



Xerox® ConnectKey® Technology-Enabled Multifunction Printers with Wi-Fi Direct® White Paper

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Preface

The purpose of this document is to describe the system components, operability and features available within Wi-Fi Direct® networks including Xerox® ConnectKey® Technology-enabled multifunction printers (MFPs). It is designed to serve as a reference guide for mobile devices and MFPs connecting within a network environment.

The target audience for this document is focused on the following customer roles:

Role	Description
Customer Technology Vendor	Deploys equipment at the direction of the customer's IT Team
Customer IT Team	Certifies and deploys the Remote Services tool set and enables/disables features
Customer Security Team	Evaluates and certifies/approves the tool set for use in the customer environment in accordance with company policies and in compliance with appropriate legislation and industry standards



Terminology Used in This Document

Wi-Fi® is a local area wireless computer networking technology that allows electronic devices to connect to the network, mainly using the 2.4 gigahertz UHF and 5 gigahertz SHF ISM radio bands (The Industrial, Scientific and Medical (ISM) radio bands).

WLAN—A **wireless local area network (WLAN)** is a computer network that links two or more devices using a wireless distribution method within a limited area such as a home, school, computer laboratory or office building. This gives users the ability to move around within a local coverage area and still be connected to the network, and can provide a connection to the wider Internet. Most modern WLANs are based on IEEE 802.11 standards, marketed under the Wi-Fi name.

WAP—In computer networking, a **wireless access point (WAP)** is a device that allows wireless devices to connect to a wired network using Wi-Fi or related standards. The WAP usually connects to a router (via a wired network) as a standalone device, but it can also be an integral component of the router itself. A WAP is differentiated from a hotspot, which is the physical space where the wireless service is provided.

WPS—**Wi-Fi Protected Setup™ (WPS)** is a network security standard to create a secure wireless network. For the Xerox® ConnectKey®-enabled MFPs that support Wi-Fi Direct®, both the Push-Button Configuration (PBC) and PIN entry methods are supported. WPS simplifies and standardizes the process of configuring and securing a Wi-Fi network. When the WPS PBC method of authenticating and connecting is used by the mobile client, the MFP automatically generates a Pre-Shared Key (PSK) and uses the WPA2™ PSK and AES-CCMP methods and algorithms per the WPS specifications.

Executive Summary

Wi-Fi Direct®, initially called Wi-Fi P2P (peer-to-peer), is a Wi-Fi® standard that enables devices to easily connect with each other without requiring a wireless access point. It is usable for everything from Internet browsing to file transfer, and to communicate with more than one device simultaneously at typical Wi-Fi speeds. One advantage of Wi-Fi Direct is the ability to connect devices even if they are from different manufacturers.

Wi-Fi Direct negotiates the link with a Wi-Fi Protected Setup™ system that assigns each device a limited wireless access point. The “pairing” of Wi-Fi Direct devices can be set up to require a button press on the mobile devices.

Wi-Fi CERTIFIED™ Wi-Fi Direct is a certification mark for devices supporting a technology that enables Wi-Fi devices to connect directly, making it simple and convenient to do things like print, share, sync and display. Products bearing the Wi-Fi Direct certification mark can connect to one another without joining a traditional home, office or hotspot network.

Wi-Fi Direct networks, including Xerox® ConnectKey® Technology-enabled MFPs, are used to print jobs easily without the need for the mobile client (typically a smartphone or tablet) to connect to the organization’s wired infrastructure network.



One advantage of Wi-Fi Direct® is the ability to connect devices even if they are from different manufacturers.

What is Wi-Fi Direct®?

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 802.11a/g/n Wi-Fi® networks. (Note: support for 802.11b is optional.)

Speed

Wi-Fi Direct does not affect the wireless speed.

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—Authentication and Connection

Wi-Fi Direct has built-in security with WPA2™, which uses AES 256-bit encryption and authentication. When the WPS PBC method of authenticating and connecting is used by the mobile client, the MFP automatically generates a Pre-Shared Key (PSK) and uses the WPA2 PSK and AES-CCMP methods and algorithms per the WPS specifications. The PSK, sometimes referred to as a Password, is not exposed. The MFP does not allow client connection cross over or route into other wired or Wi-Fi WLAN interfaces. Unlike traditional Wi-Fi access points, security cannot be disabled with Wi-Fi Direct.

Security—Connection Management

The Xerox® ConnectKey®-enabled MFP is the Group Owner with one group created autonomously. The MFP will not join a P2P Group other than the one created at the MFP, or respond to P2P Invitation requests. The MFP does not initiate or respond to Group Owner negotiation to create a new P2P Group.

Security—Repudiation

The changes to the enabled/disabled state of the Wi-Fi Direct network interfaces and other configuration changes are captured in the Device Audit log.

How It Works

Wi-Fi Direct devices, in this case a ConnectKey-enabled MFP with the wireless adapter plugged into the USB port, are capable of acting like access points or hotspots. A Wi-Fi Direct network can be one-to-one (for example, a mobile phone to printer) or one-to-many (a smartphone to multiple mobile devices).



Unlike traditional Wi-Fi® access points, security cannot be disabled with Wi-Fi Direct®.

Mobile Phone/Tablet Prerequisites

Android™ OS—4.4 (KitKat), 5.0/5.1 (Lollipop), 6.0 (Marshmallow)

- Mopria® Print Service
 - Preloaded on Amazon® Fire and Huawei models
 - Install from the Play Store App and turn **On** (Consider turning other print tools **Off**)
- Wi-Fi Direct®
 - Enable by going into Settings, Wi-Fi, and selecting **On**.

Xerox® ConnectKey® Technology-enabled MFP Prerequisites

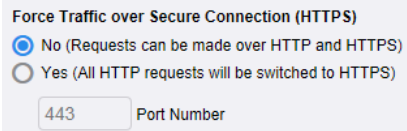
The Wireless Print Adapter is installed into the USB port on the Xerox® MFP and the light is illuminated.

The MFP needs to have 2016 software 073.xxx.xxx.34540 or later. See the table on page 11.

Xerox® MFP Setup

If the MFP is set with factory defaults, it works 'out of the box' with no configuration setting changes.

1. Power On the MFP after installing the Wireless Print Adapter.
2. In Xerox® CentreWare® Internet Services (CWIS), confirm the device admin has not changed the default setting for HTTP.
3. Go to Properties/Connectivity/Setup/HTTP and click **Edit**. Confirm that 'Force Traffic over Secure Connection (HTTPS)' is set to **No**. If it is set to **Yes**, you will need to change it to **No** and then reboot the MFP.



Force Traffic over Secure Connection (HTTPS)

No (Requests can be made over HTTP and HTTPS)

Yes (All HTTP requests will be switched to HTTPS)

443 Port Number

4. In Xerox® CentreWare Internet Services (CWIS), confirm the device admin has not changed the default setting for Mopria to **Enabled**.
5. Go to Properties/Connectivity/Setup/Mopria and click **Enabled**.



Example—Ad Hoc Print Workflow

1. Tap the Gallery app on the smartphone.
2. Tap the desired image to print.
3. Tap **Menu**, then tap **Print**.
4. Wi-Fi® automatically lists XRX WC 7830 (5503FD) as the default WPS name.
5. Tap **XRX WC 7830**; a prompt will request to connect.
6. On the MFP touch panel, click **Okay** to connect.
7. Tap **Okay** to print.

(Optional—choose the number of copies, color, range, size and type.)

Tips

- You must choose an Android™ application that is capable of printing. Some apps have not been designed to print.
- By default, Mopria will use the smartphone or tablet's device name on a print banner page. If you want to customize and put your own name or other identifying information, modify the default as follows:

Go to **Settings/Printing/Mopria Print Service/Settings/User Name** and enter the text as you wish it to appear on the banner page.



General Information

Use Wi-Fi Direct® without an Internet connection.

Wi-Fi Direct-certified devices can be used for all kinds of applications to share content, sync data, socialize, play games, audio and video, and print— all the things you do with your Wi-Fi® devices today, only easier and without worrying about finding an Internet connection.

Wi-Fi Direct connections happen anywhere, anytime.

Wi-Fi Direct device connections can happen anywhere, anytime—even when there is not access to a Wi-Fi network. Wi-Fi Direct devices emit a signal to other devices in the area, letting them know a connection can be made. Users can view available devices and request a connection, or may receive an invitation to connect to another device. When two or more Wi-Fi Direct-certified devices connect directly, they form a Wi-Fi Direct Group using Wi-Fi Protected Setup™ and the latest Wi-Fi security. Mobile phones, cameras, printers and PCs connect to each other directly to transfer content and share applications quickly and easily. Devices can make a one-to-one connection, or a group of several devices can connect simultaneously. Connecting Xerox® ConnectKey®-enabled MFPs is easy and simple, with the push of a button or entering a PIN. Moreover, all Wi-Fi Direct connections are protected by WPA2™, the latest Wi-Fi security technology. With Wi-Fi Direct, you do not need an access point or Internet connection; your personal Wi-Fi network goes with you wherever you go.

Wi-Fi Direct® in the enterprise: Evaluating peer-to-peer Wi-Fi connectivity.

Wi-Fi CERTIFIED™ Wi-Fi Direct is a certification program for products implementing peer-to-peer Wi-Fi connections between devices, without the need to establish a link to an access point.

Wi-Fi Direct device and service discovery are utilized in standardized services that streamline the overall Wi-Fi experience for users. Four pre-defined services—Wi-Fi Direct Send, Wi-Fi Direct Print, Wi-Fi Direct for DLNA® (Digital Living Network Alliance) and Miracast®, a Wi-Fi CERTIFIED solution supporting wireless display—take advantage of this simplified connection technology.

Many enterprises have begun to explore the benefits of Wi-Fi Direct and use it primarily for document distribution, printing, wireless projection, flat-screen display and white-boarding.



Wi-Fi Direct® device connections can happen anywhere, anytime—even when there is not access to a Wi-Fi® network.

FAQ

How many devices can connect?

Xerox® ConnectKey®-enabled MFPs with the optional Wireless Print Solutions Adapter support up to eight concurrent connections.

What happens when the MFP is connected to a Xerox® Wireless Print Solutions Adapter?

The Xerox® Wireless Print Solutions Adapter adds wireless and mobile printing capabilities to MFPs that don't have those capabilities built in. This pocket-sized adapter sits next to the device.

What are the pre-defined services for Wi-Fi Direct®?

Optional standardized services allow users to “discover, connect and do” in a single step. Wi-Fi Direct Print gives users the ability to print documents directly from a smartphone, tablet or PC with a single command.

If I make a Wi-Fi Direct group with another person, can they see any of the contents of my device?

No. Only the file you select for printing will be transmitted to the ConnectKey-enabled MFPs.

Is the device with the Xerox® Wireless Print Solutions Adapter certified?

Yes. It is Wi-Fi CERTIFIED™ Wi-Fi Direct. Wi-Fi CERTIFIED Wi-Fi Direct is a certification program for products implementing peer-to-peer Wi-Fi® connections between devices, without the need to establish a link to an access point.

The underlying specification connects devices using an approach similar to the traditional AP-to-client connection used in Wi-Fi CERTIFIED infrastructure networks. One Wi-Fi Direct-certified device provides the connection to other participants in a group of Wi-Fi Direct-certified devices in lieu of an AP. A device certified under the Wi-Fi Direct program does not require special hardware compared to traditional Wi-Fi AP devices.

How does security work for this Wi-Fi Direct-certified product compared to wired connections?

Group networks based on the specification underlying the Wi-Fi Direct program operate in a security domain that is independent from any infrastructure network. This means that they have the protection of the security features certified under the WPA2™ program, but are managed separately from the security system in the AP-based network (home, enterprise, hotspot). This means both the group networks based on the specification underlying the Wi-Fi Direct program and the infrastructure networks can be protected, but users don't need credentials for the infrastructure network to connect to the network based on the specification underlying the Wi-Fi Direct program.



The Xerox® Wireless Print Solutions Adapter adds wireless and mobile printing capabilities to MFPs that don't have those capabilities built in.

FAQ, continued

Does the specification underlying the Wi-Fi Direct® certification program work on both frequency bands?

Yes, the specification underlying the Wi-Fi Direct certification program supports operation in both 2.4 GHz and 5 GHz. Devices operating in the 2.4 GHz frequency band only and devices operating in both the 2.4 GHz and 5 GHz frequency bands can be certified under the Wi-Fi Direct program. Not all Wi-Fi Direct-certified devices support both frequency bands, so you should check which bands your devices support.

Can a mobile device simultaneously connect to a regular Wi-Fi® network and a group of Wi-Fi Direct-certified devices at the same time?

Yes. All devices certified under the Wi-Fi Direct program allow the user to connect to an infrastructure or a Wi-Fi Direct-certified network. Some devices certified under the Wi-Fi Direct program support connections to both an infrastructure network and Wi-Fi Direct-certified group at the same time. For example, a Samsung® smartphone may support an infrastructure connection to the organization's wireless network while also belonging to a Wi-Fi Direct-certified group.

Note: Xerox® ConnectKey®-enabled MFPs can be on a general Wi-Fi network and the MFP can use the Wi-Fi Direct (peer-to-peer) capability as a dual setup. However, this dual/simultaneous setup is an optional component of Wi-Fi Direct certification and was not specifically certified for ConnectKey-enabled MFPs by the Wi-Fi Alliance.

Does iOS support Wi-Fi Direct?

iOS devices currently do not support Wi-Fi Direct. Xerox® ConnectKey-enabled MFPs support iOS devices through other general Wi-Fi protocols such as Apple® AirPrint™ and the @PrintbyXerox app.



All devices certified under the Wi-Fi Direct® program allow the user to connect to an infrastructure or a Wi-Fi Direct-certified network.

Xerox® ConnectKey®-Enabled MFPs That Support Wi-Fi Direct®

Product	Software Version
Xerox® WorkCentre® 3655 Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/ WorkCentre 3655i Multifunction Printer	073.060.075.34540
WorkCentre 5845/5855 Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs	073.190.075.34540
WorkCentre 5865/5875/5890 Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 5865i/5875i/5890i Multifunction Printer	073.190.075.34540
WorkCentre 5945/5955 Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 5945i/5955i Multifunction Printer	073.091.075.34540
WorkCentre 6655 Color Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 6655i Color Multifunction Printer	073.110.075.34540
WorkCentre 7220/7225 Color Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 7220i/7225i Color Multifunction Printer	073.030.075.34540
WorkCentre 7830/7835 Color Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 7830i/7835i Color Multifunction Printer	073.010.075.34540
WorkCentre 7845/7855 Color Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 7845i/7855i Color Multifunction Printer	073.040.075.34540
WorkCentre 7970 Color Multifunction Printer loaded with the software for 2016 ConnectKey Technology-enabled MFPs/WorkCentre 7970i Color Multifunction Printer	073.200.075.34540



