

# **Fax/Network Data Security and Lexmark Multifunction Products**

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## Overview

Lexmark offers a variety of multifunction products that provide both network capability and fax modem capability. In environments where network security is critical, the combination of these two features on a single device has caused some concern. The purpose of this document is to address those concerns by exploring the conceivable ways that security could be breached by this device, and to describe the reasons why the design and implementation of Lexmark MFPs make this sort of abuse impractical.

## Applicable Products

This document applies to the following MFPs:

- Lexmark X463
- Lexmark X464
- Lexmark X466
- Lexmark X651
- Lexmark X652
- Lexmark X654
- Lexmark X656
- Lexmark X658
- Lexmark X734
- Lexmark X736
- Lexmark X738
- Lexmark X772
- Lexmark X782
- Lexmark X792
- Lexmark X850
- Lexmark X850 (4)
- Lexmark X852
- Lexmark X854
- Lexmark X860 (4)
- Lexmark X862 (4)
- Lexmark X864 (4)
- Lexmark X925
- Lexmark X940
- Lexmark X945

## The Proposed Concern

The issue that raises concern is the presence of a fax modem on a device that also includes a network adapter. The fax modem, by nature, is:

1. Inherently bidirectional; it is capable of sending information to and from the MFP.
2. Inherently connected to the outside world; assuming the modem is connected to a phone line, the device is theoretically open to being accessed from anywhere.

Based on these two attributes, it has been proposed that a security exposure may be present. Couldn't someone connect to the MFP via the modem and then somehow get information off of the network, thus exposing the customer's network to inappropriate access?



Figure 1.0 – The Proposed Exposure

## The Practical Considerations

There is a long list of reasons why the presence of a fax modem on a device that also includes a network adapter is not a security exposure. This document explores each of these points in more detail:

- There is no support for controlling the device via the phone connection—one cannot “dial into” the device and interact with it via FTP, Telnet, or any similar mechanism.
- The modem and network adapter hardware are on separate cards and cannot communicate directly with one another. This prohibits data from “crossing over” between the two channels.
- The modem is configured to send and receive fax only, not data.
- The modem’s configuration is limited and controlled by the MFP’s firmware. The MFP firmware does not allow arbitrary data to be exchanged over the fax modem, only facsimile data representing page images can be exchanged.
- The avenues by which the MFP’s firmware can be updated are secured, and unauthorized firmware and software cannot be placed onto the MFP.

All these factors prevent the interaction of the fax modem and network adapter hardware from providing a security exposure.

### ***No Control of the Device via Phone Line***

Many devices that support an analog phone modem do so to allow the device to be controlled remotely, via the phone line. On such devices, one can “call” the device and interact with it: turn it on or off, change its settings, and so on. Typically, this would occur over some sort of management session, such as Telnet.

However, the presence of an analog phone modem does not automatically involve any such mechanism. In order for the device to allow such interaction, the support needs to be built in and intentionally provided. Lexmark’s products do not include or allow for this sort of control.

No Lexmark MFPs allow for any sort of configuration via the phone line. There are no diagnostic modes by which any external mechanism can control or reconfigure the behavior of the modem. The only function that the analog phone modem is capable of exchanging is fax information. It does not allow for configuration or any sort of remote control of the device, and it does not allow any avenue to access the network to which the device is connected.

### ***Modem and INA are Separate by Design***

Lexmark MFPs use a third-party fax chip to handle analog-to-digital processing, while the rest of the fax modem process is handled directly by Lexmark firmware.

The internal network adapter function is implemented separately from the modem capabilities, and the two functions are implemented on separate circuit cards; the fax card is connected via a cable to a daughter card, while the network connection is on the MFP's motherboard.

The fax processes are handled directly by the Lexmark firmware, as is the network adapter interaction, and the Lexmark firmware is designed to prohibit direct interaction between the fax and network components.

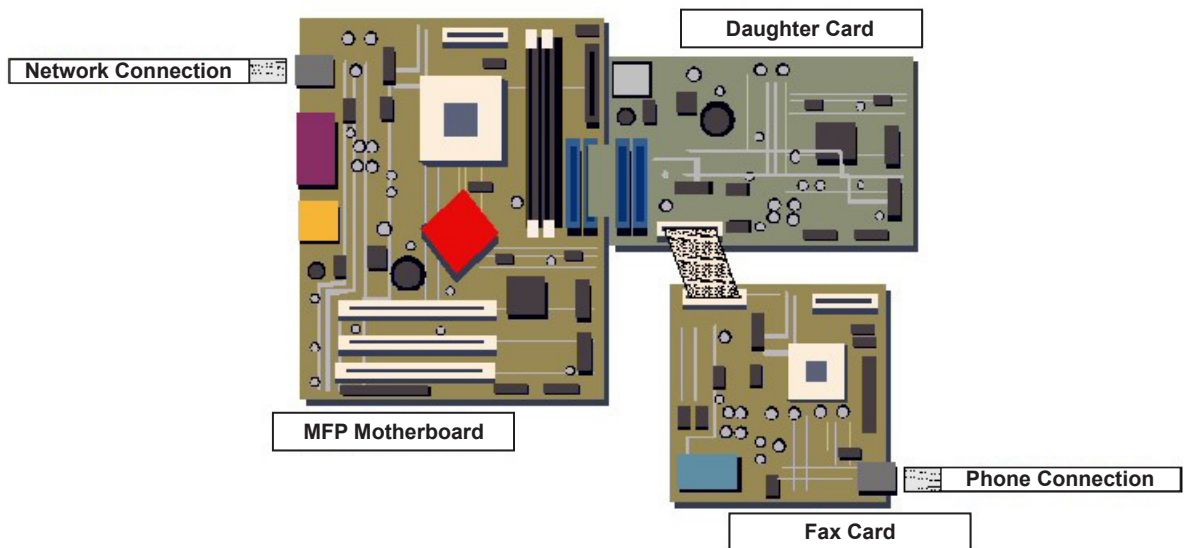


Figure 2.1 – Separation of Modem and Network Function on Lexmark MFPs

### ***Modem is Configured for Fax Only***

Control of the fax functionality is incorporated directly into the Lexmark firmware. The fax chip that sends and receives data over the phone line is directly controlled by the Lexmark firmware. The modem chip is in a mode that is even more restrictive than Class 1 mode, and it relies on the Lexmark firmware for composition and transmission of fax data. The firmware explicitly disallows the transmission of frames in data mode and only allows for the sending and receiving of facsimile jobs.

### ***No Support for the PS Fax Mechanism***

Some fax devices employ a mechanism known as PS Fax, or PostScript® File Transfer. When two fax devices support PS Fax and connect via an analog phone session, PS Fax allows a print job to be transmitted in its original PostScript format. This is faster and produces higher-quality output than converting the job to a bitmap at the sending end and transmitting the bitmap.

However, the ability of the receiving device to accept non-image data creates a security exposure. The PostScript job itself could potentially include malicious function(s), and the support for opening the connection for non-image data could leave the device vulnerable to other sorts of transmissions. For these reasons, the PS Fax capability is not supported on Lexmark MFPs.

### ***Phone Line Does Not Provide Means to Update Firmware***

Because the only way to change the behavior of the modem would be with modified firmware, the question of how that might be accomplished can be reasonably posed.

Because the network connection is secure, the avenue of concern is the phone line as it is inherently connected to the outside world.

The nature of the Lexmark firmware and the modem's fax operation, however, is to accept only fax frames—these are frames that contain image data. When these frames are combined, they are assembled and wrapped in PostScript® commands and submitted to the MFP's interpreter as image data. There is no other data path available, and no way for data that comes in via the fax to be treated as anything but a fax image. If the data that is received does not represent an image, the data is purged as an invalid PostScript job. There is no avenue by which modified firmware (or any sort of executable code) could be packaged as a fax job and become operable within the printer or MFP.

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<sup>1</sup>When accessing the MFP via the internal network, there are significant safeguards in place to disallow the modification of the MFP's firmware. One example is the requirement that any firmware upgrade is digitally signed by Lexmark, using Lexmark's private encryption key. This disallows any firmware, except that which is produced and approved by Lexmark, from being placed onto the MFP device.

## Summary

While the initial reaction to an MFP device that contains a modem and a network adapter in close proximity might raise a concern that a potential security exposure exists, such a concern is not warranted. The Lexmark MFP implements the fax and network features in such a way that the hardware and firmware are both designed to keep the fax and network mechanisms separate, and the nature of the MFP restricts the addition or replacement of the Lexmark firmware.

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