MVS-TO-LAN PRINTING OVER NOVELL NETWARE LANS

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INTRODUCTION

MVS-generated output printing has changed over the years, from computer center-based printers to remote printing (JES2 RJE or JES3 RJP) and now to desktop printers.

Until recently, it seemed enough to rely solely on VTAM-connected printers since VTAM handled the routing, ensured proper delivery, and for printers which support sharing, the locking mechanism to accomplish printer sharing. And since most personal computer users were connected in some fashion to MVS, it was sufficient for these users to print desired output via MVS-based printer products.

This is no longer the case. With MVS being viewed as a mature operating system environment, a "legacy system," and with the current interest in "client/server" distributed processing, MVS'ers need to look more closely at alternative print solutions.

There are several ways to route MVS-generated printout to LAN-based printers. It runs the gamut from being extremely simple to quite complex. Most solutions seem stop-gap at best; inflexible, kludged and require too much local "guru" knowledge to keep it running. This might be acceptable for a small, closely-knit group, but is not acceptable for most enterprises.

Enterprises that need consistency in their LANs and must provide seamless connectivity to several disparate (heterogeneous) operating system platforms should look closely at Novell's NetWare product line.

Novell's NetWare LAN has evolved into an extremely powerful multi-purpose, multi-platform LAN networking environment that supports most major networking topologies (such as Ethernet, Token-Ring and Arcnet) simultaneously. LAN printer support is inherent in the base NetWare product, providing print server, print queue and printer support in a whole slew of configurations.

This article will briefly describe the inherent functionality provided with the NetWare LAN product, as well as several products currently available, providing MVS-to-NetWare LAN printer support.

OVERVIEW OF NETWARE PRINT SERVICES

The NetWare Print Server is the component of NetWare that provides users the ability to print on LAN-based printers. One NetWare Print Server allows network users to share up to 16 printers attached to various network nodes, including DOS-based workstations, via parallel (LPT1-LPT3) or serial (COM1-COM4) ports or LAN-capable printers.

NetWare printers may be attached to virtually any node on the network. LAN administrators can select the best print server configuration for their enterprise by:

- installing print server software on a NetWare server or an external router;
- dedicating a DOS-based IBM-compatible PC as a print server; and
- accessing a DOS-based workstation printer by installing the RPRINTER terminate- and-stay-resident (TSR) program (described below).

If desired, more than one print server may be installed on a network or internetwork to service additional printers. By moving the printers off the server, the NetWare Print Server gives the LAN administrator greater flexibility in network configuration and users can have more convenient access to the printers they need.

The NetWare Print Server can service users' printing requirements on up to eight interconnected NetWare servers. Users and printers can be located in different locations within the same office complex and receive service from a single NetWare Print Server.

One NetWare SPX connection is required between the print server and a network server that is having its print queues serviced by the NetWare Print Server.

NetWare Print Server-controlled printers can be customized to service specific users or groups of users. Alert notification lets each user know when her/his job is complete and lets print operators know when printers need attention, e.g., when a printer needs paper or is offline.

LAN-TO-HOST PRINTING

Print Serving

S/390

Spool Files

LANRES | PSF | Network

LANRES NLM

Local Queue | Host Queue

NetWare

LAN-to-Host Printing Supported by a set of User Exits

Sendfile/ Transmit

System Printer

ASCII Printer (VM Only)

Remote Printer

Advanced Function Printer

Postscript via Interpreter

THE RPRINTER TSR PROGRAM

The RPRINTER TSR (terminate-and-stay-resident) program, which allows printers connected to DOS-based workstation nodes to be shared, can be automatically loaded from the workstation's AUTOEX-EC.BAT file. This makes the printer connection logic transparent to the workstation user. The workstation connected to the shared printer must have the RPRINTER TSR program loaded.

NETWARE NAME SERVICE (NNS) FACILITY

The NetWare Name Service (NNS) Facility can be used with the NetWare Print Server to simplify the printing environment. When NNS utilities are loaded on all servers in a domain, print queues and PRINTCON and PRINTDEF data bases are replicated on all domain servers. Users specify the queue name to which the job should be sent (using the CAP-TURE or NPRINT commands) and the job is routed automatically to that queue on the appropriate server. The queue appears to the user as server-independent.

NO SPECIAL TRAINING REQUIRED

No special user training is required for users to print on a LAN printer because the NetWare print utilities (such as PCONSOLE and CAPTURE) are built in. The CAPTURE command transparently redirects printer output to a network device for applications that are not designed for network printing. This command can be automatically executed as part of a batch file or LOGIN script.

PRODUCTS AVAILABLE FOR PRINTING

Several vendors, including Novell, have written products that use the NetWare print services software as the vehicle in getting MVS-generated data

into a NetWare print queue for subsequent printing.

Some of these products include:

- **NetWare HostPrint, Novell Corp., (Provo, Utah):** NetWare HostPrint, a NLM, provides server-based, IBM host-compatible 3278 printer emulation sessions. NetWare HostPrint routes host print jobs directly to NetWare print queues, reducing network traffic and providing centralized administration and control.

  HostPrint runs on NetWare for SAA, allowing users to send print jobs directly to LAN printers via server-based 3270 LU1 and LU3 emulation.

  HostPrint simplifies administration by allowing the NetWare administrator the ability to configure all printer LUs from a single workstation utility instead of configuring individual workstations. Also, print jobs can be managed using standard NetWare utilities, including PCONSOLE. It provides control features so users can identify host print jobs, set print job priorities, terminate print jobs and otherwise modify their status.

- **LANRES/MVS (IBM):** (Previously reviewed in several Information Technologies articles) LANRES/MVS provides, among many other things, the ability to provide bi-directional NetWare LAN printing. LANRES/MVS Release 2.0, available since late March 1993, uses standard NetWare interfaces to place MVS-generated output on NetWare print queues.

  LANRES/MVS Release 2, as expected, offers several improvements over Release 1. LANRES/MVS now offers TCP/IP and SNA connectivity, whereas Release 1 offered strictly channel-attached LANRES server connections.

- **VPS/PC, Levi, Ray & Shoup, Inc. (Springfield, Ill.):** VTAM Printer Support/PC (VPS/PC), offers MVS-generated print route capability for most of the popular LAN gateway products, including Novell's NetWare for SAA. VPS/PC consists of a NLM which acts as an interface between the MVS-based VPS Release 6.1 (or later) and the

NetWare print queue. The MVS-based VPS product, sold separately, is required.

VPS/PC uses APPC (LU6.2) as the communication protocol. Since both ACF/VTAM and NetWare for SAA inherently support LU6.2, no other products are required and no extra overhead is incurred.

- **PRINT/GATE, BARR Systems, Inc. (Gainesville, Fla.):** PRINT/GATE provides MVS-based applications access to NetWare print queues by converting IBM 3287 data streams into NetWare-compatible data streams.

  PRINT/GATE supports up to 24 Novell print queues from 24 corresponding SNA logical units (LUs). MVS connectivity is accomplished by either being directly connected to MVS (SDLC, X.25, Token-Ring, or BARR's COAX/3299) or via the BARR GATEWAY product (which supports Novell IPX, NetBIOS, Token-Ring or BARR's ASYNC option).

  PRINT/GATE requires a PC running MS-DOS 3.3 or higher as a stand-alone application.

- **IPDS for NetWare, Dr. Materna GmbH, (Dortmund, Germany):** IPDS for NetWare, a NLM, allows users to send IBM host print jobs using NetWare for SAA directly to printers on NetWare networks thus emulating the IBM 3812 printer. IPDS stands for "Intelligent Printer Data Stream." IPDS for NetWare generates output that can be printed by PCL-4/5 compatible devices anywhere on the LAN. Working in a host session, the user starts printing from the host application. The LaserJet or compatible printer is addressed like a IBM 3812 host printer. The processes that are needed to convert IPDS to PCL-4/5 and to manage these print jobs run in the background.

- **SCS for NetWare, Dr. Materna GmbH, (Dortmund, Germany):** SCS for NetWare, a NLM, allows users to send IBM host print jobs via NetWare for SAA directly to printers on NetWare networks via server-based 3270 LU1 emulation. Print

data is routed via NetWare print queues, so the assigned printer can reside anywhere in the network, and be managed by NetWare network management utilities. SCS for NetWare can run on any server on the network—no extra hardware is needed. SCS for NetWare must be located on any NetWare server.

SCS for NetWare generates output that can be printed by PCL-4/5 LaserJet-compatible printers, matrix printers and ink jet printers.

For more in-depth information on these products, contact each of these companies directly.

CONCLUSION

Printing MVS-generated data on an LAN can be quite complicated. An enterprise must have a plan to integrate its heterogeneous networks and a major part of this plan should address printing.

An enterprise that is considering using, or is currently using, Novell's NetWare LAN product has several options to print MVS-generated data on NetWare-accessible LAN printers.

The prudent professional will evaluate her/his enterprises needs and then select the proper print product accordingly.
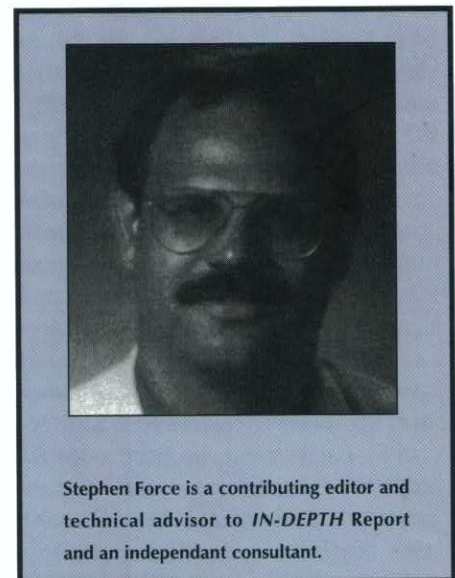
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