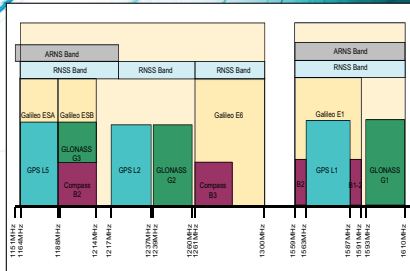
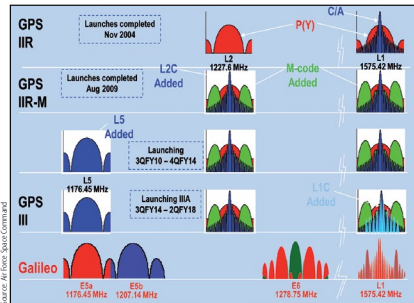


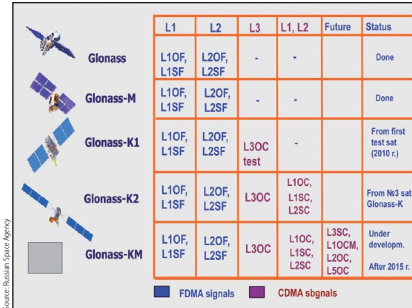
GNSS Frequency Plan



GPS Modernization



GLONASS Modernization



Source: Russian Space Agency
Signals transmitted by the different generations of GLONASS satellites. OF = open-access FDMA; SF = restricted (military) FDMA; OC = open-access CDMA; SF = restricted CDMA; OCM = open-access CDMA modernized

SIGNAL	CARRIER FREQUENCY (MHz)	CODE CHIP RATE	BANDWIDTH (MHz)	MODULATION TYPE	SERVICE TYPE	MISCELLANEOUS NOTES
L1 C/A	1575.42	1.023 Mbps	20.46	BPSK	SPS (open)	(2.046 MHz null-to-null)
L1 P(Y)	1575.42	10.23 Mbps	20.46	BPSK	PPS (restricted)	In quadrature with C/A signal
L1 M-code	1575.42	5.115 Mbps	24	BOC(10,5)	Restricted	
L1C	1575.42	1.023 Mbps	30.69	BOC(1,1)/TMBOC	Open	Interoperable with Galileo E1-civil
L2C	1227.6	1.023 Mbps	20.46	BPSK & TM	Open	Two time-multiplexed ranging codes (each at 0.5115 Mbps): CM, moderate, and CL, long
L2 P(Y)	1227.6	10.23 Mbps	20.46	BPSK	PPS (restricted)	
L2 M-code	1227.6	5.115 Mbps	24	BOC(10,5)	Restricted	
L5	1176.45	10.23 Mbps	20.46	QPSK	Open	(20.46 MHz null-to-null)
L2 M-code	1575.42	5.115 Mbps	24	BOC(10,5)	Restricted	

SIGNAL	CARRIER FREQUENCY (MHz)	CODE CHIP RATE	BANDWIDTH (MHz)	MODULATION TYPE	SERVICE TYPE	Miscellaneous Notes
L1 (legacy FDMA)	1598-1606	0.511 Mcps	0.5625	BPSK	Open	FDMA
L1 (legacy FDMA)	1593-1610	5.11 Mcps	10.22	BPSK	Restricted	FDMA, in quadrature from open signal
L2 (legacy FDMA)	1242-1249	0.511 Mcps	0.4375	BPSK	Open	FDMA
L2 (legacy FDMA)	1237-1254	5.11 Mcps		BPSK	Restricted	FDMA, in quadrature from open signal
L3 (K1)	1202.025	10.23 Mcps	20.46	QPSK(10)	Open	CDMA, test signal
L3 (K2)	1207.14	10.23 Mcps	20.46	QPSK(10)	Restricted	CDMA, launches, post-2013

PHASE II

SIGNAL	CARRIER FREQUENCY (MHz)	CODE CHIP RATE (cps)	BANDWIDTH (MHz)	MODULATION TYPE	SERVICE TYPE	Miscellaneous Notes
B1 (I)	1561.098	2.046	4.092	QPSK	Open	
B1 (Q)	1561.098	2.046	4.092	QPSK	Restricted	
B2 (I)	1207.14	2.046	24	QPSK	Open	
B2 (Q)	1207.14	10.23	24	QPSK	Restricted	
B3	1268.52	10.23	24	QPSK	Restricted	

PHASE III

SIGNAL	CARRIER FREQUENCY (MHz)	CODE CHIP RATE (cps)	BANDWIDTH (MHz)	MODULATION TYPE	SERVICE TYPE	Miscellaneous Notes
PHASE III (completion ~2020) DATA/SYMBOL RATE (bps/sps)						
B1-CD	1575.42	1.023	50/100	MBOC(6,1,1/11)	Open	
B1-CP	1575.42	1.023	none	MBOC(6,1,1/11)	Open	
B1-A (data)	1575.42	2.046	50/100	BOC(14,2)	Restricted	
B1-A (pilot)	1575.42	2.046	none	BOC(14,2)	Restricted	
B2aD	1191.795	10.23	25/50	AltBOC(15,10)	Open	
B2aP	1191.795	10.23	None	AltBOC(15,10)	Open	
B2bD	1191.795	10.23	50/100	AltBOC(15,10)	Open	
B2bP	1191.795	10.23	none	AltBOC(15,10)	Open	
B3	1268.52	10.23	500 bps	QPSK(10)	Restricted	
B3-AD	1268.52	2.5575	50/100	BOC(15,2,5)	Restricted	
B3-AP	1268.52	2.5575	None	BOC(15,2,5)	Restricted	

SIGNAL	CARRIER FREQUENCY (MHz)	CODE CHIP RATE	BANDWIDTH (MHz)	MODULATION TYPE	SERVICE TYPE	Miscellaneous Notes
E1-A (PRS)	1575.420	2.5575 Mcps	24.552	BOCcos(15,2,5)	Restricted	
E1-B (E1/L1, data)	1575.420	1.023 Mcps	24.552	CBOC(6,1,1/11)	OS, SoL, CS	Interoperable with GPS L1C
E1-C (E1/L1, pilot)	1575.420	1.023 Mcps	24.552	CBOC(6,1,1/11)	OS, SoL, CS	Interoperable with GPS L1C
E6	1278.750	5.115 Mcps	40.920	BPSK(5)	CS	B channel, data; C channel, pilot
E6 (PRS)	1278.750	5.115 Mcps	40.920	BOCcos(10,5)	Restricted	
L6	1544.0-1544.2				Open (SAR)	Search & Rescue downlink
E5	1191.795	10.23 Mcps	51.150	AltBOC(15,10)	Open	
E5a	1176.450	10.23 Mcps	27.795	AltBOC(15,10)	OS, CS	Can be processed as QPSK signals
E5b	1207.140	10.23 Mcps	23.205	AltBOC(15,10)	OS, CS, SoL	Can be processed as QPSK signals