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A Trust Adaptive Model for Mesh Network Reconfiguration

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Abstract— A Mesh network is more reliable wireless technology that provides the low cost and reliable communication with maximum coverage. The network is formed with two kinds of nodes called clients and the mesh routers. Mesh Routers are the fixed position devices that control the region nodes. The placement of these routers is the greater challenge to improve the communication reliability. In this paper, a trust and reliability driven model is provided to configure the mesh network so that the effective load sharing will be done with minimum traffic disruption. The paper has defined the algorithmic model to improve the network communication.

Keywords: Mesh Network, Reconfiguration, Routers, Recovery

I. INTRODUCTION

A dynamic network with adhoc connectivity gives the link failure because of the operating period specific drop or the communication drop because of channel interference, obstacle occurrence or the bandwidth restriction. The link specific channel estimation and coexisting network tracking was provided by the author. The demand specific link formation and communication control is observed to achieve the link maintainance so that the performance will be improved and the failure will be reduced. The number of failures in such network degrades the network performances and affects the communication reliability. The communication recovery is here defined from the deployment specific analysis so that the situation adaptive or the performance adaptive communication will be formed. The existence of different type of devices in such network also increases the communication challenge. A typical mesh network in which the mobility specific communication is performed is shown here in figure 1. The network also defined the communication with channel sharing and interference analysis. The synchronized and scheduled communication is the primary requirement of this network. The linear defined network used the TDMA and FDMA in integrated form to achieve maximum channel utilization. The bandwidth preserved communication is the key strength of this network form. The mesh controller ensures the communication reliability along with load and the channel sharing.

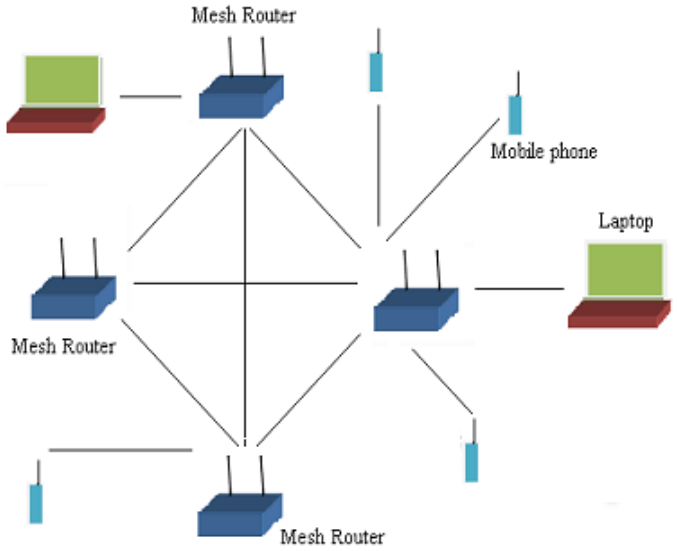

Figure 1: Mesh Configured Network

Here figure 1 is showing the typical mesh network with specification of different control routers and different mobile devices including the mobile phones and the laptops. The dynamic nature of this network can cause the failure. The performance requirement of this network are listed hereunder

A) Recovering from Poor Links

The critical challenge to the network is link quality that affects the network with specification of interference in it. The channel level communication loss can cause the degree of communication loss and packet loss. The number of collisions and the out of coverage also increase the link failure. The reconfiguration is required to provide the recovery from such link level failures.

B) QoS Enhancement

Another requirement of network is to provide the effective communication by improving the network performance under quality vector. The quality is here measured in terms of communication loss, number of switches or the delay. The data and video traffic analysis can be applied to identify the number of links. The relay nodes can be included in the network to reassociate the network and improve the network performance. The radio signal improvement and relative channel estimation is provided to achieve the adaptive network communication in robust network environment.

C) Handling Channel Unavailability

As the network is adhoc with mobility constraints so that the nodes can move outside the coverage of the controller or the base station. In such case, the out of coverage situation occur. In some cases, when the channel is shared, some nodes will not obtain the channel access. This kind of channel unavailability also causes the communication loss over the network. To achieve the work optimization, there is the requirement to provide the effective mapping of the nodes to the controller.

II. RELATED WORK

The main feature of any wireless network is the infrastructure less communication by electing the cooperative communication nodes. To improve the network communication, researchers have provided the methods for network reconfiguration and localization. In this section some of the work provided by the earlier researchers for network localization and equalization is provided in this section. Author[1] has defined a cluster specific reconfiguration and transmission control over the network. Author defined the energy effective analysis with specification of different metrics along with relative network configuration. Author provided the uniform network distribution so that the traffic control will be achieved over the network. Author[2] has defined a work on dynamic network composition by tracking and controlling the network. The positional mapping and the group specific estimation was provided to activate the multiple targets so that the effectiveness of communication will be improved. Author provided the error probability estimation and tracking with specification of performance measures. Author provided the

validation and evaluation so that the realistic behavior estimation. Author[3] has defined a work on analysis of the architecture and the behavior formation so that the operating behavior so that the parameter specific estimation will be defined. The policy specific tracking and reference context mapping is provided for effective network tracking. Author[4] has defined a self organized network for defining the constraint specific heterogeneous network for improving the network construction. Author defined the parameter specific probabilistic estimation so that the session specific blocking of bad nodes will be done. The realistic parameter specific mapping with communication rate and session access control is provided to achieving the balanced control. Author[5] has provided a work on resource configuration so that the efficiency driven resource usage will be done. The service demand specific spectrum allocation was provided by the author. A rank specific capability mapping was provided for effective service allocation and distribution.

Author[6] has defined a work on dynamic reconfiguration for heterogeneous sensor network. Author has defined the relative and the adaptive requirement measurement so that the design specific response time improvement will be done. The policy specific estimation with behavior analysis was provided for improving the communication transition. The density support based network reconfiguration was provided to improve the communication efforts. Author[7] has defined a work to improve the network effectiveness and support with capacity and the spectrum specification. The structure specific estimation and control was provided by the author to achieve optimized bandwidth utilization. Author[8] has defined a work on performance study based reconfiguration with cluster tree formation. Author defined the topology driven analysis with maximum connectivity within the coverage. The energy estimation and relative feature processing was defined to monitor the connection and reduce the number of region switching. The author improved the communication and reduced the fault. Author[9] has provided a support to the reconfiguration to achieve the hybrid communication. A response driven generic model was design to provide response tracking in real environment. Author provided the region specific interoperatibility to provide component estimation so that the network performance will be improved. The architecture specific event analysis and interaction processing was defined by the author to improve the communication strength. Author[10] has defined a cooperative base station based network selection and reconfiguration in limited network. Author provided the relative characterization and specification with requirement tracking. The heuristic solution was provided with specific implementation and measure so that the different methods will be obtained to improve the network communication efforts. Author[11] has provided a work on complex network reconfiguration in diverse environment with role leveraging to improve the performance of the network characterization. Author provided the load specific observation to improve the conditional network formation. Author also defined the method and concept specific formation with relative characterization in diverse environment. Author[12] has used the prediction and control measure for hierarchical network control in directional network. The free space optical was used in reconfigured network to achieve the topology specific configuration. The inspired network with molecular specification was provided to achieve the energy utilization. Author[13] has defined a complex dynamic network based connectivity analysis with specification of context derivation in the frequency map network. The point link generation and topology specific reconfiguration was provided in the network to reduce the computation and to improve the control. The effectiveness of work is also improved to provide solution in optimal time. Author[14] provided the organized solution and communication management in aggregation filtration and monitoring behavior. The management of the control with overhead reduction was provided by the author.

III. RESEARCH METHODOLOGY

To construct the mesh network, it is required to achieve the maximum utilization of available resources. The placement of mesh routers is required in effective way so that the equalized network distribution, load sharing and throughput improving will be achieved. To achieve the network constraints and to reduce the network overhead, the path composition through the router devices can be done. The flow control based communication improvement can be achieved to reassign the channel and to reduce the disruption over the communication. This kind of network framework comes under three main stages called channel reassignment, Link scheduling and the flow allocation.

A) Channel Reassignment

This phase basically analyzes the load and the trust features in the region. The trust here analyzed under the session driven communication analysis. The number of requests performed by the region nodes, the communication delay and the traffic level observations are considered as the main criteria for channel reassignment. This prior analysis based channel assignment method is called trust adaptive channel allocation. The probabilistic method can be defined to provide the hop count analysis and the throughput observation as the primary factors. The probabilistic measures are here applied to provide the edge pair driven observation. Path specific pair identification is provided by this phase to improve the communication trust within the region. Once the pair nodes are identified, the router position, load and the connectivity are decided. This probability driven channel assignment is provided for path specific load estimation. The expected path combinations are analyzed at the router end and the numbers of nodes that can be managed by the router comfortably, with synchronized features, are assigned to the router. The load

specific measures and the assignment are provided to reduce the load unbalancing and to provide the better communication. The algorithmic specification of this reconfiguration stage is shown here in table 1.

Table 1 : Channel Assignment

```
Algorithm(Nodes,Routers)
/*Nodes is the list of wireless mobile nodes and the routers are
the fix position devices based on which the reconfiguration
will be done*/
{
1.      For i=1 to Routers.Length
        [Process all the Routers]
        {
2.      Pos=GeneratePosVector(Router(i))
        [Generate the probabilistic positional situation for
routers]
3.      For j=1 to Pos.length
        [Process each of the positional vector and relatively
apply the reconfiguration]
        {
4.      Covers=GetNodes(Nodes,Pos)
        [Get the number of nodes in the possible coverage
        }
        }
5.      [Conn Deman]=GetFeatures(Covers)
        [Generate the load and demand specific requirement
for each cover]
6.      pos1=GetEffectvePos(Pos, Deman, Conn)
        [Analyze the load, demand and connectivity vector
for each router position relative to nodes and identify the
optimized location]
7.      Router.position=pos1
        [Assign the position to the router]
8.      Perform Channel allocation to router for group nodes
}
}
```

Here, table 1 has shown the algorithmic specification of effective position identification of nodes and channel allocation for the group nodes

B) Link Scheduling

Once the reconfiguration is done, the next work is to setup the sequence of resource access. This access sequence is called link scheduling so that the conflict free service access will be obtained. The scheduling must be defined to avoid the bottleneck situation and to provide the effective and reliable channel sharing. The time specific bandwidth access is provided in this stage to reduce the channel interference. The demand and the availability map along with throughput improvement and delay reduction are done.

C) Flow Allocation

After assigning the bandwidth, the proportional expected flow analysis at connectivity slot specification is defined to decide the order of traffic access. The route formation is done at this stage to setup the node sequence of data delivery. The aggregative time slot specific map is here done to provide effective service access. The communication constraints are here analyzed to provide the effective service allocation and to provide the load robust path formation. The decision regarding the traffic and the communication is provided to improve the communication throughput. A capacity and edge specific path generation is defined at this stage. The method is able to improve the communication throughput and reduce the communication loss.

In this section, a complete model is defined to reconfigure the mesh network at lower stage so that the network communication will be optimized and loss will be reduced.

IV. Conclusion

In this paper, the communication optimization for a more adaptive network called Mesh network is provided. The configuration stage of this network identified the optimized placement of router and to provide adaptive channel allocation. The link scheduling and flow control is also decided based on the demand. The work model is effective to improve the communication throughput.

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