

How to Print and Redirect Ports with Thin Clients

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Table of Contents

Foreword.....	3
NETiON Framework Printing Methods:.....	4
1.Option one – Raw Printing and Port Redirect:.....	4
a) Raw Printer.....	4
b) Port redirect (Network Ports with a TCP/IP port address).....	6
2.Option two – Printing via embedded CUPS:.....	7
Local (client) printer driver.....	7
A note on Thin Client printing:.....	8
Printing Scenarios.....	9
Scenario 1, Printers attached to a Server:.....	11
Scenario 2, Printing within a Linux/UNIX Session:.....	11
Assumption 1, Linux/UNIX session to client printing:.....	11
Assumption 2, Linux/UNIX JetDirect printing:.....	12
Assumption 3, Linux/UNIX Printing to Print Server:.....	12
Assumption 4 Linux/UNIX session client to client printing:.....	13
Scenario 3, Printing from within a WTS 2003 RDP session:.....	13
Assumption 1, Printing within RDP to local client printer:.....	13
Assumption 2, Printing from within RDP to Printer Server:.....	14
Assumption 3, client to client printing from within RDP:.....	15
Scenario 4, Tarantella AIP Printing:.....	15
Scenario 5, Citrix ICA Printing:.....	15
Scenario 6, NoMachine NX Client Printing:.....	16

Foreword

This content is based on the NETiON Thin Client Framework Version 4.x, the base software for the SmartFLeX NETiON SmartClient series. The NETiON SmartClient series is a highly configurable Linux based Thin Client product line, available from SmartFLeX Technology (www.smartflextech.com). The company not only develops and sells these Linux based SmartClients, but also licenses the software design to other Thin Client manufacturers.

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NETiON Framework Printing Methods:

The SmartFLeX NETiON Framework supports a variety of different printing and port redirection methods to accommodate the supported thin client technologies. Due to its importance to customers the printing methods of the NETiON Framework should be fully understood by sales and support personal alike. Providing wrong information on this subject is a sure way to loose prospects before they become customers, and to loose customers if they feel that support is unable to explain the printing methods available on a NETiON device.

The integrated printing methods are divided into two main variants:

1.Option one – Raw Printing and Port Redirect:

a) Raw Printer

Raw Printing is the preferred printing method for UNIX/Linux and other non-Windows environments. The following methods are supported: BSD/lpd, rsh, JetDirect, Instream (also called transparent printing). Generally, each of these methods positions the NETiON device as an extension to the host. The NETiON device has no active role in the printing process itself. It does not decide where a print job goes to, it does not format the print data, and it does not manage the print job. All these tasks are performed by the host printing system, which is why I do not describe in this manual how to set up the actual printing system. It is the host administrators responsibility to know how to establish a working printing environment. All the NETiON Framework provides is a target device to print to.

Here are the raw printing methods the host system administrator has at his or her disposal, depending on what port the printer is connected to on the NETiON device:

- ***BSD/lpd on port 515:*** This is the mother of UNIX style printing. Once a printer is assigned in setup to LPT, COM1, COM2 or USB, the embedded lpd daemon will recognize this printer. On the server a network printer with its appropriate driver has to be setup. The procedure to accomplish this depends on your Server OS! During setup you will be asked for the IP address of the network printer server and port. Type the IP address of the terminal acting as a printer server, and the port (LPT, COM1, COM2 or USB) where the printer is attached to. Your application should direct its printer output data to the network printer defined on your server. The

queue names LPT, COM1, COM2 and USB are case sensitive and need to be typed in upper case letters.

A typical printer address could therefore be as follows:

```
lpd://192.168.100.241/LPT
```

This printer address string would send a print job, formatted for the right printer by the host, to the NETiON device with the IP address 192.168.100.241 where it is received by the lpd printer daemon and send to the parallel port with the NETiON queue name LPT.

To test the setup, send a printjob to “lpd://192.168.100.241/LPT or COM1, COM2, USB”

- **JetDirect on port 9100 (LPT only):** Once a printer (one only, since there is only one port 9100) is assigned in setup to LPT, the embedded JetDirect daemon will recognize this printer and turn this port and printer into a recognizable JetDirect printer. On the server a JetDirect printer software has to be set up. The procedure to do this depends on your Server OS! Your software needs to support the JetDirect printing method. The terminal and the attached printer become a JetDirect device.

The printing device would be addressed as:

```
<IP address of terminal> 9100
```

To test the JetDirect printing on a Linux or UNIX system type:

```
cat <filename of printer formatted print file> | netcat <IP address of terminal> 9100
```

- **“rsh” printing on port 514:** For rsh printing the following sequence MUST be used:

```
rsh <IP-Address of Terminal> LPT or COM1 or COM2 or USB)
```

To test the setup issue the following command (example):

```
cat <filename> | rsh <IP-Address of Terminal> LPT or COM1 or COM2 or USB)
```

The LPT (COM1, COM2, USB) statement at the end is needed to address the port related print queue.

“filename” means a file formatted for a particular printer!

The rsh printing command will be issued by the application on the host during the printing process. “rsh” printing is

commonly used in legacy point of sales (POS) applications.

The embedded rsh daemon can only be used for printing! It is a proprietary software module that does not support any other functionality.

- ***Instream printing:***

Instream printing, also known as transparent printing, is a printing method where screen data are redirected to the printer port. The application executing on a host contains special ESC sequences (depending on the host type and the emulator used) that starts and ends the redirection of the screen data to the printer port. The application has to make sure that the screen data are formatted correctly.

This printing method only works in conjunction with the optionally embedded Emulator Suite!

Note:

If a port is used that does not have a printer assigned to it, the print job will still be accepted but rerouted to the NULL device, and it will therefore be lost. This avoids a hung system.

b) Port redirect (Network Ports with a TCP/IP port address)

Port redirect is not really a printing method, but exactly what it says: a method to redirect a local NETiON port to become available to the host application for one or another reason. For the host system the local NETiON port becomes transparent and can be used for I/O purposes. In setup select the port to be redirected and select the pull-down option redirect or RDP (specifically made available for RDP connections to Windows Terminal Server). Only the legacy ports COM1 to 4 and LPT show the redirect selection. Only RDP redirection is available for USB.

A Linux data daemon is available from SmartFLex Technology to allow data collections on these “redirected ports”.

The following is a list of available ports and their TCP port assignments:

1. COM1 on TCP Port 3001
2. COM2 on TCP Port 3002
3. LPT on TCP Port 3003
4. RDP and USB RDP redirection requires a RDP client connection

2.Option two – Printing via embedded CUPS:

Local (client) printer driver

Local printer driver is a printing method based on the embedded CUPS (Common UNIX Printing System), the most advanced printing system for UNIX and Linux systems.

Local Printer Driver is an optional module for the NETiON framework and needs to be selected during flash image creation by the manufacturer of the NETiON device.

Generally, the local embedded CUPS acts as a local printer server. Printers are made available as local or remote printers, meaning that the printer is either attached on a local NETiON device port or to a printer server on the network, or the printer acts as its own network printer server.

The SmartFLEx CUPS implementation supports parallel, serial, USB printers locally, and lpr and ipp print servers on the network. JetDirect, a special form of lpr printing is supported as well. For the new generation of HP USB printing devices a new local device called “HP” is provided. For Canon and Epson printers special local (USB) devices are available also.

Only one (1) CUPS controlled printer can be made available on a NETiON device. This printer automatically becomes the NETiON's local default printer. The local CUPS default printer is addressed by its name as defined during printer setup, or by a combination of printer name and device name/printer driver name, depending on the Terminal Server OS the NETiON device is supposed to connect to.

Generally, here is how local printer creation works:

1. Connect the printer and boot the NETiON device;
2. Open Setup and click on the port/printer icon;
3. Select the “Local printer Driver” tab;
4. Click the “change printer button”;
5. Assign a printer name without any blanks in it (HP_500 is o.k., HP 500 is not acceptable);
6. Provide the optional information in the “info” and “location” fields if so desired;
7. Click on the “next” button;
8. Pick a device from the pull down “connect to” menu;
9. Select the device the printer is connected to (some HP printers are automatically detected and assigned to the HP device. If this is the case select this device);
10. Click the “next” button when done;
11. Depending on the selection made in step 9, you need to provide some additional information to complete the device setup;

12. Select an exact printer driver for your printer, or select a printer driver that comes closest to your printer model. Many printers are not listed in the list but are supported by one of the listed drivers. Sometimes it takes some trial and error to find the best driver. If the printer is to be used as a “thin client printer” the correct driver to select is “raw”, since the Terminal Server running the actual applications is providing its own printer driver for the connected printer and renders and sends the formatted printer data. Therefore a local matching printer driver is not needed. Most terminal server type printing works best with the local “raw” driver. For more information on selecting the right devices and drivers in certain environments refer to the “Example Section” in this Manual;
13. Click the “finish” button;
14. Click the “save settings” button;
15. Exit setup or advance to other menu choices to complete other needed setup tasks;
16. After all setup tasks are completed, you will need to reboot the NETiON device to activate the printer settings. During boot of the NETiON device, the printer should be turned on;
17. The printer is now available as the NETiON device default printer.

To test the printer send a print job to:
<NETiON IP address>:631/printers/<printer name>

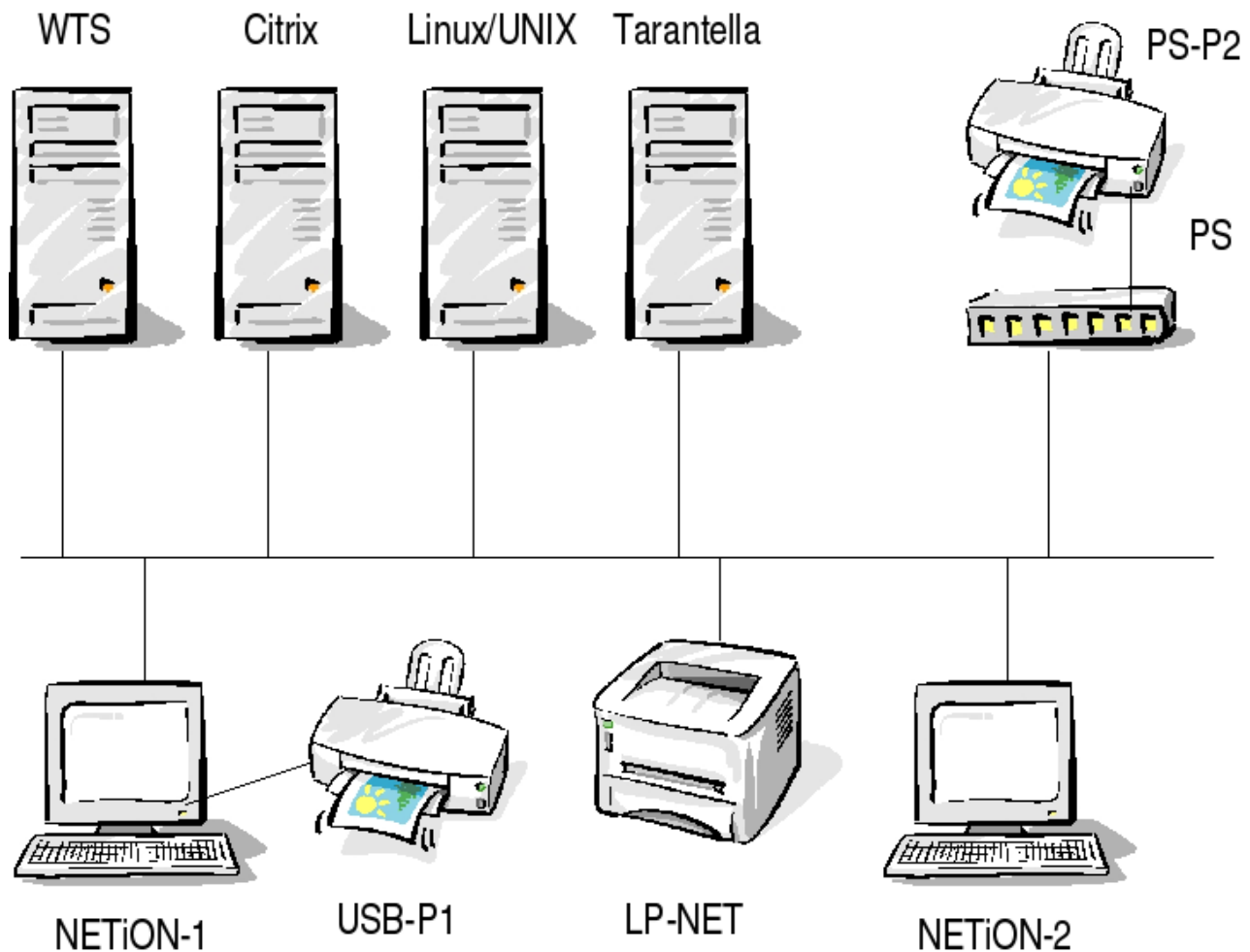
A note on Thin Client printing:

While providing a PC like user experience, Thin Clients are not PCs! Planning and setting up printing on or with Thin Clients is not an end user task, but should best be performed by experienced system administrators with a broad understanding of Server Centric Thin Client Computing. There are many tasks to be performed on the server side to enable a seamless user experience when it comes to Thin Client printing. A system administrator needs to understand the Terminal Server OS, the network design and layout, and needs to have a good understanding of network security. While UNIX and Linux remote or Thin Client printing is very easy to set up and maintain, Windows Terminal Server and Citrix Thin Client printing can be a challenge, especially if a non-Windows client device is being deployed. Not every Windows printer is compatible with Thin Client printing and some printer manufacturer provided drivers that are not suitable to be deployed and used in a Windows Terminal Service environment. Many cheap (in the very sense of the word cheap) printers need to load firmware additions off a PC, at the time they are turned on, to function either correctly or at all. These printers are usually incompatible with Thin Client networking. The HP 3900 printer series is such an example. While they are detected correctly they will not print if they are connected to a (non Windows) Thin Client. The best user experience is usually

achieved with a true PostScript type and/or “non-Windows dependent” PCL printer. A system administrator should carefully evaluate if a printer connected and controlled by a Thin Client is really necessary, since any addition to a Thin Client defeats the purpose of the Thin Client. In many cases it only complicates the use and handling of the Thin Client workplace. Printing to a centrally located printer on the network or a print server directly from the Terminal Server host or via the NETiON device is mostly a much better choice to tackle the printing issues. It is certainly a much more economical approach in terms of equipment costs and more importantly, printer supply and administration associated labor costs. Very seldom are printing problems associated to the Thin Client device. More likely than not, they are caused by inadequate setup and configuration scenarios on the server or network side. More often than not, printing problems are the result of lack of knowledge.

Printing Scenarios

The following pages explain a few printing scenarios, especially in a Windows environment, where Thin Client printing problems seem to be more common than in UNIX/Linux.



WTS: Windows Terminal Serve 2000/2003, IP = 192.168.100.1

Citrix: WTS with Citrix Access Suite, IP = 192.168.100.2

Linux/UNIX: Linux or UNIX Server, IP = 192.168.100.3

Tarantella: Tarantella Server, IP = 192.168.100.4

NETiON-1: NETiON Thin Client # 1, IP = 192.168.100.20

NETiON-2: NETiON Thin Client # 2, IP = 192.168.100.21

PS: Print Server, IP = 192.168.100.253

USB-P1: USB printer 1 on NETiON-1

PS-P2: Printer on P(ort) 2 on Print Server PS

LP-NET: LaserJet, IP = 192.168.100.249

Network: Local Area Network (Ethernet)

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Schematic-1

Above Schematic-1 describes the layout of a typical heterogeneous small business network. To not complicate matters further, we will assume that all devices are within the network segment 192.168.100.xxx. All examples are to explain Thin Client Printing issues from the view point of a system administrator sitting on one of the NETiON Thin Clients.

Printing issues across routed networks (multi segment networks or the Internet) are much more challenging. The problems with these more challenging networks lay in the network part and therefore is not within the scope of this manual. The key to setting up inter-networking printing scenarios is a good network system administrator with adequate knowledge about Thin Client and Terminal Server computing.

Scenario 1, Printers attached to a Server:

Printing with printers attached to a Server (not specifically mapped out on the Schematic-1 picture):

This is the easiest way to print for all users. The printer can be connected to any of the above servers. The printer driver is installed on the server to handle print data rendering and formatting locally on the server. The server OS handles addressing issues to route the printing data to the appropriate printer. Server connected printers can be made available to all users or selected users, depending on the users system permissions. All applications, invoked by a Thin Client session user, can address the printer if the user has the permission to do so. All printing issues need to be resolved by the server administrator. The server can also address a network attached printer, instead of a locally attached printer. Installation instructions for server related local or network printing are usually part of the server OS documentation. The user on a NETiON device will not have to know how the server directs the print job to a locally server attached or network attached printer.

Scenario 2, Printing within a Linux/UNIX Session:

Printing from within a Linux/UNIX Thin Client session.

Assumption 1, Linux/UNIX session to client printing:

Administrator on NETiON-1, connected to Linux/UNIX via XDMCP, setting up printing to USB-P1.

- Connect printer to USB port and either set up a local printer driver raw for this printer
- or
- Set up a raw printer on USB by selecting the appropriate printing protocol;

- Reboot the NETiON Thin Client device;
- To test and address the raw printer setup version follow the instructions given before in the “Option 1” section of this manual;
- To test and address the local printer driver setup version follow the instructions given before in the “Option 2” section of this manual. If server and NETiON device are in one segment the printer should be detected by a session on a current Linux distribution as the local default printer and print jobs should go automatically to this NETiON attached printer.
- Hint:
It is also possible in this scenario to direct the print data to LP-NET or even to PS-P2 via appropriate device settings during setup of a local printer driver.

Assumption 2, Linux/UNIX JetDirect printing:

Administrator on NETiON-1, connected to Linux/UNIX via XDMCP, setting up printing to LP-NET via HP JetDirect.

- Connect printer to network.
- Follow instructions in printer manual to set printer to a valid IP address and port address, in this example case to: IP 192.168.100.249 and Port 9100 (default);
- Set up a local (to server) CUPS printer driver by setting the “connect to” HP JetDirect, with “URL” socket://192.168.100.249:9100;
- Testing and addressing the printer needs to be done from within the application on the host. The printer is being addressed as a local printer to the server.

Assumption 3, Linux/UNIX Printing to Print Server:

Administrator on NETiON-1, connected to Linux/UNIX via XDMCP, setting up printing to PS-P2.

- Connect printer to printer server PS;
- Follow instructions in printer server manual to set printer server to a valid IP address, in this example case to: IP 192.168.100.253;
- Log into a session as root;
- Invoke the host CUPS by opening a browser and type <http://localhost:631> or start the CUPS printer tool of your Linux or UNIX OS;
- Set up a CUPS host printer by setting the “connect to” LPR Host, with “URL” lpd://192.168.100.253/p1, where p1 is the queue name as defined in the printer server manual;
- Select a printer and driver for the printer connected to the printer server
- Create a test print out via CUPS or the printer tool provided;

- Address the printer as it is a locally server attached printer.

Assumption 4 Linux/UNIX session client to client printing:

Administrator on NETiON-2, connected to Linux/UNIX via XDMCP, setting up printing to USB-P1.

- Connect printer to NETiON-1, which will be acting as a printer server;
- Setup printer on NETiON-1 as a raw printer on USB,
- Log into a session as root,
- Invoke the host CUPS by opening a browser and type <http://localhost:631> or start the CUPS printer tool of your Linux or UNIX OS;
- Set up a CUPS host printer by setting the “connect to” LPR Host, with “URL” `lpd://192.168.100.20/USB`;
- Select a printer and driver for the printer connected to the printer server;
- Create a test print out via CUPS or the printer tool provided;
- Address the printer as it is a locally server attached printer.

Scenario 3, Printing from within a WTS 2003 RDP session:

Printing from within a RDP Thin Client session. General assumption: Windows Terminal Server 2003 has a needed printer driver already installed and client printing is enabled. Administrator has recorded the exact printer driver name for the printer to be used.

Assumption 1, Printing within RDP to local client printer:

Administrator on NETiON-1 printing to locally attached USB-P1 via RDP connection to Windows Terminal Server 2003.

- Connect printer to NETiON device and boot to desktop
- Open NETiON setup and create a local raw printer as described in Option two (2);
- Save all settings and reboot the NETiON device
- Enter Setup and create a RDP connection to the WTS. In the printer section of the RDP setup pick the exact printer driver name from the pull down menu or record (type) the exact printer driver name of the driver installed on the WTS. The name of the printer driver being used on the WTS and printer driver name recorded in this field must be an exact match to allow automatic printer creation for the WTS/RDP session.
- Save all settings and exit the setup wizard.
- Start the RDP client to connect to the WTS server.
- The WTS printer utility should show the availability of the NETiON attached printer.

- To test the printer send a test print to the NETiON attached printer. If the printer prints your document the printer is set up correctly.

Note:

Some HP USB printer cannot be associated with the normal USB device during setup. These printers will be detected during boot and a virtual device will be created for them. This device will show in the local printer driver setup device list as HP If you see your printer listed there as an available device you must use it in order to print to this printer.

Printers connected via rdp cannot be printers that require downloading firmware add-ons during boot to become functional. These printers are sometimes called or labeled as "Host Based Printer". Remote printers need to have all needed firmware functionality embedded locally in the printer itself.

Assumption 2, Printing from within RDP to Printer Server:

Administrator on NETiON-2 printing to PS attached PS-P2 via RDP connection to Windows Terminal Server 2003.

- Connect printer to PS device and configure it according to the manufacturers guidelines.
- Open NETiON setup and create a local raw printer (local printer driver) as described in Option two (2). The device to be selected during this process is "LPR Host". The "URL" for our example scenario is `lpd://192.168.100.253/p1`.
- Save all settings and reboot the NETiON device
- Enter Setup and create a RDP connection to the WTS. In the printer section of the RDP setup pick the exact printer driver name from the pull down menu or record the exact printer driver name of the driver installed on the WTS. The name of the printer driver being used on the WTS and printer driver name recorded in this field must be an exact match to allow automatic printer creation for the WTS/RDP session.
- Save all settings and exit the setup wizard.
- Start the RDP client to connect to the WTS server.
- The WTS printer utility should show the availability of the NETiON-1 --> PS attached printer.
- To test the printer print a document to the NETiON-1 --> PS attached printer. If the printer prints your document the printer is set up correctly.

Note:

Printers connected to a network printer server cannot be printers that require downloading firmware add-ons during boot to become functional. Remote printers need to have all needed firmware functionality embedded locally in the printer itself.

Assumption 3, client to client printing from within RDP:

Administrator on NETiON-2 printing to NETiON-1 attached USB-P1 via RDP connection to Windows Terminal Server 2003.

- Connect printer to NETiON-1 device and configure it as described above in the assumption 1 section.
- Open NETiON-2 setup and create a local raw printer as described in Option two (2). The device to be selected during this process is "ipp printer". The "URL" for our example scenario is ipp://192.168.100.20:631.
- Save all settings and reboot the NETiON-2 device
- Enter Setup and create a RDP connection to the WTS. In the printer section of the RDP setup pick the exact printer driver name from the pull down menu or record the exact printer driver name of the driver installed on the WTS. The name of the printer driver being used on the WTS and printer driver name recorded in this field must be an exact match to allow automatic printer creation for the WTS/RDP session.
- Save all settings and exit the setup wizard.
- Start the RDP client to connect to the WTS server.
- The WTS printer utility should show the availability of the NETiON-2 --> NETiON-1 printer.
- To test the printer send a testprint to the NETiON attached printer. If the printer prints your document the printer is set up correctly.

Note:

Printers connected to a network printer server cannot be printers that require downloading firmware add-ons during boot to become functional. Remote printers need to have all needed firmware functionality embedded locally in the printer itself.

Scenario 4, Tarantella AIP Printing:

Printing from within a Tarantella Thin Client session.

All principle methods of above Scenario 2 can be applied. Instead of setting up the RDP client set up the Tarantella Client and provide the printer driver name and print protocol in the appropriate setup fields. The Tarantella client will pick up on this information and assign the correct printer driver for the session.

Scenario 5, Citrix ICA Printing:

Printing from within a Citrix Thin Client session.

All principle methods of Scenario 2 can be applied.

Instead of setting up the RDP client set up the Citrix Client(s).
The ICA client will pick up on available printers and map them accordingly.

Scenario 6, NoMachine NX Client Printing:

Printing from within a NoMachine NX Thin Client session.

All principle methods of Scenario 2 can be applied.
Instead of setting up the RDP client set up the NoMachine NX Client.
The NX client will pick up on available printers and map them accordingly.
The NETiON Samba module needs to be present and Samba need to be installed on the server.