

Real Time Pilot Project

Minutes of Teleconference

Product Formats and Protocols for RT

20 November 2008

1 Meeting Summary

This teleconference was held on 9 October 2008 and was hosted by NRCan.

Participants were:

ESOC:	Loukis Agrotis, Pedro Alfaro
NRCan:	Mark Caissy, Ken MacLeod, Paul Collins
BKG:	Georg Webber
Geo++:	Gerhard Wuebbena, Martin Schmitz
CDDIS:	Carey Noll

The meeting agenda items are listed below:

- 1) RT product formats and protocols
- 2) Hosting/relay of RT data and product streams
- 3) Hosting of comparison results
- 4) AOB

2 RT Product Formats and Protocols

Loukis opened the telecon with an introduction of the objectives: to agree on product exchange formats and protocols for exchange of RT solution streams between the ACs and for dissemination of the individual and combination solutions to users. He then invited BKG and NRCan to outline their current and planned capabilities.

Georg explained that RTCM is the way forward for product dissemination, with capabilities to send both public and private RTCM messages. Existing tools are available to pick up SP3 records, which everyone is able to stream. The tools are:

BNS Encoder which takes the SP3 epoch records and encodes and broadcasts the information as Broadcast Ephemeris corrections via NTRIP, using RTCM messages.

BNC Receives the RTCM messages containing the Broadcast Ephemeris corrections from multiple sources, synchronises them and outputs them per epoch. BNC also receives the Broadcast Ephemeris messages and receiver measurement streams.

BNS would need to be fed the Broadcast Ephemeris messages from a running instance of BNC in order to be able to encode the corrections.

The RTPP Analysis Centre coordinator (ESOC) could make use of these tools to receive the individual AC streams and to send out a combination solution. The frequency of the solution updates should be at least higher than every 15 sec to avoid potential transport protocol limitations of RT end users.

Currently, the solutions from BKG and DLR are carried on NTRIP and are available in this manner. BKG uses the CODE (GPS plus GLONASS) orbit predictions to estimate and transmit clock corrections, while DLR/GSOC uses the IGU predictions.

A document by Gerhard describes the RTCM formats used for transmitting state space messages. Georg requested that IGS should be represented at RTCM to be able to receive these documents.

Gerhard added that a tool like BNS could in principle also format the Broadcast Ephemeris information to allow for unambiguous decoding of the corrections by the receiving side. He said

that there are additional message for transmission of code biases. A new paper, expected to be released next week will include formats for quality information.

Ken described the NRCAN capabilities and plans. The existing system transmits clock, ephemeris and ionospheric corrections over satellite and over UDP relay. They are in RT-IGS messages in MRTCA format for more precision. UDPrelay now has TCP/IP front end as well as UDP. This winter, NRCAN will add the NTRIP protocol to UDPrelay. A preferred proposed approach for disseminating solutions is to transport binary SP3 messages in an RTCM wrapper. A target date for this capability is May-June 2009. The software for decoding/encoding the products can be made available.

Loukis said that for the AC coordination activities ESOC would propose end of March 2009 as the date for an initial capability to send out a combination solution, although this may be difficult to achieve. The ESOC solution will also be made available. For this reason the BNS/BNC tools will be used first as it already carries the DLR and BKG solutions. Loukis also noted that Jim Ray's opinion is that the individual solutions will be of more value than the combination.

Ken added that the NRCAN priorities are first to improve the network and then to have a combination solution from ESOC available, in order to drive improvements and interest. He is working with GFZ to increase the number of stations and, with addition of 4 stations from BKG, expects a total of 15 new stations to be available soon. A possible problem is the latency of data from GFZ (approximately 3 sec). The solution over Canada currently suffers from the lack of stations in the Pacific.

3 Hosting/Relay of RT Data and Product Streams

The current hosts of RT data streams for dissemination to users are NRCAN and BKG. Carey outlined the Data Centre and more specifically the CDDIS plans for handling RT data. She mentioned that KASI and IGN have expressed an interest to participate. Currently CDDIS do not receive any RT streams due to their ongoing activities to transition to a new system. The system consists of distributed Linux servers for handling incoming and outgoing data and Xserve servers for processing. Roll-out of the system is expected to start at the end of November and it will be available to users early next year.

After converting to the new system, CDDIS will start receiving RT streams, initially from NRCAN and will extend to BKG. The intention is to archive the high rate data in flat files. The dissemination of RT streams is not an objective at this stage.

Georg stated that as most receivers are now capable of streaming, it makes sense to turn the whole IGS network to a Real Time network. The BKG servers already host data from approximately 300 stations and can disseminate 1000 streams (one stream comprises the data from one station). However, he foresees that this capacity will not be enough to satisfy the needs of all real-time IGS stream users and would like to see more centres expressing an interest to relay data. He gave a rough cost of approximately €800 per month for contracting an ISP provider to provide a service similar to BKG's.

NRCAN has a view that the size of the RT network should be around 100 stations, with distribution to IGS participants. GSA Australia, DLR/GSOC and GFZ also have relays for transmission of data.

From the above discussion it is apparent that the main centres for RT data and product dissemination for the foreseeable future will be BKG and NRCan.

4 Hosting of Comparison Results

Carey said that she will work with ESOC to host the batch comparison results from the RT solution comparisons.

5 AOB

Georg requested if the solution comparisons could be made against the CODE solution so as to include GLONASS. He also stated that BKG are processing data from 5 Galileo stations, but that the data could not be made available. Pedro replied that he is working on a new comparison tool to include comparisons against the IGS finals. This will satisfy Georg's request for GLONASS statistics.

Georg suggested that an IGS mail should be sent out to highlight the RTPP activities. Mark will send it out.

Ken/Mark said that they found the new RTCM4 format very good for multi-constellation data and they are also looking at Binex for this purpose. Ken and Martin will discuss RTCM4 issues.

Loukis thanked the participants for a very constructive teleconference.