

Backup and Redundancy

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Table of contents

Introduction	2
Redundancy, Resilience and Disaster Recovery	2
Resilience	2
Redundancy	2
Disaster Recovery (DR)	2
So the difference is...?	2
How important is Redundancy to you?	2
UC for Business Redundancy: A Solution for Your Business	3
How does UCB Redundancy Work?	3
Controlled Shut Down	3
Uncontrolled Shut Down	3
Features and Benefits	3
Solutions Overview	4
Backup and Redundancy options	4
Cost	5
Redundancy Architecture	6
Examples:	6
Solutions in Detail	9
Standard Server (Solution 1)	9
Resilient Server: RAID plus Power supply plus UPS (Solution 2)	9
Resilient server with standby server (Solution 3)	9
Standby Server plus UCB Redundancy software (Solution 4)	9
SAN (Solution 5)	10
Stratus Server (Solution 6)	10
Using Redundancy in a Disaster Recovery Scenario	11
Remote Site	11
Virtual Machines	11
Frequently Asked Questions	12
Question	12
Phone agents	12
Phone agents	13
Costs/ maintenance	13
Licensing	13
Remote Control	13
Backup in a Redundancy situation	13
Stratus Server	13
Upgrades	13
Appendix	14
Acronyms	14

Introduction

Redundancy allows businesses to operate with confidence, providing security for themselves and their customers.

When a server goes down – whether in a controlled or disaster scenario – business can continue as normal, with minimum interruption to services and data loss.

With the options that UCB offers, businesses can choose the level of backup and redundancy that suits them, allowing them to tailor the solution to both their needs and their budget.

Redundancy, Resilience and Disaster Recovery

Resilience

Resilience is the **ability to recover** from error, e.g., corrupt disk, power failure or at its greatest level, motherboard/CPU failure.

Software can also be resilient; an example is the way UCB makes the Announce ports able to support *multiple* IVR applications. This means that if any one application terminates/becomes unresponsive, the Announce ports can dynamically adjust to using a different instance.

Redundancy

Redundancy means **duplicate equipment** is available that can provide an **alternative functional channel** in case of failure. An example is the way UCB supplies a separate server in the case of unrecoverable hardware failure.

Disaster Recovery (DR)

Disaster recovery is a variation of redundancy except usually the two systems are not co-located. Short cutover time is typically measured in hours – not seconds. Physical requirements such as redirecting external numbers and relocating staff eliminate most of the real time requirements. Data synchronization may not be possible due to limited bandwidth – but due to the temporary nature of a true DR system this may not be critical to the customer.

So the difference is...?

The major difference between the options is that Resilience is designed to reduce the likelihood of catastrophic faults causing system outages. Redundancy is designed to improve the ability to recover from catastrophic faults. Disaster recovery is an extension of a redundant system but operational issues at cutover are different, and limitations are imposed due to environmental conditions.

Using the system for automatic disaster recovery is only viable when the backup server is communicating with a different physical PBX. In the case of a second server being in a different geographical location, but servicing the same PBX (a typical Cisco Unified Communications Manager deployment), the backup services can only be activated after services are manually halted on the primary site.

How important is Redundancy to you?

There are a number of Redundancy solutions available in the marketplace to suit different requirements and costs.

It is possible, for a premium, to purchase a virtually fail-safe redundancy solution to cover all eventualities.

On the other hand, your own requirements may not be so stringent, or the price you wish to pay may not accommodate the perfect solution.

Businesses considering Redundancy solutions need to weigh up their costs versus reasonable benefit. More and more businesses already employ, or are considering, high-end reliability hardware such as a SAN or Stratus Server (www.stratus.com) for their infrastructure. For these businesses, the addition of the UCB Redundancy software completes a robust and very workable Redundancy solution.

Please see the Solutions Overview section for a list of potential Redundancy solutions ranging from low cost, lower benefit, to premium. For purposes of comparison, solutions that do not include UCB's Redundancy software are also shown.

Note: Abbreviations/Acronyms are listed in the Appendix at the end of this document.

UCB Redundancy: A Solution for Your Business

How does UCB Redundancy Work?

UCB's redundancy software is designed to enhance any hardware solution with an automated recognition and notification of server failure enabling manual or automatic intervention, according to your needs.

On start-up, the Backup Server connects to the Primary Server. If the connection is successful, the Backup Server remains in backup mode.

Controlled Shut Down

When the Primary Server is stopped in a *controlled* manner, it notifies the Backup Server of a normal shutdown. At this time the Backup UCB Server advertises to all local applications that the Primary Server has shutdown normally. It can then be promoted to Primary status either automatically or by user request.

Uncontrolled Shut Down

If the connection to the Primary Server is broken *without* any formal system-down notification, the Backup UCB Server notifies all local applications of the abnormal shutdown of the Primary Server. The Backup Server can be promoted to Primary status automatically or by user request and will start the application types that have the "auto start on promotion to Primary Server" option enabled in Application Manager.

Any user who has rights to run Application Manager can initiate the promotion of the Backup Server. This can be run from any PC on the network that has normal access to UCB applications. Note – client applications should be installed on an applications server that is separate to the Primary or Backup Server.

A separate task runs on the Backup Server that backs up the Primary Server's database to the Backup Server. This can occur on a daily or weekly basis (default is every 24 hours, which means that at any time the data on the Backup Server can be up to 24 hours old). With a SAN solution there is no data loss.

When client applications such as Desktop and Console see the Backup Server promoted to Primary, they automatically reconnect to the backup server and continue operation.

Features and Benefits

Increase confidence in your communications system by providing a solution that copes seamlessly with any malfunction

- Automatic notification of primary server loss means on-call/offsite staff can be instantly alerted and respond promptly, resulting in minimum downtime
- Save time and costs with simplified data synchronization; once the primary server is recovered, primary and backup data is easily and smoothly merged between the servers.

Solutions Overview

Backup and Redundancy options¹

Depending on requirements, and the level of expenditure preferred, businesses can choose the option that fits them.

Note that true uninterrupted operation must take

into account PBX failover and all solutions will be protected by external UPS.

The following solutions best suit all UCB supported systems with built-in levels of redundancy, specifically Avaya Communications Manager, NEC and Cisco Unified Communications Manager.

Solution	Benefits	Considerations
1. Standard Server	Low cost	Manual recovery requires considerable IT skills; Data is only valid to the last backup (typically 24hrs); Long downtime.
2. Resilient Server; RAID + Power supply + UPS	Large increase in uptime; Less chance of data loss due to RAID; Improved MTBF (see appendix)	No DR (Disaster Recovery); Manual recovery requires considerable IT skills; Reduced chance of data loss.
3. Option (1) OR (2) above + standby Server	Downtime on failure is reduced, as software is already setup on second PC.	Some downtime (minimal, i.e., < 2 hours); Manual recovery requires considerable IT skills; Clients may need to be restarted, i.e., require manual interaction. Chance of data loss dependent on PC specs.
4. Option (3) above + UCB Redundancy software	Improved cutover speed; Less expertise required Minimal user interaction	Some audit data will be lost. Requires manual data import in order to synchronize. Any configuration changes on the backup server will need to be reapplied on the Primary Server. Recommended lower cost solution
5. Option (4) above + SAN	Real-time data concurrency/ synchronization	Recommended medium cost solution
6. Stratus Server	No downtime; Best availability; Estimated hardware availability of 99.9996%;	High cost; Not a DR solution
7. Stratus Server + UCB Redundancy software	As for (5) above; Use with UCB Redundancy software for full DR	Recommended high cost solution

Note: When using a Stratus Server in an environment with Aculab or Dialogic cards, you will need to distribute the voice cards over two separate [reasonably spec'd] PCs. This is in addition to the Stratus Server, so the total solution is three PCs.

¹ It is assumed that Tape Backup will be installed on all systems for data recovery; Note that RAID is for protection of data – it is not a substitute for Tape Backup.

Cost

While it is impossible to represent absolute costs in this document, as they will vary globally as well as change regularly, a relative cost guide for the solutions covered is provided below.

Solution	Relative Cost
1. 1. Standard PC	Assume a unit of 1
2. Resilient Server; RAID + Power supply + UPS	Approximately double the cost of option (1) above
3. Option (1) OR (2) above + standby Server	Approximately 5 times the cost of option (1)
4. Option (3) above + UCB Redundancy software	Approximately 5 times the cost of option (1), plus the cost of UCB Redundancy module
5. Option (4) above + SAN	As above, plus cost of SAN (\$5,000 – 10,000)
6. Stratus Server	Approximately 10 times the cost of option (1)
7. Stratus Server + UCB Redundancy software	Approximately 10 times the cost of option (1) plus the cost of UCB Redundancy module.

Note: For maximum availability and minimized data loss, a Stratus Server, or a Storage Area Network (SAN) Server should be considered.

Redundancy Architecture

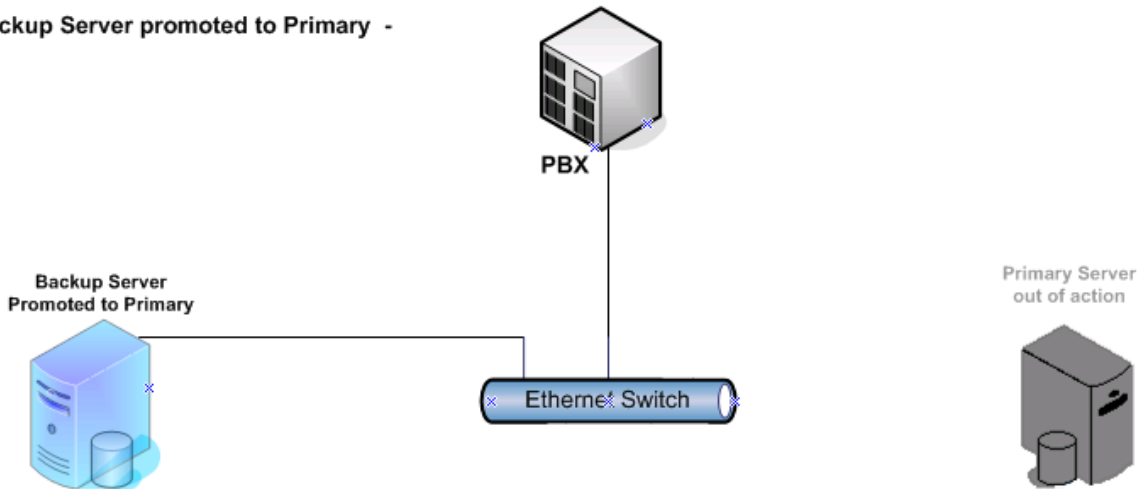
An Application server is recommended to ensure that applications continue to run in the event that the Backup Server is promoted (i.e., an existing Application Server, or using a standard spec UCB Server as the Application Server).

Examples:

The diagrams below describe the relationship between the PBX, the UCB Server and the UCB Applications.

Zeacom Redundancy and Backup (without SAN or Stratus Server)

- Backup Server promoted to Primary -



Zeacom Redundancy and Backup (without SAN or Stratus Server)

- Primary Server running -

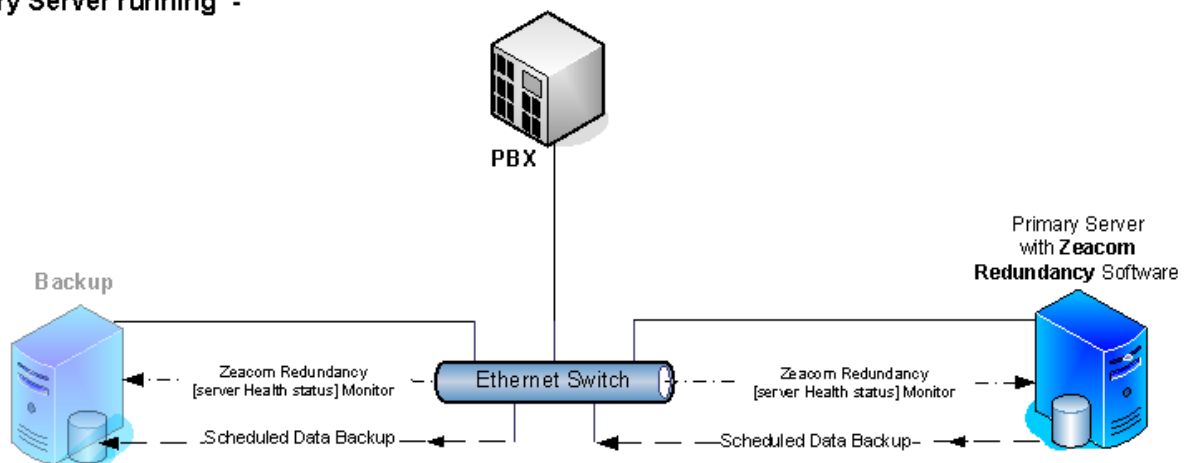


Figure 1. Standard PC with UCB Redundancy software before and after

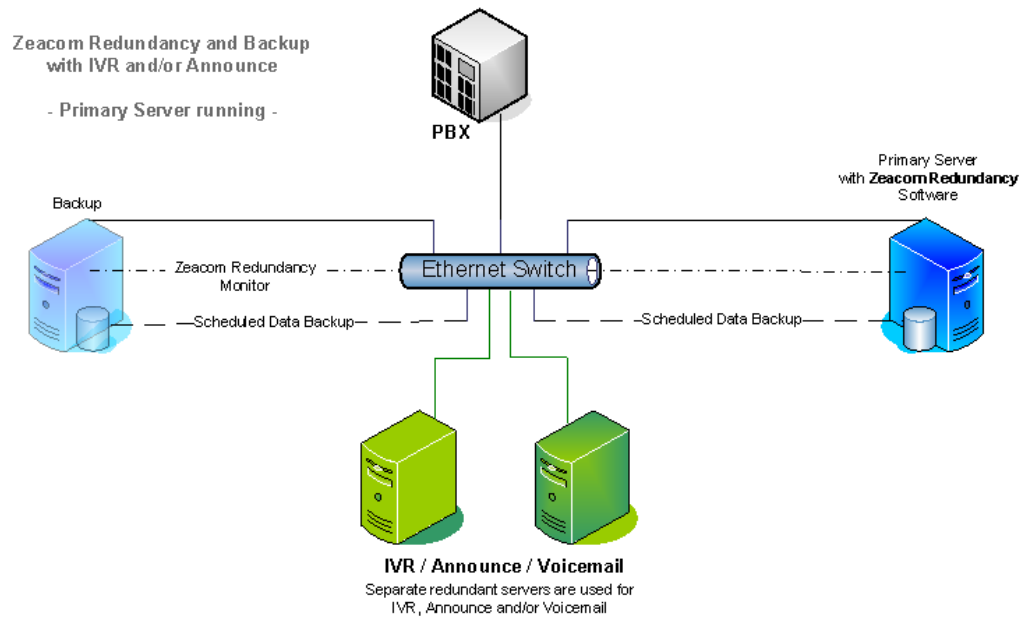


Figure 2. Standard PC with UCB Redundancy software, plus Announce or IVR

Zeacom Redundancy and Backup with SAN

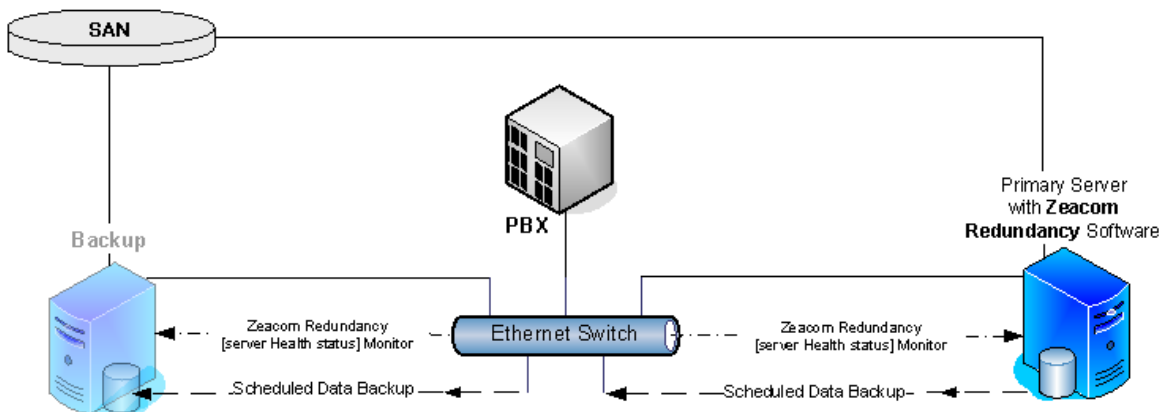


Figure 3. UCB Redundancy software with SAN

Zeacom Redundancy with Stratus Server with Soft Voice Ports

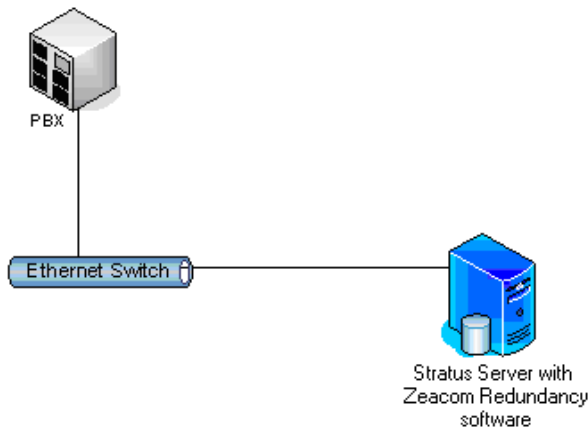


Figure 4. UCB Redundancy for NEC or Cisco using Stratus Server and Soft Ports

Zeacom Redundancy with Stratus Server using Aculab or Dialogic voice hardware

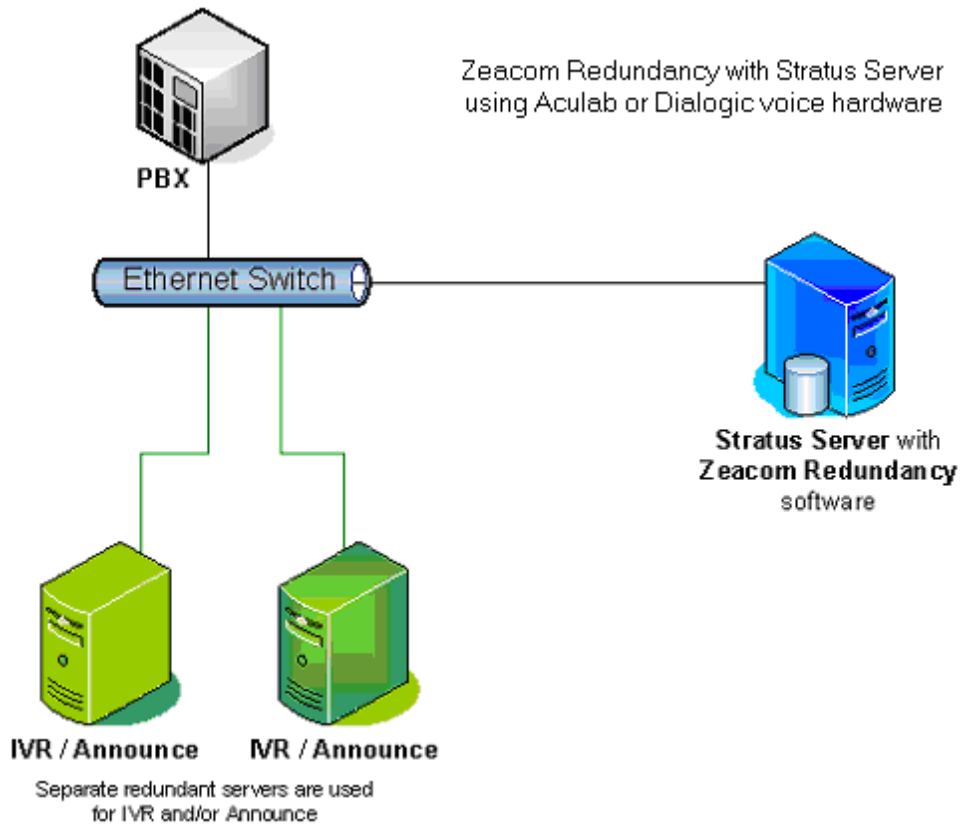


Figure 5. UCB Redundancy for NEC or Cisco using Stratus Server and Hardware Voice Port

Solutions in Detail

Please refer to the Appendix section of this document for clarification of acronyms used.

Standard Server (Solution 1)

Tape backup will typically utilize the existing backup infrastructure present in the client's LAN.

The customer will run the backup snapshot utility on the Telephony Server on a scheduled basis. This creates a local image of the server without affecting the running system.

Benefits of Tape backup are...

- Economical
- Provides for offsite backup

Considerations of Tape backup are...

- Data is typically up to 24 hrs old
- Slow to recover data
- Lowest MTBF (Mean time between Failures) of all options

Resilient Server: RAID plus Power supply plus UPS (Solution 2)

Resilient server is the combination of RAID, power supply and UPS. The combination of power supply and hard drive, cause the most common reason for failure.

Benefits of the resilient server solution are...

- Reduced time between failures i.e. medium MTBF
- Minimal chance of data loss

Considerations are...

- Exposed to environmental issues (fire or flood)
- No disaster recovery
- High level of expertise required
- Average downtime on failure

Resilient server with standby server (Solution 3)

This provides a faster cutover on failure of the primary system

Benefits are...

- Reduced downtime on failure of Primary Server
- Second server can be remote to provide a level of DR

Considerations are...

- Manual or auto activation of standby server
- Manual sync of data to standby server

Standby Server plus UCB Redundancy software (Solution 4)

Combine the option of the resilient server plus standby server with UCB's redundancy software.

Benefits are...

- Automatic sync² of data to standby server
- Automatic detection of failure of Primary Server
- Manual or auto promotion of standby server to Primary Server

Considerations are...

- MTBF is still the same as for solution above
- Data can be up to 24 hours old

Notes:

1. A SAN solution or Stratus server is mandatory in order to maintain synchronicity. Restoration of data to the Primary Server from the Backup Server is not possible.
2. Wherever a Standby Server is used and the Primary server has Dialogic or Aculab cards installed, this hardware and the connection for it to the PBX must be replicated in the Standby Server.

² Synchronization does place a load on the server, so scheduling is recommended for periods of low activity e.g., after-hours where applicable.

SAN (Solution 5)

The SAN (Storage Area Network) solution can be applied to any of the solutions above.

A SAN is a unit of hard drives that are connected to multiple servers, normally via optical fiber, and provide a fully backed up, redundant storage.

It normally appears to a PC as a SCSI drive, so normal programs are not aware that the data is stored off the local PC.

A SAN would typically be used when it is already part of the data infrastructure of the company. It is unlikely that it would be included in the UCB sale due to the high cost.

Using the SAN solution with UCB Redundancy software has the following benefits:

- Automatic sync³ of data to standby server
- Automatic detection of failure of Primary Server
- Manual or auto promotion of standby server to Primary Server
- No loss of data on failure of the PC
- No loss of data when we cut over to the standby PC

Considerations are...

- None, if the enterprise already uses a SAN – otherwise: cost

UCB Redundancy software with SAN is an excellent redundancy solution to any enterprise.

Notes:

1. A SAN solution or Stratus server is mandatory in order to maintain synchronicity. Restoration of data to the Primary Server from the Backup Server is not possible.
2. Wherever a Standby Server is used and the Primary server has Dialogic or Aculab cards installed, this hardware and the connection for it to the PBX must be replicated in the Standby Server.

³ Synchronization does place a load on the server, so scheduling is recommended for periods of low activity e.g., after-hours where applicable.

Stratus Server (Solution 6)

A Stratus Server is a hardware redundant server with a stated uptime of 99.9996% – equating to 2.1 minutes per year downtime.

It has all the advantages of the RAID / Redundant power supplies, plus all the rest of the components are redundant.

This gives extremely good MTBF, and can be used in conjunction with a standby server and UCB Redundancy software to provide a DR solution. The standby server can be a normal high availability server.

Benefits are...

- Best MTBF
- Good data protection

Considerations are...

- Cost

Note: While tape backup is only mentioned in the most basic configuration, it is assumed that all configurations include tape backup provided either by existing infrastructure or by a tape unit local to the PC. A SAN also includes its own tape backup.

RAID arrays provide good data protection but are not a substitute for tape backup.

Using Redundancy in a Disaster Recovery Scenario

When setting up redundancy for use in Disaster Recovery there are many significant and specific requirements that depend on the needs of individual customers. To discuss the particular requirements of your site please contact your local technical representative who will recommend the best solution.

Remote Site

The reasons for going to the Backup site may be an environmental or a civil emergency.

Virtual Machines

VMware or Virtual Machines can be used to isolate the CTI Server from the physical hardware to provide better resilience against hardware failures.

This is currently available for the Cisco PBX Platform.

Frequently Asked Questions

Question	Response
Applications Which UCB applications are covered by Redundancy?	Console, Desktop and Administrator, Desktop Lite, and Dashboard are covered.
<p>Note: Unified Messaging and Executive Insight will require manual synchronization. Web modules are not covered. Support for Networked modules⁴ is TBA from v5</p>	
Integration Are UCB Integration applications and plug-ins covered?	All Integration will be covered as long as it is installed on the backup system and is designed to be “backup aware”. If an application or plug-in currently runs, or <i>can</i> run under the Application server, then it will be covered. If not already available, this can be done with additional integration development per plug-in.
Citrix Does Redundancy work in the Citrix Metaframe environment?	Yes, Citrix is client only, so it has no effect.
Application shortcuts Where do the PC desktop shortcuts point to after the Backup Server is promoted?	When UCB Redundancy software is installed, application shortcuts should not be running off CTI Server, but off a separate [customer] application server, which will remain unaffected.
Recovery What is the process for data recovery from the Backup Server, after you have reinstated the Primary Server?	<p>The process for data recovery is a manual process (if you are running a SAN or Stratus Server you can easily retrieve your data from the Backup Server). Data acquired on the Primary Server since the last database backup will be lost.</p> <p>In the future, this process will be further automated, and there will be no data loss.</p>
Phone agents How do we support telephone-only agents in a shut-down?	The ability to promote the Backup Server via the phone requires a separate PC with a CTI link.

⁴ PBX specific

Phone agents	Can we do any notification to the phones?	All users that have the current option checked will receive a system restart message.
Costs/ maintenance	How will licensing costs and maintenance be handled on the redundant server?	The redundancy monitor will be licensed on the Primary PC. When operating on the Backup Server the system will be licensed in grace period.
Licensing	Do we require a duplicate set of licenses on the Backup Server?	No. When reverting to the Backup server, the system will be running in grace period for 10 days. If the system is needed to run on Backup for more than 10 days, then they will have to call NEC Support/Finance, get the license reset and re-registered.
Remote Control	How do remote Support technicians promote a Backup Server to Primary?	When started up, Application Manager will prompt for promotion of the Backup Server if the Primary Server is not detected. If Application Manager is already running it will also pop the promotion message. If a VPN connection is available to the site, the option above is available remotely.
Backup in a Redundancy situation	In the event of only one Server being available, what happens to any backup routines? If the Backup Server fails first, does the Primary Server observe this and change behavior.	The copying of data from the Primary to the Backup Server is independent of the creation of backup sets for tape backup. Therefore the Backup Server can have the backups scheduled in the same manner as the Primary Server. If the Backup Server fails a Watchdog Alert is issued.
Stratus Server	As a Disaster Recovery Option can you use the Primary Server as a Stratus server?	The two backup solutions are compatible. The Primary Server could be a Stratus server while the offsite DR solution is kept in sync via the UCB Solution. All it requires is a reasonable speed VPN between sites.
Upgrades	How should upgrades be handled? Is additional work required to ensure continued Redundancy?	Nothing extra needs to be done at upgrade. After the upgrade is performed, the Primary Server can be synched with the Backup Server at restart.

Note: When using a Stratus Server in an environment with Aculab or Dialogic cards, you will need to distribute the voice cards over two separate [reasonably spec'd] PCs. This is in addition to the Stratus Server, so the total solution is three PCs

Appendix

Acronyms

DR = Disaster Recovery

RAID = Redundant Array of Inexpensive Disks or Redundant Array of Independent Disks; RAID arrays use multiple physical disk drives to achieve improved performance and/or improved redundancy.

MTBF = Meantime between Failures

UPS = Uninterrupted Power Supply

SAN = Server Area Network or Storage Area Network; A network of shared storage devices accessible from any server in the network

SCSI (“skuzzy”) = Small Computer System Interface; a set of standards for physically connecting and transferring data between computers and [peripheral devices](#). SCSI is most commonly used for hard disks and tape drives, but it can connect a wide range of other devices, including scanners and [CD drives](#).

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