Qos Failover Routing In Tethernet

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Abstarct: Tethering is a concept of sharing of internet of a device with other devices. It's a low-cost, short-distance, wireless technology which employs the frequency hopping practice in the globally available ISM band to keep away from interference. In the tethering, to form a network, there is a concept of piconet containing master and slaves. These piconets are connected together to establish a big network called scatternet. There are several aspects on which scatternet working depends, like the piconets numbers and bridges, the bridge role, etc. Already established routes consume much more energy for the maintenance hence instead of this, routes can be created on-demand. Thus, consumption can be altered and routes flexibility will inclined. Failover is an another concept that I have included. It's about transferring one's control to the other device whenever first device is failed. In this thesis, I have proposed a QoS failover routing that will proficiently form the routes with the QoS desires and will prevent the stoppage of transmission if the transmitting node fails. It will pass its control to another node and allow it to transmit instead of it.

Keywords: Tethernet, MANETS, Smart phones, Piconet, Scatternet, 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 smartphones now a days. Since smartphones 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 USB, Wi-Fi or Bluetooth but neither 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 smartphones 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 smartphones the radio energy consumption dominates the overall energy consumption that in laptops example HP iPAC 6965 smartphones energy consumption ranges in 200-700mW while in laptop it is of 20W [1].On comparison, Wi-Fi radio consumes between 1-2W while transmitting therefore it is efficient to use Wi-Fi of a smart phone. Wi-Fi has better performance 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 communicate directly with each other). Instead, a master and up to seven slaves form a so-called piconet, two or more piconets 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 piconet. Since two slave nodes cannot be linked together directly, the path of a packet must alternate between master and slave nodes, until it reaches 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. 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.

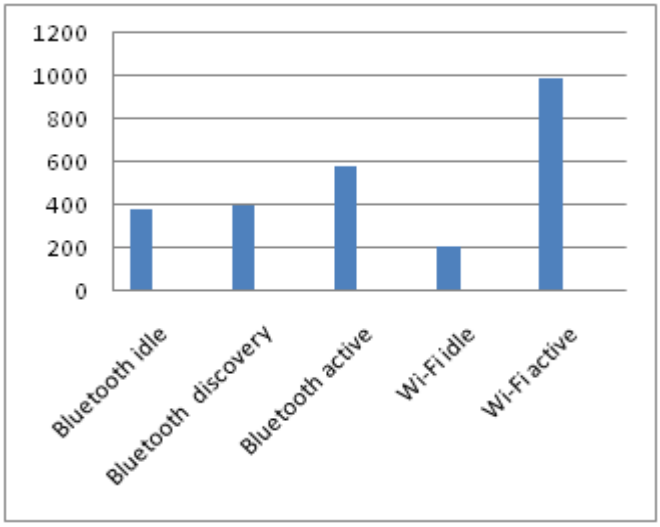

Figure 1: *Power Consumption of Bluetooth and WiFi in Differernt States.*

II. Related Work

Cool-tethered is energyefficient and connect Wi-Fi equipped and internet enabled smartphones very affordably [1]. It harnesses smartphones to build on the fly Wi-Fi hotspots. In 3-G, for higher energy efficiencyradio 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, smartphones acts as Wi-Fi client who associates with laptop client acting as a Wi-Fi access pointto offer greater energy efficiency as smartphones 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%

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more profitable than traditional Wi-Fi ad-hoc PSM mode proving that it is an energy efficient affordable internet access [1].It is an alternateway 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 clientsfor 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 adaptational algorithm developed to automatically put Wi-Fi interface of smartphones into sleep mode to save power.DozyAP with sleep request response protocol, SoftAP and its clients agreed on a valid sleep schedule of SoftAP so that the client can transmit package only when the SoftAP is active. With its sleep scheme it can limit the maximum sleep duration so DozyAP 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 modification on client side and supports PSM and CAM (constant awake mode) clients. It is energy efficient MAP mechanism conserving battery power of a MAP also by turning off Wi-Fi interface when no traffic is present. It should not increase packet delay andnot assume firmware modification on client devices.It reduces energy consumption upto 50%. Its problem is that MAP cannot sleep unless 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 modifications.DozyAP is more energy efficient 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 question arises, why there is a need of an energy efficient 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 QoS failover routing that works when a node fails while transmitting packets to another node due to low energy. It transfers its control to the other node in the same SSID. The remaining packets will be transferred to the receiving node on its behalf. Hence by this we can assure the data transmission and thus acquires QoS. These nodes are tethering Smartphone's and they are on same SSID. A tethered scatternet is formed with few nodes. All the nodes are tethering enabled Smartphones and together they share their Wi-Fi network interface.To establish a route meeting the QoS requirements, the route discovery packet is used.When a request is send to a node to have an access to a file by the browser created, the RDP is sent, it will get the ip address of the node sensed by the SSID.Then the crank-back method starts and it binds the node to establish the route.The SSID performs auto-maintenance and look after the connection table and routing table while establishing the route. Now, if while transmitting the data packets the transmitting node halts due to power failure then,the transmitting node will pass on the request to the neighboring node by using the RDP. The browser will look into the RDP and the request is sent to the next node. The same procedure follows and the connection is established. The frame sets of the file that has been sent before the first node gets faulty is provided to the next transmitting device.It will send the remaining file to the source.Therefore, this can assure the data transmission even in failure. Hence, QoS is achieved as transmission continues and overcome the failure. An application called TestSocket is developed using the Eclipse, the IDE for development of android applications.Using this, one node can access or read a file present in another node while being connected to tethernet of that node.So, there is a tethering enabled smartphone that can acts as a service provider. A node, that can be another smartphone or a laptop, will get connected to the tethernet of the service providing node. A browser is being developed. The purpose behind its development is that the operating system's browser does not allow the concept of working of RDP. Hence it was difficult to find out the approachable node to pass on the control. It will display the asked file. Here, the file being used is a pdf (post data file) which is a hexadecimal format file. The file is being cut into frames by the cutter. Every frame includes bucket sets containing 50 characters. Each bucket has given an index.

Every frame also has an index. The file is picked up page wise with each page having a start and an end i.e. an offset (the maximum end limit). Every frame also has a start and an offset. To form this app, socket programming is used. Serversocket and clientsocket is being made. As client gets connected to the server, it asks for the file. The file being cut into the frames, is sent to the Serversocket in the form of frame sets.These will be passed to the browser through the RDP that acts as a channel, and then to the clientsocket.If while transmitting, the server got down due to insufficient power, the RDP will look for another node in same SSID.It get connected with new node and then the RDP will send all information regarding frame sets sent.

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 proposed QoS Failover routing is a mechanism by which efficient routes are created with QoS desires. A node can access a file present in another node while being connected to tethernet of that node. If transmitting node fails due to insufficient power then the control will be given to the nearby node in the same SSID. It will transmit the remaining file on behalf of first node. Proposed routing has QoS desires and will be energy efficient as the transmission will not get affected if the transmitting node fails.Failover routing transfers the control to another node in order to prevent the stoppage of the data transmission. The Crank-back routing mechanism is used to bind the node to establish a route. The researchers are still experimenting on the QoS and failover area.The concept holds a huge scope in further research. The Tethering area is not completely polished.The movement that occurs in the devices is still a big task for organizing Tethering scatternet.The future scope for QoS and failover is countless as these two are really vast.Few thought-provoking topics that can be looked into in future work include security which is the main and eye catching topic, to make the routing secure by employing a security based algorithm and also the tethering enabled devices on scatternet must have a dynamic scheduling algorithms These scopes could boost up the proposed QoS Failover Routing outline to develop a stronger,QoS assured and dynamic structure for Tethering scatternet.

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