Fax over IP

Administrator's Guide

Contents

Change history

March 2017

- Added information on the following:
  - Network connection overview
  - Fax system architecture
  - Reliability of the application

January 2016

- Added support for multifunction products with a tablet-like touch-screen display.

Overview

Use the application to send and receive faxes through an Internet connection without using modems, analog phone lines, or analog telephone adapters (ATA).

The application does not have a configuration page. To configure T.38 protocol settings, go to the printer fax settings in the Embedded Web Server. These settings depend on how the IP private branch exchange (PBX) is set up and configured. Configuring the printer firmware settings does not change how documents are faxed, except that sending and receiving faxes are done through a single network connection. For more information, see "Configuring the fax settings" on page 9.

Notes:

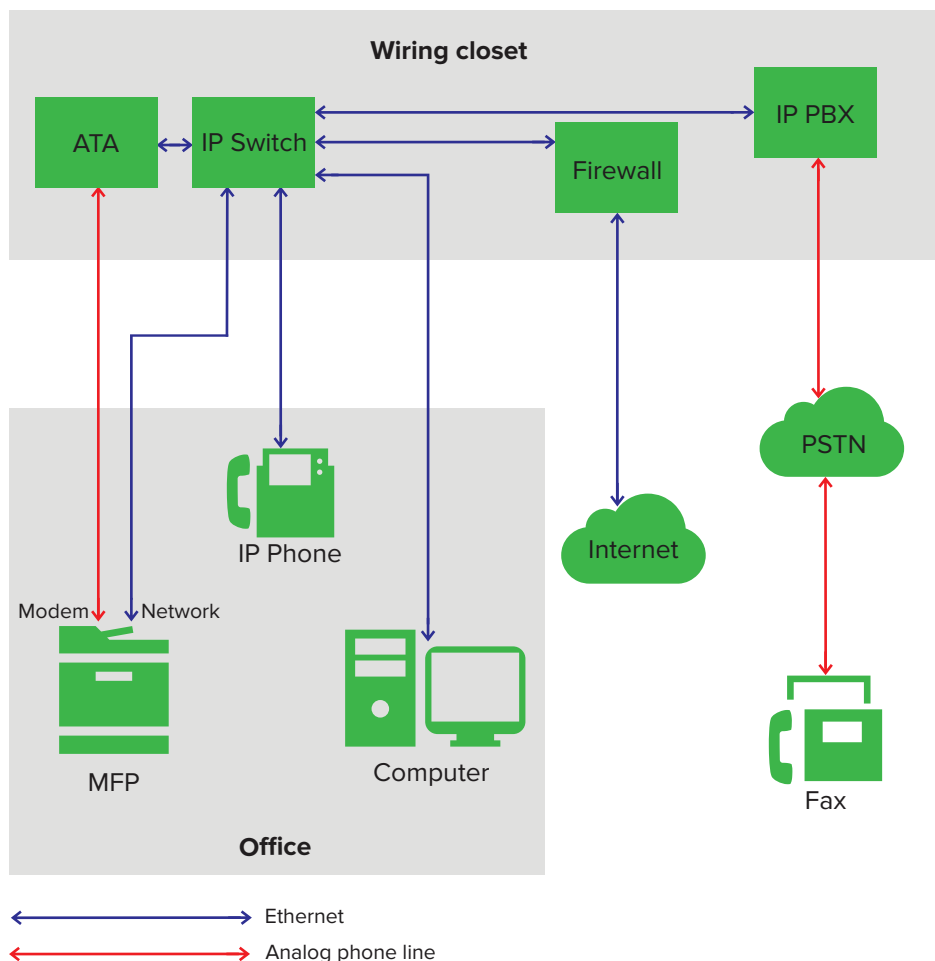- Before installing a new version of the application, uninstall the previous version.
- For a fast and reliable performance in a Voice over IP (VoIP) environment, combine real-time T.38 protocol with Session Initial Protocol (SIP) or H.323 protocol.

This document provides instructions on how to configure and troubleshoot the application.

You may need administrative rights to configure the application.

Understanding the network connection

In a typical VoIP installation, the analog phone lines for fax are provided by an ATA. The ATA connects to the network, detects when a fax call is starting, and then converts the analog tones and HDLC frames to T.38 network packets. An analog phone line connects to the modem on the multifunction product (MFP), and a network cable connects to the MFP network adapter.

Wiring closet

ATA IP Switch Firewall IP PBX

PSTN

IP Phone

Modem Network

Internet

MFP Computer

Fax

Office

Ethernet

Analog phone line

The application lets MFPs send fax data that is formatted to T.38 protocol to an IP PBX using a single network connection.
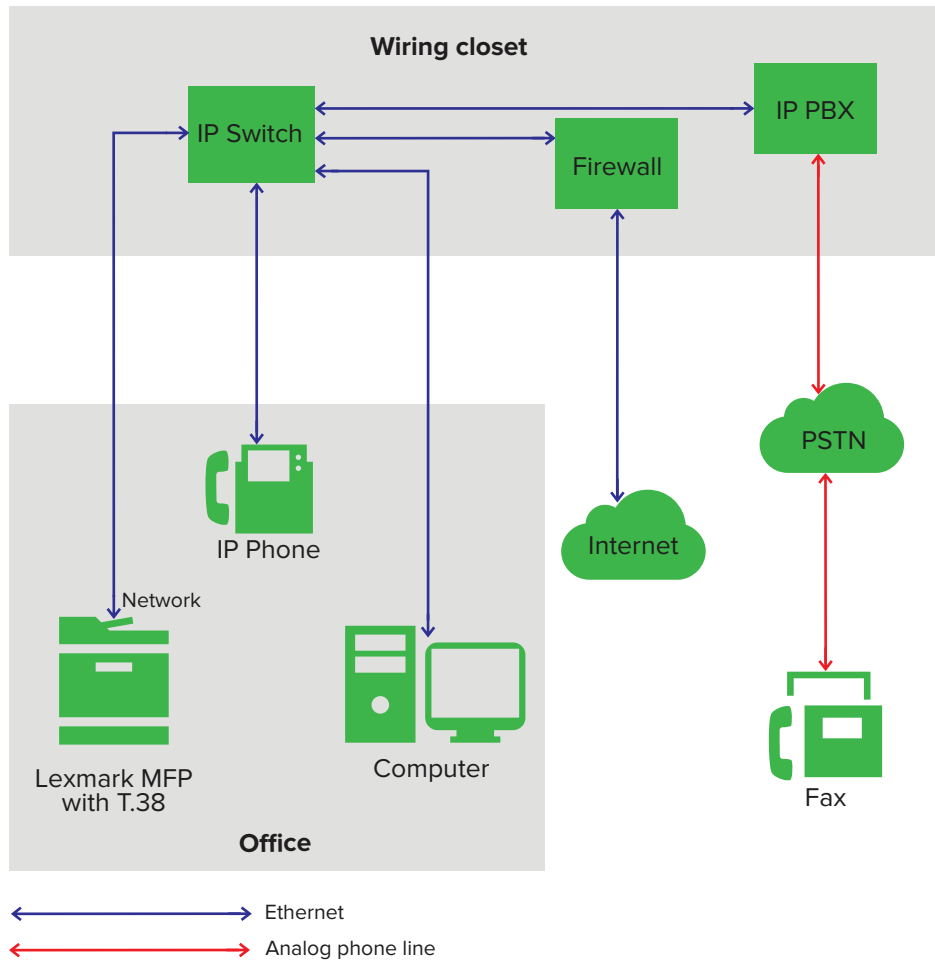
Understanding the fax system architecture

The architecture is designed to determine the protocol at the modem layer. All codes above the modem layer cannot read whether information is passed through an analog modem or a network with T.38 protocol.

Note: The T.38 protocol does not support analog audio information.
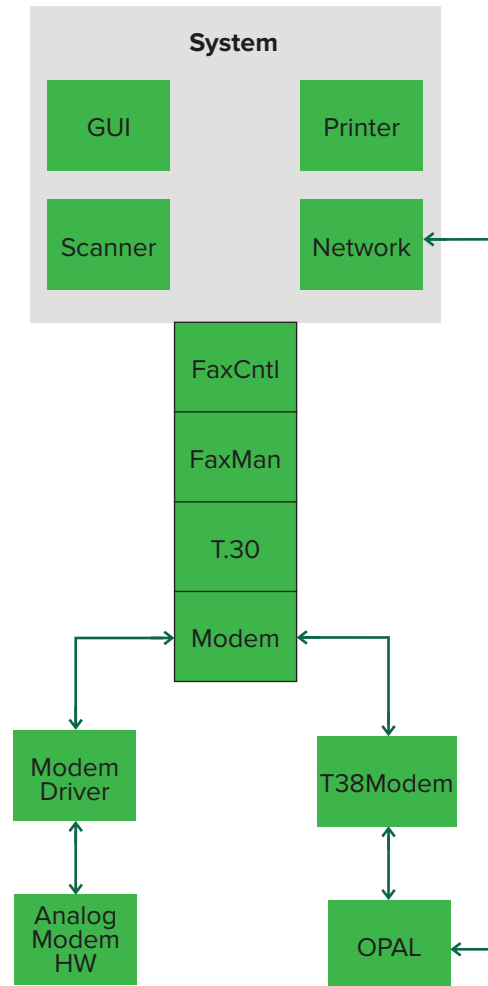
Reliability of the application

To increase system reliability, the application uses the following open source packages:

- Open Phone Abstraction Library (OPAL)
- T38Modem

OPAL is a C++ multiple-platform library that is used by the SIP and H.323 protocols.

T38Modem is an open source package that does the following:

- Use OPAL to access a VoIP phone system.
- Give a T.31 Class 1 interface to the fax system.

Deployment readiness checklist

Make sure that:

☐ Your system administrator knows how your VoIP phone system works.

This person must know how to do the following:
- Configure trunks and endpoints in SIP or H.323.
- Enable T.38 faxing.
- Set up dial plans and call routing.

☐ Your VoIP phone system supports the following:
- T.38 faxing
- SIP or H.323

☐ Your MFP is connected with the application using one of the following methods:
- SIP endpoint with registration
- SIP endpoint without registration
- H.323 endpoint
- SIP trunk with registration
- SIP trunk without registration
- H.323 trunk

☐ You have installed another application that captures network packets that stream to and from the MFP for troubleshooting and debugging the application. For example, you can use Wireshark network packet analyzer.

☐ The older version of the application is uninstalled.

☐ The MFP firmware is updated to the required version. For more information, contact your Lexmark representative.

Updating the firmware

1 Open a web browser, and then type the printer IP address.

Note: View the IP address in the TCP/IP section of the Network/Ports menu.

2 Click **Settings** or **Configuration**.

3 Depending on your printer model, do either of the following:
- Click **Device** > **Update Firmware**.
- Click **Update Firmware**.

4 Browse to the firmware file.

5 Click **Upload** or **Submit**.

Configuring the fax settings

Accessing the Embedded Web Server

1 Obtain the printer IP address. Do either of the following:

- Locate the IP address on the printer home screen.
- View the IP address in the TCP/IP section of the Network/Ports menu.

2 Open a web browser, and then type the printer IP address.

Accessing the fax settings page

1 From the Embedded Web Server, click **Settings** or **Configuration**.

2 Depending on your printer model, click either **Fax** or **Fax Settings**.

Setting the fax mode

1 Access the fax settings page.

2 In the Fax Mode menu, select **Analog/T.38**.

3 Click **Save**.

Selecting the fax transport

1 Access the fax settings page.

2 Click **Analog/T.38 Fax Setup**.

3 In the Fax Transport menu, select **T.38**.

4 Click **Save**.

Configuring other fax settings

Configuring VoIP settings

1 Access the fax settings page.

2 Click **Analog/T.38 Fax Setup**.

3 From the VoIP Settings section, configure the following:

- **VoIP Protocol**—Select the protocol used for your VoIP phone system.
- **Trace Level**—Set the trace level to **0**.

- **STUN Server**—Type the network address of the Session Traversal of User Datagram Protocol Through Network Address Translators (STUN) server. The STUN server lets Network Address Translation (NAT) clients set up phone calls to a VoIP provider hosted outside of the local network.
- **Force Fax Mode**—Set the VoIP gateway from analog to T.38 at the beginning of a fax call.

  Note: This setting is required when a gateway does not follow the T.38 specification and requires the sender to initiate T.38 mode.

4 Click **Save**.

Configuring SIP settings

1 Access the fax settings page.

2 Click **Analog/T.38 Fax Setup**.

3 From the SIP Settings section, configure the following:

Note: Some settings may not be available in some printer models.

- **Proxy**—Type the IP address or domain name of the server that converts a phone number to an IP address when sending a fax.

  Note: SIP Proxy is the only required setting in some network environments. Other settings depend on the IP PBX configuration requirements.

- **Registrar**—Type the IP address or domain name of the server that registers SIP clients.

  Note: A substitution variable can be used in place of an IP address or domain name. For a list of allowed substitution variables, see "Understanding substitution variables for configuring VoIP, SIP, and H.323 settings" on page 15.

- **User**—Type the user name used to register with the SIP registrar. This setting is required.
- **Password**
- **Contact**
- **Realm**—Type the realm name used to register with the address of record (AOR). If you want to use the proxy name as the default, then leave the field blank.
- **Auth ID**—Type the user name used when registering. If you want to use the SIP user name as the default, then leave the field blank.
- **Outbound Proxy**—Type the IP address or domain name of the server that all SIP communications pass through.
- **Disable Incoming Calls**
- **SIP Dial Out Digit**—Select **None**.
- **SIP Registration Status**—Show the response from the registrar to the registration request.

  The following are the first line of messages for different responses:
  - `200 OK`—This message indicates that the SIP request was accepted.
  - `100 Trying`—This message indicates that the SIP request is being processed.

4 Click **Save**.

Notes:

- If a problem has occurred, then other messages are shown in the SIP Registration Status. The second line contains the AOR. The third line is the registration time stamp.

- Leave the Contact, Realm, and Outbound Proxy settings blank when not in use.

Configuring H.323 settings

1 Access the fax settings page.

2 Click **Analog/T.38 Fax Setup**.

3 From the H.323 Settings section, configure the following:

Note: Some settings may not be available in some printer models.

- **Gateway**
- **Gatekeeper**
- **User**—Type the user name used to connect to the gateway server.
- **Password**
- **Enable Fast Start**
- **Disable H.245 Tunneling**
- **Disable Gatekeeper Discovery**—Enable this setting.
- **Disable Incoming Calls**
- **H.323 Dial Out Digit**—Select **None**.

4 Click **Save**.

Note: Leave the Gatekeeper and Password settings blank when not in use.

Configuring T.38 settings

1 Access the fax settings page.

2 Click **Analog/T.38 Fax Setup**.

3 From the T.38 Settings section, configure the following:

Note: The first three settings help to increase the reliability of transmitted data, but also require more bandwidth.

- **Indicator Redundancy**—Specify the number of times a fax indicator is repeated (CNG, ANS).
- **Low Speed Redundancy**—Specify the number of times a low-speed data transmission is repeated (300bps FSK signaling).
- **High Speed Redundancy**—Specify the number of times a high-speed data transmission is repeated (image data).
- **UDPTL Keep Alive Interval**—Specify how long the UPDTL connection is maintained before disconnection.

4 Click **Save**.

Sending faxes to an IP address

The application lets users send faxes to other T.38 fax machines that have an IP address.

To send faxes to an IP address, type the IP address using the following format:

YYY*YYY*YYY*YYY

where ***YYY*** is a number between 1 and 254. For example, to send to a fax machine with an IP address of 192.168.1.1, type **192*168*1*1**.

The fax is directed to the IP address instead of the SIP proxy and H.323 gateway.

Note: If you set an SIP outbound proxy, then this feature is disabled. All SIP communication is directed to the SIP outbound proxy.

Understanding settings, variables, and compatibility with telephone systems

Understanding the configuration file (UCF) identification settings

UCF ID settings	Values
`mfp.fax.mode`	**0**—Set the fax mode to **Analog/T.38**. **2**—Set the fax mode to **Fax Server**.
`mfp.fax.voipSettings.faxTransport`	**0**—Set the VoIP fax transport to **Analog**. **1**—Set the VoIP fax transport to **T.38**.
`mfp.fax.voipSettings.voipProtocol`	**1**—Set the VoIP fax protocol to **SIP**. **2**—Set the VoIP fax protocol to **H.323**. **3**—Set the VoIP fax protocol to **SIP** and **H.323**.
`mfp.fax.voipSettings.traceLevel`	Specify the VoIP debug level. Enter a number from **0** to **7**. **Note:** Higher numbers gather more debug information.
`mfp.fax.voipSettings.stunServer`	Type the STUN server name or path.
`mfp.fax.voipSettings.forceFaxMode`	• `true`—Set the VoIP gateway from analog to T.38 at the beginning of fax calls. • `false`—Disable the VoIP force fax mode feature.
`mfp.fax.sipSettings.proxy`	Type the SIP proxy server IP address or domain name.
`mfp.fax.sipSettings.outboundProxy`	Type the SIP outbound proxy server IP address or domain name.
`mfp.fax.sipSettings.registrar`	Type the SIP registry server IP address or host name.
`mfp.fax.sipSettings.user`	Type the SIP user name.
`mfp.fax.sipSettings.password`	Type the password for the SIP user name.
`mfp.fax.sipSettings.contact`	Type the SIP contact name.
`mfp.fax.sipSettings.realm`	Type the realm name used to register with the AOR. **Note:** If you want to use the proxy name as the default, then leave the field blank.

UCF ID settings	Values
`mfp.fax.sipSettings.authID`	Type the user name used to register to the SIP registrar. **Note:** If you want to use the SIP user name as the default, then leave the field blank.
`mfp.fax.sipSettings.disableIncomingCalls`	• `true`—Ignore all incoming SIP calls. • `false`—Accept all incoming SIP calls.
`mfp.fax.sipSettings.sipDialOutDigit`	Specify a prefix. Enter a number from **0** to **9**. Any call that begins with this prefix is placed as a SIP call. **Note:** If you do not want to use a prefix, then enter **-1**.
`mfp.fax.h323Settings.gateway`	Type the IP address or domain name of the H.323 gateway server.
`mfp.fax.h323Settings.enableFastStart`	• `true`—Enable fast start. • `false`—Disable fast start.
`mfp.fax.h323Settings.disableH245Tunneling`	• `true`—Disable H.245 tunneling. • `false`—Enable H.245 tunneling.
`mfp.fax.h323Settings.gatekeeper`	Type the IP address or domain name of the H.323 gatekeeper server.
`mfp.fax.h323Settings.user`	Type the user name used to connect to the gateway server.
`mfp.fax.h323Settings.password`	Type the password of the user used to connect to the gateway server.
`mfp.fax.h323Settings.disableGatekeeperDiscovery`	• `true`—Disable gatekeeper discovery. • `false`—Enable gatekeeper discovery.
`mfp.fax.h323Settings.disableIncomingCalls`	• `true`—Ignore all incoming H.323 calls. • `false`—Accept all incoming H.323 calls.
`mfp.fax.h323Settings.h323DialOutDigit`	Specify a prefix. Enter a number from **0** to **9**. Any call that begins with this prefix is placed as an H.323 call. **Note:** If you do not want to use a prefix, then enter **-1**.
`mfp.fax.t38Settings.indicatorRedundancy`	Specify the number of times a fax indicator is repeated (CNG, ANS). Enter a number from **0** to **5**.
`mfp.fax.t38Settings.lowSpeedRedundancy`	Specify the number of times a low-speed data transmission is repeated (300bps FSK signaling). Enter a number between **0** to **5**.
`mfp.fax.t38Settings.highSpeedRedundancy`	Specify the number of times a high-speed data transmission is repeated (image data). Enter a number from **0** to **5**.

UCF ID settings	Values
`mfp.fax.t38Settings.udptlKeepAliveInterval`	Specify how long the UPDTL connection is maintained before disconnection. Enter a number from **0** to **10000**.

Understanding substitution variables for configuring VoIP, SIP, and H.323 settings

Variable	Description
`${IPAddr}`	The IP address of the printer
`${SIPUser}`	The User field value in the SIP settings
`${SIPProxy}`	The Proxy field value in the SIP settings
`${SIPRegistrar}`	The Registrar field value in the SIP settings
`${H323Gateway}`	The Gateway field value in the H.323 settings
`${H323Gatekeeper}`	The Gatekeeper field value in the H.323 settings
`${StationNumber}`	The Station Number field value in the Fax settings
`${StationName}`	The Station Name field value in the Fax settings

Notes:

- To avoid setting a substitution loop, set multiple indirections. For example, you can set the SIP Auth ID to the `${SIPUser}` variable and the SIP User to the `${StationName}` variable. To avoid errors, do not set a variable that is equal to itself, such as `${SIPUser}` for SIP User.
- Substitution variables can be used in a field. For example, setting the SIP Password to the `pas$ {SIPUser}` variable results in a `pas` password string with the SIP User value. If the SIP User value is `1234`, then the password is set to `pas1234`. You can also set the SIP Contact field to `${SIPUser}@$ {IPAddr}`.
- For MFPs that show Fax Name and Fax Number instead of Station Name and Station Number, use the `$ {StationName}` and `${StationNumber}` original substitution variables.

Understanding compatibility with the Avaya telephone system

The application is compatible only with Avaya SIP.

The Avaya telephone system supports fax speeds up to 9600bps. The system also disables error correction mode (ECM) automatically. This feature prevents color faxes to be sent and provides better image compression using MMR and JBIG compression algorithms.

To provide enough time for MFPs to answer calls before the timeout, do either of the following:

- From the Avaya Aura Communications Manager, in the trunk group section, set "Redirect on OPTIM Failure" to **30** seconds.

- If you want to retain the settings on your telephone system, then do the following:

  1 From the Embedded Web Server, access the fax settings page.

  2 In the Fax Mode menu, select **Analog/T.38 Fax Setup**.

  3 From the Fax Receive Settings section, in the "Rings to Answer" field, enter **1**.

     Note: The caller ID information is lost when the "Rings to Answer" setting is set to **1**.

  4 Click **Save**.

Understanding compatibility with the Cisco telephone system

Configuring the application with a Cisco VoIP phone system has no known issues.

The following is a sample setup on a Cisco UC520 with two SIP extensions, 2001 and 2002:

```
voice service voip
allow-connections sip to sip
    redirect ip2ip
    fax protocol t38 ls-redundancy 5 hs-redundancy 2 fallback none
    sip
        registrar server
        no update-callerid

voice register global
    mode cme
    source-address 192.168.10.1 port 5060
    max-dn 2
    max-pool 2
    authenticate register
    authenticate realm lexmark
    create profile

voice register dn 1
    number 2001
    no-reg

voice register dn 2
    number 2002
    no-reg

voice register pool 1
    id mac 0021.B790.FA63
    number 1 dn 1
    username 2001 password pas2001
    codec g711ulaw

voice register pool 2
    id mac 0021.B7D8.64AD
    number 1 dn 2
    username 2002 password pas2002
    codec g711ulaw
```

Troubleshooting

Application error

Try one or more of the following:

Check the Embedded Solutions Framework (eSF) log

Note: This solution is applicable to only some printer models.

1 From the Embedded Web Server, click **Settings** or **Configuration**.

2 Depending on your printer model, do one of the following:

- Click **Apps** > **Apps Management** > **System** > **Log**.
- Click **Device Solutions** > **Solutions (eSF)** > **System** > **Log**.
- Click **Embedded Solutions** > **System** > **Log**.
- Click **Embedded Solutions**.

3 Select the appropriate filters to view the log entries.

4 Click **Submit**.

5 Analyze the log, and then resolve the problem.

Check the diagnostic log

1 Open a web browser, and then type **IP/se**, where **IP** is the printer IP address.

  Note: View the IP address in the TCP/IP section of the Network/Ports menu.

2 Click one or more of the following:

- **Embedded Solutions**
- **Dump Fax Call Log**
- **Dump Caller ID Log**
- **Dump Fax Job Log**
- **Dump Last 10 of Fax T30 Error Logs**
- **Dump Last 10 of Fax T30 Logs**
- **Dump Fax Settings Data**
- **Dump Fax T30 Log**
- **Dump T.38 Trace Log**

3 Analyze the log, and then resolve the problem.

Contact your Lexmark representative

License error

Try one or more of the following:

Make sure that the license is up-to-date

1 Open a web browser, and then type the printer IP address.

    Note: View the IP address in the TCP/IP section of the Network/Ports menu.

2 Click **Settings** or **Configuration**.

3 Depending on your printer model, do one of the following:

- Click **Configuration History** > **Apps and Bundles**.
- Click **Apps** > **Apps Management**.
- Click **Device Solutions** > **Solutions (eSF)**.
- Click **Embedded Solutions**.

4 Check the license status of the application from the list.

Contact your Lexmark representative

Two versions of the application are installed

Try one or more of the following:

Uninstall the older version of the application

Note: This solution is applicable to only some printer models.

1 Open a web browser, and then type the printer IP address.

    Note: View the IP address in the TCP/IP section of the Network/Ports menu.

2 Click **Settings** or **Configuration**.

3 Depending on your printer model, do one of the following:

- Click **Apps** > **Apps Management**.
- Click **Device Solutions** > **Solutions (eSF)**.
- Click **Embedded Solutions**.

4 Select the older version of the application from the list.

5 Click **Uninstall**.

Contact your Lexmark representative

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ZXing 1.7

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