Active RFID Readers & Tags

QUICK START INSTALLATION GUIDE

Version 2 September 2007

RFTRAQ

Active RFID, and Beyond

Index

Welcome to the RFTRAQ Readers and Tags Quick Start Installation Guide

This guide aims to prepare you for the installation of the RFRT Series ACTIVE RFID Readers in the field and help you on your way to a smooth setup and commissioning process.

Before continuing with any setup, it is recommended that you check the pre-requisites and ensure that you have all of the appropriate equipment and tools required to commission the Readers in the appropriate places.

Please be aware that the equipment that you will be handing is sensitive to Electrostatic Discharge and you must take every reasonable precaution to minimise the risk of ESD damaging components whilst handling them.

Pre-requisites

IT literacy.
This document was written on the understanding that the Installation Engineer has a working technical grasp of IT, including use of the Windows Operating Systems, and basic networking principles such as IP addressing. You will need to know which IP addresses, subnet mask and gateway addresses to assign to your Readers.

Physical Equipment
A PC to configure with (Windows 2000 or XP PC with a CDROM drive and a USB socket), .NET 2 framework installed, and connected to the LAN on which you wish to install your Reader(s) with firewall deactivated. *[Not supplied by RFTRAQ]*

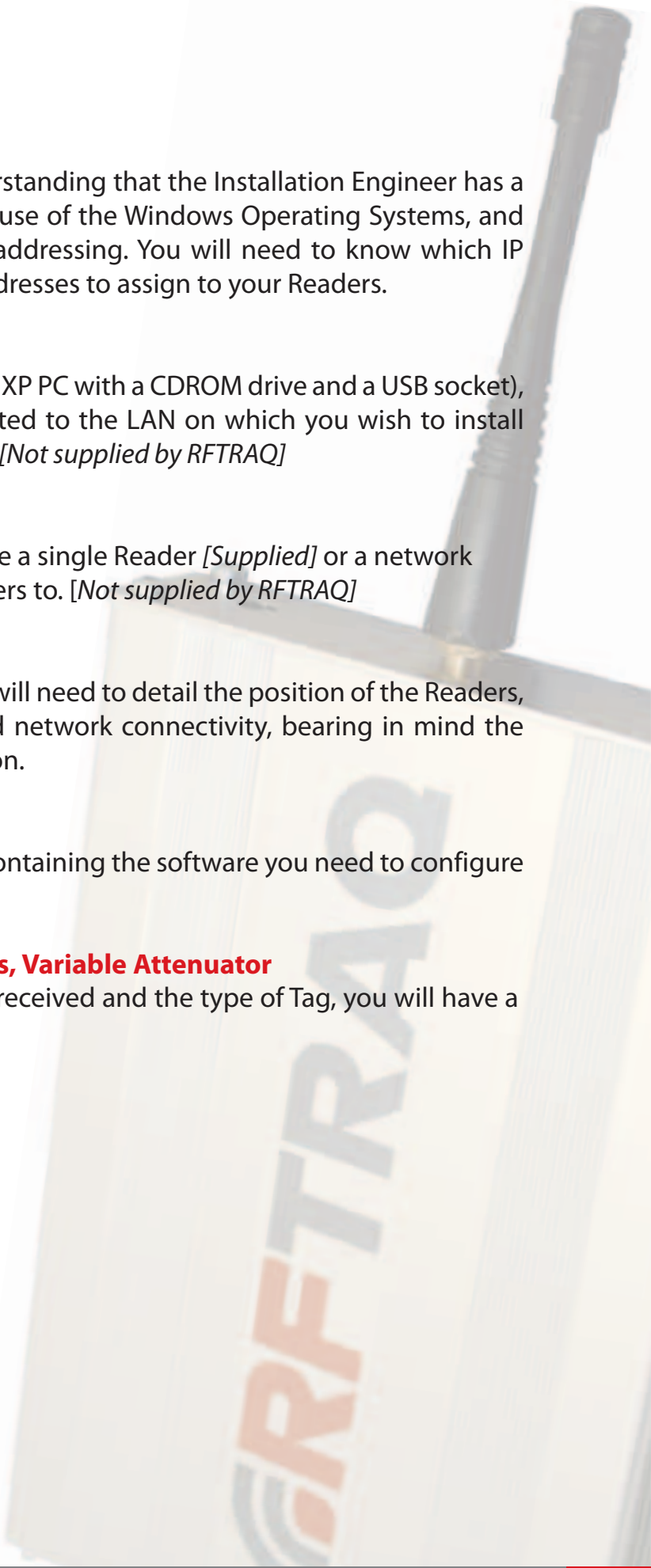
Network infrastructure

- Network cross-over cable to configure a single Reader *[Supplied]* or a network switch, to connect your PC and Readers to. [*Not supplied by RFTRAQ]*

Installation Plan.
Your installation or commissioning plan will need to detail the position of the Readers, and allow for their supply of power and network connectivity, bearing in mind the read range of the Tags for your application.

Software.
Your Readers will come with a USB KEY containing the software you need to configure the Readers.

RFTRAQ Readers and Tags, Antennas, Variable Attenuator
Depending on the Reader model(s) you received and the type of Tag, you will have a selection of the following:



Manifest Checklist

- ☐ RFRT-Series Active RFID Reader
- ☐ AC Adaptor *(Optional)* [AC adapter, output 5vDC 1.0-1.5A]
- ☐ Stubby Antenna(s) *(Optional) - depending on model purchased, you will have up to 3 antennas*
- ☐ CAT 5 Ethernet Cross-Over Cable
- ☐ Variable Atennuator *(Optional)*
- ☐ Test Tag [a special Tag with a configurable PING RATE and optional LED indicators]
- ☐ USB Key [containing RFTRAQ Reader Software]

Please take the equipment out of the boxes, and verify that the manifest tallies with the equipment you have been provided, including the Reader model number(s). If you believe you are missing or have the wrong equipment, please:

- Check the equipment with that provided on your delivery manifest. If the item(s) are on your delivery manifest, but not in your delivery, or this does not tally with your order, please contact RFTRAQ as soon as possible.

Connection Checklist

Serial number:		
MAC address:		
IP address allocated:		
Boot behaviour okay?	Yes ☐	No ☐
Test connection	Pass ☐	Fail ☐

If you have read the pre-requisites and believe you have everything you need, you're ready to start the setup process!

Depending on what Reader model(s) you received, and the type of Tag, you will have a selection of the following:

RFRT-Series Reader

Test Tag

USB Key (software)

Stubby Antenna(s) *OR*

Planar Antenna

Cat 5 Ethernet Crossover Cable

AC Adaptor

We reserve the right to supply parts which differ in style from those pictured.

The setup process

Step 1
Setting-up Readers for your network
(estimated: 10 minutes per Reader)

Step 2
Reading Tags & basic Tag acquisition testing
(estimated: 5 minutes per Reader)

Step 3
Setting the Active RFID read range
(estimated: 10-20 minutes) *Optional*

Installing **STRAQ** Director and **STRAQ** AMP Lite
(covered in a separate Guide document)

At the end of the first three steps you should be able to:

Install and power up your RFRT-Series Reader so that you can confirm the Reader is correctly configured for your network.

Read Tags via your Reader.

Step 1

Setting-up Readers for your network

We recommend:

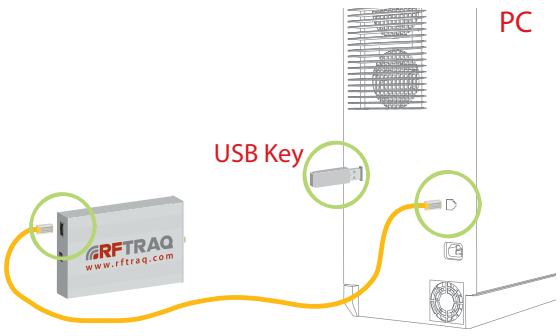
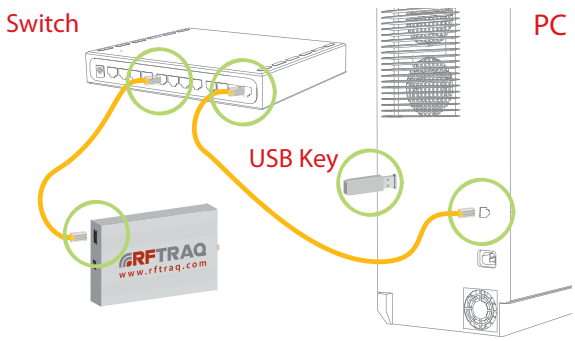
1. You identify the most logical physical location for the placement of the RFRT-Series Reader taking into account power source, network connectivity, safety, protection of the RFRT-Series Reader from its surroundings and convenient positioning of the required antenna.

2. That you configure your RFRT-Series Reader prior to physical installation, as subsequent physical access may be inconvenient

3. Even though the RFRT-Series Reader operates at a low voltage unlikely to harm you, you will be dealing with AC power outlets, so remember to be SAFE.

The following steps allow you to properly set the Reader's IP address and undertake a basic test to ensure your RFRT-Series Reader is working properly, before you place the device according to your installation plan and fine-tune the setup.

1. Start your PC or Laptop, insert the USB Key supplied, and ***EITHER;***

A: Use the Crossover Cable supplied to connect your PC to the Reader	***B:*** Connect both your PC and Reader to your switch
	

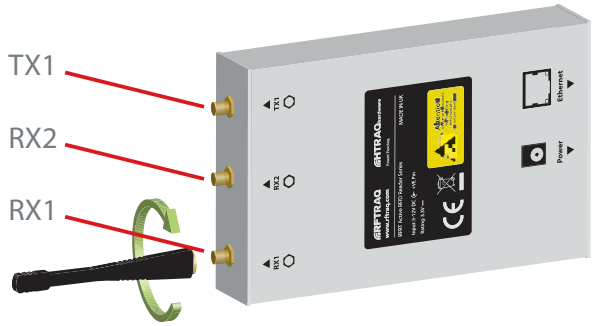
2. Using method A above (preferred) connect the Reader to your PC's network (Ethernet) socket, using the crossover cable supplied. Ensure that your PC's network adaptor is configured for DHCP with auto-IP (APIPA)

3. Wait until your network adaptor has configured itself. A message 'Limited or no connectivity' may appear in the systray. Your PC will have an IP address of 169.254.x.y if this has worked.

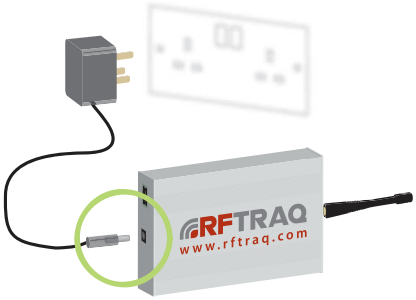
4. If it is not already connected, connect the antenna(s) to the Reader.

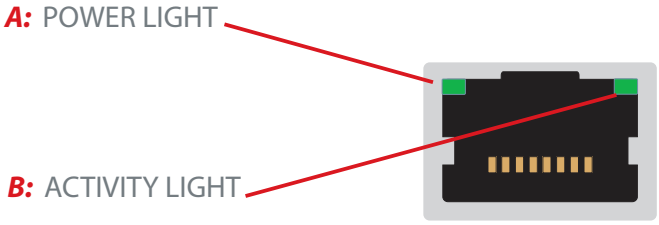
Please note: Do not over tighten.

With the reader placed as shown, the TX (Transmit), and RX (Receive) antennas should be placed as indicated.



5. Supply power to the Reader. When power has been connected, you should see two LED's light up within the network socket.





Looking at the Reader with the power socket to the right;

A: The LED to the left is the **POWER LIGHT** When lit – the Reader is powered up.

B: The LED to the right is the **ACTIVITY LIGHT** When lit - the Reader is actively sending and receiving data.

6. Copy the folder called CONFIGTOOL from the USB Key to your PC's desktop.

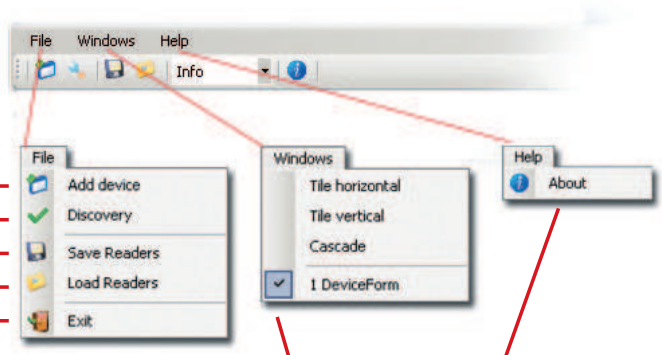
CONFIGTOOL

7. Open the CONFIGTOOL folder and run the application called RFTRCONFIG.EXE

RFTRCONFIG.EXE

RFTRAQ ConfigTool

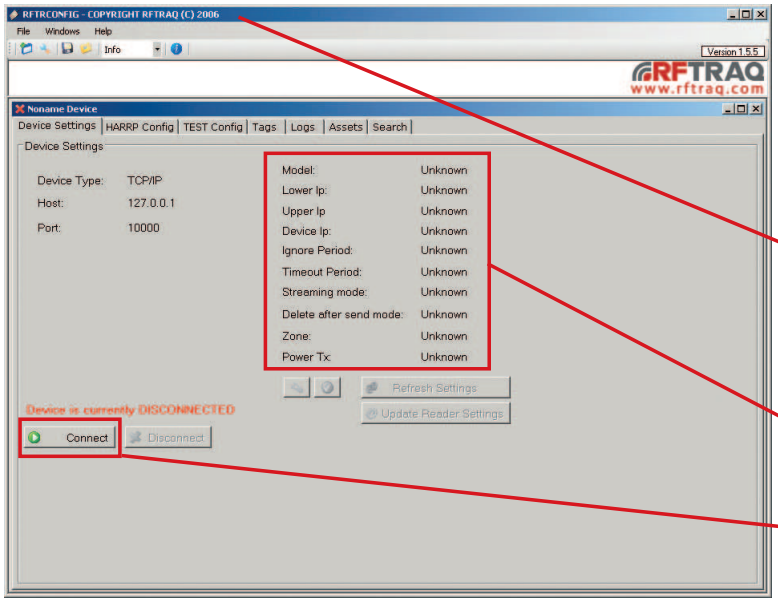
An overview of the ConfigTool interface:



The **File** menu gives options for;

Manually ADD a new Reader
DISCOVER Readers on the LAN
SAVE the Reader list
LOAD an existing list
EXIT ConfigTool

The **Help** menu shows the ConfigTool version



The **Windows** menu gives options for displaying multiple Readers on screen

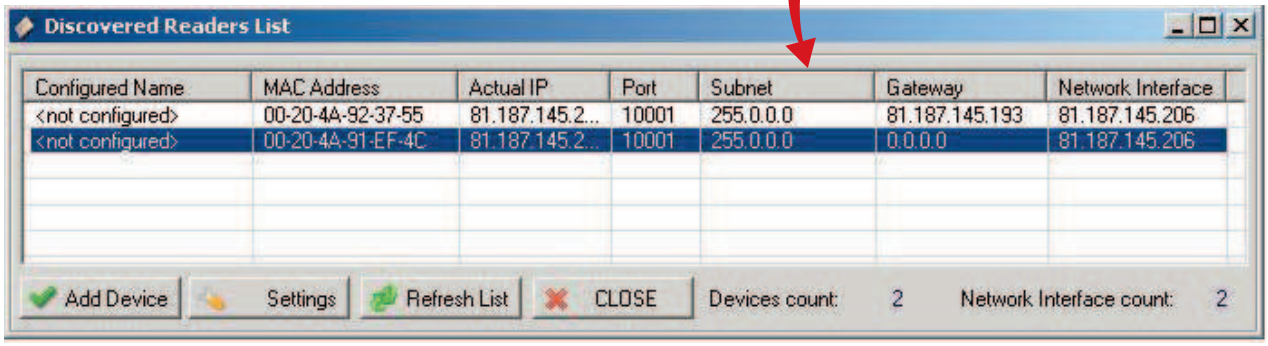
The Device Name, as entered, will be displayed here

The settings of the Reader once connected are displayed here

Click here to CONNECT to the Reader

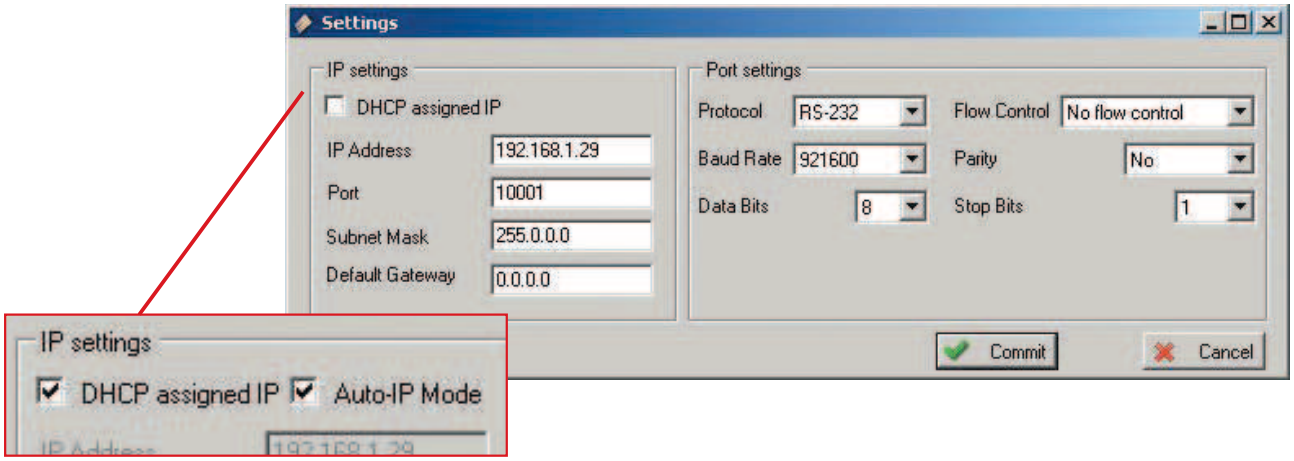
NOTE: More detailed information can be found in the ConfigTool Operators Guide.

8. From the toolbar, click the DISCOVER icon. The tool will now search for Reader(s) and display a list of the Reader(s) found.



9. Click the Reader you wish to configure (e.g. to assign a new IP for your network) and select SETTINGS. Change the IP settings as required then click COMMIT. You should see a confirmation saying that it has been successfully set and the device will reset. You may need to REFRESH the discovery list to find the Reader when it has restarted.

N.B. Please do not change the serial port settings unless you have been told to do so!

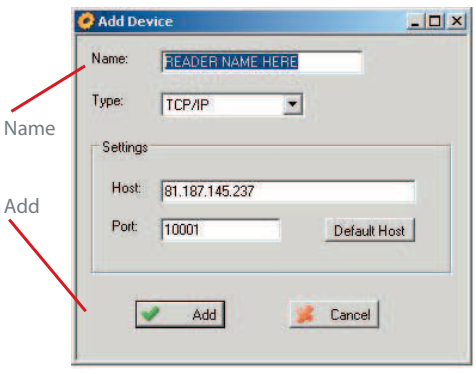


Tip!

CP assigned IP' sets the reader to automatically use DHCP mode. If this box is unchecked the currently displayed static-IP details will be used. When DHCP is ticked, 'Auto-IP' will also be ticked automatically. **The behaviour of this configuration is as follows:** An attempt to contact a DHCP server will be made, if that fails the reader will use the Microsoft APIPA standard (to automatically choose an IP address in the range 169.254.x.x). You may uncheck the Auto-IP box when selecting DHCP but if no DHCP server is found, or an IP lease is denied the reader will simply fail to acquire ANY IP address and you may have problems rediscovering it.

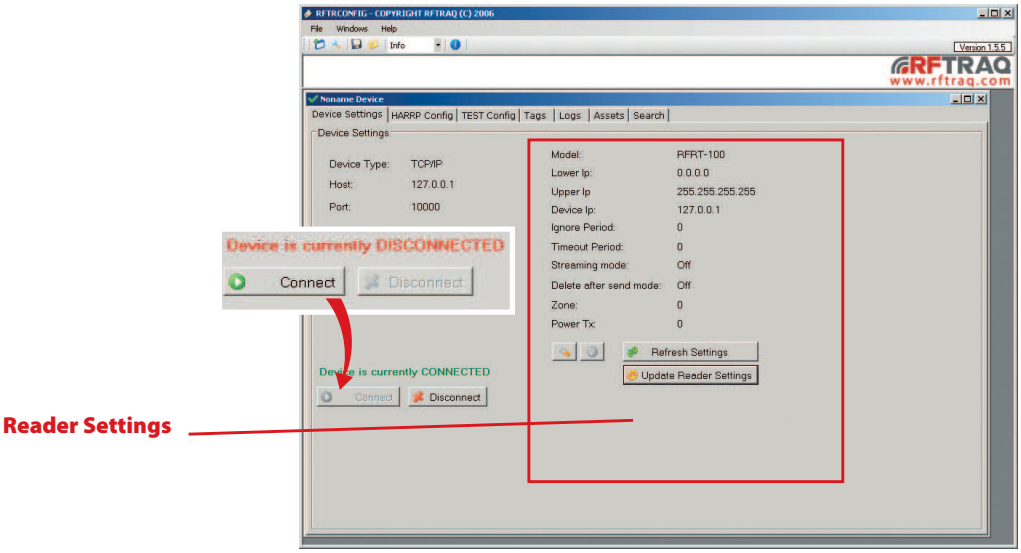
10. Reselect the Reader on the discovery list, then click ADD DEVICE.

11. Type the name by which you wish this Reader to be known to yourself in the top 'Name' box, and click ADD. The Reader is then added to the list of Readers available in the CONFIGTOOL. If you want to SAVE this for recall later, be sure to select FILE > SAVE, and make the filename appropriate to your set up.



12. Click ADD to add the reader to the screen

13. Click CONNECT to connect to the Reader. The CONFIGTOOL will now show that the Reader is connected and display the Reader's current settings on the right hand side of the screen.



14. When you have configured your Reader, make sure to click UPDATE READER SETTINGS on the DEVICE SETTINGS TAB to commit all changes, which will be stored in battery backed up memory.

You have completed Step 1.
The Reader is now configured for your network!

You may continue to configure further Readers by repeating steps 4-14, or continue to configure the basic settings required for Tag acquisition and testing.

Ensure that on your installation plan you clearly list and label the Readers with their name, location, serial number and IP address!

If this is the first time you have received and installed RFTRAQ Reader devices, please read on. If you have used our technology before, or wish to proceed straight to a more advanced configuration, please now read the Asset Management Platform Installation Guide.

Step 2

Reading Tags and Basic Tag acquisition testing

Readers will detect Tags depending on the configuration of both the Reader and the Tag. Out-of-the-box, all Readers and Tags will exist in the same zone, of which there are 4 possible zones.

By default, all Readers and Tags operate in Zone 0. This means that by default all Readers will detect all Tags. This is NOT an optimum setup; so your installation plan will need to ensure that where zones abut each other or overlap, the Readers and Tags are set to different zone values. This is covered in greater detail in the full Asset Management Platform Installation Guide.

The default settings for all Readers are:

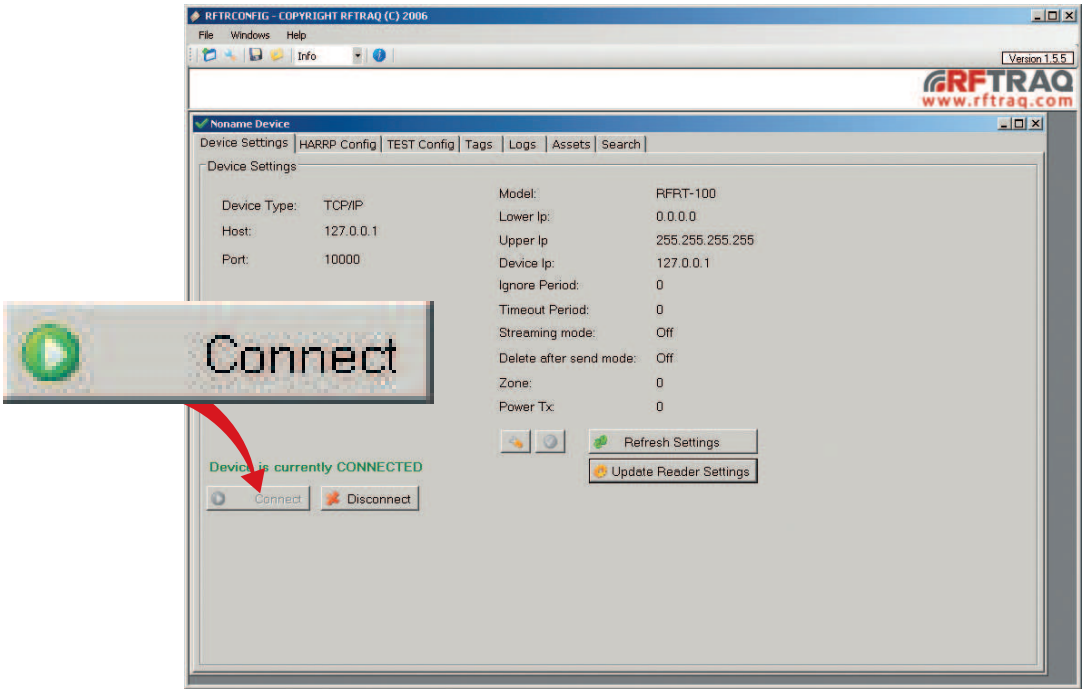
- DHCP activated (for getting a network IP address)
- Stream Mode = OFF
- Delete after send Mode = OFF
- Ignore and Timeout = 0 seconds (OFF)
- Power level = Lowest
- Zone1 activated on all RX and TX devices

The default settings for all Tags are:

- Power level = 0 (Highest)
- Sleep period = Inactive
- Ping Time = 10 seconds (Test Tag is 3 seconds)
- Zone1 activated

Reading Tags

1. Use the CONFIGTOOL to connect to a Reader you have already configured, with the antenna connected



2. Select the TAGS tab, and place your Tags close to the Reader (i.e. within a few metres), but NOT closer than 1m.

3. Click REFRESH. The Reader will now respond to your command, and send you a list of the Tags it can see.

Source IP	First Time Seen	Last Time Seen	Sleep Interval	Firmware Version	Custom Flags	Sequence Number	System Reserved Bit
192.168.18.1	22/01/2007 13:17:17 80	22/01/2007 13:17:17 80	10	0	00000000	5	0
192.168.18.2	22/01/2007 13:17:18 80	22/01/2007 13:17:18 80	10	0	00000000	1	0
192.168.18.3	22/01/2007 13:17:14 80	22/01/2007 13:17:14 80	10	0	00000000	2	0
192.168.18.4	22/01/2007 13:17:15 80	22/01/2007 13:17:15 80	10	0	00000000	3	0
192.168.18.5	22/01/2007 13:17:16 80	22/01/2007 13:17:16 80	10	0	00000000	4	0

4. Set the Reader into STREAMING mode by clicking the STREAM MODE button. Instead of sending you the list of received Tags when you click REFRESH, the Reader will now send you the data as soon as it is received from the Tag. When done, select MANUAL again to stop streaming mode.

You are now successfully reading Tags, have confirmed your configuration works and you have completed Step 2!

If you want to see all Tags in range (i.e. at maximum range - depending on your choice of antenna setup) then you need do nothing else right now, and proceed to the RFTRAQ Asset Management Platform Installation Guide.

Step 3

Setting the Active RFID read range)

(10-20 minutes) (OPTIONAL)

The TEST CONFIG tab has been included to help you find optimum read ranges (where the read range should be less than the maximum) with a minimum of fuss.

The exact configuration of your system will of course entirely depend on the positioning of the Reader, the antenna used, the buildings or obstacles around it, what you want to detect, how often etc. We cannot possibly cover all aspects of system configuration here, and recommend that you refer to your Installation Plan for your specific requirements.

We will use the following requirement as an example to take you through using this screen:

Your requirement is to shrink the maximum read range of a Reader to detect only Tags which are less than 10m from it, and in a given direction only. Since the directionality of the read is provided by the antenna's placement and shape, we will focus on how to attenuate the Reader to work at shorter distances only. By adding attenuation to the Reader, we are limiting the effectiveness of the antenna and therefore shrinking the read range. For a small read range - you need a high attenuation value. For a large read range - you need a small or no attenuation value.

Please be aware that attenuation is NOT 'linear' but is related to the square of the distance between the reader and tag.

The application will use sound effects to help you - so you may want to turn up the volume on your PC.

1. Disconnect the Reader from any software (if connected)

2. Disconnect the Reader from the power source (if connected)

3. Unscrew the antenna from the antenna socket on the Reader

4. Add the variable attenuator to the antenna socket and set to 100dB (which means the maximum amount of 'dampening' of the signal is active). You should have received one of these with your SDK, but if you do not have an SDK, we will be happy to help you locate an appropriate attenuator.

5. Re-attach the antenna to the attenuator, supply power to the Reader and wait 30 seconds for the Reader to boot. Place a Tag within 1m of the Reader

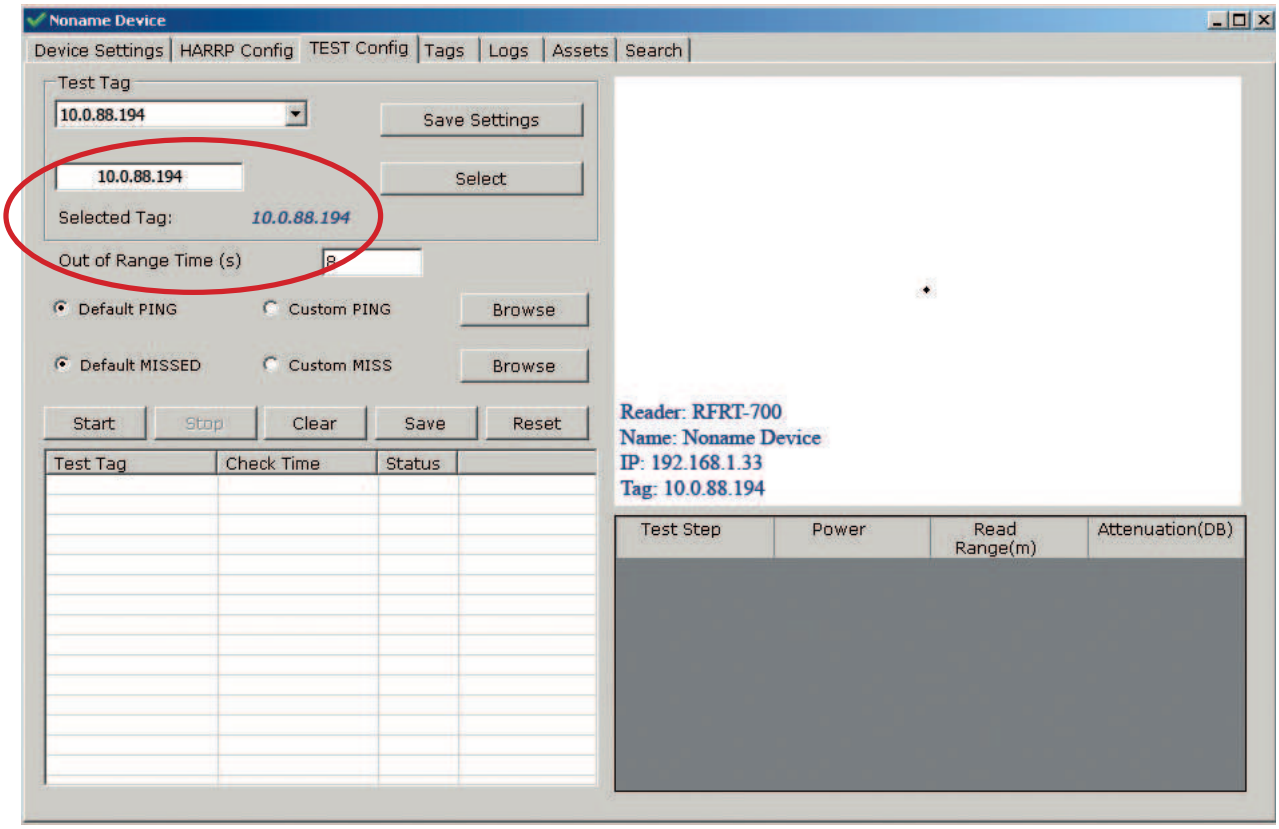
6. Using CONFIGTOOL, connect to the Reader

7. Go to the TAGS screen and click REFRESH. You should now see the Tag reported. Note the Tags IP address.

8. If the Tag is not seen at all, reduce the attenuation value by 10dB and repeat the process from step 5.

9. Select the TEST CONFIG tab

10. Choose the IP address of your Test Tag, and click SELECT. The Tag IP address should now show in the selected Tag field.



Selecting your test tag

11. If you wish to save this Tag as your default for testing with this copy of CONFIG TOOL, click SAVE SETTINGS.

12. Set the desired timeout period in seconds in the 'OUT OF RANGE TIME' box. This means that if the time selected elapses without seeing the Tag, a miss will be recorded and the 'cymbal' alert will sound.

13. Click START TEST. The Reader now goes into STREAMING mode and will begin to report each time it sees the test Tag, and ignores all other Tags. The display will be updated every time the Tag is seen, and an audible note (sonar beep) or custom WAV sounded each time the Tag is seen, along with a GREEN flash of the STATUS field.

14. The system will respond in one of two ways:

    a. If the Tag is detected, the status line flashes GREEN briefly, and the timestamp is logged. You should now begin to slowly move with the Tag AWAY from the Reader, walking no faster than a foot or two per second, as long as the Tag is reported as detected. Keep going until the system no longer sees the Tag once or twice in succession.

    b. If the Tag is not seen – after the 'OUT OF RANGE' period without detection, a different tone is sounded and the status line is RED to signify a 'miss' - meaning the Tag was not read. At this point, you should click return to the PC and click STOP.

15. The 'Test Step' and 'Power' settings are populated automatically for you. Record the distance you travelled in metres to the point at which the Tag was first reported as MISSED. Record the attenuation in dB currently on the dial.

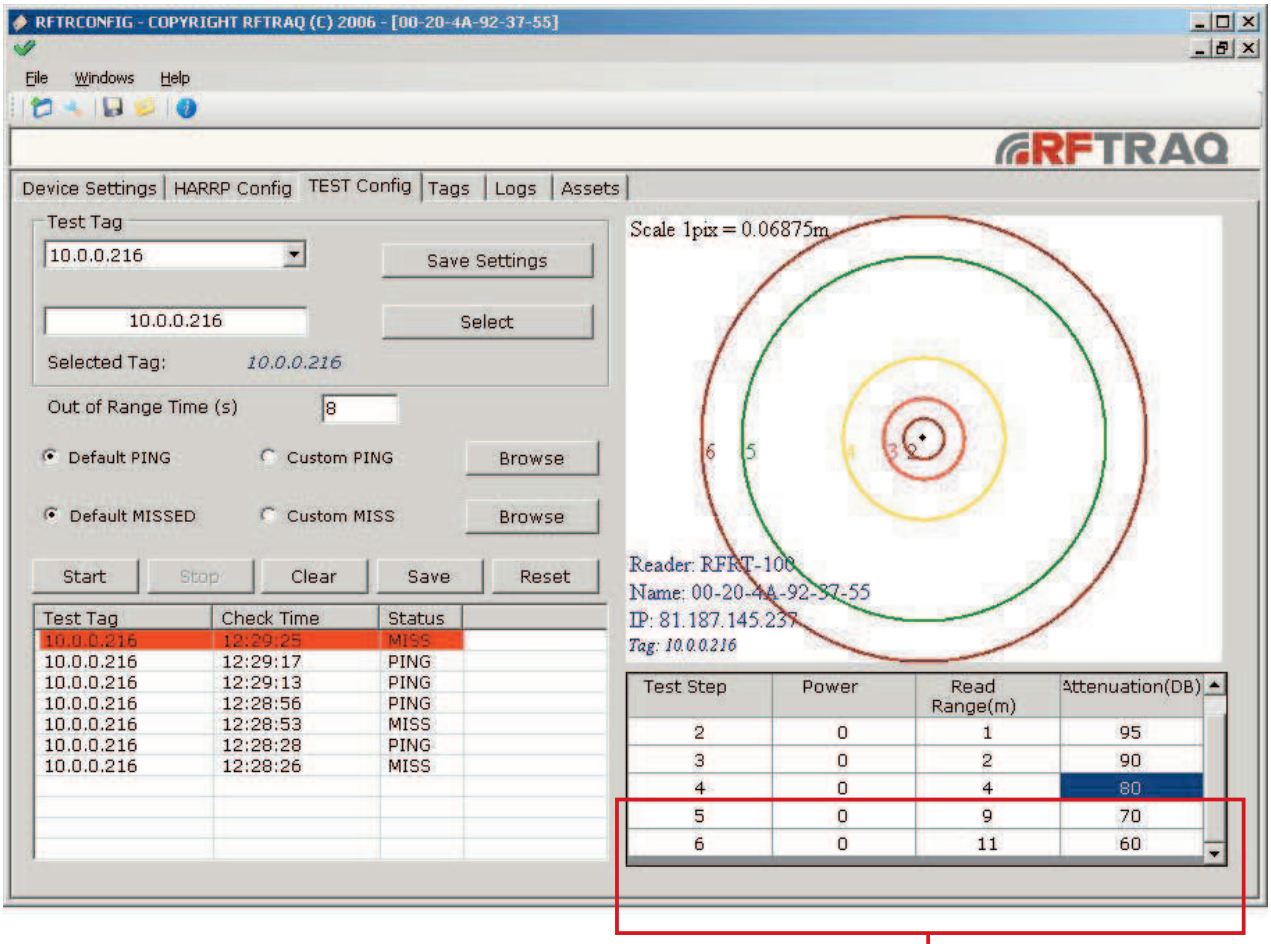
16. Reduce the attenuation value of the Reader, and starting again from the Reader, repeat from step 12 after clicking CLEAR to empty the test Tag status list.

17. When the Tag is no longer read beyond the distance you want to set as the maximum, you have found the optimum attenuation value.

If your intention is to set a longer, but still limited read range, you should start with a much lower attenuation value.

The system then represents your findings in a table, and in a graphic. The diagram on page 17 shows the distances at which the Tag could be read, with the selected attenuation values.

The example screen shows the result of the example we have been following. Each time at least 2 successive MISSES were reported, the operator measured the distance to the Reader, clicked STOP, and entered the distance and current attenuation values before clicking CLEAR, reducing attenuation by 10dB and repeating the test. The test results show that to get a read range below 10m in this case only, the optimum attenuation is between 50-60dB.



Optimum attenuation in this example is 60-70dB.

Determining optimum attenuation for given range

18. Clicking SAVE will save the graphical representation of the test as a graphics file, and the text output as extensible markup language with a name of your choosing. Clicking RESET will clear all results on this screen ready for a new test.

To read Tags within the desired range, then simply set the correct attenuation value on the antenna socket, and Tags beyond this distance would not be detected.

Troubleshooting

I can't run the ConfigTool application – why not?

You must have the Microsoft .NET Framework version 2.0, runtime (NOT SDK), installed for your Windows operating system. If you don't have it – you must download it from the Microsoft website.
http://www.microsoft.com/downloads

I have connected my reader to the network, but can't discover it, what is wrong?

This is a tricky one, as there may be many network issues causing a problem between your PC and the reader. The recommended steps to try are:

1. Connect your reader to your PC using a CROSSOVER CABLE and ensure your PC's network port is set to DHCP (Dynamic Host Configuration Protocol) with APIPA (Automatic Private IP Addressing) enabled. Wait for the network port to tell you it has 'Limited Connectivity' then try again.

Or…

2. Run a DHCP server application on your PC and configure the server application to issue IP addresses & subnet masks in the same logical network as your machine. **Note: You need to understand IP to do this!**

3. Power Off the Reader, and Power on when it is connected to your machine using an Ethernet Crossover cable. (One is supplied with the SDK package)

4. Try discovering it again. Your DHCP server may tell you what IP address has been allocated to the reader – you should also be able to PING this address successfully.

Tried the above and I still can't see it. What now?

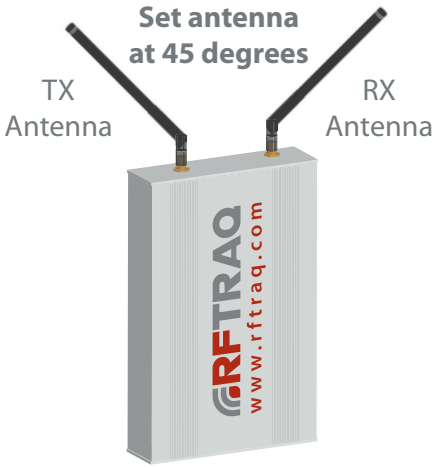
Have you checked that any personal firewall on your machine is deactivated? It may be stopping you from using the required network ports. Deactivate it and try the above again. If you still can't see the reader, it may have a problem. Contact RFTRAQ using our Support website.

I have connected my reader, and discovered it – but can't connect to it – what is wrong?

If you can discover it, you can 'see the reader' on the network, so it is likely some other application is holding the HARRP port (10001) open. Check YOU don't have any active sessions with the reader already, or that anyone else has. Each reader may only be connected to ONCE. If you cannot determine who is holding the connection open, power the reader OFF and ON to disconnect it. You should then be able to reconnect.

I can't see any tags. What is wrong?

Connect to the reader using CONFIGTOOL. Check the ZONE your RX channel is using. Check the antenna is securely connected to the antenna socket – without over-tightening it – and place the tag within 2-5m of the antenna. If you cannot read at this range, there is most likely a fault with the antenna, or the tag is set to a different Zone. Use CONFIGTOOL to step through the Zones one by one, doing manual TAG > REFRESH steps between each change to see if the tag is now visible.



The optimum position for antenna is to have them at 45 degrees to the horizontal.

Remove the TX antenna (the one that is the same side as the network socket) if not required.

Use SEARCH to try and find the tags – if you think they are a long way from the Reader – add a stronger antenna and try setting RX Power to HIGH and Tag Power to HIGH.

I can't change the ZONE or SETTINGS my tags are using, why is this?

Connect to the reader using CONFIGTOOL, and use the Device Settings tab / HARRP Config tab to check the reader model. If you have an RFTR-100 reader you cannot send commands to tags, only receive them. To transmit to tags you must be using an RFTR-700 or 800 model.

I am only able to select Zone 0 or 1 – where did the other two go?

A. Connect to the reader using CONFIGTOOL, and use the Device Settings tab / HARRP Config tab to check the reader model. If you have an RFTR-800 model reader, that is 'normal' behaviour.

I get an unexpected error or a crash when using CONFIGTOOL – what is wrong?

A. It depends on what you were doing at the time, and the nature of the error. In any case, we'd like to hear from you. If you think you've discovered a bug, please use the RFTRAQ Support Website to log an issue, detailing the version of CONFIGTOOL you are using, the steps you undertook, and any details of the error. We would also appreciate you sending us the LOGFILES and/or any screenshots as appropriate. We'll get back to you as quickly as we can!

Still have a problem?

Please refer to **http://www.rftraq.com/support** for further information.

Warranty & Servicing

All RFTRAQ Reader products are warranted for 12 months from the date of purchase for parts and labour. There are no user-serviceable parts inside the Reader or Tags. Please do not open them under any circumstances. Please note that opening the Reader enclosure will invalidate your warranty immediately.

RFTRAQ RFTR-Series of Readers and Tags are sensitive electronic devices. The Readers are NOT IP-rated and MUST at all times be kept inside a suitable enclosure. If the Reader is going to be exposed to external conditions at any time (within stated product tolerances) it MUST also be enclosed to prevent water ingress, frost or dust, and kept constantly at temperatures above 5^{0}C.

Please observe good electronics-handling practices at all times, including the use of anti-static tools to help prevent a shock which could damage the Reader's components.

Returns / RMA Process

Please log on to our website at **http://www.rftraq.com/support** and click the Returns Link if you believe your equipment to be faulty and covered by an existing warranty.

You will be asked to fill out a form which identifies the purchase, and the type of equipment and reason for return. Your request will be responded to as soon as possible.

If provided with an RMA number, please securely wrap the equipment and send by recorded delivery or courier to our RMA Department at the address below.

After receiving the equipment, and an inspection by one of our engineers, we will provide a status update regarding the return via email.

Please do not return goods without an RMA. Equipment will not be returned to you until the courier charges for redelivery have been received.

FCC Compliance

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment

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