ANNEX I

A Suggested GPS Format Update for GPS/GLONASS

This is a suggested update of the CGGTTS GPS Data Format Version 01 as published in [1], for GPS/GLONASS, with suggested name CGGTTS GPS/GLONASS Data Format Version 02. Adopted notations are the same as for Version 01.

1. File header

Line 1-3: same as Version 01.

Line 4: "CH* = *" NUMBER OF CHANNELS
Number of receiver channels separately for GPS and GLONASS.
As many columns as necessary.

Line 5-6: same as Version 01.

Line 7-9: same as Version 01, but 'GPS antenna' should be replaced by 'GPS/GLONASS antenna'

Line 10: Designation of the reference frames, and if necessary transformation parameters between GLONASS and GPS frames.
As many columns as necessary.

Line 11: same as Version 01.

Line 12: "INT*DLY* = *" INTERNAL DELAY "*ns*(GPS)," INTERNAL DELAY "*ns*(GLO)"
Internal delays entered in the receiver separately for GPS and GLONASS, in ns and given with 1 decimal.
As many columns as necessary.

Line 13: "CAB*DLY* = *" CABLE DELAY "*ns*(GPS)," CABLE DELAY "*ns*(GLO)"
Delays from the antenna to the main unit including delays in the antenna element, filters, electronics and cable length, entered in the receiver separately for GPS and GLONASS, in ns and given with 1 decimal.
As many columns as necessary.

Line 14-17: same as Version 01.

2. Line header

2.1 No measured ionospheric delays available

For no ionospheric measurements available line header update is as follows:

Line 18.1: "SAT*CL**MJD**STTIME*TRKL*ELV*AZTH***REFSV******
SRSV*****REFSYS****SRSYS**DSG*IOE*MDTR*SMDT*MDIO*
SMDI*FR*HC*FRC*CK"
The acronyms are explained in Section 4 below. 113 columns.

2.2 Measured ionospheric delays available

With ionospheric measurements available line header update is as follows:

Line 18.2: "SAT*CL**MJD**STTIME*TRKL*ELV*AZTH***REFSV******
SRSV*****REFSYS****SRSYS**DSG*IOE*MDTR*SMDT*MDIO*
SMDI*MSIO*SMSI*ISG*FR*HC*FRC*CK"
The acronyms are explained in Section 4 below. 127 columns.

3. Unit header

Same as Version 01.

4. Data line

Line 20, columns 1-3: "123" SAT
GPS or GLONASS satellite identification number.
a. GPS satellite PRN number, 1 to 38. No unit.
b. GLONASS almanac slot number plus 100, 101 to 124. No unit.

Line 20, columns 4-53: same as Version 01.

Line 20, columns 54-64: "+1234567890" REFSYS
Title changed from " REFGPS" to indicate reference to either constellation.
Data content same as Version 01.

Line 20, column 65: same as Version 01.

Line 20, columns 66-71: "+12345" SRSYS
Title changed from " SRGPS" to indicate slope for either constellation.
Data content same as Version 01.

Line 20, columns 72-101: same as Version 01.

4.1 No measured ionospheric delays available

Line 20, columns 102-103: "12" FR
GLONASS transmission frequency channel number. 1 to 24. For GPS set to 0. No unit.

Line 20, column 104: space, ASCII value 20 (hexadecimal).

Line 20, columns 105-106: "12" HC
Receiver hardware channel number. 0 to 99. No unit.

Line 20, column 107: space, ASCII value 20 (hexadecimal).

Line 20, columns 108-110: "123" FRC
Frequency and Code type used for pseudo-range measurement, where:
L1C - L1 C/A code,
L1P - L1 P code,
L2C - L2 C/A code (GLONASS future capability),
L2P - L2 P code.

Line 20, column 111: space, ASCII value 20 (hexadecimal).

Line 20, columns 112-113: "12" CK
Data line check-sum for columns 1 to 111. Check-sum algorithm as defined for Version 01.

Line 20, columns 114-140: "12345678901234567890123456 7"
Optional comments on the data line, constitued of characters which are not included in the line check-sum CK.

4.2 Measured ionospheric delays available

Line 20, columns 102-115: same as Version 01.

Line 20, columns 116-117: "12" FR
GLONASS transmission frequency channel number. 1 to 24. For GPS set to 0. No unit.

Line 20, column 118: space, ASCII value 20 (hexadecimal).

Line 20, columns 119-120: "12" HC
Receiver hardware channel number. 0 to 99. No unit.

Line 20, column 121: space, ASCII value 20 (hexadecimal).

Line 20, columns 122-124: "123" FRC
Frequency and Code type used for pseudo-range measurement, where:
L1C - L1 C/A code,
L1P - L1 P code,
L2C - L2 C/A code (GLONASS future capability),
L2P - L2 P code.

Line 20, column 125: space, ASCII value 20 (hexadecimal).

Line 20, columns 126-127: "12" CK
Data line check-sum for columns 1 to 125. Check-sum algorithm as defined for Version 01.

Line 20, columns 128-140: "1234567890123"
Optional comments on the data line, constitued of characters which are not included in the line check-sum CK.

5. Example of Proposed Standard Format (fictitious data)

5.1 No measured ionospheric delays available, separate reference frames for GPS and GLONASS

```
CGGTTS GPS/GLONASS DATA FORMAT VERSION = 02
REV DATE = 1996-10-20
RCVR = 3S Navigation, R-100/10 L1 GLONASS 2 CH, S/N 00102 Rev 002 1996-10-20
CH = 1 (GPS), 1 (GLONASS)
IMS = 99999
LAB = 3S
X = -2473157.78 m (GPS),  -2473171.90 m (GLONASS)
Y = -4706094.09 m (GPS),  -4706086.67 m (GLONASS)
Z = +3512042.48 m (GPS),  +3512038.48 m (GLONASS)
FRAME = ITRF for GPS, PZ-90 for GLONASS
COMMENTS = NO COMMENTS
INT DLY = 1366.0 ns (GPS), 1312.0 ns (GLONASS)
CAB DLY =  100.0 ns (GPS),  105.0 ns (GLONASS)
REF DLY = 30.0 ns
REF = 3S
CKSUM = FE

SAT CL  MJD   STTIME TRKL ELV AZTH   REFSV      SRSV     REFSYS    SRSYS  DSG IOE MDTR SMDT MDIO SMDI FR HC FRC CK
            hhmmss  s  .1dg .1dg    .1ns     .1ps/s    .1ns    .1ps/s .1ns      .1ns.1ps/s.1ns.1ps/s
107 34 50367 231000  780 273 3287    +903734   +114      +1906    +69   41   9  177  -46  218  -34 21  1 L1C C1
107 34 50367 232300  180 273 3287    +903764   +105      +1936    +60   42   9  156  -33  201  -30 21  1 L1C B9
  9 18 50367 232600  780 428 2719    +491057    -63      +2120    -72   29   9  119   -8  174  -16  0  0 L1C 4A
107 18 50367 232600  780 348 3257    +903854    +87      +1926    +41   42   9  142  -27  188  -28 21  1 L1C BF
```

5.2 Measured ionospheric delays available, GLONASS satellite position transformed

```
CGGTTS GPS/GLONASS DATA FORMAT VERSION = 02
REV DATE = 1996-10-20
RCVR = 3S Navigation, R-100/30, L1 GPS 12 CH, L1/L2 GLONASS 2 CH, S/N 00020 Rev 004 1996-10-01
CH = 7 (GPS), 7 (GLONASS)
IMS = R-100/30
LAB = 3S
X = -2473157.78 m (GPS,GLONASS)
Y = -4706094.09 m (GPS,GLONASS)
Z = +3512042.48 m (GPS,GLONASS)
FRAME = ITRF, PZ-90->ITRF Dx = 0.0 m, Dy = 0.0 m, Dz = 4.0 m, ds = 0.0, Rx = 0.0, Ry = 0.0, Rz = -0.000003
COMMENTS = NO COMMENTS
INT DLY = 1366.0 ns (GPS), 1312.0 ns (GLONASS)
CAB DLY =  100.0 ns (GPS),  105.0 ns (GLONASS)
REF DLY = 0.0 ns
REF = 3S
CKSUM = 86

SAT CL  MJD   STTIME TRKL ELV AZTH   REFSV      SRSV     REFSYS    SRSYS  DSG IOE MDTR SMDT MDIO SMDI MSIO SMSI ISG FR HC FRC CK
            hhmmss  s  .1dg .1dg    .1ns     .1ps/s    .1ns    .1ps/s .1ns      .1ns.1ps/s.1ns.1ps/s.1ns.1ps/s.1ns
107 34 50367 231000  780 273 3287    +903734   +114      +1906    +69   41   9  177  -46  218  -34  225  -10  09 21  1 L1C C1
107 34 50367 232300  180 273 3287    +903764   +105      +1936    +60   42   9  156  -33  201  -30  189  -40  20 21  1 L1C B9
  9 18 50367 232600  780 428 2719    +491057    -63      +2120    -72   29   9  119   -8  174  -16 9999 9999 999  0  0 L1C 4A
107 18 50367 232600  780 348 3257    +903854    +87      +1926    +41   42   9  142  -27  188  -28  202  -30  17 21  1 L1C BF
```