Handset Selection

This document outlines the general approach to determine whether and how a particular cellular handset should be configured to work with the Metro Vancouver (MV) Real-Time GPS Service, and also with particular GPS receivers.

Handsets have varying capabilities and options. Selection of a handset is important, so users should be aware of device capabilities. Since cost is always an important issue, an effective approach is to choose a handset with customizable communication and configuration options to match the receiver settings provided for specific applications.

Clients need an application called as ‘Networked Transport of RTCM via Internet Protocol’, known short as NTRIP. This is an industry standard application that many GNSS hardware and software developers have implemented into their products recently. It supports wireless Internet connection (e.g. GSM, GPRS, EDGE and etc.) and transmits RTCM, raw or any other streaming data to users. It supports mass usage; hundreds of data streams may be transmitted to thousands of users at the same time. This application can be downloaded with no cost at Crown Registry and Geographic Base / GeoBC Web site: http://www.ilmb.gov.bc.ca/crgb/gsr/downloads

If client’s GPS receiver does not have the functionality to run NTRIP client, another computing device, should be able to run the application with a connection to cellular modem and cabled (via RS-232) to the receiver. Some smart phones can provide this kind of functionality. If the GPS controller supports NTRIP client, a cellular handset may connect to the controller either by serial cable or via Bluetooth communication.

Cellular modems and cable connections should be preferred when operating continuously for long periods (e.g. vehicle mounted systems used for precise navigation in real-time). Cell phones with Bluetooth communication capabilities are generally more useful for shorter operations, due to battery demands and more fragile connection. Land or field surveying practice for a day would be sufficient to use this type of devices.

Continuously operating devices require firm sources of power, and they should be setup accordingly. Moveable units that are not setup to operate continuously can be used with the battery pack provided with the handset or additional batteries can be purchased and swapped when necessary.

Briefly, there are three types of connections known to operate with MV RTK GPS Service. These are as follows:

- Run NTRIP client application on the handset device and stream RTCM corrections via RS-232C interface or Bluetooth.
- Use handset as a cellular modem to access Internet and NTRIP application is handled by the Client GPS System. Presently, this method is confirmed to work with Trimble receivers and its software only.
Run NTRIP client application on a computer connected to a wireless modem and stream RTCM corrections to a client GPS system.

**Step 1: Pairing/Connecting Handset/Modem**

Connected (cable or Bluetooth) devices should have identical baud rate, data bits, parity, stop bits and flow control settings. Through Windows and Windows Mobile environment, this process may be completed by configuring a Dial-Up Network (DUN) connection. Users need to check and verify the GPS receiver settings, whether the serial port RTCM correction information is received and configured with accurate parameters.

If NTRIP client runs within the GPS receiver, a DUN connection should also be created on the same device. Bluetooth DUN should be configured ‘Discoverable’ for both devices; GPS receiver and the handset. Users should create and name a Bluetooth DUN pairing for easier access. During the pairing process, the receiver will indicate that a Bluetooth connection is established with the handset and it is available for data transfer mode. Typically, these modes are; Hands free, Serial and DUN. The latter is usually available for Windows and Windows Mobile. However, some handsets do not support Windows Mobile.

DUN dialling sequence will be specific to the provider of user’s handset/modem. For example:

For Bell Mobility:  
- Phone Number: #777  
- User Name: yourdevicenumber@1x.bell.ca  
- Password: Bell voicemail password

For MV RTK Domain (Bell Private Network):  
- User Name: yourdevicenumber@rtk.1x.bell.ca  
- Password: Bell password appended with “1”

General (GSM/GPRS):  
- Phone Number: *99***1#  
- User Name: wapuser1  
- Password: wap
**Step 2: Testing Internet Connection**

Users can test Internet connectivity through their device by running the installed Web browser. With Bell connection, users will have to use typical Internet settings from above, as Internet will not be accessible from the Private Network. If dial-up connection is working, users should be able to browse to any Web site on the Internet. If there is no access, users should check the configuration of connection (e.g. dial-up networking, Bluetooth, etc.).

**Step 3: Testing NTRIP Client**

For Bell managed network access, Host IP and Port should be set to:

- **Host IP:** 10.47.131.4
- **Port:** 9010

Open Internet RTK data streaming is provided through the following Host IP address for all types of service providers with Internet access enabled on their handset or RTK receivers:

- **Host IP:** 66.38.130.153
- **Port:** 9010

User ID and Password for the Real-time service needs to be entered in the appropriate fields.

The data feed from NTRIP client will be transferred to the receiver for RTK processing. If NTRIP client is running on an external device, the serial or Bluetooth connection needs to be established with receiver before DUN is established with cellular service provider. After NTRIP client establishes connection with RTK server, user will be presented with the source table. Selecting a feed from the source table should result in that feed being streamed to user’s receiver. The receiver should indicate that it is receiving RTCM, DGPS or CMR+ data on its designated port.

If receiver provides its own NTRIP client, then the connectivity is largely a function of just launching the application, after it is configured correctly.
Step 4: Testing GPS RTK Solution

When the receiver starts receiving RTCM, DGPS or CMR+ data, users should be able to accomplish an RTK GPS initialization. Once initialized, accuracy indicators on the receiver should indicate the quality of the solution instantly. The results can be confirmed by comparing the solutions obtained from feeds from different Base stations. If GPS receiver can utilize the MV Geoid model file, it is possible to test the derived elevations using the official datum (NAD 83(CSRS)).

It is a good and a safe practice to test the connection using an existing monument within the MV network. With this practice, users can compare the survey values against the published values. If derived position/elevation differs by more than a few centimetres then users are advised to test on another known point. If there are still differences noticeably, the connection is configured incorrectly with GPS receiver set-up.

Step 5: Troubleshooting

Customer support is available for troubleshooting. It is advised that clients should have all the necessary configuration information about their handsets ready to submit before calling the Help Desk line. No-cost troubleshooting up to ½ hour is provided. If needs arise, clients can request longer durations of troubleshooting with extra cost.

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