Refined characteristics of the GLONASS high-precision service (GLONASS HiPreServ)

(PPP-System for High-Precision Determination of Real-Time Ephemeris and Clock Data Corrections for Civilian Users)

Moscow, 2023

STRUCTURE

DATA COMMUNICATION DEVICES

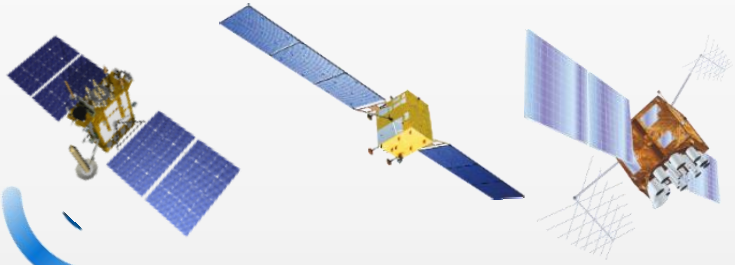
GEO

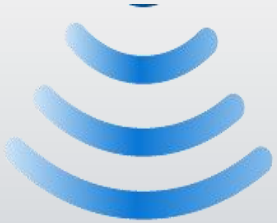
L3 GLONASS

INTERNET

NTRIP

GNSS CONSTELLATION





GLOBAL NETWORK OF MEASUREMENT COLLECTION STATIONS

DATA PROCESSING COMPLEX

- Main center
- Backup center

SPECIFICATION

Layer	Parameters	Answer	Note
Application	Service Name	System for high-precision determination of ephemeris-time information (SVO)	
	Operator	ROSCOSMOS, State Space Corporation, Russian Federation	
	Status (In Operational, development …)	Operational and modernization	
	Technology (PPP,PPP-AR,PPP-RTK,…)	PPP	PPP-RTK to be added in a later phase
	Service Area	Russian Federation	Global in a later phase
	Coordinate System	ITRF 2014	
	Time System	UTC+3h	
	Positioning Accuracy [cm] (95%)	20 cm	
	Convergence Time [s] (95%)	1200 sec	
Presentation	Message Format (RTCM, CSSR, other,…)	RTCM (ground) CSSR (space)	
	Fixed or variable length	Variable	
	Multi-GNSS, multi-signals	GLONASS (L1OF, L2OF), GPS (L1CA, L2CM), GALILEO (E1,E5a,E5b), BEIDOU (B1I, B2I)	Other signals to be added in a later phase GLONASS (L1OC, L2OC, L3OC), BEIDOU (B3I)
	Satellite selection (mask)	Yes	
	Orbit and Clock correction	Yes	
	Code bias	Yes (TBC)	To be added in a later phase
	Phase bias	Yes (TBC)	To be added in a later phase
	URA	No	To be added in a later phase
	Ionospheric correction (STEC,VTEC)	Yes (TBC)	To be added in a later phase
	Ionospheric Grid Definition	Yes (TBC)	To be added in a later phase
	Tropospheric correction	Yes (TBC)	To be added in a later phase
	Tropospheric Grid Definition	Yes (TBC)	To be added in a later phase
	Integrity	No	
	Authentication	Yes (2027)	To be added in a later phase
	Bandwidth	3424 bps	For all GNSS

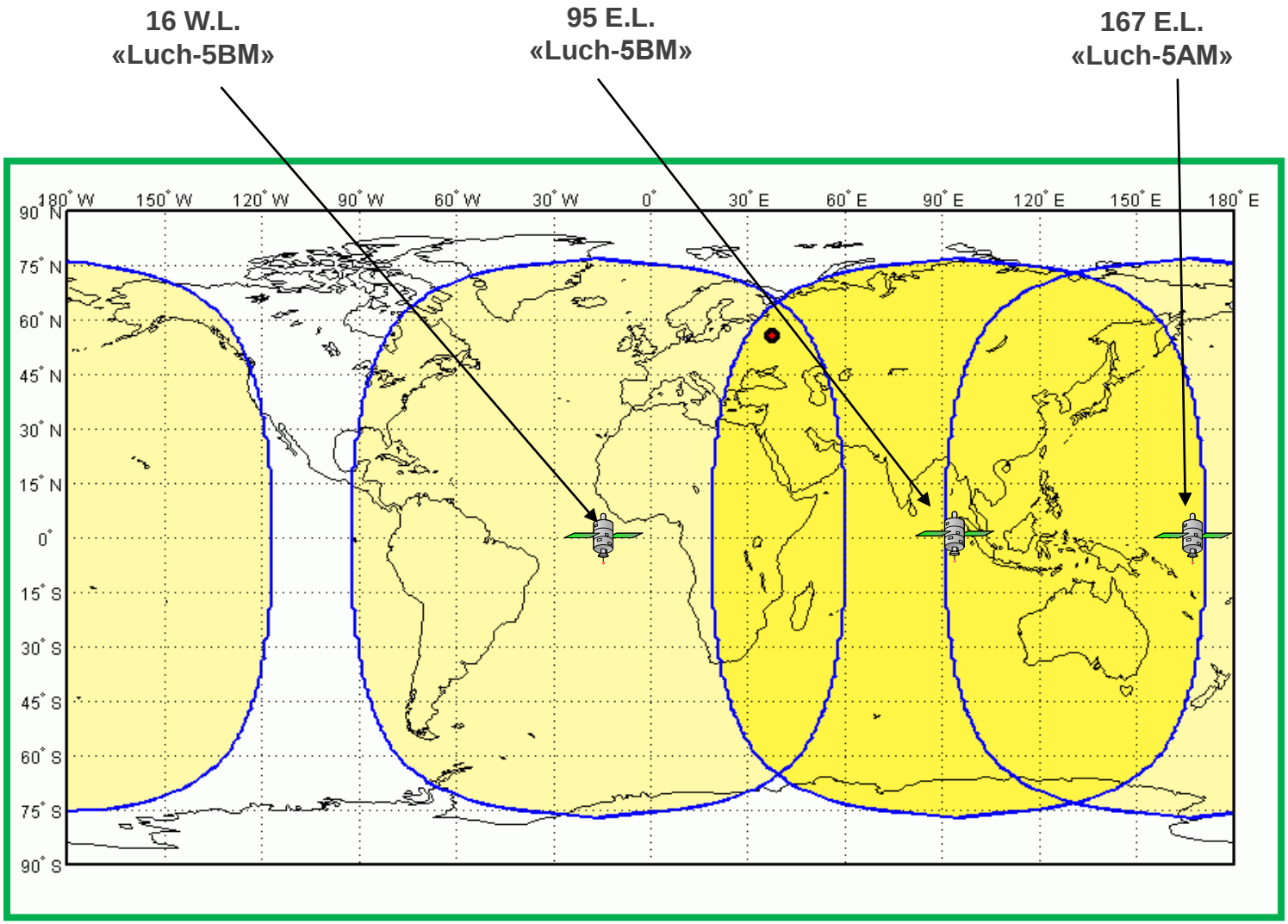
SPECIFICATION

	Efficiency	TBD	
	Extensibility	Yes	Satellite grouping for retranslation to be added in a later phase
Session	Consistency check for ephemeris update	Using GNSS IOD (is specific for a GNSS)	
	Satellite grouping	Yes	Satellite grouping for retranslation to be added in a later phase
Transport	Framing design	Preamble+payload+error correction	
	Check sum or error correction	CRC-24Q Reed-Solomon (250,218)	
	System alert	No	
	Generator id	No	
Network	Signal	L3SVO	
Data-link	Frequency band	1202,025 MHz	
	Signal Polarization	RHCP	
	Signal power	-156.6 dBW	On-ground, 0-dBi RHCP antenna, satellite elevation >5 degrees
	Spectrum	10,23 MHz	
	DS-SS Chip Modulation	BPSK (5)	
	DS-SS Chip rate	5.115 Mcps	
	DS-SS Code Length	2 ms	
	DS-SS Spectrum code	KASAMI	
	Data modulation	BPSK	
	Data rate	-	
Physical	Type (Satellite, Ground)	Ground	Satellite channel in the future
	Number of Transmitting Satellites	3	
	Orbit	GEO	

SYSTEM DEVELOPMENT

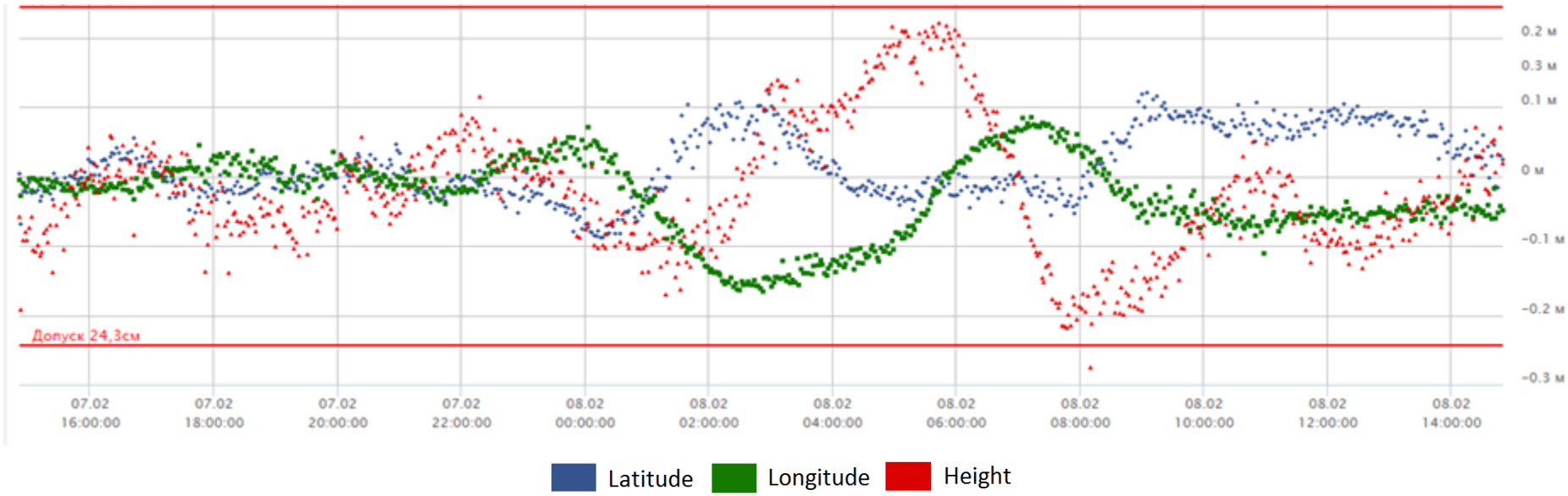
	2023	2025	Note
Signals	GLONASS (L1OF, L2OF), GPS (L1CA, L2CM), GALILEO (E1,E5a,E5b), BEIDOU (B1I, B2I)	+ L1OC, L2OC, L3OC GLONASS L5 GPS E6 GALILEO B3I BEIDOU	
Coverage area	Territory of the Russian Federation (terrestrial channels)	Territory of the Russian Federation (space channels)	Globally in perspective
Data formats	RTCM	RTCM + Compact SSR	
Data	Satellite orbits, clocks	Satellite orbits, clocks + code bias, phase bias + atmospheric corrections	
Convergence time	Up to 1800 seconds	Up to 300 seconds	
Positional accuracy (95 %)	Up to 20 cm	Up to 10 cm	

COVERAGE AREA OF SIGNAL L3CBO USING SATELLITE CONNECTION



REAL-TIME MODE ACCURACY CHARACTERISTICS (GLONASS + GPS)

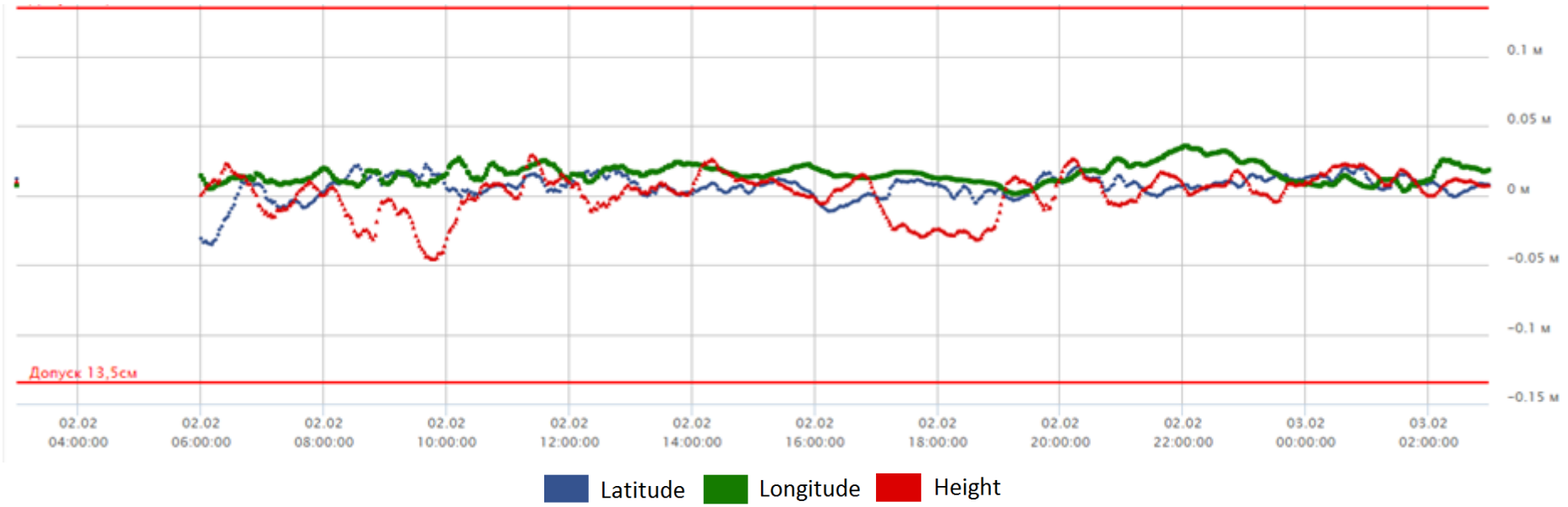
Parameter	2023
Positioning errors (standard error) in geocentric reference coordinate system due to the space segment using augmentation systems in real-time mode with initialization (3D)	**0,09 m**



Station: GZ0X; GNSS: GPS/GLONASS; Time interval (UTC+3): 07.02.2023 14:51:22 – 08.02.2023 14:49:42

POST-PROCESSED MODE ACCURACY CHARACTERISTICS(GLONASS + GPS)

Parameter	2023
Positioning errors (standard error) in geocentric reference coordinate system due to the space segment using augmentation systems in post-processed mode (3D)	**0,05 m**



Station: WTZR; GNSS: GPS/GLONASS; Time interval (UTC+3): 02.02.2023 02:59:42 – 03.02.2023 02:58:42

Joint-stock Company

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«Precision Systems and Instruments»

JC «RPC «PSI»

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Thank you for your attention!