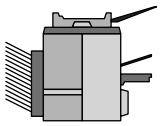
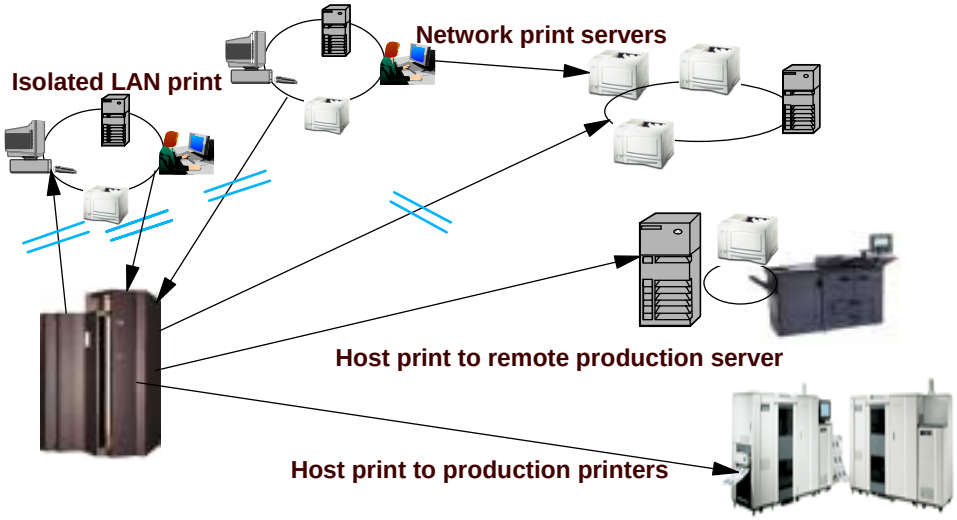
Infoprint Server for OS/390 and z/OS
Version 1 Releases 1 to 5

Infoprint Server Enhancements



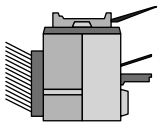
Infoprint Server for OS/390 and z/OS



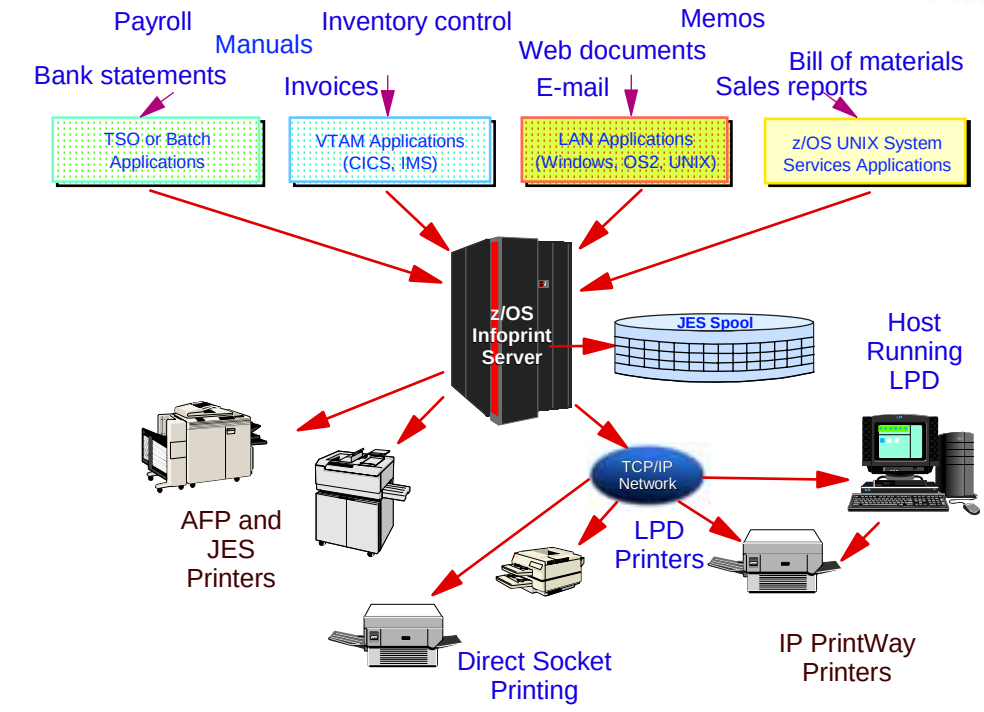
LAN applications and users can't access host printers
Host applications can't output to LAN printers
Multiple points of management = unmanaged environment (z/OS 1.5)

Infoprint Server of z/OS and OS/390

Infoprint Server Overview



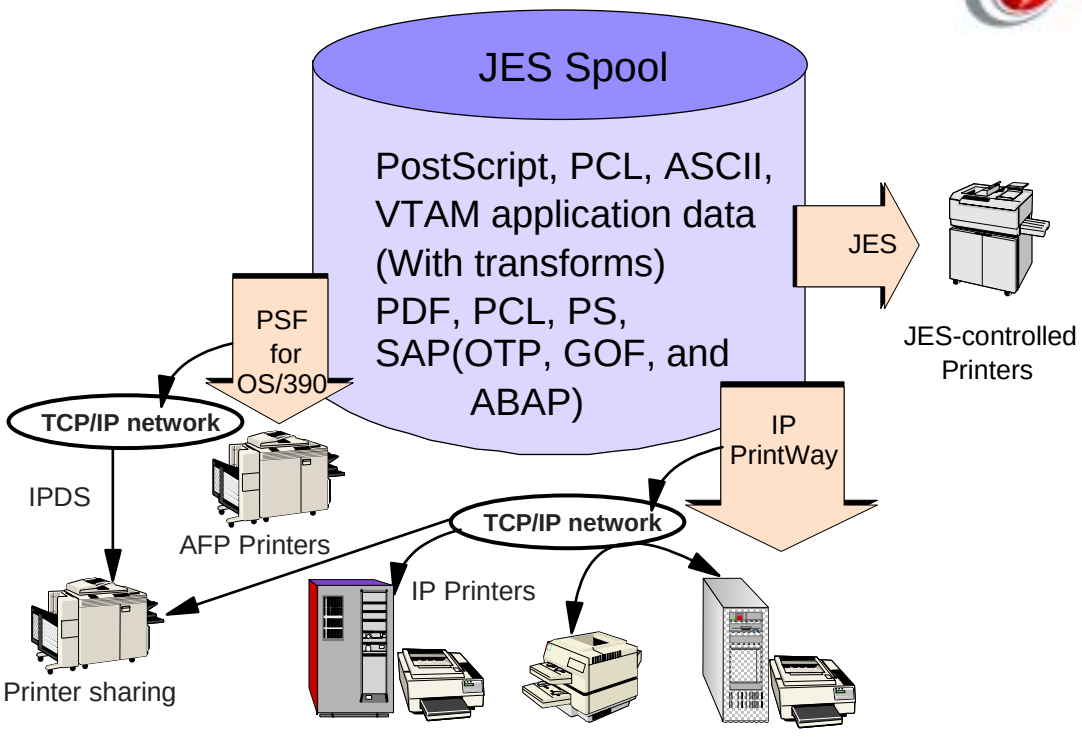
z/OS Infoprint Server



Advantages of Infoprint Server

- Connects network users to z/OS printers/print services
- Connects z/OS-based UNIX or Linux applications to z/OS printers and print services - including AFP printers
- Connects VTAM applications (CICS and IMS) to network printers over TCP/IP
- Sends print jobs to ASCII printers from any z/OS user or application over TCP/IP or Internet Printing Protocol(IPP)
- Connects VTAM-controlled coax printers to the same print services that support ASCII printing
- Converts AFP output to PDF for distribution as e-mail
- Controls print with JES spool - single point of management
- Consolidates print workload onto z/OS in a single, integrated enterprise server solution!
- Can result in a lower overall cost of distributed print

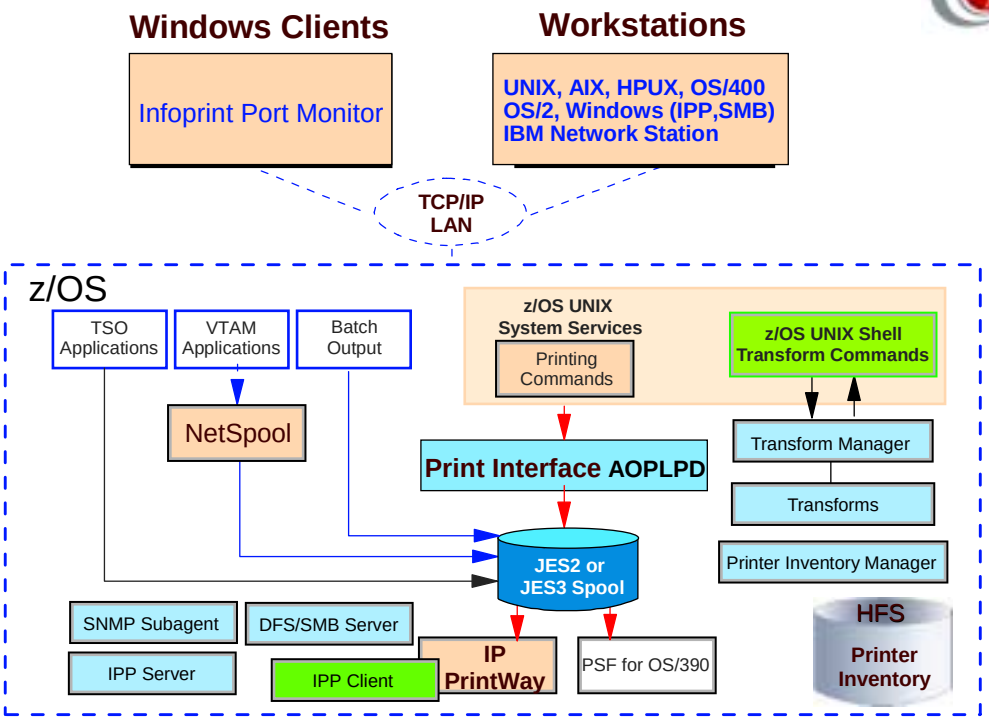
Data Streams on JES Spool



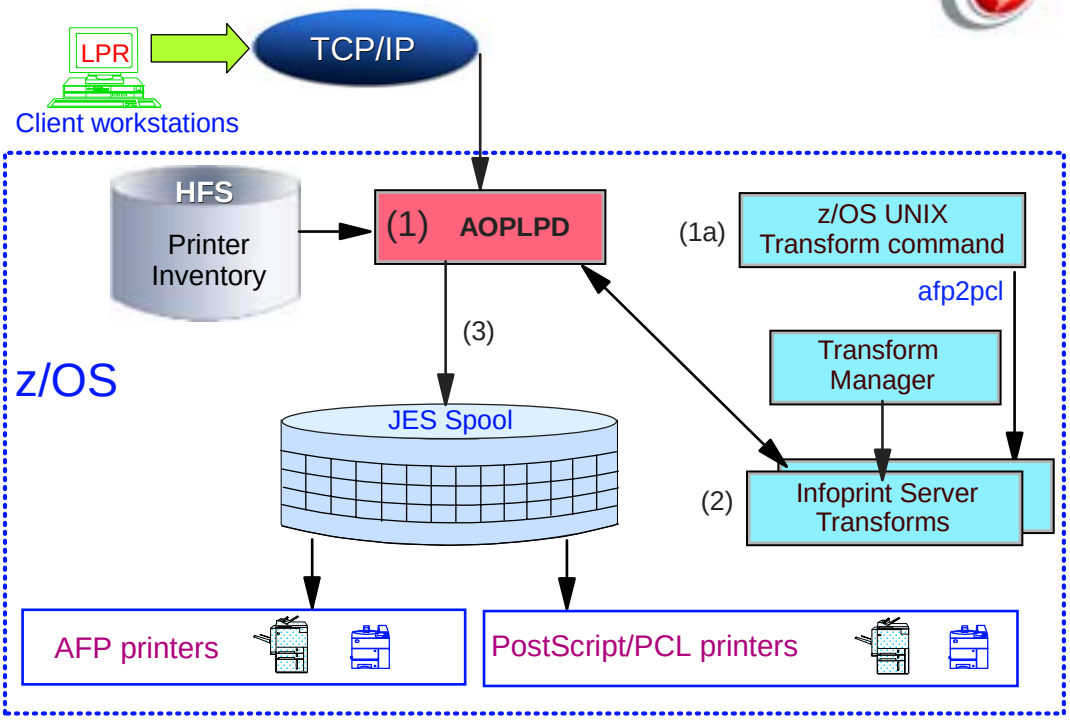
User Access to Infoprint Server

- Workstation users - (lpr command) - (IPP)
- Windows workstation users
  - lpr command - Native Windows SMB - Infoprint Port Monitor - IPP
- TSO/E - VM users - (lpr command)
- Users submitting batch JCL
  - AOPPRINT JCL EXEC - Standard JCL
- z/OS UNIX System Services users
  - lp command
- VTAM Application users
  - NetSpool
- SAP R/3

Infoprint Server Components



Datastream Transforms Overview



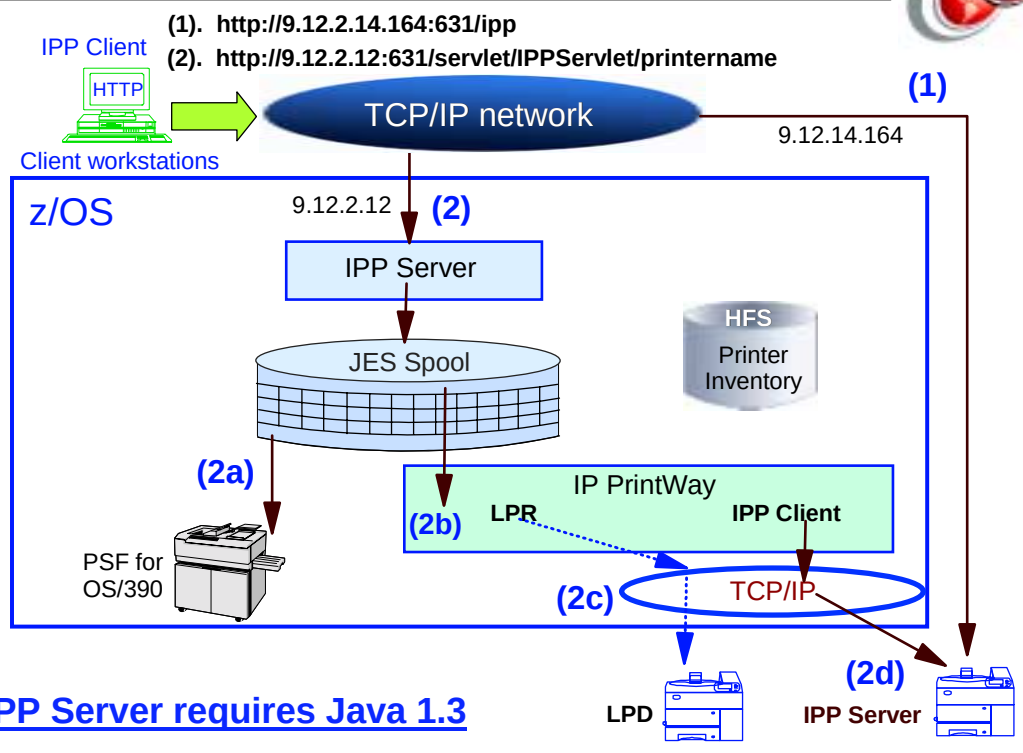
Infoprint Server Transforms

- Provided Transforms:
  - PCL5 to MO:DCA (AFPDS)
  - PostScript L1, L2, L3 to MO:DCA (AFPDS)
  - PDF to MO:DCA (AFPDS)
  - SAP OTF and ABAP to MO:DCA (AFPDS)
- Infoprint Server Transforms
  - Licensed program product (5697-F51)
  - AFP to PDF, PCL5, and PostScript
- z/OS UNIX shell commands:
  - pcl2afp - ps2afp - pdf2afp - sap2afp
  - afp2pdf - afp2pcl - afp2ps

Infoprint Server

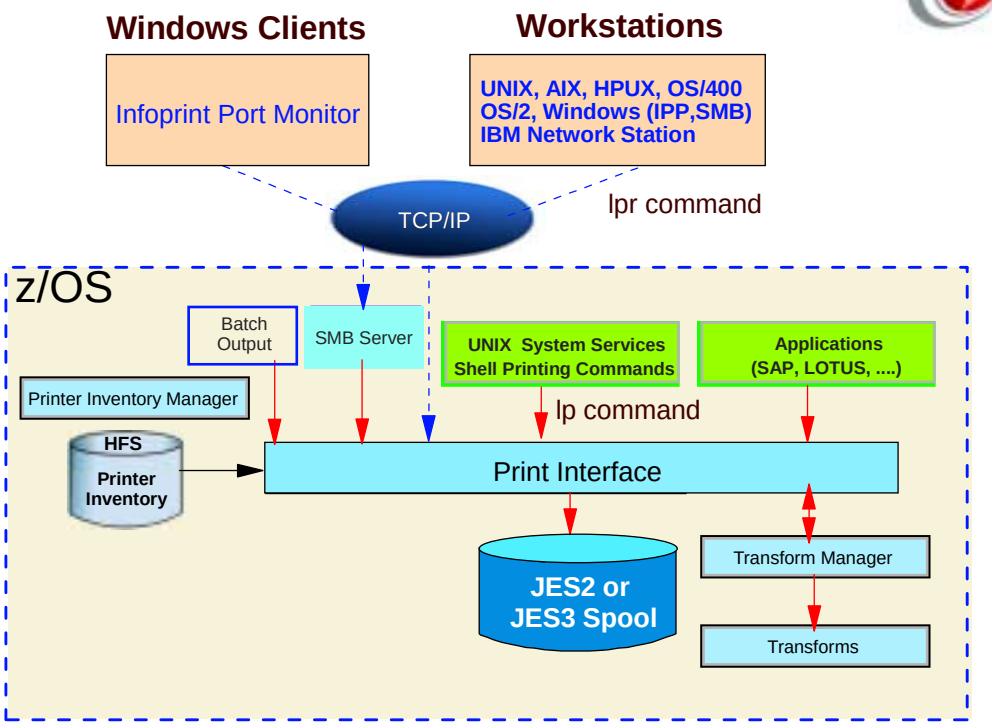
- XML Extender for z/OS (5655-J66)
  - Transforms XML to AFP
  - Supported on OS/390 V2R10 and all z/OS Releases

Internet Printing Protocol (IPP)

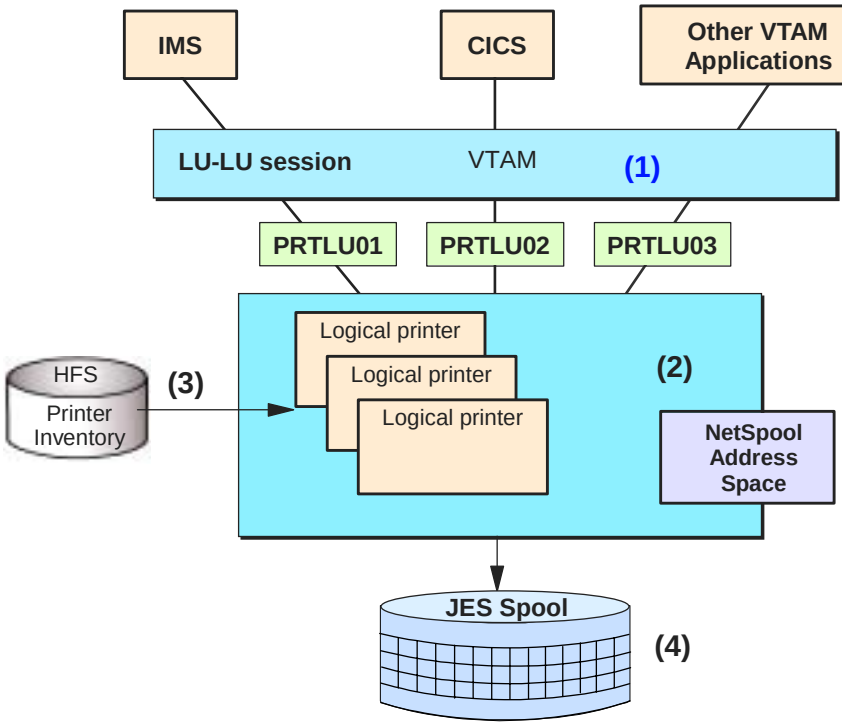


IPP Server requires Java 1.3

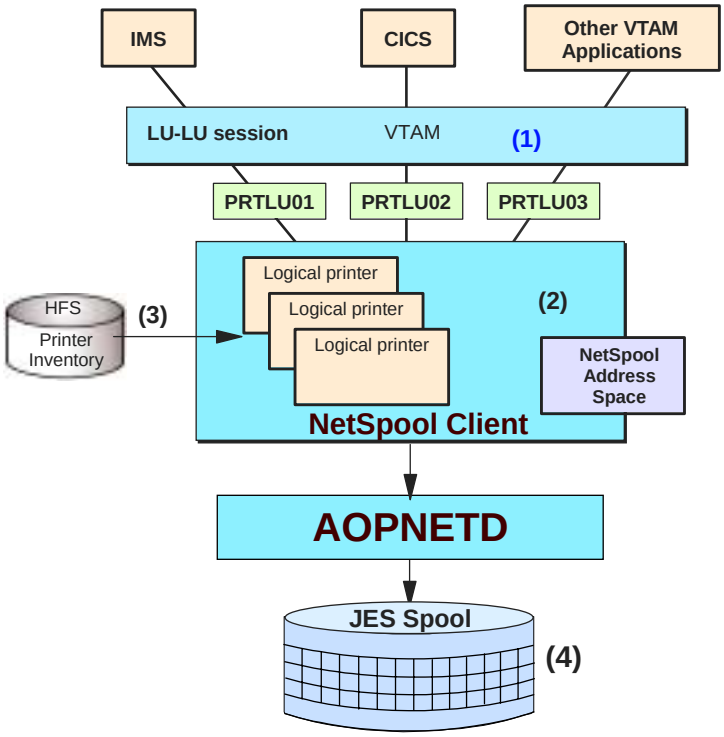
Infoprint Server - Print Interface



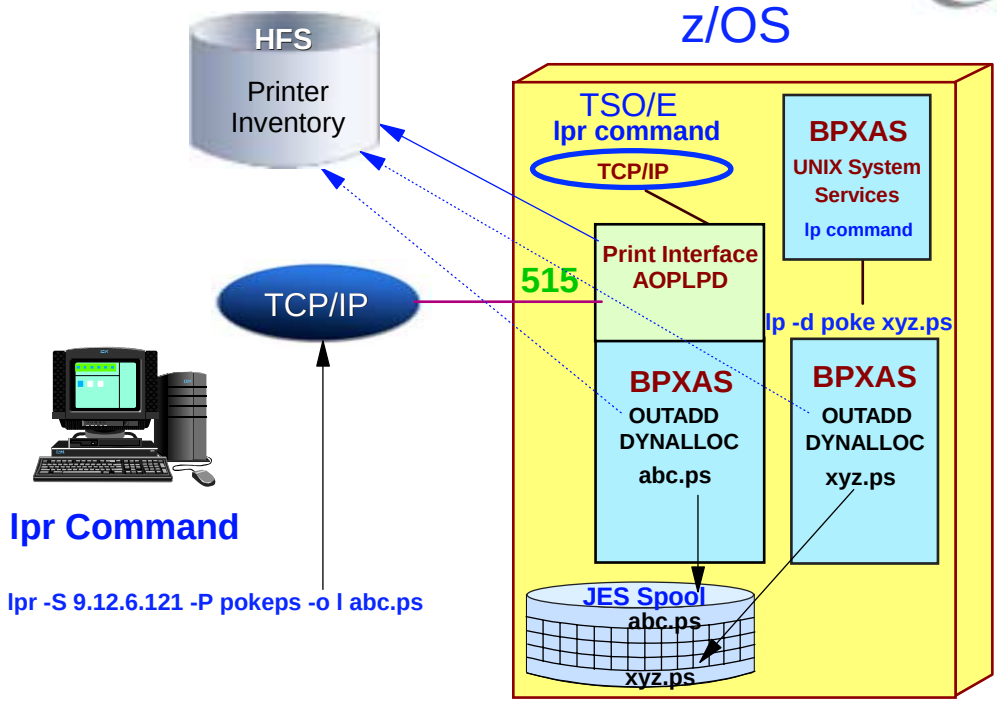
NetSpool Overview



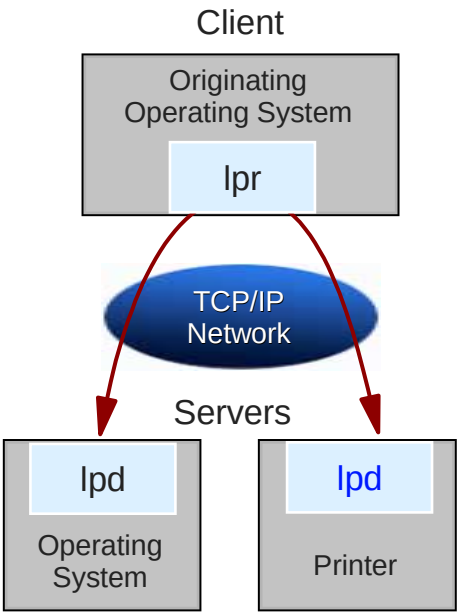
NetSpool Overview - z/OS V1R5



Print Interface Processing Requests

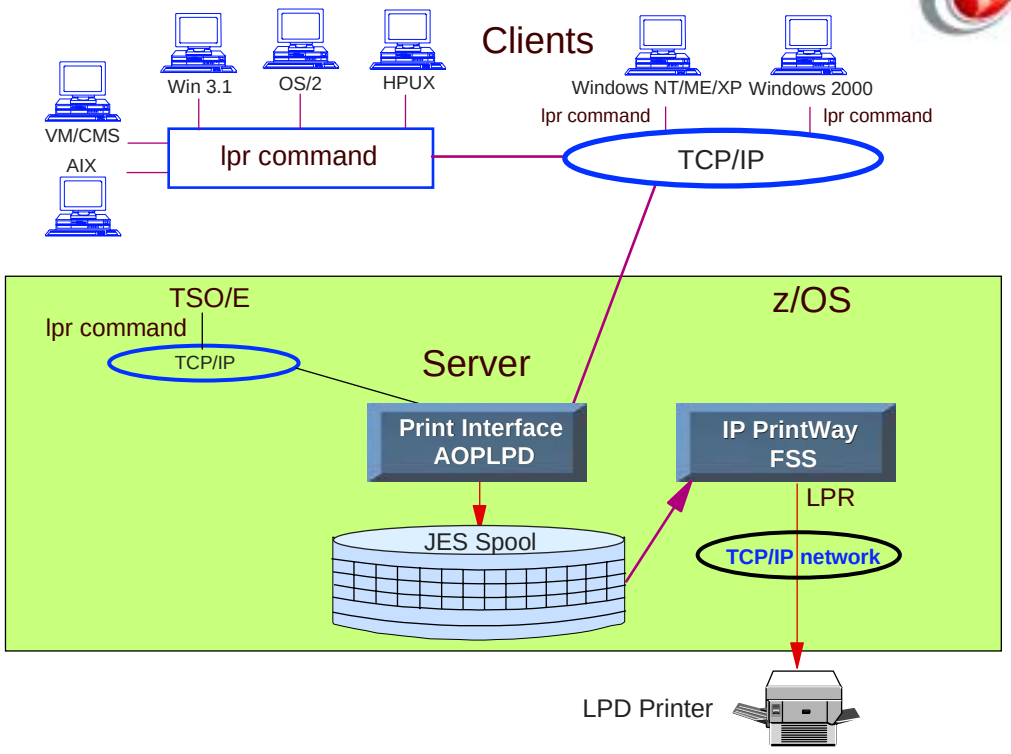


TCP/IP Printing - RFC1179

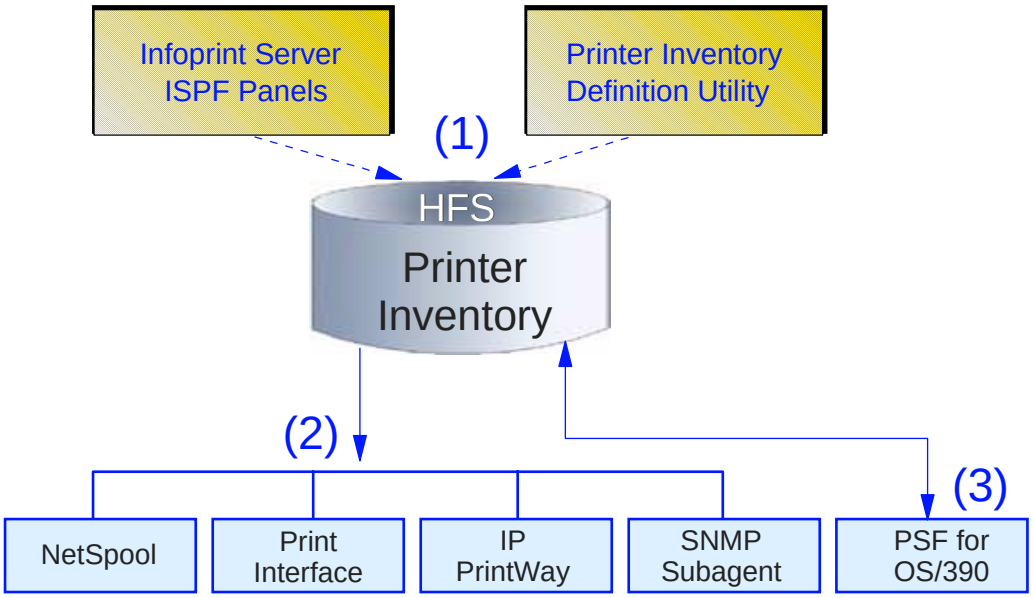


- lpr - command that requests printing
  - Standard lpr has required attributes:
    - file name, IP address, queue name
  - lpr command sends print data to a lpd via TCP/IP
- lpd - line print daemon is a destination
  - A daemon waits for the lpr command to be invoked
  - lpd receives the print data and sends it to a print queue
- lpd can reside in software or in printer hardware

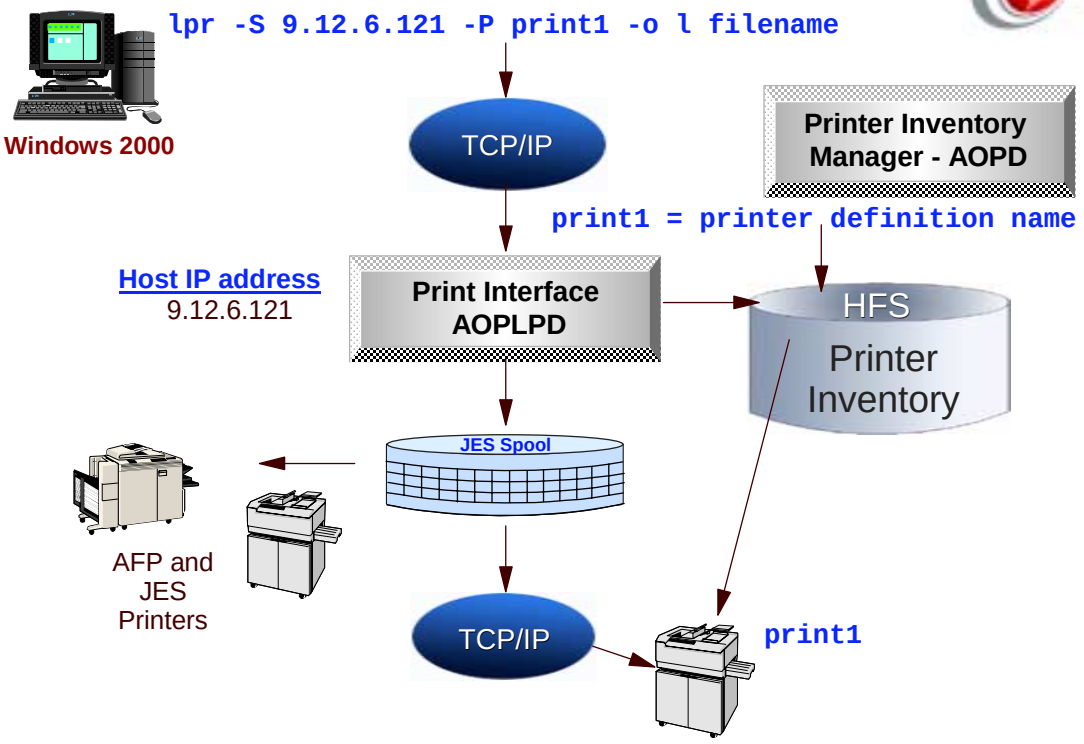
Infoprint Server LPR-LPD Support



Printer Inventory Manager



Printer Inventory Example



Enhancements in z/OS V1R5

- Common Message Log
- New daemons
- IPP Server now supports Java 1.4
- Security Enhancements
  - Read-only access to the printer inventory
  - Control access to Infoprint Central functions
  - New profiles in RACF PRINTSRV class
- IP PrintWay - miscellaneous enhancements
  - SMF Type 6 enhancements
  - IP PrintWay support for large files > 2 GB
  - IPv6 support
- NetSpool enhancements
- E-mail enhancements

Infoprint Server Component IP PrintWay

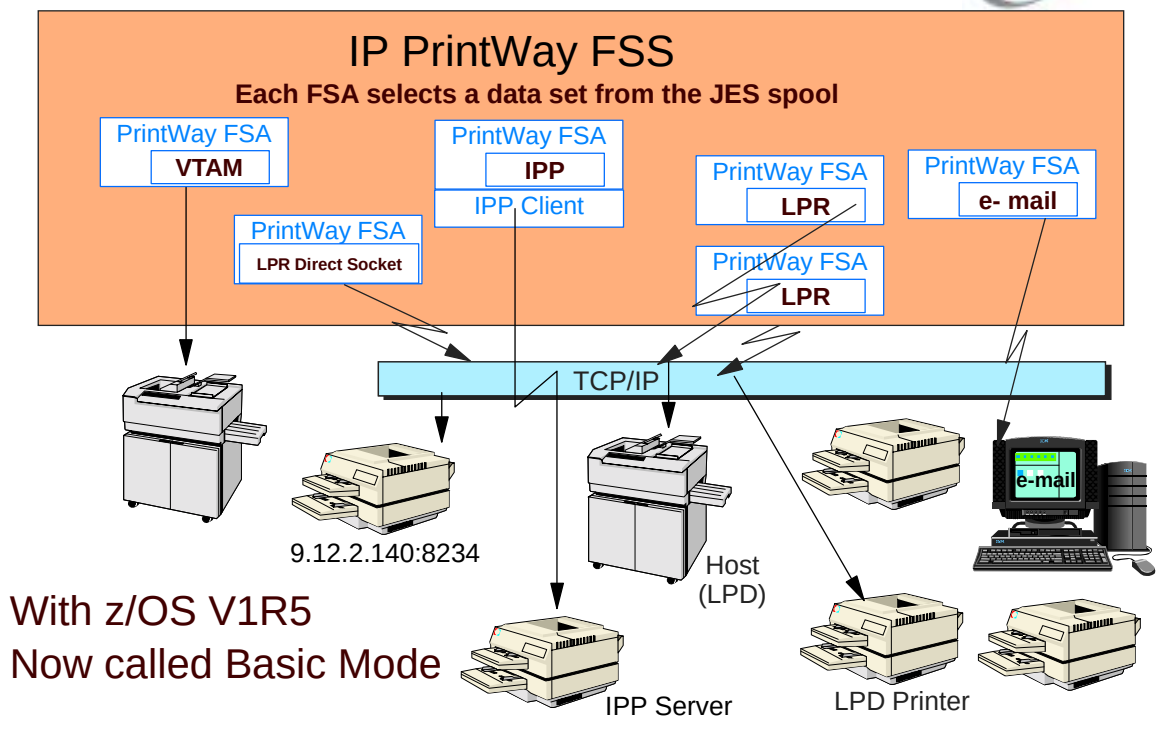
IP PrintWay Update with z/OS Version 1 Release 5

IP PrintWay Extended Mode - z/OS V1R5

2 modes for IP PrintWay

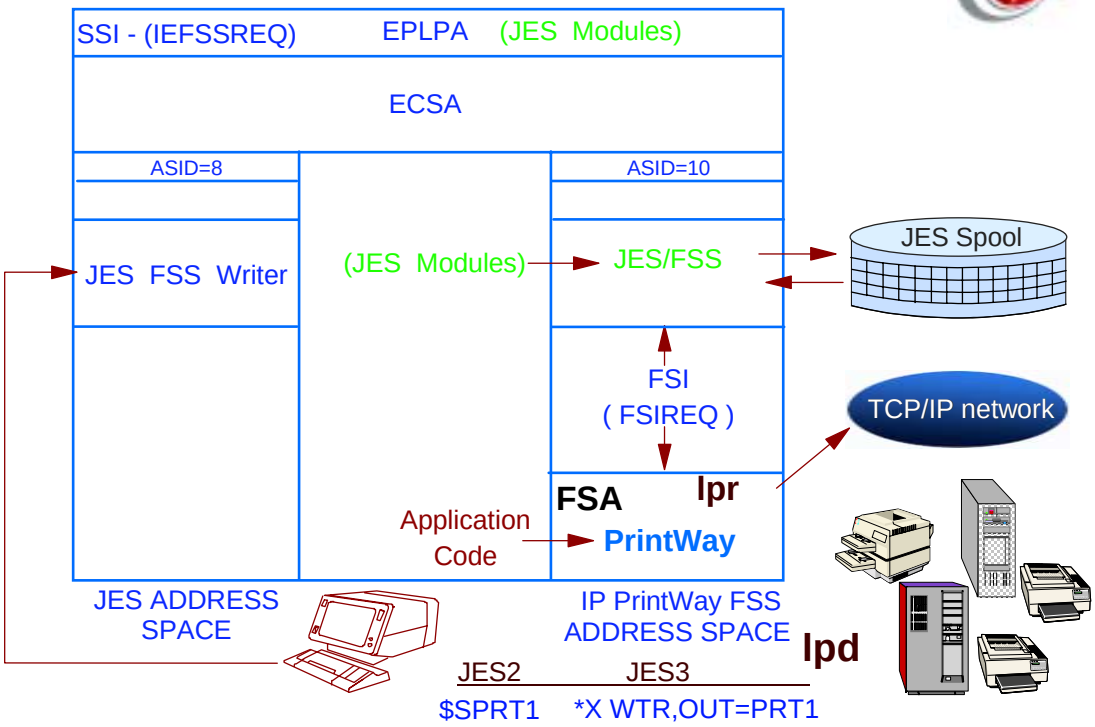
- IP PrintWay Extended Mode: (1)
  - Uses the Process Sysout API (SAPI) to:
    - Obtain jobs from the JES spool and send them to remote TCP/IP-attached printers and e-mail destinations
- Provides better control of work selection criteria
- Enables administrators to more easily:
  - Cancel the currently printing job
  - Stop and restart printing to a printer
  - Restart retained jobs
- IP PrintWay Basic Mode (FSS): - Current mode (2)

Infoprint Server IP PrintWay Printing

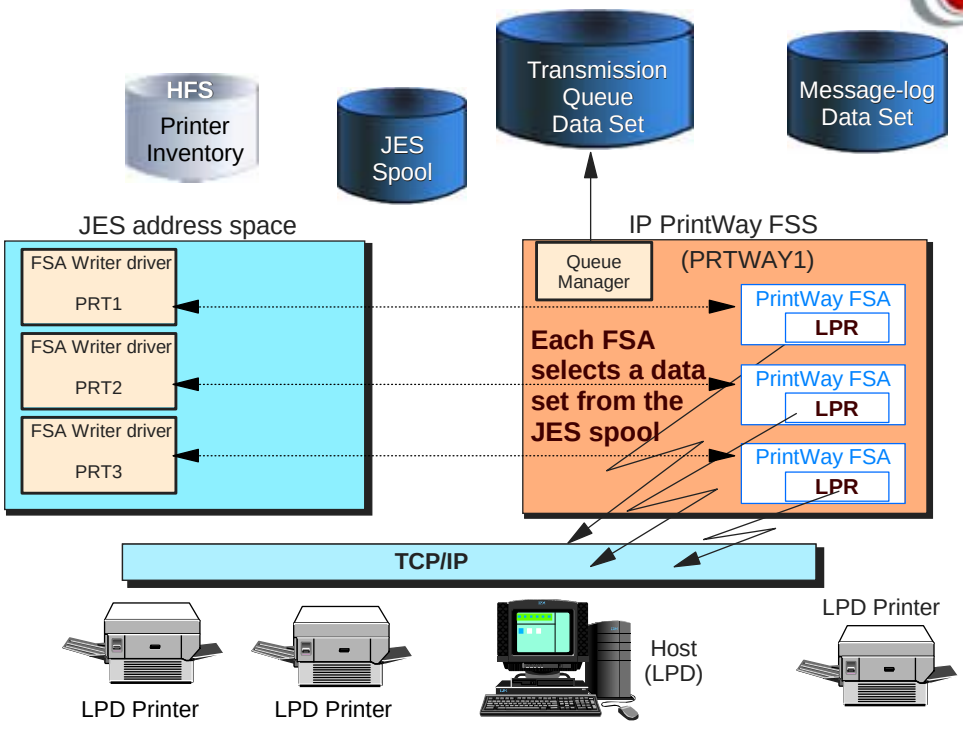


With z/OS V1R5
Now called Basic Mode

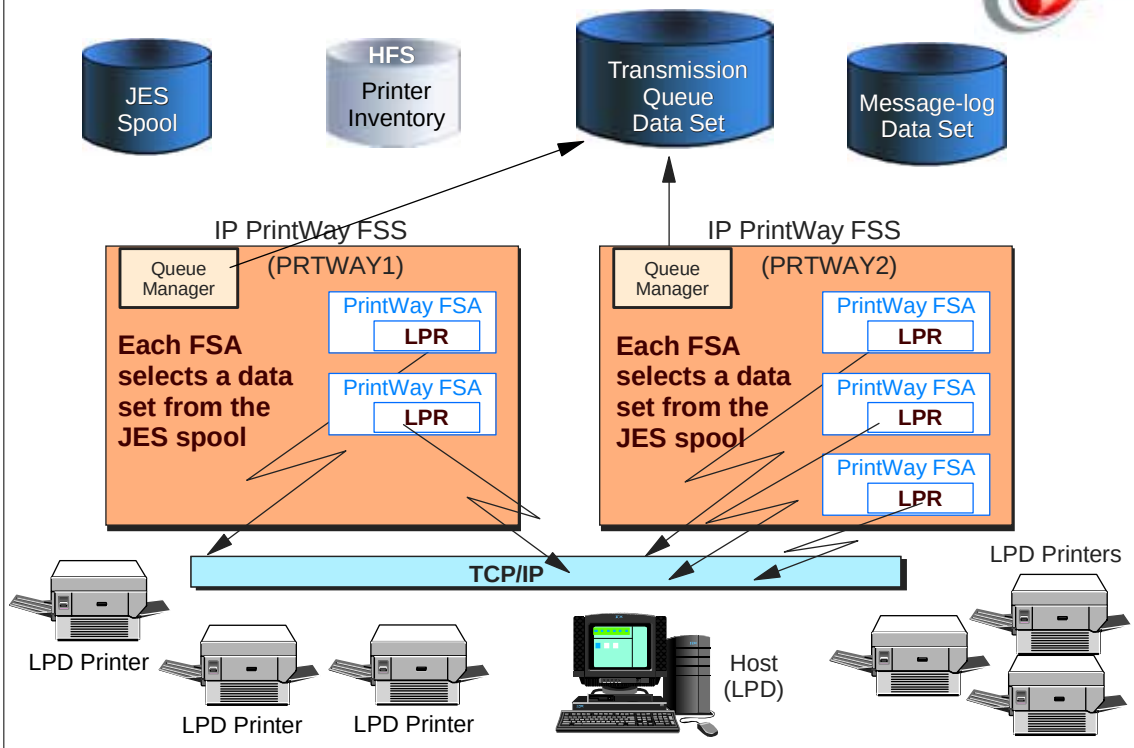
Starting IP PrintWay FSS



IP Printway and JES (Infoprint Server)



IP PrintWay FSS Address Spaces



JES Definitions for IP PrintWay

JES2

```
FSS(PRTWAY1) PROC=ANFWPROC
PRT1 FSS=PRTWAY1,MODE=FSS,START=NO,TRKCELL=YES,WS=(Q),CL=J
PRT2 FSS=PRTWAY1,MODE=FSS,START=NO,TRKCELL=YES,WS=(Q),CL=J
PRT3 FSS=PRTWAY1,MODE=FSS,START=NO,TRKCELL=YES,WS=(Q),CL=J
```

JES3

```
FSSDEF,TYPE=WTR,FSSNAME=PRTWAY1,PNAME=AFNWPROC,
DEVICE,DTYPE=PRTAFP1,JNAME=PRT1,FSSNAME=PRTWAY1,
  JUNIT=(,SC50,UR,,,SC49,UR),MODE=FSS,WC=(J),WS=(CL)
DEVICE,DTYPE=PRTAFP1,JNAME=PRT2,FSSNAME=PRTWAY1,
  JUNIT=(,SC50,UR,,,SC49,UR),MODE=FSS,WC=(J),WS=(CL)
DEVICE,DTYPE=PRTAFP1,JNAME=PRT3,FSSNAME=PRTWAY1,
  JUNIT=(,SC50,UR,,,SC49,UR),MODE=FSS,WC=(J),WS=(CL)
```

With z/OS V1R5 - Not required with Extended Mode

IP PrintWay Extended Mode

- Using IP PrintWay extended mode, you can
  - Manage all IP PrintWay printers and print jobs from the web using Infoprint Central
  - Redirect print jobs from one printer to another
  - Delete and hold jobs that IP PrintWay extended mode is currently processing
  - Retain any number of print jobs, up to the limits of the size of the JES spool
  - Call data stream transforms and other filters directly without resubmit for filtering
  - Process print jobs larger than 2 gigabytes

Extended Mode Advantages

- Better Performance
- Increased reliability
- Improved usability
- New printer management functions
- New print job management functions
- All messages written to common message log
- Automatically detect data format and verify job will print on selected printer

Extended Mode vs. Basic Mode

- Extended Mode
  - Uses SAPI
  - New in z/OS V1R5
  - Runs as daemon - outd
  - Uses printer inventory and common message log for control
  - Job selection defined in printer inventory
  - Managed using Infoprint Central
  - Writes temporary files to /var/Printsrv/printway
  - Transforms invoked directly without double spooling
- Basic Mode
  - Uses FSI
  - Original IP PrintWay mode
  - Runs as started task
  - Uses queue file and message data set for control
  - Work selection defined in JES
  - Managed using ISPF panels
  - Writes temporary files to hiperspace
  - Uses resubmit for filtering

Infoprint Server Configuration File

/etc/Printsrv/aopd.conf

```
# default aopd configuration
lpd-port-number = 515
start-daemons   = { lpd ippd xfd outd }
base-directory  = /var/Printsrv
ascii-codepage  = ISO8859-1
ebcdic-codepage = IBM-1047
job-prefix      = PS
ipp-port-number = 631
inventory       = AOP1
```

outd starts extended mode daemons (z/OS V1R5)

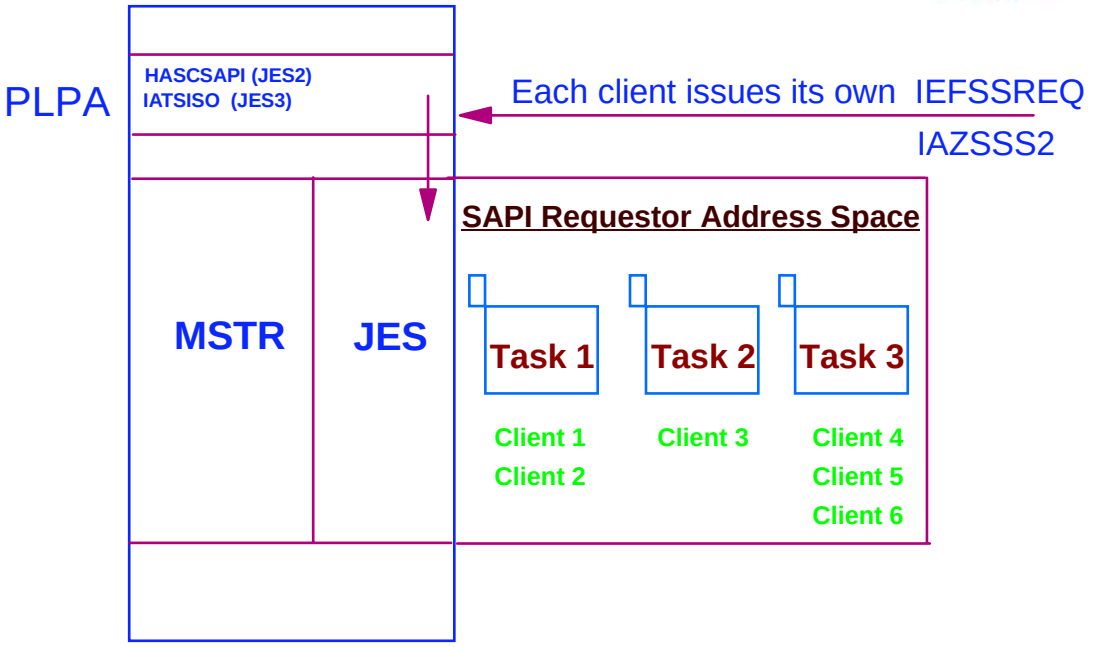
Other Changes to AOPD.CONF

- Changes to start-daemons in aopd.conf
  - **netd** - starts the NetSpool daemon **aopnetd**
  - **outd** - starts the IP PrintWay extended mode daemons **aopoutd** and **aopwsmd**
  - **ssid** - starts the Infoprint Central daemon **aopssid**
- New attributes in aopd.conf configurationfile:
  - log-retention - how long to retain messages and historical information
  - max-historical-inventory-size - limits the size of the /var/Printsrv/hinv directory
  - smf-recording - specifies whether IP PrintWay extended mode is to write SMF type 6 records

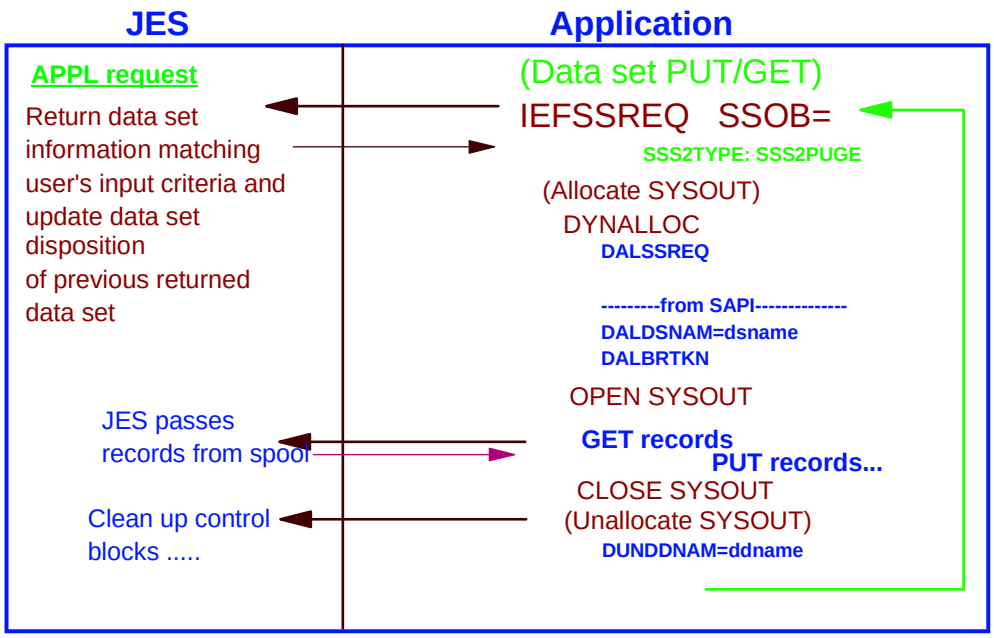
/var/Printsrv Directory

- Significantly larger space requirements
  - Mount a separate file system at /var/Printsrv mount point
- New subdirectories:
  - /var/Printsrv/hinv - contains internal historical information
  - /var/Printsrv/logdb - contains internal log information
  - /var/Printsrv/logs - Contains internal representation of common message log
  - /var/Printsrv/printway - contains temporary data files used by
- IP PrintWay
  - /var/Printsrv/searchdb - contains internal search information

SAPI Design



Client Request to JES



Printer Inventory - Selection Rules

- ISPF panels to set job selection rules
- Create job selection rules based on:
  - DEST - CLASS - FORMS - CREATOR - WRITER
  - DEST IP Address: Include, Exclude, Ignore
- Set up security profile for controlling job selection rules
- Enable SMF recording for Type 6 records

Benefits of using SAPI

- Provide better control of work selection criteria
- Improve performance
- No defining of FSA printers to JES
- Currently, selected data sets may not be modified using SDSF because printway has acquired and owns the job
- Current implementation allows a limited number of FSA's within an FSS
- Eliminate duplicate work currently done in Print Interface and Printway

IP PrintWay Support for E-mail

E-mail Protocol - Enhancement made to z/OS V1R2 Release of Infoprint Server

Infoprint Server Sendmail Support

```
//ROGERSZ   JOB   (POK,999),MSGCLASS=A,NOTIFY=ROGERS
//PRINT     EXEC PGM=IEBGENER
//SYSPRINT  DD  SYSOUT=A
//SYSUT2    DD  SYSOUT=J,DEST=EMAIL10
//SYSUT1    DD  DISP=SHR,DSN=ROGERS.SAPI.LIST3820
//SYSIN     DD  DUMMY
//
```

Processing Options for EMAIL10

```
AOPIPDRR                          Processing
Command ==> ____________________________________________________________

Printer definition name . EMAIL10_________

                                                                  More:     +
Document code page . . ____________
Printer code page. . . IBM-1047_______

Print Interface Supported Data Formats and Associated Filters:
Data format:   Filter:
/ Line data    afp2pdf.dll %filter-options                          (extend)
/ MO:DCA-P     afp2pdf.dll %filter-options                          (extend)
_ PostScript   ____________________________________________________ (extend)
/ Text         aopfiltr.so                                          (extend)
_ PCL          ____________________________________________________ (extend)
_ PDF          ____________________________________________________ (extend)
_ SAP          ____________________________________________________ (extend)
_ Other        ____________________________________________________ (extend)

/ Resubmit for filtering

SCS Conversion:
   Margins:  Top . . . ___   Bottom . . ___   Left . . ___   Right . . ___
   Line length . . . . ___             Page length . . ___
   Tabs:  Vertical . . ___  ___  ___  ___  ___  (extend)
          Horizontal . ___  ___  ___  ___  ___  (extend)
```

AFP output

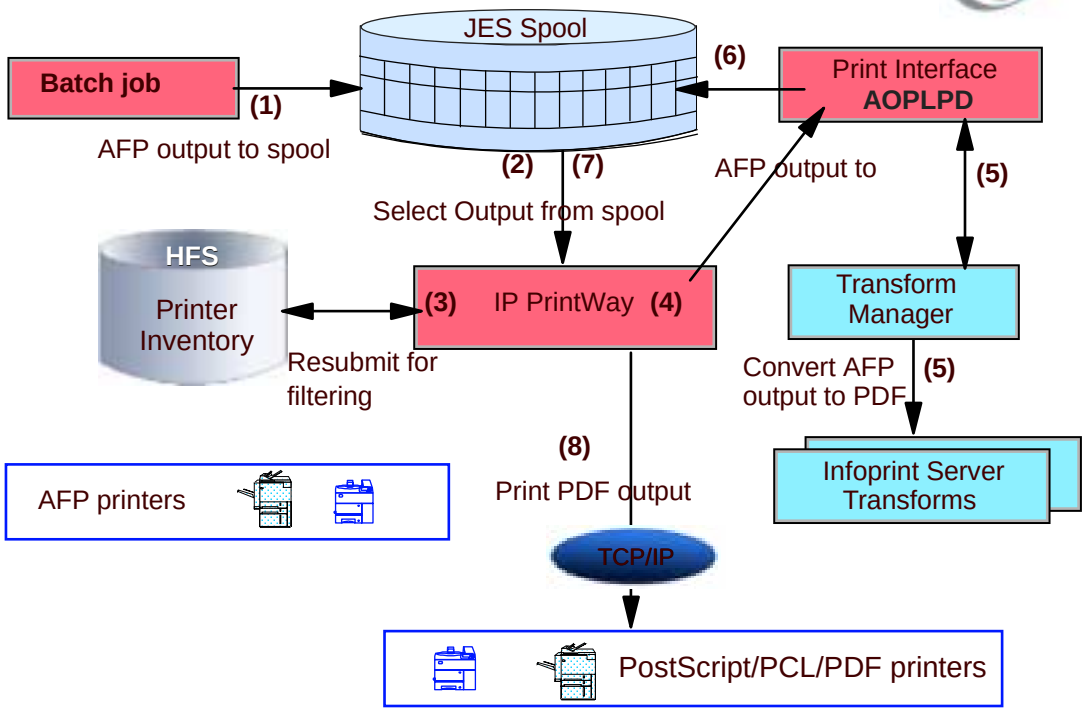
Send to Print Interface for transform to PDF

e-mail Protocol Panel

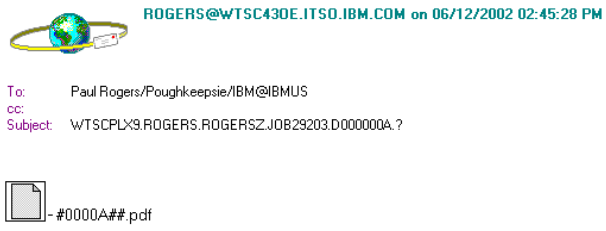
The addresses of the e-mail recipients. You can specify real e-mail addresses or alias names that are defined to sendmail. An alias name represents one or more e-mail addresses. This field is required in a printer definition with the e-mail protocol. To extend the length of this field, place your cursor on the word "extend" and press Enter.

```
Add                              E-mail Protocol
Command ==> ____________________________________________________________

Printer definition name . EMAIL10_________

E-mail addresses . . paulroge@us.ibm.com,rconway@us.ibm.com,haimo@us. (extend)
```

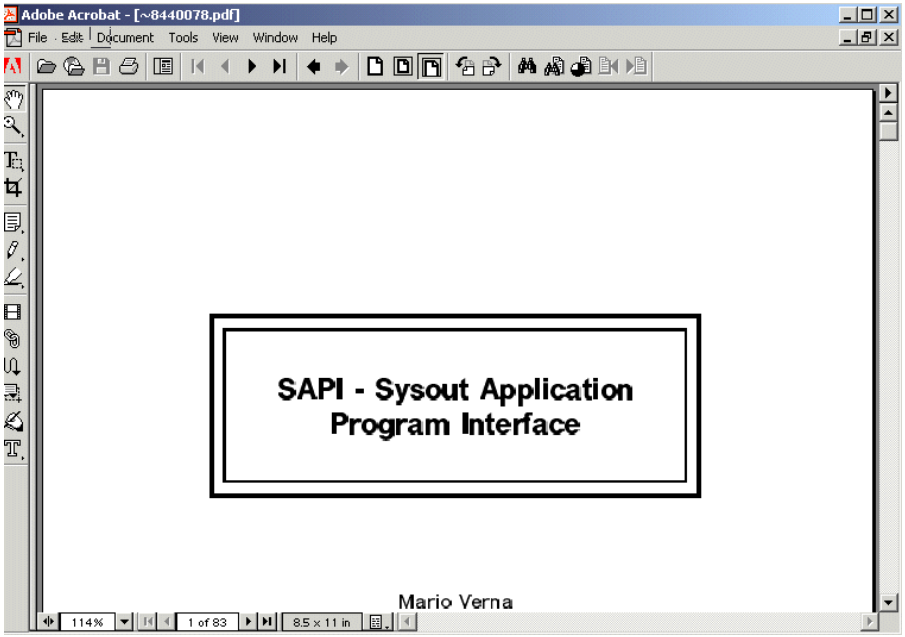
Flow for Batch Output



Data received at Lotus Notes ID



Adobe Acrobat Reader



z/OS V1R5 Support for E-mail Protocol

- Provide the capability for the end user to control how a file is sent to an E-mail destination
- Provide job attributes and JCL keywords for the following functions:
  - Recipient ("To")
  - Copy Recipient ("CC")
  - Blind Copy Recipient ("BCC")
  - Sender ("From")
  - Reply-to address
  - Attachment name

Sending a Job to an E-mail Destination

```
//PW     OUTPUT  MAILTO=username
                 'username@domainname'
                 (username,'username@domainname',...)
//                MAILFROM=sendername
                 'sender name'
//                REPLYTO=username
                 'username@domainname'
//                MAILFILE=nameofattachment
                 'name of attachment'
//                MAILCC=username
                 'username@domainname'
                 (username,'username@domainname',...)
//                MAILBCC=username
                'username@domainname'
                (username,'username@domainname')
```

Speicfying New JCL Keywords

JCL Keyword	Characteristics	Symbolic Key
MAILBCC	1- 32 value fields Each value 1-60 characters	x'0049'
MAILCC	1- 32 value fields Each value 1-60 characters	x'004A'
MAILFILE	1 value of 1-60 characters	x'004B'
MAILFROM	1 value of 1-60 characters	x'004C'
MAILTO	1- 32 value fields Each value 1-60 characters	x'004D'
REPLYTO	1 value of 1-60 characters	x'004E'

Creating an Alias File

- Create a file using the name defined by your administrator, for example create file
  - OUTPUT statement: MAILTO=branches
- /etc/aliases file:
  - branches: "include:/u/myuserid/branches.list"
- /u/myuserid/branches.list file:
  - branch01@xyz.com,branch02@xyz.com,
  - ...
  - branch56@xyz.com,branch57@xyz.com

E-mail Enhancements Rollback

- Support in BCP (new JCL keywords) - Infoprint Server
  - Rollback to z/OS V1R2 planned
    - BCP PTFs UA01836, UA01837, UA01838
  - Infoprint Server APARs
    - OW55583 - IP PrintWay
    - OA04343 - Print Interface

New // OUTPUT Keywords - z/OS V1R5

- PRINTER= (Specify a specific Infoprint printer)
  - //OUTP OUTPUT PRINTER='myprinter'
- PRTATTRS= (Specify job attributes)
  - //OUTP OUTPUT PRTATTRS='attributename=value'
- Note: Currently FSSDATA= does both functions
  - Use PRTATTRS for end-user data
  - Use FSSDATA for applciation data
  - PRINTER= takes precedence over FSSDATA=

Infoprint Server Printer Processing

- Temporary files are created when:
  - LPR protocol
  - IPP or direct-sockets protocol
  - AND printer definition specifies either:
    - Copies
    - Maximum document size
- In these cases, IP PrintWay has to read the entire file before it can begin processing
  - Reads entire file into a hiperspace (Max size is 2 GB)
- With z/OS V1R5
  - Temporary files now stored in subdirectory under /var
    - /var/Printsrv/printway

Preview of Infoprint Server z/OS V1R5

z/OS V1R5 Infoprint Server; Infoprint Central

Infoprint Central Overview

- **Problem Statement / Need Addressed:**
  - Managing distributed print is a difficult, frustrating task
    - End users can't find their output
    - Print queues get backed up and jobs don't print
  - Multiple customers requested print management functions from Infoprint Server
- **Solution:**
  - Web-based user interface to perform help desk tasks related to print management
    - Manage printers
    - Obtain status of print jobs
    - Diagnose printing problems

Infoprint Central Overview

- Using Infoprint Central, the user can
  1. Check printer's status
  2. Control printer - start, stop, space, interrupt
  3. See jobs queued to printer
  4. Redirect printer's queue to another printer
  5. View all Infoprint Server messages for a printer or job
  6. Determine status of print jobs
  7. Reroute job to another printer
  8. Delete, hold, release jobs
  9. Start and stop NetSpool LUs

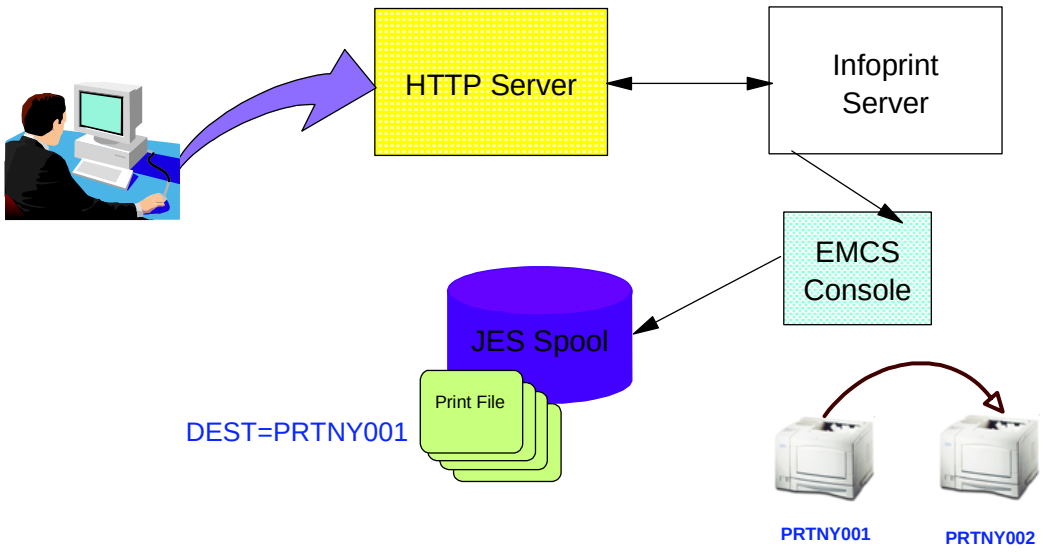
Infoprint Central Advantages

- Single point of control for print management on z/OS
- No installation required on client workstation
- Easy to use - "Point and click"
- Reduces training required for help desk operators
- Allows end users to check status of their own print jobs

Infoprint Central Usage & Invocation

- **Infoprint Central** is invoked by:
  - Accessing URL in web browser
- For English version
  - http://hostname:port/Infoprint/En_US/IPS.html
    - hostname - host name of the z/OS system where the HTTP Server is running
    - port - port number where the HTTP Server receives requests
    - Can omit the port number if using default port 80
- For Japanese version
  - http://hostname:port/Infoprint/Ja_JP/IPS.html

Infoprint Central and Infoprint Server



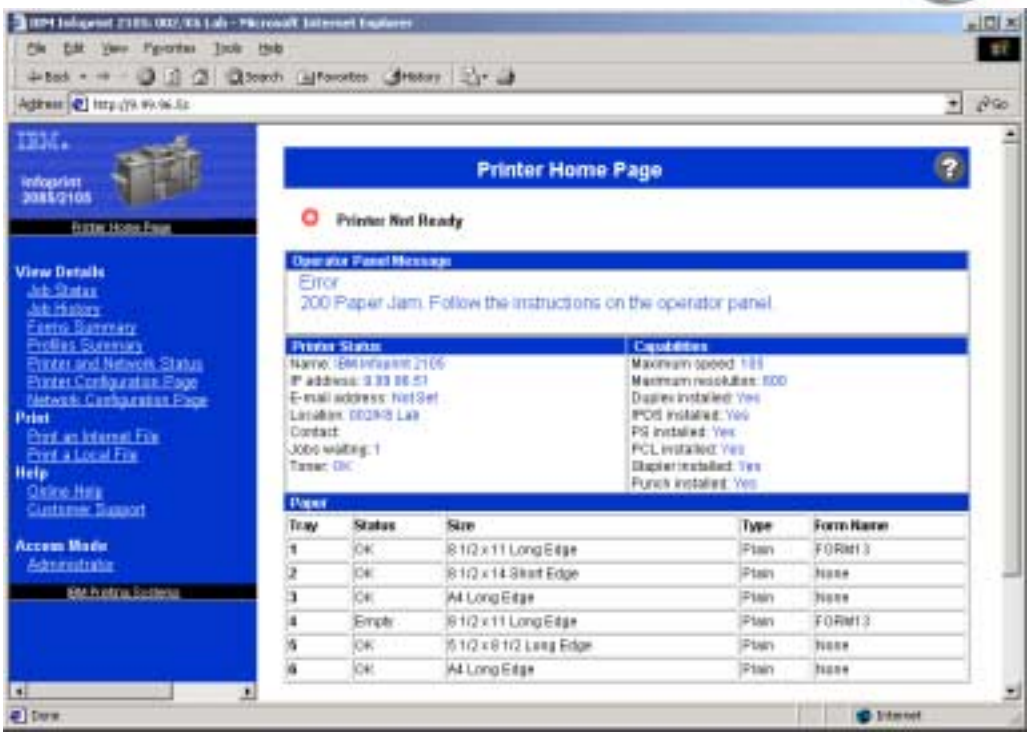
EMCS Console for Infoprint Central

- Used to issue commands and receive responses
  - JES2 commands
  - JES3 commands
  - MVS MODIFY and VARY commands
- Receives responses only to commands issued by Infoprint Server
- Console name configurable in aopd.conf file
  - Default name based on printer inventory name
- AUTH=ALL
- Issues commands on system where Infoprint Server is running

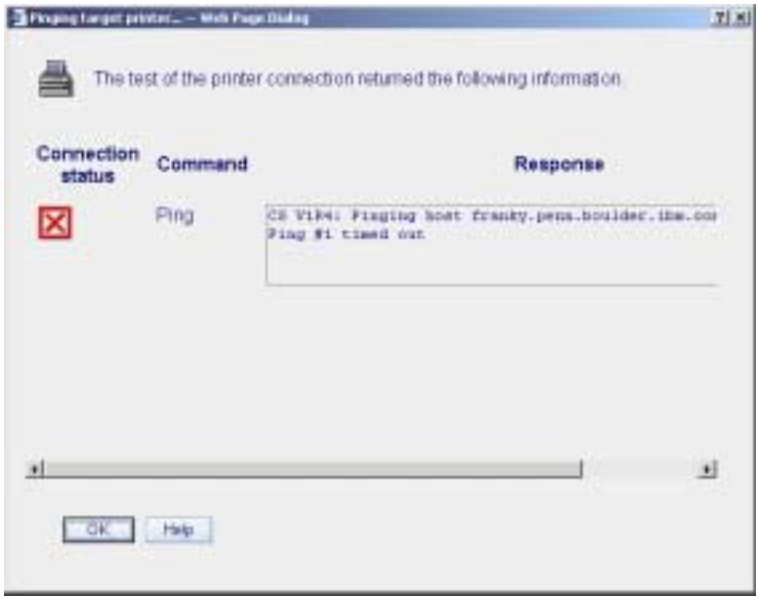
IP PrintWay Extended Mode

- Manage all IP PrintWay printers/jobs from the Web
- Ping IP PrintWay printers
- View a printer's web page
  - See if printer is out of paper or toner
- Start/stop printing to IP PrintWay-controlled printers
- Cancel/hold/delete print jobs currently processing
- Restart retained print jobs immediately
- Change priority of a print job that IP PrintWay has already selected from the spool to print
- Move print jobs from one IP PrintWay printer to another IP PrintWay printer, including the print job that is currently processing
- View all messages in the common message log for selected printers or print jobs

Look at Printer Home Page

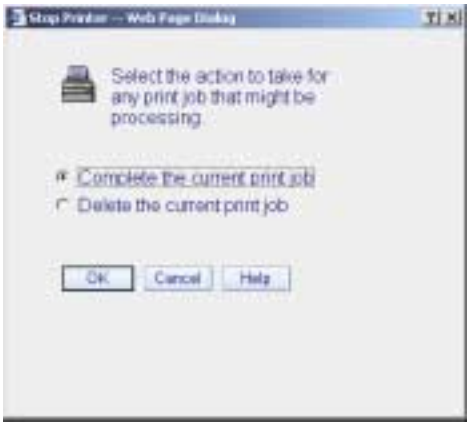


Ping Target Printer



Redirect Printer

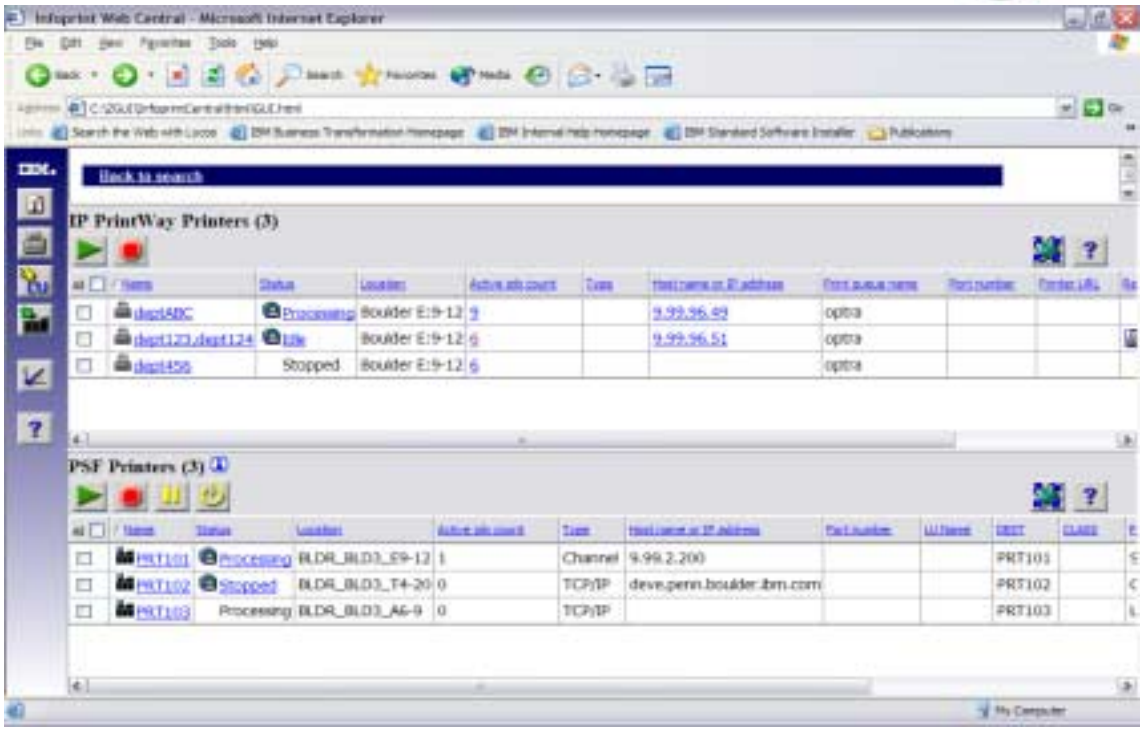
Stop a Printer



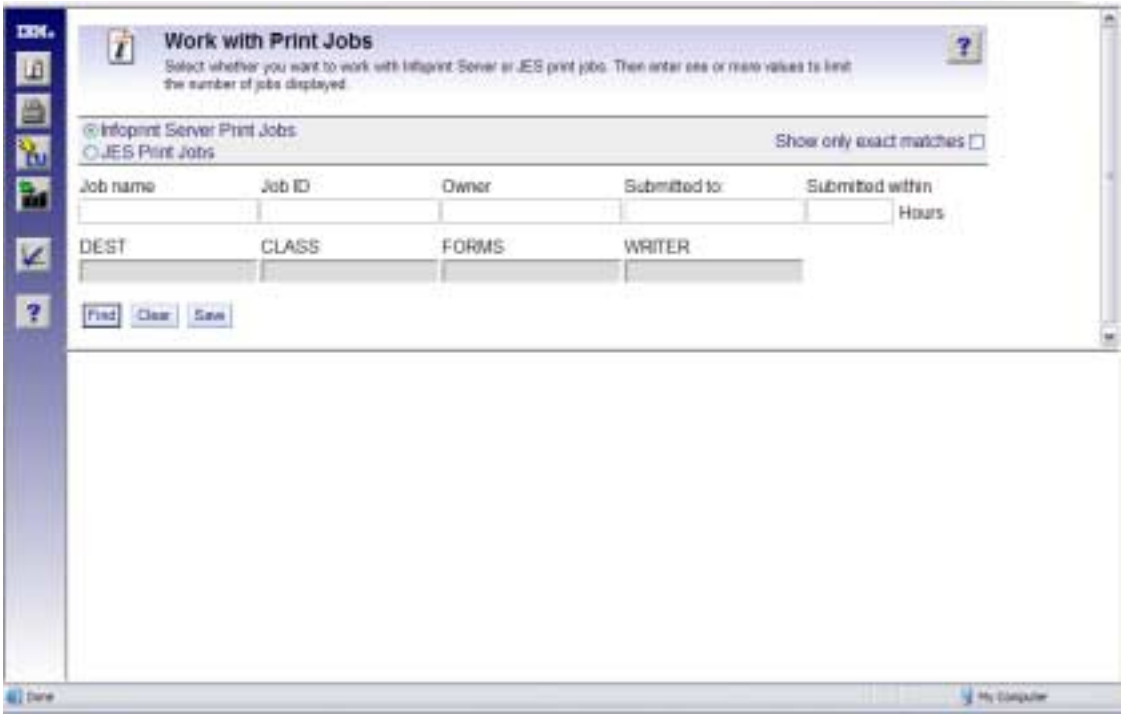
Move Print Job

Working with Printers

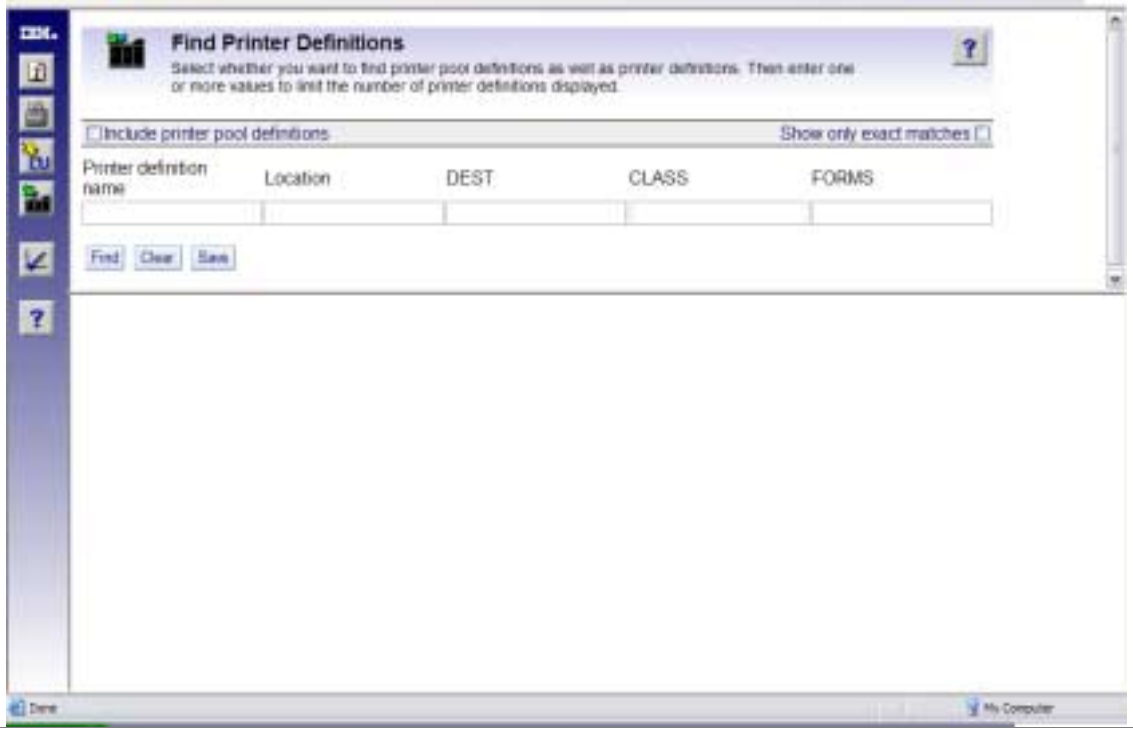
IP PrintWay and PSF Printers



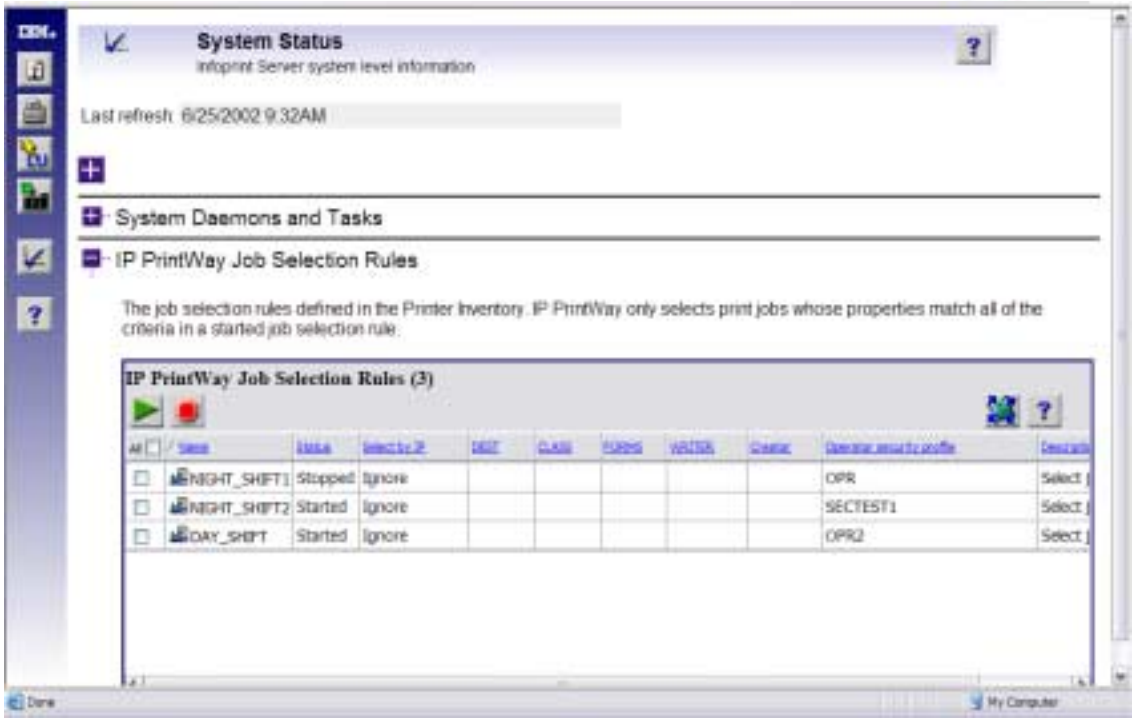
Working with Print Jobs



Look at Printer Definitions

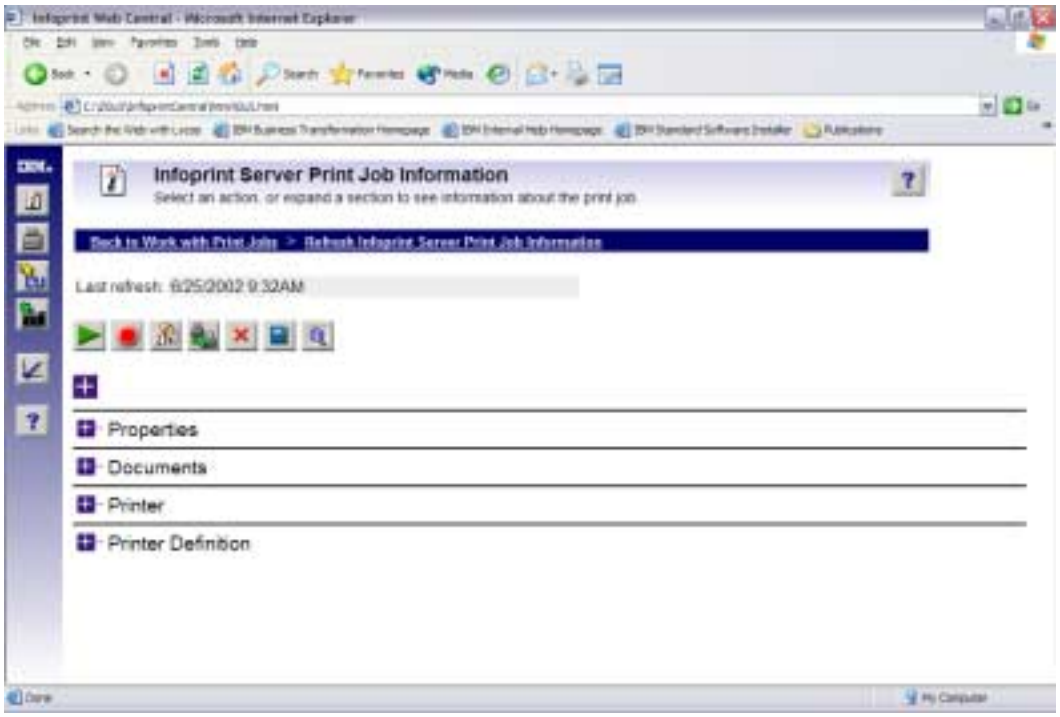


IP PrintWay Job Selection Rules

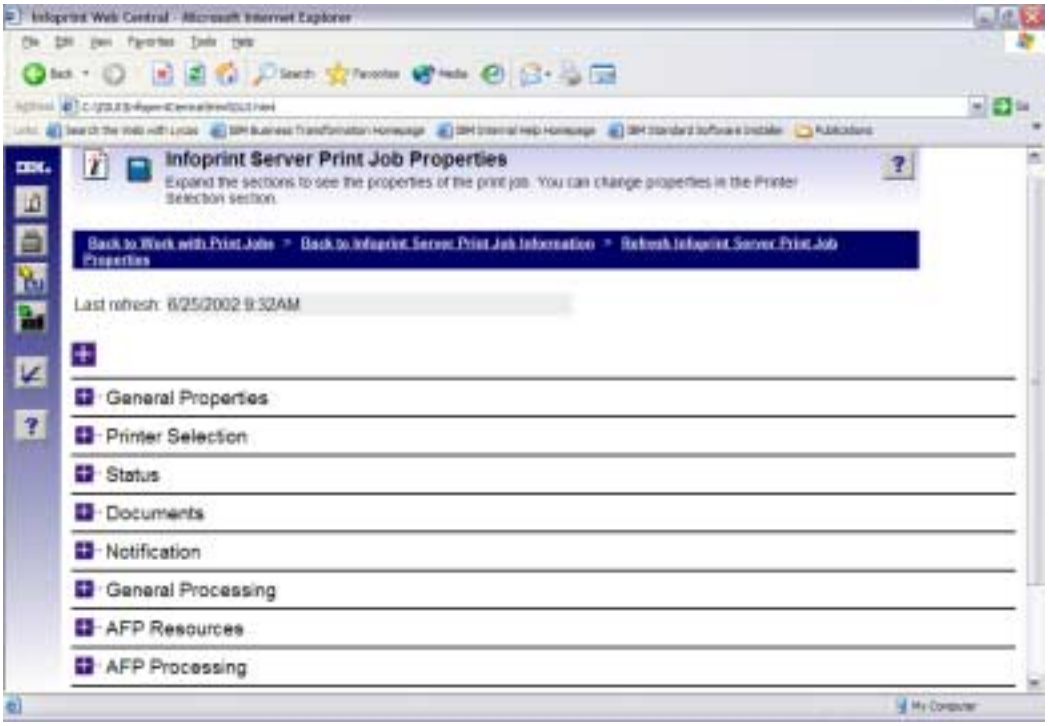


Display System Status - Daemons/Tasks

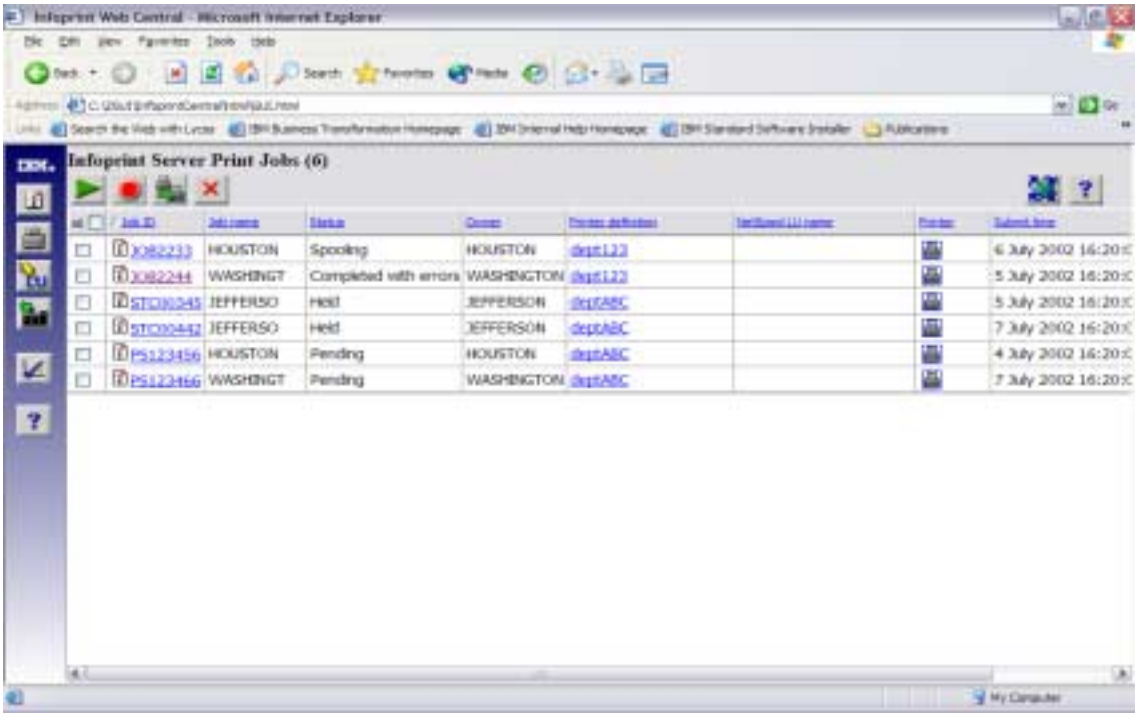
Print Job Information



Print Job Properties

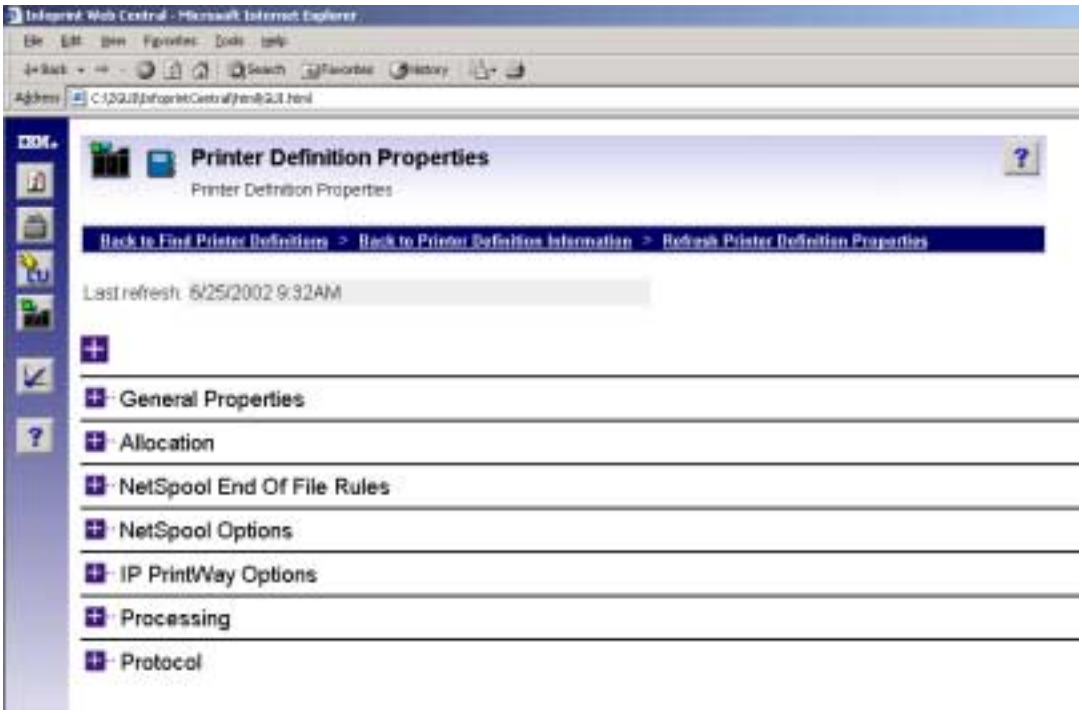


Print Jobs

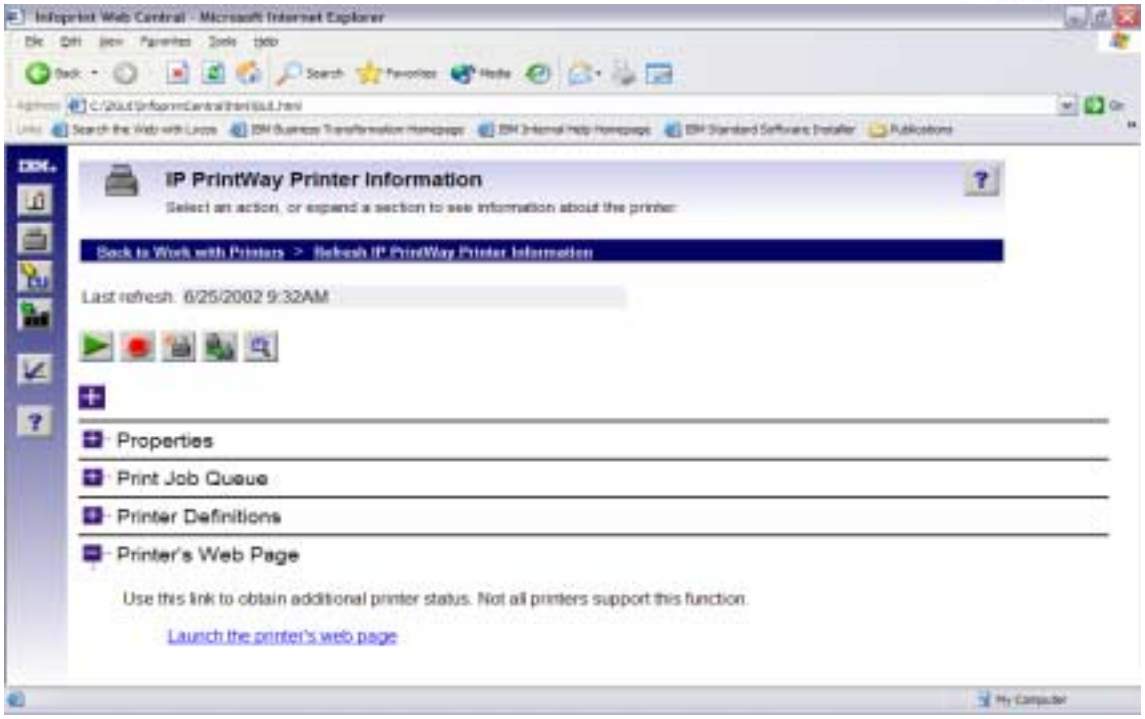


Print Jobs with Job History

Printer Definition Properties

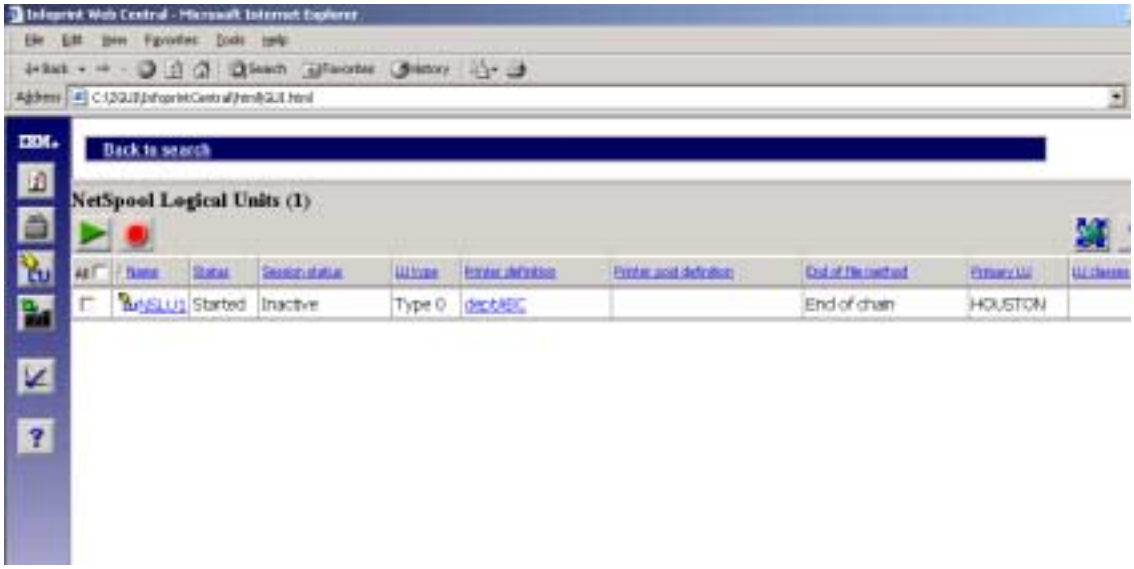


IP PrintWay Printer Information



Working with NetSpool LUs

NetSpool LUs



NetSpool LU Information

Update to AOPD.CONF

- Specify name of the extended MCS console
  - Default console name is AOPAOP1C
    - Default name AOPnnnnC
    - nnnn is the name of the Printer Inventory
  - console-name = INFOPRT
- Specify how long to keep information on historical jobs
  - Limits historical print jobs and messages that Infoprint Central can display
  - log-retention = 2
- Specify maximum size of historical inventory (optional)
  - Limits the size of the historical inventory
  - max-historical-inventory-size = 80

Infoprint Central Security Considerations

- What you can protect:
  - Who can use Infoprint Central
  - Which printers a user can control
    - IP PrintWay extended mode printers
    - PSF printers
  - Which jobs a user can see
  - What actions the user can perform
    - On jobs
    - On printers
  - Who can start and stop
    - Printers
    - Job selection rules
    - NetSpool LUs
  - Who can display status of Infoprint Server daemons

New RACF Class - PRINTSRV

- First exploited for Infoprint Server in z/OS V1R5
- General resource class
- Profile names up to 64 characters
- Ensure PRINTSRV class is active and profiles in storage:
  - SETROPTS CLASSACT(PRINTSRV) RACLIST(PRINTSRV)

Read-only Access to Printer Inventory

- AOP.ADMINISTRATOR profile in PRINTSRV class
  - READ access
    - Can use Infoprint Central
    - Can browse Printer Inventory using ISPF panels
  - UPDATE access
    - Can make changes to Printer Inventory
    - For print administrators
    - PERMIT AOP.ADMINISTRATOR CLASS(PRINTSRV) ID(AOPADMIN) ACCESS(UPDATE)
- PRINTSRV class is checked first
  - If AOP.ADMINISTRATOR profile exists
    - It will be used for access checking
  - If AOP.ADMINISTRATOR profile not defined
    - AOPADMIN profile in FACILITY class will be checked
    - Compatibility with previous releases

User Access to Infoprint Central

- Two requirements for access to Infoprint Central
  - RACF user ID and password
    - Unauthenticated users not allowed access
    - Must be defined as z/OS UNIX users
    - TSO segment not required
  - Read access to Printer Inventory
    - Permitted to AOP.ADMINISTRATOR profile with READ or higher access
    - - or -
    - UACC(READ) for AOP.ADMINISTRATOR profile
- Users can be given access to perform certain tasks, or to specific jobs or printers

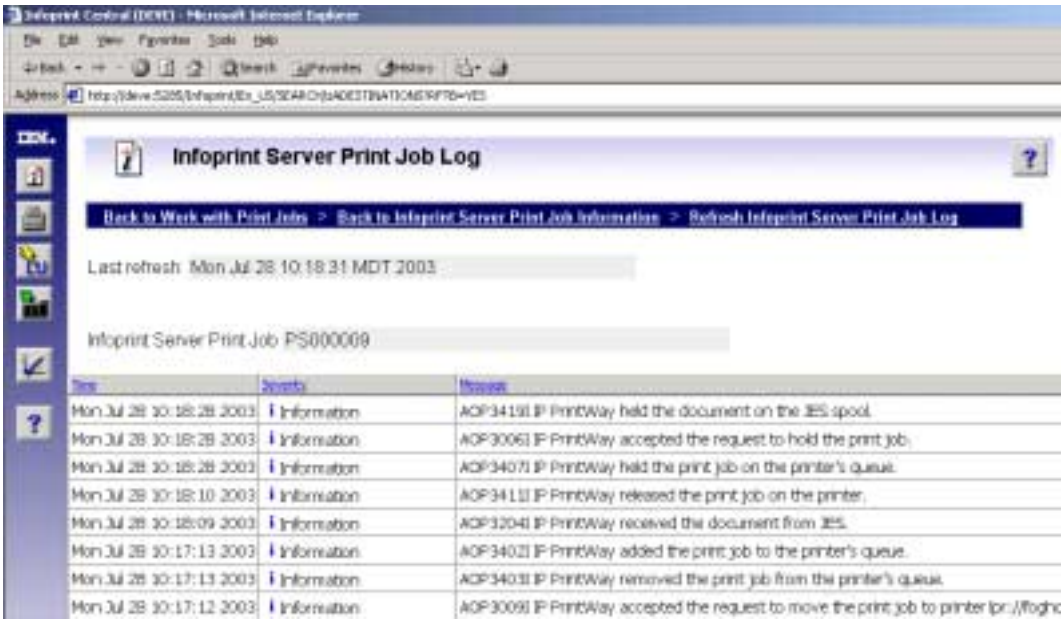
Infoprint Server z/OS V1R5

Infoprint Server Common Log

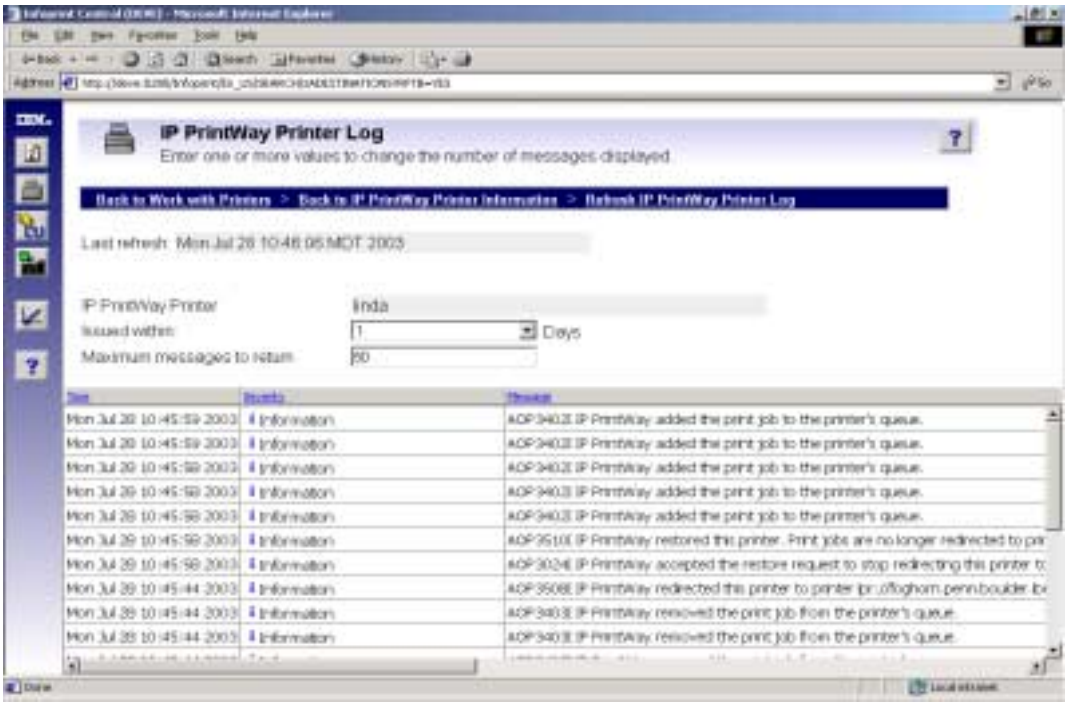
Common Message Log Overview

- Using the Infoprint Server common message log, the help desk operator can:
  - Use Infoprint Central to view all messages for print jobs
  - Use Infoprint Central to view all messages about a particular printer
- Using the Infoprint Server common message log, the print administrator can:
  - Extract all messages within a specific time period to a file using the aoplogu utility

Infoprint Server Job Log



IP PrintWay Printer Log



Common Message Log Implementation

- Common message log is disabled by default
- Common message log will be used if:
  - Infoprint Central daemon is started
    - start-daemons = { ssid }
  - Number of days of messages to keep is specified
    - log-retention=x
- Components still write messages to same locations as before
- Common message log not used by:
  - IP PrintWay basic mode
  - Infoprint Server transforms

log-retention in AOPD.CONF

- How many days of information to keep:
  - Messages kept in common message log
  - Historical print jobs in historical inventory
- Defaults:
  - When ssid is not in start-daemons list
    - log-retention = 0
  - When ssid is in start-daemons list
    - log-retention = 1
  - Example: keep information for 2 days of jobs
    - log-retention = 2

Log Utility - aoplogu

- Allows print administrator to look at common message log for a period of time
  - Can specify begin and end times
    - aoplogu -b [[[[YY:]MM:]DD:]hh:]mm -e [[[[YY:]MM:]DD:]hh:]mm
  - Example: Look at message log from 14:15 to 14:45
    - aoplogu -b 14:15 -e 14:45
  - Can also specify duration for most recent activity
    - aoplogu -l [[[[YY:]MM:]DD:]hh:]mm
  - Example: Look at messages for last 10 minutes
    - aoplogu -l 10