What you need to know about Wi-Fi before you implement

Presented by:
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CTO

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Abstract

- **Despite frequent warnings about the poor security in the IEEE 802.11b (Wi-Fi) standard, more private networks are broadcasting than ever. There are good reasons for this. In this talk we will cover a survey of the uses, security concerns and best-practice implementation suggestions for a Wi-Fi Network. We will also review solutions targeted for intrinsically safe manufacturing environments for mobile technology. Finally, we will end with a look to the future, where is Wi-Fi going and how fast is it moving.**

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Agenda

- 802.11 Today
  - Common Uses Today
  - What Is It?
- Wi-Fi Issues
- Best Practices For Your Design
- 802.11 Wrap-up
- Mobility in Manufacturing
  - Tablet PC Demo
- More Info

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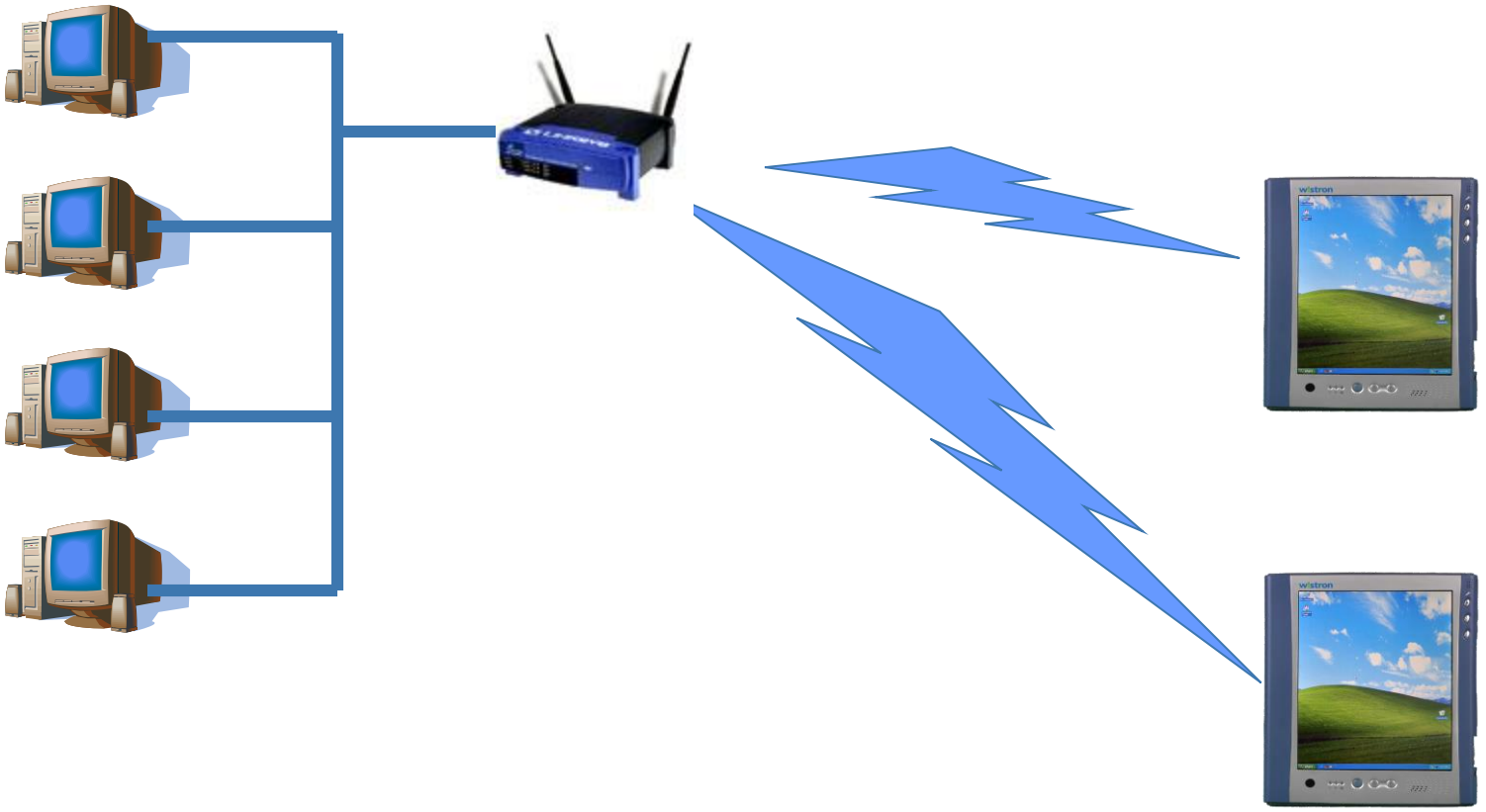
The Jump: Wired to Wireless



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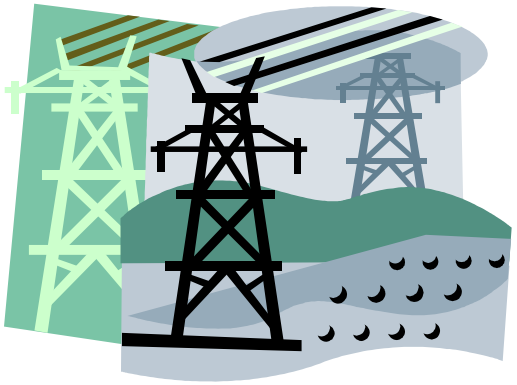
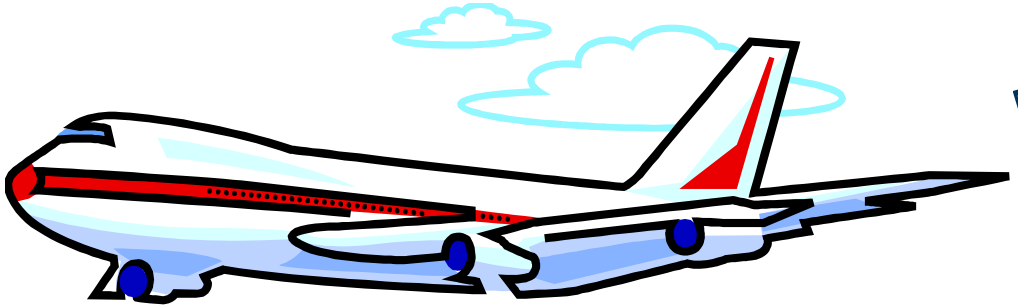
Some Common Uses





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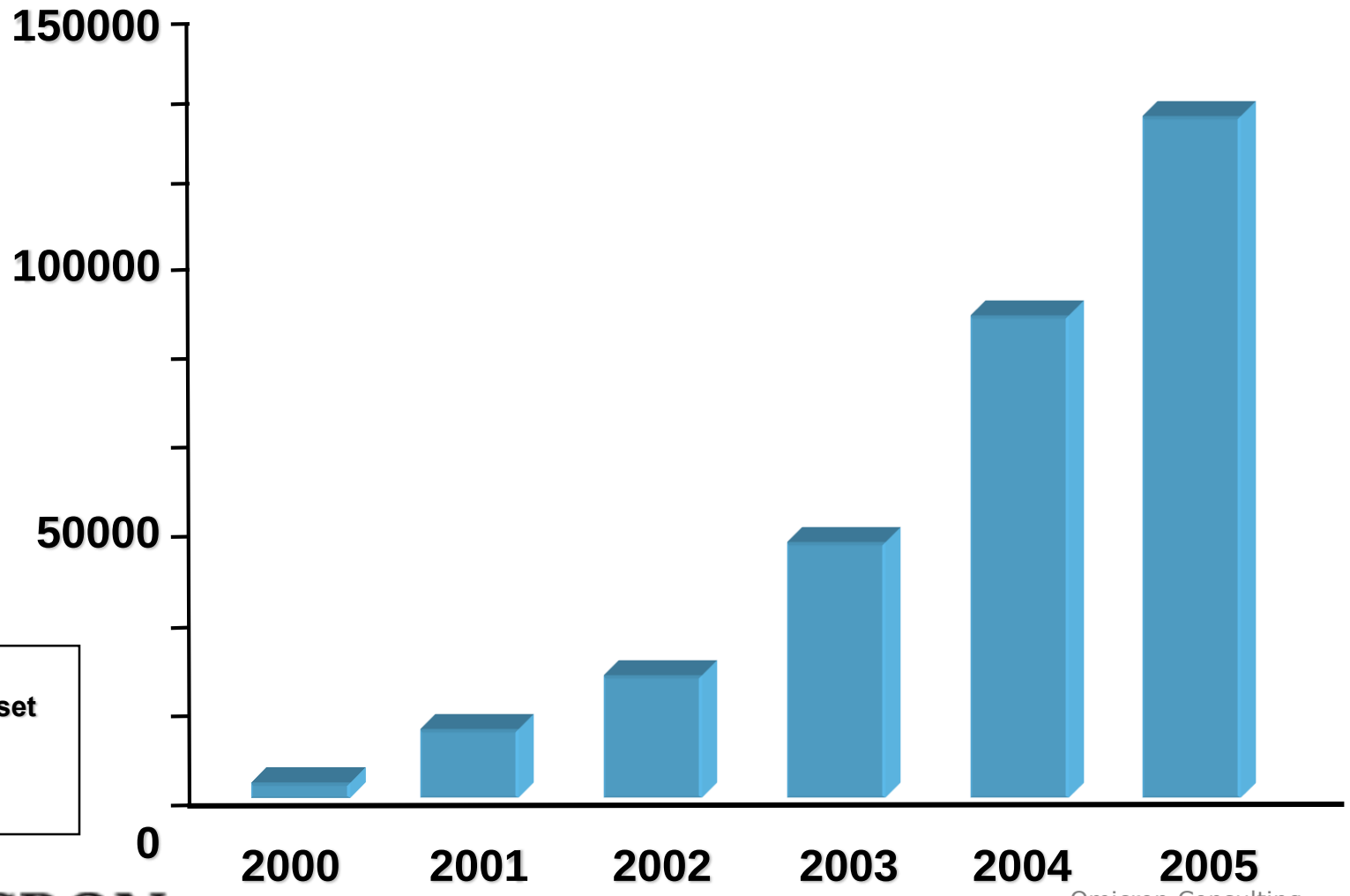
WLAN Chipset Growth



Source:
"Wireless LAN Chipset Forecast",
Gartner Dataquest,
September 13, 2001

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Some Market Figures

- Equipment Costs Dropping
  - Home ~$100
  - Industrial Strength ~ $2,000/Hotspot
- Intel To Spend 300MM On Centrino Marketing
- Cisco Paid 500M To Buy Linksys
- Microsoft
  - Hardware Manufacturer
  - Windows XP & Tablet PC Are Key
  - Office/Outlook 2003 Make It Useable
- Investments
  - Cometa == Intel + IBM + AT&T
    - MAN Next March 5,000 Hotspots
  - Boeing 100 Jets By Early 2004, 4000 In Next 10
  - Starbucks 2,100 Going To 16,000
  - Mcdonald's
    - Free 1 Hr With Value Meal Or $3/Hr
    - Pilots 10 Locations In NYC
    - 100's By Year End
  - Dell – Every Laptop By Summer, HP 70% Ready

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What is Wi-Fi?

- Wi-Fi == Wireless Fidelity
- IEEE 802.11x
- What is not (for this talk)
  - IR
  - Cellular
  - Bluetooth
  - SMS (Short Messaging Service)

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IEEE 802.11

- Institute of Electrical and Electronic Engineers (IEEE)
  - LAN/MAN Standards Committee (802)
    - LAN = Local Area Network
    - MAN = Metropolitan Area Networks
- 802 is sub-divided into working groups
  - Use a decimal point to designate working group

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IEEE 802 Working Groups

- Active (Still in development) 802 Working Groups
  - 802.1 High Level Interface (HILI) Working Group
  - 802.3 CSMA/CD Working Group
  - 802.11 Wireless LAN (WLAN) Working Group
  - 802.15 Wireless Personal Area Network (WPAN) Working Group
  - 802.16 Broadband Wireless Access (BBWA) Working Group
  - 802.17 Resilient Packet Ring (RPR)
  - 802.18 Radio Regulatory Technical Advisory Group
  - 802.19 Coexistence Technical Advisory Group
  - 802.20 Mobile Wireless Access Working Group

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802.11x Look Up

- 802.11a - 5 - 6 GHz range, 54 Mbps (54a).
- 802.11b - 2.4 GHz range, 11 Mbps (11b).
- 802.11e - A Quality of Service (QoS)
- 802.11g - 2.4 GHz range, 54 Mbps (54g).
- 802.11h – 54a for use in Europe
- 802.11i – Security – WEP Replacement

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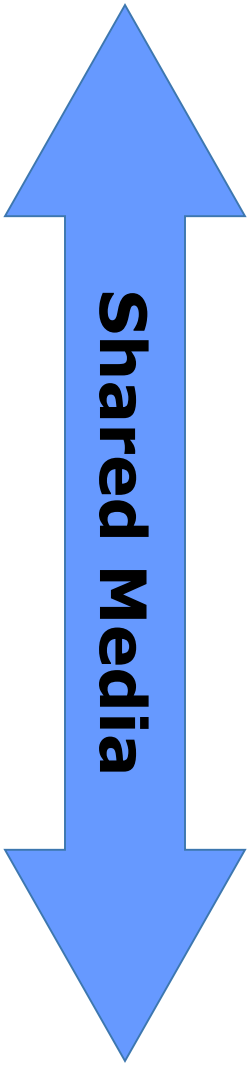
IEEE 802.11?

- 802.11a
  - Approved as a standard September 1999
  - 54 MB
  - 5 GHz band
- 802.11b
  - Approved as a standard September 1999
  - Updates to standard approved in October 2001
  - 11 MB
  - 2.4 GHz band
- 802.11g
  - Not yet an approved standard
  - Final acceptance is expected in June 2003
  - Develop higher speeds for 802.11b
  - 54 MB
  - 2.4 GHz band



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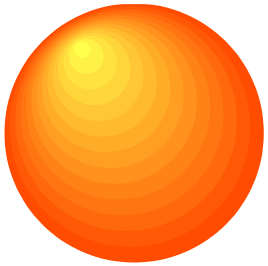
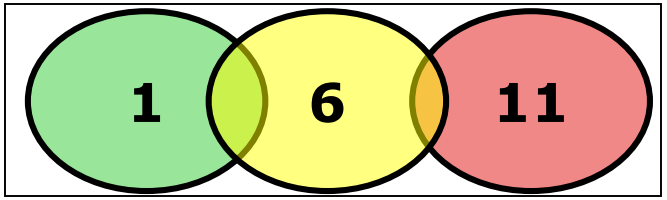
802.11b Channel Coverage

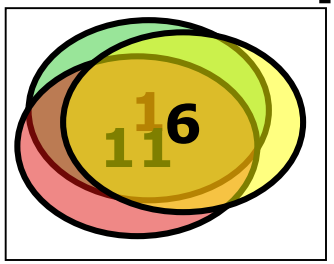
- **Sphere**
  ~ 3-4 Stories

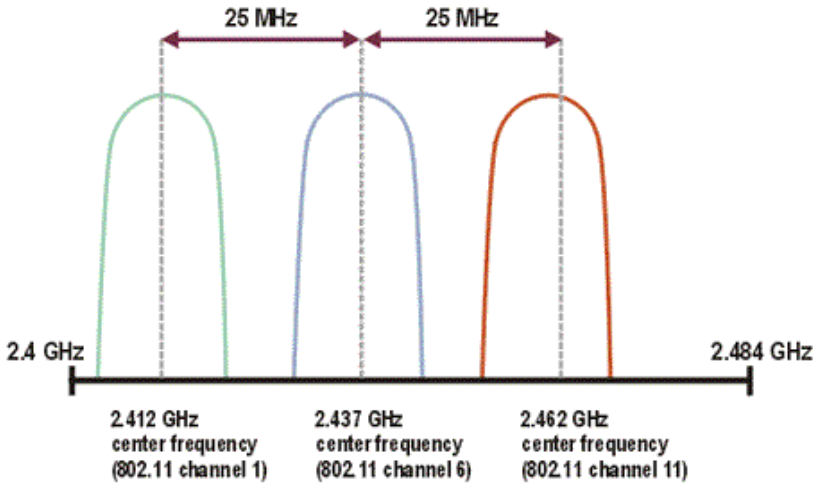


- **Room Coverage**



- **Shared Media Overlap**





Source: *The IEEE 802.11 Handbook: A Designer's Companion*

- **Channel Spacing**

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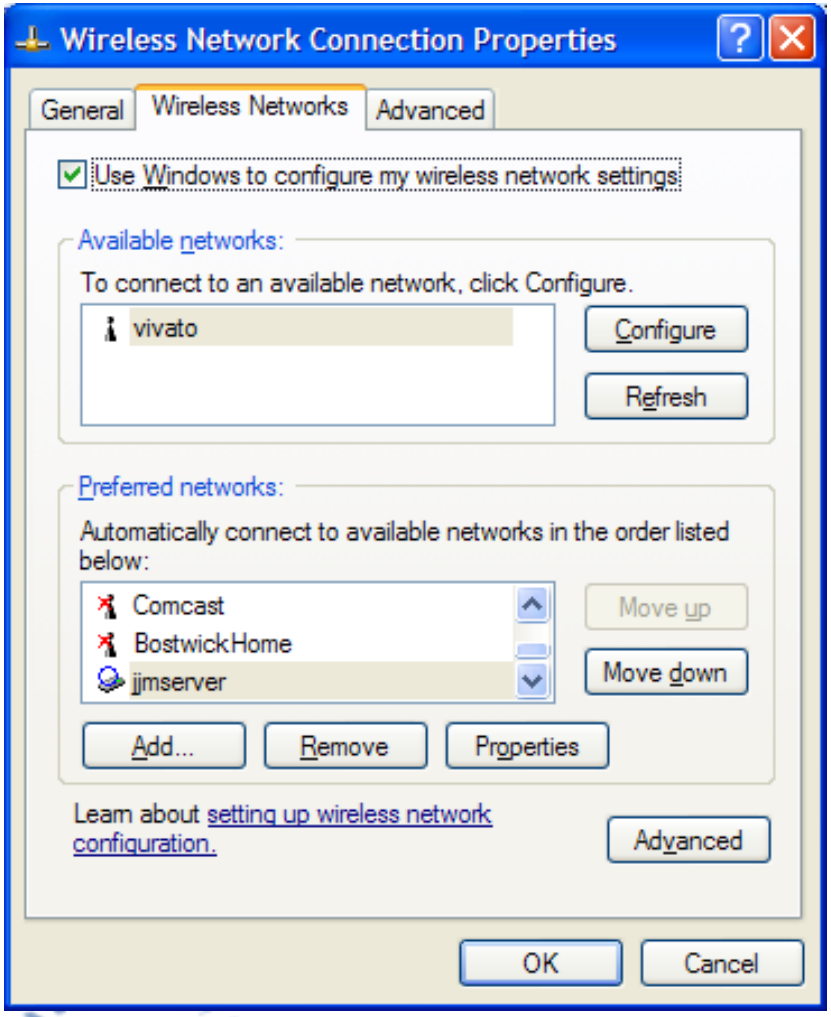
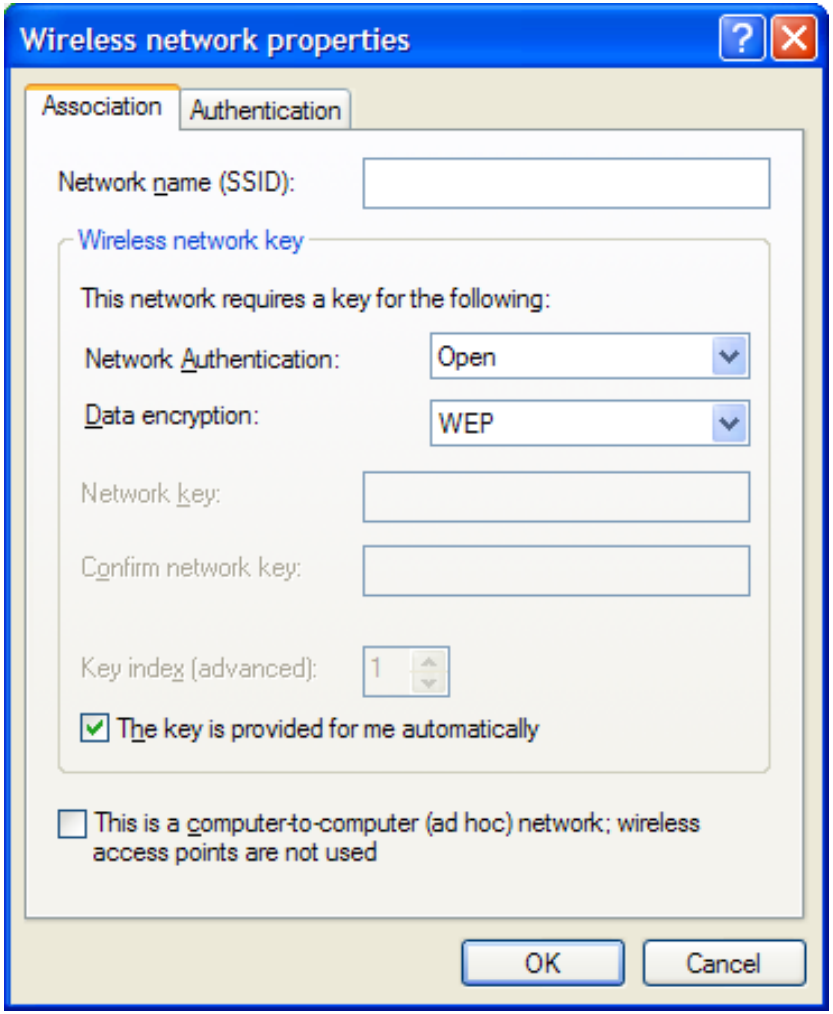
The Client-side Switches





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Wi-Fi Issues

- WEP
  - Can Be Easily Broken
- Default is easy
  - SSD
  - Administrator Passwords
  - DHCP to all by default
  - MAC Not used
- Impersonation of Access point

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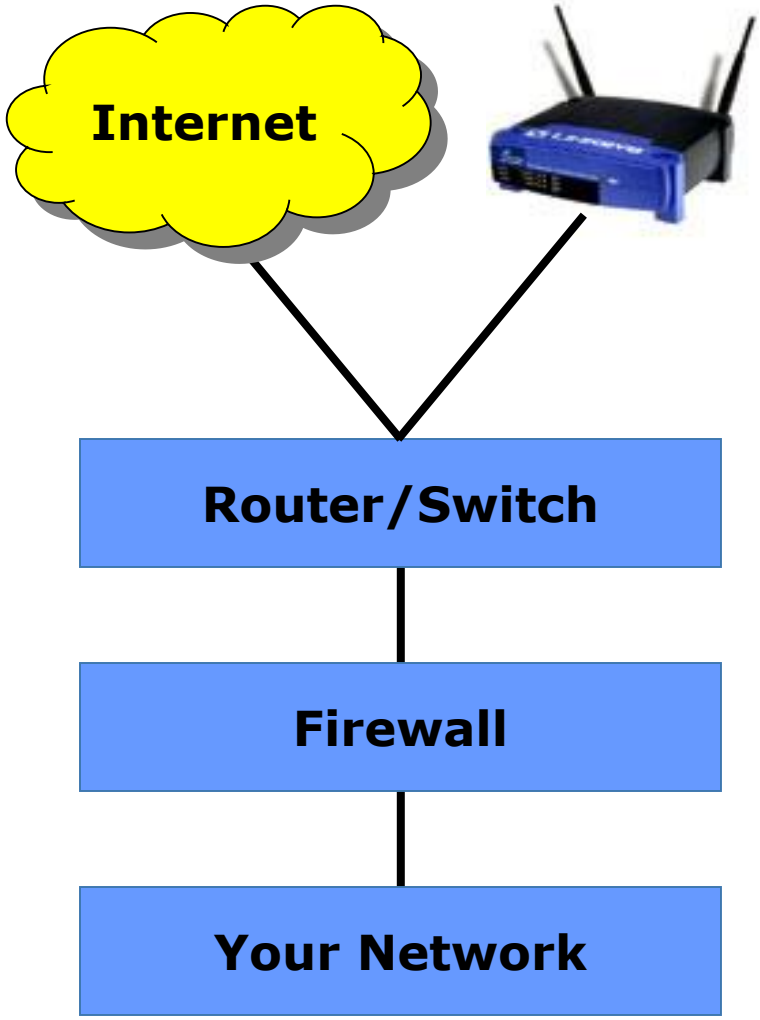
Some Best Practices

- Un-Default
- Treat it as 'open' door.
  - Do not broadcast the SSID
  - Place Segment "Outside" the firewall
  - VPN
  - MAC Address
  - Consider Certificates
- 802.11i
- Hack yourself & Learn



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Other Notes & 802.11 Wrap-up

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Intel Centrino

- Intel's new brand name of a combination of chips including CPU and wireless communications
- New CPU – Pentium-M
  - Not to be confused with Pentium 4-M
  - Complete New Design
  - Lower Power
  - Higher Speed
    - ie: Pentium-M 1.4 GHz outperformed a P4-M 2.4 GHz in one set of tests by 38%

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Intel Centrino

- **Wireless Capabilities only include 802.11b**
- **Intel claims:**
  - **802.11a support is "months" away**
  - **802.11g will be available by the end of the year**

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Wi-Fi Zones

- **Areas where Wi-Fi Access is provided**
- **Often called Wi-Fi hot-spots**
- **The Wi-Fi Alliance provides free Wi-Fi Zone registration for providers**
- **http://www.wi-fizone.org/**

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MAN: Wi-Fi Zones

- Zones in Philadelphia
  - Loews Philadelphia Hotel
  - Four Seasons Hotel
  - Wyndham Philadelphia
  - Embassy Suites Hotel
  - Radisson Plaza Warwick Hotel
  - Embassy Suites (Philadelphia Airport)
- Zones in SF
  - 27+ Coffee Shops
  - 20+ Hotels
  - …

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802.11 - Conclusions

- 802.11a is the speed king
  - Higher cost
- 802.11b is the current leader
  - Cheapest
  - Most Popular
  - Most Compatible
- 802.11g is a good option (after July)
  - Most will be backward compatible with 802.11b
  - Should see prices comparable to 802.11b
  - Higher speed than 802.11b

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Forward Looking

- FUD = Fear – Uncertainty - Doubt
- Mesh Networks
  - Tank Farm
- 802.11i
- How to get going
  - Requirements – Drive the need
  - Site Survey – Where to lay it out?
  - Access Point Network Design
  - Implementation

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Mobility in Manufacturing

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Tablet PC Designs

From Convertibles for Road Warriors

Docked Mode

- Both will enable access to full keyboard, monitor and mouse
- Both enable multi-monitor configurations

Laptop Mode

- Convertible: Attached keyboard
- Pure Tablet: Detachable keyboard

Tablet Mode

- Convertible: Keyboard folds away
- Pure Tablet: Thinnest and lightest design

To Pure Tablets for Corridor Warriors

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Not this again?

- Commodity OS - XP
- Instant On
- Robust networking
  - LAN
  - 802.11'x'
  - High-bandwidth
  - POTS
  - SMS
- Mainstream development tools
- Store and forward technology
- Useable handwriting recognition
- Useable recording and voce recognition
- Commodity HW from established players
- Built in everything

Why this time?

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Tablet PC Drilldown

Limited to a HW Needs

- Digitizer with active pen
- Support surprise removal from dock
- 2 second resume from suspend
- Legacy free (no serial or parallel ports)
- Supports both portrait and landscape modes
- Dedicated button for Ctl-Alt-Del (security key)

Windows XP Tablet PC

- Windows XP Professional
- MS Journal Utility
- Handwriting Reco Engine
- Text Input Panel
- Speech Reco Engine
- Sticky Notes
- Gesture APIs
- Gesture Reco engine
- Stylus Drivers
- Ink Controls

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Manufacturing Areas

- **Control Networks**
- **Field Data Acquisition**
- **Knowledge Workers**
  - **Engineers & Management**
  - **Application Types**
    - **Alerts**
    - **Pages w/Snapshots**
    - **PDA w/ Graphics/trends**
    - **Tablet PC Full Function**
      - Custom Application
      - PI-PB

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Manufacturing & Tablet PC

- Many Manufacturing Applications Have Touch Interface
- Store & Foreword
- PI API/SDK w/ Buffering
- PI-PB Runs Natively
- Demonstration
  - Scenario
    - Problem Investigation/Issue Resolution & Release
  - Users
    - Field Engineer
    - Plant Management
    - Engineering Supervisor
  - Technology
    - Instant Messages
    - Custom Application
    - ICE View
    - PI-PB Add-in

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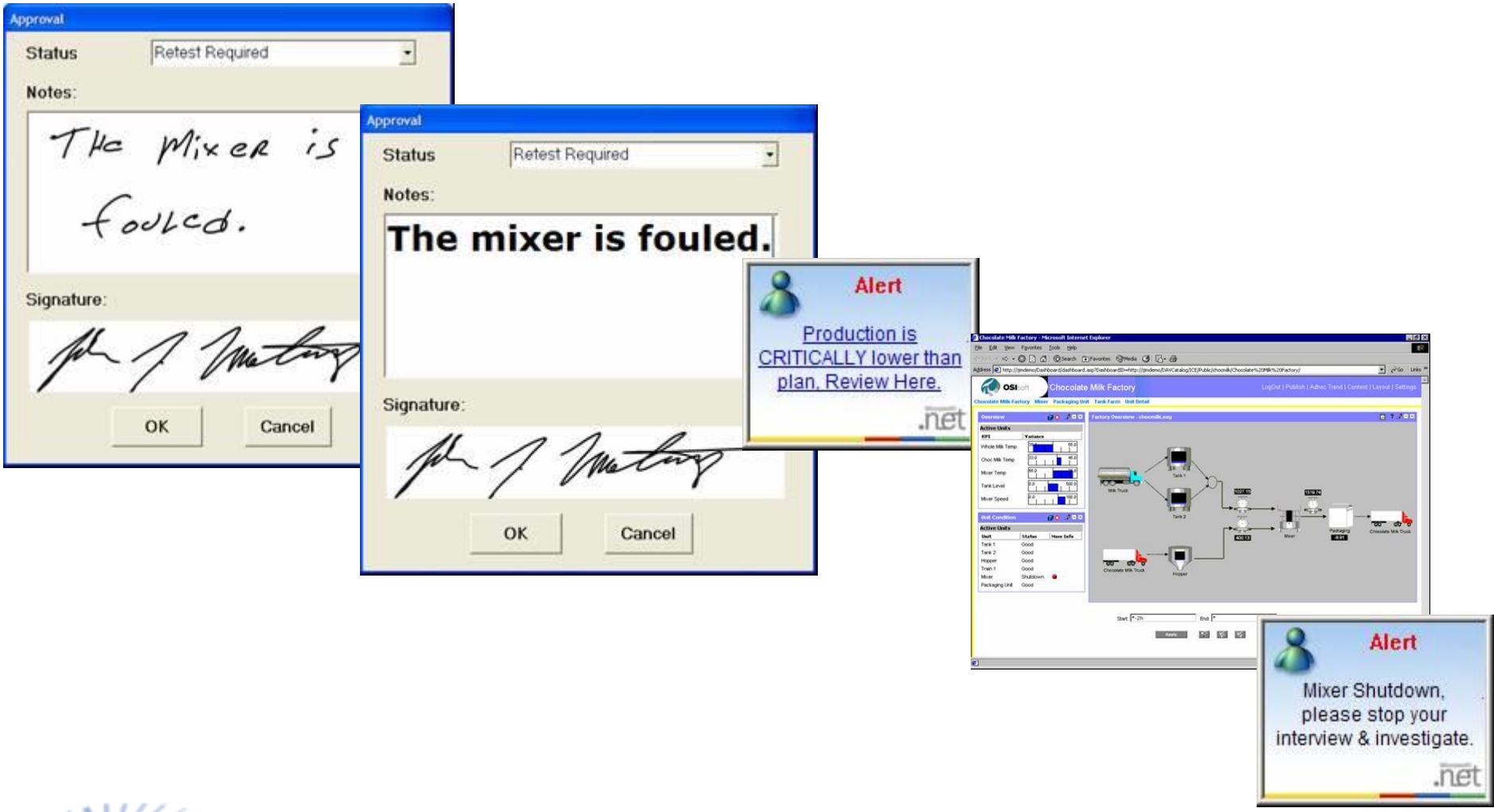
Tablet PC Demo – Part 1



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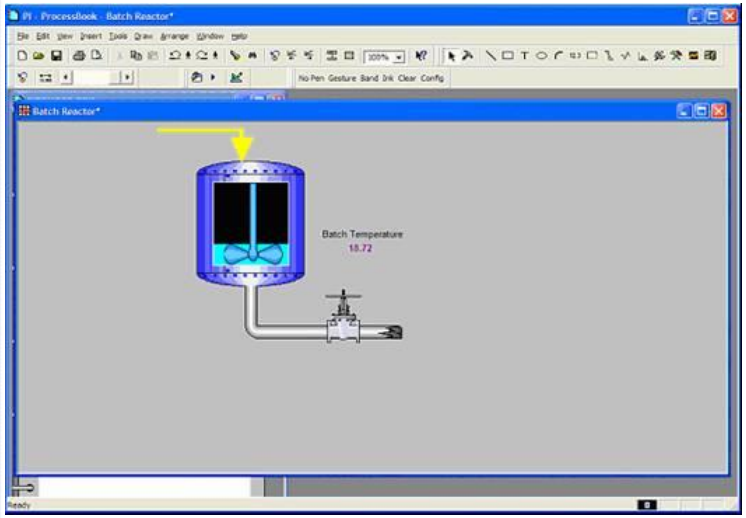
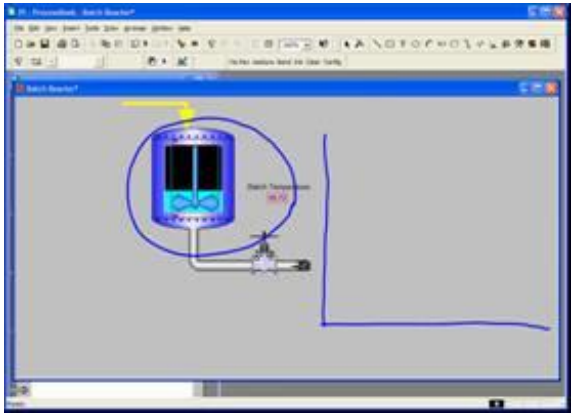
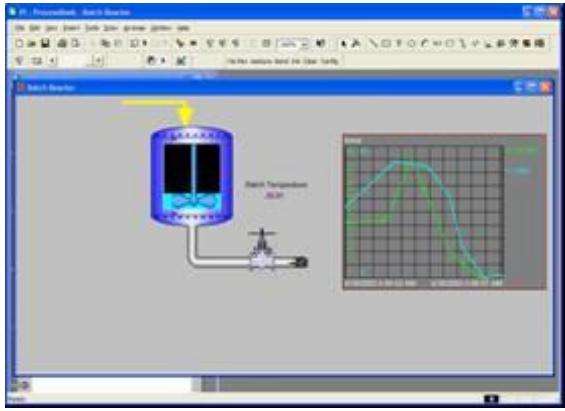
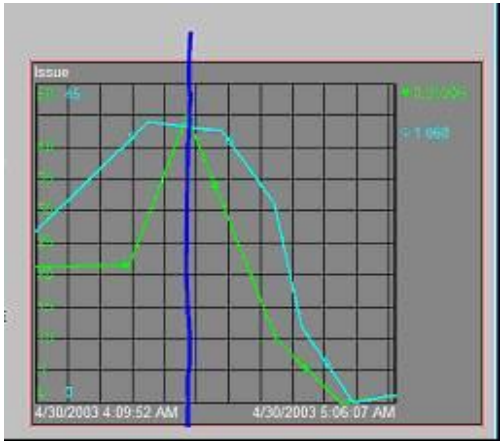
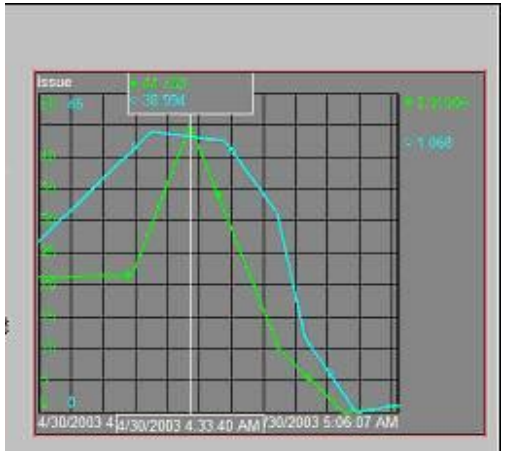
Tablet PC Demo – Part 2

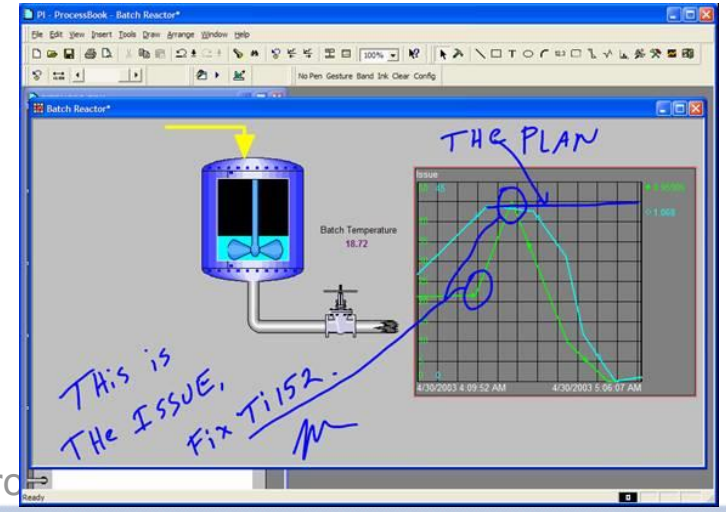












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- Other References
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