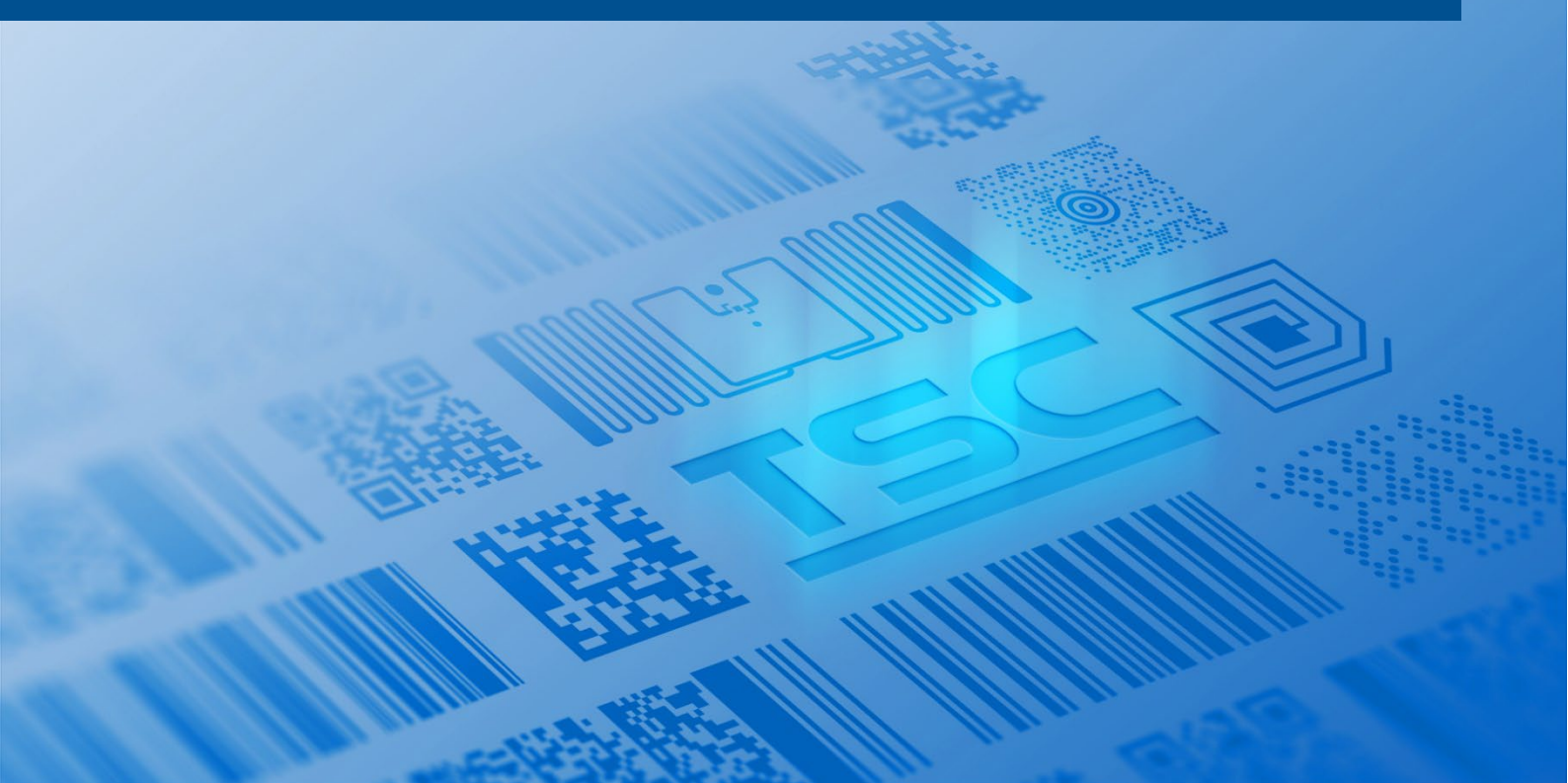




Fixed RFID READER

FR901



tscallobal.com

User Manual

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1 Introduction

The FR901 is a high- performance Fixed UHF RFID Reader designed to deliver reliable and accurate RFID data capture for retail, logistics, manufacturing, and industrial applications. It provides enterprise-grade RFID performance with flexible deployment options for portals, conveyors, smart shelves, and other fixed RFID infrastructures.

This user manual is designed to help users install, configure, and operate the FR901 safely and effectively.

- Please read this manual carefully before installing or operating the device to ensure safe and proper use.
- This device may only be used in countries where it is officially sold.
- The components and appearance of the device shown in this manual may differ from the actual product.
- Features and specifications are subject to change without prior notice.
- Some illustrations or screenshots in this manual may differ from the actual product or software version.

2 Safety Information

2.1 Symbols

This Manual uses the following Symbols to indicate hazards and additional information.

Symbol	Name	Description
	Warning	Indicates situations that could cause injury to yourself or others.
	Caution	Indicates situations that could cause damage to your device or other equipment.
	Note	Indicates additional information that can help you get the most out of the device.



Please Read this safety precaution information carefully. Failure to follow the information provided may result in fire, electric shock, or other property damage or bodily injuries.

2.2 Device



- Do not plug the Power on the device if the device is wet or do not touch adapter or power cord with wet hands. There is risk of electric shock.
- Do not use your device in an explosive danger zone.
- If your device becomes wet, do not put your device in heaters, microwaves, etc. to dry it. There is a risk of explosion or malfunction.



- Although this device is very sturdy, do not drop, hit, bend, or sit on it on purpose. It can be broken.
- Do not modify, take apart, or repair the device. Contact to your customer service center. Failure to do so will void your warranty.
- Do not attempt to modify your hardware or software. It may cause device malfunction and void your warranty.
- Backup the data and information from your device. Your data may be erased during repairs or upgrades. Do not paint your device. It can damage your device's exterior.
- Avoid using or storing this device at extreme temperatures. This device is designed to work at temperatures between -40°C and 65°C (-40°F and 149°F), and humidity level between 5% and 95%.

2.3 Environment

- Do not use the device while driving or operating heavy machinery. Doing so may result in death or serious injury.
- Do not use the device in locations with combustible goods. Doing so may result in an explosion
- Do not use the device in dusty or hot locations. Doing so may damage the device.
- Do not expose your device to direct sunlight such as on the dashboard of a car for extended periods of time.

- Do not use the device in humid locations. Doing so may damage the device and void the warranty.
- Do not keep the device close to air conditioner vents. Corrosion within the device may occur due to condensation from changes in temperature.
- Do not allow children to play with the device.

2.4 Frequency Interface



- The Device emits an electromagnetic fields. It may interfere with your medical devices.
- Do not place credit cards, phone cards, bankbook, and tickets next to the device. The magnetic field or the device can damage their magnetic strips

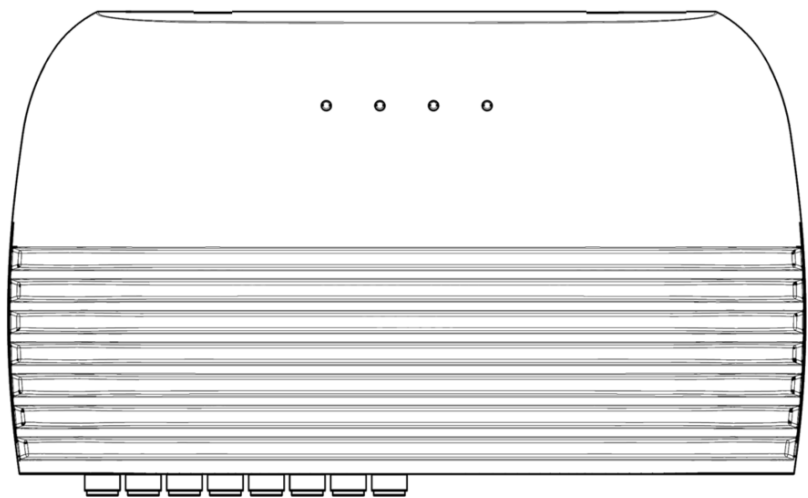
3 Getting Started

3.1 Package Contents

FR901

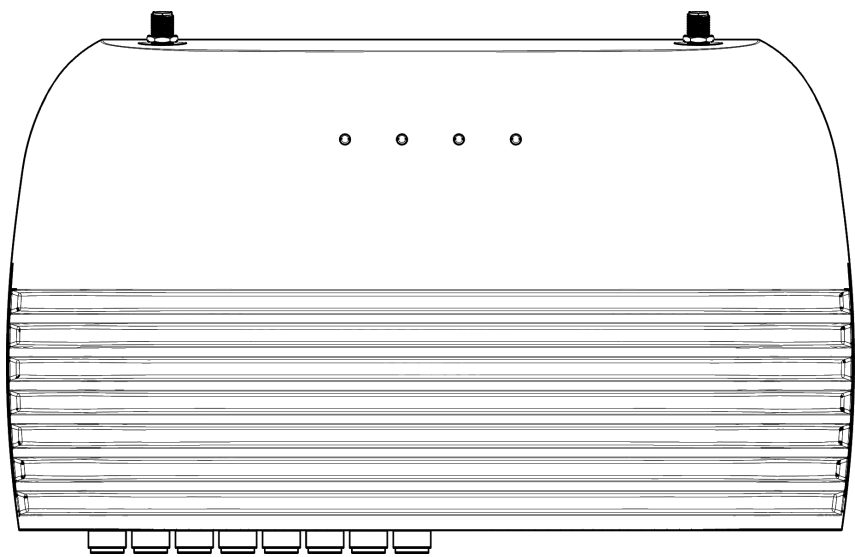
The Package includes :

3.1.1.1 Standard FR901



FR901 device

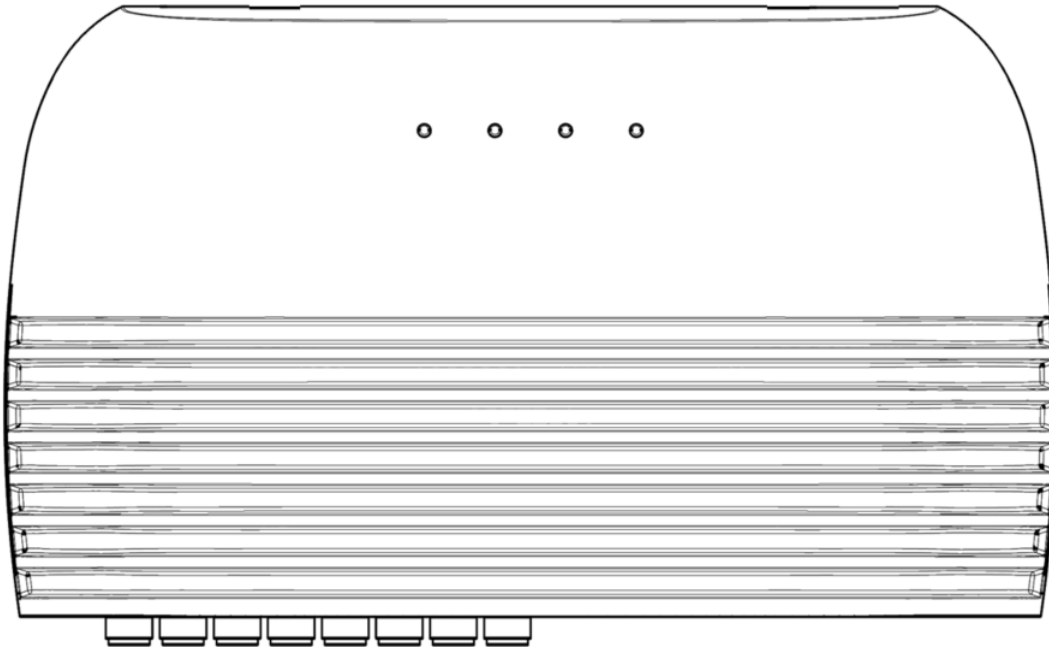
FR901 with WIFI



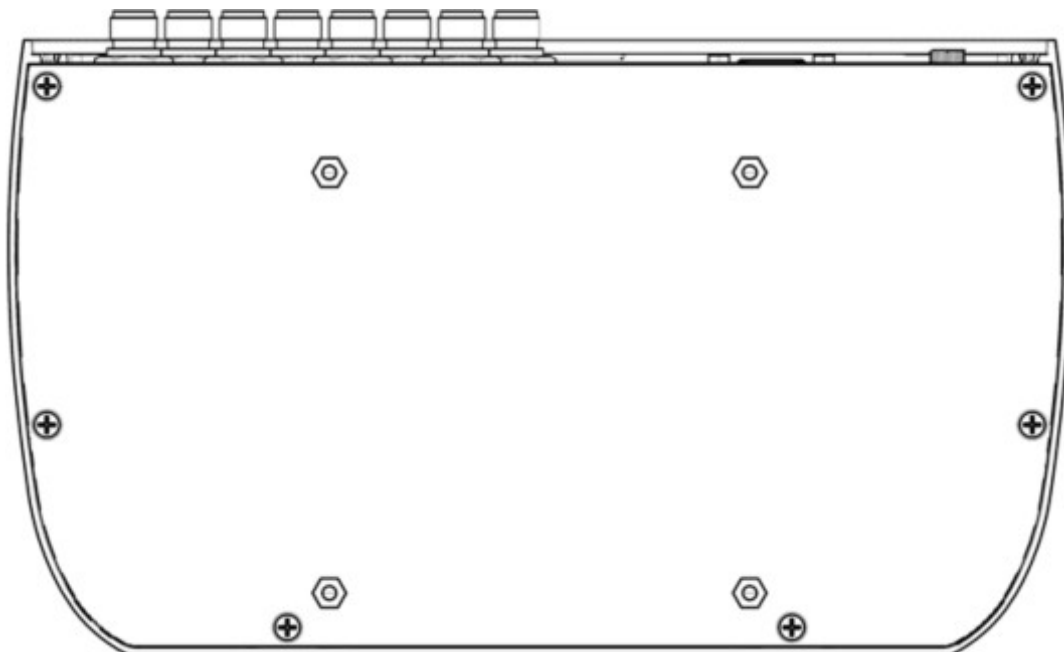
FR901 device (WIFI SKU)

3.2 Your Device

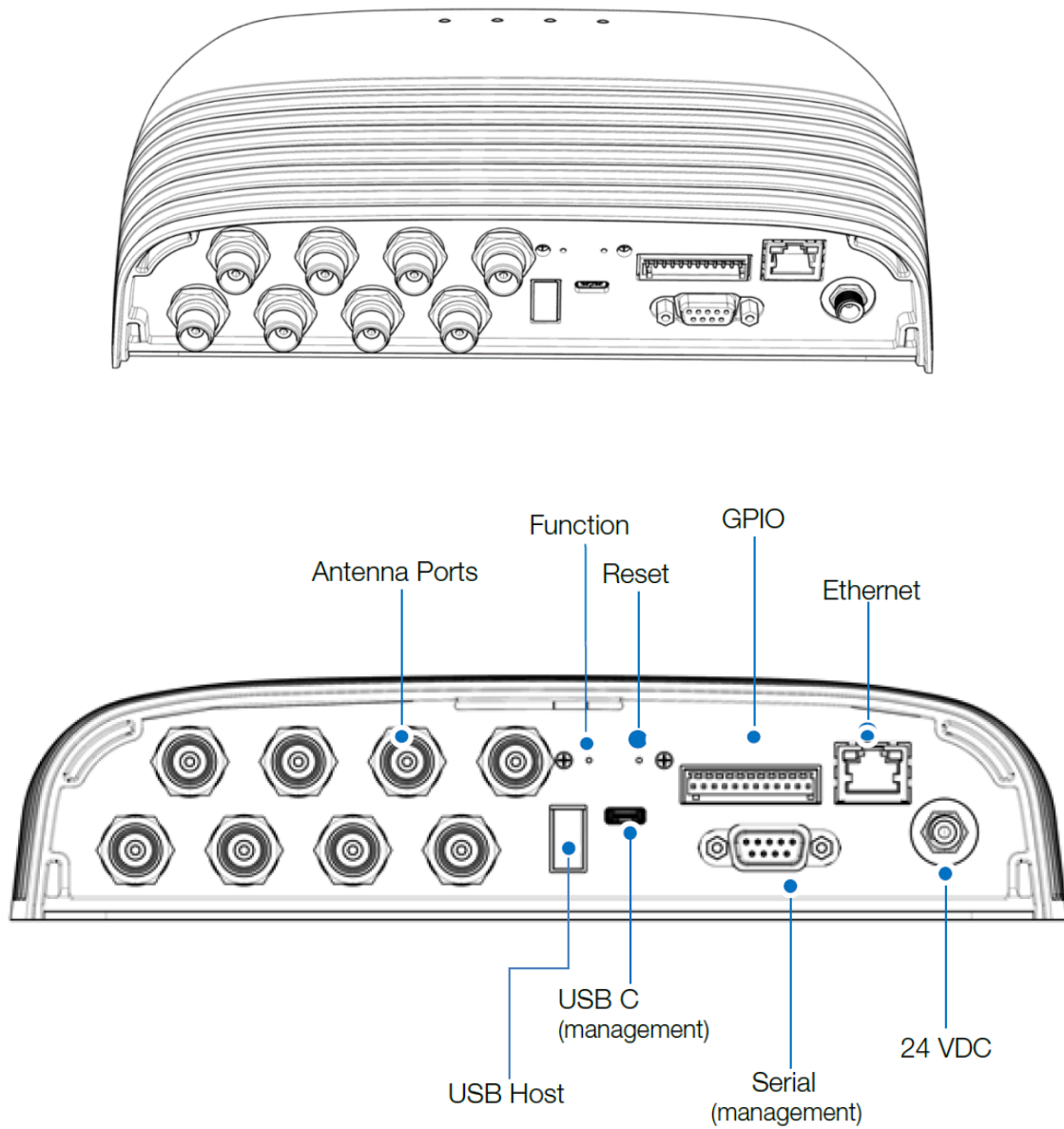
3.2.1 Front



3.2.2 Back



3.2.3 Bottom of Front



4 Installing and Connecting

This Section provides details about FR901 I/O ports and status LEDs. It also explains how to install the Reader and connect it to your network.

4.1 FR901 LED Status

	PWR	ACTV	STAT	Connect
Power	Green	---	---	---
Tag Reading	---	Green (Blink)	---	---
No Antenna Connect	---	Red (5sec)	---	---
Factory Reset	---	---	Orange	---
Booting	---	---	Orange	---
SW Update	---	---	Orange	---
SW Update Fail	---	---	Red	---
Firmware Update	---	---	Orange	---
Wifi Connected	---	---	---	Green
Wifi Connecting	---	---	---	Orange
Wifi Error	---	---	---	Red

4.2 Installing and Connecting the Reader

The primary installation and connection steps for FR901 are :

1. Position the Reader appropriately for your environment.
2. Connect the antenna (s) to the appropriate ports on the Reader.
3. Connect power to the Reader (either POE or VDC)
4. Connect the Reader to the network
5. Configure region setting on the Reader.
6. Test the Reader installation by reading tags.

4.3 Detailed installation Procedures

This section provides the details for each installation and connection step.

4.3.1 Step 1 : Position the FR901 Reader and install the Reader

Choose a suitable location for your Reader. The device should be placed away from direct sunlight, high humidity, extreme temperatures and sources of electromagnetic interference.

To Power the reader using an external universal power supply, make sure the outlet is nearby.

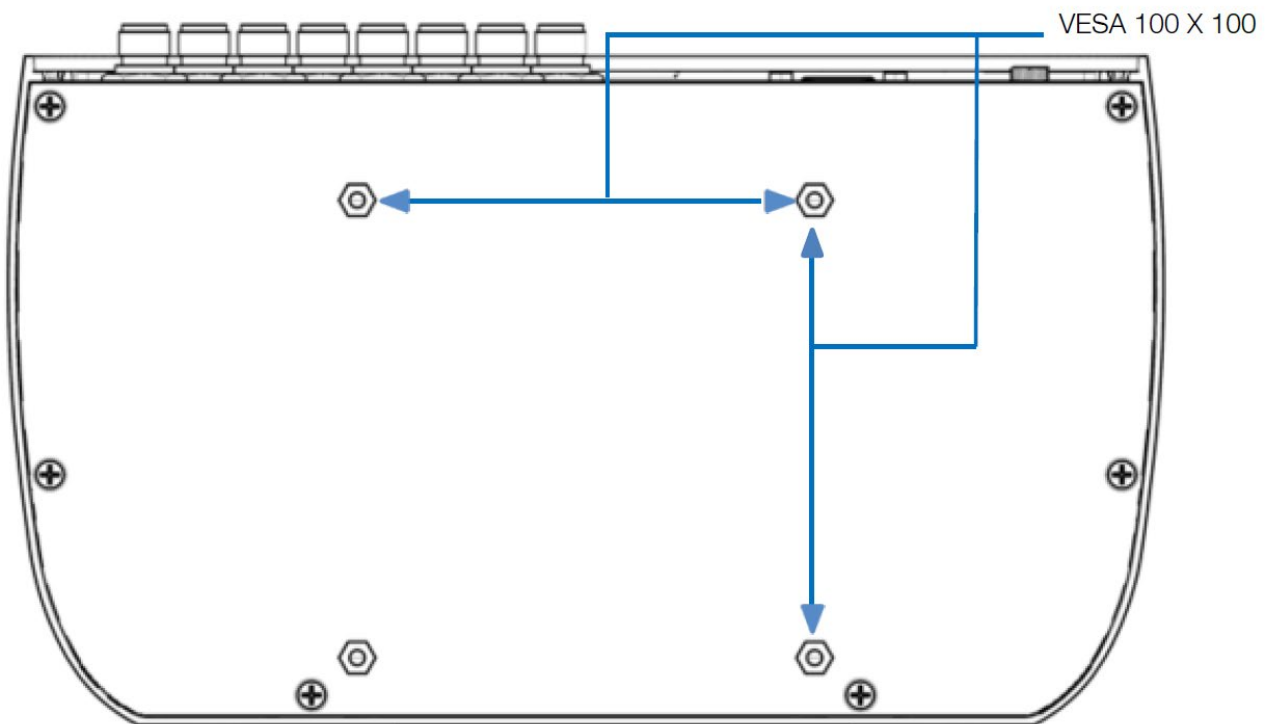


Figure 4.1 FR901 Vesa Mount Position

- The FR901 is mounted via four VESA hole on 100mm x 100mm Pattern
- The FR901 can be mounted on floor, desk, etc. through brackets with VESA 100mm x 100mm patterns.

4.3.2 Step 2 : Connect the Antenna(s) to the FR901 Reader

FR901 Reader has eight antenna ports. Each port is independent, bidirectional, and full duplex TX / RX (monostatic).

To connect the antenna(s) to the Reader:

1. Position each Reader antenna, keeping the following points in mind:
 - Position the antenna(s) to achieve the most effective and efficient tag read
2. Mount the antenna(s) according to the instructions provided by the antenna manufacturer.
3. Attach the antenna cable(s) to the antenna port(s) on the Reader
4. Finger-tighten each connection, making sure the connection is secure.

4.3.3 Step 3 : Power the Reader

External universal power supply

Connect the AC power plug into a suitable 100-240VAC. 50-60Hz power outlet.

The power and Status LEDs on the Reader alert you to the status.

For more information, see section 3.1 FR901 Port and LEDs.



Power off the reader before connecting antennas. Never disconnect the antennas while the reader is powered on or reading tags. This can damage the reader.

Do not turn on the antenna ports from a host when the antennas are not connected.

Maximum antenna gain (including any cable loss) cannot exceed 6.7 dBiL. Ensure that the device is correctly set to the country where the reader is being used to assure regulatory compliance.

When mounting the antennas outside the building, equipment shall permanently connect to building earth (ground) by a skilled person. Perform this in accordance with applicable national electrical installation codes. To connect the antennas to the reader, attach the RP-TNC connector coming from each antenna to an antenna port and secure the cable using wire ties. Do not bend the cable beyond the rated bend radius.

4.3.4 Step 4 : Connect the FR901 Reader to the Network

You are now ready to connect the installed FR901 Reader to your network. You have two options:

- if your network supports DHCP, you can connect the Reader directly to your Ethernet network. After the Reader is powered, immediately communicate with it via SSH (TCP/IP).
- If your network does not support DHCP, or if you want to connect a PC directly to the Reader via Ethernet cable, the Reader defaults to the following fixed IP address:

169.254.1.1.

Setting	Description
Hostname	FR901-XX-XX-XX where XX-XX-XX is the last three bytes of the Reader's MAC address (which is printed on the version label attached to the Reader case). Default Enabled. The Reader also reports its hostname to the DHCP server.
DHCP	Note : When the reader is plugged into a network that doesn't have a DHCP server QR when the PC is connected directly to the Reader via Ethernet cable, the Reader defaults to a fixed IP address (169.254.1.1)

To connect the FR901 Reader to the Ethernet network.

Using a standard Ethernet cable, Connect the RJ-45 connector on the Reader to a LAN drop or network switch. A typical network configuration is shown in Figure 4.2.

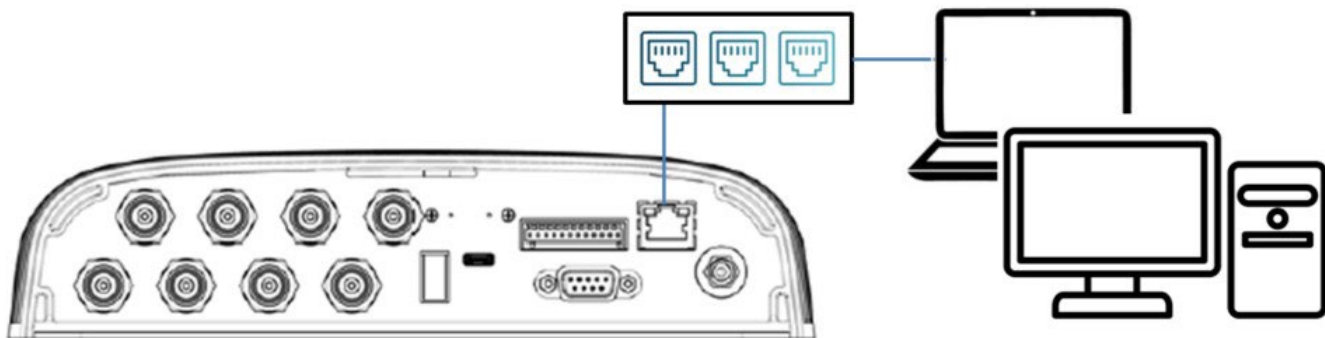


Figure 4.2 Connecting the FR901 Reader to the Ethernet Network

To Connect a FR901 Reader to your PC over a usb connection

1. Confirm that you have the latest version of Putty, a free and reliable SSH, and serial client. Putty version 0.60 or later contains support for serial connections.
2. Use a USB A-C or C-C cable to connect your PC's usb port on the Reader, as shown in Figure 3.3

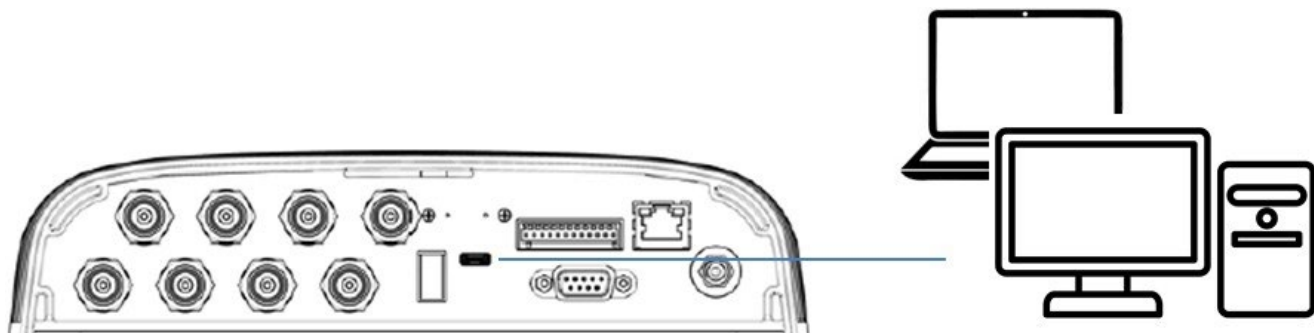


Figure 4.3 FR901 USB Connection (Management)

3. Power up the Reader and wait for the boot sequence to complete.
4. On the PC, run the Putty application and select the Serial Connection option
5. On the Putty Configuration dialog, shown in Figure 3.4, verify that serial line to connect to is set to COMX.
6. Set Speed to 115200
7. Set Flow control to Non, and then click open.

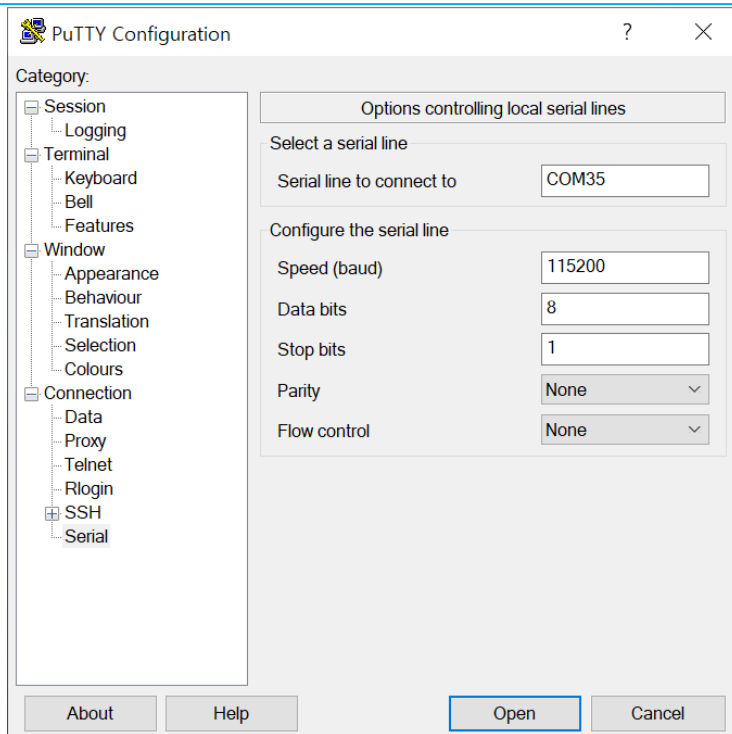


Figure 4.4 Putty Configuration Settings

8. At the BB Shell login prompt shown in Figure 3.5, log in with the Default password.

- User name : root
- password : bluebird



Figure 4.5 BB Shell login prompt

9. When the BB Shell command-line prompt displays, begin configuring the network settings for the Reader. For more information, see Section 4.1.1 Using BB Shell to Configure Network Settings for FR901.

10 .When you have completed configuration of the appropriate network settings, connect the Reader to your Ethernet network.

4.3.5 Step 5 : Configure the Region Setting

Configure the region if necessary. The region can be configured using the config system region command in the BB Shell.

Note that FCC, ETSI, Japan, and Australia Readers cannot be altered and only operate per the regulatory laws in USA/Canada, the European Union, Japan, and Australia

Command1	Description
region	Configure the Region of Reader. ASCII characters are allowed. You must use capital letters. You can only configure the region defined in the region table.

The config system region command allows the user to configure Reader's region. ASCII characters are allowed. You must use capital letters. You can only configure the region defined in the region table

0	KOREA	9	INDIA	18	NEW_ZEALAND	27	VENEZUELA	36	CAMBODIA
1	ETSI	10	INDONESIA	19	PAKISTAN	28	VIETNAM	37	MYANMAR
2	FCC	11	IRAN	20	PERU	29	RUSSIA	38	ETSI_UPPER
3	AUSTRALIA	12	ISRAEL	21	PHILIPPINES	30	ALGERIA	39	PARAGUAY
4	BANGLADESH	13	JAPAN_1	22	SINGAPORE	31	EGYPT		
5	BRAZIL	14	JAPAN_2	23	SOUTH_AFRICA32	32	CHILE		
6	BRUNEI	15	JORDAN	24	TAIWAN	33	GUATEMALA		
7	CHINA	16	MALAYSIA	25	THAILAND	34	MACAO		
8	HK	17	MOROCCO	26	URUGUAY	35	NICARAGUA		

*This list is not related to product Certification

Table 4.1 region table

Example :

[FR901] config system \$ region Korea

Return='0,Success'

4.3.6 Step 6 : Test the Reader

Read the tag and verify that the connections and functions are correct. DemoApp, TSC's Window PC test application, makes it easy to check Reader operation. Use DemoApp to configure various settings and then run a simple inventory operation.

4.4 GPIO Interface Connection

The GPIO port supports up to four input lines and four output lines, and provides a +24 VDC supply for powering external sensors and signaling equipment. The GPIO circuitry is electrically isolated from the reader's chassis ground; however, when an external 24 VDC supply is used, the GPIO ground is tied to the return path of that supply.

The GPIO inputs are designed with flexibility in mind. Each input is internally pulled up to +5 VDC and can be driven low simply by connecting it to ground. The inputs are compatible with most industrial NPN-type sensors and can be connected directly to relay contacts or mechanical switches. They can also be driven by standard 5V logic devices. In the low state, the reader sources approximately 3 mA, which can be handled by common logic families. In the high state, the input current is nearly zero.

Pin #	Description
1	Output voltage :24V (it is only output 1A when the adapter is connected)
2	GND
3	GPIO OUTPUT 1
4	GPIO OUTPUT 2
5	GPIO OUTPUT 3
6	GPIO OUTPUT 4
7	GND
8	GPIO INPUT 1
9	GPIO INPUT 2
10	GPIO INPUT 3
11	GPIO INPUT 4
12	GND

5 Configuring and Monitoring

This section provides a high-level overview of the configuration and monitoring options available for FR901 Reader.

5.1 Configuring FR901 Reader

You can think of FR901 Reader configuration in two categories: configuring the device itself and configuring the Reader's RF behavior. This section provides the basics for each type of configuration.

5.1.1 Device Configuration

BB Shell is a proprietary command-line management interface used to configure and manage network settings, firmware upgrades, and other device-oriented operations. This section introduces the BB Shell commands to use to install and connect the Reader. The BB Shell Reference Manual provides full details and syntax for all BB Shell commands.

The following procedure outlines the BB Shell commands you might need to connect the Reader to your network.

1. Open the BB Shell console.
2. View the Reader's current configuration settings by entering the show network summary command at the BB Shell command prompt as shown in the following example:

```
> show network summary
Hostname : FR901-96-69-23
Ethernet Mode : static
IP address : 192.168.50.115
Subnet Mask : 255.255.255.0
Gateway : 192.168.50.1
Return='0,Success'
```

3. Configure the appropriate TCP/IP parameters for your environment. The applicable commands are: Setting Hostname

```
>config network hostname <HOSTNAME>
```

Setting Static IP Address

```
>config network ip static <IP ADDRESS> <NETMASK> <GATEWAY>
```

Note: The IP Address is required, however the other parameters are optional. The default value is used if an optional parameter is omitted from the ip command.

Note: The Reader MUST be rebooted from this command to take effect.

Enabling DHCP

> config network ip DHCP

Configuring NTP Servers

> config network ntp add <NTP SERVER ADDRESS>

4. After successfully configuring all required network settings, connect the Reader to the network through the FR901 Ethernet port.

5.1.2 RF Configuration

FR901_SDK_DEMOAPP is an example of a PC client application.

Regardless of the application you're using, the underlying protocol is the same, Low-Level Reader Protocol (LLRP).

LLRP is a standard, asymmetric, binary protocol used for communication between a client application and the Reader. LLRP controls the configuration of the antenna transmit power, the receive sensitivity, the operating Reader, and more. For more information about LLRP, see the following documents:

- LLRP Standard This document provides the specifics of the LLRP standard ratified by EPCglobal. http://www.epcglobalinc.org/standards/llrp/llrp_1_0_1-standard-20070813.pdf

Using DemoApp to Configure and Test FR901

TSC provides a LLRP application to use to configure and test the basic RF behavior of FR901. The DemoApp is available from the TSC support Web site . To use DemoApp, your computer must be running a minimum of Windows 7 and have .NET Framework 4.6.1 installed.

This Section describes how to connect to and configure a Reader's RF parameters by using DemoApp. It also provides a high-level description of each parameter.

To configure and test a Reader by using DemoApp.

1. Launch The Demo App. The screen shown in Figure 5.1 displays.

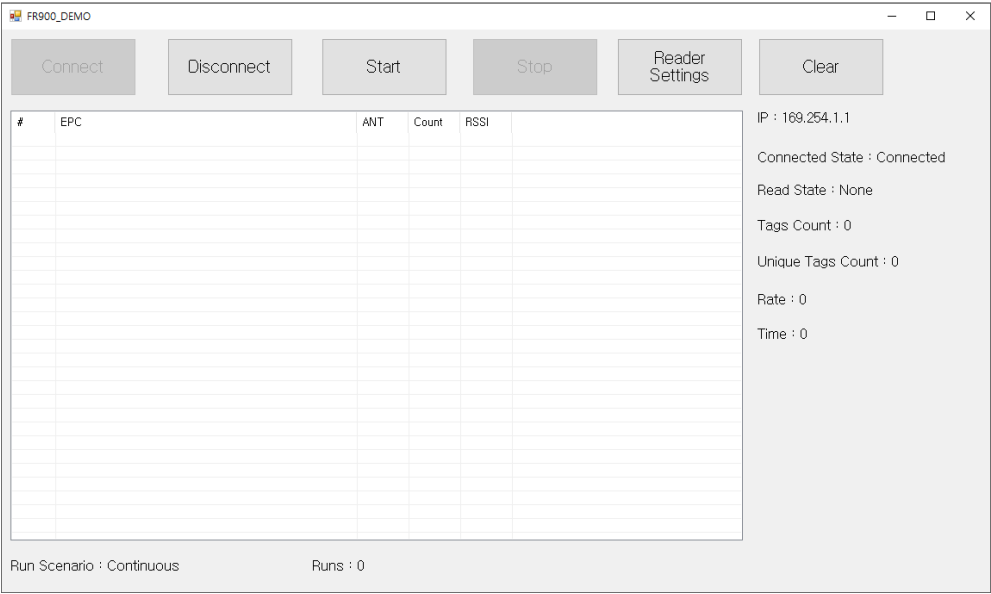


Figure 5.1 DemoApp initial screen

2. Click Reader Settings. The Reader Settings screen displays.

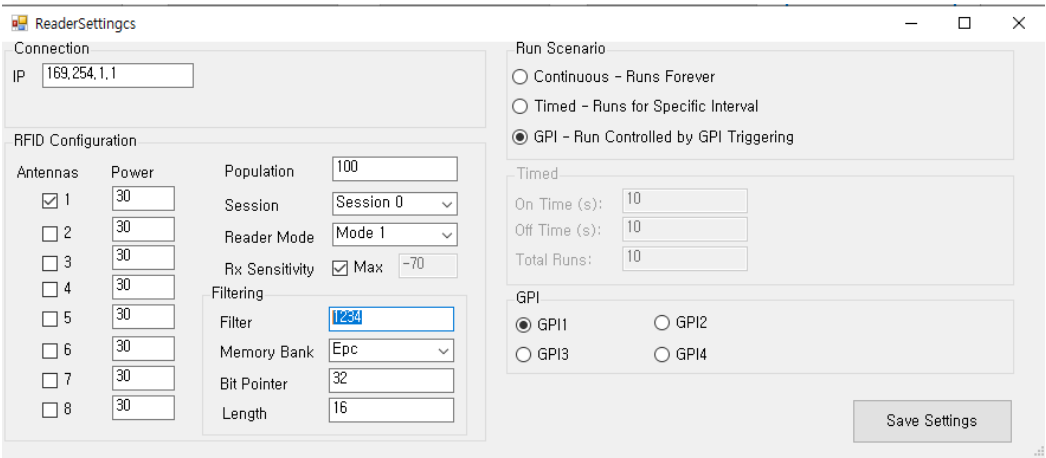


Figure 5.2 Demo App Reader Settings Connection Screen

IP : Enter the IP or hostname of the FR901.

Note : You can find out the name and the IP Address by using the BB Shell show network summary command. The show network summary command provides the dynamic values that are returned by DHCP or LLA if the current configuration is dynamic. The local hostname resolution feature (mDNS) gives the Reader a local hostname in addition to an IP address as its network identity. On an isolated network that lacks DNS service but that has mDNS enabled, a Reader with hostname FR901-A1-B2-C3, for example, can be reached using FR901-A1-B2-C3 local.

Reader Mode : Specifies the rules to use for communication between the Reader and the tag.

- Default : Mode1
- Fastest : Mode 3

Session : To control when and how often the Reader reads a tag. Each tag contains a flag that is flipped from A to B or from B to A when it is read. The Session value controls how long the flag retains its value before reverting back to the original tag value. Search Mode controls which flag values the Reader reads and, in some cases, what happens to the flag value after the tag is read.

When you set Session to Dual target, the Reader reads all the tags that have A flags. Then, after reading the tags, the Reader flips each tag to B. When there are no more A tags to read, the Reader reads all the B tags, flipping each one to A after it has been read. It continues this process back and forth from A to B and back to A. Session 1 ensures that there is a persistence period that prevents tags from reverting before they have all been read.

- Session 0 (Auto Toggle On) : Continue reading the same tag
- Session 1 (Auto Toggle On) : The same tag is read every 0.5~1 Second
- Session 2 or 3 (Auto Toggle On) : The same tag reads only once.

Polulation : 1 to 65535 can be set. Set to 100 if there are 100 tags in front of the antenna.

Rx Sensitivity : -103db

Rx Limit (RSSI) if set to -50db, RSSI below -50db will not be read.

Filter : if set to 1234, only EPCs starting with 1234 are read

Memory Banck : Reserved, EPC, TID, User (usually use EPC)

Bit Pointer : Memory offset (bit) at filter, 32bit offset for EPC, 0bit for rest

Length : Double the length of the filter text.

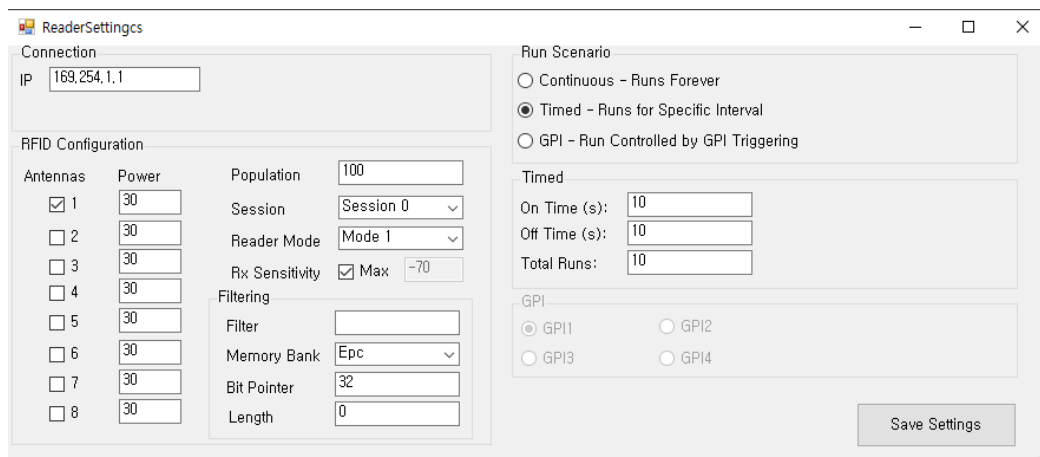
Run Scenario

- Continuous : Press start button to start, continue reading until stop button is pressed.
- Timed : Press start button to repeat start / stop every set time.

On time : Reading time

On time : Stop Time

Total Run : Repeat count



if set as below, it stops automatically after 10 times of 10 seconds Read -10 seconds stop.

Figure 5.3 Demo APP Reader settings Time mode

- GPI : Press the Start button to start reading when GPIX is high and to stop reading when it is low. Set when using sensor.

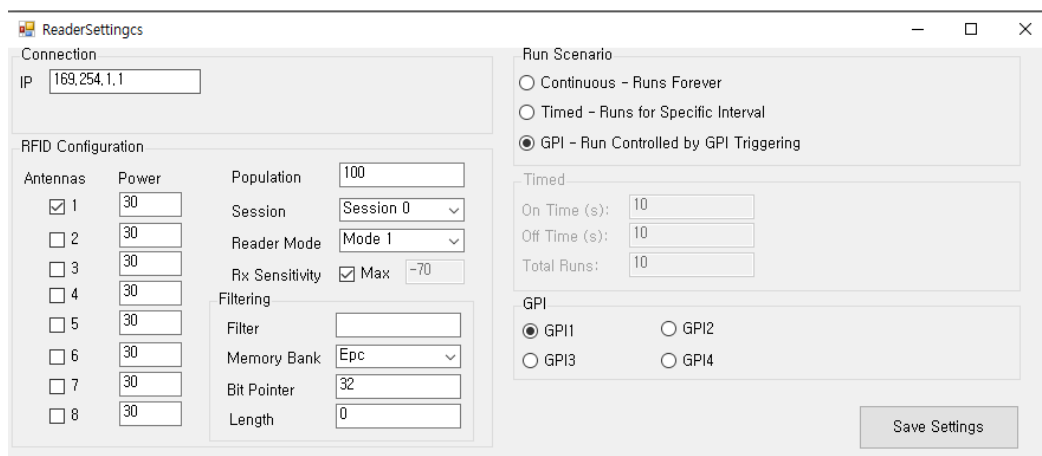


Figure 5.4 Demo App Reader Setting GPI mode

Antenna Port & Power : Power can be set for each antenna

- Antenna Port : 1-8
- Antenna Power : 0~33

The optimal setting depends on many things:

- How you are powering the Reader
- Length of the cable that connects the antenna to the Reader
- Number of antennas in the area
- Distance anticipated between the antenna and the tags

Use the default value of 30dBm for testing purpose.

3. Test your Reader installation. Place one or more tags in the read-zone of one or more of the attached antennas. On the DemoApp screen, click Connection and Start. Tag reads appear under Inventory, as shown in Figure 5.5.

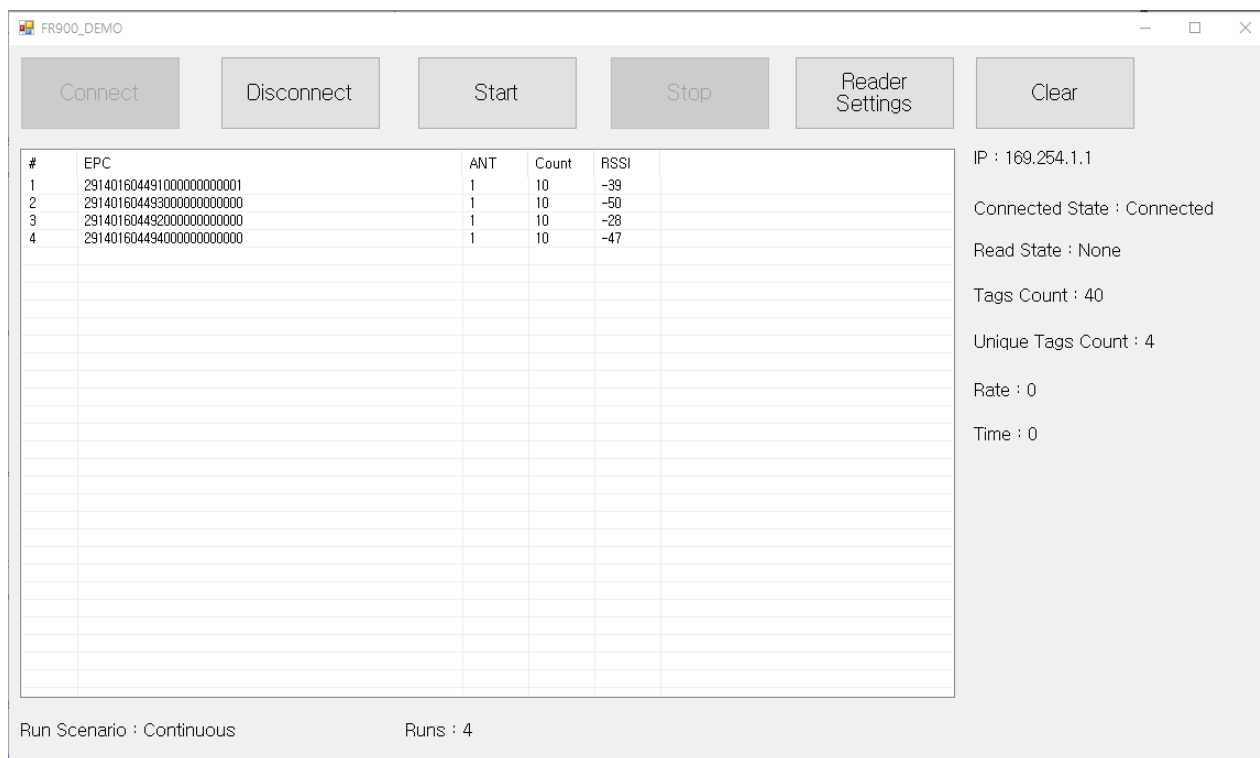


Figure 5.5 Demo App Reader Settings Connection and Start

- Inventory Start / Stop
- You can check the total tag count, unique tag count, rate, and reading time.
- You can check EPC information, Antenna and RSSI

5.2 Monitoring FR901

Use BB Shell to monitor the health and performance of the Reader when FR901 is up and running. This section presents the primary BB Shell commands to use for viewing network and RFID statistics, in addition to the Reader logs. For more information about these commands see the BB Shell Reference Manual.

5.2.1 Viewing Network Parameters and Statistics.

Use the BB Shell show network command to display networking parameters and statistics. When you use this command with the parameters shown in Table 5.1, you can see the following information:

Command	Description
Summary	Display Summary of network settings
Hostname	Display hostname
DNS	Display stored DNS server list
IP	Display IP address
MDNS	Display the Current state of MDNS Service
NTP	Display stored NTP server list and current state
HTTP	Display the fcurrent state of HTTP service
SSH	Display the fcurrent state of SSH service
FTP	Display the current state of ftp service

5.2.2 Viewing the State of the FR901 Reader

To display information about the current state of the Reader itself, use the BB Shell show system command. When you use this command, you can see the following statistics:

Command	Description
Summary	Displays a summary of system info
CPU	Displays CPU information, OS version information, memory and storage usage
Region	Displays current region and available region

Table 5.2 BB Shell Monitoring System Command

6 Device Specification

Physical Characteristics

Dimensions (W x H x D)	253 x 160 x 58.5mm
Weight	1.3kg
Visual Status indicators	Multicolor LEDs : Power, Activity, Status, Connect

RFID Characteristics

RFID Engie	E910
Max Receive Sensitivity	-103 dBm monostatic
Return Loss (Min)	10dB
Air Protocols	ISO 18000-63 (EPC Class 1 Gen2 V2), Gen2X
Fequency (UHF Band)	US: 902–928 MHz; EU: 865–868 MHz; 916.3, 917.5, and 918.7 MHz;
Transmit Power Output	1. Power Adaper US: 902–928 MHz; 5–30 dBm EU: 865–868 MHz; 5–33 dBm 916.3, 917.5, and 918.7 MHz; 5–33 dBm Japan: 916–921 MHz (w LBT), 5–30 dBm 2. POE Adapter US: 902–928 MHz; 5–30 dBm EU: 865–868 MHz; 5–31.5 dBm 916.3, 917.5, and 918.7 MHz; 5–31.5 dBm Japan: 916–921 MHz (w LBT), 5–30 dBm
Max Tag Read	1300+ Tags / Sec

User Environment Characteristics

Operating Temp	-40°C to 65°C / -40°F to 149°F
Storage Temp	-40°C to +70°C / -40°F to +158°F
Humidity	5% to 95% non condensing
Sealing	IP53
Shock / Vibration	MIL-STD-810G

WLAN (Optional)

Radio	WiFi 802.11 a/b/g/n/ac/ax 2x2 MIMO (Optional)
Data Rate	5 GHz PHY data rates up to 1.2 Gbps; 2.4 GHz PHY data rates up to 286.8 Mbps

Operating Channel	Channel 1–13: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 Channel 36–165: 36, 40, 44, 48, 52, 56, 60, 64, 100, 104, 108, 112, 116, 120, 124, 128, 132, 136, 140, 144, 149, 153, 157, 161, 165 Channel Bandwidth: 20, 40, 80 MHz, 160MHz
Security and encryption	WEP (40 or 104 bit); Enhanced Open (OWE); WPA/ WPA2 Personal (TKIP, and AES); WPA3 Personal (SAE); WPA/WPA2 Enterprise (TKIP and AES); WPA3 Enterprise (AES) - EAP-TTLS (PAP, MSCHAP, MSCHAPv2), EAP-TLS, PEAPv0-MSCHAPv2, PEAPv1-EAP-GTC, LEAP, EAP-PWD; WPA3 Enterprise 192-bit mode (GCMP256) - EAP-TLS;

Hardware, OS and Firmware Management

Processor	QCM 6490
Memory	2GB / 64GB UFS Flash 4GB / 64GB UFS Flash (Optional)
Operating System	Linux
Firmware Upgrade	USB Storage device Web-based remote firmware form FTP server
Management Protocols	BB Shell (SSH / USB)
Network Services	DHCP, HTTP, HTTPS, FTP, SSH, NTP, MQTT
Network Stack	IPv4 and IPv6
Security	Transport Layer Security Ver 1.2, FIPS 140-2
Host Interface	EPC global Low Level Reader Protocol (LLRP)
API Support	.Net

Regulatory Compliance

Safety	UL 62368-1, IEC 62368-1, EN 62368-1
RF/EMI/EMC	Part 15B, Part 15.247, Part 15.249, Part 15.407 ICES-003, RSS-247 Issue, RSS 248 Issue EN 300 440, EN 300 328, EN 301 893, EN303 687, EN 302 208, EN 55032, EN55035, EN 301 489 1/3/17
SAR/MPE	FCC 47 CFR2: OET Bulletin 65, EN 50566, EN50663, EN 50364
Other	RoHS, WEEE

✔ Please ask your sales representative for the specifications not listed above or for future upgradeable specifications.

7 Troubleshooting

I dropped the device in the water

Turn off the device. Place the device in a dry place. Let it dry completely for a considerable period of time, and then turn the device back on. If it does not turn back on, contact our service center.

My device gets too hot to touch

It is normal for the device to warm up while it is receiving a poor signal, performing an intense workload, It should cool down if you stop using the device for a certain amount of time. If the problem continues, contact the manufacturer. It may result in fire.

How do I get the repair service?

You can contact your local sales representative or you can send the device via a delivery service to TSC's Korean headquarters. When sending the package, make sure you pay for the shipping fee in advance. When the repair is finished, TSC will cover the shipping cost.

8 Warranty and Support

Customer Support

Before asking for after-sales service, please back up the data on the device. We do not back up data from the products sent to the Customer Service Center. Therefore, we assume no responsibility for loss/deletion of data.

Customer service Center.

#1103, Gplus Kolon Digital Tower 11F,
Digital-ro 26-gil 123, Guro-gu, Seoul,
Republic of Korea(08390)

- Fax : +82-2-6499-2242

- Email : rma@bluebirdcorp.com

- Hours : 9:30a.m – 6:30p.m (GMT Time: +9Hours)

✔ The Center is closed on Saturdays, Sundays, and Korean national holidays.

Registering for After-Sales Service

- We receive the products for our after-sales service through mail, delivery services and hand delivery only in principle.
- If you bought the product from a party other than TSC or an authorized TSC reseller, you need to register the product before using our after-sales service.
- Please enclose an evidence of purchase or the product receipt for our after-sales service.
- Please enclose your name, telephone number, address and details of the problem for a prompt service.
- You can ask for our after-sales service by contacting your authorized TSC dealer or the Customer Service Center in the head office.
- Do not intentionally damage the label on the product.
- A damaged label may result in a disadvantage to the customer.
- When you return the product to TSC for service, please put the product in a protective box.
- The warranty will not cover any damage which occurs during delivery. We advise you to use the box and protective cover supplied with the product.
- Make sure to deliver the product in a safe way. TSC assumes no responsibility for the loss of the product during delivery.

Charged Services

- **In the following cases, it will be charged when requesting for after-sales service.**
 - Service request due to inappropriate use of the device by the customer
 - Loss of PIN number

- Use of programs that might affect the program (over-clock, forceful changes in the input of the system, personal developments)

- **Faults caused by the customer**

- Defect due to inappropriate or careless use of the product (dropping, submersion under water, shock, damage, unreasonable operations, etc.)
- Defect due to a repair or unauthorized technician
- Defect caused intentionally or by the carelessness of the customer
- Defect due to the use of fraudulent parts or components

- **Other Cases**

- Defect due to nature (damage caused by fire, wind, flooding, etc.)
- Accessories are out of warranty (accessories like battery/charger/cable/adapter, etc. have a warranty of 6 months)

- **Regulations for repairs after charged services**

- If the same fault occurs in the part that has been repaired within a 1 month (30 days), the part will be repaired free of charge.



No refunds will be offered in the following situations :

- The Product seal has been removed (if applicable)
- The Product has been damaged due to careless use by the customer or due to a natural disaster (floods, rain, fire, etc.).
- Loss of product or other components (manual, connecting cables, etc.)
- DOA (Dead on Arrival) policy

If your product is DOA(Dead on Arrival), or has malfunction within 30days of purchase (DOA period), the product will either be exchanged or provided with after-sales service.

Warrnaty Certificate

Thank you for purchasing a product from TSC.

- In case of accessories such as batteries, only those that match the sales list managed by the Customer Service Center will be eligible for customer service.
- A repair or an exchange of batteries that does not match the sales list of the Customer Service Center due to the carelessness of the customer will be fully charged.

Name of Product	Fixed RFID Rader
Name of Miodel	FR901
Date of Purchase	
Manufacturer Number	
Place of Purchase	
Term of Guarantee	1 year from purchase

Warranty Information

- TSC provides the warranty service for its products in compliance with the TSC's warranty program.
- Upon receiving a notification on a defect of its product within the range of warranty during the warranty period, TSC will repair or replace the defective product according to its warranty policy.
- If the defective product within the range of warranty is not repairable or replaceable, TSC shall refund the purchasing price within a designated period from the date of receiving a notice of defect.
- TSC assumes no responsibility for repairing, replacement or refund until it receives the defective product from the customer. The replacement shall be equivalent to a new product in the aspect of performance.
- TSC products may contain the recycled products, components or materials equivalent to new products in the aspect of performance.
- This warranty is applied to software products only when the programming commands are not executed. TSC does not guarantee interruption-free or error-free performance.

Frequency Bands:

WLAN 802.11b/g/n20/ax: 2412 to 2472MHz

WLAN 802.11n/ax40: 2422 to 2462MHz

WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160//ax20/ax40/ax80/ax160: 5150 to 5250 MHz

WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160//ax20/ax40/ax80/ax160: 5250 to 5350 MHz

WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160//ax20/ax40/ax80/ax160: 5470 to 5725 MHz

WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160//ax20/ax40/ax80/ax160: 5725 to 5850 MHz

WLAN 802.11a/n20/n40/ac20/ac40/ac80/ac160//ax20/ax40/ax80/ax160: 5955 to 6415 MHz

RF ID: 865-868MHz/915-921MHz

Max power:

2.4G WLAN: 18.42dBm EIRP

5.2G WLAN: 15.5dBm EIRP

5.3G WLAN: 15.5Bm EIRP

5.6G WLAN: 15.37dBm EIRP

5.8G WLAN: 13.35dBm EIRP

6G WLAN: 8.76dBm EIRP

RF ID: 32.44dBm ERP

Modulation Mode:

2.4G WLAN:

802.11b(DSSS): CCK, DQPSK, DBPSK

802.11g(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11n(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11ax(OFDM, OFDMA): BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024QAM

5G WLAN:

802.11a(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11n(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11ac(OFDM): BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM

802.11ax(OFDM, OFDMA): BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024QAM

6G WLAN:

802.11a(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11n(OFDM): BPSK, QPSK, 16-QAM, 64-QAM

802.11ac(OFDM): BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM

802.11ax(OFDM): BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM

RF ID: DSB-ASK

2.4G WIFI Channel Spacing: 5MHz

5G WIFI Channel Spacing: 10MHz

6G WIFI Channel Spacing: 10MHz

WLAN: External Antenna, Gain(s):

2.4G: ANT 1: 1.27dBi, ANT 2: 1.27dBi

5GHz WLAN: ANT 1: -0.96dBi, ANT 2: -0.96dBi

6GHz WLAN: ANT 1: -0.98dBi, ANT 2: -0.98dBi

RF ID: FIXED Antenna, Gain(s): 6dBi

CE Maintenance

This product may be used in the following European member states subject to the following restrictions. For products that operate in the frequency band 5.150 to 5.350 GHz, wireless access systems (WAS), including radio local area networks (RLANs), shall be restricted to indoor use.

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES
	FI	FR	HR	HU	IE	IS	IT	LI	LT	LU	LV
	MT	NL	NO	PL	PT	RO	SE	SI	SK	TR	

Declaration of Conformity

TSC Auto ID Technology Co., Ltd. hereby declares that this Fixed RFID Reader is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU. In accordance with Article 10(2) and Article 10(10), This product is allowed to be used in all EU member states.



FCC Caution.

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.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30 cm between the radiator & your body.

This device is restricted to indoor use only.

IC Warning

- This device complies with Innovation, Science and Economic Development Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference, and
- (2) This device must accept any interference, including interference that may cause

undesired operation of the device.

Le présent appareil est conforme aux CNR Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le

brouillage est susceptible d'en compromettre le fonctionnement

- RF warning for Mobile device:

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 30cm between the radiator & your body.

L'appareil a été évalué pour répondre aux exigences générales d'exposition aux RF. Cet équipement doit être installé et utilisé avec une distance minimale de 30 cm entre le radiateur et votre corps.

This device is restricted to indoor use only.

Transmitters in the 5.925-7.125 GHz band are prohibited from operating to control or communicate with unmanned aircraft systems.

1. Devices shall not be used for control of or communications with unmanned aircraft systems.
2. Devices shall not be used on oil platforms.
3. Devices shall not be used on automobiles.
4. Devices shall not be used on trains.
5. Devices shall not be used on maritime vessels.

This radio transmitter IC: 22515-FR901 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

The antenna gain already includes the maximum loss of the antenna cable.

AN970: 6dBi; AN971: 6dBi; ANS961: 5.5dBi; ANS981: 3.5dBi



TSC CUSTOMER SERVICE

Operating Hours

Monday to Friday 9:30AM – 6:30PM

(GMT Time : +9 Hours)

**The center is closed on Saturdays, Sundays, and
Korean national holidays.**

Customer Service Center

**#1103, Gplus Kolon Digital Tower 11F, Digital-ro 26-gil
123, Guro-gu, Seoul, Republic of Korea(08390)**

TSC constantly strives to bring
utmost satisfaction to all our customers