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Review on Fog Based Spectrum Sensing for Artificial Intelligence

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ABSTRACT

Wireless Mesh Network (MWN) could be divided into proactive routing, reactive routing and hybrid routing, which must satisfy the requirements related to scalability, reliability, flexibility, throughput, load balancing, congestion control and efficiency. DMN (Directional Mesh Network) become more adaptive to the local environments and robust to spectrum changes. The existing computing units in the mesh network systems are Fog nodes, the DMN architecture is more economic and efficient since it doesn't require architecture- level changes from existing systems. The cluster head (CH) manages a group of nodes such that the network has the hierarchical structure for the channel access, routing and bandwidth allocation. The feature extraction and situational awareness is conducted, each Fog node sends the information regarding the current situation to the cluster head in the contextual format. A Markov logic network (MLN) based reasoning engine is utilized for the final routing table updating regarding the system uncertainty and complexity.

Keywords : WMN, Cloud Storage and Data Sharing.

I. INTRODUCTION

Wireless mesh network (WMN) is a radical network form of the ever evolving wireless networks that marks the divergence from the traditional centralized wireless systems such as cellular networks and wireless local area networks (LANs). Similar to the paradigm shift, experienced in wired networks during the late 1960s and early 1970s that led to a hugely successful and distributed wired network form— the Internet—WMNs are promising directions in the future of wireless networks. The primary advantages of a WMN lie in its inherent fault tolerance against network failures, simplicity of setting up a network, and the broadband capability. Unlike cellular networks where the failure of a single base station (BS) leading to unavailability of communication services over a large geographical area, WMNs provide high fault tolerance even when a number of nodes fail. Although by definition a WMN is any wireless network having a network topology of either a partial or full mesh topology, practical WMNs are characterized by static wireless relay nodes providing a distributed infrastructure for mobile client nodes over a partial mesh topology. Due to the presence of partial mesh topology, a WMN utilize multihop relaying similar to an ad hoc wireless network. Although ad hoc wireless networks are similar to WMNs, the protocols and architectures designed for the ad hoc wireless networks perform very poorly when applied in the WMNs. In addition, the optimal design criteria are different for both these networks. These design differences are primarily originated from the application or deployment objectives and the resource constraints in these networks. For example, an ad hoc wireless network is generally designed for high mobility multihop environment; on the other hand, a WMN is designed for a static or limited mobility environment. Therefore, a protocol designed for ad hoc wireless networks may perform very poorly in WMNs. In addition, WMNs are much more resource-rich compared with ad hoc wireless networks.

As communications technology evolves beyond 4th generation wireless systems, and as the 5th generation wireless systems (5G) becomes the industry standard, there is an opportunity to identify the technical gaps and challenges facing the wireless communication industry, over the next 20 years, beyond 5G. Leveraging the expertise represented across its stakeholder base, the National Institute of Standards and Technology (NIST) engaged with organizations across all levels of the telecommunications industry (e.g., wireless carriers, equipment and infrastructure manufacturers, and providers of applications and services). These stakeholders provided valuable input on which measurement, technology, and management challenges need to be addressed.

II. LITERATURE REVIEW

[1].Dmesh Incorporating Practical Directional Antennas In Multichannel Wireless Mesh Networks-Wireless mesh networks :

(WMNs) have been proposed as an effective solution for ubiquitous last-mile broadband access. Three key factors that affect the usability of WMNs are high throughput, cost-effectiveness, and ease of deployability. DMesh achieves this improvement without inhibiting cost-effectiveness and ease of deployability by utilizing practical directional antennas that are widely and cheaply available. the throughput of a WMN. Central to our architecture is a distributed, directional channel assignment algorithm for mesh routers that effectively exploits the spatial and frequency separation opportunities in a DMesh network. Simulation results show that DMesh improves the throughput of WMNsby up to 231% and reduces packet delay drastically compared to a multiradio multichannel omni antenna network. High Traffic System,Low Residancy,Exploiting Multiple Channels,Evaluating the Gain From DMesh.

[2].A Topology Control Approach For Utilizing Multiple Channels In Multi-Radio Wireless Mesh NetworksMahesh K. Marina, Samir R. Das :

The channel assignment problem in a multi- radio wireless mesh network that involves assigning channels to radio interfaces for achieving efficient channel utilization. We propose the notion of a traffic-independent base channel assignment to ease coordination and enable dynamic, efficient and flexible channel assignment. We present a novel formulation of the base channel assignment as a topology control problem, and show that the resulting optimization problem is NP-complete. We then develop a new greedy heuristic channel assignment algorithm (termed CLICA) for finding connected, low interference topologies by utilizing multiple channels. Our extensive simulation studies show that the proposed CLICA algorithm can provide large reduction in interference (even with a small number of radios per node), which in turn leads to significant gains in both link layer and multihop performance in 802.11-based multi-radio mesh networks. Channel Allocation is very poor, High Throughput delivery, Good channel allocation.

[3] Dynamic Pricing and Energy Management Strategy for EV Charging Stations under Uncertainties Chao Luo, Yih-Fang Huang and Vijay Gupta:

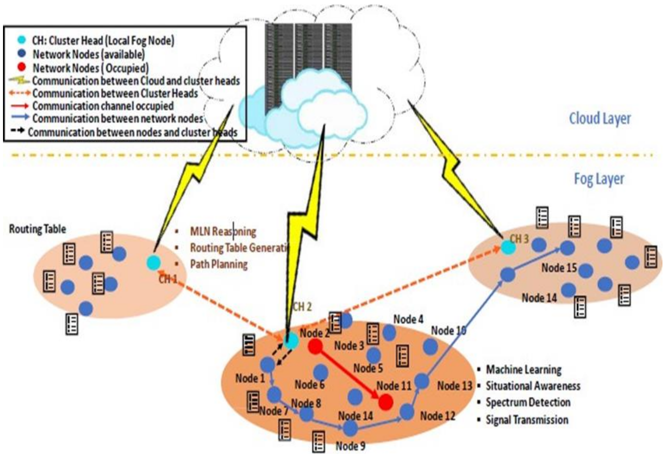
A dynamic pricing and energy management framework for electric vehicle (EV) charging service providers. To set the charging prices, the service providers faces three uncertainties: the volatility of wholesale electricity price, intermittent renewable energy generation, and spatial-temporal EV charging demand. The main objective of our work here is to help charging service providers to improve their total profits while enhancing customer satisfaction and maintaining power grid stability, taking into account those uncertainties. We employ a linear regression model to estimate the EV charging demand at each charging station, and introduce a quantitative measure for customer satisfaction. Both the greedy algorithm and the dynamic programming (DP) algorithm are employed to derive the optimal charging prices and determine how much electricity to be purchased from the wholesale market in each planning horizon. Simulation results show that DP algorithm achieves an increased profit (up to 9%) compared to the greedy algorithm (the benchmark algorithm) under certain scenarios. Additionally, we observe that the integration of a low-cost energy storage into the system can not only improve the profit, but also smooth out the charging price fluctuation, protecting the end customers from the volatile wholesale market.

[4] Inductive Logic Programming Meets Relational Databases: An Application To Statistical Relational Learning Marcin Malec, Tushar Khot, James Nagy, Erik Blasch, and Sriraam Natarajan:

The increasing amount of relational data, scalable approaches to faithfully model this data have become increasingly important. Statistical Relational Learning (SRL) approaches have been developed to learn in presence of noisy relational data by combining probability theory with first order logic. However most learning approaches for these models do not scale well to large datasets. While advances have been made on using relational databases with SRL models they have not been extended to handle the complex model learning (structure learning task). We present a scalable structure learning approach that combines the benefits of relational databases with search strategies that employ rich inductive bias from Inductive Logic Programming. We empirically show the benefits of our approach on boosted structure learning for Markov Logic Networks.

III. SYSTEM DESIGN

The fog gateway routing strategy is an improved version of the cluster head routing protocol by enhancing the gateway with the technique of fog computing. The network is grouped by clusters, each of which is formed by the fog computing node. The cluster head (CH) manages a group of nodes such that the network has the hierarchical structure for the channel access, routing and bandwidth allocation. The CH can only be changed after it lost connection to all other head nodes. The head node stores the routes to other CH nodes and the corresponding routing metrics. input for the cluster heads to conduct the Markov logic.



Network (MLN) reasoning based decision-making updates the routing tables periodically. Besides, the CH nodes will also update the routing table based on the success information delivery and transmission failure as well. Each CH node sends the data summary to the cloud for the system global updating. Each node also maintains the member table and routing table to determine the nearest CH, and the next CH node along the route to the destination. The multiple clusters structure is convenient for the load control. A CH estimates traffic load in its cluster. As the load gets higher, the CH will increase the routing metrics of the routes passing to the destination node. Based on the routing metrics, the CH will select an alternative route to avoid overloaded areas, and as a result, the WMN achieves global load balancing. A routing metric method effectively balances the traffic load and outperforms the traditional routing algorithm for searching the route with minimized expected transmission time.

IV. Related Work

Implementation is the most crucial stage in achieving a successful system and giving the user's confidence that the new system is workable and effective. Implementation of a modified application to replace an existing one. This type of conversation is relatively easy to handle, provide there are no major changes in the system.

Each program is tested individually at the time of development using the data and has verified that this program linked together in the way specified in the programs specification, the computer system and its environment is tested to the satisfaction of the user. The system that has been developed is accepted and proved to be satisfactory for the user. And so the system is going to be implemented very soon. A simple operating procedure is included so that the user can understand the different functions clearly and quickly.

Initially as a first step the executable form of the application is to be created and loaded in the common server machine which is accessible to all the user and the server is to be connected to a network. The final stage is to document the entire system which provides components and the operating procedures of the system.

The major security concern in group-oriented communications with access control is key management. Existing key management systems in these scenarios are mainly implemented with two approaches referred to as group key agreement (or group key exchange by some authors) and key distribution systems (or the more powerful notion of broadcast encryption). Both are active research areas having generated large respective bodies of literature.

4.1 Modules:

- Mesh Network streaming
- Fog based spectrum sensing
- Security based Markov Processing
- Memory Allocation and Deallocation
- Mesh Network streaming

There are a variety of areas for potential research for streaming media over wireless mesh networks, due to the new and their emerging nature and the problems they present.

Fog based spectrum sensing

Signal processing techniques that have been reported in the literature and are suitable for our proposed Fog framework are briefly introduced and summarized

Fog node serves as a machine learning engine, and utilizes various outputs from given spectrum sensing methods

Security based Markov Processing

The Fog layers of which the output would be input for the decision making.

The decision making is conducted under the framework of Markov logic network (MLN), which can address the issue regarding the sensor reading uncertainty

Memory Allocation and Deallocation

To present the concept, we have taken a cloud environment with multiple clouds along with multiple virtual machines.

All the machines are homogenous. These all clouds are assigned by a specific priority.

Now as the user request arrive, it performs the request to the priority cloud under its requirements in terms of memory & processor capabilities.

V. CONCLUSION

It can reduce the system latency and improve the overall system security. The signal transmission performance regarding the system robustness, resilience, and adaptively. The primary user signals making this sensing technique much more practical comparing to other existing approaches. Future work will focus on the hardware implementation considering the computing capability of each fog nodes and system security.

VI. REFERENCES

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