

# Standard Network AIS Receiver NWD-01T With Decode+Timestamp

## User Manual

AvionixTech

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## 1. Introduction

NWD-01T is an AIS receiver specifically designed for system integration, shore-based monitoring, and vessel tracking applications. The product adopts a dual-channel parallel reception architecture and supports dual output of raw AIS messages and decoded JSON data. It features a built-in high-precision GPS/BeiDou timing module with microsecond-level timestamp resolution, making it particularly suitable for users who require in-depth AIS data processing, time synchronization analysis, or secondary development.

With its compact size (220 × 160 × 72 mm) and lightweight design weighing only 1,150 g, the device supports 12 V DC power supply and can also be powered by a power bank. It is suitable for a wide range of deployment scenarios, including portable, fixed, and vehicle-mounted applications.

### Typical Applications

**Shore-Based AIS Vessel Monitoring System:** Connects to VTS (Vessel Traffic Services) systems or port monitoring platforms to obtain real-time vessel traffic information in the surrounding area.

**AIS Data Collection and Research:** Collects vessel track data for traffic flow analysis, route planning, and vessel behavior research.

**Multi-Sensor Fusion Systems:** Integrates with radar, ADS-B, meteorological sensors, and other systems to provide AIS data with a unified time reference.

**Portable Temporary Monitoring Deployment:** Enables rapid deployment of AIS monitoring capabilities for large-scale events, emergency response, or temporary operational areas.

**Bridge Collision Avoidance and Warning System:** Deployed at bridges or critical points along waterways to receive AIS information from passing vessels in real time.

Combined with data such as navigational clearance height and channel width, the system can provide warnings for vessels that are excessively high, deviating from the designated channel, or approaching abnormally, providing a reliable source of real-time vessel traffic data for active bridge collision prevention.



#### Packing List:

| No. | Item        | Quantity | Remarks  |
|-----|-------------|----------|----------|
| 1   | NWD-01T     | 1 unit   | Included |
| 2   | Power Cable | 1 Piece  | Included |

|   |                                   |              |          |
|---|-----------------------------------|--------------|----------|
| 3 | AIS Antenna(Long Version) & Clamp | 1 Set        | Included |
| 4 | AIS Antenna Cable                 | 1 Piece (5m) | Included |
| 5 | Ethernet Cable                    | 1 Piece      | Included |
| 6 | GNSS Antenna                      | 1 Set(3m)    | Included |

## 2. Features

### ● Multi-Band AIS Signal Reception

The device supports simultaneous reception of the standard AIS channels, AIS 1 (161.975 MHz) and AIS 2 (162.025 MHz). Optional support for the two extended frequencies, 156.775 MHz and 156.825 MHz, enables the device to cover a broader range of maritime VHF communication frequencies, meeting AIS signal acquisition requirements in specific regions and application scenarios.

### ● Dual-Format Data Output for Easier Development

The device supports two output formats: AIS raw messages (NMEA 0183 format) and JSON plain text. The JSON plain-text output directly provides decoded vessel dynamic data, including MMSI, latitude and longitude, speed, heading, and other information. Users do not need to independently parse the AIS protocol, significantly reducing system development time.

### ● Timestamp Output

The device features a built-in high-precision GNSS timing module and outputs data with UTC timestamps, including nanosecond values, providing microsecond-level timestamp resolution. This feature makes the NWD-01T particularly suitable for research and engineering applications requiring multi-sensor data fusion, Time Difference of Arrival (TDOA) analysis, and high-precision time synchronization.

### ● Flexible Network Integration

The device supports both TCP and UDP network transmission protocols and can connect to the user network via either a static IP address or DHCP. The device can be connected directly to a computer or integrated into an existing LAN through a router,

without requiring an additional serial server or protocol converter.

- **Signal Strength Output (Optional)**

Optional output of the Received Signal Strength Indicator (RSSI) for each AIS message is available, providing data support for signal coverage analysis, interference troubleshooting, and antenna deployment optimization.

- **Portable, Lightweight, and Plug-and-Play**

The device features a compact and lightweight design and operates on 12 V DC power, with a power adapter included as standard. It can also be powered by a 12 V portable power bank. An AIS antenna and GPS/BeiDou antenna are included as standard, enabling plug-and-play operation right out of the box.

- **Comprehensive Support for Secondary Development**

Clear network communication protocol documentation and data format examples are provided. OpenCPN display software is also included, making it convenient for users to perform functional verification and testing before system integration.

- **Customization Support**

Supports customer-specific OEM customization.

Supports ACARS/ADS-B/AIS integration.

### 3. Specifications

NWD-01T:

| No. | Specifications          |                                                                            |
|-----|-------------------------|----------------------------------------------------------------------------|
| 1   | Power Supply            | DC 12V, 2A(adjustable according to actual requirements)                    |
| 2   | Power Consumption       | 3.6W                                                                       |
| 3   | Receiving Frequency     | 161.975 MHz, 162.025 MHz<br>156.775 MHz(Optional)<br>156.825 MHz(Optional) |
| 4   | Sensitivity             | ≤ -115dBm @ 20% PER                                                        |
| 5   | Reception Range         | >50 km (unobstructed coastal area)                                         |
| 6   | Receiving Dynamic Range | -115 dBm to +10 dBm                                                        |

|    |                                |                                              |
|----|--------------------------------|----------------------------------------------|
| 7  | Supported AIS message types    | 1-27                                         |
| 8  | AIS Target Processing Capacity | ≥ 600 targets                                |
| 9  | Processing Capability          | > 2,500 messages/second                      |
| 10 | Data Format                    | Raw AIS messages(NMEA 0183) / JSON plaintext |
| 11 | Data Interface                 | RJ45 Ethernet                                |
| 12 | Network Configuration          | Static IP or DHCP                            |
| 13 | Network Protocol               | TCP/UDP                                      |
| 14 | Dimensions                     | 220 × 160 × 72 mm (main unit)                |
| 15 | Weight                         | 1150g                                        |

## AIS Antenna (Long Version):

| No. | Specifications          |                                |
|-----|-------------------------|--------------------------------|
| 1   | Frequency Range         | 156 MHz -166 MHz               |
| 2   | Antenna Gain            | 5 dBi                          |
| 3   | Protection Rating       | IP67                           |
| 4   | VSWR                    | ≤ 1.5                          |
| 5   | Polarization            | Vertical                       |
| 6   | Radiation Pattern       | Omnidirectional                |
| 7   | Input Impedance         | 50 Ω                           |
| 8   | Power Handling Capacity | 50 W                           |
| 9   | Connector Type          | N-J                            |
| 10  | Antenna Dimensions      | Length: 120 cm, Diameter: 2 cm |
| 11  | Antenna Material        | Fiberglass (FRP)               |
| 12  | Total Weight            | 364 g                          |
| 13  | Operating Humidity      | 5% ~ 95%                       |
| 14  | Operating Temperature   | -40°C ~ +85°C                  |

## AIS Antenna (Short Version):

| No. | Specifications  |                  |
|-----|-----------------|------------------|
| 1   | Frequency Range | 149 MHz -189 MHz |

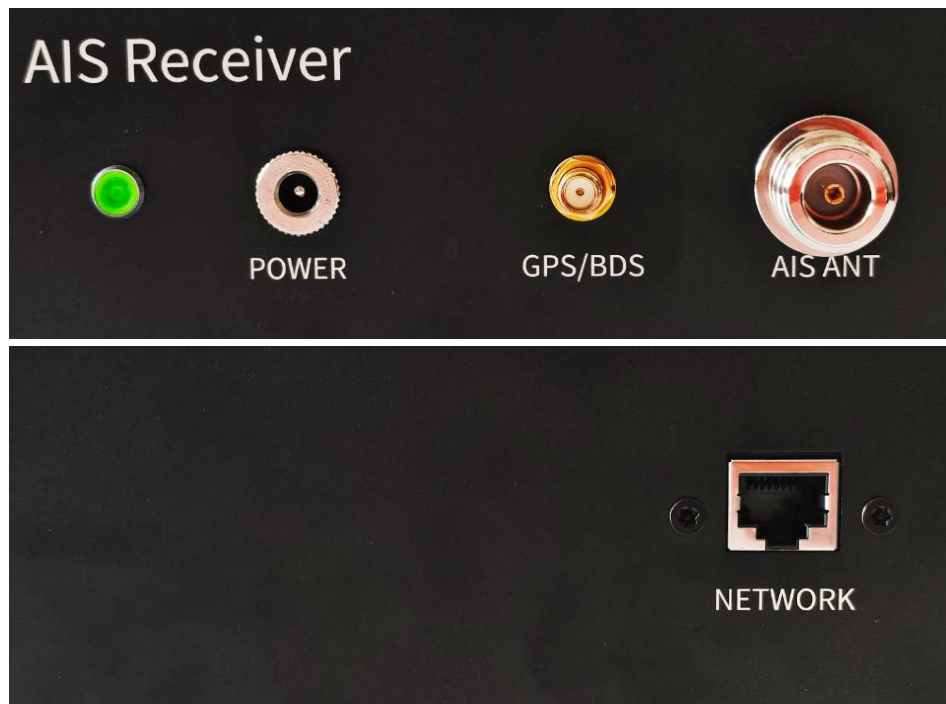
|    |                         |                 |
|----|-------------------------|-----------------|
| 2  | Antenna Gain            | 3 dBi           |
| 3  | Protection Rating       | IP67            |
| 4  | VSWR                    | $\leq 1.5$      |
| 5  | Polarization            | Vertical        |
| 6  | Radiation Pattern       | Omnidirectional |
| 7  | Input Impedance         | 50 $\Omega$     |
| 8  | Power Handling Capacity | 20 W            |
| 9  | Connector Type          | SMA-J           |
| 10 | Antenna Dimensions      | Length: 20 cm   |
| 11 | Antenna Material        | TPEE            |
| 12 | Operating Humidity      | 5% ~ 95%        |
| 13 | Operating Temperature   | -30°C ~ +75°C   |
| 14 | Storage Temperature     | -30°C ~ +75°C   |

Other antennas with different dimensions are also available and can be selected according to specific requirements.

#### GNSS Antenna:

| No. | Specifications |            |
|-----|----------------|------------|
| 1   | Gain           | 5 dBi      |
| 2   | VSWR           | $\leq 1.5$ |
| 3   | LNA Gain       | 28 dBi     |
| 4   | Noise Figure   | < 1.0      |
| 5   | Connector Type | SMA Male   |
| 6   | Cable Length   | 3 m        |
| 7   | Mounting Type  | Magnetic   |

## 4. Interface Description



Main Unit Interfaces::

| No. | Interface Name | Function                                    |
|-----|----------------|---------------------------------------------|
| 1   | POWER          | Main unit power supply interface, DC 12V 2A |
| 2   | GPS/BDS        | GPS/BDS antenna interface, SMA Female       |
| 3   | AIS ANT        | AIS antenna interface, N-Type Female        |
| 4   | NETWORK        | Data interface, RJ45 connector              |

## 5. Device Connection

The default IP address of the NWD-01T is 192.168.10.33. It must be connected to a computer via the Ethernet port. This can be done either by a direct connection to the computer or through a router.

### Direct Connection Method:

- Connect the NWD-01T directly to the computer's Ethernet port using a network cable (or via a USB to RJ45 adapter).
- Open the Network Connections interface on your computer, locate the network adapter connected to the NWD-01T, and configure its IP address to be on the same subnet as the NWD-01T device (the static IP address of the NWD-01T is 192.168.10.33).

- Open a web browser, enter 192.168.10.33 in the address bar, and press Enter. The following interface will appear, confirming that the connection to the device is successful.



Login

Username

Username

Password

Password

Sign In

### Router Connection Method:

- Connect the NWD-01T via an Ethernet cable to the router that your computer is connected to (ensure the router's gateway is 192.168.10.1).
- Open a web browser, enter 192.168.10.33 in the address bar, and press Enter.

The following interface will appear, confirming that the connection to the device is successful.



Login

Username

Username

Password

Password

Sign In

## 6. Device Configuration

### 1. Login to the Web Interface

After connecting the device, enter the device's IP address in a web browser and press Enter. You will be prompted to enter the login credentials for device configuration management.

**Username:** admin

**Password:** aaareceiver

## 2. Configuration Interface Home Page

### Dashboard

|                 |                                                   |
|-----------------|---------------------------------------------------|
| Service         | Process running                                   |
| Cable           | Manual(Static IP)                                 |
| IP              | 192.168.10.33                                     |
| Netmask         | 255.255.255.0                                     |
| Default Gateway | 192.168.10.1                                      |
| WIFI            | Automatic(DHCP)                                   |
| Reboot System   | <button>Reboot</button> <button>Shutdown</button> |

**Note:** The status under <Service> should show <Process running>. If not, please click "Process start".

### Dashboard

|                 |                                                   |
|-----------------|---------------------------------------------------|
| Service         | <button>Process start</button>                    |
| Cable           | Manual(Static IP)                                 |
| IP              | 192.168.10.33                                     |
| Netmask         | 255.255.255.0                                     |
| Default Gateway | 192.168.10.1                                      |
| WIFI            | Automatic(DHCP)                                   |
| Reboot System   | <button>Reboot</button> <button>Shutdown</button> |

## 3. Network Configuration

Two modes are available: Automatic (DHCP) and Manual (Static IP).

Click on Network Configuration > Wired, enter the desired IP address, Subnet Mask, and Gateway, then click Modify Network Configuration.

### Network Setting

IP Address Assignment

**Cable** <sup>①</sup> WIFI

☐ Automatic(DHCP)

☒ Manual(Static IP) <sup>②</sup>

IP  
192.168.10.33

Netmask  
255.255.255.0

Default Gateway  
192.168.10.1

**Change Network Settings** <sup>③</sup> Cancel

To use automatic mode, select Automatic (DHCP), click Modify Network Configuration, and then restart the device for the changes to take effect.

### Network Setting

IP Address Assignment

Network configuration successfully, please reboot the system

**Reboot**

**Cable** WIFI

☐ Automatic(DHCP)

☒ Manual(Static IP)

IP  
192.168.10.33

Netmask  
255.255.255.0

Default Gateway  
192.168.10.1

**Change Network Settings** Cancel

**Note:** After switching to Automatic mode, the device must be connected to a router

with DHCP enabled; otherwise, you will not be able to access the device.

**Note:** Wireless configuration is disabled in the current version.

## 4. Data Interface Configuration

Click on Data Interface Configuration to access the data interface settings. When outputting data externally, the NWD-01T acts as a UDP client.

**Raw Messages:** Standard AIS messages with signal strength and timestamp.

**Plaintext:** Decoded AIS data with signal strength and timestamp.

### Dataport Setting

Message output IP  
127.0.0.1

Message output port  
6666

Plaintext output IP  
127.0.0.1

Plaintext output port  
7777

Save

## 5. NTPD Status

The NTPD Status is used to view the current status of the time synchronization service. By default, the time service is enabled upon device startup. If the service is in a stopped state, it should be manually started.

### NTPD Status

| Normal status |               |                |    |   |      |      |       |        |        |        |
|---------------|---------------|----------------|----|---|------|------|-------|--------|--------|--------|
| Service       | 运行中           |                |    |   |      |      |       |        |        |        |
| Time Source   | remote        | refid          | st | t | when | poll | reach | delay  | offset | jitter |
|               | SHM(0)        | .GPS.          | 0  | l | -    | 16   | 0     | 0.000  | 0.000  | 0.000  |
|               | *203.107.6.88 | 100.107.25.114 | 2  | u | 66   | 128  | 377   | 13.479 | -0.162 | 0.574  |

## 6. GNSS Status

The GNSS Status section is used to view the current status of the GNSS service. After connecting the antenna and adjusting it to a location with signal reception, it may take a few minutes to acquire satellites. Please be patient. If the following interface appears, it indicates that the GNSS system is working normally.

### GNSS Status

| Normal status |                     |
|---------------|---------------------|
| Service       | Running             |
| Lat           | 36.694405333        |
| Lng           | 119.1488725         |
| Time          | 2025-04-10 12:45:44 |

If the following interface appears, it indicates that the GNSS service has started normally, but the GNSS antenna is either not connected or is not receiving satellite signals properly. Please connect the antenna or adjust its position.

### GNSS Status

| Abnormal GNSS service: No valid positioning acquired (at least 2D positioning required). |         |
|------------------------------------------------------------------------------------------|---------|
| Service                                                                                  | Running |
| Lat                                                                                      | No data |
| Lng                                                                                      | No data |
| Time                                                                                     | No data |

## 7. Clock Status

This section is used to check the current system clock status. If the clock status is abnormal (i.e., the time deviates from the current time), it will affect message time synchronization. When the time deviation is too large and exceeds the system's automatic time synchronization threshold, the automatic time synchronization will fail, and manual time adjustment will be required.

In the Clock Status interface, enter the current time (in UTC time). For example, if the

current time is in the UTC+8 time zone, the UTC time will be the time 8 hours earlier.

## Clock Status

|                                |                                                                                                                                                                                                                                                    |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Current system time (UTC time) | 2025-04-10 12:46:06                                                                                                                                                                                                                                |
| Set System Time                | Year <input type="text" value="2025"/><br>Month <input type="text" value="04"/><br>Day <input type="text" value="10"/><br>Hour <input type="text" value="12"/><br>Minute <input type="text" value="46"/><br>Second <input type="text" value="06"/> |

Submit

## 7. Data Format

### 1. Raw Messages

#### Raw Message Example:

The following example shows the output format of a message with a timestamp. The timestamp and the message are separated by an underscore character (\_).

The first field before the underscore (\_) is the timestamp, and the second field after the underscore is the message content.

```
2026-01-22 12:06:45 35086454_!AIVDM,1,1,,A,1000h>A00:5GDb0lgth1Ggvt1Url,0*35
2026-01-22 12:06:45 157648588_!AIVDM,1,1,,B,1000h>A00:5GDb0lgth1Ggvt1Url,0*36
```

#### Timestamp Description

The timestamp consists of three parts, separated by spaces:

- Date: Year, month, and day, in the format Y-m-d
- Time: Hour, minute, and second, in the format H:M:S
- Nanoseconds: The nanosecond value within the current second

The timestamp uses UTC (Coordinated Universal Time).

#### Raw Message Example with Optional RSSI Output

When the optional signal strength output function is enabled, the output contains signal strength information and a timestamp in addition to the raw AIS message.

The signal strength information, timestamp, and message are separated by underscore characters (\_).

The first field is the signal strength information, the second field is the timestamp, and the third field is the AIS message.

```
Radio1 Channel=A RSSI=-33dBm MsgType=1 MMSI=12345_2026-01-22 12:06:45
35086454_!AIVDM,1,1,,A,1000h>A00:5GDb0lgth1Ggvt1Url,0*35
Radio2 Channel=B RSSI=-34dBm MsgType=1 MMSI=12345_2026-01-22 12:06:45
157648588_!AIVDM,1,1,,B,1000h>A00:5GDb0lgth1Ggvt1Url,0*36
```

### RSSI Description

RSSI indicates the received signal strength of the AIS signal. The unit is dBm.

## 2. JSON Plaintext

### JSON Plaintext Example:

The following example shows the plaintext output with a timestamp. A time field is added to the original plaintext data to provide the timestamp information.

```
{
  "msg_type": 1,
  "repeat": 0,
  "mmsi": 12345,
  "status": 1,
  "turn": 0.0,
  "speed": 1.0,
  "accuracy": false,
  "lon": 75.0,
  "lat": 45.0,
  "course": 35.0,
  "heading": 511,
  "second": 30,
  "maneuver": 0,
  "raim": false,
  "radio": 417460,
  "time": "2026-01-22 12:09:58 759082566",
}
```

### Timestamp Description

The timestamp consists of three parts, separated by spaces:

- Date: Year, month, and day, in the format Y-m-d
- Time: Hour, minute, and second, in the format H:M:S
- Nanoseconds: The nanosecond value within the current second

The timestamp uses UTC (Coordinated Universal Time).

### JSON Plaintext Example with Optional RSSI Output:

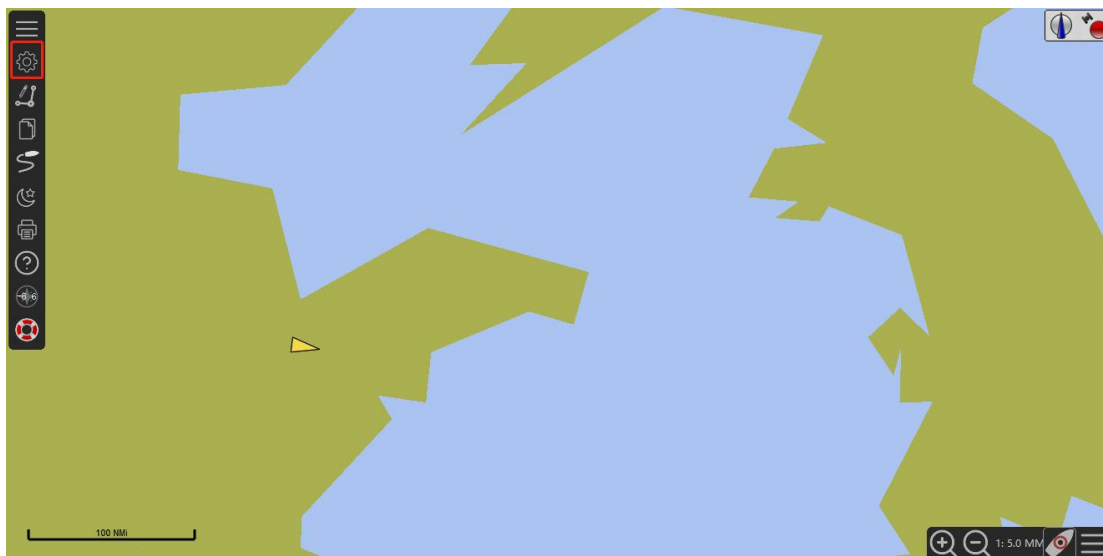
The following example shows the plaintext output with signal strength and timestamp information. Based on the original plaintext data, the time and rssi fields are added to provide the timestamp and received signal strength information, respectively.

```
{
  "msg_type": 1,
  "repeat": 0,
  "mmsi": 12345,
  "status": 1,
  "turn": 0.0,
  "speed": 1.0,
  "accuracy": false,
  "lon": 75.0,
  "lat": 45.0,
  "course": 35.0,
  "heading": 511,
  "second": 30,
  "maneuver": 0,
  "raim": false,
  "radio": 417460,
  "time": "2026-01-22 12:09:58 759082566",
  "rssi": "-36dBm"
}
```

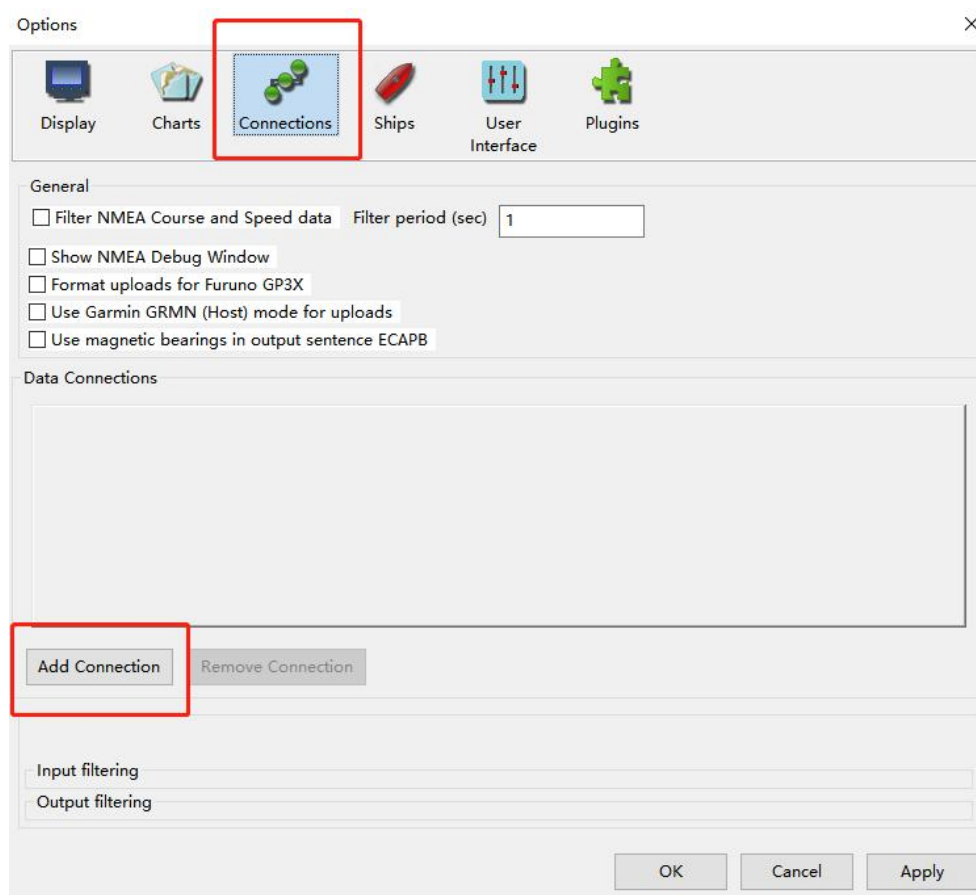
## 8. Works with OpenCPN

NWD-01T can work with OpenCPN

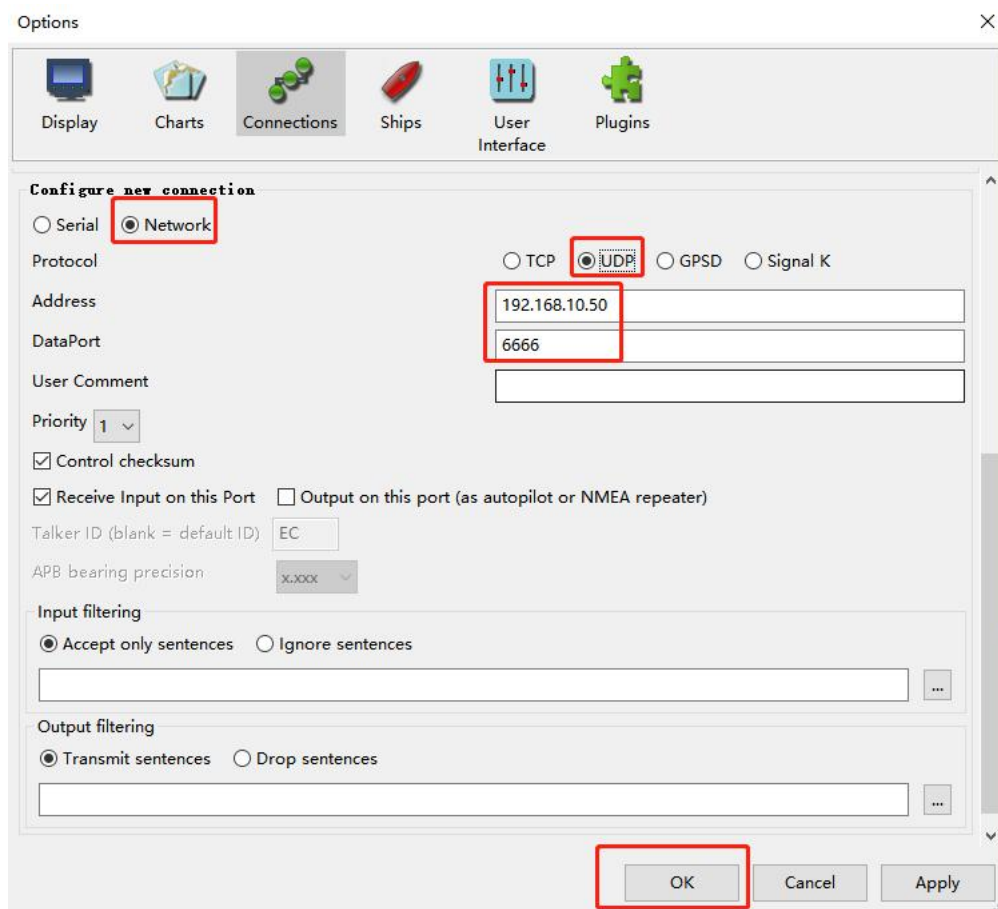
Open OpenCPN, click set



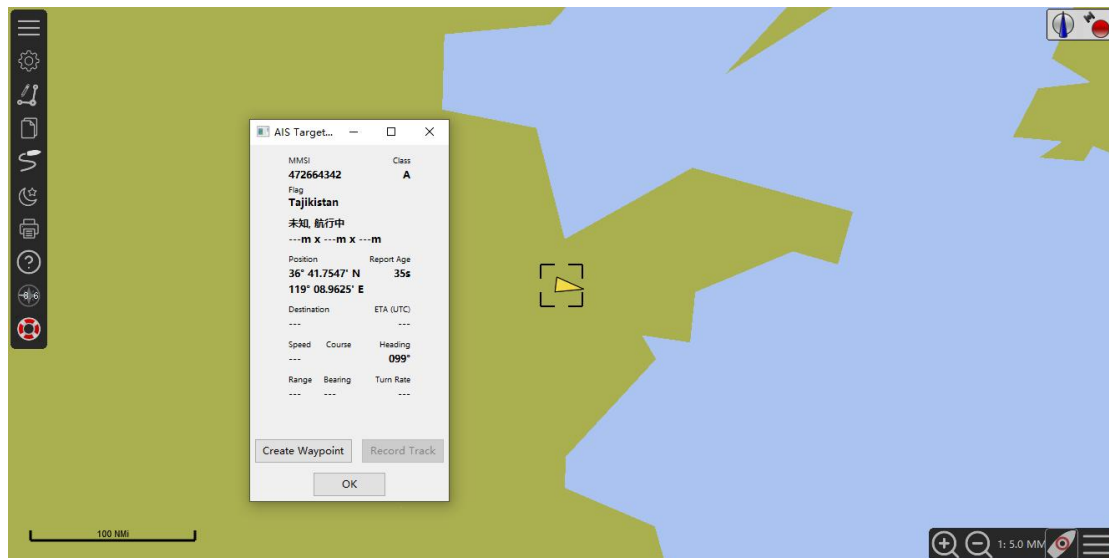
Click Connections, and then click Add Connection



Select Network, UDP. In the Address area, input the NWD-01T message output IP (usually this is your computer IP). In DataPort area, input the message output port (in this manual example it's 6666), click OK.



Done!



## 9. OEM, ODM, White Label & Customization

We offer flexible OEM, ODM, white-label, and customization solutions for our ADS-B, AIS, ACARS, and other aviation and surveillance products.

Our products can be tailored to your specific technical and commercial requirements and customized with your own brand and logo. Depending on your requirements, we can customize product designs, enclosures, hardware and software features, interfaces, and data formats.

Whether you need a ready-to-brand white-label product, an OEM solution, or a fully customized product for a specific application, our experienced team can help you bring your product to market efficiently while reducing development time and risk.

Our products are constantly evolving. New features, improvements, and capabilities are being added over time. Something that wasn't possible before may be possible today.

Contact us to discuss your specific requirements and explore the most suitable solution for your business.

## 10. Important Note

**Please note:**

Our device must not and shall not be used for military or illegal purposes under any circumstances.

## 11. Why Choose Us

- Comprehensive product range to meet users' needs for various levels of AIS receiver systems.
- Easy installation and use, with no complex configuration or high technical requirements for engineers. Simple and user-friendly.
- Complete after-sales service, providing technical support and services to help users maximize product benefits.
- Support for remote upgrades, assisting users in accessing the latest product features.
- Independent product development with customization options based on user requirements, including form factors, logo, software, hardware, performance, and functionality.

## 12. Frequently Asked Questions

### **Can the NWD-01 be used for secondary development?**

Yes. The NWD-01 is specifically designed to facilitate secondary development and system integration. AIS data is provided through the Ethernet interface, and users can select raw AIS messages or decoded JSON data according to their application requirements.

### **Can the NWD-01 be used for portable or field deployment?**

Yes. The NWD-01 has a compact and lightweight design and can be powered by a 12V power bank. This makes it suitable for portable AIS monitoring, field surveys, temporary deployments, maritime research and other applications where mains power may not be readily available.

### **What is the main advantage of the NWD-01 compared with a basic AIS receiver?**

A key advantage of the NWD-01 is that it combines AIS reception, decoding and network data transmission in one device. Instead of receiving only raw AIS messages through a serial interface, the NWD-01 can provide decoded AIS data in JSON format through Ethernet, while still supporting raw AIS output when required. This reduces software development work and makes the receiver easier to integrate into network-based surveillance and data-processing systems.

### 13. Related Products

If you're looking for a standard network AIS receiver, please check



#### Network AIS Receiver AIS-RN02

If you're looking for an AIS receiver that can output AIS messages and decoded data but without timestamp, please check



#### Network AIS Receiver NWD-01 with WiFi+decode

If you're looking for a 19 inch rack mountable AIS receiver station, please check



19 inch rack mountable AIS receiver station AIS-OS60