Network Station Manager Version 2

Network Station Printing

Network Station Education
IBM Network Computer Division
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Objectives/Contents

- Overview of printing facilities
- Changes from Version 1 Release 3
- Sample dialog panels
- Configuring printers in NSM
- Supported print datastreams
- Understanding LPD/LPR
- Understanding streaming LPD/LPR
- Using remote spooling and print transform
- Printing from Wincenter

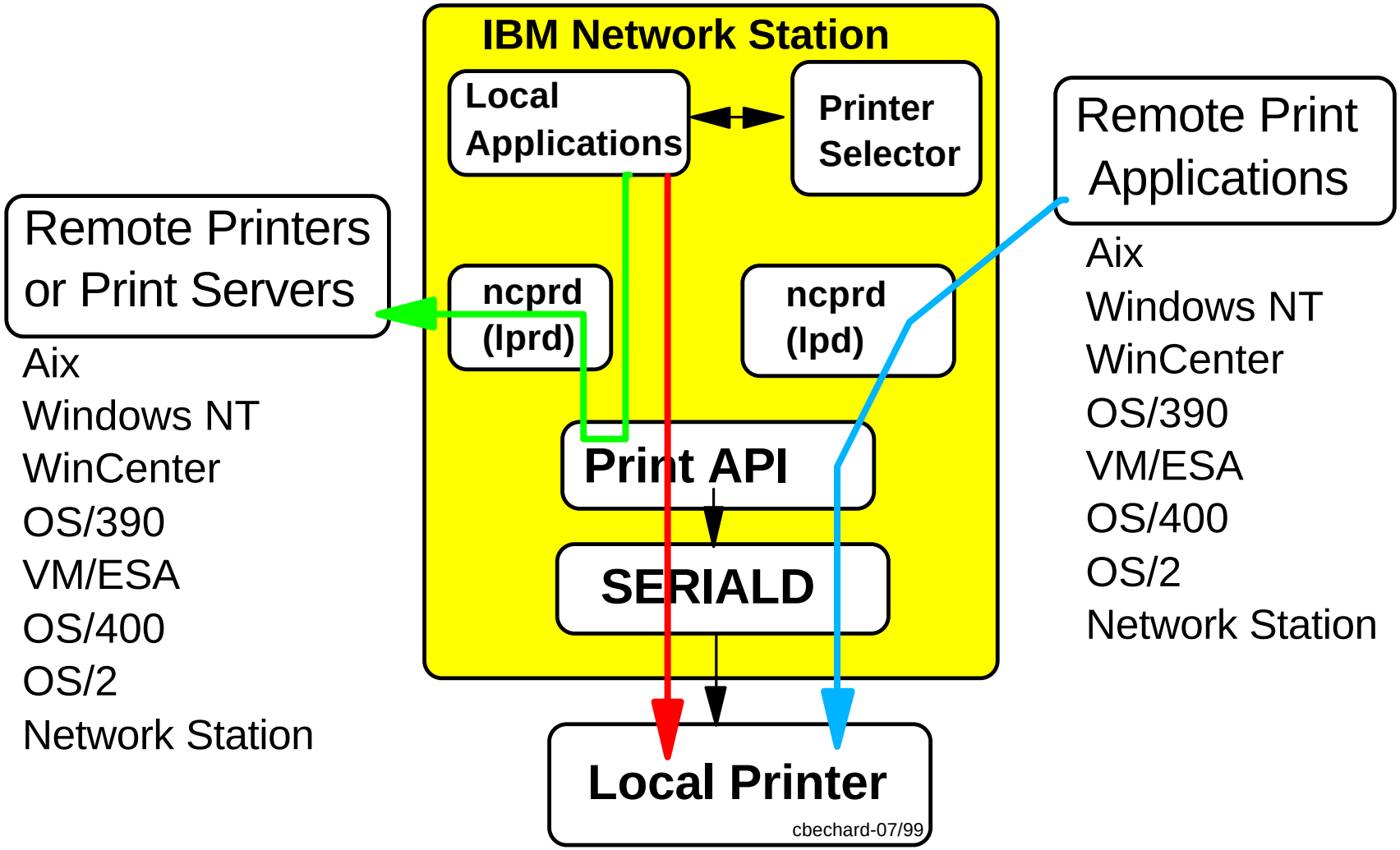
The objective of this topic is to provide you with a quick overview and understanding of the print facilities available on the Network Station and how it works.

We briefly discuss, first a high level view of the printing components and the changes that have been introduced since the last release. Then take a look at some sample print dialogs and how to configure printers in Network Station Manager.

Finally, we summarize some of the concepts of streaming LPR/LPD to better understand some of the capabilities of the Network Station.

Because there have been only minor changes since the last release, the existing redbook SG24-5212 - IBM Network Station Printing Guide, which is included in this CD, is still very applicable and we strongly suggest that you should use this book to get a lot more details than we are able to provide here in this short introduction.

Overview



This chart illustrates the major components involved in providing the printing facilities on the Network Station, which are the standard facilities provided by the TCP/IP LPR/LPD daemons.

Local applications requesting to send a print job are first presented with a print selector dialog, where the user can choose to print locally or to a remote printer; the list appearing in the print selector dialog in configured by the administrator in Network Station Manager.

If the print request is to be directed to a local printer, it is sent to the Print API, which then sends it to the SERIALD daemon which is responsible for controlling the local serial and parallel ports.

On the other hand, if a remote printer is selected, the print request is sent to the local ncprd daemon (which contains an lprd function); the lpr function contacts the remote lpd daemon and the print request is sent. NOte that any system that supports the TCP/IP LPR/LPD functions can be the target of a print request.

The station also has the ability to receive a print request from a remote LPR using its LPD daemon and route the request to the print API for sending to a local printer. Note that the request cannot be rerouted out to a remote printers mainly because there are no spooling facilities on the Network Station.

Changes from V1R3

- **Serial Ports 1 to 18 (instead of 1 to 5)**
  - On Series 2800, 2 PCI cards (at 8 ports each) plus the two native ports
- **NSM - Print GUI - Now Serial Options Settings**
  - baud rate, etc.
- **ASCII options and DBCS no longer supported**
- **Browser print dialog has changed slightly**
- **Print selector looks different but functionally the same**
- **lpr and nclpr command line command available**
- **A print monitor function to monitor local print jobs and allow the possibility of canceling jobs**
- **Direct Seriald sockets added for second native port on Series 2800**
  - 5962 for passthru
  - 6462 for command interpret mode

The changes from V1R3 relative to printing are minor changes for the most part.

Serial ports up to 18 can now be defined on a Series 2800 because there are 2 native ports and possibly two PCI cards that can each support 8 serial ports. On a Series 1000, there is one native port and a multiple serial port adapter card allowed four more for a total of 5 ports.

In NSM, the configuration panels for printer settings now have a Serial Options settings (which used to be done using override files in V1R3) and the ASCII options for DBCS have been removed.

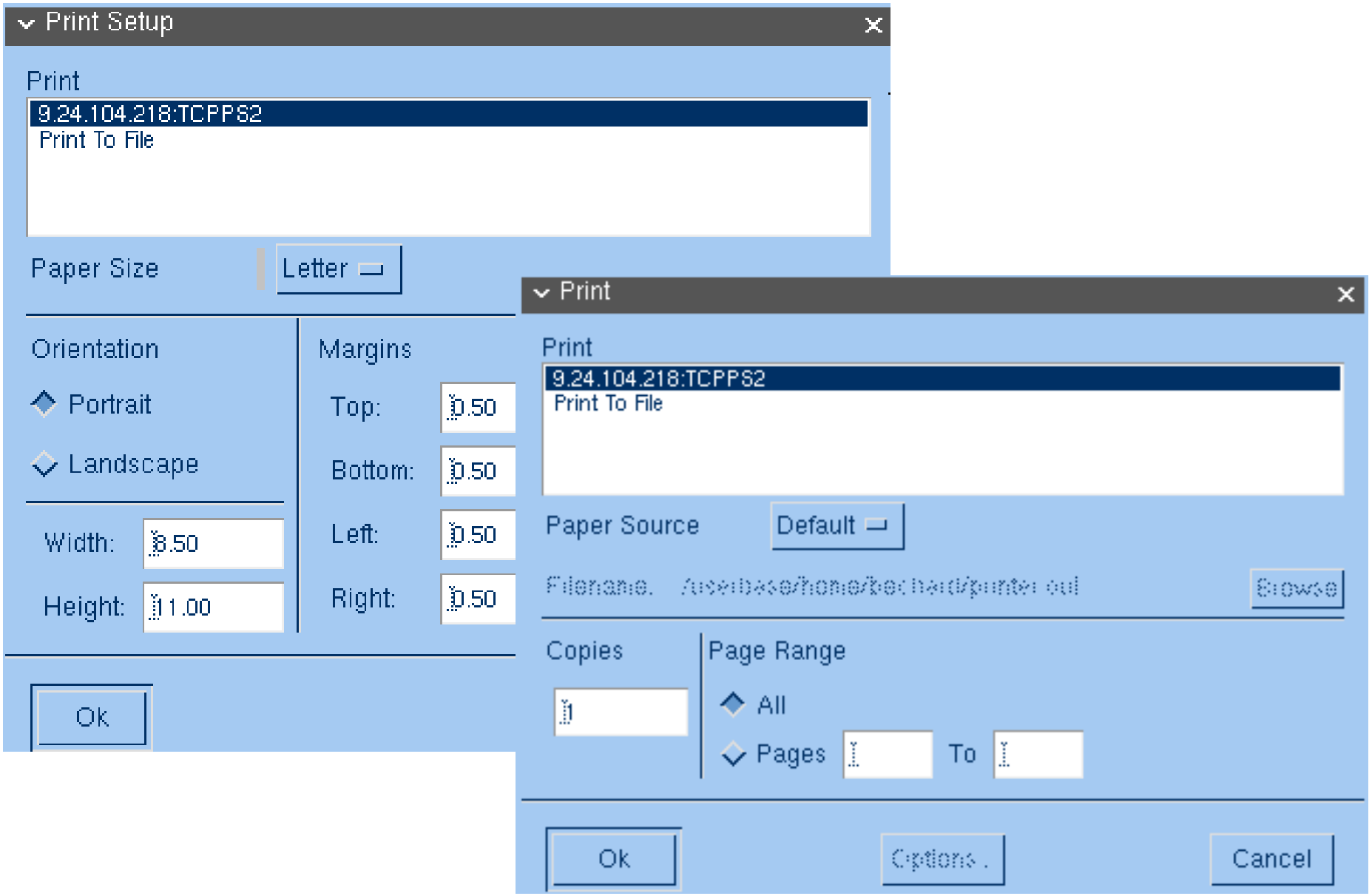
The browser print dialog has changed slightly and the print selector panel has also changed slightly but the functionality is the same.

The lpr (or nclpr which is equivalent) command can be used on the command line to initiate a print request.

A print monitor window is available to display the current print jobs scheduled for local printers, which can also be canceled from that window.

Since the Series 2800 have two native serial ports, the IP ports 5962 and 6462 have been added to the seriald daemon for the second native serial port.

Print Setup and Print Dialogs



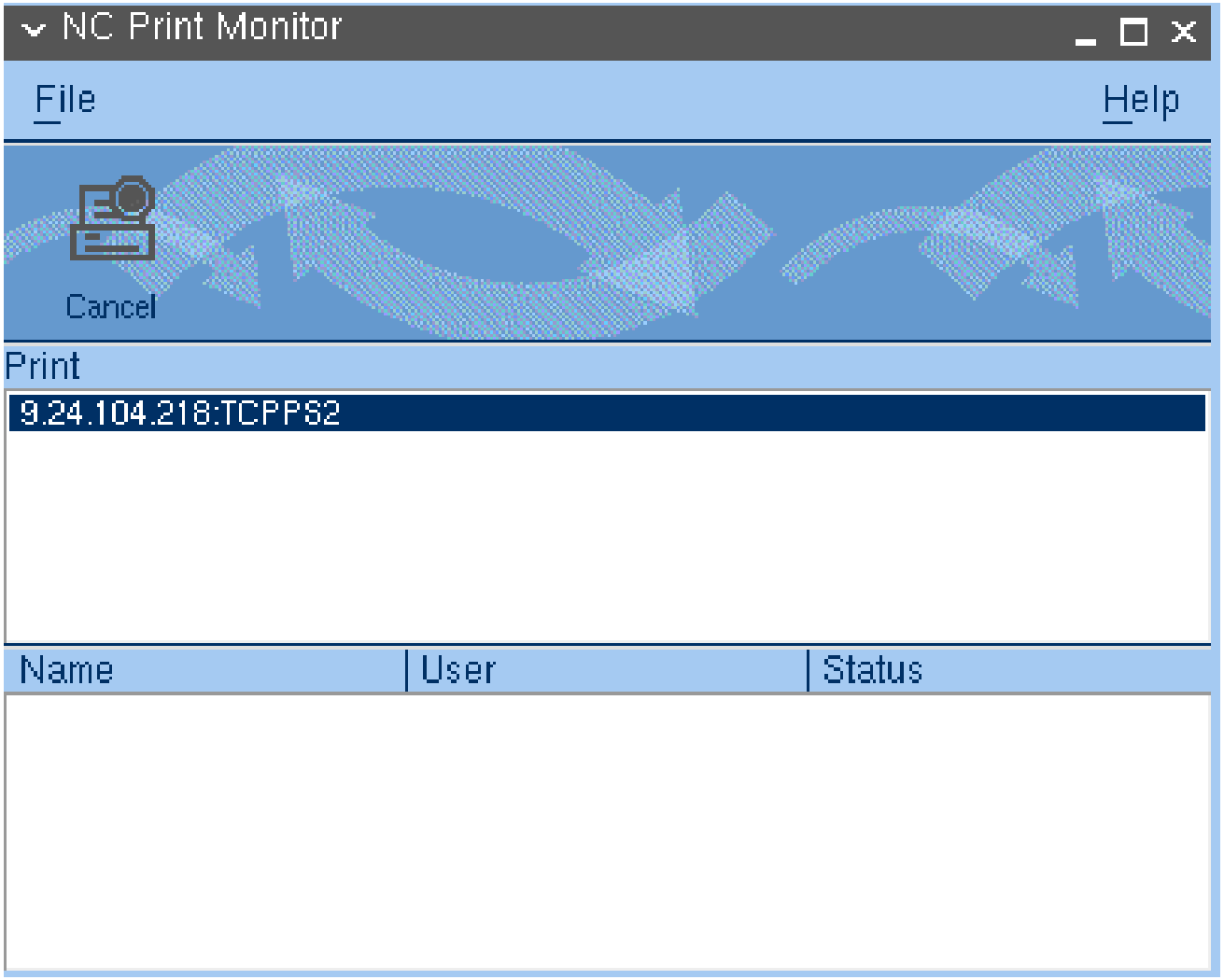
This chart is to provide you with an example of the print dialog panels used on the station.

They are only slightly different from those of the previous release but they provide the same functionality.

The top one is the Print Setup dialog, where the user can select one of the defined printers and specify characteristics such as orientation and paper size.

The bottom image is the print dialog where the user selects the printer to print to and characteristics such as the number of copies or which page range to print.

NC Print Monitor



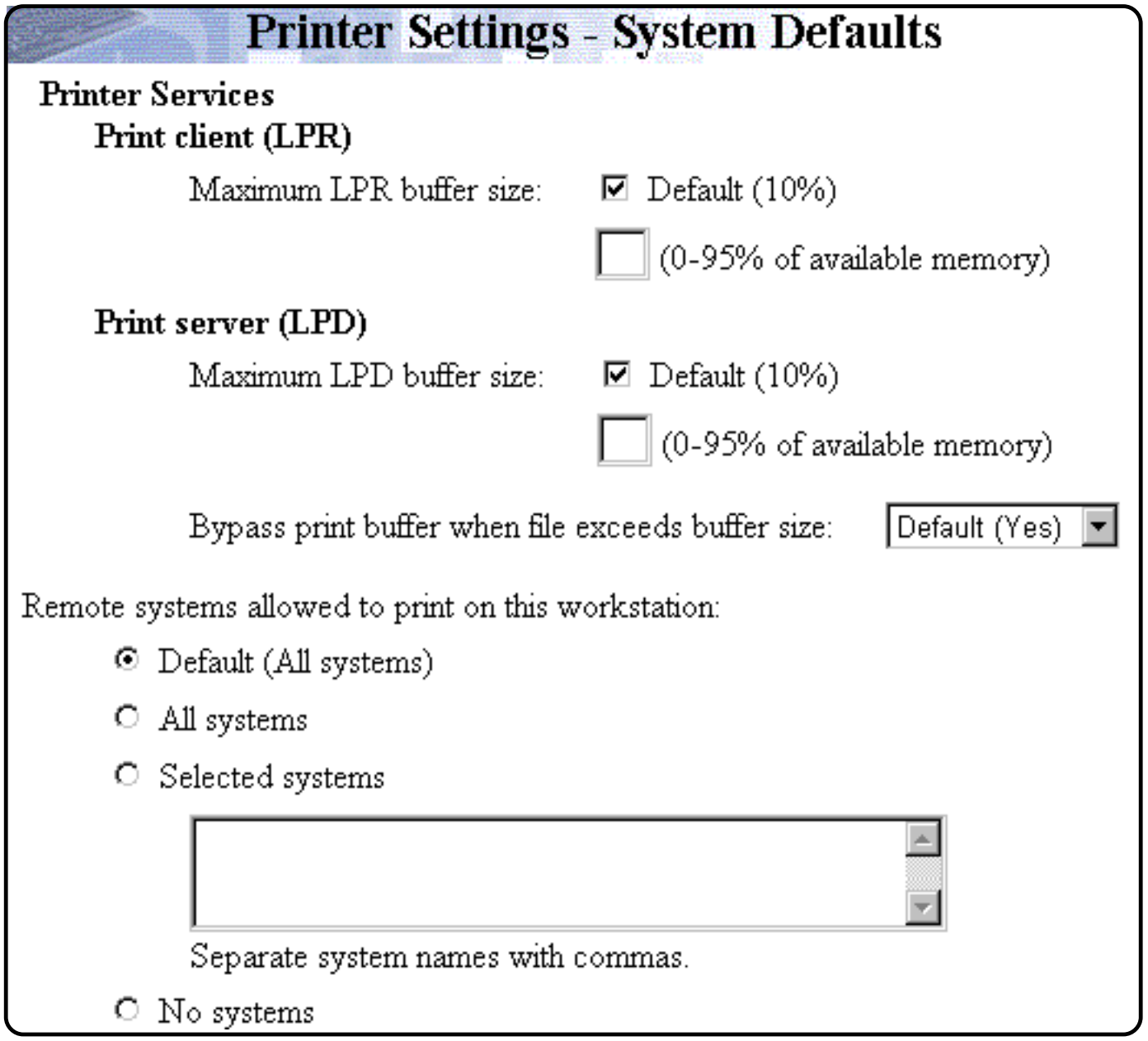
This chart shows the print monitor window that can be started from the Tools folder on the launchbar.

This function is new in V2R1 and allows a user to monitor the print jobs that are in process and to cancel jobs if necessary.

This does not apply to remote printers but only to local printers.

Select a printer in the list, if there are more than one, to display the print jobs in the lower portion of the window.

Configuring Printer Services in NSM

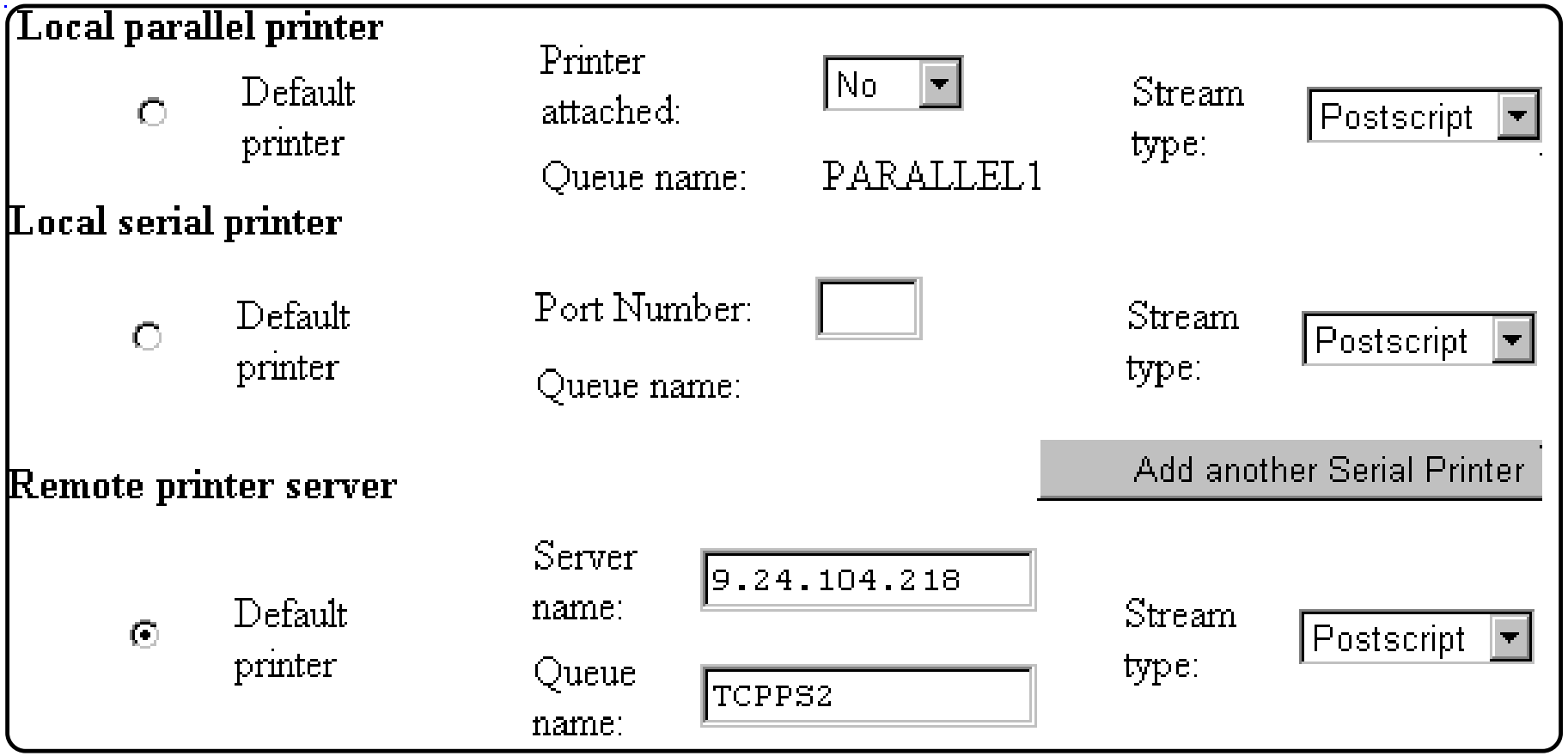


This is the main printer configuration panel in Network Station Manager which is displayed using the Hardware/Printers setup task.

The top half of the panel is to specify the size of the buffers used when sending or receiving print jobs, and whether to overflow the buffer directly onto the printer if we run out of buffer space.

The bottom half of the panel is where the administrator can specify which remote systems are allowed to use the print facilities of the Network Station. You can specify unrestricted access, no access or identify the specific hosts that are allowed to connect to the local LPD function.

Configuring the Printer List



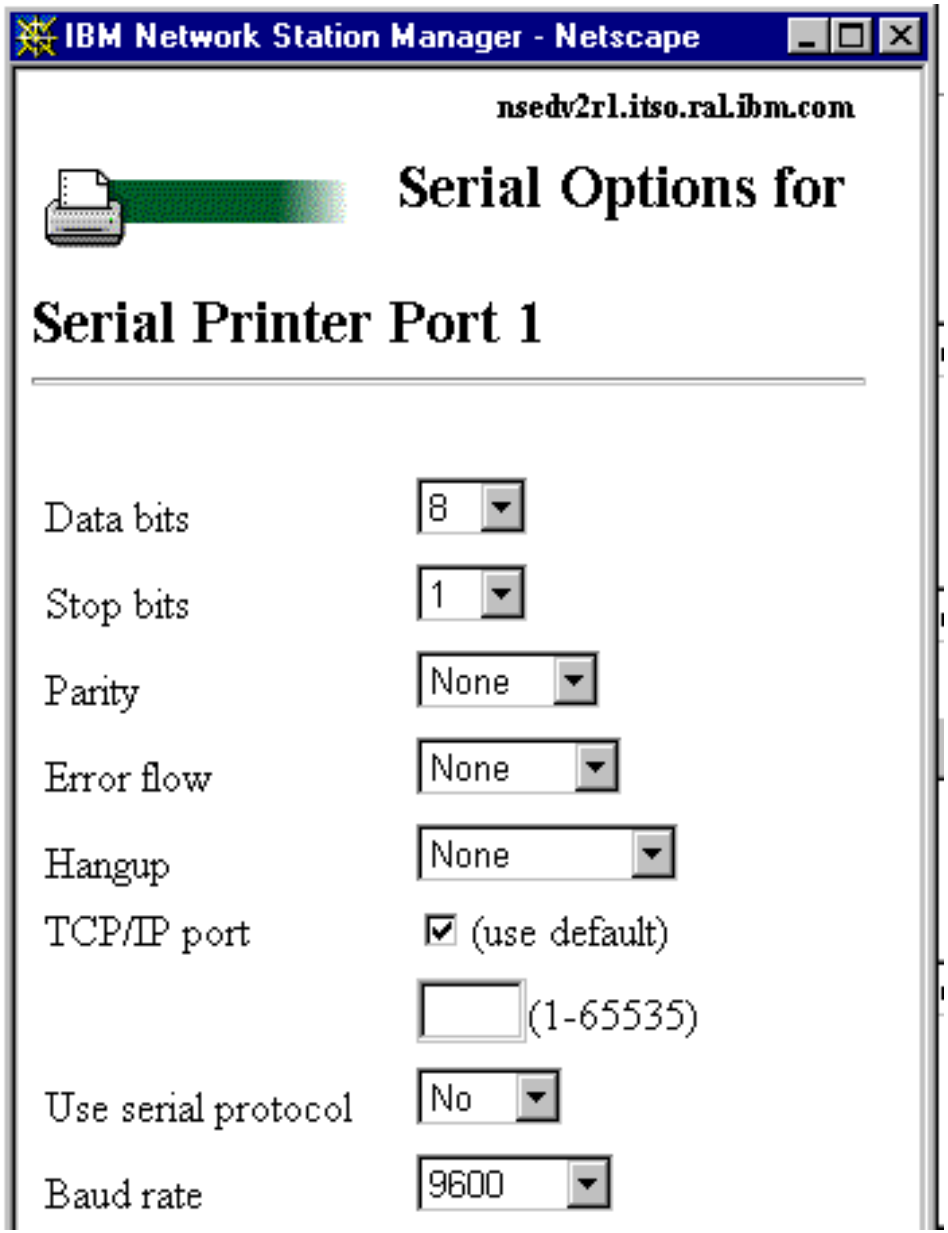
From the first panel, if you scroll down further, this particular part of the panel appears and this is where you can define the local and remote printers that you are making available to the Network Station users.

You can specify one parallel printer, which the default queue name of PARALLEL1, on or more serial printers (dependent on the number of ports you have available), and finally, one or more remote printers.

Notice that you can indicate with a checkbox which one of these definitions is to be the default printer that is automatically selected on the print dialog.

For each printer, you also indicate the type of datastream that the printer is capable of handling, such as PostScript or PCL for example.

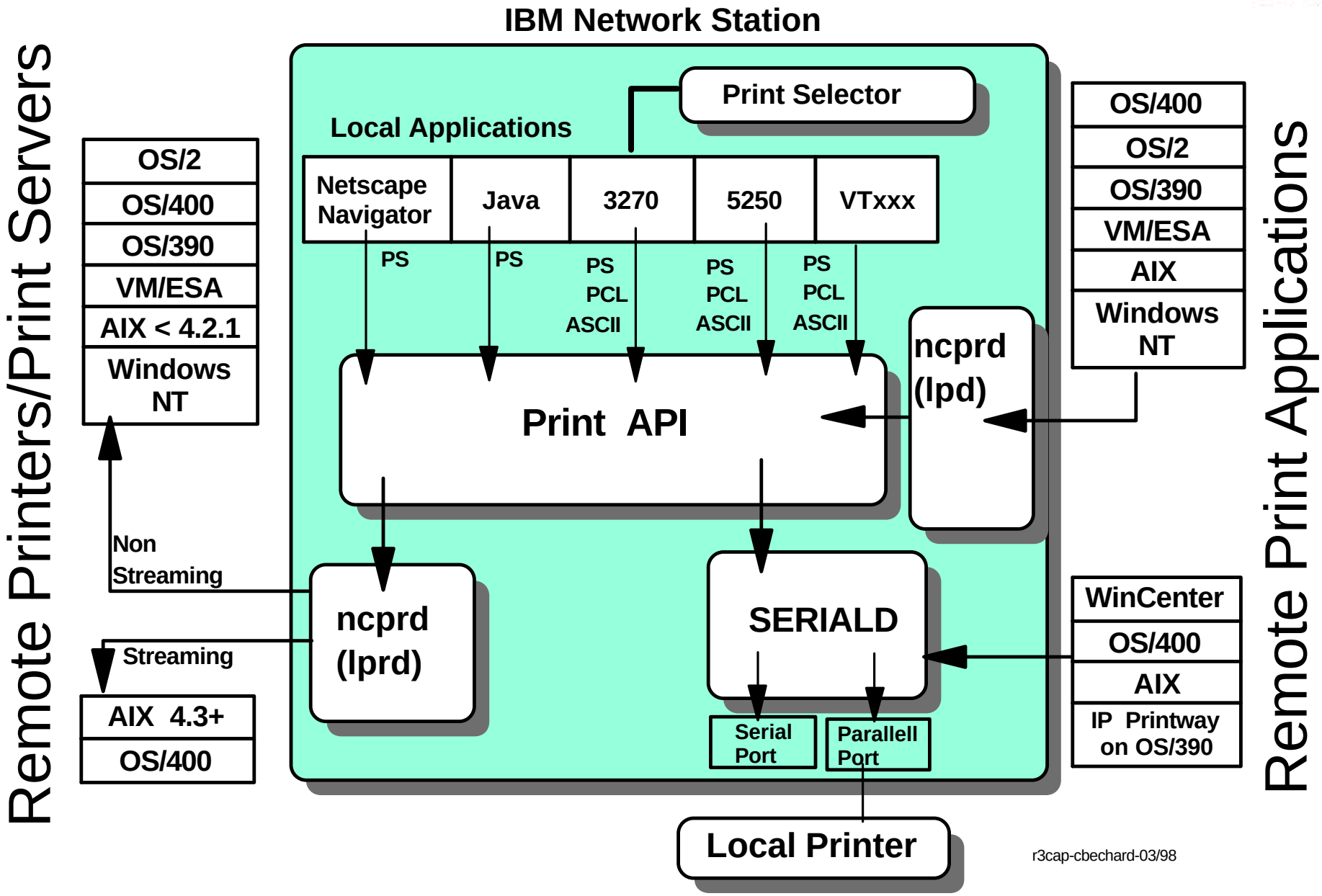
Serial Printer Options



If you define a serial printer, there are additional settings that can be entered (which were not shown on the previous panel). But there is a Serial Options button for each serial printer which displays the panel showed in this chart.

As you can determine from the fields here, these are simply the typical configuration options for a serial port.

Overview of Printing Capabilities



This chart provides the same kind of overview we saw in the first chart, except that we have included a few more details here to bring to your attention.

In particular, we have added:

- The local applications and the types of datastream they support
- The target remote systems and whether they support streaming or not. With both the AIX 4.3 and the OS/400 models we support a mode of printing called streaming LPR, which we will explain in a moment. This lets us do the printing in a more efficient manner because we do not have to buffer the entire job in memory before sending it out to the print server. If streaming is not used, the entire print job must fit in memory before being sent out.
- The remote applications that can send print requests to the station and which ones still can connect directly into the SERIALD daemon using the old mechanism that was used in previous releases of the Network Station.

Printing from Local Applications

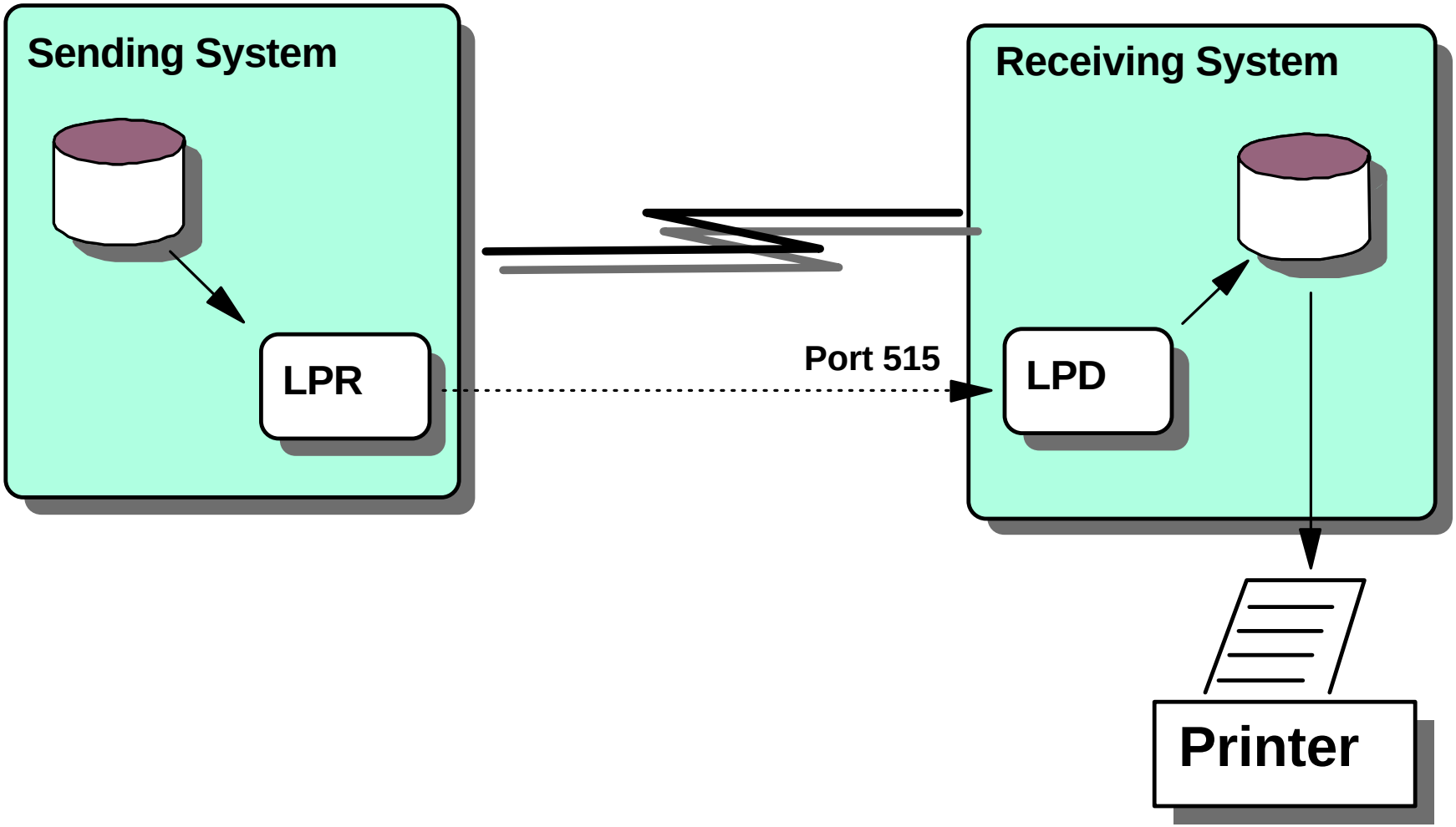
Local Applications	*Local Print*	*Remote Print*	*Data Streams*	*Functions*
5250 Emulator	**Yes**	**Yes**	**PostScript PCL ASCII**	**Screen Print Only**
3270 Emulator	**Yes**	**Yes**	**PostScript PCL ASCII**	**Screen Print and LU1/LU3 Printing**
VTxxx Emulator	**Yes**	**Yes**	**PostScript PCL ASCII**	**Screen Print and Scroll Buffer Print**
Netscape Navigator	**Yes**	**Yes**	**PostScript**	
Java Applications	**Yes**	**Yes**	**PostScript**	

This chart is a simple summary of the local applications and the print datastream that they support.

Notice that all of the applications on this chart, which are the primary applications for the Network Station Manager - the 5250 emulator, the 3270 emulator, the VT emulator, the Netscape browser, and Java applications can all print to both local and remote printers.

They also all support the PostScript datastream. The three emulators also support a Screen Print function to PostScript, PCL or ASCII printers, while the 3270 Emulator also supports LU1/LU3 printing and the VT emulator has a scroll buffer print function that allows printing screen data that has rolled off the screen.

What is LPR/LPD?



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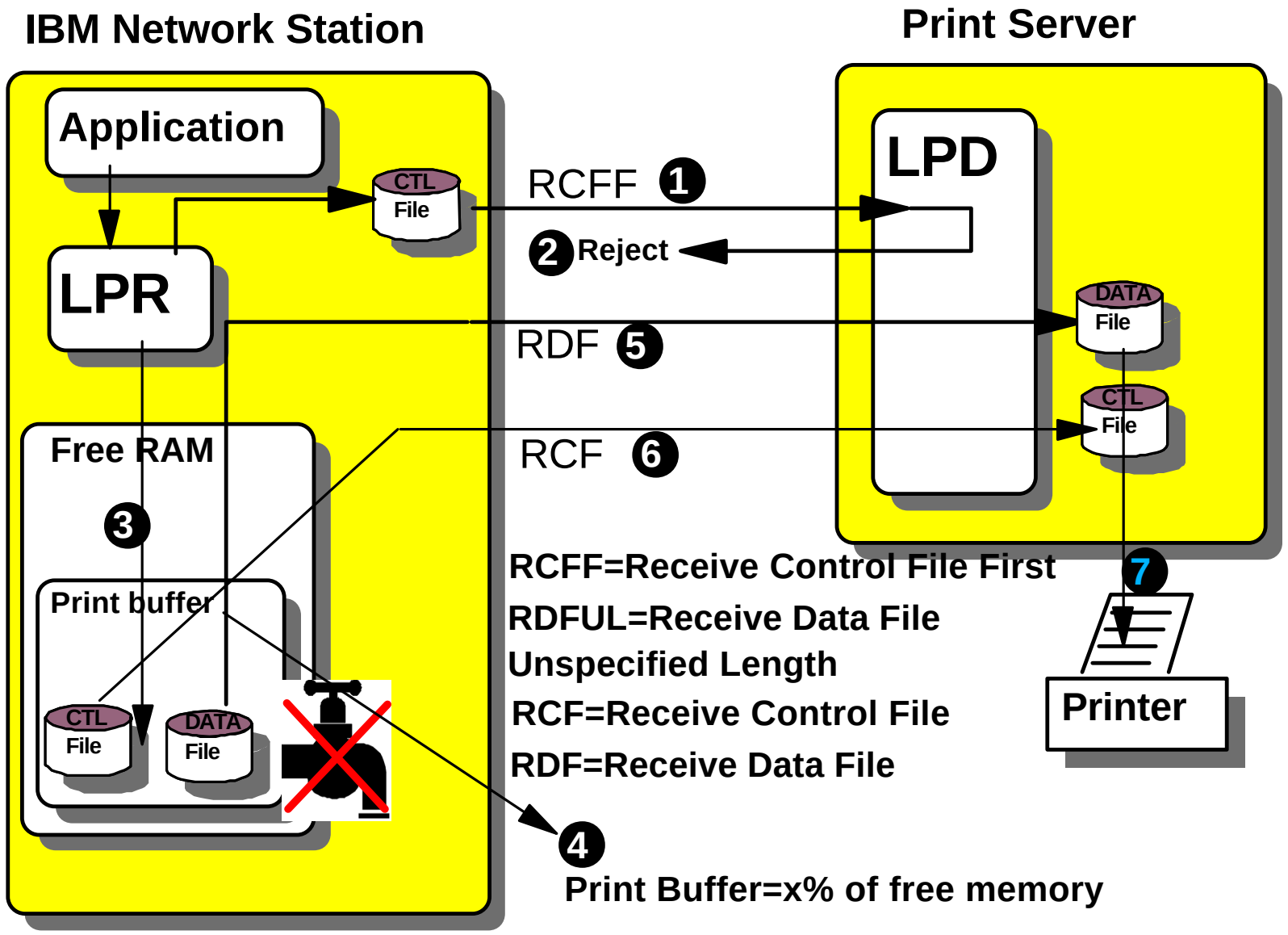
What is LPD/LPR? It is the Internet standard for sending print jobs across the network. It is defined in RFC 1179 and it identifies both a client and a server in this printing mechanism.

LPR stands for Line Printer Requester and it is the client side that sends the data across the network.
LPD stands for Line Printer Daemon and is the server side that receives the data from a client LPR.

A job is initiated by the LPR by contacting the LPD (server side) over the network using the well-defined port 515 on the server side. When contact has been accomplished, there is a particular protocol and a series of commands for authentication and verification of which queue to send the data to and so on.

The Network Station fully implements the Internet standard for LPR/LPD printing. It also implements an extension to the standard, called streaming mode, that allows print jobs to be sent as they are being generated locally, and also printed as they are received from remote hosts. This save memory both on the Network Station and on the servers that support this function. In the case of the Network Station, this is an important function to support since the system is a real memory system with no local spooling capability.

LPRD - Non-streaming Mode Send



stream3-cbechard-03/98

Let's take a look at the non-streaming mode.

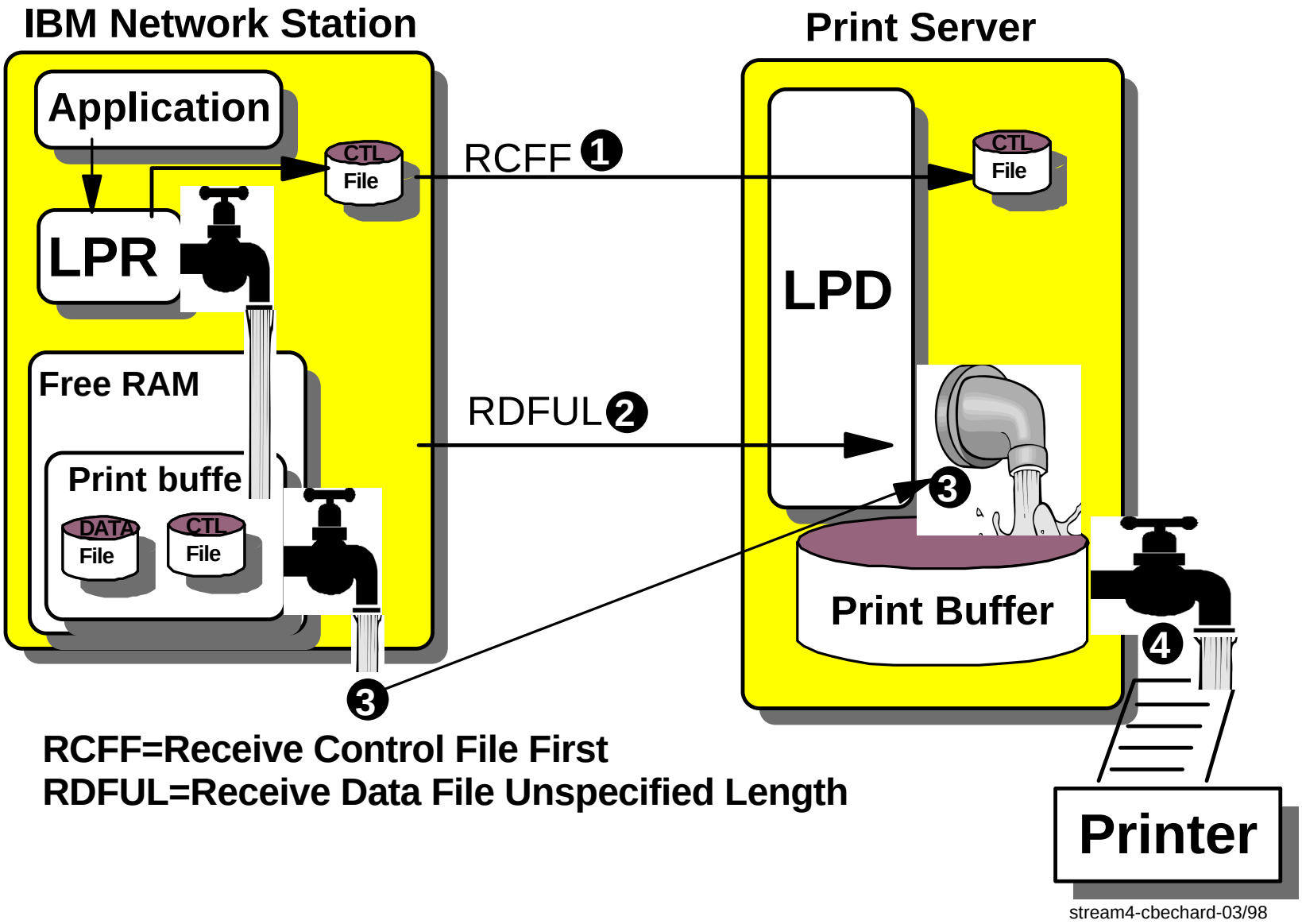
When the Network Station sends something out, it first sends a new streaming mode command called RCFF or Receive Control File First.

If the receiving LPD is an older style LPD, it sends a negative acknowledgment saying, "I don't understand what command you're sending to me."

The Network Station then buffers up the data in free RAM that is defined in a percentage of the RAM on the Network Station. It buffers the entire print job in memory and then sends it using the standard LPD/LPR protocol, effectively saying, "Here's the data, and here's how much I am sending", then sends the data, sends a control file after the data, and then says, "Now you can print the data."

We use that mechanism in the non-streaming mode.

LPRD Streaming Mode Send



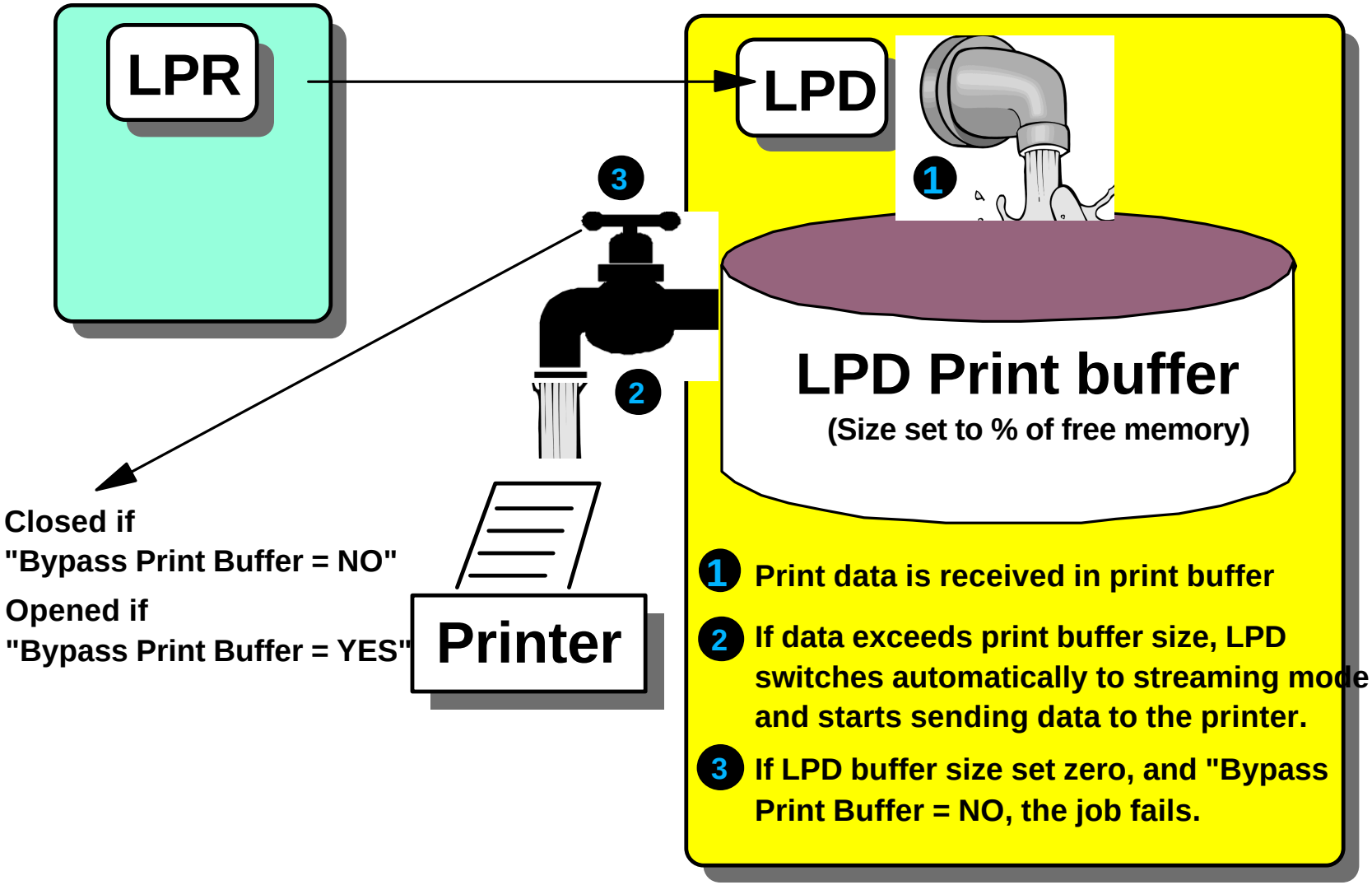
This chart illustrates the streaming mode send.

The Network Station sends a "Receive control file first" indication to the print server. The LPD that understands this protocol says, OK, send your control file." The control file is sent across before the data is sent.

At this point the Network Station sends a "Receive data file of an unspecified length" indication or RDFUL. This is an LPR command and is an extension to the original RFC. It then sends the data and sends an end of file at the end of the data to notify the server that the entire job has been printed.

In this way, only a small portion of the data needs to be buffered into the Network Station's memory as it is sent to the LPD server.

LPD



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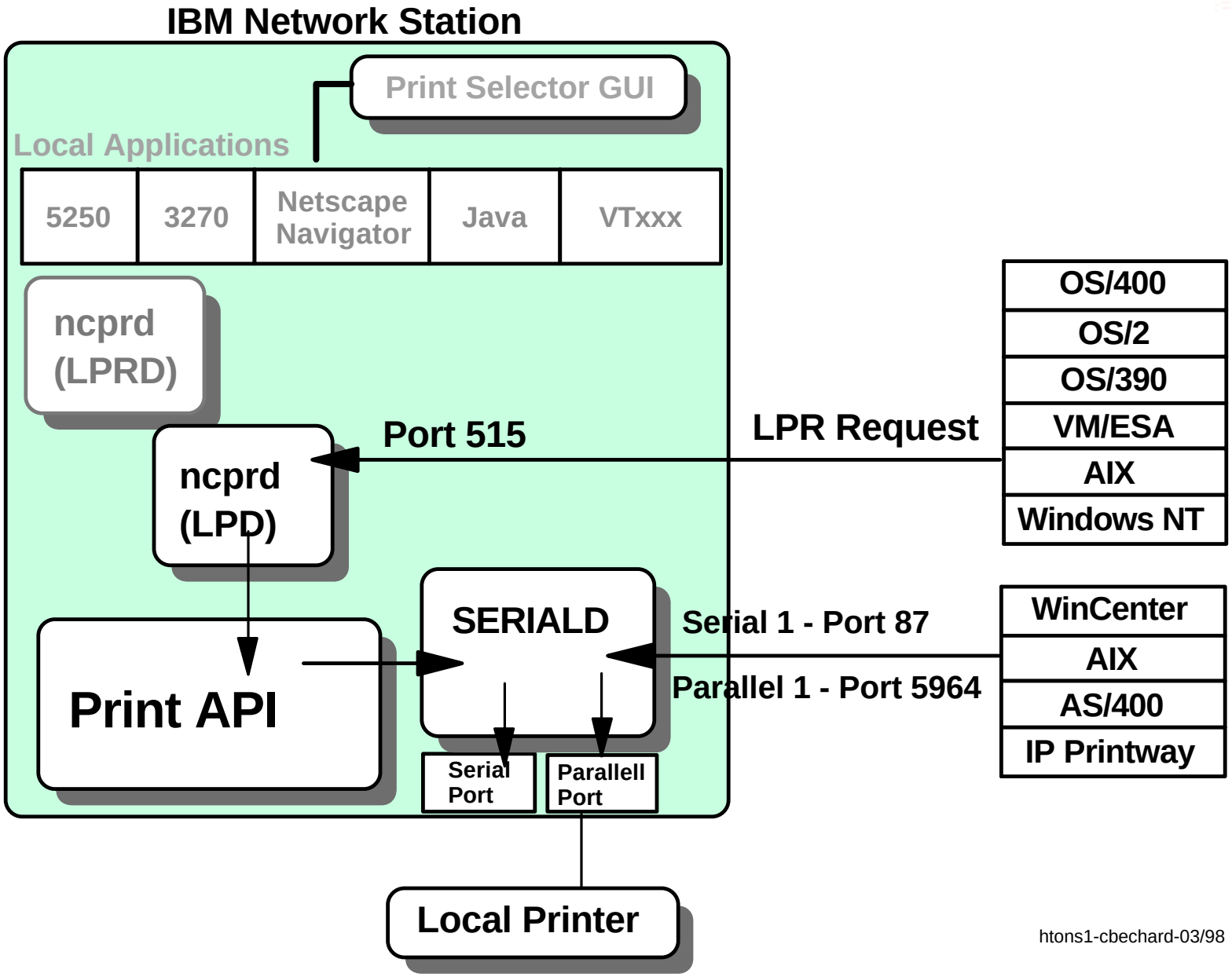
When printing from a remote server to the Network Station, in most cases, even if you are not using streaming LPD/LPR protocol, the Network Station sends the data as it receives it straight out to the printer.

There is a parameter called "Bypass Print Buffer" that when set to "NO," will cause the data to be buffered in the Network Station completely before it is sent out to the printer.

If you set this to "NO" and you overflow the amount of memory that has been specified for buffer space for your printer, the print job is canceled and lost.

The Print job fails and the print server is notified that it has failed.

Remote Printing to the Network Station



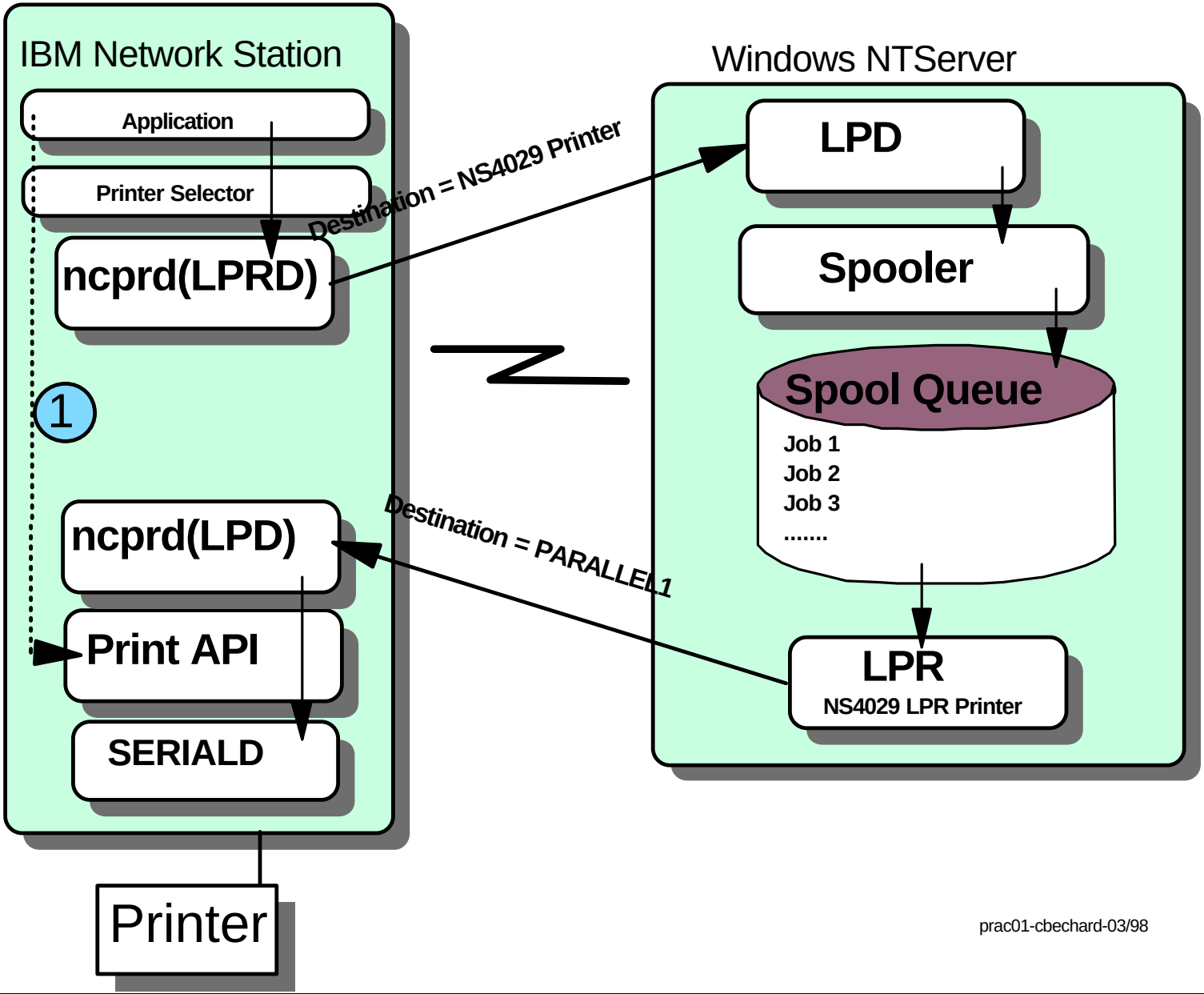
This chart illustrates again an overview of printing from a server to the Network Station.

Again, with the OS/400, OS/2, OS/390, VM, AIX, or Microsoft Windows NT you can use the LPD/LPR protocol and send data to the Network Station on port 515.

With AIX or AS/400, using IP Printway, you can send data directly to serial port 87 - or TCP/IP port 87 or port 5964 and this will send the data directly to the SERIALD daemon and directly out either the serial port or the parallel port depending on the TCP/IP port that you select.

This is discussed in much more detail in the printing redbook SG24-5212 which you should consult for all your printing needs.

Using a Remote Host Spooler

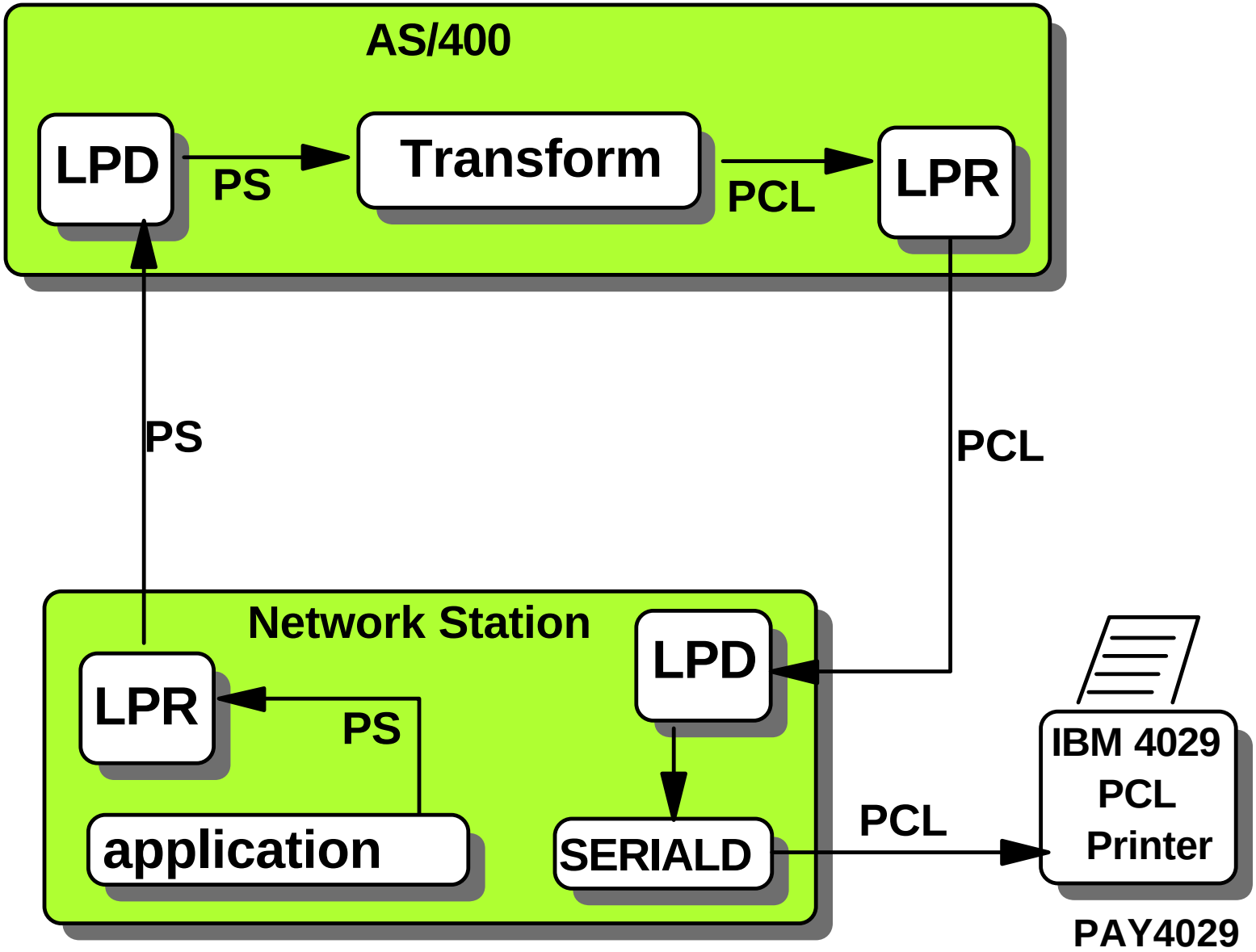


This chart shows using a remote host spooler.

If you are printing from multiple applications and you don't want to buffer up too much data inside the Network Station where the memory is limited or if you are trying to print from multiple servers to one Network Station. it may be best to set up a print server on a host such as an AS/400, or Windows NT, or AIX system.

In that case you print from the Network Station using the LPR protocol to the LPD on the print server. The print server then spools the jobs and sends them one at a time back to the Network Station.

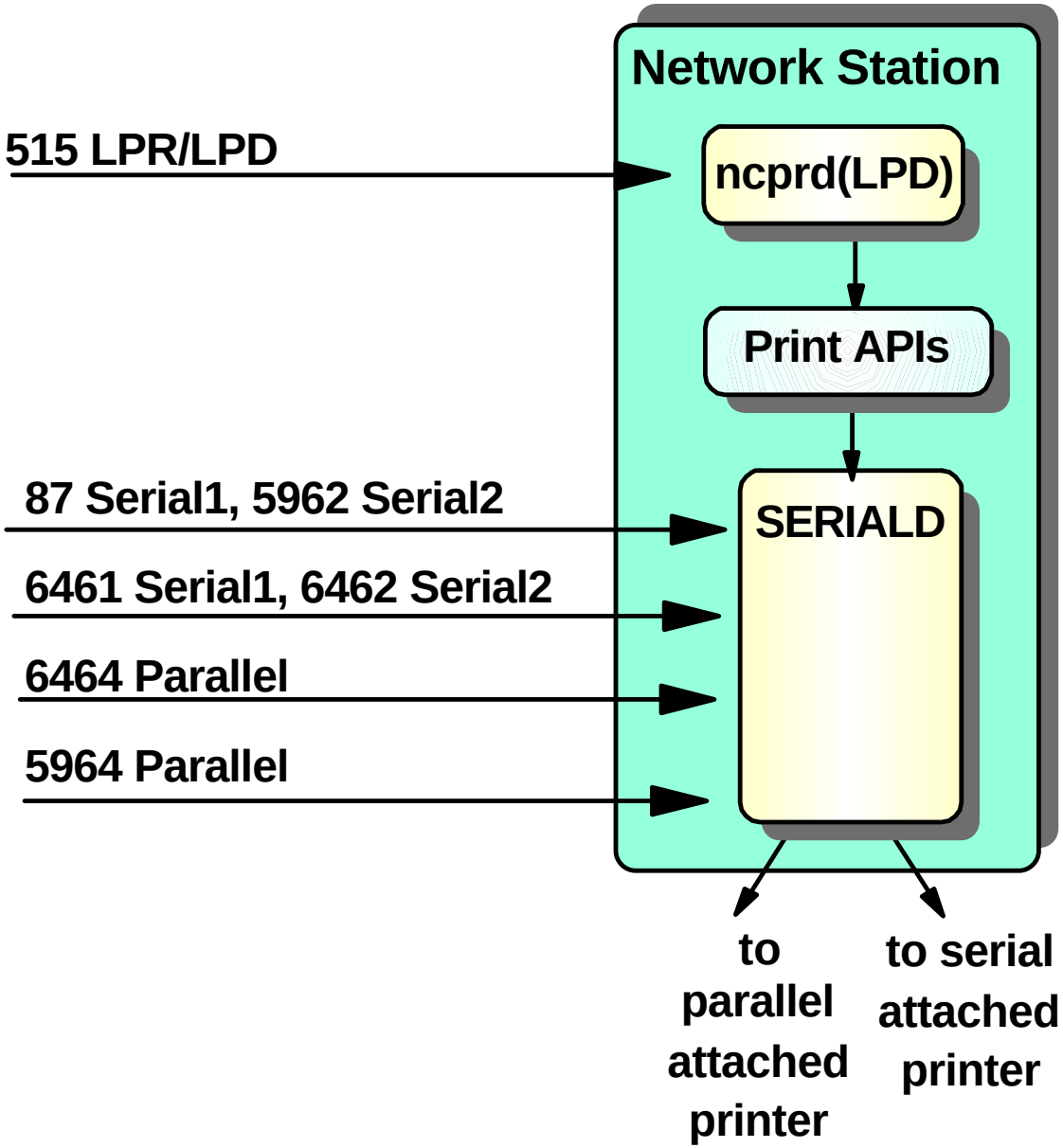
Using Host Print Transform (PS to PCL)



scen4-cbechard-03/98

Another example might be when you are printing from the browser which generates only PostScript data and you only have a PCL printer attached to the Network Station. The data is sent using the LPR/LPD protocol to a host such as the AS/400 or the RS/6000 which runs a transform function that converts the data from PostScript to PCL. Once the data is converted to PCL, it can be sent back using the LPR protocol to the LPD daemon running on the Network Station and out to the printer that is attached to the Network Station.

Network Station SERIALD Daemon



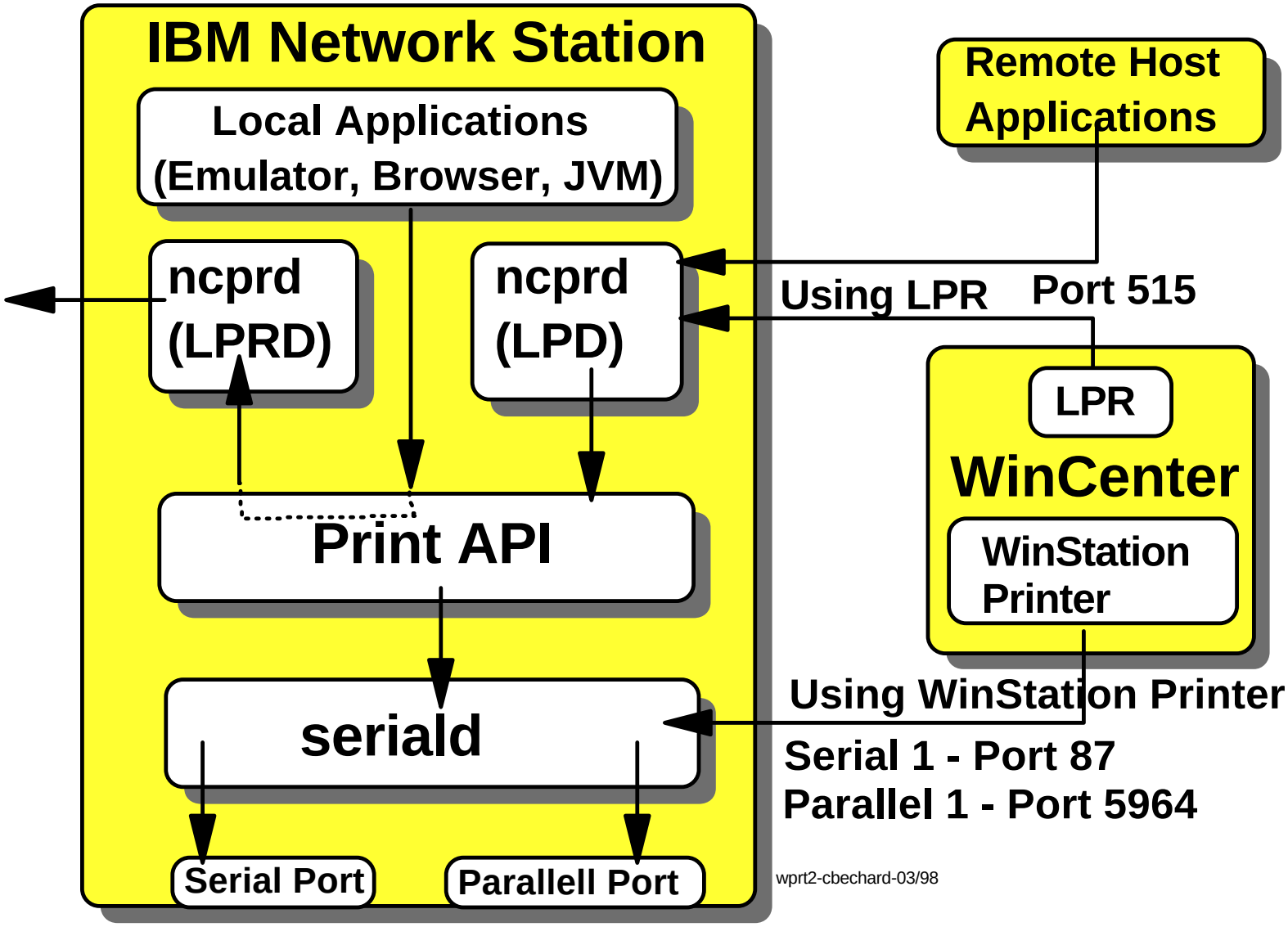
This chart shows the SERIALD daemon and the port numbers that can be used.

Again, you can always print on port 515 using the LPD/LPR protocol, but if you use a nonstandard, straight socket protocol, you can send to ports 87 or 6461 to send to the first serial port.

The difference between these is that, with the second one specified in each case, you will have carriage returns added to line feeds. So it does a small amount of formatting of your data as it gets sent to the printer. The ports for parallel are 6464 and 5964.

When you're printing from WinCenter you'll notice that you can use both the LPR (port 515) and, using a WinStation printer definition on the WinCenter server, you can send the data to the SERIALD directly and bypass the LPR protocol.

Printing from WinCenter



When printing from an application on a WinCenter server, there are two ways to send a print request to a Network Station printer.

The first is to use the standard LPR/LPD functionality by defining an LPR printer on the WinCenter server to represent the printer on the Network Station.

THe second is to define a Winstation Printer, in which case the print request is sent directly to the SERIALD daemon on the Network Station.

Although not indicated on this chart, note on the Network Station itself, the lpr (or nclpr) command can be used from the command line on the station to send a print job to a remote printer. Use lpr -help to find out about the syntax of the command.

The syntax is
lpr [-Pprinter] [-Kcopies] [-Ttitle] [-h] [-Uuser] [-v] filename

Where to go for more information

- **SG24-5212 IBM Network Station Printing Guide (Redbook)**
- **Available on this CD or from www.redbooks.ibm.com**

The next best place for more information on the Network Station printing facilities is the redbook entitled IBM Network Station Printing Guide.

We have provided you with a copy on this CD but you can also obtain it from www.redbooks.ibm.com.

This book was produced for the Network Sattion Manager Release 3 in mid 1998 but is still very much current because very little has changed from a printing perspective since that book was published.