



**Danbury Area Computer Society**

*presents*

**Wireless Networking  
for the Adventurous**

**or... How to have your cake and eat it  
too.**

**Jim Scheef  
Bruce Preston**

**July 6, 2004**

# Wireless Networking for the Adventurous

- 1 – Definitions, Terms and Concepts
- 2 – All the pieces – what the hardware does
- 3 – Sample configurations
- 4 – Wireless 101 – with demo
- 5 – Guidelines – How to do your second network the first time

# Part 1: Definitions, Terms and Concepts

- Computer networking standards
  - 802.3 – Ethernet (10Base-2, -5, -T, 100Base-TX, Gigabit and faster)
  - 802.4 – Arcnet
  - 802.5 – Token ring
  - **802.11 – Wireless ethernet, comes in flavors**
  - 802.14 – Cable modems
  - 802.15 – Personal area networks
  - 802.16 – Wireless metro area networks (high rate)
  - 802.20 - Mobile Broadband Wireless Access (MBWA)

- Wireless is just a different kind of ‘wire’
- The standards – many and confusing
  - 802.11 comes in flavors

■ Subspecies	Frequency Band	Max. Rated Speed
original	2.4 GHz	2 Mbps
A	5 GHz	54 Mbps
B	2.4 GHz	11 Mbps
G	2.4 GHz	54 Mbps

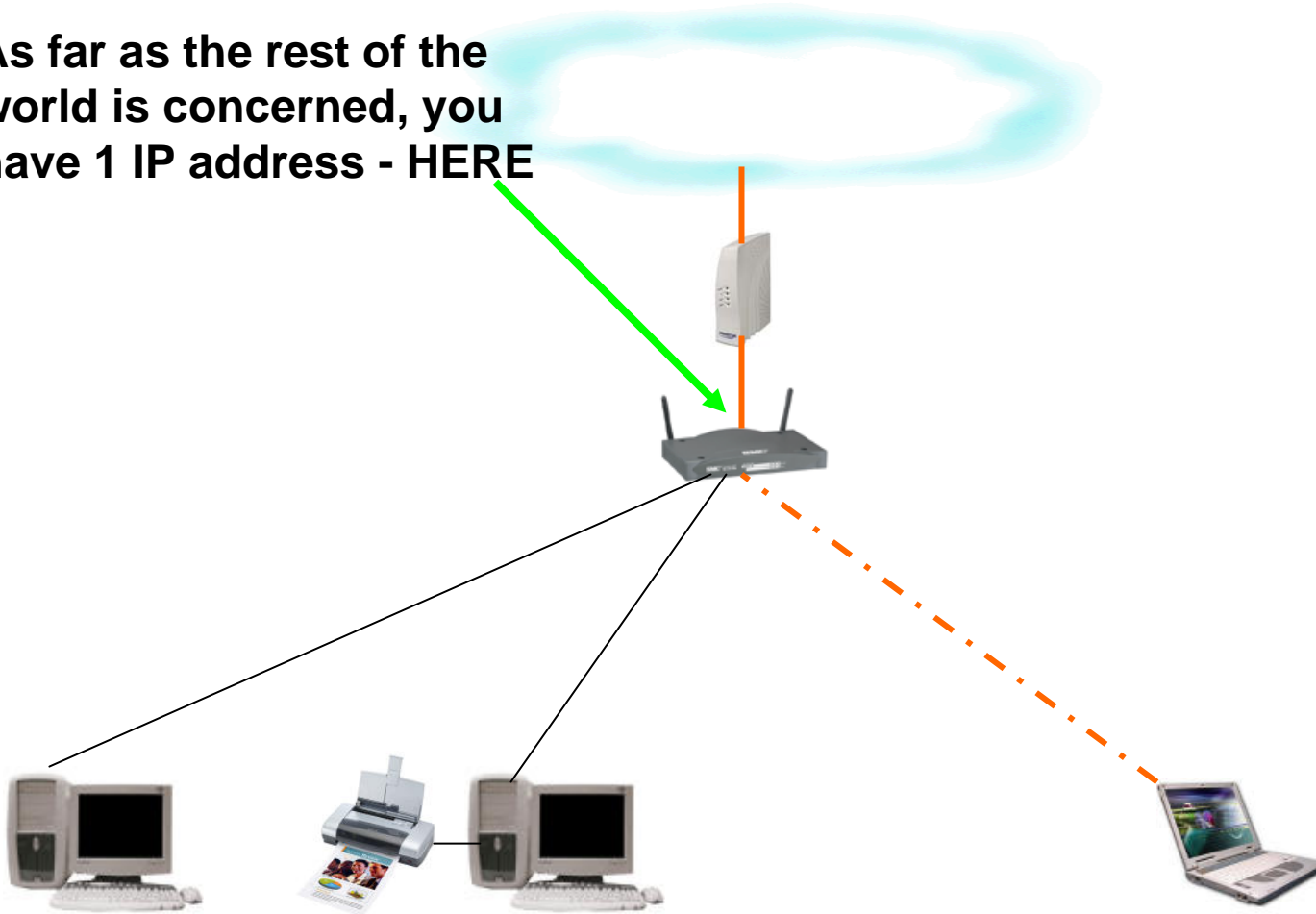
# IP Addressing



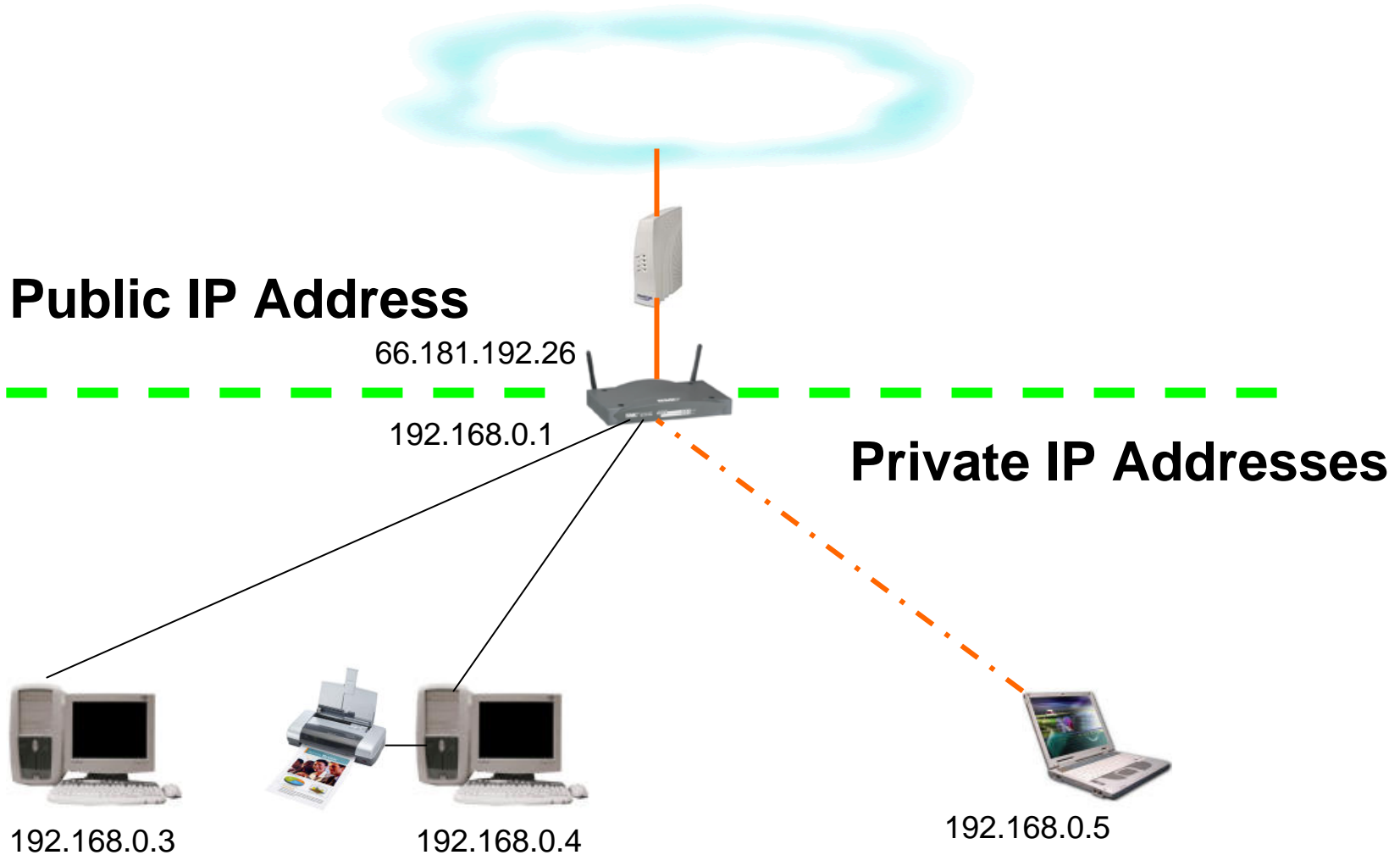
- **Every host (computer) must have a unique identifier, known as an IP (Internet Protocol) Address**
- **Your Internet Service Provider assigns an address to you when you connect.**
  - **It may be permanently assigned - STATIC IP ADDRESS**
  - **It may be “leased” to you - DYNAMIC IP ADDRESS**
  - **Dial-up - always Dynamic**
  - **Broadband - may be either, usually surcharge for STATIC**

# IP Addressing (2)

As far as the rest of the world is concerned, you have 1 IP address - HERE



# IP Addressing (3)



# TCP/IP Service Ports

Like a telephone extension number

- You have 65000 available
- Some “well known port numbers”

1	ICMP (ping)
21	FTP
22	SSH
23	Telnet
137	NetBIOS Name Service
139	NetBIOS Session Service

# Hardware Fundamentals

- Network Interface Card (NIC)
  - Wired or wireless
- Hubs and switches
- Routers
- Wireless Access Point
- Combo Router and Access Point

End Part 1

# Part 2: Basic Broadband

## Four Ways to the Highway

1. Direct Connection
2. Software Firewall
3. Hardware Firewall
4. Hardware + Software Firewalls

# Four Ways to the Highway

## 1 Direct Connection

= *Danger Will Robinson!*

- Security is based on the operating system only
- How tight are your file permissions?
- Print on your neighbor's printer

# Four Ways to the Highway

## 2 Software Firewall

- Closes and controls all the ports
- Examples:
  - Symantec Internet Firewall
  - Zone Alarm (free and \$ versions)
  - Sygate Personal Firewall

# Four Ways to the Highway

## 3 **Hardware Firewall** - A box that manages traffic to and from the internet that is separate from your computer

- Connects your LAN (local area network) to the WAN (wide area network – the Internet)
- NAT – network address translation
- Packet Inspection
- DHCP – dynamic host configuration protocol
- More...

# Four Ways to the Highway

## 3 Hardware Firewall

- Advanced features
  - Port forwarding
    - Run a web site on your home computer
    - Access your computer from anywhere


# Four Ways to the Highway

## 4 Hardware + Software Firewall

- Allows best features – most secure
  - Hardware barrier
  - Software does outbound packet filtering
- Complicates the local network
  - Example: blocks file sharing

End Part 2

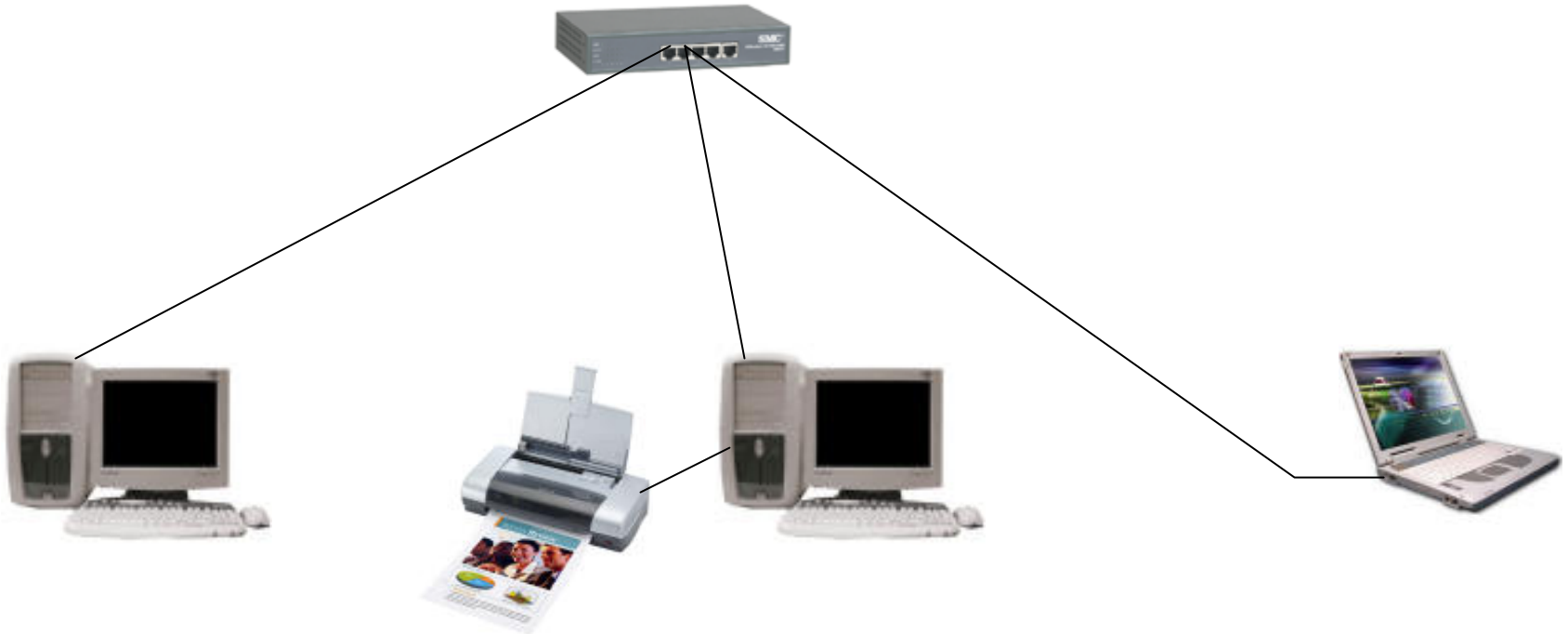
# Part 3: Sample Configurations



Let's start small and build our network using the pieces that we have identified.

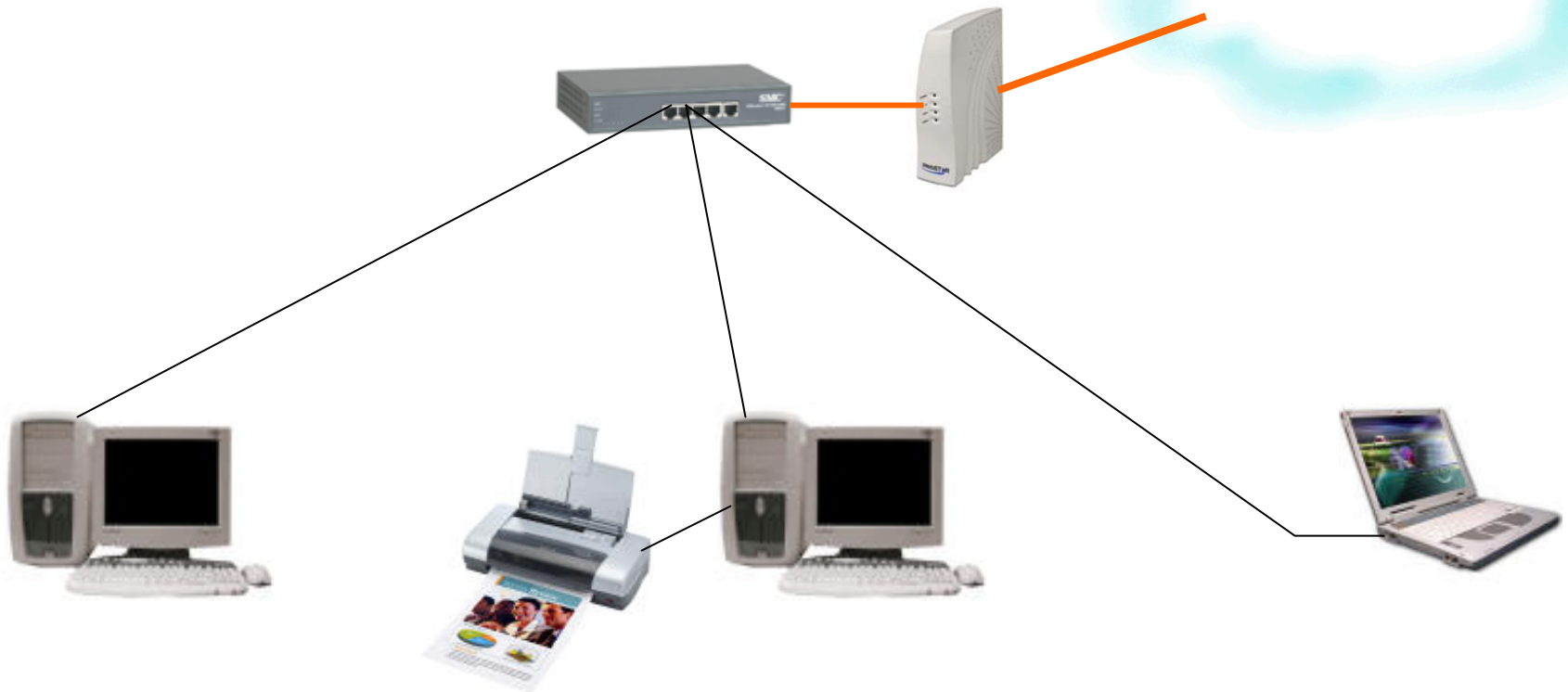
# A Little Network

**Using a HUB or a SWITCH, you can connect two or more computers and share data on disk drives, printers, etc.**



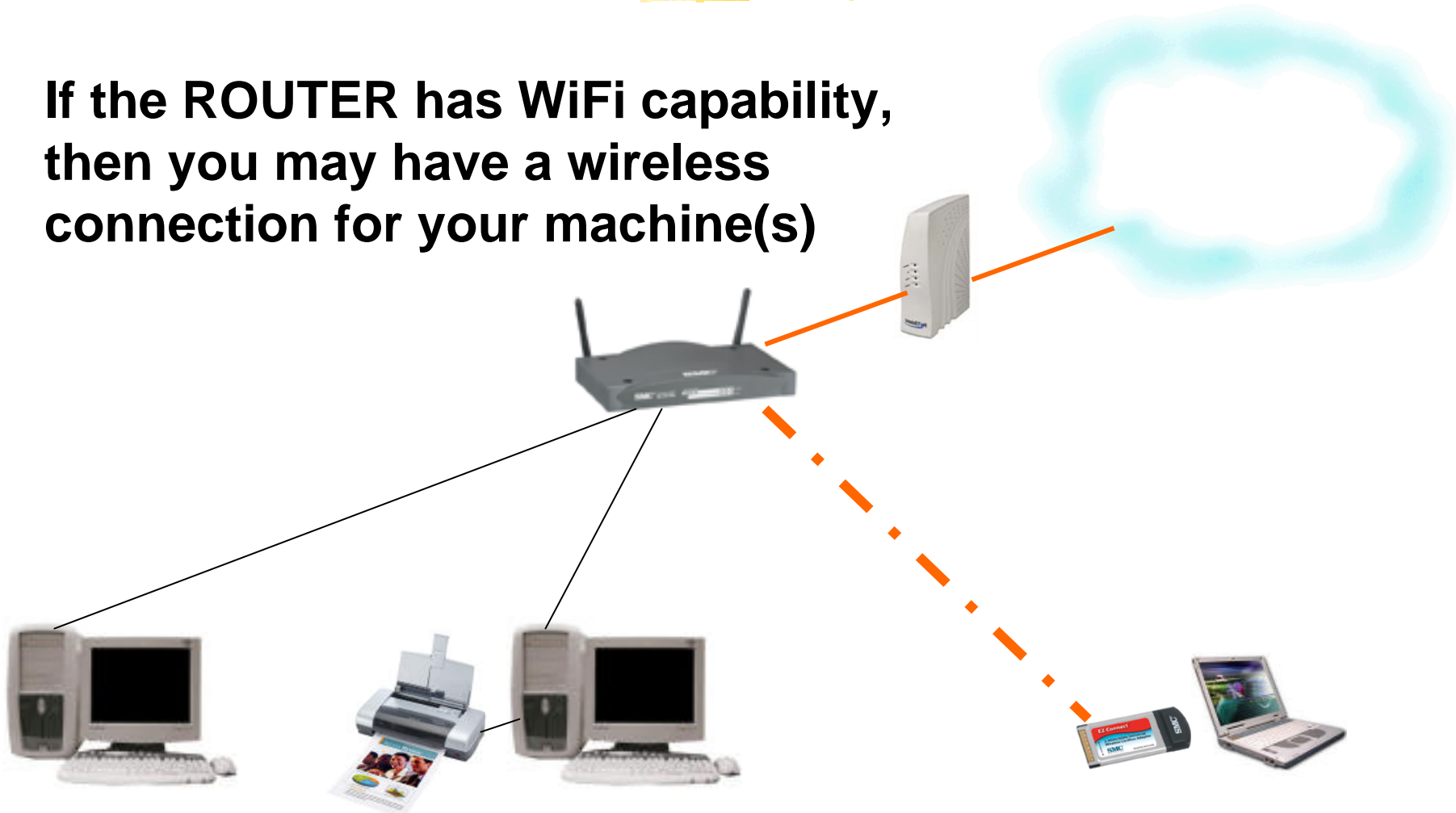
# A Bigger Network

**Add a Broadband Connection (Cable or DSL) and use a ROUTER to let all get to the Internet**



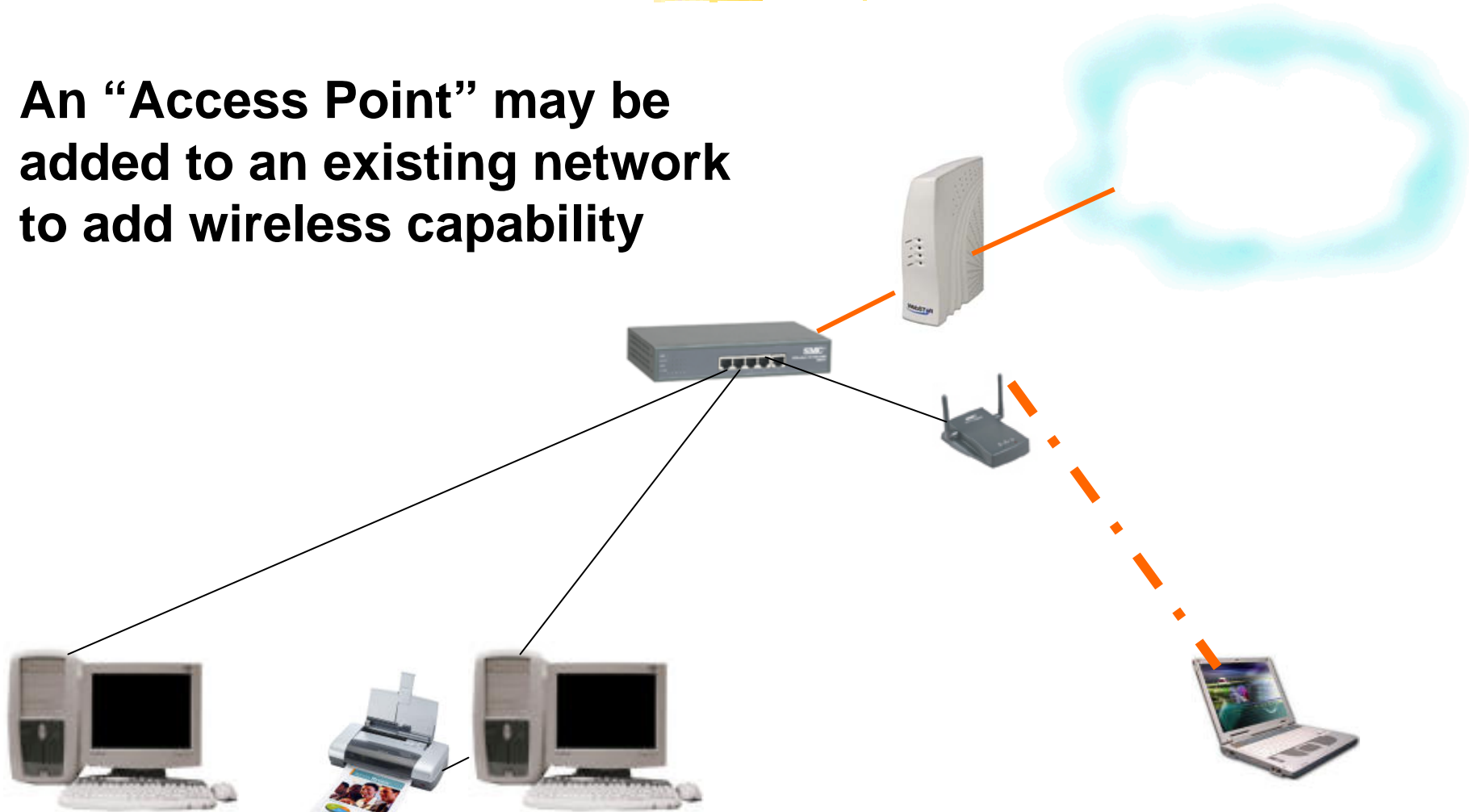
# Wireless Network (WiFi Router)

**If the ROUTER has WiFi capability,  
then you may have a wireless  
connection for your machine(s)**

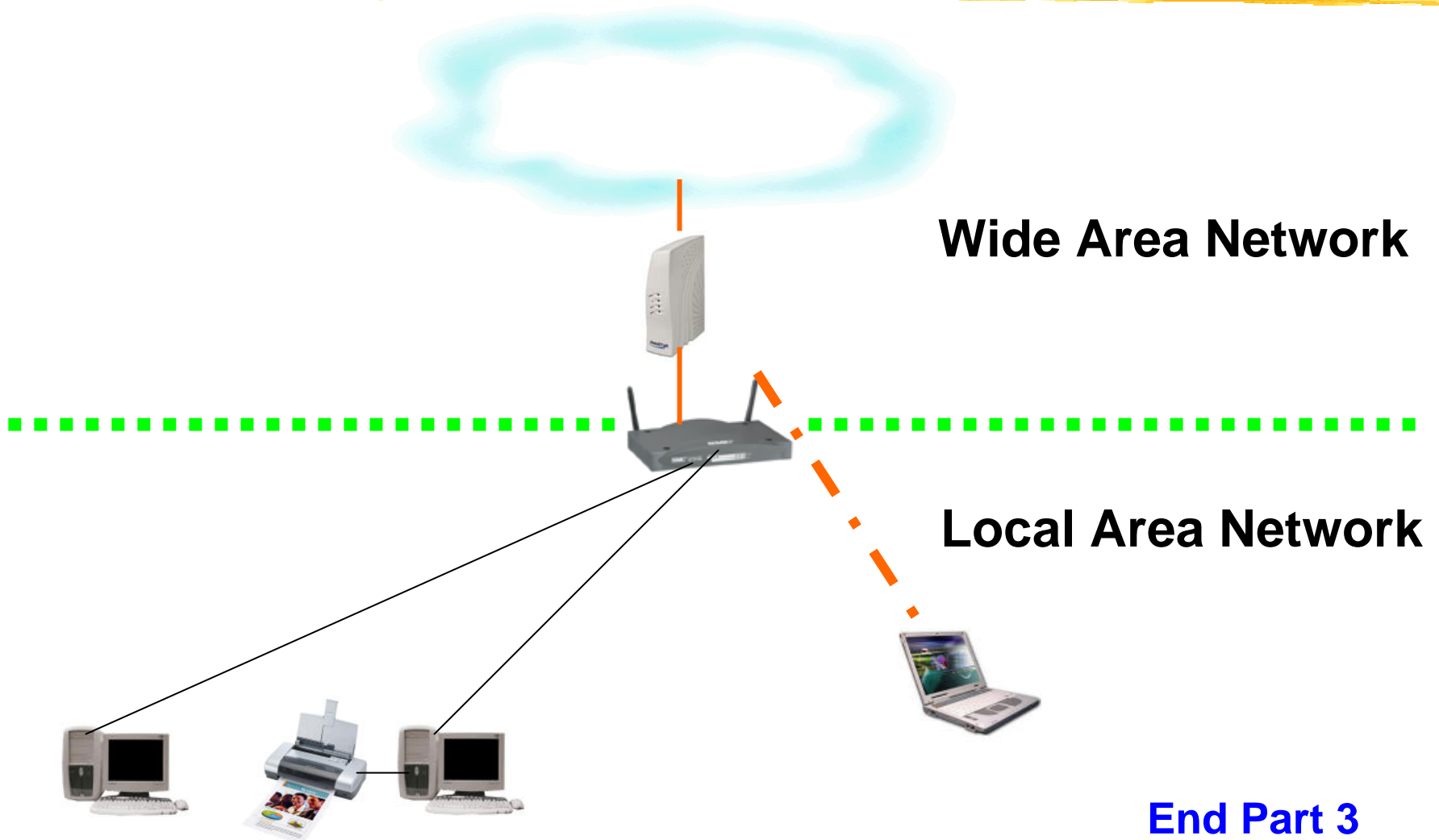


# Wireless Network (WiFi Access Point)

**An “Access Point” may be added to an existing network to add wireless capability**



# WAN vs. LAN

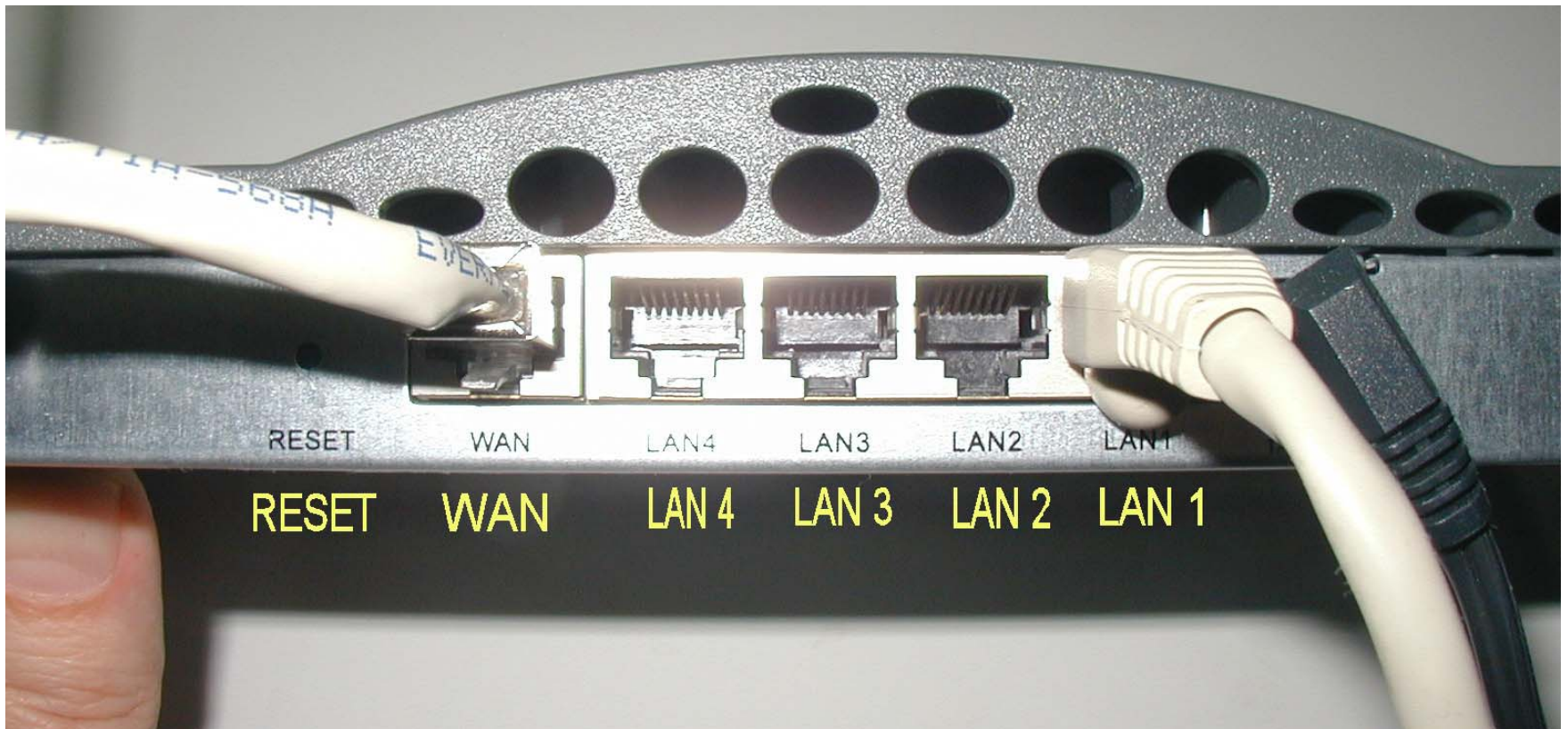


**End Part 3**

# Part 4: Wireless 101

- Router Configuration – using the browser to configure your router
  - Default configuration for router – RTFM
    - Network address, local IP addresses, DHCP
    - WAN IP address
  - Setting SSID – broadcast or not to broadcast
  - Set the channel – there are 3 useful channels
  - Setting WEP – what it is and why you (may) want it (or not)
  - Access key and/or using pass phrase
  - Setting MAC list

# Physical Setup



# Router Configuration

SMC Barricade Broadband Router (R1 93s)

**SMC Networks**

- [Status](#)
- [Toolbox](#)
- [Primary Setup](#)**
- [DHCP Server](#)
- [Virtual Server](#)
- [Special AP](#)
- [Access Control](#)
- [Misc Items](#)

### System Status

Item	WAN Status	Sidenote
IP Address	66.181.207.98	Static IP
Subnet Mask	255.255.255.252	
Gateway	66.181.207.97	
Domain Name Server	66.181.192.10, 66.181.192.12	

Item	Peripheral Status	Sidenote
Printer	Ready	

Display time: Wednesday, June 16, 2004 12:31:17 PM

Local intranet

Start | Eudora by QUALCOMM | SMC Barricade Broadb... | 12:31 PM

**View Status**

# Router Configuration

SMC Barricade Broadband Router (R1.93s)

**SMC Networks**

- [Status](#)
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- [Misc Items](#)

[Log out](#)

### Primary Setup

Item	Setting
▶ LAN IP Address	<input type="text" value="192.168.0.254"/>
▶ WAN Type	Static IP Address <a href="#">Change...</a>
▶ WAN IP Address	<input type="text" value="66.181.207.98"/>
▶ WAN Subnet Mask	<input type="text" value="255.255.255.252"/>
▶ WAN Gateway	<input type="text" value="66.181.207.97"/>
▶ Primary DNS	<input type="text" value="66.181.192.10"/>
▶ Secondary DNS	<input type="text" value="66.181.192.12"/>

[Save](#) [Undo](#) [Help](#)

Set  
WAN IP  
LAN IP  
Subnet Mask  
WAN Gateway  
DNS

# Router Configuration

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Log out

ID	Service Ports	Server IP	Enable
1	80	192.168.0.86	<input checked="" type="checkbox"/>
2	23	192.168.0.101	<input checked="" type="checkbox"/>
3	443	192.168.0.86	<input checked="" type="checkbox"/>
4	1547	192.168.0.101	<input checked="" type="checkbox"/>
5	21	192.168.0.86	<input checked="" type="checkbox"/>
6	20	192.168.0.86	<input checked="" type="checkbox"/>
7	5631	192.168.0.1	<input checked="" type="checkbox"/>
8	5632	192.168.0.1	<input checked="" type="checkbox"/>
9	14225	192.168.0.1	<input checked="" type="checkbox"/>
10	22	192.168.0.101	<input checked="" type="checkbox"/>
11		192.168.0.1	<input type="checkbox"/>
12		192.168.0.1	<input type="checkbox"/>

Set  
Port Forwarding

# Router Configuration

http://192.168.0.200/index.stm - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Media Print Copy Paste

Address http://192.168.0.200/index.stm Go Links >>

**SMC<sup>®</sup>**  
Networks

**Setup Wizard** ■ ■ ■ ■

The Barricade setup will allow you to configure your Barricade for use with an external Cable or DSL modem. Click on the navigation menu on the left to change individual settings.

**Advanced Setup** ■ ■ ■ ■

The Barricade supports advanced functions like Intrusion Detection, IP and MAC address filtering, parental control, virtual servers, and special applications. We recommend you keep the default settings.

**Overview**

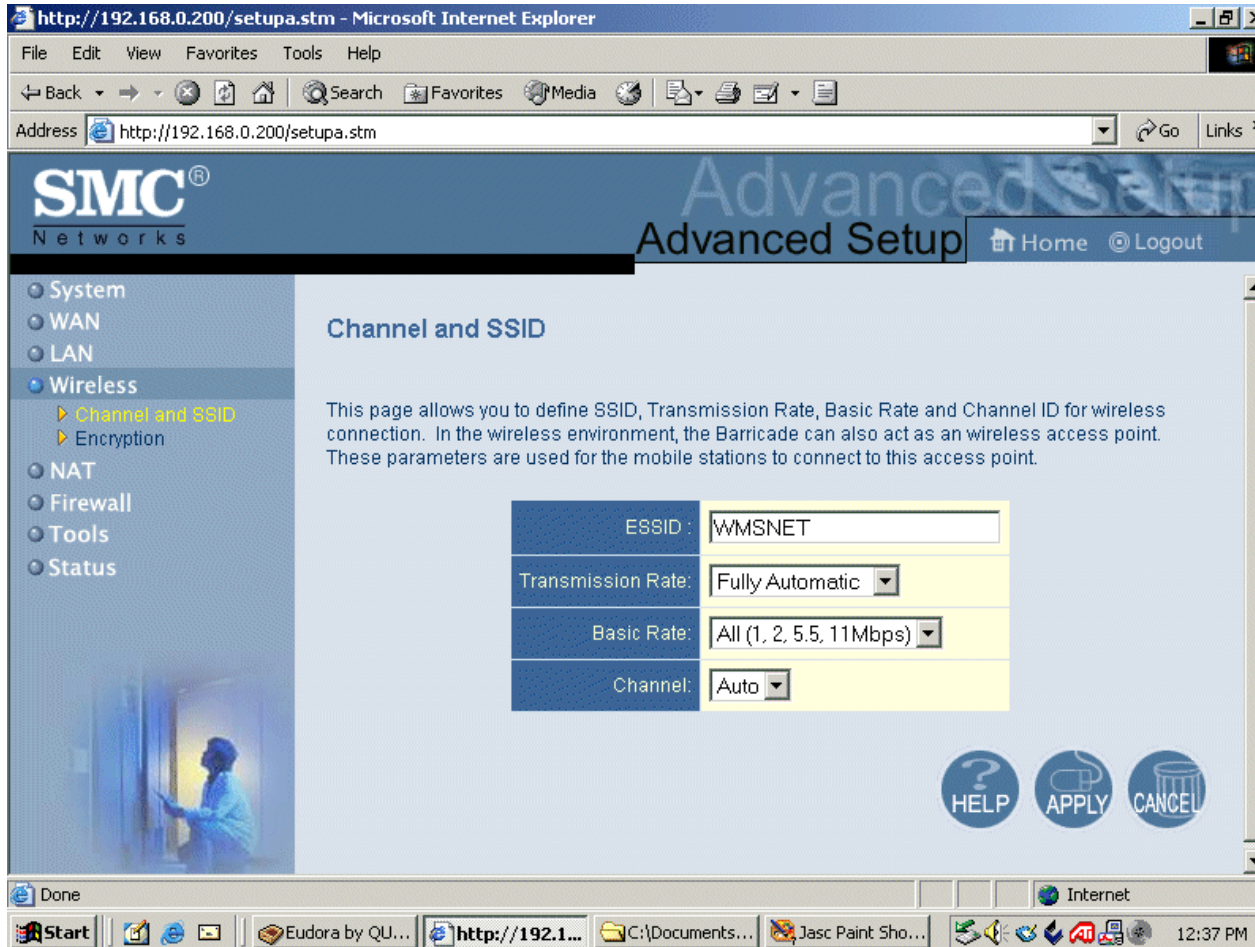
Thank you for purchasing the SMC EZ Connect Barricade Broadband Router. The Barricade is a secure device ideal for home networking and small business users alike. Its easy setup will allow you to enjoy risk-free Internet access within minutes.

Done Internet

Start Eudora by QU... http://192.1... C:\Documents... Jasc Paint Sho... 12:36 PM

**They've gotten smarter with Wizards and Help**

# Router Configuration



**SET**

**Wireless Network Name (ESSID)**

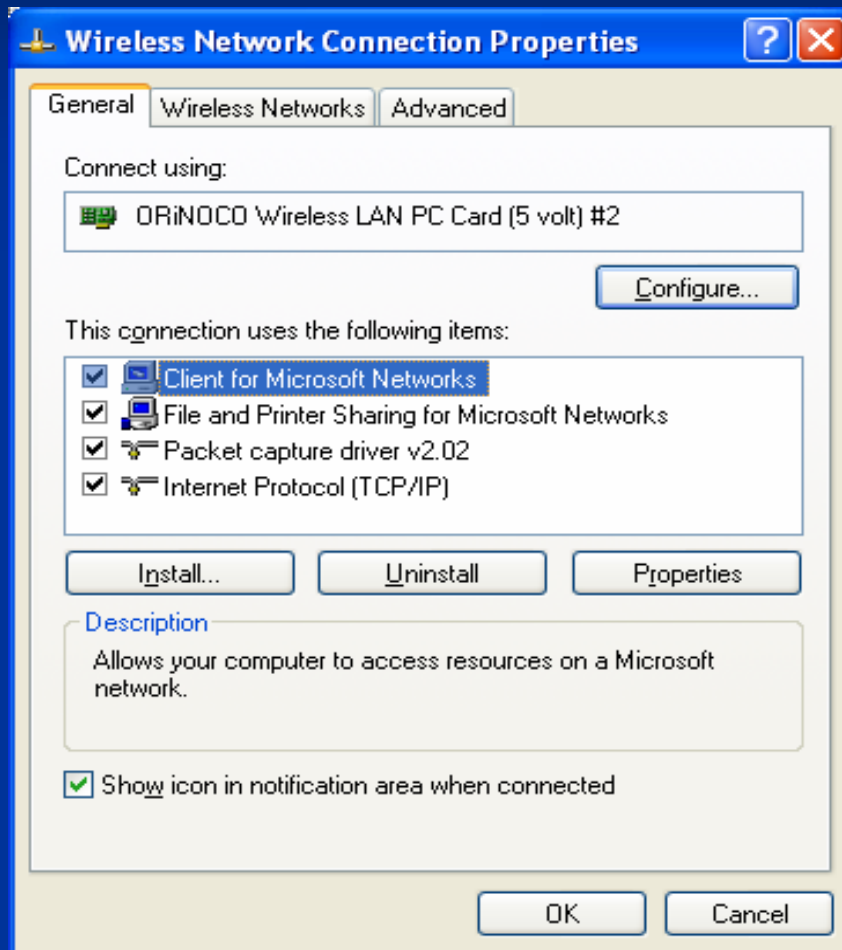
**Speed**

**Channel**

# Client Configuration

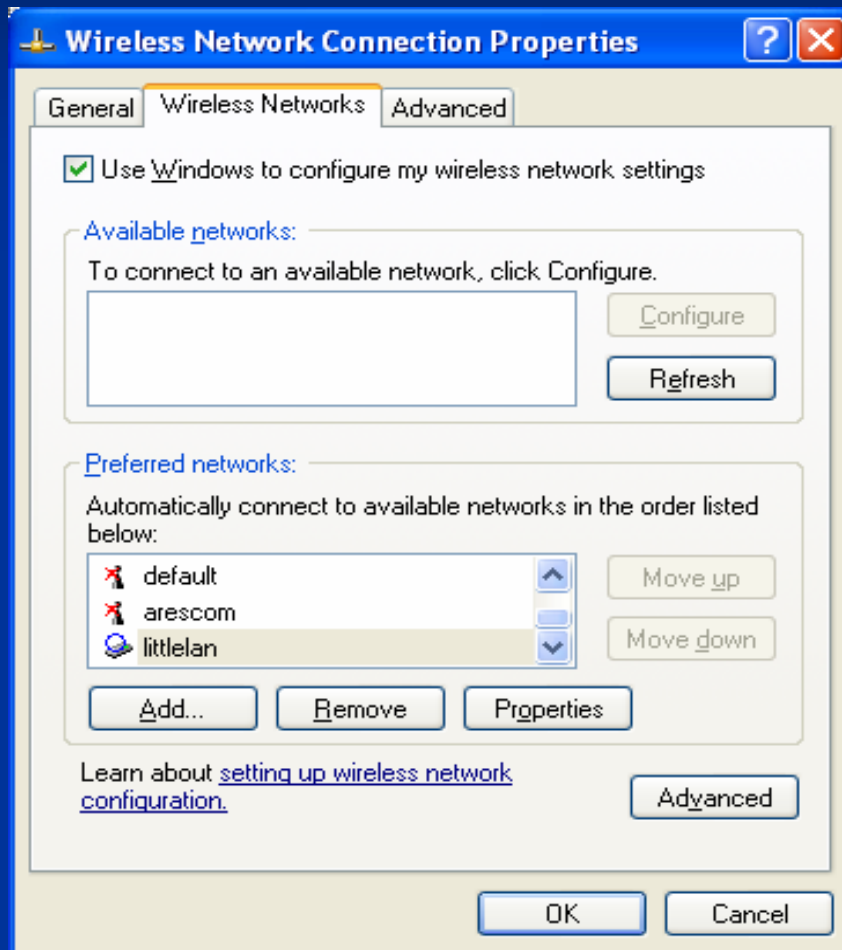
- Windows XP's Wireless Zero Configuration Service
  - XP has 'native' wireless support
  - Automatic scanning for networks
- If you don't have XP, a utility will be on a CD provided with your network adapter.
  - Different appearance
  - Similar functionality

# XP Wireless Zero Configuration

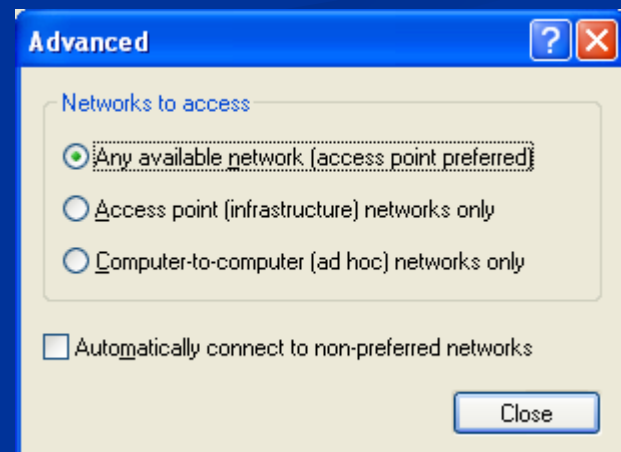


The 'General' tab is much like a wired NIC

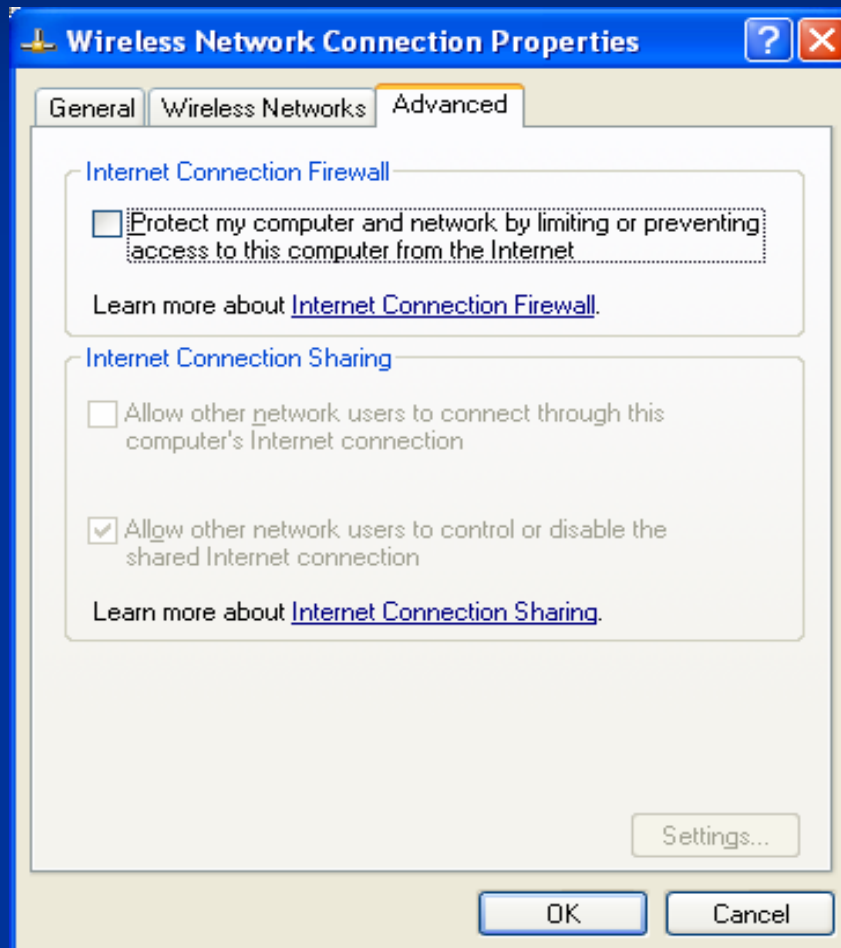
# XP Wireless Zero Configuration



The Wireless Networks tab selects from any detected networks.



# XP Wireless Zero Configuration



# Let's Do It!

- Setup and Configure a Router
- Setup and Configure Client(s)
- Move Some Data between Clients

# Part 5 – Installation Guidelines

(your mileage may vary)

- Signal strength falls with longer distance  
(laws of physics)
- Signal strength falls with walls  
(802.11b/802.11g better than 802.11a)
- Speed falls with signal strength
- Location, location, location
  - The best place for the router may not be the best place for the wireless access point
  - Under the desk is not going to work very well
  - A good antenna can help

# Part 5 – Installation Guidelines

(your mileage may vary)

- Good citizens use 1 of only 3 channels
- Location, location, location
  - The best place for the router may not be the best place for the wireless access point
  - Under the desk is not going to work very well
  - A good antenna can help

# The End

Any questions?