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QoS and Failover Routing in Tethernet

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Abstract— Tethering is a low-cost, short-distance, wireless technology which employs the frequency hopping technique in the globally available ISM band to avoid interference. In the tethering, a network consists of one to five masters and up to seven alive slaves, and handful of tethernet can couple with bridges to form a scatternet. The communication performance in a tethernet is depended on several factors, such as the numbers of tethernet and bridges, the role (master or slave) of the bridge, etc. After the entire slave has to halt for master's polling for packet transmission, the master is enhancing the bottleneck or hindrance device for communicating in a tethernet. If routes are established and then maintained in a scatternet all the time, the energy consumption in the scatternet is higher. On the other hand, if an on-demand routing is employed in a scatternet, the energy depletion can be compressed and the route flexibility can be improved. In this thesis, I will propose failover routing that will prevent the stoppage of transmission if the transmitting node about to fail. It will pass its control to another node and allow it to transmit instead of it.

***Keywords*- Tethernet, Failover and RDP.**

I. INTRODUCTION

Wi-Fi tethering is used to share internet connection on mobile phones so also called as mobile hotspots, because of its usefulness it is widely supported on smart phones now a days. Since smart phones are equipped with local area radios (Bluetooth or Wi-Fi) and wide area radios (GPRS or 3G) they are fit to serve as a communication gateway. Mobile phones are used as modem with the help of Wi-Fi, Bluetooth or USB but not either of these approaches is satisfactory due to less energy efficiency and multiple connections while the Wi-Fi tethering mobile phones acts as a mobile software access point with multiple device connectivity and internet access. It has following advantages- 1) cellular data networks provide internet access everywhere, 2) people can share data plan. Wi-Fi tethering is widely supported on most smart phones but also has disadvantage that it increases the power consumption as in this mode Wi-Fi interface is always put in in high power state reducing the battery life of the phones. In smart phones the radio energy consumption dominates the overall energy consumption that in laptops example HP iPAC 6965 smart phones energy consumption ranges in 200-700mW while in laptop it is of 20W [1].On exemplification, Wi-Fi radio devor between 1-2W while transmitting therefore it is efficient to use Wi-Fi of a smart phone. Wi-Fi has superior pursuance in terms of energy as compared to Bluetooth [2]. The figure 1 shows the power consumption of Bluetooth and Wi-Fi [1].It is found that Bluetooth has lower active cost so it is best suited for applications of low bandwidth and Wi-Fi is best for application with high traffic like web browsing. Communication of Tethering devices follows a strict master-slave scheme (i.e. there is no way for slave devices to be in touch directly with each other). Instead, a master and up to seven slaves form a so-called tethernet, two or more tethernet can interconnect to form a scatternet, where the master defines the timing and the hop pattern [3]. The slaves have to stay synchronized to the master while participating in the tethernet. After all two slave nodes cannot be coupled together directly; the path of a packet must alternate between master and slave nodes, up till it swings its final destination. Failover is a procedure by which a system automatically transfer control to a duplicate system when it detects a fault or failure. It is a backup operational mode in which the function of a system component example server, network, database, and processor are summed by a secondary system component, when primarily components become unavailable through failure. It is used to make system more faults tolerant.

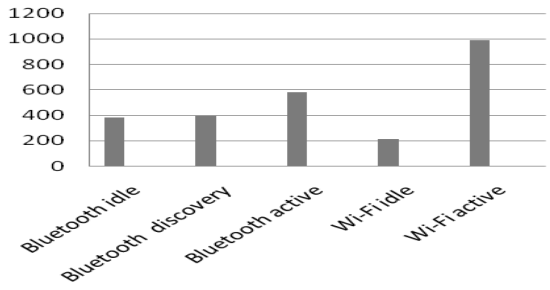

Fig 1: Power Consumption of Bluetooth and Wi-Fi in Different States

It is typically an integral part of mission critical system that must be constantly available. It can be applied to any aspect of a system within a PC, within a network, to any network component or system of component such as connection path, storage device etc.

II. RELATED WORK

Cool-tethered is energy efficient and connect Wi-Fi equipped and internet enabled smart phones very affordably [1]. It harnesses smart phones to build on the fly Wi-Fi hotspots. In 3-G, for higher energy efficiency radio use its nonlinear energy profile hence a proxy clouds first gather necessary data before transmitting it over the WAN link. In Wi-Fi to establish tethernet, smart phones acts as Wi-Fi client who associates with laptop client acting as a Wi-Fi access point to offer greater energy efficiency as smart phones are gateways of Wi-Fi interfaces which can sleep more effectively when not in use. Reverse infrastructure Wi-Fi mode of cool tethernet is 50% more profitable than traditional Wi-Fi ad-hoc PSM mode proving that it is an energy efficient affordable internet access [1].It is an

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alternate way for mobile hotspots problems inspite of higher power consumption and not supporting multiple clients. DozyAP improve power efficiency of Wi-Fi tethering, it coordinates sleep schedule of tethering with clients for that it needs night time synchronization [4].In order to adapt automatically the sleep intervals of traffic patterns, reducing power consumption upto 30% a two stage sleep interval adaptation algorithm developed to automatically put Wi-Fi interface of smart phones into sleep mode to save power. Dozy AP with sleep request response protocol, Soft AP and its clients concede on a persuasive sleep schedule of Soft AP so that the client can transmit package only when the Soft AP is active. With its sleep scheme it can limit the maximum sleep duration so Dozy AP can reduce its power consumption. E-MAP is energy saving algorithm acts as a mobile AP (MAP) temporary save MAP energy by its sleep cycle [5]. Backward compatibly do not need adjustment or modification on client side and supports PSM and CAM (constant awake mode) clients. It is energy effectual MAP mechanism preserving battery power of a MAP also by turning off Wi-Fi interface when no traffic is present. It should not increase packet delay and not assume firmware modification on client devices. It reduces energy consumption upto 50%. Its problem is that MAP cannot sleep un less power negotiation that all clients not able to send uplink traffic, it has been approached in DozyAP but not practically feasible due to need of changes. DozyAP is more energy effectual than EMAP as it has longer sleep duration but its disadvantage is that it is critical in terms of packet delay.

III. PROBLEM CONTEXT

MANETS (Mobile Ad hoc Networks) are distributed networks where mobile nodes are connected together by wireless links without any fixed infrastructure, base stations, routers, or centralized servers. There topology is not static and depends on mobility of nodes. The following are some challenges for MANETS:-

1) Limited wireless transmission range.
2) Broadcast nature of wireless medium.
3) Packet losses due to transmission errors.
4) Estimated change in route, battery constraints and Security problems.

After all study done above, a basic query raises, why there is a need of an energy efficient or economical solution? Here is its answer:-

1) Power level affects many features of operation in Network like throughput.
2) Power control also affects conflicts of medium. The number of hops will increase the delay time.
3) Transmission power influences the metric of energy Consumption.

Energy preservation is an open issue to all layers of network. Energy is main anxiety in MANETS and different techniques and studies are there and focus has been on different layer design to preserve energy efficiently. Energy preservation on mobiles devices must be maintained not only during active communication but also when they are inactive. Many standard protocols were proposed and they have two types of power management, (1) power save (PS) mode for infrastructure based wireless networks and (2) independent basic service set power save (IBSS) mode for infrastructure less network. Nodes in PS mode have less power consumption than that in active mode. The power saving mechanism is implemented using access points in the network. But this is not suitable for ad hoc network environment since there is no central coordinator like access point. DPSM (Dynamics Power Saving Mechanism) uses the concept of ATIM (Ad hoc Traffic Indication message) window and beacon interval. During this window, all nodes are conscious and those that have no traffic to receive or send goes to sleep mode after end of ATIM window [6]. But if the window is fixed, energy saving cannot be sufficient. This energy saving performance of DPSM is better but it is more complex in computation. The author Sahoo [7] proposed a distributed transmission power control protocol for wireless network to achieve energy conversation at the level of node. It uses distributed algorithm to construct the power saving hierarchy topologies without taking the local information of the nodes and provide a simple way to keep the network on account of changing the transmission power. But this is not as efficient as required.

IV. PROPOSED WORK

In this work I have created a failover routing that works when a master node about to fail while transmitting packets to a slave node due to low energy then it transfers its control to the other node and request that node to transfer the remaining packets to the slave node on its behalf. Hence by this we can assure the data transmission. A tethernet is formed with few nodes. All the nodes are tethering Smartphones and together they share their Wi-Fi network interface. For QoS routing, a connection table is recommended for each node to establish a route. The connection table stored in each master device contains the essential information, which includes the nodes connected, the master address, the bridge address and the slave. The QoS routing mechanism uses the connection table to find the destination. When it locates the destination address in the table, it checks it's either a master or slave. Then, it pursuit the routing table and the data packet can be sent to the destination. Using the routing table, a source can decide the path that the data packet can be transmitted and meet the QoS requirements. This table helps the routing mechanism dynamically find the better path even if one master holds the less power or battery. To establish a route to meet the QoS requirements, the route discovery protocol is used. On-demand routing protocols, there are some QoS requirements and no complete route information can be used for routing. Thus, a route discovery packet (RDP) is flooded into the network to find the destination. Upon receiving the first RDP, the destination sends a route reply packet (RRP) back to the source along the route. While the source catches the first RRP, it knows that this is the shortest route. And

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accompanying with the feedback of the RRP, point-to-point Tethering links are created to connect the devices along the new route and at the same time the routing tables of these devices are filled in with the information about the new discovered route. When the RRP arrives at the source device, the route is also accessible for transmitting data packets from the source to the destination. In this proposed work, the transmitting node will send frame sets to the other node after it has stopped due to power loss. The other node will only send the remaining file to the receiving node. Hence it prevents the stoppage of transmission occurring due to less power which is caused because of the continuous active involvement of the node in the network formed by tethering.

V. CONCLUSION

Tethernet is a network that allows sharing of internet connection of phones with other devices such as laptops. Failover is a procedure by which a system automatically transfers control to a duplicate system when it detects a fault or failure. Wi-Fi has better performance in terms of energy as compared to Bluetooth but also has disadvantage that it increases the power consumption as in this mode Wi-Fi interface is always put in in high power state reducing the battery life of the phones. The failover routing prevents the stoppage of transmission if the transmitting node about to fail. It will pass its control to another node and allow it to transmit instead of it. The on-demand routing provides the suitable route to transmit. When one node stops while transmitting, it will broadcast the frame sets to the another node and ask it to send the remaining frame sets.

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