Groupe de travail G&P

Panorama des constellations de satellites de positionnement

Paul CHAMBON

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GPS


7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

GPS

Etat actuel de la constellation

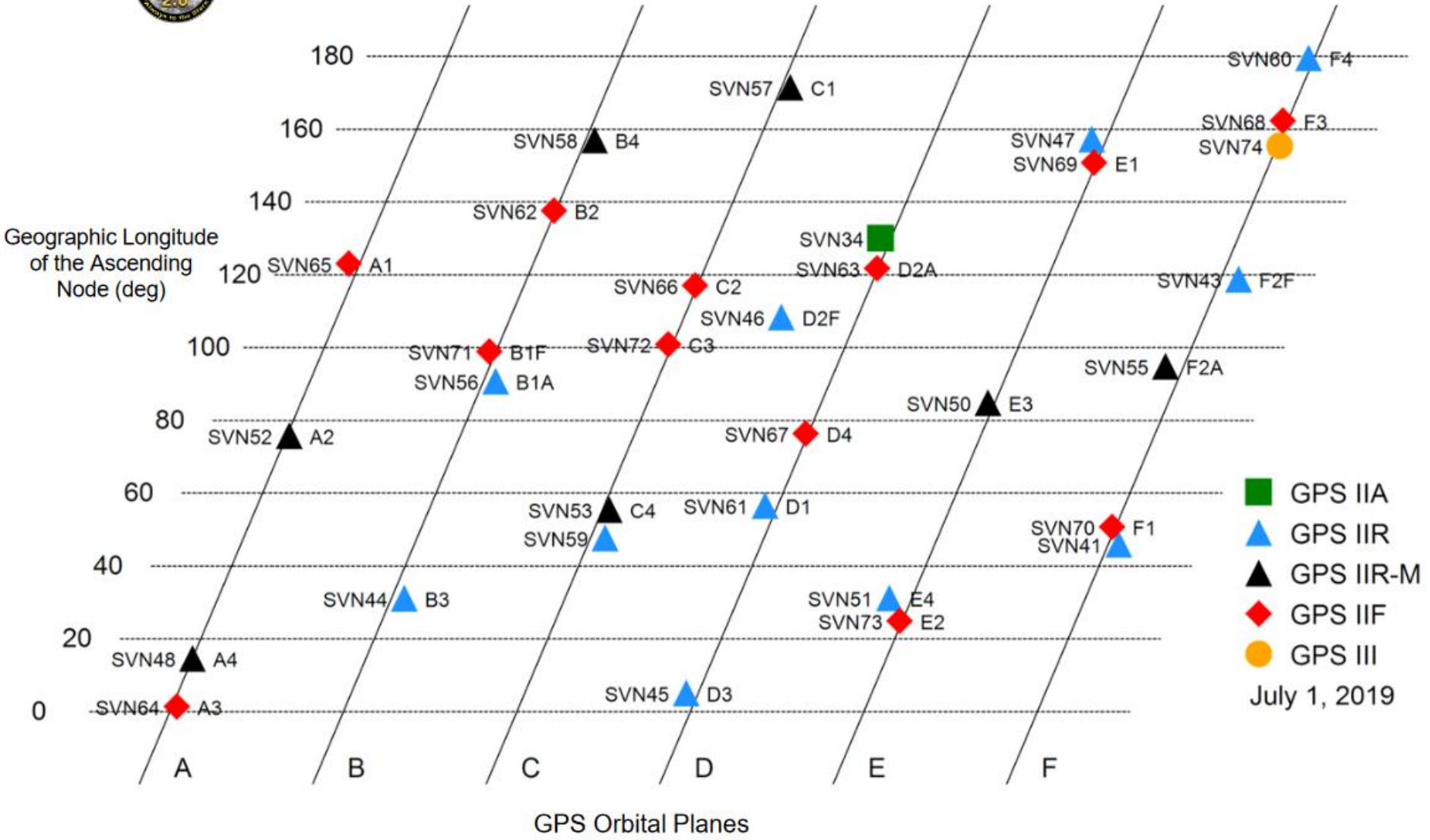
Plane	Slot	SVN	PRN	Block-Type	Clock	Outage Date	Nanu-Type	Nanu-Subject
A	1	65	24	IIF	CS	10 OCT 2019	FCSTSUMM	2019160 - SVN65 (PRN24) FORECAST OUTAGE SUMMARY JDAY 283/0700 - JDAY 283/1200
A	2	52	31	IIR-M	RB			
A	3	64	30	IIF	RB			
A	4	48	7	IIR-M	RB			
B	1	56	16	IIR	RB			
B	2	62	25	IIF	RB			
B	3	44	28	IIR	RB			
B	4	58	12	IIR-M	RB			
B	5	71	26	IIF	RB			
C	1	57	29	IIR-M	RB			
C	2	66	27	IIF	RB			
C	3	72	8	IIF	CS			
C	4	53	17	IIR-M	RB			
C	5	59	19	IIR	RB			
D	1	61	2	IIR	RB			
D	2	63	1	IIF	RB			
D	3	45	21	IIR	RB			
D	4	67	6	IIF	RB			
D	5	46	11	IIR	RB			
D	6	34	18	IIA	RB		DECOM	2019158 - SVN34 (PRN18) DECOMMISSIONING JDAY 282/2200
E	1	69	3	IIF	RB			
E	2	73	10	IIF	RB			
E	3	50	5	IIR-M	RB			
E	4	51	20	IIR	RB			
E	6	47	22	IIR	RB			
F	1	70	32	IIF	RB			
F	2	55	15	IIR-M	RB			
F	3	68	9	IIF	RB			
F	4	60	23	IIR	RB			
F	5	41	14	IIR	RB			
F	6	43	13	IIR	RB			

GPS

Slant Chart (GPS Satellite Locations)

Including GPS III SV01 as SVN 74

SPACE AND MISSILE SYSTEMS CENTER



Distribution A. Approved for public release; distribution unlimited. SMC-2019-1428, 29 July 2019.

Plans orbitaux

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GPS

GPS III

2019001	NOTICE ADVISORY TO NAVSTAR USERS (NANU) 2019001 NANU TYPE: GENERAL *** GENERAL MESSAGE TO ALL GPS USERS *** GPS III SVN74 (PRN04) WAS LAUNCHED ON 23 DEC 2018 (2018 JDAY 357) AT 1351 ZULU. THIS SATELLITE WILL UNDERGO EXTENSIVE ON-ORBIT CHECK OUT AND TESTING PRIOR TO BEING SET HEALTHY. A USABINIT NANU WILL BE SENT WHEN THE SATELLITE IS SET ACTIVE TO SERVICE. *** GENERAL MESSAGE TO ALL GPS USERS *** POC: CIVILIAN - NAVCEN AT 703-313-5900, HTTPS://WWW.NAVCEN.USCG.GOV MILITARY - GPS OPERATIONS CENTER AT HTTPS://GPS.AFSPC.AF.MIL/GPSOC, DSN 560-2541, COMM 719-567-2541, GPSOPERATIONSCENTER@US.AF.MIL, HTTPS://GPS.AFSPC.AF.MIL MILITARY ALTERNATE - JOINT SPACE OPERATIONS CENTER, DSN 276-3514, COMM 805-606-3514, JSPOCCOMBATOPS@VANDENBERG.AF.MIL

GPS

GPS III

SV01. The first GPS III satellite is in a holding state pending readiness by 2SOPS [the Second Space Operations Squadron] to take the vehicle onto the system for operational checkout, a transfer expected to take place later this year, Caldwell explained. The satellite completed on-orbit testing in July.

"We're in the process of getting the 2SOPS crews trained up to operate a GPS III vehicle," Caldwell said. "By the end of this year, they will be able to take [SV01] into the constellation and start flying it as a live, set-healthy vehicle."

SV02. Launched Aug. 22, SV02 is following in the footsteps of its older sibling, with a quiet checkout and no major findings. Like SV01, once it completes testing, it will stay in temporary holding until 2SOPS is ready to bring it into the constellation.

SV03. On May 27, the Air Force declared SV03 available for launch. It is now in final preparations for shipment, with an expected launch date in January 2020 aboard a Falcon 9 rocket.

SV04. The Air force declared SV04 available for launch; it is now in storage awaiting a launch date.

SV05. The fifth satellite is wrapping up environmental tests. Lockheed Martin anticipates that it will be available for launch early next year.

SV06. The satellite has been moved into the thermal vacuum testing chamber and begun a rigorous testing campaign before it meets the harsh environment of space.

SV07, SV08 and **SV09** are on the assembly line.

GPS IIIF Satellites. In 2018, the Air Force selected Lockheed Martin to build up to 22 GPS IIIFs, adding new features and resiliency to the original GPS III satellite design. The company has been on the path to meet the critical design review for the GPS IIIF spacecraft, which is due to take place next spring

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GPS

GNSS System	Freq. Band /Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
GPS	L1/1575.42	C/A	C1C	L1C	D1C	S1C
		L1C (D)	C1S	L1S	D1S	S1S
		L1C (P)	C1L	L1L	D1L	S1L
		L1C (D+P)	C1X	L1X	D1X	S1X
		P (AS off)	C1P	L1P	D1P	S1P
		Z-tracking and similar (AS on)	C1W	L1W	D1W	S1W
		Y	C1Y	L1Y	D1Y	S1Y
		M	C1M	L1M	D1M	S1M
		codeless		L1N	D1N	S1N
	L2/1227.60	C/A	C2C	L2C	D2C	S2C
		L1(C/A)+(P2-P1) (semi-codeless)	C2D	L2D	D2D	S2D
		L2C (M)	C2S	L2S	D2S	S2S
		L2C (L)	C2L	L2L	D2L	S2L
		L2C (M+L)	C2X	L2X	D2X	S2X
		P (AS off)	C2P	L2P	D2P	S2P
		Z-tracking and similar (AS on)	C2W	L2W	D2W	S2W
		Y	C2Y	L2Y	D2Y	S2Y
		M	C2M	L2M	D2M	S2M
		codeless		L2N	D2N	S2N
	L5/1176.45	I	C5I	L5I	D5I	S5I
		Q	C5Q	L5Q	D5Q	S5Q
		I+Q	C5X	L5X	D5X	S5X

Table 4 : RINEX Version 3.04 GPS Observation Codes


GLONASS
7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

GLONASS

Statut

GLONASS CONSTELLATION STATUS, 15.10.2019

Total satellites in constellation	27 SC
Operational	23 SC
In commissioning phase	-
In maintenance	2 SC
Under check by the Satellite Prime Contractor	-
Spares	1 SC
In flight tests phase	1 SC

GLONASS

Statut

Orb. slot	Orb. pl.	RF chnl	# GC	Launched	Operation begins	Operation ends	Life-time (months)	Satellite health status		Comments
								In almanac	In ephemeris (UTC)	
1	1	01	730	14.12.09	30.01.10		118.1	+	+ 07:36 15.10.19	In operation
2	1	-4	747	26.04.13	04.07.13		77.7	+	+ 07:36 15.10.19	In operation
3	1	05	744	04.11.11	08.12.11		95.4	+	+ 07:36 15.10.19	In operation
4	1	06	742	02.10.11	25.10.11	26.08.19	96.5	-	- 07:36 15.10.19	Maintenance
5	1	01	756	17.06.18	29.08.18		15.9	+	+ 07:36 15.10.19	In operation
6	1	-4	733	14.12.09	24.01.10		118.1	+	+ 07:36 15.10.19	In operation
7	1	05	745	04.11.11	18.12.11		95.4	+	+ 07:36 15.10.19	In operation
8	1	06	743	04.11.11	20.09.12		95.4	+	+ 07:36 15.10.19	In operation
9	2	-2	702	01.12.14	15.02.16		58.5	+	+ 07:36 15.10.19	In operation
10	2	07	723	25.12.07	22.01.08		141.8	+	+ 07:36 15.10.19	In operation
11	2	00	753	29.05.16	27.06.16		40.6	+	+ 07:36 15.10.19	In operation
12	2	-1	758	27.05.19	22.06.19		4.6	+	+ 07:36 15.10.19	In operation
13	2	-2	721	25.12.07	08.02.08		141.8	+	+ 07:36 15.10.19	In operation
14	2	-7	752	22.09.17	16.10.17		24.8	+	+ 07:36 15.10.19	In operation
15	2	00	757	03.11.18	27.11.18		11.4	+	+ 07:36 15.10.19	In operation
16	2	-1	736	02.09.10	04.10.10		109.5	+	+ 07:36 15.10.19	In operation
17	3	04	751	07.02.16	28.02.16		44.3	+	+ 07:36 15.10.19	In operation
18	3	-3	754	24.03.14	14.04.14		66.8	+	+ 07:36 15.10.19	In operation
19	3	03	720	26.10.07	25.11.07		143.7	+	+ 07:36 15.10.19	In operation
20	3	02	719	26.10.07	27.11.07		143.7	+	+ 07:36 15.10.19	In operation
21	3	04	755	14.06.14	03.08.14		64.1	+	+ 07:36 15.10.19	In operation
22	3	-3	731	02.03.10	28.03.10		115.5	+	+ 07:36 15.10.19	In operation
23	3	03	732	02.03.10	28.03.10		115.5	+	+ 07:36 15.10.19	In operation
24	3	02	735	02.03.10	28.03.10		115.5	+	+ 07:36 15.10.19	In operation
15	2		716	25.12.06	12.10.07	24.11.18	153.8			Spares
10	2		717	25.12.06	03.04.07	01.08.19	153.8			Maintenance
20	3	-5	701	26.02.11			103.7			Flight Tests

GLONASS

Statut

MOSCOW (UrduPoint News / Sputnik - 15th October, 2019) The launch of the next Russian GLONASS navigation system satellite has been postponed until December, a source in the space industry told Sputnik.

"The launch has been postponed until December 2," the source said on Tuesday, adding that the new satellite will replace a GLONASS-M satellite that stopped operating in August, after its 7-year-warranty period ended.

The launch of the new GLONASS-M satellite was initially planned for November.

At the moment, the GLONASS navigation system consists of 27 satellites, including 23 operational devices in orbit. Two satellites are in maintenance. To ensure the global coverage of the navigation system, 24 operational satellites are needed.

Earlier this month, documents of the Ingosstrakh insurance company revealed that four more satellites will join the Russian GLONASS navigation system before 2021, two GLONASS-Ms, one GLONASS-K and one GLONASS-K2 satellite.

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GLONASS

GNSS System	Freq. Band /Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
GLONASS	G1/ 1602+k*9/16 k= -7….+12	C/A	C1C	L1C	D1C	S1C
		P	C1P	L1P	D1P	S1P
	G1a/ 1600.995	L1OCd	C4A	L4A	D4A	S4A
		L1OCp	C4B	L4B	D4B	S4B
		L1OCd+ L1OCp	C4X	L4X	D4X	S4X
	G2/ 1246+k*7/16	C/A (GLONASS M)	C2C	L2C	D2C	S2C
		P	C2P	L2P	D2P	S2P
	G2a/ 1248.06	L2CSI	C6A	L6A	D6A	S6A
		L2OCp	C6B	L6B	D6B	S6B
		L2CSI+ L2OCp	C6X	L6X	D6X	S6X
	G3 / 1202.025	I	C3I	L3I	D3I	S3I
		Q	C3Q	L3Q	D3Q	S3Q
		I+Q	C3X	L3X	D3X	S3X

Table 5 : RINEX Version 3.04 GLONASS Observation Codes

GLONASS

GLONASS : A venir (sans confirmation)

- Les signaux vont migrer en CDMA
- Ajout d'une nouvelle fréquence G3

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GALILEO


7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

GALILEO

Statut

Satellite Name[1]	SV ID[2]	Clock[3]	Status[4]	Active NAGU[5]	NAGU Type[6]	NAGU Subject[7]
GSAT0101	E11	RAFS	USABLE			
GSAT0102	E12	PHM	USABLE			
GSAT0103	E19	PHM	USABLE			
GSAT0104	E20	RAFS	NOT AVAILABLE	2014014	UNP_UNUFN	UNAVAILABLE FROM 2014-05-27 UNTIL FURTHER NOTICE
GSAT0201	E18	PHM	TESTING	2019020	GENERAL	TESTING OF GSAT0201
GSAT0202	E14	PHM	TESTING	2019021	GENERAL	TESTING OF GSAT0202
GSAT0203	E26	PHM	USABLE			
GSAT0204	E22	RAFS	NOT USABLE	2017045	GENERAL	GSAT0204 REMOVED FROM ACTIVE SERVICE ON 2017-12-08 UNTIL FURTHER NOTICE FOR CONSTELLATION MANAGEMENT PURPOSES
GSAT0205	E24	PHM	USABLE			
GSAT0206	E30	PHM	USABLE			
GSAT0207	E07	PHM	USABLE			
GSAT0208	E08	PHM	USABLE			
GSAT0209	E09	PHM	USABLE			
GSAT0210	E01	PHM	USABLE			
GSAT0211	E02	PHM	USABLE			
GSAT0212	E03	PHM	USABLE			
GSAT0213	E04	PHM	USABLE			
GSAT0214	E05	PHM	USABLE			
GSAT0215	E21	PHM	USABLE			
GSAT0216	E25	PHM	USABLE			
GSAT0217	E27	PHM	USABLE			
GSAT0218	E31	PHM	USABLE			
GSAT0219	E36	PHM	USABLE			
GSAT0220	E13	PHM	USABLE			
GSAT0221	E15	PHM	USABLE			
GSAT0222	E33	PHM	USABLE			

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Plans Orbitaux

Satellite	SV ID	Slot	Semi-Major Axis (Km)	Eccentricity	Inclination (deg)	RAAN (deg)[2]	Arg. Perigee (deg)[2]	Mean Anomaly (deg)[2,3]
Nominal Slots								
GSAT0101	E11	B05	29599.8	0.0	56.0	77.632	0.0	15.153
GSAT0102	E12	B06	29599.8	0.0	56.0	77.632	0.0	60.153
GSAT0103	E19	C04	29599.8	0.0	56.0	197.632	0.0	345.153
GSAT0104	E20	C05	29599.8	0.0	56.0	197.632	0.0	30.153
GSAT0203	E26	B08	29599.8	0.0	56.0	77.632	0.0	150.153
GSAT0204	E22	B03	29599.8	0.0	56.0	77.632	0.0	285.153
GSAT0205	E24	A08	29599.8	0.0	56.0	317.632	0.0	135.153
GSAT0206	E30	A05	29599.8	0.0	56.0	317.632	0.0	0.153
GSAT0208	E08	C07	29599.8	0.0	56.0	197.632	0.0	120.153
GSAT0209	E09	C02	29599.8	0.0	56.0	197.632	0.0	255.153
GSAT0210	E01	A02	29599.8	0.0	56.0	317.632	0.0	225.153
GSAT0211	E02	A06	29599.8	0.0	56.0	317.632	0.0	45.153
GSAT0207	E07	C06	29599.8	0.0	56.0	197.632	0.0	75.153
GSAT0212	E03	C08	29599.8	0.0	56.0	197.632	0.0	165.153
GSAT0213	E04	C03	29599.8	0.0	56.0	197.632	0.0	300.153
GSAT0214	E05	C01	29599.8	0.0	56.0	197.632	0.0	210.153
GSAT0215	E21	A03	29599.8	0.0	56.0	317.632	0.0	270.153
GSAT0216	E25	A07	29599.8	0.0	56.0	317.632	0.0	90.153
GSAT0217	E27	A04	29599.8	0.0	56.0	317.632	0.0	315.153
GSAT0218	E31	A01	29599.8	0.0	56.0	317.632	0.0	180.153
GSAT0219	E36	B04	29599.8	0.0	56.0	77.632	0.0	330.153
GSAT0220	E13	B01	29599.8	0.0	56.0	77.632	0.0	195.153
GSAT0221	E15	B02	29599.8	0.0	56.0	77.632	0.0	105.153
GSAT0222	E33	B07	29599.8	0.0	56.0	77.632	0.0	240.153
Extended Slots								
GSAT0201	18	Ext01	27977.6	0.162	49.850	52.521	56.198	316.069
GSAT0202	14	Ext02	27977.6	0.162	49.850	52.521	56.198	136.069

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GALILEO

Rinex 3

GNSS System	Freq. Band /Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
Galileo	E1 / 1575.42	A PRS	C1A	L1A	D1A	S1A
		B I/NAV OS/CS/SoL	C1B	L1B	D1B	S1B
		C no data	C1C	L1C	D1C	S1C
		B+C	C1X	L1X	D1X	S1X
		A+B+C	C1Z	L1Z	D1Z	S1Z
	E5a / 1176.45	I F/NAV OS	C5I	L5I	D5I	S5I
		Q no data	C5Q	L5Q	D5Q	S5Q
		I+Q	C5X	L5X	D5X	S5X
	E5b / 1207.140	I I/NAV OS/CS/SoL	C7I	L7I	D7I	S7I
		Q no data	C7Q	L7Q	D7Q	S7Q
		I+Q	C7X	L7X	D7X	S7X
	E5(E5a+E5b) / 1191.795	I	C8I	L8I	D8I	S8I
		Q	C8Q	L8Q	D8Q	S8Q
		I+Q	C8X	L8X	D8X	S8X
	E6 / 1278.75	A PRS	C6A	L6A	D6A	S6A
		B C/NAV CS	C6B	L6B	D6B	S6B
		C no data	C6C	L6C	D6C	S6C
		B+C	C6X	L6X	D6X	S6X
		A+B+C	C6Z	L6Z	D6Z	S6Z

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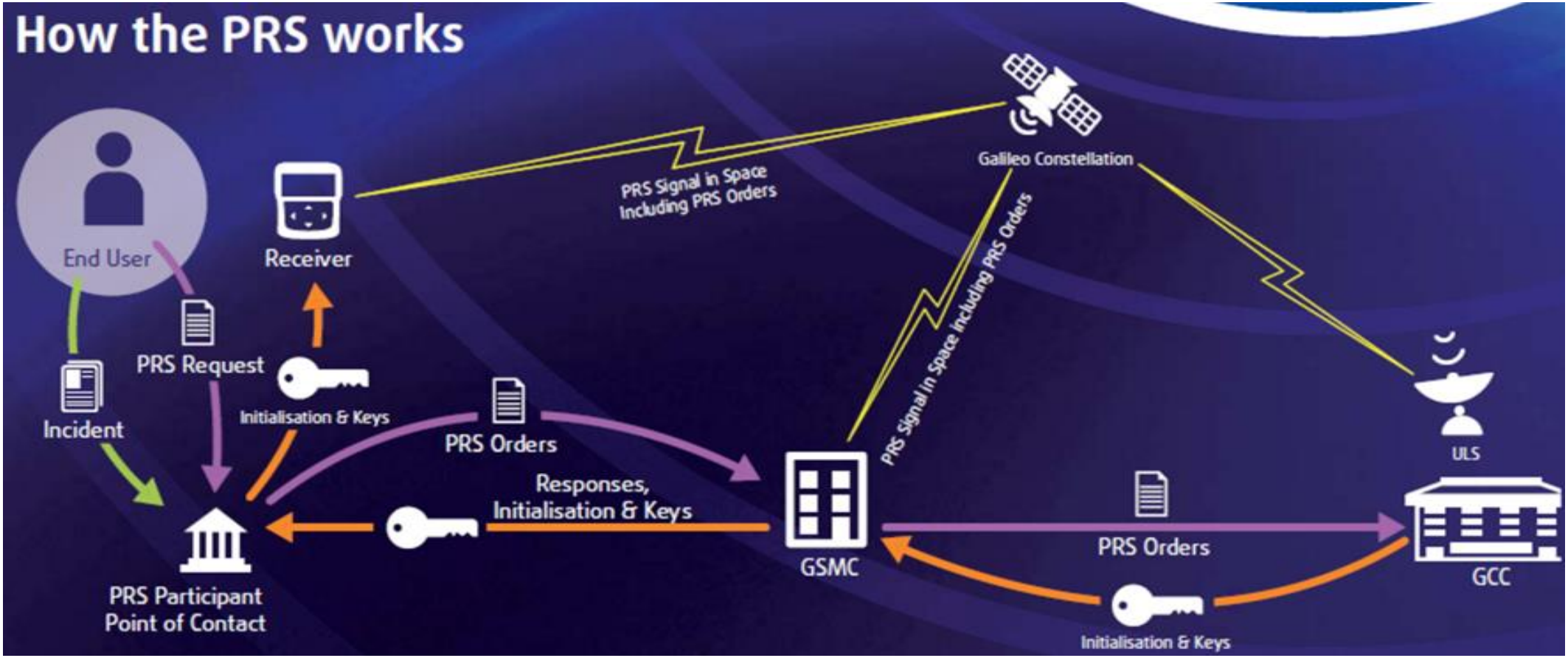
GALILEO

Les services : PRS



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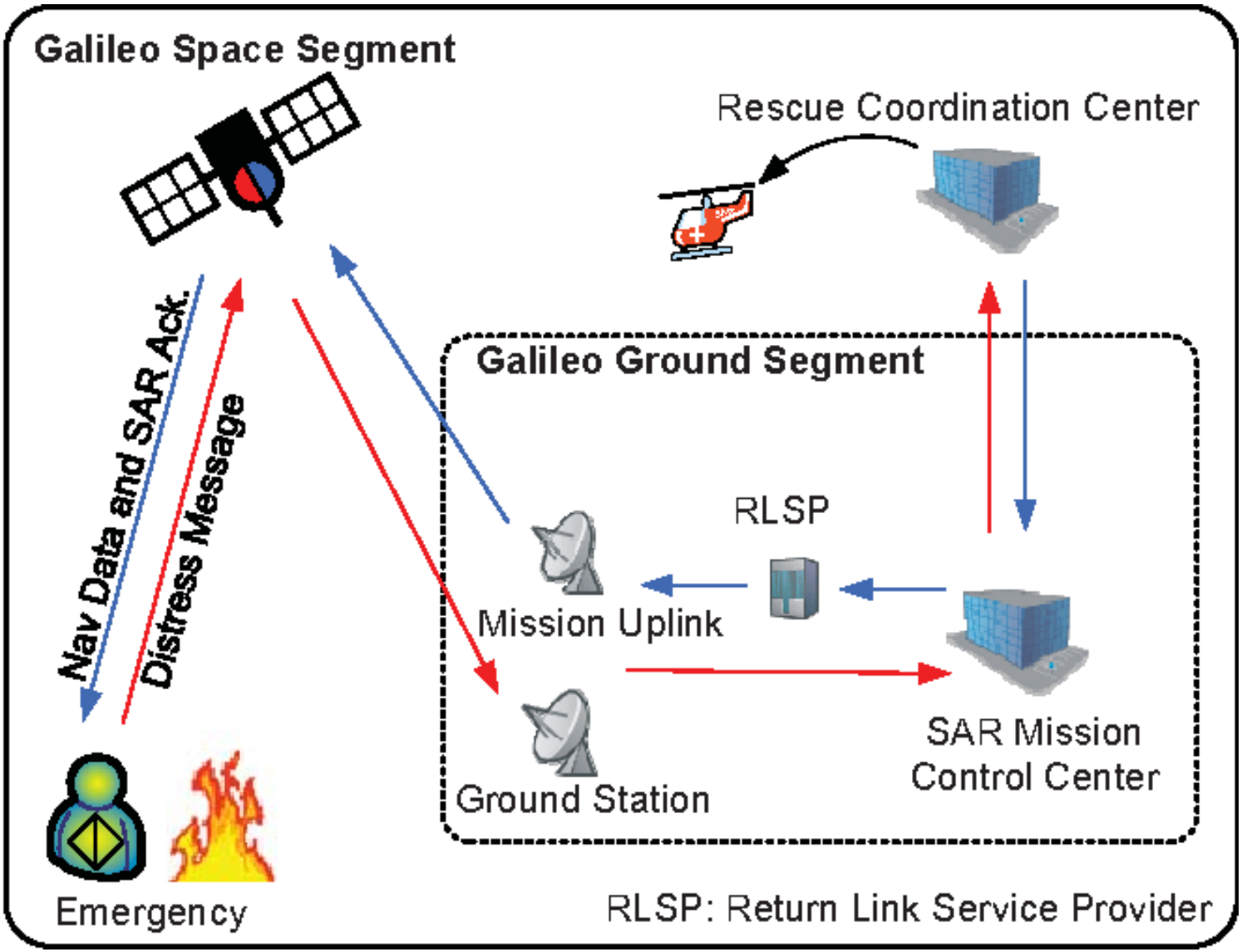
Les services : SAR (Search And Rescue)



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Les services : HAS (High Accuracy Service)

Source Galileo Advanced Services, Commission Européenne, Toulouse Space Show, Juin 2018

	Signal and Data features
Frequency	1278.75 MHz
Signal	E6B
Min. Power	-158 dBW
Modulation	BPSK(5)
Chip Rate	5.115 Mcps
Code Length	1 ms
Symbol Rate	1000 sps
Data Rate	492 bps
HA Data Rate	448 bps
Data Coding	FEC, as per Galileo OS SIS ICD, + interleaving 123 x 8
Spreading Code Encryption	No
Data Format	TBD, but based on an open ICD.
Data (TBC)	Orbit and clock corrections, code and phase biases, SQM, flags, ionospheric information.

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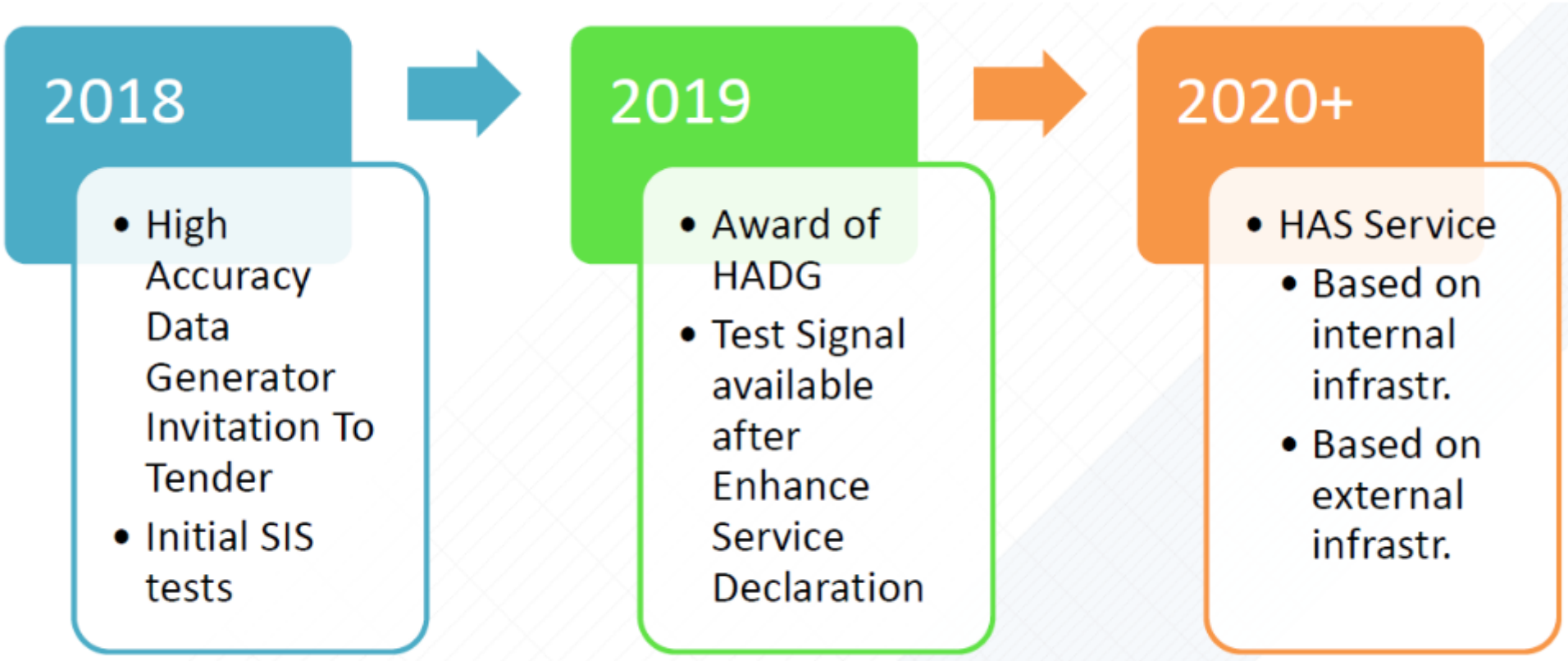
GALILEO

Les services : HAS (High Accuracy Service)



Source Galileo Advanced Services, Commission Européenne, Toulouse Space Show, Juin 2018

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GALILEO

Les services : HAS (High Accuracy Service)

Objectives

The first objective of FIX_8 was to develop a PPP solution with performance comparable to that of the existing commercial high-accuracy differential GNSS services. The prototype is a real-time software implementation of the positioning algorithms which would be applied on a GNSS receiver. The software was designed to be flexible, allowing for modifications to classical PPP algorithms to be explored. FIX_8 has also aimed to demonstrate the accuracy which can be obtained from a stand-alone GNSS receiver using EGNOS-corrected orbit and clock data in place of commercial products. Finally, the prototype can be used to estimate the performance which could be achieved in the future using the Galileo Open Service and also to explore the potential of a high-accuracy Galileo Commercial Service.

horizontal accuracy of 20 cm (95%) following a 30-minute convergence period

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Précision mesurée :

- Les éphémérides radiodiffusées sont précises à 25 cm (95%) en moyenne (110 cm pour GPS)
- PDOP< 6 à 99,6% du temps

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GALILEO

Panne du 11 au 17 Juillet

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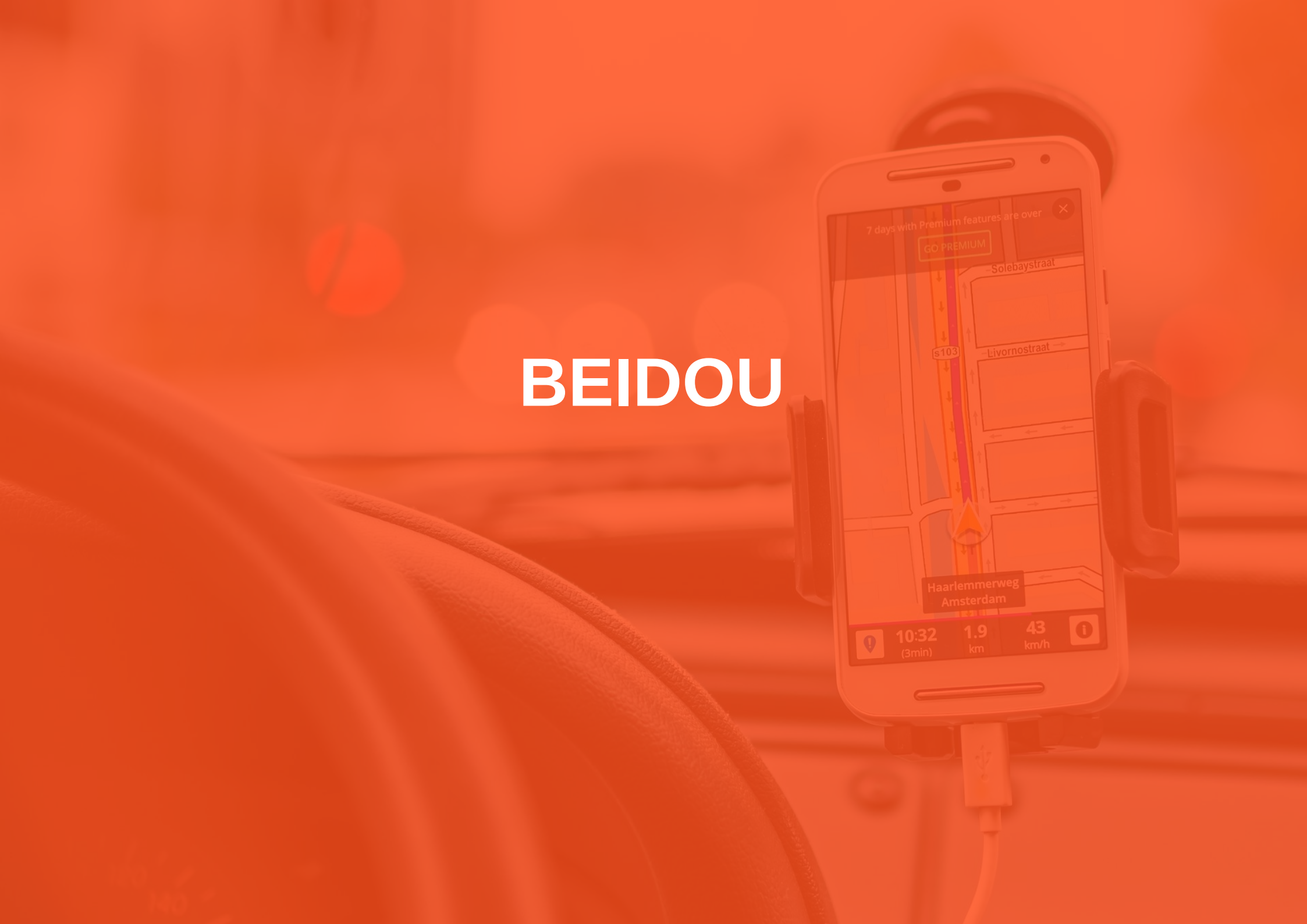
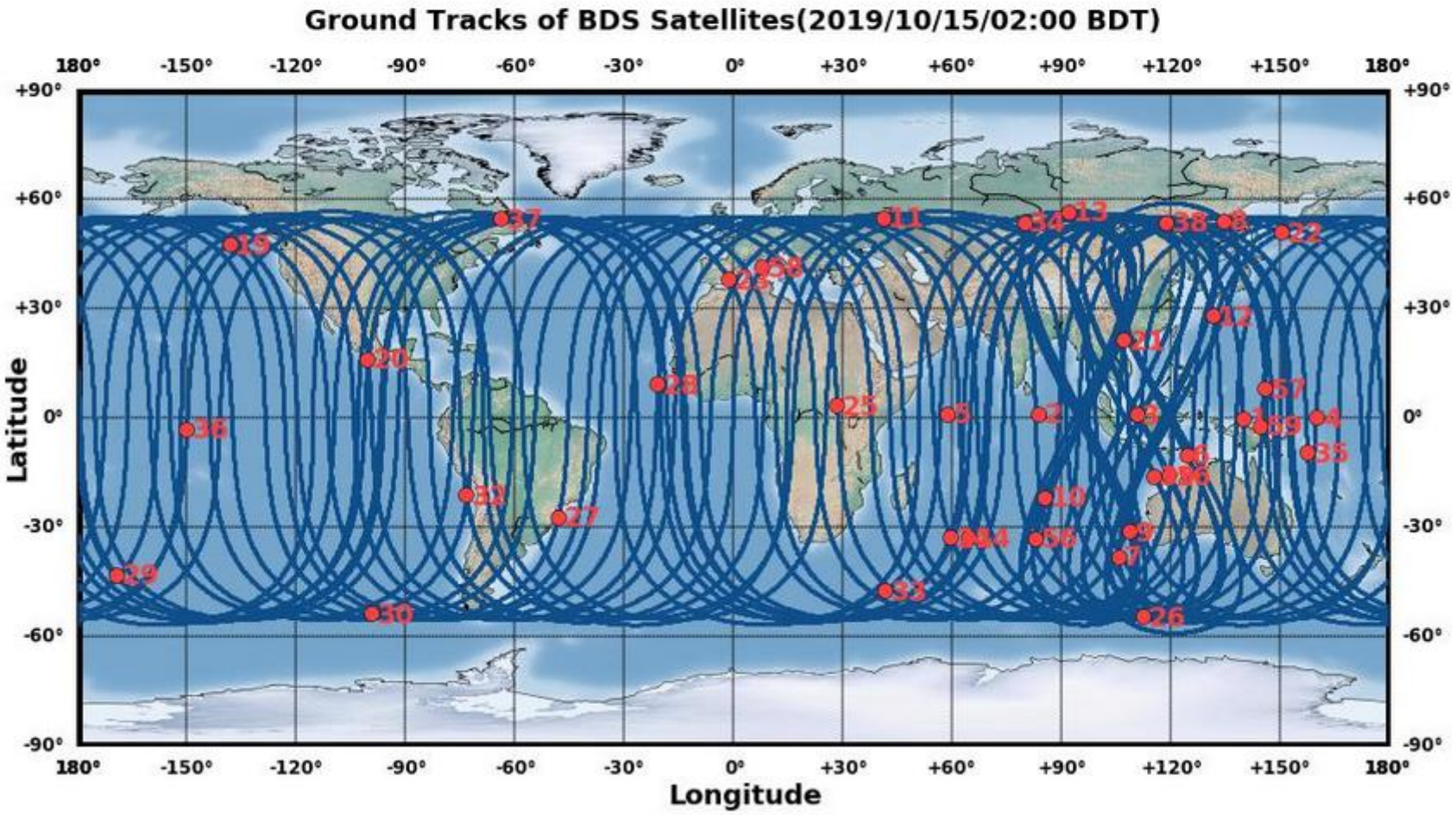
BEIDOU


7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

BEIDOU

2019-288

Source : Writer : Edit : Date : 15/10/2019



Statut

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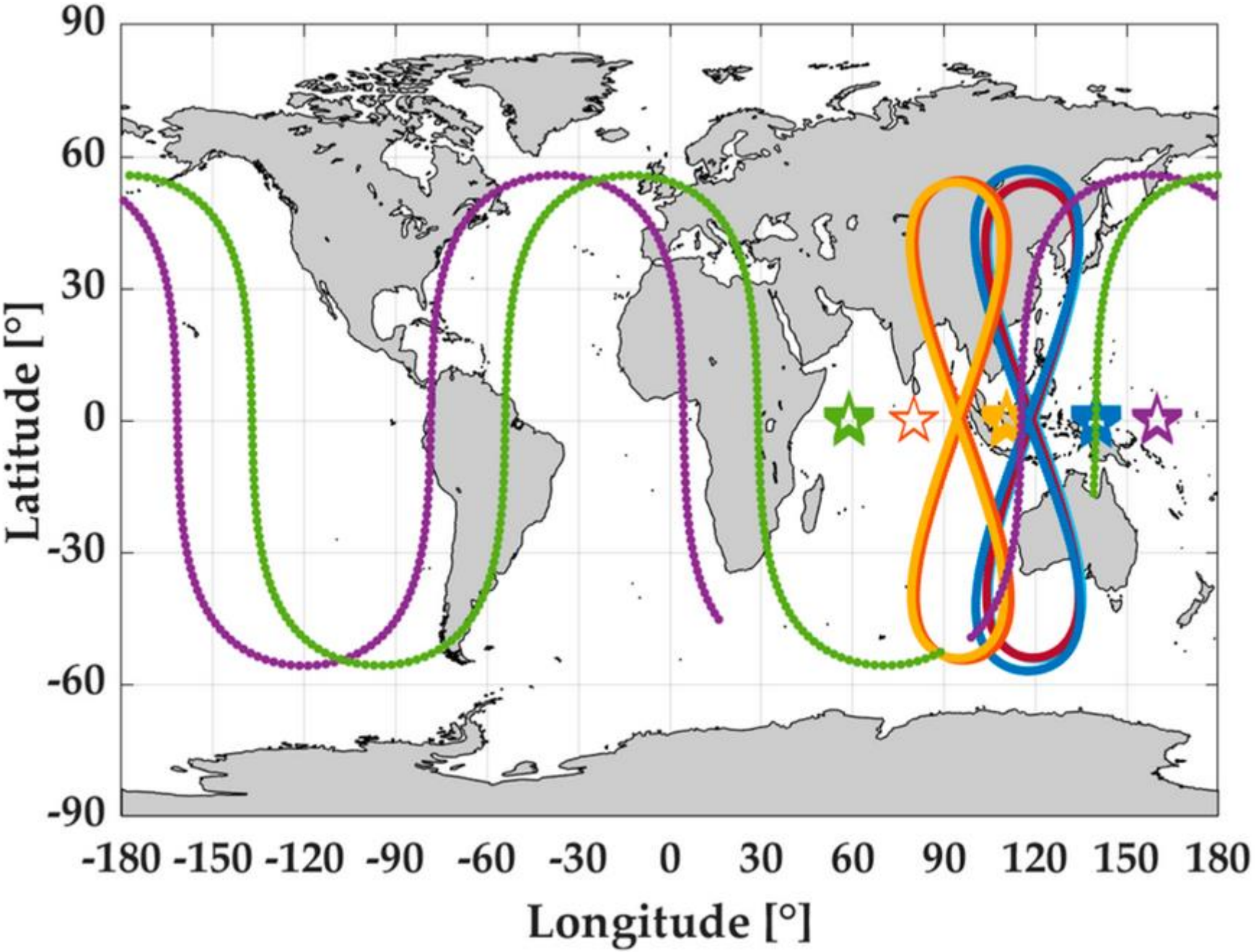
BEIDOU



Statut

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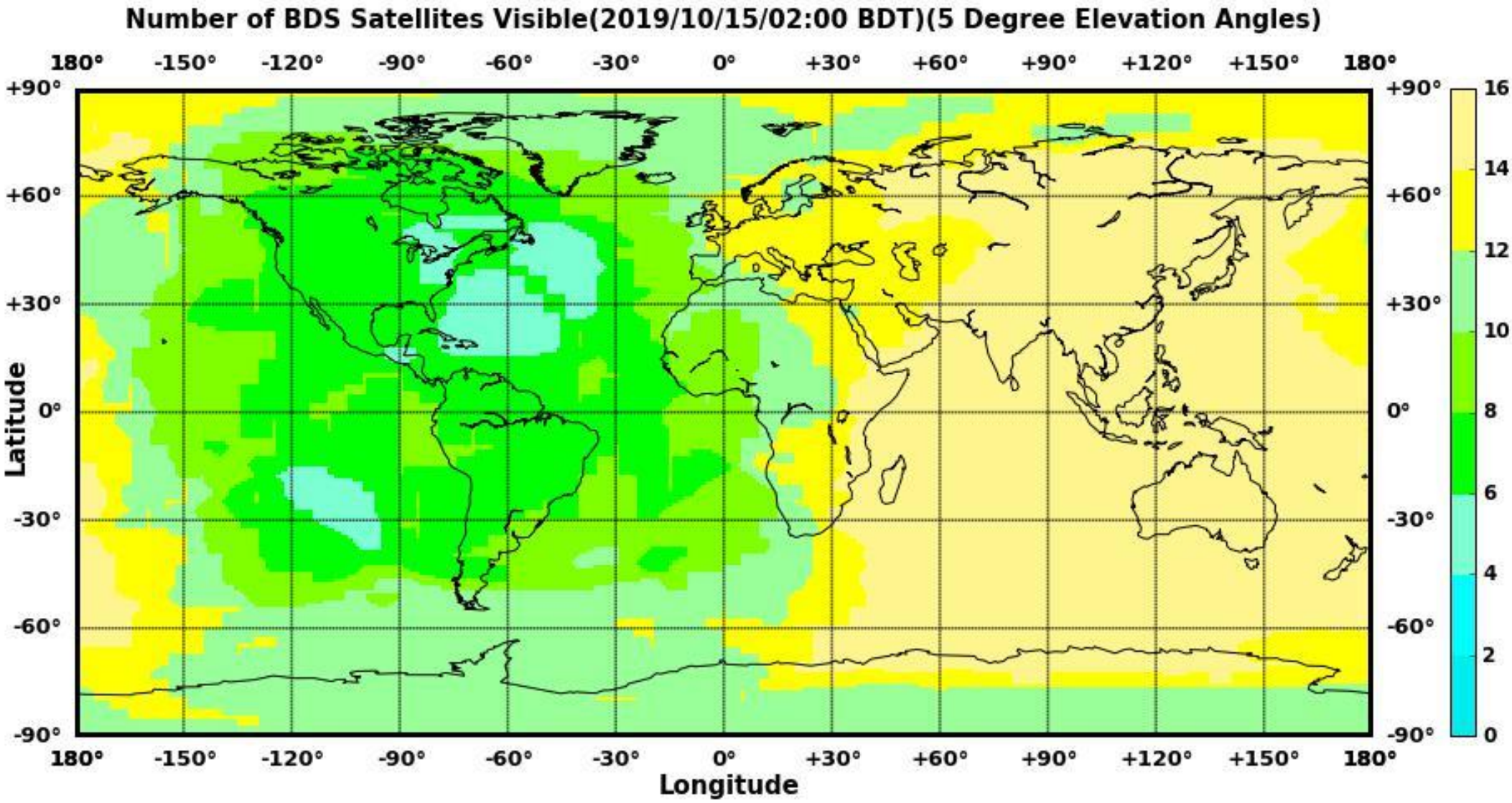
BEIDOU



Statut

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BEIDOU CONSTELLATION STATUS 15.10.19

Total satellites in constellation	42
SV is included in operational orbital constellation	34
SV is not included in operational orbital constellation	8

Statut

Satellite Number	NORAD	Satellite Name	Type of system	Launch date	Life-time (days)	Notes
C01	36287	GE001	BeiDou-2	17.01.10	3558	In operation
C02	38953	GE006	BeiDou-2	25.10.12	2546	In operation
C04	37210	GE004	BeiDou-2	01.11.10	3270	In operation
C05	38091	GE005	BeiDou-2	25.02.12	2789	In operation
C06	36828	IGS001	BeiDou-2	01.08.10	3362	In operation
C07	37256	IGS002	BeiDou-2	18.12.10	3223	In operation
C08	37384	IGS003	BeiDou-2	10.04.11	3110	In operation
C09	37763	IGS004	BeiDou-2	27.07.11	3002	In operation
C10	37948	IGS005	BeiDou-2	02.12.11	2874	In operation
C11	38250	ME003	BeiDou-2	30.04.12	2724	In operation
C12	38251	ME004	BeiDou-2	30.04.12	2724	In operation
C13	38774	IGS006	BeiDou-2	30.03.16	1294	In operation
C14	38775	ME006	BeiDou-2	19.09.12	2582	In operation
C03	41586	GE007	BeiDou-2	12.06.16	1220	In operation
C19	43001	ME001	BeiDou-3	05.11.17	709	In operation
C20	43002	ME002	BeiDou-3	05.11.17	709	In operation
C21	43207	ME003	BeiDou-3	12.02.18	610	In operation
C22	43208	ME004	BeiDou-3	12.02.18	610	In operation
C27	43107	ME007	BeiDou-3	12.01.18	641	In operation
C28	43108	ME008	BeiDou-3	12.01.18	641	In operation
C29	43245	ME009	BeiDou-3	30.03.18	564	In operation
C30	43246	ME010	BeiDou-3	30.03.18	564	In operation
C16	43539	IGS007	BeiDou-2	10.07.18	462	In operation
C23	43581	ME005	BeiDou-3	29.07.18	443	In operation
C24	43582	ME006	BeiDou-3	29.07.18	443	In operation
C25	43602	ME011	BeiDou-3	25.08.18	416	In operation
C26	43603	ME012	BeiDou-3	25.08.18	416	In operation
C32	43622	ME013	BeiDou-3	19.09.18	391	In operation
C33	43623	ME014	BeiDou-3	19.09.18	391	In operation
C34	43647	ME015	BeiDou-3	15.10.18	365	In operation
C35	43648	ME016	BeiDou-3	15.10.18	365	In operation
C36	43706	ME017	BeiDou-3	19.11.18	330	In operation
C37	43707	ME018	BeiDou-3	19.11.18	330	In operation
C38	44204	IGS001	BeiDou-3	20.04.19	178	In operation
C31	40549	IGS001-S	BeiDou-3S	30.03.15	1660	Not in operational orbital constellation
C18	40938	IGS002-S	BeiDou-3S	30.09.15	1476	Not in operational orbital constellation
C57	40748	ME001-S	BeiDou-3S	25.07.15	1543	Not in operational orbital constellation
C58	40749	ME002-S	BeiDou-3S	25.07.15	1543	Not in operational orbital constellation
C59	43683	GE001	BeiDou-3	01.11.18	348	Not in operational orbital constellation
C45	xxxxx	ME023	BeiDou-3	23.09.19	22	Not in operational orbital constellation
C46	xxxxx	ME024	BeiDou-3	23.09.19	22	Not in operational orbital constellation
C39	44337	IGS002	BeiDou-3	24.06.19	113	Not in operational orbital constellation

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GNSS System	Freq. Band / Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
BDS	B1-2 / 1561.098	I	C2I	L2I	D2I	S2I
		Q	C2Q	L2Q	D2Q	S2Q
		I+Q	C2X	L2X	D2X	S2X
	B1 / 1575.42 (BDS-3 Signals)	Data	C1D	L1D	D1D	S1D
		Pilot	C1P	L1P	D1P	S1P
		Data+Pilot	C1X	L1X	D1X	S1X
		B1A	C1A	L1A	D1A	S1A
		Codeless		L1N	D1N	S1N
	B2a / 1176.45 (BDS-3 Signals)	Data	C5D	L5D	D5D	S5D
		Pilot	C5P	L5P	D5P	S5P
		Data+Pilot	C5X	L5X	D5X	S5X
	B2b / 1207.140 (BDS-2 Signals)	I	C7I	L7I	D7I	S7I
		Q	C7Q	L7Q	D7Q	S7Q
		I+Q	C7X	L7X	D7X	S7X
	B2b / 1207.140 (BDS-3 Signals)	Data	C7D	L7D	D7D	S7D
		Pilot	C7P	L7P	D7P	S7P
		Data+Pilot	C7Z	L7Z	D7Z	S7Z
	B2(B2a+B2b)/1191.795 (BDS-3 Signals)	Data	C8D	L8D	D8D	S8D
		Pilot	C8P	L8P	D8P	S8P
		Data+Pilot	C8X	L8X	D8X	S8X
	B3/1268.52	I	C6I	L6I	D6I	S6I
		Q	C6Q	L6Q	D6Q	S6Q
		I+Q	C6X	L6X	D6X	S6X
		B3A	C6A	L6A	D6A	S6A

Rinex 3

BEIDOU

Performances

- Current the basic BDS navigation service performance standards are as follows:

- System service coverage: global;

- Positioning accuracy: 10 meters horizontally, 10 meters vertically (95%);

- Velocity measurement accuracy: 0.2 m/s (95%);

- Timing accuracy: 20 nanoseconds (95%);

- System service availability: better than 95%.

- In the Asia-Pacific region, the positioning accuracies are 5 meters horizontally and 5 meters vertically (95%).

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Plan de développement

To complete the constellation deployment with the launch of 30 satellites by 2020 to provide services to global users. And build a comprehensive space and time system that is more ubiquitous, more integrated and smarter by 2035.

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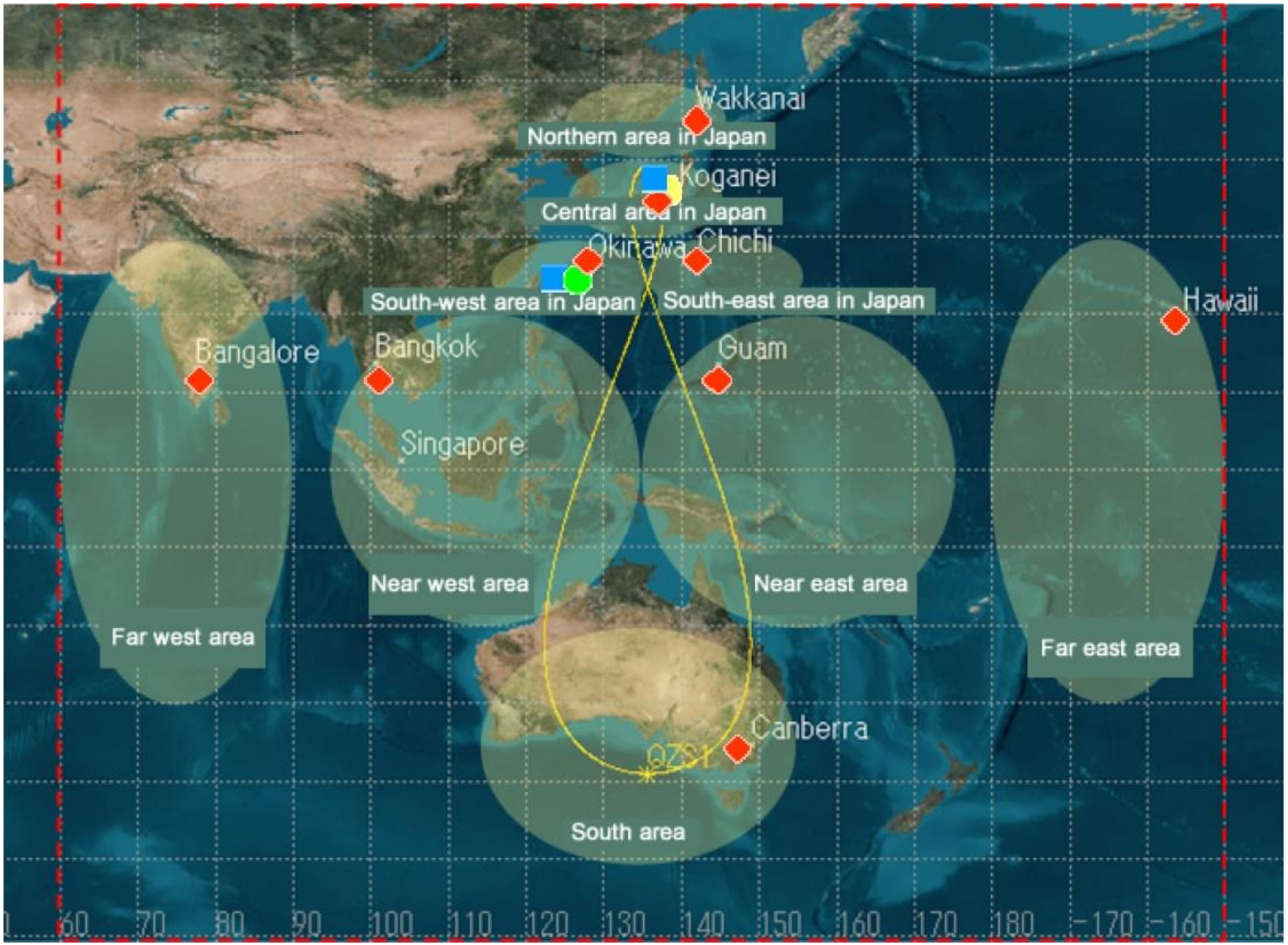
QZSS


7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

QZSS


Wakkanai
Northern area in Japan
Koganei
Central area in Japan
Okinawa
Chichi
South-west area in Japan
South-east area in Japan
Hawaii
Bangalore
Bangkok
Guam
Singapore
Near west area
Near east area
Far west area
Far east area
Canberra
QZS-1
South area
60
70
80
90
100
110
120
130
140
150
160
170
180
-170
-160
-150

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QZSS

Services

	Performance Standard	Interface Specification
Satellite Positioning, Navigation and Timing Service	PS-QZSS-001 (November 5, 2018 / PDF: 1657KB)	IS-QZSS-PNT-003 (November 5, 2018 / PDF: 4393KB)
Sub-meter Level Augmentation Service (SLAS)		IS-QZSS-L1S-003 (November 5, 2018 / PDF: 1332KB)
Centimeter Level Augmentation Service (CLAS)		IS-QZSS-L6-001 (November 5, 2018 / PDF: 1551KB)
Satellite Report for Disaster and Crisis Management (DC Report)		IS-QZSS-DCR-007 (July 12, 2019 / PDF: 4380KB)
Positioning Technology Verification Service		IS-QZSS-TV-002 (December 19, 2018 / PDF: 775KB)

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Services Performances

SIS AccuracySIS-URE ≤ 2.6 m (95%) (Error(RMS) = 1.3 m)

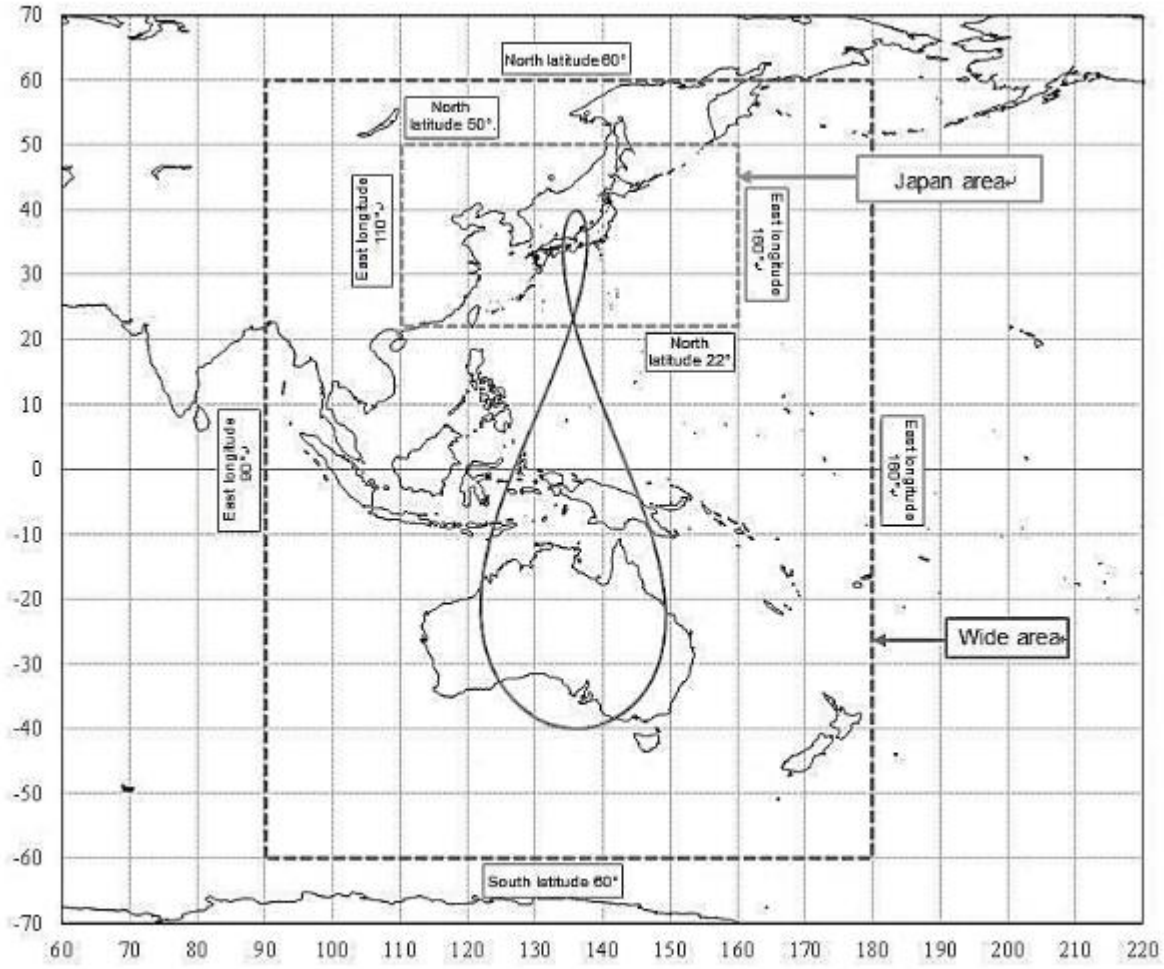

Figure 4.3-1 Target areas of ionosphere parameters

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QZSS

Services Performances

Table 5.3.1-1 Positioning Accuracy

Zone	Positioning Error	
	Horizontal	Vertical
Zone (1)	≤ 1.0m(95%) (0.58m(RMS))	≤ 2.0m(95%) (1.02m(RMS))
Zone (2)	≤ 2.0m(95%) (1.16m(RMS))	≤ 3.0m(95%) (1.53m(RMS))

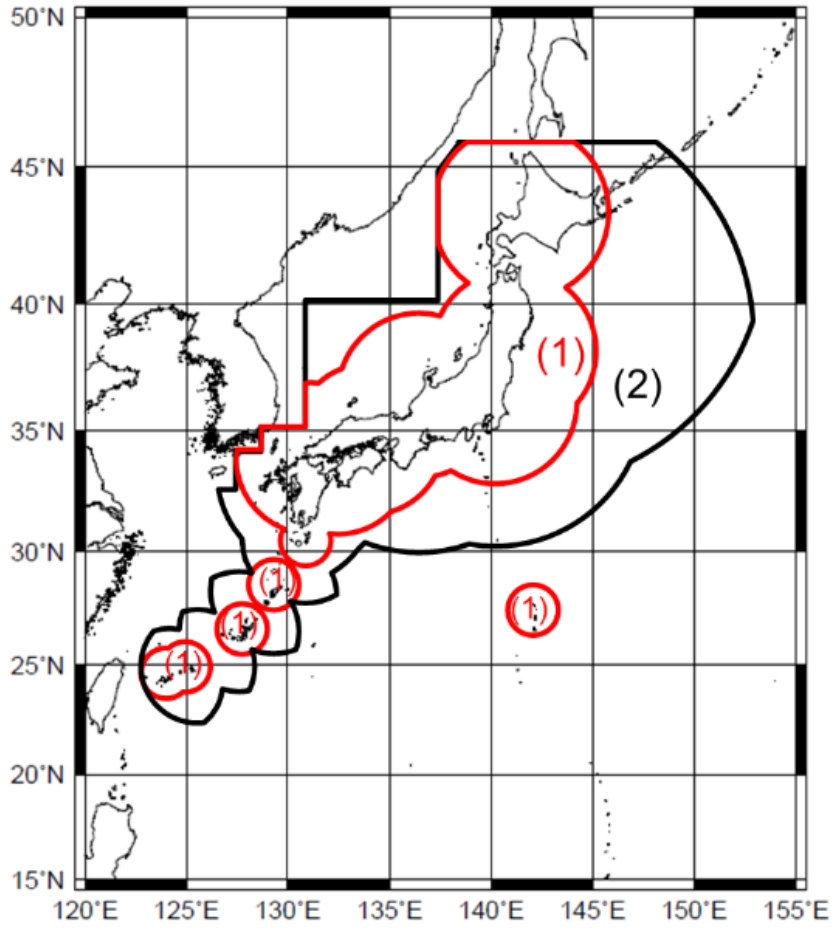

Figure 5.2-1 Service Area of the Sub-meter Level Augmentation Service (SLAS)

TTFF : 30[sec](95%)

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Services Performances

Table. 6.3-1 Positioning Accuracy

Positioning Type	Positioning Error	
	Horizontal	Vertical
Static	≤ 6cm(95%) (3.47cm(RMS))	≤ 12cm(95%) (6.13cm(RMS))
Kinematic	≤ 12cm(95%) (6.94cm(RMS))	≤ 24cm(95%) (12.25cm(RMS)

(*) The augmentation information shall satisfy the following condition.

・SIR-URE ≤ 0.08m (95%)

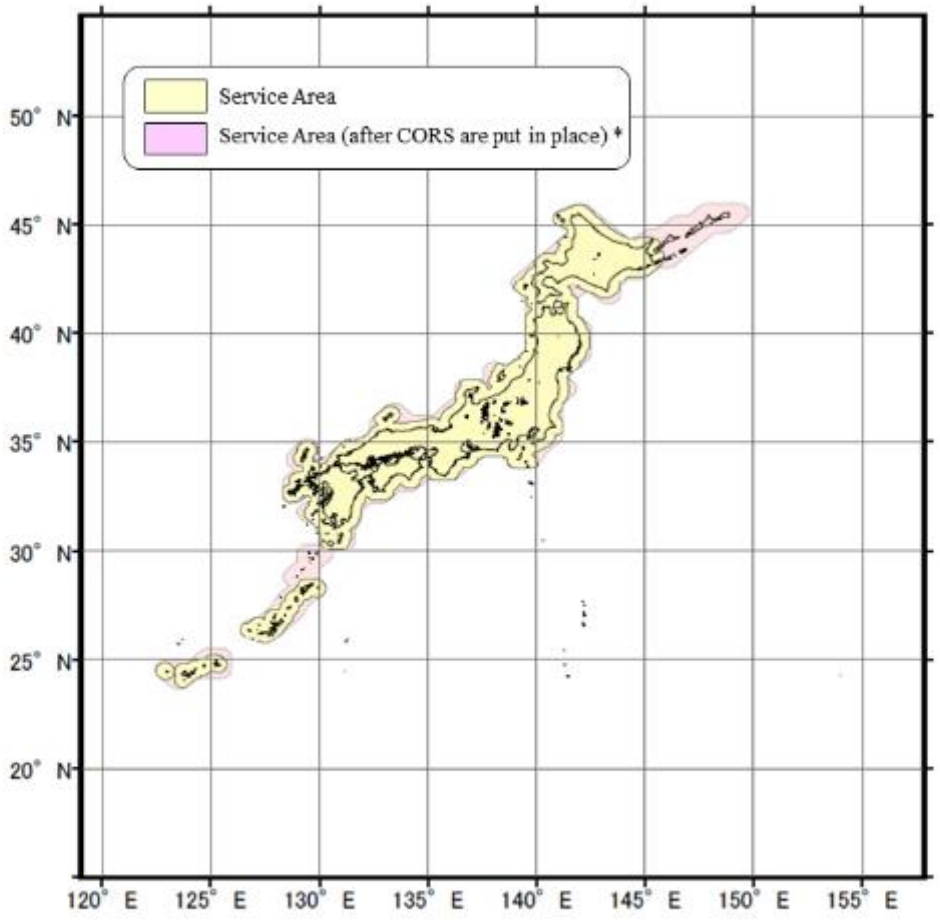

Fig. 6.2-1 Service Area of the Centimeter Level Augmentation Service (CLAS)

TTFF : 60[sec](95%)

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Signaux

Table 3.1-1 List of transmitted signals

Signal name	1st QZS	2nd to 4th QZSs		Delivered services	Center frequency
	Block I-Q	Block II-Q	Block II-G		
	QZO	QZO	GEO		
	1 sat	2 sats	1 sat		
L1C/A	Transmit	Transmit	Transmit	PNT	1575.42 MHz
L1C	Transmit	Transmit	Transmit	PNT	
L1S	Transmit	Transmit	Transmit	SLAS	
				DC Report	
L2C	Transmit	Transmit	Transmit	PNT	1227.60 MHz
L5	Transmit	Transmit	Transmit	PNT	1176.45 MHz
L5S	-	Transmit	Transmit	PTV	
L6	Transmit	Transmit	Transmit	CLAS	1278.75 MHz
S band	-	-	Transmit	Q-ANPI	2 GHz band

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QZSS

GNSS System	Freq. Band / Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
QZSS	L1 / 1575.42	C/A	C1C	L1C	D1C	S1C
		L1C (D)	C1S	L1S	D1S	S1S
		L1C (P)	C1L	L1L	D1L	S1L
		L1C (D+P)	C1X	L1X	D1X	S1X
		L1S/L1-SAIF	C1Z	L1Z	D1Z	S1Z
	L2 / 1227.60	L2C (M)	C2S	L2S	D2S	S2S
		L2C (L)	C2L	L2L	D2L	S2L
		L2C (M+L)	C2X	L2X	D2X	S2X
	L5 / 1176.45 *(Block I Signals) **(Block II L5S Signals)	I *	C5I	L5I	D5I	S5I
		Q *	C5Q	L5Q	D5Q	S5Q
		I+Q *	C5X	L5X	D5X	S5X
		L5D **	C5D	L5D	D5D	S5D
		L5P **	C5P	L5P	D5P	S5P
		L5(D+P) **	C5Z	L5Z	D5Z	S5Z
	L6 / 1278.75 *(Block I LEX Signals) **(Block II Signals)	L6D *,**	C6S	L6S	D6S	S6S
		L6P *	C6L	L6L	D6L	S6L
		L6(D+P) *	C6X	L6X	D6X	S6X
		L6E **	C6E	L6E	D6E	S6E
		L6(D+E) **	C6Z	L6Z	D6Z	S6Z

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SBAS


7 days with Premium features are over
GO PREMIUM
Solebaystraat
s103
Livornostraat
Haarlemmerweg
Amsterdam
10:32
(3min)
1.9
km
43
km/h

SBAS

Rinex

GNSS System	Freq. Band/ Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
SBAS	L1 / 1575.42	C/A	C1C	L1C	D1C	S1C
	L5 / 1176.45	I	C5I	L5I	D5I	S5I
		Q	C5Q	L5Q	D5Q	S5Q
		I+Q	C5X	L5X	D5X	S5X

SBAS - IRNSS

Rinex

GNSS System	Freq. Band / Frequency	Channel or Code	Observation Codes			
			Pseudo Range	Carrier Phase	Doppler	Signal Strength
IRNSS	L5 / 1176.45	A SPS	C5A	L5A	D5A	S5A
		B RS (D)	C5B	L5B	D5B	S5B
		C RS (P)	C5C	L5C	D5C	S5C
		B+C	C5X	L5X	D5X	S5X
	S / 2492.028	A SPS	C9A	L9A	D9A	S9A
		B RS (D)	C9B	L9B	D9B	S9B
		C RS (P)	C9C	L9C	D9C	S9C
		B+C	C9X	L9X	D9X	S9X

SBAS - IRNSS

Statut

List of Navigation Satellites

	Launch Date	Launch Mass	Launch Vehicle	Orbit Type	Application	Remarks
IRNSS-1I	Apr 12, 2018	1425 kg	PSLV-C41/IRNSS-1I	GSO	Navigation	
IRNSS-1H	Aug 31, 2017		PSLV-C39/IRNSS-1H Mission		Navigation	Launch Unsuccessful
IRNSS-1G	Apr 28, 2016	1425 kg	PSLV-C33/IRNSS-1G	GEO	Navigation	
IRNSS-1F	Mar 10, 2016	1425 kg	PSLV-C32/IRNSS-1F	GEO	Navigation	
IRNSS-1E	Jan 20, 2016	1425 kg	PSLV-C31/IRNSS-1E	GSO	Navigation	
IRNSS-1D	Mar 28, 2015	1425 kg	PSLV-C27/IRNSS-1D	GSO	Navigation	
IRNSS-1C	Oct 16, 2014	1425 kg	PSLV-C26/IRNSS-1C	GEO	Navigation	
IRNSS-1B	Apr 04, 2014	1432 kg	PSLV-C24/IRNSS-1B	GSO	Navigation	
IRNSS-1A	Jul 01, 2013	1425 kg	PSLV-C22/IRNSS-1A	GSO	Navigation	

*Geo stationary Orbit (GEO)
Geo Synchronous Orbit (GSO)

SBAS - IRNSS

Statut

The space segment consists of the IRNSS constellation of eight satellites, NavIC. Three satellites are located in suitable orbital slots in the geostationary orbit and the remaining four are located in geosynchronous orbits with the required inclination and equatorial crossings in two different planes. All the satellites of the constellation are configured identically. The satellites are configured with I-1K Bus to be compatible for launch on-board PSLV.

IRNSS-1A | IRNSS-1B | IRNSS-1C | IRNSS-1D | IRNSS-1E | IRNSS-1F | IRNSS-1G | IRNSS-1H | IRNSS-1I

SBAS - EGNOS

Statut

PRN 123	PRN 136	PRN 126
Operational Mode MT 2 Status: Active	Operational Mode MT 2 Status: Active	Test Mode MT 0/0 Status: Active

SBAS - EGNOS

Future :

Under the contract, which was signed on January 26 2018, the ESA and Airbus will provide the GSA with two EGNOS upgrade versions. EGNOS V3.1 will ensure continuity of EGNOS augmentation of GPS L1, but with a more resilient performance, while EGNOS V3.2 will support a new SBAS service, transmitting on the L5 frequency, which will augment Galileo L1/E1 – L5/E5 along with GPS.

SBAS – Australie

Statut : en développement

Description

As part of the Australian Government's National Positioning Infrastructure (NPI) Capability, Geoscience Australia is leading a nation-wide test project of a Satellite-Based Augmentation System (SBAS).

An SBAS will overcome the current gaps in our mobile and radio communications and, when combined with on-ground operational infrastructure and services, will ensure that accurate positioning information can be received anytime and anywhere within Australia.

The two-year project will test two new satellite positioning technologies including next generation SBAS and Precise Point Positioning, which will provide positioning accuracies of several decimetres and five centimetres respectively.

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SBAS – Australie

Statut : en développement

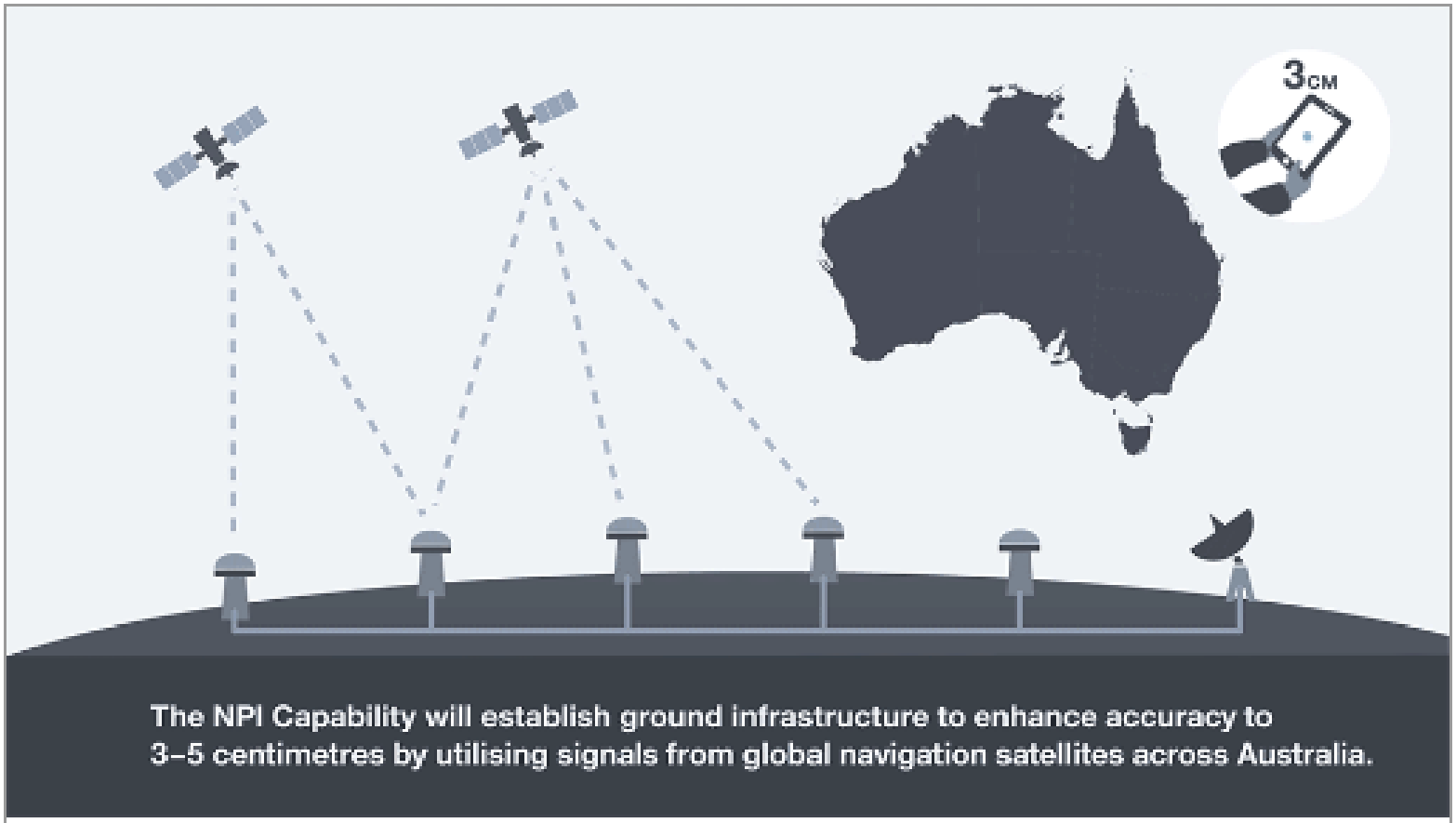
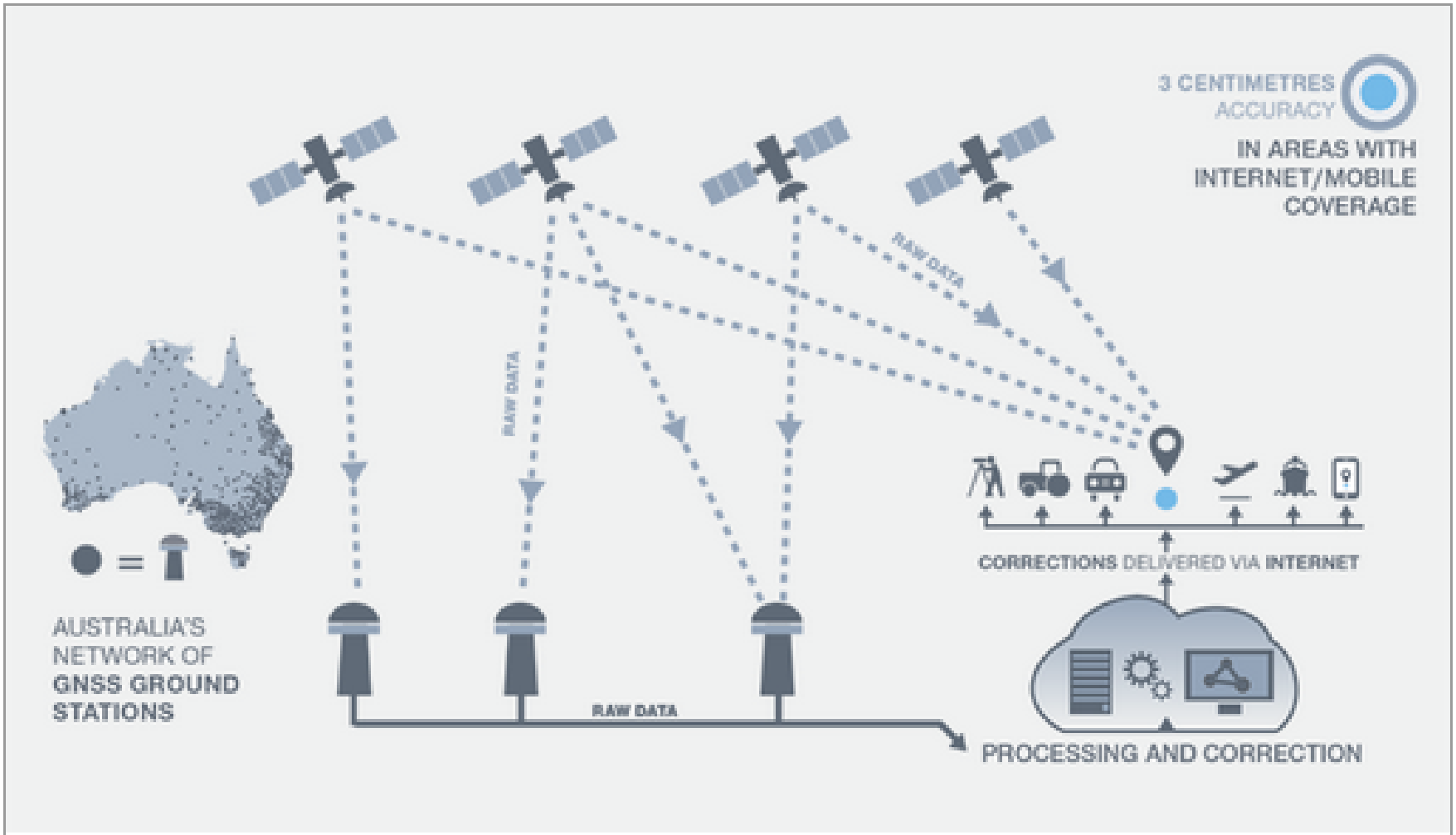


Image: Geoscience Australia

SBAS - Australie



The NPI consists of the ground infrastructure to enhance accuracy to 3 centimetres by utilising signals from global navigation satellites and the mobile phone network across Australia. (Image: Geoscience Australia)

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SBAS – Australie

Quelques informations :

The infrastructure management is being led by Geoscience Australia in partnership with Land Information New Zealand and the global technology companies GMV, Inmarsat and Lockheed Martin.

The positioning signals for evaluation are:

- The current L1 Legacy service similar to that available in the United States (WAAS), Europe (EGNOS), Japan (MSAS), India (GAGAN) and Russia (SDCM).
- A second-generation Dual Frequency Multi Constellation (DFMC) signal which will provide an improvement over the legacy signal in a number of areas. This signal has not been tested anywhere in the world until now.
- High-precision Precise Point Positioning (PPP) corrections with expected decimeter accuracies at user level.


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