

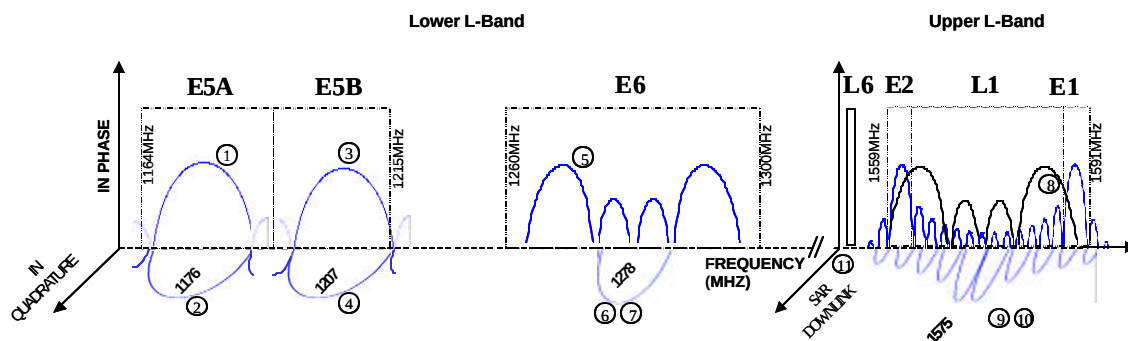
APPENDIX

OVERVIEW OF GALILEO SIGNAL STRUCTURE

Ten navigation signals and one Search And Rescue (SAR) signal are provided by the satellite constellation. In accordance with ITU (International Telecommunication Union) regulations, Galileo navigation signals will be emitted in the RNSS allocated bands, and the SAR signal will be broadcast in one of the frequency bands reserved for the emergency services (1 544 - 1 545 MHz).

The following chart describes the Galileo navigation signals emission:

- a) 4 signals are transmitted in the frequency range 1 164 - 1 215 MHz (E5a-E5b);
- b) 3 signals are transmitted in the frequency range 1 260 - 1 300 MHz (E6); and
- c) 3 signals are transmitted in the frequency range 1 559 - 1 591 MHz (L1).



Galileo signal in space description

Table 1. Galileo signal characteristics

Signals id.	Signals	central frequency	modulation	chip rate	code encryption	data rate ⁶	data encryption
1	data signal in E5A	1 176 MHz	BPSK(10)	10 Mcps	no	50 sps/25 bps	no
2	pilot signal in E5A	1 176 MHz	BPSK(10)	10 Mcps	no	no data	no data
3	data signal in E5B	1 207 MHz	BPSK(10)	10 Mcps	no	250 sps/125 bps ^{no}	no ⁷
4	pilot signal in E5B	1 207 MHz	BPSK(10)	10 Mcps	no	no data	no data
5	spilt-spectrum signal in E6	1 278 MHz	BOC(10,5)	5 Mcps	Yes – governmental approved	250 sps/125 bps	yes
6	commercial data signal in E6	1 278 MHz	BPSK(5)	5 Mcps	Yes - commercial ⁸	1000 sps/500 bps	yes
7	commercial pilot signal in E6	1 278 MHz	BPSK(5)	5 Mcps	Yes – commercial ⁹	no data	no data
8	spilt-spectrum signal in L1	1 575 MHz	BOC (n, m) ¹⁰	m Mcps	Yes – governmental approved	250 sps/125 bps	yes
9	data signal in L1	1 575 MHz	BOC (2,2)	2 Mcps	no	250 sps/125 bps	no
10	pilot signal in L1	1 575 MHz	BOC(2,2)	2 Mcps	no	no data	no data

Services allocation within Galileo signals

Both the ranging code and data carry the specific information needed for a specific service. Among the 10 navigation signals:

- a) 6 are designed for OS and SoL (signals 1,2,3,4,9,10);
- b) 2 are designed specifically for CS (signals 6,7); and
- c) 2 are designed specifically for PRS (signals 5,8).

⁶ using a 1/2 rate Viterbi convolutional coding scheme

⁷ A capability of encryption for integrity is envisaged and may be activated pending results on potential market interest for integrity

⁸ This encryption may be maintained or removed pending on market analysis results

⁹ This encryption may be maintained or removed pending on market analysis results

¹⁰ n and m operational values are the subject of on-going technical trade-o

¹¹ A capability of encryption for integrity is envisaged and may be activated pending results on potential market interest for integrity

Table 2 summarises the navigation signals characteristics and their service allocation:

Table 2. Navigation signals characteristics and their service allocation

Signals id.	Frequencies	Navigation Services				Signals characteristics	
		OS	CS	SoL	PRS	Ranging Code Type	Data Type ¹²
1,2,3,4, 9 and 10	E5a E5b L1	X	X	X		Open Access	Navigation data Integrity data SAR data ¹³ , Commercial data ¹⁴
6, 7	E6		X			Commercial encryption	Commercial data
5,8	E6 L1				X	Governmental encryption	PRS data

Note.— The SAR distress messages (from distress emitting beacons to SAR operators), will be detected by the Galileo satellites in the 406-406.1 MHz band, and then broadcast to the dedicated receiving ground stations in the 1 544 - 1 545 MHz band, called L6 (below the E2 navigation band). The SAR data, from SAR operators to distress emitting beacons, will be used for alert acknowledgement and coordination of rescue teams, and will be embedded in the navigation data of the Open Service Signal emitted in the L1 band.

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¹² Pending final service data allocation

¹³ This SAR data correspond to the information sent from SAR operators to the distress emitting beacons: alert acknowledgement, coordination of rescue teams.

¹⁴ Possibility to include commercial data is under assessment