Printing & NetWare 5 @ Novell
A Beigepaper

by Grettir Asmundarson (grettir@neticus.com)
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About The "@ Novell" Series

Most documentation starts as hastily scrawled notes from sleep-deprived developers who weren't necessarily hired for their keen communication skills. Those notes are then fleshed out by recently graduated English majors who have spent their last four years immersed in works of fiction. The results are then passed on to the marketing department whose job it is to make sure that no word or phrase, even if it's true, will reflect unfavorably on the product ("I don't think that the word 'Basic' properly communicates the exciting nature of the product. Why don't we call it 'Visual Zesty!?!'"). It is then beset by lawyers who finish the job by making sure that they haven't explicitly promised that the product will actually do anything.

By the time the documentation gets into your hands, it has been so sanitized for your protection and generalized beyond recognition that you usually have to go out and buy a 3rd-party manual (that was, more likely than not, written by the same non-technical technical writer who wrote the original documentation) in a vain attempt to get an unbiased, unexpurgated, and/or unfiltered view of just how you're really supposed to use the stuff.

That's where the "@ Novell" series comes in. Rather than the vague, generalized, and wholly fictional examples found in most documentation, we're going to tell you exactly how we use our own products to run our own company. After all, we are not a small, tidy computing environment suitable for documentation. We are a big, sprawling, untidy environment made up of over 500 production servers and 20,000 workstations in 130 locations throughout the world. In other words, we're probably an awful lot like you.

And it's not that we're necessarily any smarter than you are, we just have a distinct advantage. By the time you get your hands on one of our released products, we've already been using it to run our business for quite some time. For instance, a month before NetWare 5 shipped, well over half of our 500 production file servers had already been upgraded to NetWare 5. (Keep in mind that these were production servers. These were not test servers that we had safely tucked away in antiseptic labs. These were real-world servers in a real-world environment solving real-world problems.) And two months before NetWare 5 shipped, we'd already converted one of our buildings to IP Only. That means that we've probably gained some insights into implementing our products in a big, sprawling, untidy environment, and this paper is an attempt to share those big, sprawling, untidy insights with our customers.

But keep in mind that this document may be a little rough. It wasn't conceived by a committee, written by a committee, or approved by a committee, so it hasn't been edited, re-edited, tidied up, sanitized, and whitewashed. Don't think of this as an official whitepaper. It's more like a beigepaper.

The Problem With Printing

Do you know what the problem with printing is? Glamour, or the lack thereof. Printing just isn't very sexy. It's hard to get excited about something that has been around since the 15th

Century. You can go on and on about the importance of WYSIWYG and desktop publishing in the 80's, the impact of affordable laser and color inkjet printers in the 90's, and the massive productivity losses caused by the overabundance of TrueType fonts available to administrative assistants. But when it comes right down to it, printing is just a matter of getting data from Point A (your screen) to Point B (paper).

This lack of sexiness presents a number of problems for IT departments.

It Either Works, Or It Doesn't

Most people have a rather simple, binary view of printing. It either works, or it doesn't. You can provide users with every feature under the sun (Postscript, duplexing, flexible paper handling, bi-directional communications, event notification, automatic driver installation, job scheduling, etc) but most users only want to know one thing. Can they get their data from Point A (their screen) to Point B (paper)? If not, you'll hear about it.

Because even though printing is pretty much taken for granted, it tends to provoke the most passionate responses when it's not working properly. A person who is unruffled when they are unable to read their e-mail, log in, or access the Internet, may go absolutely bonkers if their print job doesn't appear in a timely manner.

I've seen many adults (ostensibly) throw full-out tantrums, beat on printers, scream obscenities, and rip toner cartridges and paper trays from their moorings as if disemboweling the device. Most just open the printer and stare blankly at the interior, in much the same way you might open the hood of a car and stare at the engine in hopes of somehow divining the problem and fixing it telepathically.

What this means to you is that the perceived success or failure of your printing architecture is not measured on a sliding scale. It either works, or it doesn't.

Resources Are Meager

Everybody wants printing to work, but nobody wants to have to do anything about it. Nobody wants to see the diagram of your printing infrastructure. Nobody wants to actually dedicate money and resources to printing. They just want it to work.

Rewards Are Few

And lastly, you'll probably find few rewards in designing and implementing an elegant printing architecture. Other people may get recognition for their accomplishments:

"I'd just like take a moment and recognize Bob's efforts in rolling out the new release of WidgetWare 4.0 to over 65% of our field offices last quarter. The application doesn't actually work, nor does it do anything useful, but it was a huge task, and I know he went the extra mile in a blatant attempt to curry favor

and gain recognition with this high-profile roll-out. We'd like to present him with this 'Extra Miler' plaque and a passel of stock options."

But if you get printing working better than it ever has before, the best you'll ever get is:

"What? Printing works? Well, of course it does. It's *supposed* to work. Sheesh! What do you want, a plaque and some stock options!?!"

Things We've Learned

With the release of NetWare 5, Novell Distributed Printing Services (NDPS) became the standard method of printing in a NetWare environment. And as we made the transition from our legacy queue-based infrastructure to NDPS, our main objective was to make the transition as transparent and painless as possible.

Don't get me wrong, the added functionality that NDPS provides is great, but since we were being judged on the "It Works/It Doesn't" scale, there were a number of things that we learned during our transition that helped us stay on the "It Works" side of the fence:

Keep Things Relatively Centralized

For our larger sites, our ideal is to consolidate our NDPS managers on 3 or 4 servers per site. This makes management and administration much easier.

Place NDPS Objects As Close To User Objects As Possible

We try to put the NDPS objects (printer, broker, manager, and queue) in the same container as the users that access the printer. This reduces the amount of tree walking necessary to find printing resources.

Another thing that helps is to have a replica of the partitions that contain the NDPS objects and user objects on the servers that are running the NDPS managers.

The Latest Client Can Make A Difference

Always make sure that you are running the latest version of the Novell client. Almost every new release has significant enhancements, fixes, and added functionality that directly affect NDPS' performance.

Leave Legacy Queues Intact

As we've rolled out NDPS, we've left our legacy print queues intact and configured the NDPS printer agents to service these queues. We've done this for a number of reasons:

- People can continue to use legacy queue-based printing until they are upgraded to NDPS. This allows us to roll out NDPS incrementally.
- It allows us to print from DOS boxes.
- It allows us to print from UNIX and Macintosh clients.

LPR Can Come In Handy

The majority of our workgroup printers are Hewlett-Packards with internal HP JetDirect print servers. To work with the HP Printer Gateway, the HP JetDirect firmware needs to be version x.03.06 or (preferably) higher. As we went about implementing NDPS, we found that about 15-20% of our JetDirect cards weren't up to snuff. Some of those cards needed to have new SIMMs installed, others were simply too old and couldn't be upgraded at all. The nice thing is that even if they couldn't support NDPS, most had support for LPR, and since NDPS also supports LPR we were able to continue using them until we could swap them out for newer cards.

We also use LPR to service all of our other printers that don't directly support NDPS. For instance, Tektronix will soon release a NDPS gateway. Until they do, we use LPR to access all of our Tektronix printers.

If A Server Goes Down, Load The PSM Somewhere Else

If a server that hosts a PSM is going to be down for any length of time, you can load the PSM on another server. This gets folks back up and printing as soon as possible.

Access Rights

Access rights always seem to be an issue when dealing with printers. And it's interesting to see the different attitudes about access rights that exist in different companies.

Some companies have a rather Utopian view of printing:

> Though to speak plainly my real sentiments, I must freely own that as long as there are any private printers, and while money is the standard of all other things, I cannot think that a department can be governed either justly or happily: not justly, because the best printers will fall to the share of the worst men; nor happily, because all printers will be divided among a few (and even these are not in all respects happy), the rest being left to be absolutely miserable. Therefore…I reflect on the wise and good constitution of the Utopians--among whom all printers are so well governed, and with so few laws; where virtue hath its due reward, and yet there is such an equality, that every man prints in plenty…

While others take a more Dickensian approach:

> The evening arrived; the boys took their places. The master, in his technician's uniform (jeans, Comdex T-shirt; both too tight), stationed himself at the printer; his pauper assistants ranged themselves behind him; the documents were served out; and a long grace was said over the short commons. The toner disappeared;

the boys whispered to each other, and winked at Oliver; while his next neighbours nudged him. Child as he was, he was desperate with longing, and reckless with misery. He rose from the table; and advancing to the master, blank sheet of 11x17 in hand, said: somewhat alarmed at his own temerity:

'Please, sir, I want to print in color.'

The master was a fat, healthy man; but he turned very pale. He gazed in stupified astonishment on the small rebel for some seconds, and then clung for support to the printer. The assistants were paralysed with wonder; the boys with fear.

'What!' said the master at length, in a faint voice.

'Please, sir,' replied Oliver, 'I want to print in color.'

The master aimed a blow at Oliver's head with the spare toner cartridge; pinioned him in his arm; and shrieked aloud for the beadle.

The board were sitting in solemn conclave, when Mr. Bumble rushed into the room in great excitement, and addressing the gentleman in the high chair, said,

'Mr. Limbkins, I beg your pardon, sir! Oliver Twist has asked to print in color!'

There was a general start. Horror was depicted on every countenance.

'Print in COLOR!' said Mr. Limbkins. 'Compose yourself, Bumble, and answer me distinctly. Do I understand that he asked to print in color, after he had printed in monochrome as allotted by the corporate standard?'

'He did, sir. And on 11x17, no less,' replied Bumble.

'That boy will be hung,' said the gentleman in the white waistcoat. 'I know that boy will be hung.'

Here @ Novell, we tend to fall in the former camp, rather than the latter. It's much easier to allow access to almost everything and then limit access to the few printers that need more restrictive controls.

So, rights to public printers in common areas such as reception areas, hallways, foyers, and my desk are granted at our topmost container. This grants access to those printers to all Novell employees.

Rights to private printers, like those residing in personal offices, are granted based on the approval of the owner of the printer. Rights to specialty printers (large-format color printers, plotters, etc) are also granted based on the individual needs of the user and the approval of the beadle…I mean, *owner* of the printer, too.

Printer Labeling

Each printer at Novell has a label affixed to it that gives pertinent information about the printer. For instance:

> **Access:** Public
> **NDPS Printer:** PRV-GTA-HP5000N
> **Print Queue:** PRV-GTA-HP5000N-Q
> **Context:** GTA.PRV.NOVELL
> **IP Address:** 207.46.131.137
> **Driver:** HP LaserJet 5000N

While this might appear to be just another excuse to use the labeling machine, it's really quite helpful. When our mobile users arrive at a strange location they can walk over to the printer, see its NDPS name, choose the appropriate printer back on their client, have the appropriate drivers automatically installed, and be off and printing with no intervention required by the local IT staff. And local IT staffs like "no intervention."

Register Your Printers In DNS

All of our printers have DNS entries associated with them, based on their NDPS printer object name (i.e. prv-gta-hp5000n.provo.novell.com). This makes accessing printers much easier in a Pure IP environment.

Where Are We Today?

We've currently moved 30-40% of our printing to NDPS. Our rollout of NDPS has closely followed our transition Pure IP. Where buildings or entire sites have made the move to Pure IP, we've implemented NDPS as our primary printing solution. So, by the time Novell has completed its transition to Pure IP (Oct '99), we will have completed our transition to NDPS. And, no, we won't get a plaque.

Acknowledgments

Nothing in this beigepaper represents original thought on my part. I couldn't have written a word without the generous help and input from everyone in Novell's IS&T Global Technical Architecture group. (I'd name them all individually but they'd probably get spammed.)

Send all comments, questions, corrections, and/or complaints to:

grettir@neticus.com

Tasty baked goods can be sent to:

Grettir Asmundarson
PRV-C122
122 E. 1700 S.

Provo, UT 84606

And please note that Grettir Asmundarson is just a ridiculous pseudonym, so don't bother trying to call. You'll only confuse our receptionist.