Internship Report on

Deployment of Wi-Fi Network

supported by

Information Technology Division

of

Fiber optic network solutions Bangladesh limited

Submitted by

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Date of submission:

24th August 2014

Declaration

I hereby declare that this internship report is the outcome of my own work. Requisite references are quoted to support my work. I also declare that this internship report, neither in whole nor in part, has been previously submitted anywhere else for any degree

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SUPERVISIOR'S CERTIFICATION

This is to certify that MD Abu SyeemDipu ,ID:2010-2-55-003, Department of Electronics and Communication Engineering ,East west university,has done this internship report on 'Deployment of Wi-Fi Network' project of IT under technology Division of FONS BD LTD. AS a partial requirement of B.Sc in ETE degree. To the best of my knowledge,this report is original in nature and has been prepared by his guidance and was nowhere submitted for any purpose.

I wish his every success in life.

Signature : Nahid A. Jahan 28.08.14

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Acknowledgement

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I would like to thank Md. Masud Mustofa, Solution Engineer, FONS Bangladesh ltd. for **heartiest** cooperation and guidance during the internship work.

Abstract

This internship report is predominantly representing the offloading procedure based on Wi-Fi Network Deployment. The main purpose of this report is to get practical experience by observing Wi-Fi access network at FONS Bangladesh ltd and Deploying new Wi-Fi network in different organization.

Working with a vendor like RACKUS Wireless have givenmeadequateknowledge about how to survey a site, what could be the proper solution for a deployment of new Wi-Fi network and the way how to configure an access point, Switches, Router and how to up a Network.

From these three months of internship at FONS I get to understand about the practical working environment in a vendor.

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CHAPTER 1

Wi-Fi Standards and Its Working Procedure

1.0 Introduction:

Wi-Fi system is a certification program from the Wi-Fi Alliance that is designed to ease the task of setting up and configuring security on wireless local area networks. Introduced by the Wi-Fi Alliance in early 2007, the program provides an industry-wide set of network setup solutions for homes and small office (SOHO) environments. Wi-Fi system enables typical users who possess little understanding of traditional Wi-Fi configuration and security settings to automatically configure new wireless networks, add new devices and enable security. More than 200 products have been Wi-Fi CERTIFIED for Wi-Fi Protected Setup since the program was launched in January 2007.

RUCKUS Wireless is one of the well knownvendors. They produce Wi-Fi access point (AP) controller. Working with this vendor was a vast experience; easy to configure and use of these devices. Throughout the total time period of the internship Ihave visited different site where Wi-Fi network have to bedeployed,assign solution for the Wi-Fi network and worked with RUCKUS Wireless, configuring and deployed those devices in different organization like Hotel sea pearl, Bangladesh Agricultural University, Mongla port, Chittagong university etc.

1.1 What is Wi-Fi?

Before going in depth of Wi-Fi system it is requiredto know what is Wi-Fi?

A wireless network uses radio waves, just like cell phones, televisions and radios do. In fact, communication across a wireless network is a lot like two-way radio communication. Here's what happens:

1. A computer's wireless adapter translates data into a radio signal and transmits it using an antenna.
2. A wireless router receives the signal and decodes it. The router sends the information to the Internet using a physical, wired Ethernet connection [Reference 2].

1.2 The Basics of How Wi-Fi Works:

At its heart, wireless networking is based around technology that has been in use for almost a hundred years now. A wireless network will use radio wave to communicate similar to how television and radio works. In those devices however there is only one way communication. Probably the earliest examples of Wi-Fi are the talk radio. This simple device evolved into the cell phone, and now the same core technology is being used in Wi-Fi systems to connect computers, Laptops, Smart phones up to the internet.

Wi-Fi enabled devices will take the outgoing data wanted to send, translate that information into a radio signal and transmit it using an antenna. This signal is encrypted so only the proper device that can decrypt will be able to analyze and decode the signal. In older laptops this was done by an external card with a large antenna. Today, the device is embedded inside the laptop and will notbe even seen . In order to download information, this process will work in reverse. The Wi-Fi router will send out a signal that only that particular computer can decipher, will translate it and download the information[Reference 3].

A wireless network or Wi-Fi Network usuallytransmit at a frequency level of 2.4 GHz or 5GHz to adapt to the amount of data that is being sent by the user. The 802.11 networking standards will somewhat vary depending mostly on the user's needs, as explained below:

1. the 802.11a transmit data at a frequency level of 5GHz. The Orthogonal Frequency-Division Multiplexing (OFDM) used enhances reception by dividing the radio signals into smaller signals before reaching the router. A usercan transmit a maximum of 54 megabits of data per second.

2. The 802.11b transmit data at a frequency level of 2.4GHz, which is a relatively slow speed. You can transmit a maximum of 11 megabits of data per second.

3. The 802.11g transmit data at 2.4GHz but can transmit a maximum of 54 megabits of data per second as it also uses an OFDM coding.

4. The more advanced 802.11n can transmit a maximum of 140 megabits of data per second and uses a frequency level of 5GHz[Reference 4].

1.3 Wi-Fi standards:

The data for Wi-Fi uses the 802.11 networking standard in 4 distinct types.

- IEEE 802.11a
- IEEE 802.11b
- IEEE 802.11g
- IEEE 802.11n
- IEEE 802.11ac

1.4 IEEE 802.11:

802.11 is the generic name of a family of standards for wireless networking related to Wi-Fi. The numbering system for 802.11 comes from the IEEE, who uses "802" to designate many computer networking standards including Ethernet (802.3). 802.11 standards define rules for communication on wireless local area networks (WLANs)[Reference 5].

1.5 IEEE 802.11a:

802.11a possesses an impressive performance. It is able to transfer data with raw data rates up to 54 Mbps, and has a good range, although not when operating at its full data rate.

Parameter	Value
Date of standard approval	July 1999
Maximum data rate (Mbps)	54
Typical data rate (Mbps)	25

Parameter	Value
Typical range indoors (Meters)	~30
Modulation	OFDM
RF Band (GHz)	5
Number of spatial streams	1
Channel width (MHz)	20

Table 1: Summary of 802.11 Wi-Fi Standards

The 802.11a standard uses basic 802.11 concepts as its base, and it operates within the 5GHz Industrial, Scientific and Medical (ISM) band enabling it to be used worldwide in a license free band. The modulation is Orthogonal Frequency Division Multiplexing (OFDM) to enable it to transfer raw data at a maximum rate of 54 Mbps, although a more realistic practical level is in the region of the mid 20 Mbps region. The data rate can be reduced to 48, 36, 24, 18, 12, 9 then 6 Mbit/s if required. 802.11a has 12 non-overlapping channels, 8 dedicated to indoor and 4 to point to point [Reference 6].

1.6 IEEE 802.11b:

802.11b also hold an impressive performance-andable to transfer data with raw data rates up to 11 Mbps.

Parameter	Value
Date of standard approval	July 1999
Maximum data rate (Mbps)	11
Typical data rate (Mbps)	5
Typical range indoors (Meters)	~30

Parameter	Value
Modulation	CCK (DSSS)
RF Band (GHz)	2.4
Channel width (MHz)	20

Table 2: Summary of 802.11b Wi-Fi Standard Specification

During the transmission of data 802.11b uses the CSMA/CA technique that was defined in the original 802.11 based standard and retained for 802.11b. Using this technique, when a node wants to make a transmission it listens for a clear channel and then transmits. It then listens for an acknowledgement and if it does not receive one it backs off a random amount of time, assuming another transmission caused interference, and then listens for a clear channel and thenfinally retransmits the data[Reference 7].

1.7 IEEE 802.11g:

This 802.11g standard provided a number of improvements over the 802.11b standard which was its predecessor. The highlights of its performance are given in the table below.

IEEE 802.11g Wi-Fi Features	
Feature	**802.11g**
Date of standard approval	June 2003
Maximum data rate (Mbps)	54
Modulation	CCK, DSSS, or OFDM
RF Band (GHz)	2.4
Channel width (MHz)	20

Table 3: Summary of 802.11g Wi-Fi Standard Specification[Reference 8]

1.8 IEEE 802.11n:

The idea behind the IEEE 802.11n standard was that it would be able to provide much better performance and be able to keep pace with the rapidly growing speeds provided by technologies such as Ethernet. The new 802.11n standard providesqualityperformance, the main points of which are summarized below:

IEEE 802.11n Salient Features	
Parameter	**IEEE 802.11n Standard**
Maximum data rate (Mbps)	600
RF Band (GHz)	2.4 or 5
Modulation	CCK, DSSS, or OFDM
Number of spatial streams	1, 2, 3, or 4
Channel width (MHz)	20, or 40

Table 4: Summary of 802.11n Wi-Fi Standard

To achieve thisnumber of new features have been incorporated into the IEEE 802.11n standard to enable the higher performance. The major innovations are summarized below:

- Changes to implementation of OFDM
- Introduction of MIMO
- MIMO power saving
- Wider channel bandwidth
- Antenna technology
- Reduced support for backward compatibility under special circumstances to improve data throughput

Although each of these new innovations adds complexity to the system, much of this can be incorporated into the chipsets, enabling a large amount of the cost increase to be absorbed by the large production runs of the chipsets[Reference 9].

1.9 IEEE 802.11ac:

With users requiring ever higher data rates, the IEEE developed their 802.11ac Gigabit standard also known as VHT (Very High Throughput), the system whichenables absolute maximum data rates of nearly 7 Gbps with all options running.

Some of the key or highlight features are tabulated below:

IEEE 802.11ac Salient Features	
Parameter	**Details**
Frequency band	5.8 GHz ISM (unlicensed) band
Max data rate	6.93 Gbps
Transmission bandwidth	20, 40, & 80 MHz 160 & 80 + 80 MHz optional
Modulation formats	BPSK, QPSK, 16-QAM, 64-QAM 256-QAM optional
FEC coding	Convolutional or LPDC (optional) with coding rates of 1/2, 2/3, 3/4, or 5/6
MIMO	Both single and multi-user MIMO with up to 8 spatial streams.
Beam-forming	Optional

Table 5: Summary of 802.11ac Wi-Fi Standard Specification[Reference 10]

1.10 Working Procedure of Wi-Fi:

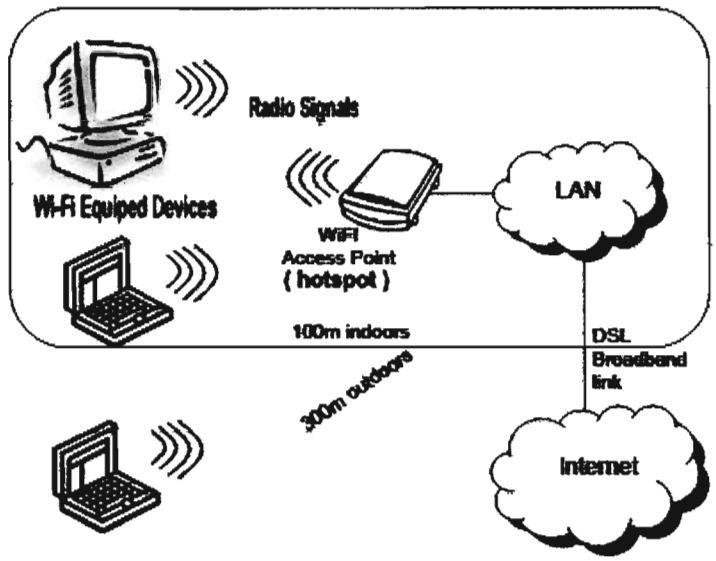


Fig 1: Wi-Fi Working Concepts

Wireless Internet Access has four components that form its structure: high-speed access, a networking gateway, a wireless network and a wireless customer. The customer connects wirelessly through the wireless network to the gateway, it then launches their internet browser, authenticates through the gateway by entering a coupon code or purchasing time and the user has high-speed internet.

The four components are:

1) High-speed access which is also known as broadband is an internet connection

which is generally faster than dial up service. Examples of high-speed internet access are ISDN, cable modem, DSL, and also satellite services.

2) Network Gateway is establishedbetween our high-speed access connection and the wireless network, which acts like a gate. This gate prevent people from accessing our wireless network unless weknow about it. The gateway also allows managing tools as well. These can include authentication, network monitoring, and other services such as printing and voice over IP.

3) Wireless local area network is a system of connecting PC's and other devices within the same physical proximity using high-frequency radio waves instead of wires. Wireless networks work as long as our wireless ready device is within range.

4) Wireless customers are people who have a PC and a wireless adapter which means they can access the internet wirelessly. The wireless adapter can be built in or it can be an external device plugged into your computer [Reference 11].

Chapter 2

Devices used for deploying Wi-Fi Network

2.1 Devices of 'RUCKUS WIRELESS':

Devices of "RUCKUS wireless" that are used during the internship period are

Access Point

- Zone Flex 7363 (Indoor)
- Zone Flex 7321 (Indoor)
- Zone Flex 7762 (Outdoor)

Controller

- Zone Director 1100

2.2 Zone Flex 7363:

The Zone Flex 7363 is a dual band product. Maximum 802.11n capacity makes the Zone Flex 7363 one of the industry's lowest cost, highest performing line of 802.11n mid-range access points available. The aesthetically-pleasing design is ideal for a variety of enterprise and hotspot environments including hotels, schools, retail outlets, branch offices and public venues.Features of Zone Flex 7363 are.

Fig 2: Zone Flex 7363

2.2.1 Best-in-class mid-range performance and cost effective

- Concurrent dual-band (5GHz/2.4GHz) support
- 600 Mbps of theoretical maximum speed
- Adaptive antenna technology
- Advanced RF management

2.2.2 Adaptive antenna technology and Automatic interference mitigation

- Up to 4 times extended range and coverage
- Automatic interference mitigation, optimized for high-density environments

- Integrated smart antenna array with over 300 unique patterns for high reliability
- Physical antenna gain of 6 dBi
- Up to an additional 4 dB Beam Flex gain and 10 dB interference mitigation

2.2.3 Concurrent support for video, VoIP and data

- Four queues per client station
- Delivers 20 concurrent voice calls, 100 simultaneous data users per radio
- Automatic prioritization of VoIP and video traffic

2.2.4 Smart meshing increases flexibility, reduces costs

- Smart Mesh Networking
- Admission control/load balancing

2.2.5 Differentiated services with multiple SSIDs

- 8 BSSIDs per radio with unique QoS and security policies
- WEP, WPA-PSK (AES), 802.1X support
- Zero-IT and Dynamic PSK
- Captive portal and guest accounts
- RADIUS and Active Directory support[Reference 12]

2.3 Zone Flex 7321:

The Zone Flex 7321 is capable of running on either 2.4GHz or 5GHz with a click of a button. Performance is enhance by up to 3dB with transmit beam forming capable clients. Performance is further enhanced by Channel Fly, Ruckus' unique channel selection approach that increases capacity by up to 50 percent over similar products from other vendors.

Fig 3: Zone Flex 7321

This Device's Features are:

2.3.1 Best-in-class mid-range performance and cost effective

- Selectable band (5GHz/2.4GHz) support
- Transmit beam forming
- Advanced channel management

2.3.2 Transmit beam forming and Channel Fly

- Results in 2 to 4 times extended range and coverage
- Up to 50 percent capacity increase with Channel Fly
- Up to 3 dB signal gain with transmit beam forming

2.3.3 Concurrent support for video, VoIP and data

- Four queues per client station
- Delivers 20 concurrent voice calls, 256 simultaneous users
- Automatic prioritization of VoIP and video traffic

2.3.4 Smart meshing increases flexibility, reduces costs

- Smart Mesh Networking
- Admission control/load balancing

2.3.5 Differentiated services with multiple SSIDs

- 32 BSSIDs with unique QoS and security policies
- WEP, WPA-PSK (AES), 802.1X support
- Zero-IT and Dynamic PSK
- Captive portal and guest accounts
- RADIUS and Active Directory support[Reference 13]

2.4 Zone Flex 7762:

The Zone Flex 7762 uniquely combines adaptive antenna technology, adaptive meshing and the power of 802.11n to enable a new level of outdoor performance at the lowest cost. Built to withstand the harshest of outdoor conditions, Ruckus designed the Zone Flex 7762 with the flexibility to function as a standalone AP or as a managed device, using the same wireless controller as its indoor Smart Wi-Fi products. If no Ethernet cabling is available, the outdoor AP meshes seamlessly with the indoor Zone Flex 7962. Unprecedented performance enables connections of 150Mbps or more between mesh nodes at distances of up to 300 meter or more. In addition, unlike other outdoor Wi-Fi device today, the Zone Flex 7762 provides advanced interference mitigation to ensure the highest resilience for both client and inter-node mesh connections. Now customers have a simple to use, deploy – indoor/outdoor – Smart Wi-Fi environment that provides extended range, simple deployment, reliable connectivity and consistent performance at range.

Fig 4: Zone Flex 7762

2.4.1 Integrates Beam Flex™ Smart Antenna Technology

- Enables consistent, high performance, extended coverage and multimedia support
- Automatic RF tuning adapts to constant changes in the environment with no client configuration needed
- Minimizes inter-nodal hops that degrade performance
- Results in fewer APs, more satisfied users

2.4.2 Provides Enormous Areas of Coverage

- Perfect for outdoor pool areas at hotels and resorts
- Ideal for schools, stadiums, and other outdoor sports facilities
- Excellent for enterprises that have shipping docks and other outdoor areas
- Automatic interference mitigation, optimized for high-density environments

2.4.3 Hardened enclosure for harsh outdoor environments

- IP-67 water and dust proof plastic enclosure with flexible wall, pole or ceiling mounting options ensures that no distortion of Wi-Fi signals is introduced
- Built-in heater for cold climate (-40° C)
- Two external N-type antenna connectors
- Standard 802.3af/at Power over Ethernet (PoE), Ruckus custom high power PoE injector included, standard 802.3af output for surveillance camera

2.4.4 True Plug-And Play Multimedia Wireless LAN (WLAN) with Unmatched Ease of Use

- Quality of Service technology provides 4 queues per client station
- Beam Flex and Quality of Service technology deliver 600 Mbps of user throughput (300 Mbps/radio) for 20 concurrent voice calls, 100 simultaneous data users or 20 Mbps of guaranteed user throughput for over 100 meters (line of sight)
- Web-based wizard supports configuration by non-wireless expert through Zone Director

- Secure, sophisticated WLAN can be created in minutes
- No RF tuning or client configuration needed

2.4.5 Differentiated services with multiple SSIDs

- Up to 16 BSSIDs with unique QoS and security policies can be configured
- Enables hot-zone operators to easily offer tiered services to different user or traffic types
- Enterprises can differentiate guest, contractor, and employee access policies or segment different traffic types
- Captive portal and guest accounts[Reference 14]

2.5 Zone Director 1100:

Fig 5: Zone Director 1100

The Zone Director 1100 integrates the Ruckus Smart/OS application engine that delivers advanced features such as smart wireless meshing, high availability, hot spot authentication, elegant guest networking and dynamic Wi-Fi security. It can be deployed and operated by non-wireless experts and installed quickly and easily through a point-and-click web-based wizard. Any organization with limited IT staff and budget can create a robust and secure multimedia WLAN in a matter of minutes.

Chapter 3

Hotel SEA PARL Project

3.1 Hotel SEA PARL Project:

It was one of the importantparts ofthe projectduring myinternship period. The purpose of the projectwas to deploya Wi-Fi networksuccessfully in this hotel.

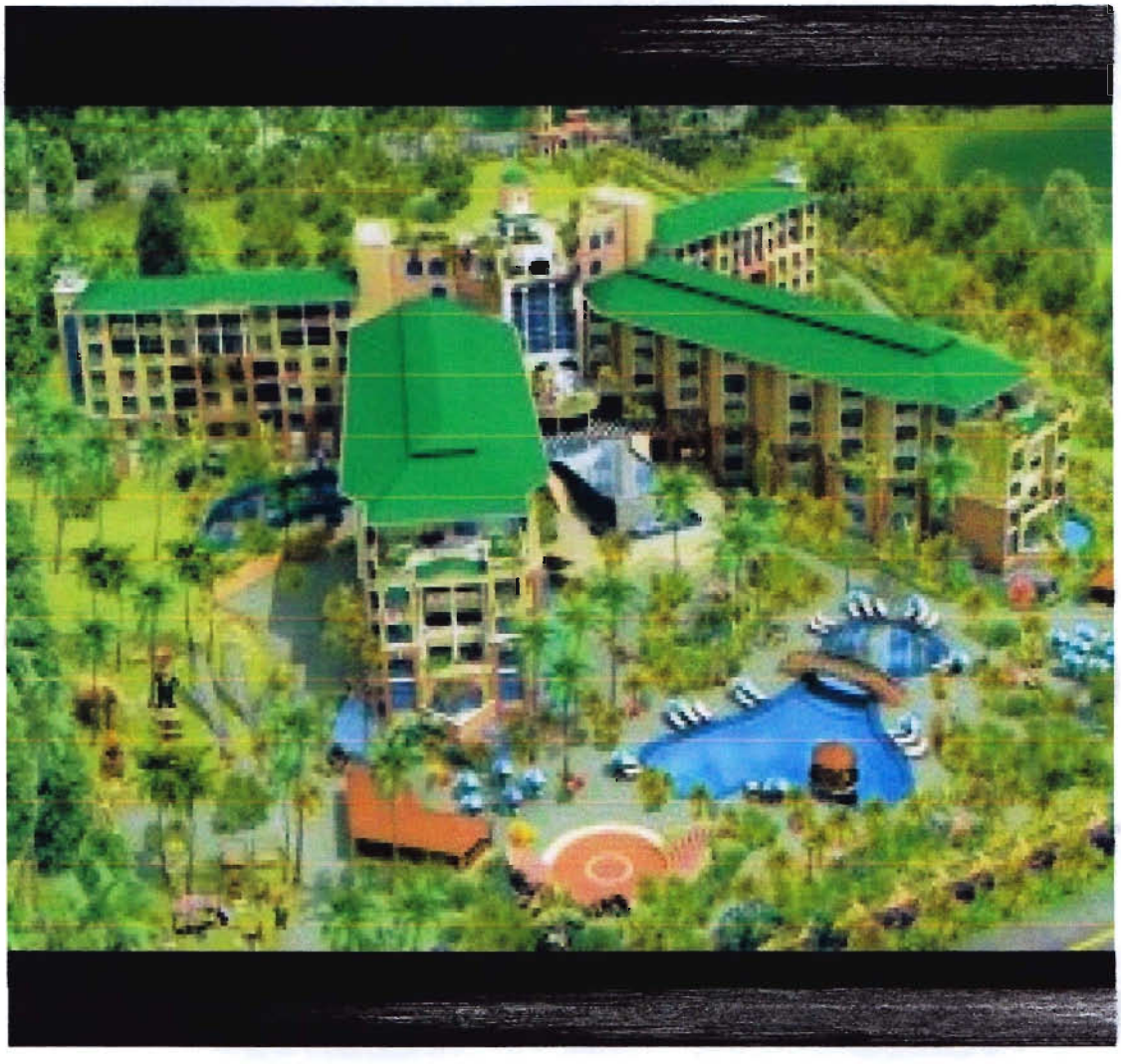
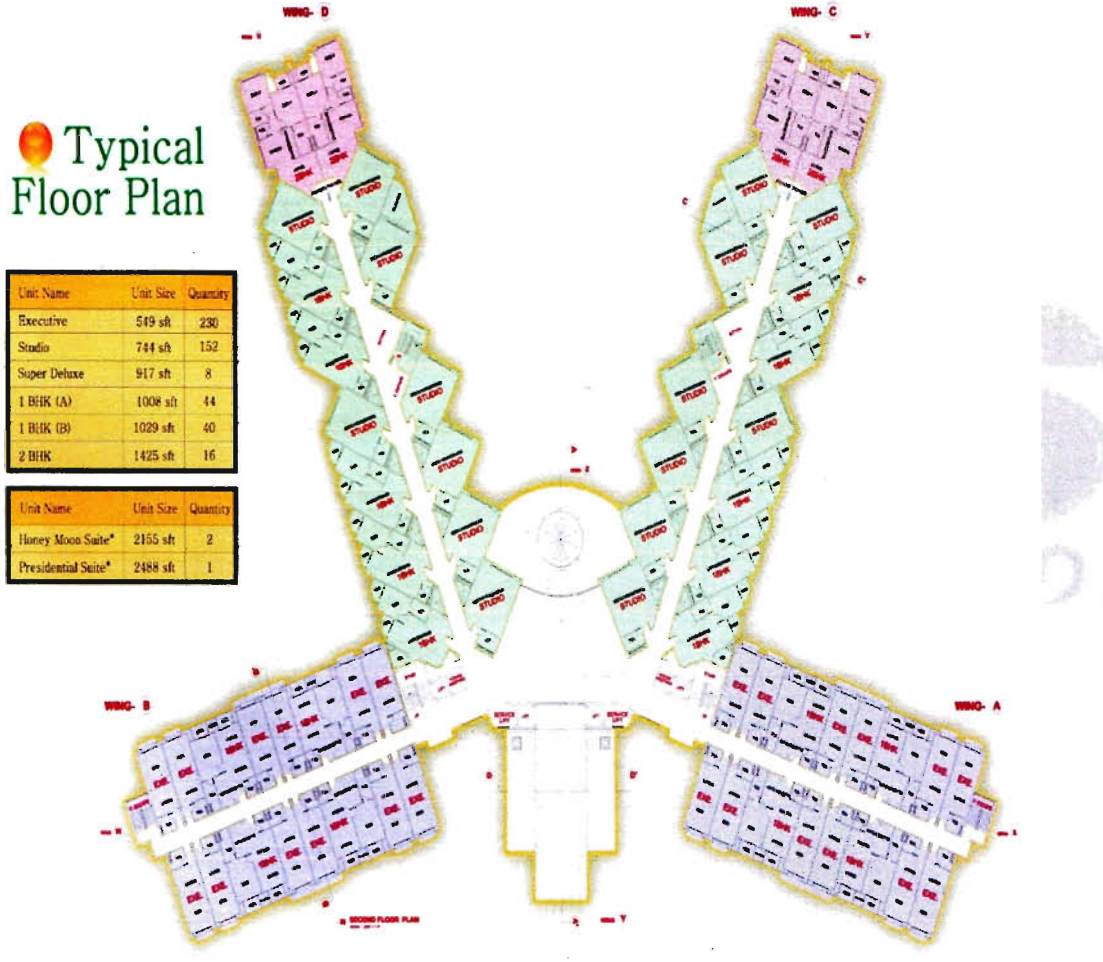


Fig 6: Graphical View of hotel SEA PEARL

Before deploying any Wi-Fi network there are some steps that should be followed. The Total Project is described step by step below:

3.2 Site survey:

Before starting to work the first step is to survey the site where the Wi-Fi network is tobedeployed. Hotel Seaparl is newly built in Coxes Bazar. It is ten storied Building. So it was a great challenge to survey that building carefully and correctly. From 3rd floor to 7th floor the design is same and the other floors are different. A floor diagram was provided by the Hotel's IT persons. The floor diagram of 3rd floor to 7th floor was like bellow



Unit Name	Unit Size	Quantity
Executive	549 sft	230
Studio	744 sft	152
Super Deluxe	917 sft	8
1 BHK (A)	1008 sft	44
1 BHK (B)	1029 sft	40
2 BHK	1425 sft	16

Unit Name	Unit Size	Quantity
Honey Moon Suite*	2155 sft	2
Presidential Suite*	2488 sft	1

Fig 7: Floor Plan of hotel SEA PEARL

3.3 Requirement and Port Calculation:

After surveying the site the second step is to identify the requirement to build a Wi-Fi network. Thereby it requiresto make a BoM (Bill of Material) sheet with port calculation. The BoM sheet for the hotel took eight days to make.

Hotel Sea Pearl Resort & Spa - Dhaka													
Sr.No	Floor	Floor Type	Total Rooms	Details	Hotel Data Points	Inroom AP 7055	Indoor AP 7363	Indoor AP 7982	Outdoor AP 7762	Total Points	HP 2530-8G PoE+	HP 2530-24G PoE+	HP 2530-24G
1	9th Floor	W Wing		1 Indoor AP in open area.	-	-	1		-	1	1	-	-
		X Wing	1	2 Indoor AP and 1 Inroom AP for Presedential Suite with 1 data port in Bed room 2, 1 Indoor AP in open area. 1 Indoor AP in Guest Corridor.	1	1	4		-	6	1	-	-
2	8th Floor	W Wing	23	20 Inroom AP to cover 20 Executive Room, 3 Inroom AP to cover 3 Studio Room. 1 Indoor in Corridor.	-	23	1		-	24	1	1	-
		X Wing	20	20 Inroom AP to cover 20 Executive Room.1 Indoor in Corridor.	-	20	1		-	21	-	1	-
3	7th Floor	W Wing	36	Super Deluxe Room to have 1 Indoor AP with 2 Data port respectively for 2 Rooms, 1 BHK Room with 2 Data port and 1 Indoor AP, 20 Inroom AP for 20 Executive Rooms, 13 Inroom AP for 13 Studio Apartment, 2 Indoor AP for Guest Corridor.	4	33	5		-	42	-	2	
		X Wing	37	Super Deluxe Room to have 1 Indoor AP with 2 Data port respectively for 2 Rooms, 1 BHK Room with 2 Data port and 1 Indoor AP, 20 Inroom AP for 20 Executive Rooms, 14 Inroom AP for 14 Studio Apartment, 2 Indoor AP for Guest Corridor.	4	34	5		-	43	-	2	
4	6th Floor	W Wing	36	Super Deluxe Room to have 1 Indoor AP with 2 Data port respectively for 2 Rooms, 1 BHK Room with 2 Data port and 1 Indoor AP, 20 Inroom AP for 20 Executive Rooms, 13 Inroom AP for 13 Studio Apartment, 2 Indoor AP for Guest Corridor.	4	33	5		-	42	-	2	
		X Wing	37	Super Deluxe Room to have 1 Indoor AP with 2 Data port respectively for 2 Rooms, 1 BHK Room with 2 Data port and 1 Indoor AP, 20 Inroom AP for 20 Executive Rooms, 14 Inroom AP for 14 Studio Apartment, 2 Indoor AP for Guest Corridor.	4	34	5		-	43	-	2	

Fig 8: Port calculation and requireddevices (part 1)

5	5th Floor	W Wing	31	1 Honey Moon Suite with 2 Data port and 2 Indoor AP,1 BHK Rooms with 2 data port and 1 Indoor AP respectively for 7 Rooms, 11 Inroom AP for 11 Studio Rooms, 12 Inroom AP for 12 Exec Room, 2 Indoor AP for Corridor.	16	33	11		-	60	-	2	1
		X Wing	32	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 2 data port in Living room and Bed Room 2 respectively,1 BHK Rooms with 2 data port and 1 Indoor AP respectively, 10 Inroom AP for 10 Studio Rooms, 1 Inroom AP for 10 Exec Room, 2 Indoor AP for Corridor.	16	34	11		-	61	-	2	1
6	4th Floor	W Wing	30	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 1 data port in Living room,1 BHK Rooms with 2 data port and 1 Indoor AP respectively for 9 Rooms, 11 Inroom AP for 11 Studio Rooms, 8 Inroom AP for 8 Exec Room, 2 Indoor AP for Corridore.	20	21	13		-	54	-	2	1
		X Wing	31	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 2 data port in Living room and Bed Room 2 respectively,1 BHK Rooms with 2 data port and 1 Indoor AP respectively, 10 Inroom AP for 10 Studio Rooms, 1 Inroom AP for 10 Exec Room, 2 Indoor AP for Corridore.	20	22	13		-	55	-	2	1
7	3rd Floor	W Wing	30	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 1 data port in Living room,1 BHK Rooms with 2 data port and 1 Indoor AP respectively for 9 Rooms, 11 Inroom AP for 11 Studio Rooms, 8 Inroom AP for 8 Exec Room, 2 Indoor AP for Corridore.	20	21	13		-	54	-	2	1
		X Wing	31	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 2 data port in Living room and Bed Room 2 respectively,1 BHK Rooms with 2 data port and 1 Indoor AP respectively, 10 Inroom AP for 10 Studio Rooms, 1 Inroom AP for 10 Exec Room, 2 Indoor AP for Corridore.	20	22	13		-	55	-	2	1

Fig 9: Port calculation and requireddevices (part 2)

8	2nd Floor	W Wing	31	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 2 data port in Living room and Bed Room 2 respectively, 1 Bhk Room with 9 Indoor AP and 2 data port respectively, 8 Inroom AP to cover 8 Studio rooms, 12 Inroom AP to cover 12 Exec Rooms, 2 Indoor AP for guest Corridor.	20	22	13		-	55	-	2	1
		X Wing	31	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 2 data port in Living room and Bed Room 2 respectively, 1 Bhk Room with 9 Indoor AP and 2 data port respectively, 8 Inroom AP to cover 8 Studio rooms, 12 Inroom AP to cover 12 Exec Rooms, 2 Indoor AP for guest Corridor.	20	22	13		-	55	-	2	1
9	1st Floor	W Wing	23	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 1 data port in Living room,1 BHK Room with 6 Indoor AP and 2 data port respectively, 5 Inroom AP to cover 5 Studio rooms, 10 Inroom AP to cover 10 Exec Rooms, 2 Indoor AP for guest Corridor. 2 Indoor AP in Meck Bar & Manager RM, 1 Indoor AP in Lobby, 1 Indoor AP in Pool area	14	17	14		-	45	-	2	
		X Wing	33	Two 2BHK Rooms will have 1 Inroom AP and 1 Indoor AP each with 1 data port in Living room and Bed Room 2 respectively, 1 BHK Room with 6 Indoor AP and 2 data port respectively, 5 Inroom AP to cover 5 Studio rooms, 20 Inroom AP to cover 20 Exec Rooms, 2 Indoor AP for guest Corridor. 1 Indoor AP for BC with 4 data port.	20	27	11		-	58	-	2	1
10	Ground Floor	W Wing	-	5 Indoor AP covering GYM,Reception,SPA,BAR & Lobby. 2 Indoor AP for Banquet with 6 Data port & 1 Indoor AP in pre-function, 1 AP in Pantry, 1 AP in Inspection Foyer, 2 AP in Locker Rooms, 1 AP in Admin,1 AP in IT Room	6	-	11	3	-	20	-	1	-
		X Wing	-	5 Indoor AP to cover Child Play Room, Beauty parlour, Female SPA, lobby & Foyer, 1 Indoor AP for Store, 2 Indoor AP to cover Beer shop and medical centre; 1 Indoor AP in lobby, 1 Indoor AP in Sea Food Restaurant, 3 Indoor AP to Barber shop, Med Centre, Game Room, 1 Indoor AP for Corridore, 2 Indoor AP for Conference 1 & 2, 2 Indoor AP for pre-function, 1 CDU to cover outdoor Restaurant.	6	-	10	6	1	23	1	1	-

Fig 10: Port calculation and requireddevices (part 3)

3.4 Network Diagram Drawing:

The third step and very important work is network diagram drawing. To have clear concept a network diagram should be drawn before starting the main work.

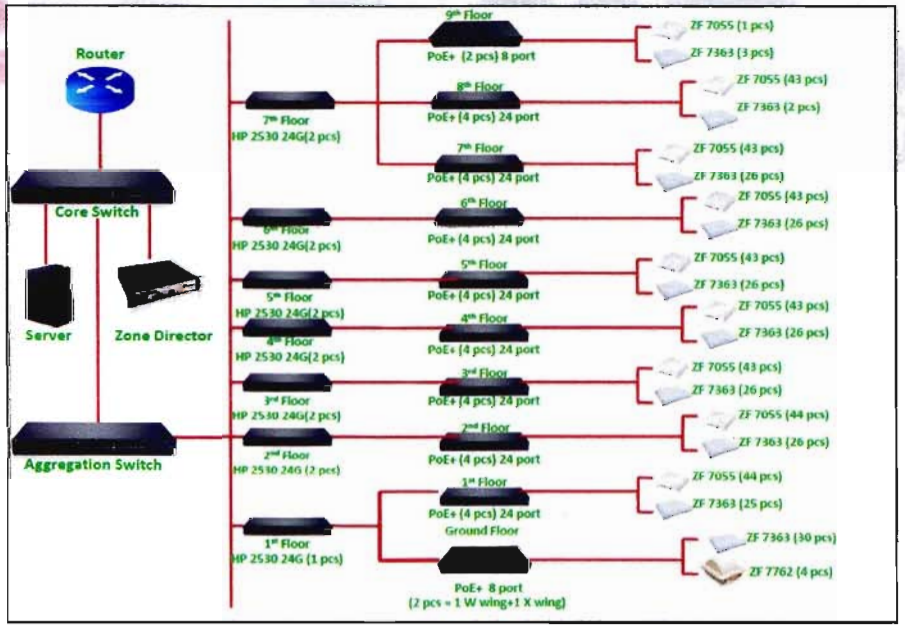


Fig 11: Network Diagram of Hotel SEA PARL's Wi-Fi network

Then the IT plan had to be drawn.

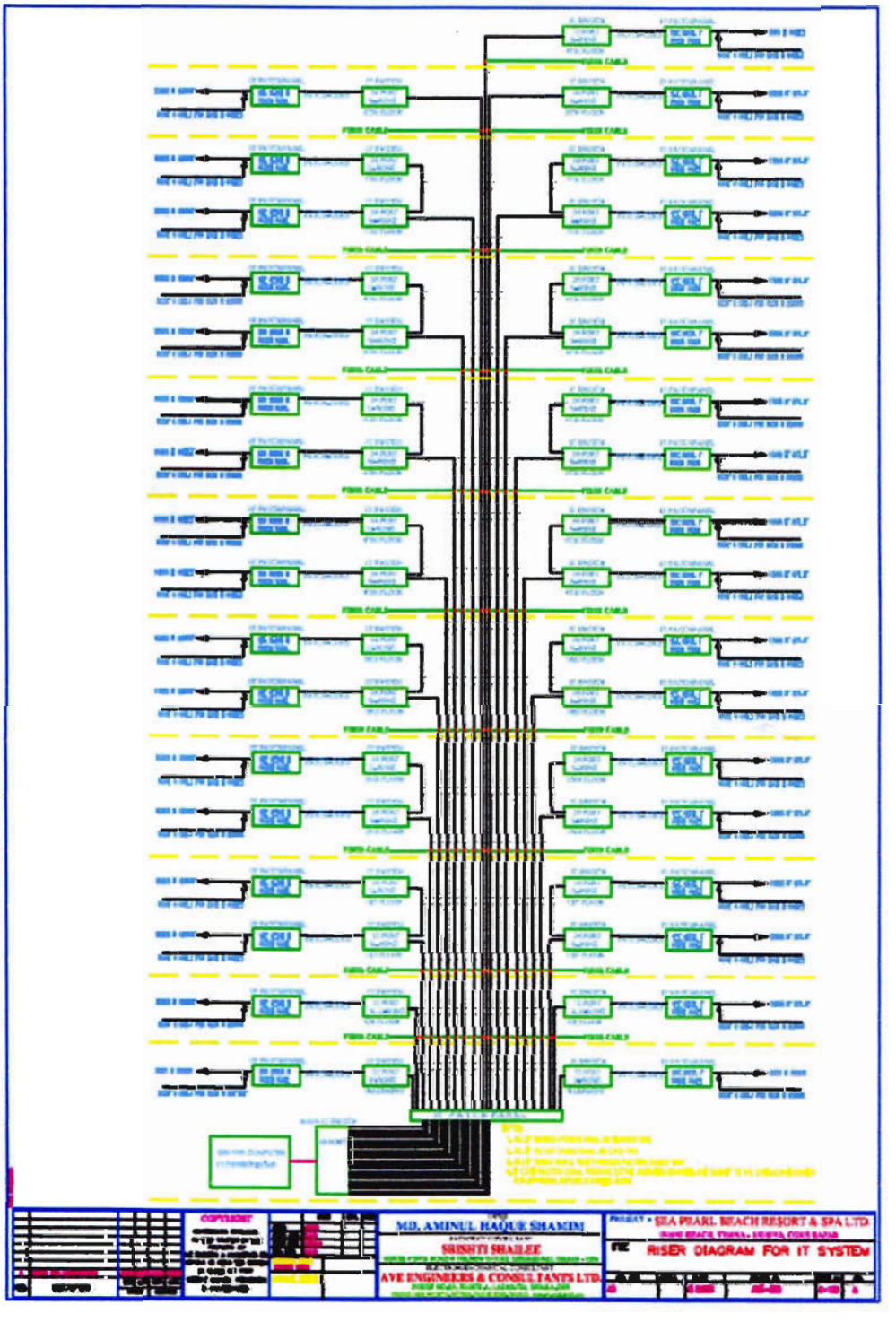


Fig 12: IT Drawing for the Connections

3.5 Device Configuration:

This step is totally technical. In this step at first all the devices (access points) are configured with the provided IP addresses by the Hotel's IT person. To configuring the Access point, the AP (access points) needs tobe connectedwith a computer. Then the IP address of the computer has tobe changed and need to set one of IP address of AP's IP series. Thereafter it is needed to open up a Browser and log into the AP by hitting with the AP's IP address. Then customize the network setting and have tosave it.

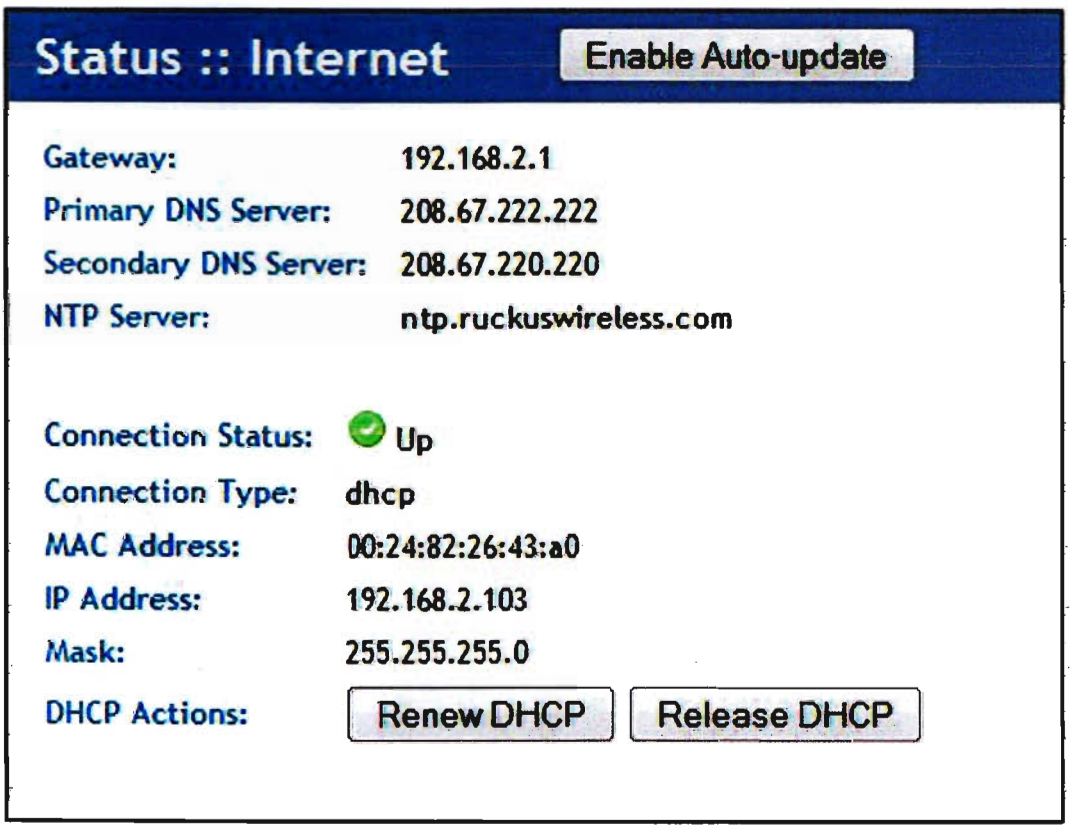


Fig 13: Final screen after configuring a Zone Flex 7363

3.6 Final Work:

At first a connection from the Core router is taken to the Core Switch, where a server and the Zone Director is connected. The server Was Linux Based DNS, WEB, Mail, PROXY server. A connection from the core switch will go to the aggregation switch from where the connections for the PoE(power over Ethernet) switch will served and from there for every connection the Access points are supplied.

Fig 14: Mounted Access point for the outdoor area

Chapter 4

Conclusion

4.1 Conclusion:

ThisInternship provides the opportunity to test interest in a particular career before permanent commitments are made. It gave meproper scope to gain experience and knowledge which co-relate with the theoreticalbackground that we learned in university courses. In FONS Bangladesh, working with the vendor like RUCKUS Wireless gave me the practical as well astechnical knowledge of Wi-Fi technology. In FONS Bangladesh I have learned how to survey a site, to providethem appropriate solution about Wi-Fi and how to deploy a new Wi-Fi network. Experience of this internship will help me to make a better carrier in telecommunication field. I also learned new concepts and new ways of working. I have learned how to work in a team, and I often needed to meet expert person to resolve some problems. I surmise thiswholeexperience such as network monitoring, site surveys and field operation has beenveryhelpful for my future assignment.

LIST OF REFERENCE

Reference No	Reference details	Page no
1	Brute forcing Wi-Fi Protected Setup. (2011, December 26)Virsion 3 [Online PDF], Available: http://sviehb.files.wordpress.com/2011/12/viehboeck_wps.pdf	2
2	Marshall Brain, Tracy V. Wilson and Bernadette Johnson (june 2012) [OnlineArticle]Available:http://www.teachict.com/technology_explained/wifi/wifi.html	2
3	How Does WiFi Work? [Online Article] Available:http://www.dciexpo.com/wifi/how-does-wifi-work.php	3
4	What is Wi-Fi and how does it work (December 2013) [Online Article] Available: http://en.kioskea.net/faq/298-what-is-wi-fi-and-how-does-it-work	4
5	Bradley Mitchell, (Wireless Standards - 802.11b 802.11a 802.11g and 802.11nThe 802.11 family explained). [Online]. Available: http://compnetworking.about.com/cs/wireless80211/a/aa80211standard.htm	4
6	Ian Poole. (Wireless technologies and standards). [Online] Available: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11a.php	5
7	Ian Poole. (Wireless technologies and standards). [Online] Available: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11a.php	6
8	Ian Poole. (Wireless technologies and standards). [Online] Available: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11a.php	6
9	Ian Poole. (Wireless technologies and standards). [Online] Available: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11a.php	8

10	Ian Poole. (Wireless technologies and standards). [Online] Available: http://www.radio-electronics.com/info/wireless/wi-fi/ieee-802-11a.php	8
11	Kelsie Jones. (13 March 2005). WiFi TECHNOLOGY. [Online] Available: http://webpages.uah.edu/~iveyd/	10
12	Ruckus Wireless. High Performance, 802.11n Mid-Range Smart Wi-Fi Access Points with Adaptive Antenna Technology. [Ruckus Wireless, main web portal] Available: http://www.ruckuswireless.com/products/zoneflex-indoor/7363	13
13	Ruckus Wireless. High Performance, 802.11n Mid-Range Smart Wi-Fi Access Points with Adaptive Antenna Technology. [Ruckus Wireless, main web portal] Available: http://www.ruckuswireless.com/products/zoneflex-indoor/7321	14
14	Ruckus Wireless. High Performance, 802.11n Mid-Range Smart Wi-Fi Access Points with Adaptive Antenna Technology. [Ruckus Wireless, main web portal] Available: http://www.ruckuswireless.com/products/zoneflex-indoor/7762	16