Guideline on installing and connecting NmeaRouter on a Windows computer with OpenCPN or any other program only accepting Serial Data

OpenCpn now accepts both UDP and TCP input, so you no longer require to use the technique described below. This information is left for legacy reasons.

I'm extremely grateful to Wim van der Heijden for preparing the tutorial explaining how to connect <u>AisDecoder</u> and <u>OpenCPN</u> simultaneously to a Serial AIS receiver using <u>NmeaRouter</u>

Explanation

You have a problem if you are receiving serial (or USB) data and you wish to output this data to two programs simultaneously, if one of the programs will **only** accept serial data. You cannot connect two programs to the same port at the same time on the same PC. When you try and connect the second program the PC will tell you the "port is in use".

If you are receiving AIS or GPS data from a device which has a serial or USP output this must be connected to a program that will open the port allocated by the PC to this device (for example COM23). NmeaRouter or OpenCPN can open COM23 but not both at the same time. If you connect NmeaRouter first, when you try and connect OpenCPN you will receive the "port in use" error and vise versa. This will occur irrespective of the two programs you are trying to use at the same time.

If the first program receiving the serial (or USB) data can output network data (TCP or UDP), and the second program accepts network data the problem goes away. It is only an issue if the first program can only communicate with the second program using serial (or USB) data.

Unfortunately OpenCPN, which is a widely used open source plotting program, only accepts networked data in two different formats. These are Garmin and Json neither of which are commonly used as an output format by other programs. NmeaRouter will output the data simultaneously to both programs but does not output either of these formats, it will only output the received format (NMEA). NmeaRouter will not convert NMEA into Garmin or Json hence it must communicate with OpenCPN using a serial port.

There is a solution, which is by creating what is called a Virtual Com Port (VCP) Pair. A VCP Pair is in fact a device driver, it is not a user program. It is similar to a USB driver. A USB driver connects (internally) a physical USB port (you plug the USB device into) to a Virtual Com Port (VCP). The incoming data on the physical USB port is sent to the Output of the VCP (eg COM23). When you connect a program (eg OpenCPN) to the USB device, you specify in OpenCPN, COM23 as the Input connection.

When you create a VCP Pair (described later), two Com ports will be created (eg COM11 & COM12), the driver internally will connect the Output of COM11 to the Input of COM12 and vise versa. Neither port physically exists, but it allows the Output of the first program to be Input into the second program. In effect both programs can now share the same port as long as the Output of one program is the Input of the other.

The Input of Program 1 is COM23 NmeaRouter The Output of Program 1 is COM11 NmeaRouter The Input of Program 2 is COM12 OpenCPN

Program 1 (NmeaRouter) and Program 2 (OpenCPN) are now using the same serial data.

NmeaRouter can simultaneously output the data to other programs running on the same PC (for example AisDecoder), via either a Network Connection or another VCP.

You do not need to create a VCP when sending data to a physical port (serial or USB) because the port will only have one device connected to the physical port.

Tutorial

The **NmeaRouter** program is designed to connect an AIS station or an AIS receiver to the **AisDecoder** program and any other AIS application like an electronic chart system at the same time on the same computer. This guideline describes the installation on a Windows XP, Vista or Windows 7 computer only.

The input is a receiving unit for AIS Messages, further called the **AIS receiver**, with an NMEA output. The interface can be a serial (also called RS232 or COM) port or an USB output. There are three options now:

1. In case you have a serial input connector and a serial input port on your computer you have just to connect the AIS receiver to your computer. The computer will assign a COM port number automatically.

2. If you have a serial output connector and just an USB input on your computer you need to connect a hardware serial to USB interface and to install the software supplied with it. Normally the software will assign a COM port number to the connection. If not, you need to install an USB to serial converter as described in the next step.

3. If the AIS receiver has an USB output you need to connect it directly to the USB input on the computer and install an USB to serial converter. The software will be supplied with your AIS receiver or can be downloaded for free from the internet. An example is

<u>http://www.ftdichip.com/Drivers/VCP.htm</u> but there are several others. Some equipment has the converter already incorporated and may install it automatically.

After installing the converter and connecting the AIS receiver you can check the Device Manager of your operating system to control the installation and to note the assigned COM port number for further use. COM23 is assigned in this example.



For connecting two applications on the one and only input device it is needed to make a sort of internal splitter to route the AIS data to both applications. For that you need to download the serial port emulator **com0com** on <u>http://sourceforge.net/projects/com0com/</u>. Take edition 3.0.0.0-i386-and-x64-unsigned for Windows XP and Vista. Take edition 2.2.2.0-x64-fre-signed for Windows 7 (because of the acceptation during installation). In the installation you see one of the following pictures (left for XP and Vista, right for Windows 7):

🕏 Null-modem emulator (com0com) Setup	🕞 Null-modem emulator (com0com) Setup
Choose Components Choose which features of Null-modern emulator (comOcom) you want to install.	Choose Components Choose which features of Null-modem emulator (com0com) you want to instal.
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.	Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.
Select components to install: ✓ com0com Description ✓ Start Menu Shortcuts ⊂over a component to ✓ COM# <>> CNCE0 see its description.	Select components to install: Select components to install: Start Menu Shortcuts CNCA0<->CNC80 Description Position your mouse over a component to see its description.
Space required: 300.0KB	Space required: 301.0KB
Nullsoft Install System v2.46	Nuksoft Instal System v2.46
<pre><gack next=""> Cancel</gack></pre>	<badk next=""> Cancel</badk>

In Windows XP and Vista uncheck the box CNCA0<->CNCB0 because you do not need this! In Windows 7 launch the Setup Command Prompt shortcut. Enter the change commands: Command> change CNCA0 PortName=COM11 Command> change CNCA0 PortName=COM12

Check the installation with the Device Manager again.

t should show \downarrow for Wind	ows XP and Vista and \downarrow in Windows 7.
It should show ↓ for Winde Device Manager File Action View Help	ows XP and Vista and ↓ in Windows 7.
	com0com - bus for serial port pair emulator 0 (COM11 <-> COM12)
Port (COME) Part (COME) Port (COM	 Disk drives Display adapters
B- Processors	

COM 11 and COM 12 in this example are assigned for the serial port emulator. Make a note of the COM ports for the further installation of the NmeaRouter.

Of course you installed the NmeaRouter on your computer but be aware that it should be version 1.1.42 or higher. Also the AisDecoder (latest edition is 3.1.0.108) should be installed. Now the NmeaRouter will be *Configured* in the following steps:

1. Make a *New Connection* for the AIS receiver and give it a name, <u>AIS receiver</u> in this case but it can be any other name as well.

R Nme	eaRouter 1.1.42 [AI	Sreceive	er]	19
File (Configure View	Help		
Starl	Profile	- >]		
Con	Connection	+	New	3/sec
AIS AIS VSF	Route Graph	+	Open Delete	H
Bou	Export	T .	and En	abled

The AIS receiver is connected on the <u>Serial</u> port <u>COM 23</u> as described before so it should be set as:

New Connection	Serial Port Configuration
Connection Name AIS received	USB Serial Port (COM23) Device COM23
Type of Connection Serial	Baud Bate Jon too
Output Only Format	
Add IEC 61162-1	Data Direction Input
	C Output
	C Input,Output
Enabled 🔽	OK Cancel
OK Cancel	

Set the Baud Rate on <u>38400</u> (should be specified by the supplier of your AIS receiver and set the AIS receiver as <u>Input</u>.

2. Make a *New Connection* for the AisDecoder program on the same way. However this should be an <u>UDP</u> connection. It is <u>Output</u>, the Remote Host (your computer) is addressed by <u>127.0.0.1</u> and the Remote Port for the AisDecoder is <u>29421</u>.

New Connection	
Connection Name Als	6 decoder 🗨
Type of Connection	P/TCF
Enabled V	

DUDP/TCP	
Protocol	UDP
Max Concurrent	C Server "Listens"
Data Direction	C Input C Dutput C Invalid
Local Host Name	
Local IP	
Local Port	62239
Remote Host	127.0.0.1
Remote Host IP	
Remote Port	29421
ОК С	ancel

3. For the real connection we need to make a *New Route* between the AIS receiver and the AisDecoder. This is done by:

R Nr	neaRouter 1.1.42 [AISrecei	ver]
File	Configure View Help	
Starl	Profile	
AIS	Route +	New
AIS VSF Rou	Graph Export	Open Delete

C. Open Route	
Between	AIS decoder
And	AIS receiver
Enabled	v
OK Car	icel

4. To check the connections so far press the *Start* button and you should see the following picture now:

R NmeaRouter 1	1.1.42 [AISrece	eiver]						3
File Configure	View Help							
Start Stop								
Connection	Direction	IP Address : Port	kB/sec	Protocol	Enabled	Sentences	Status	 1
AIS receiver	Input		4,1	Serial	Enabled	1838	Open	
AIS decoder	Output	AlSdecoder:29421	0,2	UDP	Enabled	0	Open	
Route between	Direction	and En	abled					
AIS receiver	>	AIS decoder En	abled					
1 <taiudn,1, 1<taiudn,1, 1<taiudn,1, 1<taiudn,1, 1<taiudn,1, 1<taiudn,1,< td=""><td>1,,B,23aI 1,,A,23aD 1,,A,13aE 1,,B,13aI 1,,B,13aI</td><td>:rhP1LPE;E@Md pp0P88PDC1TMd PU8P1FPG88VMg h78P88PE>w6Mg ;j?P88PDsFpMe 545P88PE6W5M2</td><td>@er4gvT3 HRtpwvT3 j>a:gvU3 @f00?vT3 6E@0?vU3</td><td>2054,0*4 28;1,0*1 261`,0*6 261`,0*1 261`,0*1 261`,0*2</td><td>0 0 C E 4</td><td></td><td></td><td></td></taiudn,1,<></taiudn,1, </taiudn,1, </taiudn,1, </taiudn,1, </taiudn,1, 	1,,B,23aI 1,,A,23aD 1,,A,13aE 1,,B,13aI 1,,B,13aI	:rhP1LPE;E@Md pp0P88PDC1TMd PU8P1FPG88VMg h78P88PE>w6Mg ;j?P88PDsFpMe 545P88PE6W5M2	@er4gvT3 HRtpwvT3 j>a:gvU3 @f00?vT3 6E@0?vU3	2054,0*4 28;1,0*1 261`,0*6 261`,0*1 261`,0*1 261`,0*2	0 0 C E 4			

The incoming NMEA sentences of the AIS receiver are shown now in the lower window of the NmeaRouter program. Start the AisDecoder now (in Windows 7 *Run as Administrator* during the installation procedure, otherwise you are not able to set the proper settings). As soon as the AisDecoder is running, the following picture should be added on your screen:

C. AisDecoder - Cor	trol/Stats	*		
1-12-2012	Received	0		
16:26:26	W/ Europe Standard Tir	ne	Waiting	0
External Source	Innut Filter		Processed	0
	Desciond Contenant	1	Filtered	0
♥ ODF □ Serial	NHCA Contences		Outputted	0
	AIC Co	es .	Scheduled	0
	AID DE	ntences	Named Vessels	520
- Input Source			Last Output	0
C Log File C Message File			Version 3.1.0.108	Start
Display		· · · · · · · · · · · · · · · · · · ·		Pause
Nmea Input-	Summary	Detail	Output	
C None	C None	C None	File	Stop
Received	 Unfiltered 	 Unfiltered 	UDP	Options
0/min	C Input Filtered	Filtered	FTP	
	C Scheduled	C Scheduled		Update
		C Select	GIS	Help

Be sure that you choose <u>UDP</u> as External Source. If you *Start* the AisDecoder you should see the AIS receptions as chosen on the screen above (Summary and Detail windows Unfiltered in this example. See the instructions for AisDecoder to filter and display AIS receptions).

											the second se
😋. Detail			5	Summary	1.00					Contraction of the local division of the loc	100.0
Description	Value	Value Description		Sentence	MMSL	Message Type	DAC	FI	L ID	Vessel Name	Comments
Creation Time Local	06-12-2012 10:49:11			JAIVDM	244660890	1	0110			DBECHTSTEDEN 2	Position Be
Nmea Sentence	IAIVDM,1,1,,B,13aGvD0P			IAIVDM	244660449	1				KILIYA	Position Be
Received Time UTC	06-12-2012 09:49:11			IAIVDM	636092225	2					Position Be
AIS Sentence	IAIVDM	Mobile class A or B, 168 b		IAIVDM	244750742	1				FOB EVEB	Position Be
Fragments in this message	1			IAIVDM	226003310	3				FUEGO	Position Re
Fragment No	1			IAIVDM	010500794	1				TOEGO	Position Re
Sequential Message ID				IAIVDM	211516390	3				SCHLOSS OBANIENBALIM	Position Re
Radio Channel	В			IAIVDM	565397000	3				SCIECCO CHAILERDADIN	Position Re
Payload	13aGvD0P00PEMh <mdgi< td=""><td>168 bits (21 8-bit words)</td><td></td><td>IAIVDM</td><td>244690949</td><td>1</td><td></td><td></td><td></td><td>PROVOCATIO</td><td>Position Re</td></mdgi<>	168 bits (21 8-bit words)		IAIVDM	244690949	1				PROVOCATIO	Position Re
Fill bits	0			IAIVDM	211511920	2				morodano	Position Re
CRC check	7E				244770027	1				ATTESA	Position Re
Vessel Name	DIAMANT				244700837	1				AMULET	Position Be
AIS Message Type	1	Position Report Class A (S		JAIVDM	244750731	1				OPPOLET.	Position Re

We have one application connected to the AIS receiver now.

5. The next step is to connect a second application on the same computer and on the same time using the NMEA sentences from the AIS receiver. In this document we connect the program OpenCPN to display AIS ships on the electronic chart while AisDecoder is running as well. Because OpenCPN will only accept a serial port as input

we need to define a Virtual Serial Port (VSP) to share the data between both applications. We make a *New Connection*, here called <u>VSP</u>. It is <u>Serial</u>, the port number is the first one from the com0com configuration, <u>COM 11</u> in this example, the Baud Rate should be <u>38400</u> and it is <u>Input</u>. <u>Output</u>.

C Open Connection	- 0 ×
Connection Name	•
Type of Connection Serial	v
Output Only Format Add IEC 61162-1	
Only NMEA 🕅	
Enabled 🔽	
OK Cancel	

comOcom - se	rial port emulator (COM11)
Device	COM11 -
Baud Rate	38400 💌
Data Direct	ion C Input
	C Output
	Input,Output

6. Finally we need a *New Route* between the VSP and the AIS receiver.

C Open Route	
Between	AIS receiver
And	VSP
Enabled	v
OK Can	cel

Now we have a virtual connection from the AIS receiver to COM 11 and via the VSP to COM 12. Now OpenCPN is started. Via its Toolbox the AIS input (here called AIS Data Port) is set to COM 12, the other end of the virtual connection.

To OpenCPN 3.0.2	19 ToolBox					
	Settings GPS Charts AIS General AIS Data Port COM12	Vector Charts AIS	Language/Fonts Etc.	PlugIns		
	CPA Calculation ONO CPA Calculation if f	arget range is greater t	han (NMi):	20.0		

Now the installation is complete! Don't forget to Save your settings (Profile) of the NmeaRouter:

R Nn	neaRouter 1.1.42 [AI	Sreceiver	1	10	R NmeaRouter 1	.1.42 [AISrece	eiver]	2	1		0		
File (Configure View	Help			File Configure	View Help							
Starl	Profile	•	New	1	Start Stop								
Con	Connection		Open	Isec	Connection	Direction	IP Address : P	ort	kB/sec	Protocol	Enabled	Sentences	Status
AIS				56C	AIS decoder	Output	192.168.1.8:2	9421	2,8	UDP	Enabled	1482	Open
AIC	Route	•	Save		AIS receiver	Input			2,9	Serial	Enabled	141677	Open
VSE	Graph		Save As		VSP	Input,Output			2,8	Serial	Enabled	141381	Open
	Export		Delete		Route between	Direction	and	Enable	ed				
Rou					AIS decoder	<	AIS receiver	Enable	ed				
					AIS receiver	>	VSP	Enable	ed				
					2 AIUDM,1,<br 3>!AIUDM,1, 1>!AIUDM,1, 2 AIUDM,1,</th <th>1,,A,23aD 1,,A,23aD 1,,A,23aD 1,,A,23aD</th> <th>qrOP1QPDuk qrOP1QPDuk qrOP1QPDuk @dPP80PENC</th> <th>IBMdeM IBMdeM IBMdeM :HMh>N</th> <th>Db?vt2 Db?vt2 Db?vt2 Db?vt2 @Ø?vv2</th> <th>20SR,0×0 20SR,0×0 20SR,0×0 20SR,0×0 2<11,0×1</th> <th>9 9 9</th> <th></th> <th></th>	1,,A,23aD 1,,A,23aD 1,,A,23aD 1,,A,23aD	qrOP1QPDuk qrOP1QPDuk qrOP1QPDuk @dPP80PENC	IBMdeM IBMdeM IBMdeM :HMh>N	Db?vt2 Db?vt2 Db?vt2 Db?vt2 @Ø?vv2	20SR,0×0 20SR,0×0 20SR,0×0 20SR,0×0 2<11,0×1	9 9 9		

The final picture of the NmeaRouter should be similar as shown here on the right above.

The two applications together, AisDecoder and OpenCPN, can be seen on a screenshot of the total picture below. On the left-top the NmeaRouter with the NMEA sentences received, the right-top the AisDecoder main window with a summary of the received AIS messages below and on the left-bottom OpenCPN with a number of AIS ships on it. Once running, the NmeaRouter can be minimized of course (but don't press Stop otherwise the AisDecoder and OpenCPN do not get input) in order to create space on the screen e.g. for specific information of one particular AIS ship.

R NmeaRouter 1.1.42 [AISreceiver]	AisDecoder - Control/Stats				
File Configure View Help	-12-2012 Received	25711			
Charles I Charles	0:42:29 C W Europe Standard Time Waiting	0			
start stop	sternal Source Input Filter Processed	25711			
Connection Direction IP Address : Port kB/sec Protocol Enabled Sentences Status	Filtered	16896			
AIS decoder Output 192.168.1.8:29421 2,4 UDP Enabled 25921 Open	Serial Dutputted				
AIS receiver Input 2,5 Serial Enabled 25921 Open	TCP AIS Sentences Scheduled	0			
VSP Input,Output 2,4 Serial Enabled 25920 Open	Named Vessels	1094			
Route between Direction and Enabled	Last Output	0			
AIS decoder < AIS receiver Enabled	Contraction	- Control			
AIS receiver> VSP Enabled	Mercado Filo	Control			
1>!AIVDM,1,1,,A,13buV@80000E71tMaGE9R14t08Aj,0*3D		Start			
3>!AIVDM,1,1,,A,13buV@80000E71tMaGE9R14t08Aj,0*3D	lisplay	Pause			
2<"ALVDM,1,1,,A,23aGv>hP0VPDS5"Me4Riawut20SE,0*22	Nmea Input Summary Detail Output	Shop			
1) THIUDM, 1, 1, 1, H, 23aGU>NP 90PDS5 ME4K1aWU12 95E, 9*22	None None None None None None	5100			
ConerCPN 3.0.2	C Heceived (• Unnitered C Unnitered C Unnitered	Options			
	Souvrierie Comput Filtered Contraction	Undate			
	C Scheduled C Select				
N N N A / / / / / / / /		Hein			
	summary				
	Sentence MMSI Message Type DAC FI ID Vessel Name	Comn			
	IAIVDM 244690204 1 SAYONARA	Positi			
	IAIVDM 205474290 2	Positi			
	IAIVDM 236491000 3 NEPTUNE MARINEI	i Positi Desiti			
	IAIVDM 244740124 I UPTIMIST	Positi			
	IAIVDM 244650162 5 ANNE	Positi			
	IAIVDM 244650657 1 ST MARIA	Positi			
	IAIVDM 244690949 1 PB0V0CATIO	Positi			
	IAIVDM 244750430 1 CORJA	Positi			
	IAIVDM 244690958 1 VECTURA	Positi			
	IAIVDM 244660106 1 AUDREY	Positi			
	IAIVDM 244710900 1	Positi			
	IAIVDM 636092225 2 SANTA CRUZ	Positi			
	IAIVDM 244660653 1 MAIN IX	Positi			
	IAIVDM 244670290 2	Positi			
	IAIVDM 244710992 1 DIAMANT	Positi			
MAN MAN	IAIVDM 244690455 8 200 10 RUBICON	Binar			
	IAIVDM 246376000 1 DUTCH PEARL	Positi			