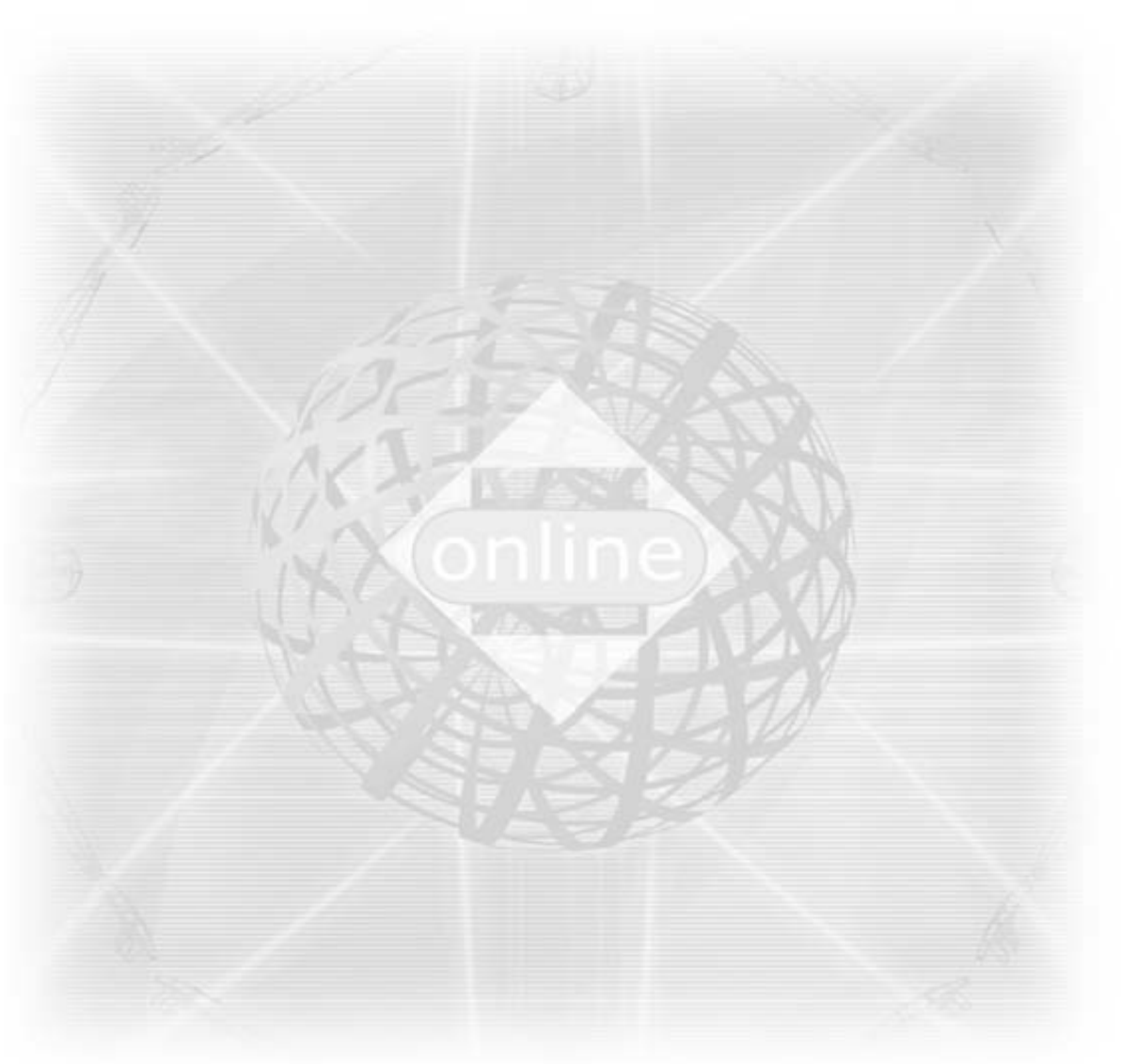
Wireless LAN Access Point

TWL-A11

User's Manual



Version 1.5

Statement of Conditions

Tellus Group Corporation (hereafter abbreviated as TGC) may make improvements or changes in the product described in this documentation at any time. The information regarding to the product in this manual are subject to change without notice.

TGC assumes no responsibility for errors contained herein or for direct, indirect, special, incidental or consequential damages with the furnishing, performance, or use of this manual or equipment supplied with it, even if TGC or its suppliers have been advised of the possibility of such damages.

Electronic Emission Notices

This device complies with Part 15 of the FCC Rules and Canada RSS-210. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio.

To assure continued compliance, any changes or modifications not expressly approved by TGC could void the user's authority to operate the equipment.

FCC Radiation Exposure Statement

This device and its antennas must operate with a separation distance of at least 5 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End users must be provided with specific operating instructions for satisfying RF exposure compliance.

This product has been certified in Canada, France, Germany, Italy, Spain, Sweden, Taiwan, UK, and US.

LIMITED WARRANTY

This product is warranted by TGC to be free from defects in material and workmanship for one (1) year from the date of purchase.

During this period if this product is found to be defective in material or workmanship, TGC or one of its authorized service facilities will at its option either repair or replace this product without charge, subject to the following conditions, limitations and exclusions:

1. This warranty extends to the original consumer purchaser only and is not assignable or transferable.
2. This warranty shall not apply to any product which has been subjected to misuse, abuse, abnormal use, negligence, alteration or accident, or has had its serial number altered or removed.
3. This warranty does not apply to any defects or damage directly or indirectly caused by or resulting from the use of unauthorized replacement parts and/or service performed by unauthorized personnel.
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1. INTRODUCTION

Wireless LAN is local area networking without wires, which uses radio frequencies to transmit and receive data between PC's or other network devices. Wireless LAN is able to configure independent networks and infrastructure networks. The former is suitable for small or temporary peer-to-peer configurations, and the later is offering fully distributed data connectivity via micro cells and roaming.

The TWL-A11 is designed to meet the mobility, performance, security, interoperability, management, reliability requirements of IEEE 802.11b high data rate standard and IEEE 802.3 Ethernet 10 Base-T standard. When installed, TWL-A11 can communicate with other IEEE 802.11b and IEEE 802.3 compatible products to create a wireless network in your office or home.

1.1 Features

- Compliant with IEEE 802.11b standard.
- Automatic data rate fallback under noisy environment (11/5.5/2/1Mbps).
- Interoperable with IEEE 802.11b and IEEE 802.3 compliant equipment.
- Supports full mobility and seamless roaming from cell to cell.
- Local, remote and automatic configuration.
- Easy client management with utility software under Windows 95/98/ME/2000/XP.
- Desktop and wall/ceiling mount.
- Up to 300m operating range (environment dependent).
- Supports point-to-point and point-to-multipoint access.
- Direct Sequence Spread Spectrum (DSSS) technology provides robust, interference-resistant and secure wireless connection.
- Supports bridging function.
- Support TCP/IP, NETBEUI, and DHCP client.
- Internal/external antenna versions available.

1.2 Applications

- Home networking for device sharing - Remote access to corporate network information email, file transfer and terminal emulation.
- Frequently changing environments - Retailers, manufacturers and banks that frequently rearrange the workplace and change location.
- SOHO (Small Office and Home Office) users - SOHO users need easy and quick installation of a small computer network functions.
- Inter-building connection - The wireless building-to-building network installs quickly, requires no monthly lease fees, and provides the flexibility to reconfigure easily.
- Typical applications include hard-to-wire buildings, campuses, hospitals/medical offices, warehouse, security huts, exhibition centers, etc.
- Temporary LANs for special projects or peak time - Auditors require workgroups at customer sites. Trade shows, exhibitions, retailers, airline, and shipping companies need additional workstations for a peak period.

2. INSTALLATION

Please follow steps described in the following Section 2.1 through 2.7 to install your TWL-A11 including hardware, driver, and utilities.

2.1 Product Kit

Before starting installation, please make sure the TWL-A11 package you purchased includes the following four items:

1) TWL-A11 Wireless Access Point with 2 antennas.
2) CD-ROM (containing Driver/Utility, and User's Manual).
3) Quick Start Guide.
4) Power adapter with power cord.

If anything is missing, please contact your vendor.

2.2 System Minimum Requirements

Your system should meet the following minimum requirements to install the TWL-A11 successfully.

1) LAN with Ethernet network device such as hub or switch.
2) An A/C power outlet (100~240V, 50~60Hz) closed with the location of TWL-A11 (refer to Section 2.3).
3) UTP Ethernet cable (category 3, 4, or 5) with RJ-45 connectors and enough length from the location of TWL-A11 to the hub.

2.3 Placement of TWL-A11

Please choose a proper place for your TWL-A11. Normally, the best location to place the TWL-A11 is at the center of all your mobile stations within line of sight. The higher up it is, the better performance you may have.

2.4 Plug in Power

Plug the power cord of the power adapter into the socket symbolized with on the rear panel of TWL-A11, and plug the power adapter into an A/C power outlet. When completed, the power LED on the top panel should light up shown as Table 1. Note that only use the power adapter supplied with TWL-A11; otherwise, the TWL-A11 may be damaged.

Table 1. LED Indicators

LED	Off	On	Flash
LAN	No power. No network connection.	Link to hub, but no network traffic.	LAN traffic is detected. The heavier the traffic, the faster the flash.
Duplex	No power. No full duplex operation.	Under full duplex operation.	Nil.
Power	No power.	Power on	Nil.
WLAN	Nil.	Nil.	Radio traffic is detected. The heavier the traffic, the faster the flash.

2.5 Connect to a Network

Plug a RJ-45 of one end of the UTP Ethernet cable into the socket symbolized with on the rear panel of TWL-A11, then plug a RJ-45 of the other end of the UTP Ethernet cable into a free socket of the hub connected to LAN. When completed, the LAN LED on the top panel should light up shown as Table 1.

Note that your wireless LAN is able to operate in some simple systems, i.e. only one TWL-A11 and a DHCP server available, by using the default settings (refer to Section 6) whenever you have completed the above steps successfully. If it is a case, your installation process is done and you can omit the following steps. On the contrary, for complicated systems or you desire to change the TWL-A11's settings, the following steps should be resumed.

2.6 Install Utilities

Before installing the utilities into your PC, you have to ensure that your PC is running Windows 95, 98, ME, NT, 2000, or XP operating system and has minimum 5 Mbytes free disk space.

Moreover, when your PC is running Windows 95, you have to download two files, "w95ws2setup.exe" and "dcom95.exe, from the website http://www.microsoft.com/windows/downloads/bin/w95ws2setup.exe and http://www.microsoft.com/com/dcom/dcom95/download.asp, respectively. Run the downloaded files and follow the prompt instructions to finish their installations. For legal considerations, these two files are not included in the supplied CD-ROM.

Please follow the following steps to install two utilities, APUtility and SNMP Manager. The former is used for the local configuration, and the later is the remote configuration. Except that the password options and physical connections, two utilities perform the same functions.

1) Insert the supplied CD-ROM in the CD-ROM drive.
2) Run \Utilities\setup.exe in the CD-ROM.
3) Follow the prompted instructions to finish the installation.
4) Restart your PC when prompted.

2.7 Install TWL-A11's Driver

You may skip the TWL-A11's driver installation on the condition that:

1) Your PC cannot connect to TWL-A11 through USB cable.
2) Your PC is running Windows 95 or NT, which does not support USB.
3) The local configuration is not in need.

Please follow the following steps to install the TWL-A11's driver.

1) Plug one USB cable into socket symbolized with on the rear panel of TWL-A11, and plug the other end of the USB cable into USB port (type A) of the PC.
2) When plugged, your PC should detect the inserted TWL-A11 automatically and display "New Hardware Found" on the display box.
3) Put the supplied CD-ROM in the CD-ROM drive.
4) The driver installation procedure will guide you through the steps standard for your operating system.
5) Restart your PC when prompted.

3. CONFIGURATION

After you have completed the Installation process of Section 2 successfully, please follow this section to configure the settings of TWL-A11 to fit in with your environment. There are two utilities available, APUtility and SNMP Manager. The former is used for local configuration, and the later is used for remote configuration.

3.1 APUtility

Before running APUtility, you have to make sure that:

1) Your PC connects to TWL-A11 through USB cable.
2) Your PC is running Windows 98, ME, 2000, or XP.
3) APUtility has been installed (refer to Section 2.6).
4) The AP's driver has been installed (refer to Section 2.7).
5) The TWL-A11 is turned on.

Run the APUtility from "Start ", "Program", "Access Point", and "APUtility". A window "AP Utility Application" will be displayed. Three buttons allow you to do the following functions.

1) "Configuration": Configure the settings of the TWL-A11.
2) "Reset AP": Reset the TWL-A11 and new configuration will take effect.
3) "Restore Default": Restore the factory default values (refer to Section 6).

After you press the "Configuration" button, a window "AP Configuration" with the current settings will be displayed. Press the "Get" button if you cannot receive the settings when the window is displayed. Clicking the listed identifier and pressing the "Modify" button, a window will be popped up to allow you to input the new setting. The new settings will be stored to the TWL-A11 only after you press the "Save" button. Press the "Exit" button when completed. Please refer to Section 6 for the detailed information of each setting.

3.2 SNMP Manager

Before running SNMP Manager, you have to make sure that:

1) The TWL-A11 is turned on and is connected to a LAN.
2) Your PC can access to the TWL-A11.
3) Your PC is running Windows 95, 98, ME, 2000, XP, or NT.
4) SNMP Manager has been installed (refer to Section 2.6).

Run the SNMP Manager from "Start ", "Program", "Access Point", and "SNMP Manager". A window "Access Point SNMP Manager" will be displayed. If you have difficult in using it, please run from "Start ", "Program", "TWL-A11", and "SNMP Help" for detailed description about how to operate the SNMP Manager.

4. SPECIFICATIONS

General	
Standards compliance	IEEE 802.3 and 802.11b
Security	WEP 64-bit, 128-bit, encryption RC4
Hardware	
RF	Frequency range: 2.4 ~ 2.4835GHz
Data rate	11Mbps / 5.5Mbps / 2Mbps / 1Mbps
Modulation	DSSS (Direct Sequence Spread Spectrum)
	DBPSK/DQPSK
Coding	1, 2Mbps: 11 chip/bit Barker Coding
	5.5, 11Mbps: Complementary Code Keying
Number of channels	Europe: 13 (3 non-overlapping)
	US: 11 (3 non-overlapping)
	France: 4 (1 non-overlapping)
	Japan: 14 (3 non-overlapping)
Host interface	RJ-45
	USB (local configuration)
Transmit power	+15dBm (Typ.)
Receive sensitivity	-83dBm (Typ.) for 11Mbps; -88dBm (Typ.) for 5.5/2/1Mbps; (@BER 10E-5)
Power	＜600mA @ 5Vdc
Range	Open environment: up to 300m (985ft) Office environment: up to 30m(98ft) @ 11Mbps up to 40m (131ft) @ 5.5Mbps up to 60m (197ft) @ 2Mbps up to 100m (328ft) @ 1Mbps Range for the TWL-A11 depends on many factors and can vary greatly depending on the environment. The actual range may be less than stated.
Software	
Management interface	Local: APUtility under Windows 98/2000/ME/XP
	Remote: SNMP under Windows 95/98/2000/ME/XP/NT
Mechanical	
Antenna	Two SX connectors for external antennas
Indicator	LAN, Duplex, Power, WLAN
Environmental	0 ~ 55°C (operation), -10 ~ +85°C (storage)
	Relative Humidity 95% (non-condensing)
Dimensions	167.0 x 117.5 x 35.5mm (w/o antenna)
Weight	Less than 350g (excluding power adapter)
Certificate	
EMC	U.S., Canada: FCC Part 15, sections 15.247, 15.205, 15.209; RSS-210
	Europe: ETS 300 328, ETS 300 826, CE Marked
	Japan: ARIB STD T-66, D-33

5. GLOSSARY

Access Point (AP) – Any entity that has station functionality and provides access to the distribution services, via the wireless medium (WM) for associated stations.

Ad-Hoc – A network composed solely of stations within mutual communication range of each other via the wireless medium (WM). An ad hoc network is typically created in a spontaneous manner. The principal distinguishing characteristic of an ad hoc network is its limited temporal and spatial extent. These limitations allow the act of creating and dissolving the ad hoc network to be sufficiently straightforward and convenient so as to be achievable by non-technical users of the network facilities; i.e., no specialized technical skills are required and little or no investment of time or additional resources is required beyond the stations that are to participate in the ad hoc network. The term ad hoc is often used as slang to refer to an independent basic service set (IBSS).

BSS (Basic Service Set) – An AP associated with several wireless stations.

ESS (Extended Service Set) – More than one BSS can be configured as an Extended Service Set. An ESS is basically a roaming domain.

Ethernet – A popular local area data communications network, originally developed by Xerox Corp., which accepts transmission from computers and terminals. Ethernet operates on 10 Mbps baseband transmission over shielded coaxial cable or over shielded twisted pair telephone wire.

Infrastructure – The infrastructure includes the distribution system medium (DSM), AP, and portal entities. It is also the logical location of distribution and integration service functions of an extended service set (ESS). An infrastructure contains one or more APs and zero or more portals in addition to the distribution system (DS).

IEEE – Institute of Electrical and Electronic Engineering.

LAN – Local Area Network.

Roaming – A function that allows one to travel with a mobile end system (wireless LAN mobile station, for example) through the territory of a domain (an ESS, for example) while continuously connecting to the infrastructure.

RTS (Request To Send) Threshold – Transmitters contending for the medium may not hear each other. RTS/CTS mechanism can solve this “Hidden Node Problem”.

SOHO – Small Office Home Office

SSID – Service Set Identifier

Wired Equivalent Privacy (WEP) – The optional cryptographic confidentiality algorithm specified by IEEE 802.11 used to provide data confidentiality that is subjectively equivalent to the confidentiality of a wired local area network medium that does not employ cryptographic techniques to enhance privacy.

6. DEFAULT SETTINGS

No.	Identifier	Description	Default Value	Possible Values
1	Eth_IP_Address	TWL-A11's IP address	192.168.1.100	
2	Eth_SubMask	Subnet mask	255.255.254.0	
3	ESSID	Extended service set ID	TWL-A11	
4	Auto Rate Fall Back	Transmission rate is subject to the past transmission status.	Enable	"Enable", "Disable".
5	Channel	Designate operating radio channel	1 for FCC, IC, ETSI, MKK. 10 for others.	FCC/IC: 1 to 11, ETSI: 1 to 13, Spain: 10 to 11, France: 10 to 13, MKK: 1 to 14.
6	WEP Type	Type of Wired Equivalent Privacy	Disable	"Disable", "64-bit WEP", "128-bit WEP".
7	WEP Key	WEP keys to be used.	None	"None", "Key1", "Key2", "Key3", "Key4".
8	Fragmentation Threshold	The size at which packets will be fragmented.	2346	"256" to "2346" bytes.
9	RTS Threshold	Minimum size to enable RTS/CTS mechanism	2346 (stands for disabled)	"256" to "2346" bytes.
10	Key1	64-bit WEP value of key 1	10 11 12 13 14	"00" to "FF" for each field.
11	Key2	64-bit WEP value of key 2	20 21 22 23 24	"00" to "FF" for each field.
12	Key3	64-bit WEP value of key 3	30 31 32 33 34	"00" to "FF" for each field.
13	Key4	64-bit WEP value of key 4	40 41 42 43 44	"00" to "FF" for each field.
14	Preamble Type	The appropriate frame format for transmission to physical layer.	Long	"Short", "Long".
15	Authentication Type	"Open System": the access to TWL-A11 is valid if the security key of station is not set. "Shared Key": the access to TWL-A11 is valid if the security key of station matches with AP's. "Both": both "Open System" and "Shared Key" and are applicable.	Both Type	"Open System", "Shared Key", "Both".
16	Access Point Name	Name used for the TWL-A11	NONE	
17	Operational Rate Set	Range of applicable data rate	82 84 8b 96	"82 84 8b 96" for 1 to 11Mbps, "82 84 0b 16" for 1 to 2 Mbps.
18	Beacon Period	Duration between beacon packets	100	20 to 1000milliseconds.
19	DTIM	Interval of TWL-A11 sends its broadcast traffic	2 (beacons)	
20	Receive Antenna	Antenna used for reception	Diversity	"Left", "Right", "Diversity".
21	Transmit Antenna	Antenna used for transmission	Diversity	"Left", "Right", "Diversity".
22	Operational Mode	Which operation mode is taken	Access Point	"WBridge Point to MultiPoint", "Access Point", "Access Point Client", "WBrdge Point to Point".
23	Gateway IP Address	IP address of the gateway	0.0.0.0	
24	IP Filtering	Allow only IP packets to pass through the WLAN	Enable	"Enable", "Disable".
25	DHCP Client	Automatic IP address assignment by the DHCP server	Enable	"Enable", "Disable".
26	Primary Port	Port connects to DHCP server	Ethernet	"Ethernet", "Wireless".

No.	Identifier	Description	Default Value	Possible Values
27	Authorization Algorithm	Enable authorized MAC address stations to access TWL-A11.	Disable	“Enable”, “Disable”.
28	SNMP Traps	The message indicates the TWL-A11’s actions.	Enable	“Enable”, “Disable”.
29	Preferred BBS	Remote MAC address for connection in the operational mode of Access Point Client or Wireless Bridge.	00 00 00 00 00 00	“00” to “FF” for each field.
30	WEP128 Key1	128-bit WEP value of key 1	10 11 12 13 14 00 00 00 00 00 00 00 00	“00” to “FF” for each field.
31	WEP128 Key2	128-bit WEP value of key 2	20 21 22 23 24 00 00 00 00 00 00 00 00	“00” to “FF” for each field.
32	WEP128 Key3	128-bit WEP value of key 3	30 31 32 33 34 00 00 00 00 00 00 00 00	“00” to “FF” for each field.
33	WEP128 Key4	128-bit WEP value of key 4	40 41 42 43 44 00 00 00 00 00 00 00 00	“00” to “FF” for each field.
34	User Community	The user password used for SNMP	public	
34	User Access:	User access rights used for SNMP	READ ONLY	“READ ONLY”, “READ\WRITE”.
35	Administrator Community	The administrator password used for SNMP	public	
36	Administrator Access:	Administrator access rights used for SNMP	READ\WRITE	“READ ONLY”, “READ\WRITE”.

7. WIRELESS LAN SYSTEM

7.1 802.11 Ad-Hoc Configuration

An 802.11 Ad-Hoc wireless LAN is a group of computers, each equipped with one wireless LAN card, connected as an independent wireless LAN. Computers in a specific 802.11 Ad-Hoc wireless LAN must be configured at the same radio channel and BSS ID. 802.11 Ad-Hoc wireless LAN is applicable to a departmental scale for a branch or SOHO operation.

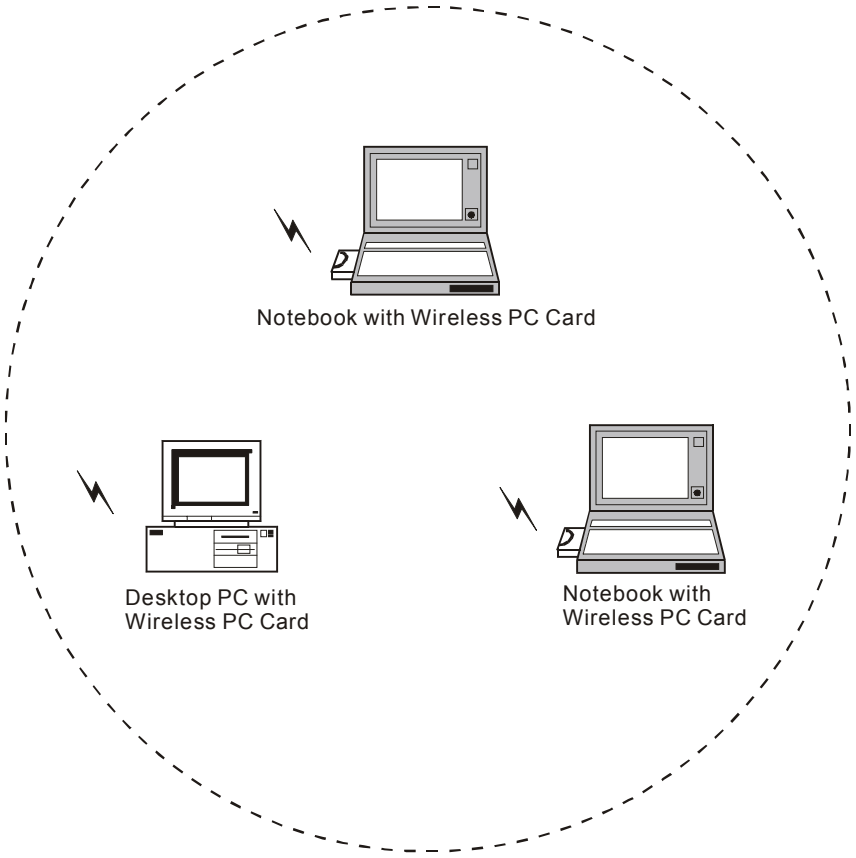

Figure 1. 802.11 Ad-Hoc Configuration

7.2 Infrastructure Configuration

An integrated wireless and wired LAN is called an infrastructure configuration. A group of wireless LAN cards and an Access Point (AP) is called a Basic Service Set (BSS). Each wireless LAN card in this BSS can be linked to any computer in the wired LAN infrastructure via the AP.

Infrastructure configuration not only extends the accessibility of a wireless LAN card to the wired LAN, but also doubles the effective wireless transmission range between two wireless LAN cards.

BSS ID is, in essential, the ID of each independent wireless LAN card. All wireless LAN cards configured without roaming options in this independent BSS must be configured with BSS ID of that AP. You may need to check BSS ID of your AP by using its vendor supplied program.

Infrastructure configuration is applicable to enterprise scale for wireless access to central database, or wireless application for mobile workers.

Two APs can be used as a point-to-point link between two LANs. LAN interconnection is applicable to a wireless backbone between buildings.

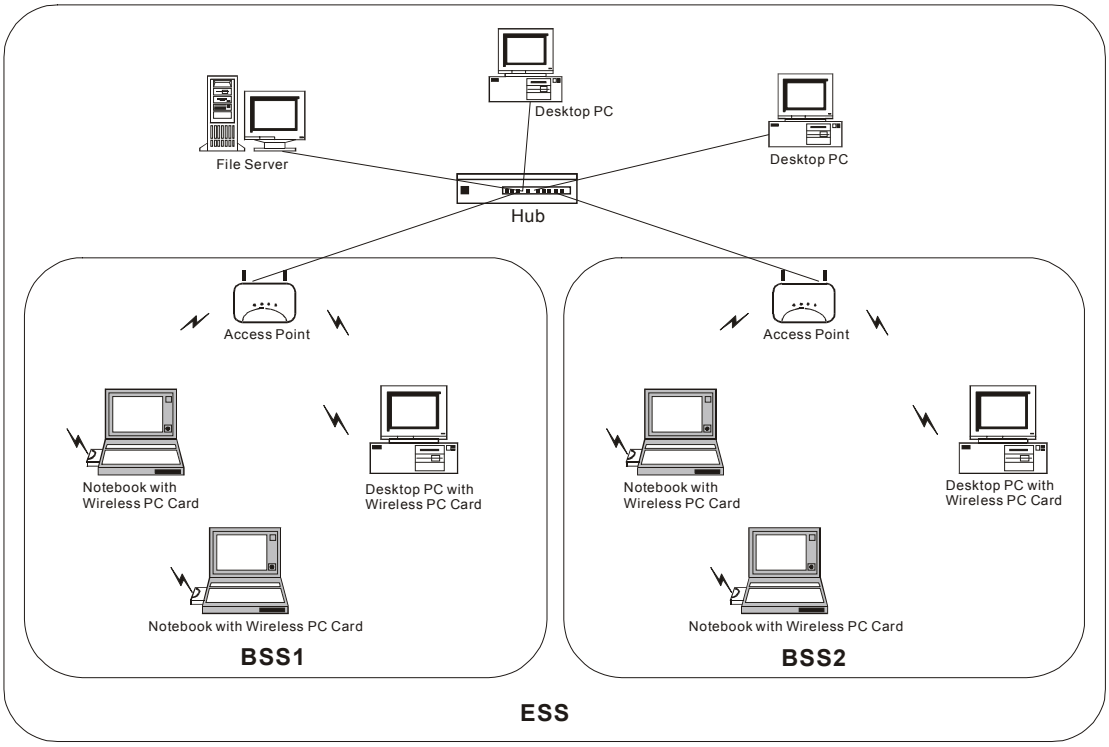

Figure 2. Infrastructure Configuration

The infrastructure configuration supports roaming capability for mobile workers. More than one BSS can be jointly configured as an Extended Service Set (ESS). On account of a continuous connection to the network, users within this ESS can roam freely. All wireless LAN cards and APs within one ESS must be configured with the same ESS ID.

Before setting up an ESS for roaming, it would be helpful to achieve good performance by choosing a feasible radio channel and right places for APs.

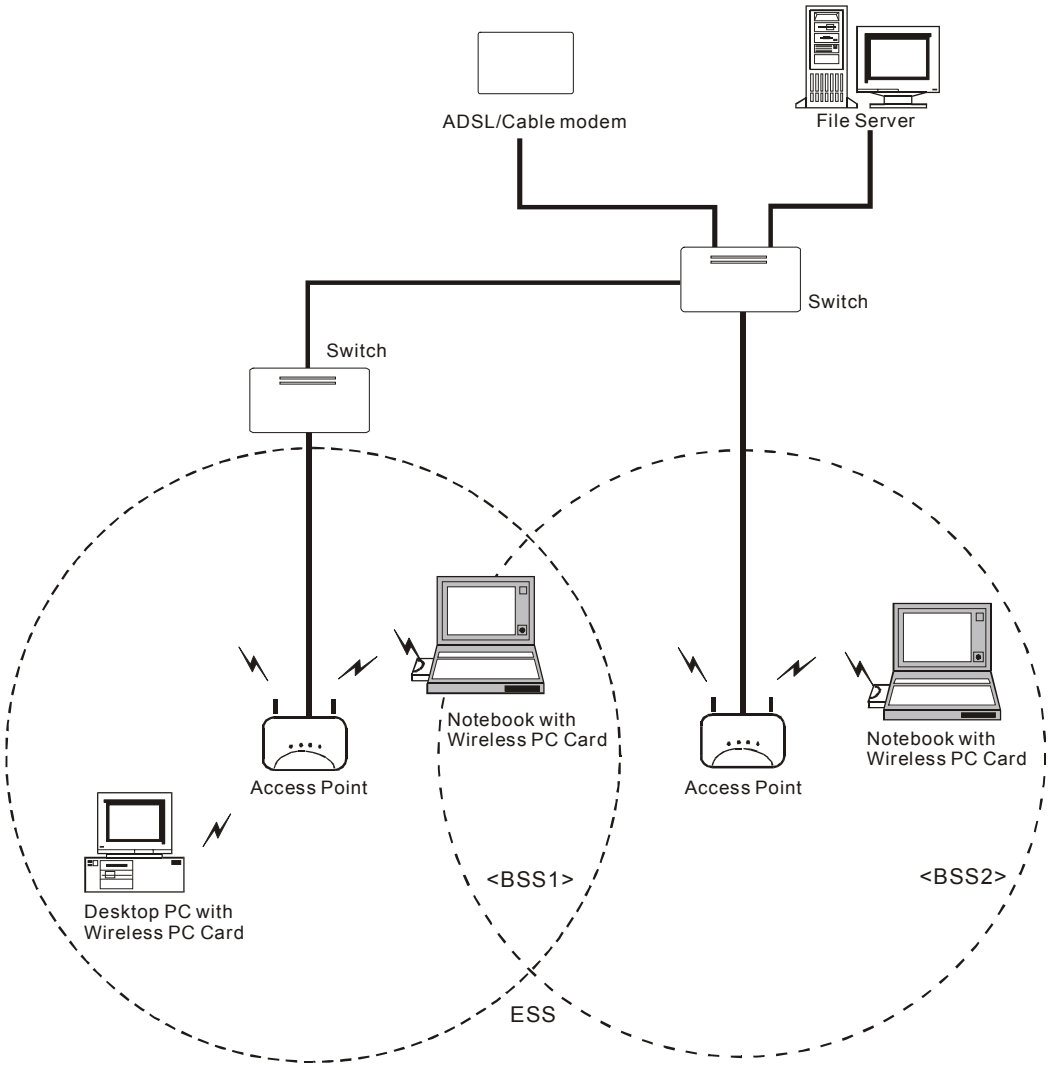

Figure 3. Seamless Roaming