

# **COMMUNICATION AND NETWORKING**

# **A Study on Firewall System, Scheduling and Routing using pfsense Scheme**

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## **ABSTRACT**

The usage of online network in day-to-day life is inevitable. Firewalls are used to safeguard essential networks from outdoor attacks to guide network access based on the firewall access rules. The firewall system plays an important aspect that protects from rule analyst and malignant attack which provides security to all the internet users.

The firewall system is located between the concealed network and the Internet which enforces the security access rule by controlling the links to be established between the two or more networks. In every network traffic should pass through the firewall, which allows only acceptable traffic flows. The main purpose of this firewall system is to manage the network access to or from a secured network. Some difficulty with the process of firewall system is due to malfunction, it might be terrible to other fewer secured systems on the internal network.

The detecting malignant packets are very significant in security issues. Therefore, this thesis proposes a Similarity Index Algorithm which is to detect the malignant packets in the firewall framework. The performance of the proposed firewall system is evaluated using Network simulator version 2 environments in terms of latency and malignant packet detection rate with respective to the number of nodes or computers in network. Experiments were conducted in various schemes using Similarity Index Algorithm. The results showed the enhanced performance of packet delivery ratio. To achieve the above objective, three approaches have been proposed for summarization.

In the first approach, firewall access rule routing and scheduling using pfsense scheme is employed. The access rules are network security rules that can be set by the network authority to allow traffic to respective web servers. The pfsense is a software tool that provides enthusiastic support to firewall system. The pfsense can be enhanced through web system. The proposed system initially realizes the available information and services. The proposed method adds two phases namely rule fixture and rule matching. This phases explains rule scheduling that can be planed to be achieve only at transparent period of time. The evaluation of the proposed approach is done with the help of scheduling in the time interval. While comparing with existing approach the range can be calculated with the 95% of latency.

In the second approach, data accessing can be processed by analyzing the real problem in packet confinement. The extracted packet confinement examines the network traffics to determine and analyze the computer network problem. The proposed approach realizes the Deep Packet Confine (DPC) and Deep Packet Assessment (DPA) to evaluate high traffic rate. The updated feature helps to assess disputation analyses to determine security threat. The proposed model explains packet framing and packet filtrate. The framing model provides records to organize information and client data. The filtrate investigates entry and exit by granting communication using specified rules. The Deep packet assessment enables the client service and summary is generated using diagnostic tools. Finally statistics report can be analyzed and the bytes value used 100Mbps to enlarge the organization policy.

In the third approach experiment evaluation shows the proposed method has the capability of perceiving a movement percentage of new attacks. It explains that the system detection can be developed by using Similarity Index Algorithm. The Similarity Index Algorithm analyzes the inward packets recognized using malignant packet detection and decides to precede packets through gateway. The implementation in firewall contributes powerful security that can be applied to all network traffic. The efficient summary is to assure data communication mechanism in the networks. The result demonstrates the gateway operation can be turned on by investigating the each packet. Ultimately the range of packet can be boosted to detect all types of illegitimate packets while comparing with the Deep packet confinement and pfsense respectively. Finally the result shows latency and malignant packet detection rate of the proposed firewall architecture is 14.74 ms and 87%, respectively.

**Keywords:** firewall system, Firewall access rule, pfsense

# **An Effective Channel Access Mechanism for Data Transmission in Hetrogeneous Cognitive Radio Sensor Networks**

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## **ABSTRACT**

Wireless sensor networks (WSN) function in ISM (Industrial Scientific and Medical) band undergoes unlimited interference problem due to overcrowded sensor nodes and also, it consumes large amount of energy to transmit data. To make an effective use of the spectrum more efficiently Cognitive Radio technology is integrated to Wireless Sensor Networks. The so-called cognitive radio and wireless sensor networks together form a new terminology

known as cognitive radio sensor networks, thereby utilizes the spectrum more efficiently by accessing licensed channels. However, in order to support cognitive radio (CR) such as channel discovery, switching and accessing licensed channel in wireless sensor networks makes the task more complex since CRSN utilizes more energy. In pursuance of a solution to the existing, this work has devised a new mechanism by effectively accessing the channel in CRSNs, to improve the energy utilization. Based on the cognitive radio functions and capability, this work has further investigated that when the nodes should shift the channel i.e. from licensed band to ISM band for improving the energy efficiency, in accordance with the packet drop measure of the license-free channel. This work has proposed the effective channel accessing and switching mechanism for data transmission within a cluster and outside cluster in CRSN. The simulation results of the proposed algorithms show that reduction of energy utilization in CRSNs.

**Keywords:** ISM(Industrial Scientific and Medical) Band, Cognitive Radio Sensor Networks Spectrum, Licensed Channel.

# **A Low Traceback and Zero Logging Overhead IP Traceback Approach for Communication Networks**

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## **ABSTRACT**

In an IP address spoofing attack, attackers send IP packets from a forged source address in order to camouflage themselves. Denial of Service attacks quite often employs IP spoofing to overwhelm a target with packets that appear to have come from legitimate IP addresses. Such attacks may be prevented by tracing these attacks back to their origin. IP traceback is a technique which plays a vital role in finding the source of spoofed packets. This paper reviews an ICMP traceback method, SPITRI and suggests a few changes in the way the packets are marked and tracked back. The proposed marking scheme reduces the number of clock cycles needed for marking and tracking back. Also, it does not require logging at any of the routers. The simulation results demonstrate that the refinements reduce the time for marking and tracing back with 100% accuracy

**Keywords:** IP Spoofing, DoS/DDoS, IP Traceback, Packet Marking, Packet Logging, Traceback Accuracy

# Energy Efficient Cluster Formation in Wireless Sensor Networks based on Multi Objective Bat Algorithm

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## ABSTRACT

Nowadays the design of wireless sensor networks (WSN) includes major challenges that too mainly in the lifetime of sensor nodes. The most crucial factor to increase the lifetime of wireless sensor network is to reduce the energy consumption. In this research, a modified approach called multi objective Bat algorithm is used to find the optimal cluster formation and routing model in wireless sensor networks. The proposed scheme optimizes the energy consumption in wireless sensor networks by selecting the best fittest node as cluster head and modeling of the communication distance by Bat's loudness parameter. The proposed scheme outperforms the LEACH and other clustering protocols. It also extends the lifetime of sensor networks and also it achieves good reliability. The experimental results show that this scheme achieves considerable improvement in accuracy and convergence when compared to Particle swarm optimization.

**Key words:** Wireless sensor networks, Multi objective Bat algorithm, Energy aware, Cluster formation.

# Sink Originated Unique Algorithm for Clustering and Routing to Forward Aggregated Data in Wireless Sensor Networks

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## ABSTRACT

In WSN, efficient communication without compromising the energy of sensor node is the major delinquent issue. In large scale deployment, data redundancy and communication delay will occur due to the crowd of sensor nodes. A Sink Originated Unique Clustering and

Routing Algorithm (UCRA) is proposed which works based on each sensor node's Node Handling capacity and processing load of a sensor node is reduced with the forward tree establishment mechanism. The proposed technique was compared with two well-known techniques, Data Routing for In-Network Aggregation (DRINA) and Efficient Data Collection Aware of Spatio-Temporal Correlation (EAST). UCRA conserves 38% more energy and reduces 24% delay when compared with other two techniques.

**Keywords:**Energy Efficiency, Node Handling Capacity, Data Aggregation, Clustering

# Adaptive Modulation for Wireless Sensor Networks

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## ABSTRACT

There are many variants of modulation techniques used in transceivers of Wireless Sensor Network nodes based on the application for which the nodes are deployed. The option of modulation is based on the channel environment, distance, encoding, etc. By varying the modulation technique in a periodic manner with the analysis of those parameters, an appreciable link quality could be produced. Nowadays as the number of nodes in sensor network is drastically increased that requires good link quality. Considering more parameters in the sensor nodes increases the design complexity of the sensor nodes. This paper provides an easier and effective way of choosing on the modulation technique while maintaining good link quality. This eliminates the complex design while implementing adaptive modulation scheme.

**Keywords—**adaptive modulation, probability of error, cluster head, signal to noise ratio

# **Study of Interline Power Flow Controller in Congestion Management of Power System with Flower Pollination Algorithm**

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## **ABSTRACT**

Inter line Power Flow Controller (IPFC) is one of the converter based latest FACTS controllers. In this paper, the appropriateness of IPFC in congestion management of power system is studied. The main challenging objective of the FACTS controllers is maximizing the usage of the existing system instead of constructing a new one. However, in several practical operating conditions this approach leads to congestion, which further collapse the entire system. Hence, investigation of IPFC in congestion management becomes an area of research interest. For that, an IEEE 30-bus system considered as a test system in MATLAB environment. A relatively latest natural inspired algorithm known as Flower Pollination Algorithm (FPA) estimates the optimal place and size of the IPFC. It mimics the flowering plants reproduction system. For the case study, three practical scenarios like those that overloading, line outage and generator outage are taking into account and adequate results obtained.

**Keywords:** Congestion management, DLUF, FACTS, Flower pollination algorithm, IPFC, LUF

# **Detection of Replica Node Attack Based on Exponential Moving Average Model in Wireless Sensor Networks**

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## **ABSTRACT**

Owing to wireless communication's broadcast nature, Wireless Sensor Networks (WSNs) are vulnerable to several attacks. Amongst, replica attack is one of the predominant attacks as it facilitates the attackers to perform some other attacks. So, it is of great importance to design an efficient security scheme for WSNs. Since wireless sensor networks

are energy restricted, introducing a trust method that assist the well-organized use of the available energy in each node is a primary design concern. In order to tradeoff between lifetime of the network and attack detection accuracy, energy based prediction approach is a suitable one. A statistical method, Exponential Moving Average (EMA) Model based replica detection (EMABRD) is proposed to detect replica node attack based on energy consumption threshold in WSNs. The difference between actual and predicted energy consumption exceeding the threshold level is considered as malicious one. The simulation results are taken using TRM simulator shows that choosing the threshold value neither too large nor too small produces optimum level of detection accuracy and lifetime of the network

**Keywords:** WSN, exponential averaging, threshold, replica node

# **Performance Analysis of Non Cooperative Spectrum Sensing Schemes in 5G Cognitive Radio Networks**

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## **ABSTRACT**

Cognitive Radio Networks (CRN) and the Fifth Generation of wireless cellular standard (5G) is considered as the vital solution for the increasing usage of cellular and internet services. 5G Architecture consists of interconnection of different wireless networks, including LAN, WAN, World Wide Web. The usage of smart antennas, CDMA technologies and CRN will lead to the development of the ultra-high speed and efficient 5G network. The unoccupied wireless channels in the spectrum band can be effectively utilized by using an intelligent radio called “Cognitive Radio”, thereby eliminating the user interference and blockage. Cognitive radio network monitors the nearby radio links and tracks information regarding the availability of the spectrum. Collected information and data are used to provide the access to the cognitive radio users while guaranteeing the normal operation of the licensed users. In this context, spectrum awareness and spectrum exploitation techniques are the major mechanisms of cognitive radio technology. Among these, spectrum sensing comes under the spectrum awareness technique. It plays a major role in any CRN for a better selection of the radio link from the available pool of spectrum. This paper exploits various non cooperative spectrum sensing methods such as Energy Detector, Matched Filter, Covariance Detector and Eigen value based detector. These spectrum sensing algorithms are simulated and the simulation results are analyzed and compared.

**Keywords:** CRN, 5G, Spectrum sensing, non cooperative



# **Analysis and Experimental Evaluation of Routing Protocol for Static and Mobile Challenging Environment in WSNs**

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## **ABSTRACT**

Targeting a growing number of promising application domains in wireless sensor network nodes can be either static or mobile, towards on the recent applications. Dealing with mobile sensor can made some interest in design of routing protocol, especially network layer. To address difficulties and challenges require mobility aware algorithms need to be predict both static and mobility, quality of service, localize needed to be established. This paper surveys current state of art of routing protocols with focus on currently proposed routing protocol confer type of node, control technique, and parameters. Interestingly this paper also associate hardware testbed results provides way towards approaching future directions for researchers in the field of wireless mobile sensor network.

**Keywords:** Wireless Sensor Networks, Routing Protocol, Mobility, Energy efficiency

# **Improving TCP's Throughput and Fairness Stability in Vehicular Network**

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## **ABSTRACT**

Throughput and fairness performance of transmission control protocol (TCP) worsens critically under vehicular environment due to its weakly bounded congestion threshold parameter, rate reduction approach and congestion recovery algorithm. In this paper, a new congestion control algorithm for vehicular networks, called VC-TCP (Vehicular customized - TCP) is proposed to overcome the limitations of the existing independent congestion control approaches. The VC-TCP implements a newer congestion threshold parameter, which regulates the spurious rate reduction due to an abrupt increase in RTT spike value. During the congestion control process, VC-TCP uses a new recovery algorithm and bandwidth

utilization based rate reduction, which substantially improves the flow fairness of TCP traffic flows with different bandwidth utilization levels. The throughput, flow fairness, and packet latency performances of VC-TCP is evaluated against the standard Vegas congestion control approach under simulated vehicular scenarios. The simulation outcomes verify the performance improvement of the proposed VC-TCP approach against the standard TCP variants in the different facets of the vehicular environment.

**Keywords:** Vehicular Ad-Hoc Network (VANET), Transmission Control Protocol (TCP), Intelligent Transportation Systems (ITS)

# **Design of UWB High Gain Modified Bowtie Antenna for Radar Applications**

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## **ABSTRACT**

The Ultra-Wideband high gain modified bowtie antenna is presented for radar applications. The proposed antenna is designed by stepped cut microstrip feed in antipodal slotted bowtie antenna with reflector at the bottom side of an antenna to achieve high gain of 4.45dB with S11 is less than - 10dB and bidirectional radiation pattern. The overall size of an antenna is 37.5 X 57 X 1.6 mm<sup>3</sup> using FR4 substrate. Finally the simulated results of the proposed antenna is analyzed for agreeing the radar applications.

**Keywords:** UWB antenna, gain, bandwidth and radar applications.

# **A Compact Stair Case Monopole UWB Antenna for Radar Applications**

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## **ABSTRACT**

A compact Ultra Wideband monopole antenna with improved gain and directivity is presented for microwave imaging applications. Introducing the staircase steps at the edges of the patch antenna improves the gain, bandwidth of the proposed antenna. Defective ground

structures at the ground plane suppress the surface wave currents and result in a better impedance matching over the operating frequency of 1.6GHz – 10.2GHz for -10dB reflections. The proposed patch results in an improved gain and directivity of 5 dB and 6.35 dB respectively.

**Keywords:** monopole antenna, defective ground structure, directivity, gain, UWB