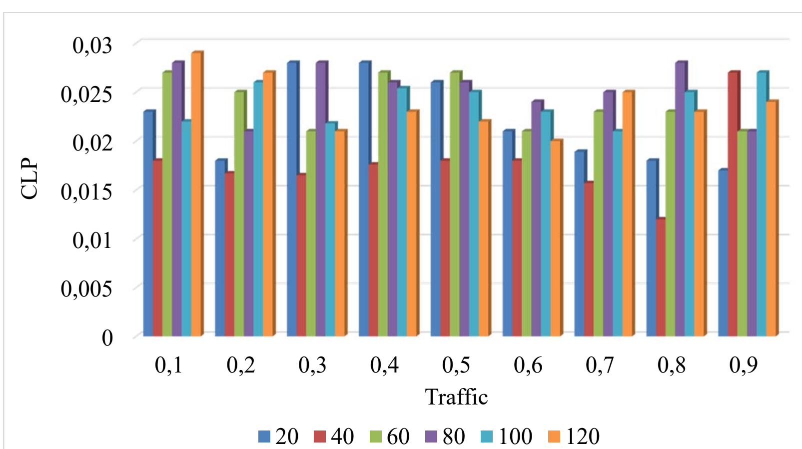

Fig. 5. Cell loss likelihood value

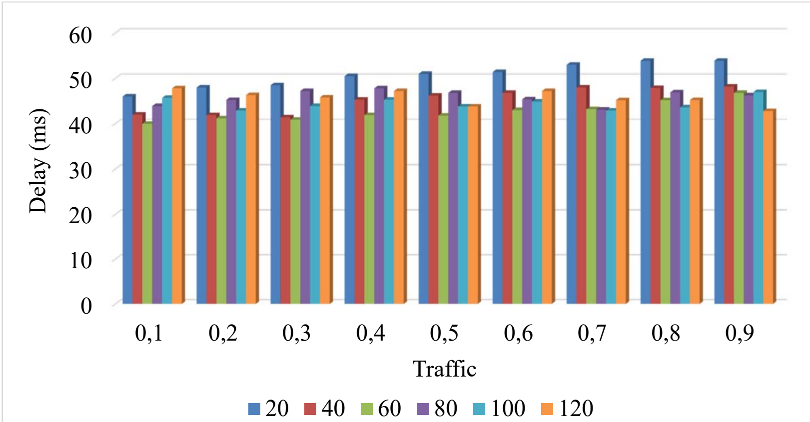

Fig. 6. Delay

Fig. 6 shows clearly that the suggested methodology has the shortest possible delay during the simultaneous broadcasting of information from the source to the destination. The determination of the station status aids in reducing the overall transmission time because of the low CLP value. The 120-transmission method ensures a 45.2 ms delay for various traffics.

5. 3. Throughput Analysis

The successful detection of idle stations, the response process, and the switching model decrease the complication of data broadcast while growing throughput. The outcome is represented in Table 3.

Table 3 clearly shows that the proposed switching and multiple access control mechanisms deliver good throughput value for different traffic in wireless ATMs. With the efficient calculation of cell likelihood loss, station condition and station arrangement determination, it is possible to select the correct transmission medium effectively. In addition, the method predicts the interconnected switching layers, which assist in the effective transfer of data from the source to the target with a large data value. Fig. 7 illustrates the attained outcome.

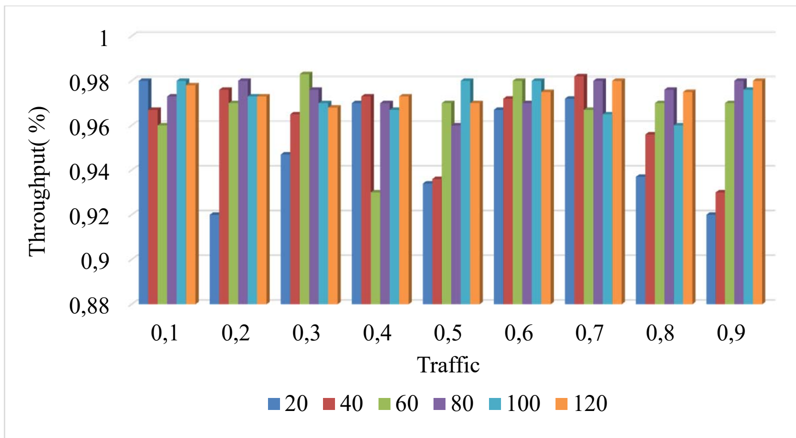

Fig. 7. Throughput

Table 3

Analysis of Throughput

Transmissions	Traffic								
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
20	0.98	0.92	0.947	0.97	0.934	0.967	0.972	0.937	0.92
40	0.967	0.976	0.965	0.973	0.936	0.972	0.982	0.956	0.93
60	0.96	0.97	0.983	0.93	0.97	0.98	0.967	0.97	0.97
80	0.973	0.98	0.976	0.97	0.96	0.97	0.98	0.976	0.98
100	0.98	0.973	0.97	0.967	0.98	0.98	0.965	0.96	0.976
120	0.978	0.973	0.968	0.973	0.97	0.975	0.98	0.975	0.98

Fig. 7 illustrates the achievement of a throughput value of 96.6 percent presented by the switching and multiple access control techniques when transporting information from the source to the target. The effective computation of each input, station and switching model adds to the optimal data transfer rate. According to the analysis results, the suggested method effectively conveys data without increasing the network complexity or delay.

6. Discussion of experimental results of applying switching and multiple access model

This section discusses the experimental results on the discussed switching and adopted multiple access protocol based data broadcast process in the WATM. The method uses effective access control mechanisms which ensures each user while transmitting data in the network search space. The data broadcast process method attains the minimize packet loss (0.1 %), delay(45.2 ms) and high packet delivery rate (96.6 %) compared to the other methods. The detailed comparison of the introduced system with existing approaches is illustrated with many transactions and traffics in the previous section. However, the present study requires an optimized routing process to ensure a high packet delivery rate. Here, security measures are needed to be considered to improve further data transactions. Therefore, the optimized routing protocol with security establishment should be incorporated to improve the overall data transactions.

Performance and dependability of the Internet are greatly influenced by the routing protocols that are used. When it comes to network structure and setup, current IP routing protocols don't take traffic load into consideration. The network operators and management systems oversee modifying the paths to the present traffic flow. Intradomain routing protocols use link weights to compute shortest pathways.

To ensure data security, copy or archive files so that they can be recovered in the case of a loss of information. It's a way to safeguard data by storing it in a different location. A firewall, a type of security device, monitors both incoming and outgoing data. An intermediary between a trustworthy internal network and an external network is needed to ensure data security. In order to ensure the security of data, encryption and decryption software is essential. This programme can be used to encrypt data objects, files, and even network packets or applications. Routing assaults disrupting route discovery are countered by secure routing algorithms on ad hoc networks.

In reality, the primary goal is to increase the use of limited wireless resources while maintaining the QoS of all traffic.. Particularly noteworthy is the real-time variable bit-rate video service. So this research aims to improve QoS with relation to packet loss, average latency, and throughput by managing the video packets that are broadcast. Video traffic's QoS can be improved by reducing packet loss and average latency.

Dynamic bandwidth is provided, making it ideal for traffic that comes and goes quickly. Data transmission is easy, consistent, and predictable since all data is encoded into identical cells. Because of the uniform packet size, mixed traffic can be handled with ease.

Complex procedures are utilised to achieve Quality of Service (QoS) in Asynchronous Transfer Mode (ATM). Compared to LAN hardware, an ATM switch is a lot more costly. Furthermore, ATM NICs cost more than ethernet NICs. As a transmission and switching fabric technology, ATM can theoretically accommodate a wide range of traffic types. Promised better integrated capabilities and services, as well as increased flexibility in using the network.

The WATM performance is hampered by network congestion, as well as delays in cell and traffic overloads. Network congestion is often caused by a lack of bandwidth. In computing, bandwidth refers to the maximum pace at which data may be transmitted across a specific route. Network congestion occurs when there is not enough bandwidth to manage the volume of traffic on a given network.

The disadvantage of WAMP is the overhead of cell header (5 bytes per cell), has complex mechanisms to achieve QoS. The congestion can cause cell loss. An ATM switch is very expensive compared with the LAN hardware. Since ATM technology is a connection oriented one, the setup time and tear down time is longer than the time to use it. The future work is to reduce the delay of network congestion.

Switching is employed to address the problems of data loss and network overhead. Effectively reducing network traffic and packet loss in cells is achieved by the proposed method. WATM uses a switching model that constantly computes SI and SC during data broadcast to minimise packet loss and overheads. A multi-access routing system is used to reduce WATM's traffic congestion and increase the network's overall throughput.

7. Conclusions

1. Thus, the system attains the data loss and network overheads issues by applying the switching model. The model computes the service interval and completeness values for every transaction. These computations help to process the data request with respectively defined time. The interval computation identifies the station idle and busy status; the information is transmitted according to the reserved criteria. This process helps to reduce network congestion, overheads and minimize packet loss (0.1 %), delay(45.2 ms).

2. Then, the system computes the cell emission probability value that reduces the packet loss during the data transmission. According to the probability value, the interconnected switching models are accounted for, which improves the further data transaction process.

3. The third objective is attained by using a multi-access routing protocol that improves the data transmission rate and avoids traffic. The routing process effectively considers the propagation delay parameters, TTL, TO and RTT values used to maintain the sequence number for every transaction, which helps improve the overall data transmission in WATM. Here let's use the switching model for synchronous inputs and output ports with buffering to guarantee the data sharing process. The traffic in the network is decreased, and the loss of packets in the cells is proficiently kept to a minimum by the suggested method. In WATM, the system uses the switching model that continuously computed the SI and SC to minimize the packet loss and overheads during the data broadcasting. A multi-access routing protocol is applied to remove traffic overload in WATM and enhance the overall network throughput value.

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