Connecting a DDF7001 Direction Finder to the Internet
A Technical Application Note from Doppler Systems
09 September 2013

1.0 Introduction

The DDF7000 series direction finders are designed to be connected to a network through the RJ45 connector on the device. However, if the direction finder is behind a NAT enabled router and the DDF7001 software (MPT User Interface or TargetTrack) is behind a NAT enabled router some settings on the routers will need to be changed and the software will need to be configured to connect through the router.

2.0 Hardware Configuration

Figure 1 represents the hardware configuration discussed in this application note. The DDF7001 Direction Finder is connected to the Internet through a NAT enabled router. The user wants to establish a data connection with the direction finder to control it and collect bearing data from it and stream audio from the direction finder to the computer.
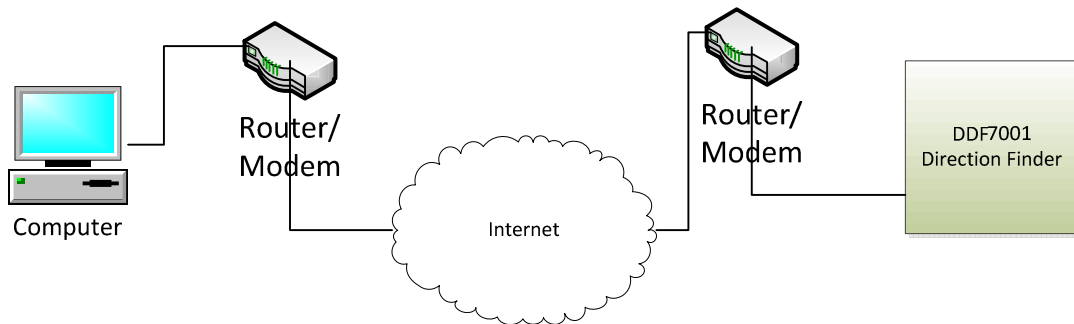

Figure 1: Block Diagram of Hardware Configuration

2.0 Configuring the Routers

Direction Finder Router

The data connection with the direction finder is via TCP/IP. The direction finder default port is 2101 so the direction finder router must port forward port 2101 to the direction finders local IP address. There are two ways to find the local IP address of the direction finder. One way is to log on to the router and find the entry in the NAT table for the direction finder. The other way is to connect a computer to the router and run the Doppler DF Discover software. Once you've determined the IP address of the direction finder log onto your router and port forward this IP address to port 2101 (or whatever port you've assigned to the direction finder.) An example of an entry in a port forwarding table is shown below in Figure 2.

External Port	Internal Port	Protocol	To IP Address	Enabled
2101	2101	TCP ▾	192 . 168 . 1. 142	☑

Figure 2: Sample Entry in Port Forwarding Table of Direction Finder Router

Computer Network Router

Next in order to stream audio to the MPT User Interface or the TargetTrack software the audio IP port must be port forwarded to the computer. To determine your computers IP address open a command prompt and type **ipconfig**.   A display similar to the one below will appear.

```
C:\Windows\system32\cmd.exe

Wireless LAN adapter Wireless Network Connection 2:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Wireless LAN adapter Wireless Network Connection:

   Connection-specific DNS Suffix  . :
   Link-local IPv6 Address . . . . . : fe80::b4a6:19d0:d310:6ae7%13
   IPv4 Address. . . . . . . . . . . : 192.168.1.134
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1

Ethernet adapter Local Area Connection:

   Media State . . . . . . . . . . . : Media disconnected
   Connection-specific DNS Suffix  . :

Tunnel adapter isatap.{F65E2E02-A877-4D1C-B896-50EF5112E2A8}:

   Media State . . . . . . . . . . . : Media disconnected
```

Figure 3: Use the IPv4 Address to Port Forward the Audio

The IPv4 address of the adapter is the IP address that you want to port forward the UDP audio to. Typically this address will be 192.16x.xxx.xxx.

Once you've determined this address then you need to set up the port forwarding in your router, forwarding the audio IP port (default value is 10001) to the IP address you obtained above. A typical entry in a port forwarding table is shown below.

External Port	Internal Port	Protocol	To IP Address	Enabled
10001	10001	UDP ▾	192 . 168 . 1. 134	☑

Figure 4: Typical Port Forwarding Entry for Audio Streaming

3.0 Configuring a TargetTrack Site for Audio Streaming

When using a DDF7000 series direction finder outside of a local area network (LAN) streaming audio to TargetTrack requires that the direction finder must know your external IP address. The external address is the address that external IP connections such as web sites use to send information to your router. Your router then translates the external IP address into an internal IP address using the NAT in the router and sends the information to your computer.
When setting up a site TargetTrack will attempt to determine the external IP address. This address will be displayed in the communications dialog box similar to the one shown below.

If the Incoming Audio IP Address is blank or if you know this address is not your external IP address then you must enter the external IP address in the test box. In most cases, if an address is displayed it will be the one to use.
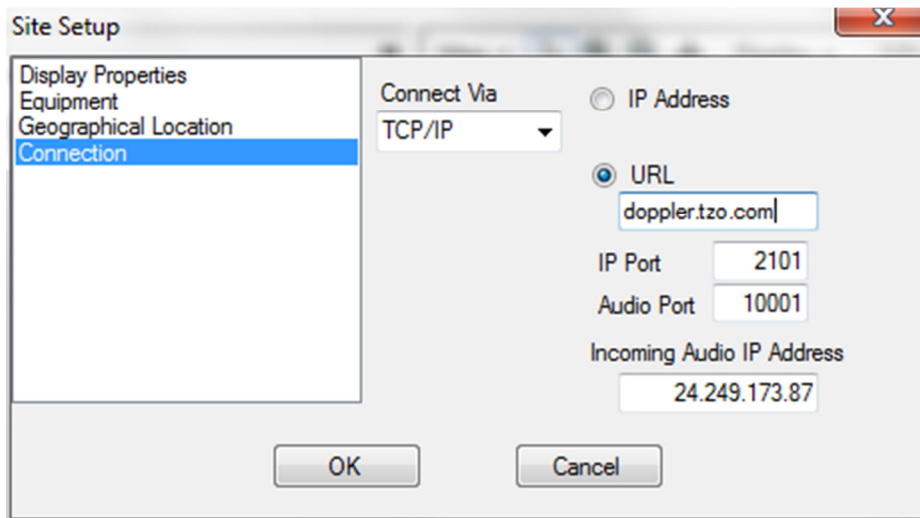

Figure 5: Setting the Receiver Using a Web Browser

If there is no address displayed then you will need to determine it. Contact your network administrator, log on to your router to find this address, or use www.whatsmyip.org.

4.0 Configuring the MPT User Interface for Audio Streaming

The DDF7001 digitizes the receiver audio and it can send this audio over a LAN IP connection or the crossover connection. The tab page for configuring the audio is shown below.
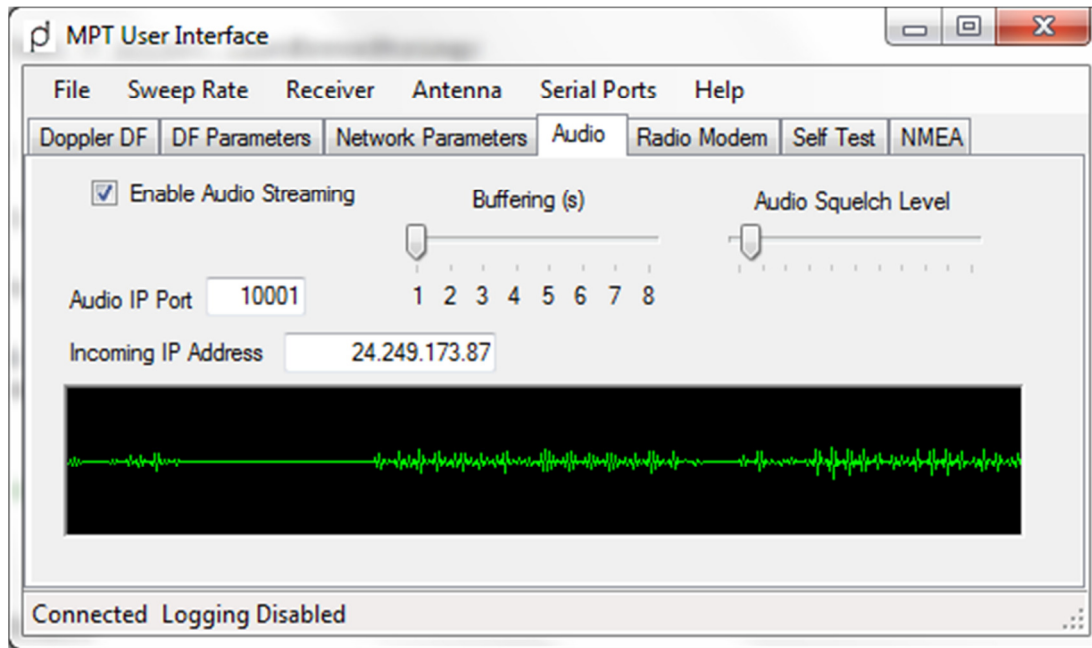
▸ **Enable Audio**

To enable audio streaming check the Enable Audio Streaming check box

▸ **Buffering**

The PC buffers the audio prior to playing it. Typically 1 second of buffering is sufficient; however, if your network is slow or has significant delays then the audio may be choppy. If this occurs increase the buffering.

▸ **Audio Squelch Level**

The DDF7001 only streams audio when the audio level is above the squelch level. Typically any value of audio that breaks the receiver squelch will also break this squelch

▸ **Audio IP Port**

This number sets the IP port number that the audio will be streamed on.

▸ **Incoming IP Address**

This number sets the address that the direction finder uses to stream audio to your computer. If the direction finder is connected to the same LAN as the computer then this text box will not be displayed. If the direction finder is outside of the LAN, for instance if it is connected to the Internet, then an incoming IP address is required. The software will attempt to determine this address. If an address is displayed then this will typically be the correct address to use. If no address is displayed then you will need to determine your external IP address. Contact your network administrator or log on to your router to determine your external IP address. See the section on ***port forwarding*** to configure your router to receive the audio.