MT300
Pico Broadcaster
Version 1.0

OPERATOR MANUAL

August 21, 2012

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1. Preface

This document provides operator information on how to set up the MT300 (Ethernet to Broadcast) Pico Broadcaster. This device requires professional installation.

2. IMPORTANT NOTICE

This equipment has been tested and found to comply with the rules for TV bands devices, pursuant to part 15 of the FCC rules. These rules are designed to provide reasonable protection against harmful interference. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

(1) Reorient or relocate the receiving antenna.
(2) Increase the separation between the equipment and receiver.
(3) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
(4) Consult the manufacturer, dealer or an experienced radio/TV technician for help.

3. Introduction

The Meld Technology MT300 White Space radio must be professionally installed by an trained installer. The installation must be in accordance with 47 CFR Part 15 Subpart H and the instructions contained in this manual. Only the following components are approved for use with the radio.

Power Supply: Stontronics 3A-401WP12
Antenna: U Tek Technology Co. EA-79X-1

3.1   Overview

MELD develops Pico Broadcast products for wirelessly distributing content to any DTV ever made for the North American market using newly opened white space frequencies and broadcast standard modulation methods.
The advantages of Personal Broadcast based solutions are:
▪   Lower cost labor for installation, modification and support

- Economy of scale using standard DTV receivers and components verses other specialized non-standard receivers and communication methods.
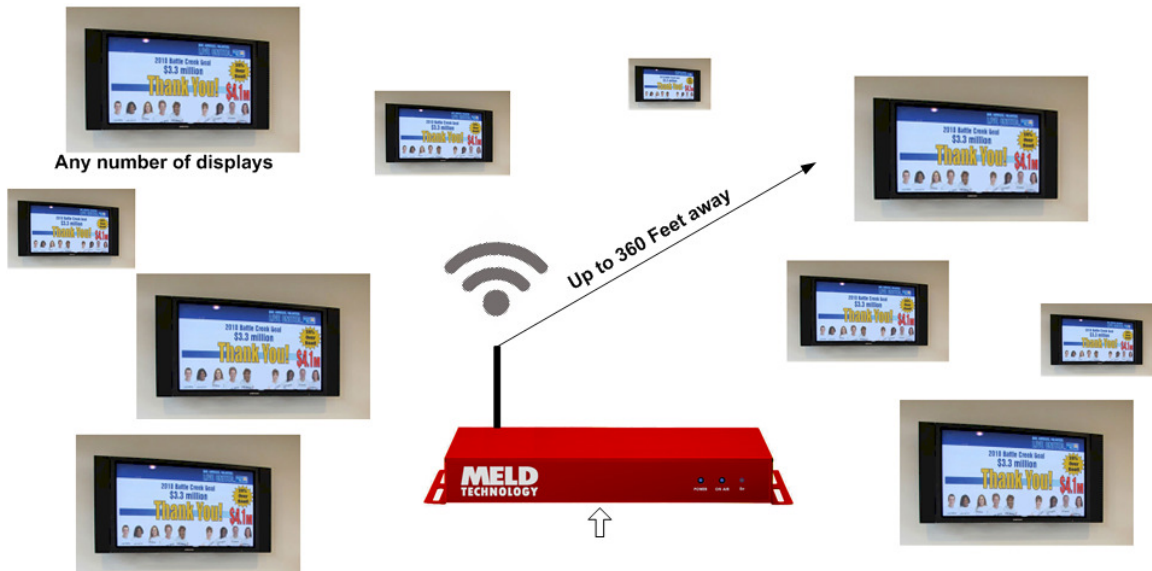
MELD's Pico Broadcaster sends live full HD content wirelessly to any number of DTVs located in an unobstructed effective range of 360 feet, about the size of a football field. No cabling or infrastructure equipment investment needed.

3.2   Default Settings.

The device has two IP address.

1) System Control CPU (default)
>   IP address: 192.168.1.194
>   Gateway IP: 192.168.1.254

2) Digital Modulator (default IP address)
>   IP address: 192.168.1.193
>   Port: 5002

3) Power levels:
>   Output Power: 11 is the highest rated power
>   01 is the lowest available power
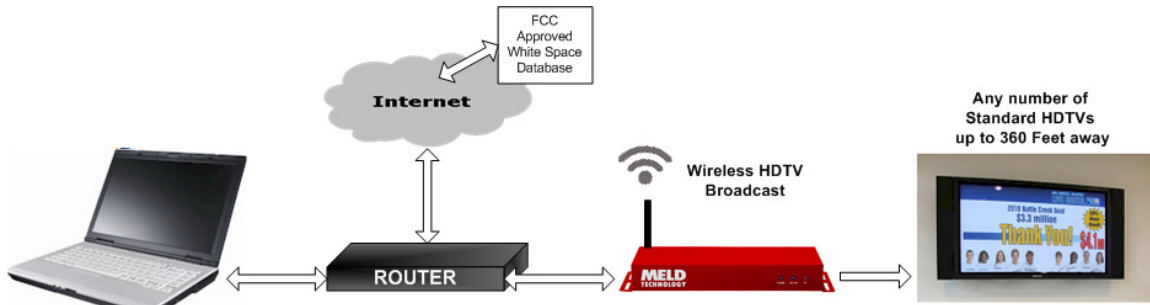
3.3   General Description

**Figure 1 - Typical Setup for Device configuration and TVWS access**

The MT300 is an easy to use Fixed TV bands device using a VSB modulator that is designed to provide low-power transmission of a DTV compatible signal over a limited area.   It is designed to not interfere with licensed broadcast transmissions and complies with the FCC CFR 47 Part 15 subpart H rules for TV Band devices. It is designed to work with the tuner input of any Digital TV sold in North America. The MT300 is designed to accept properly formatted MPEG2 transport streams from a local PC running VLC or similar streaming software or a media server. The transmitted signal is compliant with the tuner input of a Digital TV receiver.

3.4   Intellectual Property Warning

Some of the concepts described in this document are protected by appropriate patent protections or other legal means. These areas are identified in the text as being proprietary. For additional information on these subjects please contact MELD directly.

The device described herein is protected by US Patent #8,063,996, other patents pending.

3.5   System Architecture
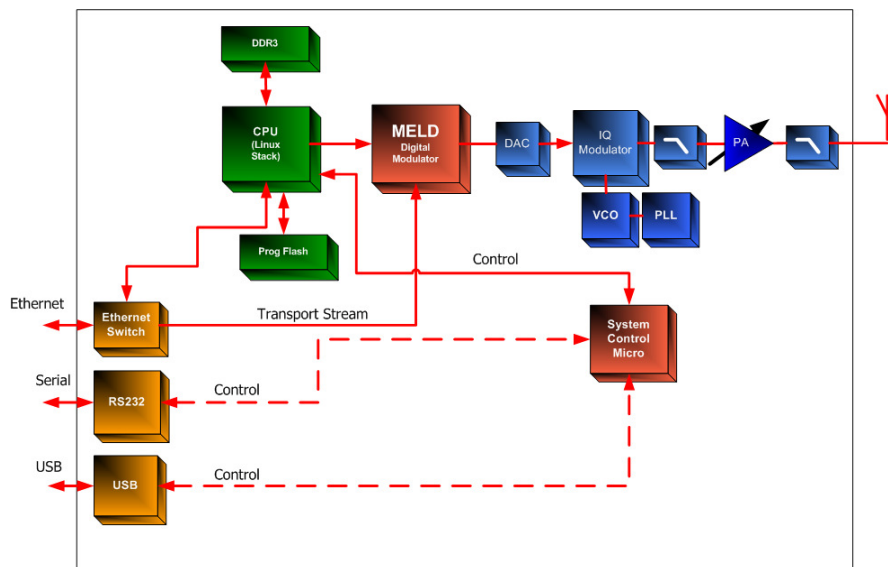
The device has two IP address:

System Control CPU (default)

       IP address: 192.168.1.194,
       Gateway IP: 192.168.1.254

       This address points to a web form used for user registration and setting up the radio for FCC compliant operation including database access, and radio control for operational parameters of the system, such as preferred channels and power.

Digital Modulator (default IP address)

       IP: 192.168.1.193
       Port: 5002

       This IP address is for Transport Stream content going directly to the MELD Digital Modulator for ATSC modulation.

3.6   Applications in Digital Signage

Pico Broadcast HD video distribution would enable airports, hotels, restaurants, bars, schools, hospitals, professional, industrial applications to wirelessly send high-quality video to any number of screens.

- Proven reliable: Used around the world; day in, day out, digital broadcast TV reliably sends perfect clear HD images and sound over large areas.
- Completely wireless: No messy wires run, hide or trip over.
- No external box need: Signal is 100% compatible with any DTV ever built.

3.7   List of abbreviations
ATSC is the Government "Standard" for the Digital (RF) Broadcast Signal
8VSB is the name of the modulation standard used in ATSC Systems
SMPTE 310M is the electrical interface that carries MPEG-2 transport streams to 8VSB modulators
PSIP is the name of the "table" structure that defines the structure and order of the MPEG Streams in a valid broadcast stream ... per government regulations of USA
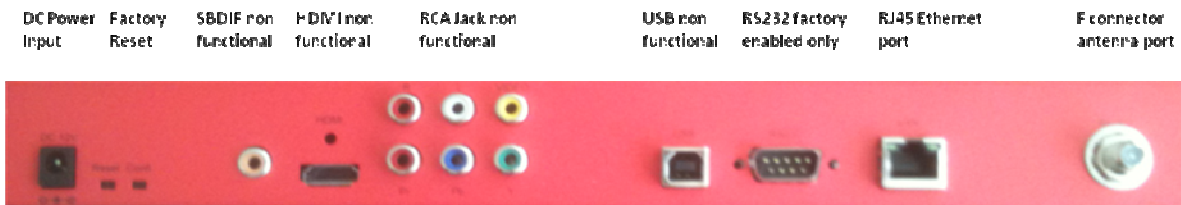
4. Installation

4.1 Front/Rear Panel Interface
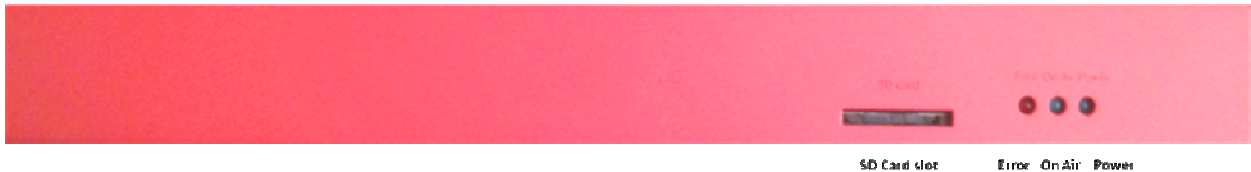
It is recommended the MT300 be installed and located in a secure area such as a network closet or operations center. The antenna may be mounted remotely in cases where such locations do not result in the desired area of RF coverage.

4.2 Setting up MT300 for first time use

To configure the device for the first time:

Connect a PC to the MT300 Ethernet port and set the computers IP Address to a static IP address on the same subnet as the MT300 (e.g., 192.168.1.100). This can be done as a direct connection or via a router, please reference figure 1 and figure 2.

Note: The MT300 needs internet access to be able to operate. The transmitter will not be enabled until the device successfully registers with and receives a channel list from the TV Bands database service.
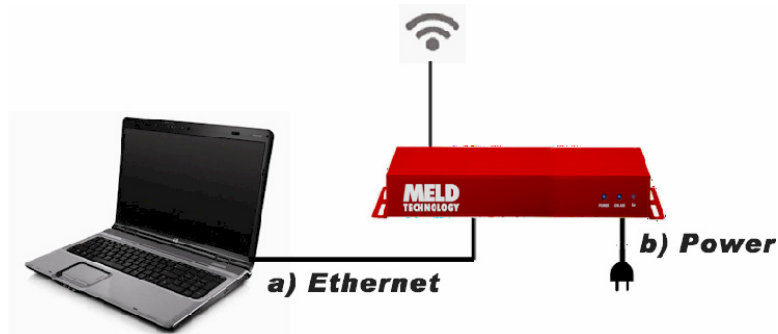
Figure 2 – Alternative setup for device configuration

Connect the antenna provided to the RF port located on the backside of the device.
(Use of a different antenna other than the one provided is prohibited)

Plug-in the power supply adapter supplied with the MT300.
(Use of a different power supply other than the one provided is prohibited)

Set up

With your browser to go: http://192.168.1.194/ and complete the device registration form. All fields are required for successful registration. This will enable the FCC certified database to authenticate the system and provide white space channels that are available for use in your location. Reference the examples shown below.

Professional installation tools and procedures for determining location must be used to accurately determine the location within +/- 50 m accuracy.

Registration Screen

NOTE: PRESS SAVE AND APPLY BEFORE GOING TO NEXT SCREEN.

Status Screen.

After your device communicates with the database (allow up to 1 minute) the transmitter output will be enabled.   NOTE: The transmitter will not output any signal prior to be authenticated by the White Space Registration database.

Advanced Settings

Set power level and the preferred channels you'd like to use.

To adjust the power use the Power Level pull down menu to select the lowest setting required to successfully transmit to the area of interest. A setting of 11 is the maximum rated power and a setting of 1 is the lowest available power.

To select preferred channels from the list of available channels, fill in the Preferred Channels field with the desired channels of operation.

4.3   Using your Pico Broadcaster

Station Identification Signal

The FCC requires that Fixed TVBDs transmit identifying information sufficient to identify the device and its geographic coordinates. The MT300 ID signal is transmitted as an ATSC compliant signal that can be received by any Digital TV receiver. The following information is required in the ID message:

> Transmitter Location: 34.34567 N, 119.32487 W
> FCC ID: OKVMT300
> Manufacturer: MELD Technology

Following the steps below the operator is required to stream the identification information for transmission no less than once a day.

Step 1: Create a file containing the required identification identified above.

- Using a video editing system such as Micro Soft Movie Maker or others, create a Title Screen containing 3 lines with the following information:

> Transmitter Location: 34.34567 N, 119.32487 W
> FCC ID: OKVMT300
> Manufacturer: MELD Technology

The location information above is an example only. The location will be unique for each device installation, refer to section 4.2 of this manual to obtain the registration location information for your device

Step 2: Save your file as an MPEG2 standard format file

- Using the video editor render the Title Screen as a 3 second MPEG2 formatted file.

Step 3: Stream the content to the MT300

- Following the instructions in section 5.3 of this manual, stream the MPEG2 file to the MT300. Verify the information is displayed on at least one of the TV receivers tuned to the transmitting channel as shown in the example below:

Transmitter Location: 34.34567 N, 119.32487 W
FCC ID: OKVMT300
Manufacturer: MELD Technology

Stream it

If you are using a BrightSign box you'll need to refer to their manual.

If you are using a PC you can use the VLC media player as an example. The application can be found here: http://www.videolan.org/vlc/index.html. If you are unfamiliar with VLC media player follow the instructions below and in section 5.3 of this manual.

What you are doing: Sending an MPEG2 transport stream to 192.168.1.193, port=5002

How to do it: Creating a batch file is a good way to easily and simply broadcast demo content.

*** Sample Batch file 1: Broadcasts a DVD ***
Note: It is very easy and convenient to stream DVDs using VLC. (DVDs are a great source for TS material).   We suggest you start with this…

Using notepad editor to create BroadcastDVD.bat
"C:\Program Files (x86)\VideoLAN\VLC\vlc.exe" dvdsimple://D:\
:sout=#rtp{dst=192.168.1.193,port=5002,mux=ts} :no-sout-rtp-sap :no-sout-standard-sap
:ttl=1

Of course file locations and stream names may change depending on your computer configuration.

For more information go to www.meldtech.com/support

NOTE: When not streaming content to your MT300, turn off your transmitter by removing power to the device.


Tune It

TV receiver: Select "antenna in" on your TV. Make sure you have an antenna attached.
Go to channel 23.1. If the TV does not allow you to directly type in a channel, do a
channel scan and then type 23.1.

5.   Trouble Shooting

5.1   Hardware Setup

If the MT300 is not transmitting the supplied content, the device may be unable to
contact the database or the media server may not be configured correctly. You must
connect the MT300 to an internet accessible network in order to access the internet for
database services. The media providing streaming content to the MT300 must be
configured correctly. Refer to the following steps:
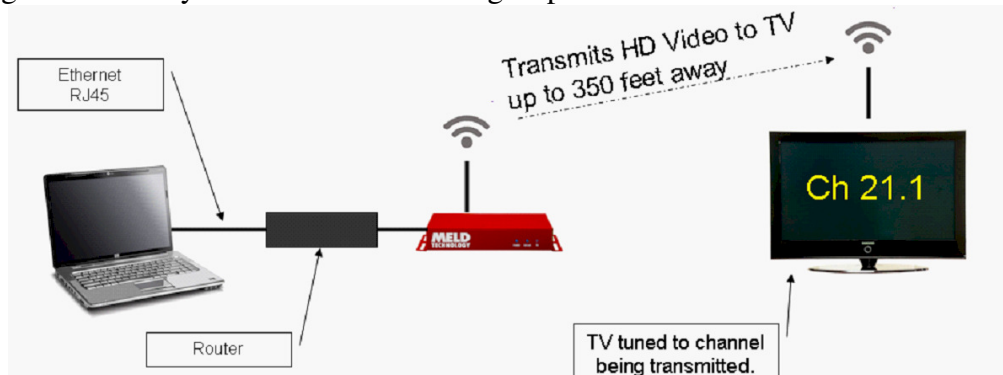
5.2   Set up and test Ethernet connection.

If the "power" LED is not illuminated on the MT300 front panel:
  • Verify the power connection is securely plug in on the back panel
  • Verify the A/C power outlet that power supply is plugged into.

Check the static address setting on the PC or media delivering the content.

  • In a DOS window type "IPCONFIG" to view the PC IP address.
Note: When using direct connection, make sure the PC and MT300 are in the same IP
domain: Set the computers IP Address to a static address on the same subnet as the
MT300 (e.g., 192.168.1.100)

If the transmit or "On Air" light is not illuminated on the front panel, verify the MT300
network connection to the TVWS database service.

- Connect a PC to the same local network connection that the MT300 is using
- In a DOS window Type "ping www.tvws.spectrumbridge.com"
- Verify a successful reply from the TVWS service:
     ping tvws.spectrumbridge.com
     Pinging tvws.spectrumbridge.com [204.51.99.33] with 32 bytes of data:
     Reply from 204.51.99.33: bytes=32 time=27ms TTL=242

Check Ethernet connection to the MT300
- in a DOS window type "ping 192.168.1.193"
- If properly working the ping command will return "Request timed out" as shown in Fig 1.0. This means the Ping command properly saw the MT300 but the MT300 did not respond back, which is to be expected as the MT300 is a one-way streamer and can not reply. If it says not connected, check physical connection and power MT300.

Make sure ARP table registry is correct
- 2.1) in a DOS window type type "Arp –a"

- You should see the device
     Internet Address: 192.168.1.193
     Physical Address: some value

Note: If for you do NOT see the device you'll need to force the ARP table to map to the IP address to the physical address of the MT300 (i.e. 00 02 03 04 05 06.)
ARP command to set ARP TABLE

- in a DOS window type   "arp -s 192.168.1.193 00-02-03-04-05-06"

5.3   Stream content to device

We are currently using VLC for streaming (www.videolan.org). This configuration has been tested using version 1.0.5 and 1.1.11. We suggest you download the latest version, its free .

VLC Streamer Command line.

Easy streaming… If you find the navigating the VLC GUI a little tedious we suggest we set up some batch files. (So examples are provided below.) You could also use VLC with a command line interface via DOS window for streaming, it is easier than the GUI interface, Sample Command line code;

Sample Batch files.

Creating a batch file is a good way to easily and simply broadcast demo content.

Of course file locations and stream names may change depending on your computer configuration.

*** Sample Batch file 2: Broadcast a few HD files in a loop ***
NOTE! The file MUST be MPEG2 format.

BroadcastHD.bat
"C:\Program Files (x86)\VideoLAN\VLC\vlc.exe"
"C:\Control\worktestvideo\Shuttle.trp" –loop
:sout=#rtp{dst=192.168.1.193,port=5002,mux=ts} :no-sout-rtp-sap :no-sout-standard-sap
:ttl=1 "C:\Control\worktestvideo\Clip4.trp" --loop
:sout=#rtp{dst=192.168.1.193,port=5002,mux=ts} :no-sout-rtp-sap :no-sout-standard-sap
:ttl=1 "C:\Control\worktestvideo\Thunderbirds 480I.mpg" --loop
:sout=#rtp{dst=192.168.1.193,port=5002,mux=ts} :no-sout-rtp-sap :no-sout-standard-sap
:ttl=1
*** Sample Batch file 3: Broadcasts what's on your PC screen.   ***
Note: First set your screen resolution to 1480x720p

Screencast.bat
"C:\Program Files (x86)\VideoLAN\VLC\vlc.exe" screen://
:sout=#transcode{vcodec=mp2v,vb=2000,scale=1}:rtp{dst=192.168.1.193,port=5002,mux=ts} :no-sout-rtp-sap :no-sout-standard-sap :ttl=1

VLC GUI Streamer Configuration.
Set to RTP streaming mode.
Address: 192.168.1.193
Port: 5002