



Session: E20

CICS TS for VSE/ESA Printing Alternatives

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CICS TS for VSE/ESA Printing Alternatives

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Topics

- CICS printing support
 - Terminal Control
 - Basic Mapping
 - CICS Spool Interface
- CICS printing using TCP/IP
- Some vendor product alternatives

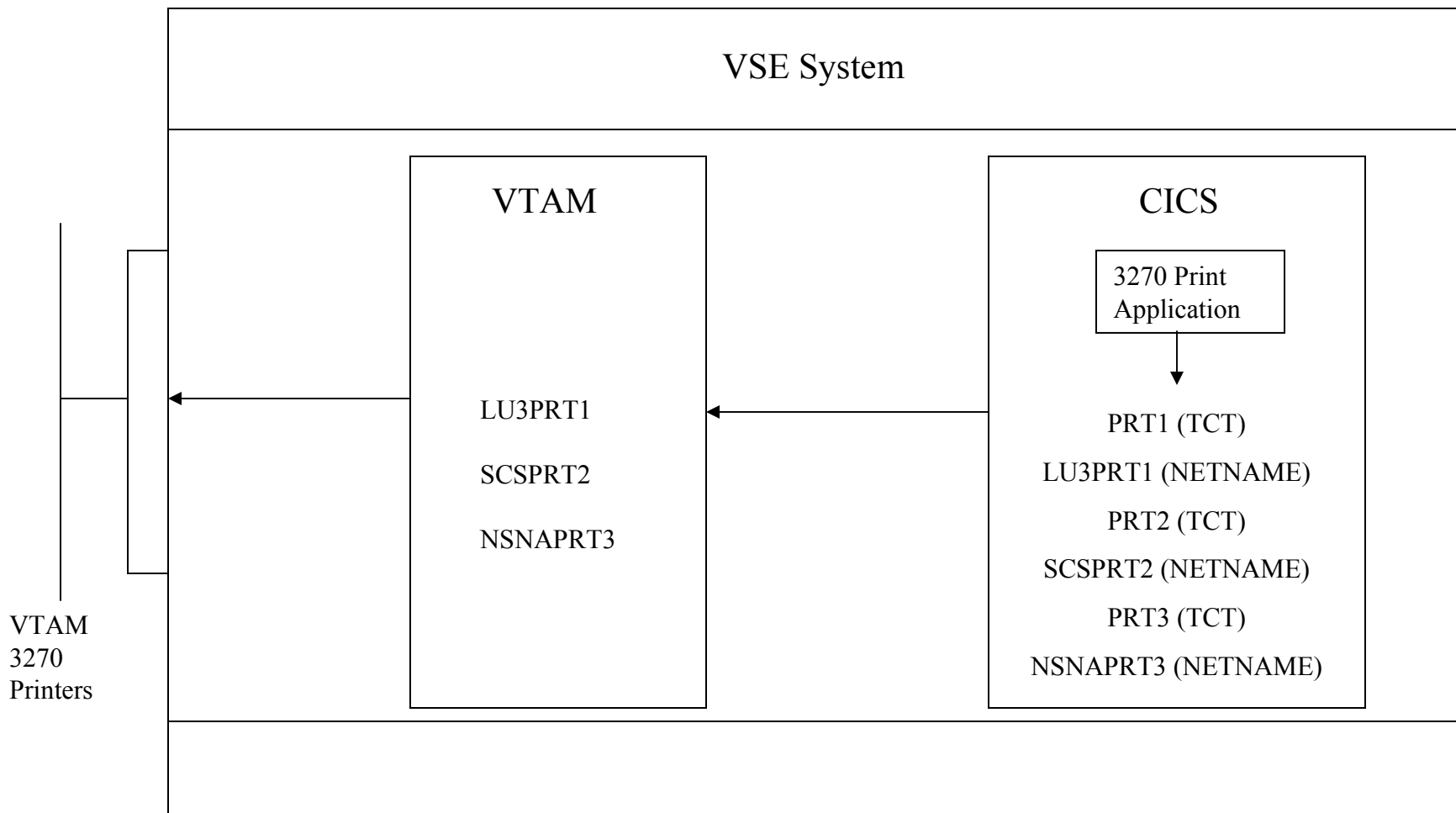


CICS Printing Support

- Traditional support
 - “Real” 3270 printers
 - 3284, 3287, 3262, etc.
 - 3270 control unit attached
 - Emulated 3270 printers attached to gateways emulating 3270 control units
 - Application Support
 - Terminal control EXEC CICS SEND
 - BMS EXEC CICS SEND MAP|TEXT|CONTROL
 - BMS EXEC CICS ROUTE



CICS Printing Support...





CICS Printing Support...

- “Real” 3270 printers
 - Supplied printer TYPETERM definitions

	CICS supplied DFHTYPE group	VSE supplied VSETYPE group
SNA LUTYPE3	DFHLU3	VSELU3A VSELU3B VSELU3C VSELU3Q
Non-SNA 3270	DFH3270P	VSEDSCP VSEDSCPQ
SNA character set (SCS)	DFHSCSP	VSESCSPA VSESCSPB VSESCSPC VSESCSPQ



CICS Printing Support...

- “Real” 3270 printers
 - Supplied VTAM printer logmode entries

	VTAM LOGMODE Table ISTINCLM	VSE LOGMODE Table IESINCLM
SNA LUTYPE3	D6328902 D6328904	SPLU3PRT SPLU3PRQ
Non-SNA 3270	DSC2K DSILGMOD DSC4K	SPDSCPRT
SNA character set (SCS)	SCS	SPSCSPRT SPSCSPRQ



CICS Printing Support...

- Application support
 - Terminal control EXEC CICS SEND
 - Native terminal control commands
 - User application must provide print formatting
 - New line (NL), end of message (EM), formfeed (FF)
 - Set buffer address and start field orders
 - CTLCHAR parameter
 - 3270 Write Control Character (WCC)
 - Print bit must be set on to print
 - ERASE parameter
 - Clears 3270 printer buffer before data written into buffer



CICS Printing Support...

- Application support...
 - BMS SEND MAP|TEXT|CONTROL
 - CICS BMS support formats datastream
 - New line (NL), end of message (EM), formfeed (FF) print format orders
 - Set buffer address and start field orders
 - User application provides print data and printing options in BMS request
 - Application is more independent of printer terminal type and 3270 datastream orders



CICS Printing Support...

- Application support...
 - BMS print formatting command options
 - PRINT parameter
 - Sets print bit on in Write Control Character (WCC)
 - Erase parameter
 - Clears 3270 printer buffer before data written into buffer
 - L40, L60 or L80
 - Sets fixed line length for printer in WCC
 - Print format orders are ignored
 - Printer performs new line after specified line length



CICS Printing Support...

- Application support...
 - BMS print formatting command options
 - HONEOM parameter
 - "Honor end of message"
 - Printer formats based on buffer control and print format orders
 - NLEOM parameter
 - BMS formats printout with new line (NL) and end of message (EM) print format orders
 - Format based on TCT PAGESIZE or ALTPAGE



CICS Printing Support...

- Application support...
 - BMS print formatting command options
 - ACCUM parameter
 - Accumulates data into one logical message for multiple SEND requests
 - Issue SEND PAGE to deliver output to printer
 - FORMFEED parameter
 - Inserts formfeed (FF) print format order at beginning of datastream
 - FORMFEED option must be specified in printer terminal TYPETERM definition



CICS Printing Support...

- Application support...
 - BMS print formatting command options
 - PRINTERCOMP parameter
 - Parameter in PROFILE resource definition used by printer transaction definition
 - Provides formatting compatible with display devices
 - PRINTERCOMP(NO)
 - Position 1 of print line reserved for attribute byte
 - PRINTERCOMP(YES)
 - Position 1 of print line available for print data



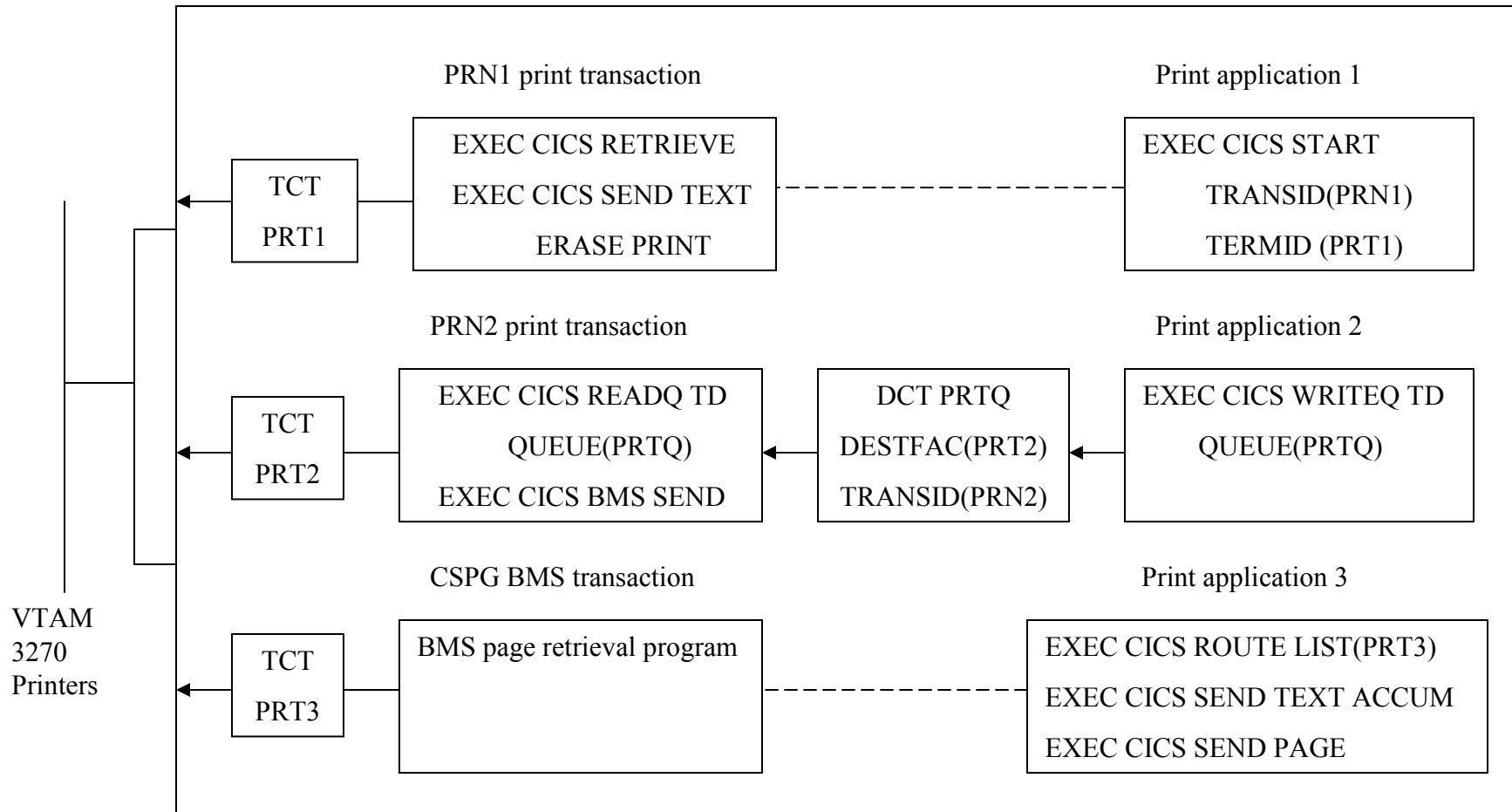
CICS Printing Support...

- Application support...
 - Getting data to the printer
 - Requires task initiated on the 3270 printer
 - EXEC CICS START with TERMID parameter
 - Transient data queue defined with printer terminal destination
 - BMS routing to printer terminal



CICS Printing Support...

CICS





CICS Spool Interface

- Programming Interface to POWER
 - Basic programming interface
 - Read a POWER spool file into a CICS application
 - Write data to the POWER spool file or a remote destination
 - Report Controller Facility (RCF)
 - Enhanced programming interface
 - Write reports and submit jobs to POWER
 - Transactions to manage reports and CICS printers
 - Send POWER output to CICS printers

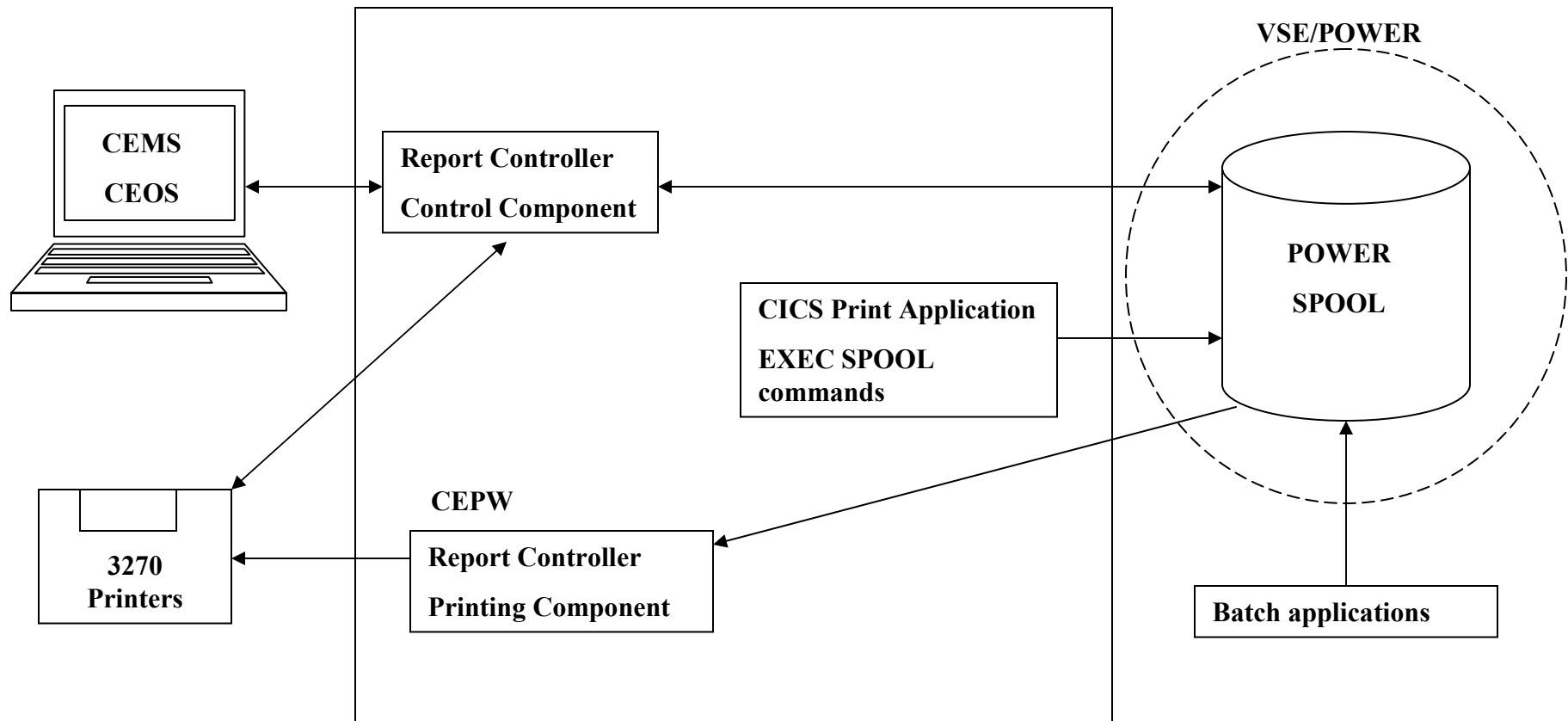


CICS Spool Interface

- Programming Interface to POWER...
 - Basic programming interface
 - SPOOLOPEN INPUT and SPOOLOPEN OUTPUT
 - SPOOLREAD and SPOOLWRITE
 - SPOOLCLOSE
 - Report Controller Facility (RCF)
 - SPOOLOPEN REPORT
 - SPOOLWRITE REPORT
 - SPOOLCLOSE REPORT



Report Controller





Report Controller...

- SPOOLOPEN REPORT
 - Defines type of report
 - ASA, MCC or NOCC
 - JCL (job submission)
 - SCS or T3270
 - POWER information
 - Report name
 - Class, destination, node
 - Userid, userdata
 - Forms, FCB, copies, Separator page
 - OUTDESCR (used to pass parameters for PSF)



Report Controller...

■ SPOOLOPEN REPORT...

EXEC CICS SPOOLOPEN REPORT

Token()

Title()

USERData()

CLass()

LOG

COpies()

PRIOriety()

FORms()

DEstination() | USERId()

NODE()

SEp | NOSep

NOCC | Mcc | Asa | Jcl | (T3270 | SCs) NOCONv

LOGIcal | PHysical

Rsl()



Report Controller...

■ SPOOLOPEN REPORT...

EXEC CICS SPOOLOPEN REPORT

PRINTfail

LINES()

LINELength()

NONum | HEADNum | FOOTNum | Bothnum

HEAD()

FOOT()

DAtetime

FCb()

Outdescr()

PWrsysid()

SOSI1 | SOSI2



Report Controller...

- SPOOLWRITE REPORT
 - Writes report output

EXEC CICS SPOOLWRITE REPORT

Token()
FRom()
FLength()
Log



Report Controller...

- **SPOOLCLOSE REPORT**
 - Closes report output
 - Sets disposition

EXEC CICS SPOOLCLOSE REPORT

Token()

RElease | Hold | RESume | Keep | DElete | DIsp()

Log



CICS Printing Using TCPIP

- TCP/IP for VSE (CSI/IBM)
 - General Print Server (GPS)
 - Separately licensed feature
 - Automatic LPR and FTP
 - Socket Applications

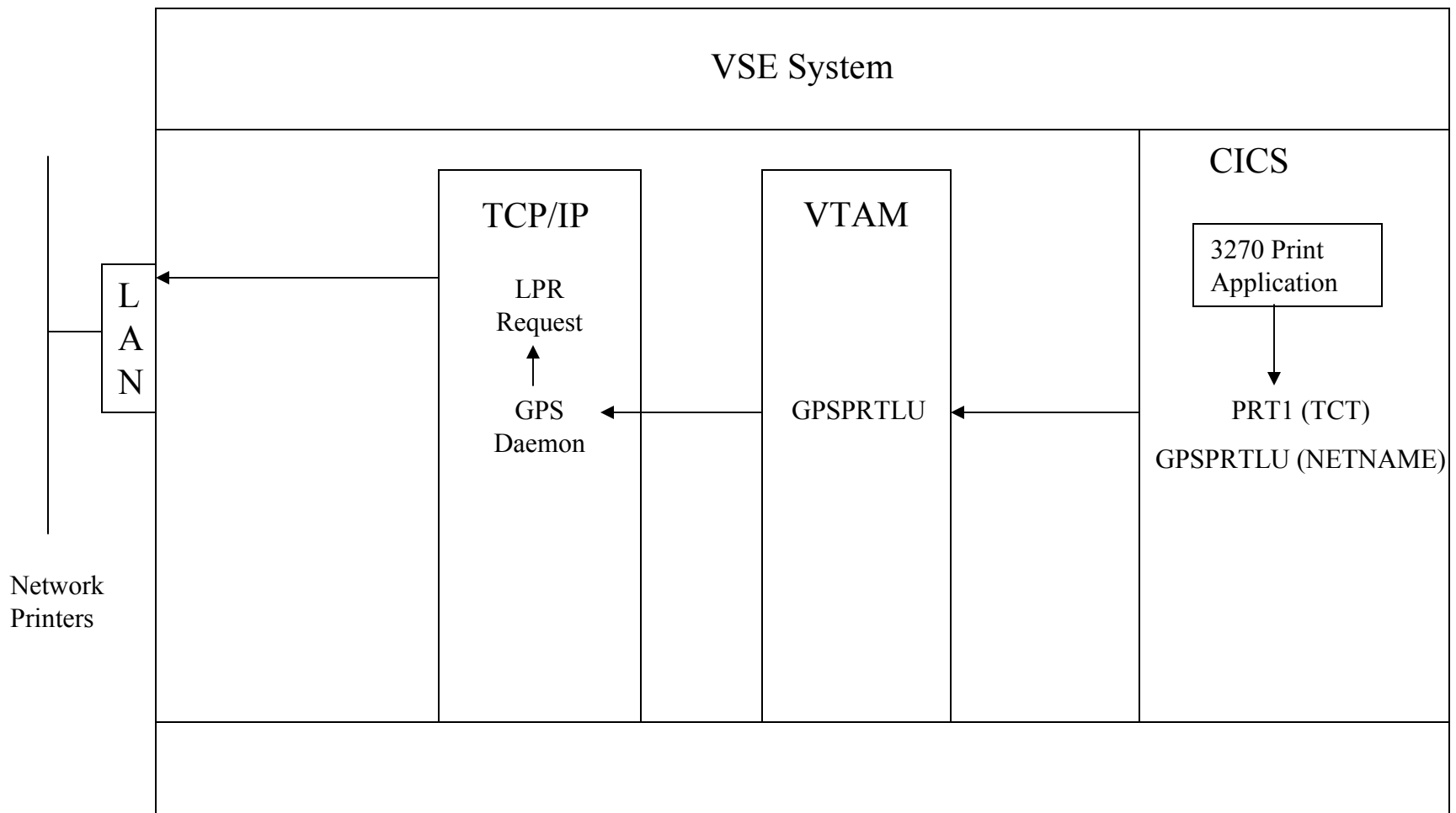


General Print Server

- Support for 3270 printer datastreams
 - Any VTAM-based non-SNA 3287 printer
 - Extended datastreams
 - CICS and other 3270 printer subsystems
- Routes print to network printers using LPR
- One GPS Daemon = one printer session



GPS Support





GPS Definitions

- DEFINE GPSD
 - ❑ Defines GPS daemon in TCP/IP partition
 - ❑ Connection to 3270 print subsystem
 - ❑ Information for LPR request
 - ❑ Recording of debug information
 - ❑ Output segmenting
 - ❑ Security and recovery information



GPS Definitions

■ DEFINE GPSD...

```
DEFINE GPSD, ID=xxxx, TERMNAME=appllu, STORAGE='sublibrary',  
    IPADDR=lpdserver, PRINTER=printqueue,  
    [INSESS=YES | NO, TARGET=appl, LOGMODE=modename,  
    INSERTS=phase, SCRIPT=script.l, OUTPUT=LPR | DIRECT, PORT=nnn,  
    EMULATE=3287 | TRANSPARENT,  
    QUEUEING=MEMORY | DISK, LOG=YES | NO, DEBUG=YES | NO,  
    LINELEN=len, ALTLEN=len, NOEJECT=YES | NO,  
    MAXPAGES=n, MAXLINES=n, MAXCHARS=n, MAXIDLE=n,  
    RETRY_TIME=tt, RETRY_COUNT=nn,  
    TRANSLATE=name, USER=name, PASSWORD=pswd]
```



GPS Definitions ...

- DEFINE GPSD
 - ❑ ID=name for definition
 - Must be unique for each daemon
 - ❑ TERMNAME=VTAM APPL LUNAME
 - ❑ INSESS=YES|NO
 - ❑ TARGET=application to connect to if INSESS=YES
 - ❑ LOGMODE= DSC2K|logmode to use



GPS Definitions ...

- DEFINE GPSD ...
 - ❑ IPADDR=IP address or name of printer
 - ❑ PRINTER=name of print queue
 - ❑ INSERTS=inserts phasename
 - ❑ SCRIPT=name of script file
 - ❑ QUEUEING=MEMORY|DISK
 - ❑ STORAGE='library.sublibrary'
 - Public name in file system
 - Print file staged as member LUNAME.PRINT



GPS Definitions ...

- DEFINE GPSD ...
 - TRANSLATE=name of translate table
 - USER=username
 - PASSWORD=user password
 - NOEJECT=YES|NO
 - Suppress initial forms feed
 - LINELEN=length of print line (132)
 - ALTLEN=line length for Erase Write Alternate



GPS Definitions ...

- DEFINE GPSD ...
 - Output Segmenting
 - End of CICS task
 - MAXPAGES=100|number of pages
 - MAXLINES=10000|number of lines
 - MAXCHARS=1000000|number of characters
 - MAXIDLE=3000|time (1/300 seconds)



GPS Definitions ...

- **DEFINE GPSD ...**
 - **OUTPUT=LPR|DIRECT**
 - Default uses LPR protocol
 - DIRECT for HP direct socket or custom applications
 - **PORT=nnn**
 - Port number of print server
 - Valid only with OUTPUT=DIRECT
 - **EMULATE=3287|TRANSPARENT**
 - Default EBCDIC to ASCII translation
 - TRANSPARENT - no translation



GPS Definitions ...

- **DEFINE GPSD ...**
 - **LOG=YES|NO**
 - Logs GPS activity in log file LUNAME.LOG
 - **DEBUG=YES|NO**
 - Records debug information
 - **RETRY_COUNT=10**
 - Retries for LPR and VTAM connect attempts
 - **RETRY_TIME=18000**
 - Retry interval in 300ths of a second



GPS VTAM Definitions

- VTAM APPL LU required for each GPS Daemon
- Non-SNA LOGMODE required
- Example

```
GPSAPPL  VBUILD  TYPE=APPL
GPSLU01  APPL    AUTH=(ACQ),DLOGMOD=DSC2K
GPSLU02  APPL    AUTH=(ACQ),DLOGMOD=DSC2K
```



GPS CICS Definitions

- Define terminal entries to CICS
 - Explicit TCT or resource definition online (RDO) entries
 - Use NETNAMEs from GPS VTAM APPL definitions
- Non-SNA 3287 printer terminal types
 - VSE supplied RDO TYPETERM VSEDSCP
 - CICS supplied RDO TYPETERM DFH3270P



GPS Definition Example

- Define 1 GPS Daemon, send to queue printq1 on remote printer HPPRINTER

```
DEFINE GPSD,ID=GPS1,TERMNAME=GPSLU01,PRINTER=PRINTQ1, -  
        IPADDR=HPPRINTER,STORAGE='TCPIP.PRINT', -  
        INSESS=NO,INSERTS=HPCTRL,MAXPAGES=100
```

VTAM APPL Definition

```
GPSAPPL  VBUILD TYPE=APPL
```

```
GPSGRP   GROUP MODETAB=ISTINCLM
```

```
GPSLU01  APPL AUTH=(ACQ),DLOGMOD=DSC2K
```



GPS Definition Example ...

- Define 1 GPS Daemon, supply LPR controls in script file

```
DEFINE GPSD, ID=GPS2, TERMNAME=GPSLU02, SCRIPT=GPSCTRL, -  
        STORAGE='TCPIP.PRINT', TARGET=DBDCCICS, INSESS=YES
```

SCRIPT FILE

```
SET HOST=HPPRINT  
SET PRINTER=PRINTQ01  
SET INSERTS=HPCTRL
```

VTAM APPL Definition

```
GPSLU02 APPL AUTH=(ACQ), DLOGMOD=DSC2K
```



Managing GPS Daemons

- TCP/IP VSE console commands
 - QUERY GPSDS
 - QUERY GPSD,ID=name
 - DELETE GPSD
 - DEFINE GPSD



Managing GPS Daemons...

- Catalog each GPS definition in separate library member
 - LPR failure will shutdown (delete) GPS daemon
 - Allows operator to restart GPS daemon from VSE console

Example:

Catalog member GPS1.L with DEFINE GPSD

Operator enters TCPIP command EXEC GPS1 to execute the member with the DEFINE command

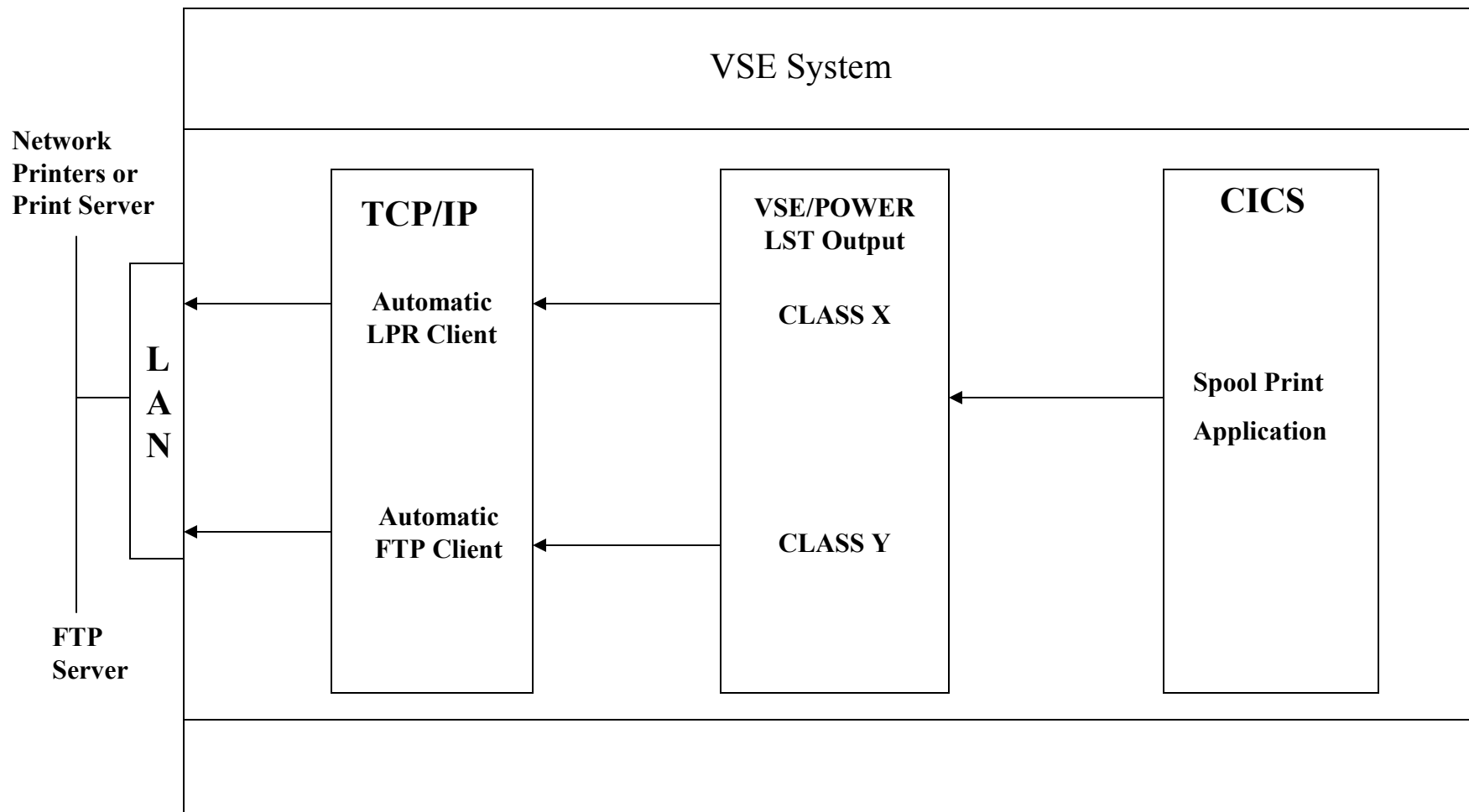


GPS Performance

- Same as other LPR clients
 - May be CPU intensive like FTP
 - Put GPS definitions in lower priority TCPIP partition
- Staging library may need to be large
 - Print file stored in 'storage' library
 - Transmitted in segments



Automatic LPR and FTP





Automatic LPR Client

- Automatic transfer of POWER LST output
- TCP/IP partition monitors LST QUEUE
- Define class to monitor in configuration

```
DEFINE EVENT, ID=LST_LISTEN, -  
    TYPE=POWER, CLASS=X, QUEUE=LST, ACTION=LPR, -  
    RETRY=1, RETRY_TIME=13500, -  
    SINGLE=YES|NO - (single space LPR output)  
    HOSTNAME=USERINFO | DEST | ROOM | DEPT | BLDG  
  
(RETRY_TIME is 1/300 seconds)
```



Automatic LPR Client...

- POWER LST card defines LPR options
 - CLASS= LPR class being monitored
 - USER parameter (or UINF in VSE/ESA 2.3)
 - IP address or symbolic name
 - LPR script member
 - DEST= LPD printer name
 - UCS= INSERTS phase name
 - SET DEFAULT_INSERTS in script to avoid override
 - FCB= name of FCB to use



Automatic LPR Client...

- POWER LST card defines LPR options
 - DEFINE EVENT...HOSTNAME parameter
 - Specifies POWER LST parameter to use for LPD host information
 - USERINFO
 - * \$\$ LST...USER= or UINF=
 - DEST
 - ROOM
 - DEPT
 - BLDG



Automatic LPR Client...

■ EXAMPLE

```
* $$ JOB JNM=LPRJOB,CLASS=0,DISP=D
* $$ LST CLASS=X,DISP=K,DEST=(*,LOCAL),UINF=HPSERVER, X
      UCS=HPCTRL
****          or          ****
* $$ LST CLASS=X,DISP=K,DEST=(*,LOCAL),UINF=HPPRINT
// JOB LPRJOB EXAMPLE TCPIP LPR EXAMPLE
// EXEC LIBR
  ACC S=PRD2.CONFIG
  L IPINIT00.L
/*
/&
* $$ EOJ
```



Automatic LPR Client...

- Other configuration options
 - SET AUTO_TIME=9000
 - Frequency TCPIP checks POWER queue
 - 1/300th seconds
 - SET RPORT=515
 - Remote LPD listen port
 - SET LPORT=721
 - Local port that VSE LPR client uses



Automatic FTP Client

- Automatic file transfer of POWER LST or PUN queue entries
 - TCP/IP partition monitors selected queue
 - Monitors a specific class
 - Executes script file identified in parameter of * \$\$ LST or * \$\$ PUN statement

```
* $$ LST CLASS=F,DISP=D,DEST=(*,FTPPRT01)
* $$ PUN CLASS=F,DISP=D,DEST=(*,FTPPUN01)
```



Automatic FTP Client...

Configuration Definition

```
DEFINE EVENT, ID=id,  
  ACTION=FTP,  
  TYPE=POWER  
  [ , CLASS=class | X ]  
  [ , QUEUE=LST | PUN ]  
  [ , RETRY=nnn | 1 ]  
  [ , RETRY_TIME=nnnnn | 13500 ]  
  [ , HOSTNAME={ USER | DEST | ROOM | DEPT | BLDG } ]  
  [ , USERID=userid | SYSTCPIP ]  
  [ , PASSWORD=pwd ]
```



Automatic FTP Client...

■ Configuration Options

- ID=*id*
 - Name for the event
 - Can be used in DELETE command to remove event
- CLASS=*class*|X
 - VSE/POWER class to be monitored within queue
- QUEUE=LST|PUN
 - Queue to be monitored



Automatic FTP Client...

- Configuration Options...
 - `RETRY=nnn|1`
 - From 0 to 9
 - Output put in DISP=Y if not successful
 - `RETRY_TIME=nnnnn|13500`
 - Interval between retries
 - 1/300 of a second



Automatic FTP Client...

- Configuration Options...
 - HOSTNAME=fieldname|USER
 - VSE/POWER JECL field name containing name of script file (.L member)
 - USERID=userid|SYSTCPIP
 - User ID sent to remote host
 - PASSWORD=password
 - Password sent to remote host
 - No default



Automatic FTP Client...

- Script file
 - FTP commands
 - Variables
 - Predefined variables
 - User defined with SETVAR command
 - Resolved when script executed



Automatic FTP Client...

Sample script using job name and job number for remote file name

```
* $$ JOB JNM=AUTOFTP2,DISP=D,CLASS=5
// JOB AUTOFTP2
// EXEC LIBR
A S=TCPIP.CONFIG
CATALOG AUTOFTP2.L      R=Y
LOPEN
LUSER local_user
LPASS local_pwd
OPEN 192.168.155.114
USER remote_user
PASS remote_pwd
CD JUNK
LSITE CC OFF
LSITE TRCC ON
SETVAR &LPATH = "POWER" + "." + &PWRQUE + "." + &PWRCLAS
LCD &LPATH
SETVAR &LFN = &PWRNAME + "." + &PWRNUMB + "." +
SUBSTR(&PWRSUFF,2,2)
PUT &LFN
/+
/*
/&
* $$ EOJ
```



Automatic FTP Client...

Automatic FTP Client Example

```
DEFINE EVENT, ID=FTP_N, TYPE=POWER, CLASS=N, QUEUE=LST, ACTION=FTP
```

```
* $$ JOB JNM=TESTAFTP, DISP=D, CLASS=5  
* $$ LST CLASS=N, DISP=D, DEST= (*, AUTOFTP2)  
// JOB TESTAFTP  
// EXEC LIBR, PARM='MSHP'  
A S=PRD2.CONFIG  
L ATCSTR00.B  
/*  
/&  
* $$ EOJ
```



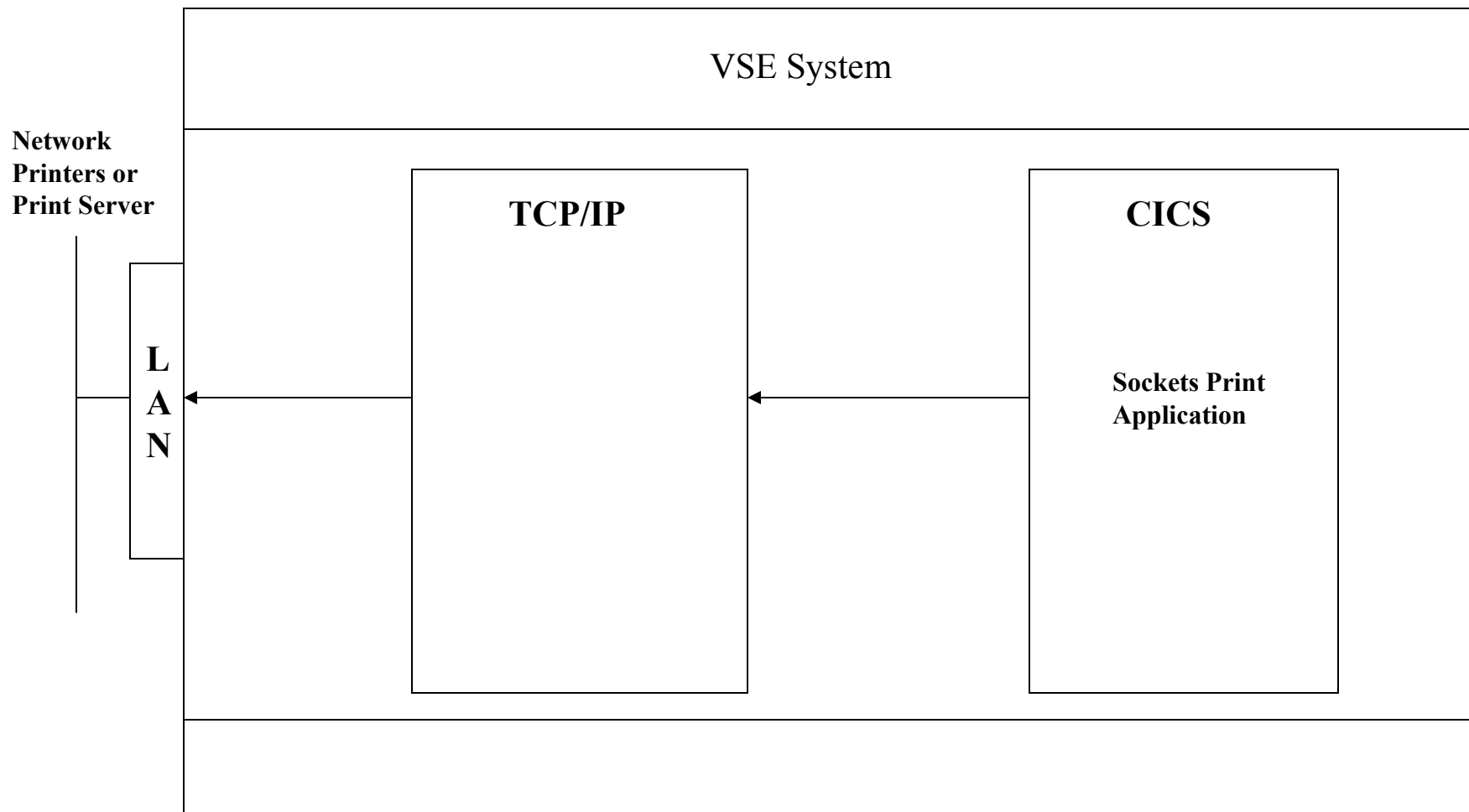

Automatic FTP Client...

Automatic FTP Client Example...

```
F5 0005 // JOB TESTAFTP
        DATE 03/06/2000, CLOCK 23/23/12
F5 0005 EOJ TESTAFTP  MAX.RETURN CODE=0000
        DATE 03/06/2000, CLOCK 23/23/13, DURATION  00/00/00
F5 0001 1Q34I  F5 WAITING FOR WORK
Z1 0086 0024: TCP911I Processing Event:FTP_N      Type:POWER Action:FTP
Z1 0086 0024: TCP912I Processing Class:N Job:TESTAFTP 02064-000
Z1 0086 0024: TCP910I  Commands will be taken from AUTOFTP2
Z1 0086
Z1 0086 001F: FTP934I FTP Session Established with:TCPA
from
Z1 0086 Ipaddr:192.168.155.112 Id:FTP05 Port:21
```



Sockets Application





Sockets Application...

■ Application Interfaces

□ Assembler API

- Low level SOCKET macro interface
- Supports TCP and UDP communication protocol
- Supports connection to TELNET, FTP and general purpose client manager in TCPIP partition

□ BSD/C

- C language interface
- Based on Berkeley sockets C language interface



Sockets Application...

- Application Interfaces...
 - High level preprocessor API
 - CICS like command level interface
 - COBOL, PLI, Assembler
 - EXEC TCP
 - Connects and communicates using TCP protocol
 - EXEC FTP
 - Connects to FTP client manager in TCPIP partition
 - EXEC CLIENT
 - Connects to general client manager TCPIP partition
 - Sample LPR client provided in TCPIP for VSE Programming Guide



Some Vendor Alternatives

- Barnard Systems TCP/IP-Tools
 - TN3270E Server
 - Support for TN3270E printer sessions
 - Non-SNA 3270 printers
 - SNA LU1 SCS printers
 - LPR and FTP supported in lieu of TN3270 client
 - LPR Client
 - Automatic LPR with REXX procedure
 - Monitors POWER class and submits LPR client jobstream to send POWER output



Some Vendor Alternatives...

- Macro4
 - VTAMPRINT (Columbus Z)
 - Enterprise wide output management solution across heterogeneous environments
 - Delivers POWER spool data to multiple channels
- Data21
 - VTAM2Spool
 - Routes VTAM (CICS, etc.) print to POWER or LPR printers
 - Uses ZIP/390 or VSE2PDF to send online print as PDF documents



Some Vendor Alternatives...

- MackKinney Systems
 - CICS/Spooler
 - CICS terminal printer spooling/routing system
 - CICS/Hotprint
 - CICS screen printing facility
 - Several other printing products



Some Vendor Alternatives...

- Computer Associates
 - CA-RAPS
 - Archival and print management system
 - Controls POWER output to CICS printers
 - CA-Deliver Output Management for VSE
 - Report bundling and delivery system



Now it is your turn

**Anybody got anything
they want to contribute?**