

STAPS**Wireless Steam Trap Monitoring System**

Installation and

Operating Instructions for use with Windows 7 operating systems



1. Safety Information
2. Technical glossary
3. Order of installation
4. Software installation
5. Software commissioning
6. Fault finding
7. Appendix A



1. Safety information

Safe operation of this unit can only be guaranteed if it is properly installed, commissioned and maintained by a qualified person in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

Registered Address:

**Spirax-Sarco Limited
Charlton House
Charlton Kings
Cheltenham
Glos
GL53 8ER**

2. Technical glossary

Cat5e cable

Cat5e cable is used to physically connect separate networked devices. The cable can be installed permanently as part of the site infrastructure (structured cabling) or be used as short 'patch' cables to connect a networkable device to a switch or hub through the structured cabling using RJ45 plugs and wall sockets.

DHCP - Dynamic Host Configuration Protocol

Dynamic host configuration protocol is a network service provided by a local machine (usually a server) that will automatically allocate an IP address to a networkable device that wishes to join a LAN. If a DHCP service is not locally available then the device will need an IP address to be manually configured.

Encryption

Encryption refers to the encoding of information using a pre-agreed cipher key prior to over-the-air radio transmission. The same 'key' is needed to decrypt the messages into a useable form at the receiver.

Ethernet

Ethernet is the physical transport medium for a networking protocol (eg TCP/IP).

Ethernet Cable

See Cat5e cable.

Head

An individual trap sensing device which is networkable.

Hexadecimal

Counting system using base 16 as opposed to a decimal system using base 10. Extensively used in computer programming and network addressing applications. Also called hex.

Intelligent Head

A normal Head unit which has received additional configuration in order for it to act as a repeater device. The head will wake up and perform the normal trap analysis functions and then it will arbitrate to offer a re-transmission service for any other heads which are on the network but not directly in range of a receiver or repeater.

IPv4 Address – Internet Protocol Address

A set of four binary octets represented in decimal by four numbers between zero and 255. IP addresses can be manually (static IP) or automatically (DHCP assigned) allocated to a network entity for identification purposes.

LAN - Local Area Network

A Local Area Network is a logical group of interconnected devices in a limited geographical area such as a home, school, factory, or office building.

MAC Address – Media Access Control

A media access control address is a unique number (in the form of six groups of two hexadecimal digits) that is assigned to a networkable device at the time of manufacture. As the number is unique it can be used to identify and address particular members of a network.

Network Administrator/IT Administrator (IT Admin)

The network administrator is an individual that is responsible for the maintenance and monitoring of computer hardware, software systems and related equipment that make up a computer network.

This individual should be able to supply the required advice and details to install the STAPS system onto your companies network.

Network Switch /Switch /Hub /Router

A switch is a device used on a computer network to physically connect devices together. Multiple devices can be connected to a switch to enable the devices to communicate with each other forming a LAN.

A router is a device that allows connections between computer networks such as a LAN and the Internet, it may have a limited switch capability.

Orifice Size

The orifice size is the size of the hole in the trap seat that the condensate passes through.

PAN – Personal Area Network

A collection of co-operative devices sharing a similar geographical location and having a common PAN-ID.

PAN-ID - Personal area network identification

A PAN-ID is a number allocated to a network co-ordinator (receiver). Heads will base a decision on which network to join based on their PAN-ID. The default PAN-ID is zero which means that the device will join any network and then assume the PAN-ID of that network. A device with a non-zero PAN-ID allocated by the user will only join a network that has the same non-zero PAN-ID.

Ping or Pinging

This is a procedure that sends a signal from the PC to another devices IP address to see if it responds. This tests the network to ensure that the route of communication is clear. Contact your Network Administrator who will help with its operation if required.

Receiver

A receiver is a physical device that creates and manages a PAN. It also functions as a gateway between the PAN and the Ethernet network.

Repeater

A repeater is a physical device not attached to the Ethernet network but forming part of a PAN. The function of the repeater is to extend the range of the network, where mains power is available.

RJ45 - Registered Jack 45

RJ45 plugs and sockets along with cat5e cable are used to connect devices together to form a network. Sometimes called an 8P8C connector. Commonly used on standard LAN interconnections.

STAPS

Spirax Total Acoustic Performance Solutions.

Static IP Address

A static IP address is configured manually on a networkable device in order to identify that device on a network; as opposed to an automatic configuration – see DHCP.

TCP/IP - Transmission control protocol/internet protocol

An internationally agreed suite of communications software used to implement computer networks that can range from a home wireless connection up to the internet. TCP/IP provides a framework enabling data communications to be formatted, addressed and routed between networked devices and between networks themselves.

Trap Number

This is the identification number given to a specific steam trap on a plant.

3. Order of installation

3.1 Accompanying documents

The following Installation and Maintenance Instructions are required to complete the system installation:

IM-P014-16

STAPS Wireless Head Unit Quick Installation Guide

IM-P014-25

STAPS Wireless Receiver / Repeater Installation Guide

IM-P014-26

STAPS Wireless Steam Trap Monitoring System Installation and Operating Instructions for use with Windows 7 operating systems

Or

IM-P014-24

STAPS Wireless Steam Trap Monitoring System Installation and Operating Instructions for use with Windows XP operating systems

To ensure that the STAPS system operates correctly adhere to Section 3.2 and you must follow the sequence of installation specified in Section 3.3

3.2 Before Installation:

A preliminary site survey of the plant must be conducted by trained personnel, the survey will identify the optimum number of Receivers and Repeaters together with their most effective location, to give the most robust wireless network.

Ensure a discussion has taken place with your Network Administrator, showing them Section 4.1 of this document.

Observe the 'Safety Information' in each of the above documents.

3.3 Recommended order of installation:

1. Install the application software onto the supporting PC, refer to Section 4.2 of IM-P014-26.
2. From the results of the site survey, carefully select the optimum position for the Receiver ensuring that there is a direct line of sight (20 - 30 m) with as many steam traps that are to be monitored as possible, referring to IM-P014-25.
3. Plug in the Receiver into the network point using an RJ45 ethernet cable.
4. Plug in the Receiver to the mains power supply, and proceed to switch it on.
Note: To act as a Receiver the ethernet network must be available and connected before the power to the receiver is switched on.
5. After a short delay the Receiver symbol will appear in the network maintenance window on the PC application software, refer to Section 5.3 - Network Maintenance of IM-P014-26.
Note: If the Receiver is installed on a different sub-net to the PC, refer to Section 5.13 of IM-P014-26.

If during the site survey it was identified that Repeaters are required complete Steps 6 to 9, if no Repeaters are required skip to Step 10.

6. Carefully select the optimum site for the Repeater ensuring that there is a direct line of sight (20 - 30 m) with as many steam traps that are to be monitored as possible, referring to IM-P014-25.
7. Plug in the Repeater to the mains power supply, and proceed to switch it on (do not plug a cable into the network connection).
Note: A Receiver must be installed and be within radio range before a repeater can communicate to the PC.
8. After a short delay the Repeater symbol will appear in the network maintenance window on the PC application software, refer to Section 5.3 - Network Maintenance of IM-P014-26.
9. Repeat Steps 6 to 8 if further Repeaters were recommended or required.
10. Fit a battery to the first Head, refer to IM-P014-16. As soon as the battery is connected into the Head it will start to transmit and will communicate with the Receiver or Repeater. This will show up on the PC software, after 15 to 30 minutes.
Note: If a Head is powered up without a Receiver being powered up first, the Head battery will discharge quickly as the Head is trying to associate itself with a network.
11. Install the Head unit to the upstream side of the assigned trap (within 150 mm) - Please reference IM-P014-16.
12. Using the software, assign a trap to the Head, refer to Section 5.6 - Assigning traps to Heads IM-P014-26.
13. Repeat Steps 10 to 12 for other STAPS Heads until all traps to be monitored within signal range are completed.
14. When all the Heads and Repeaters under a Receiver are installed and reporting correctly, it is recommended that a unique PAN ID is set for that section of the network before continuing with other Receiver sections.
Refer to Section 5.8 of IM-P014-26.

For full instructions on each step see individual sections.

4. Software installation

Software copyright

Certain computer programs contained in this product [or device] were developed by Spirax-Sarco Limited ('the Work(s)').

Copyright © Spirax-Sarco Limited 2016

All Rights Reserved

Spirax-Sarco Limited grants the legal user of this product (or device) the right to use the Work(s) solely within the scope of the legitimate operation of the product (or device). No other right is granted under this licence. In particular and without prejudice to the generality of the foregoing, the Work(s) may not be used, sold, licensed, transferred, copied or reproduced in whole or in part or in any manner or form other than as expressly granted here without the prior written consent of Spirax-Sarco Limited.

Open source software

This product uses open source software that is based on Freertos general public license (GPL), etc.

Terms and conditions of GPL

For details of GPL, visit the website: <http://www.freertos.org/a00114.html>

Operation guarantee

According to the terms and conditions of the license shown above, we do not guarantee the operation of open source software itself.

Information on respective open source license software

For module names and source codes of open source software that is used in this product, please contact us.

The latest version of this document can be found on the website at the following location:

www.spiraxsarco.com/global/uk/Products/Pages/steam-trap-performance-monitoring.aspx

4.1 Note to the Network Administrator

The STAPS steam trap monitoring system uses an IEEE 802.15.4 2.4 GHz wireless network to concentrate sensor data into a central receiver which has a wired IEEE 802.3 Ethernet connection.

The Receiver has a default TCP/IP address of 192.168.254.101 with a subnet mask of 255.255.255.0.

The Receiver may be operated with this default fixed IP address or it can have a user defined fixed IP address which is set and saved into the receiver using the PC application.

The host PC must be on the same subnet as the receiver in order for the receiver to be automatically discovered by the PC application using a UDP broadcast on port 9700. Any firewalls on the local PC or local network infrastructure must be configured to allow this discovery mechanism to function.

When the receiver starts up it will check to see if it has a previously applied, fixed, non-default IP address, if so it will attempt to join the Ethernet network using this address. If no such fixed IP has been applied the receiver will issue a DHCP broadcast requesting a DHCP server assigned address. If it does not receive an acknowledgement to the DHCP broadcast it will assume that there is no DHCP service and default to the 192.168.254.101 address.

After any interruption of power to the receiver it will restore a previously assigned fixed IP address from configuration memory and turn DHCP discovery broadcasts off. If the receiver has not had a fixed IP address previously assigned it will default to the 192.168.254.101 address unless a DHCP server assigned IP address is available.

UDP broadcasts are not routed between subnets by convention; therefore it is not possible for the PC application to use this method to discover a receiver if it is not on the same subnet as the host PC. To add a receiver that is on a different subnet it is necessary to know the IP address of the receiver in order for the PC application to unicast to the receiver. If the receiver on the different subnet has a fixed or default IP address this is straightforward; however a DHCP assigned address must be recovered from the DHCP server by examining the Ethernet MAC address of the receiver (printed on the label affixed to the rear of the receiver) and recovering the correspondingly paired IP address that was assigned. Ideally the DHCP server should be configured so that the IP address that is assigned to a receiver has a lease time that never expires. In the event of the DHCP service restarting the same IP address should be given to the receiver as it was previously, thus ensuring that the PC is unicasting to the correct device.

4.2 Installing the software:

Software:

1. Windows 7
2. Microsoft .net 4.5

Hardware:

1. 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor.
2. 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit).
3. 16 GB available hard disk space (32-bit) or 20 GB (64-bit).
4. CD/DVD Drive for STAPS CD-ROM installation.
5. 1024 x 768 colour, 32 bit.
6. LAN TCP/IP network connection.

Note: Before actioning any installation observe the 'Safety information' in Section 1.

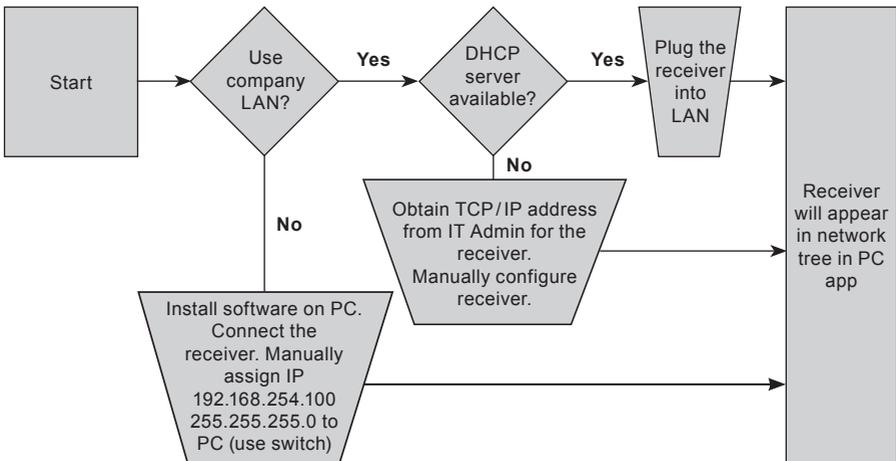


Fig. 1

Option 1 - Stand alone PC network (not using company LAN)

If the STAPS software is not going to use the site LAN, a stand alone network can be set up. A dedicated PC that uses Microsoft Windows 7 .Net 4.5 will be required, together with an ethernet switch (not supplied by Spirax Sarco), connected by an ethernet cable between the PC to switch, and switch to receiver.

1. Insert CD into PC.
2. Using the Windows filing system locate and run the "StapsInstaller" application.
3. Follow any instructions that appear on screen.
4. The software and relevant .net support files will install on to the PC and the STAPS icon  will appear on the desktop.
5. Manually assign the IP address to the PC.
IP 192.168.254.100
Mask 255.255.255.0
6. Ensure Receiver and Network equipment is switched on and fully functioning.
7. Locate and double click on the STAPS icon to run the application.

Option 2 – Using company LAN, without DHCP server

1. Contact the site IT Admin department to obtain an IP address from the system administrator.
2. Add receiver and then configure IP address for the receiver.
3. Configure PC IP address.
4. Insert CD into PC.
5. Using the Windows filing system locate and run the "StapsInstaller" application.
6. Follow any instructions that appear on screen.
7. The software and relevant .net support files will install on to the PC and the STAPS icon  will appear on the desktop.
8. Ensure Receiver and Network equipment is switched on and fully functioning.
9. Locate and double click on the STAPS icon to run the application.

Option 3 – Using company LAN, with DHCP server

1. Contact the site IT Admin department to inform them that you are going to plug the STAPS network onto the system.
2. Plug the Receiver into LAN.
3. Insert CD into PC.
4. Using the Windows filing system locate and run the "StapsInstaller" application.
5. Follow any instructions that appear on screen.
6. The software and relevant .net support files will install on to the PC and the STAPS icon  will appear on the desktop.
7. Ensure Receiver and Network equipment is switched on and fully functioning.
8. Locate and double click on the STAPS icon to run the application.
9. The DHCP server will automatically assign an IP address to the receiver and it will appear on the PC software.

4.3 Changing TCP/IP settings

With reference to Section 4.1; please contact your Network Administrator before you attempt the following:

1. Open Network Connections by clicking the Start button, and then clicking Control Panel. Locate and double click on the Icon "Network Connections".
2. Right-click on the Local Area Connection, and then click Properties. If you're prompted for an administrator password or confirmation, type the password or provide confirmation.
3. Click the General tab. Under 'This connection uses the following items', click Internet Protocol Version (TCP/IPv4), and then click Properties.
4. 'Click' on button for either 'Obtain an IP address automatically', or 'Use the following IP address' and type in 192.168.254.100 (IP address) and 255.255.255.0 (Subnet mask). Click OK, close, then close window. You may need to reboot your PC and Receivers.

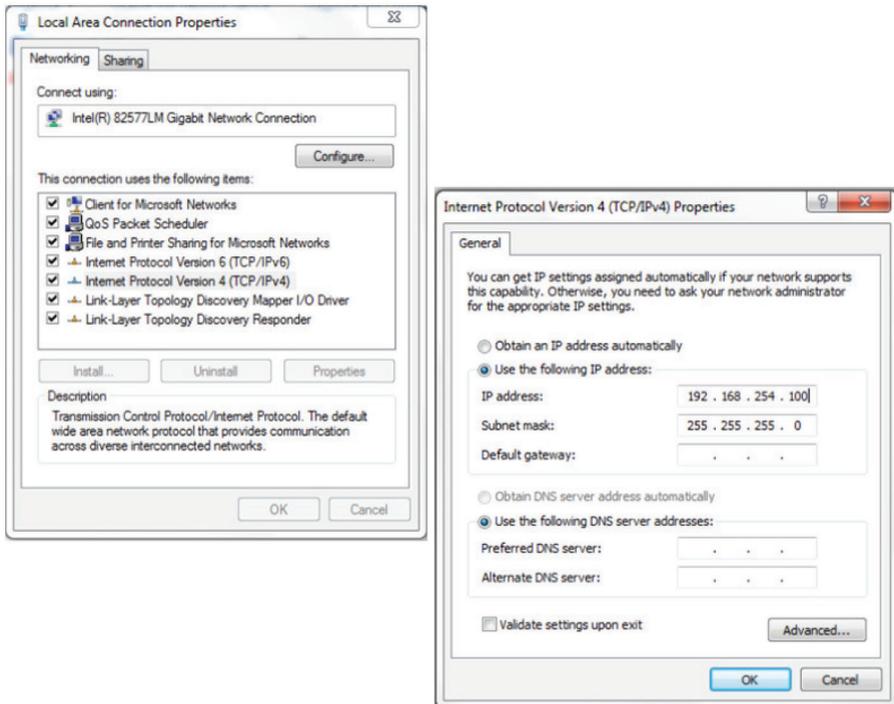


Fig. 2

5. Software commissioning

5.1 Access levels

There are three levels of access to the STAPS software, the default level is User, passwords for each level can found in section 5.21.

User – This is the basic level that enables the operator to view all of the steam traps being monitored as read only.

Maintenance – This allows access to a limited number of additional functions. The system overview, summary, network maintenance and trap maintenance icons are accessible.

Administrator – The administrator has full access to change parameters. The administration icon is accessible in addition to all other icons that are available to the Maintenance level.

Using the drop down menu in UserName box, 'Click' on Administrator.

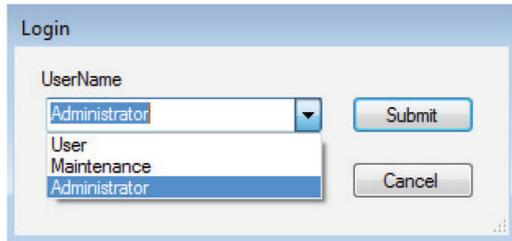


Fig. 3

Submit the password. The screen below will appear. Check that the network is healthy. A green tick and Network Health OK should be displayed in the top center part of the page.

Figure 4 shows the opening screen of the STAPS application. For an explanation of the display please see Section 5.16.

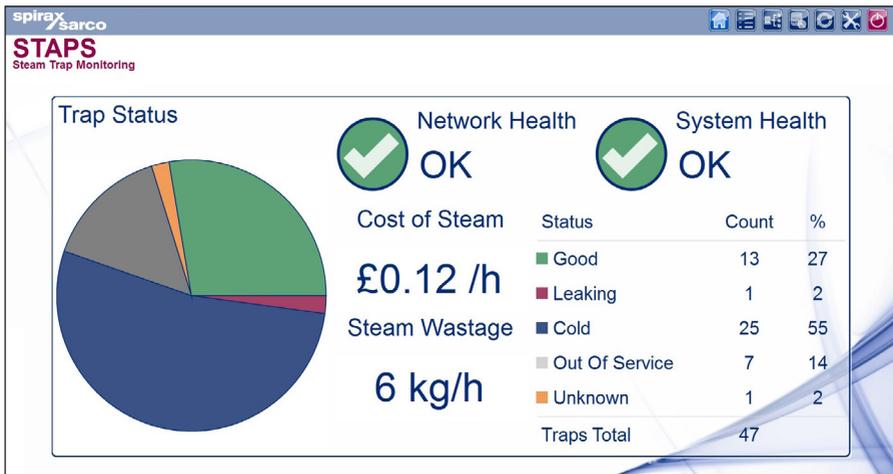


Fig. 4

5.2 Software screen icons

Dependent on the level of access that you have logged on as, you will notice there are a number of icons running along the top of the screen.



Overview - Shows the overview of the Network and System Health. It shows the total number of traps connected to the system, together with their state. It also shows the total system steam wastage figure.



Summary - This shows each trap/head connected to the system and what type of trap it is. The Head unit MAC ID is shown against each trap number, the time and date of the last communication, together with the trap condition, steam loss (if any) and pipe temperatures. The wireless signal strength and battery condition are also indicated.

Trap details and maintenance history can be accessed and amended by using the 'Right Click' mouse function, along with the trend view - See Section 5.10 and 5.11.



Network maintenance - This shows the network tree. The PC, Receivers/Repeaters and Heads with associated traps appear in this view. By clicking on each symbol the MAC ID, PAN ID and IP addresses are shown where applicable.

The 'Right Click' function allows the transmit interval and PAN ID's to be set or changed. - See Section 5.8.2.



Trap database - Allows you to see all of the data for each trap associated to a head.



Upgrade - This allows you to upgrade all heads and receivers with updated software via the wireless network.



Administration - This icon is only accessible if you are logged on as an administrator. This allows you to change access passwords, the software language, units of measure and associated costs.

Note:

The Network maintenance, Trap database, and Upgrade icons are only available if you are logged in as either Maintenance or Administrator levels.

The Administration icon is only available if you are logged on as the Administrator level.

5.2.1 Changing access level



The access level can be changed by using the login / logout button on the top right hand corner of the screen.

Default passwords are:

- **User** : User
- **Maintenance** : Maintenance
- **Administrator** : Administrator

The passwords can be changed for security. This procedure is shown in Section 5.7.

5.3 Network Maintenance

'Click' on the 'Network Maintenance' icon. This will show all of the Receivers, Repeaters and Heads that have connected to the network. Any Receivers found will show underneath the computer symbol.

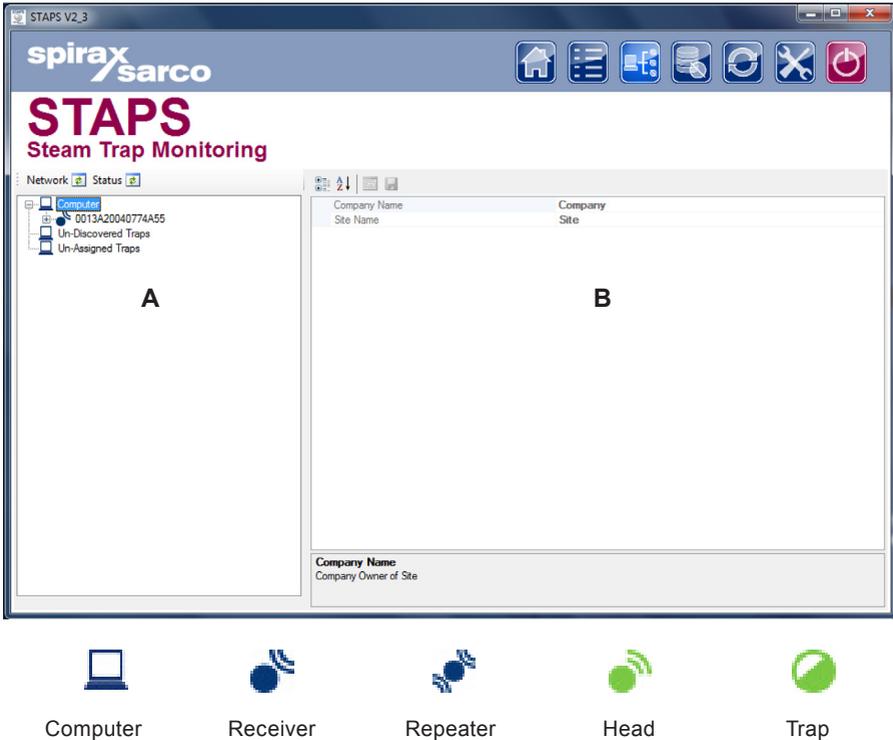


Fig. 5

Section A in Figure 5 above shows the 'network tree' and indicates which Heads and Repeater are associated with which Receivers.

Section B in Figure 5 above shows the details of the highlighted device and will change data accordingly.

The hardware symbols in the software change colour to represent different status. The Table below shows the different states.

Computer		Is always blue
Receiver		Normally blue
		A red exclamation mark will appear if it cannot be reached by the network
Head		Normally Green
		Red if it misses 3 updates
		A red exclamation mark will appear if it cannot be reached by the network
		If blue it is an intellegent head
Traps		Good Trap
		Leaking Trap
		Cold Trap
		Unknown
		Out of Service
Repeater		Normally blue
		A red exclamation mark will appear if it cannot be reached by the network

5.4 Device details

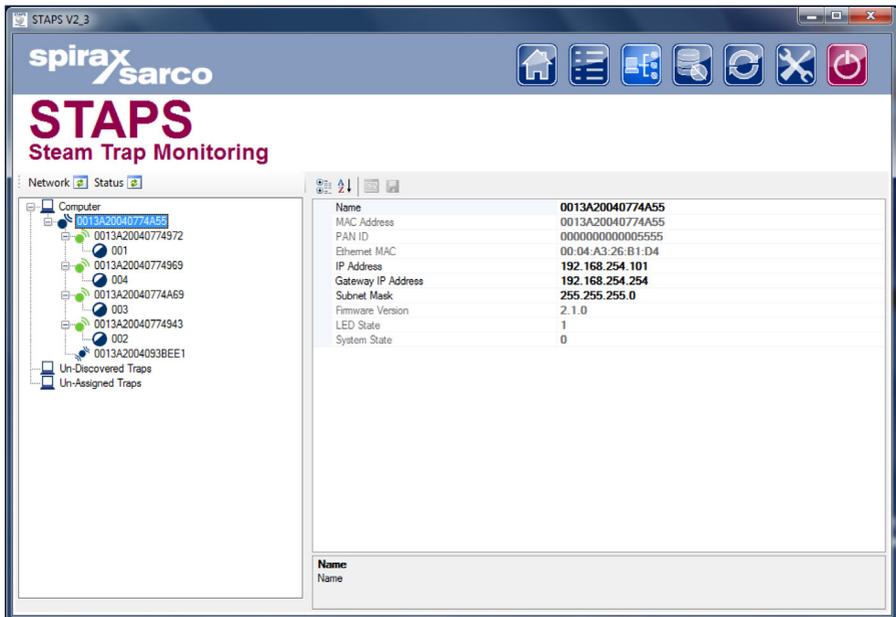


Fig. 6

When you highlight a Receiver or Repeater in the network tree the device details Section will appear as Figure 6.

Name: By default this shows the Wireless MAC address. This can be changed to a more system friendly name e.g. My Receiver 123.

MAC Address: This shows the unique wireless Media Access Control address of the Receiver/Repeater, which cannot be changed.

PAN ID: This shows the PAN ID which can be changed see Section 5.8.2.

Ethernet MAC: This shows the unique Ethernet Media Access Control address of the Receiver/Repeater, which cannot be changed.

IP Address, Gateway IP Address, Subnet Mask: Shows the IP, Gateway and Subnet Mask of the Receiver/Repeater, please contact your Network Administrator before you attempt to adjust the numbers, reference Section 4.1 at the beginning of the document.

Firmware Version: Shows the software version currently operating in the Receiver/Repeater.

LED State: This is for Spirax Sarco maintenance indication only.

System State: This is for Spirax Sarco maintenance indication only.

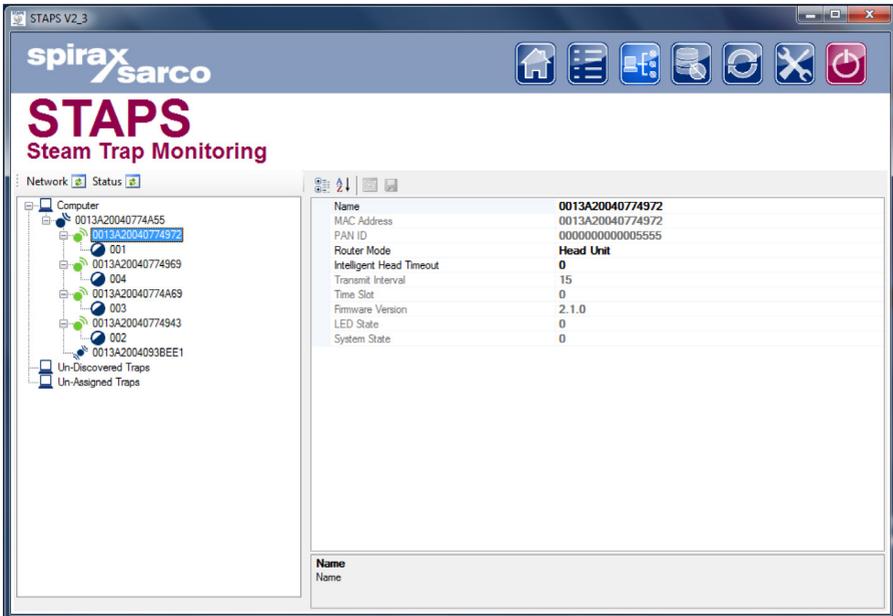


Fig. 7

When you highlight a Head in the network tree the device details Section will appear as depicted in Figure 7.

Name: By default this shows the Wireless MAC address of the Head. This can be changed to a more system friendly name e.g. My Head 123.

MAC Address: This shows the unique wireless Media Access Control address of the Head, which cannot be changed.

PAN ID: This shows the PAN ID which can be changed see Section 5.8.2.

Router Mode: This can set to either Head unit or Intelligent Head. If set to Intelligent the Head acts as a Repeater. This can significantly reduce battery life.

Intelligent Head Timeout: Set in ms this sets the duration that the Head unit listens for transmission to be repeated.

Transmit Interval: 15 mins minimum, the period at which the Head transmits, set by right clicking on the Receiver icon in the network tree, and selecting Transmit Interval, reference Figures 9 and 10.

Time Slot: Indicates which of 15 time slots the Head is allocated to, Spirax Sarco maintenance indication only.

Firmware Version: Shows the software version currently operating in the Head.

LED State: This is for Spirax Sarco maintenance indication only.

System State: This is for Spirax Sarco maintenance indication only.

5.5 Heads and Traps

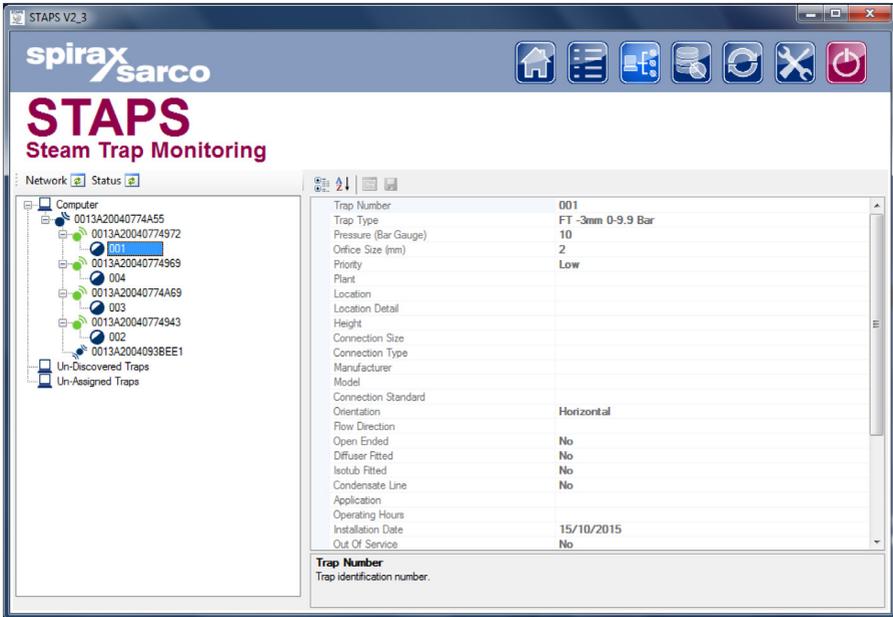


Fig. 8

When you highlight a Trap in the network tree the device details Section will appear as depicted in Figure 8, it shows all the data that has been entered for the trap see Section 5.12.

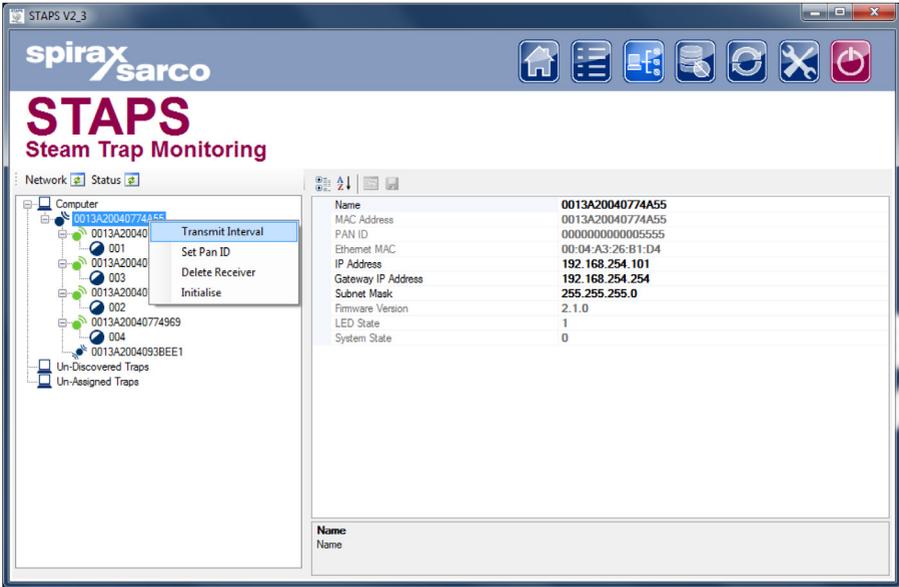


Fig. 9

To change the Transmit Interval select the Network Maintenance icon, right click on the Receiver and Select Transmit Interval.

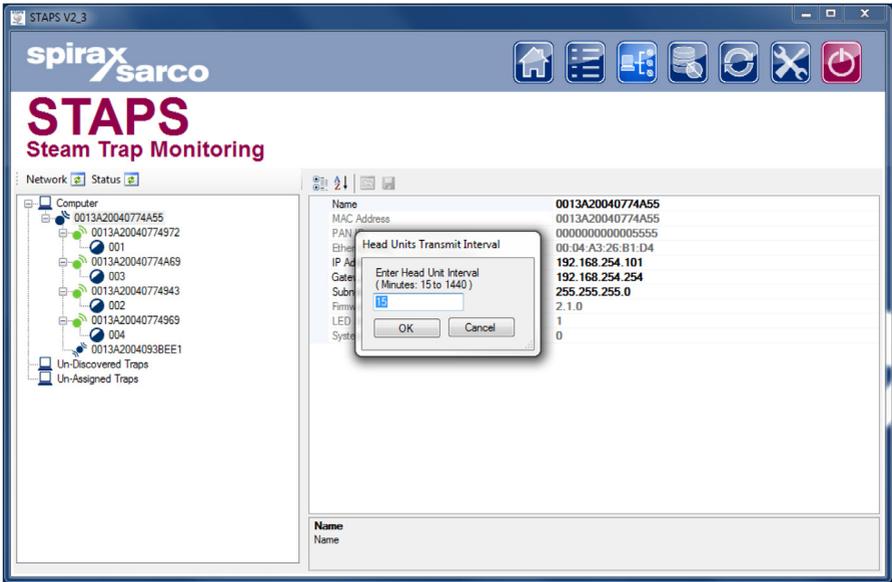


Fig. 10

An interval of between 15 and 1440 minutes can be selected. All Heads under the selected receiver will change to the new update time.

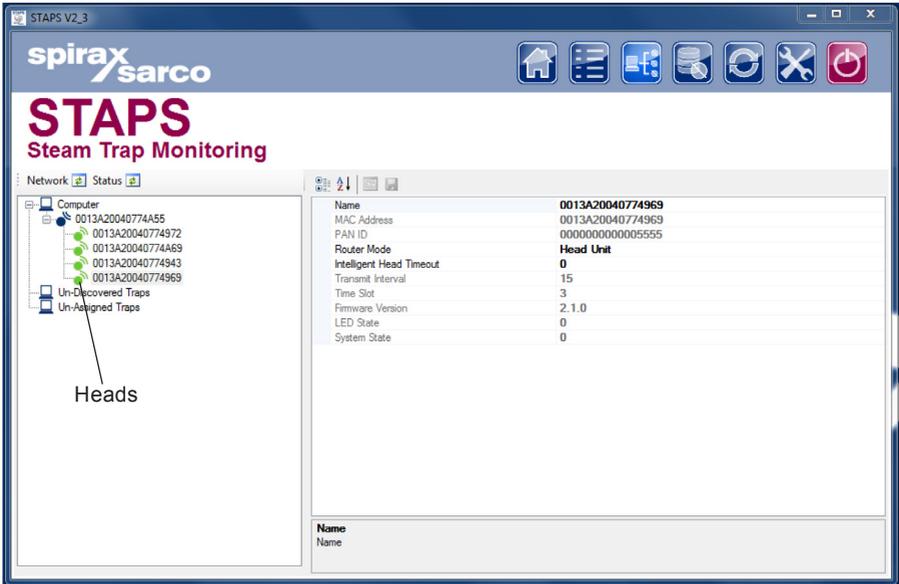


Fig. 11

Any heads will show under the Receiver symbol.

5.6 Assigning traps to heads

Right 'click' on the list entry 'Un-Assigned' trap and 'Click' on 'Add Trap'.

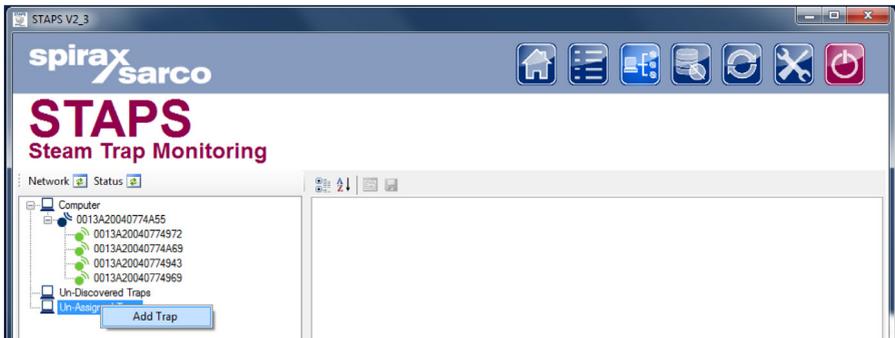


Fig. 12

Fill in all available data

To be able to continue the trap number, trap type, pressure and orifice size must be filled in. The trap number is the number/reference that you wish the trap to be identified by for your plant records. These must be unique to each trap/head as duplications will cause an error.

Sometimes manufacturers display the orifice size fitted to the trap on the product nameplate. If not, the manufacturer will need to be contacted to determine the actual orifice size. Please consult Spirax Sarco for steam trap orifice sizes.

Note: The orifice size and operating pressure is used to calculate the steam leakage. Any inaccuracies in the data entered will lead to inaccuracies in the steam wastage calculation.

Other data can be filled in at a later date - See Section 5.12.

Save and close the window.

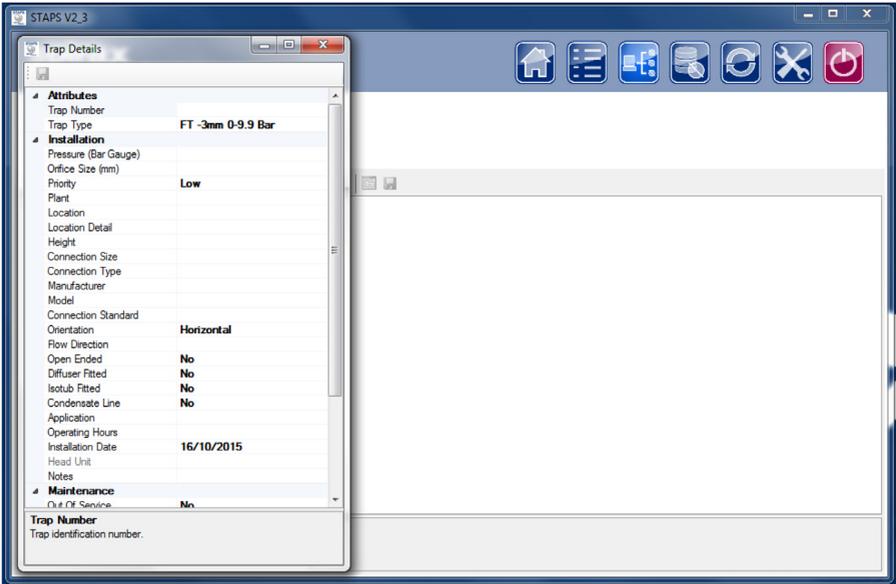


Fig. 13

A trap icon will appear under 'Un-Assigned Traps'.

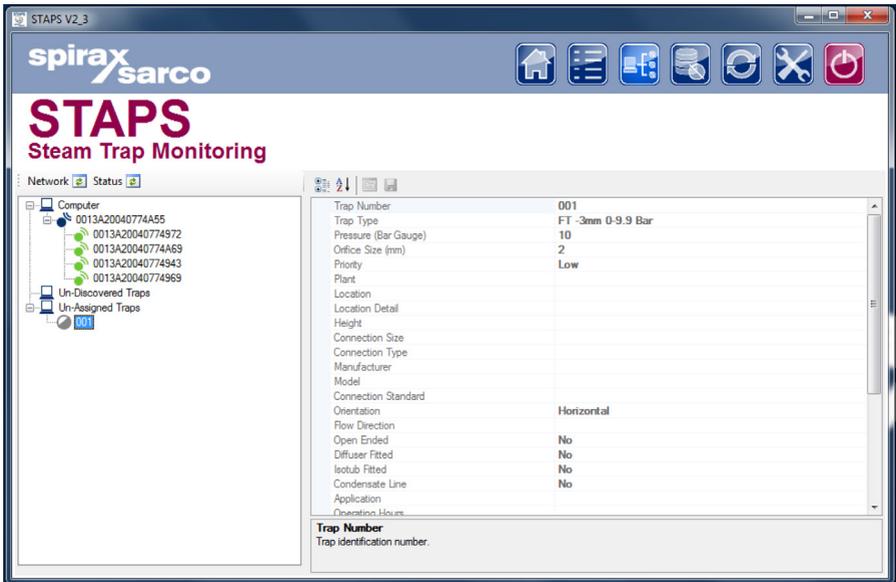


Fig. 14

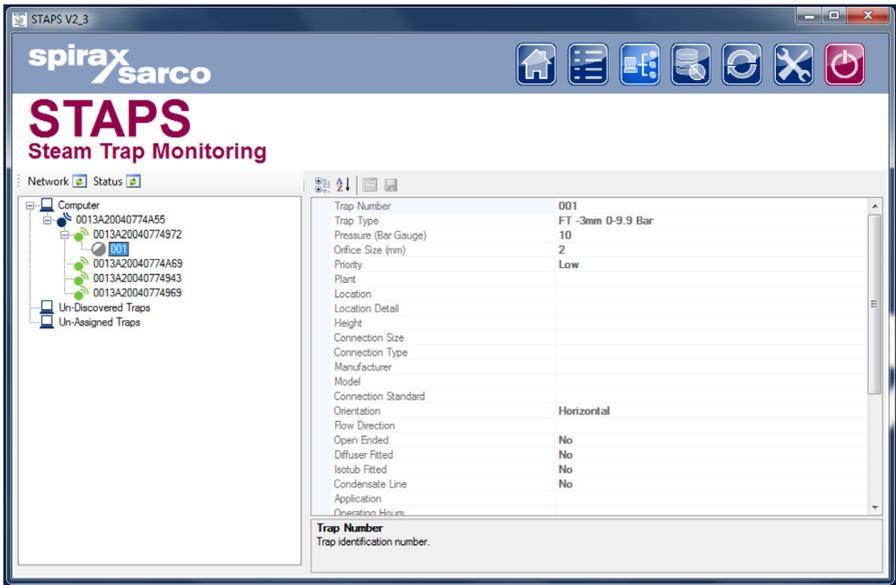


Fig. 15

Drag and drop the new trap onto the head reference, ensuring that the correct trap is allocated to its corresponding head.

'Right Click' on both the trap and the head and click on 'Update Configuration'. This may take some time as the Heads respond every 15 minutes, or longer, dependent on the Head unit Interval referring to Section 5.5.

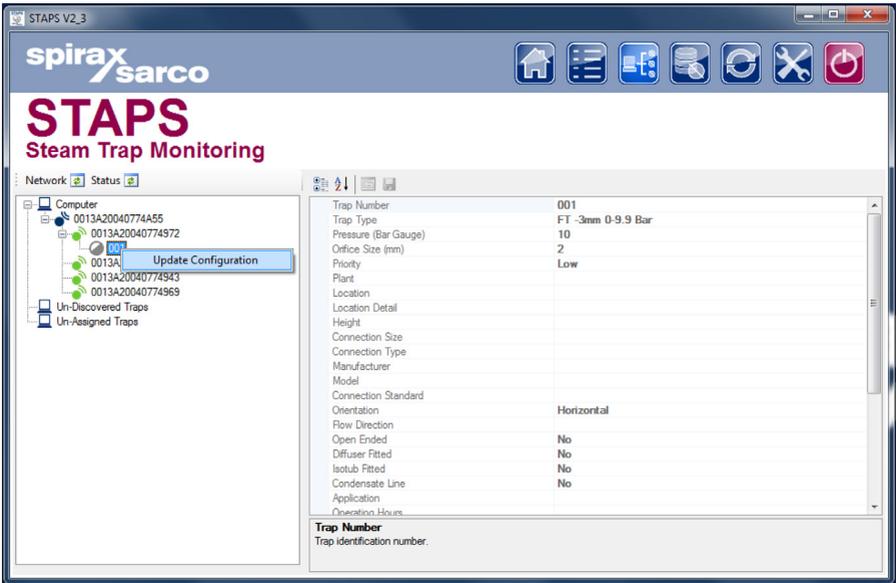


Fig. 16

Repeat to link trap data to all heads. Only one trap can be assigned to a head.

5.7 System administration

'Click' on the administration icon. From here you can change or update the system data.

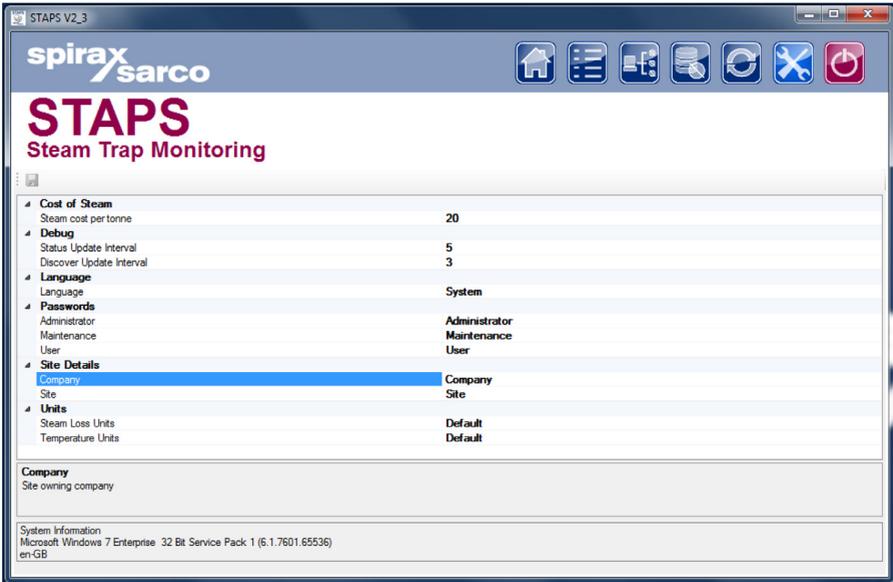


Fig. 17

Cost of steam

This allows you to change or add the cost (in monetary value) that it costs your plant to raise a tonne of steam. This is used to calculate the total cost of steam wastage.

Language

You can select the the application language that the software uses from the drop down list. The default is GB English. If the application language that you require is not listed please contact your local Spirax Sarco office.

Passwords

Each level of access to the STAPS software has its own password protection. The default passwords are:-

User: User

Maintenance: Maintenance

Administrator: Administrator

These can be individually changed here in the administration page. Only the administrator has access to change the passwords. (If you have logged in as a User or Maintenance, the administration icon is not accessible).

Remember to make a note of any changes you make to the passwords, as you will need to enter them the next time you login to the software.

Site details

You can add your company name and site details here.

Units

This allows you to change the engineering units that the system uses. Select the units you require from the drop down menu.

REMEMBER to save any changes you make by clicking the save button on the top left hand corner of this screen.

5.8 MAC address and PAN-ID

The MAC address is a unique number to the piece of equipment it is attached to. This cannot be changed and will remain with the product for its lifetime.



The PAN-ID however is changeable and can be done so through the network maintenance page.

5.8.1 Why change the PAN-ID

The STAPs network is known as a Personal Area Network or PAN. Each network is defined with a unique PAN identifier (PAN ID). This identifier is common among all Heads, Receiver and Repeaters of the same network.

It maybe that you may wish to have two STAPS systems running in parallel, but do not want them to get mixed up together. Changing the PAN-ID's for two different systems to two separate addresses will allow both systems to run independently.

It is strongly recommended that the PAN ID is changed from zero to a number unique to each network ensuring the continued smooth operation of the system. Change at least the last four numbers of the PAN ID.

The PAN-ID is set to zero as a default - See Figure 19.

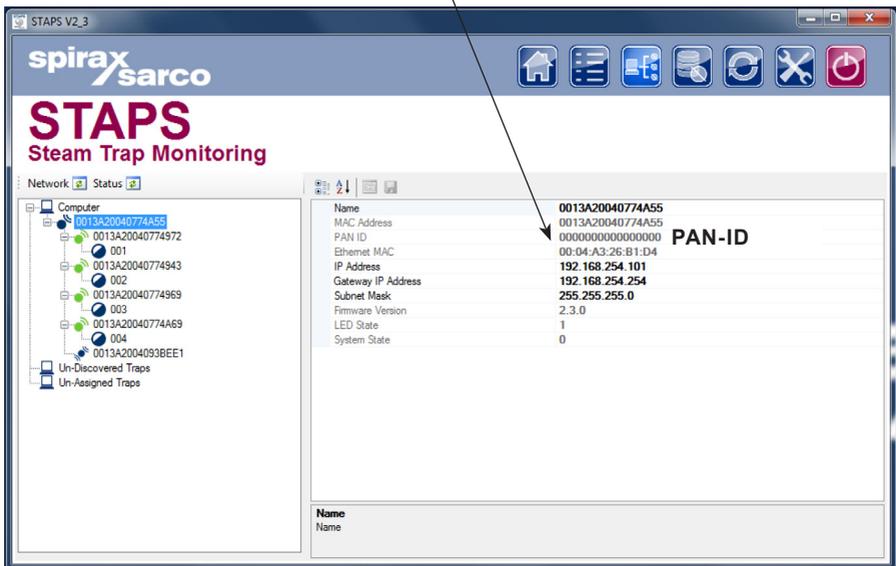
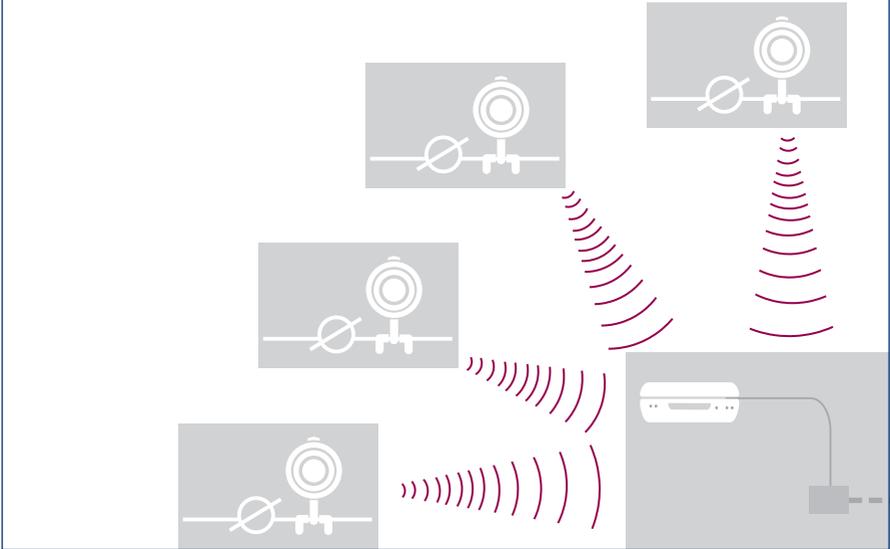


Fig. 19

An example of how the PAN id can be used is shown in the following diagram.

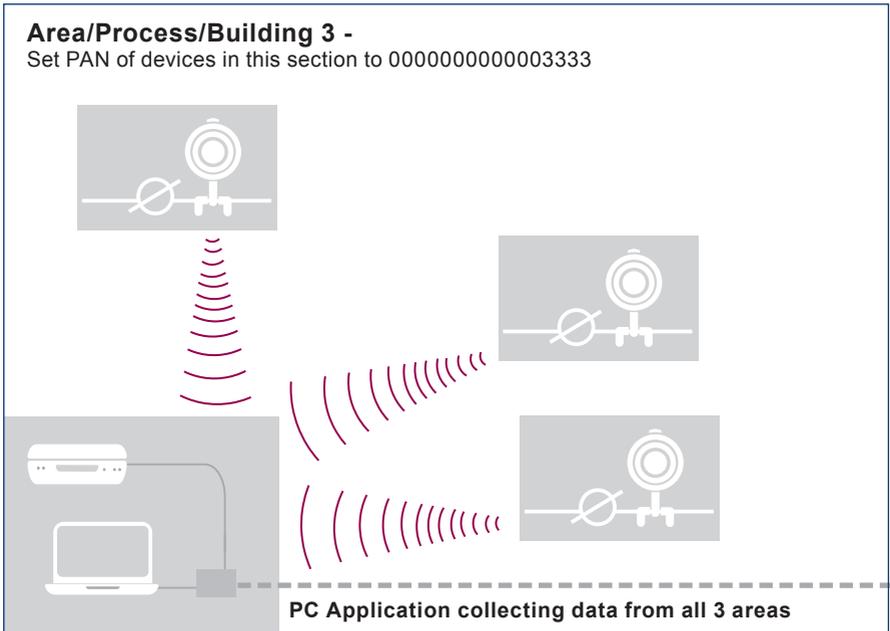
Area/Process/Building 1 -

Set PAN of devices in this section to 0000000000001111



Area/Process/Building 3 -

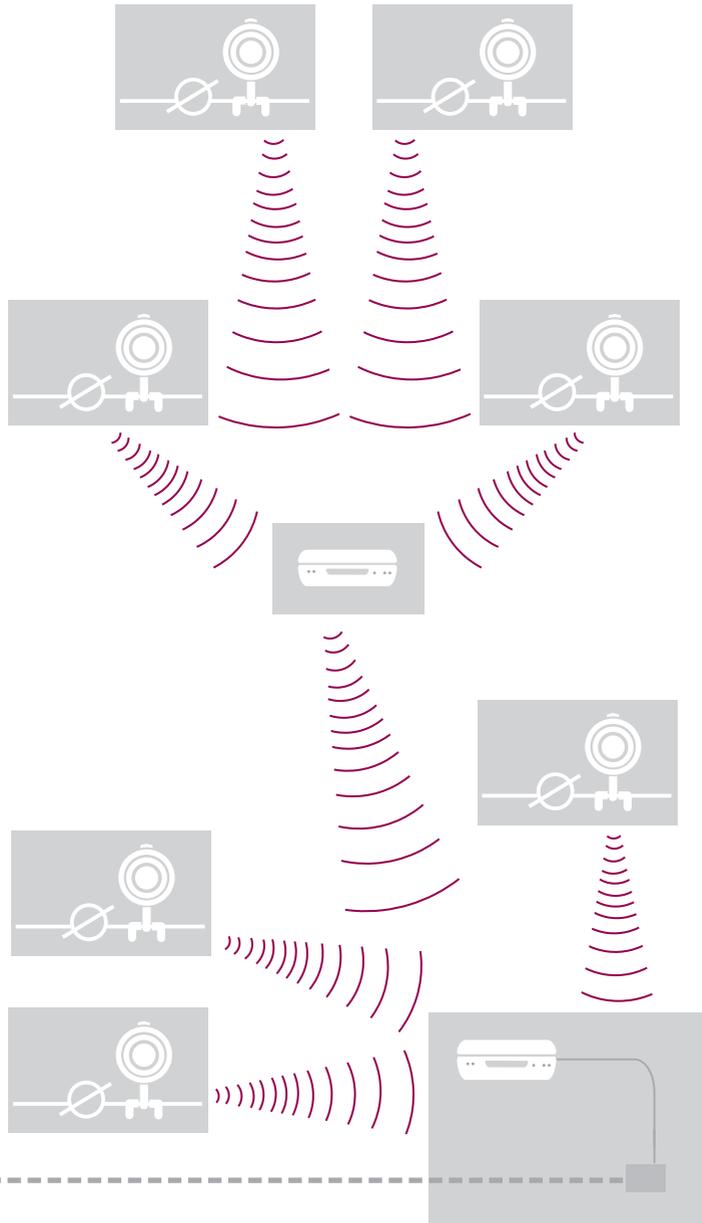
Set PAN of devices in this section to 0000000000003333



PC Application collecting data from all 3 areas

Area/Process/Building 2 -

Set PAN of devices in this section to 0000000000002222



PC



Head unit



Steam trap



Receiver



Repeater



LAN

5.8.2 How to change the Head / Receiver PAN ID

Right click on the Head/Receiver icon and click Set PAN ID. It is recommended that all of the Head PAN ID's are changed first followed by the Receiver - **Please note** that if the Receiver is changed first the Heads are orphaned and will not be picked up by the Receiver. Allow a number of 'transmit intervals' for the changes to be complete. The PAN ID doesn't get set on the HEAD until the Head has had a trap configuration associated to it.

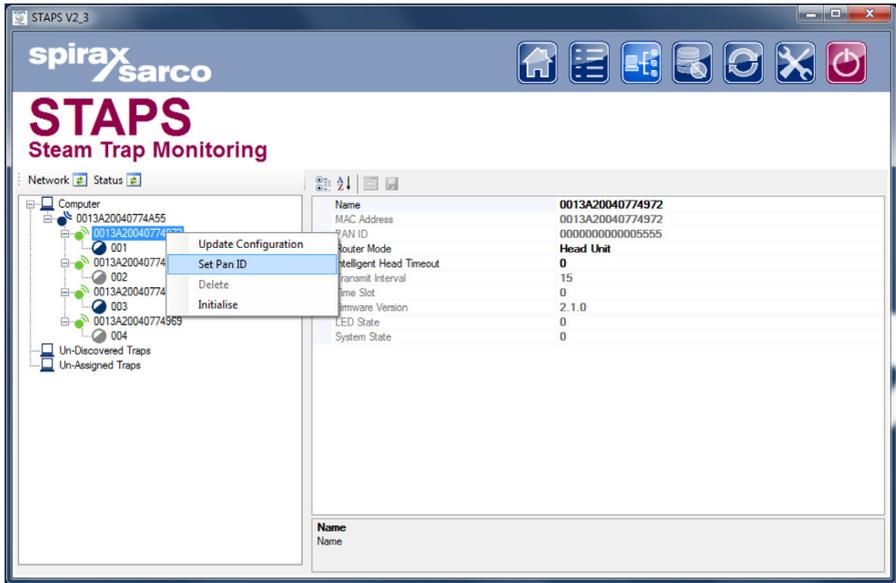


Fig. 20

Change the PAN ID to a suitable number. Changing the last three or four digits is normally enough. The default PAN ID is all zero's.

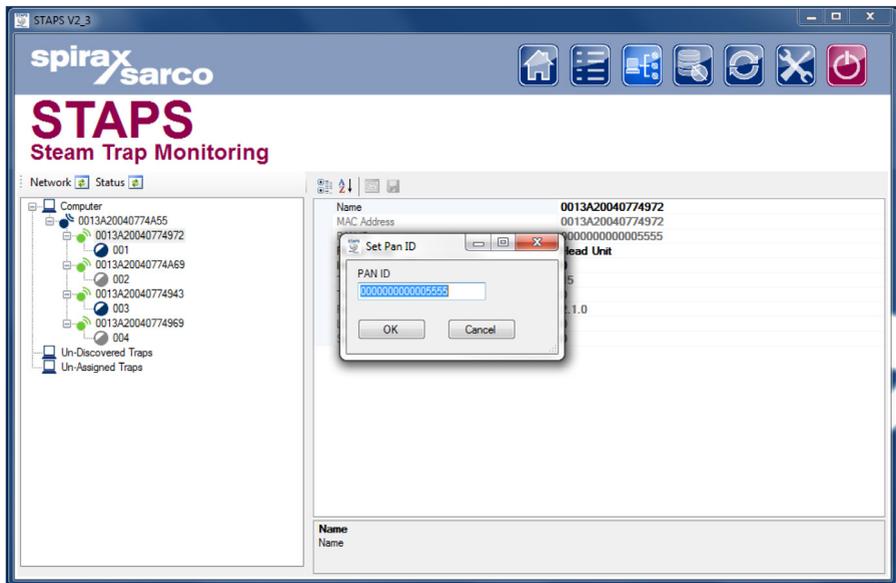


Fig. 21

Click on 'Trend View'.

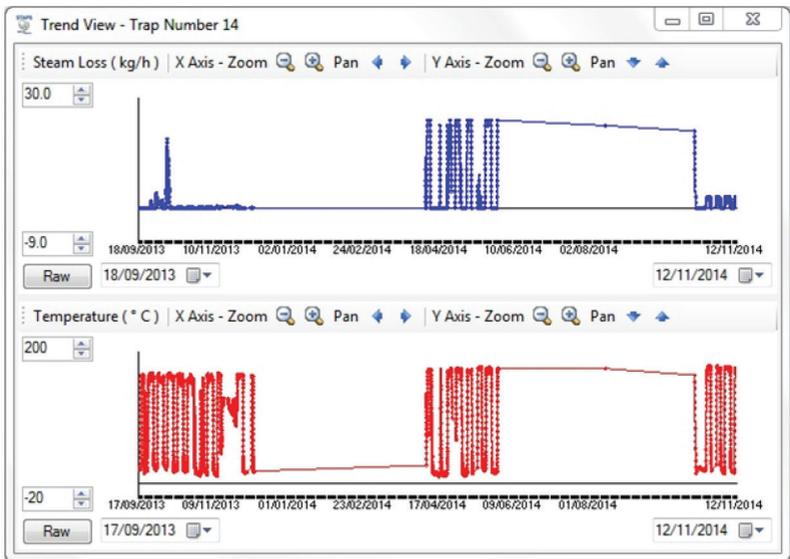
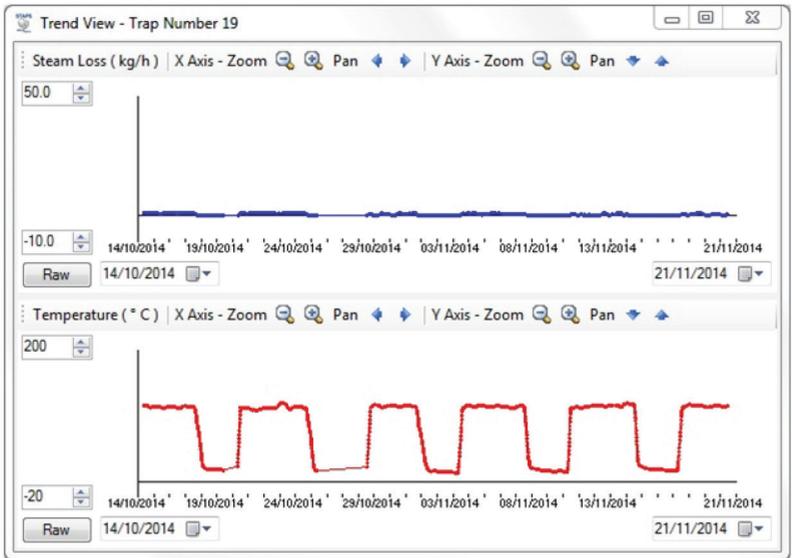


Fig. 23 Trend views

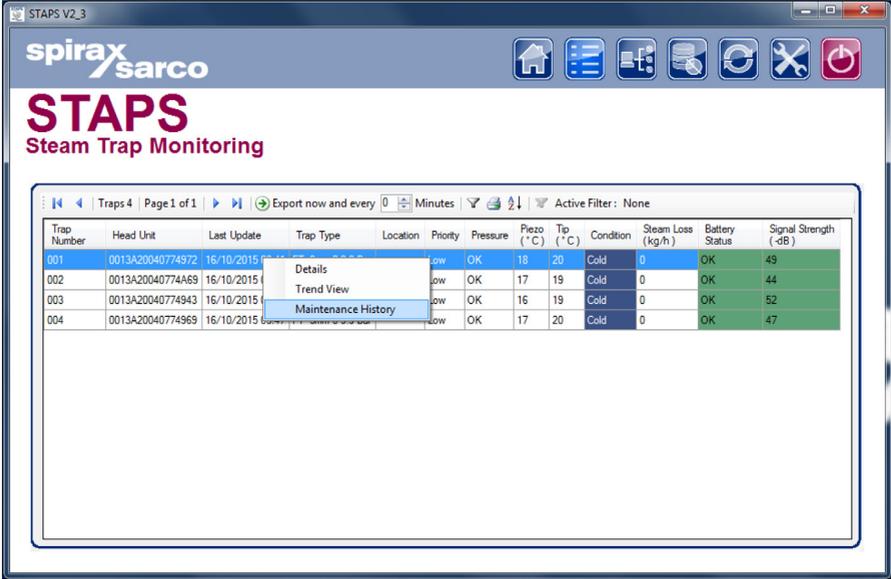
The top graph in Figure 23 show the Steam loss in mass units for a given period of time. The scales are adjustable using the tool buttons.

The bottom graph in Figure 23 show the trap temperature trend. This is also adjustable.

5.11 Maintenance History

This allows you to collate a maintenance history for each trap/head.

In the summary page, Right Click on the head you wish to create a history for.



The screenshot shows the STAPS Steam Trap Monitoring software interface. The window title is "STAPS V2_3". The interface includes the Spirax Sarco logo and the text "STAPS Steam Trap Monitoring". Below the header, there is a navigation bar with "Traps 4 | Page 1 of 1" and an "Export now and every 0 Minutes" option. The main area contains a table with the following columns: Trap Number, Head Unit, Last Update, Trap Type, Location, Priority, Pressure, Piezo (°C), Tip (°C), Condition, Steam Loss (kg/h), Battery Status, and Signal Strength (-dB). A context menu is open over the first row (Trap 001), showing options: Details, Trend View, and Maintenance History.

Trap Number	Head Unit	Last Update	Trap Type	Location	Priority	Pressure	Piezo (°C)	Tip (°C)	Condition	Steam Loss (kg/h)	Battery Status	Signal Strength (-dB)
001	0013A20040774972	16/10/2015			low	OK	18	20	Cold	0	OK	49
002	0013A20040774A69	16/10/2015			low	OK	17	19	Cold	0	OK	44
003	0013A20040774943	16/10/2015			low	OK	16	19	Cold	0	OK	52
004	0013A20040774969	16/10/2015			low	OK	17	20	Cold	0	OK	47

Fig. 24

Click on Maintenance History.

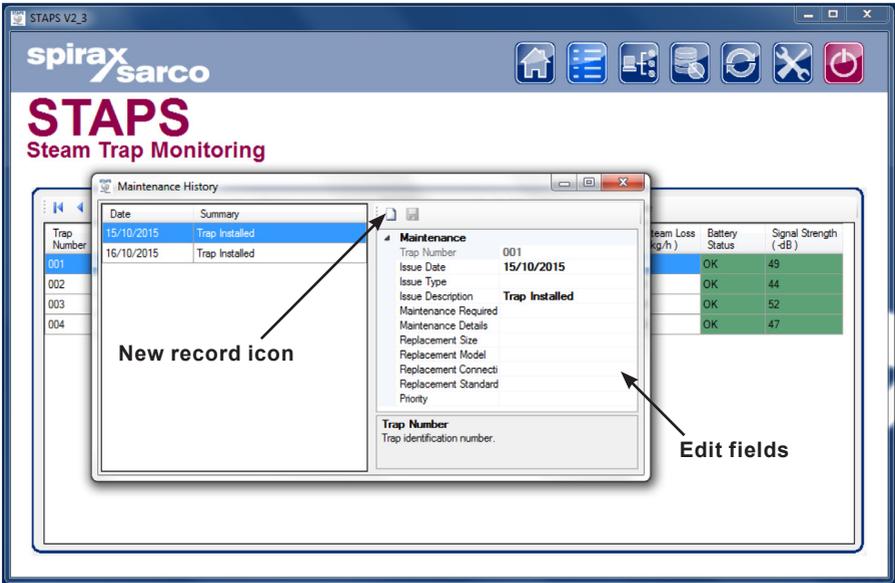


Fig. 25

You can add the history data here. Click on the new record icon to create a new record, and edit the relevant fields. Remember to click on the save button when you have finished.

5.12 Adding additional trap details.

In the summary page 'right click' on the trap that you wish update.

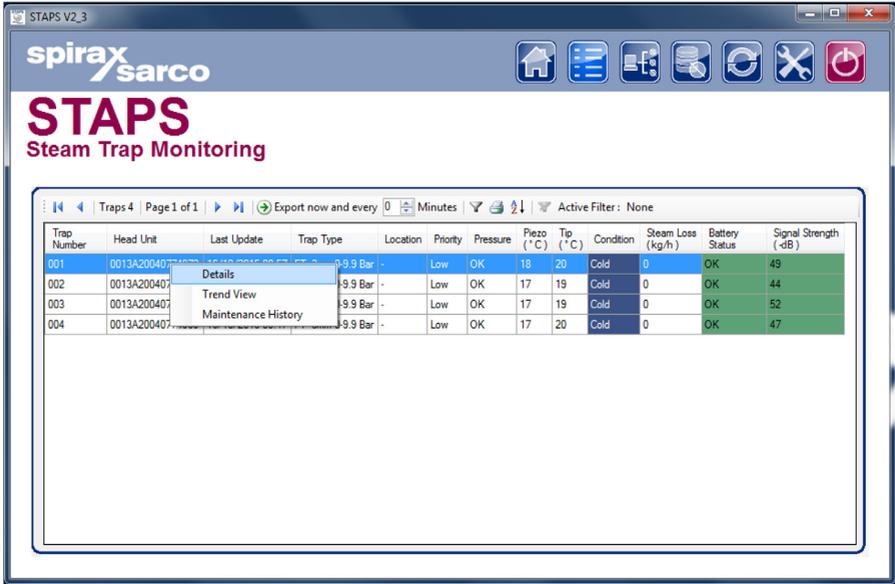


Fig. 26

This will bring up the 'Trap Details' window. Fill in all of the additional details that you require. Remember to save the changes by clicking on the 'Save' icon in the top left hand corner.

If 'Out Of Service' is set to Yes (Figure 27) the trap will be included in the 'Out Of Service' Section in the overview page (Figure 4) and not be included in steam calculation or network/system health.

Attributes	
Trap Number	001
Trap Type	FT -3mm 0-9.9 Bar
Installation	
Pressure (Bar Gauge)	10
Orifice Size (mm)	2
Priority	Low
Plant	
Location	
Location Detail	
Height	
Connection Size	
Connection Type	
Manufacturer	
Model	
Connection Standard	
Orientation	Horizontal
Flow Direction	
Open Ended	No
Diffuser Fitted	No
Isotub Fitted	No
Condensate Line	No
Application	
Operating Hours	
Installation Date	16/10/2015
Head Unit	0013A20040774972
Notes	
Maintenance	
Out Of Service	No
Status	
Last Update	16/10/2015 08:57
Steam Loss	0
Condition	Cold
Piezo	18
Tip	20
Battery Status	OK
Signal Strength	49

Trap Number
Trap identification number.

Fig. 27

5.13 Adding a receiver to a different Subnet

If the installation is very large, the local network (LAN) may be set up into a number of different Subnets. This means that the STAPS receivers may have to communicate across them to pass the data back to the PC.

They have to be added manually because the PC applications discovery protocol only works within the subnet.

1. Connect a Receiver to a different IP subnet to the PC application.
2. Power on the Receiver.
3. Record the IP address of the Receiver. If not known, liase with your IT Network Administrator.
4. On the PC application, Network Maintenance page, right click on the 'Computer Icon'.
5. Select 'Add Receiver'.

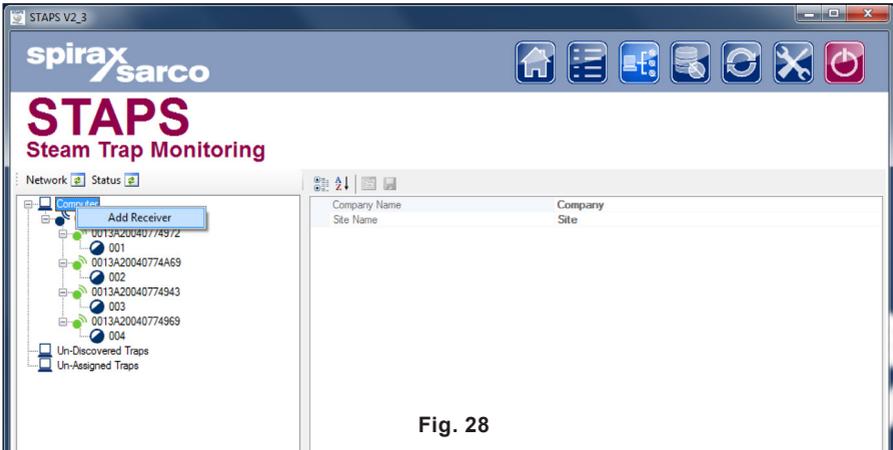


Fig. 28

6. In the dialogue box, shown in Figure 29, set the IP address of the Receiver, the Transmit Interval and PAN ID.
7. The Receiver will initially show up as undiscovered, with the entered IP address used as the Receiver name.
8. When the next discovery runs, the PC application will contact the Receiver. The Receiver will return its wireless MAC address. The PC application will show the Receiver as discovered, with the wireless MAC address being used as the Receiver name.
9. If the PC application is not able to contact the Receiver using the entered IP address, then the Receiver remains as undiscovered in the Network Maintenance page. Try 'Pinging' the IP address of the Receiver from the PC that is running the STAPS application. If it doesn't respond to the Ping, then there is probably a network setup problem.

5.14 Changing IP Address of Static Receiver

Note: We suggest that you speak with your network administrator regarding assigning a static IP address for this receiver.

5.14.1 Out of the Box

1. Configure a local network system using defaults (refer to Section 4.2 option 1). Ensure Receiver is displayed and showing default settings correctly on the PC application (refer to Figure 6 and Section 5.19 for defaults).
2. In the network tree highlight Receiver, in the device details change the IP address, gateway IP and Subnet mask to the desired settings, click save.
3. The Receiver will then display a red cross/exclamation mark after a short period of time. Close the STAPS application software.
4. Reconfigure the PC's IP settings (refer to Section 4.3) to be in the same IP range of the newly configured receiver.
5. Open the STAPS application software and check the receiver is discovered and displays the new IP address, it can now be used on the target network.

5.14.2 During Lifetime of Receiver

1. If during the life of the Receiver there is a requirement to change the IP address, then the PC application must be updated.
2. First remove the Receiver. To do this right click on the Receiver in the network maintenance tab and set the PAN ID to zero. Once you have verified this has been done right click on the Receiver again and select 'Delete Receiver' reference Section 5.17.3.
3. Once removed, re-add the receiver (once IP address has been changed) using the new IP address and the original PAN ID, following the procedures above as required (Section 5.13).

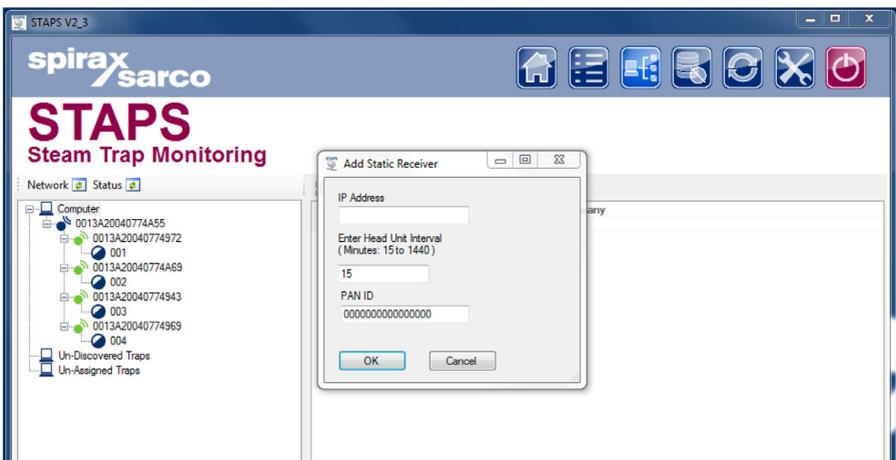


Fig. 29

5.15 Export All

The STAPS software provides an export function that includes data from all of the Head units that have traps assigned to them. A csv or XML (optionally with viewer) file is generated which can be passed into other systems, to generate this file, following the steps below. The function is found on the Summary page.

1. Select Time, from 1 to 60 minutes if minutes set at zero a single file is generated. If a value is selected the file will be updated at the time selected.
2. Click Export now.

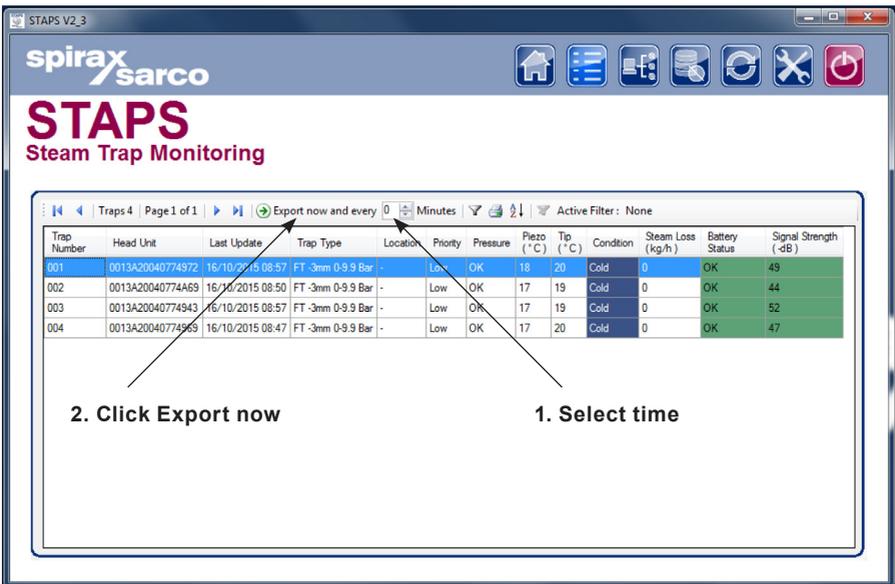


Fig. 30

3. Choose a location and file name for your exported file.
4. To end the export, click 'Stop exporting'.

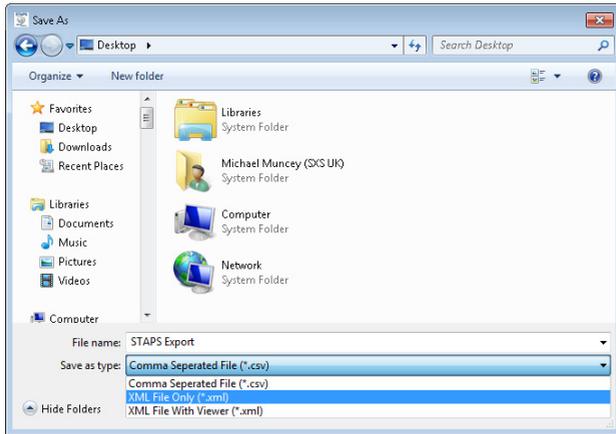


Fig.31



Fig. 32

Notes:

1. The target file will not be updated if it is held open by other software when it is being written to by the STAPS application.
2. To include the data in your system the data must be collected from the file held in the location selected above.
3. The file should be held on the same PC as the STAPS software. If the file is held on a remote machine, the link must be maintained while data is being exported.
4. CSV and XML formats are available for integration into monitoring software. The "XML file with viewer" option creates a file that can be viewed by the web browser software Internet Explorer, the location must be accessible by both the application software and the browser software.

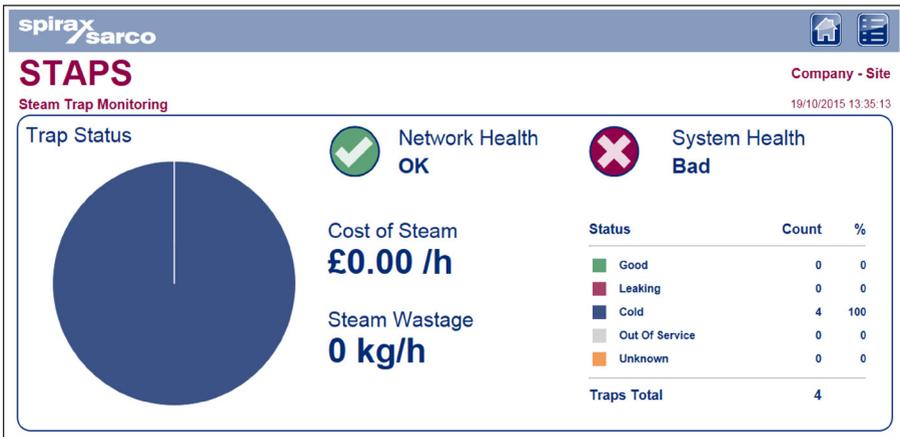


Fig. 33

5.16 Overview

When the system is operational the overview screen (Figure 34) will show the number of traps connected, the condition of each and total steam wastage together with the cost of steam.

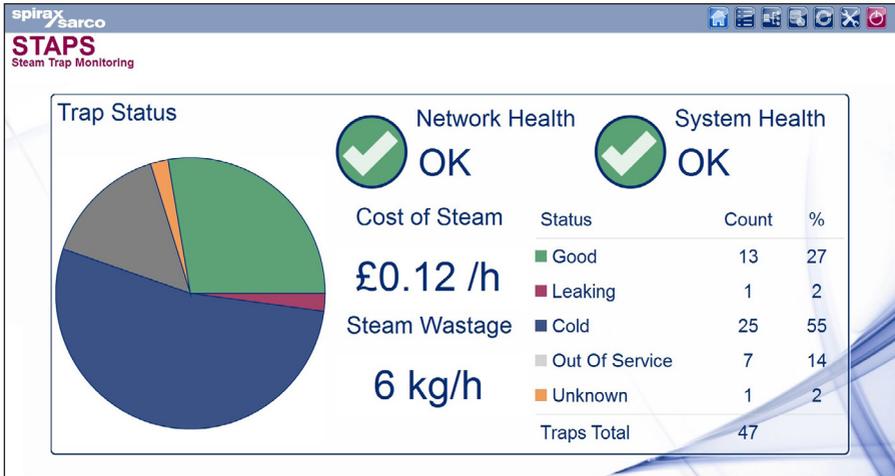


Fig. 34

Network/System Health table

Network		Network Health OK	OK - More than 90% of the devices are responding
		Network Health Warning	Warning - 80 - 90% of the devices are responding
		Network Health Bad	Bad - Less than 80% of the devices responding
		Network Health Unknown	Unknown - No devices are discovered yet or in the configuration file
System		System Health OK	Good - 90% of the traps are not leaking or cold.
		System Health Warning	Warning - 80% of the traps are not leaking or cold.
		System Health Bad	Bad - Less than 80% of the traps are not leaking or cold.
		System Health Unknown	Unknown - No devices are discovered yet or in the configuration file.

5.17 Deleting the trap, head or receiver from the software

5.17.1 Deleting a trap from the software

An occasion may arise where a trap has been made redundant and is removed. The trap data must be removed from the database.

'Drag and drop' the trap into the 'Un-Assigned Trap' folder.

'Right click' on the trap to be deleted (now showing in the 'Un-Assigned Traps') and click 'Delete'.

If the receiver or head is being put into storage the PAN ID's must be returned to zero, refer to Section 5.8.2.

If the heads and associated receiver are being relocated, but staying as associates, the PAN ID's can be left as set.

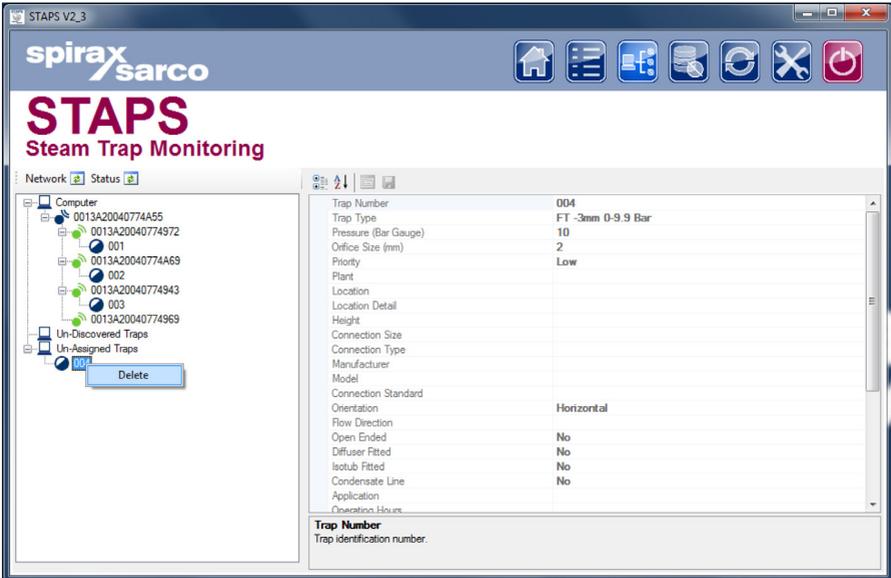


Fig. 35

If you find a trap has appeared under undiscovered check; the battery condition is OK, the PAN ID is set correctly and the Head is within radio range of the Receiver or a Repeater.

5.17.2 Deleting a head from the software

'Right click' on the head to be deleted and click on 'Set PAN ID' and set to zero.

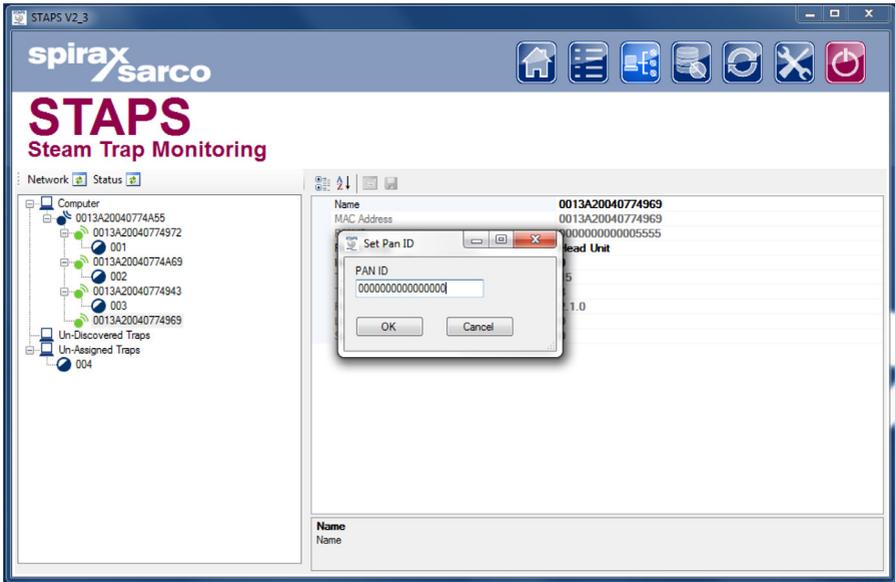


Fig. 36

Wait for at least 2 Transmit Intervals, once the PAN ID has been returned to 0, remove the battery from the head.

Return to PC and in software, 'Right click' on the head to be deleted and click 'Delete'.

Note: The software will not allow you to delete a head if a trap is still assigned to it.

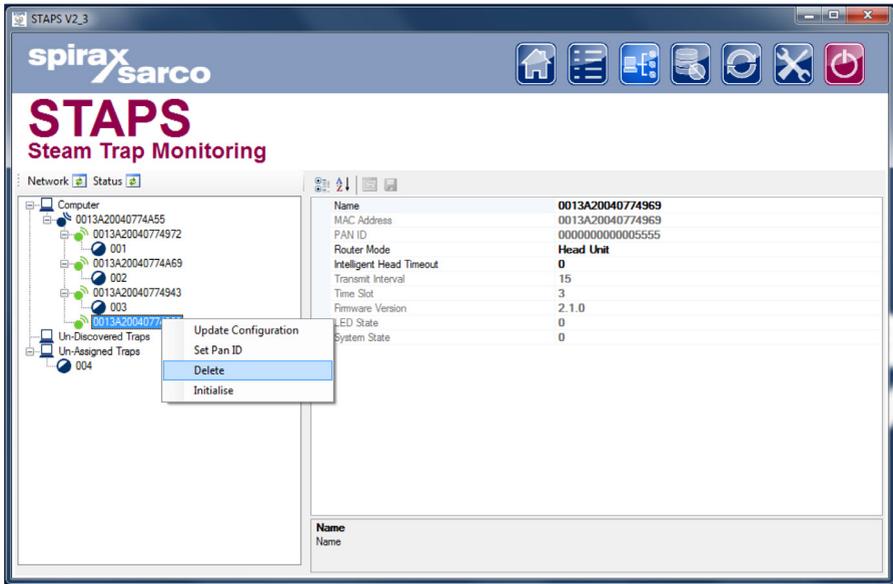


Fig. 37

Notes:

A trap may appear under 'Undiscovered traps' (see Figure 35).

A Head unit may associate itself with another Receiver when set to PAN ID 0.

5.17.3 Deleting a receiver from the software

As with the Head, the PAN ID must be returned to zero.

You can now remove the power supply and ethernet cable from the receiver.

Return to the PC. 'Right click' on the Receiver and click on 'delete'.

Note: If a Receiver is deleted whilst Heads are still connected to it, the Heads will appear in the 'Un-Discovered Traps' folder. If the Heads cannot report to a Receiver or Repeater, they will rapidly flatten their battery.

5.18 Network and Status Buttons

Clicking the Network button will run a 'Network Discovery Poll', and pickup any undiscovered Receivers and Repeaters.

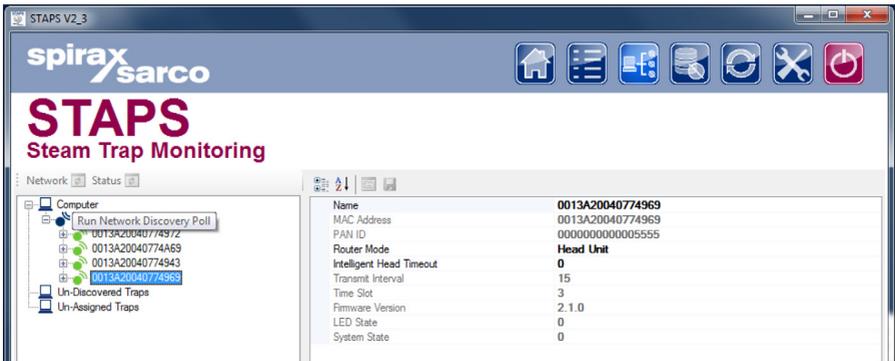


Fig. 38

Clicking the Status button will run a 'Head Status Poll' which is useful when setting up a network or adding new Head units. It forces the receiver(s) to return the latest status information they have from the heads, this may take a few seconds depending on the network size and topology.

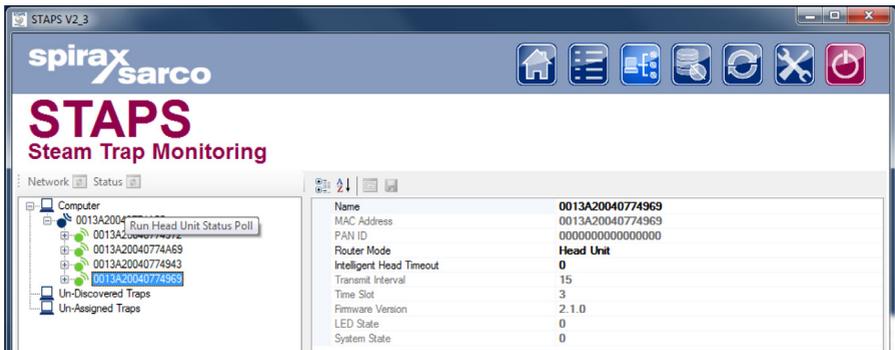


Fig. 39

5.19 Initialising heads, repeaters and receivers

It may be necessary to return the Head, Receiver or Repeater to its factory settings. To do so on the Network Maintenance page, highlight the Head, Receiver or Repeater you wish to return to factory settings. 'Right click' and click on 'Initialise' from the drop down menu.

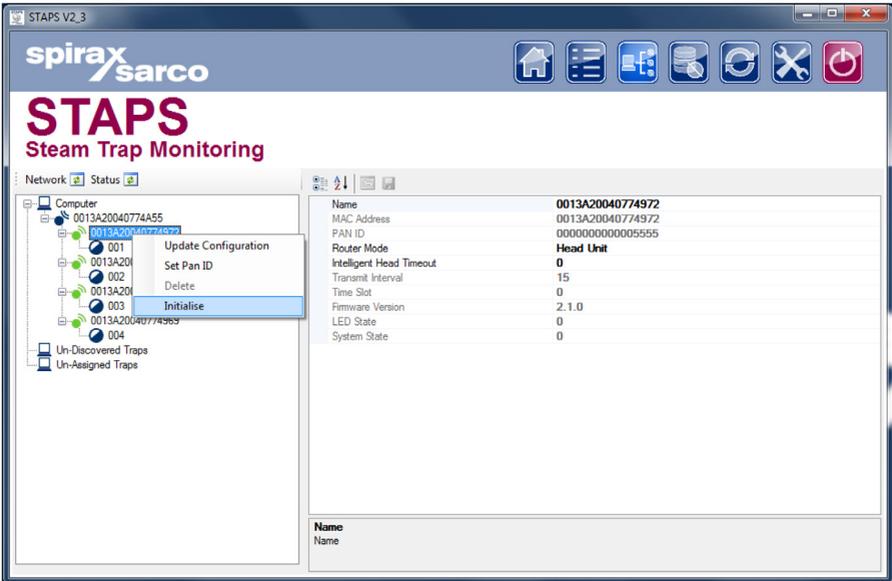


Fig. 40

Selecting this option will return the Receiver, Repeater or Head to its factory defaults for example:

Head:

Resets the Trap Details to factory Default.
PAN ID to 0000000000000000

Receiver/Repeater:

PAN ID to 0000000000000000
IP Address to 192.168.254.101
Gateway IP Address to 192.168.254.254
Subnet Mask to 255.255.255.0

It is quite likely you will not be able to communicate with a device once it has been initialised so it should only be carried out under extreme circumstances.

5.20 Upgrading head and receiver software

Over time it is likely that Spirax Sarco will update the Head and Receiver software. The STAPS software has an 'Upgrade All' function, that allows revised software to be loaded to all Receivers/Repeaters and Head by wireless communication.

Before commencing upgrades ensure all the Head batteries are in good condition and the radio signal strength between Heads, Repeater and Receivers is showing green or amber. Please contact your local Spirax Sarco representative to ensure you have the latest version of software.

5.20.1 Upgrade page

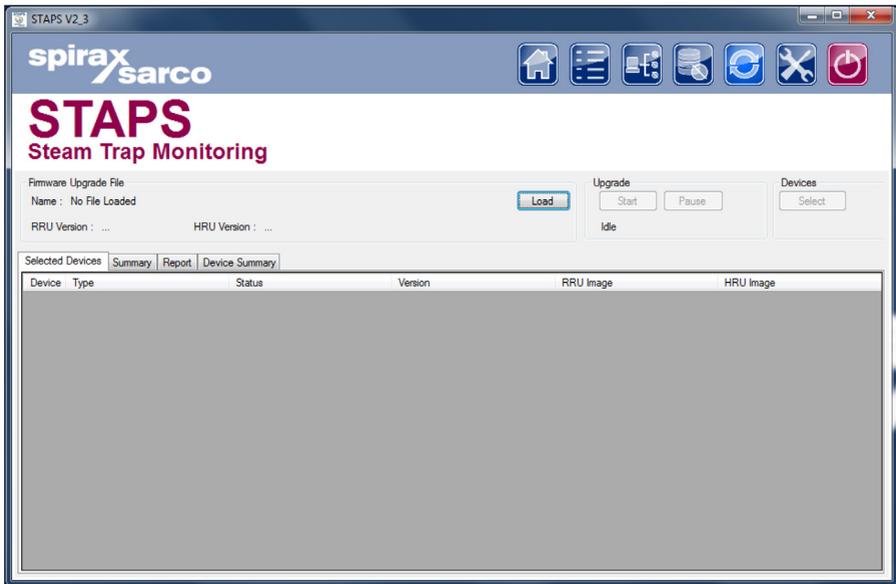


Fig. 41

Name: Will show the file name that contains the software updates for Head and Receiver e.g. STAPS_R2.1_H2.1.suf

RRU Version: Displays the version of Receiver software loaded from the 'Firmware Upgrade File' e.g. 0.2.1.0

HRU Version: Displays the version of Head software loaded from the 'Firmware Upgrade File' e.g. 0.2.1.0

The version in the example given are the same, they may differ in future releases.

Load Button: Click this button to load the 'Firmware Upgrade File'.

Upgrade Start Button: Will start the upgrade process if the 'Start Later' option is used.

Upgrade Pause Button: Will pause the upgrade process, click 'Start' to continue.

Devices Select Button: Starts the process of selecting the devices you wish to upgrade.

Click on 'Load' (Figure 40), select 'Software' (Figure 42), then click open to upload the software to the Receiver.

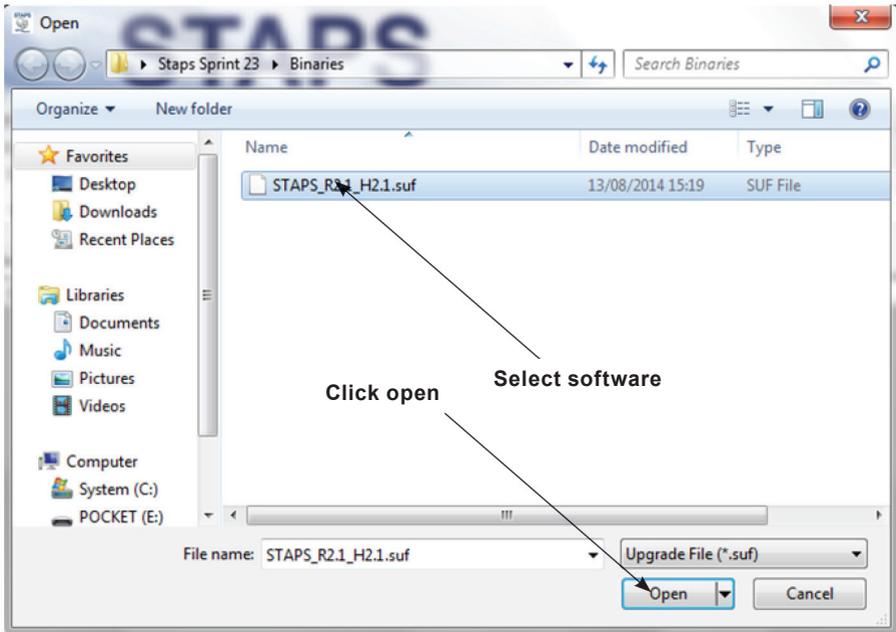


Fig. 42

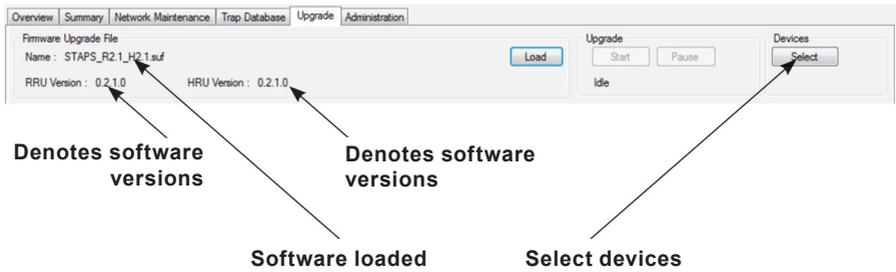


Fig. 43

The software version/file name will appear when an upgradeable version of the software is successfully selected.

5.20.2 Upgrade process

Click on 'Select' under the 'Devices' heading, the user will then be presented with a number of options as you read through the menus:

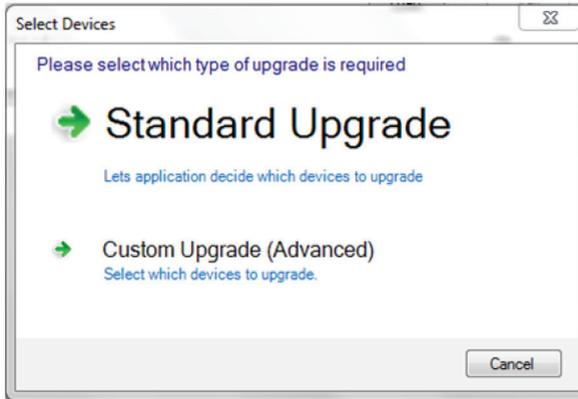


Fig. 44

Standard Upgrade allows the system to automatically review the network to identify which devices have older firmware and choose all Receivers, Repeaters and Head units that are suitable for upgrading.

After clicking 'Standard Upgrade' you will be asked to select 'Start Now' or 'Start Later'.

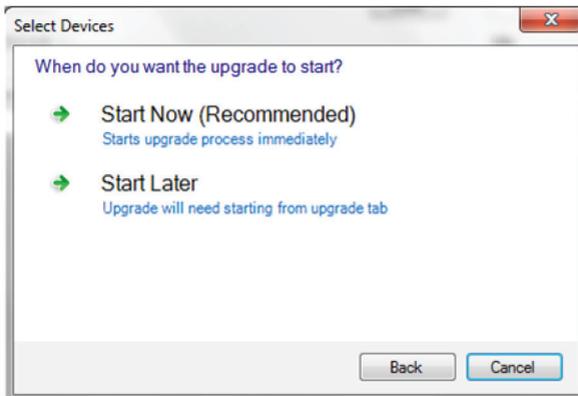


Fig. 45

Start Now, will initialise the upgrade process immediately.

Start Later, will allow the user to start the upgrade process later. The upgrade process is started by clicking the 'Upgrade Start' button on the upgrade page.

Note that while the updating process is carried out the device parameters such as PAN ID cannot be changed, and will be greyed out.

Custom Upgrade allows the user to choose which units you would like to upgrade. Click 'Custom Upgrade' (refer to Figure 44) and you will be asked to select which devices you would like to upgrade.

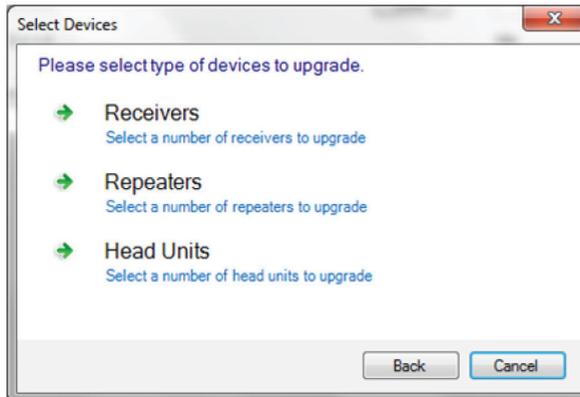


Fig. 46

After selecting the type of device you will be asked to select 'Automatic' or 'Custom'.

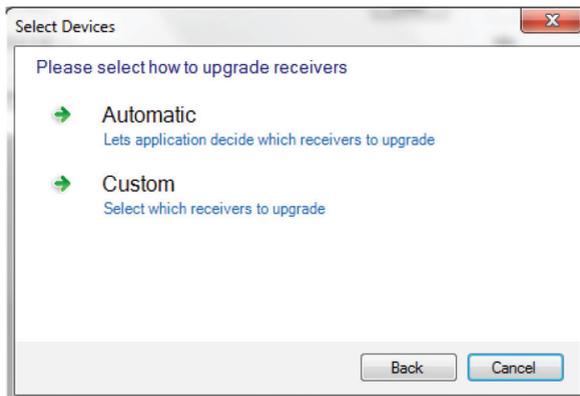


Fig. 47

If 'Automatic' is selected the system will automatically choose which devices are suitable for upgrade, you will then be asked to 'Start Now' or 'Start Later' reference Figure 45.

Custom, allows the user to choose which devices you would like to upgrade.

After clicking 'Custom' you will be asked which devices that you would like to upgrade, either individually if a Receiver, or under 'Which Receiver' if updating Repeaters or Heads.

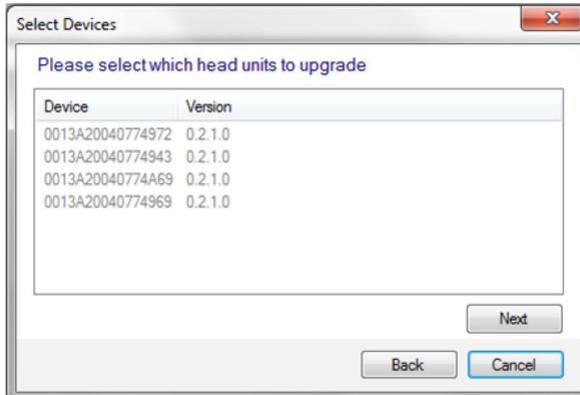


Fig. 48

Choose which devices you require updating, taking care to choose the correct ones, using the MAC ID if required to identify the devices, you will then be asked to 'Start Now' or 'Start Later', reference Figure 45.



Fig. 49

Running is displayed to show that upgrades are taking place, if idle is displayed no upgrades are taking place.

Please see Appendix A for flowcharts showing all of the upgrade options.

The upgrade progress can be followed in the Selected Devices, Summary, Report and Device Summary tabs.

Device : Lists the devices by their MAC identification, will show the devices being upgraded under the Selected Devices tab or list all the devices on a PAN under the Device Summary.

Type: Displays the device type i.e. Head unit, Repeater or Receiver.

Status: Displays the status of the Upgrade process. **Blue** - Pending, **Orange** - Upgrading, **Green** - Upgraded or **Red** - Not responding.

Version: Shows the version of the firmware upgrade file.

RRU Image: Shows the version of the Receiver software.

HRU Image: Shows the version of the Head software.

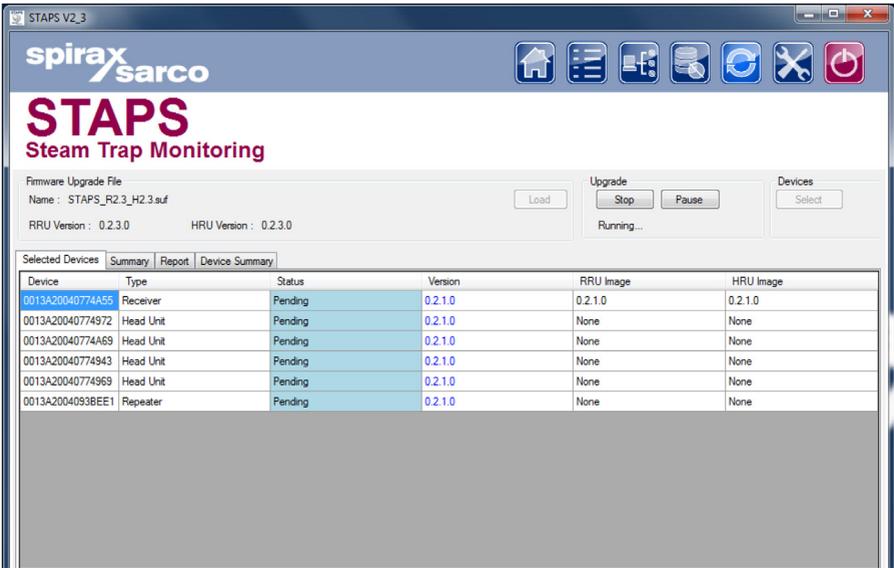


Fig. 50

The tab 'Selected Devices' will show the upgrade process to each Receiver/Repeater or Head unit being updated.

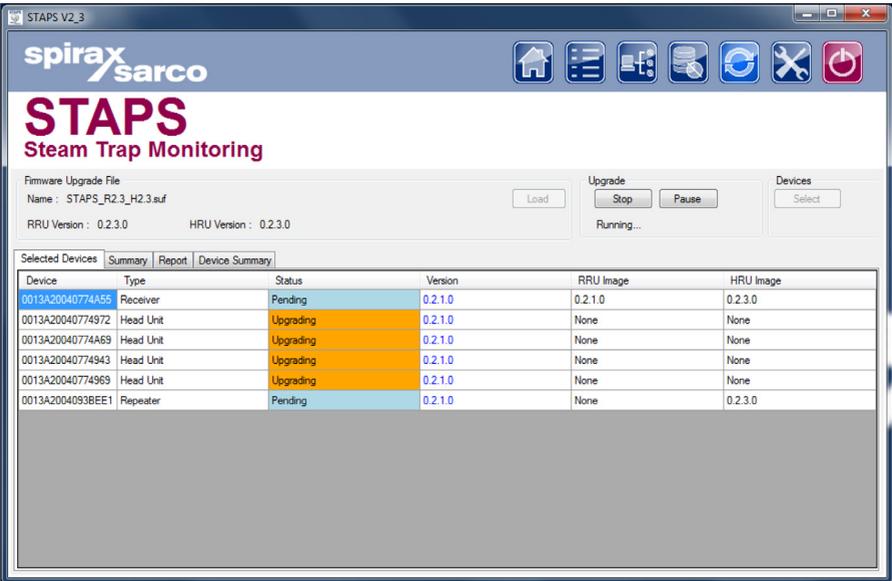


Fig. 51

Figure 50 illustrates six Head units being upgraded.

Device	Type	Status	Version	RRU Image	HRU Image
0013A20040774A45	Receiver	Failed - Not Responding	0.1.1.9	None	None

Fig. 52

If the Status appears Red check the signal strength and battery condition - move the device into range or replace the battery and repeat. If further problems are encountered, please contact your local Spirax Sarco representative.

The screenshot shows the STAPS V2.3 software interface. At the top, there are navigation tabs: 'Selected Devices', 'Summary', 'Report', and 'Device Summary'. Below the tabs, there is a table with columns: Device, Type, Status, Version, RRU Image, and HRU Image. The table lists several devices with their current upgrade status. The status colors are: Pending (blue), Upgraded (green), and Confirming (light green). Below the table, there are buttons for 'Load', 'Upgrade', 'Stop', 'Pause', and 'Running...'. The 'Upgrade' button is highlighted, indicating the process is active.

Device	Type	Status	Version	RRU Image	HRU Image
0013A20040774A45	Receiver	Pending	0.2.1.0	0.2.1.0	0.2.3.0
0013A20040774972	Head Unit	Upgraded	0.2.3.0	None	None
0013A20040774A69	Head Unit	Confirming	0.2.1.0	None	None
0013A20040774943	Head Unit	Upgraded	0.2.3.0	None	None
0013A20040774969	Head Unit	Upgraded	0.2.3.0	None	None
0013A2004093BEE1	Repeater	Pending	0.2.1.0	None	0.2.3.0

Fig. 53

The 'Device Summary' illustrates the upgrade status of the various devices on the system.

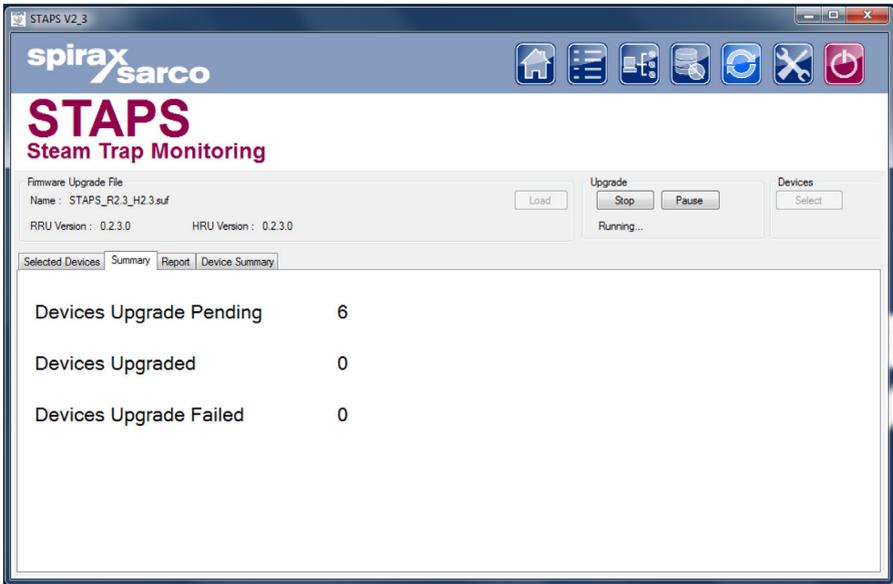


Fig. 54

The 'Summary' tab illustrates pending, upgraded and failed devices.

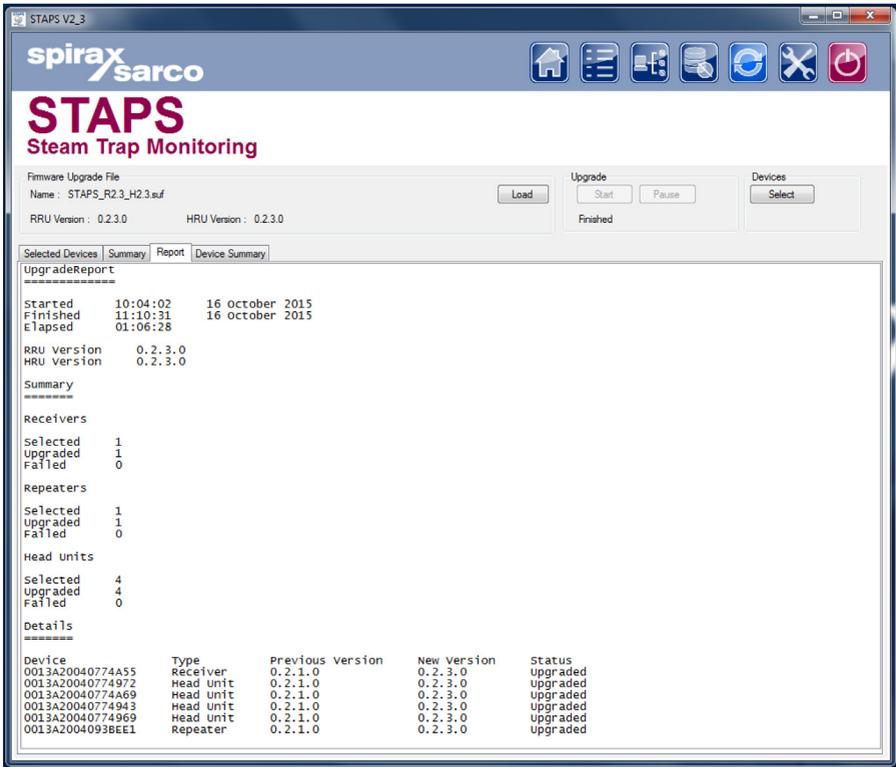


Fig. 55

The 'Report' tab will show the end result of the upgrade during a single session.

6. Fault finding

Fault condition	Primary cause	Secondary cause
<p style="text-align: center;">1 No updates received</p>	<p>Low signal</p>	Location
		Obstruction
		Battery
		Receiver / Repeater / Head fault
		Overheating
		Damaged Head unit / Receiver
		Shows cold when trap is actually hot
		Physically moved
	<p>Configuration has been changed</p>	Incorrect PAN-ID
	Interval time has been changed	
	Head unit has been moved to different trap	
	<p>Signal interference</p>	<p>Electrical motors / switchgear have been sited near to Head unit / Receiver / Repeater</p>

	Tertiary cause	Remedy
	Head unit or Receiver out of range	Install Intelligent Head or additional Receiver. Existing Receiver may be able to be resited, but ensure if moving it other Head signals are not lost.
	Temporary	Check that an obstacle like a vehicle has not parked between the Head / Repeater and the Receiver. Remove obstacle to reinstate connection.
	Permanent	Check that a permanent obstacle like a new wall / barrier or machinery has not been erected between the Head / Repeater and the Receiver. Install either an Intelligent Head or additional Receiver.
	Low battery power	Replace battery.
	Software / Hardware fault	Return to supplier.
	Head unit fitted to pipe with a temperature exceeding 425 °C	Incorrect application.
	Remote head fitted to a pipe / surface allowing the ambient temperature to rise above 70 °C	Move remote head to a cooler pipe / surface.
	Repeater / Receiver fitted to a pipe / surface allowing the ambient temperature to rise above 70 °C	Move remote head to a cooler pipe / surface.
		Check for damage and replace if necessary.
	No updates received since trap turned on	Check last update time.
	Head is now out of range of a Receiver or Repeater	Add a Receiver / Repeater or position the Head so a better radio signal strength is achieved.
	PAN-ID has been changed	Assign correct PAN-ID.
	Interval times has been set to a long period	Check interval time and return to default setting of 15 minutes.
		Move Head unit back to original trap, or reconfigure trap type.
		Assess position of electric motor / switchgear and move if possible, or move the STAPS Head unit.

Fault condition	Primary cause	Secondary cause
2 Trap shows it is cold when steam is on	Trap is out of service	
	Trap is blocked or isolated	
	Incorrect Head unit orientation on pipe	
	Head unit fitted to outlet of trap rather than inlet	
	Poor contact with the steam pipe	
3 Temperature is unreasonably high (greater than 1000 °C)	Head unit temperature sensor (PT100) has failed	
4 Trap condition incorrect	Steam trap alternates between good and leak	Intermittent trap failure
	Trap shows ok, but steam is turned off	Residue heat remaining in pipe with condensate flow
	Trap shows ok, but shows a leakage	Intermittent trap failure
	Configuration has been changed	Incorrect trap type, pressure, orifice size or other settings are incorrect
		Trap has been changed for different type
	Shows unreasonable leakage for trap	Physically moved
		Assigned trap configured incorrectly. Incorrect orifice size, pressure or trap type selected
5 System steam cost incorrect		

	Tertiary cause	Remedy
		Check again once trap is back in service.
		Unblock trap. Un-isolate if safe to do so.
		Ensure the Head unit is fitted with the head pointing vertically upwards or no more than 45° from top dead centre.
		Ensure the Head unit is fitted to the upstream side and no more than 150 mm away from the steam trap.
		Ensure that the steam pipe is clean, free from rust and scale. Check that the Head unit clamp / jubilee clips are tight. The Head unit sensor must be in direct contact with the steam pipe. The Head unit must not be clamped over the top of any pipe lagging.
		Contact Spirax Sarco.
	Dirt in the trap, Trap is borderline failure	
		Allow heat to dissipate and re-check.
		Monitor, repair or replace trap.
	Incorrect trap configuration has been set	Re-configure the correct trap type, refresh and update configuration reference Section 4.2.5.
	Incorrect trap type has been set	Re-configure the correct trap type, refresh and update configuration reference Section 4.2.5.
	Head unit has been moved more than 150 mm away from the upstream side of the steam trap	Move the Head unit to within 150 mm of the steam trap.
		Check trap configuration. Ensure trap type, orifice size and pressure are correct.
		Change steam cost under the 'Administration' icon.

7. Appendix A

Appendix A shows, using flowcharts, the full set of options of how software in the Receiver, Repeater and Heads can be updated. Refer to Section 5.20.

Click on Select under the Devices heading, you will then be presented with a number of options as you thread through the menus:

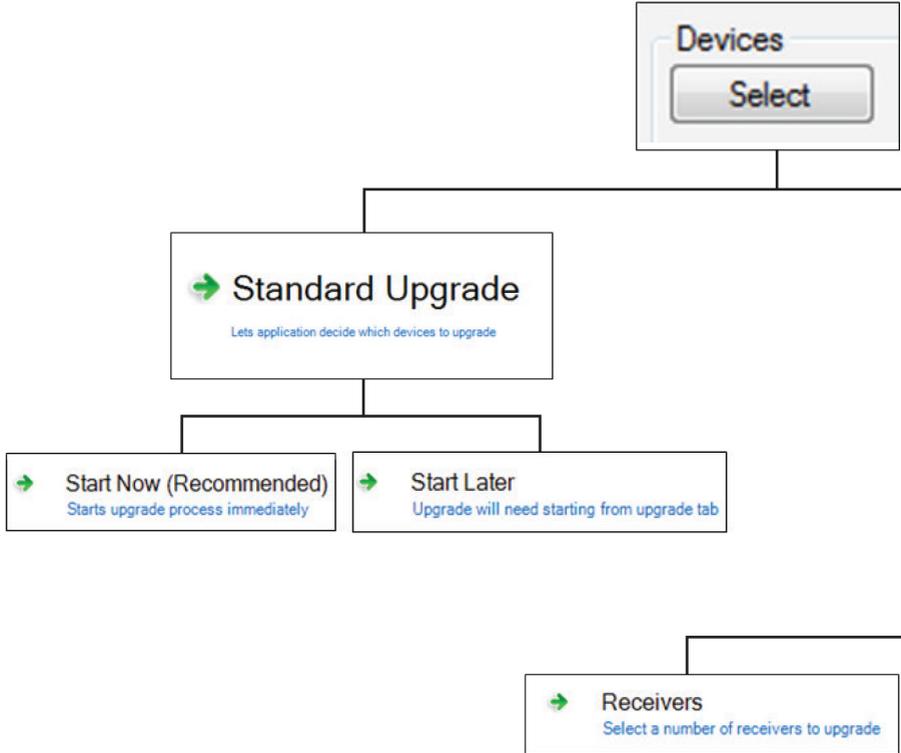


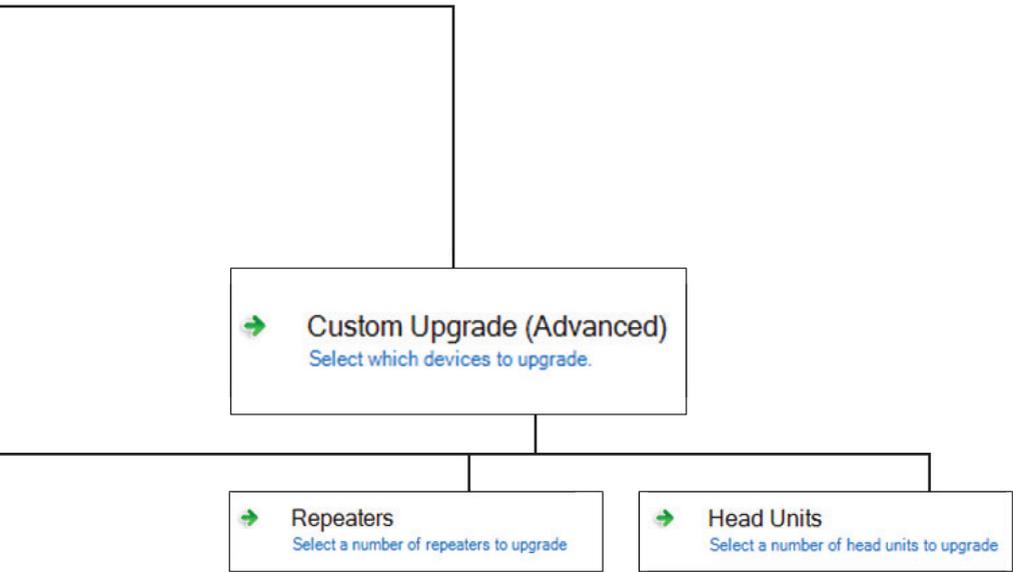
Fig.56

Standard Upgrade; the system will automatically review the network to identify which devices have older firmware and choose all Receivers, Repeaters and Head units that require upgrading. Custom Upgrade; this allows you the user to choose which units you would like to upgrade.

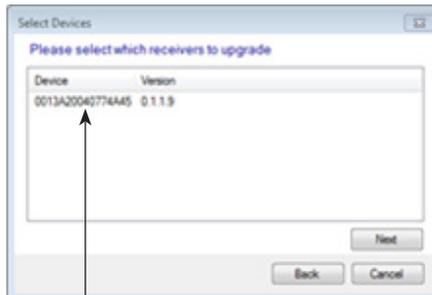
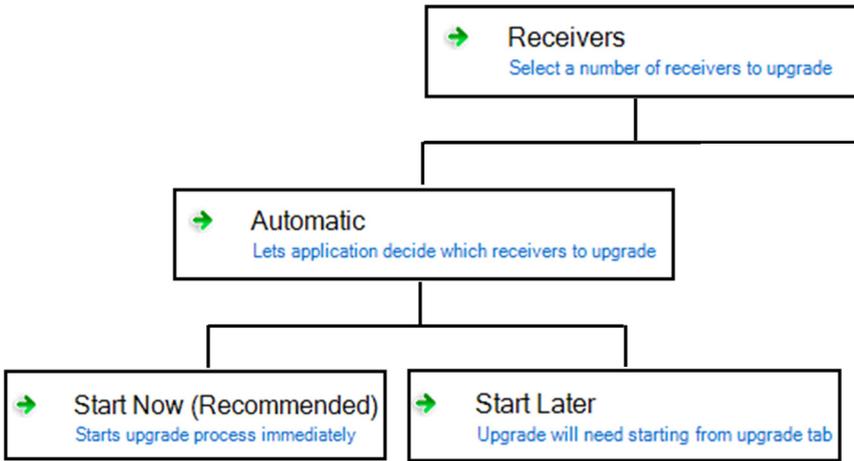
Start Now, will initialise the upgrade process immediately.

Start Later, starts the upgrade process later.

Note that while you are updating the devices parameters such as PAN id cannot be changed, and will be greyed out.

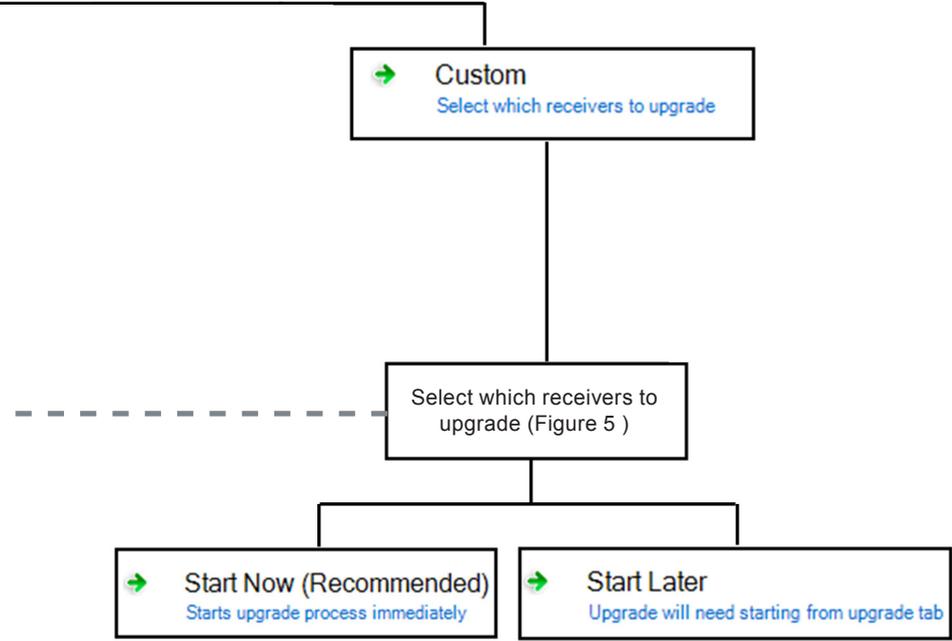


To upgrade Receivers



Highlight the required device and then click Next

Fig. 57



To upgrade Repeaters

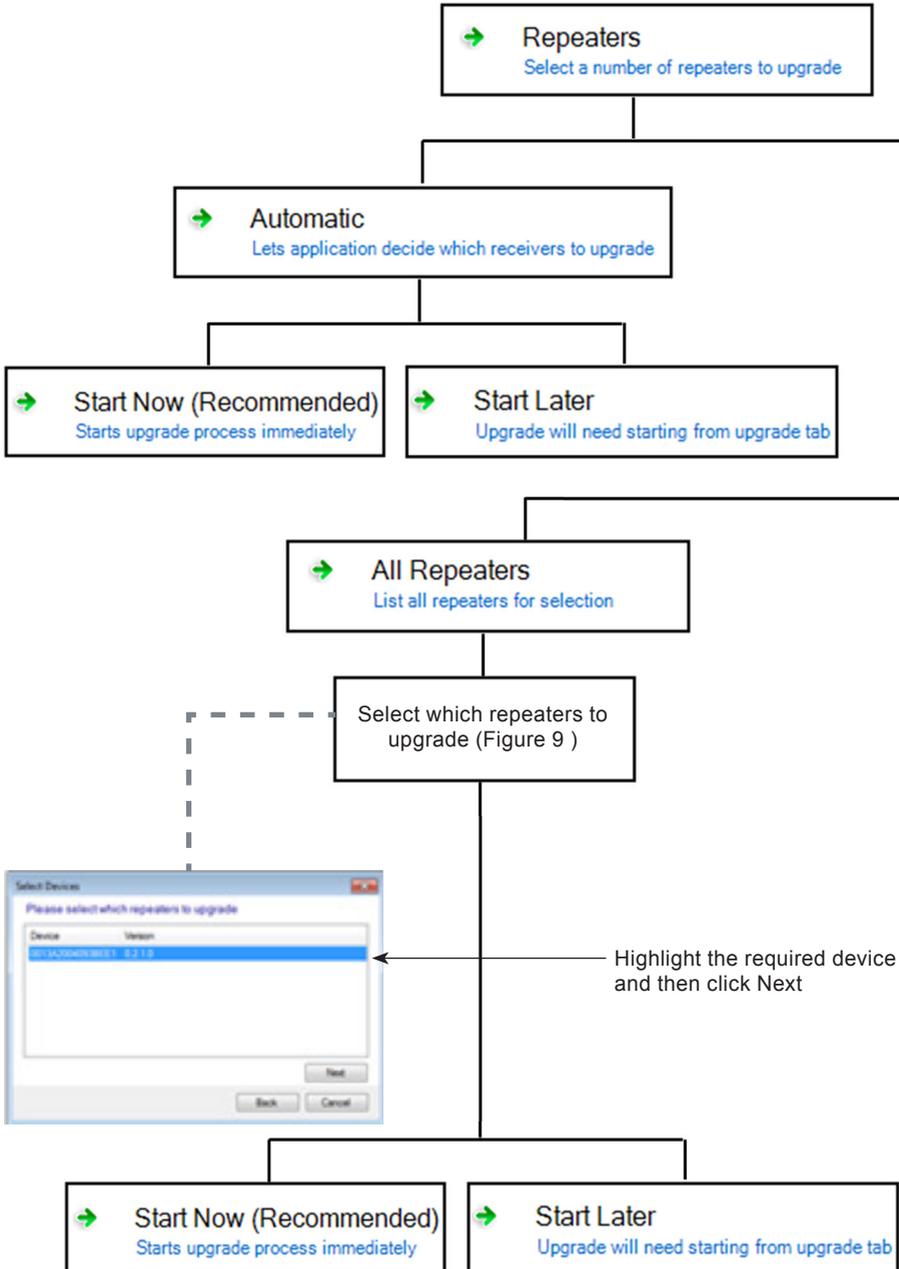
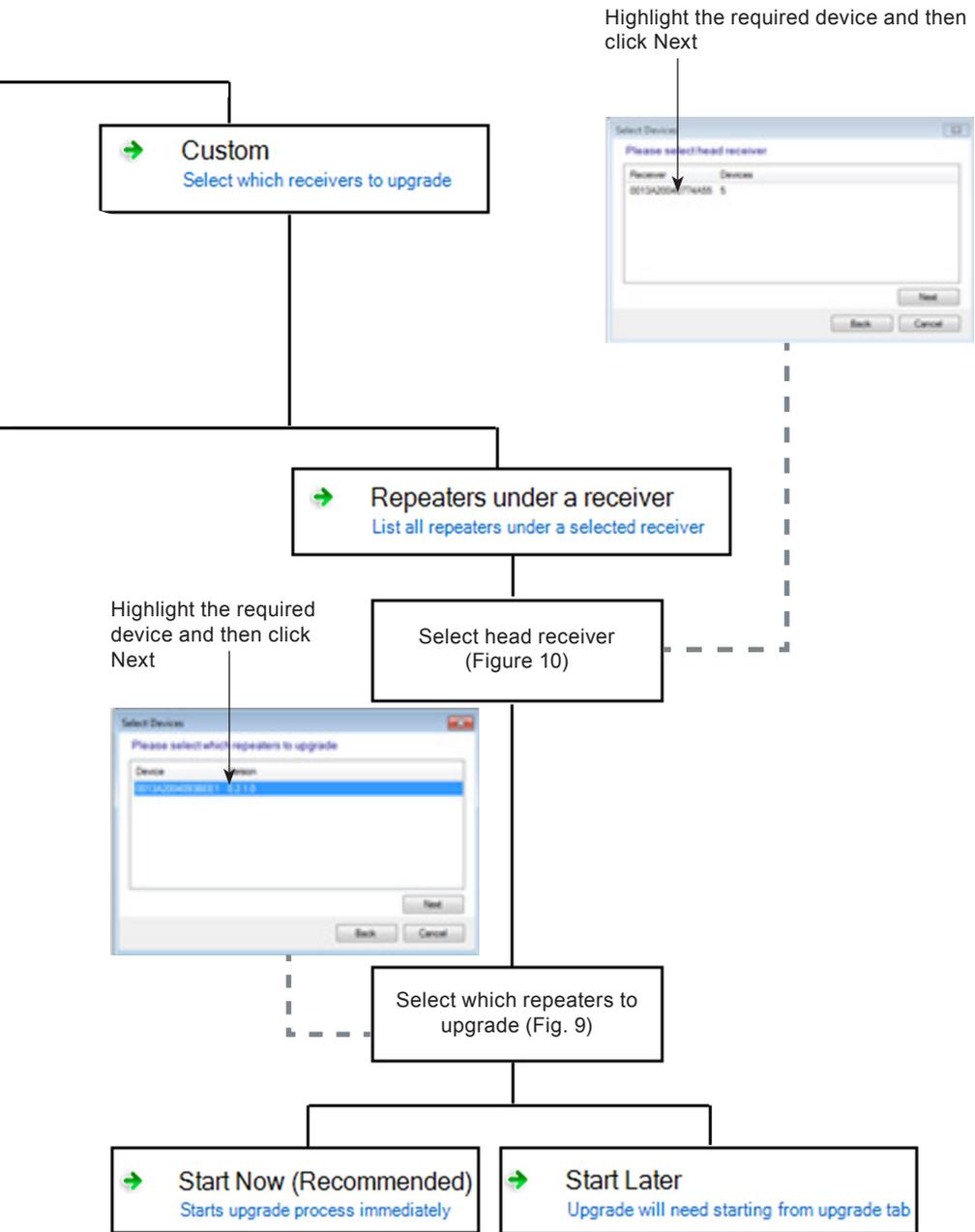


Fig. 58



To upgrade Heads

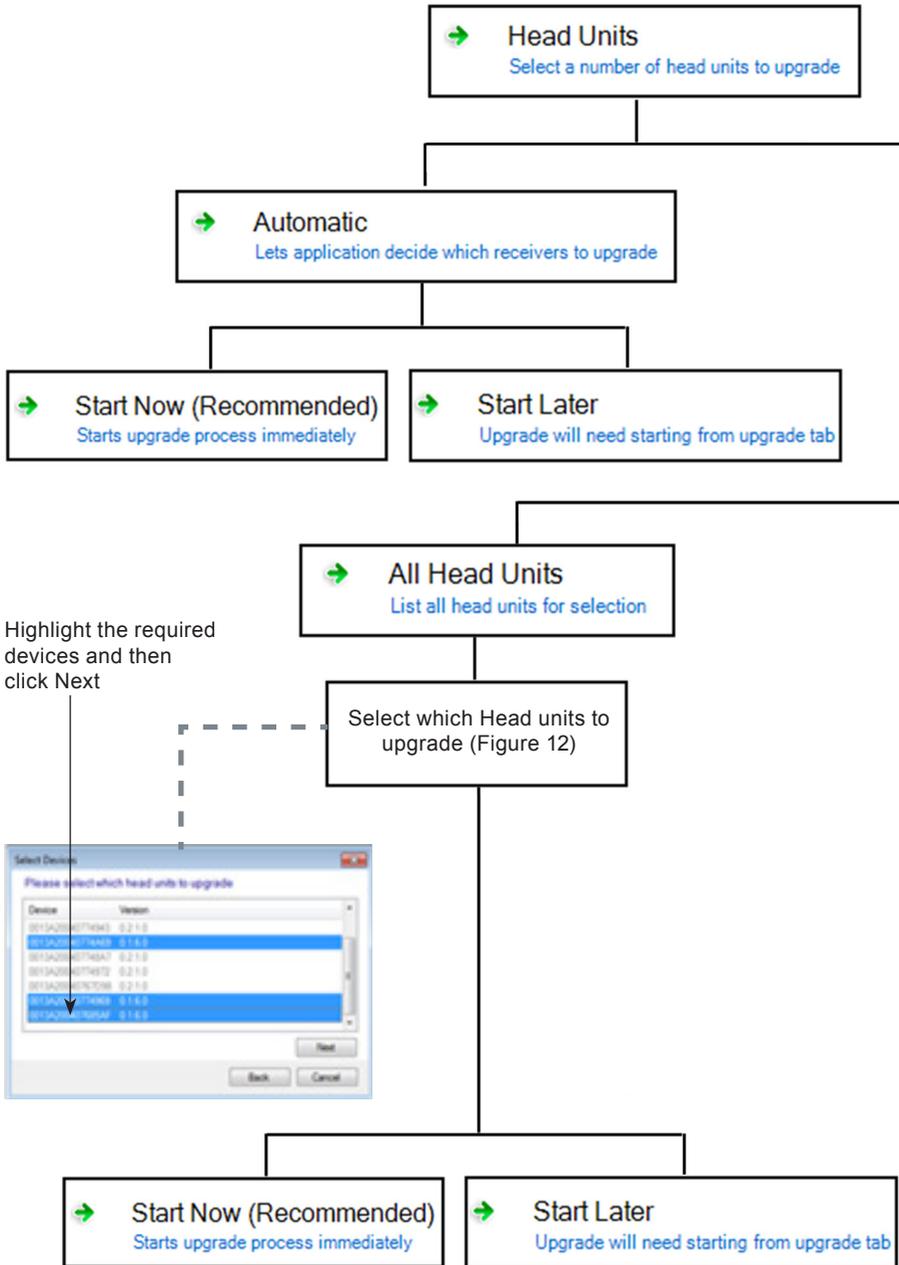


Fig. 59

