# InscapeData

# AirEther™ CB54 / CB54E / CB5418

# 2.4GHz 802.11b/g WIRELESS CLIENT BRIDGE

# User Manual

**Version 0.10**

FCC Notice

   NOTE: 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 in a residential installation.
This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

# Table of Contents

# 1 Installation Considerations

The AirEther™ CB54 / CB54E / CB5418 is a fixed wireless customer premises equipment allowing wireless network connectivity from virtually anywhere within its operating range with a Wireless Access Point (AP).   Typical operating ranges vary depending on the types of antenna, power levels, and access points and CPE's EIRP configuration.   The key to maximizing wireless range is to follow these basic guidelines:

- Keep your product away (at least 3-6 feet or 1-2 meters) from electrical devices or appliances that generate RF noise.
- Keep the number of walls and ceilings between the AP and other network devices to a minimum - each wall or ceiling can reduce your AP's range from 3-90 feet (1-30 meters.) Position your devices so that the number of walls or ceilings is minimized.
- Be aware of the direct line between network devices. A wall that is 1.5 feet thick(0.5 meters), at a 45-degree angle appears to be almost 3 feet (1 meter) thick. At a 2-degree angle it looks over 42 feet (14 meters) thick! Position devices so that the signal will travel straight through a wall or ceiling (instead of at an angle) for better reception.
- Building materials can impede the wireless signal - a solid metal door or aluminum studs may have a negative effect on range. Try to position wireless devices and computers with wireless adapters so that the signal passes through drywall or open doorways and not other materials.

The following sections, 1.1 and 1.2, demonstrate how a wireless client bridge is connected to a wireless network.

## 1.1 Network Topology - Wireless Infrastructure Client Bridge
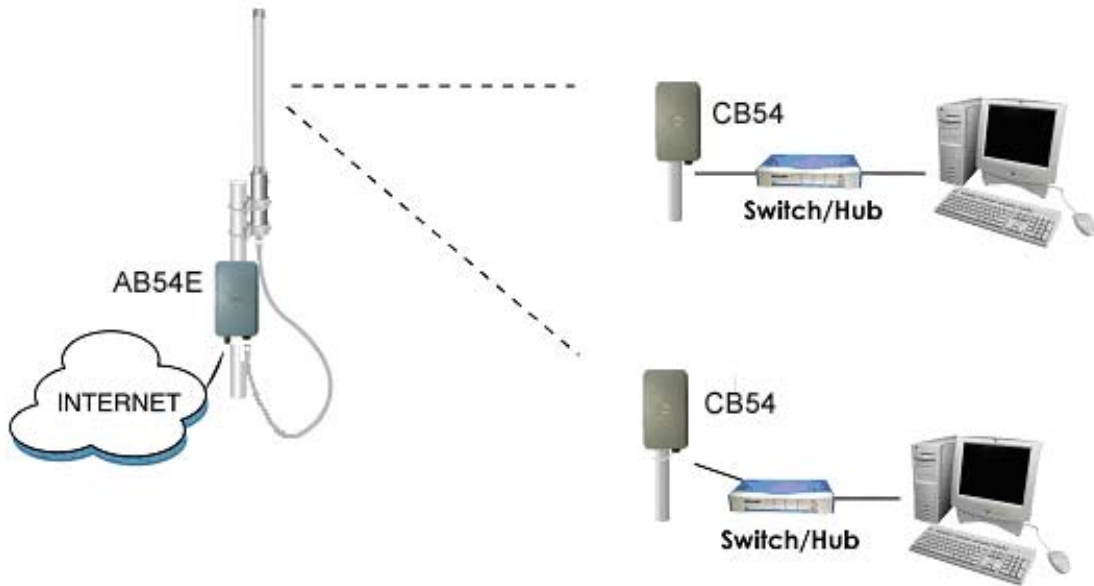


The diagram above is shown with two AirEther CB54.   For longer distance, one may use the CB54E with external 2.4 GHz high gain antenna ( i.e. AirEther PA18 or PA21).   The cost effective customer premises equipment (CPE) is boxed ready to install.   For standard Wireless ISP deployment, the CB54 with integrated 12 dBi antenna is usually sufficient for last mile broadband solutions.

## 1.2   AirEther™ CB54 / CB5418 Connection Diagram

The following diagram demonstrates the cable connections when setting up the AirEther CB54 or CB5418 Wireless Client Bridge.   Please note, the CB54 Wireless Client Bridge is equipped with an internal high gain 12dBi patch directional antenna, and the CB5418 Wireless Client Bridge is equipped with an internal high gain 18dBi patch directional antenna.
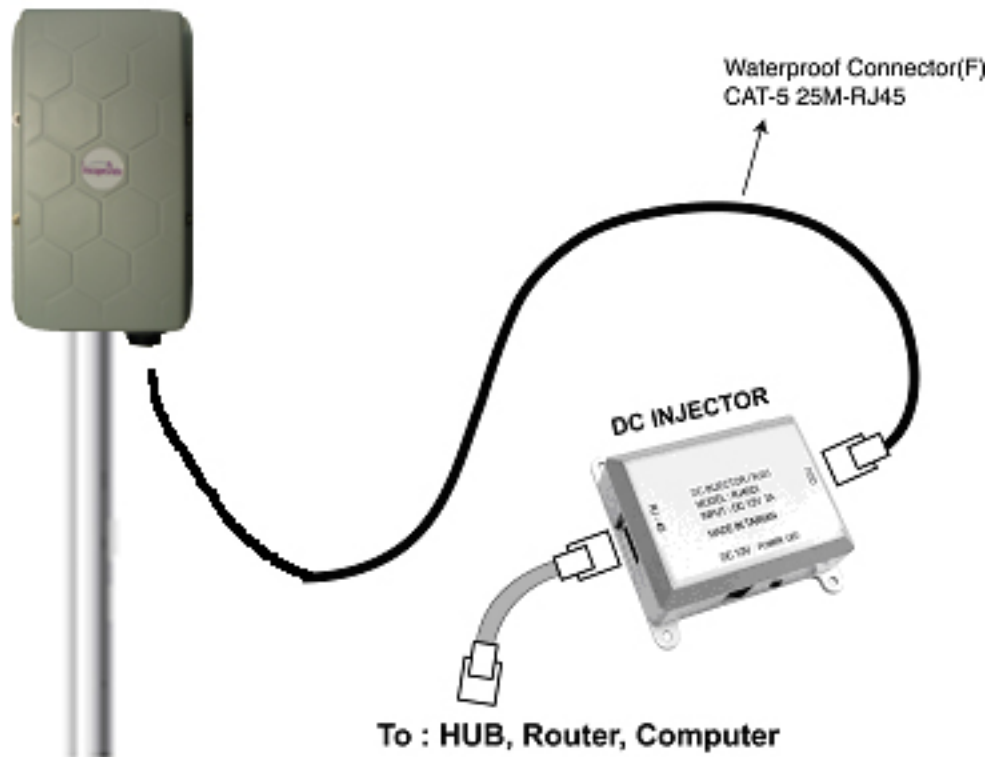
### 1.3 AirEther™ CB54E Connection Diagram

To connect an AirEther CB54E, the cable connections are shown as in the two diagrams below. Please note, you can choose a high gain antenna to achieve an EIRP (Equivalent Isotropic Radiated Power) that is suitable for your application. Diagram below is shown with Omni-directional antenna. Typically an AirEther PA16, PA18, or PA21 is used as CB54E function as point to point devices relative to the Access Point.
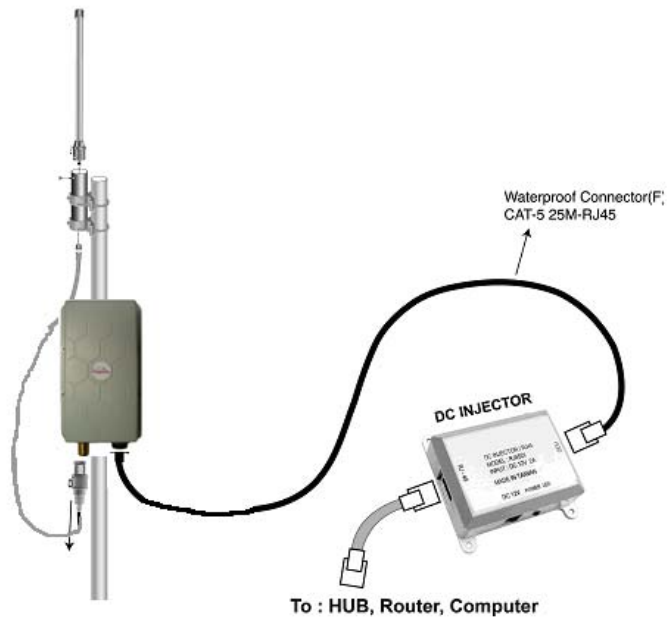
**Omni-Directional Antenna Installation Diagram**

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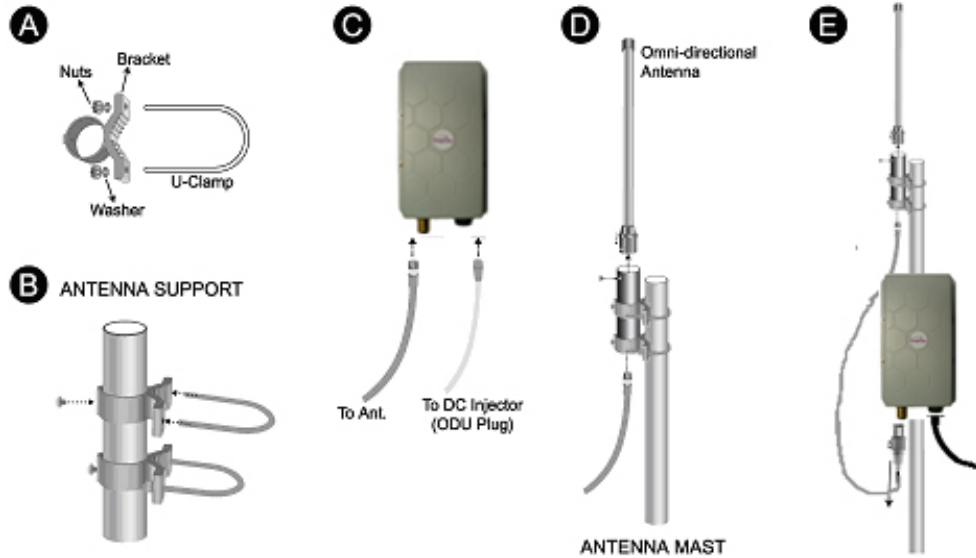
**Attention:**

- The cable distance between the AB54/E and the Router, Switch, or PC should not exceed 100 meters, the Ethernet cable limitation.
- In 10Mbps operation, Category 3/4/5 cable can be used for the cable connection. To reliably operate your network at 100Mbps, you must use Category 5, or better data grade cables.

# 2  Equipment Configuration Using Locator Utility Software

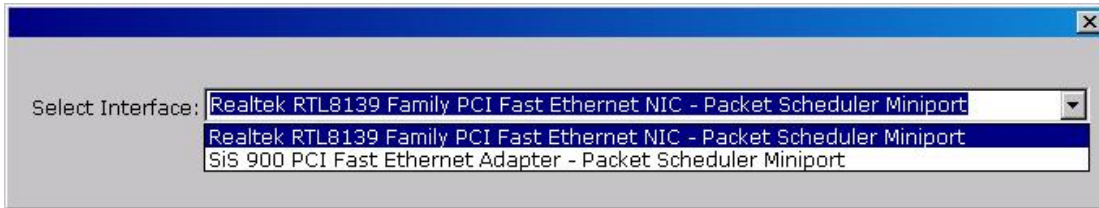The locator utility software will automatically search for available CB54 series or AB54 series equipment on the same network. The results displayed by the locator are the following: the Device Name, Device Type, IP Address, Ethernet MAC Address and Firmware Version in first page. Before initiating the Locator utility, make sure you disable personal firewall installed in your PC. (Ex. Windows XP personal firewall)

Select Interface: Realtek RTL8139 Family PCI Fast Ethernet NIC - Packet Scheduler Miniport
Realtek RTL8139 Family PCI Fast Ethernet NIC - Packet Scheduler Miniport
SiS 900 PCI Fast Ethernet Adapter - Packet Scheduler Miniport

If you have 2 Fast Ethernet Adapter or more, you can choose enable on one of the Fast Ethernet Adapter.

## 2.1  Equipment Configuration Using Web User Interface

### 2.1.1  Before Setup

### ❖  Verify the IP address setting

You need to configure your PC's network settings to obtain an IP address. Computer use IP addresses to communicate with each other across a network, such as the Internet. The following is a brief instruction for Windows based PC system.   For other operating system, please follow its respective user manual.

1.  From the taskbar, click the **Start** button, select **Settings** > **Control Panel**. From there, double-click **the Network connections** icon.

2.  Right click the **Local Area Connection** icon **Properties**; select the **TCP/IP** line for the applicable Ethernet adapter. Then, click the **Properties** button.

3.  Click the **IP Address** tab page, select **USE the following IP address**, type **192.168.1.100** in the **IP Address** field and **255.255.255.0** in the **Subnet Mask** field, then click **OK** button.

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**Attention:**

Use the IP addresses in this section as an example only.   The goal is to configure your PC to be in the same sub-network as the equipment you are configuring.   Please consult a network administrator if there are any questions on setting up a PC's IP address.

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### 2.1.2 Initial configuration of the equipment using a Web Browser

1. After a network connection is established, start the web browser (make sure you disable the proxy) and type 192.168.1.20 in the **Address** field. Press **Enter**.

   http://192.168.1.20

2. Enter the factory default *User name* and *Password* fields:

   User Name: **Admin**

   Password: **(leave blank)**

   Then click **OK** button.

3. You will enter the Utility homepage.

### 2.1.3 Initial configuration of the equipment using the Locator Utility

1. Click on the "**Web**" icon in Locator main page. The Locator will launch a default browser for you and lead you into web UI directly
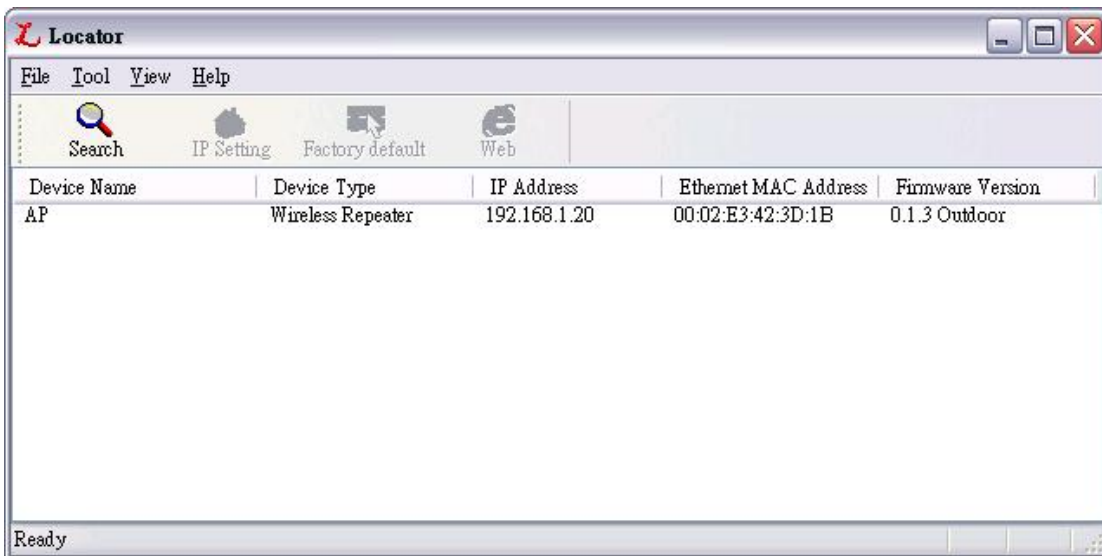
# 3   Wireless Configuration – Client Bridge Configuration

The CB54 series equipment can allow up to 16 Ethernet devices onto the wireless network infrastructure.
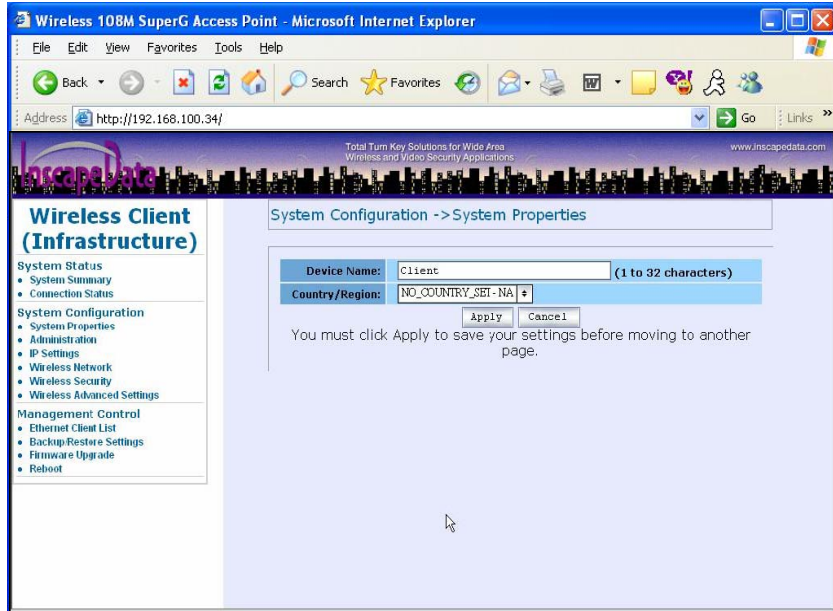


The administrator GUI displays as shown below. Status > System Summary page shows a summary of CB54's default client bridge configuration.

The Wireless Client Bridge is set with factory default values.    Should you need to change any device setting, please follow instructions described in the following sections.

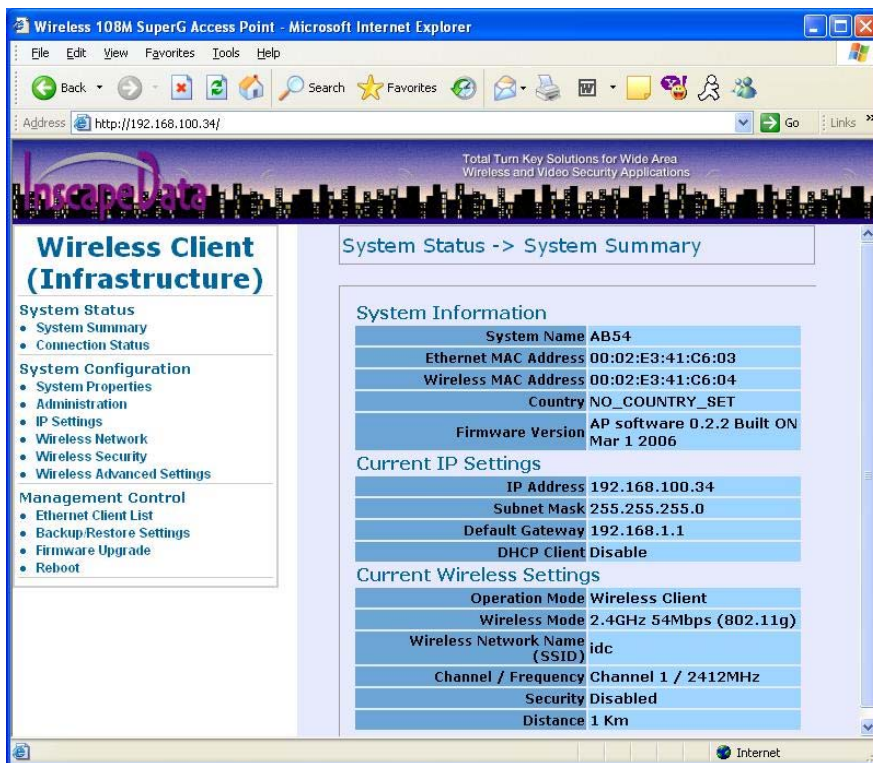**3.1    Connection Status –**

**This page display the current wireless connection status. If the CB54 is associated to an Access Point, the BSSID (MAC address) of the associated Access Point will display. If not, the connection column will show "N/A".    "N/A" reflects no Access Point association.**

- **Network Type –** Client mode (Infrastructure mode / Ad Hoc mode)
- **SSID –** SSID column displays current SSID assigned to the CB54
- **BSSID** – Displays the associated AP's MAC address.    N/A means no association.
- **Wireless Mode –** Displays the modulation mode (802.11b/g)
- **Current Channel –** This column indicates the radio channel currently in use.
- **Security -** Here indicates AP security settings in client mode. Should be either **"Disabled"**, **"WEP"** or **'WPA-PSK'**.
- **Link Quality –** This row shows current link quality in 0 to 100 percentage scale.
- **Signal Strength -** This row shows current signal strength in 0 to 100 percentage scale.
- **Activity –** reflects the transmit and receive packets
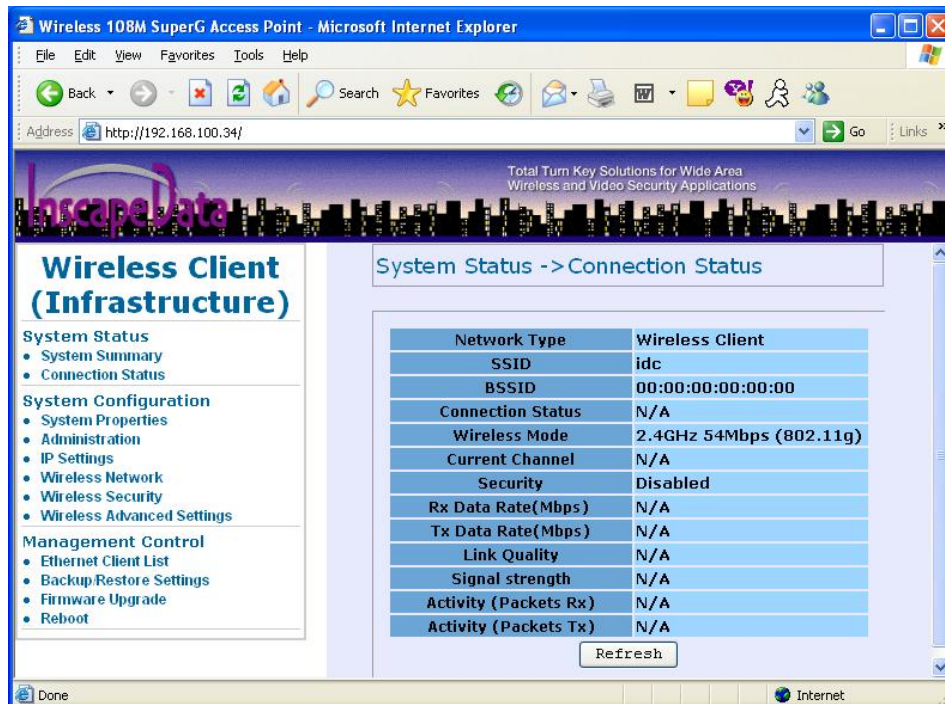
### 3.2   Wireless Network -

- **Network Mode –** You can set the wireless client to 2 different modes by clicking radio button. Wireless Client (Infrastructure) act as an AP client while Ad-hoc can support peer to peer network. Both Infrastructure and Ad-hoc can support up to 108M SuperG transmission.
- **Wireless Mode -** Default setting is **"2.4GHz 54Mbps (802.11g)"**. This will support all 802.11b/g clients You can choose **"2.4GHz 11Mbps (802.11b)"** in wireless mode column to allow only 802.11b clients. The final selection **"2.4GHz 108Mbps (802.11 SuperG)"** supports high speed 108Mbps SuperG function. In order to support SuperG 108M transmission, all wireless clients will need to be Inscape Data AirEther CB54 Clients.
- **SSID -** The SSID is the unique name shared among all points in a wireless network. The SSID must be identical for all points in the wireless network. It is case-sensitive and must not exceed 32 alphanumeric characters, which may be any keyboard character. You can choose "**Attach to any available SSID**"; system will determine the Access Point currently available and establish connection with that Access Point. If you already understand your wireless environment well, you can type in the SSID in **"Specify the static SSID"** manually.

At Wireless Network page you can find a "**Site Survey**" button as shown below. You can easily click on the "**Site Survey**" to find all wireless networks available in your current environment.
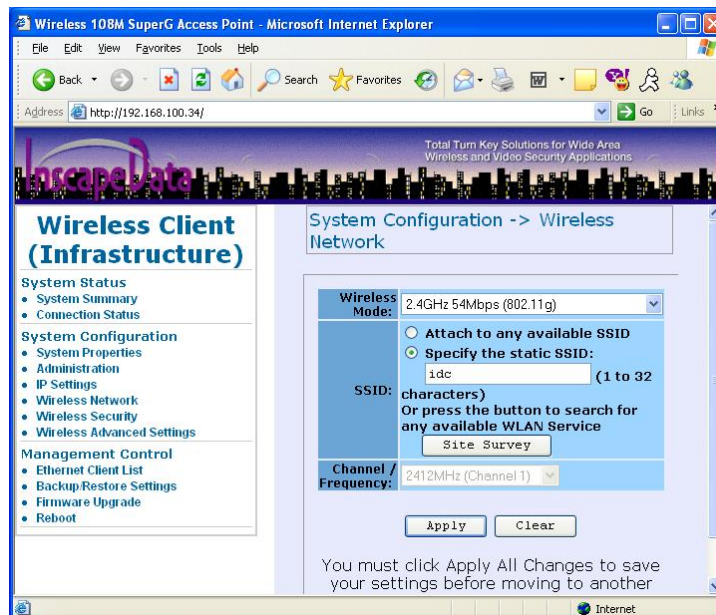
The Site Survey page can help you identify all the APs currently operating in your environment. Just easily click on the BSSID column, the system will associate to the SSID you specify. In the Site Survey page you can also see the details of all SSID currently available.
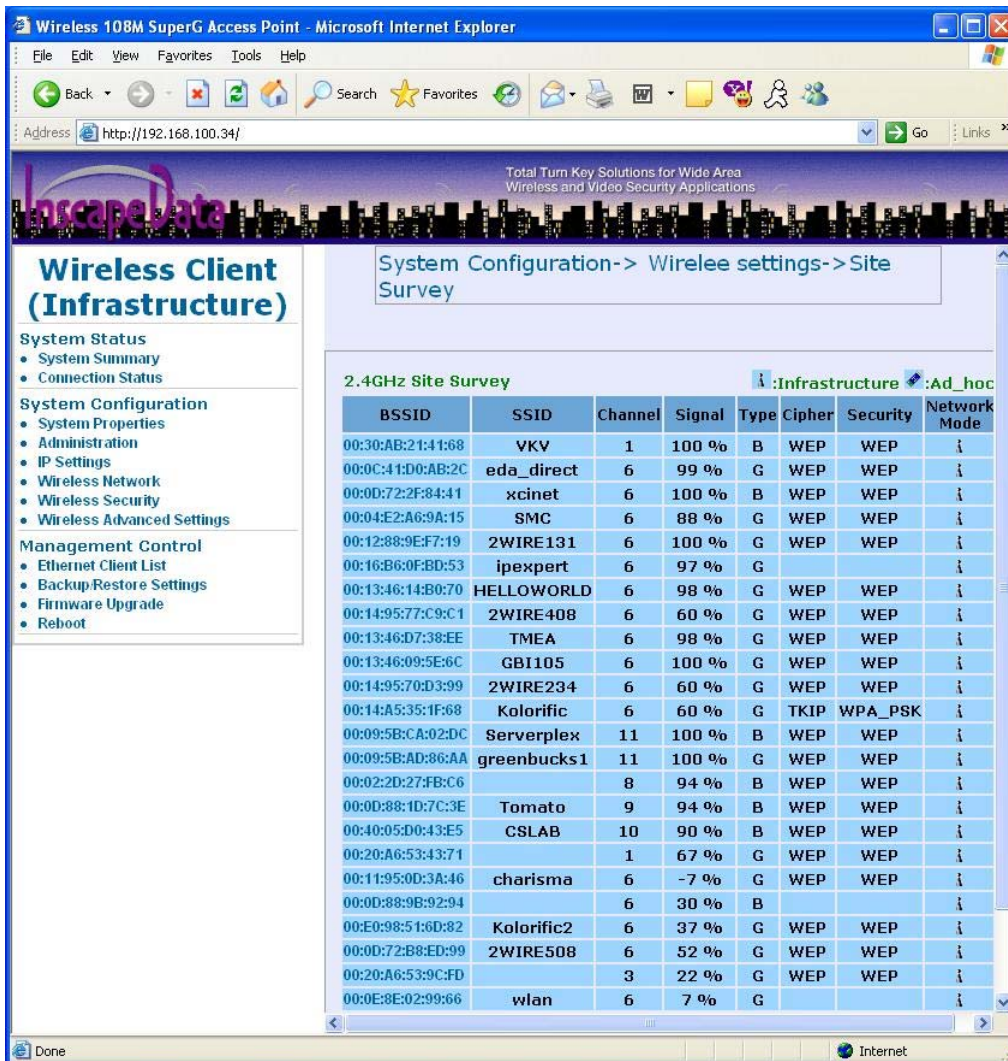


After you determine which AP (SSID) to join, you can click on the AP's BSSID column to initiate wireless connection.   The system will automatically associate to the SSID you specified after reboot.

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## 3.3 Wireless Security –

WEP is the basic encryption method, which is not as secure as WPA. To use WEP as a client, you will need to input a transmit key and a level of WEP encryption exactly the same as the Access Point.

- **Shared keys input type –** Select HEX or ASCII keys
- **Key table –** You can input 4 different WEP encryption keys into the table and by choosing the radio button to decide which one is valid now. The AP supports 64, 128 and 152bit key length. The longer key reflects higher encryption strength.

After all changes are made, be sure to click on **"Apply"** to make sure all changes are saved into the system.
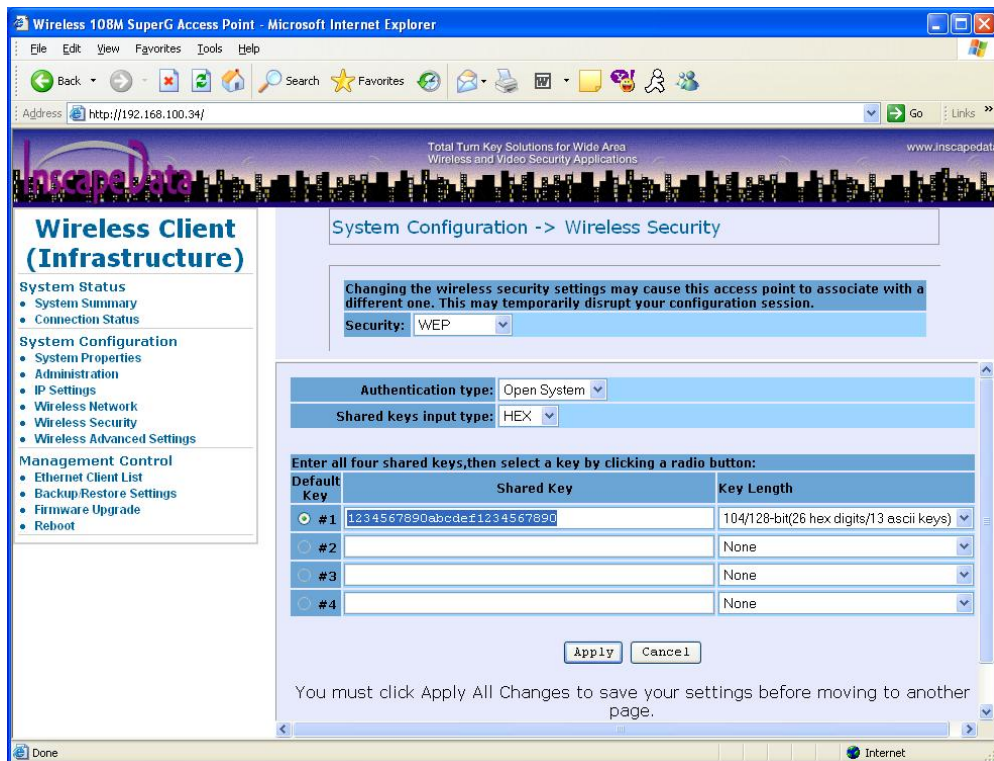
WPA-PSK stands for Wi-Fi Protected Access – Pre-Shared Key. WPA-PSK is design for service providers who do not wish to use a RADIUS server in their network environment. WPA can provide very superior security encryption level than WEP. One exception to use WPA is to ensure the wireless clients also support the encryption.

● **PassPhrase Key -** Enter a WPA Shared Key of 8-63 characters. The Shared Key should be the same key for all devices in the same wireless network.
● **Cipher Type -** WPA gives you two encryption methods, TKIP and AES, with dynamic encryption keys. Select the type of algorithm, **TKIP** or **AES**.

Remember to click on **"Apply"** to make sure all changes are made before leaving this page.
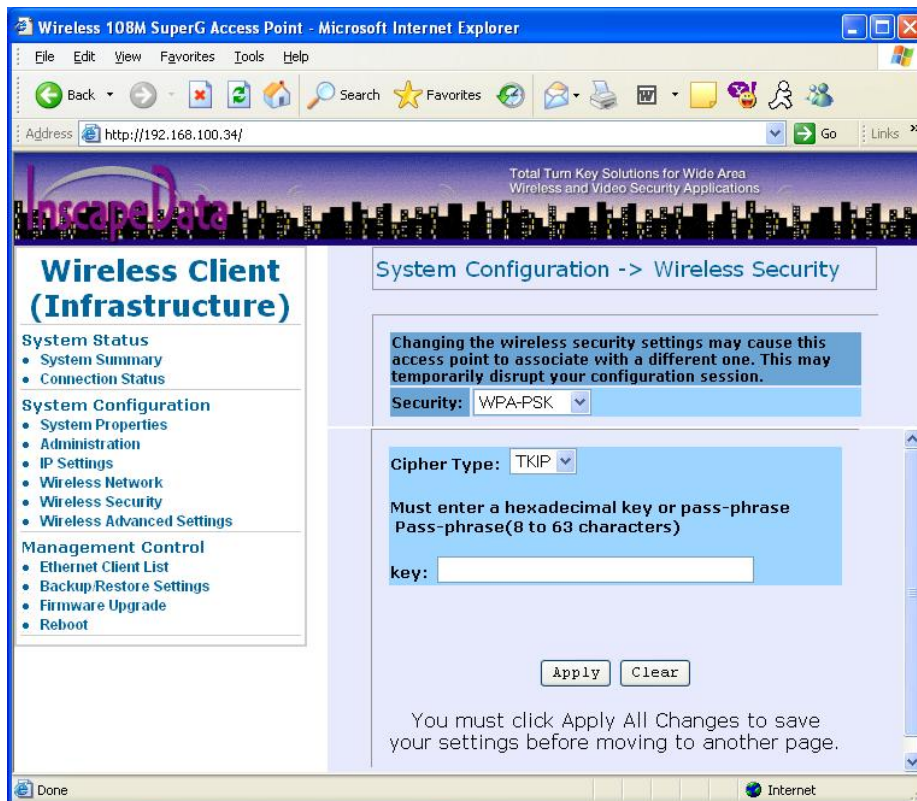
## 3.4    Ethernet Client List –

In Ethernet Client List page, you can check all the details here including IP Address and MAC Address. Press **"Refresh"** if you add any new 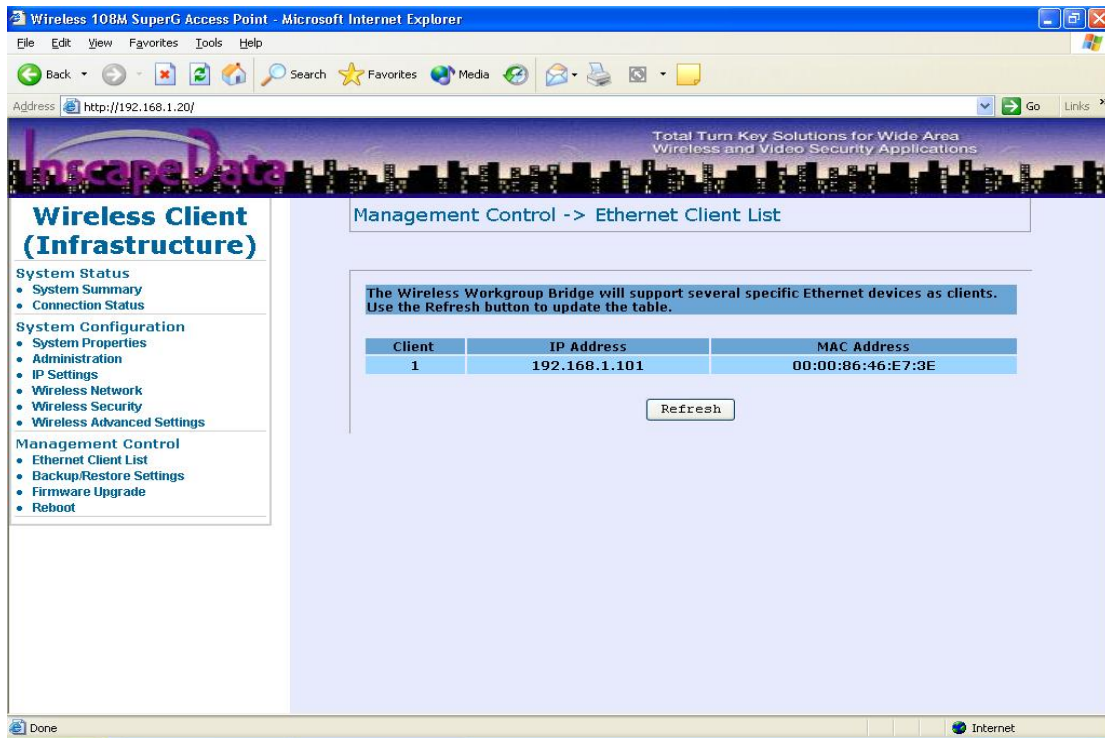Ethernet client into network. The page will update the latest status of current Ethernet network.    Up to 16 Ethernet clients is support.

# 4   Appendix A: Glossary

**802.11b** - An IEEE wireless networking standard that specifies a maximum data transfer rate of 11Mbps and anoperating frequency of 2.4GHz.

**802.11g** - An IEEE wireless networking standard that specifies a maximum data transfer rate of 54Mbps, an operating frequency of 2.4GHz, and backward compatibility with 802.11b devices.

**Adapter** - This is a device that adds network functionality to your PC.

**Ad-hoc** - A group of wireless devices communicating directly with each other (peer-to-peer) without the use of an access point.

**Backbone** - The part of a network that connects most of the systems and networks together, and handles the most data.

**Bandwidth** - The transmission capacity of a given device or network.

**Beacon Interval** - Data transmitted on your wireless network that keeps the network synchronized.

**Bit** - A binary digit.

**Browser** - An application program that provides a way to look at and interact with all the information on the World Wide Web.

**CSMA/CA** (**C**arrier **S**ense **M**ultiple **A**ccess/**C**ollision **A**voidance) - A method of data transfer that is used to prevent data collisions.

**CTS** (**C**lear **T**o **S**end) - A signal sent by a wireless device, signifying that it is ready to receive data.

**Database** - A collection of data that is organized so that its contents can easily be accessed, managed, and updated.

**DHCP** (**D**ynamic **H**ost **C**onfiguration **P**rotocol) - A networking protocol that allows administrators to assign temporary IP addresses to network computers by "leasing" an IP address to a user for a limited amount of time, instead of assigning permanent IP addresses.

**Download** - To receive a file transmitted over a network.

**DSSS** (**D**irect-**S**equence **S**pread-**S**pectrum) - Frequency transmission with a redundant bit pattern resulting in a lower probability of information being lost in transit.

**DTIM** (**D**elivery **T**raffic **I**ndication **M**essage) - A message included in data packets that can increase wireless efficiency.

**Encryption** - Encoding data transmitted in a network.

**Ethernet** - IEEE standard network protocol that specifies how data is placed on and retrieved from a common transmission medium.

**Firmware** - The programming code that runs a networking device.

**Fragmentation** -Breaking a packet into smaller units when transmitting over a network medium that cannot support the original size of the packet.

**Gateway** - A device that interconnects networks with different, incompatible communications protocols.

**Hardware** - The physical aspect of computers, telecommunications, and other information technology devices.

**IEEE** (The **I**nstitute of **E**lectrical and **E**lectronics **E**ngineers) - An independent institute that develops networking standards.

**Infrastructure** - A wireless network that is bridged to a wired network via an access point.

**IP** (**I**nternet **P**rotocol) - A protocol used to send data over a network.

**IP Address** - The address used to identify a computer or device on a network.

**ISM band** - Radio bandwidth utilized in wireless transmissions.

**ISP** (**I**nternet **S**ervice **P**rovider) - A company that provides access to the Internet.

**LAN** - The computers and networking products that make up your local network.

**MAC** (**M**edia **A**ccess **C**ontrol) **Address** - The unique address that a manufacturer assigns to each networking device.

**Network** - A series of computers or devices connected for the purpose of data sharing, storage, and/or transmission between users.

**Node** - A network junction or connection point, typically a computer or work station.

**Packet** - A unit of data sent over a network.

**Passphrase** - Used much like a password, a passphrase simplifies the WEP encryption process by automatically generating the WEP encryption keys for Linksys products.

**Port** - The connection point on a computer or networking device used for plugging in cables or adapters.

**Roaming** - The ability to take a wireless device from one access point's range to another without losing the connection.

**Router** - A networking device that connects multiple networks together.

**RTS** (**R**equest **T**o **S**end) - A networking method of coordinating large packets through the RTS Threshold setting.

**Server** - Any computer whose function in a network is to provide user access to files, printing, communications, and other services.

**SNMP** (**S**imple **N**etwork **M**anagement **P**rotocol) - A widely used network monitoring and control protocol.

**Software** - Instructions for the computer. A series of instructions that performs a particular task is called a "program".

**SOHO** (**S**mall **O**ffice/**H**ome **O**ffice) - Market segment of professionals who work at home or in small offices.

**Spread Spectrum** - Wideband radio frequency technique used for more reliable and secure data

transmission.

**SSID** (**S**ervice **S**et **ID**entifier) - Your wireless network's name.

**Static IP Address** - A fixed address assigned to a computer or device that is connected to a network.

**Subnet Mask** - An address code that determines the size of the network.

**Switch** - 1. A data switch that connects computing devices to host computers, allowing a large number of devices to share a limited number of ports. 2. A device for making, breaking, or changing the connections in an electrical circuit.

**TCP** (**T**ransmission **C**ontrol **P**rotocol) - A network protocol for transmitting data that requires acknowledgement from the recipient of data sent.

**TCP/IP** (**T**ransmission **C**ontrol **P**rotocol/**I**nternet **P**rotocol) - A set of instructions PCs use to communicate over a network.

**TKIP** (**T**emporal **K**ey **I**ntegrity **P**rotocol) - a wireless encryption protocol that provides dynamic encryption keys for each packet transmitted.

**Topology** - The physical layout of a network.

**Upgrade** - To replace existing software or firmware with a newer version.

**WEP** (**W**ired **E**quivalent **P**rivacy) - An optional cryptographic confidentiality algorithm specified by IEEE 802.11 that may be used to provide data confidentiality that is subjectively equivalent to the confidentiality of a wired local area network (LAN) medium that does not employ cryptographic techniques to enhance privacy confidentiality.

**WPA** (**W**i-Fi **P**rotected **A**ccess) - a wireless security protocol using TKIP (Temporal Key Integrity Protocol) encryption, which can be used in conjunction with a RADIUS server.

# 5   Appendix B: Specification

| Standard support | IEEE802.11b |
| --- | --- |
| | IEEE802.11g |
| | IEEE802.3 |
| | IEEE802.3u |
| Interface | Wireless IEEE802.11b/g |
| | One 10/100 RJ-45 port |
| Antenna Connector | External N-Female Connector (CB54E Only) |
| Embedded Antenna Gain | 12 dBi Panel (CB54) \| 18 dBi Panel (CB5418) |
| Max. Bandwidth | |
| Ethernet | Full Duplex: 200Mbps (for 100BASETX), 20Mbps (for 10BaseT) |
| | Half Duplex: 100Mbps (for 100BaseTX), 10Mbps (for 10BaseT) |
| Wireless | 1, 2, 5.5, 6, 9, 11, 12, 24, 36, 48, 54, 108Mbps Auto Fall-Back |
| Wireless Radio | Data Rate |
| |   1, 2, 5.5, 6, 9, 11, 12, 24, 36, 48, 54 and 108Mbps |
| | Signal Frequency |
| |   2.4Ghz to 2.5Ghz OFDM with BPSK, QPSK, 16QAM, 64QAM, |
| |   DBPSK, DQPSK, CCK |
| | Encryption |
| |   64bit / 128bit and 152bit WEP data encryption |
| | Channel |
| |   America/FCC：2.412~2.462 GHz (11 channels) |
| |   Europe CE/ETSI：2.412~2.472 GHz (13 channels) |
| |   Japan　：2.412~2.484 GHz (14 channels) |
| |   France：　2.457~2.472 GHz(4 channels) |
| |   Spain: 2.457~2.462 GHz (2 channels) |
| | RF Power Output: 21dBm at 11Mbps / 18dBm at 54Mbps (typical) |
| | Receiver Sensitivity: 54Mbps OFDM, 10% PER, -74dBm |
| |          11Mbps CCK, 8% PER, -88dBm |
| Wireless Setting | –　　Operation Mode –Wireless Client Point to Point Mode |
| | –　　SSID |
| | –　　Channel Selection |
| | –　　Transmission Rate (Best, 108, 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1) in Mbps |
| | –　　Transmit power (Full, Half, Quarter, Eighth, Minimum) |

| | |
|---|---|
| | – Beacon Interval (20-1000): 100 |
| | – Data Beacon Rate (DTIM (1-16384): 1 |
| | – Fragment Length (256-2346): 2346 |
| | – RTS Threshold (256-2346): 2346 |
| | – Short Preamble: Enable |
| | – Allow 2.4GHz 54Mbps Station Only |
| | – Protection Mode: Auto / Enable / Disable |
| | – eXtended Range |
| | – Distance |
| Wireless Security | WEP setting |
| | – Authentication type: Open System / Shared Key |
| | – Shared keys input type: HEX / ASCII |
| | – Shared keys length: (64-bit, 128-bit, 152-bit) |
| | – Default WEP Key to use (1-4) |
| | WPA-PSK setting |
| | – PassPhrase |
| | – WPA Cipher Type (Auto, TKIP, AES) |
| | – Group Key Update Interval: 300 |
| | WPA setting |
| | – Radius Server IP Address |
| | – Radius Port: 1812 |
| | – WPA Cipher Type (Auto, TKIP, AES) |
| | – Shared Key |
| | – Group Key Update Interval: 300 |
| Software / Firmware | – Site Survey |
| | – DHCP Client |
| | – WPA Support (WPA personal and enterprise) |
| | – Web-based configuration via popular browser (MS IE, Netscape…) |
| | – Windows "Locator" program to help find IP in DHCP client mode |
| | – Firmware upgrade and configuration backup via Web |
| | – Reset to default by WebUI |
| Forwarding Mode | Store and Forward |

# 6   Appendix B: CB54 Series Package Contents

## AIRETHER™ CB54/CB54E PACKAGE CONTENTS

| Item Name | PCS |
|---|:---:|
| 1.   AirEther™ CB54 or CB54E Outdoor Wireless Client Bridge Unit | 1 |
| 2.   Ethernet Inline Power Injector (PoE), 12V DC | 1 |
| 3.   Waterproof Connector | 1 |
| 4.   AC-DC12V, 1Amp, Adapter with Wall-Plug Power Cord | 1 |
| 5.   Installation CD with Locator Utility & User Manual CD | 1 |
| 6.   Mast Mounting Kit (U Bolt) | 1 |
| 7.   Warranty Information Sheet | 1 |
| 8.   Quick Installation Guide | 1 |

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