MS-DMT and AMT Installation and Use for M110a Digital Communications

DOCUMENT UNDER CONSTRUCTION

INTRODUCTION

This document describes how **MS-DMT** and **AMT**, digital communications software for MIL-STD-188 **M110a** transmission and reception, are installed and configured. M110a is commonly used in military communications, and some military radios have M110a hardware modems built-in, so MARS operators need to be compatible with this communications mode.

Introduction to MS-DMT

The MIL-STD Data Modem Terminal (MS-DMT) software provides basic M110a modulation and demodulation (modem) functionality along with basic transmit and receive terminal windows for composing and displaying text messages.

Introduction to AMT

Automated Message Terminal (AMT) is a more advanced terminal application that supports breaking a message into smaller blocks for transmission, and integrating a series of received blocks during reception. M110a has the property that loss of receive synchronization is frequent with long transmissions under difficult radio conditions. Breaking a large message into smaller blocks reduces the probability of synchronization loss and reduces the time required to re-transmit fills for lost blocks.

Introduction to Com0Com

The two software applications, MS-DMT and AMT, communicate with one another using serial ports.
1) A null modem cable and real hardware RS-232 or USB to RS-232 Serial Ports is required, or
2) Virtual serial port null modem (a virtual pair) is required.

Software applications to support virtual serial ports include Com0Com, and VSPE.

This document also describes the installation and configuration of these software packages

Introduction to VSPE

VSPE not only supports Virtual Pairs but also Virtual Splitters. If multiple software applications need to communicate with the Radio Transceiver, i.e. MS-DMT and FLDIGI, to assert PTT via the RTS signal from a COM port, a VSPE Virtual Splitter can be used to do so. This allows a station to simultaneously operate Olivia, MT63, and M110a, not just for receive, but also to transmit, without shutting down either of the two applications. This document also describes the installation and use of VSPE to support simultaneous Olivia, MT63, and M110a with MS-DMT/AMT and FLDIGI/AMP.

System Block Diagram of MS-DMT, AMT, and Radio Transceiver

The primary radio is an Apache Labs Anan 100D, CAT port = COM6, PTT port = COM8.
The secondary radio is a TS-2000x with CAT port on COM3 and PTT/CW/FSK port on COM4.
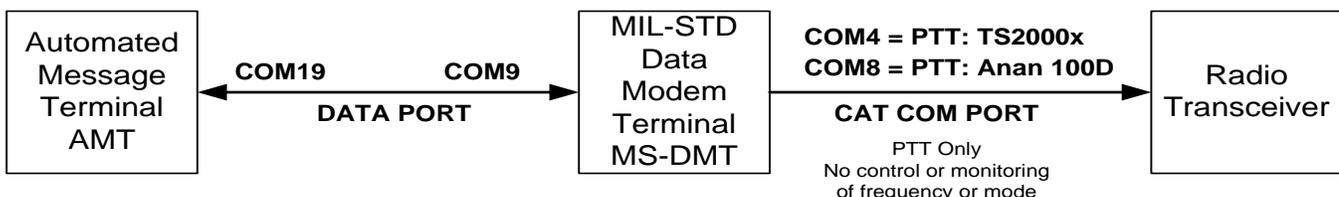
MS-DMT

MIL STD Data Modem Terminal (MS-DMT) supports the MIL-STD-188-116 – Interoperability Standards for Information and Record Traffic Exchange. This communications mode is suitable for an audio voice channel 2.8 KHz in width from 100 Hz to 2900 Hz in the audio passband, compatible with most Amateur Radio Transceivers.

There are several versions of the standard for different modes, but the relevant one is **MIL-STD-188-172 – Mode II**.

1. MIL-STD-188-171 supports Mode I – ARQ mode with blocks for terrestrial.
2. **MIL-STD-188-172 supports Mode II** – non ARQ mode
   also previously in DCAC 370-D175-1 and MIL-STD-188-116-2.
3. MIL-STD-188-173 supports Mode V – ARQ with channel coordination for terrestrial.
4. MIL-STD-188-174 supports Mode VI – ARQ for terrestrial and satellite.
5. MIL-STD-TBD supports Mode VII - future

Installing MS-DMT

MS-DMT is available at URL: http://www.n2ckh.com/MARS_ALE_FORUM/MSDMT.html

See the **section** entitled: MIL-STD Data Modem Terminal (MS-DMT) software

First time users should download: **MS-DMT v1.01 Build 1.0.1.1 full install (INSTALL.EXE) plus . . .**

There *IS* a video describing how to install: **Video on the basic MS-DMT install**

Other documentation is available in this section of the WEB page at the above URL.

Configuration of MS-DMT

The following is the configuration of MS-DMT used at AFA1DI / W1TR for the TS-2000x transceiver controlled by two USB to Serial RS-232 devices.

Data Port Configuration

The **DATA PORT** (shown as COM9 here) is the Data Communications **Interface between MS-DMT and AMT**.

The **Baud Rate** is not important for use with Com0Com because it is *virtual*, so pick any arbitrary number such as 19200.

If using real hardware serial COM ports and a null modem cable, the baud rate for MS-DMT and AMT must match.

CAT Port Configuration

The **CAT COM PORT** (shown as COM4 or COM8 here) is the COM port used to control the Transceiver **PTT** using the **RTS** handshake line. **PTT** should be configured as **RS232**.

There is **no actual CAT control**, i.e. control and monitoring of frequency and mode, in MS-DMT, **only PTT**, therefore **Baud Rate is Irrelevant** so pick any arbitrary number such as 9600.

DTR/RTS CheckBox should be **checked** to select the **DTR** line for PTT,

unchecked to select the **RTS** line for PTT (which is the normal HAM installation).

Example MS-DMT Configuration

Audio Configuration

Use the **PCSDM** button to configure the audio input and output between the computer and the transceiver.
Typically you will use microphone or line-input and speaker output, but this is dependent on the sound card accessories available on your computer such as Signal Link, other external USB audio devices, or Virtual Audio Cable for SDR radios.

The AMT WEB page: **http://amtog.org/amt/** has audio setup information for Signal Link and SDR radios that use Virtual Audio Cable like the FLEX and Apache Labs SDR radios.

Setup for TS-2000x – use microphone / speaker
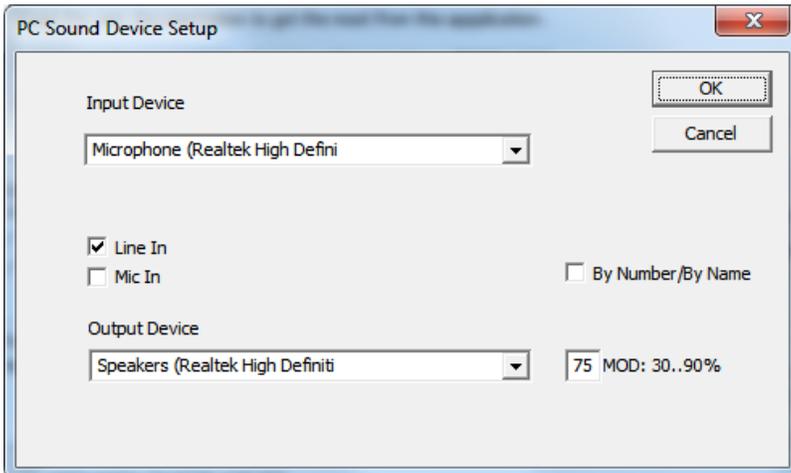
Setup for Apache Labs Anan 100D SDR – use Virtual Audio Cable
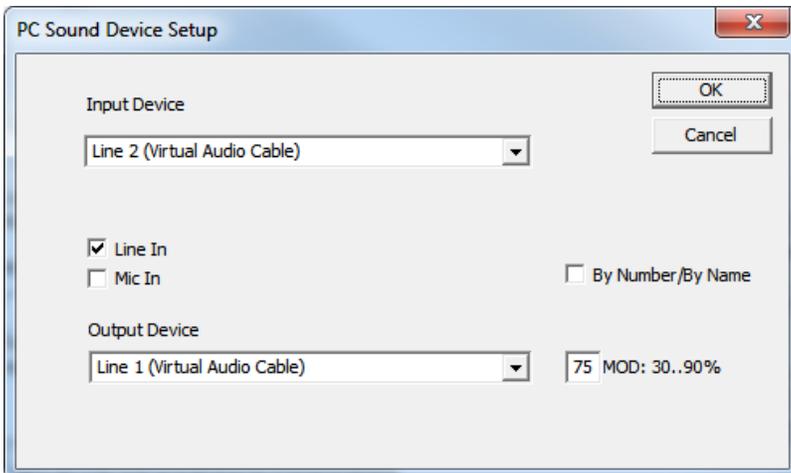
Audio Setup for Apache Labs Anan 100D:

Use 0 dB Gain on VAC TX / RX, adjust using Windows Sound Mixer for 50% output (50w)

Balance the MS-DMT (MIL-STD Data Modem Table) and FLDIGI output levels so the same VAC gain can be used (0 dB).

Using MS-DMT

To send a message, place the message text in the lower Transmit Window and use the **Send** Button.

Use the **INC** or **DEC** buttons to increase or decrease the transmission data, rate bits per second (BPS).
1200 or 600 bps is very fast for an HF radio circuit but will work when conditions are good.
Better reliability will be achieved with 300 or 150 BPS. If conditions are difficult, reducing speed to 75 bps might be necessary.

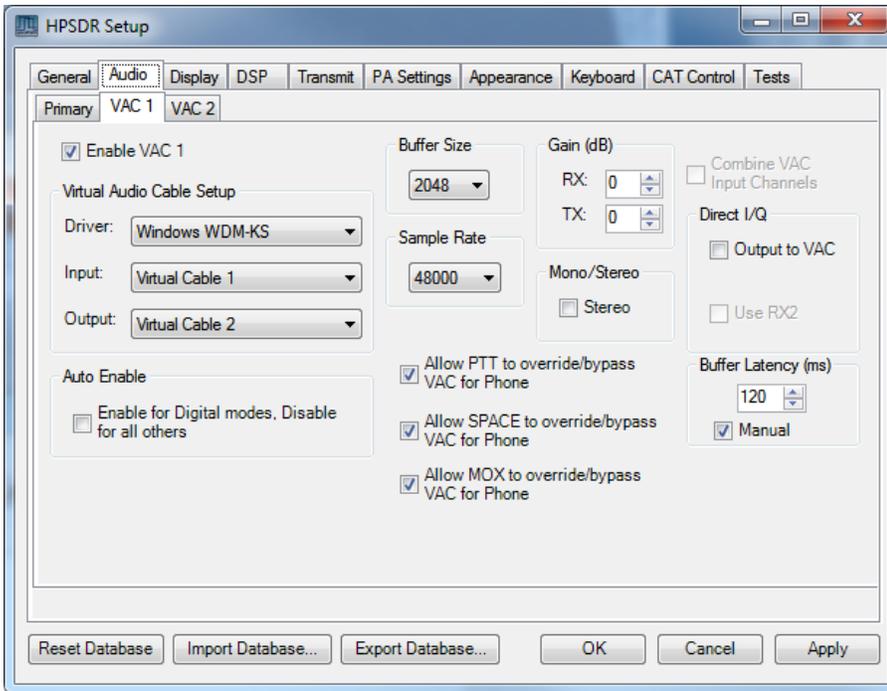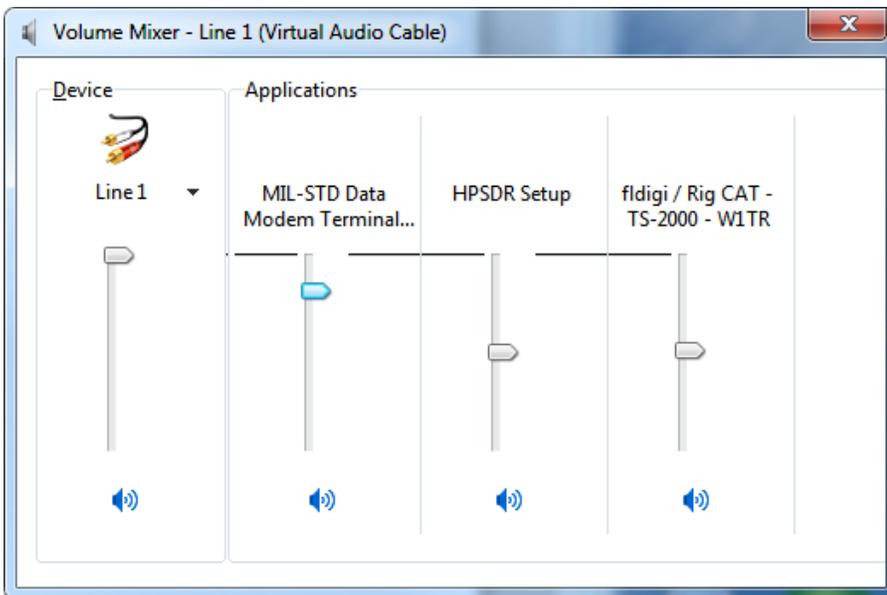To receive messages, configure MS-DMT properly and when M100a transmissions are received by the Radio Transceiver, the message will display in the upper Receive Window. The software automatically detects the BPS rate being sent.

Automated Message Terminal (AMT)

The Automated Message Terminal (AMT) is an accessory to MS-DMT that breaks a message into smaller blocks for transmission and reception. The M110a emission mode has the property that receivers can frequently loose clock synchronization with long transmissions during poor radio conditions. Breaking the message into separate smaller blocks can reduce the probability of losing synchronization and reduce the time needed to ask for and supply fills.

Installing AMT

AMT (formerly AKA Block Term) is available at URL: **http://amtog.org/amt/**
To download, use the following item:
Already familiar with everything on this page? Download and install AMT V2.2.4.

This WEB page has plenty of help on the use of AMT, and also has information regarding the use of the **Com0Com** and **VSPE** virtual serial port software available from K5FR.

Example Configuration of AMT

The following shows the configuration of AMT at AFA1DI / W1TR.
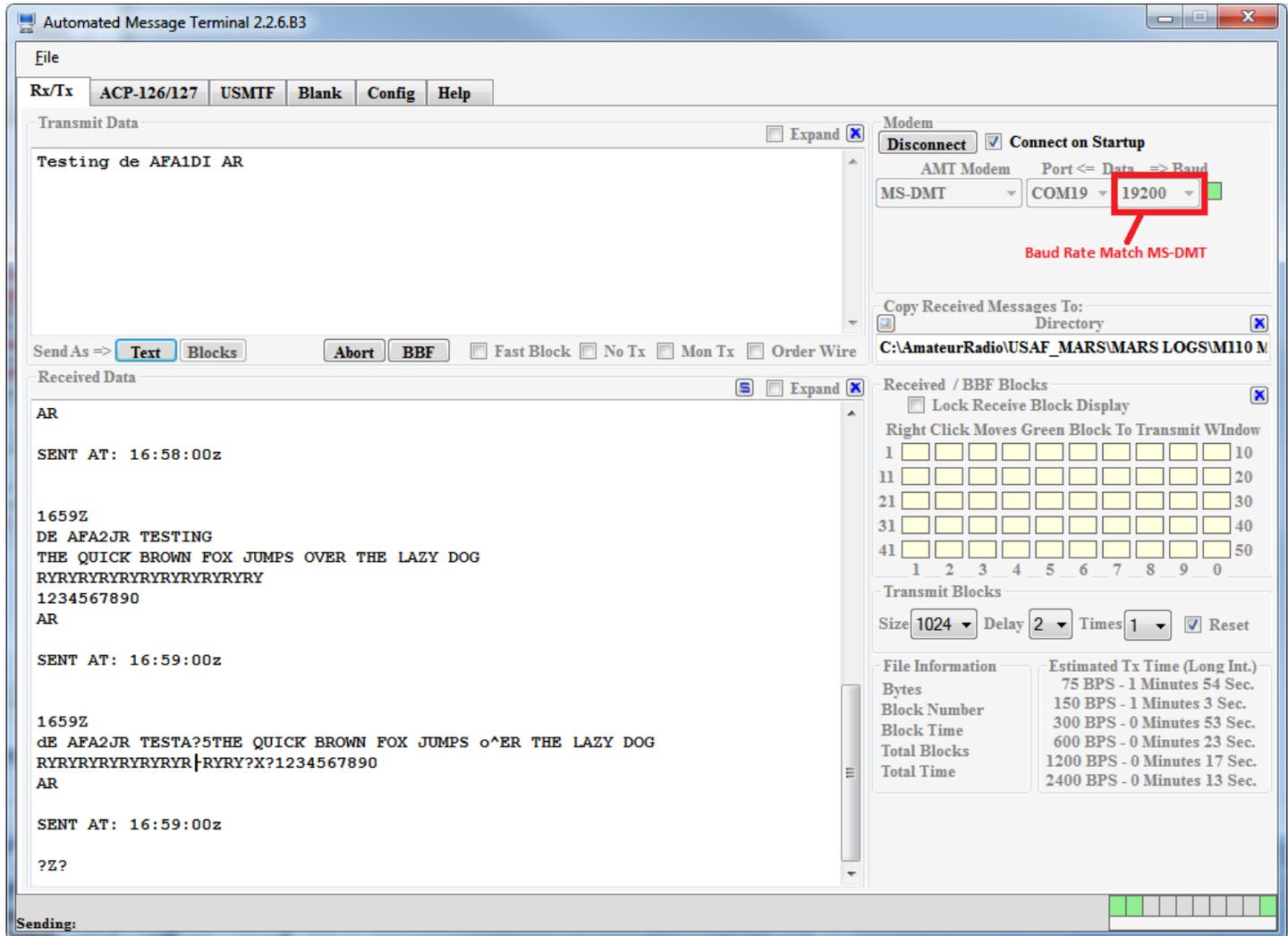
The **DATA PORT** used is **COM19** at **19200** baud, same baud rate as the **DATA PORT COM9** for **MS-DMT**.

COM19 is used instead of COM9 (used for MS-DMT) because these two COM ports belong to a virtual pair of ports that are connected via a software virtual null modem.

Using AMT

To send, enter data in the **Transmit Data** window.

Use the **Text** button to send the message **without blocking**.

Use the **Blocks** button to send the message **using blocking**.

To receive, simply setup MS-DMT properly interfaced to AMT. When M110a transmissions are received by the Radio Transceiver, the message will display in the **Received Data** window. Messages received will be saved to disk in the directory selected.

Com0Com Virtual Serial Port

Installing Com0Com

Com0Com is available for downloading at : http://com0com.sourceforge.net/

Download and install the software.

The installation process requires administrative privileges.

32 Bit Version:

http://sourceforge.net/projects/com0com/files/com0com/

Use the following link:

Looking for the latest version?

Download com0com-3.0.0.0-i386-and-x64-unsigned.zip (277.0 kB)

64 Bit Version

http://sourceforge.net/projects/com0com/files/com0com/2.2.2.0/

Use the following link:

com0com-2.2.2.0-x64-fre-signed.zip

Extract and run the *.exe in the ZIP file.

The Com0Com icon will appear on the screen.

Example Configuration of Com0Com

Com0Com allows the creation of virtual serial port pairs that emulate a null modem.

Use the **Add Pair** button to add a pair of COM ports.

Use the **Remove** button to delete a pair of COM ports.

The following is the Com0Com GUI showing the configuration in use at AFA1DI / W1TR.

Note Virtual Port Pair 0: COM9 to COM19 which is used for the MS-DMT to AMT data communications.

Note: Diagram below shows COM6 / COM16 which is obsolete.

Note: Com0Com is no longer used at W1TR / AFA1DI in favor of VSPE.
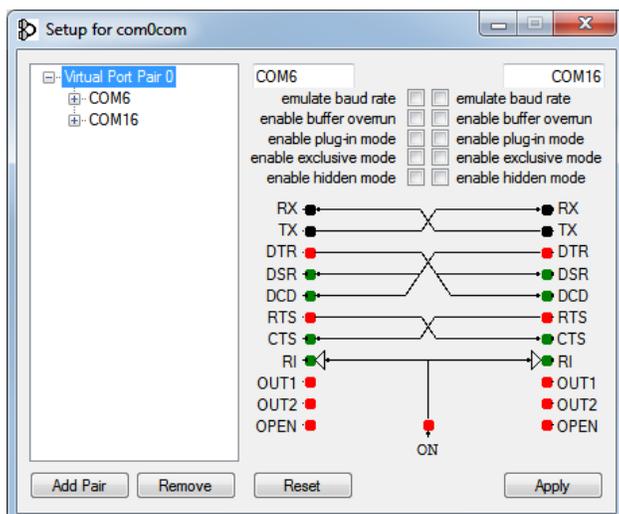
VSPE

VSPE is an alternative virtual serial port program to Com0Com **which also allows port sharing**, i.e. PTT from both FLDIGI and MS-DMT can be used to control your transceiver.

Installing VSPE

Download VSPE from http://www.eterlogic.com/Downloads.html

Download the Software

The DOWNLOAD button will download a ZIP file with the following Information in it:
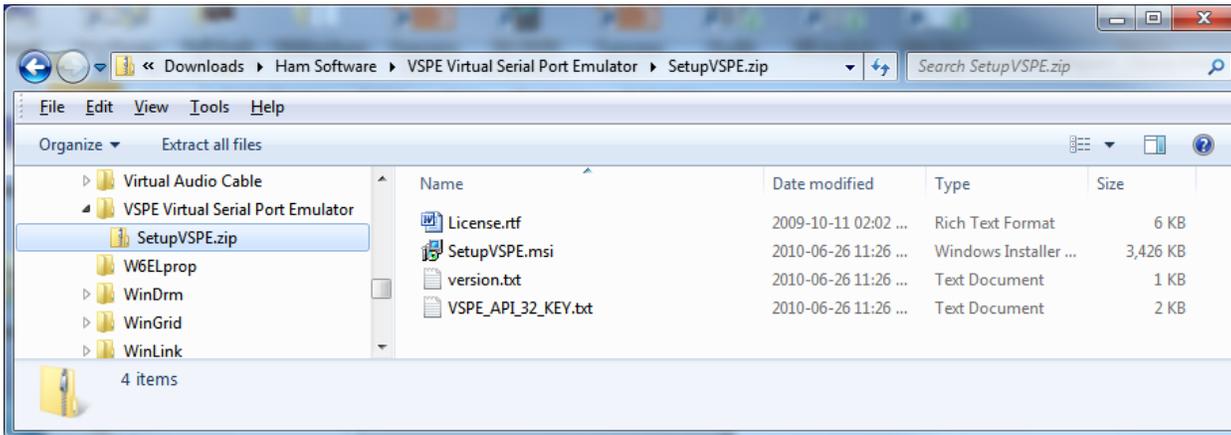
The license, version, 32 bit key, and the install package are in the ZIP file.

Install the Software

Double click on the *.msi file and VSPE will be installed by the Microsoft Installer.
The install works on both 32 bit and 64 bit MS Windows operating systems...

The VSPE icon will appear on the desktop.

You must **purchase a KEY for the 64 bit version** to work ($24).
Use the **BUY VIA REGNOW** button under the **LICENSE FOR 64 BIT PLATFORM (X86_64).**
This is a standard credit card purchase dialog that requires the usual information and an EMAIL to which the key will be sent.

Download the HELP File

Under the **ONLINE DOCUMENTATION** section, use the **Download CHM** button which downloads a *.chm file
(MS Windows Compiled HTML Help file).

Setting Up VSPE

Radio setup at AFA1DI / W1TR

AFA1DI / W1TR is a Single Operator Two Radio Setup,

Radio #1 is a Kenwood TS-2000x,

Radio #2 is an Apache Labs Anan 100D SDR.

System Block Diagram of AFA1DI / W1TR - SO2R

The AFA1DI / W1TR station can be used for complex MARS Operations or HAM Contesting.

Hardware

Software

VSPE

MMTTY
N1MM — N1MM CAT (green)
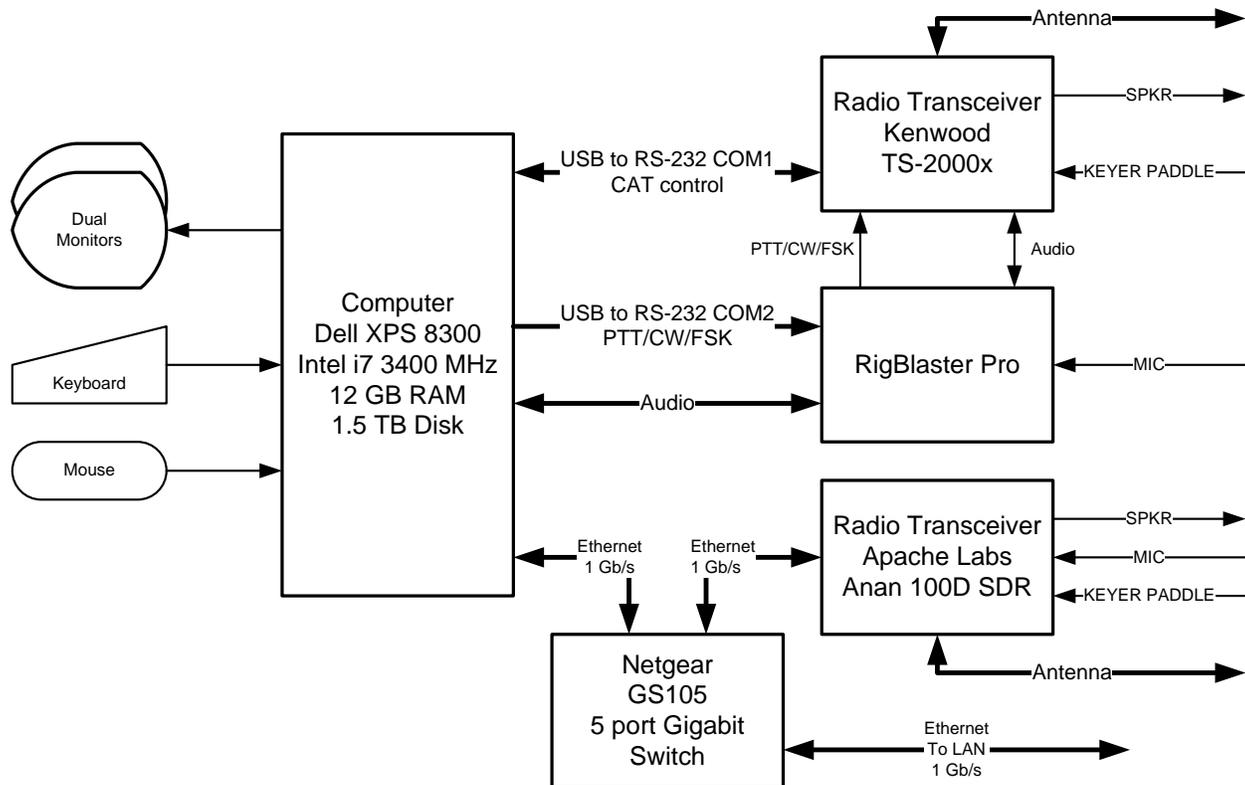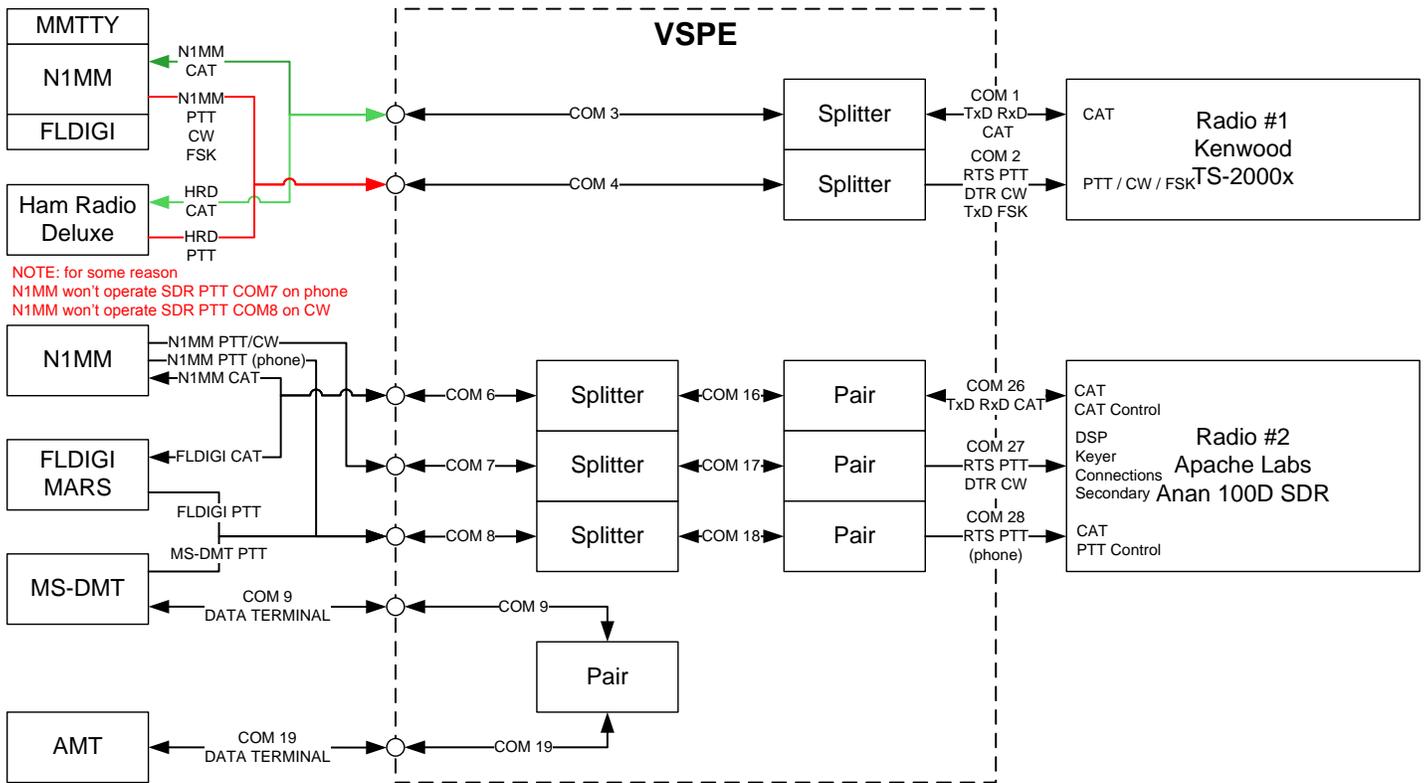FLDIGI — N1MM PTT CW FSK (red)

Ham Radio Deluxe — HRD CAT (green), HRD PTT (red)

NOTE: for some reason
N1MM won't operate SDR PTT COM7 on phone
N1MM won't operate SDR PTT COM8 on CW

COM 3 → Splitter — COM 1 TxD RxD CAT — CAT — Radio #1 Kenwood TS-2000x
COM 4 → Splitter — COM 2 RTS PTT DTR CW TxD FSK — PTT / CW / FSK

N1MM
— N1MM PTT/CW
— N1MM PTT (phone)
— N1MM CAT

FLDIGI MARS — FLDIGI CAT
FLDIGI PTT

MS-DMT — MS-DMT PTT
COM 9 DATA TERMINAL

AMT — COM 19 DATA TERMINAL

COM 6 → Splitter ← COM 16 ← Pair — COM 26 TxD RxD CAT — CAT / CAT Control — Radio #2 Apache Labs Anan 100D SDR
COM 7 → Splitter ← COM 17 ← Pair — COM 27 RTS PTT DTR CW — DSP Keyer Connections
COM 8 → Splitter ← COM 18 ← Pair — COM 28 RTS PTT (phone) — Secondary / CAT PTT Control

COM 9 ← COM 9 → Pair
COM 19 ← COM 19

Virtual Serial Ports Emulator (Emulation started)

File View Language Emulation Device Help

Title	Device	Status
COM1 => COM3	Splitter	Ready
COM2 => COM4	Splitter	Ready
COM16 <=> COM26	Pair	OK
COM17 <=> COM27	Pair	OK
COM18 <=> COM28	Pair	OK
COM16 => COM6	Splitter	OK
COM17 => COM7	Splitter	Ready
COM18 => COM8	Splitter	OK
COM9 <=> COM19	Pair	OK

{Wednesday, February 11, 2015} [COM16 => COM6] Initialization...OK (1)

{Wednesday, February 11, 2015} [COM17 => COM7] Initialization...OK (1)

{Wednesday, February 11, 2015} [COM18 => COM8] Initialization...OK (1)

{Wednesday, February 11, 2015} [COM9 <=> COM19] Initialization...OK

Ready

http://www.eterlogic.com

Radio #1 TS-2000x

COM1 is a USB to Serial RS-232 COM port for the TS-2000x CAT control.
COM2 is a USB to Serial RS-232 COM port for the TS-2000x PTT/CW KEY/FSK.
COM1 => COM3 is a VSPE splitter that allows COM1 to be accessed by up to 4 applications as COM3.
COM2 => COM4 is a VSPE Splitter that allows COM2 to be accessed by up to 4 applications as COM4.

CAT Port Splitter Configuration
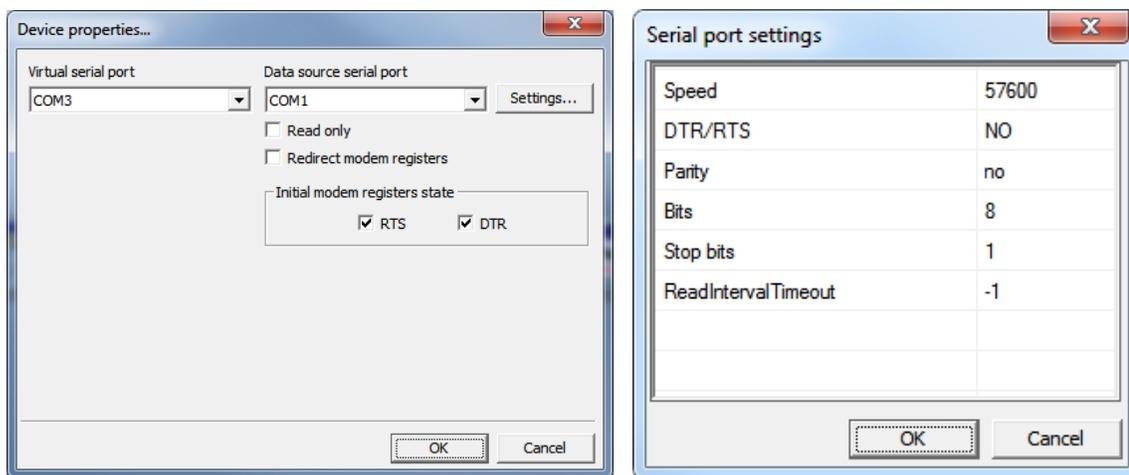
COM1 => COM3
COM6 => COM16
Redirect Modem Registers is NOT asserted, ignoring the computer RTS and DTR settings.
RTS and DTR are asserted to bypass hardware handshaking and always assert flow control OK.
DTR/RTS is set to NO.
Perhaps the above settings should be revisited to actually USE RTS and DTR for hardware flow control.
Serial Port settings are setup to match hardware COM1.

Device properties...		
Virtual serial port	**Data source serial port**	
COM3	COM1	Settings...
	☐ Read only	
	☐ Redirect modem registers	
	Initial modem registers state	
	☑ RTS ☑ DTR	
		OK Cancel

Serial port settings	
Speed	57600
DTR/RTS	NO
Parity	no
Bits	8
Stop bits	1
ReadIntervalTimeout	-1
	OK Cancel

PTT / KEY / FSK Port Splitter Configuration
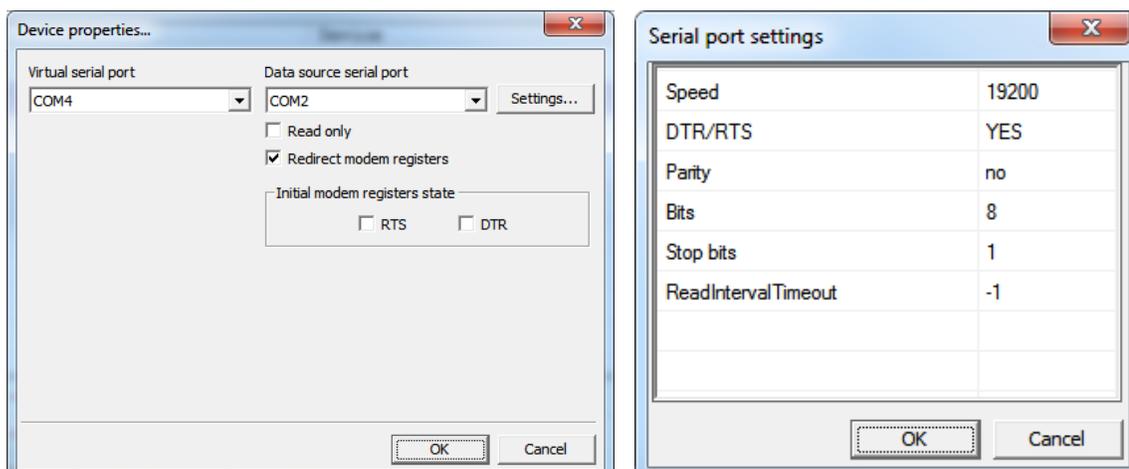
COM2 => COM4
COM17 => COM7
COM18 => COM8
Modem Registers are redirected to pass DTR and RTS Signals from the Computer.
DTR/RTS is set to YES.
Serial Port baud rate and other settings don't matter since only DTR/RTS are used, so DTR/RTS are set to YES.
I'm not sure how EXTFSK will work with this for MMTTY FSK RTTY, this has not been tried.

Device properties...		
Virtual serial port	**Data source serial port**	
COM4	COM2	Settings...
	☐ Read only	
	☑ Redirect modem registers	
	Initial modem registers state	
	☐ RTS ☐ DTR	
		OK Cancel

Serial port settings	
Speed	19200
DTR/RTS	YES
Parity	no
Bits	8
Stop bits	1
ReadIntervalTimeout	-1
	OK Cancel

Radio #2 Apache Labs Anan 100D

COM26 is a VSPE Virtual Port for the CAT connection for Apache Labs Anan 100D.

COM16 <=> COM26 is a VSPE Pair that allows COM25 to be accessed as COM15.

COM16 => COM6 is a VSPE Splitter that allows COM15 to be accessed by up to 4 applications as COM6.

This allows sharing of the CAT port by multiple applications like FLDIGI, N1MM, HRD, W1TR Rig Control.

COM27 is a VSPE Virtual Port for the RTS PTT and DTR CW KEY connection for Apache Labs Anan 100D.

COM17 <=> COM27 is a VSPE Pair that allows COM27 to be accessed as COM17.

COM17 => COM7 is a VSPE Splitter that allows COM17 to be accessed by up to 4 applications as COM7.

This allows sharing of the PTT and CW ports by multiple applications like FLDIGI, N1MM, HRD, W1TR Rig Control for CW operation.

COM28 is a VSPE Virtual Port for the DTR PTT connection for Apache Labs Anan 100D.

COM18 <=> COM28 is a VSPE Pair that allows COM28 to be accessed as COM18.

COM18 => COM8 is a VSPE Splitter that allows COM18 to be accessed by up to 4 applications as COM8.

This allows sharing of the PTT KEY port by multiple applications like FLDIGI, N1MM, HRD, W1TR Rig Control for phone operation.

Device Properties for the splitters
Use Redirect Modem Registers
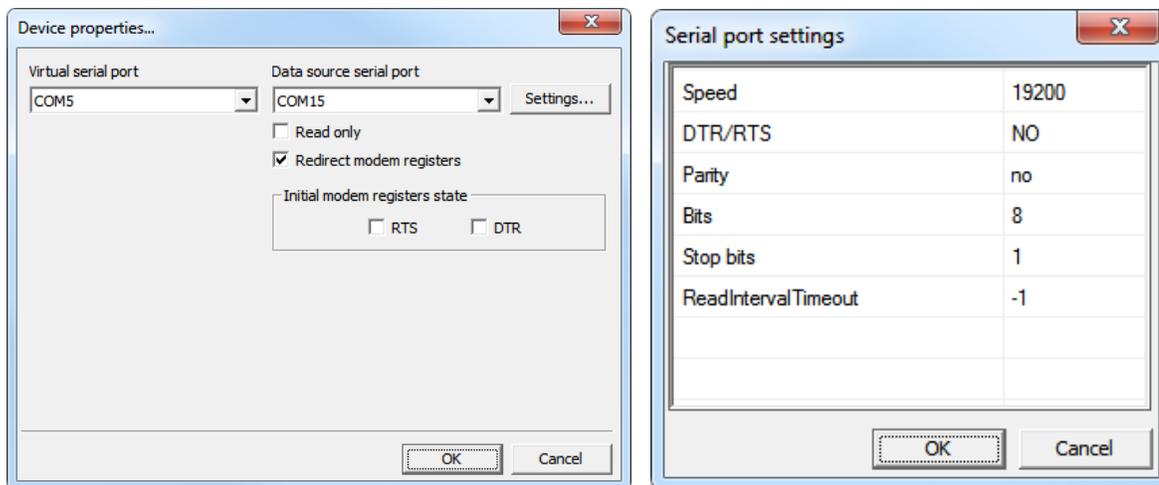
AMT to MS-DMT Data Port

COM9 <=> COM19 is a VSPE Pair that allows COM19 to be accessed as COM9.

COM9 is the MS-DMT Data Port connection to the AMT Data Port on COM 19.

This allows AMT to communicate with MS-DMT.

DDutil

DDutil allows sharing of COM ports among multiple software applications, particularly for Rotor Control, Antenna Switch Control, Linear Amplifier Control, etc.

THIS SECTION IS NOT STARTED YET

Installing DDutil

Download DDutil from http://k5fr.com/ddutilwiki/index.php?title=Latest_Revision

Extract the contents of the ZIP file (only one file *.msi).

Install the software by double clicking on the *.msi file.

The DDUtil icon will appear on the screen

SUMMARY

The MIL-STD Data Modem Terminal (MS-DMT) and Automated Message Terminal (AMT) are software applications that the MARS program uses for data communications using the MIL-STD-188 M110a digital communications mode. MS-DMT is the basic modem and terminal software and the AMT is an advanced message terminal that is capable of simple text or data block transmission and reception. The two software applications communicate using serial interface, either by a real hardware serial RS-232 (COM) ports and a null modem cable, or by using a virtual serial port software package such as Com0Com or VSPE. The installation, configuration, and use of this software are described.