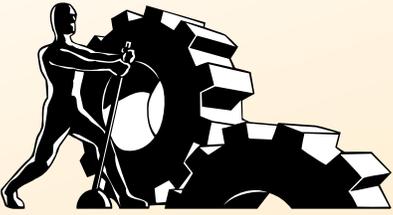


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Take Control of

v1.3

iPad Networking and Security

Glenn Fleishman

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Table of Contents

Read Me First

Updates and More	4
Basics	5
What's New in Version 1.3.....	7

Introduction

Quick Start to Networking and Security

In-Depth on Wi-Fi

Managing Wi-Fi Connections	11
Wi-Fi Troubleshooting	19
Tweaking Your Home Network for Faster iPad Performance	22

Connect to a Secure Wi-Fi Network

Connect with WPA/WPA2 Personal.....	25
Connect with WPA2 Enterprise	26
Outdated Methods	28

Work with 3G

Two Kinds of 3G	34
Why Use 3G.....	35
Pick a Data Plan	36
Activate and Manage Service	41
Keep Usage Restrained.....	46
Choose to Use 3G or Wi-Fi	48
Cross-Border 3G iPad Use.....	50
Alternatives to iPad Data Plans	52

Set Up Bluetooth

Bluetooth Basics.....	54
Pairing Any Device.....	55
Tethering	57
Peer-to-Peer Pairing	58

Apple Wireless Keyboard	60
Audio Devices	62
Airplane Mode	
What's Airplane Mode?	65
Turning Radios off Separately	66
Transfer Data Securely	
Exposure	68
Secure Solutions	74
Keep Data Safe	
Exposure	81
The Danger of Safari's AutoFill.....	84
Mitigation	84
When Your iPad Goes Missing	
Safety Tips While Out and About	88
Find My iOS Device.....	88
Remote Tracking Software	100
About This Book	
Ebook Extras.....	103
About the Author	103
About the Publisher.....	104
Copyright and Fine Print	
Featured Titles	
Increase Your iPad IQ.....	106
Use Your Mac Like a Pro	106

Read Me First

Welcome to *Take Control of iPad Networking & Security*, version 1.3, published in June 2010 by TidBITS Publishing Inc. This book was written by Glenn Fleishman and edited by Tonya Engst.

This book describes how to use your iPad or iPad 2 with iOS 4 on a Wi-Fi or 3G network securely, making connections with ease while protecting your data and your device. It also covers troubleshooting connection problems, and picking the right mobile broadband plan or other options for cellular connectivity.

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Updates and More

You can access extras related to this book on the Web (use the link in [Ebook Extras](#), near the end of the book; it’s available only to purchasers). On the ebook’s Take Control Extras page, you can:

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Basics

In reading this book, you may get stuck if you don't understand a few basic facts related to the iPad, or a few conventions that the Take Control series uses.

Software and hardware:

- **iPad and iPad 2:** This book covers all iPad models shipped to date, including the original and iPad 2. The iPad 2 is slightly thinner and lighter, and somewhat faster than the original, and it has front- and rear-facing cameras. For the purposes of this book, the old and new units function alike.
- **iOS:** iOS is the name of the operating system (OS) that handles all of the iPad's operations, managing hardware and software. Apple formerly called iOS *iPhone OS*, which made increasingly less sense given that the iPhone, iPad, and iPod touch all use the operating system.

iOS 4 is an upgrade for all the original iPads, starting with iOS 4.2.1. The iPad 2 shipped with 4.3. All iPads may be upgraded to iOS 4.3 and later releases. Apple's iOS 5, due in the third quarter of 2011, will work on all iPads as well.

- **GSM and CDMA:** GSM and CDMA are the two most widely used cellular standards in the world. GSM is in far greater use, with AT&T in the United States and major carriers across Europe, Asia, and the Americas relying on it. CDMA is used by Verizon Wireless in the United States and by a few other carriers in limited markets. Apple originally released the 3G iPad in a worldwide GSM edition. The iPad 2 comes in separate models for 3G GSM and for Verizon Wireless's CDMA network.
- **Radio types:** All iPad models have Bluetooth and Wi-Fi radios. *Bluetooth* is a short-range wireless technology for linking audio headsets, wireless speakers, keyboards, and mice. *Wi-Fi* is a high-speed networking standard for moving data among computers and other devices on a local network.

The 3G iPad has two more radios: a *cellular modem*, which allows data communications on mobile networks, and a *GPS receiver* for calculating position based on satellite signals, just like with a

standalone GPS navigator. The cellular modem may be for either GSM networks or Verizon Wireless's CDMA network.

Information Related to 3G Networking is Highlighted

I use a special blue box to call out information particular to the iPad's 3G hardware and 3G service plans.

- **Desktop vs. mobile:** In this ebook, a *desktop device* is either a laptop or a traditional computer that would sit on a desk, typically running Mac OS X or Windows. A *mobile device* means a portable or handheld computer-like device such as an iPhone, iPad, iPod touch, Android phone, Kindle, or Blackberry. *Mobile software* or a *mobile operating system* refers to software running on a mobile device, such as iOS or the mobile version of Apple's *desktop* Safari Web browser, which is technically called *Mobile Safari*, even though Apple calls it "Safari" on the iOS 4 Home screen.

Navigating on the screen and in the menus:

- **Touchscreen:** I often mention tapping an item on the touchscreen, such as "tap the Join button." Occasionally, you may need to double tap, or even touch. *Touching* means putting your finger on the screen and keeping it there until something happens. You may also need to swipe or drag your finger across the screen.
- **Settings app:** I often tell you to adjust options in the Settings app. By default, this app appears on the first page of the Home screen. To view the Home screen, press the round Home button on the edge of the device. To open the Settings app, tap its icon.
- **Navigation:** To describe moving around in the iOS 4 interface, I sometimes use a shortcut. For example, if I wanted to tell you to open the Settings app, tap the Wi-Fi option at the left, and then—in the right hand Wi-Fi Networks pane—tap Other, I might instead tell you to "tap Settings > Wi-Fi > Other."
- **Using an external, physical keyboard:** Some directions assume you are using an onscreen keyboard. If you are using a physical keyboard, you may need to press the Return or Enter key to enter certain information, instead of tapping the Join or Search button that would otherwise appear on the onscreen keyboard.

What's New in Version 1.3

Improvements in iOS with the release of 4.3 have been folded into this version. This includes network-related features, such as:

- Apple has released Verizon Wireless versions of the iPad 2 that use Verizon's less-common cellular network standard, CDMA. Information related to Verizon's network has been added and updated throughout the book.
- Service plan information for prepaid and postpaid plans for AT&T and Verizon Wireless has been altered.
- [Alternatives to iPad Data Plans](#), a topic that discusses alternatives to using a 3G network for iPad access, has been dramatically simplified due to improvements in using phones as mobile hotspots, and the addition of Bluetooth tethering to the iPad.
- The [Set Up Bluetooth](#) chapter was updated to explain how and why to use Bluetooth tethering with an iPad to gain access to the Internet through a phone, laptop, or router.
- I removed two chapters on apps for remote access and document access because of the rapid changes in apps in those categories and because of an apparent lack of general interest on the part of readers. Most of the former "Access Documents" chapter is covered in [Take Control of Working with Your iPad](#).
- Beyond the Verizon-related changes noted above, no changes were necessary for the iPad 2, which has minor hardware differences from the original iPad, but otherwise functions the same from the network and security standpoint.
- The EPUB-formatted file for this new version was created using Take Control's in-house procedure, instead of outsourcing it, as we've done previously. The new look is now much closer to the usual Take Control styling. (Read [Ebook Extras](#), near the end of the ebook, to find out how to get the EPUB.)

Introduction

An argument against the iPad before its introduction was that it was just “a big iPod touch.” In reality, it is not: the bigger screen makes it possible to use it in a different way altogether. But from the standpoint of networking and other communications, the iPad is like a giant iPod touch—with some iPhone features thrown in, too.

Like the iPod touch, the iPad can’t place phone calls via the separate voice portion of a cellular network, and it has Wi-Fi built in; like the iPhone, the 3G iPad can send and receive data over a 3G cellular network—but it can’t handle cell phone calls. This combination of options—and the likelihood that you probably don’t own both a Wi-Fi-only and a 3G iPad—has implications for the choices you make about how you connect and the security of those connections.

One of the most important ongoing decisions you’ll make about your iPad is how to obtain a network connection. If you have a 3G iPad, you may choose each month whether to enable cellular data connectivity or not. Those with Wi-Fi-only iPads may spend a fair amount of time finding, connecting to, and interacting with Wi-Fi networks all over. There’s plenty of advice in this title on both 3G and Wi-Fi connections and networks.

In this book, I guide you through how to make consistent and secure network connections, whether over Wi-Fi or 3G, and how to best protect your data and your iPad.

Calling: *Just to muddy the water even further, you can make phone calls from an iPad using voice over IP (VoIP) programs, like [Skype](#), that connect calls between Skype users or to and from the public switched telephone network over the Internet.*

Quick Start to Networking and Security

This book explains how to use an iPad safely on a network, including how to connect and customize a connection, and how to secure data that's on your device or that's passing over a network. You can read the ebook in order or skip to topics of particular interest.

Make a connection:

- Hook up with Wi-Fi without worries by reading [In-Depth on Wi-Fi](#).
- Sort through the mobile broadband plan you need and learn how to keep usage reasonable in [Work with 3G](#).
- To tether your iPad to another device for Internet access, or to use a Bluetooth accessory, see [Set Up Bluetooth](#).

Ensure you're secure:

- Set up a secure Wi-Fi connection. Read [Connect to a Secure Wi-Fi Network](#).
- Prevent others from sniffing your passwords and data over wireless networks. See [Transfer Data Securely](#).
- Don't let your data fall into the wrong hands. See [Keep Data Safe](#).
- Learn how to set up the "Find My iPhone" service, and find out what to do [When Your iPad Goes Missing](#).

Learn to use a 3G iPad's cellular data services:

- Discover the ins and outs of cellular data plans from AT&T and Verizon Wireless, and get advice about other carriers, in [Work with 3G](#).
- Avoid unexpected data service plan fees. See [Keep Usage Restrained and Choose to Use 3G or Wi-Fi](#).
- Keep cellular data costs under control outside your home country. Read [Cross-Border 3G iPad Use](#).

Go under the hood, gain more control, and solve problems:

- Read [Managing Wi-Fi Connections](#) to learn the ins and outs of joining and forgetting hotspot networks, configuring your device to connect in complex scenarios, and work through problems with [Wi-Fi Troubleshooting](#).
- Find tips for setting up a residential Wi-Fi network to work well with iPads in [Tweaking Your Home Network for Faster iPad Performance](#).
- Get advice on setting up a secure wireless network in [Connect to a Secure Wi-Fi Network](#).
- Learn how to turn off the iPad's various wireless radios in [Airplane Mode](#).

In-Depth on Wi-Fi

Wi-Fi works quite simply in iOS 4, but there's a lot of hidden detail. In this chapter, you will learn how to interpret the Wi-Fi Networks settings view, handle automatic hotspot connections, manipulate custom network settings, and troubleshoot common problems.

You'll also find out how to configure a home or small office Wi-Fi network to best take advantage of the iPad's Wi-Fi adapter.

Managing Wi-Fi Connections

iOS 4 centralizes all its Wi-Fi management into the compact space of the Wi-Fi Networks settings view. To reach it, open the Settings app and tap Wi-Fi.

The Wi-Fi Networks view (**Figure 1**) has three elements:

- The Wi-Fi switch is used to disable and enable the Wi-Fi radio.
- Beneath the Choose a Network label, you may see a list of networks. Each entry in the list has three or four elements:
 - ▶ The network name, which is also called the SSID (Service Set Identifier) in some of the geekier base station configuration tools. This is the name that a network uses to *advertise* itself to Wi-Fi adapters that are looking to make a connection.
 - ▶ A lock icon (optional). A lock indicates that there's some form of protection on the network.
 - ▶ A signal strength indicator. One, two, or all three of the radio waves in the indicator are lit up (starting at the bottom) to show the strength of the signal being received by the device.
 - ▶ A detail  button. Tapping this—carefully, because it's a tiny target—reveals technical details about the network, as well as an option to forget the network. For more about these technical details, see [Drill Down to Network Details](#), a few pages ahead.

Connect to a Secure Wi-Fi Network

Most home networks are now secured, and nearly all businesses networks employ some way of keeping outsiders out. Connecting to these networks requires a little bit of knowledge and planning to avoid roadblocks. This chapter looks at how to connect an iPad to a network, and at solving common problems that you may encounter.

Wi-Fi security divides out into three main types:

- **Simple network security:** Since 2003, the best option for a home or small office network is Wi-Fi Protected Access, which comes in WPA and WPA2 flavors. This what's now mainly used, due to Apple and Microsoft improving their operating systems, and wireless router makers improving their devices. See [Connect with WPA/WPA2 Personal](#).
- **Corporate/academic security:** Many companies and colleges rely on WPA/WPA2 Enterprise, a stronger method of security that's fully supported in iOS. Read [Connect with WPA2 Enterprise](#).
- **Outdated, unreliable “security”:** This category is where I put Wireless Equivalent Privacy (WEP), a Wi-Fi security method that was broken in 2003, but is still in use. It's also where I put MAC address filtering, in which unique adapter numbers are used to control access. Consult [Wired Equivalent Privacy \(WEP\)](#) and [Mac Address Filtering](#) to learn more.

Of course, I'd prefer you always made a secure connection, but you may not have control over how a network is protected.

Separate security on 3G networks: 3G networks have their own security methods, which are partly based on the Subscriber Identity Module (SIM) for GSM networks and on a unique set of identifiers for CDMA networks.

Work with 3G

The iPad with 3G is an odd beast. It can connect to 2G and 3G mobile broadband networks in order to access the Internet, but it doesn't have cellular voice calling built in. The 3G iPad can connect to the Internet with Wi-Fi instead of with a mobile broadband network, but you can sign up for a mobile plan if you need ubiquitous Internet access.

Even more potentially confusing is that starting with the iPad 2, Apple sells two kinds of 3G tablets in the United States, but only one kind in the rest of the world. Apple offers a GSM model worldwide, and a CDMA version tailored for Verizon Wireless in the United States. That's troublesome only when figuring out which to buy and setting up accounts.

Because every 3G iPad has both Wi-Fi and 3G capabilities, you're often balancing the advantages of one versus the other. Let's look at the choices you can make and how to set them up.

At the end of this chapter, I discuss [Alternatives to iPad Data Plans](#) to help you extend 3G service to any iPad, regardless of whether it has a 3G radio or an active 3G plan.

Two Kinds of 3G

Around the globe, two kinds of cellular communications standards dominate mobile networks: GSM and CDMA. GSM has billions of voice users, and it is the dominant standard in most nations—except the United States. Apple's GSM models of the iPhone, iPad, and iPad 2 are designed to work on GSM networks worldwide. AT&T and T-Mobile, currently in the midst of an attempt to merge, are both GSM carriers.

GSM voice and data standards extend from 2G (plainly named GSM) and GPRS (dial-up modem speeds) through 2.5G (EDGE, the only flavor available on the original iPhone) and 3G (UMTS, HSPA, and HSPA+). (T-Mobile's particular implementation of 3G prevents current iPhone and iPad models from working on that network at 3G speeds.)

Set Up Bluetooth

Bluetooth wireless networking lets you connect peripherals like battery-powered headphones, earpieces, headsets, and keyboards to an iPad for listening to music and entering text.

Starting in iOS 4.3, you can also use Bluetooth to provide Internet service to an iPad from another device, such as an iPhone with Internet Tethering or Personal Hotspot turned on, a laptop, or a cellular router with Bluetooth as a connection option.

Read this chapter to learn how to set up and manage Bluetooth devices.

Bluetooth Basics

The Bluetooth SIG, a trade group, certifies devices as Bluetooth compliant for particular *profiles*, which include things like text entry, stereo audio, file transfer, and modem access. The iPad works correctly with any device that meets the Bluetooth spec for several profiles, including audio, peer-to-peer transfer, and external keyboards. Bluetooth hosts, like these devices, aren't required to support all profiles.

Not every device or model supports all available profiles. iPhones, for instance, allow access to the Hands-Free Profile to use a headset or earpiece for phone calls, while the iPad (and iPod touch) omit such support—even though it would be useful for VoIP (voice over IP) apps, such as Skype. Apple documents iOS device compatibility in a support note at <http://support.apple.com/kb/HT3647>.

When you connect with Bluetooth, the process is known as *pairing*. Some devices can be paired with several hosts (like computers or mobile devices); others can pair with only one host at a time, and must be re-paired to switch. Bluetooth devices are *discoverable* when they are set to allow a pairing connection.

Bluetooth is handled from the Bluetooth view (Settings > General > Bluetooth). This view lets you turn Bluetooth on and off and displays a list of (under Devices) of Bluetooth peripherals. The list shows any

Airplane Mode

Before you're flying so high with some guy in the sky, you need to disable radio communications from your iPad. The Airplane Mode switch makes this simple.

Contrary to urban myth, cellular phones don't cause planes to crash. That's good, because researchers empowered by a joint government-airport study group that sets standards for airworthiness have found that at least one mobile phone is left on during nearly all flights. (They also found no cause for alarm; you can read the whole report at <http://spectrum.ieee.org/aerospace/aviation/unsafe-at-any-airspeed/o>.)

The reason that the FAA and worldwide flight authorities demand that most kinds of electronics that produce or receive radio signals be turned off during a flight, as well as all electronic devices while flying below 10,000 feet, is because of a slight potential for risk that hasn't entirely been teased out from the reality of risk.

All electronic devices produce some emissions, and it's thought from years and years of testing that certain *avionics*—aircraft electronics—may be susceptible to some radio signals that are otherwise benign. Under 10,000 feet, a particular reading being knocked for a loop could be extremely dangerous. Hence the desire to reduce such risks.

What's Airplane Mode?

The Airplane Mode in iOS, available to all iOS devices, is a simple way to set your device to a legally required quiet mode during flight.

Saves battery life, too: *If you don't need to use any of the radios for network access, peripherals, or location, Airplane Mode is an effective way to extend battery life, too.*

Transfer Data Securely

Any networked mobile device, whether an iPad, laptop, Nintendo game player, or what have you, can be in constant communication with a network, which means that you could unintentionally reveal a lot about yourself—including passwords and private data—as your data flows between a central hub and the device. With an iPad, that hub is either a Wi-Fi router or, for a 3G model, a cellular base station on a tower nearby.

On an open public network, such as the Wi-Fi found in restaurants, cafés, and airports worldwide, anyone in your vicinity can use free, simple *sniffing* software to capture all the data passing by, extract passwords and personal information, and use it to wreak havoc, commit identity theft, and order goods and services for themselves. While it may sound paranoid, there's no built-in protection for some of your data, and you thus have to assume from the perspective of risk that someone is always trying steal your data.

Fortunately, it's easy to overcome this problem with a small amount of preparation and configuration. Here's what you need to know to stay protected while using local networks and the Internet.

Exposure

To figure out how to respond to the risk of data being captured as you transfer it, let's first consider what precisely is at risk and not at risk.

Cellular data is far less risky: *Cellular data is encrypted by default, and cell networks have far less risk for use. See [2G and 3G Data Networks](#) for more details, later in this chapter.*

What's at Risk?

When your iOS device is connected via Wi-Fi, the risk is both in data passing over the air to the Wi-Fi router, and data passing between the Wi-Fi router and a broadband modem over Ethernet. Malicious software that's found its way onto a computer that's connected via Ethernet to a Wi-Fi router could sample all data coming and going between Wi-Fi-connected devices and the Internet. In the paragraphs

Keep Data Safe

Someone using a completely unprotected iOS device can access any precious information stored on it and access accounts related to apps and Web sites. You can prevent other people from having access to that data, whether you leave your iPad on a living room table or your office cubicle and walk away for an hour, or if your device is stolen.

Exposure

Let's start with your exposure. iOS keeps relatively little data accessible; rather, what's at risk is access to resources. A person who uses your device without permission can't, for instance, recover your email account password, but could use your email account to read your email and send email purporting to be from you, or view any document in a word-processing program and view your photos.

What's at Risk?

Someone using your iOS device could access a large variety of the information that you've stored on it, as well as act as if he were you via email or within certain apps. Here are some examples:

- Read your email and send new messages.
- Access the content in any app that does not have password protection, such as Photos.
- Access, and potentially change or delete, files on any server that you've linked to in programs for remote file access, such as Air Sharing HD and GoodReader.

App passwords: *Air Sharing and GoodReader let you set a passcode that prevents unauthorized access separately from any iOS passcode (many programs offer this option). In Air Sharing, tap the wrench  icon at the lower right of the main screen, tap Application Lock, and turn the passcode on; in GoodReader, tap the settings  icon, tap General Settings, and scroll down for several options.*

When Your iPad Goes Missing

Your iPad is a desirable item for thieves. It's compact, it has a high retained value, and there's a huge market for used models.

Without freaking you out about theft, I want to tell you how you can make it impossible for a thief to use your device, protect your data when it's disappeared, and find your device if it's stolen or lost.

Safety Tips While Out and About

Let me start with a few practical tips, applicable to any mobile device:

- **Don't pull out your device outdoors or in large open public spaces indoors if you can be approached from behind:** I don't suggest always keeping your back to the wall, but if you're in a crowded railway station and whip out the unit, it would be easy work for someone to run by and snatch it.
- **Don't set it down and turn away:** Leaving it on a table at a café while you turn away to talk to someone could provide a thief with a good opportunity to relieve you of your device.
- **Lock your device when you're not using it:** If you use the passcode lock described in [Set a Passcode](#) and hit the Sleep/Wake button when you're not using the device, it's more likely that a thief couldn't access your data.

Find My iOS Device

In 2009, Apple added a clever feature that combines the location awareness of iOS devices with MobileMe: Find My iPhone. Despite that name, which is how it's labeled at the Me.com site, you can find the last reported position of any iPod touch, iPhone, or iPad, so long as you've set up a MobileMe account on the device and turned on the tracking feature. You can also take action remotely, choosing among

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About the Author

Glenn Fleishman writes constantly about technology in all its forms, from how-to guides to articles looking into how tech invades, co-exists with, and improves people's lives. He was trained as a typesetter, received a degree in art, and works as a journalist and programmer. His writing appears regularly in *the Economist*, where he contributes regularly to its Babbage blog; *the Seattle Times*, where he been a Mac columnist since 2000; and *TidBITS*, for which he programs, writes, and helps with strategy and planning. Glenn also regularly pens pieces for BoingBoing, Ars Technica, and his own Wi-Fi Networking News. He lives in Seattle with his wife and two sons.

Author's Acknowledgments

I dedicate this book to my wife, Lynn, and sons, Ben and Rex. They keep me sane and happy, and keep me from spending my entire day thinking about and using digital devices. A big thank you also to the tireless Tonya Engst.

Shameless Plug

I looked through thousands of iPhone, iPad, and iPod touch apps to find just under 200 included in *Five-Star Apps* (<http://5str.us/>), a book of reviews, advice, and insight into the iOS app experience. Visit the Web site to buy an unlocked PDF directly from the publisher, or a print copy with a 30 percent discount.

About the Publisher

Publishers Adam and Tonya Engst have been creating Apple-related content since they started the online newsletter *TidBITS*, in 1990. In *TidBITS*, you can find the latest Apple news, plus read reviews, opinions, and more (<http://www.tidbits.com/>). Adam and Tonya are known in the Apple world as writers, editors, and speakers.



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