CONCURRENT WI-FI CONNECTIVITY ISSUES AND ITS SOLUTION

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ABSTRACT: *In the present era of technology, we are easily in touch with each other using wired and wireless network connections. The next move to its development requires that we are able to connect several connections concurrently or not? In this regard, the main approaches that have been presented so far are the use of hardware interface and creating a wireless virtualization environment. These techniques, no doubt, have revolutionized the world of internet. However, they accompany a few drawbacks as well, e.g. costing high, occupying large space, consuming high power, etc. Further advancement introduces us with the Connectify Dispatch that is the latest merge of techniques supporting simultaneous multi-connections. It is cost effective and eliminates the demerits of previous techniques. But it is not applicable to the Bluetooth connections.*
We propose a new approach named Multiple Connection Wi-Fi (MCW) that contains various steps for more than one network on a single computer. We have also explained the steps with the help of pictorial representation. In the end, we will be able to see several active connections at the same time, e.g. DSL, hotspot, mobile Wi-Fi, etc. In the future, we will research the bandwidth bonding of several networks through the multi-link PPP (Point to Point Protocol).

INTRODUCTION:

In every computer, there are several ports for Wi-Fi connectivity, but on a single operating system, only one interface works at a time. In the presence of many access points, it is a question mark, how concurrent connecting of two or more Wi-Fi devices can be made possible.

This issue can be addressed by:

Adding hardware interfaces or maintaining wireless virtualization. The hardware interface is expensive to apply and will definitely occupy enough space. Besides, power utilization will also increase. So, virtualization can solve this issue in a better way, overcoming the cost, power, overhead and space problems. This is achieved when an intermediate layer is added to control the virtual interface devices. Hence, with different access points, we are able to establish multiple Wi-Fi connections at a time. It can also be devised in a systematic manner that each device is specific to perform a specific function only, e.g. browsing, load-balancing, backhaul, downloading, etc. The same issue can be addressed on mobile as well.

This technique not only makes it happen in an efficient way but also enhances the performance, functionality, and throughput of the underlying network. The intermediate layer works fine without affecting the state of other layers of the OSI Model. In the Transmission Control Protocol, the network layer is attached to a Static IP. The MAC layer is attached to a MAC address and the network layer is enclosed to the MAC layer. The main function is set to the virtual interface of the MAC address. It manages all the relevant tasks [1].

The resource sharing and abstraction are the main advantages of virtual systems. However, the challenges of network security, resource detection, separation, and control are yet to be considered [2]. The objective of this paper is to discuss the techniques to handle this problem of multiple Wi-Fi connectivities and to explain the structure of the proposed scheme.

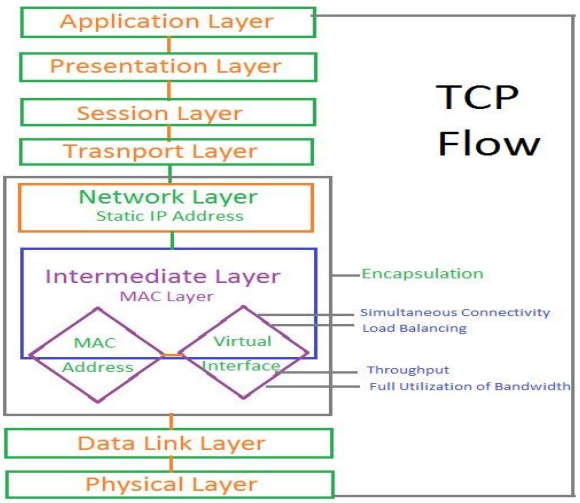
The goal of this paper is to explore wireless network communication. How it works and how can be useful for further work. It aims to give a better idea, how we can improve the Wi-Fi speed. So, this paper addresses the design or can say some steps for how multiple Wi-Fi connect and enhance the speed issue.

With the increasing demand for computer and mobile users, it has been experimented, how we can have a concurrent connection to the multiple networks. If we use several wireless network cards, its drawback is the consumption of a high level of energy and as a result, the battery reduces the lifetime of the computer rapidly. Using the "Multinet" scheme, we make it possible with the help of virtualization of one wireless card. We use two approaches called:

The Switching Scheme (The Card swaps between the networks we want to connect concurrently and brings into action the related stack. It is beneficial in the sense that it makes no change in the running protocols and layers.)

The Buffering Scheme (A protocol is devised to see, are the packets of data between the switching ends being delivered? It also checks the devices are synced or not while switching to various networks) [3].

It has improved the working of WLAN card and we are able to use the applications by downloading and sharing at the same time. The abstraction of LAN card saves the cost and state information as well as can control several network stacks [3].



When Multinet is added below the Network Layer, the performance of Transmission Control Protocol affects in a way that it finds the unpredicted ups and downs in the packet transmission. The active network packets are acknowledged promptly, but there is a delay in the ACK of buffered packets [3].

In this paper the author describes WNV. It comprises not only WNV but also discusses different network frameworks and some of the works that have already been done & some which will be worked in the future to achieve better wireless virtualization.It also discusses some research issues and challenges and gave broader perspectives to overcome these[2].

This paper addresses some history and some current projects on NV. It worked on the motivations for WN and present business models & their roles in WNV. Some performance metrics, some architectures, different virtual machines, etc. Except for WNV, some enabling technologies were explained. Some challenges that described mobility management, network management, control signaling, isolation, and some other challenges.WNV is just as an infant. This paper tries to explain wireless community, current technologies & its future vision [2].

Virtualization accompanies the grand benefits of abstraction and data sharing. It shares the physical infrastructure of the same device, but provides a virtual operating environment, reducing the cost that definitely incurs in the presence of most operating systems. The virtual Wired Networks have been used since the last decades, including VLANs (Virtual LANs) and VPN (Virtual Private Network). Nowadays, Wireless Virtualization is possible and much effort is being made on it as a solution to multiple Wi-Fi connectivity issues [4].

The wireless virtualization, the network can manage to merge powerful techniques. It not only can address the technical issues of isolation, resource allocation, security, etc. but also non-technical problems, for example, the governing behavior of the organization. However, the isolation and network management are harder in wireless virtualization as compared to the wired network where hardware (link & port) is used [4].

vWLANTM is another solution to multiple concurrent Wi-Fi connection problems. This technique is basically the architecture for WLAN cards. With one hardware card, you can use several virtual Wi-Fi cards simultaneously. More precisely, it can be stated that it is an abstraction of one physical WLAN card as several virtual WLAN cards. They are stored in the memory of the PC. You are connected to the heterogeneous networks at a time through several access points [5].

Each card can be configured to any network connection of your choice. You connect to a guest's machine and can surf the internet, play games or download any file over different kinds of networks. It is a combination of software as well as hardware. Further work on the setting of virtual Wi-Fi to Xen is in progress[5].

The Hypervisor is the software that allows virtual machines to work directly on the attached hardware and lies between the h/w and the s/w. Similarly, “FlowVisor” is another aspect of virtualization that works as an abstraction layer and remains logically between the control and next paths on a network. This layer is named as OpenFlow. It has been tested on wired and wireless networks. It is cost effective and can be applied in the organizations, data centers, and homes as well. Bandwidth is divided among each link on a network. There might be virtual network events, e.g. Link Failure, Forwarding Loops, etc [6].

There is a limit for the network traffic. This is because each network can be separated from the other networks without any load. Like the operating system schedulers, here slicers allocate the resources in different networks. FlowVisor acts as an OpenFlow Proxy. It controls the channel of the messages b/w the active switches and controllers [6].

Currently, virtualization of the networks has been applied in research workplaces successfully, such as 4Ward and G-Lab. It has also proved to be advantageous for cloud computing environs. The wireless band resources of CNs (Core Networks) and RANs (Radio Access Networks) can be shared on a virtual system, e.g. OpEx (Operation Expenses) and CapEx (Capital Expenses), etc. Mobile Virtual Network Operators who offer telecom services, including the video calling, VoIP, etc. can obtain more customers and increase their profits, if they lease the separate networks virtually [2].

A very useful approach of multiple Wi-Fi connectivities using a single embedded system on smart devices is the implementation of the hotspot Wi-Fi. Its deployment is expensive with respect to the site contract. Generally, it is used in public places, including the markets, hotels, education centers, entertainment points, etc. Within the range of 2.4 GHz, there are three non-overlapping paths. Other operators can get it on lease from the service provider as well. Hence, multiple hotspot services have been effectively applied on a single platform [7].

Sharing wireless network interfaces seems to be a difficult task. Whereas, we can say virtualization is a technique that can solve this problem. In this paper, the authors gave a viable solution to deploy virtualized wireless networks. Their results show that their solution is capable to support multiple virtualized wireless networks without having issues in its performance [8].

Virtualization enables multiple operating systems to run simultaneously in isolated containers on a single physical machine and provides an abstraction layer to separate the underlying hardware from what the OS inside a Virtual Machine (VM) observes. Virtualization has already been widely adopted in data centers, where the technology has helped to consolidate servers and dynamically manage existing resources more efficiently. The technology is moving towards "client virtualization", where virtual machines run on end users' devices, from notebooks to smartphones [9].

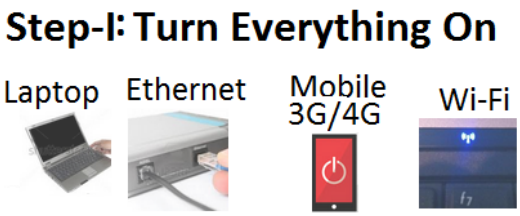
In this paper, the authors gave a review of network virtualization in two perspectives one is industry and the other is academic research groups. Focusing on the main features of virtualization like resource abstraction, etc. Different challenges & research directions arise in network virtualization become an enabler for future deployment research, results & experiments [10].

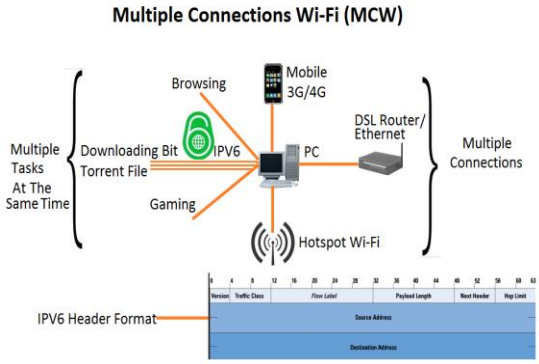
Next section describes different techniques are using for different perspectives. Some are using for multi-connections some are working to increase bandwidth and many more.

Each technique has some merits and demerits. Later Section based on the proposed solution that is (MCW) Multi Connection Wi-Fi elaborated with diagrams as well. The last Section is validation that is based on comparison techniques. Finally explains conclusion & future work.

MATERIALS AND METHODS

Propose Steps for MCW





RESULTS AND DISCUSSION

We propose a software name as Multi Connection Wi-Fi (MCW). Which is based on some already used techniques?

MCW Software a few steps to connect as:

At 1st Step: Turn everything on, i.e. your computer, modems (in case of DSL)

At 2nd Step: Connect them on their relative ports.

At 3rd Step: Now it's time to establish an internet connection by their own ways to connect and test each one by one, separately. If all good proceed to the next step.

At 4th Step: Noticed which one is an active connection and will be used tool iperf [10] which is applied for measuring bandwidth to see which connection is working more appropriate having good bandwidth.

At 5th Step: Now use software IPv6 then use DNS and DHCP

By 6th Step: Mode selection having Virtual Wi-Fi in Windows & and up

At 7th Step: Enjoy the High Speed

Combining Internet Connections (wired, wireless or DSL) but not applicable on Bluetooth connections. The software will be appropriate for Windows 7 or 8 and so on because from windows 7 and up devices can create a Wi-Fi hotspot, even though it's working on another Wi-Fi. The software will be combinations of some routing software like IPv6 (utilizing the Internet Protocol version 6 (IPv6) eliminates the demand for Network address Translation by offering a much larger address space that leaves the network resources to own their own unique real IP address. IPv6 provides a bigger address space that permits greater flexibility in assigning unique addresses over the Internet) as well as DNS, and DHCP (as it uses for the assignment of an IP address so that there will be no cause of conflict, as other routers are connected with device.) Microsoft built several utilities into Windows 7 that is capable to make your device as a virtual hotspot. Whereas Virtual Wi-Fi has no user interface till now it can only be operated by an administrator via the "netsh" command line. These utilities do not tell the users that any connection is getting connect and cannot tell the IP address of connected devices. When the device becomes a hotspot it runs in two modes: Access Point mode & Ad-hoc mode. The main difference in AP mode and Ad-hoc mode is that AP access mode allows you to create a hotspot using LAN card through which device going to connect with internet whereas Ad-hoc mode requires that connection comes from separate devices like Wi-Fi, DSL etc to your device. Propose software works on Ad-hoc mode because different connection comes from to our device.

Comparison B/W Connctify Dispatch & Multiple Connection Wi-Fi

Feature	Connectify Dispatch Lite	Connectify Dispatch PRO	MCW
Software Load Balancer	✓	✓	✓
Combine Multiple Internet Connections	✓	✓	✓
Real Time Bandwidth Monitoring	✓	✓	✓
Unlimited Dispatch Uptime		✓	✓
Application Specific Settings		✓	✗
Connection Metering		✓	✓
Interface Selection Methods		✓	✓
Automatic Startup		✓	✗
No Ads or Banners		✓	✓
Premium Support		✓	✓

CONCLUSION & FUTURE RECOMMENDATIONS:

We have proposed the design of Multiple Connection Wi-Fi (MCW), a system that can help us in establishing multiple connections simultaneously. It observes the connection metering and can monitor Real-time Bandwidth. It is a method, different from the virtualization and the hardware interface card used for the same purpose. Our proposed scheme overcomes the drawbacks of virtualized multinet. It occupies lesser space, hence not as much expensive as the hardware solution is. The performance of network connections is faster with no overhead. Network switching is also possible. Multitasking can be done using a single computer with several connections concurrently, e.g. downloading, web surfing, gaming, etc.

The implementation of Multiple Connection Wi-Fi (MCW) software will solve the issue of multi-connection on a single system at the same time. However, the improvement is yet to be. More work can be done on increasing the bandwidth of concurrent connections. In the future, we will research the bandwidth bonding of several networks through the multi-link PPP (Point to Point Protocol). We will also see how we can make it supportive for the particular application background. In addition, we will explore, is there any possibility that the connections establish spontaneously each time, the computer starts. One more point worth considering is that this multi-connection be connected to Bluetooth connections.

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