



Getting from Xerox to AFP

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Agenda

What is InfoPrint XT?

Xerox LPS challenges

- How does InfoPrint XT meet the challenges?

How does InfoPrint XT work?

What about the Xerox LPS specification?

What else does InfoPrint XT do?

How long has InfoPrint XT been available?

What platforms does InfoPrint XT support?

What does InfoPrint XT not do?

Additional questions



What is InfoPrint XT?

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What is InfoPrint XT?

Strategic InfoPrint Solutions Company Xerox transform

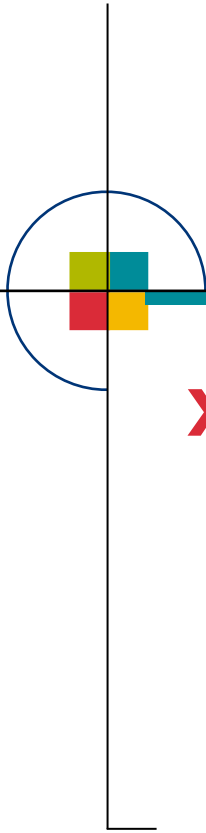
Migrates LCDS / Metacode print files to AFP

Addresses legacy Xerox LCDS / Metacode challenges

- Resource characteristics
- Resource management
- Data stream characteristics
- Data stream identification
- Data stream processing
- Conformity to Xerox LPS specification
- Online mode connectivity

Connects LCDS / Metacode applications to newer technology

- StreamServe software
- InfoPrint Solutions software
- AFP Printers



Xerox LPS challenges

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Xerox LPS challenges

Resource characteristics

- Printable resources
 - FNTs raster fonts; SBCS, DBCS or EBCDIC
 - IMGs graphic images
 - LGOs logos; part font, part image
 - FRMs forms
- Print environment control resources
 - JDLs libraries of environment descriptions (JDEs)
 - CMEs modifications to partial pages and / or selected copies
 - PDEs font lists, orientation
 - STKs cut sheet bin selection
- Source format resources
 - JSLs PDL compiler converts to print environment control resources
 - FSLs FDL compiler converts to FRMs
 - ISLs highlight color ink catalog source
 - CMDs operator command automation

Resource example: PDXTON.JSL

```
PDXTON: JDL;
PDXTPO: PDE BEGIN=(1,1), PMODE=PORTRAIT, FONTS=(P0612C, P06BOB);
PDXTLA: PDE BEGIN=(1,1), PMODE=LANDSCAPE, FONTS=(L0112C, L01BOB);
PDXTBL: CODE    DEFAULT=EBCDIC, ASSIGN=(X'13', X'CC'),
              ASSIGN=(X'14', X'CE'), ASSIGN=(X'15', X'EC'),
              ASSIGN=(X'16', X'BF'), ASSIGN=(X'17', X'BB');
V1:         VFU    TOF=1, BOF=70, ASSIGN=(1,1);
           VOLUME HOST=IBMONL, LABEL=NONE, CODE=PDXTBL,
           OPTIMIZE=(NCC, NDC, NPR);
           IDEN   PREFIX='$$XEROX', OPRINFO=NO, SKIP=8, OFFSET=0;
           LINE   PCCTYPE=IBM3211, UCSB=IGNORE, FCB=IGNORE, DATA=(0,150),
           MARGIN=(1, POS), VFU=V1;
           OUTPUT COPIES=1, DUPLEX=NO, FORMAT=PDXTLA,
           NUMBER=NO, GRAPHICS=YES, OFFSET=ALL;
           ACCT   USER=NONE;
           T1:    TABLE CONSTANT=('REPORT END');
           C1:    CRITERIA CONSTANT=(0,10, EQ, T1);
           RSTACK TEST=(C1), HRPTNA=(0,10), DELIMITER=YES, PRINT=NONE;
STRTON: JDE;
        MESSAGE  ITEXT='EXECUTING UNDER JDL=PDXTON, JDE=STRTON';

LDONLN: JDE;
        VOLUME  HOST=IBMONL, LABEL=NONE, CODE=EBCDIC;
        MESSAGE  ITEXT='EXECUTING UNDER JDL=PDXTON, JDE=LDONLN';

MCONLN: JDE;
        VOLUME  HOST=IBMONL, LABEL=NONE, CODE=NONE;
        MESSAGE  ITEXT='EXECUTING UNDER JDL=PDXTON, JDE=MCONLN';
```



Xerox LPS challenges

Resource management

- Resources resident on and unique to each physical printer
- Identical resource names not a guarantee of identical contents
- Customer pain: keeping resources in synch on multiple printers
- Proprietary, undocumented internal formats
- Resources must be available at data stream processing time



Xerox LPS challenges

Data stream characteristics

- LCDS (Line Conditioned Data Stream)
 - Line data with EBCDIC or ASCII text
 - ANSI or machine code (IBM 3211) carriage controls
 - Embedded print control records (DJDEs)
 - Documented in Xerox LPS PDL / DJDE Reference manuals
- Metacode
 - Native language of Xerox LPS DEC PDP-11 printer controllers
 - Binary control sequences + ASCII text
 - ANSI or machine code (IBM 3211) carriage controls
 - Embedded print control records (DJDEs)
 - Proprietary
- LCDS + Metacode possible in the same data stream



Xerox LPS challenges

Data stream identification

- LCDS / Metacode cannot be "sniffed" to identify format
 - no unique identifier
- Explicit external identification as Xerox LPS data required
- DJDEs (Dynamic Job Descriptor Entries)
 - Pre-defined identifier (e.g., \$\$XEROX, \$DJDE\$, "* ,,X\$", etc.)
 - DJDE identifier string can be anything
 - Location, content consistent throughout job
 - Override specific aspects of current JDL / JDE
 - Change to different JDL / JDE
 - Add IMAGE objects to print output inline
 - Load Xerox resources inline via FILE DJDE

Example: LCDS data stream

```

+$$$XEROX JDL=PDXTON,JDE=LDONLN,;
+$$$XEROX FONTINDEX=0,DATA=(1,78),FONTS=(PR111E,P0612C,P06BOB),;
+$$$XEROX PMODE=PORTRAIT,BEGIN=(1,1),;
+$$$XEROX ASSIGN=(1,7),ASSIGN=(2,15),ASSIGN=(3,33),;
+$$$XEROX END;
1
01      InfoPrint XT                                PR111E
22      A B C D E F G H I J K L M N O P Q R S T U V W X Y Z P0612C
02      a b c d e f g h i j k l m n o p q r s t u v w x y z P0612C
02      0 1 2 3 4 5 6 7 8 9 ! @ # $ % ? & * ( ) - _ = + ; : P0612C
03      A B C D E F G H I J K L M N O P Q R S T U V W X Y Z P06BOB
03      a b c d e f g h i j k l m n o p q r s t u v w x y z P06BOB
03      0 1 2 3 4 5 6 7 8 9 ! @ # $ % ? & * ( ) - _ = + ; : P06BOB
InfoPrint XT                                PR111E
+$$$XEROX FONTINDEX=0,DATA=(1,78),FONTS=(PR111D,L0112C,L01BOB),;
+$$$XEROX PMODE=LANDSCAPE,BEGIN=(1,1),;
+$$$XEROX ASSIGN=(1,1),ASSIGN=(2,10),ASSIGN=(3,30),;
+$$$XEROX END;
1
01      InfoPrint XT                                PR111D
22      A B C D E F G H I J K L M N O P Q R S T U V W X Y Z L0112C
02      a b c d e f g h i j k l m n o p q r s t u v w x y z L0112C
02      0 1 2 3 4 5 6 7 8 9 ! @ # $ % ? & * ( ) - _ = + ; : L0112C
03      A B C D E F G H I J K L M N O P Q R S T U V W X Y Z L01BOB
03      a b c d e f g h i j k l m n o p q r s t u v w x y z L01BOB
03      0 1 2 3 4 5 6 7 8 9 ! @ # $ % ? & * ( ) - _ = + ; : L01BOB
31      InfoPrint XT                                PR111D

```

Example: Metacode data stream

```
+$XEROX JDL=PDXTON, JDE=MCONLN, ;
+$XEROX FONTS=
(PR111E, P0612C, P06BOB, PR111D, L0112C, L01BOB), ;
+$XEROX PMODE=LANDSCAPE, BEGIN=
(0,0), FONTINDEX=NONE, DATA=(0,79), ;
+$XEROX END;
1
+ metacode data
+ metacode data
+ metacode data
+REPORT END
```

Typical metacode record:

```
0 --- +--- -- 1 -----+-----2-----+-----3 --- --+----- 4
                          InfoPrint XT                          PR111E
4 020 080 00 0 46665766725522222222 060 553334 0
E 6C1 4CA 00 9 9E6F029E408400000000 773 021115 1
```



Xerox LPS challenges

Data stream processing

- Each job has unique attributes
- Each job requires unique information to start processing
- No predictable pattern or format
- Explicit external specification of data format required
- Index bytes
 - Reserved column in data
 - FONTINDEX: Font change control
 - INKINDEX: Ink change control for highlight color
- Logical Processors
 - Identifiers
 - Predefined contents of range of columns
 - Change in contents of range of columns
 - RSTACK: end report, revert to starting environment
 - RAUX: pull paper from AUX bin
 - RPAGE: move to different side or sheet
 - ROFFSET: jog output sheets
 - BANNER: identify banner page and its contents



Xerox LPS challenges

Online mode connectivity

- 3211 Bus & Tag Channel to z/OS host
- Direct channel connect now very rare
- Channel emulation via Barr Systems hardware / software
- Data conversions and reformatting via other transform solutions
- TCP / IP: EPS models
- LPS printer in online mode always believes it is channel attached

Offline mode

- Input data on tape
- Specialized / rare formats
 - IBMOS
 - RSX11
 - Burroughs
 - Honeywell
 - NCR
 - Unisys



Xerox LPS challenges

The printer is the Xerox LPS specification

- Metacode and resource format internals not documented
- Command interactions not always clarified in publications
- Correct output determination can require running job on a Xerox printer
- Xerox provides diagnostic tools
 - OLDUMP: shows actual carriage controls used
 - Page Log Analyzer: dumps of pages in Metacode format
- Research requires tests on a Xerox printer



How does InfoPrint XT meet the challenges?

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How does InfoPrint XT meet the challenges?

Logically replaces Xerox LPS printer

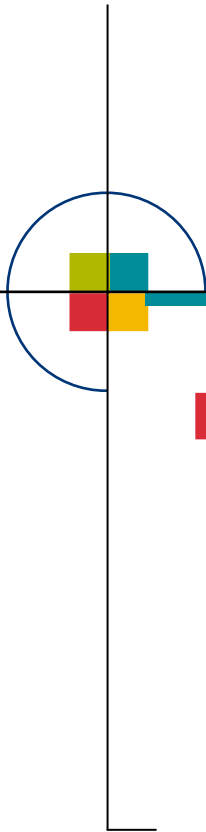
- Converts Xerox LPS resources to AFP resources
- Transforms Xerox LCDS / Metacode to data streams to AFP
- Application migration speed under customer control
 - Enables immediate use of AFP
 - Keeps Xerox applications running during migration

Readily adapts to a variety of environments

- Command line interface for use with solutions such as Persuasion
- Plugs into InfoPrint Manager (AIX or Windows)
- Plugs into Infoprint Server (z/OS)
- Plugs into InfoPrint ProcessDirector as External Step (AIX)

Requires no customer application changes, assuming

- Resources and data streams work on a Xerox LPS printer
- Applications conform to Xerox LPS documentation
- Data sent to InfoPrint XT matches data as received by Xerox LPS printer



How does InfoPrint XT work?

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How does InfoPrint XT work?

Resource conversion: pdxloadres command

- Printable resources
 - Convert FNTs to AFP fonts
 - Convert IMGs and LGOs to AFP page segments
 - Convert FRMs to AFP overlays
 - Reformat useful internal information into metrics files
 - 300-pel resolution to match Xerox LPS 300 dpi resolution
- Print environment control resources
 - JDLs, CMEs, PDEs, STKs, etc.
 - InfoPrint XT reads Xerox binary resource formats
 - Convert DEC PDP-11 formats
 - Reformat into metrics files
- Source format resources
 - JSLs, FSLs, ISLs, CMDs
 - Convert to metrics files in readable text format

How does InfoPrint XT work?

Resource compilation: pdxtpdl command

- Facilitates ongoing processing for print environment control resources
 - PDL compiler (JSLs to JDLs, etc.) resides on LPS printers
 - If Xerox printer replaced, PDL goes with it
 - Xerox xjdc (workstation PDL) compiler only available on EPS printers
 - Other transform solutions may have only used JSLs, not binary resources
 - No way to update print environment control resources if running in parallel
- Compiles JSLs into InfoPrint XT reformatted resources
- Command syntax and parameters similar to pdxtloadres

How does InfoPrint XT work?

Resource management

- Stores printer-specific resource sets in centralized resource groups

- AFP resources converted from printable Xerox resources

`/var/pdxt/resources/res_group_name`

- Metrics from all Xerox resource types:

`/var/pdxt/resources/res_group_name/metrics`

- Copies of successfully converted Xerox resources:

`/var/pdxt/resources/res_group_name/xrxres`

- Default `res_group_name` is common
- Scalable solution: emulates simple or complex Xerox environments
- Resources available to data stream conversions

How does InfoPrint XT work?

Data stream conversion: pdctx2afp command

- Logically takes the place of a Xerox LPS printer
- Reads input data stream from STDIN
 - LCDS / Metacode
 - Online mode (IBM3211)
 - Offline mode (IBMOS, RSX11)
- Accesses converted / reformatted Xerox resources
- Applies DJDEs and Logical Processors to data stream
- Writes fully-composed MO:DCA-P document output to STDOUT
 - Inline FORMDEF specific to job
 - Overlay and page segment invocations
 - Optional inline AFP resources
 - Text in PTOCAs
 - 300-pel resolution to match Xerox LPS 300 dpi resolution
- Writes listing and messages to STDERR
- Writes optional DJDE report

How does InfoPrint XT work?

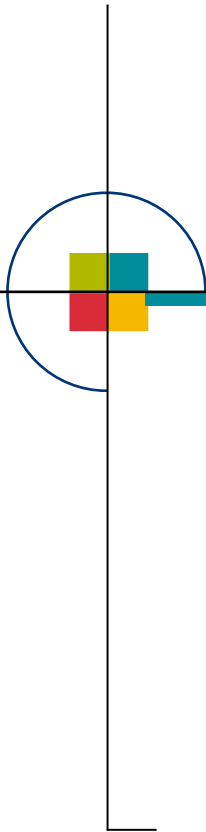
Data stream conversion: pdxtx2afp command

- Xerox LPS job submission
 - START jde_name,jdl_name command
 - Manually issued by operator at print console
 - Can be issued programmatically by CMDs
 - Defines beginning print environment for job
- InfoPrint XT job submission
 - Parameters emulate START command:
 - xjdl starting JDL name
 - xjde starting JDE name
 - Additional job attribute parameters
 - xcc ansi | machine
 - xrecfm fixed | variable
 - xlrecl
 - Large selection of other parameters
 - Parameter mapping
 - Specify unique parameter sets per job
 - Distinguish sets by job ID, job name, CLASS, DEST, FORM

How does InfoPrint XT work?

Connectivity

- Data stream converter expects Xerox online mode formats
 - IBM3211
 - Carriage controls
 - Machine code
 - ANSI – converts to machine code internally
 - Channel format variable length records
 - 2-byte length field
 - Value excludes length field (actual length – 2)
 - Fixed length records
- Input exit handles many non-IBM3211 formats
 - RECFM=V, RECFM=VB (RDW / BDW)
 - Barr Systems formats
 - SPOOL, METABAR3, VM, VBM
 - TBV | S370 | METABAR2 | COMPUSSET
 - CRLF
 - Converts to expected variable / fixed format
- Offline mode formats: IBMOS, RSX11

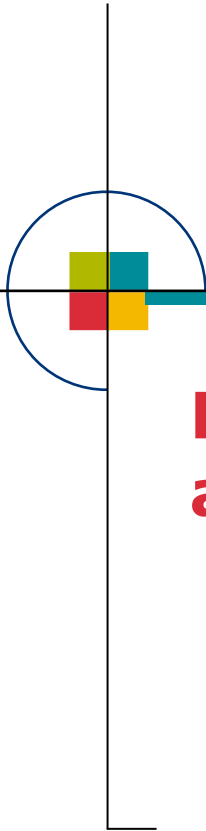


What else does InfoPrint XT do?

What else does InfoPrint XT do?

Utility commands:

- pdxtblkres / pdxtdblres: source file format control
- pdxtcapture: capture diagnostic information
- pdxtctxform / pdxtsetdest: configuration for Infoprint Manager
- pdxtsetenv: configure /etc/environment (AIX only)
- pdxtdownload: Download for z/OS "script"
- pdxtjtape: process jobs from tape (AIX only)
- pdxtrtape: resource management on tape (AIX only)
- pdxtmsg: display message help
- pdxtman: display man pages (Windows)
- pdxtcluster: process cluster data bases for cut sheet environments



How long has InfoPrint XT been available?

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How long has InfoPrint XT been available?

Page Printer Migration Programs for MVS (1989)

Xport Services Offering for AIX (1995)

InfoPrint XT for AIX (2002)

Infoprint XT Extender for z/OS (2003)

InfoPrint XT for Windows (2004)



What platforms does InfoPrint XT support?

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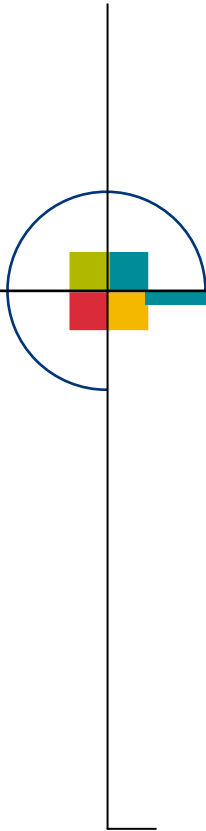
What platforms does InfoPrint XT support?

Supported platforms

- PRPQ (Programming Request for Price Quote)
 - Pre-qualification required
 - InfoPrint XT 2.1 for AIX
 - InfoPrint XT 2.1 for Windows
- Program Product
 - Infoprint XT Extender V1R1 for z/OS
 - **Solutions Assurance Required**

Cross-platform support

- All platforms built from a single code base
- Fixes and enhancements ported to all applicable platforms
- No one-off customization



What's new for InfoPrint XT?

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Resource enhancements

JSL Metrics Compiler

- Long-standing InfoPrint XT requirement
 - Xerox pdl command / xjdc utility
 - Compiles JSL source files
 - Creates binary print environment control resources: JDLs, CMEs, PDEs, STKs, etc.
 - When InfoPrint XT succeeds in displacing Xerox printer
 - PDL compiler (JSLs to JDLs, etc.) resides on LPS printers
 - If Xerox printer replaced, PDL goes away with it
 - Xerox xjdc (workstation PDL) compiler only available on EPS printers
 - Other transform solutions may have only used JSLs, not binary resources
 - No way to update print environment control resources if running in parallel



Resource enhancements

JSL Metrics Compiler

- InfoPrint XT solution: pdxtpdl command
 - Compiles JSLs
 - LF / CRLF-delimited ASCII text (AIX and Windows)
 - EBCDIC text (z/OS)
 - Binary 80-byte card image format (all platforms)
 - Creates reformatted JDLs, etc. for InfoPrint XT data stream conversions
 - Supports customer-specified resource groups
 - Syntax similar to existing pdxtloadres command
 - Successfully implemented at CGI
 - Available now (PU14)

Resource enhancements

- Clusters: collections of input paper bins
- Automated cluster database processing: Xerox background
- Database: CLUSTR.LIB associates cluster names and bin numbers
- InfoPrint XT cluster source file generated from a CLUSTR.LIB:

```

*
* CLUSTER  AUTO  —PREFERRED TRAYS—  —CURRENT TRAYS—
* NAME     SIZE  AFP  Xerox  future  AFP  Xerox  future  STATUS
* -----  -    MMC 12345678  future  MMC 12345678  future
* |-----|-----|-----|-----|-----|-----|-----|-----|
*
*
MAIN      A      1 1 3      1 1 3      HAS TRAYS
AUX       A      2 2 4      4 4        HAS TRAYS
AUTO      A      1 1234     1 123      HAS TRAYS
RITLET    1 1      1 1        HAS TRAYS
RITLE2    2 2      2 2        HAS TRAYS
RITSTD    1 1 3     1 1 3     HAS TRAYS
RITSTM    1 1 4     1 1 4     HAS TRAYS
SLIP01    3 34     3 34     HAS TRAYS
NUBLET    4 4      4 4        IS DEFINED
NUBLE2    5 5      5 5        IS DEFINED
NUBSTM    4 4 6     4 4 6     IS DEFINED
NEXT      6 6      6 6        HAS TRAYS

```

Resource enhancements

Automated cluster database processing: Xerox background

1. FEED commands in JDLs, DJDEs, specify cluster references:

```
$$DJDE FEED=SUMMRY,END;           [in data stream]
OUTPUT STOCKS=BILLS,FEED=COVER;   [in JDL / JDE]
```

2. STOCKSET assigns cluster references (COVER, SUMMRY) to cluster names (CV102 ,SM233):

```
BILLS: STOCKSET ASSIGN=('CV102', COVER),
        ASSIGN=('SM233', SUMMRY),
        INIFEED=COVER, [cluster ref to use if no FEED]
        SYSPAGE=AUX; [cluster ref for system pages]
```

3. CLUSTR.LIB entries associate cluster names (CV102 ,SM233) with input paper bins (2, 3):

```
* CLUSTER  AUTO  ---PREFERRED TRAYS--  ----CURRENT TRAYS---
*  NAME     SIZE  AFP  -----Xerox-----  AFP  -----Xerox-----  STATUS
*  -----  -    MMC 12345678 future  MMC 12345678 future  -----
*--+---+---1---+---+---2---+---+---3---+---+---4---+---+---5---+---+---6---+---+---7---
*
*  MAIN     A     1 1 3                1 1 3                HAS TRAYS
*  AUX      A     2 2 4                4 4                HAS TRAYS
*  AUTO     A     1 1234              1 123              HAS TRAYS
*  CV102    A     2 2                2 2                HAS TRAYS
*  SM233    A     3 3                3 3                HAS TRAYS
```



Resource enhancements

Automated cluster database processing

- Long-standing InfoPrint XT requirement
 - InfoPrint XT reformats clustr.lib and STKs, supports FEED
 - InfoPrint XT supports multiple cluster databases via xclb parameter
 - How to change clustr.lib after Xerox printer replaced?
 - How to implement if newer Xerox printer has no clustr.lib?
 - Manual, undocumented process with 2 shell scripts



Resource enhancements

Automated cluster database processing

- InfoPrint XT solution: new pdxtcluster command
 - Simplifies operations on clustr.lib from Xerox printer
 - Reformat
 - Produce source file
 - Copy source file to desired resource group
 - Rename and edit source file
 - Recompile
 - Shipped sample cluster source file
 - Useful when Xerox printer has no clustr.lib
 - Copy source file to desired resource group
 - Rename and edit source file
 - Recompile
 - Available now (PU15)

Resource enhancements

Automated cluster database processing: shipped cluster source file

```

*
* CLUSTER  AUTO  ---PREFERRED TRAYS--  ----CURRENT TRAYS---
* NAME     SIZE  AFP -----Xerox-----  AFP -----Xerox-----  STATUS
* -----  -    MMC 12345678 future  MMC 12345678 future  -----
*---+---1---+---2---+---3---+---4---+---5---+---6---
+---7---+---8
*
MAIN      A      1 1          1 1          HAS TRAYS
AUX       A      2 2          2 2          HAS TRAYS
AUTO      A      1 1234       1 1234       HAS TRAYS
ONE       1 1          1 1          HAS TRAYS
TWO       2 2          2 2          HAS TRAYS
THREE     3 3          3 3          HAS TRAYS
FOUR     4 4          4 4          HAS TRAYS
FIVE     5 5          5 5          HAS TRAYS
SIX      6 6          6 6          HAS TRAYS
SEVEN    7 7          7 7          HAS TRAYS
EIGHT    8 8          8 8          HAS TRAYS

```

Data stream enhancements

MO:DCA media types

- InfoPrint XT solution
 - New xmediatypes parameter
 - Associates MO:DCA media types or component IDs with Xerox tray numbers
 - Supports up to 8 tray number associations
 - New xbinerror parameter
 - xbinerror=ignore: no media error instruction in inline FORMDEF
 - xbinerror=stop: printing stops if specified media type not found
 - xbinerror=continue: print with default media if media type not found
- Available now (PU14)

Data stream enhancements

MO:DCA media types

```
xmediatypes=-:BLUE-MED:GREEN-STOCK:LETTER
xmediatypes=:MY_PAPER::8x13_MED:69
```

Xerox tray numbers	Media type substitutions in AFP output
1	User defined media name 'BLUE MED'
2	User defined media name 'GREEN STOCK'
3	Registered MO:DCA media name LETTER (component ID 50)
4	Tray 4, no substitution
5	User defined media name 'MY PAPER'
6	Tray 6, no substitution
7	Registered MO:DCA media name '8x13 MED' (component ID 163)
8	Registered MO:DCA component ID 69 (media name STATEMNT)



Data stream enhancements

Input data formats

- Long-standing InfoPrint XT requirement
 - Original aixlxie input exit written to process only RECFM=V, RECFM=VB
 - Other input data formats frequently encountered
 - Required new or rewritten versions of input exit
- InfoPrint XT solution: enhanced aixlxie input exit
 - Handles many non-IBM3211 formats
 - RECFM=V, RECFM=VB (RDW / BDW)
 - Barr Systems formats
 - SPOOL, METABAR3, VM, VBM
 - TBV | S370 | METABAR2 | COMPUSET
 - CRLF
 - Converts to expected variable / fixed format
 - Available now (PU15)

Data stream enhancements

InfoPrint ProcessDirector

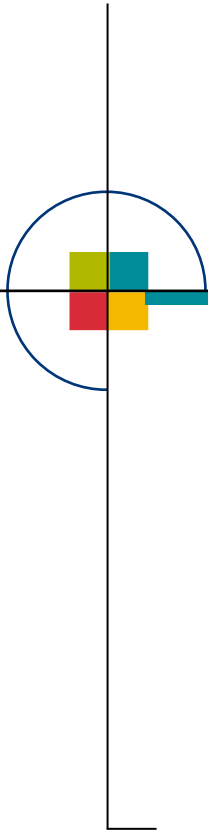
- InfoPrint XT works with IPPD on AIX
 - pdxtdownload command download directives
 - -h
 - Specifies IPPD hot folder for submitting Xerox jobs to IPPD
 - Default: /aiw/aiw1/System/hf/pdxt
 - -i [ippd | ipm]: print manager coexistence
 - ippd: pdxtdownload submits jobs to IPPD
 - ipm : pdxtdownload submits jobs to InfoPrint Manager
 - -k mvsprsd parameter: retain JCL files for IPPD
 - IPPD RunExternalProgram step:
 - /usr/opt/pdxt/bin/pdxtx2afp -i \${getFileName(print,unknown,read)}
 - -o \${getFileName(print,afp,write)} -p -opa=class=\${Job.Class},
 - destination=\${Job.Destination},forms=\${Job.Form},
 - jobid=\${Job.Host.JesID},jobname=\${Job.Name}
- Available now (PU14)



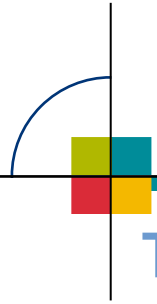
Documentation enhancements

New InfoPrint XT publications

- InfoPrint XT for AIX: Installing and Using (G550-1339-00)
- InfoPrint XT for Windows: Installing and Using (G550-1340-00)
- Up-to-date documentation for InfoPrint XT 2.1 PRPQs
 - Features
 - Enhancements
 - Parameters
 - Messages
- Available now (PU16)
- Download from <ftp://public.dhe.ibm.com/printers/products/pdxt/fixes>
 - Publications
 - Product update installation images
 - PU15
 - PU16



Additional questions?



Thank you!