

neoECU AVB/TSN User's Guide



An AVB/TSN Audio/Video Endpoint Simulator with integrated AVB/TSN Switch

1. Introduction and Overview
2. A Tour of neoECU AVB/TSN Hardware
3. Software Setup
4. The neoVI Explorer Configuration Utility
 - 4.1 System Settings and Firmware Updates
 - 4.2 General Settings
 - 4.3 CAN Network Settings
 - 4.5 The Text API
 - 4.6 Performance Tests
 - 4.6 Ethernet Switch Configuration
 - 4.7-AVB Endpoint Configuration

5. 88Q5050 Switch Use and Configuration

Safety and Other Important Notices



Safety Notices

1. Prior to using this product, read, understand, and follow the instructions for this device and any associated software. If you do not fully understand the instructions, contact icssupport@intrepidcs.com for support.
2. Do not use this product if it has been used outside of the specified operating conditions or is suspected to be damaged.
3. There are no operator serviceable parts inside this equipment. Should you suspect the device is not operating properly, please contact icssupport@intrepidcs.com.
4. The failure modes of this device should be carefully considered prior to using it to instrument safety critical systems. A single point of failure at this device should not prevent the safe operation of any vehicle system.
5. Occasionally, hardware and software are released for testing and evaluation in a beta release. These releases are not subject to full Quality Assurance. They should be used only in a controlled environment with consideration of any impact the safety of the user and the surrounding people and environment. Data and test results from beta hardware and software should be appropriately scrutinized.



Intended Use

This hardware is intended for the use of developing automotive communication networks. It is suitable for operation in dry environments such as the passenger compartment or trunk area. Direct exposure to water or excessively damp environments may result in malfunction or damage to the device.

Deviating from the intended use of this product or operating outside of its specifications may cause malfunction or damage and will void the manufacturer's warranty.



Disclaimers

1. Every attempt is made to keep this documentation accurate and current. Intrepid Control Systems reserves the right to update this documentation without notice and assumes no liability from its use.

1. Introduction and Overview

1.1 Introduction

Thank you for purchasing a neoECU AVB/TSN from Intrepid Control Systems (ICS). Here are some of the noteworthy features of your new device.

Product Features

- Configurable as Talker or Listener for Audio and Video Streams
- Integral 7-Port AVB/TSN Switch
- 8x dual purpose LEDs for network status and device configuration
- Field-upgradeable flash firmware
- Rugged aluminum case with shock-absorbing end caps

Supported Standards

- 802.1Qat Stream Reservation Protocol (SRP)
- 802.1Qav Forwarding and Queuing for Time-Sensitive Streams (FQTSS)
- 802.1AS generalized Precision Timing Protocol (gPTP)
- IEEE 1722 (AVTP)
- IEEE 1722.1 (AVDECC)

Supported Stream Formats

| Video | Audio |
|------------------------------------|-------------------------|
| IEC 61883-6 (h264, 1080p @ 30 fps) | IEC 61883-4 |
| Compressed Video Format (CVF) | AVTP Audio Format (AAF) |

Media Interfaces

- HDMI output
- 2x analog audio in (mini jack)
- 8x analog audio out (mini jack)
- USB host (camera)
- SD card (Media file storage)

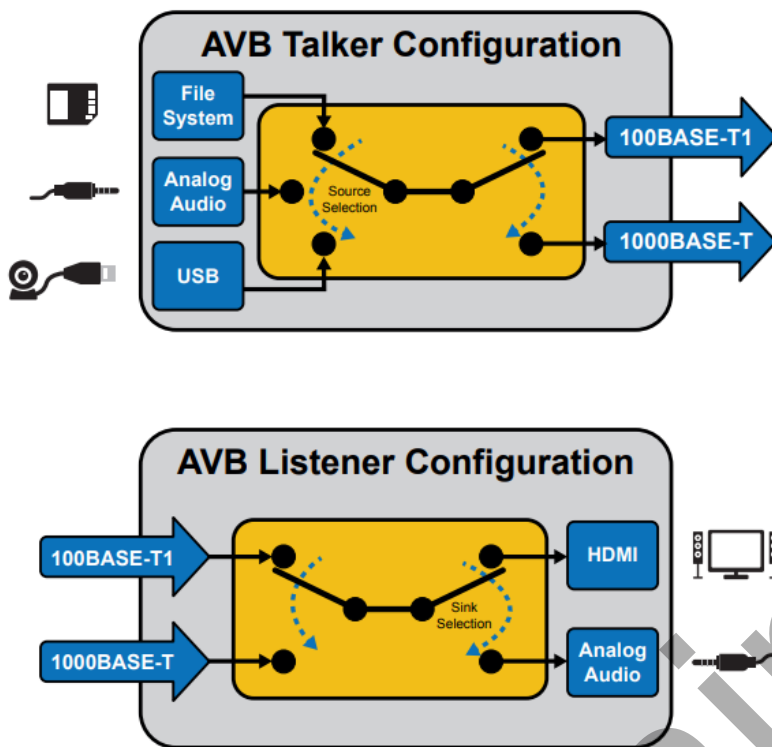
Integral 7-Port AVB/TSN switch (Marvell 88Q5050):

- 5x 100BASE-T1 Ports
- 2x 1000BASE-T Port

2x CAN-FD Interfaces

1.2 Operational Overview

The neoECU AVN/TSN can be configured as a talker or listener.



1.2.1 Talker Configuration

As a talker, a media stream can be generated from one of 3 sources:

1. Video stored on an internal micro SDCard (with or without audio)
2. Audio via 3.5mm audio jack
3. Webcam video using the USB Host port

This media stream can be transmitted on either a 100BASE-T1 or 1000BASE-T port

1.2.1 Listener Configuration

A listener may receive a stream over 100BASE-T1 or 1000BASE-T.

The stream can be decoded and played over 1 of 2 interfaces:

1. micro-HDMI (720p with or without audio)
2. Analog audio via 3.5mm jack

1.3 Package Contents

Your neoECU AVN/TSN package includes both hardware and software. Upon receipt, please remove, unwrap and inspect all its contents. If anything is missing or damaged, please contact Intrepid for prompt assistance, using the information at the end of this guide.

Hardware

Your neoECU AVN/TSN package includes the following:

- The neoECU AVN/TSN device.
- A standard 8-wire Ethernet cable (CAT5e)
- Nano-MQS Connector and Terminal kit
- A standard USB Type A to Type B device cable
- A 12 Volt Power Supply

Software

In your package you will find a software/driver CD containing:

- Drivers for the neoECU AVN/TSN.
- An API install kit containing the neoVI Explorer utility for configuring the device.

1.4 Hardware Requirements

Device Power

The neoECU AVN/TSN can be powered in 2 ways

1. DC supply: This device comes with a DC supply rated for this device. If an alternate supply is used, insure that the voltage is between 5V-40V and is rated for at least 1
2. 9-pin DSUB (See section 2.2 for pin assignments)

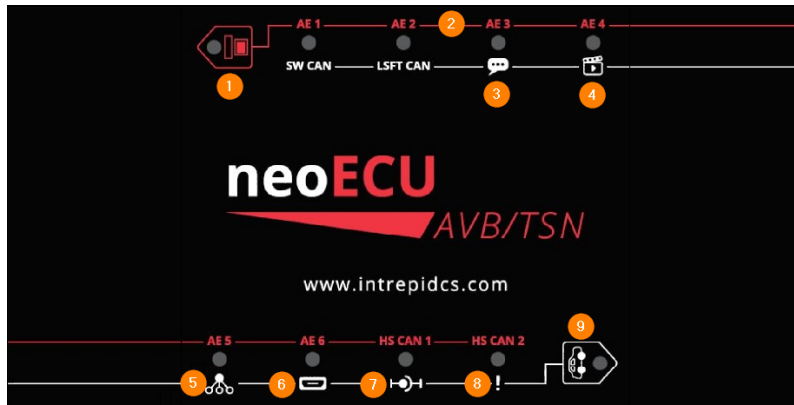
Computer Interface

As a hardware device, there are no specific requirements on the computer aside from the proper USB interface and the proper device driver installed. Instructions on installing the device driver are covered later with the installation of software.

2. A Tour of neoECU AVB/TSN Hardware

Before learning how to configure and set up the device, let's examine the device from all sides to understand all of its interfaces and status indicators.

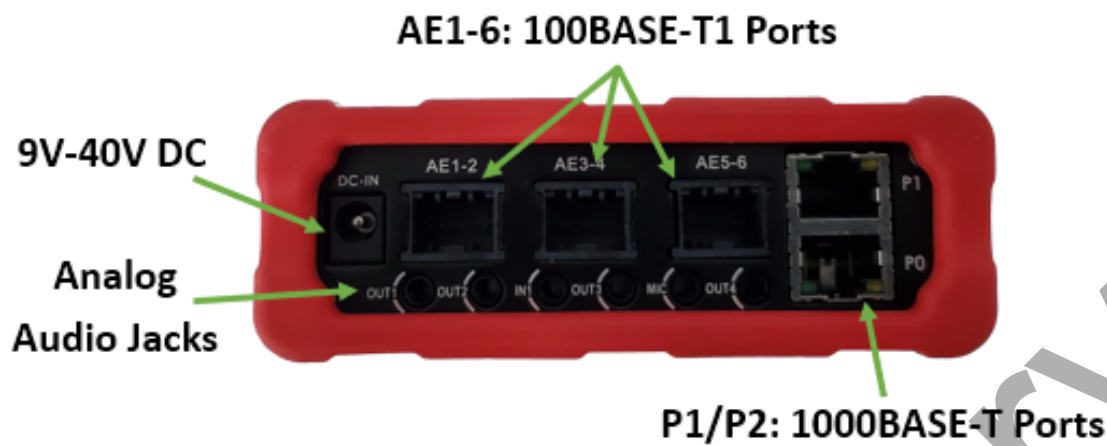
2.1 Label and Status Indicators



1. **Red Button** (*Activates Red Labels*)
 - Solid Blue: Red LED labels apply
 - Inactive: Unpowered, has not booted, or White Button is active
2. **AE1-6 (100BASE-T1)** (*May take a few seconds to change state*)
 - Solid Blue: Link Active
 - Inactive: No Link
3. **Text Balloon**
 - Solid Blue: Talker configuration
 - Inactive: Listener Configuration
4. **Clacker**
 - Solid Blue: ADP indicates video source or sink
 - Inactive: Not configured as video component
5. **GM Indicator**
 - Red: Standard Profile / No AS-Capable Device Connected
 - Solid Blue: Grand Master
 - Flashing Blue: Clock Slave
6. **HDMI**
 - Solid Blue: Configured for HDMI output
 - Inactive: Currently an invalid state
7. **Stream Status**
 - Solid Blue: Stream Active
 - Inactive: No Stream Active
8. **Device Error**
 - Solid Red: Internal Software Fault Detected
 - Inactive: No faults detected
9. **White Button** (*Activates Red Labels / Toggles status screen overlay on HDMI*)
 - Solid Blue: White LED labels apply
 - Inactive: Unpowered, has not booted, or Red Button is active

2.2 Connector Interfaces

2.2.1 Ethernet / Audio Endpanel



2.2.1.1 DC In

This device is shipped with a 12V DC power supply which mates with this connector. DC supplies with a compatible connector can be used provided they supply a voltage in the range 9-40 Volts with a current of 1A or greater.

2.2.1.2 Audio Ports

If enabled, OUT1-4 provide an unamplified signal of the audio being streamed for use with headphones or external amplifier. This audio is present for both talker and listener endpoint configurations.

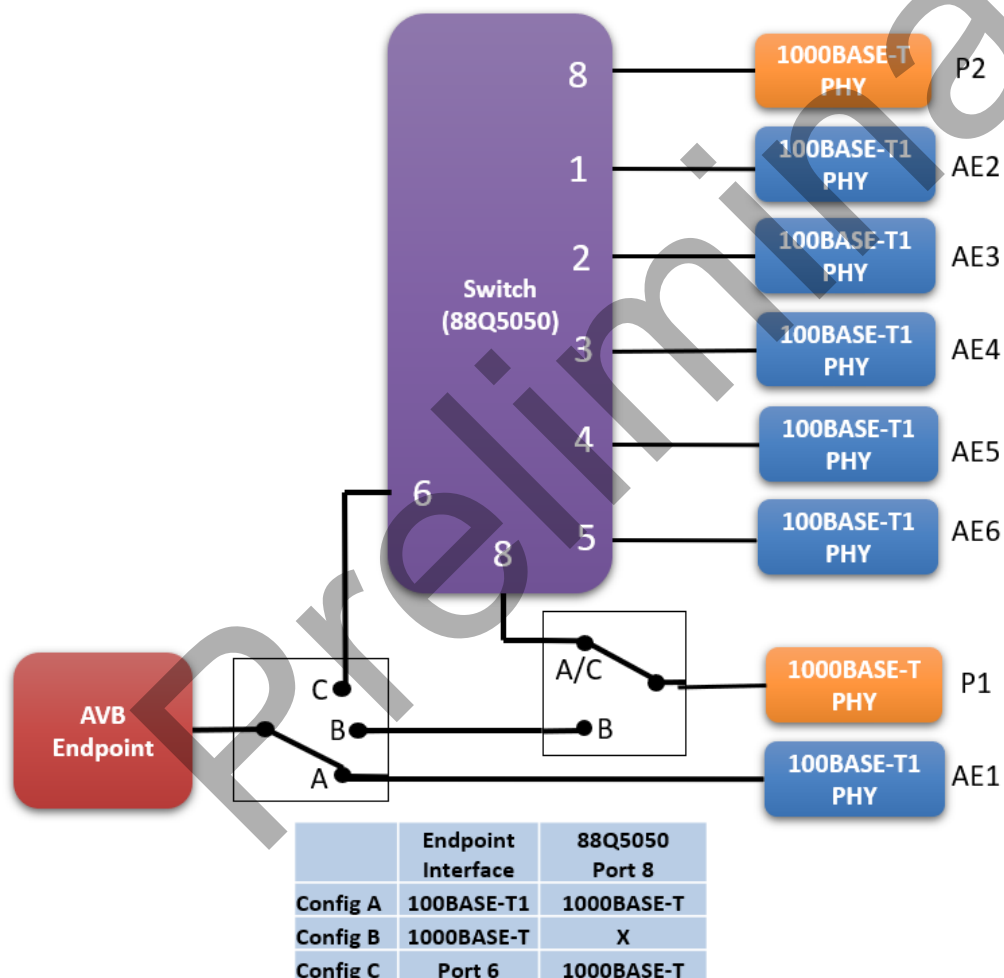
| Audio Port | Audio Channel | Notes |
|------------|---------------|--|
| OUT1 | 1/2 | (2-Channel Audio from Video Stream) |
| OUT2 | 3/4 | |
| OUT3 | 5/6 | |
| OUT4 | 7/8 | (Channel 8 is the ".1" if the stream is Dolby 7.1) |
| IN1 | -- | Can be configured to be audio source for talker stream |
| MIC | -- | Not used |

👉 Note that Stream 0 is the only stream associated with these audio ports. Additional audio streams can be connected simultaneously but this device is not capable of decoding and playing the audio.

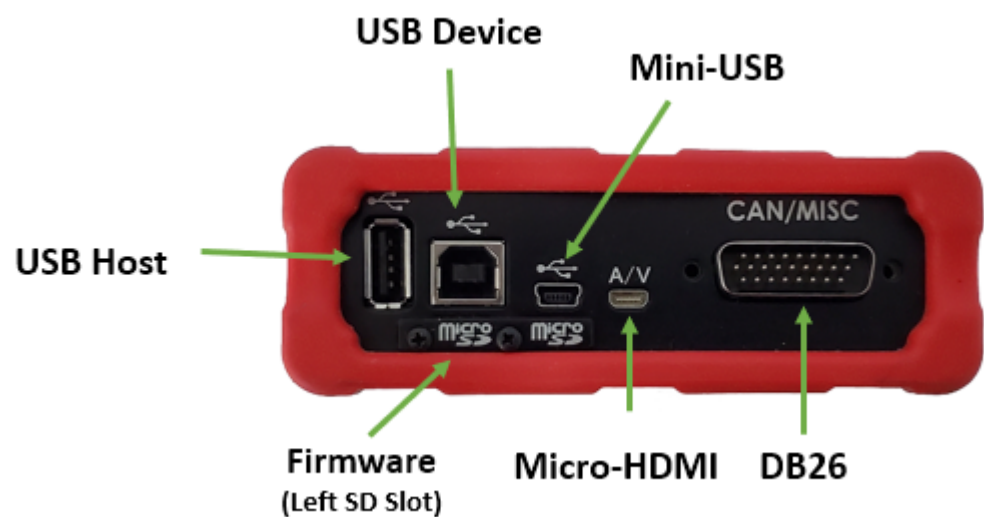
2.2.1.3 Ethernet Ports

| Device | Port(s) | |
|----------------|----------|---|
| AVB Endpoint | AE1 / P1 | The Ethernet interface of the AVB Endpoint is selectable between AE1 (100BASE-T1) and P1 (1000BASE-T) |
| 88Q5050 Switch | AE2-6 | 5x 88Q5050 Switch Ports (100BASE-T1) |
| 88Q5050 Switch | P2 | 1x 88Q5050 Switch Port (1000BASE-T) |

The following diagram helps visualize the different modes of operation that are configurable in the neoVI Explorer configuration utility. It also shows the physical port assignments on the 88Q5050 which must be known to configure the switch properly for your network.



2.2.2 USB / HDMI / CAN Endpanel



| Interface | Use |
|--------------------|--|
| USB Host | This port can be configured to be the source of a video stream using a Linux compatible web cam |
| USB Device | This port is used to connect to a PC for configuration or to utilize the CAN/LIN interfaces |
| Mini-USB | This interface is not used |
| Micro SDCard Slots | The firmware and media storage resides on micro SDCards in these slots. The data on this media is not intended to be accessed or updated with anything other than Intrepid software. Not using Intrepid software with this media may render the device inoperable and void the warranty of the device. |
| Micro-HDMI | This interface can be connected to an display to the video being streamed by a talker or received by a listener. |
| DB26 | Reference pin assignments in section 2.2.3 |

2.2.3 Connector Information

2.2.3.1 DB26 (Power/HSCAN)

| Pin | Signal |
|-----|-----------|
| 4 | HSCAN 1 L |
| 6 | HSCAN 2 L |
| 10 | GND |
| 14 | HSCAN 1 H |
| 16 | HSCAN 2 H |
| 19 | VBATT |

2.2.3.2 100BASE-T1 Connections (AE1-6)



Connector: TE 2177586-1
Terminal: 2-1703930-1

| Ports | 100BASE-T1_P | 100BASE-T1_N |
|-------------|--------------|--------------|
| AE2/AE4/AE6 | Pin 8 | Pin 7 |
| AE1/AE3/AE5 | Pin 4 | Pin 3 |

2.2.4 AVB Endpoint Status Screens

When the micro HDMI port is connected to a display, a video overlay displaying endpoint status information can be enabled by double pressing the white switch membrane on the top label of the device.

```
=====
General Information
=====
endpoint_mac addr:      00:FC:70:99:99:99
ip addr:
machine name:           neoecu-avbtsn.local
endpoint connection:    standard ethernet (p1)
switch mac addr:        00:FC:70:99:99:74
ae1 linkup:
ae2 linkup:             no
ae3 linkup:             no
ae4 linkup:             no
ae5 linkup:             no
ae6 linkup:             no
p0 linkup:              yes
p1 linkup:              no
software version:        20190802171329

=====
AVB Endpoint Status
=====
gptp daemon:           running
gptp port role:         slave
avb mode:               video listener
avb daemon:             running
avb app:                running
|index|    role|      stream format|      status|
|   0 |listener|      IEC61883-4| waiting for connect|
```

Note that AVB/TSN is a set of Layer 2 protocols, therefore an IP Address is not necessary, and may not be present.

Stream Status lists all streams which have been enabled in the configuration, their format, and connection status.

Helpful Debug Information

- Anything "Stopped" suggests a problem with the device's software or device configuration
- If gptp port role status is "disabled", it is waiting to be connected to an "asCapable device"

3. Software Setup

While Vehicle Spy software is not required to use your device, Intrepid devices often require specific drivers to function properly. Your device should have arrived with the software necessary to use it. If the media containing this software is no longer available, the software can be found at the following link.

<https://www.intrepidcs.com/support/support-resources/>

If you intend to use Vehicle Spy, any necessary drivers are installed with that software installation.

If you do not intend to use Vehicle Spy, it will be required to install a package having the necessary drivers and the hardware configuration utility. This same package will also install support files to allow the hardware to be accessed through APIs hosted here: <https://github.com/intrepidcs>

If you are having trouble finding or installing the software, please contact our customer support at icssupport@intrepidcs.com

Preliminary

4. The neoVI Explorer Configuration Utility

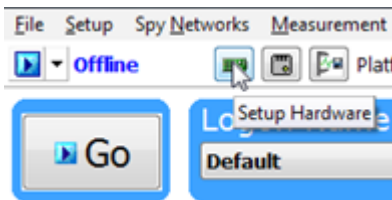
Starting and Using neoVI Explorer

The neoVI Explorer utility allows you to connect to, manage and configure all of your Intrepid Control Systems hardware. It is supplied both as an integrated feature of Vehicle Spy, and as a standalone program. This section will describe general features and the basics of using neoVI Explorer, so you will understand the utility when we get into settings specific to your device.

Starting neoVI Explorer from within Vehicle Spy

There are several ways to open neoVI Explorer from within VSpy. These are probably the two easiest, since they are accessible at all times:

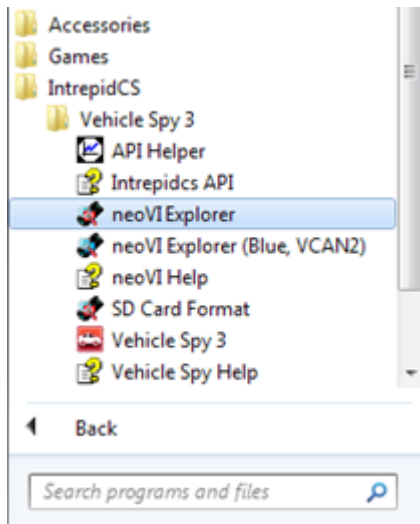
- Menu Item: Click the Setup menu and then select Hardware.
- Hardware Setup Button: Click the button located in the main Vehicle Spy toolbar just under its menu (Figure below).



Note that you cannot start neoVI Explorer when Vehicle Spy is online (even if in simulation mode). If you attempt to do so, VSpy will prompt you to either go offline and launch neoVI Explorer, or remain online and return to Vehicle Spy.

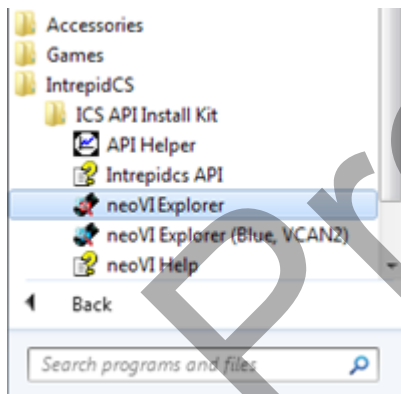
Starting neoVI Explorer as a Standalone Program

If you want to work with your device without opening Vehicle Spy, you can launch neoVI Explorer directly. Open the Start Menu, navigate to the IntrepidCS folder, then under the Vehicle Spy 3 subfolder, select neoVI Explorer (Figure below).



Starting neoVI Explorer as a Standalone Program (API Kit Installed)

If you installed the API kit and support files instead of Vehicle Spy, you can run neoVI Explorer from the Start Menu using the same basic process as described above. The only difference is the name of the subfolder, so you will navigate to the IntrepidCS folder, then open the ICS API Install Kit subfolder, and finally select neoVI Explorer (Figure below).



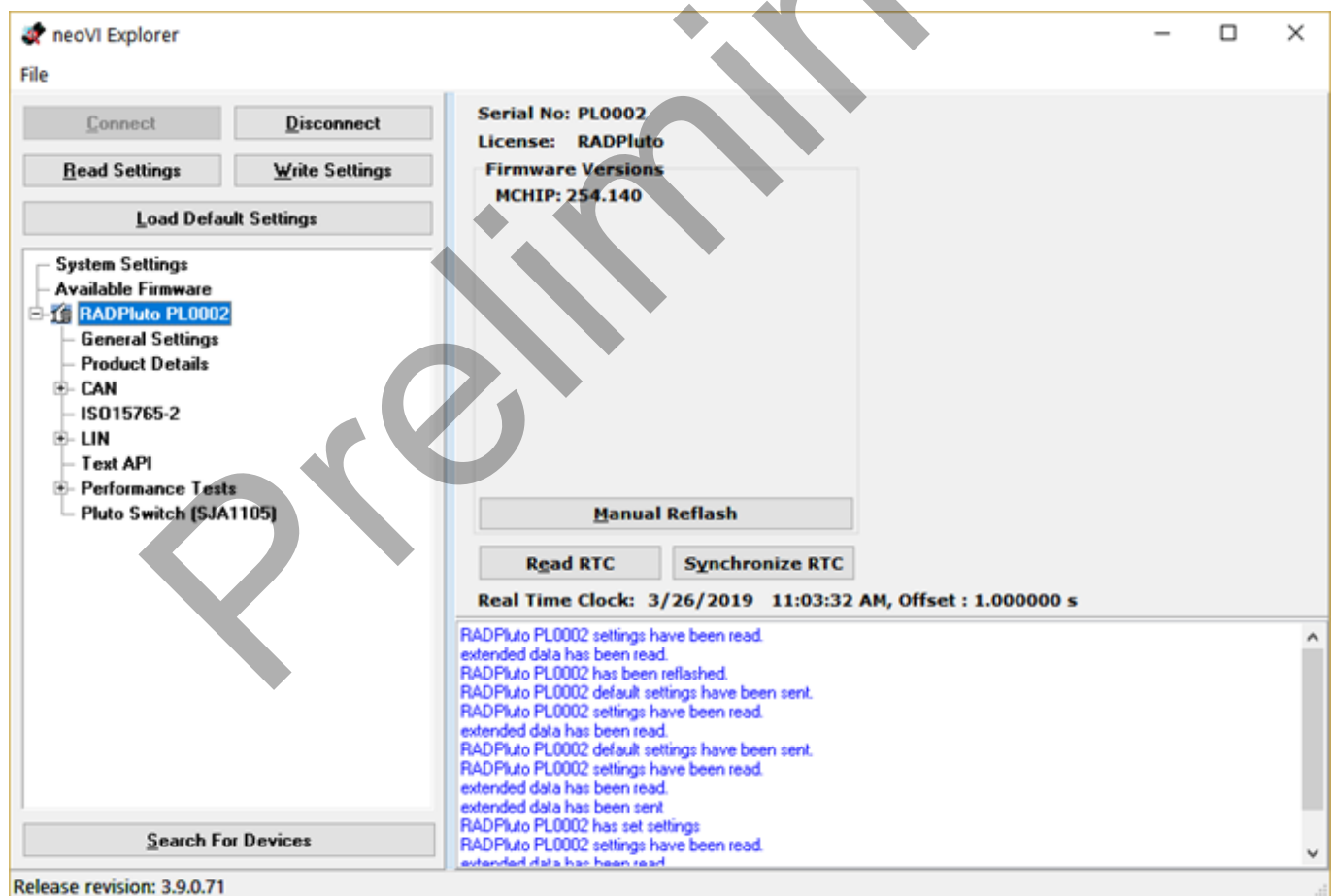
4.1 System Settings and Firmware Updates

4.1.1 Connecting to the your device

When neoVI Explorer loads, it will start up with the first hardware device it can find selected in the menu pane on the left. You should see your device listed here, along with its serial number. If you don't see the device to be connected, but do see other Intrepid devices, be sure to scroll down to look for it. If it is still not visible, this means its drivers have not been installed correctly, it is not powered properly, or there is a problem with the USB connection.

To manage your device, click on its entry in the navigation pane (if it is not already highlighted) and then press the Connect button. After successfully connecting to the device, you will see a "thumbs up" icon next to the device's name, and checkmarks will appear next to currently-enabled networks in the explorer area on the left. You should also see a message in the message box on the right saying " settings have been read". This tells you that neoVI Explorer has loaded the current settings from the unit.

The screen as a whole should appear similar to one of the screens shown below (but note that the version number shown at the bottom may be different).



👉 It is possible to click on various parameter groups at any time, but they will not show valid date until you connect to the device. Remember also to connect to the device before making changes, or they will be erased when you do connect to the settings in the hardware are

Writing and Reloading Settings

To avoid potential problems, neoVI Explorer will not save any changes to device parameters until you instruct it to do so. This is done by pressing the Write Settings button, which will update the parameters within the firmware in your device. If you make changes you do not want to keep, pressing the Read Settings button will reload the settings stored in the device, wiping out any modifications made in neoVI Explorer that had not yet been saved.

Reloading Device Defaults

To return all settings to factory defaults, press the Load Default Settings button. This is convenient if many changes have been made and written to the firmware in the past, and you want to start over with a clean slate. Note that pressing this button actually writes the defaults to the device first, and then reloads them automatically, so you do not need to also press Write Settings. You will see messages in the message area telling you that defaults have been sent to the device and then read from it.

Disconnecting from the device

Press the Disconnect button to tell neoVI Explorer that you are done working with the device. This step is actually optional, because neoVI Explorer will disconnect from any connected devices when you exit the program.

Searching for Devices

If you attach new hardware to your PC after starting neoVI Explorer, press the Search For Devices button at the bottom left of the dialog box to prompt the program to scan for new hardware you can manage.

Exiting neoVI Explorer

Like any Windows program, you can close neoVI Explorer by clicking the "X" in the top right corner, or pressing the Alt+F4 key combination.

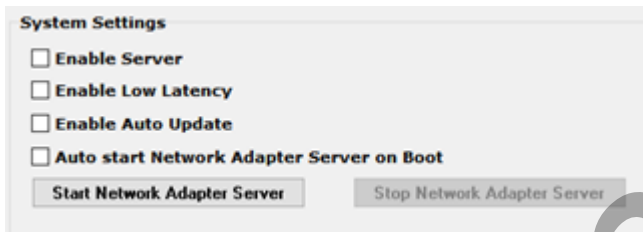
4.1.2 System Settings and Firmware Updates

The top two entries in the explorer window on the left side of neoVI Explorer contain system- wide settings that apply to all hardware devices, and information related to firmware updates.

System Settings

In the top branch of the tree in the left pane of neoVI Explorer you will see several settings that you can enable or disable:

- **Enable Server:** Turns on the neoVI Server feature, a background program that allows your hardware to be used by multiple applications at the same time.
- **Enable Low Latency:** This is an advanced setting for applications where fast response is needed after transmission.
- **Enable Auto Update:** When enabled, both neoVI Explorer and Vehicle Spy will automatically update firmware. If this box is not checked, firmware must be updated manually. (See below for details.)
- **Network Adapter Server:** This is a feature that is used with Intrepid products having Active Taps for Automotive Ethernet. It may not apply to your device.



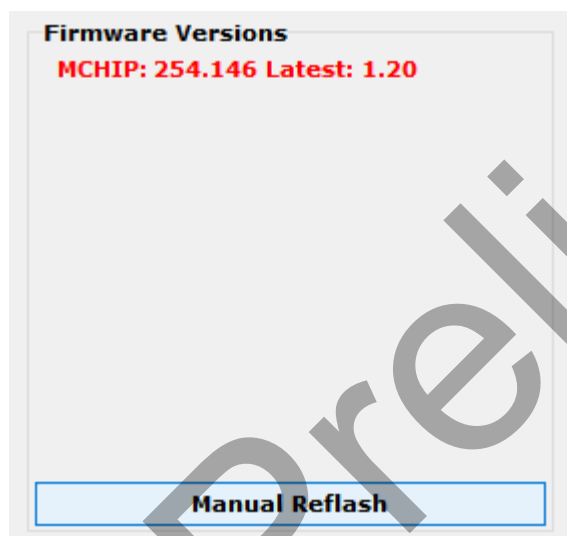
Available Firmware

This is an informational page that shows which firmware versions are available in this version of neoVI Explorer for various Intrepid products. Note that some devices have multiple firmware programs that control different aspects of their operation; You normally won't need to look in this area, because as we'll see in Section , neoVI Explorer shows you the current and available firmware versions for your device when you connect to it.

Automatic and Manual Firmware Updates

Firmware is essentially software that runs hardware and is required to enable the many capabilities of your device. New versions of firmware are created regularly by Intrepid's engineers to implement new features and correct problems that have been identified.

If you have Enable Auto Update on—which is the default, and is recommended—then you don't really need to worry about firmware updates. Each time you connect to your device in neoVI Explorer or go online with it in Vehicle Spy, the firmware will be checked, and if a newer version is available, the device will immediately be updated. If you do not have automatic updates enabled, you control when your firmware is updated. When new firmware is available, you will be notified on the initial connection screen, as shown below. Simply press the Manual Reflash button to update the firmware.




While your device may appear to operate with incompatible firmware, proper and reliable operation cannot be guaranteed unless the version of firmware matches what is listed in Vehicle Spy

The Firmware Update Process

During the firmware update process, the device will be placed into bootloader mode, indicated by all LEDs on the top label flashing synchronously. Normal LED flash patterns will resume when the update is complete and the device reboots. You will see a dialog box on the screen showing you the progress of the firmware update operation. an example is shown below. You will also see messages in the message box on the right side of neoVI Explorer as the firmware program is sent to the device. When the process is complete the dialog box will disappear and another message will appear in neoVI Explorer to confirm that the update has finished. If you receive any error messages or experience any other problems updating your device's firmware, please contact Intrepid for assistance.



 Please take heed of the warning on the firmware update dialog box: leave the device connected and powered on for the entire firmware update process to avoid possible problems with the device.

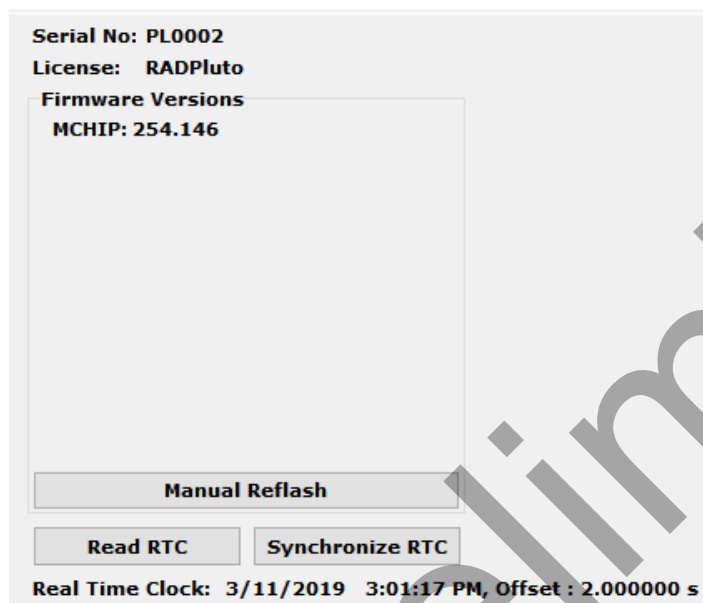
4.2 General Settings and Product Details

These two areas of the device's parameter setup provide information about the device and allow you to perform a few basic maintenance tasks.

General Settings

After connecting to the device you will see basic information about it in the right-hand pane of the window:

- The device's serial number.
- The firmware versions currently in the device, and an indication if new firmware is available.
- A message showing that the hardware license for the device was recognized.
- A current readout of the device's real-time clock.



This information can be displayed again at any time by clicking the device's name in the explorer navigation window, or the General Settings entry immediately below it.

The version of the MCHIP firmware for the device will be shown in black if it matches the firmware version within neoVI Explorer. If not, the current version and the newest available version will be shown in red to help you notice that an update is available. [Section 4.1](#) provides more information on firmware updates.

There are three buttons on this screen. Manual Reflash was described in Section 4.2. The Read RTC button will reload the device's internal time clock, while Synchronize RTC will set the device's clock to the same value as that of the PC.

Product Details

This is an informational area that provides technical data on the devices's hardware and internal setup. You will generally only need this if requested by Intrepid in order to facilitate support or troubleshooting. You can use the Copy To Clipboard button to copy all of the information to the Windows Clipboard, so you can then paste it into an email or file.

4.3 CAN Network Settings

4.3.1 CAN Networks

This area of neoVI Explorer is used to enable, disable and configure the 2 High Speed CAN channels. Each channel has an entry under the “CAN” group (which cannot be clicked itself). The current status of each channel is shown next to its name; a green checkmark indicates that the channel is enabled, while a red X means it is disabled. The figure below shows an example of the CAN channels area, with HS CAN enabled and HS CAN2 disabled.



Both of these channels have the same parameters, which can be configured using the controls in the right-hand pane; the default settings are shown below.

| HS CAN2 | CAN FD |
|---|---|
| <input checked="" type="checkbox"/> Enabled | <input checked="" type="checkbox"/> Enabled |
| Baud Rate: 500000 | Baud Rate: 2000000 |
| <input checked="" type="checkbox"/> Specify by Baud | <input checked="" type="checkbox"/> ISO |
| TQ SEG1: 63 | TQ SEG1: 15 |
| TQ SEG2: 16 | TQ SEG2: 4 |
| TQ Prop: 0 | TQ Prop: 0 |
| Sync: 16 | Sync: 4 |
| BRP-1: 1 | BRP-1: 1 |
| (Clock is 80 MHz) | TDC: 32 |
| Bit Rate Calculator | |
| Mode: Normal | |

Enabled

Place a checkmark in this box to enable the channel, or clear the checkmark to disable it. When disabled, all of the other parameter controls are disabled (grayed out).

Specify by Baud

This is a master control that determines whether the operation of the channel is controlled by a numeric baud rate, or is calculated from lower-level timing parameters. When checked, the Baud Rate and CAN FD Baud Rate drop-down boxes are enabled and the various TQ, Sync and BRP-1 entries are disabled. When unchecked, this is reversed.

Specifying by baud rate is the default, and is recommended except for advanced users with special requirements.

Baud Rate

When Specify by Baud is selected, choose a baud rate for the channel from the drop-down box below. The default value is 500000.

CAN Timing Settings

When Specify by Baud is deselected, the operation of the CAN channel is based on these five settings: TQ SEG1, TQ SEG2, TQ Prop, Sync, BRP-1. These settings are for advanced users and normally should be left at their default values.

CAN FD Baud Rate

When Specify by Baud is selected, choose a baud rate for the data phase of CAN FD messages. The default value is 2000000.

CAN FD Timing Settings

When Specify by Baud is deselected, use these settings (TQ SEG1, TQ SEG2, TQ Prop, Sync, BRP-1) for the data phase of CAN FD messages. These parameters are for advanced users and normally should be left at their default values.

Mode

The operating mode of the channel; choose from one of these four options:


- Normal: Normal operation (default).
- Disable: Channel is disabled.
- Listen Only: This channel only receives messages, with no transmissions, and also no error frames generated nor acknowledgments sent.

Bit Rate Calculator

Press this button to launch the Intrepid Bit Timing Calculator.

4.3.2 ISO15765-2

This page contains one setting: IFS Shift Register (shown below). Changing this from its default value of 0 causes time to be added to the Inner Frame Spacing of USDT frames transmitted by CoreMini scripts running in the FIRE 2. The number entered is multiplied by 6.4 μ s to determine the time offset. The allowed range is -1563 to 1563.



IFS Shift Register

X 6.4us = 0 us

This value is added to the received Inner Frame Spacing for USDT frames transmitted from CoreMini. Each increment represents 6.4us. Range: -1563 to 1563.

neoVI Explorer IFS Shift Register Parameter for ISO 15765-2.

4.5 Text API

These parameters control the operation of the text API that can be used to operate the neoVI FIRE 2 using third party software. Please contact Intrepid if you require assistance with using the API.

Text API

☒ None

☐ UART1

☐ RS232/UART2

☐ HS CAN

☐ MS CAN

Tx ID1ffffff

Rx ID1ffffffe

☒ 29 Bit ArbIDs

☐ HS CAN 2

Tx ID1ffffff

Rx ID1ffffffe

☒ 29 Bit ArbIDs

☐ HS CAN 3

Tx ID1ffffff

Rx ID1ffffffe

☒ 29 Bit ArbIDs

neoVI Explorer Text API Parameters.

4.6 Performance Tests

USB/ Ethernet PC COM Performance Test

☐ Enable Performance Blast Test

(Blasts Simulated CAN Network Traffic to test Bandwidth)

☐ Enable Hardware COM Latency Test

(Sends Periodic Latency Report from the Hardware)

12/17/2019

24 / 32

4.7 neoECU AVB/TSN Endpoint Configuration

The Endpoint can be configured in one of 3 modes from the dropdown menu displayed below.

The screenshot shows the 'nEAT avb config' window. The 'endpoint_mode' dropdown is set to 'Video Talker'. Below it, the 'Video Talker Stream' section contains several dropdown menus: 'talker stream' (set to 'IEC61883-4'), 'Stream Format' (set to 'Local File'), 'Local File Name' (set to 'gooseberry_blender.mp4'), and 'Talker Video Preview delay (ms)' (set to '275').

4.7.1 Video Talker Configuration: Source of an AVTP Video Stream

This screenshot shows the detailed configuration for the 'Video Talker Stream'. The 'endpoint_mode' is 'video talker' and 'class mode' is 'A,B'. The 'Video Talker Stream' table has columns for 'talker stream', 'Stream Format', 'Talker Input', 'Local File Name', 'Talker Video Preview delay (ms)', 'Stream Connect Mode', 'Class', 'StreamID', and 'Destination Mac Addr'. The 'talker stream' dropdown is set to 'IEC61883-4'. The 'Stream Format' dropdown is set to 'Local File'. The 'Local File Name' dropdown is set to 'gooseberry_blender.mp4'. The 'Talker Video Preview delay (ms)' is set to '275'. The 'Stream Connect Mode' dropdown is set to 'Static Stream Configuratic'. The 'Class' dropdown is set to 'CLASS_A'. The 'StreamID' is '0x0123456789abcdef' and the 'Destination Mac Addr' is '0x91ef0000fe00'. A red box highlights the 'Static Stream Configuration Only' section, which includes the 'Class', 'StreamID', and 'Destination Mac Addr' fields.

- **Stream Format:** The AVTP video formats IEC61883-4 and CVF are supported and can be chosen from this drop down menu.
- **Talker Input:** Any one of the following can be chosen to be the source of the video stream.
 - Local File:
 - Stream a media file stored in the devices internal storage.
 - Reference section 4.7.6 for media file management
 - USB:
 - Stream a video from a USB camera connected to the USB Host port.
 - Most cameras having a Linux driver will work.
 - Limited to resolution of TBD
 - Test Pattern
- **Local File Name:** A list of available files will be displayed if Local File is selected as the Talker Input.
- **Talker Video Preview Delay (mS):** Set the amount of time the video rendering will be delayed.
- **Stream Connect Mode**
 - AVDECC: Endpoint will wait for an AVDECC command to connect with a Listener Endpoint.
 - Static Stream Configuration:
 - Stream Reservation Class, Stream ID and Destination MAC Address are statically configured instead of using MSRP.
 - Note that the endpoints still require MSRP to be supported by switches in the network.



Note: The following 3 configurations only applies to Static Stream Configuration

- **Class:** Select Stream Reservation Class A or B.
- **StreamID:** AVTP Stream ID
- **Destination MAC Address:** The Destination Address used by the AVTP frame.

4.7.2 Video Listener Configuration: Sink of an AVTP Audio Stream

nEAT avb config gPTP config nEAT general config

endpoint_mode video listener

class mode A,B

Video Listener Stream

| Stream Format | Listener Video Mode | Listener Audio Output | Stream Connect Mode | talker_entity_id | talker_unique_id | Class | StreamID | Destination Mac Addr |
|---------------|---------------------|-----------------------|-----------------------------|--------------------|------------------|---------|--------------------|----------------------|
| IEC61883-4 | Video and Audio | Audio Jack | Static Stream Configuratic | 0x00fc700000010000 | 0 | CLASS_A | 0x0123456789abcdef | 0x91ef0000fe00 |
| IEC61883-4 | Video and Audio | Audio Jack | AVDECC | | | CLASS_A | | |
| CVF | Video Only | HDMI | AVDECC (BTB mode) | | | CLASS_B | | |
| | | | AVDECC (Fast Connect mode) | | | | | |
| | | | Static Stream Configuration | | | | | |


- **AVTP Stream Format:** Select between IEC61883-4 and Compressed Video Format (CVF)
- **Listener Video Mode:** Select between Audio/Video or Video Only
- **Listener Audio Output:** Select between audio playing on Audio Jack #1 or over HDMI.
- **Stream Connect Mode**
 - AVDECC: Endpoint will wait for an AVDECC command to connect with a Talker Endpoint.
 - Static Stream Configuration: Stream Reservation Class, Stream ID and Destination MAC Address are statically configured instead of using MSRP.



Note: The following 3 configurations only apply to Static Stream Configuration

- **Class:** Select Stream Reservation Class A or B.
- **StreamID:** AVTP Stream ID
- **Destination MAC Address:** The Destination Address used by the AVTP frame.

4.7.3 Audio Talker/Listener Configuration: Simultaneous Source and Sink AVTP Audio Streams

 **Note:** An endpoint is limited to a maximum of 9 simultaneous streams

HEAT avb config | GPTP config | nEAT general config

endpoint_mode: audio talker/listener

class mode: A,B

| Stream | Stream Format | Sampling Freq | Channel | Samples Per Frame | Bit Depth | Talker Input | Local File Name | Sample Format | Stream Connect Mode | Class | StreamID | Destination Mac Addr |
|-----------------------|---------------|---------------|---------|-------------------|-----------|--------------|--------------------------|---------------|-----------------------------|---------|--------------------|----------------------|
| Audio Talker Stream | IEC61883-6 | 48KHz | 2 | 6 | 24 | Local File | sample.L.raw | S24_BE | Static Stream Configuration | CLASS_A | 0x0123456789abcdef | 0x91ef0000fe00 |
| talker stream 2 | IEC61883-6 | 48KHz | 3 | 12 | 24 | Local File | test_5.1_48KHz_S24BE.raw | S24_BE | Static Stream Configuration | | | |
| talker stream 3 | IEC61883-6 | 48KHz | 4 | 48 | 24 | Local File | test_7.1_48KHz_S24BE.raw | S24_BE | Static Stream Configuration | | | |
| talker stream 4 | IEC61883-6 | 48KHz | 5 | 64 | 24 | Local File | sample.L.raw | S24_BE | Static Stream Configuration | | | |
| talker stream 5 | IEC61883-6 | 48KHz | 6 | 6 | 24 | Local File | sample.L.raw | S24_BE | Static Stream Configuration | | | |
| talker stream 6 | IEC61883-6 | 48KHz | 7 | 6 | 24 | Local File | sample.L.raw | S24_BE | Static Stream Configuration | | | |
| talker stream 7 | IEC61883-6 | 48KHz | 8 | 6 | 24 | Local File | sample.L.raw | S24_BE | Static Stream Configuration | | | |
| Audio Listener Stream | IEC61883-6 | 48KHz | 2 | 6 | 24 | Audio Jack | | S24_BE | Static Stream Configuration | CLASS_A | 0x0123456789abcdef | 0x91ef0000fe00 |
| listener stream 1 | IEC61883-6 | 48KHz | 3 | 12 | 24 | Audio Jack | | S24_BE | Static Stream Configuration | | | |
| listener stream 2 | IEC61883-6 | 48KHz | 4 | 48 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |
| listener stream 3 | IEC61883-6 | 48KHz | 5 | 64 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |
| listener stream 4 | IEC61883-6 | 48KHz | 6 | 6 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |
| listener stream 5 | IEC61883-6 | 48KHz | 7 | 6 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |
| listener stream 6 | IEC61883-6 | 48KHz | 8 | 6 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |
| listener stream 7 | IEC61883-6 | 48KHz | 2 | 6 | 24 | No Output | | S24_BE | Static Stream Configuration | | | |

Static Stream Configuration Only

Streams 1-7 do not support Static Stream Configuration

Static Stream Configuration Only

Streams 1-7 do not support Static Stream Configuration

Audio Out Stream 0 Only

Fast Connect Mode Only

4.7.3.1 Audio Talker Stream

- **Stream Format:** The AVTP video formats IEC61883-6 and AAF are supported and can be chosen from this drop down menu.
- **Sampling Frequency:** of the audio stream
- **Channel:** Number of audio channels in the stream
- **Samples per frame:** Number of audio samples per AVTP Frame (*AAF format only*)
- **Bit Depth:** of the audio stream
- **Talker Input:** For Stream 0, the audio can be selected from either a file or an audio source connected to IN1. All other streams are from a local file stored on the endpoint.
- **Local File Name:** Select the audio file from a list of files available. (*See section 4.7.6 on managing media files*)
- **Sample Format:** This device requires S24_BE
- **Stream Connect Mode:**
 - AVDECC: Endpoint will wait for an AVDECC command to connect with a Listener Endpoint.
 - Static Stream Configuration: Stream Reservation Class, Stream ID and Destination MAC Address are statically configured instead of using MSRP.

4.7.3.2 Audio Listener Stream

- **Stream Format:** The AVTP video formats IEC61883-6 and AAF are supported and can be chosen from this drop down menu.
- **Sampling Frequency:** of the audio stream
- **Channel:** Number of audio channels in the stream
- **Samples per frame:** Number of audio samples per AVTP Frame (*AAF format only*)
- **Bit Depth:** of the audio stream
- **Audio Output:** Note that *only* Stream 0 is decoded for listening and can be streamed out of OUT1 or over HDMI. *The remaining streams are intended for testing only.*
- **Stream Connect Mode**
 - AVDECC: Endpoint will wait for an AVDECC command to connect with a Listener Endpoint.
 - Static Stream Configuration: Stream Reservation Class, Stream ID and Destination MAC Address are statically configured instead of using MSRP.



Note: The following 2 configurations only apply to Fast Connect Mode

- **Talker Entity ID:** In Fast Connect Mode, the Listener will use AVDECC commands to attempt to connect a stream with a talking having this Entity ID.
- **Talker Unique ID (UID):** UID of the Talker which the Listener will attempt to Fast Connect.



Note: The following 3 configurations only apply to Static Stream Configuration

- **Stream Class:** Choose the Stream Reservation Class of the stream
- **StreamID:** AVTP Stream ID
- **Destination MAC Address:** The Destination Address used by the AVTP frame.

4.7.4 gPTP Configuration

nEAT avb config **gPTP config** nEAT general config

gPTP mode: automotive profile (dropdown menu shows: gtp disabled, standard profile, automotive profile)

neighborPropDelayThresh: 100000

PdelayReqInterval: 0

SyncInterval: -3

announceInterval: 0

Announce message configuration

gmCapable: 1

priority1: 248

clockClass: 248

clockAccuracy: 254

offsetScaledLogVariance: 17258

priority2: 248

Automotive profile

gPTP port role: master

neighborPropDelay mode: static

initial neighborPropDelay: 250

gtp_grandmaster_id: 0x0123456789abcdef

Standard Profile Configurations

Automotive Profile Configurations

gPTP can be disabled, or set to the standard or Automotive Profile (AVNU)

4.7.4.1 Profile Independent Settings

- **neighborPropDelayThresh (nanoseconds)**
 - Device will be identified as non-AS Capable if pDelay exceeds this value
 - Default 800, but increased to 100000 to insure latency of active tap does not impact ability to connect stream.
 - Can be set as high as 10000000 for the purposes of certain AVNU testing



*Note: The value of the following 3 parameters is calculated as follows.

Value = $\log_2(\text{Interval in Seconds})$

Min = -5 / Max = 22

- **PdelayReqInterval**
- **SyncInterval**
- **announceInterval**

4.7.4.2 Standard Profile Settings

- **gmCapable:** If enabled, the endpoint will participate in the BCMA and attempt to serve as Grand Master

 *Note: The following 5 values define the credentials of the Grand Master as specified in gPTP*

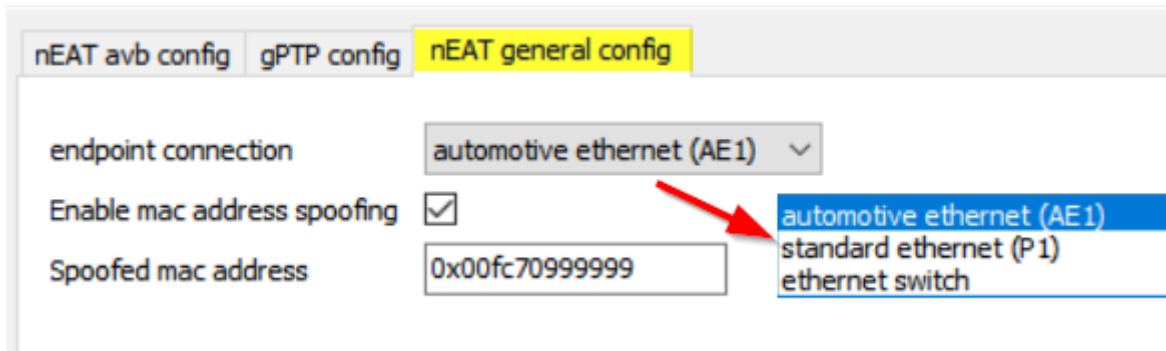
- **priority1:**
- **clockClass:**
- **clockAccuracy:**
- **offsetScaledLogVariance:**
- **priority2:**

4.7.4.3 Automotive Profile Settings (Avnu)

- **gPTP port role:** Select Master, Slave, or disabled
- **neighborPropDelay Mode:**
- **initial neighborPropDelay:**
- **gptp_grandmaster_id:**

Preliminary

4.7.5 nEAT general config



nEAT avb config gPTP config **nEAT general config**

endpoint connection automotive ethernet (AE1) ▾

Enable mac address spoofing ☒

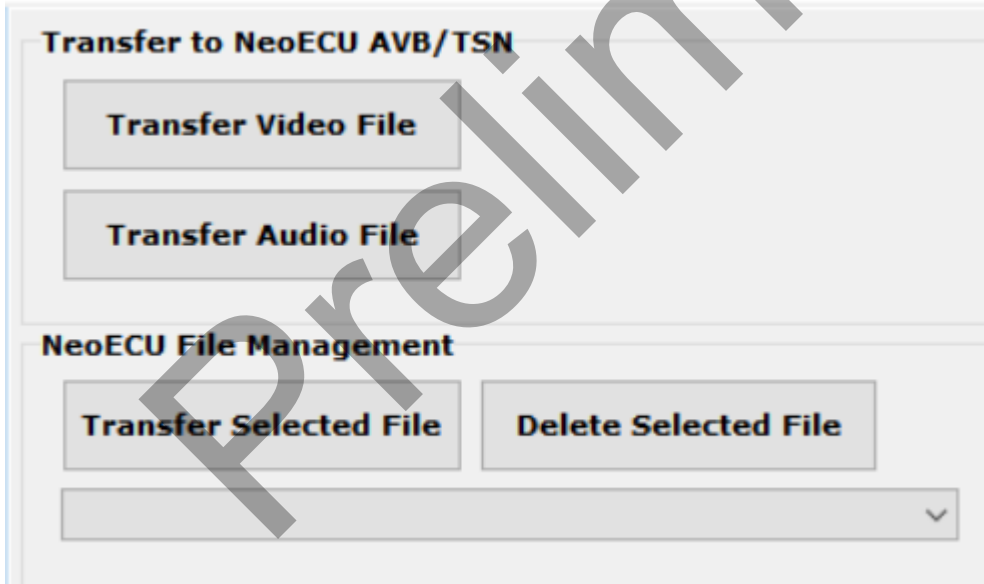
Spoofed mac address 0x00fc70999999

automotive ethernet (AE1)
standard ethernet (P1)
ethernet switch

- **Endpoint Connection:** Choose which Ethernet port is used to send and receive AVB Streams.
 - AE1: 100BASE-T1 Automotive Ethernet
 - P1: Standard Ethernet (100/1000BASE-T)
 - Ethernet Switch: The endpoint is connected directly to a port of the internal 88Q5050 Switch.
- **MAC Spoofing:** The factory assigned MAC address may be overridden when this feature is enabled.

4.7.6 Media File Management

This interface allows the user to upload media files to the endpoint, as well as download them to the computer or delete them.



Transfer to NeoECU AVB/TSN

Transfer Video File

Transfer Audio File

NeoECU File Management

Transfer Selected File Delete Selected File

▾

👉 Note: the maximum files size supported is 2 GB

4.7.7 Linux

Here the versions of the hardware and Embedded Linux firmware can be seen.

The Linux firmware of can also be updated here for hardware versions rev3 and later. *If you have hardware earlier than rev3, please contact customer support if you think a firmware update is needed.*

