

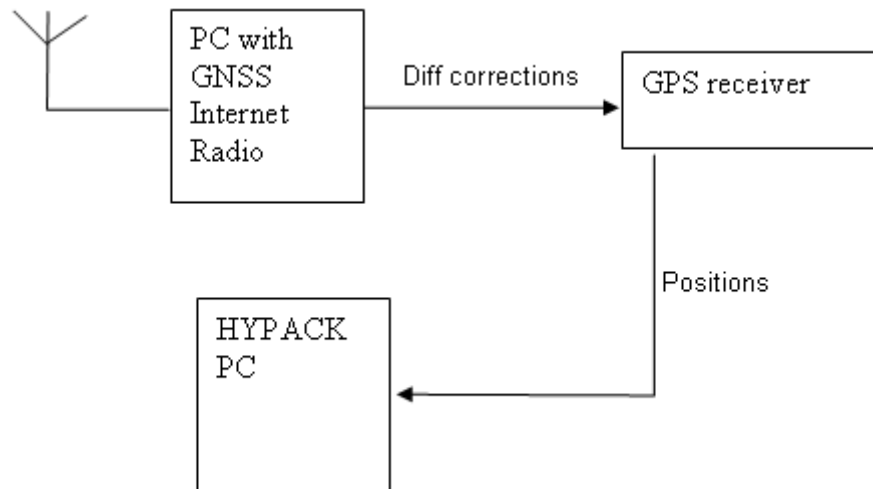


Receiving Differential and RTK Corrections over the Internet

By Mircea Neacsu

For a number of years now, it has been possible to receive differential or RTK corrections using a network connection. Sometimes the feature is called a “virtual base station” because, from the GPS receiver’s point of view, it acts just like a base station installed close to the rover’s position. The service comes in many flavors and at varying prices, from free to fairly expensive subscription packages. A typical configuration is shown in the following diagram:

FIGURE 1. Typical Virtual Base Station Configuration



In most cases users preferred to have two different PC’s, one running the program that receives the differential corrections and another running the HYPACK® software that receives corrected positions from the GPS receiver. If budget was really tight, one could try to use the same PC but you still needed two separate serial ports: one for sending out corrections and another for receiving position information. If you throw into the mix a PPS box for synchronization, the whole thing becomes just an ugly tangle of cables.

A new feature added to the GPS (and KINEMATIC) driver promises to simplify this configuration: the latest driver can receive the differential corrections and send them to the GPS receiver over the same port that is used to receive position information.

BACKGROUND – THE NTRIP PROTOCOL

Transmission of differential correction over the Internet is done using a protocol called NTRIP (Network Transport of RTCM via Internet Protocol). In the NTRIP world there are three classes of objects communicating with each other:

- *Servers* are the GPS stations that provide differential corrections
- *Clients* want to receive these corrections. To find who is providing these services clients connect to:
- *Casters* that get the corrections from servers and send them to clients. Servers also get in touch with those casters to advertise their service.

In order to receive a stream of differential corrections, one needs only to know the address of a caster and, in turn, the caster is going to advertise all the correction streams available. As an example such a caster can be found at www.igs-ip.net . Most casters operate on the standard HTTP port 80 in addition to another default port of 2101. If you point your browser to the above address you will see something like:

```
SOURCETABLE 200 OK
Server: NTRIP Caster 1.5.10/1.0
Content-Type: text/plain
Content-Length: 16923

CAS;www.igs-ip.net;2101;IGS-IP;BKG;0;DEU;50.12;8.69;http://www.igs-ip.net/home
CAS;rtcm-ntrip.org;2101;NtripInfoCaster;BKG;0;DEU;50.12;8.69;http://www.rtc-
ntrip.org/home
NET;IGS;BKG;B;N;http://igsb.jpl.nasa.gov/;http://igsb.jpl.nasa.gov:80/igsb/
station/general/skel;http://igs.bkg.bund.de/index_ntrip_reg.htm;none
NET;Misc;BKG;B;N;http://igs.bkg.bund.de/root_ftp/NTRIP/streams/streamlist_igs-
ip.htm;http://igs.bkg.bund.de:80/root_ftp/NTRIP/station/rnxskl;http://
igs.bkg.bund.de/index_ntrip_reg.htm;none
NET;IGLOS;BKG;B;N;http://igs.bkg.bund.de/root_ftp/NTRIP/streams/streamlist_igs-
ip.htm;http://igs.bkg.bund.de:80/root_ftp/IGLOS/station/rnxskl;http://
igs.bkg.bund.de/index_ntrip_reg.htm;none
NET;Test;BKG;B;N;http://igs.bkg.bund.de/root_ftp/NTRIP/streams/streamlist_igs-
ip.htm;http://igs.bkg.bund.de:80/root_ftp/NTRIP/station/rnxskl;Closed;none
NET;GIOVE;BKG;B;N;http://igs.bkg.bund.de/root_ftp/NTRIP/streams/streamlist_igs-
ip.htm;http://igs.bkg.bund.de:80/root_ftp/NTRIP/station/rnxskl;Closed;none
STR;ALBH0;Albert-Head;RTIGS;SOC(1);2;GPS;IGS;CAN;48.39;236.51;0;0;AOA BENCHMARK
ACT;none;B;N;1300;none
STR;ALGO0;Algonquin-Park;RTIGS;SOC(1);2;GPS;IGS;CAN;45.96;281.93;0;0;AOA BENCHMARK
ACT;none;B;N;1300;none
STR;ALIC0;Alice_Springs;RTCM
3.1;1004(1),1006(15),1008(15),1012(1);2;GPS+GLO;IGS;AUS;-
```

Each line starting with “STR” describes a stream of corrections and it is the responsibility of the client program to decipher that information. There are a number of client programs freely available, one of the most popular one being “GNSS Internet Radio” that can be downloaded from http://igs.bkg.bund.de/index_ntrip_down.htm

As an example the line highlighted above shows the following information in GNSS Internet Radio. We can see the approximate location of the base station, the type of corrections sent, if it requires authentication (i.e. username and password) and so on.

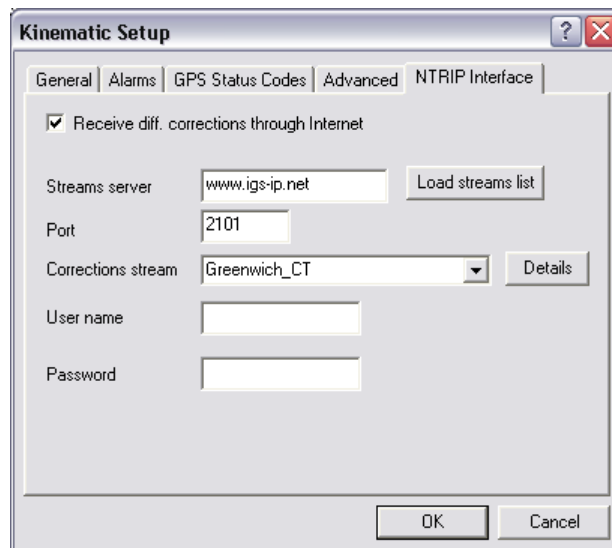
FIGURE 2. Details of GNSS Internet Radio Stream



NTRIP CLIENT IN KINEMATIC DRIVER

The KINEMATIC driver configuration has received an additional page for configuration of the NTRIP client:

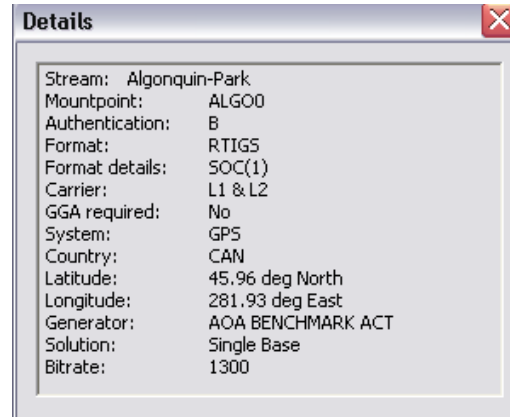
FIGURE 3. Kinematic Driver Setup Dialog



To configure the NTRIP:

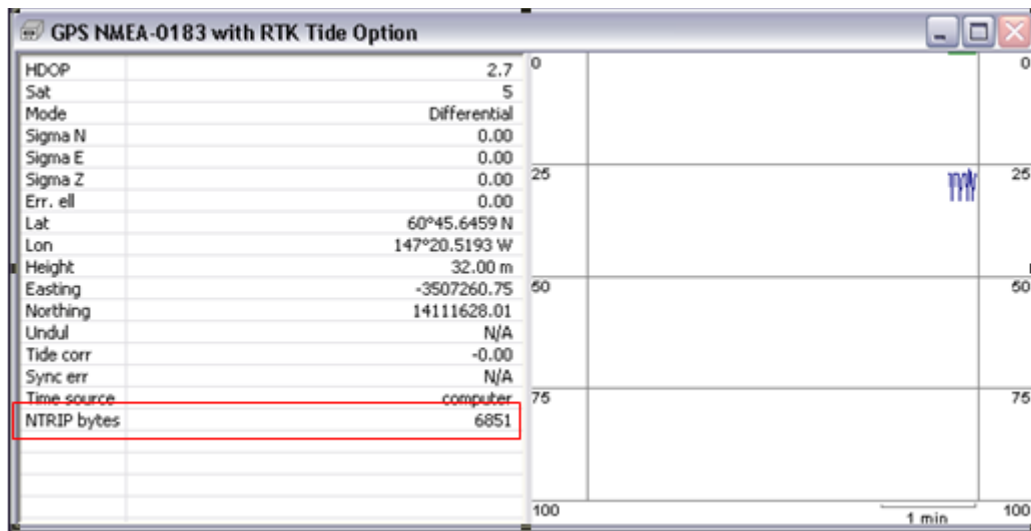
1. **Check 'Receive diff. corrections through Internet'** to enable the NTRIP client.
2. **Set the address (and port number) of an NTRIP caster** (called here "Streams server").
3. **Click [Load streams list]** to get a list of available corrections streams. (This populates the 'Corrections Streams 'drop-down' list.)
4. **Select the stream you want to use.**
5. **Enter a User Name and Password** if you aren't using a free stream.

We can see that HYPACK® reads and interprets the same information as other NTRIP clients, this is the Details window for the same stream:



When all is said and done, you will get just an additional line in the device driver window showing how many correction bytes have been sent to the GPS receiver (the number should keep going up).

FIGURE 4. Kinematic Device Window shows the NTRIP value.



All that remains to be done now is to configure your GPS receiver to accept the differential corrections on the same port on which it is sending the position data to HYPACK®.

Arthur C. Clarke once said that really advanced technology is indistinguishable from magic. I tried to make this interface as close to magic as possible!