NEWS from the **Radio Technical Commission for Maritime Services (RTCM)**

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The Radio Technical Commission for Maritime Services (RTCM) Publishes New Standard for Networked Transfer of RTCM via Internet Protocol (Ntrip)

Summary: RTCM Special Committee 104 has completed a new standard which defines a protocol for streaming differential correction data or other kinds of Global Navigation Satellite System (GNSS) data to stationary or mobile users over the Internet. Titled "Networked Transport of RTCM via Internet Protocol (Ntrip)" the standard is named for the widely used RTCM data format, but it can also be used for other data formats. Designated as Version 1.0, (Paper 200-2004/SC104-STD), the standard is available from RTCM at its secure online publication store. Visit www.rtcm.org and click on "Publications."

Global Navigation Satellite Systems (GNSS) provide geographical positioning information from a constellation of satellites in orbit to receivers at sea, on the ground, and in the air. The best known of these systems is the U.S. Global Positioning System (GPS), but the Russian GLONASS system provides a similar service, as will the European Galileo system. Together they are known as Global Navigation Satellite Systems, and they can provide position accuracies in the 10 meter to 15 meter range. Although the satellites have the potential to provide more accurate positions, atmospheric and other effects degrade the quality of the satellite signals.

As impressive as GNSS systems are, they do not directly provide accuracies that are good enough to rely on for ships entering harbors, or docking, for example. The satellite signals can be corrected by using a reference stations at precisely known locations, which broadcast corrections to GNSS receivers nearby. This technique is known as Differential GNSS (DGNSS) service, and it has enabled precise navigation not only by ships, but also aircraft, and ground vehicles. Centimeter level precision can now be obtained, allowing tractors to cross agricultural fields in precisely the same track every time, improving crop yields, and enabling snow plows to operate quickly over roads buried beneath an otherwise trackless snow field. New applications continue to be developed.

Typically, differential corrections have been broadcast over radio data links from single reference stations located in precisely known locations, to mobile receivers (rovers)

located on the equipment whose position needs to be known. As the uses of DGNSS services have grown, governments and commercial service providers have established networks of reference stations. One way to further increase accuracy is to use correction data from multiple reference stations, such as these networks provide. For all these applications, replacing the radio data link with data streaming over the Internet to stationary or mobile users using the Ntrip protocol, can be advantageous.

The Ntrip project was initiated by the German Federal Agency for Cartography and Geodesy (Bundesamt für Kartographie und Geodäsie, BKG). Although there are uses for stationary DGNSS receivers that could access the Internet via landline, the growing availability of Internet service through the mobile telephone network was a persuasive reason to develop and formalize a publicly available Internet protocol for streaming DGNSS data. Ntrip is designed to distribute differential correction data or other kinds of GNSS streaming data to stationary or mobile users over the Internet, allowing simultaneous PC, Laptop, PDA, or receiver connections to a broadcasting host. Ntrip supports wireless Internet access through Mobile IP Networks like GSM, GPRS, EDGE, or UMTS.

Ntrip is meant to be an open non-proprietary protocol. Major characteristics of Ntrip's dissemination technique are the following:

- It is based on the popular HTTP standard, and is comparatively easy to implement when limited client and server platform resources are available.
- Its application is not limited to one particular plain or coded stream content; it has the ability to distribute any kind of GNSS data.
- It has the potential to support mass usage; it can disseminate hundreds of streams simultaneously for up to a thousand users when applying modified Internet Radio broadcasting software.
- Regarding security needs, stream providers and users are not necessarily in direct contact, and streams are usually not blocked by firewalls or proxy servers protecting Local Area Networks.
- It enables streaming over any mobile IP network using TCP/IP.

Correction data through Ntrip is available now through approximately 20 services, primarily in Europe. RTCM SC 104 believes that the new Ntrip protocol will prove useful in supporting precision navigation applications worldwide.