

α312 Demo Guide for .Net framework

Ver. 2.0

Apulsetech

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Revision History

Version	Date	Description
V1.0	2020-07-12	Draft
V2.0	2020-10-05	Description of reverse access and additional functions
V2.0.1	2020-10-21	Correct typos and translations

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1. Overview

This document has been prepared for the purpose of explaining the α312 ADK Demo for .Net framework.

This document is made for the purpose of providing information how to use α312 ADK Demo for .Net framework.

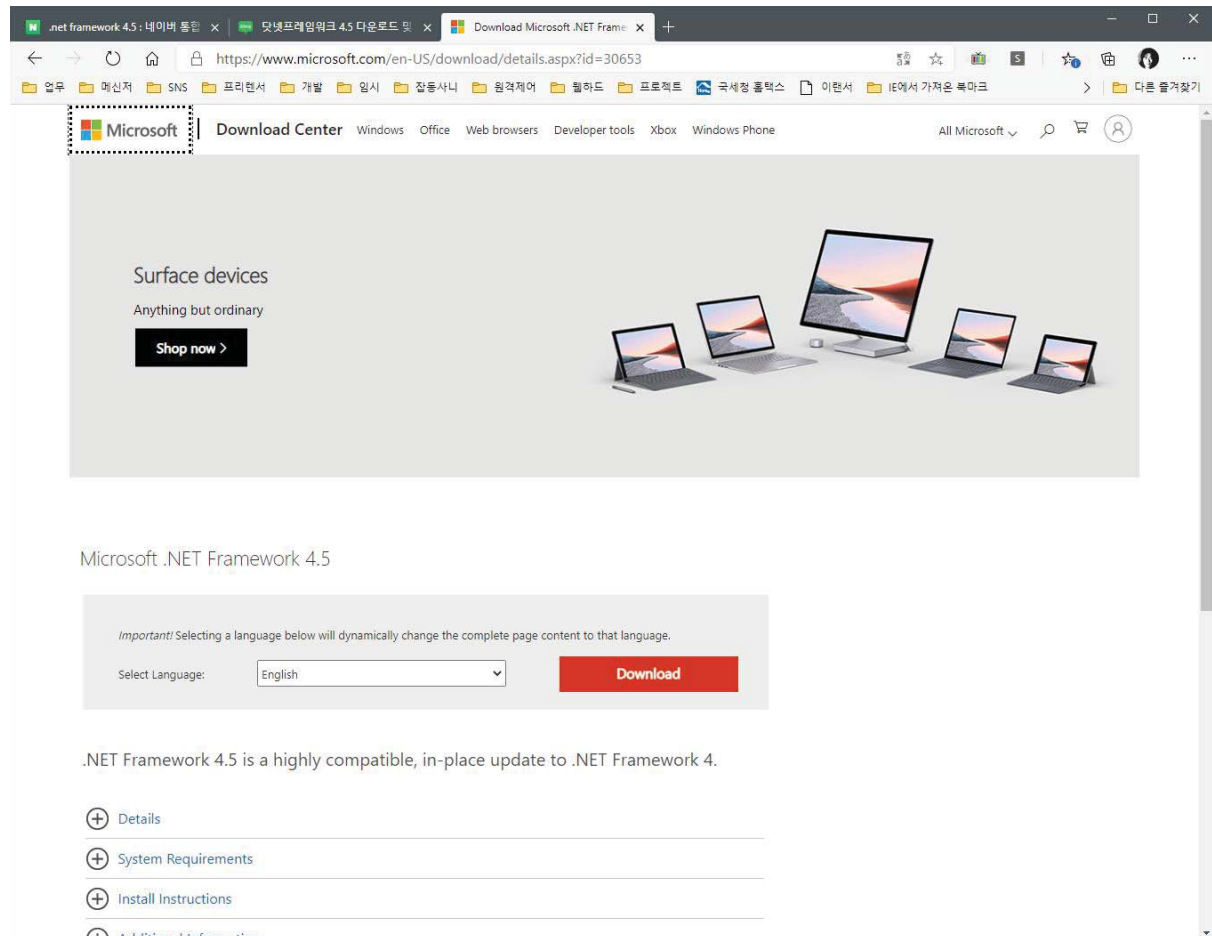
A312 ADK Demo described in this document is based on .Net framework v4.5.

2. Preparation

The α 312 ADK Demo application is developed with the α 312 ADK. α 312 ADK is developed based on Microsoft's .Net framework v4.5. Therefore, Net framework v4.5 must be installed first.

.Net framework v4.5 can be downloaded from the following URL.

<https://www.microsoft.com/ko-kr/download/details.aspx?id=30653>

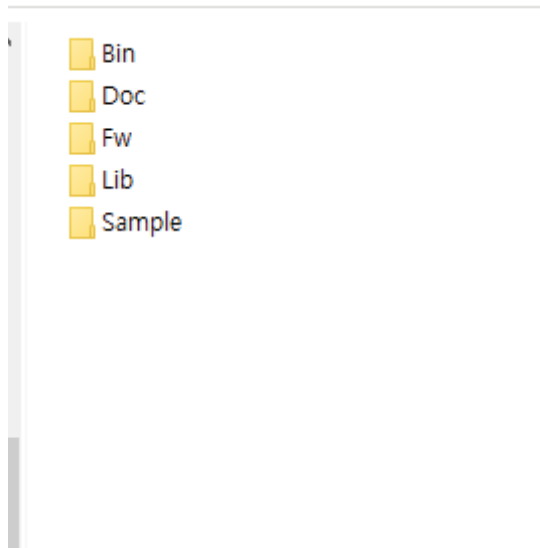


Installation of .Net framework v4.5 is omitted.

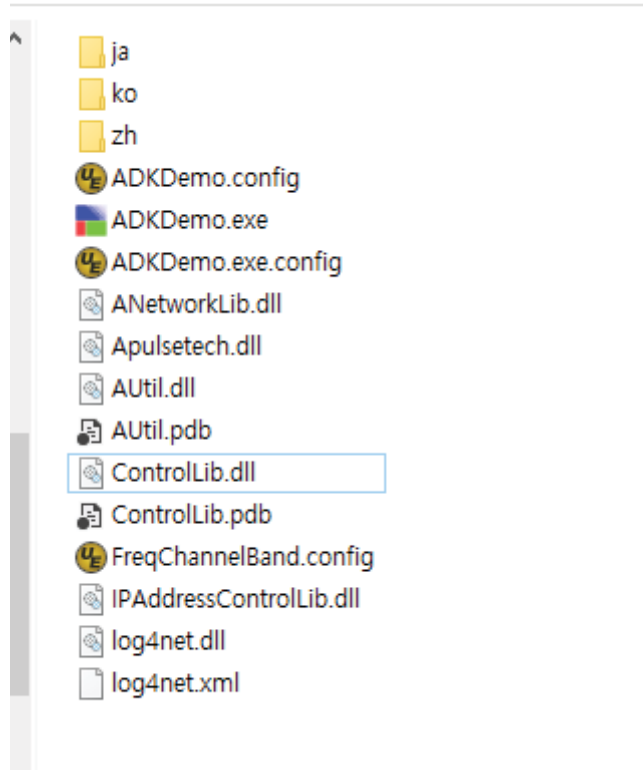
3. α312 ADK Distribution Configuration

When the distribution of α312 ADK that is provided is uncompressed, the folder is organized as shown in the following figure.

There are folders as shown in the following figure when uncompressing α312 ADK.

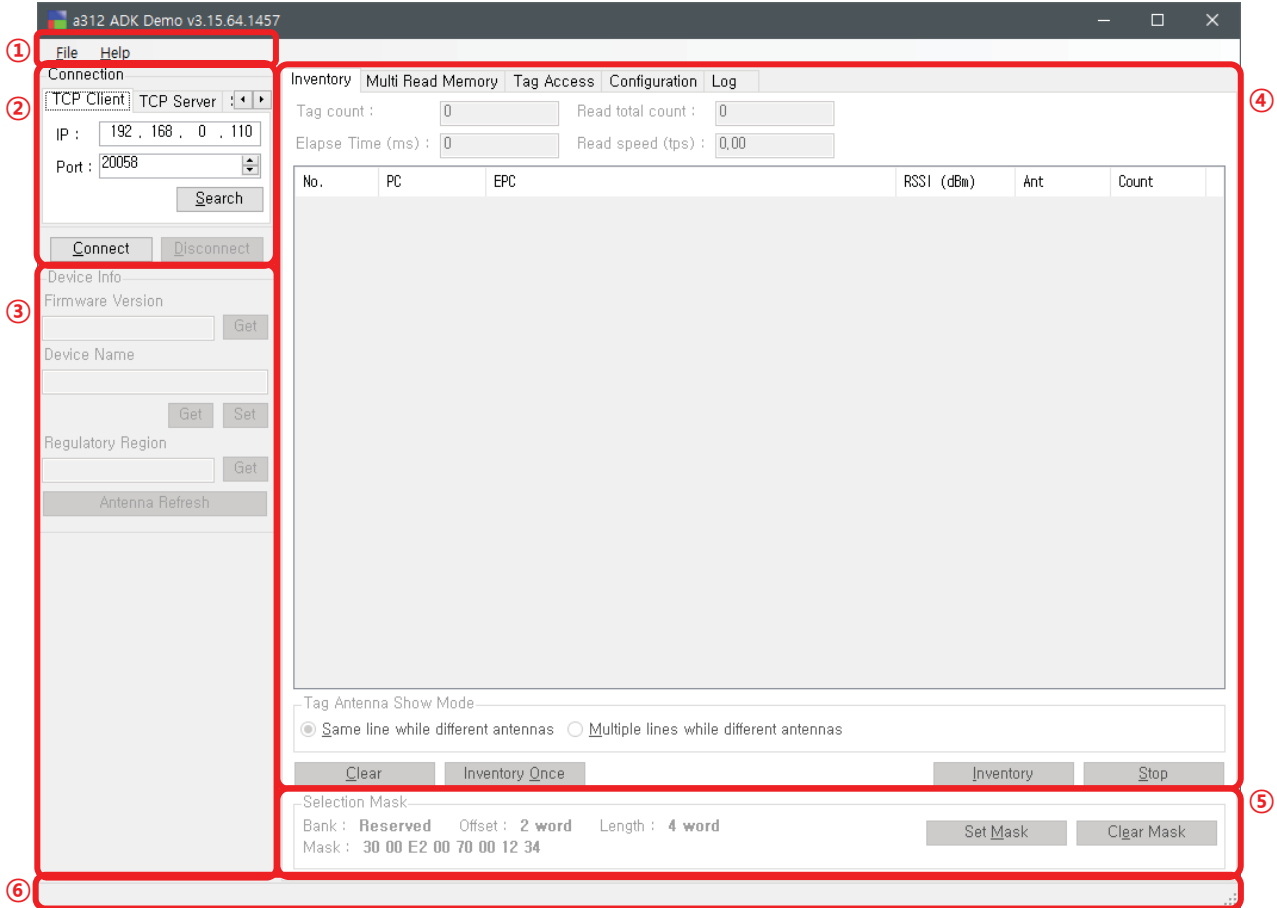


The “Bin” folder contains an executable copy of the α312 ADK Demo as shown in the following figure.



4. α312 ADK Demo Screen Composition

When you run α312 ADK Demo, you can see the following screen.



① Menu

It consists of the File menu and the Help menu. The File menu has a Language menu and an Exit menu, and the Help menu has an About menu.

The Language menu is a menu to select the language displayed on the screen, and the Exit menu is a menu to exit the program. And the About menu shows program information.

② Connection Configuration

It consists of information about the connection to connect with the device, and a connect button/disconnection button.

Connection information is composed of "TCP Client" tab, "TCP Server" tab, and "Serial Port" tab according to the connection method.

TCP Client - This is a tab to set the connection information of the program to connect to α312

equipment through TCP communication.

TCP Server - This is a tab to set the connection information of the method that α312 equipment connects with a program through TCP communication.

Serial Port - This is a tab to set the connection information of the program to connect to α312 equipment through serial communication.

③ **Device Information**

After being connected to the device, it shows the information of the currently connected device.

④ **Demo Tabs**

There are demo tabs, Inventory, Multi Read Memory, Tag Access, Configuration, Log, etc. In the case of administrator mode, the Extend tab is added.

Inventory – Performs RFID inventory and lists PC and EPC values of the inventory tags.

Multi Read Memory – When RFID inventory is performed, it performs Multi Read that reads a specific memory of the tag at the same time, and lists the data of the tag memory along with the inventoried PC and EPC values.

TagAccess – Performs Read Memory to read a specific memory of a tag, Write Memory to write data to a specific memory of a tag, Lock Memory to lock a tag, Kill Tag to destroy a tag, Block Write to write large data to a specific memory of a tag, Executes the Block Erase command to delete the data of the specific memory of the tag and outputs the result.

Configuration – You can check the antenna and module settings of the device and digital input/output.

Extend – This tab, which is only active in Administrator mode, allows you to verify or test your device.

Log – Outputs the program log.

⑤ **Selection Mask**

Inventory, Multi Read Memory, Tag Access tab screen is a screen for setting selection mask information. You can check the filter setting so that the module of the equipment can only read tags with specific conditions.

This is a screen for setting selection mask in inventory, Multi Read Memory, Tag Access tab screen. You can check the filter setting so that the module of the equipment can only read tags with specific conditions.

⑥ **Status Bar**

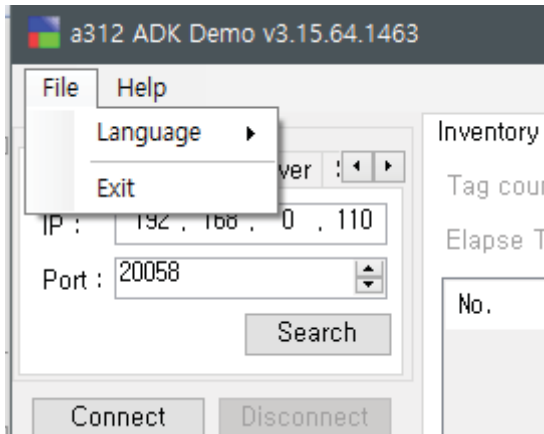
While running the demo, the communication results are output.

5. Menu Description

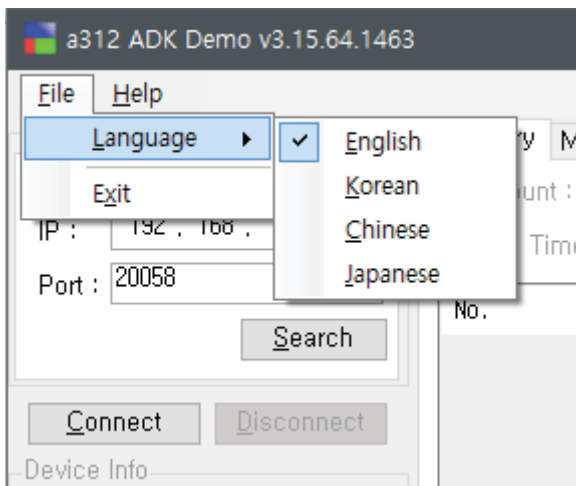
The α 312 ADK Demo application's menus are largely divided into a File menu and a Help menu.

5.1. File Menu

The File menu has a Language menu and an Exit menu as shown in the figure below.



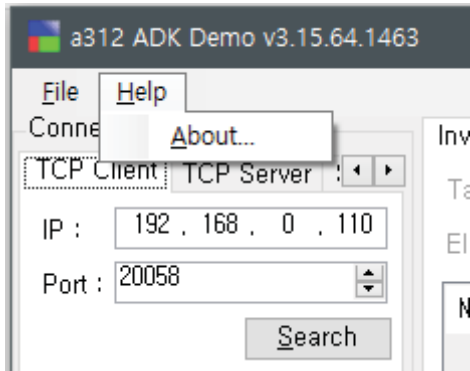
The Language menu is a menu to select the regional language of the α 312 ADK Demo, and it supports English, Korean, Chinese, and Japanese as shown in the figure below.



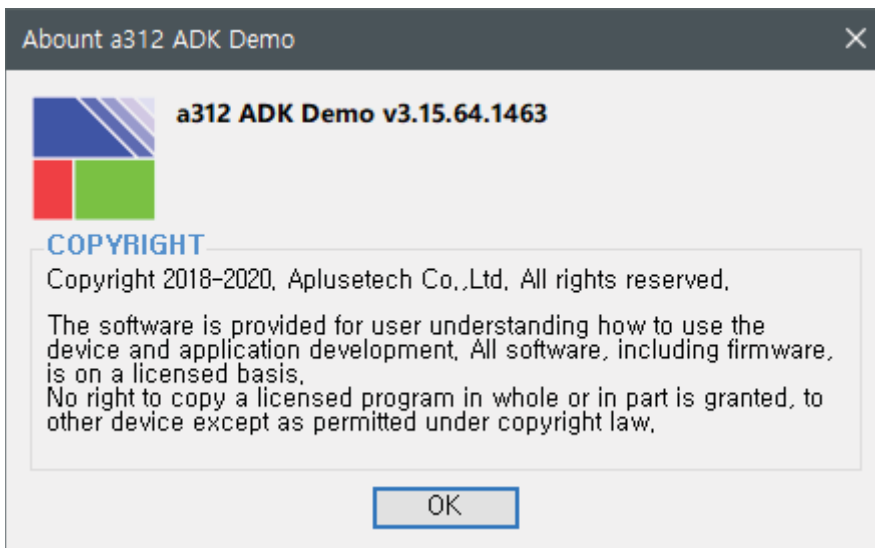
The Exit menu closes the α 312 ADK Demo application.

5.2. Help Menu

The Help menu has an About menu as shown in the following figure.



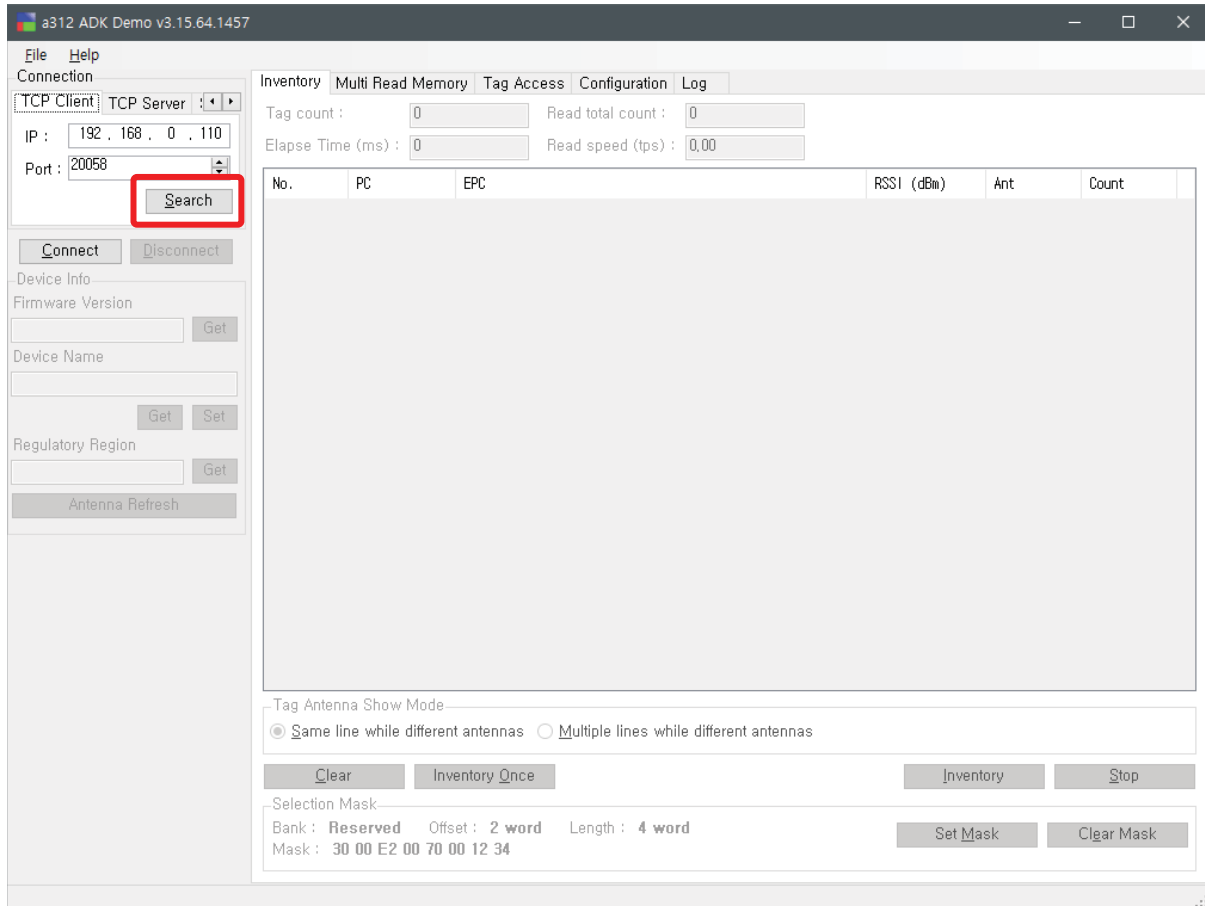
If you select About menu, you can check the version and license of a312 ADK Demo as shown in the figure below.



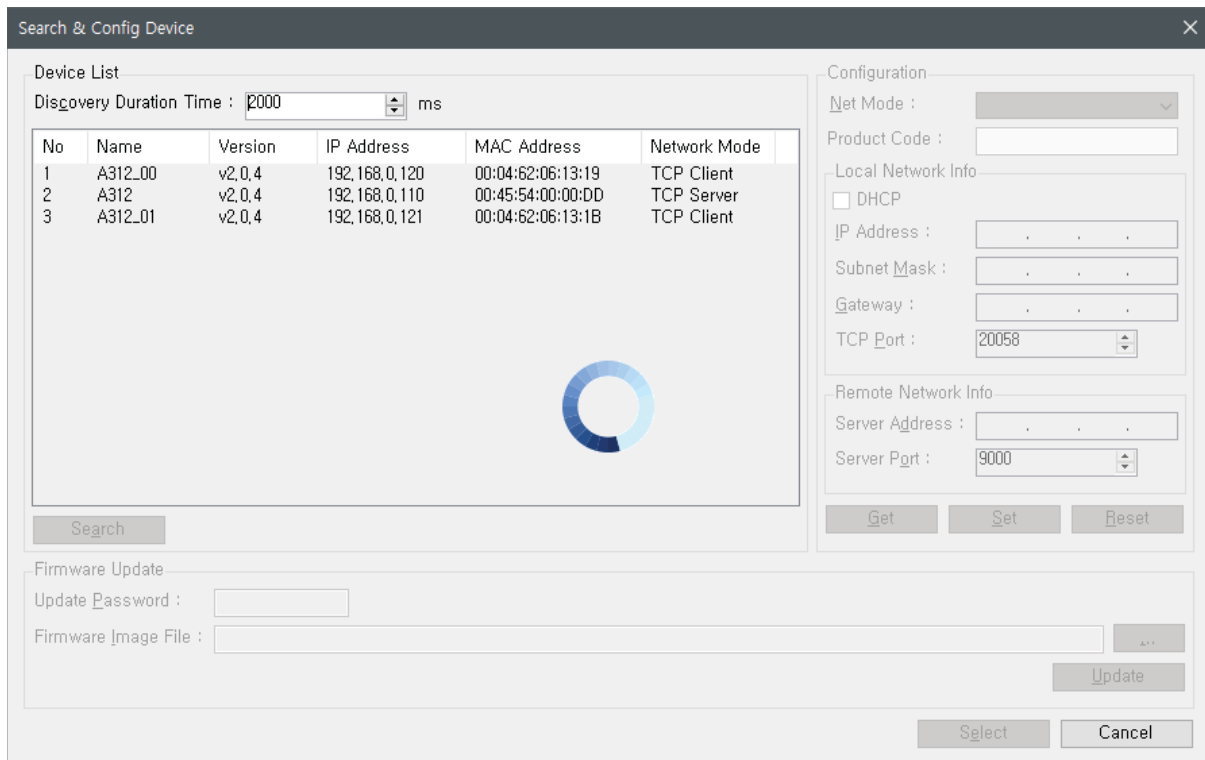
6. Device Configuration

Before connecting to the device, you must set up the environment to be able to connect by setting up the α 312 device.

To set up the device, click the "TCP Client" tab in the Connection section at the top left of the main screen or the "Search" button in the "TCP Server" tab as shown in the following figure.



When you click the "Search" button, the "Search & Config Device" dialog box (hereinafter referred to only as a dialog box) will appear as shown in the figure below.



When the "Search & Config Device" dialog box appears, devices are searched for the time set in "Discovery Duration Time" (default setting is 2000ms).

When the search is complete, the searched devices are displayed in the Device List as shown in the following figure.

The screenshot shows a software window titled "Search & Config Device". It is divided into several sections:

- Device List:** A table with columns for No, Name, Version, IP Address, MAC Address, and Network Mode. It contains three rows of data.
- Configuration:** A section with various input fields and buttons for network settings, including Net Mode, Product Code, Local Network Info (DHCP, IP Address, Subnet Mask, Gateway, TCP Port), and Remote Network Info (Server Address, Server Port).
- Firmware Update:** A section with fields for Update Password and Firmware Image File, along with an Update button.

No	Name	Version	IP Address	MAC Address	Network Mode
1	A312_00	v2.0.4	192.168.0.120	00:04:62:06:13:19	TCP Client
2	A312	v2.0.4	192.168.0.110	00:45:54:00:00:DD	TCP Server
3	A312_01	v2.0.4	192.168.0.121	00:04:62:06:13:1B	TCP Client

6.1. Device Configuration Description

Device List

Discovery Duration Time : 2000 ms

No	Name	Version	IP Address	MAC Address	Network Mode
1	A312_00	v2.0.4	192.168.0.120	00:04:62:06:13:19	TCP Client
2	A312	v2.0.4	192.168.0.110	00:45:54:00:00:DD	TCP Server
3	A312_01	v2.0.4	192.168.0.121	00:04:62:06:13:1B	TCP Client

Configuration

Net Mode : TCP Server

Product Code : 0

Local Network Info

DHCP

IP Address : 192 . 168 . 0 . 110

Subnet Mask : 255 . 255 . 255 . 0

Gateway : 192 . 168 . 0 . 1

TCP Port : 20058

Remote Network Info

Server Address : 192 . 168 . 0 . 74

Server Port : 9001

Firmware Update

Update Password :

Firmware Image File : ...

Update

Select Cancel

① Device List

Display the list of searched devices.

Discovery Duration Time – You can set the time to search for the device in ms.

Search – a Button manually re-searches the device.

② Configuration

Outputs the setting information of the device selected from the device list.

Net Mode – This is the TCP connection mode of the device. When set to “TCP Client”, the host program connects to the device. When set to “TCP Server”, the device connects to the host program.

Product Code – This information is supported only when the firmware version of the device is 2.x.x or higher, and the product code of the device is displayed.

Local Network Info – TCP information of the device.

DHCP – Determines whether the device's network settings are automatically received from a DHCP server.

IP Address – The TCP/IP address of the device.

Subnet Mask – This is the TCP/IP subnet mask of the device.

Gateway – TCP/IP gateway of the device.

TCP Port – This is the TCP/IP connection port number of the device. The default is 20058.

Remote Network Info – This information is used when the device is in “TCP Client” mode.

Server Address – TCP/IP address of the server or host program to which the device will connect.

Server Port – TCP/IP port number of the server or host program to which the device will connect. The default is 9001.

Get – Manually retrieves the device's configuration information and outputs the information.

Set – Saves the configuration information of the set device to the device.

Reset – Restarts the selected device.

③ **Firmware Update**

Update Password – Enter the update password.

Firmware Image File – Enter the path of the firmware image file to be updated. The input method is “...” Click the button to select the firmware image file.

Update – Update the device's firmware.

6.2. Get Device Configuration

Basically, when you select the device you want to set from the Device List, the set value of the selected device is displayed automatically in "Configuration" as shown in the figure below.

Search & Config Device

Device List

Discovery Duration Time : 2000 ms

No	Name	Version	IP Address	MAC Address	Network Mode
1	A312_00	v2.0.4	192.168.0.120	00:04:62:06:13:19	TCP Client
2	A312	v2.0.4	192.168.0.110	00:45:54:00:00:DD	TCP Server
3	A312_01	v2.0.4	192.168.0.121	00:04:62:06:13:1B	TCP Client

Search

Configuration

Net Mode : TCP Server

Product Code : 0

Local Network Info

DHCP

IP Address : 192 . 168 . 0 . 110

Subnet Mask : 255 . 255 . 255 . 0

Gateway : 192 . 168 . 0 . 1

TCP Port : 20058

Remote Network Info

Server Address : 192 . 168 . 0 . 74

Server Port : 9001

Get Set Reset

Firmware Update

Update Password :

Firmware Image File : ...

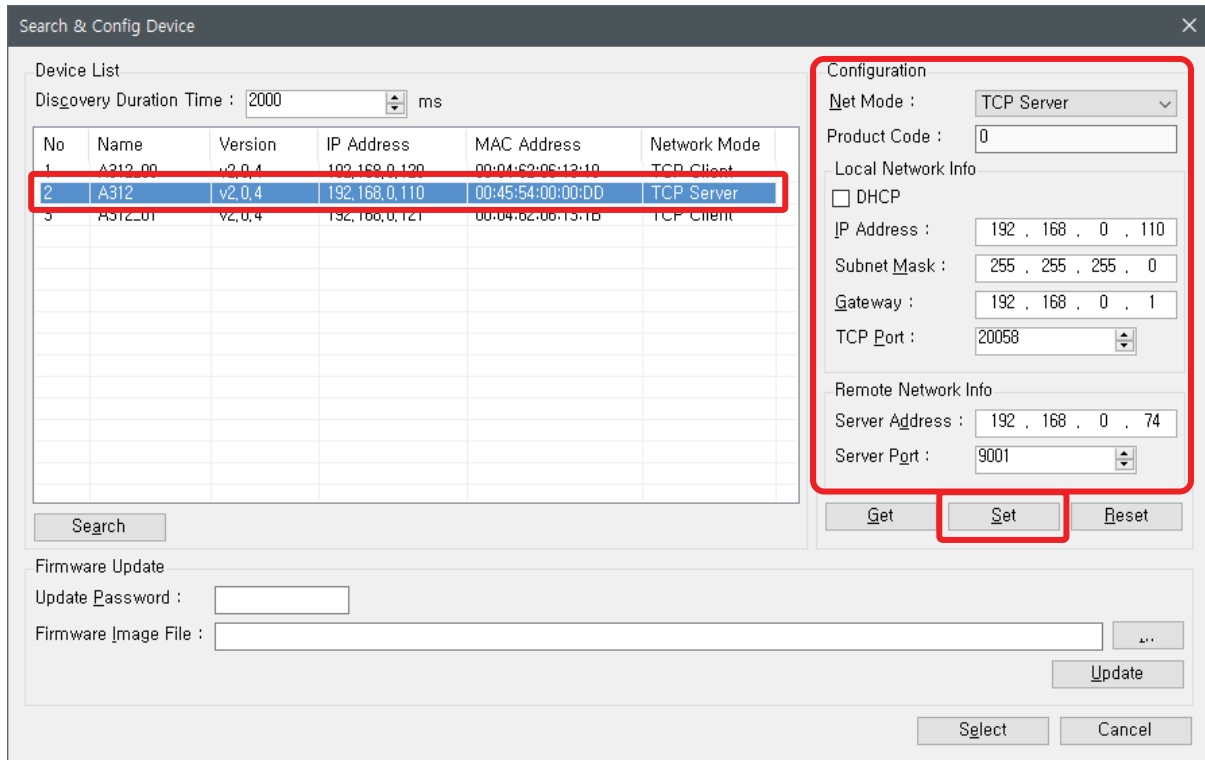
Update

Select Cancel

In order to get the set value of the device manually, click the "Get" button at the bottom of the "Configuration" section.

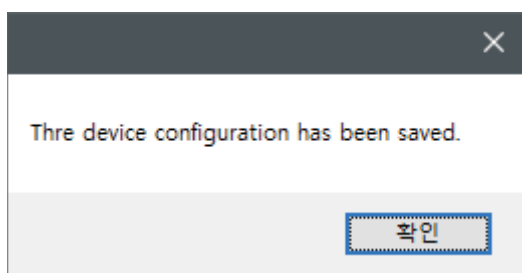
6.3. Set Device Configuration

Select the device to modify the setting value from the Device List.



The setting value of the device selected in "Configuration" is displayed on the right.

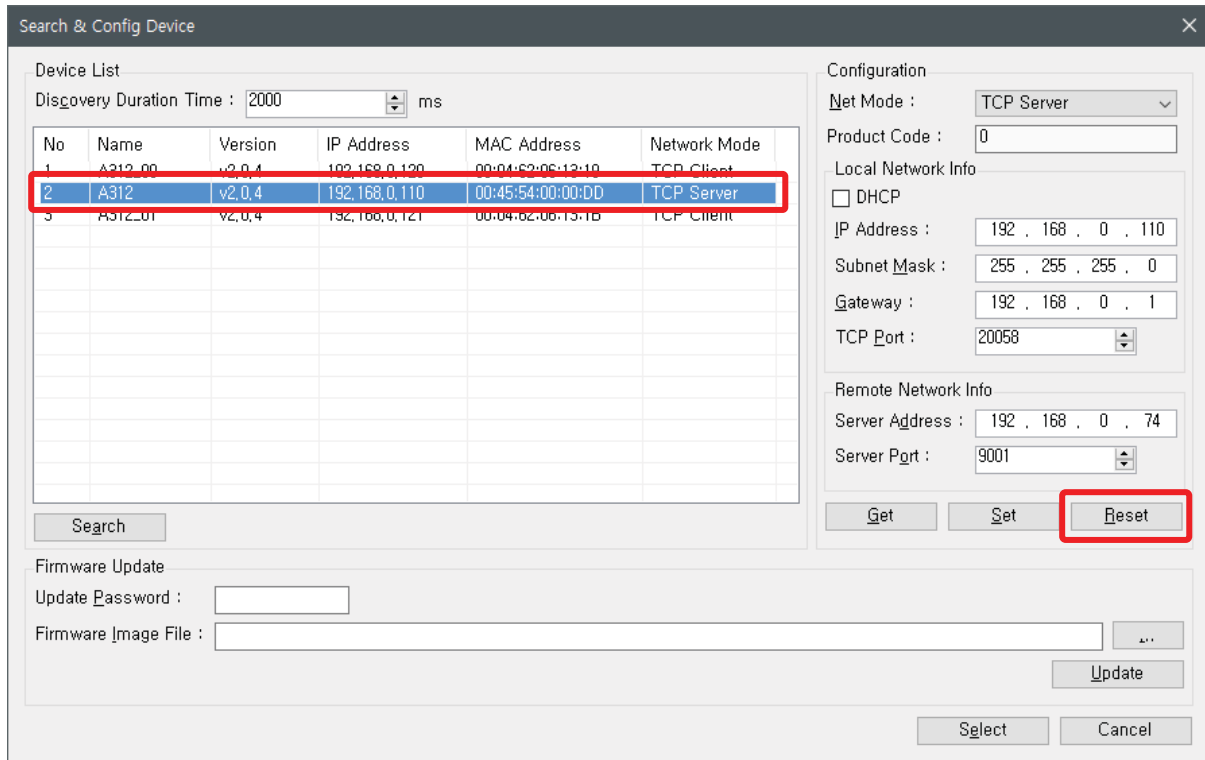
After modifying the set value, click the "Set" button to save the device set value. When saving of settings is complete, a message appears as shown in the following screen.



Click the "Search" button again to search for the device whose set value has been modified, and select the device again to check if the set value has been modified.

6.4. Reset Device

Select the device to reset from the Device List.



Click the "Reset" button on the right to reset the device.

When the device is normally reset, a message window appears as shown in the figure below.



After about 10 seconds have passed, click the "Search" button to search the device and check whether it is normally searched.

6.5. Device Firmware Update

Select the device to update the firmware from the Device List.

The screenshot shows the 'Search & Config Device' window. The 'Device List' table is as follows:

No	Name	Version	IP Address	MAC Address	Network Mode
1	A312_00	v2.0.4	192.168.0.120	00:04:62:06:13:19	TCP Client
2	A312	v2.0.4	192.168.0.110	00:45:54:00:00:DD	TCP Server
3	A312_01	v2.0.4	192.168.0.121	00:04:62:06:13:1B	TCP Client

The 'Firmware Update' section at the bottom is highlighted with a red box. It contains the following fields:

- Update Password :
- Firmware Image File :
- Update button

Other sections include 'Configuration' (Net Mode: TCP Server, Product Code: 0), 'Local Network Info' (IP Address: 192.168.0.110, Subnet Mask: 255.255.255.0, Gateway: 192.168.0.1, TCP Port: 20058), and 'Remote Network Info' (Server Address: 192.168.0.74, Server Port: 9001). Buttons for 'Get', 'Set', 'Reset', 'Select', and 'Cancel' are also visible.

If "Firmware Update" is activated at the bottom, enter "password" in "Update Password".

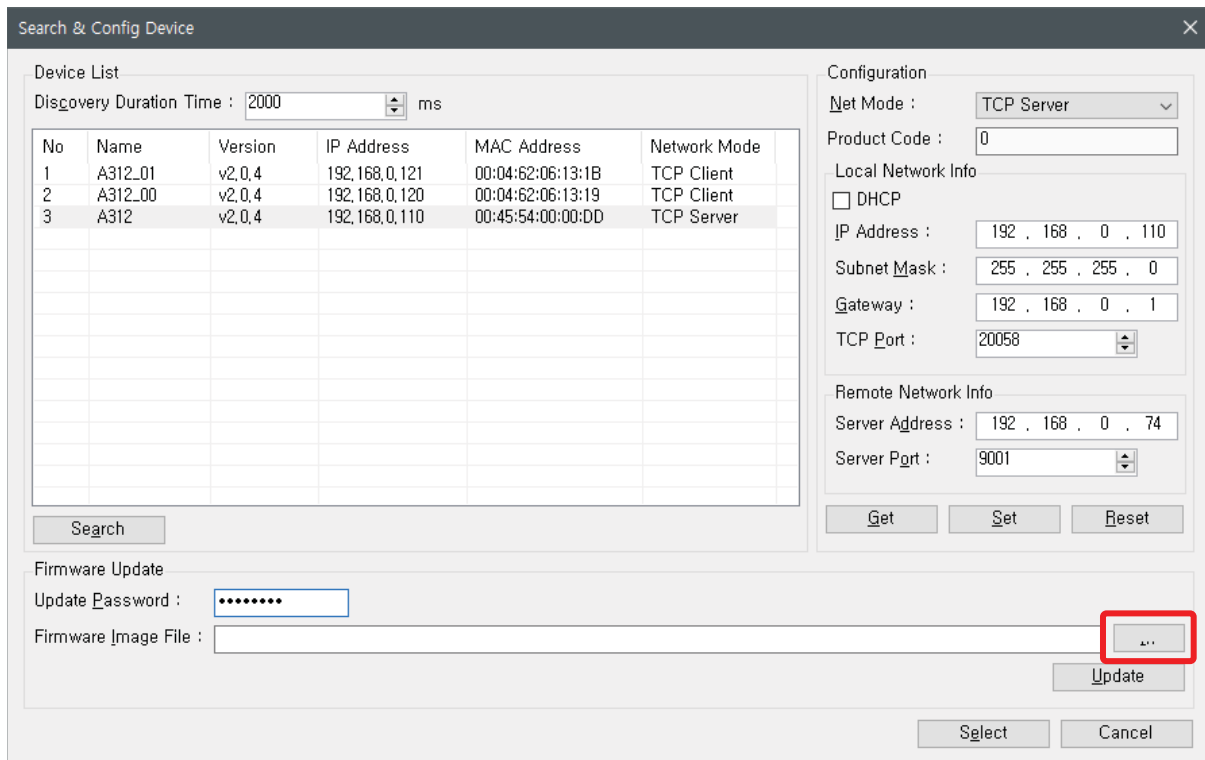
The screenshot shows the 'Search & Config Device' window with the 'Firmware Update' section. The 'Update Password' field is now filled with dots and highlighted with a red box. The 'Firmware Image File' field remains empty. The 'Update' button is still visible.

The 'Device List' table is now sorted by Name:

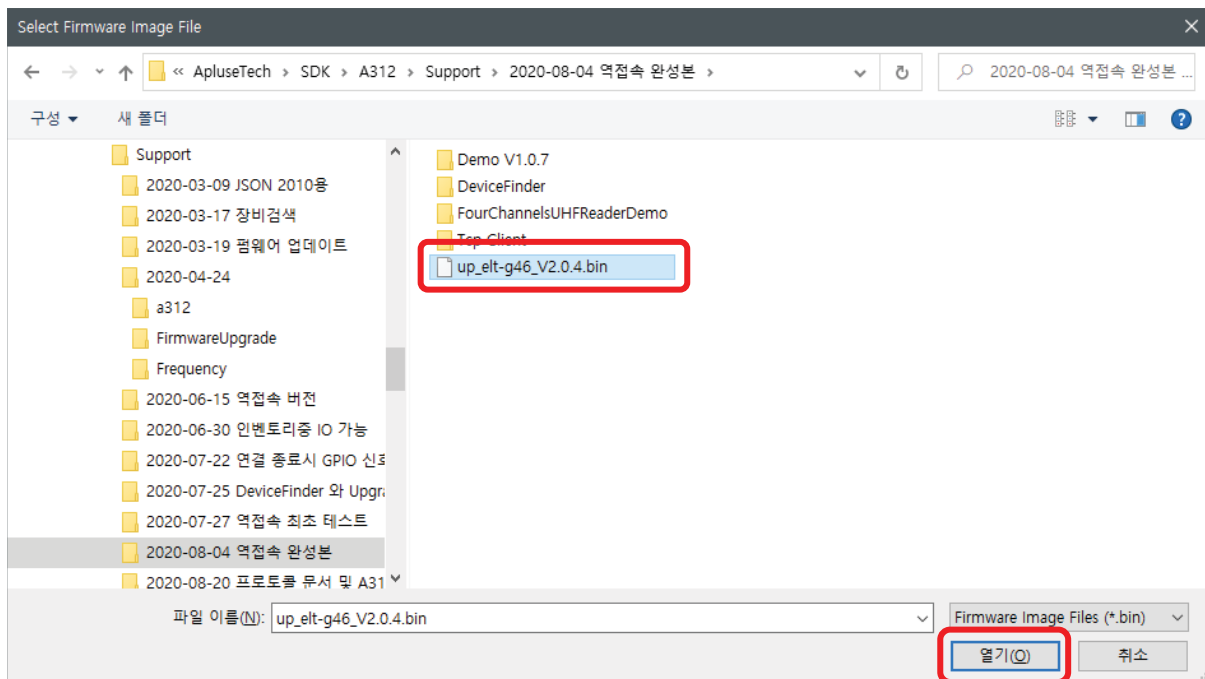
No	Name	Version	IP Address	MAC Address	Network Mode
1	A312_01	v2.0.4	192.168.0.121	00:04:62:06:13:1B	TCP Client
2	A312_00	v2.0.4	192.168.0.120	00:04:62:06:13:19	TCP Client
3	A312	v2.0.4	192.168.0.110	00:45:54:00:00:DD	TCP Server

The rest of the window, including the 'Configuration' and network info sections, remains the same as in the previous screenshot.

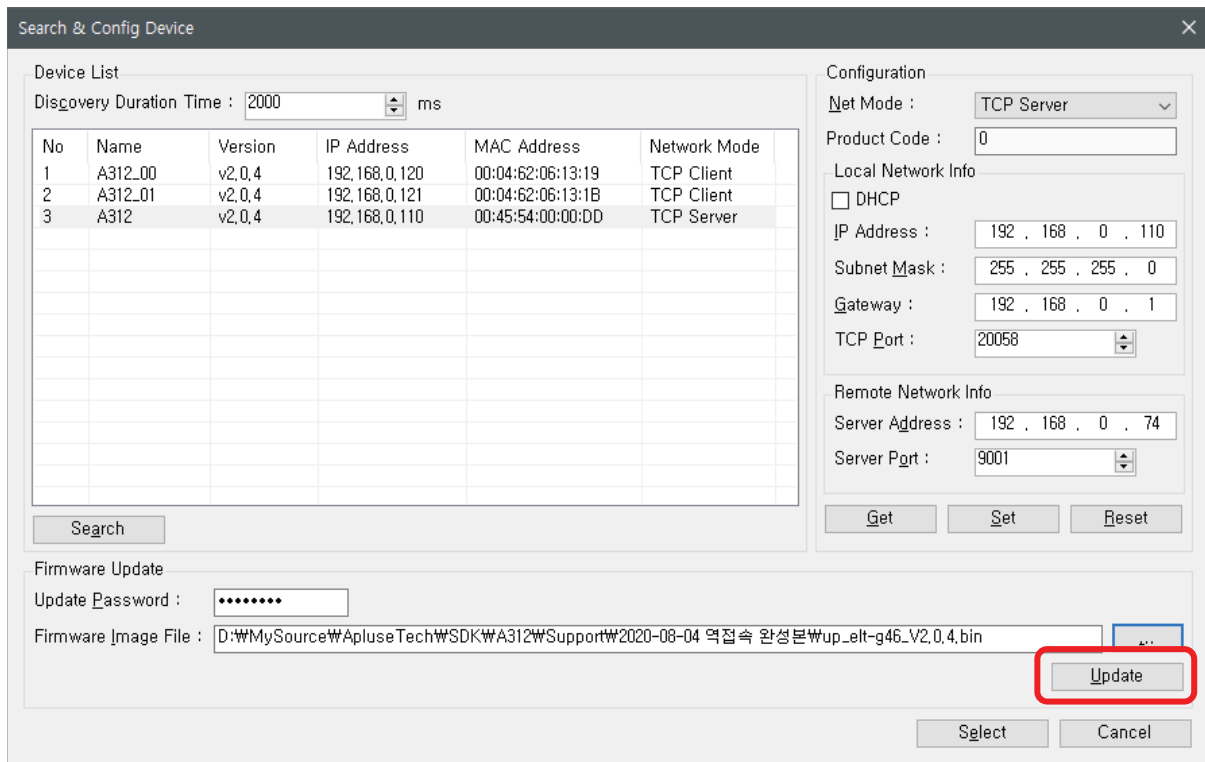
If you have entered the update password, click “...” to the right of “Firmware Image File”. Click the “button”.



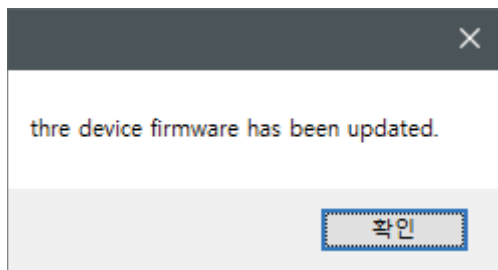
When the “Select Firmware Image File” dialog box appears as shown in the figure below, select the α312 firmware file and click the “Open” button.



After selecting the password and image file, click the "Update" button to update the firmware of the selected device.



When the update is completed normally, the update completion message window appears.



7. Connect the device

There are 3 ways to connect to the device. First of all, the network mode of the device must be set to "TCP Server" as a method for the program to directly access the device in "TCP Client" mode. This is a method of accessing a local network or one program device or a source device.

In the "TCP Server" mode, the program becomes the server of the device, and the network mode of the device is set to "TCP Client", and the TCP/IP of the program's PC is set as the server IP. When the device is disconnected, it periodically tries to connect to the set server's IP address.

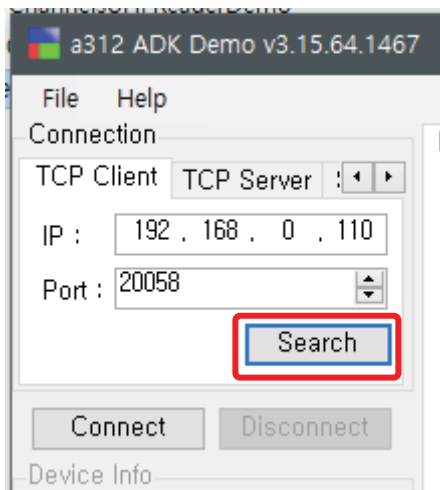
Finally, the "Serial Port" mode is a method in which programs and equipment are connected through a serial port. The device to be connected to the serial port must have the firmware updated to support the serial port connection, and the extended digital input/output port cannot be used when the serial port is connected.

7.1. TCP Client

In order to connect in "TCP Client" mode, α312 device's network mode should be set to "TCP Server".

7.1.1. Set α312 Device Network Mode to TCP Server

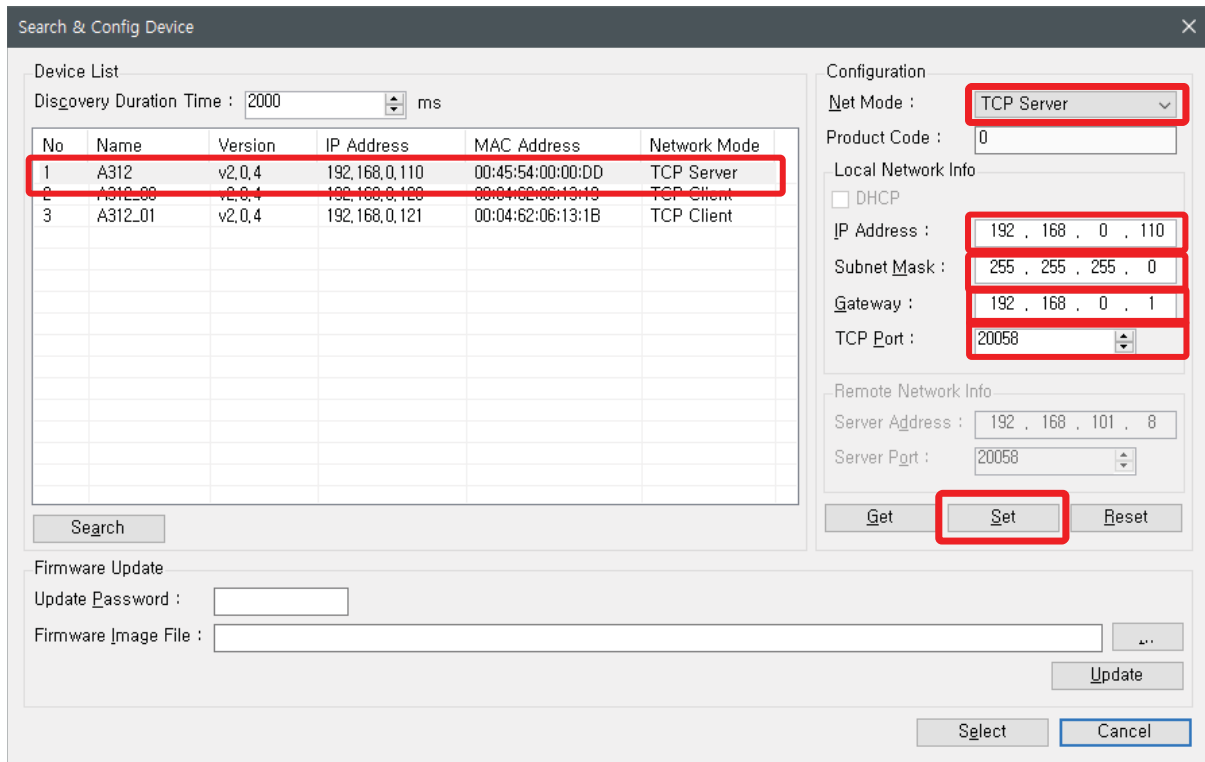
To set the network mode of α312 device to "TCP Server", select the "TCP Client" tab in "Connection" at the top left of the main screen and click the "Search" button as shown in the figure below.



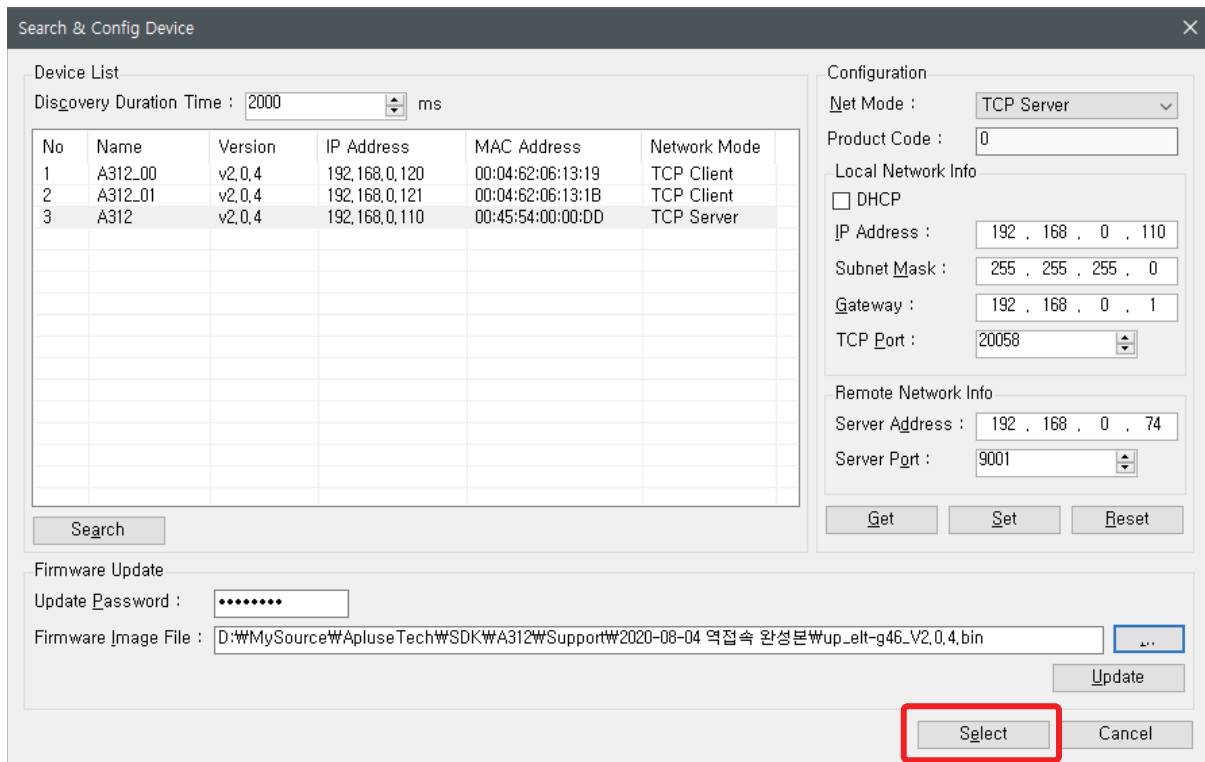
As shown in the figure below, the "Search & Config Device" dialog box appears and when the device search is completed, select the device to modify the network mode from "Device List", and set "Net Mode" to "TCP Server" from "Configuration" on the right.

And for a fixed TCP/IP address, enter "IP Address", "Subnet Mask", and "Gateway" and set "TCP Port" to 20058.

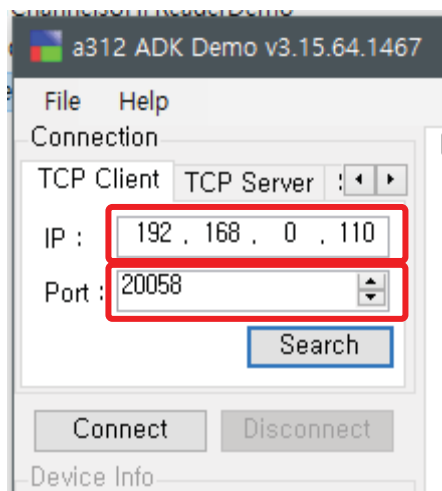
When the setting is complete, click the "Set" button to save the setting.



When the device setting is complete, click the "Search" button and in the "Device List" on the left to search for the device again to confirm that the setting has been changed.



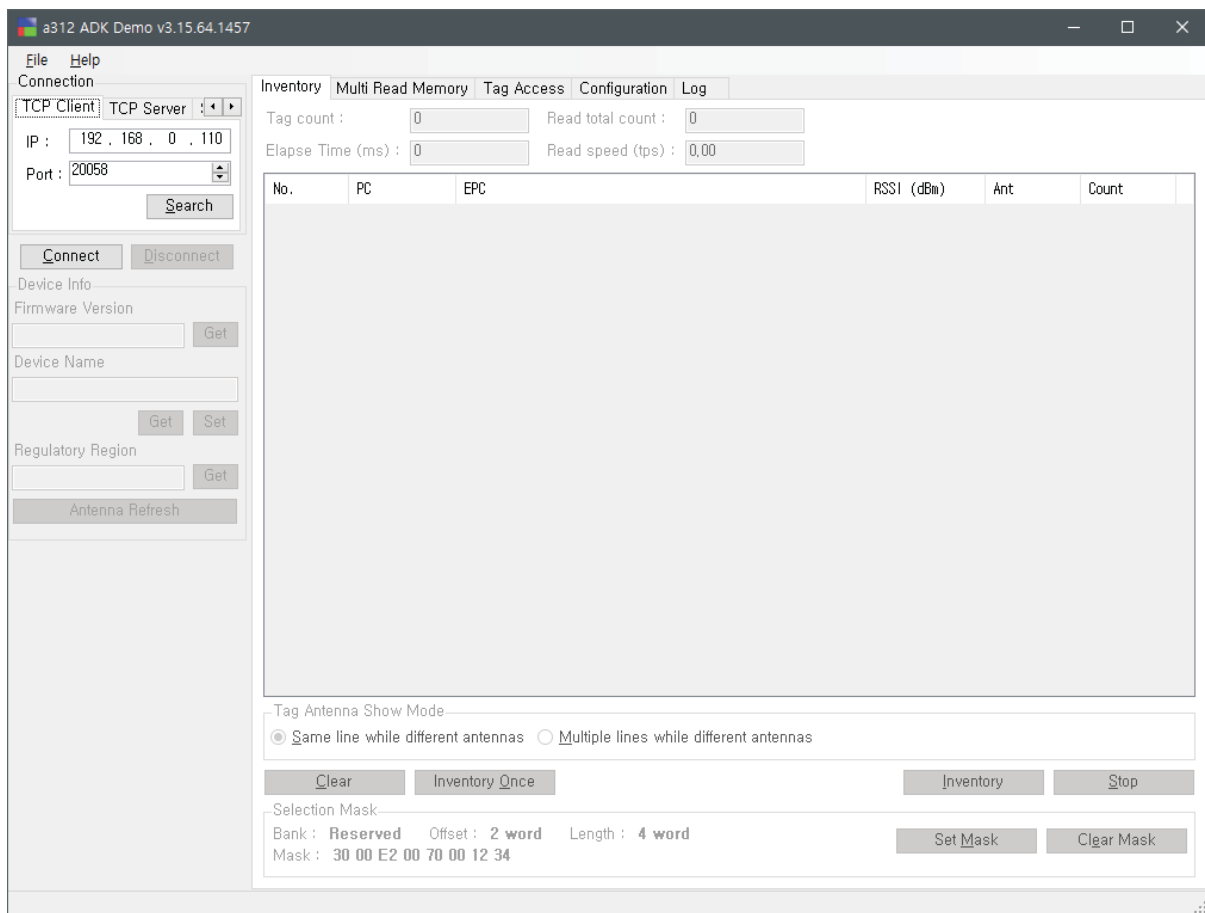
When the search for α312 device is completed, select the device you want to connect and click the "Select" button at the bottom right.



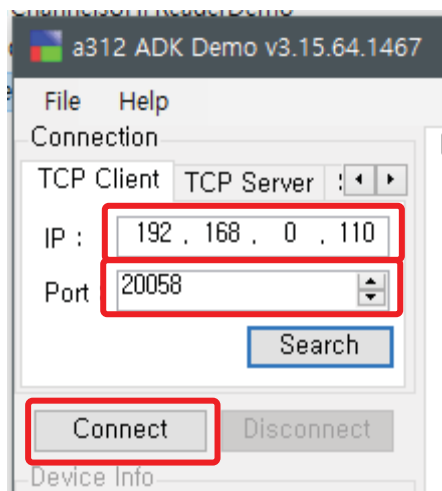
Then, you can check that the IP address and Port of the α312 device selected as the above figure are entered in the "TCP Client" tab in the "Connection" of the main screen.

7.1.2. Connect to α312 device in TCP Client mode

When α312 demo program starts, you can see that all functions except "Connection" in the upper left corner are disabled.



Select the "TCP Client" tab in "Connection" at the top left of the main screen.

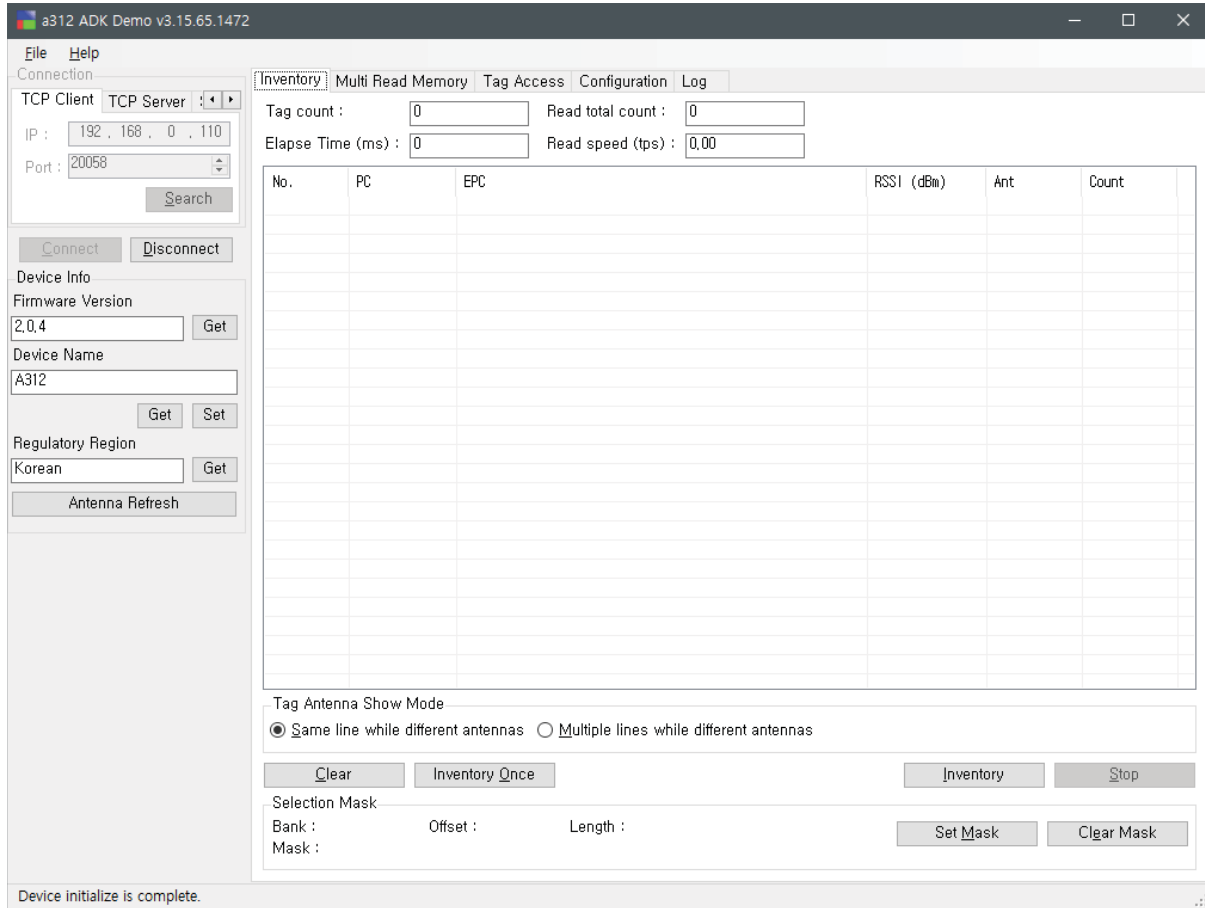


Enter the IP address of the device you want to access in the "TCP Client" tab and enter 20058 in

the Port.

After entering the IP address and Port, click the "Connect" button.

If it is normally connected to the α 312 device, the "Connect" button is deactivated, and the "Disconnect" button and other functions are activated as shown below.

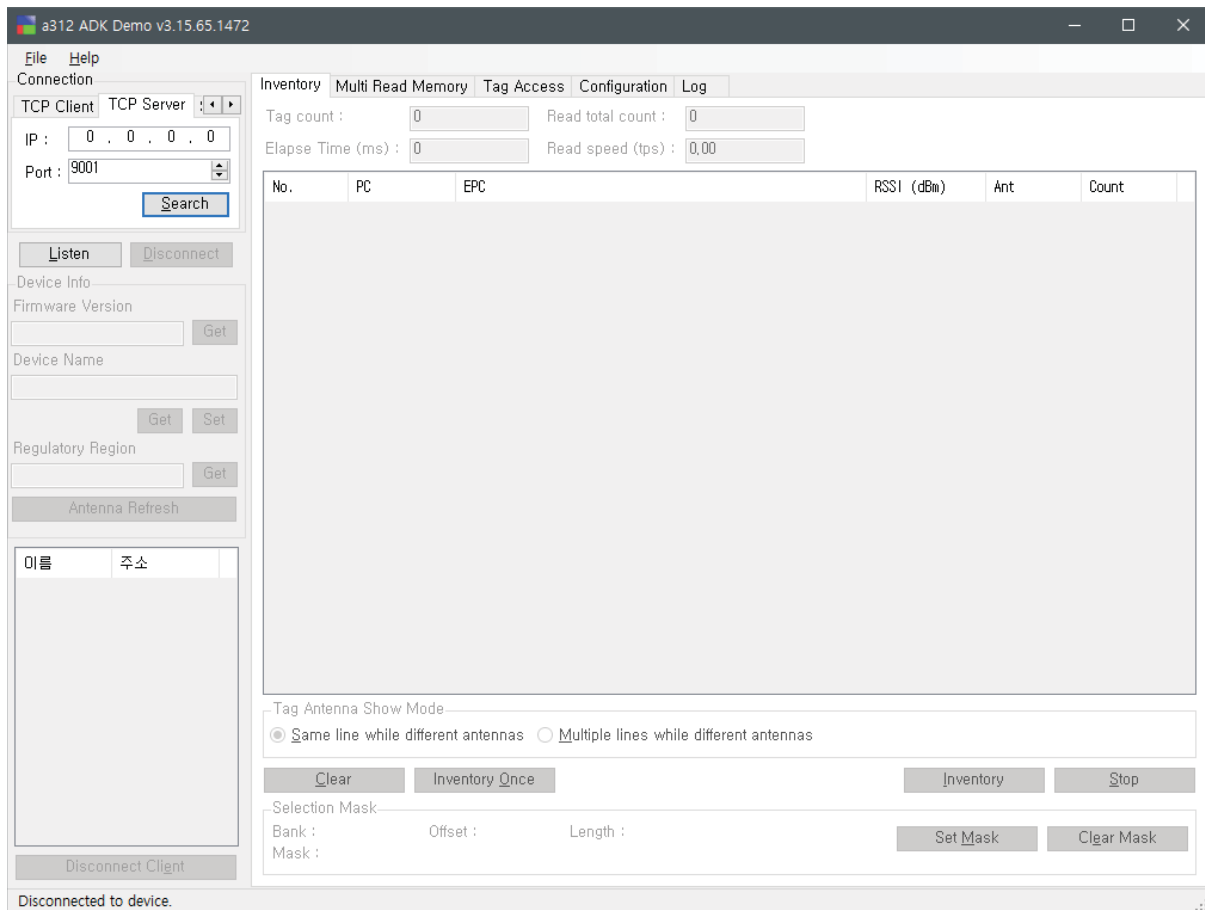


Also, the firmware version, device name, and local frequency information of the α 312 device currently connected are displayed in "Device Info" on the left side of the main screen.

7.2. TCP Server

In order to connect with α 312 devices in “TCP Server” mode, the network mode of α 312 devices should be set to “TCP Client”.

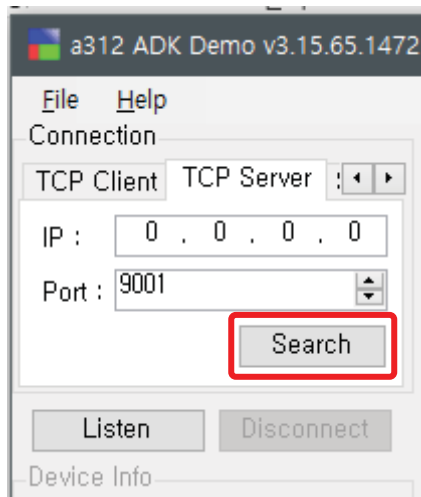
The “TCP Server” mode operates as a mode that waits for α 312 equipment to be connected to the program, and multiple equipment can access the program.



Therefore, when entering the “TCP Server” mode, the device list that displays the devices connected to “Device Info” is shown on the left side of the main screen as shown in the figure above.

7.2.1. Set α312 device network mode to TCP Client

To set the network mode of α312 device to "TCP Client", select the "TCP Client" tab in "Connection" at the top left of the main screen and click the "Search" button as shown in the figure below.

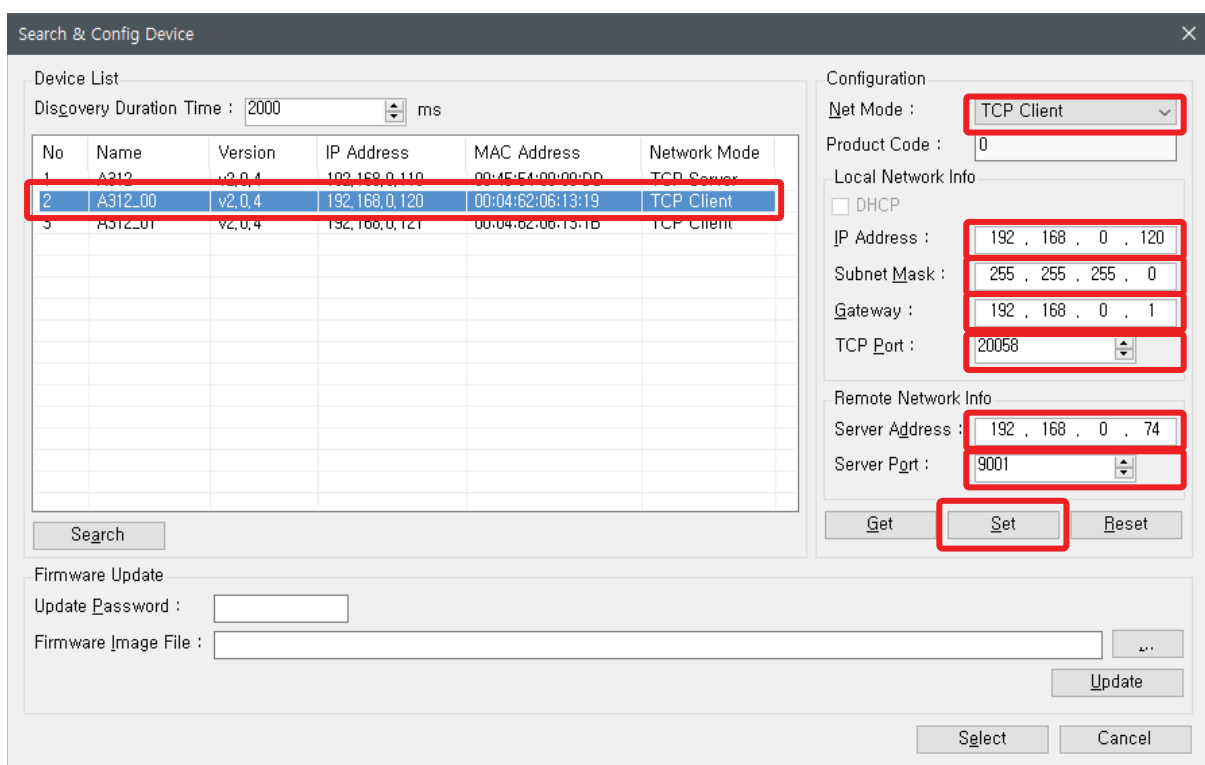


As shown in the figure below, the "Search & Config Device" dialog box appears and when the device search is complete, select the device you want to modify the network mode from "Device List", and change "Net Mode" from "Configuration" to "TCP Client" Set.

And similarly to "TCP Client", input "IP Address", "Subnet Mask", and "Gateway" for a fixed TCP/IP address and set "TCP Port" to 20058.

Then, input the address of the demo program that α312 equipment will connect to in Server Address, and the Server Port is 9001 (or the port number set in the TCP Server connection later).

When the setting is complete, click the "Set" button to save the setting.



When the device setting is complete, click the "Search" button in the "Device List" on the left to confirm that the setting has been changed.

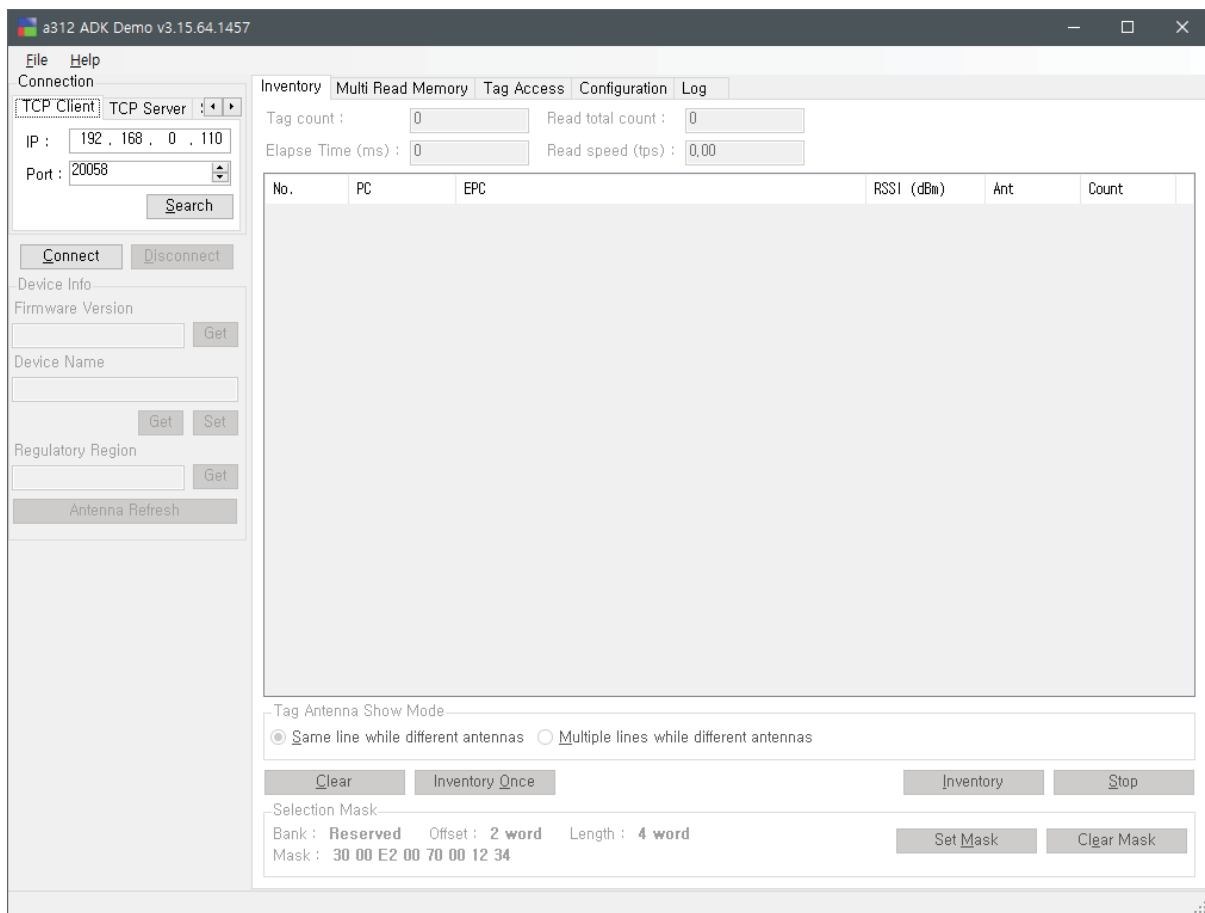
After confirming that the settings have been changed, click the "Cancel" button to return to the main screen.

The screenshot shows a software window titled "Search & Config Device". It is divided into several sections:

- Device List:** A table with columns for No, Name, Version, IP Address, MAC Address, and Network Mode. The second row is selected. Below the table is a "Search" button.
- Configuration:** A panel on the right with various settings:
 - Net Mode:** A dropdown menu set to "TCP Client".
 - Product Code:** A text input field containing "0".
 - Local Network Info:** A section with a "DHCP" checkbox (unchecked) and fields for IP Address (192.168.0.120), Subnet Mask (255.255.255.0), Gateway (192.168.0.1), and TCP Port (20058).
 - Remote Network Info:** A section with fields for Server Address (192.168.0.74) and Server Port (9001).
 - Buttons for "Get", "Set", and "Reset" are located at the bottom of this section.
- Firmware Update:** A section at the bottom left with fields for "Update Password" and "Firmware Image File" (with a browse button "..."). An "Update" button is at the bottom right of this section.
- Bottom Buttons:** "Select" and "Cancel" buttons are located at the bottom right of the window. The "Cancel" button is highlighted with a red rectangle.

7.2.2. Connect α312 device in TCP Server Mode

When α312 demo program starts, you can see that all functions except "Connection" in the upper left corner are disabled.



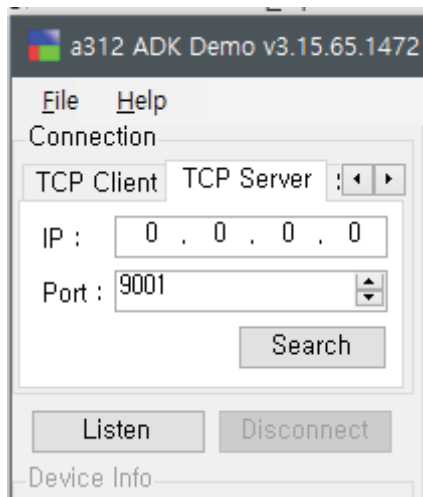
Select the "TCP Server" tab in "Connection" at the top left of the main screen.

If the PC has one network card, enter "0.0.0.0" in IP.

If there are multiple network cards of the PC running the program, enter the IP address of the PC's network card that will accept the connection of α312 equipment in IP.

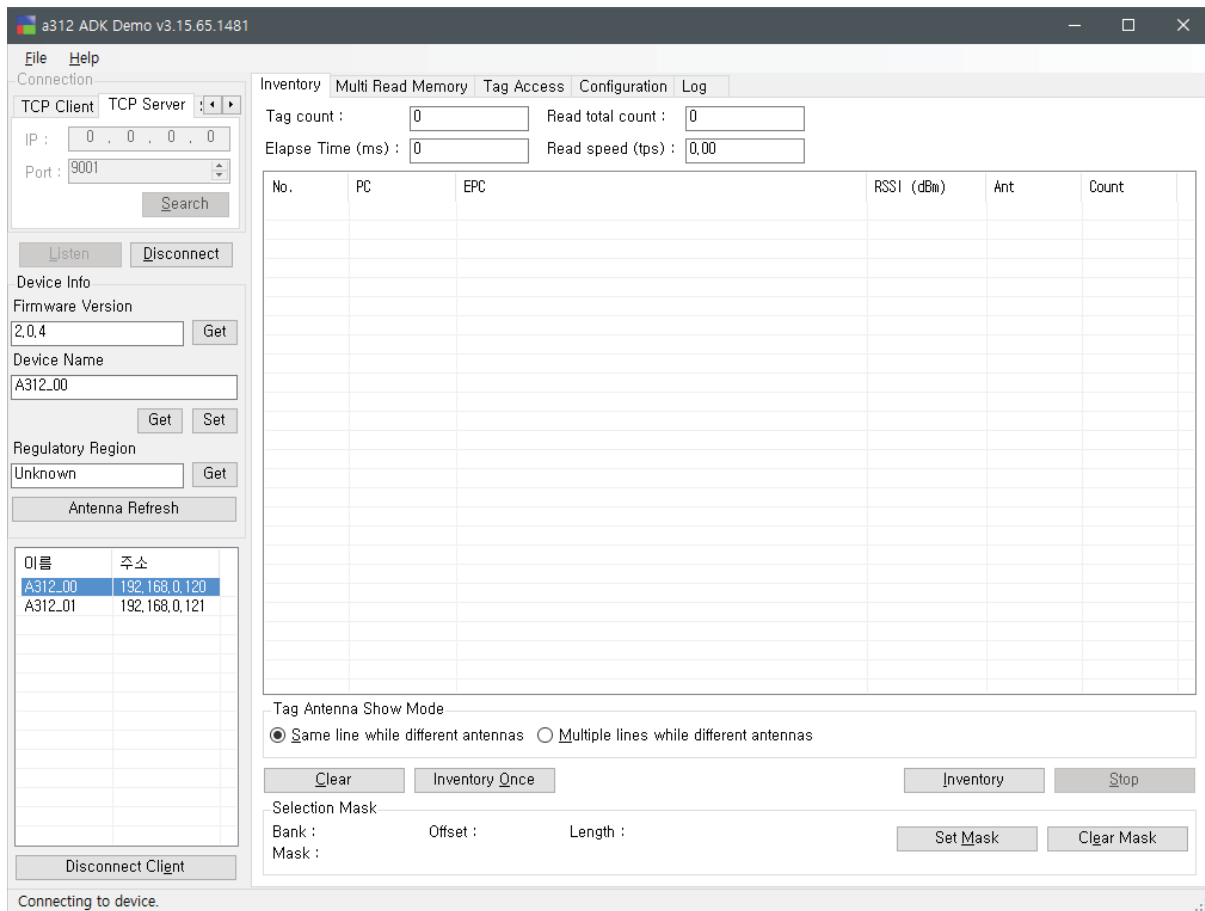
Enter "0.0.0.0" in IP to accept device access from all network cards without accepting device access from a specific network card.

Enter the IP Port that the device connects to in Port. The default value is 9001.



After entering the IP address and Port, click the "Listen" button.

When the α312 device is normally connected, the “Listen” button is deactivated, and the “Disconnect” button and other functions are activated as shown in the figure below.



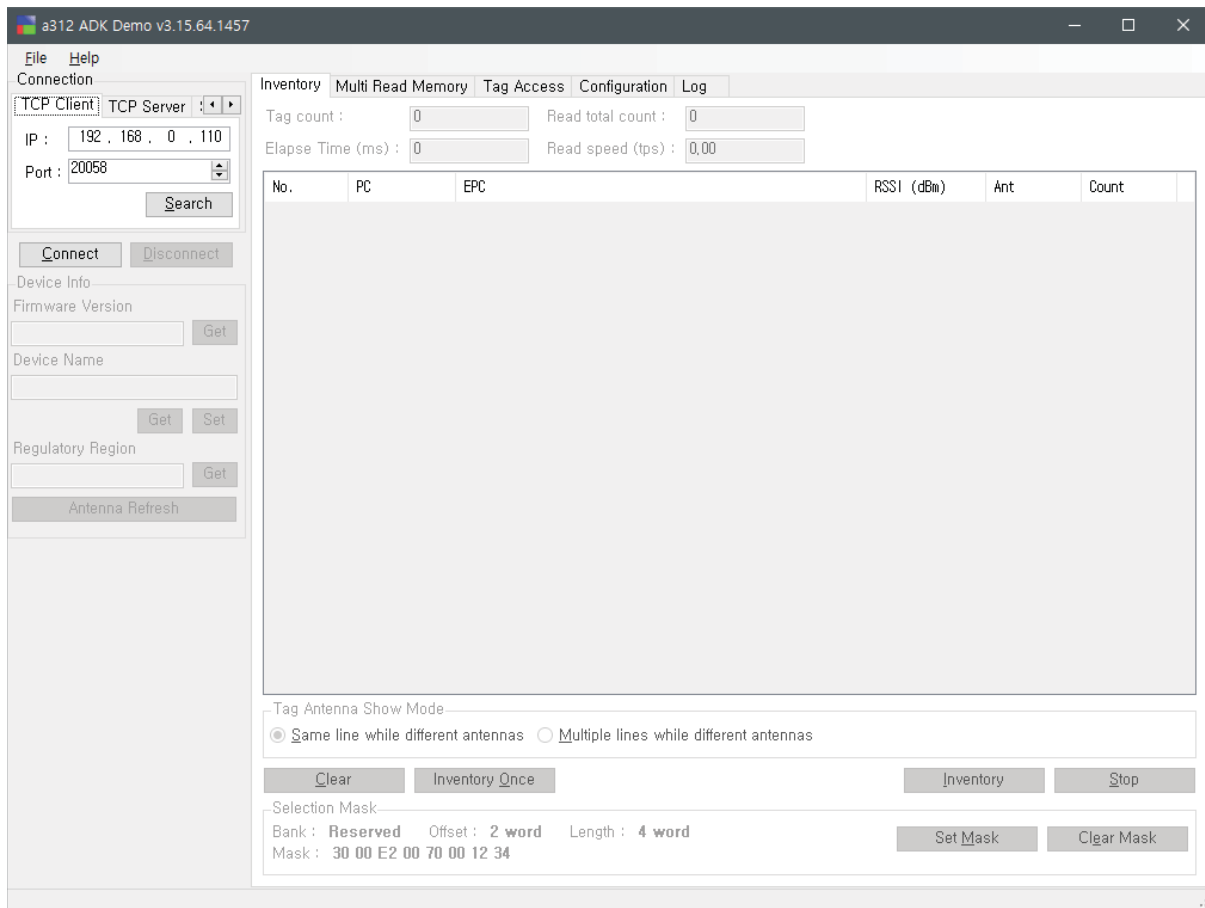
Also, when the device is connected, the list of α312 devices currently connected to “Device Info” is displayed and the device selected from the list is controlled by the program.

The firmware version, device name, and local frequency information are displayed on the device selected from the connected device list.

7.3. Serial Port

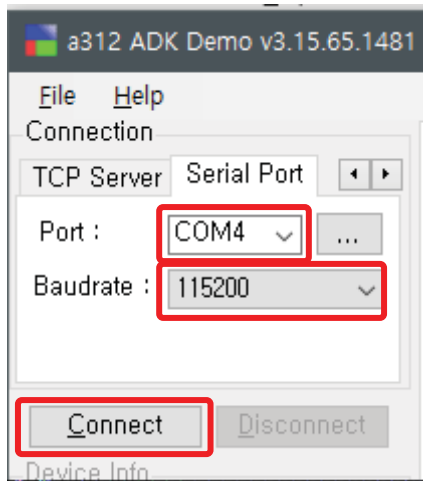
To connect to an α312 device in "Serial Port" mode, you need to update the α312 device to the firmware that supports the serial port. Device firmware update is 6.5. See Device Firmware Update.

When α312 demo program starts, you can see that all functions except "Connection" in the upper left corner are disabled.



Select "Serial Port" in "Connection" at the top left of the main screen.

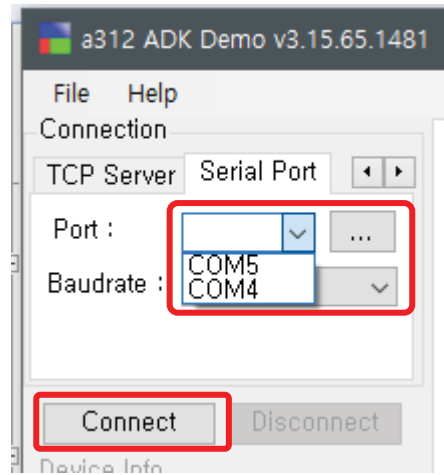
Enter the serial port name you want to connect to the port as shown in the figure below, or select the serial port name already found in the combo box. To re-search the serial port name of the combo box, click “...” to the right of the combo box. Click the “button.



And baud rate is 115200.

If you have selected the serial port name and baud rate, click “Connect” button to connect.

After connection, the main screen is 7.1.2. It is the same as connecting to α 312 device in TCP Client mode.



8. Demo Operation

When connected to the α312 device, the demo tab is activated on the left side of the main screen. The tab consists of Inventory, Multi Read Memory, Tag Access, Configuration, and Log. In Administrator Mode, Extend is added.

In addition, in the Inventory, Multi Read Memory, and Tag Access tabs, you can set and use a selection mask in common.

8.1. Inventory

If you select "Inventory" in the Demo tab, you can see a screen like the following figure.

The screenshot shows the 'a312 ADK Demo v3.15.65.1482' application window. The 'Inventory' tab is selected. The interface is divided into several sections:

- Connection Panel (Left):** Includes fields for TCP Client, TCP Server, IP (192.168.0.11), and Port (20058). A 'Search' button is highlighted with a red circle 2. 'Connect' and 'Disconnect' buttons are also present.
- Device Info (Left):** Shows Firmware Version (2.0.4), Device Name (A312), and Regulatory Region (Korean). 'Get' and 'Set' buttons are available for each field. An 'Antenna Refresh' button is at the bottom.
- Main Data Table:** A table with columns: No., PC, EPC, RSSI (dBm), Ant, and Count. It is currently empty.
- Statistics (Top Right):** Fields for Tag count (0), Read total count (0), Elapse Time (ms) (0), and Read speed (tps) (0.00).
- Tag Antenna Show Mode (Bottom Middle):** Radio buttons for 'Same line while different antennas' (selected) and 'Multiple lines while different antennas'.
- Control Buttons (Bottom Middle):** 'Clear', 'Inventory Once', 'Inventory', and 'Stop' buttons.
- Selection Mask (Bottom Right):** Fields for Bank, Mask, Offset, and Length. 'Set Mask' and 'Clear Mask' buttons are present.

At the bottom of the window, a status bar reads 'Device initialize is complete.'

8.1.1. Inventory Information

Displays information of tags being inventoried.

Tag Count – The number of tags (number of tag list) that are not duplicated during Inventory.

Read Total count – Total number of tags read during Inventory.

Elapse Time – Outputs the time that has progressed while Inventory is running in ms.

Read speed – Calculates and prints the Inventory speed while Inventory is in progress.

8.1.2. Tag List

Displays the tags being inventoried in a list.

No – The order in which tags were recognized during Inventory.

PC – Outputs the PC value of the Inventory tag.

EPC – Outputs the EPC value of the inventory tag.

RSSI – Outputs the reverberation propagation strength of the Inventory tag in dBm unit.

Ant – This is the antenna number that recognized the inventory tag. When the tag list output option is "Same line while difference antennas", the antenna number that recognized the tag at the end is output.

Count - This is the number of recognized PC values and EPC values during Inventory.

8.1.3. Tag List Display Option

Same line while different antennas – Output with the same tag even if the same tag is recognized by different antennas

For example, as shown in the figure below, even if the same tag is recognized as a different antenna, only one tag is output in the list, and the antenna is the last recognized antenna number.

No.	PC	EPC	RSSI (dBm)	Ant	Count
1	3000	11112222F565BC3480470460	-62.40	1	29
2	3000	11112222F5665B348047060C	-60.80	1	24
3	3000	111122229000000000000000	-47.00	3	61
4	3000	11112222F56571B4804708F6	-59.18	1	30
5	3000	11112222F56666F48047070B	-53.90	1	31
6	3000	11112222F5667A7480470759	-61.80	1	17
7	3000	11112222F5665674804706C9	-58.30	1	31
8	3000	11112222F5664AB48047069A	-57.60	1	31
9	3000	11112222F565C3F48047047F	-59.90	1	30
10	3000	11112222F565CFB4804704AE	-59.10	1	29
11	3000	11112222F5666EB48047072A	-54.80	1	30
12	3000	11112222F565AD7480470425	-59.90	1	30
13	1000	11112222	-73.90	3	28
14	A800	1111222252482424364E24244E363034343393233363935313524...	-53.90	3	26

Multiple line while different antennas – If the same tag is recognized by different antennas, it is divided into different tags and output.

For example, as shown in the following figure, if the same tag is recognized as a different antenna, the list is duplicated for each antenna and output.

8.1.4. Inventory Control

Clear – Deletes all tags displayed in the tag list.

Inventory Once – Inventory runs only for one inventory round. The inventory round is the sum of the dwell times for each antenna. Inventory ends automatically after the inventory round time has elapsed.

If the α 312 device has two antennas connected to #1 and #2, the dwell time of antenna #1 is set to 2000ms and the dwell time of antenna #2 is set to 1000ms, the inventory round time will be 3000ms.

Inventory – Starts inventory. Once started with inventory, it continues until you hit Stop.

Stop – Stop inventory. When the inventory starts by clicking the “Inventory” button, it is activated to stop the inventory. When inventory is stopped, it will be disabled again.

8.1.5. Selection Mask Information

Selection Mask can be conditional so that only specific tags can be accessed in Inventory, Multi Reading, and Tag Access operations. In the selection mask information, the information of the currently involved selection mask is output, and the information of the selection mask is displayed for the purpose of showing whether the user currently has a mask in Inventory, Multi Reading, or Tag Access operation, and what conditions are in effect if a mask is applied. Is printing.

Bank – Shows which memory bank of the tag the Mask value masks, which memory bank is the target of the mask.

Offset – The mask value is the starting position in the memory bank data where the comparator starts, in word units.

Length – The length to which Mask values are compared, in word units.

Mask – Mask value is output.

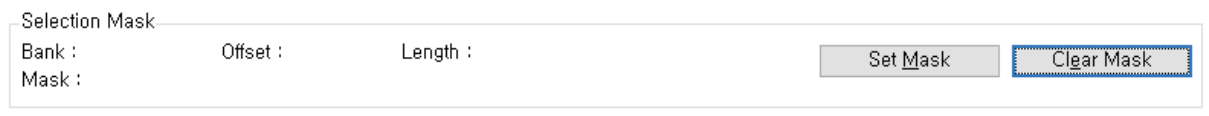
Set Mask – Manually set the Selection Mask.

Clear Mask – Clears the selected selection mask.

8.2. Selection Mask

Selection Mask is a function that gives conditions to tags recognized when α 312 equipment approaches and recognizes RFID tags, and is used when only tags with specific conditions are needed.

When the α 312 device is connected for the first time, the selection mask is canceled, and nothing is displayed in the selection mask information as shown in the figure below.



Selection Mask

Bank : Offset : Length :

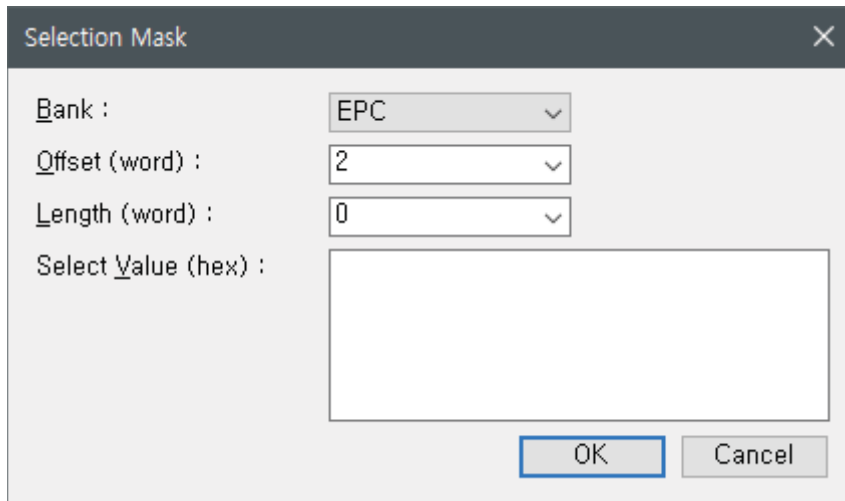
Mask :

Set Mask Clear Mask

How to set the Selection Mask is the manual setting method in which the user sets an arbitrary Selection Mask by using the "Set Mask" button in the Selection Mask information on the same screen in the Inventory, Multi Read Memory, Tag Access tabs, and the Inventory tab. There is an easy setup for targeting tags.

8.2.1. Manual Selection Mask

To manually set the Selection Mask, click the "Set Mask" button in the Selection Mask information, and the following screen will appear.



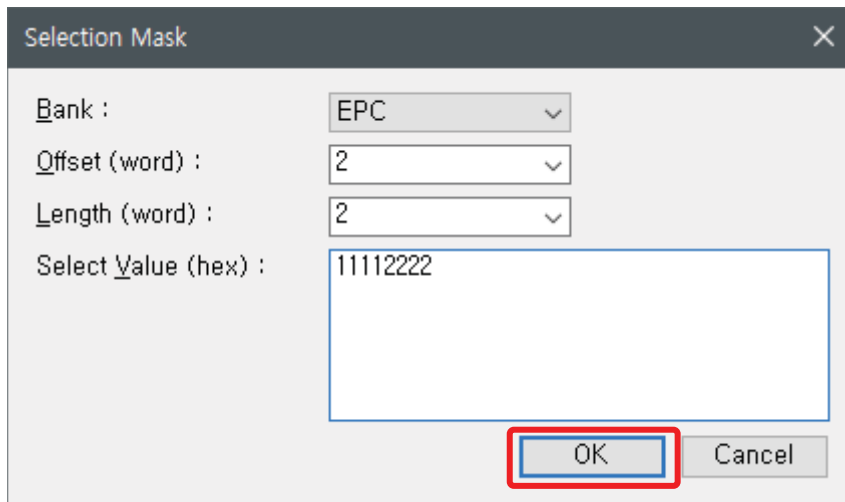
Bank : Select the memory bank of the tag to be compared with the Select Value of the Selection Mask.

Offset : Designates the start address of the tag to start comparing the Select Value of the Selection Mask in word units.

Length : Specify the length to be compared with the Select Value of the Selection Mask in word units. At this time, even if the input Select Value is greater than the specified length, only Length is compared. And if the input Select Value is less than Length, the Selection Mask will fail.

Select Value : Enter the data to be compared with the Selection Mask as Hex value. At this time, it must be entered in units of 4 characters (word units).

Enter all the selection mask information and click the "OK" button as shown in the following figure.



If the selection mask is properly input, the set selection mask information is displayed as shown in the following figure.



If the Selection Mask is properly set, if you do Inventory, you can see that only tags matching the Selection Mask conditions are Inventory.

The screenshot shows the 'a312 ADK Demo v3.15.65.1483' application window. The 'Inventory' tab is active, displaying the following statistics:

- Tag count : 1
- Read total count : 193
- Elapse Time (ms) : 2947
- Read speed (tps) : 65.49

A table below these statistics shows the results of the inventory operation. The first row is highlighted with a red box:

No.	PC	EPC	RSSI (dBm)	Ant	Count
1	3000	11112222F5666EB48047072A	-54.80	1	193

At the bottom of the window, the 'Selection Mask' section is also highlighted with a red box. It shows the following configuration:

- Bank : EPC
- Offset : 2 word
- Length : 2 word
- Mask : 11 11 22 22

Buttons for 'Set Mask' and 'Clear Mask' are visible next to the mask configuration. The status bar at the bottom left indicates 'Inventory stopped'.

8.2.2. Easy Setting Selection Mask

Selection Mask Easy Setting is a function that allows you to easily set the Selection Mask in the Inventory tab.

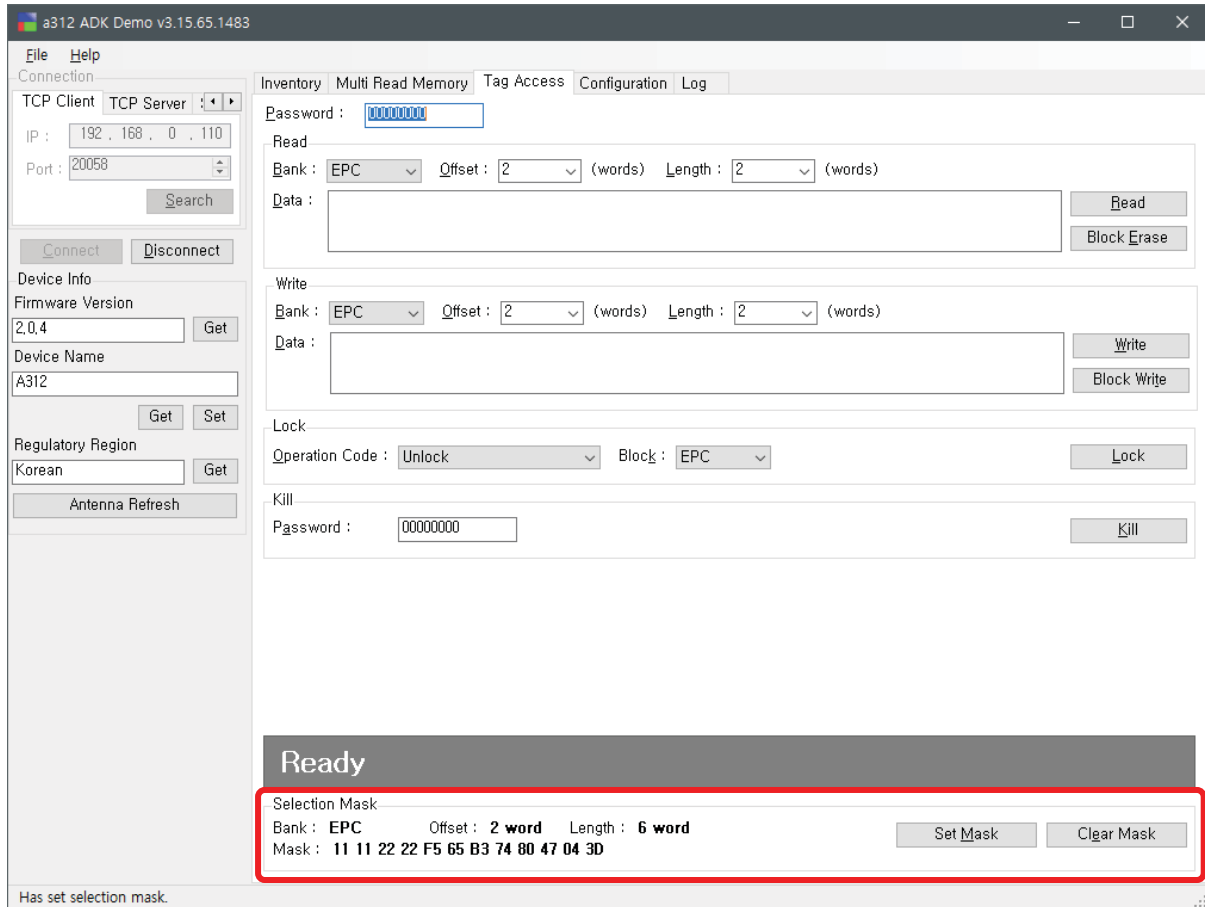
In the Inventory tab, perform Inventory as shown in the following figure.

The screenshot shows the 'a312 ADK Demo v3.15.65.1483' application window. The 'Inventory' tab is active, displaying a table of inventory items. The table has columns for No., PC, EPC, RSSI (dBm), Ant, and Count. Row 8 is highlighted with a red box. Below the table, there are controls for 'Tag Antenna Show Mode' (radio buttons for 'Same line while different antennas' and 'Multiple lines while different antennas'), 'Inventory Once', 'Inventory', and 'Stop' buttons. At the bottom, there is a 'Selection Mask' section with fields for 'Bank', 'Offset', and 'Length', and buttons for 'Set Mask' and 'Clear Mask'. The status bar at the bottom left indicates 'Inventory stopped'.

No.	PC	EPC	RSSI (dBm)	Ant	Count
1	3000	111122229000000000000000	-44.30	1	3
2	3000	2005F962A81F3281F5999468	-70.40	1	2
3	3000	11112222F565B37480470430	-66.80	1	2
4	41B1	05440C2CB490C30C30C4833068700	-59.90	1	2
5	3000	11110000000000000000000077	-66.80	1	2
6	3000	0088054C0701839000253A03	-65.90	1	2
7	3000	11112222F565B3480470460	-61.80	1	2
8	3000	11112222F5667A7480470759	-65.90	1	2
9	4000	E40010002016711240160003000000000	-67.90	1	2
10	3000	E2007031F5667F348047076C	-70.40	1	2
11	41B1	05440C2CB490C30C30C4833068700	-75.00	1	2
12	3000	11112222F5659FF4804703EF	-67.90	1	2
13	3000	11112222F5664A7480470699	-66.80	1	2
14	3000	E200001A85060109158051DA	-75.00	1	2
15	3000	E200001B170202052290BA96	-71.90	1	2
16	3000	E200001B170202262290CBC0	-75.00	1	2
17	3000	E200001B170202532340E61A	-75.70	1	2
18	3000	E200001A8506011615805602	-67.90	1	2
19	3000	1111222240C8F633802ACBE8	-73.90	1	2
20	3000	11112222F5665534804706C4	-65.10	1	2
21	3000	30303030303134303030303033	-59.90	1	4
22	3000	E200001B1702011423105400	-75.00	1	2
23	41B1	05440C2CB490C30C30C483301C100	-76.40	1	2
24	3000	E2007031F5669D34804707E4	-72.90	1	1
25	4400	1111222231303030303030303030303030	-57.60	1	1

When Inventory is executed and the Inventory tag is displayed in the tag list, double-click the tag for which Selection Mask is set in the list.

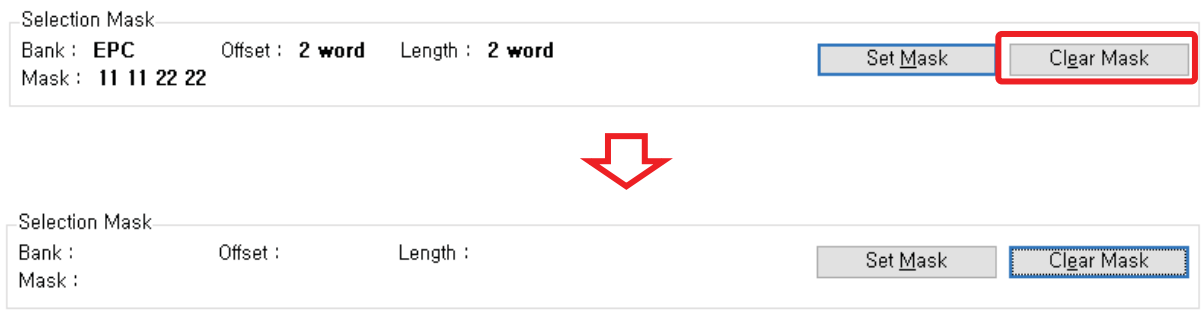
Then, you can check that the Selection Mask is set to the double-clicked tag while moving to the “Tag Access” tab as shown in the following figure. This method is a method guided by the RFID standard and is a method to show controlling tags after inventory.



In general, after finding a tag with Inventory, it guides you to perform the functions of Read Memory, Write Memory, Lock, and Kill by specifying the tag.

8.2.3. Unsetting Selection Mask

If you don't need the Selection Mask anymore, you need to clear the Selection Mask. In this case, you can confirm that the Selection Mask is released by clicking the "Clear Mask" button in the Selection Mask information as shown in the following figure.



8.3.1. Read Memory Condition

Enter the Read Memory condition to perform Multi Read Memory. At least one of Reserved, TID and User memory must be selected.

Reserved – Designates the Read Memory operation option for the reserved memory of the tag.

Used – Set whether to read memory for the reserved memory of the tag.

Offset – Reserved Specifies the address to start reading of the memory in word units.

Length – Reserved Specifies the read length of the memory in word units.

TID – Specifies the Read Memory operation option for the tag's TID memory.

Used – Set whether to read memory for tag's TID memory.

Offset – Designate the address to start reading of TID memory in word unit.

Length – Specifies the read length of the TID memory in word units.

User – Specifies the Read Memory operation option for the user memory of the tag.

Used – Set whether to read memory for the tag's user memory.

Offset – Designate the address to start reading of user memory in word unit.

Length – Designate the read length of user memory in word unit.

Password – If the tag has a password, enter the tag's Access Password in 8 digits (2 words) as the Hex value.

8.3.2. Tag List

Displays the tags being inventoried in a list.

No – The order in which tags were recognized during Inventory.

PC – Outputs the PC value of the Inventory tag.

EPC – Outputs the EPC value of the inventory tag.

Reserved – If Used of Reserved is checked, the reserved memory data that has been read memory is output while inventorying according to the reserved condition.

TID – If TID Used is checked, the TID Memory Data that has been read memory is output while being Inventory according to the TID condition.

User – If User's Used is checked, the User Memory Data that has been read memory is output while being Inventory according to the User condition.

Count - This is the number of recognized PC values and EPC values during Inventory.

8.3.3. Inventory Control

Clear – Deletes all tags displayed in the tag list.

Inventory – Starts inventory. Once started with inventory, it continues until you hit Stop.

Stop – Stop inventory. When the inventory starts by clicking the "Inventory" button, it is activated to stop the inventory. When inventory is stopped, it will be disabled again.

8.3.4. Selection Mask Information

Selection Mask can be conditional so that only specific tags can be accessed in Inventory, Multi Reading, and Tag Access operations. In the selection mask information, the information of the currently involved selection mask is output, and the information of the selection mask is displayed for the purpose of showing whether the user currently has a mask in Inventory, Multi Reading, or Tag Access operation, and what conditions are in effect if a mask is applied. Is printing.

Bank – Shows which memory bank of the tag the Mask value masks, which memory bank is the target of the mask.

Offset – The mask value is the starting position in the memory bank data where the comparator starts, in word units.

Length – The length to which Mask values are compared is output in word units.

Mask – Mask value is output.

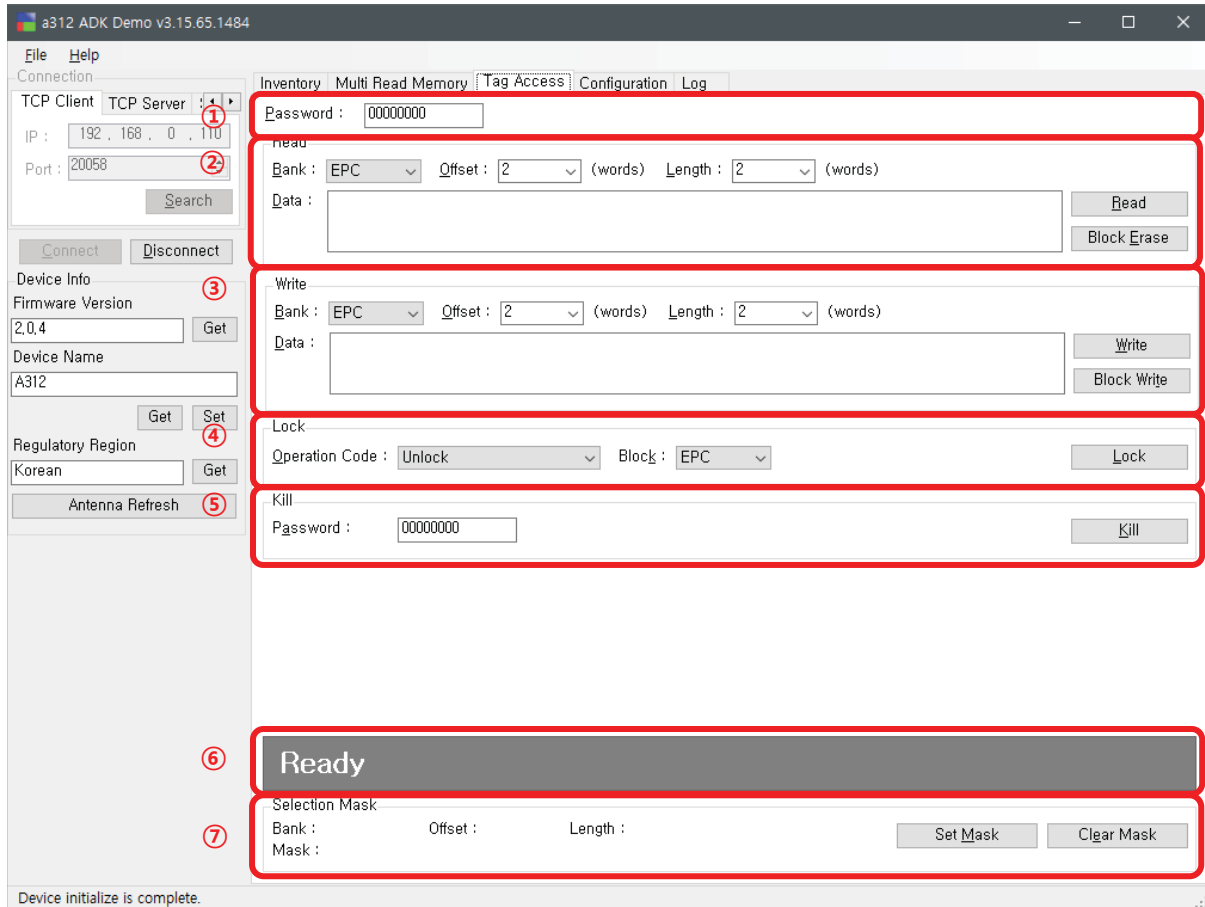
Set Mask – Manually set the Selection Mask.

Clear Mask – Clears the selected selection mask

8.4. Tag Access

If you select "Tag Access" in the Demo tab, you can see a screen like the following figure.

Tag Access can be viewed by demonstrating RFID functions to access tag memory such as Read Memory, Write Memory, Lock, Kill, Block Write, and Block Erase.



8.4.1. Password

If the tag has a password, enter the tag's Access Password in 8 digits (2 words) as the Hex value.

8.4.2. Read / Block Erase

Enter information to perform Read Memory and Block Erase, and execute Read Memory or Block Erase.

Bank – Select a memory bank to perform Read Memory or Block Erase.

Offset – Enter the start address of the memory to start reading with Read Memory or the start address of the memory to start erasing with Block Erase in word units.

Length – Input the length of data to be read from Read Memory or the length of data to be erased by Block Erase in word units.

Data – It is read-only, and the data read into Read Memory is output as Hex value.

Read – Execute Read Memory.

Block Erase – Execute Block Erase.

8.4.3. Write / Block Write

Enter information for performing Write Memory and Block Write, and execute Write Memory or Block Write. Write Memory can write up to 20 words, and Block Write can write up to 40 words.

Bank – Select the memory bank to perform Write Memory or Block Write.

Offset – Enter the start address of the memory to start writing with Write Memory or Block Write in word units.

Length – Enter the length of data to be written by Write Memory or Block Write in word units.

Data – Input data to be written by Write Memory or Block Write as Hex value. Data must be entered in word units and must not be less than Length.

Write – Execute Write Memory.

Block Write – Execute Block Write.

8.4.4. Lock

To lock the tag, input the information necessary for the lock and execute the lock.

Operation Code – Select the operation code of the lock.

Unlock – Unlocks the selected memory area.

Permanence Writable – Permanently unlocks the selected memory area. After execution, the selected memory area cannot be locked.

Security Lock – Locks the selected memory area.

Permanence Unwritable – Permanently locks the selected memory area. After execution, the selected memory area cannot be locked.

Block – Select the memory area to lock.

Kill – Locks the Kill Password area of the reserved memory.

Access – Locks the Access Password area of the reserved memory.

EPC – Locks the EPC memory area.

TID – Locks the TID memory area.

User – Locks the User Memory area.

Lock – Execute Lock.

8.4.5. Kill

Enter the information required for the kill to destroy the tag and perform the kill.

Password – Enter the Kill Password as Hex value. Enter the Kill Password in 8 digits (2 words) as the Hex value.

Kill – Execute Kill.

※ **When the kill is performed, the tag can no longer be used. Pay attention to performing the kill**

8.4.6. Result information

Output the execution result. If the command execution result is successful, "Success" is displayed in blue, and if it fails, "Fail" is displayed in red.

8.4.7. Selection Mask Information

Selection Mask can be conditional so that only specific tags can be accessed in Inventory, Multi Reading, and Tag Access operations. In the selection mask information, the information of the currently involved selection mask is output, and the information of the selection mask is displayed for the purpose of showing whether the user currently has a mask in Inventory, Multi Reading, or Tag Access operation, and what conditions are in effect if a mask is applied. Is printing.

Bank – Shows which memory bank of the tag the Mask value masks, which memory bank is the target of the mask.

Offset – The mask value is the starting position in the memory bank data where the comparator starts, in word units.

Length – The length to which Mask values are compared is output in word units.

Mask – Mask value is output.

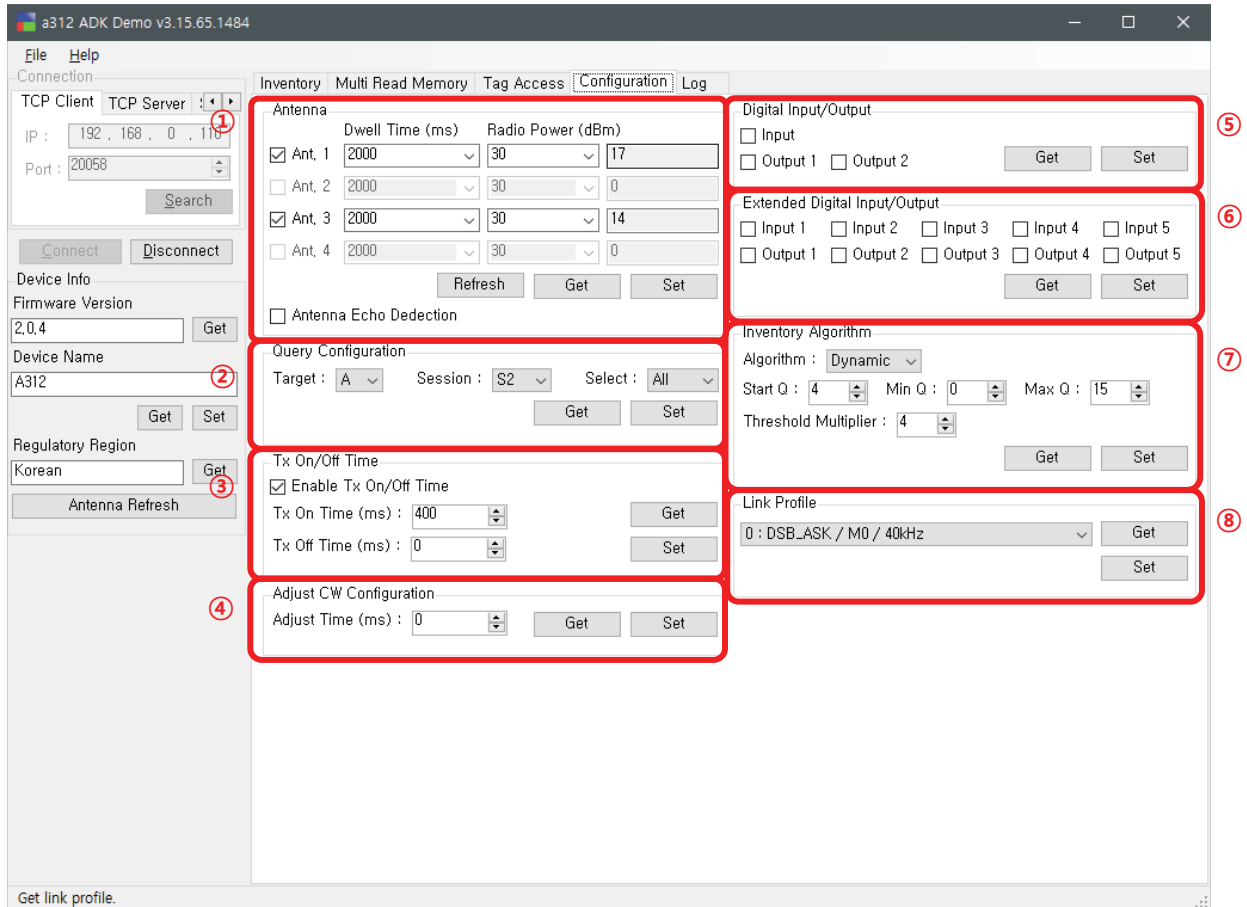
Set Mask – Manually set the Selection Mask.

Clear Mask – Clears the selected selection mask

8.5. Configuration

If you select "Configuration" in the demo tab, you can see a screen like the following figure.

In Configuration, you can set the antenna and operation options of the RFID module. Settings in Configuration affect the operation of Inventory, Multi Read Memory, and Tag Access.



8.5.1. Antenna

Detects the antenna connected to the α 312 device and returns/sets the antenna's dwell time and output power. The α 312 can connect up to 4 antennas.

Antenna			
	Dwell Time (ms)	Radio Power (dBm)	
<input checked="" type="checkbox"/> Ant. 1	2000	30	16
<input type="checkbox"/> Ant. 2	2000	30	0
<input checked="" type="checkbox"/> Ant. 3	2000	30	14
<input type="checkbox"/> Ant. 4	2000	30	0

Antenna Echo Dedection

Ant – Set whether to use the antenna. If checked, the antenna can be used. If the check is off, the antenna is not used.

Dwell Time – Set the time each antenna operates. The maximum time that one antenna can operate is 3000ms. If the dwell time is set to 0ms, the antenna does not work.

Radio Power – Set the output power of the antenna. The unit is dBm.

Refresh – Check the antenna connection status again. When Antenna Echo Detection is activated, the connected antenna is automatically detected.

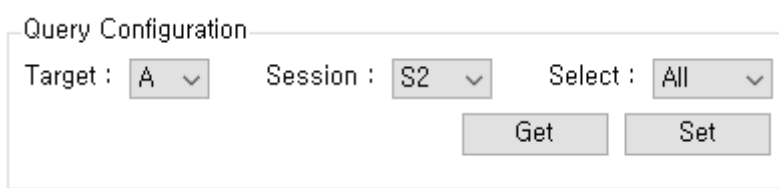
Get – The antenna setting value is fetched from α 312 device and output.

Set – Apply the antenna settings to the α 312 device.

Antenna Echo Detection – Set whether to automatically detect the antenna connected to α 312 equipment.

8.5.2. Query Configuration

Configures the settings for the RFID module's Query operation. This value is related to Inventory behavior and Selection Mask.



The image shows a 'Query Configuration' window with three dropdown menus and two buttons. The 'Target' dropdown is set to 'A', the 'Session' dropdown is set to 'S2', and the 'Select' dropdown is set to 'All'. Below these are two buttons labeled 'Get' and 'Set'.

Target – Determines whether to collect the session state of the tag collected by Inventory in A state or B state.

Session – Determines the session of tags collected by Inventory. There are four sessions of tag: S0, S1, S2, S3.

Select – Determines whether to collect regardless of the status of Select Flag of tags collected by Inventory, only set tags, or only unset tags.

Get – Query settings are retrieved from α 312 equipment and output.

Set – Query set values are stored in α 312 equipment.

8.5.3. TX On/Off Time

Set the antenna output time and idle time during the antenna operation time. The antenna outputs radio waves in 400ms units during the dwell time, then stops and repeats. The combined Tx On Time and Tx Off Time should not exceed 400ms.

Tx On/Off Time

Enable Tx On/Off Time

Tx On Time (ms) :

Tx Off Time (ms) :

Enable Tx On/Off Time – Determines whether to use TX On/Off Time. When TX On/Off Time is deactivated, the antenna maintains its output for Dwell Time.

Tx On Time – Enter the time that the antenna outputs radio waves in ms.

Tx Off Time – Enter the time that the antenna does not output radio waves in ms.

Get – The set value of TX On/Off Time is brought to $\alpha 312$ device and output.

Set – Saves TX On/Off Time setting value to $\alpha 312$ device.

8.5.4. Adjust CW Configuration

Gets or sets the time to output a continuous wave.



Adjust CW Configuration

Adjust Time (ms) :

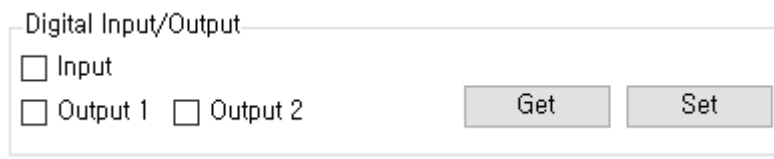
Adjust Time – Specifies the time to output the continuous wave in ms.

Get – The value of Adjust Time is retrieved from α 312 device and output.

Set – Saves the value of Adjust Time to α 312 device.

8.5.5. Digital Input/Output

Get or set digital signal input/output status to α 312 equipment. The α 312 equipment basically has one digital input signal port and two digital output signal ports.



Digital Input/Output

Input

Output 1 Output 2

Input – Digital input signal status is output

Output1 – Digital output port 1 signal status.

Output2 – Digital output port 2 signal status.

Get – Get the digital input signal status from α 312 device.

Set – Set the digital output status to the α 312 device.

8.5.6. Extended Digital Input/Output

In order to expand digital input/output ports for α 312 equipment, additional input/output expansion modules can be added. When the extended digital input/output module is connected to the α 312 device, the extended digital input/output function can be used. Digital signal ports of five inputs and five outputs can be used for the extended digital input/output module.

Extended Digital Input/Output

<input type="checkbox"/> Input 1	<input type="checkbox"/> Input 2	<input type="checkbox"/> Input 3	<input type="checkbox"/> Input 4	<input type="checkbox"/> Input 5
<input type="checkbox"/> Output 1	<input type="checkbox"/> Output 2	<input type="checkbox"/> Output 3	<input type="checkbox"/> Output 4	<input type="checkbox"/> Output 5

Input1 – Digital input port 1 signal status is output.

Input2 – Digital input port 2 signal status is output.

Input3 – Digital input port 3 signal status is output.

Input4 – Digital input port 4 signal status is output.

Input5 – Digital input port 5 signal status is output.

Output1 – Set the digital output port 1 signal status.

Output2 – Set the digital output port 2 signal status.

Output3 – Set the digital output port 3 signal status.

Output4 – Set the digital output port 4 signal status.

Output5 – Set the digital output port 5 signal status.

Get – Gets the state of the extended digital input signal from the α 312 device.

Set – Sets the state of the extended digital output to the α 312 device.

8.5.7. Inventory Algorithm

Inventory Algorithm sets the algorithm used by the RFID module to perform Inventory on $\alpha 312$. RFID module largely supports Dynamic Algorithm and Fixed Algorithm. Dynamic Algorithm uses Start Q, Min Q, Max Q, and Threshold Multiplier to dynamically find Q value and collect tags. And the Fixed Algorithm collects tags with only a fixed Q value.

The image displays two screenshots of the 'Inventory Algorithm' configuration interface. The top screenshot shows the 'Dynamic' algorithm selected. The 'Algorithm' dropdown is set to 'Dynamic'. The 'Start Q' is 4, 'Min Q' is 0, and 'Max Q' is 15. The 'Threshold Multiplier' is 4. The bottom screenshot shows the 'Fixed' algorithm selected. The 'Algorithm' dropdown is set to 'Fixed'. The 'Q Value' is 4, 'Min Q' is 0, and 'Max Q' is 0. The 'Threshold Multiplier' is 0. Both screenshots include 'Get' and 'Set' buttons.

Algorithm – Select the algorithm type. You can choose either Dynamic or Fixed.

Start Q – Set the Q value that starts initially in Dynamic Algorithm. The range of Q value is Min Q~ Max Q.

Min Q – Specifies the minimum Q value in the Dynamic Algorithm. The minimum Q value range is 0 to Max Q.

Max Q – Specifies the maximum Q value in the Dynamic Algorithm. The initial Q value ranges from Min Q to 15.

Threshold Multiplier – Specifies a multiplier for the threshold value.

Q Value – Specify a fixed Q value in the Fixed Algorithm. The Q value is 0-15.

Get – Inventory Algorithm is imported from $\alpha 312$ device.

Set – Save Inventory Algorithm to $\alpha 312$ device.

8.5.8. Link Profile

The RFID module of α 312 equipment modulates/demodulates the radio signal to communicate with the tag. Link Profile provides the signal modulation/demodulation method in a profile format.

Link Profile

0 : DSB_ASK / M0 / 40kHz

Link Profile – Select a link profile. The profiles that can be selected are shown in the following table.

No	Modulation	Demodulation	Frequency
0	DSB-ASK	M0	40 KHz
1	PR-ASK	M4	250 KHz
2	PR-ASK	M4	300 KHz
3	DSB-ASK	FM0	400 KHz
4	DSB-ASK	FM0	640 KHz

Get – Get the link profile from the α 312 device.

Set – Saves the link profile to the α 312 device.

8.6. Extended

If you select "Extended" in the Demo tab, you can see the screen like the following figure.

Extended can only be viewed by enabling administrator mode. Extended consists of commands for module certification or testing, or functions for expert use.

The screenshot displays the 'a312 ADK Demo v3.15.66.1507' application window. The 'Extended' tab is active, showing several configuration panels. Red boxes and numbers 1 through 8 highlight specific areas:

- 1: TCP Client and TCP Server fields.
- 2: Device Info section, including Firmware Version (2.0.4) and Device Name (A312).
- 3: Regulatory Region (Korean).
- 4: Antenna Refresh button.
- 5: Inventory Configuration panel (Inventory Algorithm: Dynamic, Match Report Count: 0).
- 6: Frequency Band panel (Please select a frequency band config file).
- 7: MAC Register and OEM Register panels (Address: 00000000).
- 8: Test Antenna / Power (Antenna: 1, Power: 33 dBm) and Test Frequency (917,300 MHz) panels.

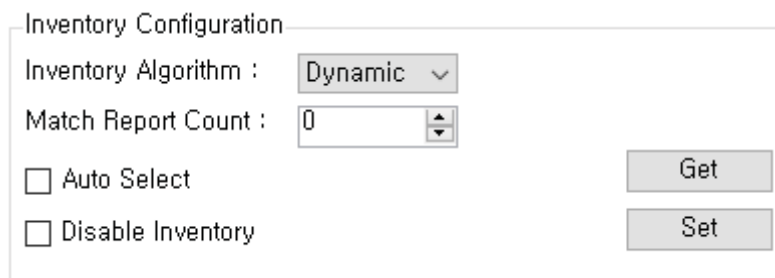
The 'Hopping Channel' table is also visible:

Used	Frequency	Set
<input checked="" type="checkbox"/>	917,300 MHz	
<input checked="" type="checkbox"/>	917,900 MHz	
<input checked="" type="checkbox"/>	918,500 MHz	
<input checked="" type="checkbox"/>	919,100 MHz	
<input checked="" type="checkbox"/>	919,700 MHz	
<input checked="" type="checkbox"/>	920,300 MHz	

Device initialize is complete.

8.6.1. Inventory Configuration

Gets or sets Inventory configuration information of ISO 18000-6C standard of RFID module of α312 equipment.



Inventory Configuration

Inventory Algorithm : Dynamic ▾

Match Report Count : 0

Auto Select

Disable Inventory

Get

Set

Inventory Algorithm – Select the algorithm to be used when performing Inventory. It has the same meaning as the Algorithm value of Inventory Algorithm in Configuration.

Match Report Count – Specifies the highest number of tags to be collected for Inventory to stop. If the setting value is 0, Inventory must be stopped by the user. If a value greater than 0 is specified, the number of tags specified can be read and stopped automatically.

Auto Select – Determines whether to use the Selection Mask automatically.

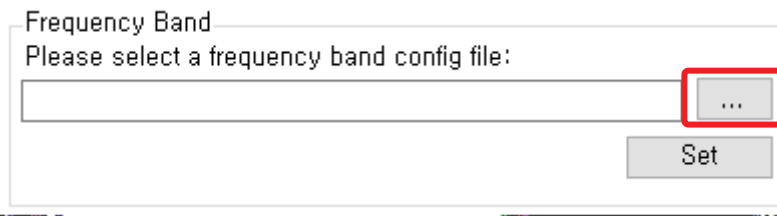
Disable Inventory – Determines whether to disable Inventory collection function.

Get – Get Inventory Configuration value from the RFID module of α312 device.

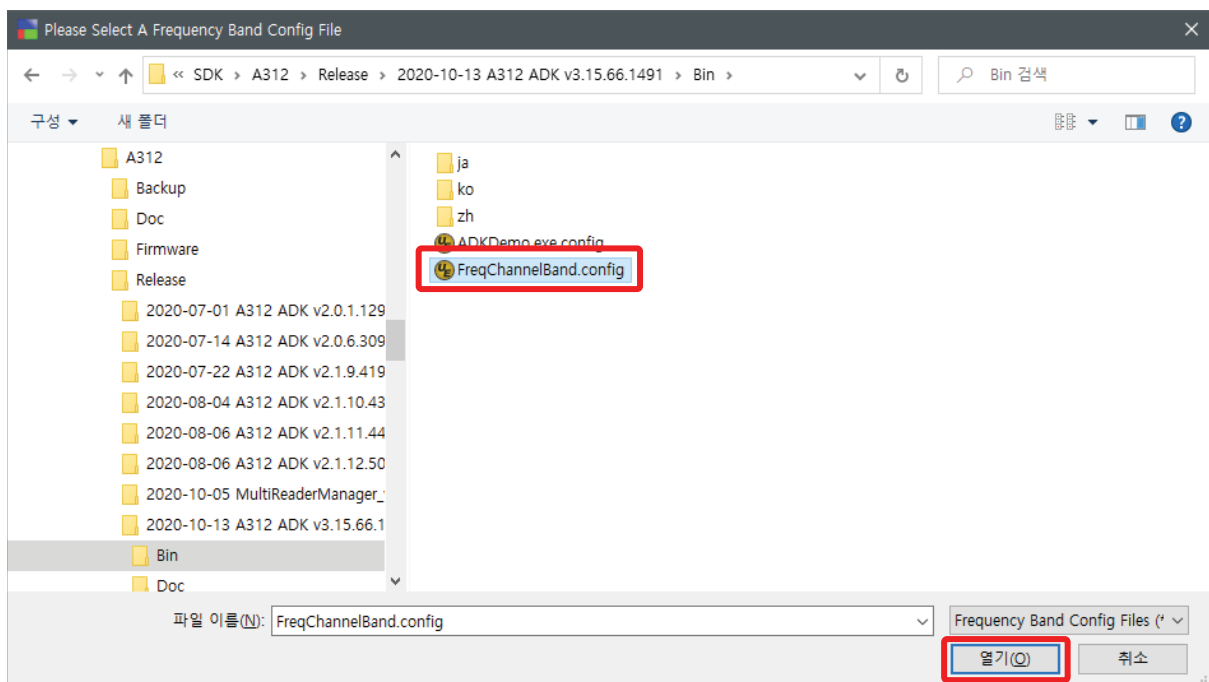
Set – Saves Inventory Configuration value to the RFID module of α312 device.

8.6.2. Frequency Band

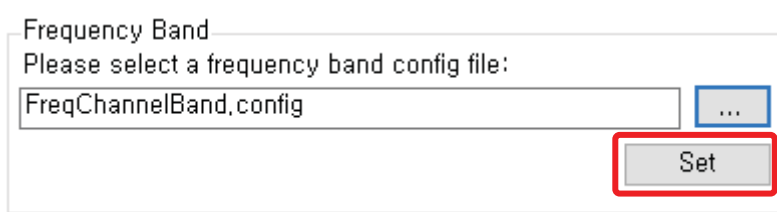
Set the frequency table in the RFID module of α 312 device.



"..." Click button to select the frequency table setting file. Then click the "Open" button.



When the frequency table is printed, click "Set" to save the frequency table to the α 312 device in the RFID module.



8.6.3. MAC Register

It reads or writes values to the MAC register of the RFID module in α 312 device.



MAC Register

Address : Value :

Address – Enter the address of MAC register as HEX value.

Value – The value to be written to the MAC register is input as HEX value, or the read MAC register value is output as HEX value.

Read – Read the value from MAC register.

Write – Writes the value to the MAC register.

8.6.4. OEM Register

It reads or writes the value to the OEM register of the RFID module in α 312 device.



OEM Register

Address : Value :

Address – Enter the address of OEM register as HEX value.

Value – The value to be written to the OEM register is input as a HEX value, or the read OEM register value is output as a HEX value.

Read – Read value from OEM register.

Write – Writes the value to the OEM register.

8.6.5. Continuous Wave

The RFID module of α312 equipment turns the continuous wave output on or off.

Continuous Wave

On – Turns on the continuous wave.

Off – Turns off the continuous wave.

8.6.6. Hopping Channel

Set whether to use for hopping channel.

Hopping Channel

Used	Frequency	
<input checked="" type="checkbox"/>	917,300 MHz	
<input checked="" type="checkbox"/>	917,900 MHz	
<input checked="" type="checkbox"/>	918,500 MHz	
<input checked="" type="checkbox"/>	919,100 MHz	
<input checked="" type="checkbox"/>	919,700 MHz	
<input checked="" type="checkbox"/>	920,300 MHz	

8.6.7. Test Antenna / Power

Randomly set the output to a specific antenna for testing.

Test Antenna / Power

Antenna : Power : dBm

8.6.8. Test Frequency

For testing, set to output only a specific frequency from the hopping frequency table.

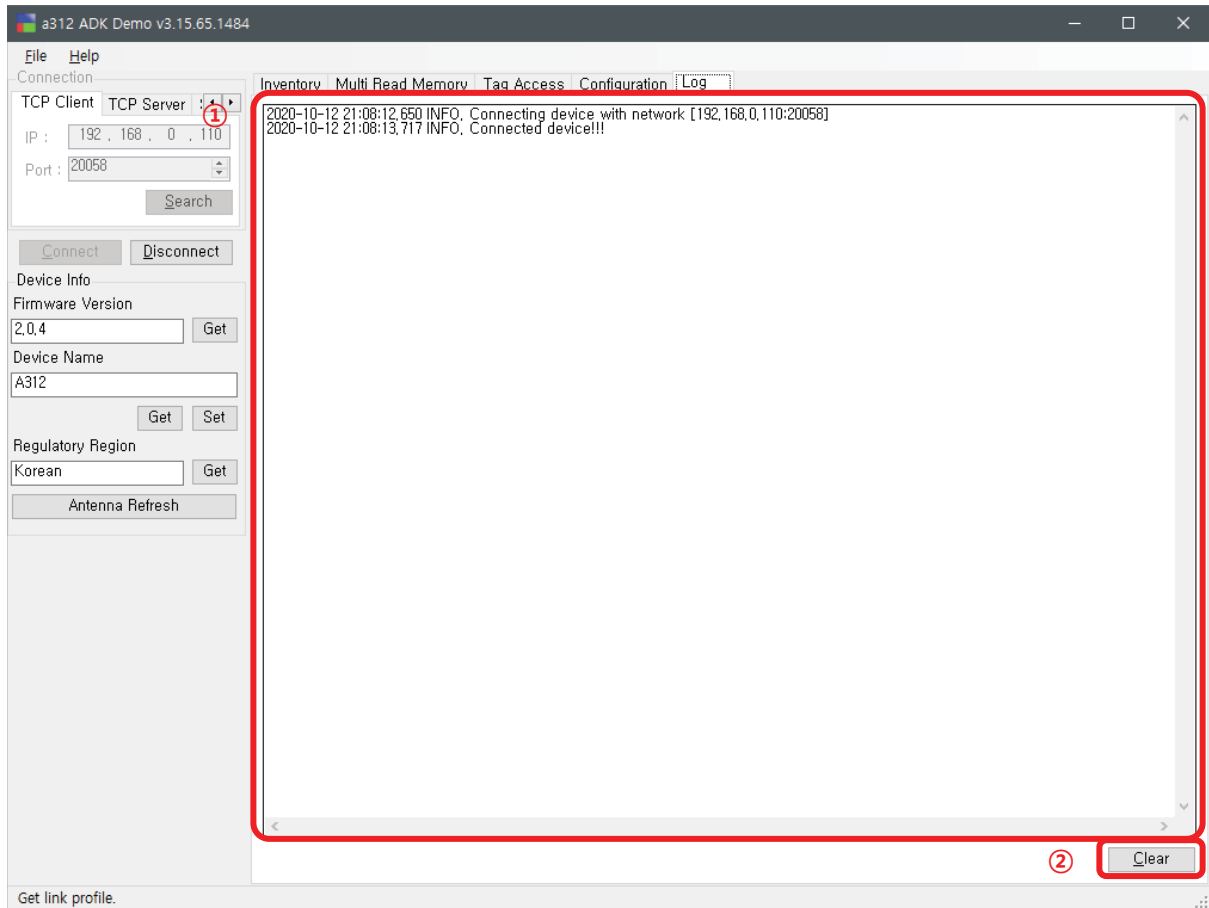
Test Frequency

917,300	▼	Set
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8.7. Log

If you select “Log” in the demo tab, you can see a screen like the following figure.

In the Demo tab, you can run the demo program and view the log of the output demo.



8.7.1. Log List

Print the log output by the demo.

8.7.2. Clear

Clear the log list.

FCC Part 15.19

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.

FCC Part 15.21

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

FCC RF Radiation Exposure Statement: This equipment complies with FCC RF Radiation exposure limits set forth for an uncontrolled environment.

This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

This device must be used with approved antenna.