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IMPLEMENTATION OF EFFICIENT CLOCK SYNCHRONIZATION USING ELASTIC TIMER TECHNIQUE IN IOT

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ABSTRACT. Synchronizing IoT is the way of executing synchronized tasks allowing the chronological sequential ordering of information. On the basis of existing literature, several research studies have been shown on synchronization approaches. Implementation of Elastic Timer Synchronization technique is proposed that works in the better form in case of Energy Consumption and Convergence Time as compared to standard or basic synchronization technique. The proposed work increases the elasticity of the algorithm and efficient in terms of Energy or Power consumption and network convergence time simultaneously.

1. INTRODUCTION

IoT is a collective integration of devices and sensors that creates a network of connectable objects. The era of IoT spreads in every sector comes in our mind like Healthcare, Industries, Agriculture, Smart Wearables, Transport, Home Automation, Security etc. The IoT is a trending concept showing the growth and connection of devices controlled by the Internet [1]. In general, the count of IoT devices increased in the past few years and is also increasing day-by-day like the globalized value in market of IoT is projected to reach the figure of 7.1 dollar trillion by 2020 [2]. The Figures may be variable from source to source

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but this statement cannot be ignored that IoT devices are increasing day by day world-wide and will continue to increase. A major concern to note in the field of IoT is Clock Synchronization that adjusts the internal signals of clock to sync with the clocks of other available physical devices. Synchronization is a critical issue especially for low power IoT Networks and connecting devices. Synchronization of clocks is a problem highlighted in the research efforts of literature. Several related approaches from the history of literature introduce the overhead of redundant transmissions,increase or rise in the cost of hardware due to the requirement of Global Positioning System. To confirm the sync of two nodes, a relaxation of synchronization requirements has to be considered or multiple Hello/Check messages have to be passed. For the IoT decentralized networks, global time reference may be duplicate, so, relative time is preferred. If the role of nodes of a network is just to sense the channel or information, global time seems redundant.

2. RELATED WORK

Literature revolves around the discussion of various time synchronization strategies. There is an existence of a large extent of Agencies that are working on Security of data based on behavioral or special characteristics of network [3]. Authors also differentiate several representative clock synchronization protocols into those categories [4]. Due to the complex type of synchronization strategies, topologies like Tree, Flooding Time Synchronization Protocol (FTSP) need specific topologies [5]. Few of them need single communication and others need two sided communications. Synchronization can be varied from the sender side and reciever side in the literature [6]. As per the present scenario, people are restricted to use computers and its applications as there is a need of networking facilities to communicate or connect between, People-People, People-Machine and Machine-Machine [7]. Mani et al. proposed the YetiOS operating system that worked using mesh topology that can be installed in heterogeneous structure and should be powered by battery for deployment in various scenarios [8]. Wang et al. discussed that for choosing the synchronization, the two important factors-energy and robustness are helpful that are implemented and used for industrial applications [9]. Fanarioti et al. presented that synchronization of nodes is highly required during transmission of packets from source node to sink node [10]. Alagirisamy et al. researched that novel data aggregation collects data from all the node associations and implements various accumulation functions [11]. Ray elaborated on the architectural knowledge that provides resistance and capability to get the awareness scope of IoT approaches [12]. As it is apparent that the IoT family of end devices can't stop growing and is becoming advanced day-by-day. Therefore, the synchronization of mobile nodes becomes more complex and tedious every day. So, a methodology is required to address the selection of the type of synchronization strategies appropriate for the scenario and network.

3. Proposed Elastic Time Synchronization Algorithm

For achieving more security during data transmission, RSA is best as it is one of the first public-key cryptographic systems and preferred over Diffie-Hellman algorithm as the latter is much vulnerable to the security attacks [13, 14]. The proposed Elastic time-synchronization strategy permits the network to achieve reliability in terms of energy-efficiency and low-latency communication [15]. The results demonstrated that Elastic Time Synchronization strategy promotes elasticity and robustness and provide vital resources in case of convergence time, congestion overhead and power consumption for the operation of applications. The proposed work decreases the consumption of energy by suppressing nodes to avoid redundant or duplicate transmission as compared to the previous available standard algorithms. The detailed steps of the proposed Elastic Time Algorithm are as mentioned below:

(1) **Start**
(2) Create a network and deploy sensor nodes in network, apply clustering and select source and destination.
(3) **If QoS degraded, then Set a Timer, T = ON**
(4) **Initialize ANN Parameters**
(5) **For i = 1 T, If T belongs to the property of communicating nodes**
(6) G (1) = Properties of training data according to the real nodes
(7) **Else if T belongs to the property of non-communicating nodes**
(8) G (2) = Properties of training data
(9) **End - If**
(10) **End - For**
(11) Initialized the ANN using T and G-IoT-Net = Newf ($T,\ Group,\ N$)
(12) **Else**

(13) **Timer, T = OFF**
(14) **Required Key matching using RSA encryption technique**
(15) **End - If**
(16) Authentication = simulate (IoT-Net, CSN) and**If Authentication = True**
(17) Genuine sensor node not consider as affected, Else
(18) ASN = ASN
(19) **End**
(20) **Return:** ASN a list of affected sensor nodes
(21) **End**

4. RESULTS AND ANALYSIS OF THE PROPOSED ELASTIC TIME SYNCHRONIZATION ALGORITHM

This section will present the performance of Elastic Time Synchronization Strategy evaluation for parameters like Energy consumption and Throughput. The results demonstrating Elastic time synchronization will then be distinguished by using RSA algorithm. To evaluate the performance of simulation experiments, the MATLAB R2016a simulator was used that helps to show results and values of evaluated performance metrics. Figure 1 and Figure 2 shows the Comparison Graph of Throughput and Energy Consumption. Throughput can be calculated by the following expression:

Throughput=((number of packets received)/(number of packets sent))*time.

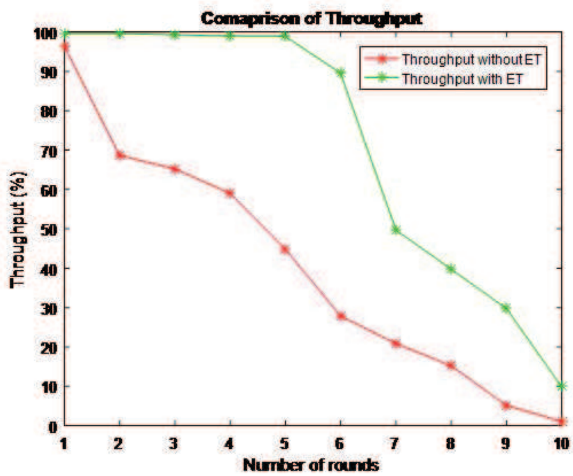

FIGURE 1. Comparison Graph of Throughput

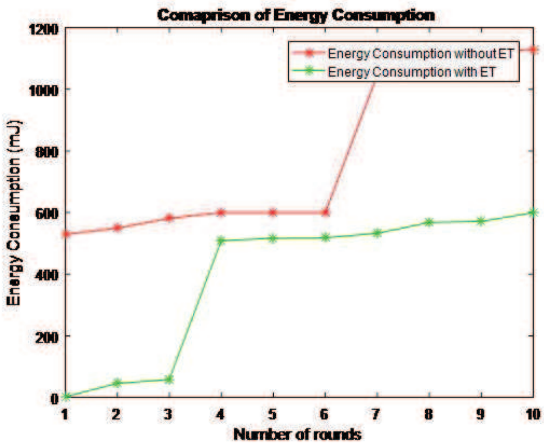

FIGURE 2. Comparison Graph of Energy Consumption

Energy Consumption can be calculated by the following expression:

Energy Consumption=Number of packets transmitted X Per unit Energy.

5. CONCLUSION AND FUTURE SCOPE

The proposed Elastic Time Synchronization methodology ensures efficient time synchronization strategy functioning of any IoT application. The proposed algorithm increases the elasticity of the protocol that guarantees optimality and enables the network configuration in terms of energy consumption and convergence time as compared to previous available algorithms. In Future work, the proposed technique will be used and get evaluated for the testing of performance for more parameters to ensure better synchronization.

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