GroupWise @ Novell
A Beigepaper

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A Service Of Novell's Information Services & Technology Technical Architecture Group

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 Road Not Taken

Of all of the beigepapers that I've been assigned to write, this is the one that I've been dreading. Don't get me wrong, it's not that I don't appreciate GroupWise as the "fully integrated, easy-to-

use messaging system that offers a wide range of powerful communication and collaboration capabilities…" that it is. But it's just so darn big that I can't get my hands around it.

For heaven's sake, the GroupWise 5.5 Administration Guide is a *17-volume set*. Even the User's Guide is 322 pages long. And it's not just that the technical writers were being long-winded. The product is just so broad and dense that I'm afraid that whatever I write will either be brief and unhelpful or it will turn into a 17-volume set that no one would bother to read unless they had to pass a certification exam. So, which road do I take?

I shall be telling this with a sigh
Somewhere ages and ages hence:
Two roads diverged in a wood, and I--
I chose not to write a 17-volume set.

And now that I've already wasted the better part of two pages without providing a single useful piece of technical information, let's get started.

We Couldn't Get Here From There

Shortly after the Novell/WordPerfect merger, Bob Frankenberg (Novell's interim CEO at the time) wanted to send an e-mail message to everyone in the company. I can't recall the contents of the message he wanted to send. (Probably just the standard post-merger propaganda about "leveraging synergies" and troop-rallying references to "The Greater Novell.") But it didn't really matter what the contents were, because the individuals in the Corporate Communications department had the unenviable task of telling their boss, "You can't get there from here."

That's right. At the most advanced networking company in the world, you couldn't actually send an e-mail message to everyone in the company.

It wasn't for lack of e-mail infrastructure. There was e-mail infrastructure to spare. Novell had grown very large in a very short period of time and, as often happens in start-ups, chaos reined. Without any centralized control/support/clue, every department had set up their own e-mail system, each independent of the others.

For instance, the Finance Department had one system and the Operations Department had another. Neither wanted to give theirs up, so the Finance Department gave everyone in Operations an e-mail account on their system. And the Operations Department gave everyone in Finance an e-mail account on their system.

By one estimate there were as many as 80,000 e-mail accounts at Novell and, needless to say, there were *not* 80,000 employees working @ Novell at the time. One individual could have fifteen different e-mail accounts on fifteen different systems and the only way they could be sure to get any mass mailing out was to send it to their entire address book on each of the fifteen systems.

The gentleman who was in charge of Novell's internal MHS implementation once made a diagram of the plethora of MHS systems scattered throughout the company. Each MHS system was represented by a single star, the size of the star corresponding to the size of the MHS system. Between each of these stars he had drawn intersecting lines showing how each individual system was connected to the others. I never had a chance to see this infamous "constellation map," but it was so ridiculously convoluted that it has gone down in history in a what's-wrong-with-this-picture sort of way.

We've Come A Long Way

Why am I telling you all of this?

First, to make you feel better. There is something in human nature that delights in hearing about others that are in an even worse predicament than you are.

Second, to give you hope. If we, in all of our post-merger dysfunction, can go from employees snarling, "I'll *never* use GroupWise," to employees snarling, "GroupWise has been down for 2.3 seconds. When will it be back up?" in less than a year…so can you.

Third, to point out how GroupWise has become an *assumed* service…like oxygen. A service that is so valuable that we can't do without it. A tool that is so important to our business processes that, the moment it is gone, we start suffocating. And something so ubiquitous and constant that we often take it for granted.

So now that you know where we've been, let's talk about where we are today…

Where We Are Today

In A Nutshell

- 4,500 employees
- 130 sites around the world (99% of which are connected to a global WAN)
- 7,000 mailboxes
- 400,000+ messages a day
- 135 domains
- 175 post offices
- 200 document libraries
- 100 WebAccess gateways
- 7 Internet gateways
- Async, pager, fax, & WebPublishing gateways (amongst others)

Domains

Here @ Novell, we essentially have one domain per site. The main reason for this is the way we've deployed our gateways. Since we have an async gateway and a WebAccess gateway at almost every site, keeping gateways and their domain on the same segment cuts down on WAN traffic.

We also have separate service domains that are centralized at our main sites. There are no post offices on these domains; they are only used to support the various gateways.

Post Offices

Here @ Novell, we have at least one Post Office per site. At our larger sites, we break things up into more digestible pieces, with 300-350 people per Post Office. We arrived at this number, in part, based on the size of the file servers that we were using at the time and the amount of disk space that we allow people to use.

We currently allow users to have 100-MB of data in their mailbox at any given time. This is quite bit more than many companies allow, but when you're involved in software development you find yourself transferring largish files on a regular basis. Also, that 100-MB limit is a soft limit. We don't strictly enforce it, but make users aware of their disk usage by sending out weekly reports that say something to the effect that, "You are currently taking up over 124-MB of disk space. Sheesh, you're the 2nd biggest disk hog on this Post Office." But we phrase it much more nicely than that. We generate these reports and messages by using an automated GWCheck event and a homespun Win32 app that uses the GroupWise APIs.

To help keep disk space usage reasonable, we have a corporate-wide 120-day expire policy. Anything older than 120 days gets purged from the system. I'm sure that our lawyers would prefer something even less (perhaps 90 days…or 3½ hours), but our finance department really needs 120 days to facilitate quarterly reporting. We also limit the size of inbound messages that we accept to 50-MB. Some customers were mailing their 1-GB coredumps to the NTS team and it was, shall we say, "complicating" our storage management issues.

The other consideration we used in deciding on the number of users per post office was the fact that we are running in client/server mode. Running in client/server mode offloads a lot of the processing from the client to the server. Where before the server just transferred data, in client/server mode it's doing most of the work and the client is just transferring the data.

But notice that our main limitations here are not based on the capabilities of GroupWise, per se, but on hardware limitations. This is true of almost all aspects of GroupWise. GroupWise itself scales very well. A great example of this is our Orem domain, which (until recently) was running on a 66-MHz Pentium with 128-MB of RAM. It was happily processing about 150,000 messages a day. 150,000 messages a day on a *66-MHz Pentium*! Think of what it could do with a Pentium III with 1-GB of RAM.

Mail Servers

While we're talking about our mail servers, everything about them has been standardized as much as possible. Hardware configuration, volume names, domain, post office, and software directory structures, NCFs…you name it. This simplifies management a great deal since everyone is dealing with identical configurations worldwide.

Internet Gateways

We currently have seven Internet gateways handling inbound and outbound mail. As far as regular production gateways are concerned, we have four in Utah and two in Capelle, Netherlands. At each location, half of the gateways are located inside the DMZ, the other half safely inside the firewall. The gateways in the DMZ merely act as go-betweens, transferring data to and from the gateways located inside the firewall.

Our two gateways in Utah handle the majority of incoming traffic due to their MX records' performance ranking. For incoming mail, Capelle is mainly used as a backup. Outgoing mail is routed to the nearest gateway, whether its in the US or Europe.

A seventh gateway is dedicated to mailing lists, so as not to bog down the regular production gateways.

Management

On the management side, we keep our GroupWise information up to date by using NDS Sync four times a day to capture changes made by non-GroupWise administrators. We also rely heavily on three different management tools:

GroupWise Monitor – Receives traps from GroupWise Agents and monitors whether or not the GroupWise agents are running.

ManageWise – Also receives traps from the GroupWise Agents and monitors the general health of the mail servers, just as it would any other NetWare 5 server.

Tally Systems' Mailcheck – A third-party monitoring tool that allows us to "bounce poll" each post office, monitor end-to-end connectivity, and report response times and post office availability.

Clients

Just a couple of quick notes…

When we started formulating our transition to Pure IP we had to establish how all of our applications were going to behave in a Pure IP environment. GroupWise was one of the simplest applications we dealt with. We simply set GroupWise clients to use client/server mode (rather than relying on a mapped drive) and that's all there was to it. It just worked.

Similarly, when we started mucking about with Novell Cluster Services in our production environment, one of the first services that we migrated was my GroupWise post office. I was very curious to see how my GroupWise client would behave if someone just walked over and turned the power off on the GroupWise server. Quite a few client/server applications don't like it if the server part of the equation disappears for a few seconds in the middle of a transaction. The GroupWise client, however, didn't even hiccup. It just worked.

Remote Access

Something that is becoming more and more important here @ Novell is remote access. In the not-so-distant past we relied on GroupWise Async gateways to handle GroupWise Remote requests. But maintaining a completely separate remote access infrastructure just for your e-mail system doesn't make a whole lot of sense in this day and age.

So, we're adopting the same philosophy for GroupWise Remote that we have for regular remote access. You can connect to the Internet any way you'd like to. Once you're connected to the Internet, we'll provide a way for you to access your corporate e-mail.

Do you have an account with AOL? Great, we'll provide a way for you to access your corporate e-mail. Do you want to dial in to the corporate remote access system? Great, we'll provide a way for you to access your corporate e-mail. Does your grandma have a cable modem? Great, we'll provide a way for you to access your corporate e-mail.

There are essentially three ways that we provide access:

1. Via a standard GroupWise client/server connection.
2. Via a GroupWise Remote client/server connection.
3. Via GroupWise WebAccess.

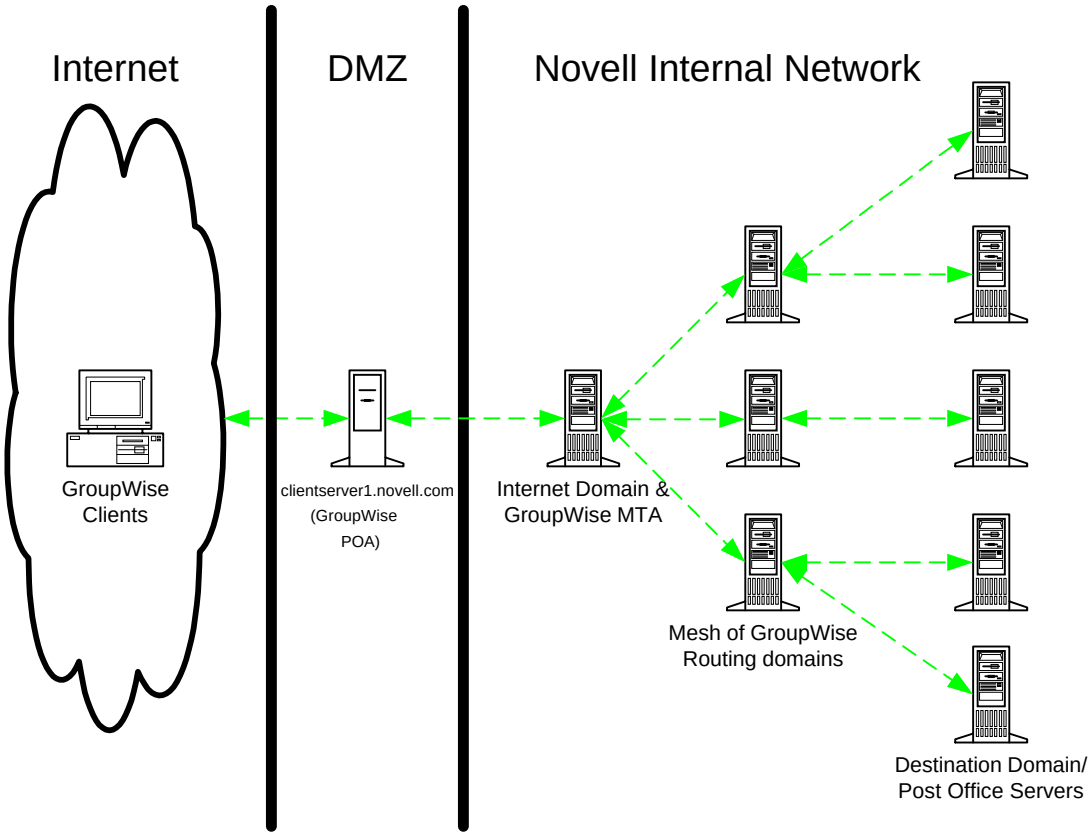
GroupWise Client/Server Connection

If a user dials into our corporate remote access system, they have a connection that is inside the corporate firewall. They can therefore establish a standard client/server connection to their GroupWise Post Office.

If a user is connecting to the Internet by some other means (AOL, cable modem, etc), they can use the BorderManager VPN client to connect to the corporate network and then establish a client/server connection to their GroupWise Post Office.

GroupWise Remote Client/Server Connection

If they'd rather use GroupWise Remote to download messages for offline perusal, etc., they can establish a GroupWise Remote client/server connection no matter where they are. The following diagram shows how this works:



Amateurish Visio Pro Drawing 1: GroupWise Remote Client/Server

Here's how the Remote Client/Server connection is handled:

1. User on the Internet makes a remote request to clientserver1.novell.com on port 1677.
2. Request is accepted by the POA running on clientserver1.novell.com.
3. The POA routes this to the MTA.

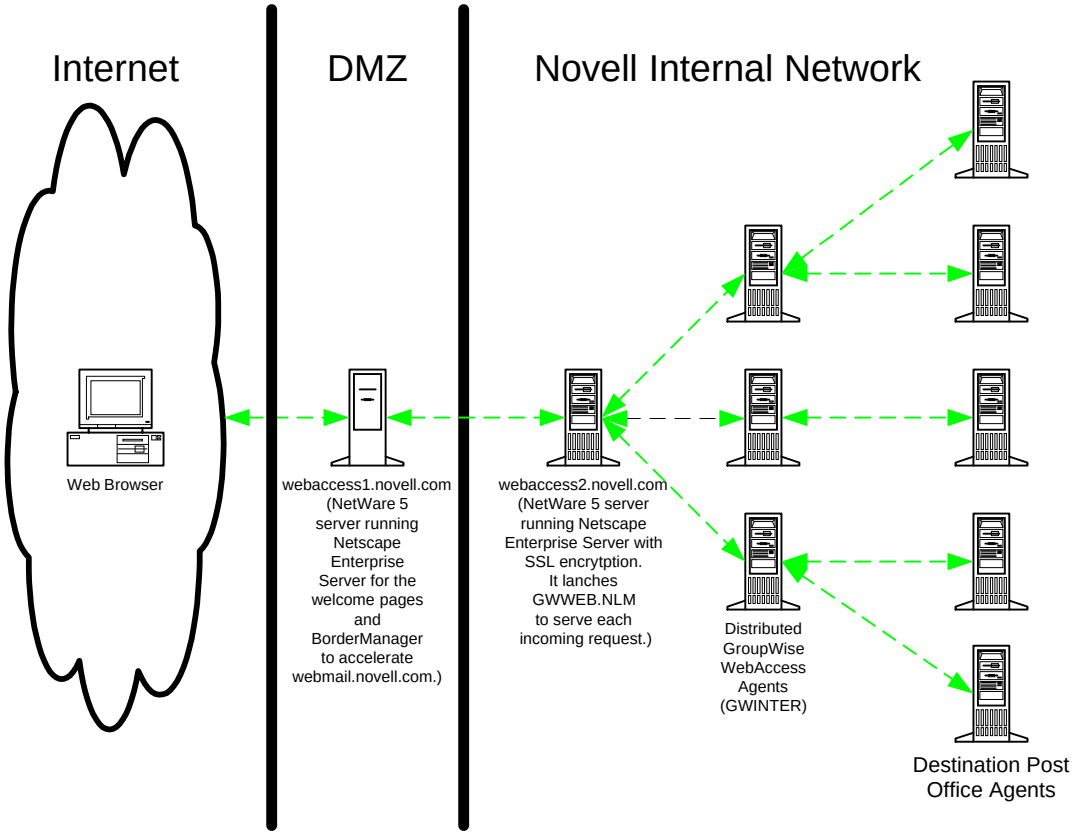
4. The MTA then routes this to the destination Post office via normal GroupWise routing through the mesh of routing domains.

5. The "home" POA processes the request and routes the response back to the post office on clientserver1.novell.com.

6. If the user has left the client/server connection open, then the POA will transmit the results back to the GroupWise client. Otherwise, it will be stored on clientserver1.novell.com until the client connects again (up to 7 days later).

GroupWise WebAccess

If a user doesn't have the GroupWise client or would rather just use GroupWise WebAccess, we also provide access to WebAccess from anywhere. The following diagram shows how it works:



Amateurish Visio Pro Drawing 2: GroupWise WebAccess

Here's how a GroupWise WebAccess request is handled:

1. User points web browser at http://webaccess1.novell.com

2. Netscape Enterprise server running on webaccess1.novell.com returns the welcome screen.

3. The User clicks on the link graphic to proceed.

4. This redirects the user to https://webaccess1.novell.com/.

5. BorderManager running on webaccess1.novell.com, accelerating a Netscape Enterprise Server with SSL extensions running on webaccess2.novell.com processes this request.

6. As the root of the web directory on webaccess2.novell.com is password protected, the first thing the user sees is a request for authentication.

7. The user enters the generic username/password for the service.

8. If the correct username/password are entered, the Netscape Enterprise Server on webaccess2.novell.com presents a page asking the user to select their geographical region.

9. Once the user selects their region, the browser will request a URL of the form https://webaccess1.novell.com/cgi-bin/gwweb.exe?…….WAS_IP=x.x.x.x…… This initiates the gwweb.exe process on webaccess2.novell.com which attempts to talk to the defined GWINTER agent at IP address x.x.x.x.

10. The GWINTER and GWWEB produce the login page, which the Netscape Enterprise Server on webaccess2.novell.com sends back to the browser.

11. The user enters their GroupWise username and password, which get passed to GWINTER. GWINTER looks up the name in its local domain database and uses its post office links to contact the relevant POA for that user.

12. The POA opens a new connection for the GWINTER for the user and the GWINTER retrieves the initial information (folders, etc).

13. GWWEB builds a HTML page based on this information and this is sent to the browser by the Netscape Enterprise Server on webaccess2.novell.com via the BorderManager proxy on webaccess1.novell.com.

14. The conversation continues with the user requesting information from the POA webaccess1.novell.com, webaccess2.novell.com and the relevant GWINTER

The one thing we don't currently allow is the use of POP3/IMAP clients from outside the firewall. There are just too many concerns about transferring unencrypted data across the Internet.

Where We're Going From Here

Post Offices

Bigger post offices, fewer of them. Here @ Novell, we are making a technical/cultural shift from having numerous, smaller file servers to deploying fewer, larger file servers. So, our short-term goal is to move to 500 users on each post office. Right now, a 500-user system seems like a good fit as far as scalability and manageability is concerned. Processing power won't be an issue and we can reasonably support backups and restores of data stores of that size. But as soon as we hit the 500-user milestone, we'll be moving toward thousands of users on a single post office.

Also, once you get 500-1000 on a single post office, fault tolerance becomes a concern. So we're working with GroupWise running in protected mode and on Novell Cluster Services in our production environment.

GroupWise 5.5 Enhancement Pack

With the recent release of the GroupWise 5.5 Enhancement Pack, there are quite a few changes we're going to be making.

Here's the short list:

- Since you can now send to NDS groups as if they were distribution lists, we are going to have administrative assistants use NWAdmin to control the membership of NDS groups. These groups will then be synched to the GroupWise address book, thus bypassing the Help Desk. The Help Desk will still create the Netware groups and then link it to GroupWise, but after that it will be up to the administrative assistants to control it.

- We'll be moving toward using HTTP as our chief means of software distribution, rather than relying on being able to map a drive to the software distribution server.

- Support for SMIME has our security people salivating.

- Those who are comfortable with GroupWise and who would rather not bother with multiple e-mail clients can now use GroupWise as their POP/IMAP client, as well.

- The new GroupWise Monitor is going to help us reduce service outages since we can now threshold MIB values.

- The new GroupWise WebAccess interface is one of the most popular new features with our end-users.

- The new Live Remote feature will allow us to remove the POA that currently resides in the DMZ and replace it with a brain-dead MTA. This will improve security since nothing will be stored in the DMZ other than the name of the internal MTA with which it will communicate.

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.)

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