

# Serial Devices on the Network

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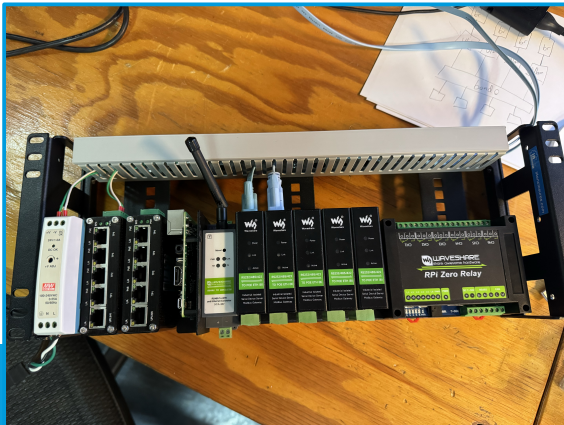
# Why put serial on the network?

Accessibility and Flexibility

Make use of existing network infrastructure

**Virtualization** – Virtual machines, containers, without needing serial/usb pass-through to any particular physical host.

Do away with all the serial/usb adapters

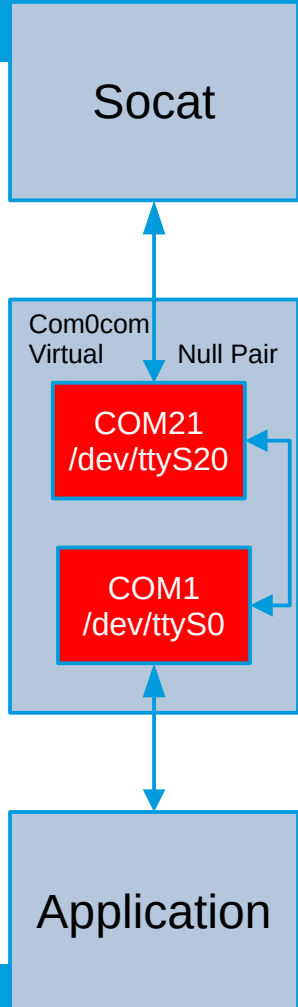


# Why not put serial on the network?

- Serial is simple and relatively straightforward to troubleshoot.
- The network adds a layer of complexity.
- Need reliable network infrastructure



# Workflow



## **Socat** – Bidirectional data pipe.

Run as a windows service via nssm (non-sucking service manager)

Supports a variety of address options

- Device servers
- serial ports
- TCP
- UDP (unicast,broadcast,multicast)
- SSL
- File
- External utility such as mosquito\_sub (via exec: option)

## **NSSM** – Non-sucking Service Manager

- Create and edit windows services
- Use to launch your socat command

## **Com0com** – Virtual null modem pair

Lets you create two connected virtual serial ports.

- One for the socat connection
- One for the application

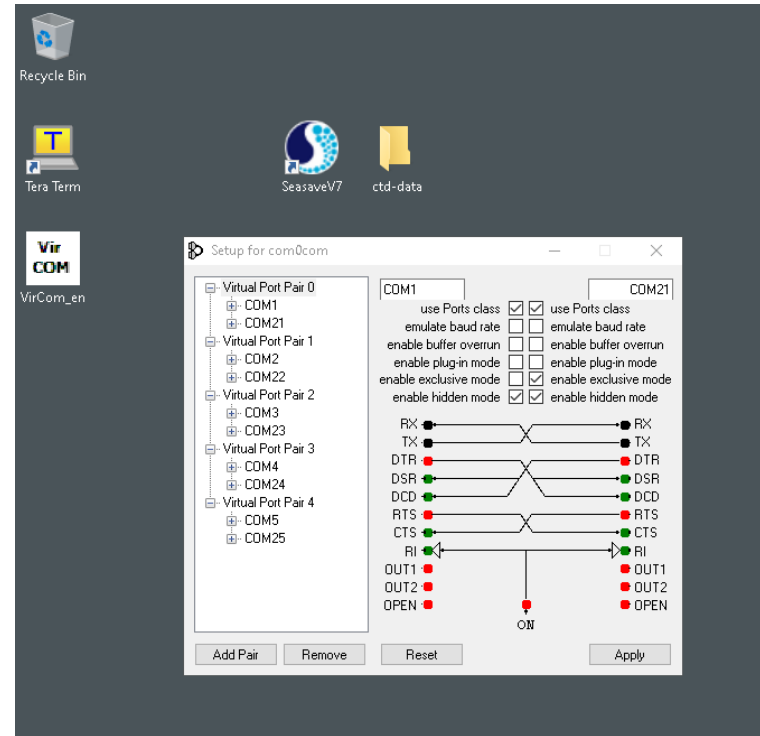


# Com0com - <https://com0com.sourceforge.net/>

- Make a high and low number COM port pair.
- Use “Enable exclusive” to hide the high port from applications once it is open.
- Hidden mode prevents device enumeration. No gps “Crazy Mouse”.
- Enable buffer overrun to prevent buffering up of data on the low port before application opens it.

## Things to be aware of

- Disable secure boot to fix com0com driver signing problems.

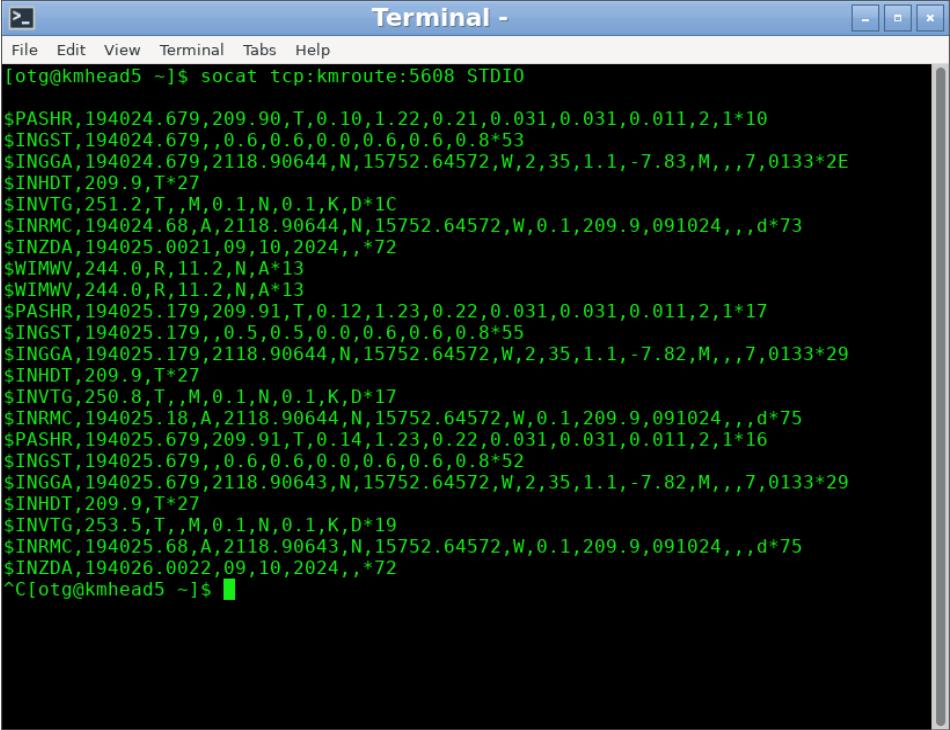


## Bidirectional Pipe Handler

- usage: socat <addr1> <addr2>

Addresses 1 and 2 can be any one of:

- TCP socket
- UDP socket (uni/multi/broadcast)
- serial device
- file
- another executable

A terminal window titled "Terminal -" with a menu bar (File, Edit, View, Terminal, Tabs, Help). The prompt is [otg@kmhead5 ~]\$. The command executed is socat tcp:kmroute:5608 STDIO. The output consists of multiple lines of green text, each starting with a dollar sign (\$) and followed by various alphanumeric characters and numbers, representing data received from the remote host. The output ends with ^C[otg@kmhead5 ~]\$ indicating the user pressed Ctrl-C to stop the process.

```
[otg@kmhead5 ~]$ socat tcp:kmroute:5608 STDIO
$PASHR,194024.679,209.90,T,0.10,1.22,0.21,0.031,0.031,0.011,2,1*10
$INGST,194024.679,,0.6,0.6,0.0,0.6,0.6,0.8*53
$INGGA,194024.679,2118.90644,N,15752.64572,W,2,35,1.1,-7.83,M,,7,0133*2E
$INHDT,209.9,T*27
$INVTG,251.2,T,,M,0.1,N,0.1,K,D*1C
$INRMC,194024.68,A,2118.90644,N,15752.64572,W,0.1,209.9,091024,,d*73
$INZDA,194025.0021,09,10,2024,,*72
$WIMWV,244.0,R,11.2,N,A*13
$WIMWV,244.0,R,11.2,N,A*13
$PASHR,194025.179,209.91,T,0.12,1.23,0.22,0.031,0.031,0.011,2,1*17
$INGST,194025.179,,0.5,0.5,0.0,0.6,0.6,0.8*55
$INGGA,194025.179,2118.90644,N,15752.64572,W,2,35,1.1,-7.82,M,,7,0133*29
$INHDT,209.9,T*27
$INVTG,250.8,T,,M,0.1,N,0.1,K,D*17
$INRMC,194025.18,A,2118.90644,N,15752.64572,W,0.1,209.9,091024,,d*75
$PASHR,194025.679,209.91,T,0.14,1.23,0.22,0.031,0.031,0.011,2,1*16
$INGST,194025.679,,0.6,0.6,0.0,0.6,0.6,0.8*52
$INGGA,194025.679,2118.90643,N,15752.64572,W,2,35,1.1,-7.82,M,,7,0133*29
$INHDT,209.9,T*27
$INVTG,253.5,T,,M,0.1,N,0.1,K,D*19
$INRMC,194025.68,A,2118.90643,N,15752.64572,W,0.1,209.9,091024,,d*75
$INZDA,194026.0022,09,10,2024,,*72
^C[otg@kmhead5 ~]$
```



# Additional uses for socat

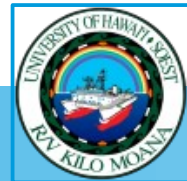
Replace DataDistrib on Kongsberg mapping computer.

The screenshot shows the 'Data Distribution - MDM 400' application window. The table below represents the data shown in the application:

Source Port	Source File	Packets	Destination : Port	Destination : Port	Destination : Port	Destination : Port	Destination File
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
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0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					
0		-1					

The screenshot shows the Windows Services console with the 'socat-emdpth' service selected. The 'NLSM service editor' dialog is open, showing the following configuration:

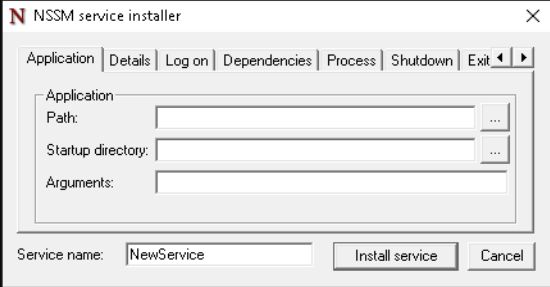
- Application: C:\Program Files\socat\socat.exe
- Path: C:\Program Files\socat
- Startup directory: C:\Program Files\socat
- Arguments: udp:recv:4310,rcvread:range=127.255.255.255/8 udp
- Service name: socat-emdpth



# nssm - <https://nssm.cc/download>

```
Command Prompt
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>nssm.exe install NewService
Administrator access is needed to install a service.

C:\Users\otg>
```

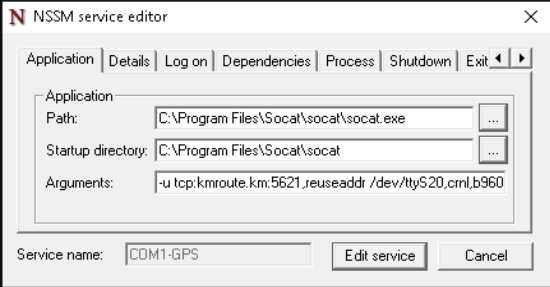


```
Command Prompt
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>
C:\Users\otg>nssm.exe install NewService
Administrator access is needed to install a service.

C:\Users\otg>nssm.exe edit com1-gps
Can't open service!
OpenService(): Access is denied.

Administrator access is needed to edit a service.

C:\Users\otg>
```





# Additional uses for nssm

- Reliable way to start up anything that needs to be started with windows and runs in the background.
- syncthing
- socat

Description:  
Syncthing Service

The image shows a Windows Services console window with a list of services. The 'Syncthing' service is highlighted. Below it, the 'NSSM service editor' dialog box is open, showing the configuration for the 'Syncthing' service. The dialog has tabs for 'Application', 'Details', 'Log on', 'Dependencies', 'Process', 'Shutdown', and 'Exit'. The 'Application' tab is active, showing the following fields:

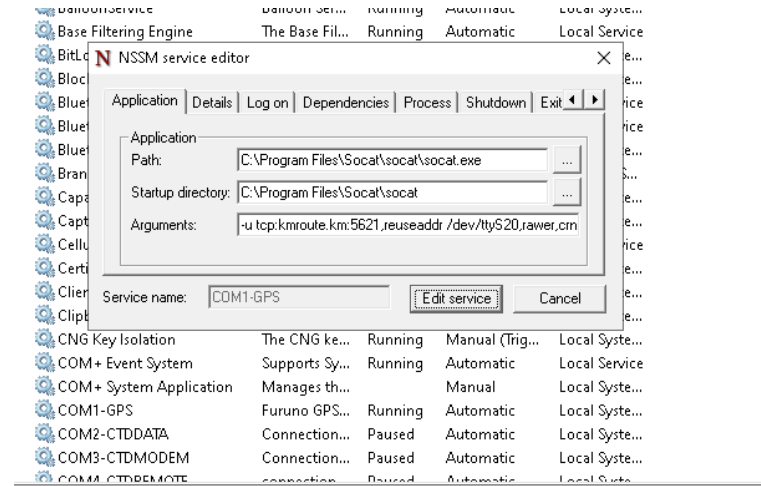
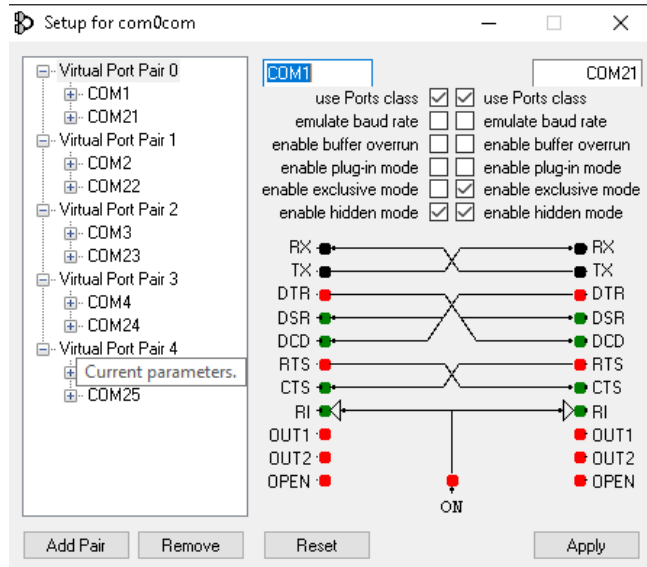
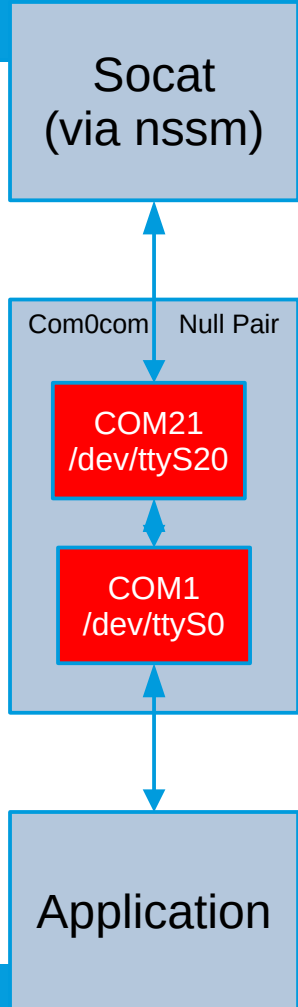
- Application Path: C:\Program Files\Syncthing\syncthing.exe
- Startup directory: C:\Program Files\Syncthing
- Arguments: -no-browser --no-console

At the bottom of the dialog, the 'Service name' is set to 'Syncthing', and there are 'Edit service' and 'Cancel' buttons.

Service Name	Description	Status	Start Type	Log On As
SSDP Discovery	Discovers n...	Running	Manual	Local Service
State Repository Service	Provides re...	Running	Manual	Local System
Still Image Acquisition Events	Launches a...		Manual	Local System
Storage Service	Provides en...	Running	Automatic	Local System
Storage Tiers Management	Optimizes t...		Manual	Local System
Sync Host_48d7e	This service ...	Running	Automatic	Local System
Syncthing	Syncthing S...	Running	Automatic	Local System
UPnP Device Host	Allows UPn...		Manual	Local System
User Data Access_48d7e	Provides ap...	Running	Manual	Local System
User Data Storage_48d7e	Handles sto...	Running	Manual	Local System
User Experience Virtualizati...	Provides su...		Disabled	Local System

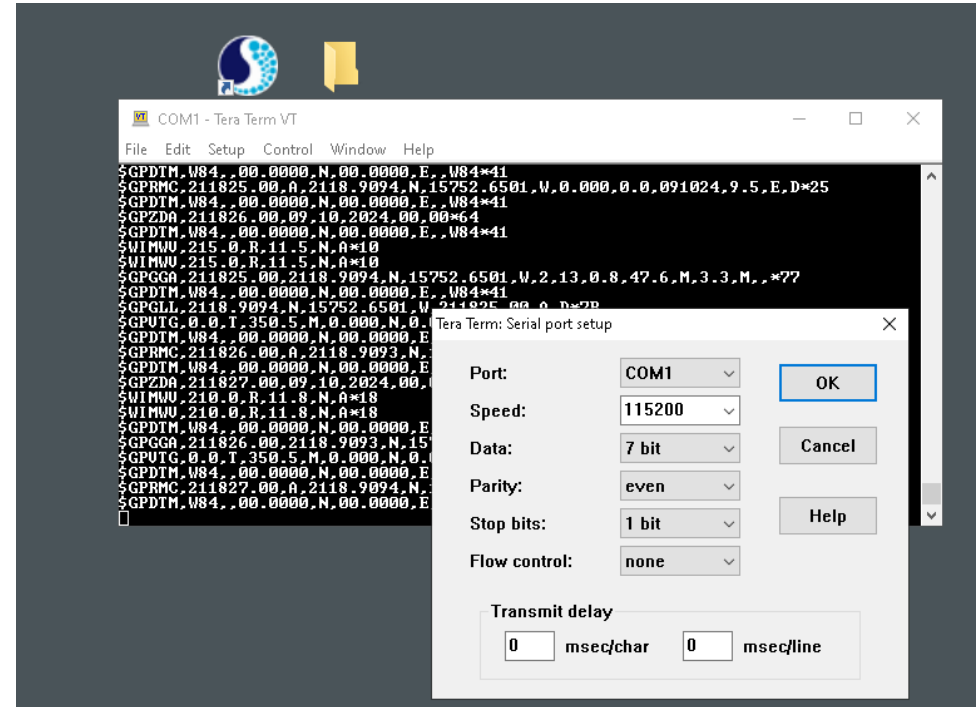
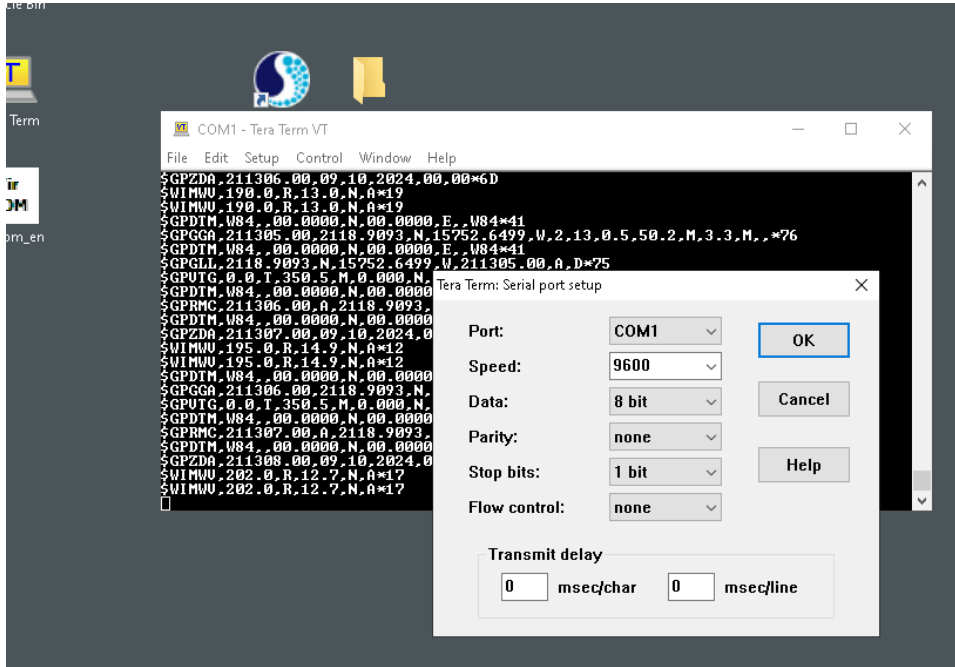


# Pipeline



# Interesting Behaviors

Virtual com ports are baudrate agnostic



# CTD

GPS – Com1  
Data – Com2  
Modem – Com3  
SBE14 – Com4  
  
Serial data out  
– Com5

