



UHF RFID Reader

Max Faster GVR9040

User Guide

Model: Max Faster GVR9040

FCC ID: 2AL59GVR9040

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1 Introduction to Max Faster GVR9040

Max Faster GVR9040 is a stationary, four-port, UHF Reader, which is designed to support the EPC Class 1 Gen 2 (ISO 18000-6C/63) protocol. It has unparalleled advantages in providing high identification accuracy under long distance and fast speed. Its strong anti-interference features can adapt to complex electromagnetic environment, especially in the intelligent traffic management, logistics, mobile asset management, and other applications.

The reader is designed for indoor and outdoor environment and delivers high performance under challenging circumstances, such as fast vehicle speed and extreme temperature. Therefore this equipment is ideal for commercial and industrial applications.

1.1 Product Parameters

Wireless Link Characteristics	
Parameters	Specifications
Air Interface Protocol	ISO/IEC18000-6C/63 EPC Global Gen2 V1 and V2
Supported Regions	902MHz~928MHz; Other frequency ranges can be customized.
Data encoding	FM0、Miller
BLF	64~640 KHz

Electrical and Application Characteristics	
Parameters	Specifications
Power supply	AC 100~220V, 50~60Hz
Communication interface	10/100M FE; RS-485;
Antenna ports	4 N-type Female
GPIO interface	4 GPIO

Control mode	Trigger/continuous
WiFi	Optional
4G	Optional

Applicable Characteristics	
Parameters	Specifications
Protection grade	IP65
Working temperature	-40℃ ~ +75℃
Storage temperature	-40℃ ~ +85℃
Working humidity	5%~95% RH

Mechanical Characteristics	
Parameters	Specifications
Dimension	361mm×287mm×110mm
Weight	6.5kg
Case material	Aluminum alloy
Case color	Gray
Mounting position	Gantry or roadside pole
Mounting mode	Cantilever type, gantry type, pole type

1.2 Feature

- **Multi-channel support:** with 4 N-type RF interfaces, it supports radio communication in multiple channels and the co-function of 4 antennas.
- **Wide application:** support frequencies ranging from EPC C1Gen2 860MHz to 960MHz.
- **Powerful Function:** support device self-test to accurately detect its operation status; support intelligent temperature modification to stabilize the power output within the changes of ± 1 dBm; support remote update, centralized monitoring and control; support data storage up to 512MB, and offline cache of over 500,000 transaction entries.

- **Premium Performance:**
 - ✧ By adopting our patent technology -- multi-mode adaptive interference cancellation and suppression, it can automatically eliminate the interference outside the antenna;
 - ✧ With high-standard receiving sensitivity, it guarantees the reception quality of tag identification;
 - ✧ The employment of multi-core high-speed host CUP and Linux system enable its strong processing capability;
- **Stability and Reliability:** by employing industrial high-speed processor, advanced software radio engine and carrier cancellation technology, it has strong anti-interference capability and IP65 protection level.
- **High-speed Identification:** tag identification speed reaches 1000 times/s.

2 Installation

2.1 System Composition

The application system is mainly composed of UHF Tag, antenna, reader (interrogator) as well as the backend system (including server, router, etc.), the figure is as follow:

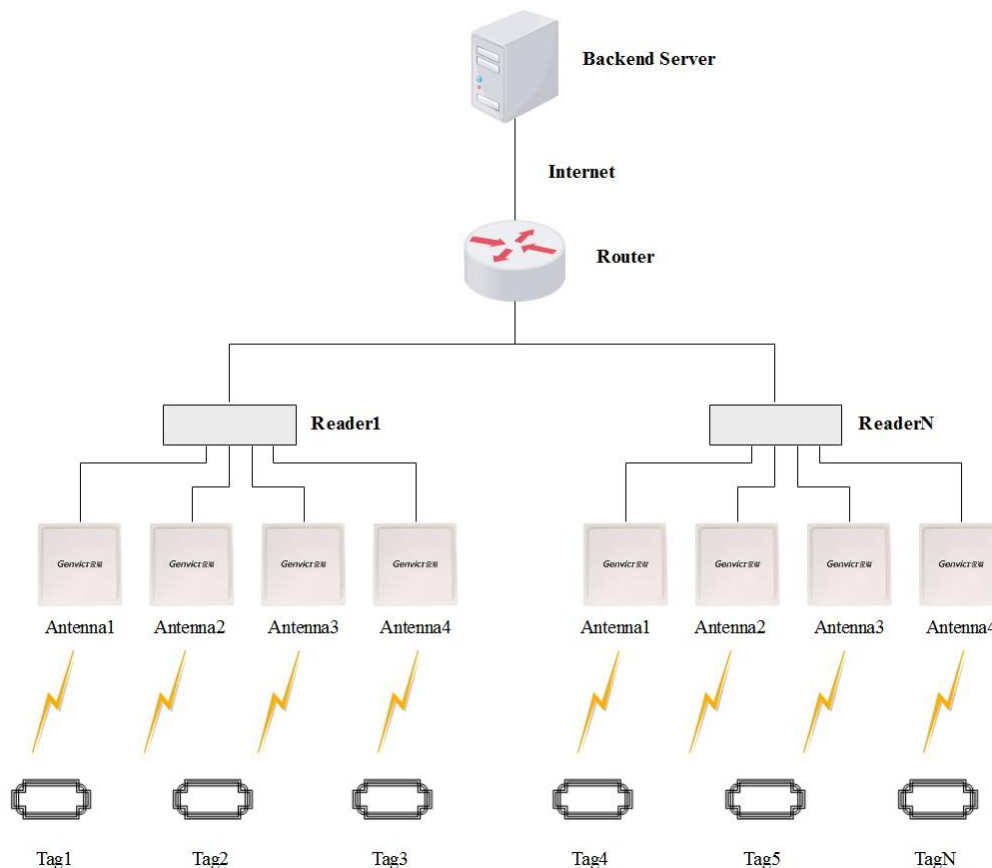


Figure 1 Application System

Equipment Functions are as follows:

Tag: store identification information, etc.

Antenna: signal conversion for interactive communication between reader and tag.

Reader (Interrogator): it can be installed in the pole or beam. Through wireless communication between antenna and tag, the tag data can be acquired and transmitted to the backend server.

Router: support Ethernet network connection of the reader (Interrogator).

Backend server: used for reader configuration, monitoring and management; the tag data can be acquired by the reader and thus forming the data record.

2.2 Interfaces

Interfaces include: power interface, GPIO, Ethernet, RS-485, status indicator, RF port, 4G and WIFI ports.

The schematic diagram of interface panel is shown in the following figure:

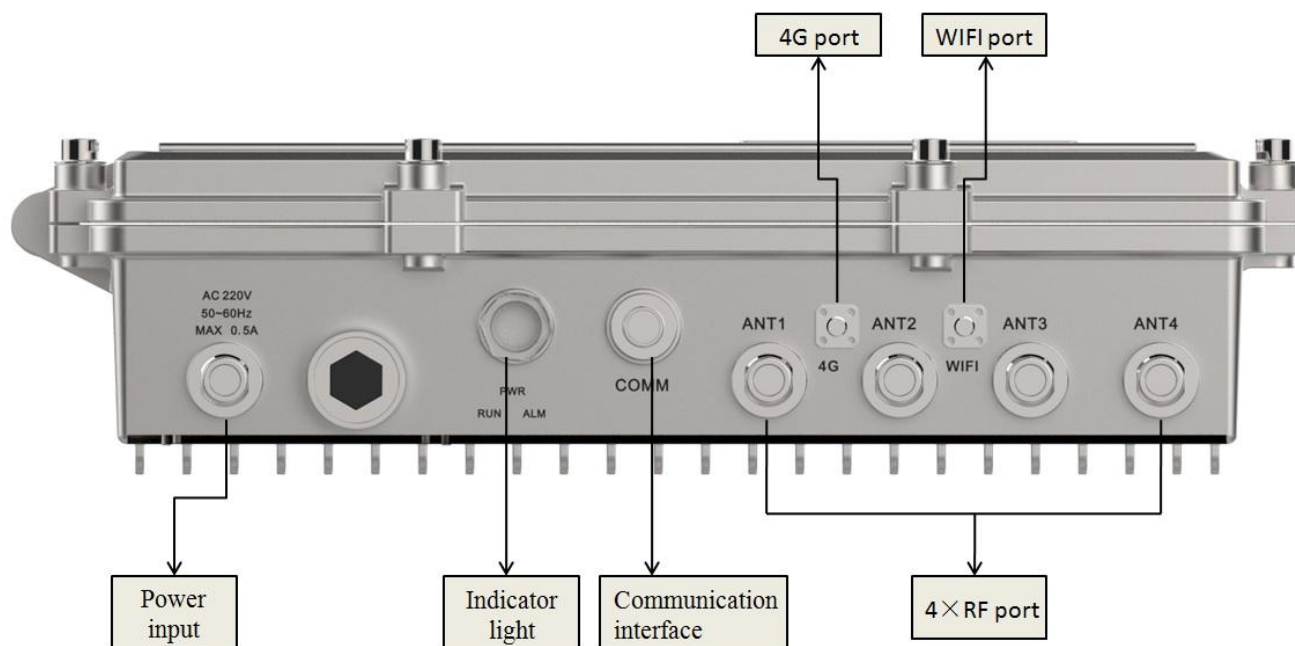


Figure 2 The Schematic Diagram of Interface Panel

- (1) AV220V: support external power input;
- (2) Waterproof port;
- (3) Status indicator: red light, yellow light and green light;
- (4) Communication port: including Ethernet 10/100 Base-T; and RS-485: full duplex, default 19200bps;
- (5) Antenna port: 4 N-type female RF connectors;
- (6) 4G port;
- (7) WIFI port;

2.3 Mounting the Reader

Bracket accessories are used to install reader. It consists of one bracket FN4, one bracket FN6 and four sets of M10*240 bolt assemblies.

Table 1 List of Bracket Accessories

Item	Unit	Quantity	Remark
------	------	----------	--------

Bracket FN4	PCS	1	
Bracket FN6	PCS	1	
M10*240 bolt assemblies	Set	4	

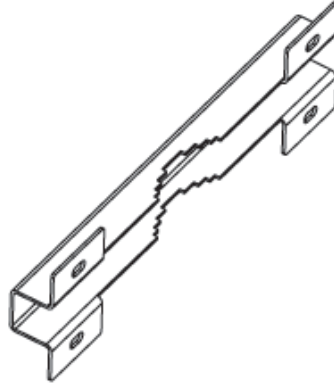


Figure 3 Bracket FN4

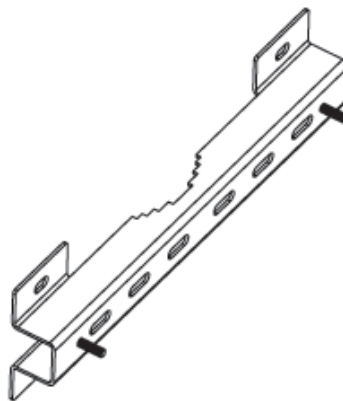


Figure 4 Bracket FN6

Fix bracket FN4 and bracket FN6 at the appropriate position on the pole by using four sets of M10*240 bolt assemblies:

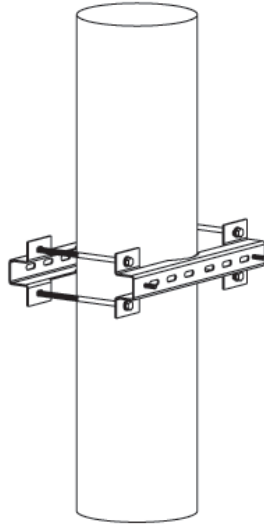


Figure 5 Bracket Installation

Insert the bolt of the bracket FN6 into the holes on both sides of the reader, and then tighten the cap nuts:

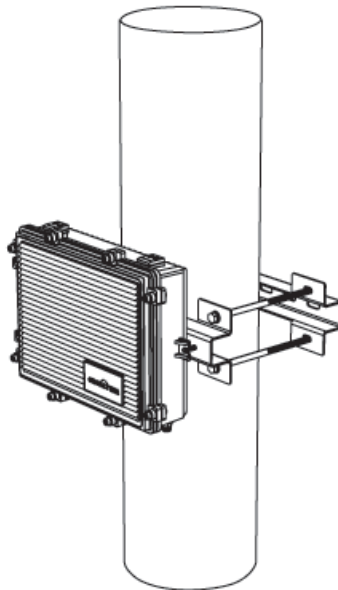


Figure 6 Equipment Installation

The power and digital signal cables are shown in the following figures.



Figure 7 Power Cable



Figure 8 Digital Signal Cable

2.4 Connecting the Reader

The Max Faster GVR9040 reader gives priority to network interface for device communication. The device is connected to the network device or PC via the dedicated communication cable as shown in the following figure:



Figure 9 The Diagram of Equipment Connection

2.5 Reader-Backend Communication Procedure

The application flow of reader and upper computer at the backend is shown in the figure below:

The reader receives the control instructions from the upper computer;

The reader receives the instruction to carry out data processing and then returns the operation result to the upper computer;

The reader processes the received response signal and presents the relevant tag data to the user.

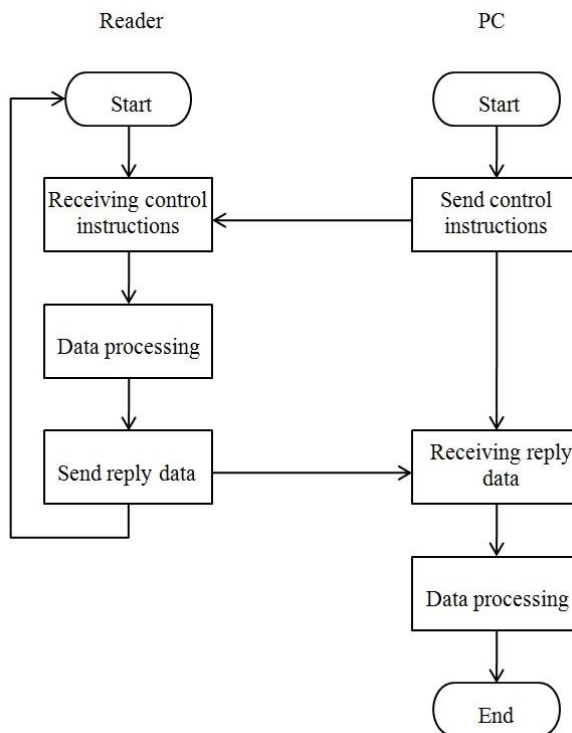


Figure10 The Reader-Backend Communication Procedure

3 Operation

The reader supports the Low Level Reader Protocol (LLPR), but when carrying out equipment function test, specific operation process is conducted as follows.

3.1 Equipment Connection

By default, the reader connects the device through the network cable. The default IP is 192.168.5.245. For devices with modified IP, the changed IP is used to connect. If the IP address is forgotten, scanning tool can be used to obtain IP address information.

When opening the upper computer for the first time, user need to select the network card which corresponds to the local IP address of the same network segment. The upper computer should be restarted for the configuration to take effect. Click “Scanning”, select the IP address of scanned device or enter the IP address manually, then the reader is connected. After the upper computer is successfully connected, the log info at the bottom will notify its connection success.

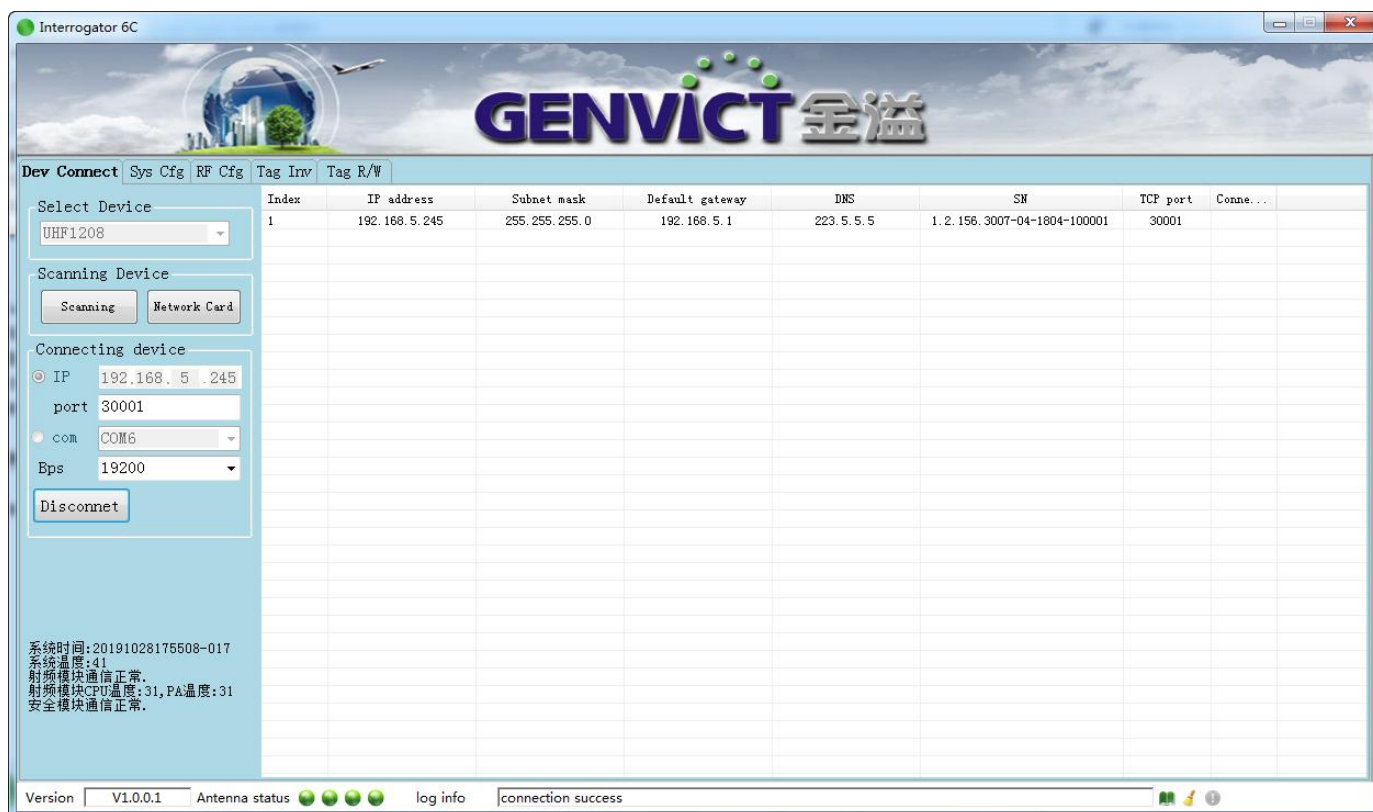


Figure 11 Connection Interface

3.2 RF Configuration

The parameter configuration mainly involves the number of antennas, antenna No., transmitting power, encoding mode, reverse data rate and the selection of fixed or hopping frequency. Each parameter has a separate communication interface to facilitate testing. The specific configuration is described below.

3.2.1 Antenna Configuration

The reader supports maximal four antennas to work at the same time. The number of antennas and the corresponding antenna port will be configured according to the actual application. Before configuring the antenna, it is necessary to ensure that corresponding antenna port has been connected with the antenna or is loaded. Otherwise, the antenna port will not open.

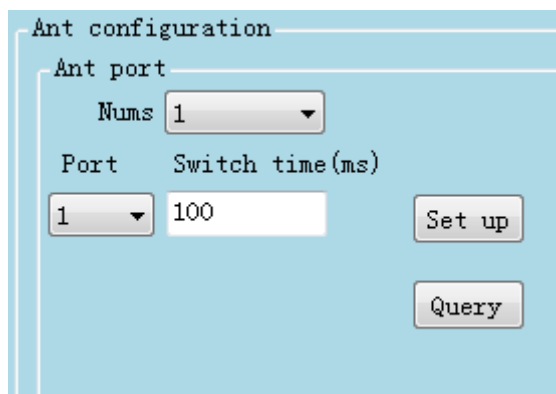


Figure 12 Antenna Configuration

3.2.2 Transmitting Power Configuration

The reader supports the configuration and query of transmitting power ranging from 15dBm to 33dBm.



Figure 13 Transmitting Power Configuration

3.2.3 Frequency Configuration

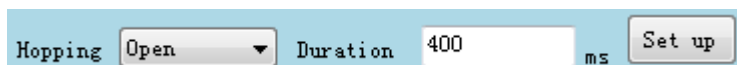
The working frequency ranges from 902.75MHz to 927.25MHz. A total of 50 frequency points can be set up and queried.



Figure 14 Frequency Configuration

3.2.4 Hopping Mode Configuration

Select frequency hopping as “Open” and click “Set up” to configure the reader to work in frequency hopping mode. The default frequency hopping interval is 400ms, and the frequency hopping points are 50 frequency points from 902.75MHz to 927.25MHz. When the frequency hopping is selected as “Close”, the reader works in fixed frequency mode, and its working frequency point is set by the frequency point configuration.



The interface shows a configuration bar with the label 'Hopping' on the left. To its right is a dropdown menu currently set to 'Open'. Further right is a text input field labeled 'Duration' containing the value '400', followed by a unit indicator 'ms'. On the far right is a button labeled 'Set up'.

Figure 15 Hopping Mode Configuration

3.2.5 Reverse Data Rate Configuration

The reader supports the decoding of tag response data in the reverse rate ranging from 64K to 640K. The reverse data rate configuration tells the reader which reverse rate is currently in use for correct decoding.



The interface shows a configuration bar with the label 'BLF' on the left. To its right is a dropdown menu currently set to '320K'. Further right is a button labeled 'Set up'. To the right of the 'Set up' button is a text input field containing the value '320K'. On the far right is a button labeled 'Query'.

Figure 16 Reverse Data Rate Configuration

3.2.6 Encoding Mode Configuration

Reader is set to support decoding with FM0, specifically M2, M4 and M8 encoding data. The encoding mode configuration is used to inform the reader current encoding mode for correct decoding.



The interface shows a configuration bar with the label 'Encode' on the left. To its right is a dropdown menu currently set to 'FM0'. Further right is a button labeled 'Set up'. To the right of the 'Set up' button is a text input field containing the value 'FM0'. On the far right is a button labeled 'Query'.

Figure 17 Encoding Mode Configuration

3.2.7 Carrier Switch Configuration

When the carrier is turned on, the power can be output at the corresponding antenna port in accordance with the previously configured transmitting power, provided that the corresponding port is connected with the antenna or is loaded, otherwise it will be notified that the carrier fails to be turned on.



The interface shows a configuration bar with the label 'CW' on the left. To its right is a dropdown menu currently set to 'Open'. Further right is a button labeled 'Set up'. To the right of the 'Set up' button is a text input field containing the value 'Open'. On the far right is a button labeled 'Query'.

Figure 18 Carrier Switch Configuration

3.3 Tag Inventory

Tag inventory is the core function of the reader. Tag inventory test can be carried out once the RF parameters are configured as above. First switch to “Tag Inventory” page, then click “Inventory”. The tag number, tag data, corresponding antenna port, inventory time and other data will then be reported. The inventory result is shown in Figure 20.

Dev Connect
Sys Cfg
RF Cfg
Tag Inv
Tag R/W

Tag Info
Counts SN
Tag Numbers Inv Time

Inv Result
Duration Inv Speed Times / sec
Success Rate Inv Conf s

Index	EPC	Counts	Ant

Inventory
Clean up

Figure 19 Tag Inventory Page

Dev Connect
Sys Cfg
RF Cfg
Tag Inv
Tag R/W

Tag Info
Counts SN
Tag Numbers Inv Time

Inv Result
Duration Inv Speed Times / sec
Success Rate Inv Conf s

Index	EPC	Counts	Ant
0	103400E2003098440C027620404473D2010000	2555	1

Stop
Clean up

Figure 20 Inventory Result

3.4 Upgrading

The reader supports upgrade via web page. It can be logged in by entering the device IP address after opening the browser. The default device IP is 192.168.5.245.

Select “App Upgrade” on top, click “Browse” to select the upgrade package file, and then click “Upgrade”. An upgrade success notification box will pop up once upgrade is completed. The device will then automatically restart. The whole upgrading process is completed once the buzzer beeps again.

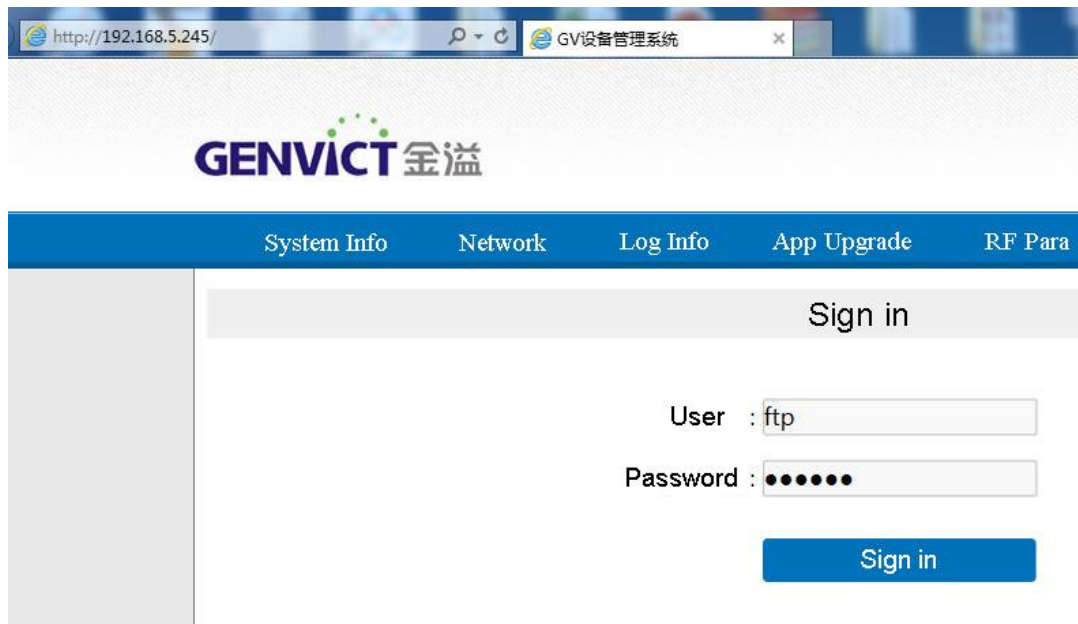
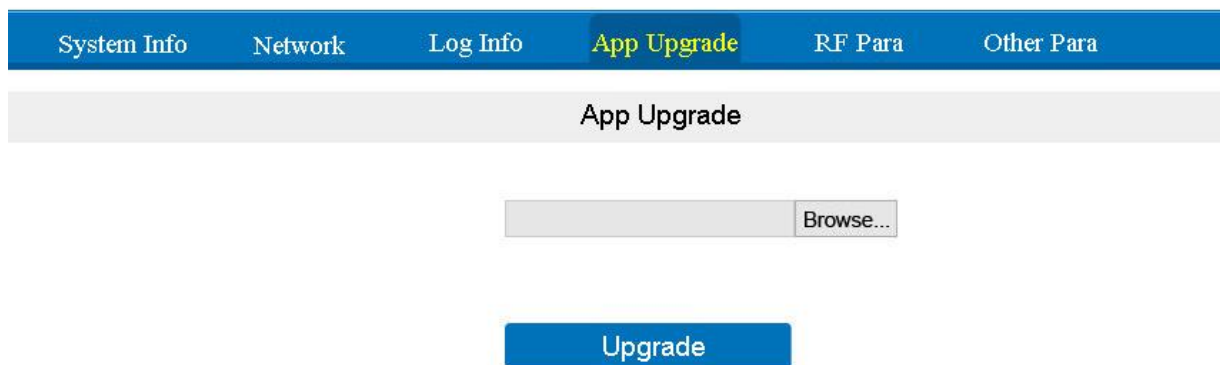


Figure 21 Web Log-in Page



*Note: please pay attention to the result prompt after the upgrade.

Figure 22 Web Upgrade Page

4 Safety Instruction

User Requirement

- Please keep the equipment installed vertically or in steady place to prevent it from falling.
- Use the equipment only within the rated input and output range.
- Do not disassemble the equipment.
- Transport, use, and store the equipment within the permissible humidity and temperature range.
- This product must be installed by a professional installer, and non-professionals should not install or disassemble it at will.

Power Requirement

- Different power cables are recommended in accordance with regions, and shall be used within its rated specifications.
- Connect the Class I equipment to the socket with ground protection.
- The power supply should be within the rated voltage. The specific requirements can be checked on the nameplate on the right side of the equipment.

The reader may be exposed in the outdoor environment for a long time. Therefore, working procedures must be strictly conducted in the assembly, sealing and installation process to guarantee its waterproof level. In addition, the equipment casing should be grounded through thick wires to prevent lightning damage.

5 FCC Warning

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.

*RF warning for Mobile device:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.