

# Software-Defined Networking Strategies for Adaptive Resource Management in Wireless Mesh IoT Systems

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## Abstract

Wireless Aries Network (WMN) provides scalability and flexibility, but faces challenges such as link failures, traffic imbalances, and inefficient resource usage. To address these limitations, the Software-Defined Networking Wireless Mesh Networks with Intelligent Artificial Fish Swarm Algorithm (SDN-WMN-IAFS) framework was introduced. The aim of this framework is to enhance the adaptability and optimization capabilities of WMNs, particularly in Internet of Things (IoT) environments. The framework integrates Software-Defined Networking (SDN) for centralized programmability and control, with the Intelligent Artificial Fish Swarm Algorithm (IAFSA) to optimize resource allocation and traffic management. The framework operates by dynamically monitoring network states to detect link failures and congestion. Using IAFSA, the system efficiently balances traffic loads and allocates resources by improving convergence speed and optimization accuracy. This process ensures reduced latency, efficient bandwidth utilization, and rapid recovery from link failures. The outcomes validate the effectiveness of the suggested framework, representing significant improvements in throughput, fault tolerance, and network resilience associated to traditional methods. The framework not only strengthens the robustness and

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scalability of WMNs but also offers a promising solution for IoT systems and other resource-constrained environments.

**Keywords:** Wireless Mesh Networks (WMNs), Software-Defined Networking (SDN), Traffic Balancing, Internet of Things (IoT), Intelligent Artificial Fish Swarm Algorithm (IAFSA).

## 1 Introduction

The Internet of Things (IoT) is one of the most important technologies of the twenty-first century. A surrounded workstation with networking and sensing abilities is referred to as an IoT object. More infrastructure is needed to exchange data with the base station as IoT networks expand, and the communication distance with the Internet widens as well (Kavitha et al., 2022). The nodes in WMN create an ad hoc network to create mesh connectivity between them, making it a self-configured and self-organized network. Transport system, broadband home networking, emergency response communication, public safety, community network, and building automation are some of the many uses for WMN (Narayana & Hosur, 2022). These networks provide scalable and reasonable explanations for a range of applications, such as smart cities, industrial computerization, and general IoT perfections (Pandey & Gupta, 2024). Nevertheless, WMNS has faced many obstacles that disrupt overall network performance, such as dynamic connection failures, uneven traffic allocation and ineffective resource usage (Fogli et al., 2022). Software-Defined Networking (SDN) has historically been used in wired and fixed environments with several nodes, like data centers and businesses (Maulana et al., 2024). These approaches have difficulty in allocating resources efficiently, which increases delay, causes congestion, and reduces tolerance (Peydayeshi & Karimi, 2017). Software, SDN, which enables unified control, network programmability, and dynamic traffic management, presents a viable way to obtain these restrictions (Singh et al., 2021). To improve WMN performance, integrate SDN with IAFSA and optimize resource allocation, traffic balance, defect recovery and adaptive IoT scalability. Real-time processing limitations include high computing complexity, increasing energy consumption, difficulty changing IoT environment, and possible scaling problems (Prakash & Khanna, 2024).

## 2 Related Work

Adaptive routing and frequency selection were implemented in WiFi modules to create a lightweight, SDN-based multi-hop mesh network (Abdollahi et al., 2021). Mininet-WiFi tested the system in dense networks and expanded Dijkstra's algorithm for non-overlapping frequency bands with N2 processes. By adjusting to WiFi traffic and favouring routes and frequencies over shortest-path techniques, the results demonstrated increased throughput (Bhatia & Bansal, 2024). The SDFog-Mesh controller made it possible for IoT-based smart infrastructures to use wireless mesh networks for microservice execution and in-network computing (Ali et al., 2022). The scalability of fog communication was assessed using a testbed and Mininet-WiFi based on setup time, flow formation, execution time, and Quality of Service (QoS) in a MQTT-based IoT application. The outcomes indicated that SDFog-Mesh enhanced fog node selection, improved QoS, and reduced setup time.

An SDN-based system called REWIRE improved mesh networks in smart cities in terms of communication, dependability, and flexibility (Mamatas et al., 2023). It made use of SDN with containerized stacks and clustering and change point (CCP) for flexibility, Delay Tolerant Networking (DTN) for delay reduction, and Named Data Networking (NDN) for data retrieval (Soyipov et al., 2024). Tests conducted on two test bands for smart cities showed that communication, dependence and network change were detected. Software-Defined Hybrid Wireless IoT (SDHW-IoT) Integrated Software-

Defined Wireless Aries Network (SDWMN) and Software-Defined Wireless Sensor Network (SDWSN) to regulate the network traffic and reduce the congestion through the use of customized logging-based entry control mechanisms (Opt-CM) (Kumar et al., 2021). Opt-ACM was formulated as a Mixed-Integer Linear Programming (MILP) issue and tested against other protocols using Gurobi and Mininet-WiFi. The findings performed better with congestion and network performance with better packet delivery ratio (PDR), decrease in packet loss ratio (PLR), and significant improvement in delay and nervousness (Gupta & Verma, 2025). The efficiency of the traditional IoT system was limited by scalability and safety (Abid et al., 2022) issues. Network function virtualization (NFV) and software-defined networking (SDN) were assessed as ways to improve network connections and flexibility (Khyade, 2018). Research analysis of various SDN/NFV deployments showed how they can increase IoT performance, flexibility and overall effectiveness.

### Intelligent Network Disruption Forecasting in SDN-WMN

SDN-WMNS requires the swift identification and resolution of link disruption due to radio intervention, noise, mobility or congestion. A traffic management approach guarantees adaptive identification, rapid recovery and optimal network performance. The plan to detect an effective failure should reduce computational complexity, ensure accuracy and be on time. Traditional methods, such as propagation HELLO messages, introduce overheads and delay. The strategy to detect a proposed two-layer disruption continuously identifies connectivity issues, increases network flexibility, and separates temporary disruption from major challenges. Figure 1 represents the block diagram architecture of SDN-WMN.

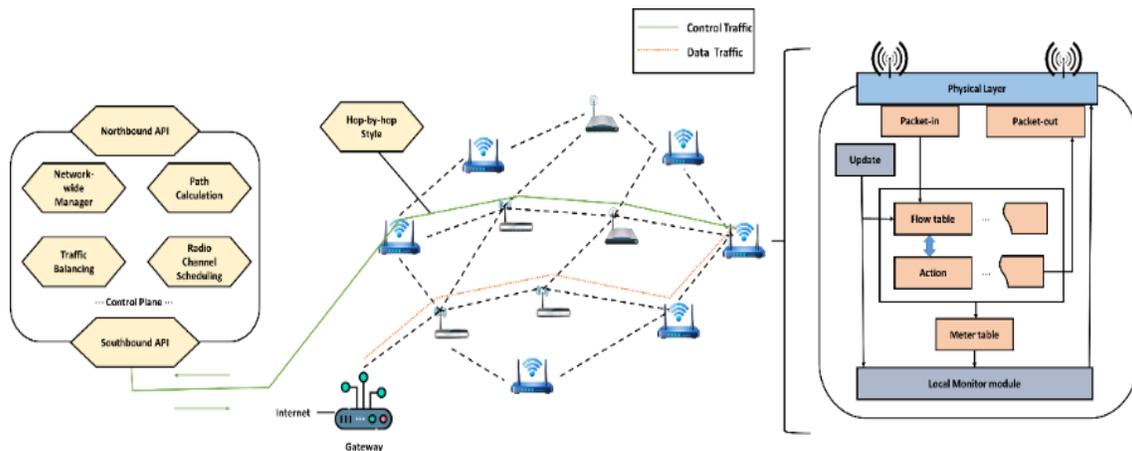


Figure 1: The Block Diagram of SDN-WMN Architecture

**Link Quality Measurement:** The suggested SDN-WMN framework assesses network quality by calculating the signal to noise ratio (SNR) using received signal strength (RSS). Measurement of noise impact and firmware differences. Time  $T_m$  prediction accuracy and latency are impacted by monitoring. Reliability is increased with Kalman filter and smooth SNR. As sender-receiver distance increases, noise has a linear impact on filtered SNR, improving the accuracy of link failure predictions.

### Optimized Traffic Balancing and Alternative Path Selection

The SDN-WMN network model enhances network efficiency through real-time traffic balance and multi-channel resource allocation, adapting the routing based on the lowest control overhead, minimum control overhead and traffic effects

Mathematical Model of SD-WMN: The SDN-WMN network is represented as a graph  $H = (U, F)$ , with traffic demand at node  $u$  defined by  $TD_u$ . Data flows within a single channel are analyzed, and the outgoing traffic demand across different paths is determined using a model. Mathematical model derived by equation (1).

$$\{e_{B1}^{\rho 1}, e_{B2}^{\rho 2}, \dots, e_{An}^{\rho m}\} = \Delta_u \times TD_u \quad \forall u \in U \quad (1)$$

Here,  $e_B^\rho$  represents the transmission rate of flow  $B$  from node  $u$  along path  $\rho$ . Each path  $\rho$  consists of a sequence of connections within the network. The flow rate  $e_B^\rho$  can be expressed as the following equation (2).

$$e_B^\rho = \{\alpha_B^{e(ID:1)} e_{O=in}^{ID:1}, \alpha_B^{e(ID:2)} e_{O=in, \dots}^{ID:2}, \dots, \alpha_B^{e(ID:m)} e_{O=in}^{ID:m}\} \quad (2)$$

The ratio of outgoing flow on the node  $u$  relative to the flow collected along the path  $\rho$  is important for network efficiency, ensuring that the traffic ability does not cross it. It is represented in equation (3).

$$\sum_{o \in e(f)} e^\rho \leq d(f) \quad \forall f \in F \quad (3)$$

The network model addresses radio intervention by ensuring easy data flow by keeping the neighbouring link inactive during transmission. The optimal performance required efficient scheduling and adaptive routing expressed in equation (4).

$$\frac{e_f^{ch(j)}}{d_{ch:j}(f)} + \sum_{f' \in J(f)} \frac{e_{f'}^{ch(j)}}{d_{ch:j}(f')} \leq 1 \quad \forall f \in F \quad (4)$$

When the edge  $f$  is inactive, its intervention can activate several neighbouring edges within the set  $J(f)$ , allowing more efficient use of network resources and better data transmission derived by equation (5).

$$\frac{e_f^{ch(j)}}{d_{ch:j}(f)} + \sum_{f' \in J(f)} \frac{e_{f'}^{ch(j)}}{d_{ch:j}(f')} \leq D_{J(f)} \quad \forall f \in F, j \in L \quad (5)$$

Balance the data flow between the relay nodes for network efficiency and congestion prevention. Traffic analysis and intervention matrix identify the effects of competitive links for optimal display and spontaneous data flow in the following equation (6).

$$E_{u:in}^{ch(j)} = \sum_{f \in F_{in}(u)} E_f^{ch(j)}; \quad E_{u:out}^{ch(j)} = \sum_{f \in F_{out}(u)} E_f^{ch(j)} \quad (6)$$

Suppose the node  $u$  uses  $L$  channels for data broadcasting, total data flow is distributed to these channels to adapt the network performance and reduce the crowd in equation (7).

$$\sum_{j \in L} E_{u:out}^{ch(j)} = \sum_{j \in L} E_{u:in}^{ch(j)} = \forall u \in U, \{E_{u:out} \cup E_{u:in}\} \subset \{e(u, \sim), e(\sim, u)\} \quad (7)$$

The total traffic of the node  $u$  excludes the origin or receives the flow, which optimizes the network performance by maximizing the flow transmitted by following the obstacles, prioritizing  $\omega$  with weight factor and prioritizing the QOS requirements. There are represented in equation (8).

$$\begin{aligned} & \text{Max: } \sum \omega O \times \alpha_B^{e(ID:j)} e_O^{ID:j} \\ \text{Subject to: } & \{e_{B1}^{\rho 1}, e_{B2}^{\rho 2}, \dots, e_{Bm}^{\rho m}\} = \Delta_u \times TD_u \quad \forall u \in U \quad \sum_{\rho \in e(f)} e^\rho \leq d(f) \quad \forall f \in F \\ & \sum_{j \in L} E_{u:out}^{ch(j)} = \sum_{j \in L} E_{u:out}^{ch(j)} \quad \forall u \in U, \{E_{u:out} \cup E_{u:in}\} \subset \{e(u, \sim), e(\sim, u)\} \\ & \frac{e_f^{ch(j)}}{d_{ch:j}(f)} + \sum_{j \in L} \frac{e_{f'}^{ch(j)}}{d_{ch:j}(f')} \leq D_{J(f)} \quad \forall f \in F, j \in L \end{aligned} \quad (8)$$

Adaptive Traffic Management for Network Disruptions: Prioritize shorter routes for control overhead and maintain the original route if disruption occurs, reducing flow table updates and control traffic. The SDN organizer manages rerouted circulation by identifying optimal pathways and setting a threshold to mitigate congestion, ensuring efficient distribution without disrupting other flows shown by equation (9).

$$TD_e^{ct} \leq \Phi_e^{ct} \quad \forall e \in TD^{ct} \quad (9)$$

The IAFSA optimizes traffic distribution using real-time network monitoring, reducing control overhead and improving network resilience, particularly in IoT-based Wireless Mesh Networks represented in equations (10) and (11).

$$TD^s = TD + TD^{ct}TD^s \leq (TD + \Phi^{ct}) \quad (10)$$

$$\{a_{B1}^{\rho1}, a_{B2}^{\rho2}, \dots, a_{Bm}^{\rho m}\} = \Delta_u \times TD_u \quad \forall u \in U \quad (11)$$

Where  $a_B^\rho$  represents the traffic flow rate along path  $\rho$ . To prevent congestion, the rescheduled load ( $a^\rho(f)$ ) on any link  $f$  must stay within capacity, ensuring efficient traffic flow and optimized resource allocation in dynamic SDN-driven WMNs. This is demonstrated by equation (12).

$$\sum_{\rho \in a(f)} a^\rho(f) \leq d(f) \quad \forall f \in F \quad (12)$$

A constraint is introduced for access and outlet flows to stop queue overflow at every node, ensuring stable traffic management and efficient data processing in equation (13).

$$\sum_{j \in L} E_{u:out}^{ch(j)} = \sum_{j \in L} E_{u:in}^{ch(j)} \quad \forall u \in U \{E_{u:out}^{ch(j)} \cup E_{u:in}^{ch(j)}\} \subset \{a(u, \sim), a(\sim, u)\} \quad (13)$$

Equation (14) provides the limitation for radio channels.

$$\frac{a_f^{ch(j)}}{d_{ch:j}(f)} + \sum_{f' \in J(f)} \frac{a_{f'}^{ch(j)}}{d_{ch:j}(f')} \leq D_{J(f)} \quad \forall f \in F, j \in L \quad (14)$$

Alternative routing minimizes control overhead by optimizing traffic flow adjustments, ensuring network stability and efficiency in equation (15).

$$\begin{aligned} & \text{Min: } \sum_{f \in F} \|a_B^\rho(f) - e_B^\rho(f)\|_1 \\ & \text{Subject to: } TD_e^{ct} \leq \Phi_e^{ct} \quad \forall e \in TD^{ct} \\ & \sum_{\rho \in a(f)} a^\rho(f) \leq d(f) \quad \forall f \in F \\ & \sum_{j \in L} E_{u:out}^{ch(j)} = \sum_{j \in L} E_{u:in}^{ch(j)} \quad \forall u \in U, \{E_{u:out}^{ch(j)} \cup E_{u:in}^{ch(j)}\} \subset \{a(u, \sim), a(\sim, u)\} \\ & \frac{a_f^{ch(j)}}{d_{ch:j}(f)} + \sum_{f' \in J(f)} \frac{a_{f'}^{ch(j)}}{d_{ch:j}(f')} \leq D_{J(f)} \quad \forall f \in F, j \in L \end{aligned} \quad (15)$$

The equations optimize traffic engineering by managing link capacity, node throughput, and collision avoidance. The central controller dynamically adjusts traffic flow using an L1 norm-based optimization, solvable in polynomial time via linear programming.

### Intelligent Artificial Fish Swarm Algorithm (IAFSA)

Optimization may be hampered by the set visual and step of the typical AFSA. The IAFSA adds adaptive parameters to improve resource allocation and traffic management in dynamic SDN-WMNs, increasing accuracy and adaptability.

The New AF Population: Opposition-based reinforcement learning optimizes the distribution of fish swarms, accelerates convergence, and enhances traffic control in dynamic networks. To improve search efficiency and traffic optimization, opposite position  $\tilde{W}_j$  of an artificial fish  $j$  at  $W_j$  within  $[a, b]$  is calculated in equation (16).

$$\tilde{W}_j = b + a - W_j \quad j \in [1, m] \quad (16)$$

Each fish's opposite position  $\tilde{W}_j$  is evaluated, selecting the better fitness  $Z(W_j)$  or  $Z(\tilde{W}_j)$  to optimize traffic management is solved by equation (17).

$$W_j = \begin{cases} W_j & Z(W_j) > Z(\tilde{W}_j) \\ \tilde{W}_j & Z(W_j) < Z(\tilde{W}_j) \end{cases} \quad j \in [1, m] \quad (17)$$

This process generates a refined artificial fish swarm with optimized individuals, enhancing traffic management and resource allocation.

Parameter Variation on IAFSA: A parameter  $\alpha$  is introduced to enhance visual, ensuring a balanced global and local search for improved convergence and traffic optimization. It is defined as the following equation (18).

$$\alpha = \exp\left(-25 \times \left(\frac{s}{s_{max}}\right)^t\right) \quad (18)$$

$\alpha$  adjusts dynamically for balanced search. With  $s$  as the iteration and  $s_{max}$  as the limit,  $t$  controls attenuation speed, set to 3 in IAFSA for optimal traffic optimization. The improved visual is determined as in the following in equation (19).

$$visual = visual \times \alpha + visual_{min} \quad (19)$$

$visual_{min}$  ensures balance; a larger visual aids global search early on, while a smaller visual later enhances local optimization.

A gaussian distribution function is used to adjust step, balancing solution accuracy and iteration speed. It is defined as follows in equation (20).

$$e(w) = \frac{1}{\sigma\sqrt{2\pi}} e^{-(w-\mu)^2/2\sigma^2} \quad (20)$$

A gaussian distribution function with  $\mu = 0$  and standard deviation  $\sigma$  is introduced as an adaptive operator to optimize step, enhancing adaptive search efficiency. It is defined as following equation (21).

$$Step = Step \times e\left(\frac{s}{s_{max}}\right) + Step_{min} \quad (21)$$

$step_{min}$  is set based on problem space requirements. Initially, a larger step speeds up convergence, while a smaller step later enhances solution accuracy for optimal traffic management.

An inertia weight factor ( $\beta$ ) is introduced to enhance search flexibility and balance global and local optimization. Inspired by PSO,  $\beta$  influences movement by adjusting the impact of previous positions and step sizes, ensuring efficient traffic optimization. It is defined as in the following equation (22).

$$\beta = \beta_{start} - \frac{\beta_{start} - \beta_{end}}{s_{max}} \times s \quad (22)$$

Here,  $\beta$  decreases over iterations, enhancing global search early and local optimization later for balanced traffic management.

New Behaviours: The new prey behaviour allows each artificial fish to perform an independent local search. Given the current position  $W_j(s)$ , a new position  $W_j(s + 1)$  is randomly generated within its visual range for improved traffic optimization. it is represented by equation (23).

$$W_j(s + 1) = (1 - \beta)W_j(s) + \beta \times Step \times rand(-1,1) \quad (23)$$

If the new position  $W_j(s + 1)$  improves traffic optimization compared to the current  $W_j(s)$ , it is selected for the next iteration in the SDN-WMN-IAFS framework in equation (24).

$$W_j(s + 1) = W_j(s) \tag{24}$$

The new swarm behaviour calculates the central position as the average of all artificial fish positions. The next position  $W_j(s + 1)$  is then determined for optimized traffic distribution in equation (25).

$$W_j(s + 1) = (1 - \beta)W_j(s) + \beta \times \frac{W_D - W_j(s)}{|W_D - W_j(s)|} \times Step \times rand(0,1) \tag{25}$$

If the new position  $W_j(s + 1)$  improves traffic optimization over  $W_j(s)$ , the artificial fish moves toward the central position  $W_D$  within a random distance. New follow behavior increases traffic adaptation by directing each artificial fish to perform best within its visual range, improves efficiency and resource allocation in equation (26).

$$W_j(s + 1) = (1 - \beta)W_j(s) + \beta \times \frac{W_{best} - W_j(s)}{|W_{best} - W_j(s)|} \times Step \times rand(0,1) \tag{26}$$

### Experimental Findings

A Windows 10 system with an Intel i7 processor and 16GB of RAM was used to implement the SDN-WMN-IAFS framework. Mininet-WiFi and NS-3 were utilized for simulations, and NumPy and SciPy in Python were used for IAFSA optimization. MATLAB was used to analyse performance. Table 1 represents the performance metrics for SDN-WMN-IAFS values and Figure 2 illustrates the performance metrics for (a) Throughput (Mbps), (b) Latency (ms) and Resource Utilization (%), and (c) Fault Recovery Time and Convergence Speed.

Table 1: Performance Metrics for SDN-WMN-IAFS

Epoch	Throughput (Mbps)	Latency (ms)	Fault Recovery Time (s)	Resource Utilization (%)	Convergence Speed (s)
10	220	85	4.8	78	4.5
20	260	70	3.6	85	3.8
30	280	60	3.0	88	3.3
40	300	50	2.5	90	3.0
50	320	45	2.0	92	2.7
60	340	38	1.8	94	2.5

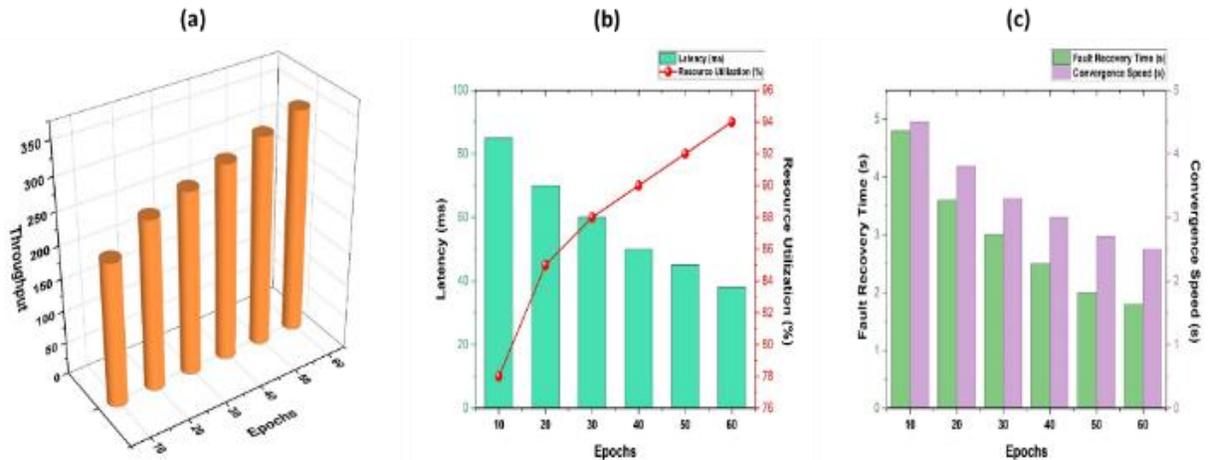


Figure 2: Performance Metrics (a) Throughput (Mbps), (b) Latency (ms) & Resource Utilization (%), and (c) Fault Recovery Time and Convergence Speed

The SDN-WMN-IAFSA system demonstrates significant performance improvements throughout training. With optimized traffic management, throughput rises to 340 Mbps (epoch 60), ensuring efficient data transmission. Latency drops 38 ms, enhancing network responsiveness. Fault recovery time decreases 1.8s, accelerating link failure detection. Resource utilization improves 94%, highlighting better bandwidth allocation. Additionally, convergence speed increases 2.5s, optimizing network operations. These results confirm that IAFSA effectively enhances SDN-WMN performance in dynamic IoT environments, making it ideal for adaptive resource management.

### 3 Discussion

The SDN-WMN-AFSA structure makes sufficient improvement in wireless Aries network performance. Compared to the traditional SDN-WMN model, it increases the throughput (220 Mbps to 340 Mbps), reduces delay (85 ms to 38 ms), and ensures faster and more stable data transmission. Fault healing time falls from 4.8S to 1.8S, demonstrating the gadget's capacity to fast detection and deal with community failures. Furthermore, the increase in resource usage (78% to 94%) emphasizes the efficient use of bandwidth, which lowers congestion and enhances scalability. Rapid convergence speed (4.5 to 2.5s) confirms better adaptation capabilities of IAFSA compared to traditional approval methods. IAFSA guarantees robust and effective resource management by dynamically adjusting to network conditions, which makes SDN-WMN-AIFSA a promising option for widespread IoT applications.

### 4 Conclusions

The SDN-WMN-AFSA architecture associates SDN-based control mechanisms with IAFSA-driven adaptation to improve adaptive resource management in the Wireless Aries Network (WMNS). This architecture's stable traffic distribution and dynamic resource allocation greatly increase network flexibility and efficiency. Experimental results show a fast mistake recovery time of 1.8 seconds, low latency of 38 ms, and high throughput of 340 mbps when compared to traditional methods. In addition, 94% of resources are used, guaranteeing optimal bandwidth distribution. Despite obstacles such as computational difficulty, this development keeps SDN-WMN-AIFSA in position as a scalable and effective solution for IoT-powered WMNS. To further increase network performance, future research will focus on real-time adaptation, energy efficiency growth and comprehensive IoT integration.

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## Authors Biography



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**Dr.V. Aruna** earned her Ph.D. in Knowledge Management from Manonmaniam Sundaranar University, with her research centered on Knowledge Sharing and Information management. She holds an MBA in Marketing and Human Resources from Anna University and a B.Tech in Information Technology from Madras University. She is currently serving as an Assistant Professor in the Department of Management Studies at St. Joseph's Institute of Technology. Dr. Aruna has over two years of teaching experience and three years of industry exposure. She has authored a textbook on Digital Marketing and has published 10 research papers in reputed journals as well as in national and international conferences.



**Dr.R. UdayaKumar** completed his M. S (Information Technology and Management) from A.V.C. College of Engineering and Awarded Ph.D. in the year 2011. He is serving in Teaching & Research community for more than two decades, he successfully produced 5 Doctoral candidates, he is a researcher, contribute the Research work in inter disciplinary areas. He is having h-index of 27, citation 2949(Scopus). He is associated as Dean –Department of computer science and Information Technology and also Director IPR, Kalinga University, Raipur, Chhattisgarh.



**Umidjon Jurayev**, PhD in Technical Sciences, is an Associate Professor in the Department of Information Technologies at Gulistan State University, Uzbekistan. His academic and research interests lie in the fields of network architecture, wireless communication, and Internet of Things (IoT) systems. He specializes in Software-Defined Networking (SDN) approaches for adaptive resource management within wireless mesh networks. Dr. Jurayev's work focuses on enhancing the scalability, flexibility, and efficiency of IoT infrastructures by leveraging programmable network solutions. He is actively engaged in developing innovative models that support dynamic resource allocation and intelligent decision-making in modern networked environments.



**Madina Safarova** is a basic doctoral researcher specializing in the History of Pedagogical Teachings at Jizzakh State Pedagogical University, Uzbekistan. As part of her academic pursuits, she contributes to interdisciplinary research such as Resource Management, exploring the educational and theoretical implications of technological advancements in modern learning environments. Her broader research focuses on the evolution of pedagogical thought and its relevance to contemporary educational challenges. Through this dual engagement, Ms. Safarova aims to bridge historical pedagogical frameworks with emerging innovations in education and technology.



**Dr.P. Srinivasan** is a Professor and Head in the Department of Computer Science and Engineering (AI and ML) at Paavai Engineering College since June 2023. Previously, Dr. P. Srinivasan has held many prominent academic and administrative positions such as Professor and Head in the Department of Artificial Intelligence and Data Science at Muthayammal Engineering College and NBA and NAAC Coordinator from 2005 to 2023. He earned his Ph.D., in Computer Science and Engineering from Anna University before which he obtained a Master's degree in Computer Science and Engineering and a Bachelor's degree in Computer Science. On the professional front, He has completed a research project received from Tamil Nadu State Council for Science and Technology (TNSCST). He also received 3 seminar grants from DST (SERB) and 1 from ISTE in the contemporary technology of Artificial Intelligence. Dr. P. Srinivasan's areas of interest encompass Machine Learning, Deep Learning, Data Science and Computer Vision. He is currently engaged with pioneering research on Artificial Intelligence in the field of Agriculture and Deep Learning in the field of Crop Health Care. His vast knowledge has been shared through seminars and workshops and guest lectures at various prestigious forums. He is the author of over 28 research articles in the International Journals and published 25 papers in the International Conferences and successfully guided four Research Scholars as a DC Member, fostering a culture of academic excellence in the Department of AI. Dr. P. Srinivasan's contributions extend beyond academia, as he has life time membership in 9 professional societies and he also received 2 awards from prominent professional organizations and also possessed N number of Certificate Courses. He holds 9 patterns deriving from his research. As of 2023, Google Scholar reports over 100 citations with 4 h-index and 4 i10-index to his work.