

# A Study on Communication Characterization in WPAN Network

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## ABSTRACT

WPAN is the hybrid network form that combines the features of mobile network and sensor network for the restricted coverage network. The mobile devices are placed in the personalized area such as hospital to provide the personalized communication. The short distance communication is performed in the presence of infrastructure devices. The network is able to provide high speed communication based on the controller or the device to device communication. In this paper, a characterization to the wireless personal area network is provided to generate the safe and reliable communication over the network. The routing protocols and the communication architectures involved in this network form are also discussed in this paper.

**Keywords:** WPAN, Mobile Communication, Wireless Network, Routing

## 1. INTRODUCTION

WPAN is the restricted area network which is established for the personalized and commercial building to provide the cooperative communication between the authorized users. The network established in a building, campus or commercial area comes under WPAN network. The WPAN network is composed of smart sensor based devices such to provide the composite network composition and communication optimization. The smart devices or the equipments present in the geographical area can be the part of wireless personal area network. The network composition of WPAN is shown in figure 1

Here in figure 1 is showing the generation of WPAN network in the local personalized area. The network is defined with existence of some controller point or access point as shown in the figure. Each of the devices in the area can use the signals of this access to perform the cooperative

communication. The inter-network and intra-network communication can be performed within the area. The devices in the WPAN network can be static or the mobile based on the requirement of the network. The devices are also defined with power backup or the energy specification. But the devices are having larger battery, processing capability and the larger memory space. A geographical area can have multiple access points to control more number of devices. The size of network, coverage of access point and the load are the factors that can be used to decide the communication performed by WPAN network. In such case, the movement of the devices can result the switching between the access point. There is the requirement to maintain the signal strength these area switching. This kind of switching is called handoff. The network has to handle the seamless communication during the handoff process and to provide the inter-region and

intra-region communication over the network. When the area is having multiple regions with different technologies, the challenge to the network also increases. In this paper, the basic characterization of WPAN network and the communication method in the network area are explained.

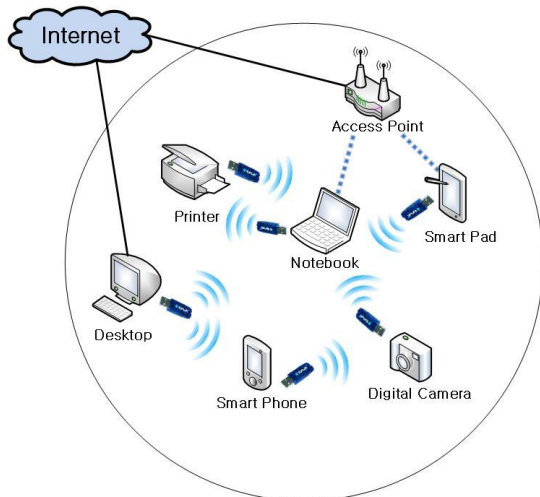


Figure 1: WPAN Composition

## 2. RELATED WORK

The communication is the primary requirement for any network. In WPAN network, the mobile nodes are providing the data and voice communication. To optimize the network communication and routing different approaches are suggested by the earlier researchers. In this section, the contribution of earlier researchers is presented. Author [1] has provided the characterization of network composition against various challenges. The detailed study on different routing protocols is provided under different simulators. The routing challenges and the effect of the routing algorithms on these topologies is also characterize in this paper. The route generation, route maintenance specific issues were identified by the author. Author [2] has defined a work on the mobile network characterization and the associated network protocol. The performance driven analysis is performed on different scenarios. The performance driven analysis was provided under based on different parameters including communication throughput, delay

and load. Author [3] has provided a work on the evaluation on different protocols for mobile network. The data delivery and integrity specific observation was provided by the author. The protocol specific network analysis is defined for both the mobile network and the sensor network. The performance driven evaluation is provided in this paper along with specification of the hybrid protocol. Author [4] has defined a work on demand driven routing protocols for the real time scenario. The performance driven analysis to the network was provided in the sensitive mobile network. The user specific and load specific observations are taken in this work. The performance valuation for smaller network is provided to generate the effective results under load specification. Author [5] has provided a work on throughput enhance under the collision occurrence and to improve the network communication. The load and the environment specific observation were provided to improve the network communication and network throughput. The performance driven evaluation was provided to enhance the communication throughput.

Author [6] has defined a work to evaluate the routing protocols for personal area network. The observations and the performance evaluation were provided on AODV and OLSR protocol. The demand driven analysis was provided to improve the routing for the effective network deployment. Author [7] has defined study on the DSR protocol for the mobile network and applied it in the real time network. The network service driven observation was taken to improve the performance in terms of communication throughput and communication delay. The method is defined to utilize the network services in the particular instance of time and to improve the network communication. The network quality analysis under the service distribution was provided in this work. The architecture level evaluation was provided to provide the best outcome in terms of resource utilization in the mobile network.

The constraint specific observation was provided to enhance the communication throughput. Author [8] has used the network access in the personalized area and to provide the different kind of communication. The multimedia service respective to the QoS parameter is discussed in this paper. The bandwidth driven, jitter driven evaluation was provided so that the communication driven analysis was provided. The objective driven analysis was provided to achieve the proactive routing and communication in the personalized network. The routing methods are compared under the delay, energy cost, link stability for each node parameters.

Another challenge to the mobile and other personalized network is the security attacks. The network suffers from different kind of security attacks. Blackhole is one such critical attack that avoids the data forwarding. Author [9] has defined an attack preventive route formation using Bluff Probe approach. The method has first analyzed the individual nodes and categorized them based on the criticality vector. Once the critical nodes are identified, the preventive route formation is done. Author [10] has analyzed the network under different kind of attacks. Different internal and external attacks were identified by the author. The functional behavior and the impact on the network were explored by the author. Author [11] has defined a work on the behavior of MAC protocol for WPAN network. The contention window formation and the communication architecture and constraint are defined in this paper. Author [12] has improved the functioning of DSR protocol for wireless mesh network. Author has defined a new integrated metric to enhance the routing method for mobile network. The communication method is defined under the real time constraint. Author [13] has defined a comparative analysis on DSR and DSDV protocol. The analysis on the mobile model is provided to improve the network communication. The dynamic route formation and its analysis in

terms of communication throughput and lossrate are provided in this paper. Author [14] has defined an effective routing protocol for WPAN network by adjusting the threshold values. The dynamic generation of threshold value and the route selection based on the threshold ranges is provided in this paper. Author [15] has provided a comparative study on different routing protocols and applied them for wireless mesh network. The reactive protocols were discussed by the author for mobile network. Author [16] has defined a work on multipath routing protocol for wireless mesh network. The secure routing method is defined in this paper.

### 3. COMMUNICATION PROTOCOLS

Wireless Personal area network is the improved form of mobile network which is defined in the personalized area. The network is defined for the specific region such as building or the campus. The mobile nodes are defined under different mobility models and the network nodes are defined with energy specification. The network was defined fixed topology, scenario and the infrastructure. The network deployment with dynamic communication and routing method is defined in this network. The communication structure and constraint relative to the work stations is defined in real time scenario. The nodes are defined with limited resources but the functional power of the nodes is higher than any other network. The network nodes are having good processing capability and the memory limit. The routing protocols are defined to generate the dynamic and static route over the network. In this paper, the routing method relative to the work is provided and discussed. Different types of routing methods or protocols defined in personalized area network are provided. These protocol categories are shown in figure 2.

Figure 2 has shown the routing protocols available in any mobile network in three main categories called reactive protocols, proactive protocols and the hybrid protocol.

In this section, all these kind of protocols are discussed.

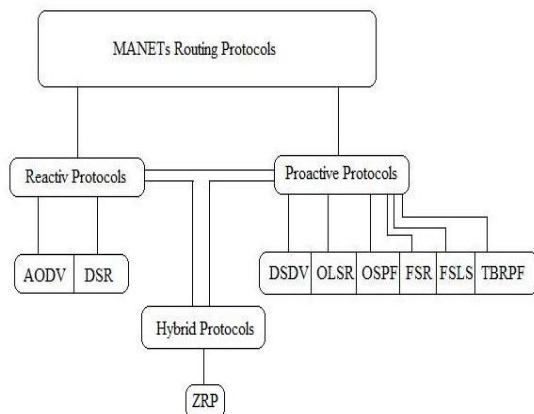


Figure 2: Routing Protocols

### 3.1 Reactive Protocols

The reactive protocols are also called demand driven protocols. These protocols are dynamic protocols and generate the path by generating the neighbor list of nodes dynamically. The route discovery of the nodes and the routing is provided in this protocol to generate the effective communication. The communication setup against the protocol is also provided by these protocols. The protocol performs the request to the neighbor node based on the coverage range. Once the neighbor list is generated, the effective node selection is done based on the characterization of dynamic routing. The demand driven route formation is provided in these protocols. The node specific communication is provided specific to the source node and to generate the effective communication. The reactive routing protocols process by considering the source node and generate the dynamic route formation till the destination node. The characterization of reactive protocol is given here under:

- The demand driven dynamic route formation is provided
- The neighbor discovery on each intermediate node is performed by flooding the route request. The request based propagation is applied till the final route is not composed.

- The bandwidth information is not used to form the communication route

### 3.2 Proactive Protocols

These kinds of protocols are maintaining the routing tables on each node and update the table as the communication initializes. To perform the communication, the node floods the request message to the network to identify the change in the network topology or the node position. Once the updated information is obtained, the table driven path is formed in this protocol. As each time the complete table is search and the higher memory is required to maintain the list of connectivity over the network. This kind of information management increases the cost of network formation. The DSDV (Distance Sequenced Distance Vector) and FSR (Fisheye State Routing) are such kind of protocols. The properties of these protocols are

- The table is used to maintain the connectivity and the composition to the neighboring nodes.
- The table based analysis is performed to generate the route over the network.
- The cost of information management is the overhead to the network route formation.

### 3.3 Hybrid Protocols

The hybrid protocol is the effective routing protocol for mobile network that comes the working of Distance Vector Routing and Link State routing. The optimal destination can be identified by this protocol. It is effective for the dynamic network where the node position is updated regularly. This protocol is also called Balanced Hybrid Routing protocol. The features of this protocol are

- The protocol requires the lesser memory as compared to the proactive routing protocols
- It combines the features or advantages of both the reactive and proactive routing protocols
- The node level activation to the flooded routing is provided.

#### 4. CONCLUSION

Wireless personal area network is the critical network form that enables the personalized communication in limited area network. The network formation is here done in presence of controller or the infrastructure devices. The network form is able to provide the generation of communication route for transferring different types of data over the network including the routing protocols. In this paper, the characterization of communication features is done for wireless personal area network.

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