

# Redundancy Options in NotauScore

Artur Uzieblo (AUS 83369)

## 1. TABLE OF CONTENTS

2. Document.....	1
3. Overview.....	1
4. Currently supported operation.....	3
5. Networking configuration.....	3
6. NotauScore configuration.....	6

## 2.DOCUMENT

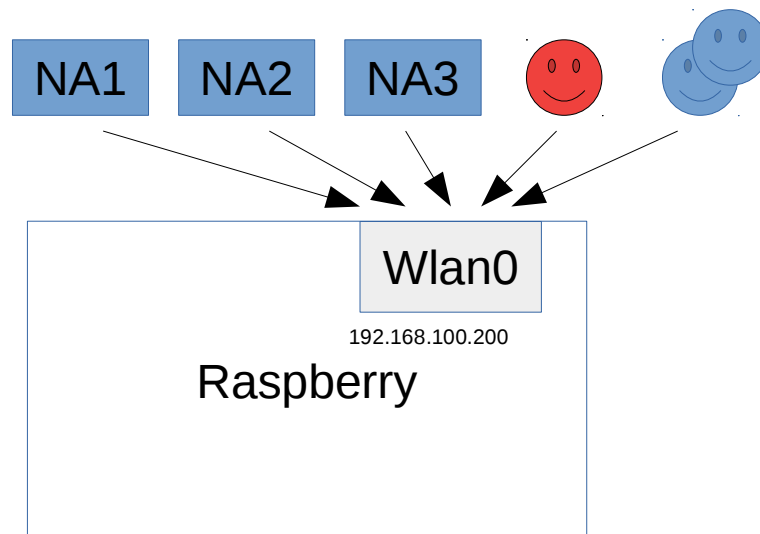
Purpose of this document is to describe Architecture and Configuration of redundancy option in NotauScore.

## 3.OVERVIEW

In a normal field mode of operations NotauScore is usually deployed on a single, battery powered Raspberry Pi 3. The raspberry provides a wireless Access Point (on wlan0) that is used for Notautomatics communications (scores, miscellaneous) and administrator and the users access.

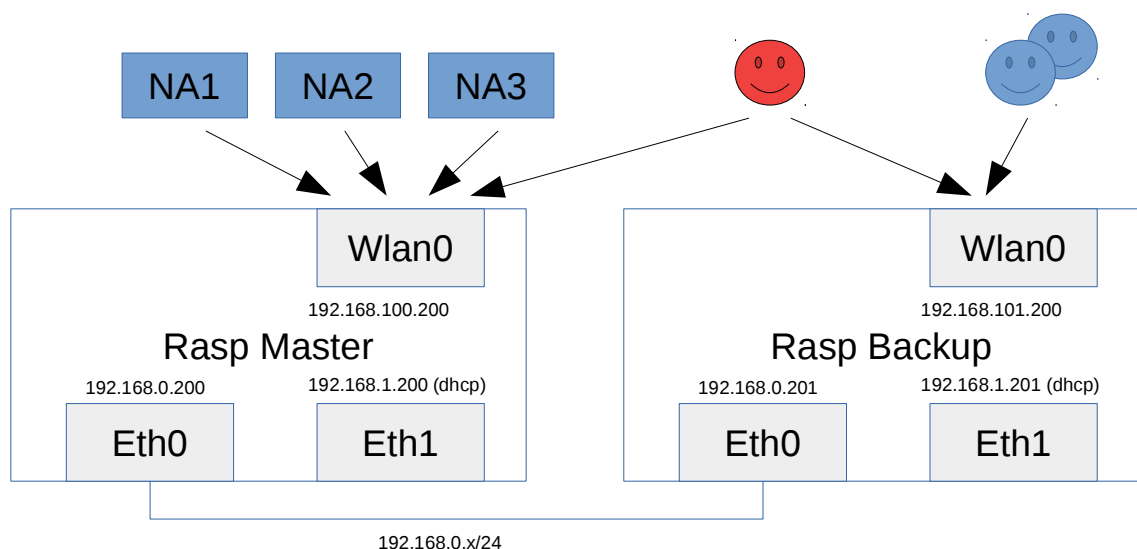
This works great in smaller and medium size competitions where the user load on the systems is resonable and until the time when either the SD card or some of the software modules of the systems become corrupt.

### *Normal mode of operations*



In the redundant mode of operations, two raspberries with identical competition configuration work in tandem, duplicating the score storage and sharing the system and user load.

### *Redundant mode of operations (example networking)*



Major benefits of the redundant configuration are:

1. results received from Notautomatics are stored on both units in separate databases

2. If any of the systems or their modules becomes corrupted, the competition may continue uninterrupted using the remaining system (some wlan0 reconfiguration may be required on the redundant raspberry)

3. The Master raspberry load is minimal improving its performance and reducing risks

Please note that if the infrastructure allows for this, the redundant system platform may be different than raspberry and will support application of PCs or other systems. The redundant system may be either local or remote and could be accessed (including user access) via the public Internet.

## 4. CURRENTLY SUPPORTED OPERATION

Upon receiving scores from any of the Notaumatics, the Master Notauscore system will forward the results to the Redundant Notauscore. It is performed almost immediately, before storing the results in the local database. This way both of the systems will have the most updated results.

At this stage, any of the administration operations on both of the systems must be performed manually. It will change in the future where some of the operations will be automatically synchronised from Master to Redundant. It will be done either by bulk dB updates (total table synchronisation), transactional or both:

- flight status synchronisation
- manual results updates
- results calculations
- competition definition and updates (flights, pilots, judges, etc)
- other

## 5. NETWORKING CONFIGURATION

New addition to the networking configuration is a new private subnet connecting two systems via Ethernet ports. Raspberry is equipped with only one electrical Ethernet port so if there is a need to connect to any of the raspberries configured for redundancy, an Ethernet USB dongle should be used. Ethernet 1 (eth1) has been configured for this purpose. Other changes to the networking include:

1. Master
  - a) changing wlan0 access password limiting it to Notaumatics and admin
  - b) configuring eth0 static IP address
  - c) configuring eth1 (via external Ethernet USB dongle) for direct access from external devices
2. Redundant
  - a) changing wlan0 Access Point IP address
  - b) configuring eth0 static IP address

- c) configuring eth1 (via external Ethernet USB dongle) for direct access from external devices

Configuration of both of the devices can be performed by accessing Raspberry Operating System as a 'pi' sudo user and performing the following tasks:

1. remove udhcp on both Master and Redundant raspberry - some systems may have an option to use udhcp or dhcp software packages to provide DHCP server. Remove udhcp and use dhcp only
  - a) [pi@notauscore](#):~ \$ sudo apt remove udhcpd

2. configure Master dhcp
  - a) edit /etc/dhcp/dhcp.conf and define the following subnet. It will be used to provide a pool of ip addresses to wlan0 interface

```
subnet 192.168.100.0 netmask 255.255.255.0 {
    range 192.168.100.10 192.168.100.30;
    option broadcast-address 192.168.100.255;
    option routers 192.168.100.200;
    default-lease-time 600;
    max-lease-time 7200;
    option domain-name "local";
    option domain-name-servers 192.168.100.200;
}
```

- b) edit /etc/default/isc-dhcp-server and confirm that it contains

```
INTERFACES="wlan0"
```

3. configure Master networking
  - a) edit /etc/network/interfaces

```
auto lo
iface lo inet loopback

# sequence is very important, the electric eth1 receiving client requests
must be on the top of eth0
auto eth1
iface eth1 inet dhcp

auto eth0
iface eth0 inet static
address 192.168.0.200
netmask 255.255.255.0
network 192.168.0.0
broadcast 192.168.0.255
gateway 192.168.0.1

allow-hotplug wlan0
iface wlan0 inet static
address 192.168.100.200
netmask 255.255.255.0
gateway 192.168.100.1

allow-hotplug wlan0
iface wlan0 inet manual
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf
```

4. configure Master wlan0
  - a) edit /etc/hostapd/hostapd.conf. This file defines SSID 'notaumatics' and its password 'notaumatics34'.

```

interface=wlan0
driver=nl80211
ssid=notaumatics
hw_mode=g
channel=8
mcaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=notaumatics34
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP

```

## 5. configure Redundant dhcp

- a) edit /etc/dhcp/dhcp.conf and define the following subnet. It will be used to provide a pool of ip addresses to wlan0 interface

```

subnet 192.168.101.0 netmask 255.255.255.0 {
    range 192.168.101.10 192.168.101.50;
    option broadcast-address 192.168.101.255;
    option routers 192.168.101.200;
    default-lease-time 600;
    max-lease-time 7200;
    option domain-name "local";
    option domain-name-servers 192.168.101.200;
}

```

- b) edit /etc/default/isc-dhcp-server and confirm that it contains

```

INTERFACES="wlan0"

```

## 6. configure Redundant networking

- a) edit /etc/network/interfaces

```

auto lo
iface lo inet loopback

# sequence is very important, the electric eth1 receiving client requests
must be on the top of eth0
auto eth1
iface eth1 inet dhcp

auto eth0
iface eth0 inet static
address 192.168.0.201
netmask 255.255.255.0
network 192.168.0.0
broadcast 192.168.0.255
gateway 192.168.0.1

allow-hotplug wlan0
iface wlan0 inet static
address 192.168.101.200
netmask 255.255.255.0
gateway 192.168.101.1

allow-hotplug wlan0
iface wlan0 inet manual
wpa-conf /etc/wpa_supplicant/wpa_supplicant.conf

```

## 7. configure Redundant wlan0

- a) edit /etc/hostapd/hostapd.conf. This file defines SSID 'notauscore' and its password 'notauscore1'.

```

interface=wlan0

```

```
driver=nl80211
ssid=notauscore
hw_mode=g
channel=8
mcaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=notauscore1
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

## 6. NOTAUSCORE CONFIGURATION

New addition to the configuration is a new configuration parameter 'REDUNDANCY' that is either configured to an IP address or disabled '-'.

Master - valid IP address or a host, e.g. 192.168.0.201, raspberry2.apa.org  
Redundant - '-'