

PLANTSCAPE SERVER

SERVER REDUNDANCY

TABLE OF CONTENTS

Redundancy Options.....	5
Overview.....	5
Redundant Servers	5
Redundant Servers	6
Software Arbitration	6
Communications Director Arbitration	6
Operation	7
When Servers are not Synchronised	7
Synchronising	8
Steps to Configure Redundant Servers	8
Non-Database File Transfer.....	10
Introduction.....	10
Defining which files to transfer	10
Changing the transfer period.....	10
Station Setup	11
Single Network	11
Dual Networks	12
Monitoring Redundancy Operation	13
Station Server Redundancy Status page.....	13
Historising Redundancy activity	13
Fast Failover	15
Introduction.....	15
How to Configure	15

SESSION OBJECTIVES

At the end of this section of the course the student will be able to:

- Describe the operation of the PlantScape Server Redundancy option
- Configure a pair of PlantScape Servers to operate in Redundant mode
- Configure Stations to operate with a pair of Redundant PlantScape Servers
- Synchronise the databases of a pair of Redundant PlantScape Servers

REFERENCES

Knowledge Builder:-Server & Client Configuration Guide→
Configuring & Monitoring a Redundant System

Redundancy Options

Overview

Within the PlantScape system there are several levels of redundancy are available

- **Redundant Servers**
Protects against computer hardware failure in the PlantScape Server
- **Redundant Ethernet Networks**
An extension of the Redundant Servers option this protects against network failure
- **Redundant ControlNet**
This topic is covered in the course “PlantScape Hybrid Controller Implementation”
- **Redundant Hybrid Controllers**
This topic is covered in the course “PlantScape Hybrid Controller Implementation”
- **Redundant Channels**
Protects against communications failure between the PlantScape Server and Non-Hybrid Controller(s).
The applicability of this option depends on the type of Controller being used.

Redundant Servers

The purpose of having redundant servers is to provide a higher level of availability of PlantScape Server.

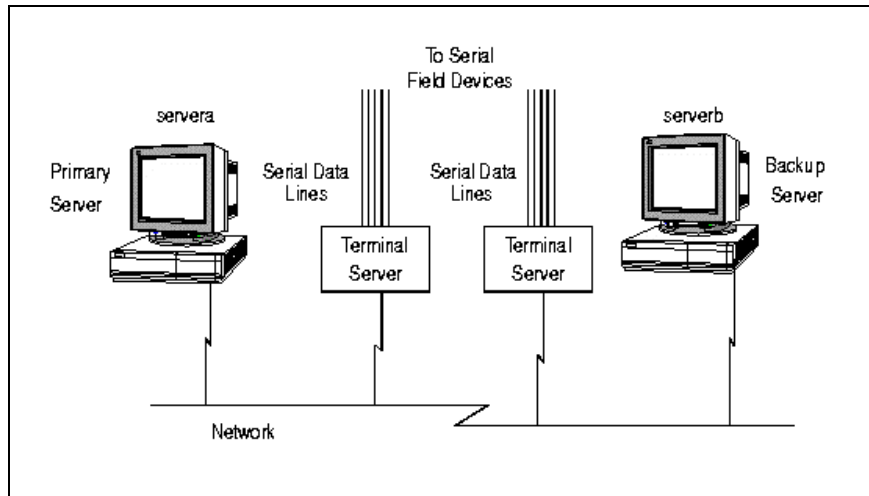
This is achieved by having two servers, one designated “Primary” and the other “Backup”, with automatic “failover” to the Backup in the event of failure of the Primary.

The rest of this section deals with the issues associated with the implementation and operation of Server redundancy.

Redundant Servers

Software Arbitration

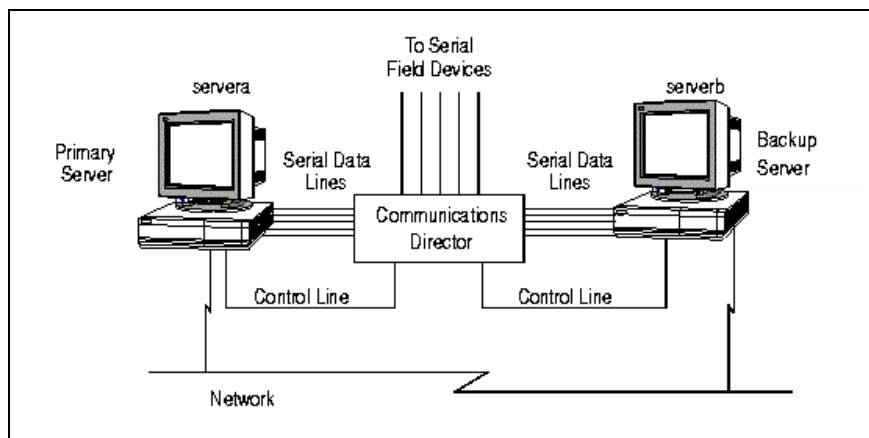
Arbitration software runs in both the primary and backup servers. Each server polls the other to determine whether it has failed. If Controllers are connected using serial links then Terminal Servers are used.



Communications Director Arbitration

The Honeywell Communications Director arbitrates between the primary and backup servers and switches serial devices to the primary server.

Each server polls the Communications Director, using a serial connection called a "Control Line", to determine if the other server has failed.



continued on next page

Redundant Servers.....continued

Operation

The Server that starts first assumes the role of Primary.
When the other Server comes up it will detect that there is a Primary already in operation and will assume the role of Backup.

The Primary Server sends an image of the memory resident database tables to the disk of the Backup Server at a default period of 300s (this is referred to as “checkpointing”).

A write to a Primary Server, disk based, database file or user table, will immediately update the same file or table on the Backup Server. This includes ALL history files.

Changes in selected non-database files can be configured to be transferred to the Backup periodically (see page 10).

With Software Arbitration the two Servers send “keep-alive” messages to each other across the network every second.
If either Server detects a loss of 10 consecutive messages it will assume that the other Server has failed.

An Alarm will be generated by the Primary if failure of the Backup is detected.

On resumption of Backup Server operation it will require manual synchronisation with the Primary.

If the Backup detects failure of the Primary it will automatically assume the role of Primary.
The default change over time is approximately 30 seconds or better (see page 13).

Stations can be configured to re-connect automatically to the Primary Server.

Each Server can be configured to synchronise its date and time with a nominated time source.

When Servers are not Synchronised

When the Servers are not Synchronised, even if the Backup is running:

- checkpointing does not occur
- transfer of disk resident database tables does not occur
- transfer of non-database files does not occur

continued on next page

Redundant Servers.....continued

Synchronising

Following any period of time during which one of the Servers has had its System Service stopped there is no guarantee of either:

- the contents of the two databases being equal, or
- which Server should be considered to have the most current database.

It is left for the user to decide which Server should be Primary and then to request a database synchronisation.

When a Synchronisation is requested the Primary Server will transfer all the configured database tables to the Backup plus all non-database files defined in flbkup.def (see page 10).

Steps to Configure Redundant Servers

The following is a summary of the steps required to configure a pair of Redundant PlantScape Servers.

For details of each step see

*Knowledge Builder:-Server & Client Configuration Guide→
Configuring & Monitoring a Redundant System.*

Step	Action
1	Install identical versions of Windows NT and PlantScape (including the Redundancy option) on both Servers.
2	Setup the Computer Names of each Server: <i>namea</i> the computer that is to be normally Primary <i>nameb</i> the computer that is to be normally Backup
3	Install network cards and TCP/IP on each Server.
4	Configure and test the “hosts” file on both Servers.
5	Edit the redun.hdw file then run hdwbld to define the connection(s) between the two Servers. <div><div>Attention It is advisable to set the RECOVER option to REBOOT.</div></div>

continued on next page

Redundant Servers.....continued

Steps to Configure Redundant Servers

....continued

6	<p>Configure time synchronisation between the Backup and Primary, or between both Servers and an external time source.</p> <div><p>Attention</p><p>Ensure that the time zone is the same on both servers with automatic daylight saving changes disabled.</p></div>
7	Configure the flbkup.def file as required (see page 10) to enable changes in non-database files to be transferred periodically from the Primary to the Backup.
8	Configure the Station setup files (see page 11 of this Student Guide).
9	Stop PlantScape Server Daemons service on both Servers.
10	Start PlantScape Server on <i>namea</i> (the nominal Primary) and ensure that it starts successfully.
11	Start PlantScape Server on <i>nameb</i> (the nominal Backup) and ensure that it starts in Backup mode.
12	Display the Redundancy Status page: System Menu→System Status→Server Redundancy
13	Ensure that the Backup status is OK.
14	Synchronise the Backup with the Primary.
15	Configure the Primary database as required.

Non-Database File Transfer

Introduction

In addition to the transfer of database tables previously described, the Servers can be configured to transfer non-database files from Primary to Backup.

Each time the transfer is scheduled the Primary checks the date/time labels on the corresponding files in the Primary and Backup and only transfers files when the Primary version is newer than the Backup version.

Defining which files to transfer

The files to be transferred are defined by editing the file \honeywell\server\data\flbkup.def in both the “A” and “B” Servers.

```
*****
* flbkup.def
*
* This is a sample configuration file specifying which directories
* on the primary server should be sent to the backup server.
* *****
* Valid syntax is any line starting with the character
*   '*' is a comment line,
*   'S' indicates the directory (and subdirectories)
*       should be sent to the backup.
*   'X' indicates the directory should be excluded.
*
* There should also be a line starting with the character 'T'
* for the last transfer time. Do not change this line.
T 10/11/96 11:52:57
*
* Uncomment the following line to send your custom files and
*                                     applications to the backup
*S c:\honeywell\server\user
* Uncomment the following line to send your custom displays to the
*                                     backup
*S c:\honeywell\client\abstract
* Uncomment the following line to send your Quick Builder database to
*                                     the backup
*S c:\honeywell\client\qckbld
* Uncomment the following line to send your history archives to the
*                                     backup
*S c:\honeywell\server\archive
* Uncomment the following line to send your report output files to
*                                     the backup
*S c:\honeywell\server\report
```

Changing the transfer period

The default transfer period is 60 minutes.

To define a different period add the following entry in redun.hdw and re-run hdwblt if it has been previously run:

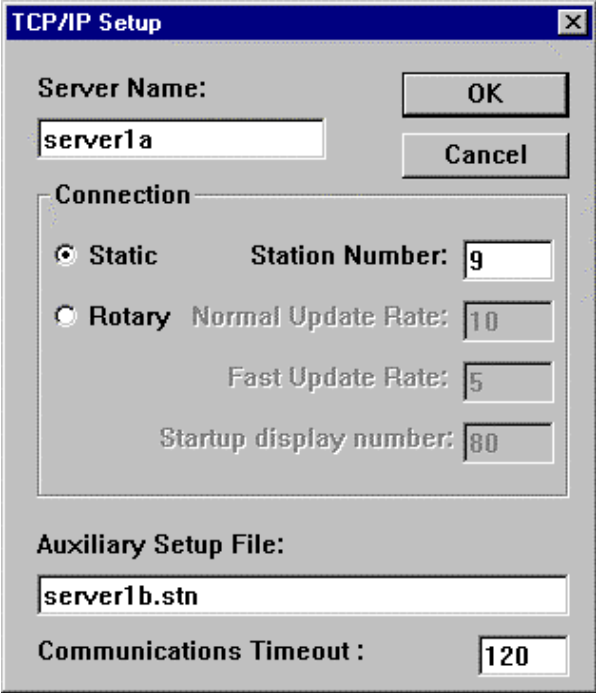
```
ADD LNK00 .....DAEMON_VALUE2=nn
      :      :      :      :      :
      :      :      :      :      :
ADD LNK01 .....DAEMON_VALUE2=nn
```

where *nn* is the required period in minutes.

Station Setup

Single Network

To configure a Station to work with Redundant Servers and automatically reconnect when failover occurs, follow this procedure:

Step	Action
1	<div>Start a Station, configure the TCP/IP setup settings as shown, and save as filename server1a.stn.....</div> <div></div>

continued on next page

Station Setup.....continued

- 2 Reset the TCP/IP setup settings as shown and save as filename server1b.stn:

The screenshot shows the 'TCP/IP Setup' dialog box. The 'Server Name' field is set to 'server1b'. Under the 'Connection' section, 'Static' is selected, and the 'Station Number' is 9. The 'Rotary' option is unselected. The 'Normal Update Rate' is 10, 'Fast Update Rate' is 5, and 'Startup display number' is 80. The 'Auxiliary Setup File' is 'server1a.stn' and the 'Communications Timeout' is 120. There are 'OK' and 'Cancel' buttons.

- 3 Configure desktop shortcut for Station with the target:
c:\honeywell\client\station\station server1a.stn

Dual Networks

When a dual network is being used there are different strategies available for configuring the setup files.

The following strategy should be used if it is considered that the PlantScape Server is more likely to fail than the network.

Setup filename	Connect to Server...	Using network...	Auxiliary Setup filename
server1a0.stn	server1a	first	server1b0.stn
server1b0.stn	server1b	first	server1a1.stn
server1a1.stn	server1a	second	server1b1.stn
server1b1.stn	server1b	second	server1a0.stn

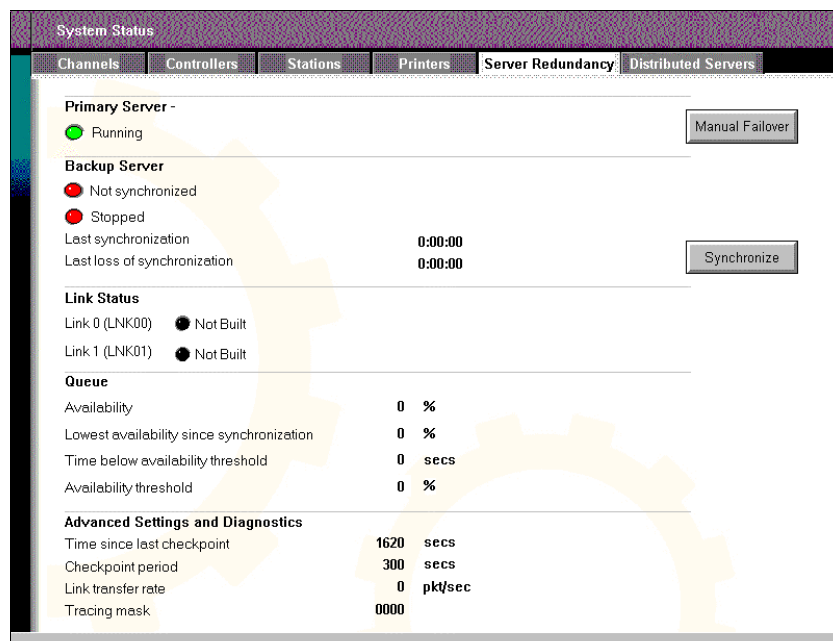
If it is considered more likely for the network to fail than the PlantScape Server then the 2nd and 3rd sequences in the above table should be exchanged.

Monitoring Redundancy Operation

Station
Server Redundancy
Status page

In Station select

System Menu⇒System Status⇒Server Redundancy



Historising
Redundancy activity

Server Redundancy activity can be historised by building three special points whose definition data is provided with the system.

To build the points follow this procedure:

Step	Description
1	Start Quick Builder and open the Server's project file.
2	Select Tools⇒Import , browse to the PSc Server file c:\honeywell\server\user\redun.pnt and click Open .
3	For each point's PV Source address change the Controller to a valid Controller name, preferably a Controller that has been configured specifically for database or "dummy" points.

continued on next page

Monitoring Redundancy Operation.....continued

4	<p>Edit the following, and any other, point parameters as desired:</p> <ul style="list-style-type: none">• set the engineering units of redun_cur_q_ava to %• set the engineering units of redun_xfer_rate to pkt/s• set the State3 descriptive text of redun_syncd to INVALID• configure redun_syncd for Fast and Standard history
5	<p>Add these three points to a Trend page and monitor as required</p>

Fast Failover

Introduction

It is possible to tune Station and Server timeout parameters to achieve approximately 10 second reconnect time after failover.

This option is only available when using Software Arbitration and the following should be noted about its use:

- Static Stations will reconnect marginally faster than Rotary Stations
- When restoring Station from a minimised state the message **Disconnecting/Reconnecting** will appear. This can be ignored, it indicates that Station is re-establishing its connection with the Server.
- Station and Server will put an increased amount of traffic onto the network
- Server will have an increased susceptibility to failover due to network disruptions

Because of the last two points it is recommended to isolate the Servers and, if possible, the Stations from as much network traffic as possible.

How to Configure

The following Server and Station parameters need to be configured to achieve fast failover and reconnect

Step	Action
1	<p>On every Station edit the %SystemRoot%\station.ini file to uncomment the following two lines:</p> <pre>KeepAliveTimeout=30 DisConnectTimeout=30</pre> <p>The units for these settings are 0.1s and the defaults are 15.</p> <p>Stop and restart Station for the changes to take effect.</p> <p>These settings control how long Station waits after losing connection to a Server before it tries to connect to then next one.</p>

continued on next page

Fast Failover.....continued

2	<p>Ensure that the hosts file on all machines contain entries for all the Server and Station machines in the system.</p> <p>This minimises the time taken to resolve hostnames to IP addresses.</p>
3	<p>Run fileio to change the value of F:8, R:1, W:82 (ripsd timeout) from 0 to 5.</p> <p>The data type is INT2.</p> <p>This setting controls how long the Server takes to relinquish a network connection to Station so that the Station can attempt to reconnect on the other link.</p>
4	<p>Alter the Server arbitration timeouts on the Backup Server by adding the following entries in redun.hdw:</p> <p>ADD PSW00IDLE=5 READ=10</p> <p>IDLE defines the period of keep alive messages between the Servers (units = 0.1s, default = 10)</p> <p>READ defines the number of messages that must be lost before failover occurs (default = 10)</p>
5	<p>Stop the System and Daemons Services on the Backup Server.</p>
6	<p>Open a Command Prompt and run the commands:</p> <pre>cd \honeywell\server\user hdwbld redun.hdw - out redun.out</pre> <p>Open the file redun.out to diagnose any errors that occur during this step.</p>
7	<p>Start the System and Daemons Services and ensure that it starts as Backup.</p>
8	<p>Synchronise the Servers and then Manually Failover to the other Server and repeat steps 4 to 7.</p> <p>Complete the process by Synchronising the Servers.</p>