Managing the information that drives the enterprise

STORAGE

ESSENTIAL GUIDE TO

Storage Networking for SMBs

We highlight the storage networking technologies that will have the most impact on storage administrators at SMBs.

INSIDE

5 DAS still plays a role
8 Tips for better storage support
12 RAID primer
15 SAN options for SMBs
18 Outsourcing data storage

TechTarget
The Technology Media ROI Experts

Finding the right storage

Storage options for SMBs used to be limited, but today there are plenty of alternatives ... and challenges.

STORAGE IS OFTEN a matter of scale and perspective. While a very large company's storage requirements might call for massive, high-performance arrays, smaller companies logically have more modest needs. But when perspective comes into play, the importance of an efficient storage infrastructure to support business operations is equal—regardless of the number of people on the payroll, the square feet of office space or how many digits annual revenues run out to.

That's because data fuels businesses of all sizes these days, and how well you manage, protect and use that data is likely to affect a company's success or failure. So while smaller businesses might deal with smaller amounts of data, their storage concerns and interests aren't any smaller than those of a large enterprise.

Although the data storage needs of SMBs may parallel those of large enterprises, their available IT resources and expertise typically don't.

For some time, there was a gap among storage offerings. Most major storage vendors focused their efforts on creating enterprise-class products, while at the low end of the storage spectrum consumer-oriented vendors offered basic networked storage products intended for very small businesses. As a result, many small- to midsized businesses (SMBs) fell through the cracks. But today, the needs of SMBs are better recognized, with the gap being filled by both high- and low-end storage vendors.

That's the good news. The much broader selection of SMB storage products also brings a new set of challenges. While the data storage needs of SMBs may parallel those of large enterprises, their available IT resources and expertise typically don't. Yet SMBs still need many of the same sophisticated tools and features in their networked storage that enterprises require. This is being addressed as storage vendors endeavor to remove some of the operational complexities from their SMB products with innovations like configuration wizards, easy-to-use management interfaces and hot-swappable hardware components.

Newer options like online (or cloud) storage services provide even more alternatives for SMBs. An online backup service, for example, can help a resource-strapped business by providing effective, inexpensive data protection for backups and disaster recovery. Other services offer

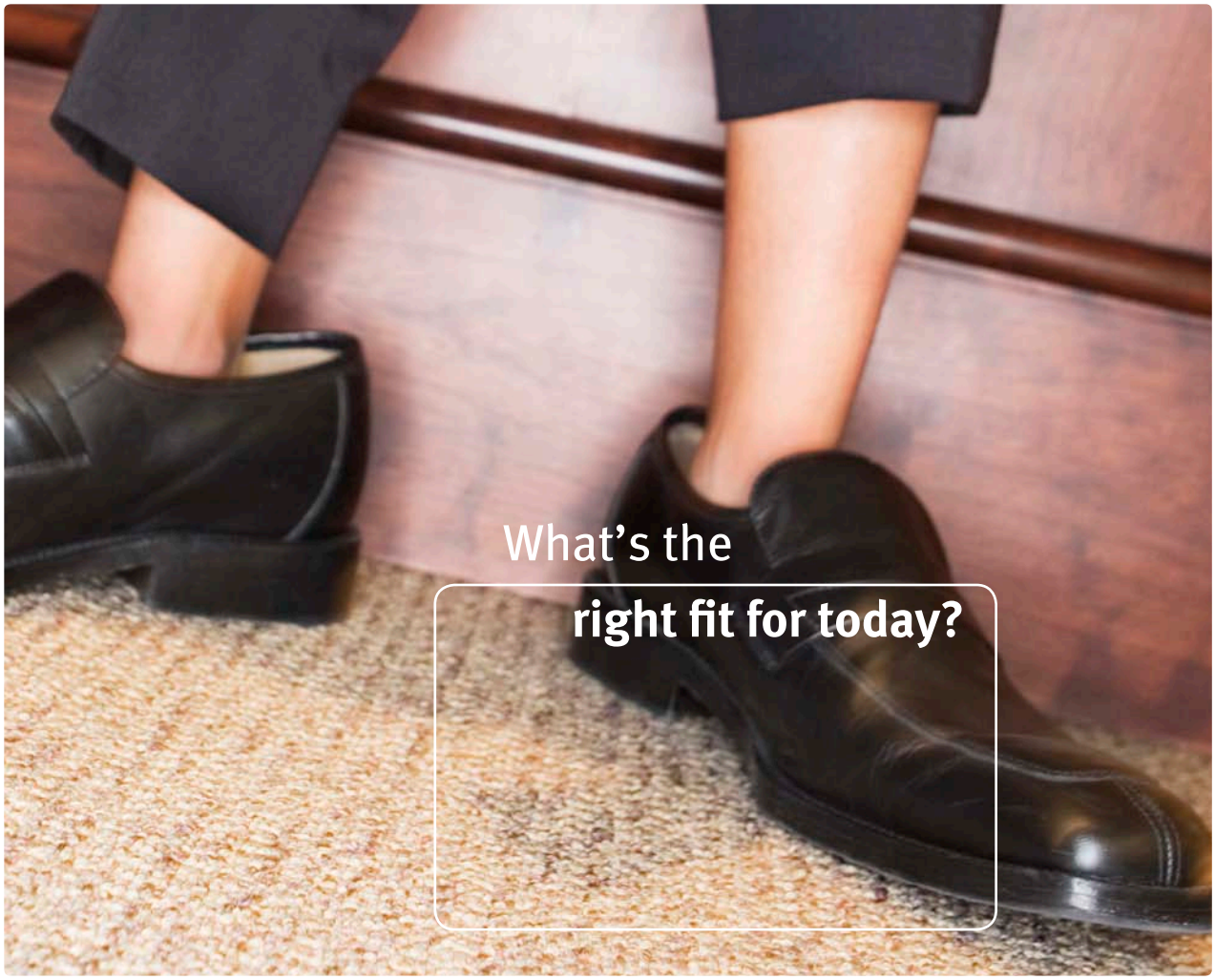
Outsourcing storage
SAN options
RAID primer
Better storage support
DAS for SMBs

the advantages of networked storage without having to actually install and maintain the hardware onsite. These services are convenient, scalable and offer some services that may otherwise be out of the reach of a smaller company.

This guide will help you make the critical decisions in your choice of a storage system for you company. It also provides some of the expertise that a smaller organization may lack. The special selection of articles on the following pages will give you a head start in selecting, operating and maintaining your company's storage. ⊙

Rich Castagna (rcastagna@storagemagazine.com) is editorial director of the Storage Media Group.

EMC²
where information lives®



EMC SMB solutions measure up to your changing needs—at the right price.

Your storage solutions shouldn't pinch your growth—or your budget. With EMC solutions for small and medium businesses, you get proven, reliable technology that's cost-effective, a snap to deploy, and simple to manage. Even as your business requirements expand, you'll be prepared to deal with increasing complexity, limited resources, and cost constraints. Now, doesn't that give you happy feet?

Call 1-888-811-1155 or visit www.EMC.com/smb.

DAS STILL PLAYS A ROLE

Direct-attached storage is still a mainstay in many SMB shops simply because it's a better choice.

By Sandra Gittlen

IKE THEIR ENTERPRISE COUNTERPARTS, SMBs are under tremendous pressure to throw out their direct-attached storage (DAS) architecture in favor of a consolidated storage-area network (SAN). Still, IT managers like Tom Gonzales at the Credit Union of Colorado, find that some applications just work better with DAS.

"We've migrated many of our disparate storage islands onto our SAN, but some of our systems just aren't good candidates for the move," said Gonzales, senior network administrator at the Denver-based financial institution.

He's found that DAS, which hooks directly onto a server, is a better choice than SANs in three specific cases:

- Where putting the application on the SAN would require too much expansion of the SAN with little to no return on investment
- Where the legacy nature of the application and its storage won't allow for integration with the SAN's iSCSI or Fibre Channel data fabric
- Where the application or server data has a low enough recovery time objective (RTO) or business value that it's not worth the money or time to move the data over to the SAN, such as a testing and development environment

As an example, he points to the credit union's primary line-of-business financial application, which is SCSI-attached and therefore still requires DAS.

THE BENEFITS OF DIRECT-ATTACHED STORAGE

While staying with DAS may seem like a hardship because of the tremendous growth in SANs, industry experts say DAS technology has also matured in both hardware and management tools and offers its own rewards.

"DAS' biggest benefit is that it gives SMBs easy-to-use storage and storage management in a single box," said Mike Karp, senior storage analyst at Enterprise Management Associates. "In some cases, it's even faster than if you deployed a SAN."

Ray Austin, director of storage product marketing at Sun Microsystems Inc., agreed. "DAS has this old connotation that it's limited and non-scalable. That's just not true. DAS is making a comeback because some SMBs want the benefits of a SAN, such as backup and recovery, without having to deal with the complex issues involved with testing and managing them," he said.

> "DAS' biggest benefit is that it gives SMBs easy-to-use storage and storage management in a single box."
>
> —Mike Karp, senior storage analyst, Enterprise Management Associates

Many of today's DAS products feature fault-tolerant, high-availability architectures atop hard disks, CD-ROMs, tape drives or portable USB drives. They also include data protection, such as policies and encryption, to help SMBs comply with security and privacy mandates.

The ability to get all this functionality at a relatively low price is part of the draw for SMBs, according to Harold Pike, team leader for entry and midrange disk at IBM. "In this economic climate, SMBs are maniacally focused on the acquisition cost, not the total cost of ownership, of storage, and DAS has the lowest acquisition cost," he said.

He added that with layoffs, SMBs might not have the storage expertise on staff needed to run a SAN. "DAS definitely is easier to implement and requires less skill sets in your IT team," he said.

While simplicity is critical for SMBs, DAS is also attractive for its inherent speed. "Organizations running large databases may intentionally deploy DAS because of the performance advantages gained from direct attachment," said Ted Ritter, analyst at Nemertes Research.

That's the logic that has kept the Northwest Radiology Network in Indianapolis using DAS for its picture archiving and communications system, said Marty Buening, director of IT.

"We capture large, high-fidelity images from the radiology equipment, such as MRI machines, and send them off to the storage system. They have to be viewed in a fast fashion by our radiologists so we need incredible disk I/O performance. We get that from DAS," he said.

The team uses IBM's DAS technology, which attaches to the picture

archiving and communications system server via SCSI connections to a RAID-based disk cabinet with five 1.4 TB nodes.

Northwest Radiology Network's Buening, who has deployed SANs elsewhere in his network, predicts DAS will back his imaging system for the foreseeable future. "Because it's a specific, data-intensive application, you don't want the network to become the bottleneck," he said.

The Credit Union of Colorado's Gonzales uses a mix of DAS vendors such as Dell in his network, and also doesn't see the need for DAS diminishing. "For smaller businesses, the true strength of DAS—compared to SANs—is its 'set it and forget it' reliability. Therefore, any time your data storage needs are predictable, finite and larger than what is reasonable for a personal drive, DAS is your answer," he said. ⊙

Sandra Gittlen is a freelance technology editor in the greater Boston area.

Seven steps for better storage support

Follow these steps to secure first-rate tech support for your shop.

By Marc Staimer

WHENEVER STORAGE VENDOR technical support comes up in discussions with users, eyes roll, heads shake and frustration levels become tangible. Dissatisfaction appears to be universal, regardless of the brand.

The causes are many: system complexity, lack of tech support training, outsourcing, vendor interdependencies, strategic alliances, insufficient testing, mergers and acquisitions. Standards are often too loose or too proprietary, and diagnostic software often provides root cause analysis that is too limited.

So how do you improve your data storage vendor's tech support? Preparation, planning and perspiration, plus a bit of common sense. Unfortunately, as Voltaire stated: "Common sense isn't so common."

Don't expect your storage vendor's tech support to be very knowledgeable about your environment. The more information you can provide about your environment, the faster and more effective your storage vendor's tech support will be. Here's a common-sense checklist that will help you improve your storage vendor's tech support:

1 Understand your service contract.

If the service contract calls for next-day onsite support, it's hard to fault the vendor's tech support for not being there today. Make sure the service contract matches IT commitments before there's a problem. If the contract doesn't match the organizational requirements, upgrade it or accept the risk.

2 Call the correct tech support organization.

We've all done this. You're not sure where the problem originates, so you call the tech support organization that you are most comfortable with, although there's no indication the problem is theirs. Even if they help troubleshoot the problem, it strains the relationship and probably cost you some money. Before calling tech support, you should troubleshoot the problem as best you can to determine where it originates. There are storage management products available that can help isolate problems and provide root cause analysis.

3 Always provide a detailed description of the problem: when it started, the symptoms, and what has been done to isolate or fix what failed.

Another key is to provide as much detail as possible as to what happened immediately preceding the problem. It's useful to have system logs, data dumps, traps and so on available. Don't send tech support this information in an email attachment. Put it on a URL or FTP site for them to look at and analyze.

4 Be sure you have a complete and current database with a visual diagram of the entire storage environment.

This includes all information (vendor, version, serial numbers,

microcode levels, patches, etc.) about the server hardware, applications, host bus adapters (HBAs) and/or NICs, cables, connectors, switches, power, cooling, security, etc. This is something that has to be continuously updated. You should also have on hand an up-to-date log (audit trail) of all changes, when they were made, who made them and if they were backed out.

5 Make sure the current storage vendor's compatibility matrix (hardware and software) doesn't exclude some piece of your storage environment.

This is guaranteed to rear its ugly head as finger-pointing and a delayed resolution to the problem. If there's a current item not on the vendor's compatibility matrix, attempt to isolate it from the problem. If that fixes the problem, persuade your current storage vendor to support it or move it to a supported environment. If the problem still persists after the offending item(s) have been removed, make sure this information is included in the data dump provided to the storage vendor's tech support.

6 No matter what happens, do whatever it takes to stay calm and professional.

The storage vendor's tech support staff responds better to polite, firm professionalism rather than insults or screaming. Remember, they didn't cause your problem (OK, sometimes they make things worse or cause other problems). However, they do want to fix the problem quickly and make you happy.

7 If the problem isn't being resolved in a reasonable timeframe, escalate per the storage vendor's tech support escalation procedures.

One thing that may not be in those escalation procedures is getting the sales rep and sales manager involved because they know an unhappy customer is less likely to buy again. This can make them a fabulous ally in getting a problem resolved. But use this option judiciously, as it loses effect the more it's used.

If your storage vendor's tech support leaves you permanently unhappy, no matter what you have done, cajoled, escalated or

threatened, switch vendors over time. Make sure the new vendor knows about the past vendor's tech support issues and any support promises are written into your contract. As you may have figured out, the responsibility falls squarely on you to make sure you get the tech support you require.

Marc Staimer is president of Dragon Slayer Consulting in Beaverton, Ore. He's widely known as one of the leading storage market analysts in the network storage and storage management industries.

RAID primer for SMBs

Here's a look at the most common RAID levels used in SMB storage shops today. *By Rick Cook*

ALTHOUGH there are half a dozen or so officially recognized RAID levels, and a number of combinations, there are only a few that are commonly used in small- to midsized businesses (SMBs).

RAID 0

RAID 0 isn't a RAID level at all because there's no redundancy. It is a shorthand way to describe striping data across several disks. It increases performance on reads and writes, but provides no additional protection against drive failure. RAID 0 is typically used to speed the read/write performance of temporary files. With files longer than one block (approximately 4K typically), RAID 0 reads and writes from multiple disks simultaneously, speeding access. However, because it has no redundancy, it doesn't protect the data from a disk failure.

RAID 1

RAID 1 refers to mirroring all writes—writing the same information to two or more disks. The data is written twice to separate disks. RAID 1 is simple, provides excellent protection and can be restored very quickly.

The downside to RAID 1 is cost. It's by far the most data storage-intensive method because the needed storage space is twice the size of the data being stored. So if you have 300 GB of data, you need 600 GB of disk capacity, which in turn doubles your disk costs.

RAID 3

RAID 3 includes parity information so data can be reconstructed in the event of a single disk failure. One disk is set aside for parity data and the data is striped across the other disks. If a disk fails, RAID 3 uses the parity data to reconstruct the contents of the failed disk.

RAID 5

RAID 5 is probably the most common RAID level for SMBs because it offers a good combination of protection and economy. RAID 5 stripes both the data and parity across all the disks in the set. However, the extra overhead involved in calculating parity means it suffers a performance penalty compared to RAID 10. Not only does it take longer to write the data, but it takes longer to reconstruct the data set in the event of a disk failure. Of course, while the array is being rebuilt, it has a single point of failure in case another disk fails.

RAID 6

RAID 6 is RAID 5 with extra redundancy. It uses two parity disks instead of one, meaning it can recover from two failed disks. RAID 6 is becoming more common with the increased use of SATA drives, which are cheaper but less reliable than SCSI drives.

RAID 10

RAID 10 is an example of a nested RAID level. It combines two RAID levels to gain additional benefits. RAID 10 mirrors the data across disks and then stripes the mirrored set. Striping provides higher performance, while mirroring provides redundancy. RAID 10 shares the speed and simplicity of RAID 1 and provides better performance through striping. Like RAID 1, it's expensive in disk space, but many administrators are willing to pay the price.

An alternative method is RAID 01, which stripes the data across the disks and then mirrors the striped set. RAID 01 isn't as robust as RAID 10 and thus isn't as popular. There are other levels. RAID 2 is rarely used because it has no advantages over more popular levels and RAID 4 (striping with bit rather than block parity), but it is used occasionally for applications with large sequential files.

If you need performance, RAID 10 is probably the best choice. For economy, RAID 5 gives the most redundant storage with the fewest disks. RAID 6 is useful for situations where you want the extra protection of added redundancy. In those cases, select a RAID array with more hot spares (extra disks installed and ready to go in the event of a failure).

Unless you have a lot of disk arrays or high-performance requirements, any of the popular redundant RAID levels (i.e., anything but RAID 0) will work for SMBs. ⊙

Rick Cook specializes in writing about issues related to storage and storage management.

SANs for SMBs

While most large enterprises have implemented a SAN already, SMBs must carefully weigh the pros and cons.

By Sandra Gittlen

WHILE MANY SMBs are increasingly looking to deploy a storage-area network (SAN), many experts agree that a full-scale deployment could be overkill.

"Just like not everyone needs a four-wheel-drive vehicle, not all companies need a full-scale SAN. It's important to align your storage technology with the tasks you have at hand," said Greg Schulz, founder and senior analyst at StorageIO Group.

He added that SMBs face tremendous pressure from the storage industry to go big and bold with their storage. "They've been told they need to keep up with the Jones'—in this case, larger enterprises—to succeed. But then they end up overspending," he said, which in this economy, is incredibly dangerous. In addition, many don't have the time, expertise or reason to use a majority of the features found in today's full-scale Fibre Channel and iSCSI SANs.

More importantly, these SANs might not even be the appropriate solution for SMB storage dilemmas. For instance, Microsoft Corp. has said that Exchange Server has a lower TCO when used with a direct-attached storage (DAS) solution, such as a high-performance serial-attached storage array, rather than a SAN.

ALTERNATIVES TO DEPLOYING A STORAGE-AREA NETWORK

Schulz said companies should consider the following alternatives before committing to a full-scale SAN:

- DAS, which connects directly to a server or multiple servers
- Network-attached storage (NAS), which provides file-level access to storage
- Hybrid NAS/ISCSI, which supports file-level and block-level access

"The easiest way to determine if you can do without a pure SAN is if you have a single location and/or multiple locations that don't need to share data. Then you'd be fine with a DAS or NAS solution," said Natalya Yezhkova, research manager at IDC.

However, if you're storage is spread across several sites and you want to move data between them for remote access, business continuity and disaster recovery, you'll most likely need a SAN, she added. And if you have an app, such as credit card processing, that requires a high transactional volume, then a SAN might be the better bet.

"The easiest way to determine if you can do without a pure SAN is if you have a single location and/or multiple locations that don't need to share data."

—Natalya Yezhkova, research manager, IDC

SMB SAN PACKAGES

The good news for SMBs these days is that even the largest of vendors—including Dell, EMC Corp., Hewlett-Packard (HP) Co., IBM, NetApp and Sun Microsystems Inc.—have portfolios featuring scaled-down storage offerings that allow you to start small and grow into a larger SAN environment. Some vendors even help SMBs protect hardware investments by requiring only an adapter to switch between protocols, such as NAS to iSCSI, if they eventually upgrade to a SAN.

Some examples of these products include Dell's PowerVault NX 1950; EMC's Celerra NS Series/Gateway (which also supports Fibre Channel); IBM's System Storage N3300 and NetApp's FAS series appliances. Schulz said hybrid offerings for smaller SMBs start in the sub-$10,000 range.

For Steve Fletcher, IT director at environmental remediation firm Sky Research Inc. in Ashland, Ore., that kind of flexibility has been critical to keeping infrastructure and management costs low. Originally, Fletcher had made an investment in NetApp NAS appliances to support his 80-employee Windows File Sharing environment of user home directories and Oracle databases. However, his data storage needs soon grew to include a block-based SQL Server. Rather than adding a Fibre Channel

SAN, he turned to an alternate strategy—NetApp's hybrid Ethernet-based NAS/ISCSI appliance. "I can centrally manage and store file and block storage without the heavy expense of Fibre Channel," he said. He admitted that incorporating iSCSI into his network required additional skills, but added that "Fibre Channel would have required a lot more."

HOW TO GET UP TO SPEED ON SAN STORAGE

SMBs can benefit greatly by reaching out to your peers for advice on choosing a storage strategy. "They may have overspent on a solution and can share how they got back on track," Schulz said.

He suggested that SMBs "take a step back" and consider the apps and policies they're trying to support before deciding upon a storage strategy. You should weigh the following:

- The expertise of your staff or outsourcer
- The capacity, performance and availability requirements of your applications and data
- The disaster recovery, failover and compliance needs of your business
- The environmental and economic energy constraints you face

You can connect with other SMB storage teams through industry organizations such as the Storage Networking Industry Association and the SCSI Trade Association, as well as through vertical industry groups.

Seminars and blogs offer tremendous opportunities to find out the criteria companies used to match their application and data needs to an appropriate storage strategy, Schulz said.

You can also partner with an outsourcer or consultant who specializes in storage networks. Whatever approach you take, it's critical to take the time to bring in multiple vendors and test drive their technology in your environment.

"It might require time and a slight disruption to your network," he said. "But you'll save time and money in the end by making sure the strategy you pick is best for your business." ⊙

Sandra Gittlen is a freelance technology editor in the greater Boston area.

Outsourcing storage for SMBs

Five tips for SMBs considering storage outsourcing. *By Martha Young*

OUTSOURCING DATA STORAGE and backups is an excellent way for businesses to capitalize on technology benefits without having to make the investment themselves. With the increased tightening of capital markets, outsourcing allows SMBs to free up what would be long-term, capital expenditures and instead transfer that investment to a pay-as-you-go operational expense.

SMBs that leverage storage outsourcing, particularly for backups, also reduce technology implementation costs, including IT headcount, monitoring and managing the devices, maintaining patches and bug fixes, and maintaining software licenses. As SMBs continually seek to improve cash flows and balance sheet statements, storage outsourcing is a natural model to consider.

SMBs should consider the following when determining if they should outsource their storage needs.

1. DON'T SETTLE FOR A MARGINAL STORAGE OFFERING BASED ON PRICE.

Instead, focus on meeting your business's near- and long-term storage requirements. There are hundreds of service providers in the market. Prior to developing your company's request for proposal (RFP), decide what features and functionality are "must haves" vs. "nice to haves."

This list won't be shared with RFP participants, but it will act as a guideline when interviewing prospective storage hosting providers. For example, do backups need to be performed intermittently during the day, like in the case of a financial business, or is the middle of the night adequate for your business? How often are the backups tested for accuracy and completion?

The must-have feature list is nonnegotiable; the nice-to-have feature list is your area of negotiation. If the provider can't come down in price, then the number of service features need to come up. Focus on features and functionality as they relate to your business needs. For example, if you must perform large data file activities, make sure the storage strategy accommodates the capacity needed.

2. WHAT TYPES OF BACKUPS ARE SUPPORTED?

For example, bandwidth is probably a far greater consideration if a company is going to use a service for its primary or near-line storage vs. just for backup.

On a pay-as-you-go model, the type of backups will ultimately define a substantial part of the bottom line of your outsourced storage expense. Some providers offer full backups each night, while others offer file-level backups.

Full backups are a complete copy of all the files every night. This creates massive amounts of storage capacity requirements very quickly.

File-level storage backs up only files that have changed or that are new from the prior backup. This method is substantially more economical in terms of storage footprint than full daily backups.

3. WHERE IS DATA DEDUPLICATION PERFORMED?

Where data deduplication is performed makes a difference. If dedupe is performed at the service provider site, then the cost of bandwidth to

transmit unnecessary files is an unnecessary, superfluous expense. This means you'll pay a lot for bandwidth even though the data is eventually deduped or compressed.

If dedupe is performed at your site, is it agent-based or appliance-based? If it's agent-based, then the agent will consume its own footprint on the local server, plus CPU cycles. If deduplication is performed on your site using an appliance, then the CPU cycle consumption is transferred to the appliance. Get clarity on who owns the appliance and is responsible for its upkeep. This could be an unforeseen expense. These last two alternatives will have far lower bandwidth costs.

4. DOES THE OUTSOURCED STORAGE PROVIDER USE MULTI-TENANCY ON THE SERVERS?

You want to ensure that your data doesn't co-mingle with any other data the service provider is supporting. It's not unusual for a service provider to have several SMBs on the same storage server, segregating the companies across different blades and/or using virtualization software. Be sure you fully understand how your firm's data will be secured against data leakage within the same storage device.

Some specific questions for providers to prevent data leakage include: How many companies are supported on a virtual server? Are the virtual server blades set up to support one blade per company or do multiple companies reside on a common blade? How are backups conducted of the virtual server blades: all at the same time or staggered?

These are a few of the considerations you need to ask hosted storage provider. The goal is to get them to ensure that your data will be isolated from another business' backups that the provider also supports.

5. HOW IS DATA RECOVERY SUPPORTED?

There are two main methods for outsourced storage recovery: simple data backups and bare-metal restore. Simple data backups are the most basic backup option. Simple data backups only back up the application data. This method doesn't back up the applications themselves, nor does it back up the operating system.

Bare-metal restore restores a computer from the ground up, including the operating system, applications and data. Bare-metal requires an entirely new device to restore to. The decision between which recovery method to use depends on the cost of downtime for your business.

As SMBs look at storage and backup outsourcing as a way to contain business expenses, a close examination of the business' storage require-

ments going forward prior to the RFP process will assist in selecting the best storage service provider for your business. As illustrated above, there are options within components of outsourced storage that can only be addressed by knowing the business' needs and objectives. Knowledge of the business' storage requirements will ensure you only buy what you need, further improving the ROI of using an outsourced storage provider. ⊙

Martha Young is principal and CEO at Nova Amber LLC, a business consulting company specializing in business process virtualization.

Check out the following resources from our sponsor:

EMC² where information lives®

EMC for SMB - World-class technology. Priced for your world.

Why EMC is the Market Leader in IP Storage

Video: EMC: Redefining Backup with Deduplication

About EMC Corporation:
EMC understands that your information is one of your most strategic assets. We work with organizations of all sizes, in all industries, to maximize the power of information. We can help you design, build, and manage flexible, scalable, and secure information infrastructures. And with these infrastructures, you'll be able to intelligently and efficiently store, protect, and manage your information so that it can be made accessible, searchable, shareable, and, ultimately, actionable.