



HEXAGON



APN-089

IP Delivery for Global TerraStar Corrections



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TerraStar

TerraStar is a global provider of precise satellite positioning services for land and near-shore applications. TerraStar owns, operates, maintains, and controls its global network of over 100 GNSS reference stations and the associated infrastructure to ensure maximum operational reliability of its augmentation services for land precise positioning. Corrections provided by the network are broadcast via five geostationary satellites or over the internet. For more information about TerraStar, visit novatel.com.

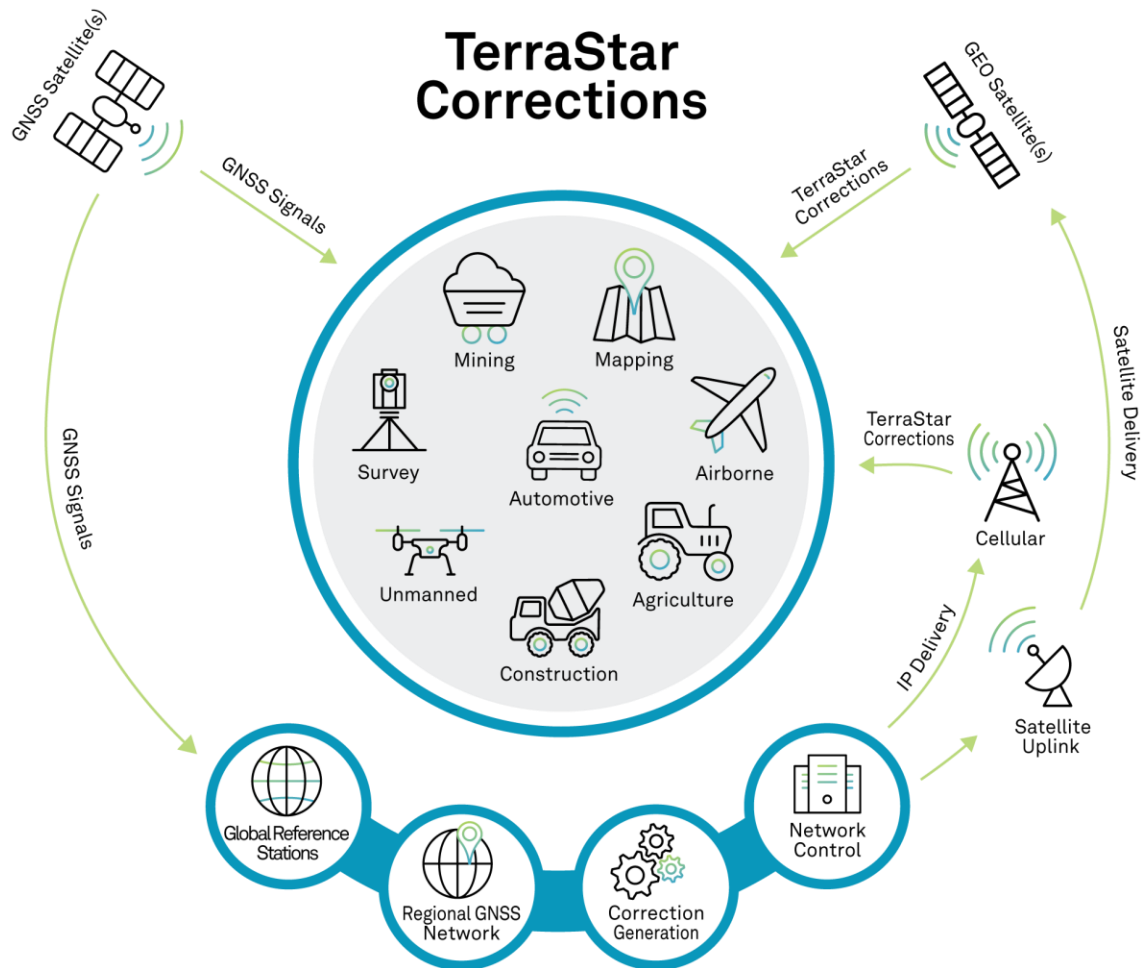


Figure 1: Global TerraStar corrections delivery



IP Delivery

Introduced in the 7.04.00 firmware release, IP delivery allows users to receive global TerraStar corrections over IP in addition to the standard L-band delivery. There are many benefits of using IP delivery, particularly in environments where L-band signals are difficult to track.

When used simultaneously with L-band, IP delivery adds redundancy to the solution, creating a layer of resiliency in challenging environments. IP delivery can also be used as the single correction delivery method.

This document provides an overview of IP delivery for global TerraStar corrections, with in depth instructions for IP delivery specifically. For more detailed information on configuring the receiver for L-band delivery, refer to [Enabling PPP](#) or [TerraStar on OEM7](#).

IP corrections are generally received through a cellular network, requiring the user to establish an internet connection to receive the corrections. If IP delivery is the only configured source, this cellular connection must be maintained for the duration of the positioning application. As IP delivery is not dependent on L-band satellite visibility, this delivery method may extend the serviceable region if the application area does not have L-band coverage, or if the environment obstructs L-band signals.

If possible, it is recommended to have both L-band and IP delivery sources configured. This redundancy will ensure the best coverage and positioning experience should one of the sources be temporarily unavailable. When both delivery methods are configured, they are used simultaneously; one source is not prioritized over the other. This means that the receiver will use the most recent correction data packet received, regardless of which source it comes from.

The correction data and activation messages are identical over both IP and L-band delivery, and the difference in correction age between the two sources is negligible. If using both delivery methods, there may be slight changes in correction age if one source is temporarily lost and regained, however the user should not notice any impact on the positioning performance. As long as one correction source is still available, the user should not expect any interruptions or delay in corrections. Once the second source becomes available again, the receiver will seamlessly reconnect and use both sources as before.

Requirements for IP Delivery

Firmware

IP delivery is only available on OEM7 products on firmware version 7.04.00 or later.

Hardware

An OEM7 receiver is required for IP delivery.

IP Hardware

To use IP delivery, the receiver must have a configurable Ethernet, USB, or serial port available for IP delivery. A built-in NTRIP client is available on all OEM7 products equipped with an Ethernet port.

Alternatively, an external NTRIP client can be used to re-direct the IP corrections over an available serial or USB port on the receiver. The port used for IP delivery should be exclusively used for correction delivery and it is not recommended to configure any other logs to be transmitted/received on this port.



L-band Hardware

To use L-band delivery, both the receiver and antenna must be capable of tracking L-band signals.

Model

The receiver requires a software model that allows a TerraStar subscription. Refer to [TerraStar on OEM7](#) for model information.

Subscription

There must be a subscription activated for the receiver used to access IP delivered corrections. Refer to [TerraStar on OEM7](#) for subscription information.

Configuration

Method 1 – Receiver NTRIP Client

The following steps can be referred to for configuring a receiver for TerraStar IP delivery. This method requires that the receiver card has an Ethernet port.

Step 1 – Confirm Network Connectivity

The receiver's Ethernet port can be configured with a static or dynamic IP address. More information on setting up static or dynamic IP address configuration can be found on the [OEM7 Receiver Documentation Portal](#).

Once configured, IP address assignment can be confirmed by the IPSTATUS log. It should report similar to below:

```
#IPSTATUSA,COM1,0,90.5,FINESTEERING,1609,500464.121,02000000,7fe2,6259;1,ETHA
,"10.4.44.131","255.255.255.0","10.4.44.1",1,"198.161.72.85"*ec22236c
```

In the above example the receiver has been assigned the IP address **10.4.44.131**.

Now that we have established the receiver has an IP address assigned, the following commands should be sent to the receiver to configure the receiver as an NTRIP client:

```
NTRIPCONFIG NCOM1 CLIENT V1 sid-output.com:2101 SID08 SID MELs9tPw4 ALL
```

```
INTERFACEMODE NCOM1 VERIPOS NONE OFF
```

The 'NCOM1' port is used in the above commands but this can be changed to any free NCOM port, as long as both commands are issued to the same NCOM port. Credentials used in the command above are as follows:

Table 1: IP delivery credentials

	Value
Username	SID
Password	MELs9tPw4
Mountpoints	SID08 SID09



The differences between mountpoints are:

- SID08 emulates the L-band beam data rate of 1200 bps.
- SID09 uses a data rate of 4800 bps.

Step 2 – Verify Subscription Activation

The receiver should report that it is **LOCKED** to the TerraStar beam as per the TERRASTARSTATUS log below:

```
#TERRASTARSTATUS,COM1,0,53.0,FINESTEERING,2074,339035.394,02004120,32bc,15824;DISABLE,LOCKED,0,DISABLED,DISABLED*1087cb3f
```

The receiver can now acquire the activation message over the IP connection. Once the subscription is received, the subscription status in the TERRASTARSTATUS log will change to **ENABLE** as seen below:

```
#TERRASTARSTATUS,COM1,0,53.0,FINESTEERING,2074,339035.394,02004120,32bc,15824;ENABLE,LOCKED,0,DISABLED,ONSHORE*1087cb3f
```

Step 3 – Monitor PPP Solution

Once the activation message is acquired, the receiver should now have incoming corrections on the configured Ethernet port, 'NCOM1' in this example. The user can verify the PPP solution with the PPPPOS log. The solution will start at **PPP_CONVERGING** and show **PPP** once converged.

```
#PPPPOSA,USB2,0,31.0,FINESTEERING,2076,159185.000,02000000,ec34,15824;SOL_COMPUTED,PPP_CONVERGING,51.15039194531,-114.03069801746,1096.0146,17.0001,WGS84,1.9853,1.5026,4.0140,"TSTR",15.000,0.000,35,33,33,27,00,00,15,33*9d7a2c41
```

```
#PPPPOSA,USB2,0,25.5,FINESTEERING,2076,159625.000,02000000,ec34,15824;SOL_COMPUTED,PPP,51.15038830176,-114.03069816314,1097.3369,17.0001,WGS84,0.1675,0.2114,0.2227,"TSTR",15.000,0.000,35,33,33,27,00,00,15,33*9d7a2c41
```

Method 2 – External NTRIP Client

This method must be used if the receiver does not have an Ethernet port. This is an alternative method for receivers that do have an Ethernet port.

Step 1 – Configure External Client for IP Delivery

IP corrections can be received using an external NTRIP client to re-distribute them over a serial or USB (virtual serial) port connected to the NovAtel receiver. In this example we use the Lefebure NTRIP Client.

The external NTRIP client must be configured, similarly to the receiver card in Method 1.

Click **Edit** on the NTRIP Stream and enter the NTRIP caster settings below:

Address: **sid-output.com**
Port: **2101**
Username: **SID**
Password: **MELs9tPw4**

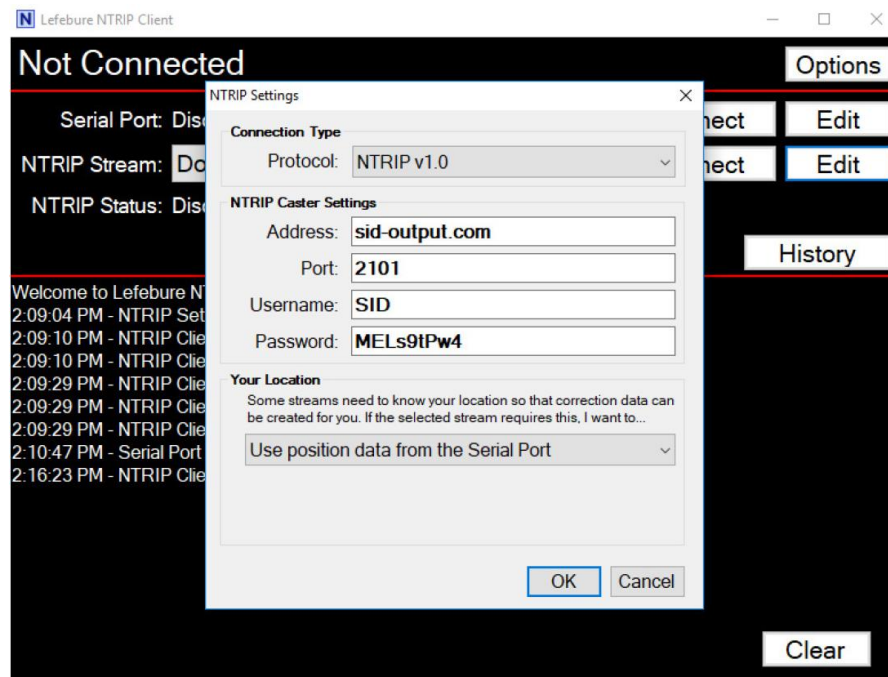


Figure 2: Lefebure NTRIP Client: NTRIP settings

Click the drop-down menu in NTRIP Stream and select **Download Source Table** and select the NTRIP Stream (mountpoint) 'SID08' or 'SID09'.

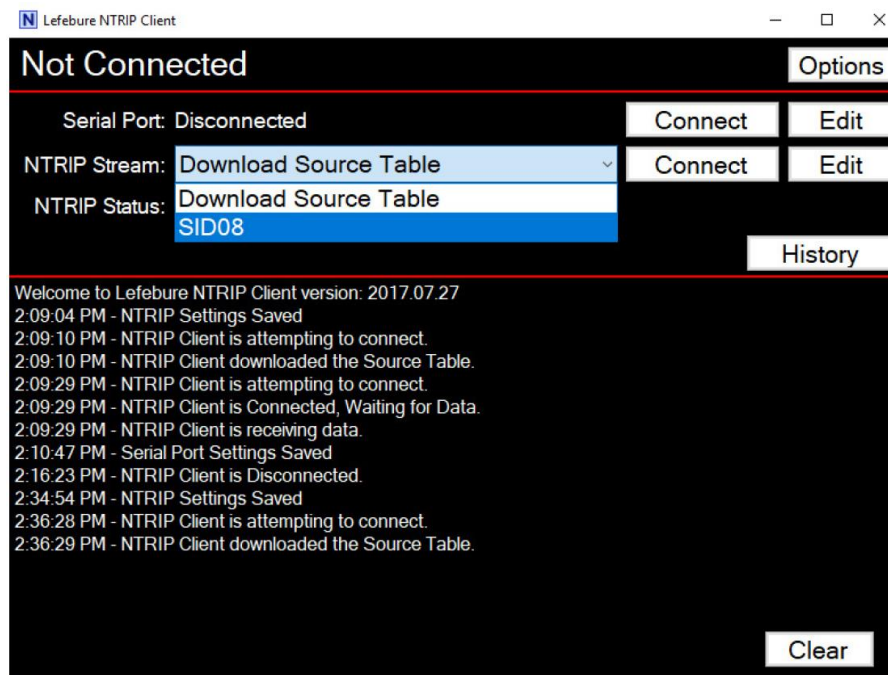


Figure 3: Lefebure NTRIP Client: Selecting the mountpoint



Click **Connect** on the NRTIP Stream and the NTRIP Status will change to indicate the number of incoming bytes received:

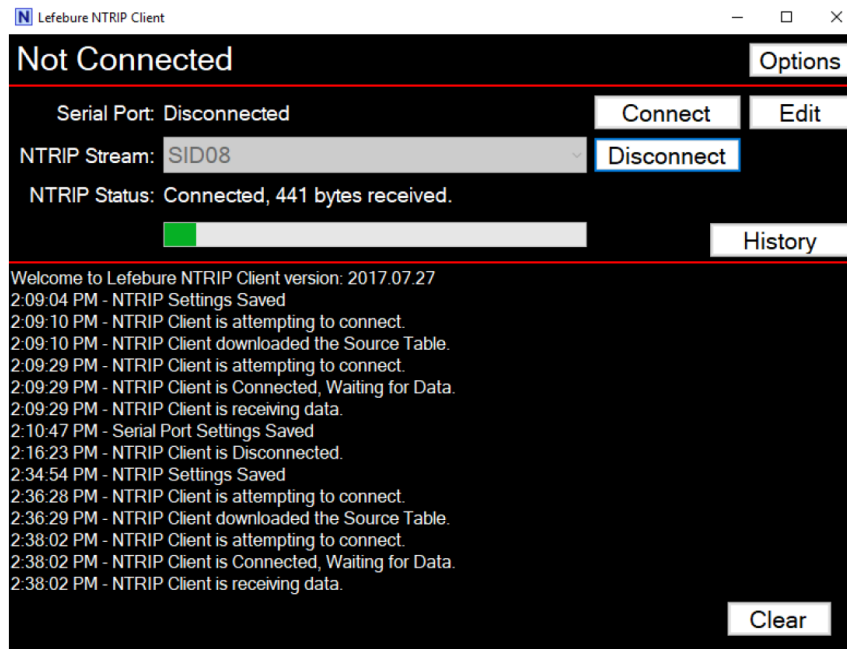


Figure 4: Lefebure NTRIP Client: NTRIP status connected

Click **Edit** on the Serial Port and select the desired computer serial port to deliver the corrections to the receiver. The baud rate can be left as default at 115200 bits/second.

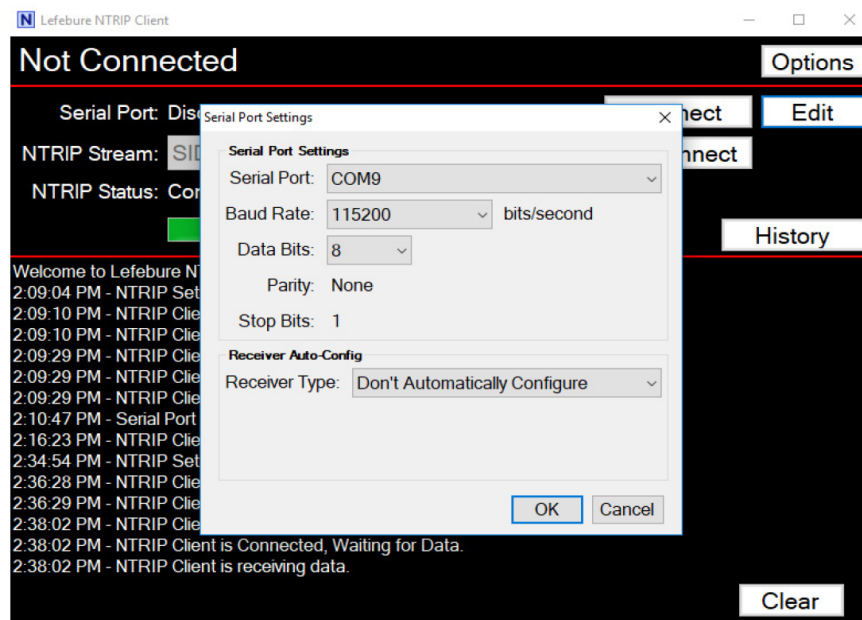


Figure 5: Lefebure NTRIP Client: Serial port settings



Click **Connect** on the Serial Port and the corrections will be streamed from the NTRIP client software to the specified port. In this example, the computer COM9 port is connected to COM3 of the NovAtel receiver.

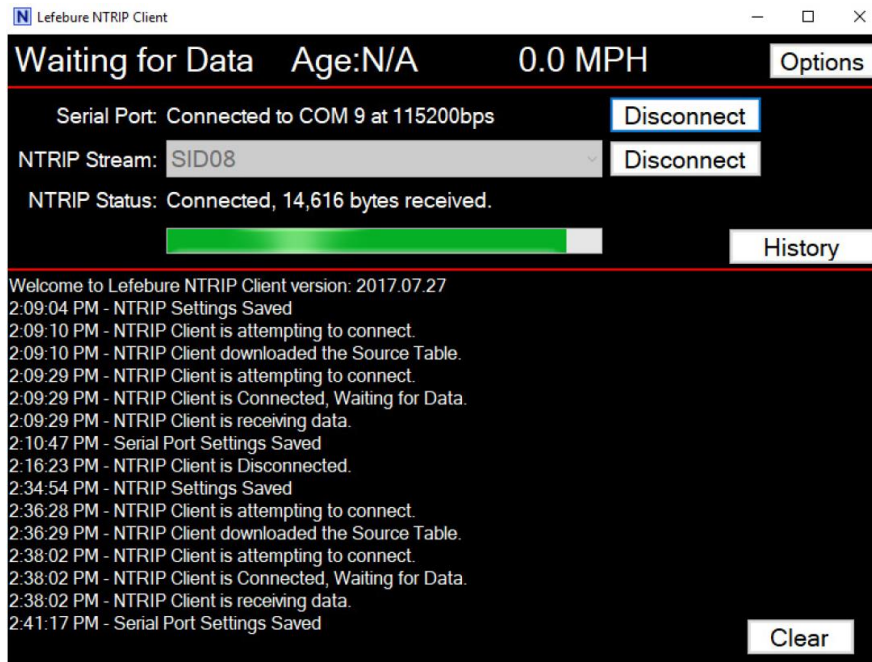


Figure 6: Lefebure NTRIP Client: Configuration complete

Step 2 – Configure Receiver

To receive the corrections from the NTRIP client software on the receiver, it is necessary to change the SERIALCONFIG command settings to match those in the NTRIP client software, and change the INTERFACEMODE of the designated COM port to allow the corrections:

```
SERIALCONFIG COM3 115200
```

```
INTERFACEMODE COM3 VERIPOS NONE OFF
```

Note: COM3 is an example port, other available COM or USB ports can be used. If a USB virtual serial port is used, the SERIALCONFIG command does not apply, however USB drivers are required (available on the [NovAtel Support site](#)).

The next steps are identical to Method 1:

- [Step 2 – Verify Subscription Activation](#)
- [Step 3 – Monitor PPP Solution](#)



Additional Resources

Commands

For general information about issuing commands to a NovAtel receiver, please visit our online documentation for [Commands](#).

- [ASSIGNLBANDBEAM](#)
- [NTRIPCONFIG](#)
- [INTERFACEMODE](#)
- [SERIALCONFIG](#)

Logs

Any of the logs described below can be output using the LOG command. For general information about requesting logs from a NovAtel receiver, please visit our online documentation for [Logs](#).

- [IPSTATUS](#)
- [PPPPOS](#)
- [TERRASTARINFO](#)
- [TERRASTARSTATUS](#)



Support

To help answer questions and/or diagnose any technical issues that may occur, the [NovAtel Support website](#) is a first resource.

Remaining questions or issues, including requests for test subscriptions or activation resends, can be directed to [NovAtel Support](#).

Before contacting Support, it is helpful to collect data from the receiver to help investigate and diagnose any performance-related issues. A list of appropriate troubleshooting logs can be found on the [OEM7 Documentation Portal](#) (the LOG command with the recommended trigger and data rate is included with each log).

The data can also be collected using [NovAtel Application Suite](#).

Documentation

For any questions on logs and command, please visit the [OEM7 Documentation Portal](#).

Contact Hexagon | NovAtel

support.novatel@hexagon.com 1-800-NOVATEL (U.S. and Canada) or 1-403-295-4900

For more contact information, please visit novatel.com/contact-us

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