A Parameteric Estimation Approach to for Effective Cluster Selection in WPAN

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Abstract- WPAN is the most advanced communication network that combines the capabilities of Mobile network and sensor network in a complex global area scenario. This network defines various integrated processes under communication scenario specification. Cluster Selection process is the most common requirement of any WPAN scenario because of the mobility feature for vehicle nodes. In this work, an effective soft-Cluster Selection mechanism is defined under positional and communication parameter analysis. The work is defined for global highway scenario. The obtained results from system shows the effective comm-unication rate and lesser communication loss.

Keywords: WPAN, cluster selection, positional analysis, highway scenario.

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A Parameteric Estimation Approach to for Effective Cluster Selection in WPAN

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Abstract- WPAN is the most advanced communication network that combines the capabilities of Mobile network and sensor network in a complex global area scenario. This network defines various integrated processes under communication scenario specification. Cluster Selection process is the most common requirement of any WPAN scenario because of the mobility feature for vehicle nodes. In this work, an effective soft-Cluster Selection mechanism is defined under positional and communication parameter analysis. The work is defined for global highway scenario. The obtained results from system shows the effective comm-unication rate and lesser communication loss.

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I. Introduction

WPAN is defined as an effective emergy communication network defined under integrated communication capabilities with wireless vehicle node communication. In this nework system, an intelligent vehicle communication is defined under safety, comfort and optimized and directed path identification. Thse communication network required he effective route optimization and the efective comm-unication generation so that the minimum commu-nication throughput is obtained. This kind of network is defined with some specific protocol definition such as GPSR, DSDV etc.

WPAN network is different from mobile network with highly dynamic nature and frquenty change in node position and the node exclusion and inclusion in the network. Generally no node is permanent in this network scenario. The nodes enter to the scenario for a fixed interval and then moves to other network. Each network sceanrio is controlled by a base station. As a vehicle switch between the base station network, this process is considered as Cluster Selection process.

a) Cluster Selection Mechanism

In vehicular area netwrok as the communication is performed on mobile node and the node moves outside its current coverage range controlled by the base station or the cluster head or road side unit. Then, outside the current coverage range, there can exist mul-

tiple such controlleres that can take the charge of the node. All the base station or controller devieces that find a new node in their coverage range, send the access request to that node. This process of request generation is considered as request poll. As a vehicle node get the poll request from multiple base station, It has to elect a base station that will bet the node control. The identification of most effective base station for a node is done using the Cluster Selection mechanism analysis. This analysis is done under the base station strength analysis. From this analysis, the effetive base statoin identification is done. After this identification, the control of the node shifted from earlier base station to this new base station.
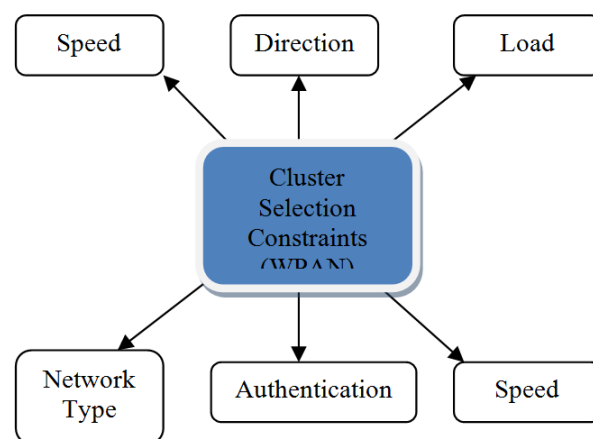

Figure 1 : Cluster Selection Constraints

This process of switching a node between base station is called Cluster Selection mechanism. The Cluster Selection mechanism in vehicular area network is having number of challenges shown in figure 1.

WPAN is most dynamic communication network in which nodes enter to the system for a small interval and the speed of the nodes is very high because of this there is the requirement of a fast analytical approach that perform the analysis on multiple parameters. These parameters includes the positional parameters such as speed and direction. A predictive analysis approach is required to analyze the position or localization of nodes so that effective Cluster Selection will be obtained. The direction aspect is quite important, because if two base stations are having a node coverage then the base station, in direction of which node is moving is more effective. Because over the distance, the signal will bec-ome stronger. The base station load is the parameter to

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decide the network capability. A base station with heavy traffic cannot provide effective Cluster Selection.

In WPAN, the Cluster Selection can be controlled by different kind of network devices such as a cluster head, base station or the RSU. The decision of the reposible component is based on the type of communication scenario. A network type with group mobility perform the Cluster Selection over the cluster wheras in city sceanrio like network base station can be considered. Aother factor reliable Cluster Selection process is the authenticated communicaiton. If the key sharing authenticaiton is defined in such case before the Cluster Selection process, authentication is required to apply.

According to the type of networks involved in the Cluster Selection mechanism, the Cluster Selection is divided in two main classes called horizontal Cluster Selection and vertical Cluster Selection. If the Cluster Selection is performed between two similar networks it is called Horizontal Cluster Selection but if the Cluster Selection is performed between two dissimilar networks, the Cluster Selection mechanism is called vertical Cluster Selection. This mechanism is called network switching mecahism. The hyrbrid networks enables the vertical Cluster Selection. The classification of Cluster Selection process depends on the base stations and the associated applications. This kind of Cluster Selection mechanism is called break before make Cluster Selection mechanism. It enables the one to one commu-nication under the connection network analysis. This network type defines the break connection while performing the Cluster Selection process. The softClu-ster Selection whereas first make the connection with new one and then perform the break with previous one. This does not give any data loss during Cluster Selection process.

In this paper, an effective Cluster Selection mechanism is defined for vehicular area network. The approach has used the communiation and positional parameters for effective base station identification. In this section, an introduction to vehicular area network and Cluster Selection mecahnism is defined. In section II, the work defined by earlier reserchers is discussed. In section III, the proposed WPAN communiation archite-cture is presented. In section IV, the results obtained from the work is discussed. In section IV, the results obtained from the work is presented. In section V, conclusion obtained from the work is presented.

II. Existing Work

In this section, the work done by the earlier researchers on different issues and challenges associated with vehicular network is discussed. This section has defined the contribution of the earlier resear-chers. B. Karp and H.T. Kung [1] has defined a GPSR based routing approach to provide effective commu-

niation in WPAN. Author has defined the routing protocol specificaiton under complexity analysis and packet delivery analsyis in a densed communication network. Author defined the complexity analysis and packet delivery analysis in traffic analysis in route length optimization for protocol message generation and mobility analysis so that the data packet transmission is not performed. Data packet is defined under protocol specification. Johnson and Maltz[2] has defined a traffic analysis approach using DSR. Author defined the packet throughput in the network. Authr defined the route defintion and request analysis so that the destination analysis for propagation for request analysis.

C. Lochert [4] has defined an improved communication for psotion based routing and Cluster Selection process. Author defined work for city scenario and provide the effetive network communiation in such network. Author defined the traffic analysis under multiple parameters and provided topology specific communication to improve delivery rate and latency. Author[7] also defined the GPSR based routing to improve the communication throughput. Authro prsented the comparative sutdy with AODV and DSR protocols so that effective delivery rate will be obtained and the delay will be reduced over the communication. H. FulBler [8] has presnted a location analysis based approach for optimized Cluster Selection process for highwy secnrio. Author defined the topology based mecahnism to provide effective route generation in city scneario. Author presented the broader view under route optimization. Author defined multihop communication approach for real word scanrio.

Author[7] refer to vehicles that link WPAN with the 3G/UMTS network. The present paper addresses these concerns in the envisioned WPAN-UMTS integr-ated architecture and delineates the methodology of dynamic clustering and adaptive gateway manag-ement. Author [9] explores geographical location awareness to support software agent mobility in ad hoc networks. The idea is to evaluate the concept of oppo-rtunistic communication to perform agent migration and mobility among nodes (Cluster Selection), in an infrastructureless vehicular ad-hoc network (WPAN). Author[10] analyzed several Ad hoc routing commun-ications protocol, Responsive, Proactive & Hybrid, lecturing in to consideration several Vehicular Ad-Hoc Network argument corresponding Speed, height etc in actual traffic Scenario. The parameters of Vehicular Ad-Hoc Network (WPAN) are changing demonstrates that in the actual traffic scenarios proactive communication protocol accomplish more efficiently toward energy preservation [8]. Author [11] studied various Ad hoc routing protocols, Reactive, Proactive & Hybrid, taking in to consideration various WPAN parameters like speed, altitude etc in real traffic scenario and evaluated them for various battery models for energy conservation. Author [12] defined novel routing protocols for a sparse

environment in WPAN with the context of utilising the mobility feature, with the aid of the equipped devices, such as Global Position System (GPS) and Navigation System (NS). This approach exploits the knowledge of Second Heading Direction (SHD), which represents the knowledge of the next road direction the vehicle is intending to take, in order to increase the packet delivery ratio, and to increase the route stability by decreasing instances of route breakage.

III. Proposed Model

When we work in a personal area network, in such network the smart sensor devices are attached with different products that can be in static or in moving state. Such as the PAN area defined in a hospital can have some moving devices. Each sensing device is controlled by some controller device. Each controller device is defined with some range specification in which it can control the sensing devices. When these moving sensor moves outside the sensing area then it is required by some other controller device to take the charge of this sensing device. The process of taking the charge or control of some device by some controller is called handoff process. In PAN area where accuracy or the effective throughput is one of the critical factor handoff process is required to be very effective. In this present work, an effective parametric handoff process is proposed in case of wireless PAN.

The presented work is parametric defined under 4 major parameters called energy, direction, throughput and the capacity. As the handoff process is performed, a link break is performed as the node is outside its current sensing range. Now all the controller device, set their eligibility to the node to take its control. This process is called polling. Now as the polling performed, the analysis will be performed to identify the most eligible controller for the device. At the first stage, the physical chararacerstics of the controller devices is taken such as the capacity and the throughput. Base on these analysis the primary decision is taken. Later on at the second level, the direction based analysis is performed. To take this analysis the throughput and distance is analyzed in two time frames. If the distance towards a node is decreasing it shows that the node is moving to that node's direction and the handoff will be performed to that node only. As the network is a sensor network with energy limit, the energy estimation in the handover process is also required to estimate. Here energy is taken as the secondary parameter.

Algorithm

```
Algorithm()
{
1. Define a network with N Nodes with clustered
   Topology
2. Define the Clusters ovr the network with effective
   controller node
3. For i=1 to Count(Clusters)
   [Process All Clusters]
   {
   For j=1 to N
   {
4.
   if(Distance(Node(j),Cluster(i))<SensingRange)
   {
5. Cluster(i).Add(Node(j))
   }
   }
6. Select the Random Set of Pairs of Nodes for Inter
   and Intra-Cluster Communication
7. For i=1 to Length(Pairs)
   [Process All Communication Pairs]
   {
8. Set Src=Pairs(1)
   Set Dst=Pairs(2)
   [Set source and destination node for each node
   pair]
9. if(CommunicationType(Src,Dst)="Intra-Cluster")
   {
10. Perform                          Communication
   Between(Src,ClusterHead)
   Perform                           Communication
   Between(ClusterHead,Dst)
   }
11. else
   {
12. Cluster1=IdentifyCluster(Src)
   Cluster2=IdentifyCluster(Dst)
   PerformCommunication(Src,Cluster1)
   PerformCommunication(Cluster1,Cluster2)
   PerformCommunication(Cluster2,Dst)
   }
   }
13. As Node moves outside its cluster range identify the
   adaptive clsuter list
14. Identify the cluster with effectve throughput,
   capacity and idle Rate called clsuter C
15. ShiftControl (Node, Cluster C)

   }


   }
```

IV. Results

In this prsent work, parameteric Cluster Selection mechanism is defined for WPAN network. The work includes the positional and communication parameter analysis. The is implemented in NS2 network. The simulation parameters considered in this work are shown in figure 1

Parameter	Value
Frequency Band	5 MHz OFDM
Modulation Scheme	1/2 BPSK
No of BS	5
No of MS	50
No of active MS under each BS	5
Simulation duration	10 s
Requested data rate	50 kbps
BS coverage	10 m
Propagation model	Two ray ground
Antenna Model	Omni directional
MS Speed	5 m/min

Table 1 : Simulation Parameters

The analysis of work is defined in terms packet loss anlysis and communication delay analysis. The results obtained from the work are shown here.

Figure 2 : Packet Loss Analysis

Figure 2 is showing the packet loss analysis in proposed approach and the default adaptive approach of protocol. Here x axis represents the simulation time and y axis represents the packet loss. Figure is showing the proposed work has provided the effective communication over the network in specified time. The figure shows that the proposed approach as reduced the packet loss over the network.

Figure 3 : Communication Delay Analysis

Figure 3 showing the packet Delay analysis in proposed approach and the default adaptive approach of protocol. Here x axis represents the simulation time and y axis represents the packet delay. Figure is showing the proposed work has provided the effective communication over the network in specified time. The figure shows that the proposed approach as reduced the packet delay over the network.

V. Conclusion

In this paper, an effective parameteric analysis approach is defined for Cluster Selection process optimization in vehicular network. The work is based on positional and communication parameters. The obtained results shows that the presneted work has improved the packet communicaton and reduced the communication loss and delay.

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