

Whitepaper

An Industry Look at Wi-Fi Direct

Executive Summary

The promise of Wi-Fi Direct is pretty simple: **create a protected connection between two devices over standard Wi-Fi with as little hassle as possible.** This whitepaper introduces readers to this new standard from the Wi-Fi Alliance, covering topics from the technology details to applications and a market update.

An Introduction to Wi-Fi Direct

Wi-Fi Direct enables devices to connect to one another directly without having to join a traditional home, office, or hotspot network. This means that mobile phones, laptops, printers, cameras, gaming devices, tablets, and other devices can find each other and transfer content without a wireless router or access point. Wi-Fi Direct devices support typical Wi-Fi ranges and data-transfer rates and the technology promises to make it even easier for consumers to share content across the multitude of devices in the home or on the road.

Wi-Fi Direct is a software upgrade that should be available on Wi-Fi hardware devices. (See the Device Manufacturer for more details.) The Wi-Fi Direct standard and certification process is managed by the non-profit Wi-Fi Alliance.



Wi-Fi Direct: The Details

These are a few of the key features to know when it comes to Wi-Fi Direct:

Technology

Wi-Fi Direct uses the 802.11 networking standard. Wi-Fi Direct software can work on 802.11 a, g and n Wi-Fi networks (note: support for 802.11 b is optional).

Speed

Wi-Fi Direct does not affect the wireless speed. Wi-Fi speeds will be dependent on the Wi-Fi technology used, 802.11 a, b, g, or n.

Distance

According to the Wi-Fi Alliance, Wi-Fi Direct devices can reach each other from as far as 656 feet (200m) away, under optimal conditions. Like the speed standard above, this figure is on paper only – although the majority of applications and users would require an actual distance that's a fraction of this distance.

Security

Wi-Fi Direct has built-in security with WPA2, which uses AES 256-bit encryption and authentication. Unlike traditional Wi-Fi access points, security cannot be disabled with Wi-Fi Direct.

How it Works

Wi-Fi Direct devices are capable of acting like access points or hotspots. A Wi-Fi Direct network can be one-to-one (i.e. a mobile phone to printer) or one-to-many (i.e. laptop to multiple mobile devices). A Wi-Fi Direct device can connect with virtually any legacy wireless device. This means that only one of the Wi-Fi products needs to include Wi-Fi Direct software in order for a two-way connection to be set up. In addition, Wi-Fi Direct networks can cross-connect to an infrastructure Wi-Fi network and the Internet. A single device in a Wi-Fi Direct-certified group network may share Internet connectivity with other devices in the network by establishing simultaneous infrastructure and Wi-Fi Direct connections.

W-Fi Direct Facts:

- Wi-Fi Direct connections can be one-to-one or one-to-many
- The number of devices in a Wi-Fi Direct-certified group network is expected to be smaller than the number supported by traditional standalone access points
- A Wi-Fi Direct device will be able to make device group connections with existing 802.11 a/g/n Wi-Fi gear
- A single device in a Wi-Fi Direct group network can share an Internet connection with other devices in the network
- Home routers do not need to support WiFi Direct since WiFi Direct works directly between the individual devices.

Applications

With Wi-Fi Direct, Wi-Fi devices – from laptops and printers to phones and projectors – can connect to one another without existing networks and access points. Potential Wi-Fi Direct applications include:

- Users on-the-go can print, share data, and sync files from notebooks, netbooks, and smartphones. If you're on a business trip and can't find a convenient hotspot, you can still transfer files quickly from your tablet to laptop.

- Consumers can wirelessly push content from their PC (or even the Internet) to their television: for example, you can shoot photos from your computer to your television or a Wi-Fi Blu-Ray player could wirelessly stream a movie to a TV in another room.
- Friends can battle head to head in a multi-player game.
- Users can print photos from their camera/mobile device to printer without a router or home network.
- Colleagues can easily share files between laptops without having to find a hotspot first.
- Business users can stream a presentation from their laptop to projector without needing a cable or network connection.

Wi-Fi Direct Certification

Device to device communication between Wi-Fi devices isn't necessarily new. For example, Nintendo DS has long offered proprietary device-to-device Wi-Fi interaction. Apple, Intel, and HP have some form of a wireless printing solution, and Intel's wireless display offers a way to push PC content to a TV. However, these applications are either proprietary, rely on an existing Wi-Fi network, or require an extra piece of hardware (i.e. an adapter).

Wi-Fi Direct opens up device-to-device capabilities beyond these vendor-specific silos. For example, direct wireless communication isn't limited to just a Windows or Intel environment. With the Wi-Fi Direct certification program, consumers are free to purchase and use a mixture of devices (set top box, gaming console, TV, laptop, mobile phone, printer, etc) from multiple vendors. The availability of an industry standard should help propel the Wi-Fi Direct market and enable broader consumer adoption.

The Certification Process and Timeline

The Wi-Fi Alliance first released the Wi-Fi Direct specification in Q4 2009, and launched its Wi-Fi Direct certification program in October 2010. The standard has support from major Wi-Fi silicon providers, including Intel, Atheros, Broadcom, and Marvell. However, to date, product certifications have been a gradual process. By comparison, when the Wi-Fi Alliance first began certification on 802.11n, more than 95 products received certification within the first three months.

The Wi-Fi Alliance keeps a current list of all Wi-Fi Direct certified products on its website. The bulk of certified products to date are mini-card/dongle adapters for laptops. LG demonstrated Wi-Fi Direct at CES 2011 on its Optimus Black handset and TV screen. LG has received Wi-Fi Direct certification on several Blu-Ray players and home theater systems. And Sony's Bravia Digital TV line is also Wi-Fi Direct certified.

Market research firm In-Stat forecasts that more than 170 million devices with Wi-Fi Direct will ship in 2011, representing almost a fifth of all Wi-Fi products expected to be manufactured.¹ They believe that the bulk of devices shipping with embedded Wi-Fi Direct in 2011 will include PCs, digital TVs, mobile phones, and notebook PCs.

The In Stat report also predicted:

- There will be 80 million digital televisions with Wi-Fi Direct by 2015
- Every PC, CE device, and mobile phone that ships in 2014 with Wi-Fi silicon will be Wi-Fi Direct-enabled.
- The Wi-Fi Direct-enabled device shipment compounded annual growth rate will be 79% between 2011 and 2015.

Wi-Fi Direct via Software Upgrade

It's important to note that Wi-Fi Direct is software based, so in theory, most Wi-Fi chipsets could be upgraded to support Wi-Fi Direct via firmware. This means the marginal cost of a Wi-Fi Direct-enabled chip over a basic Wi-Fi chipset is negligible.

This reality also puts more burden on software development and the app ecosystem. Brian O'Rourke, Research Director of In-Stat, stated, "Ultimately though, the key to Wi-Fi Direct's success will lie in the application programming interface (APIs) software that is developed to make Wi-Fi Direct useful to the consumer."

Conclusion

It's yet to be determined just how strongly consumers will embrace Wi-Fi Direct. However, it's clear that Wi-Fi is a mainstay in this era of mobility. 70 percent of Millennials (ages 17-29) in the U.S. said they spend more than four hours a day on a Wi-Fi connection.² And the Wi-Fi Alliance projected that 82 million Wi-Fi enabled portable consumer electronic devices and 216 million Wi-Fi enabled handsets shipped in 2010.³ These numbers provide a powerful foundation for the adoption of Wi-Fi Direct, as existing Wi-Fi solutions can be upgraded to Wi-Fi Direct without a hardware upgrade. In addition, even non-upgraded devices can still join a Wi-Fi Direct network as long as there is one Wi-Fi Direct device present.

The technology behind Wi-Fi Direct presents exciting opportunities for digital home, collaboration, and mobility applications. Time will tell just how much Wi-Fi Direct will change the way data is shared and transferred across devices.

About Actiontec

Actiontec Electronics develops broadband connectivity and broadband-powered solutions that simplify and enrich the digital life – delivering a unified experience that encompasses communications, entertainment, home management, and more. Actiontec offerings range from the market's broadest selection of IPTV-capable broadband home gateways for bringing IP-based video services into the home, to DSL modems, wireless networking devices, routers and digital entertainment devices. The company's carrier-class products are easy to install, manage, and use, and are sold through retail channels and broadband service providers. The company is committed to protecting the environment through energy efficient products and other green-friendly practices. Founded in 1993, Actiontec is headquartered in Sunnyvale, CA, and maintains branch offices in Colorado Springs, CO; Shanghai, China; and Taipei, Taiwan.

Appendix: Resources and References

¹“173 Million Wi-Fi Direct-Enabled Devices to Ship in 2011.” In-Stat, April 20, 2011

²“Millennials Rely on Wi-Fi to Maintain Relationships.” Ryan Kim. GigaOM. Sept. 20, 2010

³ Press Release:“Wi-Fi gets personal: Groundbreaking Wi-Fi Direct launches today.”Wi-Fi Alliance. October 25, 2010.