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## White Paper: Backup Solution Options

### Community IT Innovators (CITI)

Steve Longenecker, Principal Infrastructure Consultant, [slongenecker@citidc.com](mailto:slongenecker@citidc.com),

#### Overview

CITI clients generally employ one of four general kinds of backup solutions:

- Backup to tape
- Backup to external hard drive
- Internet backup solution
- Backup Appliance with offsite replication

The type of solution CITI recommends as a “best fit” is dependant on the complexity of the data being backed up and the value the client places on their organizational data. Financial constraints mean that the solution that provides the best protection of an organization’s data isn’t always within reach. CITI helps clients understand the parameters of each backup type within the context of their particular business operation so that they can choose the backup solution that meets their requirements.

#### RPO and RTO

Two criteria that differentiate the four general types of backup solutions that CITI implements are Recovery Point Objective (RPO) and Recovery Time Objective (RTO).

**Recovery Point Objective** is a measure for how recent you need your backup to be in a recovery scenario. Imagine you've lost your server and must recover the data from backup. What are the costs (financial and otherwise) of the most recent backup being a month ago vs. the night before last? With tape, backups generally occur every evening. This provides a recovery point objective of 24 hours in the best case scenario. In the worst case scenario a disaster occurs at the end of a business day before the nightly backup runs so that data recovery requires use of the tape from the night before. In that scenario a day of data (checks entered in financial systems, emails sent and received, documents written, etc.) is lost.

**Recovery Time Objective** is a measure of how quickly your backup solution allows data recovery. Imagine again losing a server, this time (fortunately) with all the data backed up just the night before. In this scenario there isn’t a lot of data loss because of the recent backup, but what are the costs (financial and otherwise) of needing 3-5 business days to restore the backed up data to make it accessible to your organization again. What if you could have that data accessible again in a matter of minutes or hours?



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## Backup Solution Choices

Each of the four choices - tape, external hard drive, entry-level hosted solution, and managed backup appliance – has advantages and disadvantages. Here is a brief description of each solution.

**Tape solutions** employ a tape drive (either internally installed in a server or attached externally with a SCSI cable) and tape cassette media. Tapes and tape drives come in a variety of types, which cost more or less depending on how much data a single tape can hold. In addition to the tape drive, backup software is required. While Windows includes a backup utility called NTBackup, CITI recommends using Symantec’s Backup Exec.

Tape’s relatively slow speed prevents an RPO much better than 24 hours. Tape solutions generally only backup the data of a server, not its entire operating system, so in the event of a disaster the operating system needs to be rebuilt from scratch before the recovery from tape can begin (reducing RTO).

**External hard drives** essentially replace the tape media in the previous solution with USB hard drives. The advantage of external hard drives is their low cost relative to tape. External hard drives aren’t much bigger than tapes and are just as easily taken offsite. A downside to USB hard drives is that third party backup software doesn’t catalog individual drives well – the software doesn’t remember which backup job went on which hard drive. This means the solution really only works for recovery of most recently backed up files and full disaster recovery and it’s not so good for the creation of archival backups. Another limitation of external USB hard drives is that their “data throughput” is significantly less than that of a tape drive. This limits the solution’s effectiveness in situations where large amounts of data are being backed up.

Because they are being used more or less “as tapes”, the limitations of tape (best case RPO around 24 hours and a reduced RTO because only data is backed up) persist. And, as with tape, regular human intervention is required to cycle the hard drives for each backup.

**Internet Backup solutions** are made possible by increasingly inexpensive and available Internet bandwidth. You install a program which uploads data to a remote server owned and operated by a third party online backup service provider. You pay the provider a subscription fee for storing the backed-up data, and the data can be restored from the provider's server to the organization when needed.

CITI’s experience is that entry-level solutions are not nearly as reliable as the other solutions reviewed in this paper, particularly with complex and/or very



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large datasets. The RPO for this solution can also be very long, depending on the vendor's service level agreement (recovering a server's worth of data over the Internet could take weeks). The attraction of this solution is its low cost.

**Managed Backup Appliances** use virtualization technology to completely backup servers on the network. Both the data and operating system components of a server are backed up. The speed of the appliance and the software it employs provides the capacity to take snapshots of the servers multiple times an hour (providing an RPO as low as 15 minutes). The solution also securely replicates a copy of the backup over the Internet, in encrypted form, to an offsite data hosting facility on a nightly basis. This service is monitored and if a backup fails, an alert is delivered to CITI allowing our prompt attention to the matter.

Because the entire server is backed up at the block level, restoration of an entire server in the event of a disaster is a simple, fast one-step process. Because the process is entirely automated, the solution is not prone to failure due to human error around forgetting to change media or take media offsite. The managed backup appliance is the most expensive of the backup solutions recommended by CITI but it also provides the best performance, and its return on investment in a disaster can be very high. It has by far the best RPO and RTO and is the solution least likely to fail due to human error or equipment failure.

## Conclusion

Each backup solution has advantages and disadvantages, including wide variation in costs. CITI understands that each client's operational requirements and constraints are different, and does not recommend the same solution to every client. CITI works extremely hard to help each client find the backup solution that fits its particular requirements.