Perceptions of Travellers Regarding Wireless Local Area Networks at International Airports

A research study by

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Abstract

This research is concerned with identifying and analysing the issues for travellers around the availability and use of wireless network in public areas of international airports. The subjects of this research study are travellers who use wireless network connections at international airports.

The mixed research methodology has been chosen for this research study, which combined quantitative and qualitative research methods together. The quantitative data was collected through paper surveys, and the main qualitative data was gathered through interviews. The total of 60 travellers who were using wireless local area networks (wireless LANs) at three international airports (Beijing, Guangzhou, and Auckland) were selected to do a survey. Twelve participants who were surveyed at Auckland International Airport were chosen to do the interview. Both the quantitative and qualitative data have been presented in full by the researcher, and all of the data were analysed by the researcher to produce the final conclusions of this research.

The purpose of this research is to uncover issues such as: why a traveller would use a wireless LAN, what are the types of activities for which a traveller uses wireless LANs and what are their expectations of International airports. The main research question is ‘What are the perceptions of travellers regarding wireless LANs at international airports’. The sub research questions are:

- What kind of travellers regularly use wireless LANs at international airports?
- What are the principal expectations and demands of the travelling public regarding wireless LANs at international airports?
- How has the wireless LAN in airport waiting areas impacted on the
How does the travelling public think wireless network services at airports can be improved?

What wireless network technologies can be used in airports to meet these expectations?

Keywords

wireless, wireless networks, wireless LANs, Wi-Fi, hotspots, international airport, social informatics, tourism
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1 Introduction

Wireless LANs is the acronym for wireless local area networks, which are widely used in public areas nowadays. Many airports provide wireless LAN access to the public. With the development of technologies, wireless networks became as important for airports as keeping customers and airlines happy. Both of them are main business strategies for airports. The main purpose of the airports in providing a wireless network service is to give more benefits and create additional value to the travellers. Therefore, this research is focused on analysing the perceptions of travellers using wireless LANs at international airports.

The wireless project began early at airports. Sanborn (2001) states that many airports wanted to implement or had already started the wireless project, including San Jose, Dallas-Fort Worth, Philadelphia, Austin-Bergstrom, and San Francisco International airports. Many of the airports limited the wireless network service when they first implemented it, making it available only to airline and airport staff, and gradually developed it to provide for public use.

The wireless networks have more benefits than traditional broadband internet access, especially because it is wire free, but its security issues needed more attention. “The security issues that are attributed to wireless networks have prevented the adoption of wireless devices on a larger scale” (Schmidt & Townsend, 2003, p. 50).

This thesis is focused on travellers’ perspectives of using wireless LANs at international airports. It includes a review of relevant literature, discussion of the research methodology, presentation of both quantitative and qualitative data, and comparison and analysis of the integrated data. The final findings
from the research questions are also discussed. Conclusions and recommendations for further research are also provided at the end of this thesis.

2 Purpose of Research

The purpose of this research is to identify and analyse the issues for travellers around the availability and use of wireless networks in public areas of international airports. The subjects of this research study were travellers who were using wireless network connections at international airports. The purpose is to uncover issues such as: why a traveller would use a wireless LAN, what are the types of activities for which a traveller uses wireless LANs and what are their expectations of International airports. Technical issues are also covered. The main research question is ‘What are the perceptions of travellers regarding wireless LANs at international airports’. The main research question can be divided to several sub-questions, such as:

- What kind of travellers regularly use wireless LANs at international airports?
- What are the principal expectations and demands of the travelling public regarding wireless LANs at international airports?
- How has the wireless LAN in airport waiting areas impacted on the travelling public?
- How does the travelling public think wireless network services at airports can be improved?
- What wireless network technologies can be used in airports to meet these expectations?
3 Literature Review

3.1 Introduction

The purpose of the literature review is to review current literature on the use of wireless LANs at international airports and to further investigate solutions to the issues raised during the questionnaire and interview processes. The next section will review the different publications about wireless LANs in the different areas. In section 3.2, Literature, the researcher will review all selected literature. The order of the selected literature follows the research process, from general information about wireless technologies to general use of wireless LANs in public areas, specific use of wireless LANs at airports and finally, the issues arising from the use of wireless LANs at airports concluded this literature review. This literature review process informed the research purpose to research “perceptions of travellers regarding wireless LANs at international airports”. The literature map will be presented in section 3.3, Literature Map. This chapter will also be summarised in section 3.4.

3.2 Literature

3.2.1 Wireless

- **General Information on Wireless Technologies**
  Tyler (2004) talked about the evolitional network technologies, from the earlier mobile cellular phone networks in 1970s to the latest wireless network technologies in the 21st century. According to Tyler (2004, p. 24), “everyone is talking about Hot Spots and some of us are actually using them. But how seriously should we take it all”. Go back to 1970s, and the mobile phone networks service was expensive. At that time there was only
one cheap service, provided jointly by Phonepoint and Telepoint. They set up the radio base units’ service in public places where people congregated, such as rail stations, airports, and conference centres. This service could be matched with cheaper phones. People could connect with these radio base units’ services to make calls by using the cheaper phones within the range. This service helped people at that time, but it had a few limitations on use, such as difficulty in detecting signals, and limited range. In April 2002, “British Telecom Retail unveiled its intention to launch a Public Access Wireless LAN network as soon as the Radio Agency allowed commercial services to operate across the 2.4 GHz radio spectrum” (Tyler, 2004, p. 25). This wireless network allows users to use their own laptop or PDA, which if equipped with a wireless network card can sign up to the hot spot service.

Nowadays, most new laptops and PDAs are produced already fitted with WiFi capability. According to Tyler (2004), most service providers used 128K encryption to secure their network. “One service quoted the IEEE 802.11b gross data rate of 11Mbps but that is misleading. IEEE 802.11 can deliver net data rates of 8Mbps at best and more likely 6Mbps” (Tyler, 2004, p. 25). In fact, the connection speed is not as fast as that claimed by the service. The actual connection speed always depends on the user’s location, together with signal strength, coverage scope, number of users and interference. According to Tyler (2004, p. 25), “there are probably about 4,000 Hot Spots across the UK (about 15,000 globally)” until 2004 and “They exist in airports and rail termini as one would expect but also in such places as conference centres, urban hotels and eating places and some motorway service stations”. The travelling public can spend their waiting time at these public places through hotspots. The public wireless hotspots are wire free and convenient, but the speed of connection is
slower than broadband cable connection. There is a new wireless standard called 802.11n, which can improve the data transfer rate to 100 Mbps. The new standard 802.11n is still at the auditing stage, and IEEE has not yet achieved certification.

Further developments in wireless technologies will apply more to mobile phones, which are more flexible and portable. As we already seen, 3G (third generation) networks allowed us to connect by using W-CDMA (Wideband Code Division Multiple Access) or UMTS (Universal Mobile Telecommunications System) mobile phones. 3G achieves speedy data transmission through the internet, and can browse websites and so on by using wireless compatible mobile phones.

Tyler’s article reviewed the development, usage and promotion of hot spot network services, which included early mobile phone networks, public access wireless LAN networks and third generation networks in Britain. The author pointed out that “Hot spots will succeed in the short term”, and ended by saying “Analysis Research estimated that the number of people actively using Wi-Fi in the UK by 2005 will top 850,000” (Tyler, 2004, p. 27).  

- **Impact of Wireless LANs**

  The “Wi-Fi goes to Washington” article was written by Hundt, Newman & Richards (2002). It discussed the impact of the new technology called Wi-Fi (wireless fidelity) on business and industries. Hundt, Newman & Richards (2002, p. 150) stated that Wi-Fi “is threatening the business models of the mobile carriers, the phone gear makers, and the providers of high-speed DSL and cable modem services”. It is simple and inexpensive. Users just need to install a Wi-Fi device into their PCs or PDAs, and they
can then access the internet with this low cost and high speed network connection. “Even better, with exciting new technologies such as mesh and ad hoc networks, improved Wi-Fi devices could create overlapping Wi-Fi networks in hotels, airports, office buildings, and malls” (Hundt, Newman & Richards, 2002, p. 150). Wi-Fi access is much faster with fibre. According to Hundt, Newman & Richards (2002, p. 150), “the transfer speed of Wi-Fi can be faster than a DSL or cable modem connection”. The authors also assumed a new generation in the future. They forecast that we will be making call by using computers with microphones. For the telephone market, Wi-Fi has chance to replace the single phone line connection. It will also affect the revenue of mobile carriers. So these companies will use the authority of the government to slow down the development of Wi-Fi. “Already, in Taiwan only communications providers licensed by the government can operate commercial Wi-Fi networks” (Hundt, Newman & Richards, 2002, p. 151). A similar situation also happened in European countries which prohibited Wi-Fi services. But in the United Kingdom, British Telecom has already offered commercial Wi-Fi services. The authors indicated that “Now is the time for the US government to embrace Wi-Fi and, for that matter, many related new technologies” (Hundt, Newman & Richards, 2002, p. 152). At the end of this article, the authors appeal that we have to support the growth of new technology, and let it bring everyone into the Internet age.

“Main Points” (2003) discusses how the demand for growth in wireless LAN services challenges the government policies of OECD (Organisation for Economic Cooperation and Development) countries. Wireless technology allows anyone to connect to the Internet from outside the signal coverage areas of fixed networks. Wireless networks have more benefits
than the traditional broadband internet access; in particular, the wireless networks do not need wires to be set up. “Wireless LAN standards enable anyone to set up a network easily and share a broadband Internet connection among several computers equipped with wireless Ethernet cards” (“Main points”, 2003, p. 4). The rapid development of wireless LANs is changing the leading status of the telecommunications industry step by step, since we can also access wireless LANs in some public places.

“While wireless technology has been led mainly by industry, governments are encountering some policy challenges as Wireless LAN services grow in popularity” (“Main points”, 2003, p. 4). Some policies are regulated by government, and detailed examples of regulated policy are described in “Main Points”. According to “Main points” (2003, p. 4), these policies ensure that the spectrum is allocated for wireless LANs, provide unified worldwide frequency bands for wireless LANs, allow a single subscriber to set up a network, make wireless LANs combine with IP telephony, provide licensed radio spectrum for wireless LANs, and provide authority for wireless internet access service in public places.

“Main points” (2003) pointed out that the security issue is currently the biggest disadvantage of wireless LANs. It will be impacted the development and diffusion of wireless LANs. “Governments need to ensure that the policy and regulatory environments are conducive to this technology and the spectrum resources are made available to help grow the use of this technology” (“Main points”, 2003, p. 5).

- **Security Issues of Wireless Networks**

  The impact of wireless networks on our lives is very large, the “wire free” networks have provided us with many benefits, but the security of wireless networks also presents some problems. “The security issues arise in
Institute of Electrical and Electronic Engineers (IEEE) 802.11x and third generation (3G) wireless networks" (Shridhar, Joyce & Kolahi, 2006, p. 69).

Currently, the wireless network is very popular. There are more and more organisations that would like to use the wireless network. But the greatest concern for users and business is the price and security of the wireless network.

According to Shridhar et al. (2006), the common wireless network technologies in the market are including IEEE 802.11x, 3G and Bluetooth. Shridhar et al. (2006, p. 69) states that “IEEE 802.11x wireless networks are increasingly used in a wireless local area network environment and there are three common 802.11x wireless standards: 802.11b, 802.11a and 802.11g.” Most families and offices prefer to use the 802.11b wireless standard. “There are a number of security issues that are associated with 802.11b” (Shridhar et al., 2006, pp. 69-70).

Compared with the IEEE 802.11x wireless networks, the 3G network has no restriction on location; it can be used wherever you go. However the speed rate of the 3G network is slower than the IEEE 802.11x wireless networks. “The security architecture in 3G networks is much better and they are relatively more difficult to break into than 802.11x networks” (Shridhar et al., 2006, p. 71). When the 3G network detects an attack, it may prevent the attack by itself.

Urbas & Krone (2006, p. 1) stated that “the security and risk factors associated with mobile and wireless technologies need to be understood and addressed to ensure safe and secure business and personal use of
mobile technologies”. Mobile and wireless technologies have become popular today. We can use mobile phones to access the internet, to communicate with others, or simply browse websites. Internet access does not need a wired system any more. It can be done through any available mobile access point by using mobile phones. “Such access points or hot spots are now widely available in airports, hotels, educational institutions and other public buildings” (Urbas & Krone, 2006, p. 1). The security and risk factors are important for providers who provide access points and users who use mobile access to the internet.

There are some places such as public places where we could not previously access the internet, but the wireless technologies allow us connect to networks at those locations. According to Trusted Information Sharing Network (2006), as quoted in Urbas & Krone (2006, p. 2),

“travellers using wireless enabled laptops and mobile devices can now connect to their offices and exchange data from the comfort of an airliner flying 10,000 metres above land”. According to Krone (2006), as quoted in Urbas & Krone (2006), there are two advantages to wireless and mobile technologies, such as flexibility and mobility. “However, there is a trade off between convenience and security” (Urbas & Krone, 2006, p. 2). There are some security risks with mobile and wireless systems. They are intrusion, leeching, and exploitation, as reported by Urbas & Krone (2006). The law enforcement agencies can minimise the security risks. According to Lopez (2004), as quoted in Urbas & Krone (2006, p. 4), “there is a wide range of commercially available products and services designed to enhance security of mobile and wireless networks, including encryption tools, access controls and intrusion detectors”. There are three main methods that can help us to enhance the protection. They are prevention, detection and investigation, and prosecution.
This article clearly states the mobile and wireless security issues and also provides protective solutions. The article also presents two wireless hacking case studies and one wireless war spamming case study. These real cases allow us to easily understand, from actual situations, the security issues of wireless.

3.2.2 Wireless LANs in Public Areas

- Technical Aspects

According to Roshan & Leary (2003, pp. 247-248), the public prefers to have access provided to wireless networks in particular areas. The provision of internet access via the wireless medium has grown in public areas, particularly in hotels, cafes, airports, and other locations where people congregate. Most of those wireless network providers do not give free services. For user authentication, there are many developments that use billing systems for public access. The existing Global System for Mobile Communication (GSM) billing system is the key to making authentication schemes easy. This authentication scheme can be based on different users to allocate authority.

Today, the biggest issue for billing systems for public access is roaming. “Roaming refers to the ability to use networks from multiple providers while maintaining a single customer-vender relationship” (Roshan & Leary, 2003, p. 248). In different locations, users have to pay for wireless internet access with the vendor who is providing the service. This issue has improved after the Subscriber Identity Module (SIM) billing system combined with 802.1x authentication schemes.
On page 248 of Roshan & Leary (2003) there is a figure that illustrates the sample public access architecture of 802.11 wireless LAN fundamentals. The figure “shows a sample architecture of a public access solution with multiple public access hot spots connected to a single point of presence (POP)” (Roshan & Leary, 2003, p. 248). It also shows the signalling system 7 (SS7) network authentications for public internet access. The essential problem for a public access wireless network is the actual physical deployment. Both the billing and the roaming areas are the big challenge for the developers. They will focus on these areas much more than others.

The Wi-Fi Zone designation provides an easy public access wireless network to users. “Wi-Fi ZONE providers are required to provide quality customer service and a high level of service that supports Virtual Private Networks (VPNs) back to corporate networks” (Roshan & Leary, 2003, p. 249). The designation of Wi-Fi Zones is a key component of public access.

➢ **Social Aspects**

This research study will focus on both technical and social aspects. Most of the above articles discussing the technical aspects of wireless networks. For the social aspects, Dr. Steve Sawyer is a professional researcher on social and organisational informatics. He said

“computers, both on the desktop and embedded in automobiles, appliances, cellular phones, and satellite dishes have become part of the fabric of our work and social lives. In three decades, the Internet has grown from a network connecting four American universities and research labs to a global communications network.” (Sawyer, 2000, p. 89).
It means the information and communication technologies have been developed very fast and today are more important. The wireless network is beside a significant player in these roles. The rapid evolution of wireless technology affected a great number of commercial organisations, especially universities, cafes, hotels, restaurants, airports and conference halls, who would like to develop and improve their wireless network service for public use.

### 3.2.3 Wireless LANs at Airports

- **Wireless Project started at Airports**

  Sanborn (2001) pointed out that in the future, airports will want to obtain the benefits of being served by wireless networks. Passengers and business travellers will always for various reasons, like bad weather, mechanical trouble, and busy runways be stuck in the waiting areas at airports. Business travellers usually fly between different places, and for them the waiting time is also very important. Airports seem to be their movable offices, so the wireless network will bring advantages to them, and let them to handle business affairs instantly. Loss of signal and unavailability of wireless can be a great inconvenience for the travellers. Many airports plan to establish a wireless network to avoid these.

  “Installing these networks in or on airport buildings gives better coverage and signal strength -- meaning there’s less chance of wandering into a ‘dead spot’ in a terminal -- and improves network capacity and wireless signal penetration into airport buildings.” (Sanborn, 2001, p. 30). According to Sanborn (2001), many airports wanted to implement or had already started a wireless project, including San Jose, Dallas-Fort Worth, Philadelphia, Austin-Bergstrom, and San Francisco International airports.
With the development of technology, the wireless networks became for the airports as important as keeping customers and airlines happy. Both of them are main business strategies and key selling points for the airports.

- **Restricted Wireless LANs at airports (Only for Airlines and Airport Staff)**

There are Wi-Fi hot spot enthusiasts who would like to discuss wireless topics, such as Mr. Fraser “whose job takes him between New Zealand, Australia and Singapore, and who says his office consists of a slender briefcase containing an ultra-portable notebook computer and accessories” (Doesburg, 2003). According to Doesburg (2003), Mr. Fraser said in 2003 the wireless network was working well in Singapore airport, and could be used to access email, but it was not working in Auckland international airport. He suggested that there were many locations that could be established as a Wi-Fi Zone, such as Starbucks, Mecca, and Totem. He could use his Microsoft Smartphone to access email and reply by notebook. “Chris White, IT manager at Cookie Time in Christchurch, says he accessed the conference’s wireless network from his Apple notebook” (Doesburg, 2003). According to Doesburg (2003), the Wi-Fi network was great, and Intel had joined forces with Centrino to build up wireless capability. Wi-Fi is like a hub, so the running speed is very slow. According to “IEEE 802.11” (2007), various scientists are developing the technology to improve the speed of the wireless network, which is hoped to be the same as the Gigabit Ethernet. It is believed that scientists began to develop the next generation of wireless technology when they launched the first generation of wireless technology. There are some suitable applications for Wi-Fi, such as email, but it easily falls over when larger data are transferred.
“An account manager at ECONZ, a wireless application developer, Stephen McCormick, says numerous Wi-Fi networks can be discovered in Auckland — not all of them public” (Doesburg, 2003). McCormick used NetStumbler to detect wireless networks in Auckland city. He proposed to build up public wireless networks throughout the city.

By August 2004, a consortium of international airlines planned to install wireless networks at all international airports of New Zealand. But this network was not a public Wi-Fi network, and could be used only by airline and airport staff during working time. “They can use wireless barcode scanners to keep tabs on baggage once it is checked in and moved on and off aeroplanes” (Pullar-Strecker, 2004, p. C6). It was described as a wireless baggage reconciliation system. This system should bring advantage for airlines, enabling them to locate baggage and seek lost baggage easily.

This plan would push to set up other wireless services at airports, including establishing a public Wi-Fi network for passengers. Passenger convenience is the most important, and should be considered first. “Auckland airport head of IT Paul Menz says the needs of the international airlines take precedence over establishing a public Wi-Fi service which passengers could use to access the Net” (Pullar-Strecker, 2004, p. C6). It is an eventual goal to provide public Wi-Fi networks at international airports.

“Delta goes wireless” (2004, p. 22) reports that Delta Air Line announced it would use wireless technology to track its passengers’ luggage at airports. This technology is called RFID (Radio Frequency Identification). Delta
needed a large investment to achieve this goal. “Despite a rocky financial outlook, the Atlanta-based airline estimates that it will invest up to $25 million and two years to implement the initiative” (“Delta goes wireless”, 2004, p. 22). Delta Air Line’s director Robert Maruster indicated that approximately 80 million items of passenger baggage failed to arrive with their owners at their final destination. The delivery of this misdirected luggage cost his company about $100 million per year. Robert Maruster believed RFID technology would help his company to reduce the amount of misdirected luggage and easily track the location of passengers’ luggage. According to “Delta goes wireless” (2004, p. 22), “British Airways has also used RFID technology to streamline its baggage handling”.

The main point of this article is to talk about Delta Air Lines, plan to use RFID technology at airports. This wireless technology is not like the one provided for public use, but it also brings advantages to passengers, as RFID technology can help airlines to track passengers’ luggage and cut down the number of lost items.

> **Public Access Wireless LANs at Airports**

Wang, Cuthbert, Mullany, Stathopoulos, Tountopoulos, Sotiropou, Mitrou & Senis (2004) have done a project which analyses how the Intelligent Decision and Management system (IDMS) provides wireless services in an airport environment. “This system is studied and developed within the scope of the IST ADAMANT (Airport Decision and Management Network) project, where AIA (Athens International Airport) is used as a trial environment” (Wang, et al., 2004, p. 1). Actually, the approach of this system is suitable for any mode of transport, but this article focuses on an airport environment. The authors divided it into four main parts to describe the system: system overviews, application scenarios, the agent approach
of system architecture, and SLA (Service Level Agreement) management and business process model.

The airport environment consists of indoor and outdoor environments. The potential users are identified clearly. “Four different categories of potential users, within this operational environment, can be identified: passengers, meters and greeters, the airport staff and other airport Service & Content Providers (i.e. security companies, airlines, duty-free and facility companies)” (Wang et al., 2004, p. 1). The AODB (Airport Operational Database) contains all information on flights and flight-related matters. According to Wang et al. (2004), the whole airport operational database is protected by UFIS (Universal Flight Information System). This system “provides technical and logical functions for an effective and reliable data processing of operational flight information and holds the central UFIS database of the airport” (Wang et al., 2004, p. 2).

The passenger support system is very useful for this research study, since it is the core application. Passenger support is very important for running this system at an airport. Passengers can access the internet inside the airport with their own PDAs or portable computers. This system allows the airport to provide better services to passengers, such as providing flight stats information with passenger profiles and allowing the airport to track passenger positions for emergencies. Furthermore, this system makes it possible to extend hotspot coverage areas. It satisfies passengers’ needs to have mobile access to the internet at airports.

An annual survey conducted by SITA, Airports Council International (ACI) and Airline Business in 200 airports throughout the World, showed in 2005
that within the next two years about 90% of airports would provide public Wi-Fi network. “The Wi-Fi standard is of industrial strength, which makes it a particularly suitable underlying infrastructure for providing shared-use services to both the public and airport tenants such as shops and ground handlers” (“Airport WiFi Flies High”, 2005). They do not stop here. About 75% of airports had promised to provide 75% of airport wide communication to support new passengers and airline service such as voice over (VoIP). “As the needs of airlines and their support operations grow, airports are increasingly deploying a single airport-wide communication network to reduce the cost and complexity of existing systems, and provide a platform for new services, such as VoIP and Wi-Fi” (“Airport WiFi Flies High”, 2005).

According to Frew (2006), in April 2006 the wireless network was installed at Auckland airport. It also included a new secure wireless baggage reconciliation system and public wireless internet access. Tony Wickstead, Auckland International Airport Limited’s (AIAL’s) head of information technology and telecommunications, said “new legislation led to tighter security requirements, including a requirement for baggage reconciliation” (Frew, 2006). The new wireless baggage reconciliation could use PDA as a scanner to track luggage through its whole journey. This was an increased security function for it.

The public wireless internet access project is managed by HP. The wireless internet services are provided to various stakeholders throughout the airport. “HP’s Shane Williamson explains that different areas are able to be treated as separate hotspots” (Frew, 2006). The hotspots had already been launched in lounge and public areas in the airport. Passengers could
access wireless internet with their laptops, PDAs, and cell phones. The public wireless internet access needed to be managed with a secure and stable billing system. “HP had an existing partnership with Stockholm-based company Aptilo, who manage thousands of Wi-Fi hotspots around the world, including the giant Taipei city project where the whole city is wirelessly enabled” (Frew, 2006). Aptilo’s software brought many facilities to passengers, and let them pay the network viewing fees by credit card. “Aptilo’s billing solution allows Auckland Airport a simple way to provide Wi-Fi access to its visitors, passengers, businesses at the airport and other stakeholders” (Frew, 2006). The wireless network services allow the different stockholders’ specific needs to be satisfied.

The demand for use of wireless networks at international airports is large. In the future, HP will concentrate on enlarging the coverage of the wireless network at Auckland International Airport.

### 3.2.4 Issues Arising from the Use of Wireless LANs at Airports

#### Technical Issues

The wireless network can help airport administrators to improve airport services, according to Cisco Systems (2003, p. 1), such as airport security, baggage management, and passengers’ internet access. “As domestic and international traffic continues to grow at Australia’s largest, busiest airport, an extensive wireless LAN is playing a central role in keeping passenger and cargo movement on schedule” (Cisco Systems, 2003, p. 1). The Cisco Aironet wireless technology could be used at airports. By using Cisco Aironet wireless technology, “the airport’s wireless network
expedites airport maintenance, emergency services, and taxiway management” (Cisco Systems, 2003, p. 1).

According to Cisco Systems (2003), a logically designed wireless LAN can satisfy airport operations and public demand. “This Wireless LAN produces significant benefits, including streamlined support and maintenance that improves manageability and total cost of ownership, easier integration of various services, and the ability to support converged applications such as voice, data, and video running over the same network” (Cisco Systems, 2003, pp. 1-2). Benefit is another point of concern in airports. If they use a unified wireless LAN, the airports can provide the best basic service to airlines and other businesses. They could also charge them for the required services. In this way, the airlines and other businesses can then provide tiered services to travellers.

According to Cisco Systems (2003), the uncoordinated of wireless LANs will bring some problems, such as inconsistent network coverage, dead spots with no coverage, and security problems caused by the lack of security settings in the wireless LANs. “All of these issues – from comprehensive wireless coverage and passenger productivity to real-time security and revenue generation – were matters that Sydney Airport operators hoped to address with installation of the end-to-end wireless LAN” (Cisco Systems, 2003, p. 2).

Cisco Systems (2003) reported some technical solutions to solve those problems. “Using Cisco Aironet wireless technology, SACL (Sydney Airport Corporation Limited) has achieved airport-wide consistency for its wireless systems. The WLAN covers taxiways, runways, most ancillary buildings, and all terminals (with the present exception of the Qantas Domestic
Terminal 3)” (Cisco Systems, 2003, p. 2). This article described in detail how to use Cisco Aironet wireless technology to set up the unified wireless network at Sydney Airport. The security issues are of particular priority for the internet services at Sydney Airport, particularly after September 11 environment. Therefore this unified wireless network is very important for keeping the entire airport secure.

**Security Issues**

Wildstrom (2008, p. 85) says that “the wireless service offered in airports, coffee shops, hotels, and other hotspots is almost always unencrypted”. It means it is very open to attack by someone else. Even though they are provided with protection, they also just use Wired Equivalent Privacy (WEP). The protection of WEP is not good enough. It is very easy to be hacked.

“A survey of 14 airports in the U.S. and three in Asia by AirTight Networks, a company that sells gear to make wireless connections more secure, found that 57% of the networks were wide open” (Wildstrom, 2008, p. 85). This data included both public and private usage. According to Wildstrom (2008), there are 28% of the networks are protected by WEP, and only 15% of the networks are protected by Wi-Fi Protected Access (WPA). WPA is a stronger protection form than WEP. Secure networks are extremely important for both commercial and home access. “A virtual private network VPN provides end-to-end encryption of all traffic, anyone who intercepts data will see nothing more useful than the network address of the VPN gateway” (Wildstrom, 2008, p. 86). Employers should provide VPN and ask their employees to use VPN on public networks.

The free Wi-Fi network also has some risks. “Much worse is the risk that you will connect to a rogue network that will try to steal your data and infect
your computer” (Wildstrom, 2008, p. 86). It is better to use wireless networks which are protected by WPA, even it is not free. According to Wildstrom (2008), we have to take high attention of “ad hoc” or "peer to peer" networks especially. They will damage your system even though you are not online. The wireless network services are useful in public areas, “but the dangers are real, and simply understanding them will go a long way toward keeping you safe” (Wildstrom, 2008, p. 86).

Many people prefer to spend their waiting time connected to the Wi-Fi network at the airport. The wireless network services are always unencrypted. We have to avoid accessing private and business information on public networks, such as checking personal e-mails, logging in to online bank accounts, paying bills by credit card and remotely connecting to corporate systems without the VPN. We should visit only web sites that offer secure connection and use wireless networks with Wi-Fi Protected Access.

### 3.3 Literature Map

The literature map is a useful tool to clearly present the relationship between publications. “This map is a visual summary of the research that has been conducted by others” (Creswell, 2003, p. 39). The researcher used a flow-chart model to present the literature map of this research. “The central idea is that the researcher begins to build a visual picture of existing research about a topic. This literature map presents an overview of existing literature” (Creswell, 2003, p39). See the following figure 3.3 – 1: Flow-chart Literature Map
Wireless

General Information on Wireless Technologies:
Tyler (2004)

Impact of Wireless LANs:

Security Issues of Wireless Networks:
Shridhar et al. (2006); Urbas & Krone (2006)

Wireless LANs in Public Areas

Technical Aspects:
Roshan & Leary (2003)

Social Aspects:
Sawyer (2000)

Wireless LANs at Airports

Wireless Project Started at Airports:
Sanborn (2001)

Restricted Wireless LANs at airports (Only For Airlines and Airport Staff):
Doesburg (2003); Pullar-Strecker (2004); “Delta goes wireless” (2004)

Public Access Wireless LANs at Airports:
Wang et al. (2004); “Airports WiFi Flies High” (2005); Frew (2006)

Issues Arising from the Use of Wireless LANs at Airports

Technical Issues:

Security Issues:
Wildstrom (2008)

This Research: Perceptions of Travellers Regarding Wireless LANs at International Airports

Figure 3.3 - 1: Flow-chart Literature Map
3.4 Summary

Most of the literature discusses how to use wireless technologies to improve airport services. It does not discuss users’ perspectives of wireless LANs at international airports. Therefore the researcher decided the main research purpose for this research study was to focus on and analyse travellers’ perspectives.

The project teams who are developing wireless technologies at airports should follow users’ perceptions to provide wireless network services. They should know why a traveller would use a wireless LAN, what are the types of activities for which a traveller uses a wireless LAN, and what are travellers’ expectations of international airports. They should also promote the features and functions of wireless LANs to attract more travellers to use wireless network connections at airports. The value of this research project is to gather more information on the issues for travellers as regards the availability and use of wireless networks in public areas of international airports. The results may be useful to airport management and to other researchers.
4 Methodology

According to Creswell (2003, p. 17), there are three approaches to research design: quantitative, qualitative and mixed research methods. “Research methods can be classified in various ways, however one of the most common distinctions is between qualitative and quantitative research methods” (Myers, 1997, p. 3). “A quantitative approach is one in which the investigator primarily uses postpositivist claims for developing knowledge, employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data” (Creswell, 2003, p.18). According to Ereaut (2007, p. 1), “Qualitative research is all about exploring issues, understanding phenomena and answering questions”. Mixed methods study can combine the quantitative and the qualitative methods.

A mixed research methodology has been chosen for this research. This research aims to identify and analyse the issues for travellers regarding the availability and use of wireless networks in public areas of international airports. The purpose is to uncover issues such as why a traveller would use a wireless LAN, what are the types of activities for which a traveller uses wireless LANs and what are their expectations of international airports. Technical issues will also be involved.

This research study took place from September 2007 to August 2008. A suitable research methodology has to be chosen, to help the processes of research to progress properly. This meant that the processes of investigating a research topic, developing research questions, collecting information and analysing data would be executed in a unified way. According to Creswell (2003, p. 208), “With the development and perceived legitimacy of both quantitative and qualitative research in the social and human sciences, mixed methods research, employing the data collection associated with both forms of data, is expanding”.

Creswell (2003) reported that there are three approach procedures for mixed methods research. They are sequential procedures, concurrent procedures, and transformative procedures. After reviewing detailed information on these different types of procedures, the mixed research methodology – sequential procedure was chosen for this research study, because “the researcher seeks to elaborate on or expand the findings of one method with another method” (Creswell, 2003, p. 16). The researcher decided that begin this research study “with a qualitative method in which theories or concepts are tested, to be followed by a qualitative method involving detailed exploration with a few cases or individuals” (Creswell, 2003, p. 16). The following paragraph discusses the selected approaches for both quantitative and qualitative research.

There are two approaches to quantitative research: experiment and survey. The researcher chose the survey strategy, which uses questionnaires for data collection. In qualitative research, some clear approaches are currently available. They are ethnographies, grounded theory, case study, phenomenological, and narrative research. The case study approach was chosen, because it is the easiest approach for the researcher to collect qualitative data.

“Case studies, in which the researcher explores in depth a program, an event, an activity, a process, or one or more individuals. The case(s) are bounded by time and activity, and researchers collect detailed information using a variety of data collection procedures over a sustained period of time” (Stake, 1995, as quoted in Creswell, 2003, p. 15).

4.1 Survey and Case Study

The survey, as a quantitative research strategy, can collect quantitative data by different types. Fink (1995), as quoted in Creswell (2003, p. 155), says there are four data collection types of survey, “self-administered questionnaires; interviews; structured record reviews to collect financial, medical, or school information; and structured observations”. The researcher designed
self-administered questionnaires to survey different travellers who were using wireless LANs at international airports. “The data collection may also involve creating a Web-based or Internet survey and administering it online” (Nesbary, 2000, as quoted in Creswell, 2003, pp. 155-156). For this research, the researcher used paper questionnaires to collect information.

According to Yin (1994), the case study as a qualitative research strategy can be used in many different states. “In general, case studies are the preferred strategy when “how” or “why” questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context” (Yin, 1994, p. 1). According to Flyvbjerg (2006), a reason to choose case study methodology is because the case study provides a systemic way to gather data and analyse information and conclude results by following different events. In this research study, each investigative subject (member of the travelling public) who was using wireless network connection at the international airport would be researched as a different case. In addition, the participants were unique, so each person interviewed could be considered as a different case. After the subjects had been interviewed, the researcher used a thematic analysis to determine the common and prevalent issues of the traveller. These formed the basis of the technology requirements for wireless airport LAN systems. The case study research method was easy to use for analysing the data on this research topic, because several multiple data resources could be collected and analysed.

The particular research process of this study is outlined in the following sections on data collection and data analysis.
4.2 Data Collection

In this section, the researcher discusses the procedures for the different ways of collecting the data. Data collection was done from December 2007 to April 2008.

According to Creswell (2003, pp. 185-188), data collection can be separated into different parts, which include documentation (literature review), observation, questionnaire and interview. The detailed information on each part is presented below:

- **Step 1: Literature review**
  - **Secondary data**
    At this stage, the researcher reviewed current literature, identified issues, gaps, and solutions. The literature was identified found out from different sources by following the definition of research topic, scope of research topic, main research question and sub research questions.

    The data collected in the secondary stage were used to write the literature review. Before doing the full literature review, a detailed plan had to be made of where and how to collect data. This plan had to include definition of research areas, main research question and sub research questions. The researcher followed this plan to search and find out relevant literature.

    The best literature came from journals and books. The researcher focused on journals and books to find publications and use them to do the literature review. This did not mean that the researcher could not find literature from newspapers and websites, but the researcher found that most literature came from journals and books. The data collected at this stage was qualitative, and during the process of the research this would affect the results of this research project. The literature review helped the researcher to explore research areas, to know how much was already known and how much is required in the future, and to understand the advantages and
disadvantages of using wireless LANs at airports. In addition, the researcher used a literature map to classify all literature into different categories.

- **Step 2: Observation**
  The researcher observed how different travellers used wireless LANs at each airport (Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport). At this stage, the researcher made some notes about the different observation circumstances at each airport. The notes made at this stage were preparation for later collection of data (surveys and interviews).

Observation was the first step for researcher to get the primary data. During observation, “*Researcher has a firsthand experience with participants. Researcher can record information as it is revealed*” (Creswell, 2003, p.186). The researcher first went to each airport to get general information on the wireless network service from airport staff. The duration of observation was one day at each airport. The researcher found out where the hotspot locations were at each airport, and then observed the situation at different locations over different periods. The observations took place prior to the surveys. According to Creswell (2003), observation helps the researcher gain a knowledge and understanding of the context of the survey and interview locations and behaviours of the interviewees.

- **Step 3: Questionnaire and Interview**
  **Primary data**
  At this stage, the researcher used a paper questionnaire to collect information from 60 people who were using the wireless network at three international airports (Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport). The questionnaire was a survey which included some questions about using wireless LANs at international airports. The researcher will use closed questions for this questionnaire (see 8.1 Appendix A for Questionnaire
Questions). The closed question type is a simple and fast way to collect primary information, because the simple answer is easy to classify and analyse. The researcher chose to survey the first 20 people seen by the researcher who were using wireless LANs at each airport. The collected data from the surveys were quantitative data.

After using the paper questionnaire to collect information, the researcher chose 12 travellers to do the face-to-face interview to collect more and in-depth information. Every interviewee had to read an information sheet (see 8.2 Appendix B for Information Sheet) and sign a consent form (see 8.3 Appendix C for Consent form) before the interview. The interview was an informal interview which included some in-depth questions about wireless (see 8.4 Appendix D for Interview Questions). The researcher only chose travellers who had been surveyed at Auckland International Airport. The interview questions were open-ended questions, which the interviewees could answer with their own opinions. The gathered data from interviews were qualitative data.

Both the questionnaire and the interview were a good means of collecting the information about this research topic because the researcher could gather the information from different people who had experience of using wireless LANs at airports.

The researcher approached travellers who were using wireless LANs at the three international airports and asked them if they were willing be surveyed and interviewed. The questionnaire and interview data collection types are the main types which were used to gather the data for this qualitative research study.
4.3 Data Analysis

“The process of data analysis involves making sense out of text and image data.” (Creswell, 2003, p.190). The detailed processes are stated below. The data analysis process is a continual and ongoing process of data reflection. “Case study and ethnographic research involve a detailed description of the setting or individuals, followed by analysis of the data for themes or issues.” (Creswell, 2003, p. 191). According to Creswell (2003, p191), generally, the research process often follows the inherent processes to collect and analyse data. The inherent processes include the following steps:

- **Step 1:** “Organise and prepare the data for analysis” (Creswell, 2003, p.191)
  In this first step, after data collection, all collected data and information needed to be prepared. This included arranging questionnaire and interview information (if the data and information collected from questionnaires and interviews used different languages, it included translating them into English), briefly scanning collected data and information, marking file notes and unifying data types. This step was an important approach for getting a good start on the data analysis. The preparation of data helped the subsequent processes of data analysis.

- **Step 2:** “Read through all the data” (Creswell, 2003, p.191)
  The second step was to read through all the quantitative and qualitative data which were prepared in the first step. All the data and information needed to be reflected in this stage. The researcher first had to understand the meaning of all the data, information and participants’ ideas and then decide whether to use the information or not. In particularly, the researcher could also “write notes in margins or start recording general thoughts about the data at this stage” (Creswell, 2003, p.191).
Step 3: “Begin detailed analysis with a coding process” (Creswell, 2003, p.192)

The third step of data analysis was to start a coding process. The data analysis techniques and tools were outlined in this stage. “Coding is the process of organising the material into ‘chunks’ before bringing meaning to those ‘chunks’.” (Rossman & Rallis, 1998, p.171). According to Creswell (2003, p.192), it includes putting text data, images, paragraphs or pictures into categories. In addition the categories were labelled by using the actual words of the participant. The researcher read all data and information carefully to get a sense of the whole. The researcher classified all information into different categories. For example, the researcher could use different colour codes for different categories. Creswell suggested that researchers can “analyse their data for material that can yield codes that address topics that readers would expect to find, codes that are surprising, and codes that address a larger theoretical perspective in the research” (Creswell, 2003, p.193).

The coding process can be enhanced by using software programs. The analysis techniques and tools must be suitable for both quantitative and qualitative data. These computer software programs are widely used for mixed methods research. Especially for qualitative data, “they are useful when the qualitative database is large (e.g., more than 500 pages of transcription) and when the researcher wants to quickly locate useful quotations and multiple perspectives on a category or theme.” (Creswell, 2003, p.193). There is one major data analysis software package that was used for this research study: Microsoft Excel.

The Microsoft Excel software could be used to present quantitative data which was gathered from the surveys. The researcher typed into Microsoft Excel spreadsheet all data collected from the surveys of each participant. The researcher could use different background colours to separate data gathered from different airports. Microsoft Excel helped the researcher to determine the differences between each participant. It could group the
same data results together and count how many results were the same and how many results were different. Microsoft Excel has a strong drawing function which can automatically produce many different types of statistic graphs, such as bar graphs, pie graphs and line graphs. All of these graphs can be shown as three-dimensional views. These graphs easily and quickly helped the researcher to understand, tidy up and analyse all the quantitative data collected from the surveys. The final results will be displayed by using Microsoft Excel. The researcher set out the detailed explanation in word. The researcher used this transcript to code the words and patterns for the qualitative data gathered from interviews.

The researcher used Microsoft Word software to type text documents (such as the report on findings and discussion of data analysis) and arranged the collected text data. The researcher copied the graphs from Microsoft Excel to the findings section to show the data results clearly in this report.

- **Step 4:** “Using the coding process to generate a description of the setting or people as well as categories or themes for analysis” (Creswell, 2003, p.193)

In this step, the researcher generated data description by using a coding process. “Description involves a detailed rendering of information about people, places, or events in a setting” (Creswell, 2003, p.193). This is a useful analysis for case studies. According to Creswell (2003), the researcher uses coding to generate themes or categories; these themes are the major finding in this research study. Creswell also reported that the researcher can identify many themes during the coding process to add more layers of complex data analysis.

- **Step 5:** “Advance how the description and themes will be represented in the narrative” (Creswell, 2003, p.194)

In this fifth step of data analysis, the description and themes were set out. The data narrative is the most popular approach to managing the findings
of the data analysis. Many researchers like to “use visuals, figures, or a discussion with inter connection themes. They convey descriptive information about each participant in a table.” (Creswell, 2003, p.194). The findings of the data analysis were used to answer the main research question and sub research questions.

➢ **Step 6: “Making an interpretation or meaning of the data”** (Creswell, 2003, p.194)

The final step of data analysis was to make an interpretation or meaning to the data. The final findings and research discussions were addressed at this stage. These findings and discussions were also included in the researcher’s personal thinking or understanding of this research study. Possible future research directions are included in this final report. The data gathered from literature, observations, surveys and interviews were all used together to form an interpretation. Therefore, the researcher drew a table to present all the data results described in the findings and discussion section, to link with the main research question and sub research questions of this research study. In addition, the useful information gathered form the literature was also linked with the research questions.
## 4.4 Summary of Research Methods

<table>
<thead>
<tr>
<th>Methods</th>
<th>Purpose</th>
<th>Number of Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature Review</td>
<td>Used to review current literature, identify issues, gaps and solutions. The literature review helped in understanding this research topic.</td>
<td></td>
</tr>
<tr>
<td>Observation</td>
<td>Used to define this research topic deeply and explore research area.</td>
<td></td>
</tr>
<tr>
<td>Questionnaire</td>
<td>Used to gather basic information by using paper questionnaire questions (See Appendix A).</td>
<td>60 travellers</td>
</tr>
<tr>
<td>Interview</td>
<td>Used to collect more and in-depth information by using interview questions (See Appendix D).</td>
<td>Selection of 12 travellers from questionnaire participants</td>
</tr>
</tbody>
</table>

Table 4.4 - 1: Summary of Research Methods

The mixed research methodology was chosen for this research study. As the summary of research methods table shows above, the quantitative data was collected first and informed the qualitative data approach adding richness and depth to the final analysis.
5 Findings and Discussion

5.1 Introduction

The following section presents the results of both the quantitative data and the qualitative data. The processes of data collection were as described in the methodology section. All of the data were gathered from the observations, surveys and interviews also described in the methodology section.

The data gathered from observations is fully discussed in section 5.2, presentation of data from observations. The researcher discusses the initial stages of the observation at each airport, which included general information on wireless network services, hotspot locations, and the number and location of travellers using wireless LANs at each airport. The researcher breaks down the results of the survey and presents them in section 5.3, presentation of data from surveys. The data from the surveys, which was coded and organised by using Microsoft Excel, includes statistical quantitative data and graphs. In addition, the detailed explanation was also discussed in word. The researcher summarises general interviews and makes specific reference to specific interview questions of each interviewee in section 5.4, presentation of data from interviews.

Sixty travellers were selected to do a survey at Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport (20 travellers at each airport). These travellers were using a wireless LAN at the airports. Because the surveys used closed questions, most data gathered from the surveys were quantitative data. Twelve travellers who were surveyed at Auckland International Airport were chosen to do the face-to-face interview to collect more and in-depth information. Because the interview questions were open-ended, the information collected from the 12 interviews was qualitative data.
The results from these quantitative and qualitative data were used to do the further data analysis. The discussion of crossing comparison and integrated analysis is presented in section 5.5, data analysis.

5.2 Presentation of Data from Observations

According to the methodology section, the researcher did the observation before collecting the 60 questionnaires at three different international airports (Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport). The survey collection time was different at these three international airports, since they are in different locations. The following present information about the observations carried out separately before the survey at three airports.

✧ Observation at Beijing Capital International Airport

The observation at Beijing Capital International Airport was done on 20 December 2007. Detailed information on the wireless network service was provided by the airport’s help desk staff. Several hotspots were found at the airport, such as the international waiting hall, security hall, boarding area, cafes and restaurants. Basic observation at each hotspot location showed that most travellers were in a hurry to check-in and join the queue to enter the security check area. It was very hard for the researcher to find passengers to do the survey. A different location was found, to observe in cafes and restaurants. Most of travellers waiting for flights were relaxed in the cafes and restaurants. The researcher found one cafe that supplied free internet connection via wireless for their customers, located on the ground floor of Beijing Capital International Airport building 2. They listed connection user name and password on each table. Finally, this cafe was selected for gathering survey information, since compared with other cafes and restaurants, it was here that most travellers congregated to access the internet via wireless. The following table 5.2
– 1 shows the information from observation at Beijing Capital International Airport.

<table>
<thead>
<tr>
<th></th>
<th>9am – 11am</th>
<th>11am – 1pm</th>
<th>1pm – 3pm</th>
<th>3pm – 5pm</th>
<th>5pm – 7pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check-in and Security check area</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Waiting Hall (Building 2)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Cafes and Restaurants (First Floor of Building 2)</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Cafe which provided free wireless network service</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 5.2 - 1: Information from observation at Beijing Capital International Airport

 Observation at Guangzhou Baiyun International Airport
The observation at Guangzhou Baiyun International Airport was done on 17 January 2008. The wireless network service at Baiyun International Airport was provided by the “Mobile Office” of China Netcom (CNC). Baiyun International Airport did not provide free wireless network service to passengers. A “mobile office” prepay card was sold at the airport. The account number and password were on
this card, which travellers could use to connect to the airport’s wireless network provided by CNC. In contrast to the situation at Beijing Capital International Airport, only a few travellers were accessing the internet via wireless. See the following table 5.2 – 2: information from observation at Guangzhou Baiyun International Airport:

| Number of travellers accessing internet via wireless at Guangzhou Baiyun International Airport at different times (on 17 January 2008) |
|---|---|---|---|---|---|
| 9am – 11am | 11am – 1pm | 1pm – 3pm | 3pm – 5pm | 5pm – 7pm |
| Security Clearance | 0 | 0 | 0 | 0 | 0 |
| International Waiting Hall | 2 | 1 | 2 | 2 | 3 |
| Cafes and Restaurants | 1 | 3 | 3 | 2 | 4 |

Table 5.2 - 2: Information from observation at Guangzhou Baiyun International Airport

The researcher decided not to do the surveys at the areas specified in the table above. The researcher found the different travellers who were using wireless LANs to do the survey at every hotspot location within Guangzhou Baiyun International Airport.

 Observation at Auckland International Airport

The observation at Auckland International Airport was done on 04 April 2008. Auckland International Airport also does not provide a free internet access service via wireless. There are several hotspot locations at the international terminal, such as the arrivals waiting hall, Cafe Down Under area and the departures waiting hall. The observation situation at Auckland International Airport was same as at Guangzhou Baiyun International airport, in that only a few travellers were accessing the internet via wireless. As a result, the researcher
also planned to do the surveys at all hotspot locations within Auckland International Airport. The following table 5.2 – 3 shows the information from observation at Auckland International Airport.

<table>
<thead>
<tr>
<th></th>
<th>Number of travellers accessing internet via wireless at Auckland International Airport at different times (on 04 April 2008)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9am – 11am</td>
</tr>
<tr>
<td>Arrivals Waiting Hall</td>
<td>0</td>
</tr>
<tr>
<td>Departures Waiting Hall</td>
<td>1</td>
</tr>
<tr>
<td>Cafe Down Under area</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 5.2 - 3: Information from observation at Auckland International Airport

There is a display of Samsung’s platform in the departures waiting hall, which provides three desktop computers for travellers to access the internet. In addition, this service is free to the public. The researcher found many people queuing to use these three computers to access the internet. Most travellers were basically using them to check email and browse websites. Compared with the charges for the wireless network service, this free Internet access service should be more attractive to travellers. The researcher discusses and explains this point in section 5.5, data analysis.
5.3 Presentation of Data from Surveys

The following is the data that has been coded and organised for the quantitative part of this research study. The results are present below. All of the results came from the surveys.

- **Waiting for a Flight**
  The participants of this research were required to be travellers and to have used wireless LANs at one of the three international airports, Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport. The questionnaires surveyed 20 travellers at each international airport. According to these 60 surveys, 57 participants (95% of the total) were waiting for their flights. Only three participants of the survey were not waiting for a flight. Two of them had just arrived. And one was waiting to pick up her friend. See following figure 5.3 – 1: Waiting for a Flight:

  ![Waiting for a Flight](image)

  Figure 5.3 - 1: Waiting for a flight

- **Frequency of flying within a year**
  Based on these 60 surveys, there are sixteen participants fly once per year. Nineteen out of sixty travellers said that they fly twice a year. And just four participants travel by air three times every year. Most of the travellers (34% of the total) said they fly more than three times a year. Linked with the
occupation question, most of them were students and business people who were flying because of their work. The following figure 5.3 – 2 shows the frequency of these 60 travellers flying each year.

![Frequency of flying each year](image)

**Figure 5.3 - 2: Frequency of flying within a year**

- **Access to the internet every time while waiting**
  There were 44 of the 60 travellers who said they like to access the internet every time while waiting for their flights. Another 16 participants would not access the internet every time while they are waiting. See figure 5.3 – 3: Access to internet every time while waiting:

![Access to internet every time while waiting](image)

**Figure 5.3 - 3: Access to internet every time while waiting**
Participants' reasons for using wireless LANs at international airports

According to the 60 surveys, 39 participants had a single reason for using wireless LANs at international airports. Another 21 participants had multiple reasons. Most participants liked to check their email by using wireless LANs at international airports. There were 29 participants (34% of the total), who said they were using wireless LANs to check their emails. Obviously, checking email was the main reason why these 60 participants were using wireless LANs at international airports. Fourteen out of sixty travellers were reading news. And another thirteen participants (15% of the total) were chatting online. Twelve passengers were browsing websites. Looking at the results, reading news, chatting online and browsing websites had similar results. Online games and online meetings had the same results, which were 3 participants. Only one participant selected Download as the reason for using wireless network service at the airport.

Nine participants circled the “other” option. All of them explained their reasons in detail. One participant mentioned the reason was to contact a friend, another participant was using wireless LANs to read the university’s online notes and another was updating her online personal space. The following figure shows the detailed information of reasons for which the travellers used wireless LANs at international airports.
Equipment used by participants to connect to the wireless network

Most participants (49) were using a laptop to access the internet via wireless at airports. This result indicated that the laptop is the most important equipment that these participants use to access the internet via wireless at international airports. Eight participants in the survey were using PDA to link with wireless networks at airports. Two out of sixty travellers liked to use a mobile phone to surf the internet. And one participant indicated that she was using both a laptop and modem from Vodafone to connect to the wireless network at Auckland International Airport. See the following figure 5.3 – 5: Equipment used by participants to connect to the wireless network.
Differences between airports

After finishing the 60 surveys in these three different international airports (Beijing Capital International Airport, Guangzhou Baiyun International Airport, and Auckland International Airport), the researcher found that only Beijing Capital international airport provided a free wireless network service. Both Guangzhou Baiyun International Airport and Auckland International Airport charge for the wireless network service. In addition, most participants think this wireless network service is not cheap.

Survey at Beijing Capital International Airport (21 – 23 December 2007)

The researcher asked the airport’s help desk staff about the locations of the wireless hotspot locations at Beijing International Airport. Several hotspots were found at the airport, such as the international waiting hall, security hall, boarding area, cafes and restaurants. One cafe that supplied free internet connection via wireless for their customers was located on the ground floor of Beijing International Airport building 2. They listed the connection user name and password on each table. Users had to open a web page and type in the user name and password to connect to the internet via wireless. This café

![Figure 5.3 - 5: Equipment used by participants to connect to the wireless network](image-url)
shop also provided mobile and laptop charging services for their customers. These free services helped them to attract more customers, so it was easy for the researcher to find participants to do the surveys.

Survey at Guangzhou Baiyun International Airport (18 – 24 January 2008)
The researcher also asked the airport’s help desk staff about the location of wireless hotspots at Guangzhou Baiyun International Airport. As stated in the section on presentation of data from observations, the wireless network service at Baiyun International Airport is provided by the “Mobile Office” of China Netcom (CNC). It covers several areas, such as the international waiting hall, security hall, first class lounge, easy boarding area, cafes and restaurants. The research took longer to do than the survey at Guangzhou Baiyun International Airport. It took a total of seven days to collect all 20 surveys, four days more than the survey at Beijing Capital International Airport. Because Baiyun International Airport did not provide free wireless network service to passengers, not so many people used it there. During this investigation, the researcher found that most passengers liked to browse local stuff on their own laptop while they waited for their flights rather than spending money on connecting to the wireless network at airport. This is the main reason it took longer to do the surveys at Guangzhou Baiyun International Airport.

The one hour wireless internet access fee was 30 yuan per hour. One hour of wireless internet access was available free with the purchase of one cup of coffee in the airport cafe shop. Most travellers were using a “mobile office” account or buying a “mobile office” prepay card at the airport to login and access the internet via wireless. See the following figure 5.3 – 6: Login to Mobile Office:
Survey at Auckland International Airport (05 – 11 April 2008)
The situation of the survey at Auckland International Airport was same as Guangzhou Baiyun International Airport. They also did not provide a free service for internet access via wireless. Two internet access options could be chosen by passengers. The first was one hour of internet access for NZD9.95. The second option was four hours of internet access for NZD18.95. But many survey participants were not sure about the wireless internet access fee. They said that it is easy to forget. The following figure 5.3 – 7 shows these two internet access options.
Connecting to the Internet is easy - follow these simple steps and you’ll be connected to the Internet in no time.

**STEP 1: Choose your connection package**

- 1 hour internet access NZD9.95
- 4 hour internet access NZD18.95

**STEP 2: Select your payment type**

- Credit Card

**STEP 3: Enter your desired username, password and email.**

Username:  
Password:  
Email:  

---

**Figure 5.3 - 7: Internet Access Options**

---

**Credit card details**

First name:  
Last name:  
Email (for receipt of purchase): pengfangpengfang@hotmail.com
Credit card number:  
Card type: Visa or Master Card
Expiry date:  
Month:  
Year:  

---

**Figure 5.3 - 8: Pay by Credit Card**
Eighteen travellers were using a credit card to pay for the internet access. And another two travellers were been paid for by their company. The above figure 5.3 – 8 is the credit card payment page; the travellers just needed to type in their credit card information to pay for internet access via wireless at Auckland International Airport.

- **Set up wireless network connection**

  From the above figure, we can see that 93% of travellers thought that it is easy to set up a wireless network connection at airports. Only 4 participants (7% of the total) thought it is hard to connect to wireless network by themselves. The reason was because they were not familiar with wireless network. All of them asked other people to help them to set up it, such as airport staff or their friends.

- **Advantages of connecting to wireless LANs at airports**

  Based on these 60 surveys, 41 participants (68% of the total) thought that there were some advantages in using wireless LANs at airports instead of other ways to connect to the internet. Most of them said that wireless LANs at airports are convenient, fast, instant, and stable. They could enjoy their waiting time and continue with their work. Another 19 participants thought that there are no advantages in using wireless LANs at airports instead of other ways of connecting to the internet. See the following figure 5.3 – 10:
Advantages of connecting to wireless LANs at airports:

- Yes: 68%
- No: 32%

Figure 5.3 - 10: Advantages of connecting to wireless LANs at airports

- Limitations of connecting to wireless LANs at airports

Only three participants had no opinion about limitations of connecting to wireless LANs at airports. More than half (33) participants thought that there are no limitations to wireless network connections. Over 40% (24 participants) indicated that there are some limitations on connecting to wireless LANs at airports, such as expensive services, security issues and battery problems. See the following figure 5.3 – 11: Limitations on connecting to wireless LANs at airports:

- Yes: 40%
- No: 55%
- Not Sure: 5%

Figure 5.3 - 11: Limitations on connecting to wireless LANs at airports
5.4 Presentation of Data from Interviews

All of these 12 in-depth interviews have been processed individually and clearly. These 12 interviewees were chosen from the participants who were surveyed at Auckland International Airport. Each interview was completed face to face. Every interviewee read the information sheet and signed the consent form before the interview.

The following section presents the detailed information from both the 12 surveys and the interviews. The results from the closed type of survey questions are laid out in three tables. In addition, the outcomes from the open ended interview questions are discussed separately.

The data collected from the surveys have been divided into three sub areas. They are: personal information about participants, basic situation of accessing the internet via wireless, and detailed information about wireless network services at airports. All of them are shown separately in the following tables 5.4 – 1, 5.4 – 2 and 5.4 – 3. Table 5.4 – 1 includes general information about each participant. Table 5.4 – 2 involves each participant’s basic situation as regards accessing the internet via wireless at airports. Table 5.4 – 3 contains specific information about wireless network services at airports, including cost of wireless network service, payment options, setting up a connection, advantages and limitations of using wireless LANs at airports.
As the researcher mentioned in the consent form of Appendix C section, the participants’ confidential information can not be identified in this research. The researcher uses different code names to refer these participants. Because these selected 12 interviewees were employed in different occupations, the researcher decided to use the initial of each interviewee’s occupation instead of their real name, such as participant S, APSA and T. These code names are used in the following sections.

<table>
<thead>
<tr>
<th>Participants</th>
<th>Waiting for Flight</th>
<th>Occupation</th>
<th>Frequency of Flying a year</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Yes</td>
<td>Student</td>
<td>Six Times</td>
</tr>
<tr>
<td>APSA</td>
<td>No, waiting to pick up friend</td>
<td>Airport Passenger Service Agent</td>
<td>Twice</td>
</tr>
<tr>
<td>T</td>
<td>Yes</td>
<td>Technician</td>
<td>Twice</td>
</tr>
<tr>
<td>HRS</td>
<td>Yes</td>
<td>Human Resource Specialist</td>
<td>Three Times</td>
</tr>
<tr>
<td>C</td>
<td>Yes</td>
<td>Chef</td>
<td>Once</td>
</tr>
<tr>
<td>DD</td>
<td>Yes</td>
<td>Database Designer</td>
<td>Three Times</td>
</tr>
<tr>
<td>A</td>
<td>Yes</td>
<td>Analyst</td>
<td>Approximately Ten Times</td>
</tr>
<tr>
<td>E</td>
<td>Yes</td>
<td>Engineer</td>
<td>Twelve Times</td>
</tr>
<tr>
<td>D</td>
<td>Yes</td>
<td>Doctor</td>
<td>Twice</td>
</tr>
<tr>
<td>CORC</td>
<td>Yes</td>
<td>Consents Officer Regional Council</td>
<td>Approximately Ten Times</td>
</tr>
<tr>
<td>MLS</td>
<td>Yes</td>
<td>Medical Laboratory Scientist</td>
<td>Four to Five Times</td>
</tr>
<tr>
<td>P</td>
<td>Yes</td>
<td>Programmer</td>
<td>Twice</td>
</tr>
</tbody>
</table>

Table 5.4 - 1: Personal Information on Participants
<table>
<thead>
<tr>
<th>Participants</th>
<th>Always access internet while waiting for flights</th>
<th>Reason for using Wireless LANs</th>
<th>Equipment that participants use to connect to wireless network</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Yes</td>
<td>Check Email Online Game</td>
<td>Laptop</td>
</tr>
<tr>
<td>APSA</td>
<td>No</td>
<td>Read News</td>
<td>Laptop</td>
</tr>
<tr>
<td>T</td>
<td>Yes</td>
<td>Check Email</td>
<td>Laptop</td>
</tr>
<tr>
<td>HRS</td>
<td>Yes</td>
<td>Other: Work</td>
<td>Laptop</td>
</tr>
<tr>
<td>C</td>
<td>Yes</td>
<td>Check Email</td>
<td>Laptop</td>
</tr>
<tr>
<td>DD</td>
<td>Yes</td>
<td>Chat</td>
<td>Laptop</td>
</tr>
<tr>
<td>A</td>
<td>Yes</td>
<td>Check Email Browse Website</td>
<td>Laptop</td>
</tr>
<tr>
<td>E</td>
<td>Yes</td>
<td>Other: Business</td>
<td>Laptop</td>
</tr>
<tr>
<td>D</td>
<td>No</td>
<td>Other: Work</td>
<td>Laptop</td>
</tr>
<tr>
<td>CORC</td>
<td>No</td>
<td>Check Email Other: work purposes</td>
<td>Laptop</td>
</tr>
<tr>
<td>MLS</td>
<td>Yes</td>
<td>Check Email Other: work</td>
<td>Laptop and Modem from Vodafone</td>
</tr>
<tr>
<td>P</td>
<td>Yes</td>
<td>Read News Check Email Other: Update personal space</td>
<td>Laptop</td>
</tr>
</tbody>
</table>

Table 5.4 - 2: Basic Situation of Accessing Internet via Wireless
<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>APSA</th>
<th>T</th>
<th>HRS</th>
<th>C</th>
<th>DD</th>
<th>A</th>
<th>E</th>
<th>D</th>
<th>CORC</th>
<th>MLS</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Free Wireless Network</strong></td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Service</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cost of accessing</strong></td>
<td>Don't Know</td>
<td>Don't Know</td>
<td>$10 per hour</td>
<td>Don't Know</td>
<td>$9.95/hour</td>
<td>$9.95/hour</td>
<td>Not Sure</td>
<td>Don't Know</td>
<td>Not Sure</td>
<td>Approximately $60/month</td>
<td>Approximately $70/month</td>
<td>$9.95/hour</td>
</tr>
<tr>
<td><strong>internet via wireless</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Payment Options</strong></td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Credit Card</td>
<td>Work provided</td>
<td>Company pays</td>
<td>Credit Card</td>
<td></td>
</tr>
<tr>
<td><strong>Easy to set up</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No, asked airport staff to connect</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>wireless network</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>connection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Advantages</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Limitations</strong></td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Not Sure</td>
<td>Not Sure</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 5.4 - 3: Detailed Information about Wireless Network Service at Airports
In order to analyse further the above tables, the integrated information gathered from each survey will be discussed in the following paragraphs.

**Participant S**
Participant S is a student. S was waiting for his flight in the departures waiting hall. S is studying in the University alone in Auckland. His home town is in Sydney, Australia, so he has to fly several times a year between Sydney and Auckland. S flies approximately six times a year.

S always accesses the internet while waiting for his flights, because both Sydney and Auckland Airports provide a wireless Internet access service. He used a laptop to connect to the wireless network. He likes to use the wireless LANs to check his e-mail and play online games while waiting.

S pointed out that the wireless internet access service is not free at Auckland International Airport. S does not know how much the service costs. He just paid by credit card to get an account to connect to the wireless network. He thought that it is very easy to set up a wireless network connection.

S indicated that there are some advantages for him in using wireless LANs at airports instead of other ways to connect to the internet. S is very happy to enjoy his waiting time with the wireless network. He will not waste time while waiting for the flight. In the other hand, there are some limitations too, such as the connection speed not being enough to play his online games.

**Participant APSA**
Participant APSA is an Airport Passenger Service Agent at Auckland International Airport. She had just finished work. APSA was not waiting for a flight, she was having a cup of coffee and waiting to pick up her friend in the Cafe Down Under area. The number of flying times for APSA is much less than participant S, she only flies twice per year during her annual leave holidays.

APSA does not access the internet every time while waiting for a flight. She
only accessed the internet a few times at the airport. APSA used a laptop to connect to the wireless network as well. She normally likes to use the wireless LANs to read some online news on the specific websites.

“The wireless internet access service is not free at Auckland International Airport”, was also pointed out by participant APSA. APSA paid to use this service by credit card and she did not remember the access fee for this service, as she indicated that she just wanted to use the service and did not care about how much it would cost. APSA thought that it is easy to set up a wireless network connection at the airport.

APSA thought that a wireless network service at airports is a convenience although she did not specifically state that on the survey. In addition, APSA thought there are no limitations to connecting to wireless LANs at airports.

**Participant T**

Participant T is a Technician and comes from China. T is working full time on a working visa in Auckland. T was waiting in the departures waiting hall for his flight to go back to China with his wife for a holiday. His situation was same as participant APSA: T also flies twice every year during his holidays.

T would like to access the internet every time while waiting at the airport. He used his own laptop to connect to the wireless network. He normally only uses the wireless LANs to check his e-mails and reply to them, as the waiting time for his flight is not very long after check in.

T said that the wireless internet access service is not free at Auckland International Airport and the internet access fee is 10 dollars per hour. As most participants did, he also paid by credit card. T felt that it is easy to get a connection to wireless LANs at Auckland International Airport.

T has no opinion about limitations of using wireless LANs at airports. But as for advantages of accessing the internet via wireless, he thought it is easy to
Participant HRS

Participant HRS is a Human Resource Specialist. HRS was waiting for his flight. He said that he was going to Europe for a business trip. Because of his work, HRS has to go abroad three times every year to do different research.

HRS always liked to spend his waiting time on wireless internet access at airports. He always used a laptop to surf the internet. HRS thought that the laptop is the best equipment to satisfy his mobile work requirement. HRS usually used the wireless network service to continue his work, such as checking business email, contacting his colleagues and transferring business files. This means work purpose was the main reason for HRS to use wireless LANs to connect to the internet at airports.

HRS said the wireless network service is not free at Auckland International Airport. He only knew that one method of payment was by credit card, and did not know of any other payment options. In addition, he did not know how much it cost. Like other participants, HRS also felt it is easy to set up a wireless connection at airports.

HRS thought that it is very convenient to have wireless LANs at the airport. But at the same time, he was also worried about the security issues of using wireless LANs in public areas, and ensuring that there was no loss of confidential business information.

Participant C

Participant C is a chef. He worked in a restaurant in Auckland city. C was waiting to depart for his honeymoon with his newly-married wife. C is a kind person and answered the survey questions seriously. C does not travel regularly by air and he only flies once a year.

Participant C always liked to access wireless internet while waiting for flights.
He used a laptop to connect to the wireless network. He liked to connect to wireless LANs to send and receive e-mail. He attached new photos to e-mails and sent them to his family and friend.

As the wireless internet access service is not free, C had to pay by credit card to get the connection. He said that there were two internet access options provided by Auckland International Airport. One was NZD9.95 per hour of internet access. Another option was NZD18.95 for four hours internet access. C thought it was easy to set up a wireless network connection. During the process of connection, an account user name and password had to be created. The account would be valid for 365 days and would expire automatically when the paid hours had been used.

C thought the wireless internet access service is instant. He can use his own laptop to get a connection anywhere he wants at the airport. About the limitations on connecting to wireless LANs at airports, C gave his own opinion as well. He said that he has to pay to access the internet. This is not convenient for passengers. To make it free would be much better than the current situation.

**Participant DD**

Participant DD is a database designer. DD came from Singapore. He is a short term visitor to New Zealand. DD was waiting for a plane to go back to Singapore. He likes to travel to different countries, so he flies three times a year.

DD pointed out that a laptop is very important for him when he is travelling. He always uses his favourite laptop to surf on the internet at the airport. He basically accesses the internet via wireless every time while he is waiting. DD usually likes browsing websites and chatting online with his stock agent.

DD pointed out that the wireless internet access service is not free at Auckland International Airport. DD knew the cost of this service, NZD9.95 per hour. As
most participants did, DD also paid by using his credit card. Furthermore, he believed that the process of connecting to the wireless network is not complicated.

It is very fast to get a connection which is the advantage for DD in using wireless LANs at airports. DD also thought that there are some limitations on connecting to wireless LANs at airports. Because DD was using his own laptop to get wireless connection, it was very hard for him to find a place to charge his laptop. This was the most serious problem for DD.

**Participant A**

Participant A is an analyst. Because of her work, she has to fly frequently on business. She flies approximately 10 times per year in total. A was waiting for a flight when she did this survey.

A always connects to wireless LANs while waiting at the airport. A prefers using her own laptop to browse websites and check email through a wireless network.

A only knows that the internet access service via wireless is not free at Auckland International Airport, but she is not sure about the access fee. A said that she just paid by credit card and she did not care too much about how much it cost. She had to use it to pass time while waiting. Of the 12 participants, A was special, as she was the only person who thought that it is hard to set up a wireless network connection at the airport. She asked the airport’s help desk staff to help her to set up the connection.

A indicated that there are some advantages for her to use wireless LANs at the airport instead of other ways to connect to the internet. She can sit anywhere she wants to get a connection by using her own laptop. A has no opinion about limitations of using wireless LANs at airports. A is very satisfied with this service and she can think of no limitations.
**Participant E**
Participant E is an engineer. E is a very busy business man. He flies more times than all of the participants above. E flies about 12 times a year. E was waiting for his flight when he answered these survey questions in the departures waiting hall.

E connects to wireless internet every time after checking in. He enjoys his waiting time at the airport. A Laptop is necessary when E is travelling, so he always uses wireless LANs with his notebook at the airport. The main reason for E to access wireless internet is business. He mentioned that he can continue to handle his work at the airport too.

As the wireless network service is not free at Auckland International Airport, E got an account to connect to the internet via wireless and he usually paid to top up his account by credit card. E thought it is very easy to set up wireless network connection.

E did not think of any specific advantage for him to use wireless LANs at the airport instead of other ways to connect to the internet. He just felt that it is convenient. For the limitations, he wrote “it depends on the airport, we must pay it now.” E thought that not having a free service is the biggest limitation for travellers on internet access via wireless at Auckland International Airport.

**Participant D**
Participant D is a doctor. D worked in National Women’s Hospital. D was waiting for her flight in the departures waiting hall. She does not fly many times a year. D said that she only flies twice per year.

D does not always access the internet while waiting for her flight. She wrote “I only accessed the internet at the airport for an emergency”. D also indicated that if it were free, she would always access the internet while waiting for flights. She was using a laptop to browse the National Women’s Hospital website. Like participant E, D’s main reason for accessing wireless internet was business.
As mentioned above, participant D said “the wireless network is not free at Auckland International Airport”. Like participant A, D paid by credit card and also was not sure about the access fee for surfing the internet at the airport. In addition, “it is easy to set up a wireless network” thought participant D.

For advantages of a wireless network service, D wrote down “wireless is the best service which is provided at airports. It is convenient for passengers.” She also thought that charging for the wireless network service is not good. She did not like to pay for it.

**Participant CORC**

Participant CORC is a Consent Officer in a Regional Council. He was waiting for a flight and having a cup of coffee in the Cafe Down Under area. Like the other business man, CORC flies approximately 10 times every year.

CORC did not access the internet at the airport every time. He used his notebook to surf on the internet. CORC normally used wireless LANs for checking email and for work. He always contacted with his colleagues while he was waiting.

CORC only knew that there is not a free internet access service at Auckland International Airport. As regards charging a fee for the wireless network service and payment method, CORC gave a different response from other participants. He has one wireless modem which is work-provided. He mentioned that it is approximately 60 dollars per month, but he does not have to pay himself, since it is provided by his work. He felt that it is easy to connect to wireless LANs.

CORC thought that there are some advantages for him to use wireless LANs at the airport. CORC said that there are so many wireless hotspots in the airport, he can sit and use his own mobile internet connection. It is very fast and convenient. CORC had no idea about limitations on using wireless LANs at the airport. He did not feel there were any limitations on the wireless network.
Participant MLS
Participant MLS is a Medical Laboratory Scientist. MLS was waiting a flight to leave Auckland. She did this survey at the Cafe Down Under area. MLS has to fly four to five times every year. Most of her flights are because of work.

MLS would always access the internet after check-in at Auckland International Airport. She liked to use her own laptop to connect to the wireless network. Like participant CORC, MLS usually had to use wireless LANs for checking email and also for her work. The main reason for accessing the internet via wireless for MLS was to continue with her work. MLS indicated that she can contact with her colleague by email and operate the remote kiosks to continue working.

The wireless network service is not free. MLS used a laptop and modem from Vodafone to connect to the wireless network. MLS said that it was approximately 70 dollars per month, but she did not pay it herself. It was paid for by her company. This is the same as for participant CORC. MLS also thought that to set up a wireless network connection is not complicated.

MLS indicated that it is very convenient to use wireless LANs at the airport. She could have a cup of coffee and get wireless connection in the cafe. It is really a relaxed service. In addition, MLS did not think of any limitations on the wireless service.

Participant P
Participant P is a programmer. P came from China. P was waiting for her flight in the departures waiting area. P has a full time job in Auckland. She only has two annual leave holidays a year, so she flies twice every year.

P would always access the internet while waiting at Auckland International Airport. P used a laptop to connect to the wireless network at the airport. P had
many reasons for multiple using wireless LANs, such as read the news, check email and browse websites. Especially, she liked to update her online space while she was waiting.

Participant P knew there was not a free wireless network service at Auckland International Airport. Like participant E, P also used her credit card to recharge her account, connect and access the internet via wireless. P felt that it is easy to set up a wireless network connection at the airport.

P indicated that there are some advantages for her to use wireless LANs at airport instead of using other ways to connect to the internet. P thought that the wireless network service satisfied her need. She found it very convenient, because she could surf the internet everywhere she wanted, contact her family and friends instantly, and continue with her work as well. P was happy to enjoy her waiting time with the wireless network and not waste time. P also pointed out that in her opinion there is a limitation on the use of wireless LANs at the airport. She was worried about security issues of surfing online when using a public wireless network.

The above section describes the detailed information for each participant which was gathered from separate surveys. These 12 participants agreed to do the in-depth interview.

The following table 5.4 – 4 shows the results from each interview. It includes conveniences and inconveniences of wireless LANs, speed of connection, whether wireless LANs satisfy participants’ need or not, importance of a wireless network service at the airport, whether availability of wireless LANs influences participant choice of airport or not, and suggestions from participants.
<table>
<thead>
<tr>
<th></th>
<th>S</th>
<th>APSA</th>
<th>T</th>
<th>HRS</th>
<th>C</th>
<th>DD</th>
<th>A</th>
<th>E</th>
<th>D</th>
<th>CORC</th>
<th>MLS</th>
<th>P</th>
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<tr>
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<td>Yes</td>
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</tr>
<tr>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Speed of Connection</strong></td>
<td>Normal</td>
<td>Slow</td>
<td>Better than home</td>
<td>Normal</td>
<td>Fast</td>
<td>Just enough</td>
<td>OK</td>
<td>OK</td>
<td>Good</td>
<td>Just OK</td>
<td>Normal</td>
<td>OK</td>
</tr>
<tr>
<td><strong>Do wireless LANs satisfy your need?</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Sometimes</td>
</tr>
<tr>
<td><strong>Importance</strong></td>
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<td>Yes</td>
<td>Not really</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Not really</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Availability of Wireless LANs influences your choice of airport or airline?</strong></td>
<td>Does not</td>
<td>Yes</td>
<td>Does not</td>
<td>Does not</td>
<td>Does not</td>
<td>Yes</td>
<td>Does not</td>
<td>Yes</td>
<td>Does not</td>
<td>Does not</td>
<td>Not really</td>
<td>Does not</td>
</tr>
<tr>
<td><strong>Suggestions</strong></td>
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<td>Yes</td>
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<td>Yes</td>
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</tbody>
</table>

Table 5.4 - 4: The results collected from each Interview
As shown in table 5.4 – 4 above, all 12 interviewees answered all the interview questions seriously. The detailed information gathered from each interview is discussed next.

**Participant S**

- **The conveniences of using wireless LANs at airports**
  
  Participant S thought that there are some conveniences for him to use wireless LANs at the airport. The best advantage is to help him to pass time while waiting. He mentioned that there are lots of activities which he can do through wireless internet at the airport. For example he can check information about his flight, check his personal email, browse websites and play online games. S said “It is fantastic that I can play my favourite online games while waiting for a flight”. He positively enjoyed the waiting time by accessing the internet via wireless.

- **The inconveniences of using wireless LANs at airports**
  
  Participant S felt there were some inconveniences of using wireless LANs at the airport. “I have to pay for using wireless internet by my credit card. This is not safe for me. The credit card number is my personal confidential information. I do not want to provide it to use a public wireless network” participant S said. He mentioned that the payment method is not good enough. This security problem is one limitation indicated by S. In addition, because this service is not free at Auckland International Airport, and the cost is based on time, the time limit is another limitation on using wireless LANs at the airport.

- **Speed of wireless network connection**
  
  Participant S thinks the speed of wireless network connection is normal speed. He said “It is normal speed for me to access the internet via wireless at Auckland International Airport, but sometimes it is not fast enough for playing my online games”. If giving a score out of five for speed of connection, S gave three points for speed of wireless network connection at Auckland International Airport.
Satisfaction with wireless LANs at airports

The major reason for using wireless LANs at the airport for participant S is to pass the time spent waiting. He does not like to waste time even when waiting for a flight, so the wireless internet service satisfies his needs. He usually uses his own laptop to surf the internet and watch a movie online. S also said that waiting time is different for different people. Using wireless LANs helps them to manage their waiting time, and they would not waste time while waiting for flights.

Importance of using wireless LANs at airports

Participant S is a student. He sometimes uses wireless LANs to upload and submit his assignment. He also likes to browse the University’s website to check his study notes and download them. It is important for his study. In addition, it is also important for him to have fun. He does not want to spend his waiting time just sitting at the airport. It is quite boring for him. Therefore, he is very happy to access wireless internet to surf the internet and play online games.

Influences of the availability of wireless internet at airports

Participant S does not feel that the availability of wireless internet at airports influences his choice of airport or airline carrier when he is travelling. He said he always chooses the airline depending on the price of the air ticket. “The wireless LANs are not the only thing in the airport” participant S said. He mentioned that if the air ticket price is not too different, it would not change his mind. The price of the ticket is the first consideration for S when he is travelling.

Suggestions to help improve wireless network service at airports

Participant S only gave one suggestion to help improve the wireless network service at Auckland International Airport. S suggested that the airport should provide a free wireless network service to travellers. “Because we have already paid the departure fee, this wireless network
service should not charge us again” participant S said. He said if this service was free, it would find it even more convenient to use.

Participant APSA

- **The conveniences of using wireless LANs at airports**
  Participant APSA said Auckland International Airport provides a wired free network service. “It means we do not need to run around, just trying to find somewhere to plug in our laptops for surfing the internet” APSA said. It is convenient for her to read online news while waiting for the flight. She also mentioned that it saves the cost of international calls, since she can chat with her family online.

- **The inconveniences of using wireless LANs at airports**
  On inconveniences of using wireless LANs at airports, Participant APSA said she could not think of any inconveniences of this service. She felt that the wireless network service is currently quite good.

- **Speed of wireless network connection**
  Participant APSA thinks the speed of wireless network connection is slow sometimes. “The speed could be quite slow when everyone is trying to use the internet via wireless at the same time” participant APSA said.

- **Satisfaction with wireless LANs at airports**
  Participant APSA thinks that using wireless LANs at airports satisfies her need. APSA mentioned that she can access the internet via wireless at the airport to spend time while waiting. She feels that using wireless LANs is better than wasting time at the airport. She does not have any special needs while waiting for flights.

- **Importance of using wireless LANs at airports**
  It is important for Participant APSA to be able to use wireless LANs at the airport. APSA said “It is a definitely going to be a bonus”. She indicated that the waiting time for flights is quite boring for her, so she is glad she can use
wireless LANs to access the internet.

- **Influences of the availability of wireless internet at airports**
  Participant APSA thought the availability of wireless internet at airports definitely influences her choice of airport when she is travelling. She said “For business people, it is a factor that would concern them. For me, it is going to be an advantage if the airport has it”.

- **Suggestions to help improve wireless network service at airports**
  As the wireless network service is not free at Auckland International Airport, participant APSA suggested that the airport provide a free internet access service for passengers. “Try not to overcharge, that will put passengers off the wireless network service” said participant APSA.

**Participant T**

- **The conveniences of using wireless LANs at airports**
  Participant T gave example of the convenience of using wireless LANs at airports. He said that it is easy to connect to the internet, because it has wireless single coverage at the airport. He said that he can use wireless LANs at the airport to check his email and keep in contact with his family, friends and colleagues online while waiting for his flight. He feels this service is the best way for him to spend his waiting time, because it is instant and secure.

- **The inconveniences of using wireless LANs at airports**
  Participant T thought of two inconveniences of using wireless LANs at airport. The first one is that internet access service via wireless is not free for the public. This is the biggest limitation thinks participant T, because he has to spend time setting up the wireless network connection, in that he has to pay by credit card to create an account first and then get the connection. The second inconvenience which provided by T is he thought it is very hard to find somewhere to charge his laptop.
- **Speed of wireless network connection**
  Participant T thinks the speed of wireless network connection is better than at his home. He mentioned that his home network is dial-up connection. The speed of connection is just 64 KB per second.

- **Satisfaction with wireless LANs at airports**
  Participant T thinks that using a wireless network at airport satisfies his need, because he does not want to waste time while waiting for his flight. He was going back to China this time not only for holiday and not only to spend time with his family as well. He planned to do something related to his work, like buy some working tools from China and bring them back to Auckland. He wanted to search for these tools online, to find out the place of sale and compare the price of different tools as well. He was happy to enjoy his waiting time at the airport doing this research via wireless internet.

- **Importance of using wireless LANs at airports**
  Participant T feels that it is not really important for him to have wireless internet at the airport when he is travelling. T is not a frequent internet user, he does not use it very much even at home. So he does not feel the wireless network service is important for him, but it is quite helpful. As mentioned above, he was enjoying his waiting time researching the tools online with faster speed connection than at home.

- **Influences of the availability of wireless internet at airports**
  Participant T indicated that the internet and flight are quite different and separate things for him, so the availability of wireless internet at airports does not influence his choice of airport or airline carrier when he is travelling.

- **Suggestions to help improve wireless network service at airports**
  Participant T strongly suggested that the airport provide a free service for internet access via wireless. It can increase the utilisation rate of wireless
LANs at airports if this service is free. He found the speed of browsing overseas websites was slower than browsing local websites. So he hopes the airport will upgrade the speed of connection to make the speed of browsing overseas websites the same as browsing local websites.

Participant HRS

- **The conveniences of using wireless LANs at airports**

  Participant HRS found it convenient to use wireless LANs at the airport. “Wireless network has been a revolution in the internet industry and to be able to use it in airports has become more convenient for business class people. With wireless LANs, we do not have to worry about plugging-in the laptop with the phone line and neither we do have to wait for others. It is very simple as you can get wireless internet connection just using the account name and password and log into the system, and have your business going even if you are in an airport” participant HRS said. He was thinking from the business point of view, because he is a business-man. He said the business-men always think time is important, since time is their money. This is the reason why he does not want to waste time, even the time while waiting for a flight.

- **The inconveniences of using wireless LANs at airports**

  “As far as I know, some airports provide free internet access service via wireless, but this service is not free at Auckland International Airport. I have to pay for surfing the internet through wireless LANs” Participant HRS said. HRS also mentioned another inconvenience of using wireless LANs at the airport. HRS said he uses using wireless LANs to continue his work at the airport. So he is concerned about security issues when he checks business emails or transfers business files when using a public wireless network. “I feel the information I am sending or getting might be hacked by others as it is a wireless network” said HRS. The security issue is an important consideration which concerned HRS.
➢ **Speed of wireless network connection**

He thought the speed of wireless network connection is normal speed at the airport. He said the speed really does not matter for him when sending and receiving information. For HRS, the speed of connection has so far not been a factor.

➢ **Satisfaction with wireless LANs at airports**

Participant HRS feels that using wireless LANs at airport satisfies his needs to a great extent, as he just wants to use it to check his email, read news and continue his work sometimes. “I have been able to set up my meetings online and also change my appointments online at the airport. I do not have to stay in the queues to get access to the internet” HRS said. He feels that the use of wireless LANs at the airport has been a great relief for him.

➢ **Importance of using wireless LANs at airports**

Participant HRS is a Human Resource Specialist, but he also has to handle some other work for his company. For example, he sometimes has to go overseas and meet clients of the company. “My schedule is so tight sometimes. I have to set up my meeting online while I am travelling. On the other hand, I also have to keep an eye on the company’s products and foreign currency, which in turn helps me to deal with international clients” participant HRS said. Overall, it is really important for HRS to have wireless LANs at airports.

➢ **Influences of the availability of wireless internet at airports**

Participant HRS does not think the availability of wireless internet at airports influences his choice of airport or airline when he is travelling. Because he is a business-man and he just goes where he has to go. He can not choose it himself. It depends on where the clients are. But it is really a bonus if the airport provides this service.
Suggestions to help improve wireless network service at airports

“It is better to reduce the cost of the wireless network service at Auckland International Airport” participant HRS said. He suggested that it would be best if the airport made this wireless internet access service free.

Participant C

The conveniences of using wireless LANs at airports

Participant C said there are some conveniences for him of using wireless LANs at the airport. “I can pass the time when I am waiting at the airport. I can move around to access the internet via wireless at airport” said C. He mentioned that he can search for information on his honeymoon trip via wireless internet. He also feels the convenience of sending emails with new photos attached to keep in contact with his family and friends by using wireless LANs at the airport.

The inconveniences of using wireless LANs at airports

For participant C, he thinks that the use of wireless LANs is not free, which is one inconvenience, because he does not want to spend money on that, but he has to pay for it to get a connection. Overall, he is satisfied with the airport’s wireless LANs. He mentioned that he can not think of any more inconveniences of using wireless LANs at the airport.

Speed of wireless network connection

Participant C thinks that the speed of wireless network connection at airport is quite fast. He is the only one interviewee who thinks the speed of connection is absolutely fast at airport.

Satisfaction with wireless LANs at airports

Participant C said the use of wireless LANs at airport is definitely satisfies his need. The purpose of his trip this time is to go on his honeymoon with his newly-married wife. He said “I have three hours before boarding, since my flight is delayed for one hour. I can spend my waiting time online to change my schedule, such as change the check-in time of my booked
hotel. For the rest of the time, I can check information about famous places
to visit, information about other hotels, and search out a local famous
restaurant”. As mentioned above, he said he likes to contact his family as
well. He feels that all the things he wants to do via internet he has done at
airport by using wireless LANs while waiting for his flight, so he is very
satisfied with this service.

➢ **Importance of using wireless LANs at airports**
Participant C’s flight was delayed suddenly, and he had to contact his
booked hotel and confirm with them his new check-in time. The wireless
LANs helped him to solve this problem instantly. Furthermore, he also
needed to contact his family immediately to tell them of the flight delay. He
thought this was very important for him. He said his reason was “it is very
important for me to let my family know my schedule changed and I am safe.
I do not want my family to worry about me”. Therefore, it was extremely
important for C to have wireless LANs at the airport.

➢ **Influences of the availability of wireless internet at airports**
Participant C does not think the availability of wireless internet at airports
influences his choice of airport or airline. Because he does not travel many
times every year, when he does travel, the price of the air ticket is the only
thing influencing his choice of airline. He feels that the availability of
wireless internet at airports is not relevant.

➢ **Suggestions to help improve wireless network service at airports**
In relation to the section on inconveniences, participant C mentioned that
the wireless network is not free. This is the only inconvenience indicated
by C, who suggested that Auckland International Airport provide a free
wireless network service. His suggestion is the same as most participants.
Participant DD

- **The conveniences of using wireless LANs at airports**
  Participant DD thinks that it is very convenient for him to use wireless LANs at the airport. DD usually likes browsing websites and chatting online with his stock agent. He said he can check his share stock information instantly at airports via wireless internet. He also always needs to communicate with his stock agent. He pointed out that the wireless LANs also help him to do some immediate financial transactions for his share stock.

- **The inconveniences of using wireless LANs at airports**
  There are three inconveniences pointed out by Participant DD. The first one is that the wireless network service is user-pays at Auckland International Airport. DD thought it is not easy for travellers to get a connection because they have to set up payment first. The second inconvenience is that it is very hard to find somewhere to charge his laptop at the airport. The last one is the lack of security when submitting his credit card number to get wireless internet connection through the public network.

- **Speed of wireless network connection**
  Participant DD said the speed of wireless network connection is just enough, not really fast. He mentioned that it is just enough to open the text webpage and not fast enough to load the graph of share stock.

- **Satisfaction with using wireless LANs at airports**
  “Yes, it satisfies my need to use wireless LANs at the airport” said by participant DD. As mentioned above, DD needs to check the share stock information as often as he can, since he has to monitor the trends of his share stock. Therefore the wireless LAN is exactly what he needs at airports.
Importance of using wireless LANs at airports
Participant DD feels it is very important for him to have wireless internet at the airport. He indicated that he needs to contact many people very often, such as his stock agent, staff of the stock exchange and colleagues. During he waited for his flight, the wireless LANs at the airport helped him to keep in contact with these people online instantly.

Influences of the availability of wireless internet at airports
“Yes, the availability of wireless internet at airports influences my choice of airport” Participant DD said. He always chooses airports which provide wireless LANs to the public. In addition, he said that he would like to go to Hong Kong, since Hong Kong airport provides a free wireless network service.

Suggestions to help improve wireless network service at airports
Participant DD proposed some suggestions for Auckland International Airport. He suggested the airport make the wireless network service free to travellers and improve the speed of wireless internet connection. He said “if the wireless network service is free, it will attract more users. For the speed of connection, it is just normal at the moment. If many people access the internet at the same time, the network might get slow. I saw just a few people using it here, but the speed of connection is just enough. So they are better to improve the speed of connection”.

Participant A
The conveniences of using wireless LANs at airports
Participant A said that the major convenience of using wireless LANs at airport is to help her contact other people easily, such as her family, friends and colleagues. She was enjoying the time while waiting for her flight, because she could receive and send email through wireless internet.
The inconveniences of using wireless LANs at airports
Participant A thought there are no inconveniences of using wireless network service at airport. She said she could not think of any inconveniences of using wireless LANs while waiting for her flight.

Speed of wireless network connection
Participant A felt that the speed of wireless network connection was okay for her to check her personal email. Anyway, she did not use it much at airport, so it is did not matter to her what the speed of connection was.

Satisfaction with wireless LANs at airports
Participant A thought that using wireless LANs at airports satisfies her needs. She said it is easy for her to contact her family, friends, and colleagues by accessing wireless internet at the airport. She felt this service is good and helps her to spend her waiting time at the airport.

Importance of using wireless LANs at airports
Participant A said she feels the wireless network service is important for her sometimes, since she had to continue her work online suddenly when she was at the airport. A said “It is really necessary to me when I sometimes have to continue my work via the internet at the airport”. She can send email to her colleagues and chat online with them as well. She only thinks this service is important when she uses it for business purpose.

Influences of the availability of wireless internet at airports
Participant A mentioned that the availability of wireless internet at airport does not influence her choice of airport or airline carrier when she is travelling. A said “My choice of airline just depends on the price of ticket”.

Suggestions to help improve wireless network service at airports
Participant A only gave one suggestion to help improve wireless network service at airports, based on the cost of this service. She suggested that airports should provide a free wireless network service to travellers. A
mentioned that if the use of wireless LANs at the airport is free that should be great.

Participant E

- **The conveniences of using wireless LANs at airports**
  Participant E thinks the main convenience of using wireless LANs at airports is he can spend time while waiting for his flight. He mentioned that the main reason for him to access wireless internet is to continue his work. As well as business reasons, he also has lots of personal reasons to use wireless LANs at the airport. “I can check my email, chat with my friends online, book hotels online and read sports news” participant E said. He feels that internet access via wireless can help him to save money by chatting online instead of calling by phone. E is a sports fan. He has to read sports news online every day. He does not want to stop this habit even when he is travelling, so he feels that the use of wireless LANs at the airport has been a great relief for him.

- **The inconveniences of using wireless LANs at airports**
  There are some inconveniences for participant E of using wireless LANs at the airport. “Although the wireless network service at the airport brings lots of benefits to the travellers, the services provided by the airport still have inadequate aspects, such as the charging service for laptops and mobile phones. It is hard to find somewhere to charge my laptop” participant E said. He said that the major inconvenience is this power supply issue, as most passengers prefer to use their own laptops or mobiles to access the internet via wireless.

- **Speed of wireless network connection**
  Participant E feels the speed of wireless network connection is okay at Auckland International Airport. He does not have a need high speed internet connection in public areas. He thought the normal speed to load the website is enough for him.
Satisfaction with wireless LANs at airports
Participant E thinks that using the wireless network at the airport is satisfies his need. He told me a story about himself at this point of the interview. His home town is in Sichuan in China. E is a business-man. Most of the time his flights are for business purpose. Never the less, he also flies once a year to his home town. He went back to China the previous month for a holiday. As mentioned above, he has a habit of reading the news he is interested in online. This gave him immediate knowledge of the earthquake in Sichuan. He was planning to fly from Auckland to Beijing first and then transfer to a plane to Sichuan. This immediate news helped him to change his schedule, such as booking a hostel online, changing the flight time from Beijing to Sichuan and also contacting his family immediately. This incident happened suddenly, but the airport’s wireless network service helped him to complete what he wanted to do at that time.

Importance of using wireless LANs at airports
“Internet is a part of my life. It is like people can not live without water. So it is especially important for me to use wireless LANs at the airport” Participant E said. As said above, both the conveniences and satisfactions of using wireless LANs at airport are very important for him. Furthermore, he said that he is the same as other business-men, he always needs new and more information, and keeps updating his work while waiting for his flight. So the use of wireless LANs at the airport is quite important for E, especially for business purposes.

Influences of the availability of wireless internet at airports
“Yes, the availability of wireless internet at the airport influences my choice of airport” Participant E said. Because he is a business-man, he can not handle his job without the internet. So he always chooses airports which provide a wireless network service to the public, and then he can keep tracking his work at the airport while waiting for his flight.
Suggestions to help improve wireless network service at airports
Participant E proposed some suggestions for the airport. For examples, upgrade the wireless network service, increase speed of wireless LANs connection, and reduce the cost of the wireless network service. E said “I do not consider speed of connection very much, but it is good to increase the speed of connection. It is better to make this service free for the public as well. It will attract more passengers to use wireless LANs at the airport if it is free”. He also mentioned that the airport can provide some related services to make it more convenient for passengers, such as providing a laptop rental service and a laptop charging service. These wireless network related services are a good way to help travellers use wireless LANs at the airport. Business-men always want to cut down the amount of their baggage, so if the airport can provide a laptop rental service, then they would not need to bring their own laptops.

Participant D
The conveniences of using wireless LANs at airports
Participant D indicated that there are some conveniences of using wireless LANs at airports, such as checking email instantly, contacting colleagues or friends online instead of by phone and browsing the National Women’s Hospital website. D said she was enjoying her waiting time and having fun at the airport, because she could continue her work and also chat with her friends as well.

The inconveniences of using wireless LANs at airports
Participant D gave a special answer on the inconveniences of using wireless LANs at airports. D said that she concentrated too much on using wireless LANs to access the internet, she even forgot to check the time, and missed her flight.

Speed of wireless network connection
Participant D felt the speed of wireless network connection is very good at Auckland International Airport. She said it is fast enough for her to check
email, chat online and browse websites.

- **Satisfaction with wireless LANs at airports**
  Participant D does not like to waste time even when waiting for a flight, so the wireless network service satisfies her needs. She can check email, contact colleagues or friends online and browse websites. These activities have helped D to spend her waiting time at the airport.

- **Importance of using wireless LANs at airports**
  Participant D felt that it is not really important for her to have wireless internet at the airport when she is travelling except when she has to access wireless internet for an emergency. D mentioned that she does not always access the internet while waiting for her flight. She said she can watch some movies which she saved in her laptop. She would like to surf her local stuff rather than pay for internet access via wireless.

- **Influences of the availability of wireless internet at airports**
  Participant D thought that the availability of wireless internet at airports does not influence her choice of airport or airline. She said it depends on the price of the ticket. She always bought the cheapest or a special airline, never thought about which airport provides wireless network service.

- **Suggestions to help improve wireless network service at airports**
  Because the internet access via wireless service is not free, participant D suggested that the airport should provide a free wireless network service for the public. She also said the airport could improve the speed of wireless network connection and make it more convenient for travellers.

**Participant CORC**

- **The conveniences of using wireless LANs at airports**
  Participant CORC said he feels it is convenient to use the wireless network to access the internet at the airport, because he can enjoy surfing the internet at airports by using his own computer.
- **The inconveniences of using wireless LANs at airports**
  Participant CORC did not mentioned much about the inconveniences of using wireless LANs at airports. He said “It is not too much inconvenience I found, but the area of wireless network coverage at the airport is limited. That is not good enough at the moment”.

- **Speed of wireless network connection**
  Participant CORC said the connection speed of the wireless network connection is just okay. He mentioned that he would like faster speed, even though he can do a video chat with his colleagues online uninterrupted.

- **Satisfaction with wireless LANs at airports**
  Participant CORC said the wireless LANs satisfy his needs while waiting for his flight. The use of wireless LANs helps him to spend that boring waiting time. He also mentioned that many people are worried about security issues when accessing the internet via a public wireless network. He said as far as safety goes, it is all right for him as he always uses a firewall on his own laptop to prevent hackers.

- **Importance of using wireless LANs at airports**
  Participant CORC indicated that it depends on how long he has to stay at an airport. The longer he has to stay at an airport, the more important is his need for wireless to access the internet.

- **Influences of the availability of wireless internet at airports**
  Participant CORC did not feel that the availability of wireless internet at airports influences his choice of airport or airline carrier when he is travelling. He said he does not care about it too much.
Suggestions to help improve wireless network service at airports
Even though CORC does not have to pay for the wireless network service himself, as he has a wireless modem which is provided by his work, he also wanted to suggest that the airport should provide a free service to passengers. It would be more convenient.

Participant MLS
- The conveniences of using wireless LANs at airports
  Participant MLS said there are many conveniences. For example, she can check her email to pass time when waiting, and through virtual private network (VPN) she can connect to her work website to download or upload working files to continue her work. For MLS the main reason for accessing the internet via wireless is to continue with her work. She felt it is very convenient for her to continue working online at the airport. It is much better than wasting time.

- The inconveniences of using wireless LANs at airports
  Participant MLS was worried about the security of the public wireless internet. She said she can not use the public wireless network to browse some websites which she has to provide personal information to access, such as online banking, since she does not want provide her private information to hackers.

- Speed of wireless network connection
  Participant MLS felt that the speed of the wireless network connection is normal. MLS also said that the speed of the wireless network is slower than the wired network.

- Satisfaction with wireless LANs at airports
  Participant MLS felt that using wireless LANs at the airport satisfied her needs. As her major reason for accessing the internet via wireless is keep working at the airport, the wireless network service definitely satisfies her needs and helps her to set up a temporary mobile office at the airport.
➢ Importance of using wireless LANs at airports
   As mentioned above, the wireless network service satisfies all MLS’s needs, so it is really important for her to have wireless internet at airports when she is travelling. MLS mentioned that this service is the best for travellers who are busy with their work.

➢ Influences of the availability of wireless internet at airports
   Participant MLS mentioned that the availability of wireless internet at airports does not influence her choice of airport or airline carrier when she is travelling. She indicated that it depends on where she has to go and price of ticket.

➢ Suggestions to help improve wireless network service at airports
   Participant MLS proposed some suggestions to the airport. For example, reduce the price for using the wireless network service, extend the wireless signal coverage areas, and enhance the wireless network service. MLS mentioned that a free wireless network service would be better for travellers, and extending the wireless signal to cover the whole airport would also make it more convenient for travellers. She also suggested that the airport could provide laptop or wireless network card rental services to make their wireless network service perfect.

Participant P
➢ The conveniences of using wireless LANs at airports
   Participant P said there are some conveniences for her to use wireless LANs at the airport. “I like to receive and send email to my family and friends when I am travelling” said participant P. She said this lets her family and friends know where she is and they can feel safe. She also indicated that she also can use her own Windows Live Messenger software to send instant messages to her family and friends. This is the best way for her to spend time while waiting for her flight at the airport. She said “I am happy to enjoy my waiting time by using wireless LANs at the airport”. P said that
she also can continue her work sometimes at the airport.

➢ **The inconveniences of using wireless LANs at airports**
Participant P felt there were some inconveniences in using wireless LANs at airport. P gave her own opinion about inconveniences. The security issue is the biggest consideration for P. “I do not like to give my credit card number to get a wireless network connection. I feel that it is not secure” said P. She explained that hackers would like to steal people’s credit card information through the public wireless network. P said “I also need to watch the time, I do not want to pay for one hour and just use it for 10 minutes”. She feels that the internet access options are not enough. The only options she can choose are one hour and four hours internet access.

➢ **Speed of wireless network connection**
Participant P thinks that the speed connection is okay for just sending emails and instant messages, but it is a little bit slow for surfing overseas websites.

➢ **Satisfaction with wireless LANs at airports**
Participant P feels using wireless LANs at the airport satisfies her needs sometimes. P thought that she needs to do something while waiting for a flight. The wireless network service was what she needed at that moment. The main reason for P to access the internet via wireless at the airport was to have some fun. “When I have to wait for my flight for more than a couple of hours, I need to get some fun, such as checking email, chatting online and surfing the internet” said P.

➢ **Importance of using wireless LANs at airports**
Participant P thinks that it is important for her to have wireless LANs at airports. She said “I think it is convenient. For example, I can contact my family and friends through the internet instead of calling everyone. It helps me to save money. I do not need to pay for international calls”. She also indicated that it is important for her to contact her family instantly, since she
wants her family to know she is safe and will go back soon. If the flight is delayed, she can send an instant message to her family through internet.

- **Influences of the availability of wireless internet at airports**
  Participant P mentioned that the availability of wireless internet at airports does not influence her choice of airport or airline carrier when she is travelling. She said she just goes where she has to go. She felt that she does not have alternative choices.

- **Suggestions to help improve wireless network service at airports**
  The wireless zones do not cover the whole area at Auckland International Airport. Participant P suggested expanding the areas of the wireless zones. She does not want to stay in the departures waiting hall or Cafe only. Because she usually uses her laptop to access the internet, the power supply for the laptop is very important for her. She said “I have to find an electrical outlet to charge my laptop to ensure it has enough power while I access the internet”. So she also suggested the airport provide more electrical outlets for the public to charge their laptops. In addition, P thought that Auckland International Airport does not provide enough internet access options for travellers to choose, since there are only two options and both of them are based on an hourly charge. P suggested that for download usage the airport could count the actual cost instead of counting by hours, because different travellers have different needs. Some of them may need huge usage, some of them may only need a couple of minutes to access the internet. So P thought that for downloading, counting the actual cost is the best way to satisfy the different needs of different people.
5.5 Data Analysis

As stated in the section on purpose of research, the purpose of this research is to identify and analyse the issues for travellers around the availability and use of wireless networks in public areas of international airports. The main research question is ‘What are the perceptions of travellers regarding wireless LANs at international airports’. The main research question can be divided into several sub-questions, such as:

- What kind of travellers regularly use wireless LANs at international airports?
- What are the principal expectations and demands of the travelling public regarding wireless LANs at international airports?
- How has the wireless LAN in airport waiting areas impacted on the travelling public?
- How does the travelling public think wireless network services at airports can be improved?
- What wireless network technologies can be used in airports to meet these expectations?

In this data analysis section, the researcher will use the results from both quantitative and qualitative data to link the research questions, analyse these data and find the answers for these research questions. The discussion on data crossing comparison and integrated data analysis is presented below. In addition, the researcher will also discuss the meaning of the data and set out her interpretation of this research. The following table 5.5 – 1 is a brief outline of the relationship between research questions and the literature, observations, survey questions, and interview questions.
<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Literature / Observations / Survey Questions / Interview Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>What kind of travellers regularly use wireless LANs at international airports?</td>
<td>➢ Are you waiting for a flight?</td>
</tr>
<tr>
<td></td>
<td>➢ What is your occupation?</td>
</tr>
<tr>
<td></td>
<td>➢ How many times do you fly within a year?</td>
</tr>
<tr>
<td>What are the principal expectations and demands of the travelling public regarding wireless LANs at international airports?</td>
<td>➢ What kind of purposes do you use wireless LANs for?</td>
</tr>
<tr>
<td></td>
<td>➢ Are there any advantages for you in using wireless LANs at airports instead of other ways to connect to the internet? If yes, what are they?</td>
</tr>
<tr>
<td></td>
<td>➢ What are the conveniences of using wireless LANs at airports? Please explain your answer.</td>
</tr>
<tr>
<td></td>
<td>➢ Survey Observations: Differences Between Airports</td>
</tr>
<tr>
<td></td>
<td>➢ Observation at Auckland International Airport: Display of Samsung’s Platform</td>
</tr>
<tr>
<td>How has the wireless LAN in airport waiting areas impacted on the travelling public?</td>
<td>➢ Would you access the internet while waiting for flights every time?</td>
</tr>
<tr>
<td></td>
<td>➢ Do you think it is easy to set up a wireless network connection?</td>
</tr>
<tr>
<td></td>
<td>➢ Do you think that using wireless LANs at airports satisfies your need? If yes, how? If no, how? Please explain your answer.</td>
</tr>
<tr>
<td></td>
<td>➢ How important is it for you to have wireless internet at airports when</td>
</tr>
<tr>
<td>Research Questions</td>
<td>Literature: Wireless Network Technologies</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>How does the travelling public think wireless network services at airports can be improved?</td>
<td></td>
</tr>
<tr>
<td>➢ What kind of equipment do you use to connect to the wireless network?</td>
<td></td>
</tr>
<tr>
<td>➢ Is the wireless network service free?</td>
<td></td>
</tr>
<tr>
<td>➢ If not, how much is it?</td>
<td></td>
</tr>
<tr>
<td>➢ If not, how do you pay for it?</td>
<td></td>
</tr>
<tr>
<td>➢ Are there any limitations on connecting to wireless LANs at airports? If yes, what are they?</td>
<td></td>
</tr>
<tr>
<td>➢ What are the inconveniences of using wireless LANs at airports? Please explain your answer.</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.5 - 1: The relationship between research questions and literature, observations, survey questions, interview questions

The researcher will follow the outline in the above table to describe the meaning of the data results. It will be analysed by data group. The following section is divided into five parts to discuss the five sub-research questions.
5.5.1 The Groups of Travellers of Using Wireless LANs at International Airports

According to the 60 surveys, 57 participants in the survey were waiting for their flights. In addition, most of the travellers mentioned that they fly more than three times a year. Linked with the survey question on occupation, most of them were business travellers who were flying because of their work. For other travellers the reasons for flying were different. Other travellers‘ reasons were vacation and tourism. Based on this result of data, the travellers using wireless LANs at international airports can be divided into two groups: business travellers and non-business travellers.

5.5.2 The Travellers‘ Expectations and Demands Regarding Wireless LANs at International Airports

- The reasons why travellers use wireless LANs at international airports
  According to the results gathered from the first interview question, most participants indicated that they like to use wireless LANs to access the internet, because it is convenient. They thought that the wireless network service can help them to pass time while waiting for their flights. This is a simple answer, since most participants did not want to waste time even while waiting for their flights at airports. During that time, the use of wireless LANs to access the internet is a good option for travellers to fill in time. Their activities are described below.

- The types of activities for which a traveller uses wireless LANs at international airports
  There are some differences between business travellers and non-business travellers. If we combine the travellers‘ occupation question (question 2 of
the surveys) and their reason for using wireless LANs question (question 5 of the survey) together, the statistical results show that the different occupations of travellers reflect different reasons. Most of the business travellers used wireless LANs for work. They positively prefer to continue their work at airports, for example online meetings, checking business email, contacting colleagues and browsing their company website. For non-business travellers the reasons for using wireless LANs at airports are quite different. Most of them were travelling for a holiday. Their main reasons for accessing the internet via wireless at airports were to have fun and relax. They liked surfing on different websites, chatting online with their family and friends, and reading news. Especially for students, they also preferred playing online games while waiting at airports.

Generally, checking email, reading news, and chatting online are the most popular activities used by travellers through wireless networks at airports. This result shows that the reasons travellers use wireless LANs at airports are many and broad.

The following table 5.5 – 2 shows the different activities of business travellers and non-business travellers when using wireless LANs at airports.

<table>
<thead>
<tr>
<th>Business Travellers</th>
<th>Non-Business Travellers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continue work (via VPN)</td>
<td>Browse websites</td>
</tr>
<tr>
<td>Online meeting</td>
<td>Check personal email</td>
</tr>
<tr>
<td>Check business email</td>
<td>Chat online</td>
</tr>
<tr>
<td>Contact colleagues online</td>
<td>Read news</td>
</tr>
<tr>
<td>Download or upload business files</td>
<td>Play online games</td>
</tr>
<tr>
<td></td>
<td>Download</td>
</tr>
</tbody>
</table>

Table 5.5 - 2: The different activities of business travellers and non-business travellers when using wireless LANs at airports
Travellers’ expectations of wireless LANs at international airports

As mentioned above, the different travellers had different reasons for using wireless LANs at airports. Similarly, they also had different expectations. The business travellers required a fast, easy and safe wireless LAN to access the internet. Most of them said that they always use wireless LANs to continue their work, for example through virtual private network (VPN) to connect to their business website to download or upload working files, check business email and set up business meetings online. As a result the secure environment of the wireless network is very important for business travellers. They definitely do not want their confidential business information to be available to hackers.

Non-business travellers liked to use wireless LANs for multiple reasons to enjoy their waiting time; this included reading news, chatting online, browsing websites, playing online games. Most of them did not consider security issues too much. However, some of them mentioned that they did not feel secure about paying by credit card to get the connection. Some of them deemed that the speed of connection is not fast enough, especially for the travellers who liked to play online games.

As shown in the section on presentation of data from the surveys, the researcher found different results. Only Beijing Capital International Airport provides a free wireless network service. Both Guangzhou Baiyun International Airport and Auckland International Airport charge for the wireless network service. Therefore, the researcher spent four more days to finish the survey at Guangzhou and Auckland than at Beijing. It was very hard for the researcher to find passengers to do the survey at Guangzhou and Auckland because only a few people were willing to pay for the wireless network service. During the investigation, the researcher found that most passengers liked to browse local stuff on their own laptop while waiting rather than spend money on accessing the internet via wireless at the airport. Furthermore, most travellers thought that the cost of wireless internet at these airports is too expensive.
As mentioned also in the section on presentation of data from observations, at Auckland International Airport there is a display of Samsung's platform in the departures waiting hall which provides free internet access service. On the positive side, this service attracted more travellers than the wireless network pay service. The data results from interviews support this point. Eleven out of 12 interviewees suggested that the airport should provide a free wireless network service for the public. This result clearly showed that the free Internet access service should be more attractive to travellers. On the negative side, although this service is free, there are only three desktop computers for passengers to use, so many people have to wait in the queue, and also travellers have to stand to browse websites. It is significantly different from using their own laptop and surfing on the Internet at their leisure.

Overall, the data results show that travellers expected to use their own portable equipment to access free wireless internet at their leisure while waiting for flights at international airports.

**5.5.3 The Impact on the Travelling Public of Using Wireless LANs in Airport Waiting Areas**

- **The travellers’ satisfaction with wireless LANs at airports**
  All of the participants indicated that the use of wireless LANs at airports satisfied their needs, apart from the high cost of wireless network service and speed of connection. Generally, all of the participants felt it was boring to wait their flights at the airport and they wanted to do some activities through the internet. Therefore, using wireless LANs to access the internet was the best thing for them and satisfied their different demands. As mentioned above, most participants basically just wanted to check email, chat online, read news, and browse websites. Since the waiting time was different for different passengers, the use of wireless LANs helped them to
occupy their own waiting time. They thought it was good to use the wireless network service rather than waste time at airports. Some of the participants had specific reasons for thinking that the use of wireless LANs in airport waiting areas satisfied their needs. For example some of them were sports fans, they need to read sports news every day and did not want stop this habit even when travelling. Some of them preferred to book hotels online and plan their travel schedule at airports. Some of them liked to contact their family and friends and keep chatting with them, let them know they were safe and exchange information instantly. Some of them had to communicate with their stock agent and check share stock information regularly at airports. And some of them were students, who sometimes needed to download study notes and submit assignments via wireless internet at airports. The detailed information has already been explained by the researcher in the section on presentation of data from interviews. Although every participant had different reasons for using wireless LANs at airports, they had one thing in common, in that all of them wanted to get an internet connection to carry out online activities. The wireless network service definitely satisfied travellers’ needs for internet access. In addition, setting up a wireless network connection basically satisfied travellers’ demands. According to the responses to question 10 of the survey, 93 percent of the travellers thought that it is easy to set up a wireless network connection at airports. This result shows that the setting-up process for wireless network service at the airport is good enough at present, in that most of the travellers expressed satisfaction with that.

- **The importance for the travelling public to have wireless LANs at airports**
  Ten out of 12 participants pointed out that they felt it was important to have wireless LANs at airports. Based on this statistic, most of the travellers felt that the use of wireless LANs to access the internet is important for them. Only two participants indicated that it was not really important. One of them was not a frequent user of the internet, and the other only needed to
access the internet at airports for an emergency. Depending on the
different reasons of different travellers for using wireless LANs, the
degrees of importance varied. For business travellers, they felt that having
wireless network services was really important for them, since it helps
business travellers to save time and achieve their demand for a mobile
office, for example to set up online meetings, check business email to
solve customers’ issues and login to their company’s Visual Private
Network (VPN) to download, upload or update business documents. The
business travellers mentioned that they always think time is important,
because time is money. This result has shown us that for business
travellers it is very important to have wireless LANs at airports. It has
special significance for business travellers.

Non-business travellers also felt that it is important for them to have
wireless LANs at airports. But not all of them pointed out any particular
importance as business travellers did. For non-business travellers the
main reason for travelling was holiday. They were not in a hurry like
business travellers. They needed internet access via wireless at airports
because they wanted to spend their waiting time in having fun and relaxing.
Most of them would have liked to surf the internet, chat, check email and
play online games. Compared with the business travellers, they had less
critical aims, but travellers who had special needs or habits still thought
that the wireless network service is indispensable at airports, for activities
such as checking stock information, reading sport news, submitting an
assignment and so on. They mentioned that the internet is a part of
people's life, like people can not live without water. Since only a few
travellers had these special needs, for non-business travellers the degree
of importance of having wireless LANs at airports was medium.
The influence on travelling public of the availability of using wireless LANs at airports

The result of question 4 of the survey shows that over 70 percent of participants would always access the internet while waiting for flights. The majority of the passengers who have used wireless LANs at airports will continue to use this service every time in the future when they are waiting for flights in airport waiting areas. This result told researcher that wireless LANs have a significant impact on travelling public.

The data from the interviews show that only three participants reported that the availability of wireless internet at an airport influences their choice of airport or airline carrier when they are travelling; for the other nine participants it does not. This result indicated that the use of wireless LANs to access the internet is still not popular at airports and not all passengers need to use this service. This result also let the researcher understand that even though the most participants felt this service is important, it is still not necessary for every traveller. They mentioned that they always go where they have to go, but the wireless network service is a real bonus if airports provide it. Many travellers still thought that the price of the air ticket is the priority consideration when they are travelling. If the ticket prices are not too different, it would not change their mind.

For non-business travellers, the wireless internet was not the only thing at an airport. It is only an advantage if the airports have it. They were not too concerned about its availability. But for business travellers, it was a definitely a factor that concerned them. Wireless network has been a revolution in the internet industry and to be able to use it in airports has become more convenient for business class people. It is very simple to get an internet connection and run their business even while they are at airports. As indicated before, time is money for business people, this is why they do not want to waste time, even the time in waiting for flights. Therefore, the availability of wireless internet at airports influences most business travellers’ choice of airport or airlines when they are travelling.
This result may have been influenced by the fact that Auckland International Airport is the only choice of international airport. What is clear is that the requirement and need for Internet provision at airports is high. This may be a factor that can be considered by airline companies in attracting clients.

Overall, the wireless network service was a value added service for all of the passengers. This service let them spend their waiting time more efficiently. It also brought many advantages and conveniences for the travellers. With wireless LANs at airports, the travellers did not have to worry about having to plug-in the laptop with the phone line and neither did they have to wait for others. They could enjoy the wired free internet access service with their own portable equipment.

5.5.4 The Improvement of Wireless Network Services at International Airports

People always talk about the inconveniences and recommendations together, because we always think the inconveniences first and then make suggestions to improve them. That is why the researcher did the analysis of these two parts together. The following table 5.5 – 3 shows the comparison of inconveniences in using wireless LANs at airports and travellers’ suggestions for improving them.
<table>
<thead>
<tr>
<th>Inconveniences of Using Wireless LANs at Airports</th>
<th>Travellers’ Suggestions to Help Airports Improve Wireless Network Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>The limited coverage of wireless LANs</td>
<td>Expand areas of coverage of wireless LANs at airports</td>
</tr>
<tr>
<td>The limited availability of related services for wireless LANs</td>
<td>Provide more related services for wireless LANs</td>
</tr>
<tr>
<td>The limited internet access options</td>
<td>Provide more internet access options</td>
</tr>
<tr>
<td>The wireless network service is not free</td>
<td>Provide free wireless network service at airports</td>
</tr>
<tr>
<td>The speed of wireless network connection is not fast enough</td>
<td>Improve the speed of wireless network connection</td>
</tr>
</tbody>
</table>

Table 5.5 - 3: Comparison of Inconveniences and Suggestions

- **The inconveniences of using wireless LANs at airports**
  
  1) **The limited coverage of wireless LANs**

  The wireless zones did not cover the whole area of the airports. They were limited to areas at waiting halls, security clearance, cafes, and restaurants. The passengers said that they did not want to only stay at the signal place to get the wireless internet connection. This limited the range of their activities.

  2) **The limited availability of related services for wireless LANs**

  Based on the result of question 6 of the survey, there are over 80 percent of participants liked to use their laptop to connect to the wireless network at airports. Since most of the passengers preferred to use their own portable equipment to access the internet via wireless at airports, such as laptops, PDAs, and mobile phones, the ability to recharge this portable equipment is very important for them. Many participants mentioned that the major inconvenience is that it is very hard to find somewhere to charge their portable equipment. They were worried that they would not have enough power while the accessing internet at airports.
3) **The limited internet access options**

Based on this research study, Auckland International Airport did not provide enough internet access options for travellers, since there were only two options and both of them were based on hourly rates. These two options could not satisfy the needs of all travellers.

4) **The wireless network service is not free**

According to the section on presentation of data from surveys, Guangzhou Baiyun International Airport and Auckland International Airport did not provide a free service of wireless LANs. This was the biggest limitation on passenger use of wireless LANs at airports. The passengers had to pay by credit card to get a wireless network connection. The survey question on payment method showed that 18 out of 20 participants who did the survey at Auckland International Airport had paid to access wireless internet by credit card. This data result shows that most passengers had to provide their personal credit card number before using wireless LANs at airports. Many participants thought that it was no security when using their credit card number on a public network. They said that hackers could steal their credit card through the public wireless network.

5) **The speed of wireless network connection is not fast enough**

Most participants felt that the speed of connection was normal. Some of the participants mentioned that if many people access the internet at the same time, the network might become slow. This data result let the researcher know that the use of wireless LANs at airports cannot be large. Otherwise it would affect the speed of wireless network connection.
Suggestions of the travellers to help airports to improve their wireless network services

1) *Expand areas of coverage of wireless LANs at airports*

Some travellers suggested that airports should expand wireless zones areas and try to cover the whole airport. They should enlarge the coverage areas of the wireless signals and not only limit them to inside the terminals. They should also consider outside areas, such as car parks. This would provide more benefits to travellers.

2) *Provide more related services for wireless LANs*

As mentioned above, many travellers preferred to use their own portable equipment to access wireless internet, so the power supply was a very important factor which the airports should address. They should provide more electrical outlets for the public to charge their portable equipment or provide a free charging service for travellers. Business travellers were a major group using wireless LANs at airports, who always want to reduce the amount of their baggage. The airports could also consider providing a laptop rental service, and then people would not need to bring their own laptops. In addition, the airports could provide a wireless network card rental service to travellers who have a laptop without a wireless network card. These related services for wireless LANs would be a good promotion to attract more travellers to use it. They could also help airports to make their services perfect.

3) *Provide more internet access options*

If the airports want users to pay for wireless internet services they should provide more internet access options for travellers to choose from. It is better to base the cost on download usage instead of charging by the hours, because different travellers have different needs. Some travellers may need huge usage, while some travellers may only need a couple of minutes to access the internet. Therefore using download usage to calculate the cost is the best way to satisfy the different needs of different people.
4) **Provide free wireless network service at airports**

The airports should provide free wireless network service to the public. Eleven out of 12 participants mentioned that they wanted to use free wireless LANs to access the internet at airports. They thought that a free wireless network service would be the best for travellers. They thought that as they had already paid their departure fee, the service should not charge them again. Anyway, free wireless LANs would attract more passengers to use it at airports.

5) **Improve the speed of wireless network connection**

According to most of the participants the speed of the wireless network connection is not fast enough at airports, so airports should improve the speed of connection to upgrade their service. A sufficiently fast speed of wireless network connection would satisfy the many need of travellers, such as high speed of connection for online meetings and downloading. A high speed wireless network service would increase travellers’ decisions to use wireless LANs at airports.

As mentioned above, the most of non-business travellers felt that the wireless network service is still not necessary for every traveller, but the business traveller sees internet provision as necessary and preferred. The researcher personally thinks that travellers could be allowed some of the main airports’ services through wireless LANs. It would more easily attract travellers to use wireless LANs at airports, if duty free shopping was provided online, so passengers could buy duty free goods online and pick them up before boarding. It could provide information about flights online as well, so that passengers do not need to check their flight information on information boards at fixed places, but can look up their check-in time, gates and departure times online. Airports could also set up a server to send messages automatically to the wireless LANs user accounts to remind them of their boarding time. This service could reduce the chances
of travellers missing their flights.

It is suggested to therefore to airports or airline companies that business travellers see internet as an import service provision.

5.5.5 The Use of Wireless Network Technologies to Meet Travellers’ Expectations at Airports

Most data on wireless network technologies have been collected from the literature. As explained in previous sections, most of the travellers expected the airports to improve the speed of wireless network connection and provide a secure environment for the wireless network. The following paragraph concentrates on these two traveller expectations of the wireless network. It is divided into two parts: technical issues and solutions.

- The technical issues of wireless network service regarding traveller expectations at airports

  1) Speed of wireless network connection

     According to Doesburg (2003), Wi-Fi network is great, and Intel has joined with Centrino to build up wireless capability. But Wi-Fi is like a hub, so the running speed is very slow. “Wi-Fi network has 4 T1 connection, which provides users with speeds of up to 1.5 Mbps” (Sacramento International Airport, 2008). This data from the literature can be matched with the result of the interviews, as most participants mentioned that the speed of wireless network connection is not fast enough at airports. Tyler (2004, p. 25) mentioned that “one service quoted the IEEE 802.11b gross data rate of 11Mbps but that is misleading. IEEE 802.11 can deliver net data rates of 8Mbps at best and more likely 6Mbps”. The actual speed of connection might be affected by many factors, such as signal strength, coverage scope, number of users and interference. Because of these factors, it is very difficult to achieve the expected speed of wireless network connection.
“Hot Spots are shared services so the wireless element can reduce considerably and in any case the speed depends on what the wireless base unit uses for connection to the big wide world” (Tyler, 2004, p. 25). Insufficiently fast speed of connection is a major limitation of the wireless network.

2) Secure environment of wireless network

Wildstrom (2008, p. 85) says that “the wireless service offered in airports, coffee shops, hotels, and other hotspots is almost always unencrypted”. It means that it is very open to attack by someone else. “Without encryption and other protective measures, anyone can use readily available tools to see all your Wi-Fi traffic” (Waring, 2007). Even though they provided the protection, they also just used Wired Equivalent Privacy (WEP). The protection of WEP is currently not good enough. It can be broken real easily. “WEP is the oldest security standard for Wi-Fi. At a 2005 Information Systems Security Association meeting, presenters from the FBI demonstrated breaking a WEP network in three minutes, using the latest attack tools, all available on the Internet” (Reinhold, 2006).

“A survey of 14 airports in the U.S. and three in Asia by AirTight Networks, a company that sells gear to make wireless connections more secure, found that 57% of the networks were wide open” (Wildstrom, 2008, p. 85). This data included both public and private usage. According to Wildstrom (2008), 28% of the networks are protected by WEP. In addition, the weak password is another threat to wireless network security. “Since most users’ pick passwords in fairly predictable ways, an attacker equipped with a password guessing program could break into network much more quickly, perhaps in a matter of minutes” (Reinhold, 2006). The security issue is currently the biggest issue for wireless network. The wireless network development team should focus on it to find solutions.
Technical solutions to meet travellers’ expectations

1) 802.16e (Wi-Max) and 802.11n

According to “IEEE 802.11” (2007), various scientists are developing the technology to improve the speed of the wireless network, which is hoped to be the same as Gigabit Ethernet. It is believed that scientists had begun to develop the next generation of wireless technology when they launched the first generation of wireless technology. According to Tyler (2004, p. 26), there are two wireless standards called IEEE 802.16e and 802.11n (802.11n standard is still at the auditing stage, and IEEE has not yet achieved certification).

The IEEE 802.16e standard is suitable for mobile wireless LAN users. “Mobile Wireless LAN users are limited to a scattering of public hotspots through which they can access the Internet. The new 802.16 or Wi-Max, standard promises to change this by increasing the range to about 31 miles” (Tyler, 2004, p. 26). The 802.16e came from the improvement and upgrade of 802.16-2004. “IEEE 802.16e-2005 (formerly known as IEEE 802.16e), addressing mobility, was concluded in 2005” (“IEEE 802.16”, 2008). According to Marks, Kiernan & McCable (2007), 802.16e (Wi-Max) has in fact achieved the wide signal range and high speed of connection.

The 802.11n is a new standard proposed by the 802.11n task group. According to “Geekzone” (2006), the 802.11n standard is a new high performance product of wireless LAN in which the draft support speed is up to 600 Mbps and the promise speed is up to 108 Mbps. The further adoption of the 802.11n standard will push the wireless network technology to the next generation.

These two new wireless network technologies can help airports to achieve travellers’ expectation of a high speed wireless network connection.
2) **WPA and VPN**

Since almost all the airports’ public WiFi do not use encryption, travellers should assume that their personal data can be stolen by anyone. There are some technical measures that can help to protect wireless network at airports. Compared with the weak WEP WiFi protection method, the WPA (Wi-Fi Protected Access) is a stronger protection method. WPA is a new security standard that can be used to protect wireless networks. According to Reinhold (2006), WPA has many security features and corrects many problems of the WEP standard. The secure networks are highly important for both business travellers and non-business travellers. Travellers also can use virtual private network (VPN) to enhance security. “A *virtual private network VPN provides end-to-end encryption of all traffic, anyone who intercepts data will see nothing more useful than the network address of the VPN gateway*” (Wildstrom, 2008, p. 86).

In addition, travellers should use strong password to secure their accounts. They also should “*periodically look at their Wi-Fi configuration and remove any unneeded networks from the preferred list and should not connect to any unknown wireless networks in public places*” (Piazza, 2008). Travellers also have to avoid accessing private information on public networks, such as logging in to online bank accounts, paying bills by credit card and remotely connecting to corporate systems without the VPN.
5.6 Summary

The above findings and discussions section has presented all the data results gathered from the observations, surveys and interviews and has related them to the research questions to determine the answers. The researcher analysed data, grouped same results together and used them to answer the research questions one by one.

Travellers using wireless LANs at international airports can be grouped into business travellers and non-business travellers. Their reasons for using wireless LANs at airports are different, but both of them do not want to waste time even when waiting for flights at airports. The wireless LANs bring many advantages and conveniences for travellers. The researcher used the analysis of travellers’ expectations, importance of wireless LANs and impact on travelling public of using wireless LANs at international airports to determine the elements that are lacking in wireless network services and their solutions for improvements.
6 Conclusions and Recommendations

6.1 Conclusions

This research reviewed current literature on wireless LANs, identified suitable research methodology, discussed both quantitative and qualitative data, and analysed all of the data to produce conclusions from the research results. The research process was based on the perceptions of travellers using wireless LANs at international airports.

The service of internet access via the wireless medium has grown in international airports. The wireless network service has had a great impact on the travelling public. Different travellers have different reasons for using wireless LANs at airports. These travellers can be divided to two groups, business travellers and non-business travellers. The business travellers interviewed always used wireless LANs to continue their work, for example through virtual private network (VPN) to connect to their business website to download or upload working files, check business email and set up business meetings online. The non-business travellers liked to use wireless LANs for multiple reasons; this included reading news, chatting online, browsing websites, playing online games. The research results show that the free internet access service attracted more travellers than the pay service. Most of travellers expected that the airport provide a free wireless network service for the public. They expected to use their own portable equipment to access free wireless internet at their leisure while waiting for flights at international airports.

The business travellers require a fast, easy and safe wireless LAN to access the internet. The secure environment of the wireless network is very important for them. The wireless network has been a revolution in the internet industry and to be able to use it in airports has become more convenient for the business travellers. So the availability of wireless internet at airports is definitely a factor of interest to business travellers. Non-business travellers
have less critical aims, but travellers who have special needs or habits still think that the wireless network service is indispensable at airports. Most of them did not consider security issues too much. However, some of them mentioned that they did not feel secure about paying by credit card to get the connection. Some of them deemed that the speed of connection is not fast enough, especially for the travellers who liked to play online games. The requirement and need for Internet provision at airports is high. This may be a factor that can be considered by airline companies in attracting clients. The wireless network service brings many advantages for travellers. It is a value added service for all passengers. It lets them to spend their waiting time more efficiently. It helps them to occupy their waiting time, and not waste time while waiting for flights.

Through the analysis of data, the wireless network service still has some deficiencies and needs to improve. The wireless zones do not cover the whole area of airports. Airports should enlarge the coverage areas of the wireless signals. There are currently not enough related services for wireless LANs at airports. They should provide more services to support travellers using wireless LANs, such as a free charging service for portable equipment, and laptop and wireless network card rental services. For internet access options, it is better to use download usage for counting instead of charging by hours and it would be best for travellers if the airports provided free wireless LANs. For speed of connection, the airports should pay attention to new technologies and try to upgrade the speed of wireless network connection. According to Tyler (2004), the both new wireless standards 802.16e and 802.11n have in fact achieved the wide signal range and high speed of connection. In addition, because travellers think security is the most important issue, the airports must pay greater attention, and find ways to provide a secure environment for the wireless network. The WPA (Wi-Fi Protected Access) is a stronger protection method that can be encrypted public Wi-Fi. Travellers also can use virtual private network (VPN) to enhance security.
In summary the perceptions of travellers is that internet is a necessary or at least a very convenient service to offer at airports. The cost and provision of these services may be aspects for airport and airline companies to consider as competitive or strategic advantage over competitors, particularly to the business traveller.

To sum up, the airports provide the wireless network service to travellers, and the essential purpose is to provide advantages and convenience for them. Different travellers have different expectations of using wireless LANs at airports, and therefore the airports should upgrade their services and try their best to satisfy travellers’ needs.

6.2 Recommendations for Further Research

Based on this research study, wireless LANs are not widely used by travellers at airports. Most of the travellers thought this service is important, but not every traveller thought it is necessary. Further research needs to focus on an investigation into how to make the usage of wireless LANs popular at airports.

Further research can be also done in different airports, and particularly needs to investigate airports that do not provide wireless internet. Since the different airports are located in different cities or even different countries, the situations should be different as well. The researcher should investigate the different situations at these airports without wireless LANs, such as the thoughts of travellers who are waiting for flights at airports without wireless LANs, and their expectations of a wireless network service at airports. This kind of information is also very important and useful for increasing the use of wireless LANs at airports.

More research would also be useful in investigating the differences between the situation before and after implementing a wireless network at the airport thus gaining a more true perspective of travellers perceptions.
Wireless network technologies are growing and developing rapidly. With the development, updating and implementation of wireless technologies, further research needs to keep pace with these changes and consider the ongoing changing environment.
7 References


Main points. (2003). *OECD Papers*, 3(9), 4-5.


8 Appendices

8.1 Appendix A: Questionnaire Questions

1. Are you waiting for a flight?
2. What is your occupation?
3. How many times do you fly within a year?
4. Would you access the internet while waiting for flights every time?
5. What kind of purposes do you use wireless LANs for?
   A) Read News
   B) Chat
   C) Check Email
   D) Browse Website
   E) Online Game
   F) Download
   G) Online Meeting
   H) Other___________
6. What kind of equipment do you use to connect to the wireless network?
   A) Laptop
   B) PDA
   C) Mobile Phone
   D) Other___________
7. Is the wireless network service free?
8. If not, how much is it?
9. If not, how do you pay for it?
10. Do you think it is easy to set up a wireless network connection?
11. Are there any advantages for you in using wireless LANs at airports instead of other ways to connect to the internet? If yes, what are they?
12. Are there any limitations on connecting to wireless LANs at airports? If yes, what are they?
8.2 Appendix B: Information Sheet

I am a Master of Computing student at Unitec New Zealand. I am doing a research study that focuses on issues involved in using wireless network at international airports. You are invited to take part in this research.

The primary researcher is Fang Peng. The research will be conducted under supervision from Logan Muller, Unitec New Zealand (supervisor) and Sam Kolahi, Unitec New Zealand (associate supervisor). The research proposal has been presented to the Unitec Research Ethics Committee and approved. The research will take place from September 2007 to August 2008.

Data collection will be through questionnaires and interviews with travellers who are using wireless network in international airports, the analysis of documentation, wireless articles, reports, journals, books, and other related information.

Confidentiality and your anonymity will be protected in the following ways:
- No reference will be made that identifies the organisations involved.
- The primary data (interviews and notes) will be stored securely for at least 5 years.

Please contact the primary researcher (see below) if you have any further questions.

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UREC REGISTRATION NUMBER: (2007.xxx)
This study has been approved by the UNITEC Research Ethics Committee
from (4 October 2007) to (3 October 2008). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
8.3 Appendix C: Consent Form

The purpose of this research is to identify and analyse the issues for travellers around the availability and use of wireless networks in public areas of international airports. The subjects of this research study are travellers who are using wireless network connections at international airports. The purpose is to uncover issues such as why a traveller would use a wireless LAN, what are the types of activities a traveller uses wireless LANs and what are their expectations of International airports. In additional technical issues will also be involved. The main research question is ‘What are the perceptions of travellers regarding wireless LANs at international airports’.

The research is being done by Fang Peng and will be supervised by (Logan Muller) and (Sam Kolahi) from UNITEC New Zealand.

Name of Participant: ........................................................................................................

I have seen the Information Sheet dated (                ) for people taking part in the wireless network in international airports research project. I have had the opportunity to read the contents of the information sheet and to discuss the project with Fang Peng. I am satisfied with the explanations I have been given. I understand that taking part in this project is voluntary (my choice) and that I may withdraw from the project at any time up to final draft stage.

I understand that I can withdraw from the interview if, for any reason, I want this.
I understand that my participation in this project is confidential and that no material that could identify me will be used in any reports on this project.

I have had enough time to consider whether I want to take part.
I know whom to contact if I have any questions or concerns about the project.
The principal researcher for this project is Fang Peng - email: pengfangpengfang@hotmail.com, phone 0064-9 6246558 (home), 0064-21 1604006 (cell)

Signature………………………………………(participant) …………………(date)

The participant should retain a copy of this consent form.

UREC REGISTRATION NUMBER: (2007.xxx)
This study has been approved by the UNITEC Research Ethics Committee from (4 October 2007) to (3 October 2008). If you have any complaints or reservations about the ethical conduct of this research, you may contact the Committee through the UREC Secretary (ph: 09 815-4321 ext 7248). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.
8.4 Appendix D: Interview Questions

1. What are the conveniences of using wireless LANs at airports? Please explain your answer.
2. What are the inconveniences of using wireless LANs at airports? Please explain your answer.
3. What do you think about the speed of connection?
4. Do you think that using wireless LANs at airports satisfies your need? If yes, how? If no, how? Please explain your answer.
5. How important is it for you to have wireless internet at airports when you are travelling?
6. Does the availability of wireless internet at airports influence your choice of airport (routing) or your choice of airline carrier when you are travelling? Please explain your answer.
7. Do you have some suggestions to help improve wireless network services at airports?