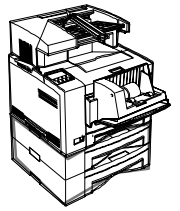
Network-attached printers on the AS/400

Configuration Methods



Terminology

- LANs
  - Local Area Networks - Token Ring or Ethernet
- Protocols
  - Mainly TCP/IP, some SNA, Lexlink, IPX...
- Datastreams
  - IPDS, SCS, PCL, Postscript, PPDS...

Some LAN-attached printer methods

- TCP/IP
  - LPR/LPD (Line Printer Requester/Daemon)
  - PJL Driver
  - PSF/400 IPDS
  - PSF/400 IPDS via i-data 7913
- SNA
  - APPC (LU 6.2 session)
- Lexlink
- IPX

TCP/IP: LPR/LPD

- Also known as an OS/400 *Remote Output Queue*
- Characteristics:
  - no device description (can create a dummy one if required)
  - must know identity of remote host (usually the printer) via an IP address
  - must reference remote host's print queue
  - LPD daemon (process) running at remote host

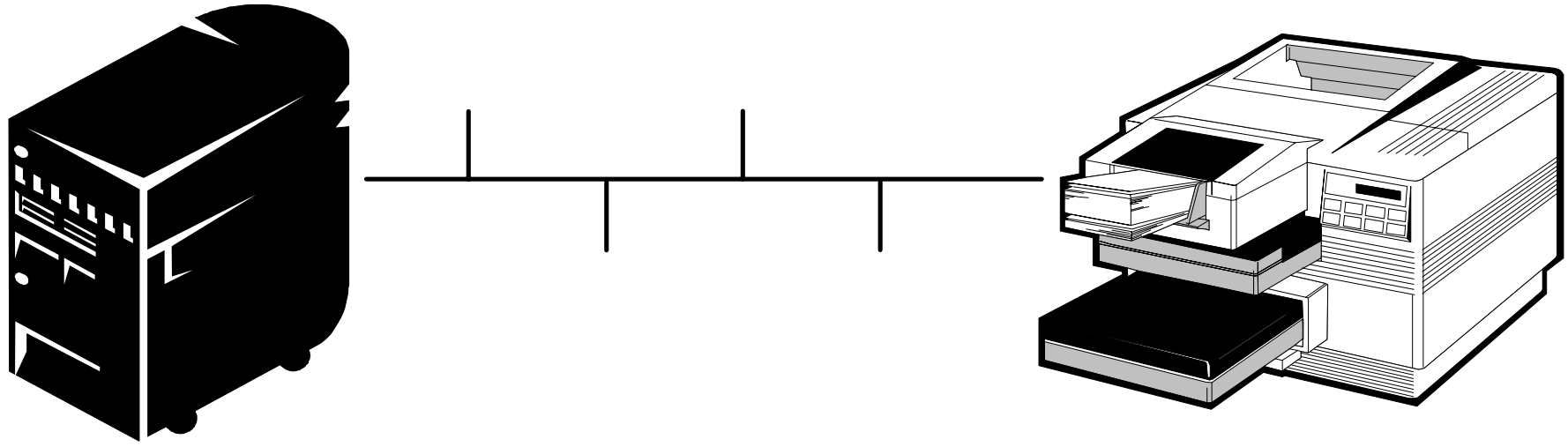
TCP/IP: LPR/LPD...

- Operation:
  - spooled file arrives on the output queue
  - (optionally) print writer job automatically starts; sends spooled file to printer using LPR
- Advantages:
  - just another output queue to the user
  - Host Print Transform supported, e.g. for sending AFP jobs to non-AFP printers
  - easy to set up: `CRTOUTQ`, IP address, print queue name

TCP/IP: LPR/LPD...

- Disadvantages:
  - relatively heavy load on CPU / system memory
  - no page range support (e.g. can't selectively print pages 1-10 of 100-page document)
  - no feedback to AS/400 if any problems occur
  - no error recovery
  - some applications e.g. OfficeVision refer to a printer device name, not an output queue
  - different startup command used (`STRRMTTWR`)
  - not all LPD daemons support all requests

Example: attach HP LaserJet via Remote Output Queue



AS/400

HP4 with JetDirect card

Creating the output queue

```
CRTOUTQ OUTQ('HPJETRMT')
  RMTSYS(*INTNETADR)
  RMTPRTQ('raw')
  AUTOSTRWTR(1)
  CNNTYPE(*IP)
  DESTTYPE(*OTHER)
  TRANSFORM(*YES)
  MFRTYPMDL(*HP4)
  WSCST(*NONE)
  INTNETADR('128.1.1.2')
  DESTOPT('XAIX' 'XAUTOQ')
```

Could use a host name here, if defined in TCP/IP Host Table Entries

HP printer will treat the job as formatted text. NB use of lower case, and single quotes to preserve case

Send to "another system"

Host Print Transform (SCS or AFP to ASCII)

Support for many non-IBM ASCII printers

IP address of printer (actually of JetDirect card)

Support multiple copies

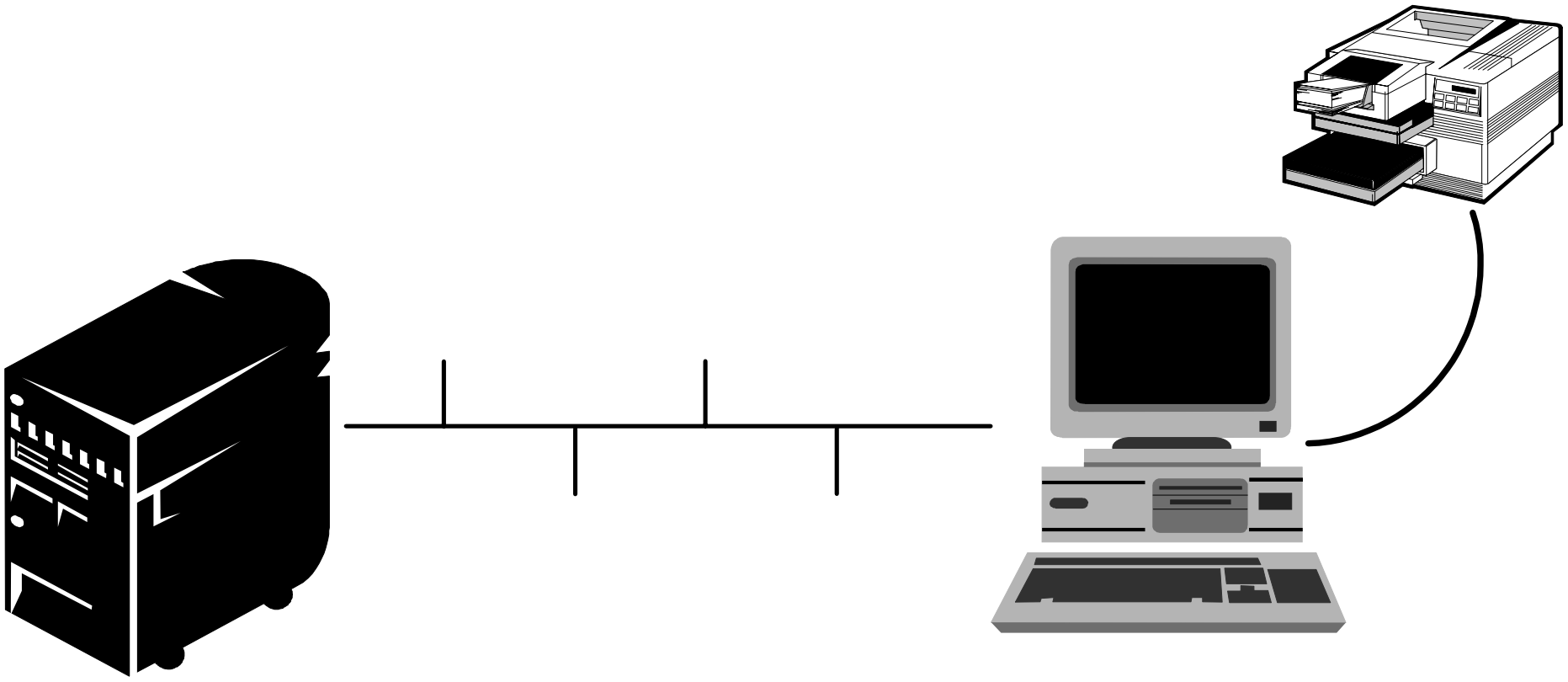
Prevent time-out during transform

List of common internal print queue names

HP JetDirect card (internal)	'text' or 'raw'
HP JetDirect Server (external)	'text1' or 'raw1', 'text2' or 'raw2', etc.
Lexmark INA / INO (internal)	'prt0'
Lexmark Marknet XLe (external)	'/prt1' and '/prt2' (parallel)
	'/ser' or /prt9' (serial)
IBM Network Print Server	'pr1' to 'pr8'
IBM Network Printer	PASS or TEXT
IBM 3130 printer	'afccu2'
Intel Netport XL	TEXT1 or TEXT2
Intel Netport Pro	LPTx_PASSTHRU or LPTx_TEXT
UNIX systems	printer_queue_name

Note - you *must* use these names to obtain a successful connection. Use of the single quotes keeps the names in lower case

Example: attach printer via PC



AS/400

LPD process running on PC. HP4 parallel-attached to PC

Creating the output queue

```
CRTOUTQ OUTQ('HPPCRMT')
  RMTSYS(*INTNETADR)
  RMTPRTQ('HP4Q1')
  AUTOSTRWTR(1)
  CNNTYPE(*IP)
  DESTTYPE(*OTHER)
  TRANSFORM(*YES)
  MFRTYPMDL(*HP4)
  WSCST(*NONE)
  INTNETADR('128.1.1.3')
  DESTOPT('XAIX' 'XAUTOQ')
```

This is the name of the HP4 printer *as known to the PC.*

IP address of PC

Examples of remote LPDs

- OS/2
  - LPRMON
  - LPRPORTD
- Windows 3.1, WfWG 3.11, Windows 95
  - None natively
- Windows NT
  - LPDSVC (Windows NT TCP/IP Print Service)
  - only for locally-attached printers

Examples of remote LPDs - third-party utilities

- NIPRINT
  - Network Instruments:
    - http://www.netinst.com
- Remote Print Manager
  - Brooks Internet Software
    - http://www.brooksnet.com
- MultiView 2000
  - JSB
    - http://www.jsb.com

AS/400 Printer Device Description

- Tells the AS/400 what sort of printer is to be used:
  - attachment method (*LAN...)
  - protocol (TCP/IP, Twinax...)
  - form type (cut-sheet or continuous)
  - where to find it (i.e. printer address)
    - IP address
    - Twinax port number / address number
    - MAC address

TCP/IP: PJL Driver

- Can create an AS/400 PJL Device Description
  - Also known as TCP/IP "sockets" printing
  - Uses PJL(Printer Job Language) used by most PCL printers e.g. HP, IBM, Lexmark
  - Older printers e.g. IBM 4029, HP III, early Lexmark 4039s, or LAN-attached impact printers (IBM PPDS) do not have PJL support
- Same advantages as for a Remote Output Queue
- Far fewer disadvantages - some limited error feedback and recovery

TCP/IP: PJL Driver...

- Available from OS/400 V3R7 and higher
  - Part of base code at V4
  - Note that you may also require PTFs for correct HPT operation
- Message CPD337F returned on trying to start the writer if the printer does not support PJL

Creating the PJL device description

Tip: press Enter after entering each parameter

```
CRTDEVD DEV(PRTNPPJL)
   DEVCLS(*LAN)
   DEVTYPE(3812)
      MODEL(1)
   CNNTYPE(*IP)
   PORT(2501)
   FORMFEED(*AUTOCUT)
   ACTTMR(170)
   INACTTMR(*SEC15)
   TRANSFORM(*YES)
   MFRTYPMDL(*IBM4317)
   PPRSRC(*A4)
   RMTLOCN('128.1.1.4')
   SYSDRVPGM(*IBMPJLDRV)
```

Always use this emulated device type and model

TCP/IP Port Number for IBM Network Printers PJL. For HP, Lexmark and other IBM printers use 9100.

Activation Timer - allowable time in which to make a connection to the printer

Inactivity Timer - time period after which the writer will release the printer to other hosts

System driver program (HPPJLDRV is the other choice)

TCP/IP: PSFCFG object

- Print Services Facility Configuration Object
  - an extension ("plug-in") to the device description
- Purpose:
  - provide support for IPDS LAN-attached printers
  - also provide additional printer functions such as:
    - Edge / Side Sensitivity
    - IPDS Passthrough
    - Explicit page size control
    - Printer resident fonts
    - AFP resource retention

TCP/IP: PSF/400 IPDS

- To configure LAN-attached printer for IPDS support:
  - Create LAN-attached printer device description
  - For OS/400 V3R2, you must create a PSFCFG to define some required parameters
    - IP address
  - For OS/400 V3R7 and higher, *optionally* create a PSFCFG to define some parameters

Creating the IPDS device description (V3R7 & higher)

Tip: press Enter after entering each parameter

```
CRTDEVD DEV(PRTNPIPDS)
  DEVCLS(*LAN)
  DEVTYPE(*IPDS)
    MODEL(0)
  CNNTYPE(*IP)
  AFP(*YES)
  PORT(5001)
  FORMFEED(*AUTOCUT)
  ACTTMR(*NOMAX)
  RMTLOCN('128.1.1.4')
  USRDFNOBJ(AFPPRTRS)
    OBJTYP(*PSFCFG)
```

Always use this device type and model

TCP/IP Port Number for IPDS printing

NB Same IP address as the PJL device description?? Yes.

Pointer to a generic PSFCFG object called 'AFPPRTTRS'

Creating the IPDS device description (V3R2)

Tip: press Enter after entering each parameter

```
CRTDEVD DEV(PRTNPIPDS)
   DEVCLS(*LAN)
   DEVTYPE(*IPDS)
      MODEL(0)
   AFP(*YES)
   AFPATTCH(*APPC)
   PORT(5001)
   FORMFEED(*AUTOCUT)
   RMTLOCN('MICKEYMOUSE')
```

OS/400 V3R2 code does not have settings for IP-attached printers, so we "pretend" it is APPC (SNA) attach... Alternative is *WSC i.e. twinax-attach

An "APPC" printer device description requires this parameter be filled in - but will not be used

Other parameters are the same as before. Note: no mention of TCP/IP address, activation timer or inactivity timer. At V3R2 these go in the PSFCFG object

Creating the PSFCFG object (V3R2)

```
CRTPSFCFG PSFCFG(PRTNPIPDS)
  IPDSPASTHR(*YES)
  ACTRLSTMR(*NORDYF)
  RLSTMR(*SEC15)
  RETRY(*NOMAX)
  RMTLOCNAME('128.1.1.4')
  PORT(5001)
  ACTTMR(*NOMAX)
    Etc...
```

PSFCFG object *must* be same name as the printer device description and be created in library QGPL

IPDS Passthrough - non-IPDS jobs will be printed faster when this is set on

Number of SNA retry attempts to reconnect. Also valid for TCP/IP with PTF SF42745

Specify any special parameter settings you require (leave as default otherwise)

A one-to-one relationship between PSFCFG object and printer device description

Creating the PSFCFG object (V3R7 and higher)

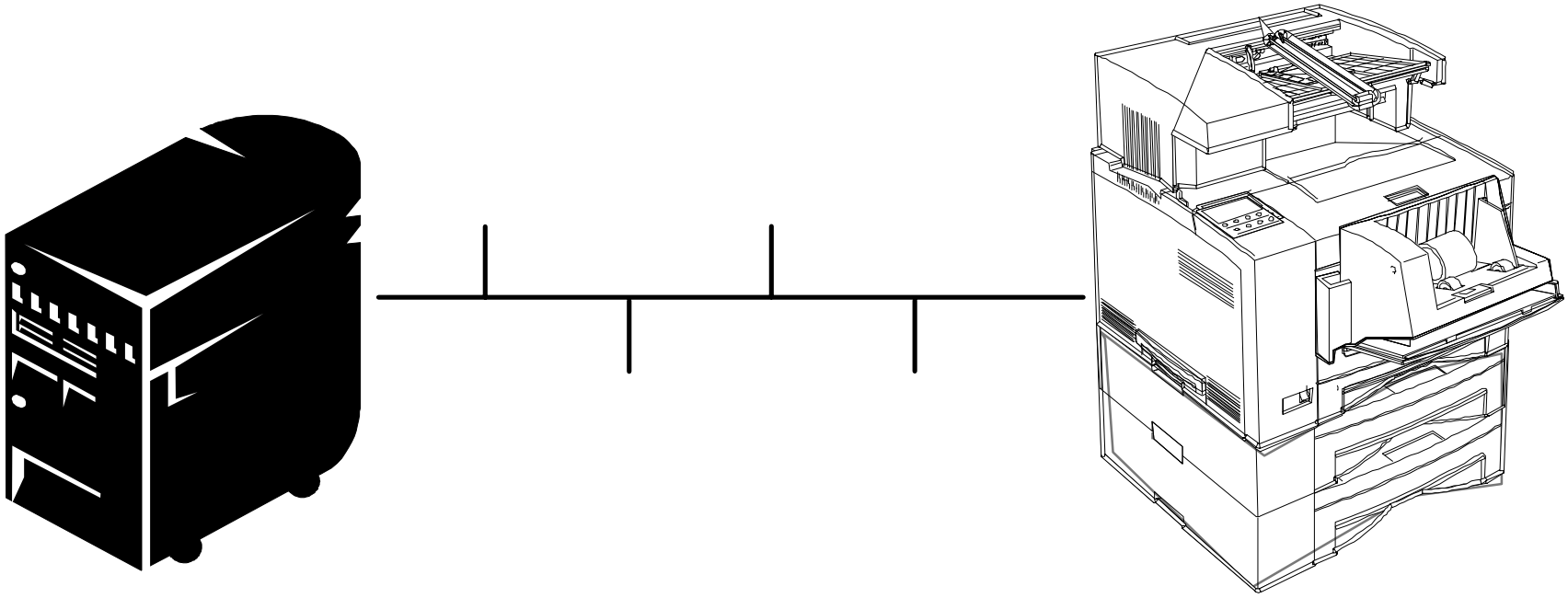
```
CRTPSFCFG PSFCFG(AFPPRTRS)
  IPDSPASTHR(*YES)
  ACTRLSTMR(*NORDYF)
  RLSTMR(*SEC15)
    Etc..
```

PSFCFG object can have same name as the printer device description, or can create and use a generic PSFCFG object Must tie up with the "user-defined object" parameter used in the device description.

Could also specify *NOMAX if printer is not shared

A one-to-one relationship between PSFCFG object and printer device description, if required, or a one-to-many.

Example: attach same IBM Network Printer by two different methods



AS/400

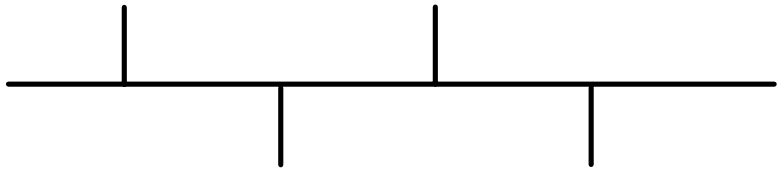
Network Printer 17

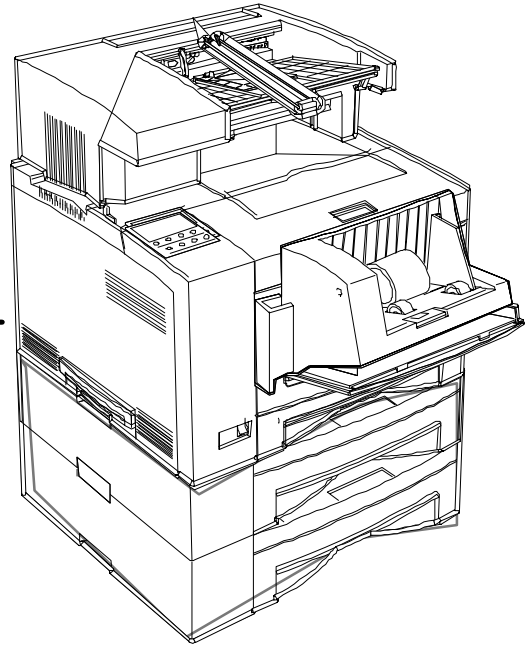
IP address: 128.1.1.4

Network Printer 17 via PJL Driver

PRTNPPJL

PJL device description
Can send AFP or SCS
as PCL using HPT





AS/400

Network Printer 17

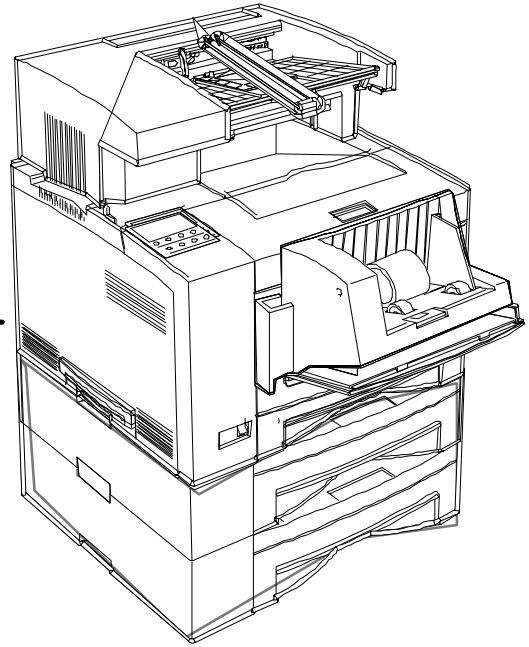
IP address: 128.1.1.4

Network Printer 17 via IPDS

PJL device description
Can send AFP or SCS
as PCL using HPT

IPDS device description
Can send AFP or SCS

PRTNPPJL



PRTNPIPDS

AS/400

Network Printer 17

IP address: 128.1.1.4

Why have two configurations for same printer?

- Keep one device for general-purpose printing (reports, listings, e-mails)
- Other device for AFP jobs (or testing AFP jobs)
- Alternative configuration might be for a system which does not have AFP support
- PSFCFG / device description settings ensure printer will switch between PRTNPIPDS and PRTNPPJL

Why have two configurations for same printer?...

- Operator panel will tell you which interface and what protocol is active, e.g:
  - **PCL TOKEN-RING**
  - **IPDS TOKEN-RING**
  - **NONIPDS TWINAX**
  - **SWITCHING TO IPDS**
  - **IPDS TWINAX**

TCP/IP: LAN-attached printer via i-data 7913

- Reminder: 7913 is a LAN brick that attaches IPDS twinax or coax printers to a LAN using TCP/IP
- Use same guidelines as for V3R2 i.e:
  - device description with `AFPATTACH(*APPC)`
  - PSFCFG object with IP address & `PORT(5001)`
- Twinax address on printer must be 0. System does not need to know this - communicates with 7913
- Can therefore attach coax printer to AS/400 LAN (but not a twinax printer to S/370 LAN)

SNA LAN-attached printer

- Not for IBM Network Printers, Lexmark, HPs
- Examples: IBM 3130, 3160
  - TCP/IP probably a better bet
- You need:
  - Line (LAN) description
  - APPC Controller description
  - APPC Device description
  - Physical printer device description
  - WRKAFP2 or PSFCFG objects to handle special requirements
  - Configuration list entries if using APPN

SNA LAN-attached printer...

- You need...
  - to read the manual(s):
    - 3130, 3160 and InfoPrint 60 Attachment Configuration Guide, S544-3977-04
    - Shipped with printers
    - Chapter-by-chapter guides to different hosts via different attachments
    - Highly recommended

Lexlink LAN-attached printer

- Use for attaching an ASCII printer with internal network adapter (INA) card (Marknet XL) or via external brick (Marknet XLe)
- Decision is made at this point:

```
CRTDEVD DEV(PRT4039)
DEVCLS(*LAN)
DEVTYPE(3812)
MODEL(1)

CNNTYPE(*IP) or: CNNTYPE(*LEXLINK)
```

- If at V3R7 or higher, recommend using the PJL driver over TCP/IP instead

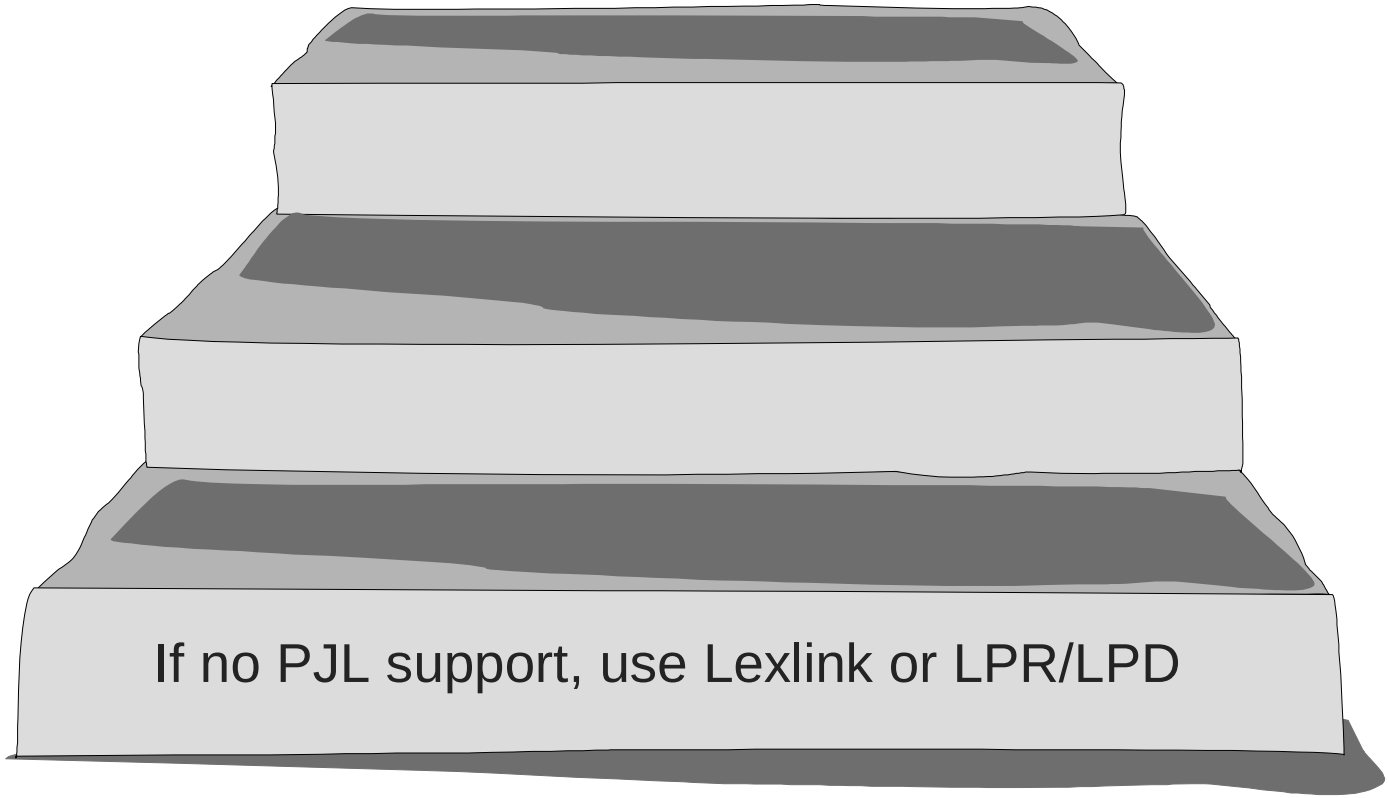
IPX LAN-attached printer

- Print to a Novell Netware printer via Netware print queue
- Uses OS/400 Remote Output Queue
  - `CNNTYP(*IPX)`
  - `DESTTYPE(*NETWARE3) or (*NDS)`
  - `RMTPRTQ(print_server_name)or (.ntw_queue.asprt.ntwhp)`
- You need the OS/400 Enhanced Integration for Netware feature installed and started on the AS/400

IPX LAN-attached printer...

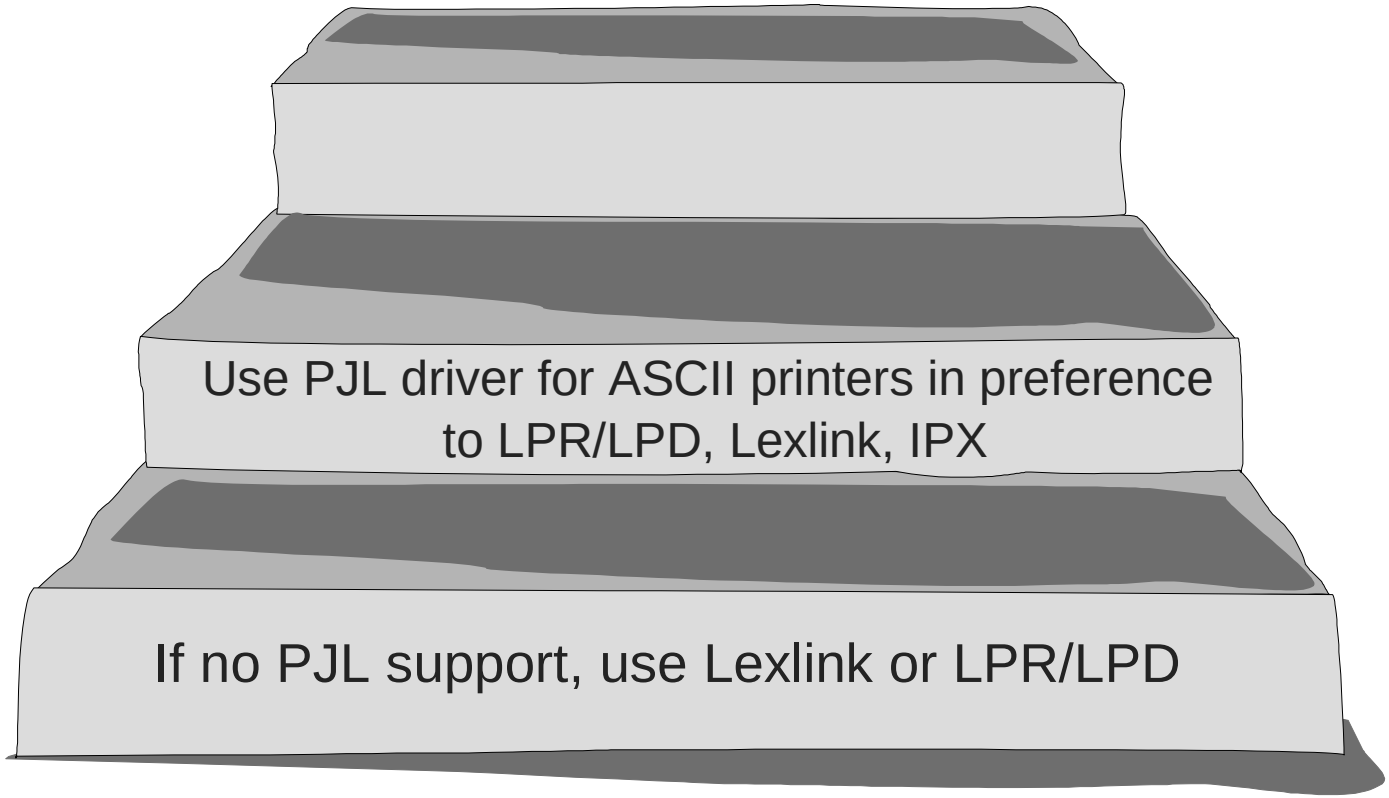
- Perhaps advantageous if you wish all print jobs to go via the Novell print server (for reasons of priority, accounting, manageability, header sheets, etc...)
- If printer supports it, could print directly to the printer using TCP/IP

Three steps to heaven - summary of LAN-attached printer methods



Bronze

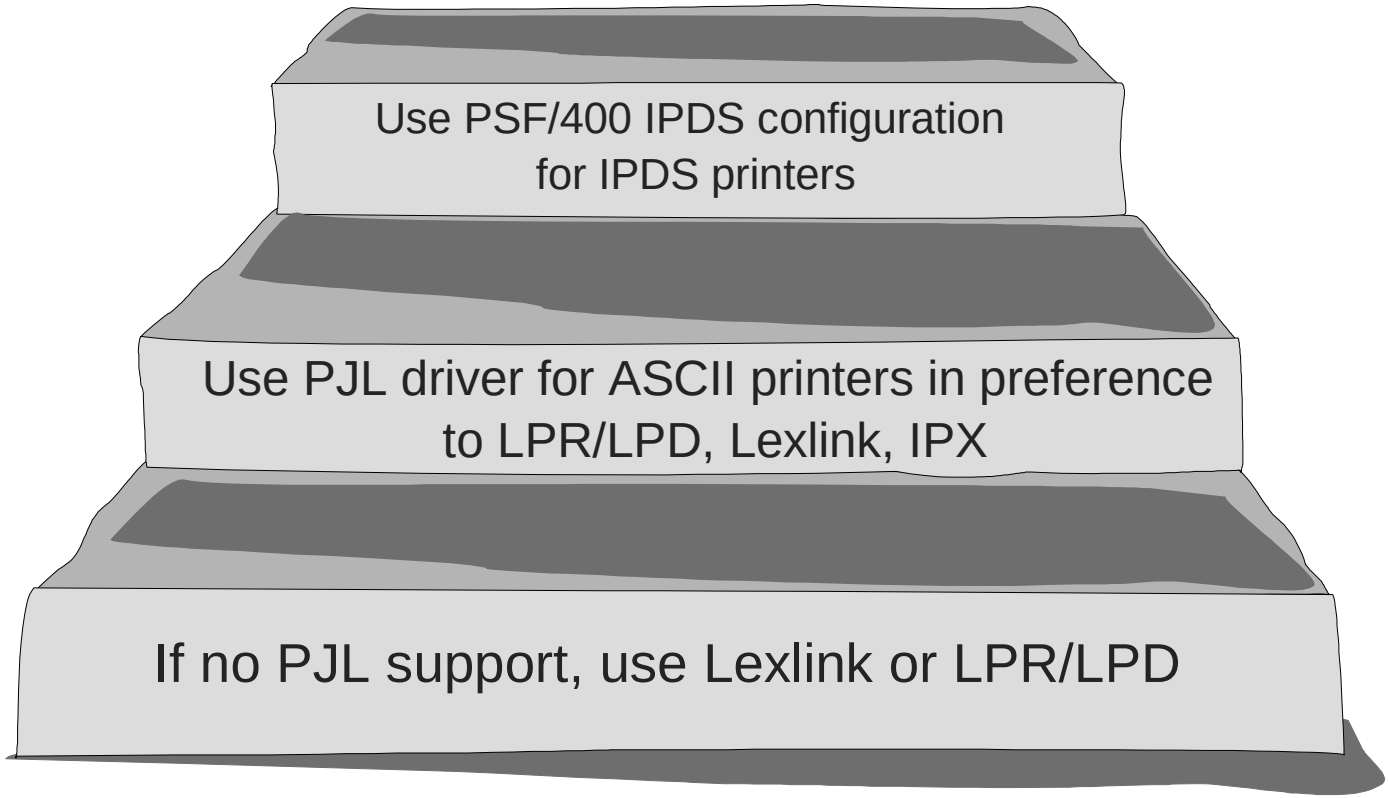
Three steps to heaven - summary of LAN-attached printer methods



Silver

Bronze

Three steps to heaven - summary of LAN-attached printer methods



Gold

Silver

Bronze